Lower Yolo Tidal Marsh Restoration Project

by Carl Jensen, Landscape Architect, ICF International
Photos courtesy Curt Schmutte, Curt Schmutte Consulting

Introduction
The State and Federal Contractors Water Agency (SFCWA) is undertaking the Lower Yolo Restoration project (Project) in collaboration with California Department of Water Resources and U.S. Bureau of Reclamation. The cooperative project is intended to reduce costs and help restore 8,000 acres of habitat as required by Biological Opinions issued by the U.S. Fish and Wildlife Service and National Marine Fisheries Service for continued operation of the State Water Project and federal Central Valley Project. SFCWA is a joint powers authority comprising public agencies that receive water from the State Water Project or Central Valley Project.

Regulatory Context
The Lower Yolo Restoration Project is part of a larger regional habitat restoration effort that has been in development for many years. Since the mid-1990s, state
The Lower Yolo Project site is located at the southern end of the Yolo Bypass floodway directly to the north of Liberty Island and near the north end of the Cache Slough complex. The Yolo Bypass is a levee-protected, 59,000-acre floodplain west of the lower Delta; up to 10,000 acres of seasonally inundated floodplain habitat along major channels; and enhancement of floodplain in the Yolo Bypass. A primary venue for that effort was the CALFED Bay-Delta Program (CALFED), which was approved in 2000 to achieve four interrelated objectives: levee system integrity, ecosystem restoration, water supply reliability, and improved water quality.

Subsequent to CALFED, the Delta Vision plan was created by then-Governor Arnold Schwarzenegger to “develop a durable vision for sustainable management of the Delta” so that the Delta can support environmental and economic functions important to the people of the state of California. The Delta Vision Strategic Plan was issued in 2007 and contains recommended strategies and actions which include: restoring tidal and riparian habitats and increasing frequency of floodplain inundation, improving migratory corridors, addressing invasive species, relocating export diversions and implementing conveyance improvements, revising flow standards and operating criteria, and improving water quality. Many of these actions are now being pursued through the proposed Bay Delta Conservation Plan (BDCP).

Nearing completion of its planning phase, the BDCP is being prepared by a group of local water agencies, environmental and conservation organizations, state and federal agencies, and other interest groups in compliance with the federal Endangered Species Act and the California Natural Communities Conservation Planning Act. When complete, the BDCP will provide the basis for issuing endangered species permits for the operation of the State Water Project and Central Valley Project over the following 50 years. The heart of the BDCP is a long-term conservation strategy that sets forth actions needed for a healthy Delta, building upon the framework established through the CALFED and Delta Vision processes. The draft biological goals and objectives in the BDCP call for substantial commitments to restore natural habitats, including up to 65,000 acres of tidal wetland and associated estuarine and upland habitats distributed across the Delta; up to 10,000 acres of seasonally inundated floodplain habitat along major channels; and enhancement of floodplain in the Yolo Bypass.
Sacramento River. The 41-mile-long bypass routes Sacramento River floodwaters away from heavily developed urban and suburban areas and onto minimally developed farmland. Land uses within the Yolo Bypass are managed to facilitate flood flow conveyance. Land uses within the Bypass consist of the state-owned Yolo Wildlife Area (16,700 acres) and privately owned agricultural lands, all of which are subject to flood flow conveyance easements that restrict development. The bypass is predominantly used for annual agricultural crops and some grazing. The Yolo Wildlife Area is managed for emergent wetland vegetation. Bordering the Yolo Bypass on the east is the Sacramento Deep Water Ship Channel.

The Project site contains a ranch compound in the northwest corner of the property (including small seasonal residences, barns, other outbuildings, and corrals) and irrigated pasture on the remainder of the site. The topography of the Project site is primarily flat, with an almost imperceptible slope descending from the northwest to the southeast. Much of the site is at elevations above modern mean higher high tide (+6.5 ft. NAVD88)1, with elevations ranging between +6.5 to +15 ft. NAVD88. Approximately one-quarter of the site topography is within intertidal elevation ranges of +2 to +6.5 ft. NAVD88. Many areas within the site are currently pastures that have been graded to drain to agricultural drainage ditches. Before being diked off for agriculture in the early 1900s, the Project site likely contained a matrix of grasslands, seasonal wetlands, perennial open water backwater lake features, and tidal marsh. The Project site is now primarily used for seasonal cattle grazing except during the rainy season, when it provides flood conveyance capabilities as part of the Yolo Bypass. To prevent tidal flooding, the hydrology of the site is intensively managed through a series of levees, flood/drainage ditches, tide gates, flap gates, and other associated infrastructure.

Goals and Objectives

The overall Lower Yolo property, which is owned by Westlands Water District, is approximately 3,423 acres, of which approximately 2,134 acres will be restored, enhanced and/or preserved aquatic and terrestrial species habitat. The highlight of the project is restoration of approximately 1,672 acres of tidal freshwater marsh habitat.

The goals and objectives of the project are to:

- Enhance regional foodweb productivity and export to Cache Slough complex in support of delta smelt (*Hypomesus transpacificus*) recovery
- Provide rearing habitats for out-migrating salmonids
- Provide rearing, breeding, and refuge habitats for a broad range of aquatic and wetland-dependent species that utilize or depend upon the combination of Delta aquatic and terrestrial habitats
- Suitable habitat for establishment of diverse native plant communities including rare plants
- Minimize potential for colonization by Brazilian waterweed (*Egeria densa*)
- Preserve existing topographic variability to allow for habitat succession and resilience against future climate change

Because of its location at the Sacramento-San Joaquin Delta margin, the Project site provides an opportunity to restore extensive wetland-upland transitional habitats, and can accommodate sea level rise for many decades as marsh expands landward.

Design and Construction

Utilizing historical ecological information recently developed by the San Francisco Estuary Institute, the Project seeks to utilize the site’s unique position on the landscape. According to the Institute, the Project site historically held a uniquely rich location at the intersection of the Putah Creek alluvial fan, historic Yolo Basin floodway, and north Delta tidal marshes. The proposed Project seeks to partially restore some of these ecological functions in the current, highly altered landscape and restore as much of the historic hydroperiod diversity as possible. This includes reconnecting the

1 North American Vertical Datum of 1988
historic lake features with surrounding natural tidal waterways and removing obstructions to tidal inundation to allow seasonal and tidal waters to drain slowly through the marsh plains.

The proposed Project also seeks to maximize ecological productivity by enhancing resiliency, diversity, and regional integration. Utilizing the existing topography and irrigated pasture infrastructure at the site, the proposed Project would increase hydraulic residence time through increased surface flow complexity and discharge distance to receiving waters. These Project features would maximize resiliency in the face of sea level rise and regional stressors such as changes in tides, floods, salinity mixing, and invasive species. Depending on the seasonal and regional hydrology, water would come from daily tidal exchange or from seasonal inundation during flood events in the Yolo Bypass.

Specific actions associated with the proposed Project include: restoring approximately 1,672 acres of tidal marsh, including 4 acres of tidal channels and swales; enhancing approximately 28 acres of tidal marsh habitat and 49 acres of riparian habitat; removing agricultural irrigation from approximately 385 acres surrounding the restored wetlands (fringe tidal wetlands); and relocating and installing several water control structures and some irrigation and drainage ditches. Approximately 58,000 cubic yards of soil will be excavated from the restoration area and stockpiled on existing agricultural fields in the northwest corner of the property, behind restricted-height levees.

tidal restoration and enhancement would be accomplished by eliminating or moving existing water control infrastructure elements or installing new elements, excavating notches in existing internal and perimeter berms, and creating new tidal channels and swales to connect restoration and enhancement areas to existing tidal waters adjacent to the site. High tides would be temporarily captured behind existing berms that are part of the irrigated pasture landscape that now exists on the Project site. Water will discharge from the site though the existing irrigated pasture ditch network via overland flow, and through swales that will be cut to drain the deepest parts the existing landscape. Depth of the swales will vary in order to vary the hydroperiod within the associated drainage area and test different residency time hypotheses. Removing irrigation control structures will greatly reduce the potential for fish stranding. In addition, grazing will be restricted within the restoration footprint through the seasonal use of exclusion fencing.

Surrounding the restored wetlands will be an additional 385 acres of transitional uplands on which agricultural irrigation will be discontinued. Seasonal cattle grazing will be utilized within this wetland buffer zone as a vegetation management tool. To ensure that irrigation and drainage needs of the remainder of the site and of adjacent properties are maintained, the one tide gate will be relocated. Areas on the property that are outside of the Project footprint will remain in their current condition and continue to support agricultural operations following Project implementation.

The final Environmental Impact Report for the project has been certified and regulatory permits for project construction are currently being reviewed by the relevant public resource agencies. Construction is scheduled for the summer of 2014.
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Hope to see you there! — Kevin Mackay, SERCAL President and 2014 Conference Chair

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In August 2013, the South Pacific Division of the U.S. Army Corps of Engineers (Corps) released draft Regional Compensatory Mitigation and Monitoring Guidelines (Guidelines) for unavoidable impacts to aquatic resources. The Guidelines were designed to help the regulated public and mitigation/restoration practitioners comply with the 2008 national regulations ("Mitigation Rule"). The South Pacific Division encompasses a large geographic area — Arizona, California, Nevada, Utah, New Mexico and parts of Colorado and Texas. The Los Angeles, Sacramento, San Francisco, and Albuquerque Districts have been working together for several years to develop these Guidelines, as well as other tools to aid in the identification, design, implementation, and monitoring of compensatory mitigation sites. These efforts have been led by Dr. Daniel Swenson, North Coast Section Chief, Los Angeles District. It was an enormous effort corralling busy State and Federal regulators to participate in meetings and then facilitate discussions between people with varying degrees of restoration and mitigation experience. In addition, the large geographic area complicated the effort due to the vast diversity of ecological conditions, aquatic resources and sometimes conflicting regional goals and state regulations that govern land and water uses. So although not perfect, these Guidelines are a big step in the right direction.

The Guidelines supplement the Mitigation Rule by providing regionally-specific information and tools for developing the twelve required elements of a Compensatory Mitigation Plan. Of particular interest to SERCAL members may be Sections 3.4 and 4.2.2, Amount of Compensatory Mitigation; Section 4.3, Site Selection; and Section 4.4, Design, including subsections on recommendations and potential pitfalls. Historically, the amount (e.g. mitigation ratio) of compensatory mitigation required by regulatory agencies has been inconsistent, particularly when ratios have varied greatly across districts or between regulators within a single district. Section 3.4 describes the eight variables Corps regulators will consider in setting mitigation requirements. The standardized approach for evaluating these
variables is provided in a separate guidance document referred to as the Standard Operating Procedure for Determination of Mitigation Ratios ("Mitigation Ratio Checklist"). The Mitigation Ratio Checklist is a tool for comparing the impact site to the proposed mitigation site(s). Supporting information is provided for each variable in the Guidelines, expressing why each should be considered in developing a mitigation plan. These include the type, condition, and location of the affected jurisdictional resources at the impact site relative to those at the proposed mitigation site; the risk and uncertainty of successfully implementing the mitigation site; and whether the temporal and indirect jurisdictional impacts are adequately addressed.

Site selection, as required in Section 4.3, is a key part of the process needed to restore or establish a natural and sustainable aquatic resource. As referenced in the Guidelines, it is well documented that the type of aquatic resource proposed should be ecologically suitable to the location, taking into consideration the physical, hydrological, and biological processes needed for the aquatic resource to function naturally. Unfortunately, this has not frequently been the practice for proposed mitigation sites. Often, mitigation sites are proposed on landscapes that are convenient or available and cost-effective to the permittee, with little consideration to landscape position, physical or hydrological processes, and surrounding land uses. Based on my recent experience as a Corps regulator in the Los Angeles District, it is my opinion that poor site selection is the primary reason for mitigation failure. These Guidelines should help to reverse that trend.

Section 4.4 of the Guidelines discusses design and the development of the mitigation site work plan, including basic recommendations for design approach. Although it does not cover all of the information needed to design a successful mitigation site — or an exhaustive list of all the problems that practitioners can experience — it does cover some of the most common mistakes. There is a statement that a conceptual design needs to provide enough site-specific data to provide the Corps with confidence the proposed project would fulfill its objectives. After the conceptual plan is approved, the final work plan must include grading and planting designs which require substantial site-specific data. The design recommendations include choosing a location and design with buffer areas, connectivity with other aquatic resources or natural open space, sources of natural hydrology, and soils conducive to the type of aquatic resource and target vegetation community. Reference sites in proximity to the mitigation site are recommended for use in setting realistic performance standards and to provide a basis for comparison during site development, particularly during abnormal weather years or in the face of a changing climate.

The Guidelines are intended to standardize compensatory mitigation procedures throughout the SPD region by providing definitions for commonly used terms and simple guidance for mitigation plan requirements in the Mitigation Rule. Also provided is an outline for developing mitigation plans that, if followed, will address the 12 elements required by the Mitigation Rule. These Guidelines are a substantial step in the right direction to providing both regulators and the regulated public with clear expectations for planning and implementing successful compensatory mitigation.

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October 18-19 Theodore Payne Foundation Fall Plant Sale: 10459 Tuxford St., Sun Valley 91325. www.theodorepayne.org


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