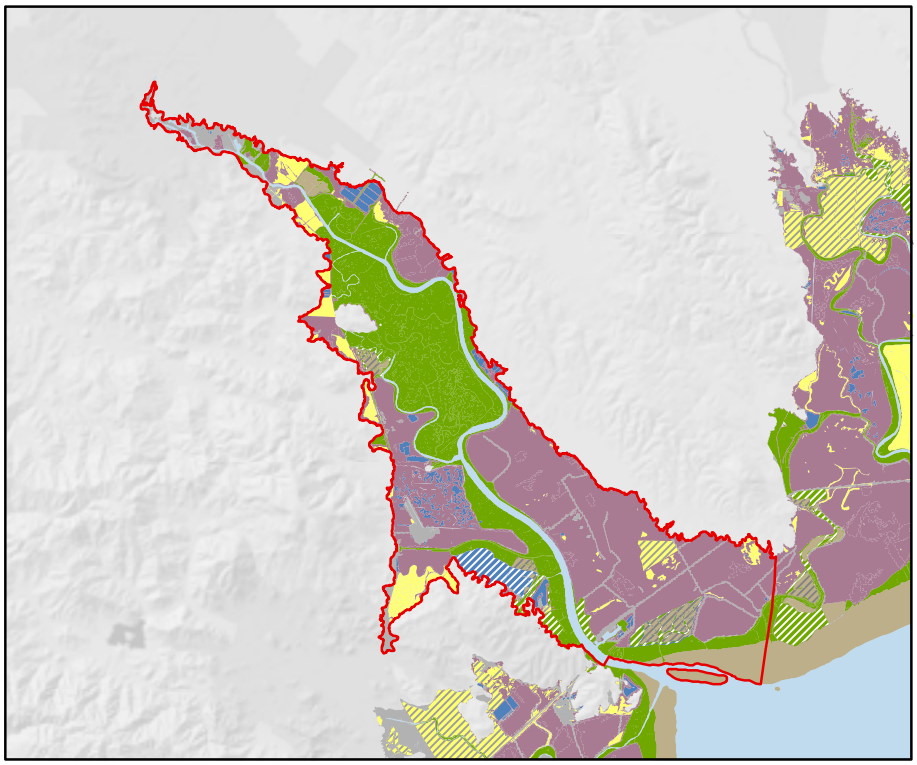

PETALUMA RIVER AREA

Northwestern edge of San Pablo Bay and lands in the lower Petaluma River drainage

Baylands 2009

- Bay/Channel
- Diked Wetland
- Salt Pond
- Managed Pond
- Tidal Flat
- Tidal Marsh
- Agriculture and Other Undeveloped Areas
- Developed Areas

Red line shows the boundaries of Segment F.

Hatching indicates areas where restoration activities had occurred as of 2009. For managed ponds this included habitat enhancement.

By: San Francisco Estuary Institute

Data: Wetland data from SFEI includes BAARI (v1, 2009) Baylands and Wetlands, NLCD 2006, and wetland tracker data.

Imagery: ESRI World Imagery (updated 2015)

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Miles

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Unique Opportunities

Segment F provides opportunities to restore extensive tidal marsh and natural marsh–upland transition zones near the subregion's largest brackish marsh. It also provides opportunities to expand remnant populations of rare plants, such as the soft bird's-beak, into restored tidal marsh areas. There is the unique opportunity to enhance the transition zone between San Antonio Creek and tidal habitats, one of the few places where such restoration can take place. Opportunities also exist to significantly increase and enhance seasonal wetland habitats in the diked baylands and adjacent uplands, particularly on the eastern side of the Petaluma River. This segment also provides opportunities to restore and enhance current and future transition zones, particularly with oak woodlands.

Segment Features and Setting

Tidal marsh was once the dominant habitat type in this segment. Salt marsh existed near the mouth of the Petaluma River and became brackish upstream. There were relatively small tidal flats at the river mouth, but several large areas upstream at False Bay. Small patches of moist grassland dotted the northeastern edge of the baylands, and a very large area of this habitat lay near Petaluma. The Petaluma Estuary exhibits a low-energy wave system with high sediment availability, characterized by extensive high and mid-marsh plains served predominantly by tidal sloughs; mudflats are limited. Due to low wave energy, the main controlling factors determining wetland form and function are the tidal range and tidal prism of the system.

Today, this segment remains relatively undeveloped, and it contains Petaluma Marsh, the largest intact tidal marsh within the estuary. However, almost all of the extant transition zone is either separated from the tidal marsh by dikes and roads or agriculturally modified for cattle grazing or viticulture. This marsh exhibits many of the features that were characteristic of the estuary's historical marshes: pans, a system of extensive channels, and natural transitions to adjacent uplands. These are not readily apparent in most other bay marshes. This marsh includes brackish and salt marsh areas and supports a great diversity of native plant species, important populations of Ridgway's rails, black rails, waterfowl, and shorebirds. Adjacent to the baylands, the landscape retains much of the historical character of moist grassland bordered by oak woodland. Portions of the Petaluma Marsh are connected to hillslopes (such as Burdell Island), and portions border dikes or railroad berms that sever the marsh from terrestrial lowland valleys and flats. These lowland valleys in grazing lands, like those north of Gallinas Creek, still support natural fresh-to-brackish surface drainage and subsurface (groundwater) connections to the baylands. The segment receives freshwater flows from San Antonio Creek, which supports extensive riparian habitat, and from the Petaluma River and Adobe Creek, which support runs of steelhead.

Much of the marsh plain has been diked and drained. As a consequence of draining, the deep peats have subsided considerably. Fringing marshes along the Petaluma River remain, and these have maintained their position relative to the tide. As a result, the Petaluma River is bordered by relatively high marshes, behind which are large areas of lower-lying land cut off from tidal action.

The North Novato baylands include mature, wide, topographically complex tidal marsh and creek systems (the Toy/Green Point Marsh and outer Bahia marshes along

Northern shoveler

the Petaluma River) that support dense and large populations of Ridgway's rails and black rails. The wide fringing mature brackish-to-salt-marsh gradient along Black John Slough is also an important habitat for black rails and (particularly toward the east) Ridgway's rails. The Bahia tidal lagoon (silted former marina) and channel also support Ridgway's rails adjacent to the recent tidally restored Central Bahia baylands. The Central Bahia baylands (including former Mahoney Spur) are currently in early tidal mudflat–salt marsh succession following tidal restoration. These baylands support abundant waterbirds and are expected to provide extensive additional habitat for an expansion of the adjacent Ridgway's rail populations. The East Bahia lagoon supports an important foraging habitat for bay ducks, diving ducks, wading birds, and shorebirds. The filled peninsulas surrounding the East Bahia lagoons support ruderal (weedy) upland vegetation and seasonal wetlands. The West Bahia lagoon is a damped tidal brackish lagoon that supports extensive submerged aquatic vegetation (widgeon grass) beds and waterfowl and wading bird habitat. Nontidal seasonal and perennial fresh–brackish wetlands also support important waterfowl and shorebird roosting and foraging habitats in the former dredged-sediment-disposal and decant pond sites.

Since the 1999 Baylands Goals, the area of tidal marsh has increased in the segment following the restoration of tidal action to diked wetlands through initiatives such as the Sonoma Baylands Project, Bahia Marsh Restoration Project, and Petaluma Marsh Expansion Project. Additional efforts are under way, including the Sears Point Restoration Project, which encompasses 1,000 acres of future tidal marsh and critical transition zones that provide high-tide refugia and space for landward migration, as well as seasonal wetlands and vernal pool habitat north of the SMART rail and Highway 37.

Implications of Drivers of Change

The Petaluma Marsh area is expected to undergo divergent responses to sea-level rise, depending on its position within the sedimentation gradient along the Petaluma River and its initial topography (diked bayland or tidal marsh). The southern reaches of this subregion, which are relatively rich in suspended-sediment supply, are more likely to sustain fringing tidal marshes where they exist today, and to support tidal marsh restoration currently in progress. Subsided diked baylands (especially in northern reaches of the Petaluma Marsh in Marin County) are likely to undergo more frequent levee overtopping, breaching, or failure (conversion to open water) and to develop a greater demand for drainage where levees do not fail. The extensive tidal slough and marsh plains of the Petaluma Marsh may be subject to bank erosion along the river, and an expansion of pans and low marsh within the marsh plain as tidal energy increases. Prehistoric tidal marsh remnants are likely to shrink and to lose native species diversity as lower marsh zones expand and upper marsh zones contract. Undeveloped agricultural lands with valley gradients or gentle hillslopes bordering tidal marshes in this subregion (including areas that are currently diked nontidal wetlands) will provide some of the best opportunities to restore and conserve tidal marsh ecosystems that retain all the critical subhabitats and species of concern during an accelerated sea-level rise. Populations of invasive plant species are likely to expand where levees are armored or maintained more frequently.

Considerations for Implementing the Actions

NEAR TERM (NOW TO MIDCENTURY, PRIOR TO SLR CURVE ACCELERATION)

If current suspended-sediment concentrations persist, existing natural and restored tidal wetlands will likely be resilient to sea-level rise even at higher rates. If additional areas are opened up for restoration, they are also likely to evolve resiliently, particularly if they are connected to the natural gradually sloping topography of the estuary margin. Alternatively, high-value artificial habitat can be created through the management of water, creating shallow wetlands such as those at Rush Creek.

LONG TERM (LATTER HALF OF THE CENTURY, AFTER SLR CURVE ACCELERATION)

Over time, with rising sea levels and potentially more extreme storms, flood protection along leveed edges will decline. In response to climate change, the options are either to improve flood protection along the existing levees or, as an adaptation strategy, selectively and opportunistically realign existing levees and concentrate flood protection along critical infrastructure (such as Highway 101). The railway will also come under progressive risk from tidal waters and will likely require upgrading. At such time, it would be beneficial to improve tidal connectivity to gradually sloping uplands, which would allow for the restoration of a potentially high-quality buffer habitat that with adequate space would be more resilient to sea-level rise.

Recommended Actions

FOR HABITATS AND THE LANDSCAPE IN GENERAL

- Protect and restore tidal marsh on both sides of the Petaluma River, particularly on the eastern side, between Highway 37 and False Bay (Dustman Road), which is already vulnerable to flooding.
- Protect, restore, and manage agricultural lands and other open space to reestablish a transition zone and buffers adjacent to tidal marsh and to provide space for landward migration. Create transition zone habitats on gentle slopes in front of flood-risk-management levees.
- Enhance the stream–marsh transition zone between San Antonio Creek and tidal habitats, one of the few places where such restoration can take place.
- Consider ways to increase the sediment supply to tidal baylands. Reconnect stream channels into marshes, and augment the trapping efficiency of tidal baylands to foster accretion, as appropriate.
- Protect and enhance moist grassland habitats on the eastern portion of this segment.
- Elevate Highway 37 to a causeway, and remove, realign, or elevate other barriers (such as the SMART rail) to achieve unimpeded tidal and other hydrological connectivity.

FOR PARTICULAR WILDLIFE POPULATIONS

- Identify, conserve, and manage selected refugia for native bayland plants. Focus on unique or core populations of uncommon plants, especially in low marshes.
- Reduce the runoff of agricultural contaminants and nutrients from agricultural activities to improve water quality in the adjacent wetlands.
- Control perennial pepperweed invasions in otherwise intact tidal brackish marsh to prevent a loss of high-marsh plant diversity.
- Continue to control invasive *Spartina* in the Petaluma River and other tidal areas in this segment.

Restoration Benefits

Significant benefits for tidal marsh species such as the Ridgway's rail, black rail, and salt marsh harvest mouse could be achieved in this segment. Restoring tidal marsh would also improve nursery habitat for salmon, steelhead, starry flounder, and other aquatic species. Restoring and enhancing a fluvial/riparian–tidal marsh transition zone along San Antonio Creek and possibly Adobe Creek would benefit fish, amphibians, and plants. Restoring the estuarine–terrestrial transition zone would improve conditions for rare high-marsh and transition zone plant species. Furthermore, the conservation of transition zones and their reconnection with the baylands ecosystem would provide critical migration space for high tidal marsh and brackish marsh to migrate as sea levels rise toward the end of the 21st century.

Challenges

Challenges for the existing marshes and future transition zones are similar to those of the other segments between Novato Creek and the Napa River, namely, California Northern Railroad tracks, Highway 37 and Lakeville Highway east of the Petaluma River, and PG&E power lines. The Redwood Landfill was built in 1958 on historic marshes just north of Novato. It is bordered on three sides by San Antonio Creek. As with many other landfills, leachate drainage could be exacerbated if groundwater levels rise. The need to maintain and protect the landfill would be a constraint on the management of San Antonio Creek marshes with rising sea levels. Another area that will need to be protected is CBS Tower Field and the adjacent airfield at Gnoss Field. Here the drainage of the adjacent marshes has been considerably modified. Vineyard development on the adjacent hill slopes, changing the agricultural land use from low to high intensity, may constrain the options for managed realignment and flood protection. Planning will require coordination with local agencies and organizations, including Sonoma County, the Sonoma RDC, San Pablo Bay National Wildlife Refuge, CDFW, Sonoma Land Trust, Northwestern Pacific Railroad, SMART rail, and Caltrans.