

DELTA PLAN CERTIFICATION OF CONSISTENCY

**Detailed Findings - Mitigation Measures, Best
Available Science, and Adaptive Management**

TULE RED TIDAL RESTORATION

Grizzly Bay, Solano County, California



April 29, 2016

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I. INTRODUCTION

A. PURPOSE OF PROJECT

The Tule Red Tidal Restoration Project (Project) is a collaboration of the State and Federal Contractors Water Agency (SFCWA), California Department of Fish and Wildlife (CDFW), and Westervelt Ecological Services (WES) to restore and enhance approximately 420 acres of tidal wetlands to benefit listed fishes (delta smelt, longfin smelt, and salmonids). The goal of the Project is to partially fulfill the 8,000-acre tidal restoration obligations of the Fish Restoration Program Agreement (FRPA) in satisfaction of the requirements in the 2008 U.S. Fish and Wildlife Service (USFWS) Biological Opinion (BiOp) for delta smelt and the 2009 National Marine Fisheries Service (NMFS) BiOp for listed salmonids and green sturgeon (*Acipenser medirostris*) potentially affected by the Coordinated Operations of the Central Valley Project (CVP) and State Water Project (SWP). The Project also partially fulfills requirements of the Incidental Take Permit (ITP) for longfin smelt (*Spirinchus thaleichthys*) potentially affected by the SWP. The Fishery Agency Strategy Team (FAST) approving the Project consists of representatives from the USFWS, NMFS, CDFW, and the U.S. Bureau of Reclamation (Reclamation). A secondary purpose is to create transitional and refugia habitat for the salt marsh harvest mouse (SMHM; *Reithrodontomys raviventris*) consistent with the requirements in the Suisun Marsh Habitat Management, Preservation, and Restoration Plan (Suisun Marsh Plan, or SMP) (Reclamation et al., 2013). The Project is identified as a Priority Restoration Project under the California EcoRestore Program.

B. PROJECT GOALS AND OBJECTIVES

The restoration goal of the Project is to benefit native fish species by establishing tidal connectivity to the Project site as described below. The restoration objectives to achieve this goal include:

1. Enhance regional food web productivity and export to Grizzly Bay in support of delta smelt and longfin smelt recovery.
2. Provide rearing habitats for out-migrating juvenile salmonids.
3. Provide rearing, breeding, and refugia habitats for a broad range of other aquatic and wetland-dependent species that utilize or depend upon the combination of brackish aquatic-tidal marsh habitat, including Sacramento splittail.
4. Provide ecosystem functions associated with the combination of Delta brackish water aquatic, tidal marsh, and upland interfaces that these species require.
5. Provide topographic variability to allow for habitat succession and resilience against future climate change and sea level rise.

C. PURPOSE OF DOCUMENT

The Project is considered a covered action under the Delta Plan. A state or local agency that proposes to undertake a covered action must submit a Certification of Consistency with the Delta Plan to the Delta Stewardship Council, with detailed findings demonstrating that the covered action is consistent with the Delta Plan (Water Code Section 85225).

A Certification of Consistency has been submitted electronically for this Project, via the Delta Stewardship Council's website on-line form. The purpose of this document (Detailed Findings – Mitigation Measures, Best Available Science, and Adaptive Management) is to provide detailed findings in support of this Certification of Consistency, specifically consistency with regulatory policy GP 1 / 23 CCR Section 5002:

(b)(2) Mitigation Measures

(b)(3) Best Available Science

(b)(4) Adaptive Management

II. COVERED ACTION SUMMARY

A. SETTING

A full description of the Regional and Site Setting is provided in the AMMP (pp. 6-13).

The Project is located on Grizzly Island in the Suisun Marsh (Solano County, California). Historically, the Suisun Marsh was a tidal marsh system. In the late 1800s, the Marsh was diked for water management to support agriculture and duck hunting club activities. Grizzly Island is currently comprised primarily of duck clubs and the Grizzly Island Unit of the CDFW Grizzly Island Wildlife Area (Refuge). The Project is located on the eastern shoreline of Grizzly Bay, immediately adjacent to the Refuge, and lies within Region 4 as demarcated in the SMP (**Figure 1**).

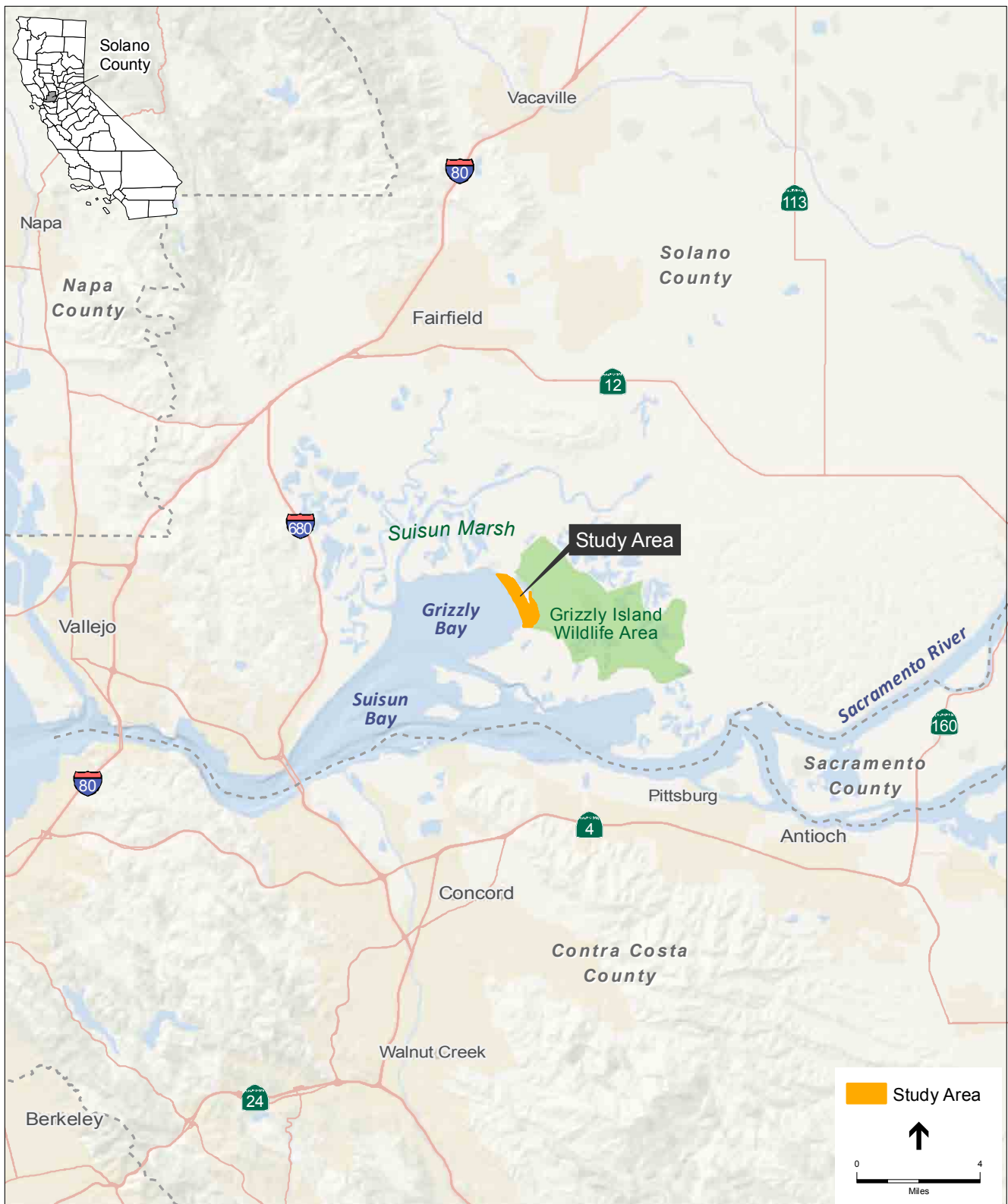
The Project site consists of approximately 2,000 acres owned by Westervelt Ecological Services (WES), and approximately 70 acres owned by CDFW. Within the WES property boundary, approximately 1,600 acres lie within the intertidal and sub-tidal zone of Grizzly Bay. The area proposed to be restored to tidal influence is comprised of a crescent of land adjacent to Grizzly Bay, roughly 1,500 feet wide and 10,000 feet long, totaling approximately 420 acres currently managed as a duck club. The vast majority of the site is managed marsh, with a small area of tidal marsh at the northern end of the site and along the bayside margin of the natural berm. Upland habitat is located along the uppermost crowns of the adjacent levees.

B. PROJECT DESCRIPTION

The full project description is available in the CEQA Addendum (Section 2 - Project Description). Summary excerpt below:

The Project would restore approximately 420 acres of existing managed brackish wetlands to tidal habitat to benefit delta smelt, longfin smelt, and salmonids. The project would provide four primary habitat features:

1. a permanent breach of the natural berm to allow for full daily tidal exchange through the interior of the Project site;
2. a network of tidal channels that supports a full tidal exchange (i.e., tidal prism) on the Project site;
3. a series of tidal pannes and basins intended to retain water for periods up to 2 weeks to maximize aquatic food production and export; and
4. a continuous habitat berm along the eastern perimeter of the property to provide a more gradual transition from marsh to upland habitat and maintain the existing levels of flood protection for adjacent properties.



SOURCE: ESRI, 2012; ESA, 2015

Tule Red Restoration Project . 150158

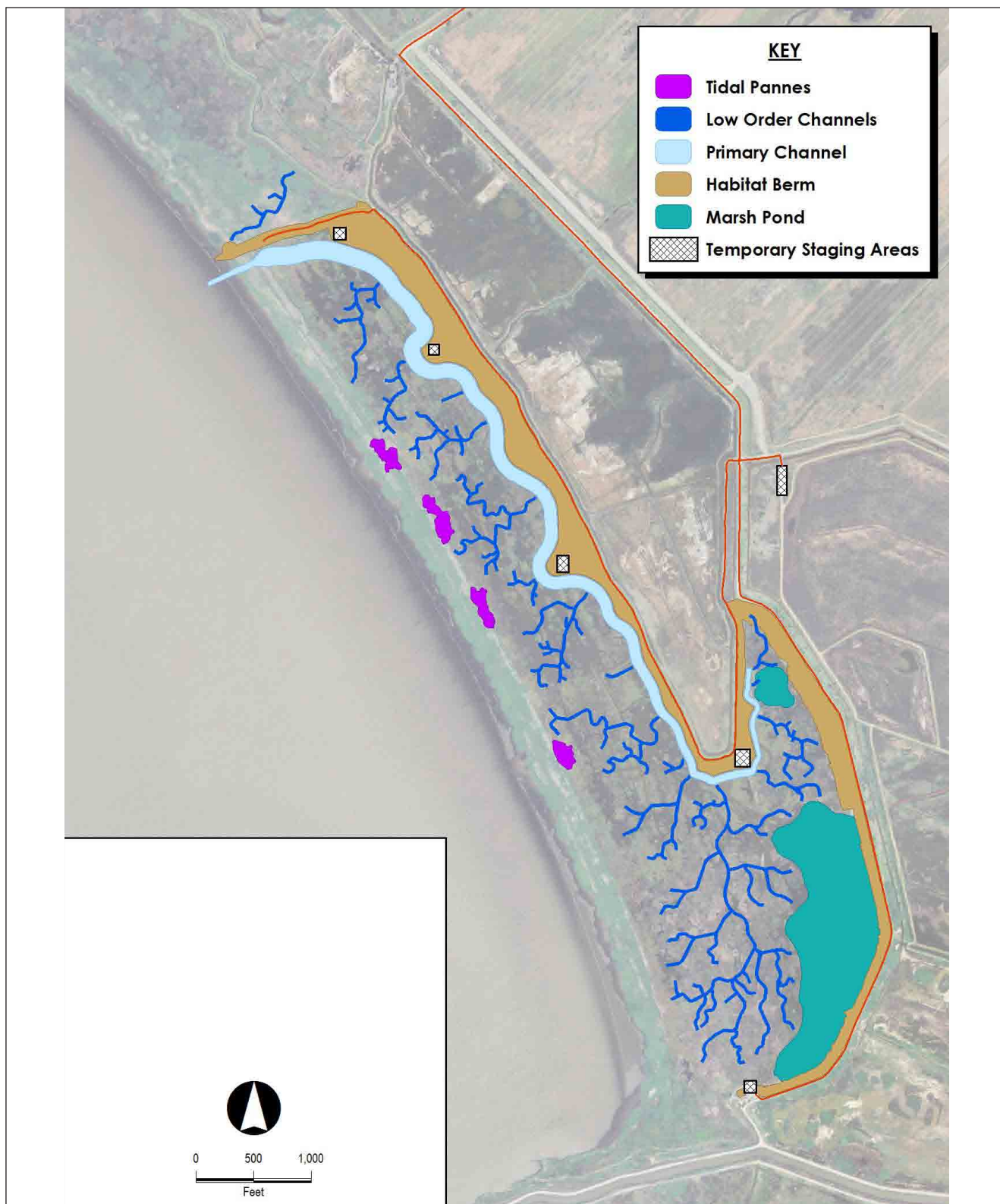
Figure 1
Project Vicinity and Area

Figure 2 shows the conceptual plan for the proposed project, and **Figure 3** shows a cross section of the proposed habitat berm. The four habitat features would support the interrelated resources and functions described in the SMP.

Construction would occur in two phases. Phase 1 would consist of site preparation, grading, revegetation, and associated activities on the land side of the natural berm, including modification of the existing CDFW drain to improve dissolved oxygen (DO) on the project site. The existing CDFW drain outfall allows CDFW to pump discharged drain water from the managed wetlands of the Grizzly Island Wildlife Area onto the project site. Then the project site would be managed for 1 to 2 years to revegetate the disturbed soils. Phase 2 would consist of demolishing several on-site structures and breaching the natural berm to restore tidal action to the project site.

Once the project site is restored, habitat establishment would occur, starting in approximately 2018. Limited maintenance, monitoring, and management tasks would occur during this time, including development of tules and other native marsh vegetation, weed control within the habitat berm, inspection of erosion or settling with respect to habitat level, and patrolling for trash and trespass. Long-term management of the project area would begin once the habitat berm vegetation is established. Long-term management would include all habitat establishment activities, periodic biological monitoring of the project area, and periodic mapping of the marsh and channel. The breach location is expected to reach equilibrium at a width of approximately 120 feet during this time.

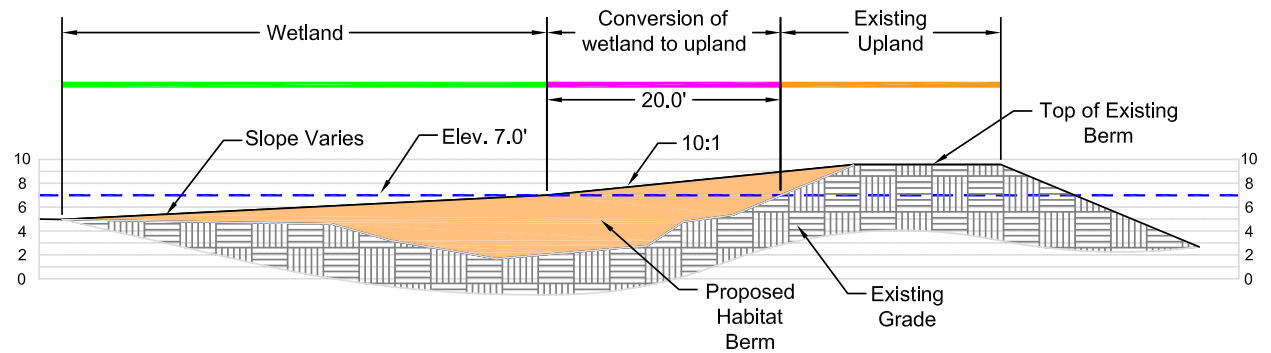
Ultimately, SFCWA is proposing a transfer of the project site to CDFW to be managed as part of the Grizzly Island Wildlife Area. CDFW would manage the restored property in perpetuity as part of the Grizzly Island Wildlife Area.



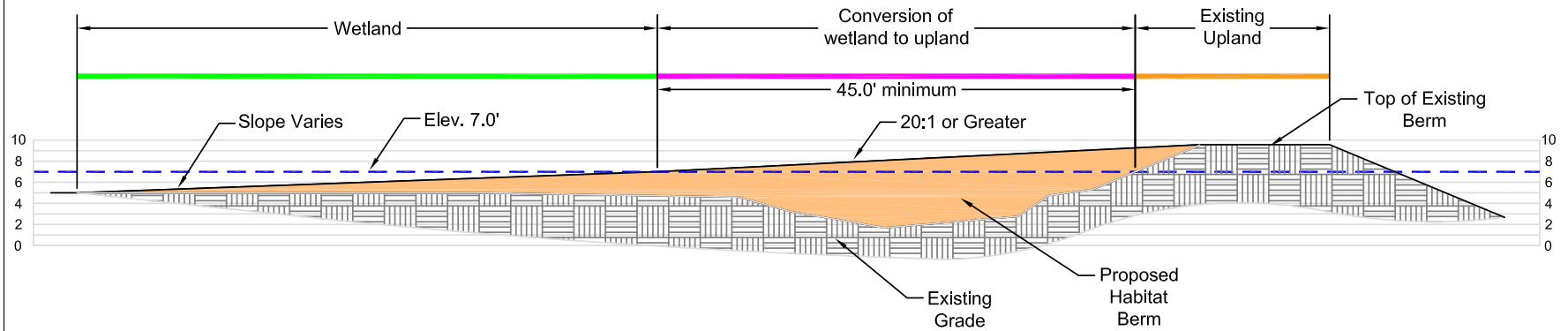
SOURCE: Westervelt Ecological Services, 2015

Tule Red Restoration Project . 150158

Figure 2
Concept Design



10:1 - Proposed Habitat Berm



20:1 or Greater - Proposed Habitat Berm

III. MITIGATION MEASURES (23 CCR SECTION 5002(B)(2))

This section provides detailed findings of consistency with regulatory policy *GP 1 / 23 CCR Section 5002: (b)(2) Mitigation Measures*.

The Project was subject to CEQA review and an Addendum was completed. The Addendum included feasible mitigation measures that will avoid any potentially significant impacts. The proposed project would incorporate the appropriate environmental commitments (or equivalent measures) and mitigation measures, as identified in the SMP EIS/EIR (Section 2.5, *Environmental Commitments and Mitigation Measures*) and the Tule Red CEQA Addendum (Appendix B, *Tule Red Tidal Restoration Environmental Commitments and Mitigation Measures*). Additional conservation measures were developed in the course of Section 7 consultation with USFWS. Each Project measure is consistent with and at least as effective as relevant mitigation measures included within the SMP's EIR and the Delta Stewardship Council's Mitigation and Monitoring Reporting Program (MMRP).¹

These Project-specific mitigation measures have been uploaded as supporting documents for this Certification of Consistency, as:

- CEQA Appendix B - Tule Red Tidal Restoration Environmental Commitments and Mitigation Measures ("ECs and MMs")
- Additional Conservation Measures ("ACMs"), developed in support of the Project's pending Section 7 Consultation with USFWS

A comprehensive table that 'crosswalks' all mitigation measures included in the Delta Plan EIR MMRP with the Project's specific environmental commitments and/or mitigation measures, to demonstrate consistency with these Delta Plan measures, has been uploaded as a supporting document for this Certification of Consistency as:

- Mitigation Measures and Project Consistency with the Delta Plan MMRP – Tule Red Tidal Restoration Project

¹ Neither the Delta Reform Act nor CEQA mandates or authorizes the Delta Stewardship Council to impose any mitigation requirements on a project adopted or implemented by another lead agency such as SFCWA.

IV. BEST AVAILABLE SCIENCE (23 CCR SECTION 5002(B)(3))

This section provides detailed findings of consistency with regulatory policy *GP 1 / 23 CCR Section 5002: (b)(3) Best Available Science*.

The Project design and adaptive management plan are based on best available science, as demonstrated by the following elements:

- Well-stated objectives and hypotheses.
- Conceptual models of tidal wetland functions, habitat requirements and distribution of sensitive fish and wildlife species,
- Background studies of historic and reference habitats in the Suisun Marsh and Delta
- Site-specific hydrodynamic modeling of various design alternatives, and water quality assessment
- Best professional judgment of experts.

Scientific literature cited in preparation of the design and AMMP are provided at the end of this detailed findings document in *Section VI – References*.

A. OBJECTIVES AND HYPOTHESES

One of the steps for achieving the best science is to provide clearly stated objectives:

1. Enhance regional food web productivity and export to Grizzly Bay in support of delta smelt and longfin smelt recovery.
2. Provide rearing habitats for out-migrating juvenile salmonids.
3. Provide rearing, breeding, and refugia habitats for a broad range of other aquatic and wetland-dependent species that utilize or depend upon the combination of brackish aquatic-tidal marsh habitat, including Sacramento splittail.
4. Provide ecosystem functions associated with the combination of Delta brackish water aquatic, tidal marsh, and upland interfaces that these species require.
5. Provide topographic variability to allow for habitat succession and resilience against future climate change and sea level rise.

For the purpose of adaptive learning, a certain number of questions have been developed from the objectives and questions, and framed as hypotheses for evaluation to reduce areas of uncertainty and improve understanding of system functions (discussed further in *Section V. Adaptive Management* of this document).

B. CONCEPTUAL MODELS

The Project's restoration design and crediting has been based on an understanding of target fish species, Delta habitats, food webs, and tidal marsh evolution. This includes life history and habitat requirements of delta smelt, Chinook salmon, and longfin smelt, as well as ecological

functions of tidal emergent wetlands and managed wetlands. Information from the Suisun Marsh Plan Conceptual Models was used to capture current understanding of how the ecosystem works and how species may respond to restoration (Raabe et al., 2010; Siegel et al., 2010). This understanding informed the design of sustainable habitat features that would increase rearing habitat for salmonids and food web productivity for delta smelt and longfin smelt, while minimizing potential negative effects on other species.

The AMMP (uploaded) provides further details for conceptual models of the Delta food web, tidal marsh evolution, and fish use of tidal marshes in *Section V-B-1 Conceptual Models* (pp. 31-34).

C. BASIS OF DESIGN

Focused studies were conducted to reduce uncertainties and refine the design, including background studies of historic and reference habitats in the Suisun Marsh and Delta (Northwest Hydraulic Consultants [NHC], 2015), hydrodynamic modeling of various design alternatives (NHC, 2015; Resource Management Associates [RMA], 2015), water quality assessment (Robertson Bryan, Inc. [RBI], 2015), site-specific geomorphic analysis and hydrodynamic modeling (NHC, 2015; RMA, 2015).

The *Basis of Design Report* by NHC (2015, uploaded – CEQA Addendum App. D.2.) provides details and supporting science for the following project design elements:

- Breach of the natural berm
- Tidal channel network
- Series of tidal pannes/basins
- Water quality of drain water
- Sediments, accretion, and sea level rise

D. TECHNICAL ADVISORY GROUPS

The proposed project design has been refined through repeated collaboration with multiple agencies, entities, and scientists. SFCWA convened several technical advisory groups to provide guidance with tidal wetland project development from a variety of disciplines, including fisheries, other special status species, monitoring, engineering, construction, and land management. A partial list of meetings and consultations with outside experts for the Tule Red Project is provided below.

1. SUISUN MARSH ADAPTIVE MANAGEMENT ADVISORY TEAM (AMAT)

The AMAT is an advisory team comprised of technical staff from the Bay Conservation and Development Commission (BCDC), California Department of Fish and Wildlife (CDFW), Department of Water Resources (DWR), Suisun Resource Conservation District (SRCD), Reclamation, US Fish and Wildlife Service (USFWS), and the Delta Stewardship Council (DSC), and Delta Science Program (DSP) with invitations to other entities to participate as

appropriate. The project proponents have used the AMAT and their knowledge of the Suisun Marsh for project development, design, and support, and as a forum to coordinate and cooperate for the benefit of the overall restoration goals identified in the SMP.

The AMAT was convened for a Tule Red project review and discussion with the project proponents on June 3, 2015. Attendees and contributors included:

Cody Aichele BCDC	Kristin Garrison DWR
Darcy Austin DSC	Lauren Hastings DSP
Bob Batha BCDC	Tiffany Heitz USFWS
Steve Chappell SRCD	Daniel Huang DSC
Maggie Christman DSC	Karen Kayfetz DSP
Jessica Davenport DSC	Gregory Krzys USBR
Sarah Estrella CDFW	Joe Laclair BCDC
Cliff Feldheim DWR	Erik Loboschfsky DWR

2. FISHERY AGENCY STRATEGY TEAM (FAST)

The FAST is a review team comprised of technical level representatives from each Fishery Agency (USFWS, NOAA Fisheries, CDFW) and Reclamation that work with proponent water agencies to review and assist in planning habitat restoration projects and provide guidance to water agencies on expected benefits of proposed habitat projects in meeting restoration objectives. The FAST was consulted about the Tule Red project on the following dates:

February 6, 2013	November 21, 2014
March 27, 2013	April 1, 2015
May 21, 2013	June 23, 2015
September 23, 2013	October 28, 2015

3. EXPERT PANEL

The Expert Panel was convened once at the recommendation of the FAST, specifically to analyze the proposed Tule Red project. The panel was comprised of representatives of the scientific community specifically involved in research and studies related to the Delta ecosystem as well as those experienced in tidal wetland design and implementation. Professional expertise was represented at the February 18, 2015 Expert Panel meeting, in the following disciplines, and by the following individuals:

- Suisun Marsh Plan Consistency: Steve Chappell, Suisun RCD
- Tidal Marsh Restoration Ecology: Peter Baye, Ph.D., SFSU
- Marsh Construction Engineering: Steve Carroll, Ducks Unlimited
- Sediment Transport: Brad Hall, Northwest Hydraulics Consultants
- Long-Term Marsh Sustainability: Larry Wyckoff, CDFW
- Terrestrial Marsh Species (SMHM): Lauren Thompson and Katie Smith, CDFW
- Suisun Marsh Historic Ecology/Processes: Amber Manfree, UC Davis
- Monitoring: Ramona Swenson, ESA

4. UC DAVIS CENTER FOR WATERSHED SCIENCES

UC Davis scientists conduct on-going scientific research and provide extensive scientific knowledge and study of issues facing the Bay-Delta. Dr. John Durand and Professor Peter Moyle of the Center for Watershed Sciences were consulted on the design of the proposed project on February 13, 2015. Their recent studies on Luco Pond regarding the effect of residence times in brackish marshes and native fish populations significantly influenced the selection of the final breach location, and addition of marsh ponds and tidal pannes to the Project.

V. ADAPTIVE MANAGEMENT (23 CCR SECTION 5002(B)(4))

This section provides detailed findings of consistency with regulatory policy *GP 1 / 23 CCR Section 5002: (b)(4) Adaptive Management*.

The Tule Red Project will be implemented within an adaptive management framework that is guided by and Adaptive Management and Monitoring Plan, consistent with the Delta Plan Appendix 1B framework and the SMP (*Appendix E, Adaptive Management and Monitoring Plan*, of the SMP EIS/EIR). The AMMP is uploaded as a supporting document and summarized below.

A. PURPOSE OF AMMP

The purpose of the Tule Red AMMP is to ensure that the restored habitats are protected, managed, monitored, and maintained for purposes and benefits of the target species (delta smelt, longfin smelt, salmonids, and salt marsh harvest mouse). The AMMP establishes objectives, priorities, and tasks to manage, monitor, maintain, and report on the habitats and species at the Project site. The monitoring component of this Plan identifies the metrics of functional outcomes from Project construction and operation that will be measured to evaluate progress toward desired or hypothesized outcomes, and to inform corrective measures if criteria are not met. Monitoring categories include physical processes, vegetation, food web (nutrients, primary and secondary productivity), fish, and water quality (DWR et al., 2012, Interagency Ecological Program in development).

B. OBJECTIVES AND HYPOTHESES

The AMMP defines the Project objectives, expected outcomes related to those objectives, metrics and monitoring methods by which progress towards objectives is measured, and thresholds for undertaking a management response if goals are not being met or if problems occur which require intervention. Project restoration objectives include:

1. Enhance regional food web productivity and export to Grizzly Bay in support of delta smelt and longfin smelt recovery.
2. Provide rearing habitats for out-migrating juvenile salmonids.
3. Provide rearing, breeding, and refugia habitats for a broad range of other aquatic and wetland-dependent species that utilize or depend upon the combination of brackish aquatic-tidal marsh habitat, including Sacramento splittail.
4. Provide ecosystem functions associated with the combination of Delta brackish water aquatic, tidal marsh, and upland interfaces that these species require.
5. Provide topographic variability to allow for habitat succession and resilience against future climate change and sea level rise.

For the purpose of adaptive learning, objectives and selected questions have been framed as hypotheses for evaluation to reduce areas of uncertainty and improve understanding of system

functions. The following hypotheses have been developed for the Project (AMMP, *Section V-B-2 Uncertainties and Hypotheses*, p. 35):

- **Hypothesis 1 Physical:** The channel inlet at the breach will self-adjust over time from an initial construction width of about 50 feet and invert of -2 feet NAVD88 to a final equilibrium width of about 160 feet and invert of -5 feet NAVD88 within 7 years after construction. This hypothesis will test the calculation of equilibrium breach dimensions based on tidal prism within the site, substrate shear strength, and tidal regime (boundary tidal condition).
- **Hypothesis 2 Food Web:** Primary and secondary productivity in the marsh ponds (mean residence time 6 -14 days) will be greater than in the tidal pannes (mean residence time about 3 days), the marsh plain (mean residence time about 3-9 hours), tidal channel, and Grizzly Bay. This hypothesis will test the value of tidal ponds and tidal pannes and increased residence time in the restoration design in terms of food web production.
- **Hypothesis 3 Fish:** The restored habitats at the Project site (tidal channel, marsh ponds, pannes) will support a fish community (including juvenile salmonids) similar in composition and relative abundance to that documented in comparable habitats in the Suisun Marsh region. This hypothesis will test habitat suitability and use by target fish species.
- **Hypothesis 4 Vegetation:** Elevation, hydrology, and existing vegetation within different habitat features will affect colonization of the site by *Phragmites*. This hypothesis will test which elevations within the created tidal regime are suitable for *Phragmites* colonization, and whether pre-inundation establishment of native vegetation such as tules may preempt establishment of undesirable invasive vegetation.
- **Hypothesis 5 Vegetation:** Soil organic matter and planting methods will influence vegetation establishment on the habitat berm. This hypothesis will test the difference between the use of organic matter from stockpiled topsoil and hydroseeding/drill seeding and mulch in establishing desired vegetation on the habitat berm.

C. MONITORING APPROACH

Monitoring for the Project will follow an adaptive management approach. Adaptive management is a framework allowing for a flexible decision-making process for ongoing knowledge acquisition, monitoring, and evaluation, leading to continuous improvements in management and implementation of a project to achieve specified objectives (Delta Reform Act, Water Code Section 85052).

The Project includes monitoring elements to serve multiple purposes (AMMP, pp. 29-51):

- **Compliance Monitoring:** Mandatory monitoring elements driven by permit requirements.
- **Effectiveness Monitoring:** High priority monitoring elements to track progress towards Project objectives

- **Special Studies:** Desirable discretionary (supplementary) monitoring elements. These are noted in the event that additional funding or research partners become available.

In addition, all monitoring will be used to identify the need for management actions necessary for the development and maintenance of the site and to learn whether or not the stated objectives of the Project are being met.

The monitoring framework within this Plan is objective-driven. Indicators of functional outcomes from Project construction and operation (metrics) will be measured to evaluate progress toward expected outcomes and to inform corrective measures if thresholds for action are met. Monitoring categories include physical processes and hydrology, water quality, food web, fish, and wetlands and vegetation (DWR et al., 2012). Metrics have been selected to be ecologically meaningful, efficient, cost-effective, feasible to measure, and informative for management decisions.

Monitoring will be consistent with the *FRPA Implementation Strategy* (DWR et al., 2012), the *SMP Adaptive Management and Monitoring Plan* (USBR et al., 2013), the *Delta Science Plan* (Delta Stewardship Council, 2013), and guidance being developed by the IEP Tidal Wetlands Monitoring Project Work Team. The AMMP outlines sampling design, metrics and methods for the following categories: (1) physical processes and hydrology, (2) water quality, (3) food web, (4) fish, and (5) wetlands and vegetation.

D. MANAGEMENT THRESHOLDS AND RESPONSES

While it is not anticipated that major modification to the site will be needed, an objective of this Plan is to guide monitoring and to identify any thresholds that may compromise the Project objectives, and to propose potential management responses or further focused monitoring efforts. This section of the AMMP (pp. 53-60) summarizes the five Project objectives, the expected outcomes related to those objectives, the metrics by which progress towards meeting the objectives is measured, as well as thresholds for undertaking a management response if goals are not being met or problems occur which require intervention.

E. RESOURCES TO IMPLEMENT ADAPTIVE MANAGEMENT

The Project has access to adequate resources and delineated authority to implement the proposed adaptive management process. As specified under the FRPA (DWR and DFG 2008, 2010), individual restoration projects shall include funding sufficient to implement, monitor, and manage the proposed Project in perpetuity. This project's AMMP will be funded under the current DWR/CDFW funding agreement for implementation of the FRP, as CDFW will likely be the long term land owner and manager and will, as such, be reimbursed for management and monitoring by DWR under the FRP agreement.

The Project has been developed in partial fulfillment of permit requirements for the coordinated operation of the CVP and SWP. The restoration is anticipated to generate habitat "credits" to apply against restoration obligations of the water projects. SFCWA, under its Memorandum of Agreement (MOA) with the California Department of Water Resources (DWR), will sell or

transfer credits granted SFCWA to DWR for the restoration in exchange for DWR reimbursing SFCWA for development costs for the restoration. DWR will provide management funds under existing agreements with DFW for the FRP. Funding will come from SWP operational funds, and will be part of the Statement of Charges from DWR to the various State Water Contractors. Funding arrangements will be detailed in a Credit Purchase Agreement with DWR.

Implementation of the Credit Purchase Agreement is contingent upon SFCWA delivering a fully executed project with attendant credits, which also includes all necessary permit authorizations, such as the U.S. Army Corps of Engineers (USACE or Corps) permit. Should DWR desire SFCWA to manage the completed restoration project for an interim period, that funding will be provided under a separate DWR/SFCWA contract. SFCWA may independently fund discreet science project investigations in the restored wetland not otherwise required under the AMMP.

VI. REFERENCES

Scientific literature and other supporting documents cited in Project documents are listed below, from the AMMP and the Basis of Design report.

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