Resilient Landscape Restoration on Lower Walnut Creek

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The tidal reaches of Walnut Creek once occupied a wide floodplain that supported a tidal marsh complex along the south shore of Suisun Bay. Mid-century flood control projects confined the creek between engineered levees and disconnected the marshes from the tides. The Contra Costa County Flood Control District is leading the Lower Walnut Creek Restoration Project, which aims to remove or setback the levees and reconnect and restore more than 200 acres of historic floodplain habitat.

The project area includes several former dredge placement sites which are at supratidal elevations and are located adjacent to restorable tidal marsh areas. These sites provide a rare opportunity to restore gently-sloped marsh to upland transition zones. This habitat type is highlighted in the Baylands Goals Project Update (2015) as providing improved ecological value in the near term as well as with future sea-level rise.

The restoration design prioritizes tidal wetland restoration in areas where existing grades are close to tidal elevations, while preserving and enhancing adjacent transition zones to allow for marsh transgression as sea-levels rise. The project will restore and enhance seasonal wetlands to improve the ecological function of transition zones in the near term, and is designed to facilitate the future succession of transition zones to tidal marsh. New tidal channel networks will be integrated with upland drainages, anticipating the extension of tidal channels with rising tides. The project includes landscape management to reduce the concentration of invasive non-native plant species within the transition zones, and will reduce re-vegetation costs through on-site native plant cultivation.

By restoring a full ecotone landscape that includes both tidal wetlands and adjacent transition zones, the Lower Walnut Creek Restoration Project will improve ecosystem function in the near term while creating a tidal marsh complex that will be resilient in the face of rising sea-levels.

Keywords: Tidal Wetland Restoration, Habitat Restoration, Transition Zone, Ecotone, Sea-level Rise

Poster Topic Habitat Restoration - Flood Management/Levees/Dams

The Effects of Wetland Hydraulics on Organic Accretion and Land Subsidence Reversal

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The islands of the Sacramento-San Joaquin Delta have undergone significant subsidence since the native peat marshes were leveed and drained more than 100 years ago. In 1997, studies were initiated to determine whether restoring marshes could reverse land-surface subsidence. Portions of Twitchell Island, a peat island in the Sacramento-San Joaquin Delta, were flooded in order to construct wetland environments. Wetland hydraulics may affect the processes of accretion and subsidence reversal in a constructed wetland environment. This study looks at spatial variation of flow velocity within the West Pond, a constructed wetland on Twitchell Island. The objective is to better understand larger flow patterns within the wetland and assess whether backwater areas, or areas with reduced flow and longer residence times, contribute to increased accretion rates. Velocity measurements were taken at six established piers throughout the wetland. A tracer study was also implemented to identify flow patterns and quantify the residence time distribution. Measured spatial variation of water velocity and flow patterns within the wetland are compared to long-term accretion measurements. Preliminary results indicate that the highest velocities occurred at the location where historical accretion was lowest.

Student Award Competition: Yes

Keywords: Wetland, subsidence, accretion, flow, velocity, tracer, residence time, backwater, delta

Poster Topic Habitat Restoration - Flood Management/Levees/Dams

Restoration Design in the Sacramento-San Joaquin Delta: Lessons from Case Studies

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While the goals for tidal, floodplain, and riparian restoration projects in the Delta may range from meeting habitat mitigation needs to providing benefits such as flood attenuation or water quality improvements, the common goal of restoring self-sustaining native habitats and ecosystems means that most, if not all, restoration projects should be based upon a common set of principles and tools to ensure success. This requires awareness of tidal and riverine processes and disturbance regimes, vegetation, fisheries, and wildlife response to these processes as well as ecological interactions. The ultimate measure of our success will be the degree to which native species are able to use and thrive in the habitats we provide. We build upon experiences throughout the Delta using specific examples to illustrate a variety of methods for restoring ecosystems for a sustainable future. Case studies include projects aimed at enhancing the physical template to restore ecological processes such as restoring tidal action in the Cache Slough region to enhance primary and secondary productivity and food availability for Delta Smelt and other native fishes; increasing tidal access and tidal wetland habitat in the central Delta to support spawning and rearing of salmonids; and combining changes to the physical template with revegetation in the eastern Delta to benefit giant garter snake and native fishes. Another project in the central Delta involves no changes to physical site conditions but is focused on improving vegetation composition and structure to support wildlife diversity, including benefits to Swainson's hawk. For all these projects, the explicit integration of ecosystem processes operating at appropriate scales is a fundamental part of planning, implementation, and adaptive management. Practical but often critical matters of site selection, sequencing, funding, stakeholder interactions, and permitting are also recognized as equally important aspects of restoring or enhancing the Delta for native species.

Keywords: tidal, floodplain, riparian, restoration, ecosystem, sustainable, ecological, salmonids, revegetation

Poster Topic Habitat Restoration - Flood Management/Levees/Dams