3. Proposed Project and Crediting

3.1 Restoration Design Process

The restoration design process for this Project was carried out with close attention paid to the Restoration Design Principles described below. The process began by determining the locations on the property with the greatest suitability for tidal wetland construction. These locations were initially determined by examining the topography of the site in relation to the local tidal datums. The 2005 Delta LiDAR digital elevation model (DEM), updated with more recent data in certain locations to improve accuracy, served as the topographic data source, while the local tidal datums were calculated by cbec for this restoration effort. All areas of the site within intertidal elevations (below mean higher high water [MHHW], above mean lower low water [MLLW]) were prioritized for restoration.

For the Lower Yolo project effort, a technical advisory committee of scientists with expertise in regional ecosystems and hydrology was formed in order to advise SFCWA on the design for the Project site. The design for the Yolo Flyway Farms builds on the conclusions reached by the committee and seeks to integrate the two projects together as much as possible.

According to Robin Grossinger with SFEI, both the Lower Yolo and Yolo Flyway Farms project sites hold a uniquely rich location at the intersection of the historic edges of the Putah Creek alluvial fan, the Yolo Basin floodplain and the north Delta tidal marshes. Optimal function in the current highly altered regional landscape would preserve as much of the historic hydroperiod diversity as possible by creating habitats that will flood at different time of the year depending on the prevailing hydrology. The Project design will provide the maximum resiliency in the face of sea level rise and regional stressors such as changes in tides, floods, salinity mixing and invasive species.

The technical advisory committee has indicated that they would like to see designs that are mindful of the historical ecology of the site and region and does just enough to tip a site onto a new ecological trajectory. With this direction in mind, the Yolo Flyway Farms project seeks to accomplish the following objectives.

- Preserve as much of the historic hydroperiod diversity as possible and incorporate the ability to come back to the site to adjust Project features and change functionality depending on monitoring results.
- Provide functions and values that meet the immediate needs of the special-status fish species targeted by the OCAP Biological Opinions.

- Preserve a landscape that can accommodate some sea level rise.

In order to accomplish these objectives, the Project design seeks to maximize residency time diversity, and associated foodweb production, by capturing and slowly draining water on the existing landscape. This water will come from daily tidal exchange or from seasonal inundation during flood events in the Yolo Bypass. Water will be partially impounded behind existing berms that are part of the irrigated pasture landscape that now exists on the Project site. Notches would be excavated in certain spots to allow for water and biota to flow out into surrounding tidal marsh plain and channels, and will help reduce the potential for fish stranding. In order to facilitate outflow from the site, swales will be cut to drain the deepest portions of the site. Depth of the swales will vary in order to vary the hydrology within the associated network and test different residency time hypotheses. Details of these design elements are discussed in the following section.

The tidal wetland restoration area will connect to the Toe Drain via two engineered breaches excavated along the eastern property boundary. The dimensions of these engineered breaches were sized according to the methods used to determine the tidal channel geometries, as described above. The breaches will be sited to minimize, if possible, any areas supporting existing vegetation. Opportunities to relocate/transplant existing vegetation elsewhere would be afforded to the appropriate resource agencies prior to construction.

Minimal earthwork will occur in areas of the Project site that are currently at intertidal elevations. Earthwork in these areas will be limited to channel creation, berm breaching, and bench creation and is described in detail in Section 3.1.1.

The transitional uplands within the grazing buffer, tidal marsh enhancement areas, and riparian enhancement areas generally encompass those areas directly adjacent to the restored tidal marsh/tidal channels. The wetland enhancement areas were selected from areas that would become isolated and inaccessible as a result of the restoration Project (and therefore could no longer be effectively managed with irrigation for agriculture). The transitional uplands areas would provide a suitable wetland transition zone and accommodate extreme high tides and future sea level rise and act as ecological buffers from the adjacent continued agricultural activities (primarily cattle grazing and associated irrigation practices).

The enhancement actions would involve the removal or reduction of current agricultural management activities and, in some areas, improvements to the hydrologic regime. The southwest Lower Step is currently grazed but not irrigated and its enhancement would involve

fencing it from grazing to allow natural extreme high tide and winter flooding inundation to recover natural wetland plant communities. The many isolated patches would be enhanced through removal of irrigation and/or cattle grazing and/or improving connectivity to tidal waterways to enhance hydrology. Areas within the grazing buffer would continue to be accessible for cattle grazing but would be minimally grazed post-restoration for vegetation management purposes only (primarily for certain invasive weeds). A temporary electric fence would be installed seasonally along the edge of the grazing buffer for livestock management. Agricultural irrigation practices would cease. The complete removal of irrigation practices within the enhancement areas would ensure that minimal agricultural contaminants in the form of irrigation runoff would enter the restored tidal marsh habitat.

3.1.1 Restoration and Enhancement Design

The purpose of this section is to describe the Project restoration and enhancement design in terms of the design elements, design criteria and rationale, and resulting proposed landscape changes. The design involves returning tidal action to existing lands within intertidal elevations and enhancing the immediately surrounding non-tidal environments with improved hydrology.

Project Design Overview

The Project would be implemented during the summer of 2018.

The restoration design in its entirety, presented in Figure 3-1, would include modifications of up to approximately 303 acres of the 359-acre site. The 80-acre parcel where excavated soil will be place is outside of the Project footprint and will remain in its current condition and support agricultural operations following Project implementation.

Components of the Project Footprint

1) **Tidal Marsh Restoration:** Restoring 278 acres of intertidal and associated subtidal marsh habitat, including approximately 11.5 acres of new tidal channels and swales,
2) **Riparian Enhancement:** Enhancing approximately 3 acres of existing riparian habitat.
3) **Transitional Uplands:** Enhancing approximately 56 acres of agricultural uplands.
4) **Water quality enhancement and minimizing the introduction of agricultural contaminants:** Improving irrigation and drainage on the Project site by relocating, modifying, or completely removing several water control structures and irrigation and drainage ditches.