

Suisun Marsh

Ecological History and Possible Futures

Edited by

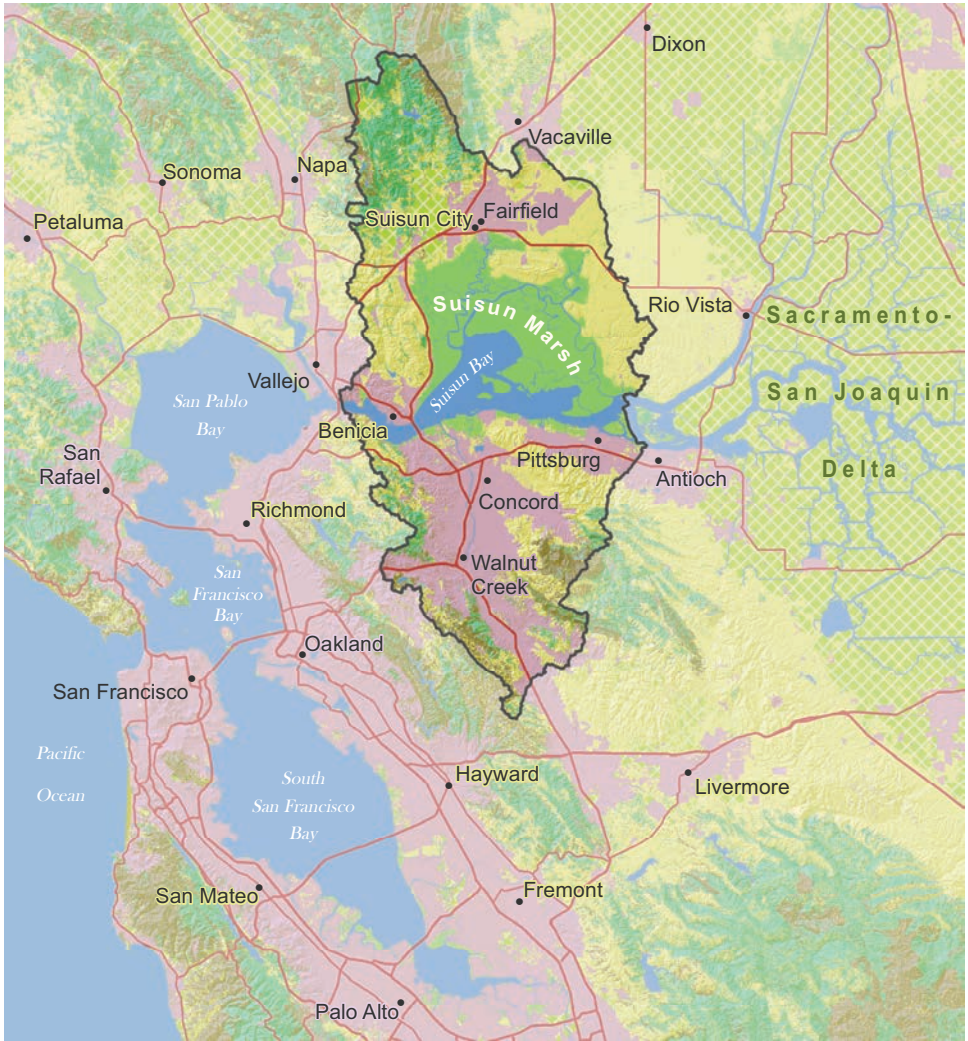
Peter B. Moyle, Amber D. Manfree,
and Peggy L. Fiedler

M A P S

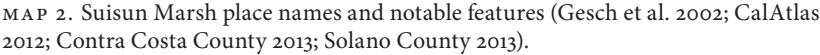
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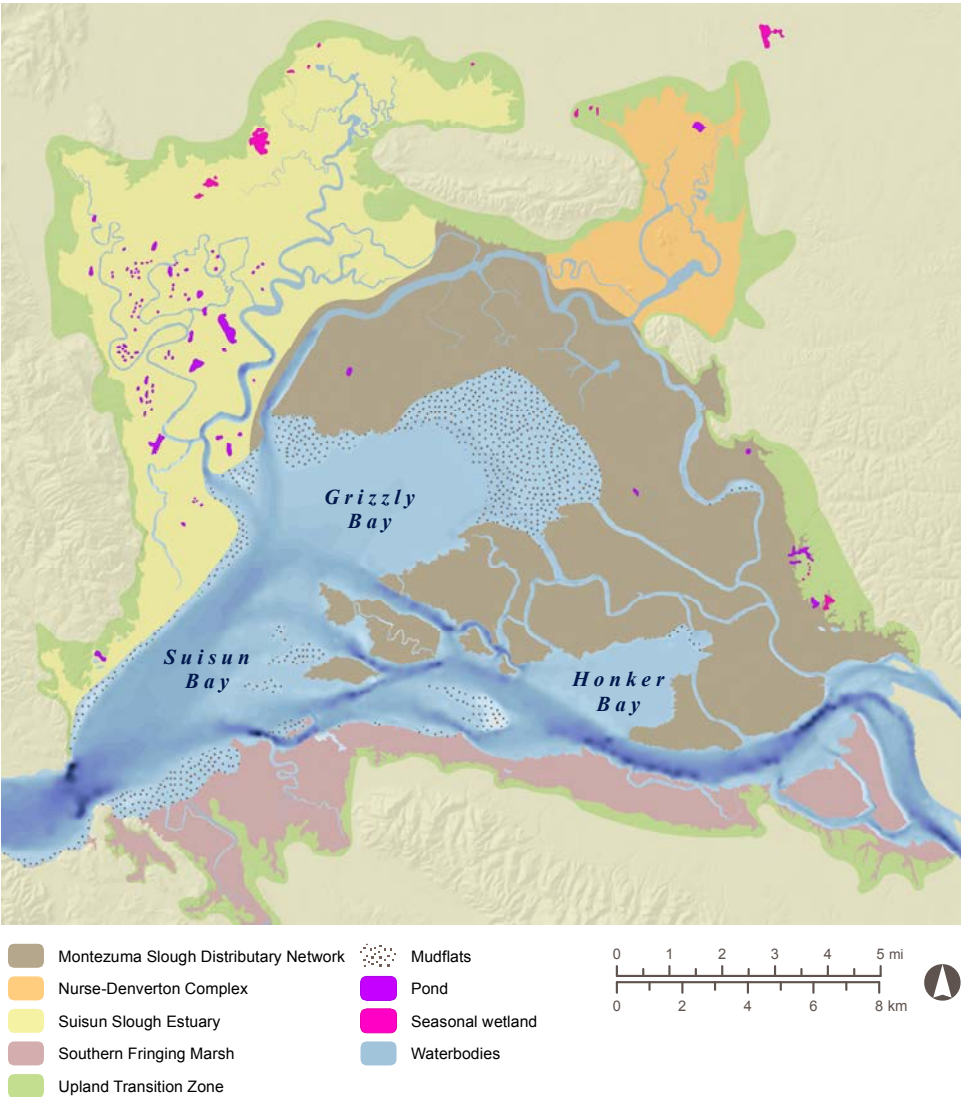
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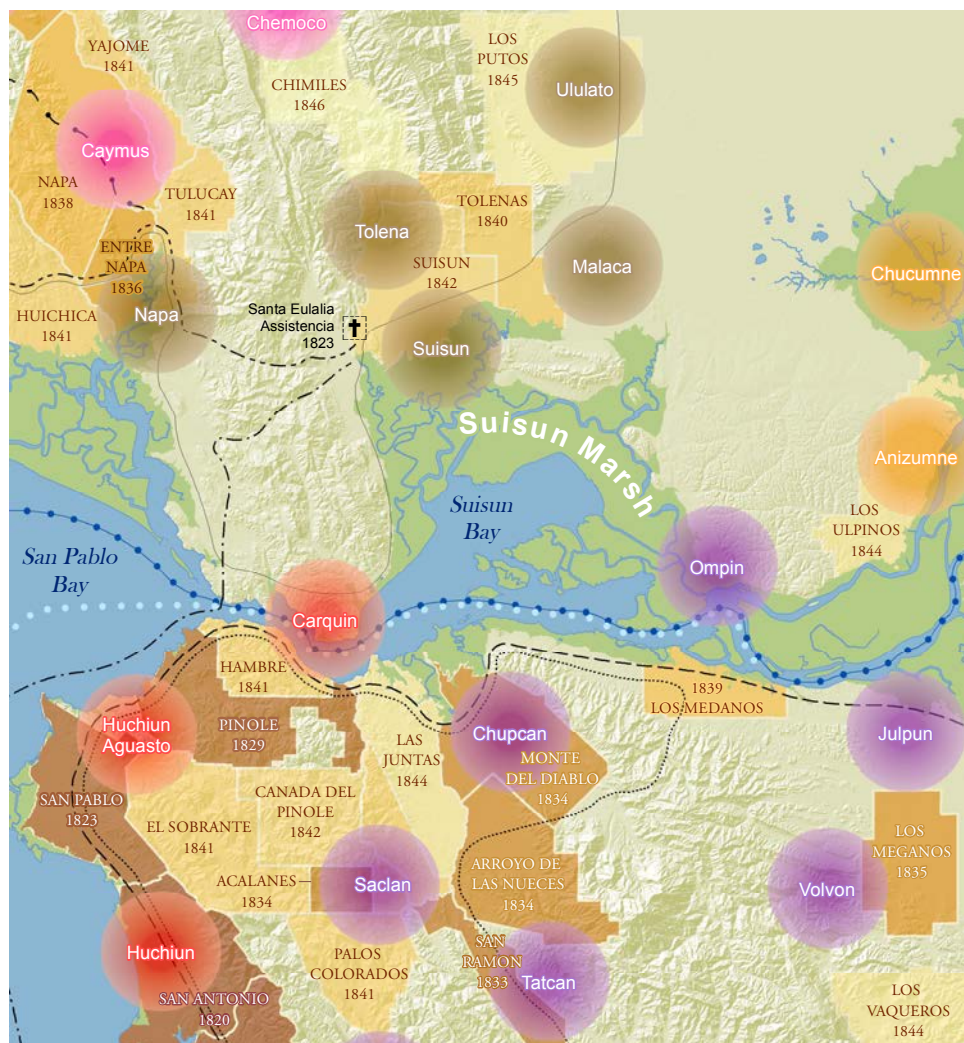
MAP 1. The San Francisco Estuary, showing the position of Suisun Marsh in relation to the Delta and San Francisco Bay, as well as regional land cover types (Gesch et al. 2002; CalAtlas 2012; U.S. Geological Survey 2013).



MAP 2. Suisun Marsh place names and notable features (Gesch et al. 2002; CalAtlas 2012; Contra Costa County 2013; Solano County 2013).



MAP 3. Historical functional subregions of Suisun Marsh, late 1800s. Sloughs, landforms, and bathymetry are from measurements taken during 1856–67 (Bache 1872). Ponds and wetlands are from topographic maps surveyed during 1896–1907 (U.S. Geological Survey 1896, 1918a, 1918b). Topography is contemporary (Gesch et al. 2002).



Tribal language group

- Wappo
- Patwin
- Plains Miwok
- Bay Miwok
- Costanoan

European incursions

- 1772 Fages-Crespi (1)
- 1775 Canizares (1)
- 1776 Anza-Font (1)
- 1810 Moraga (2)
- 1823 Amador (1)
- 1823 Altamira (1)
- 1832 Work (3)
- 1833 Yount (3)

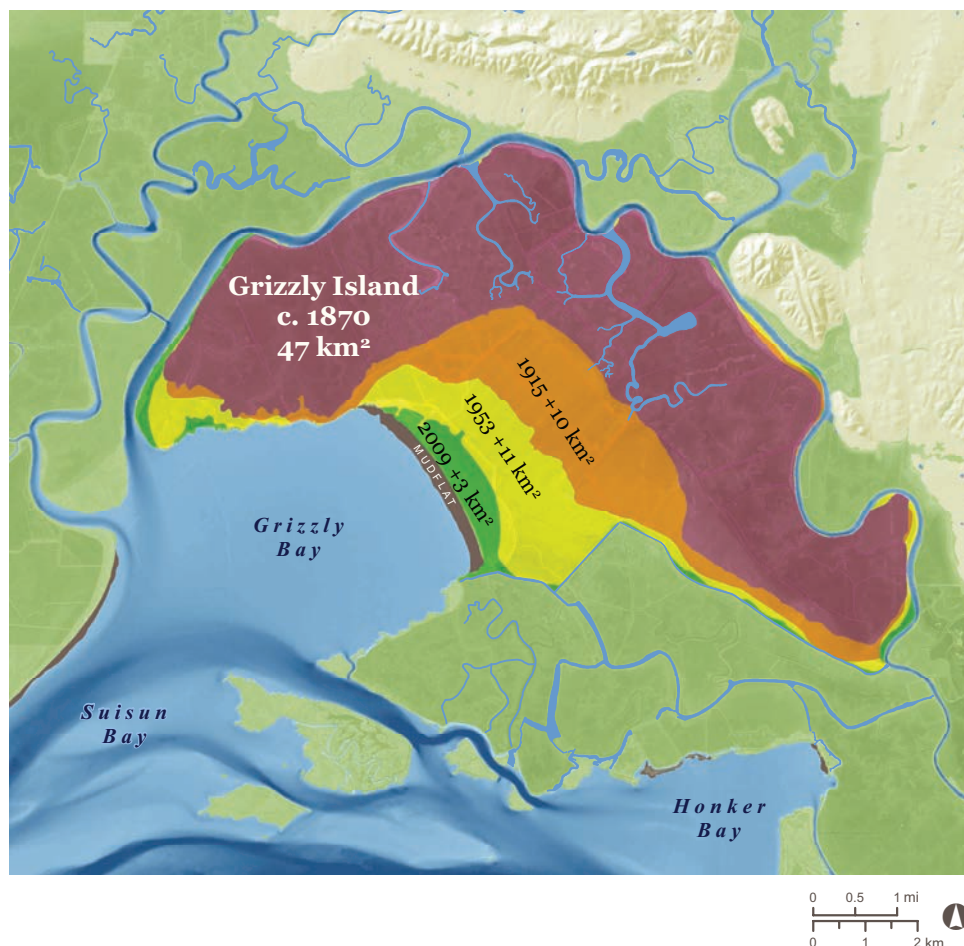
- (1) Exploration
- (2) Attack
- (3) Trapping

Ranchos by year granted

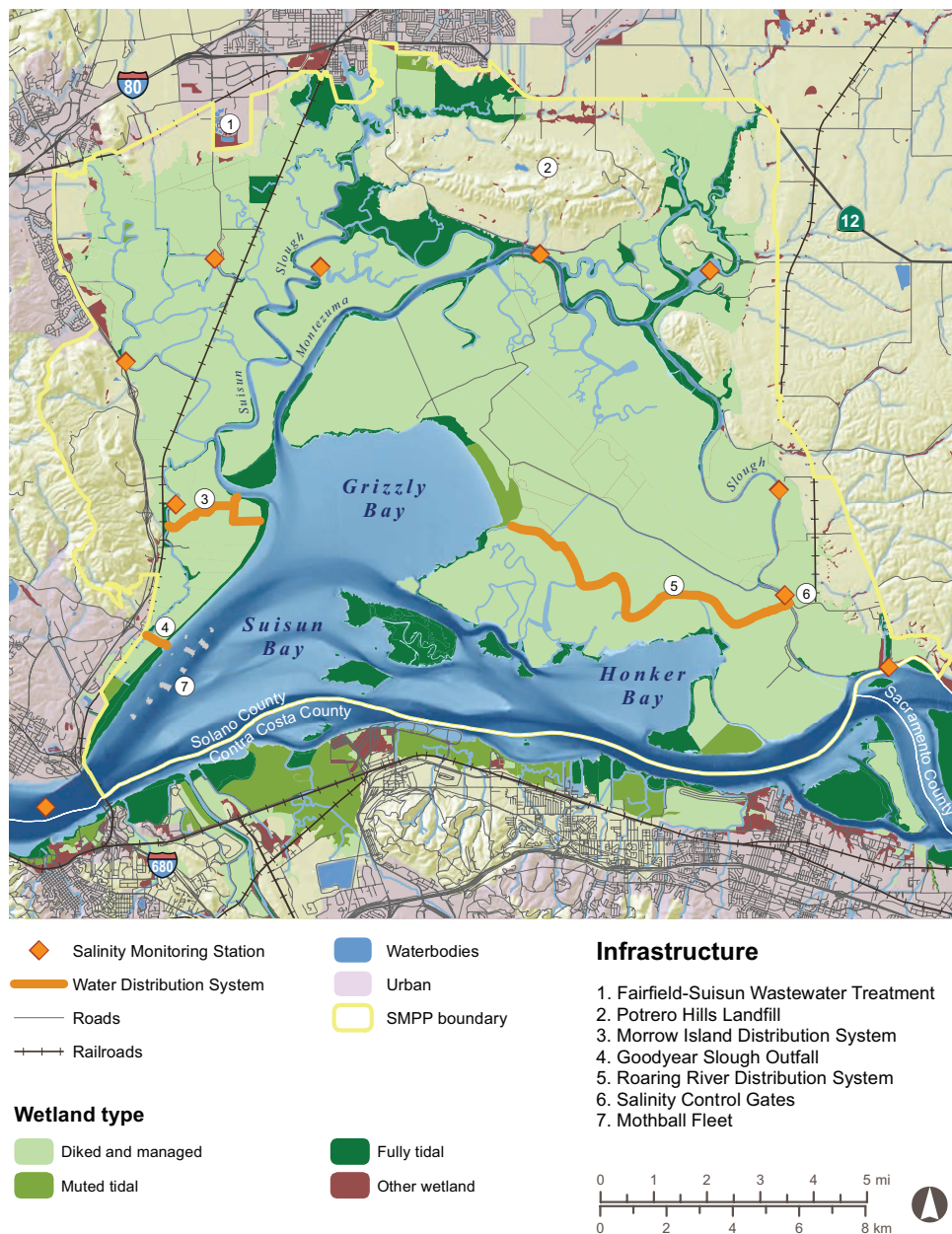
- 1820 - 1824
- 1825 - 1829
- 1830 - 1834
- 1835 - 1839
- 1840 - 1846



MAP 4. Shifting landscape pressures, 1772–1846: a representation of known human presence, intended for conceptual illustration. Circles show approximate centers of areas inhabited by tribal groups; colors represent Indian language groups. Also shown are early explorers' paths and Mexican land grants. (Geospatial data sources: Eldredge 1909; Camp and Yount 1923; Maloney and Work 1943; Shumway 1988; U.S. Bureau of Land Management 1993; Milliken 1995; Gesch et al. 2002; Bowen 2009; San Francisco Estuary Institute 2012; Whipple et al. 2012.)



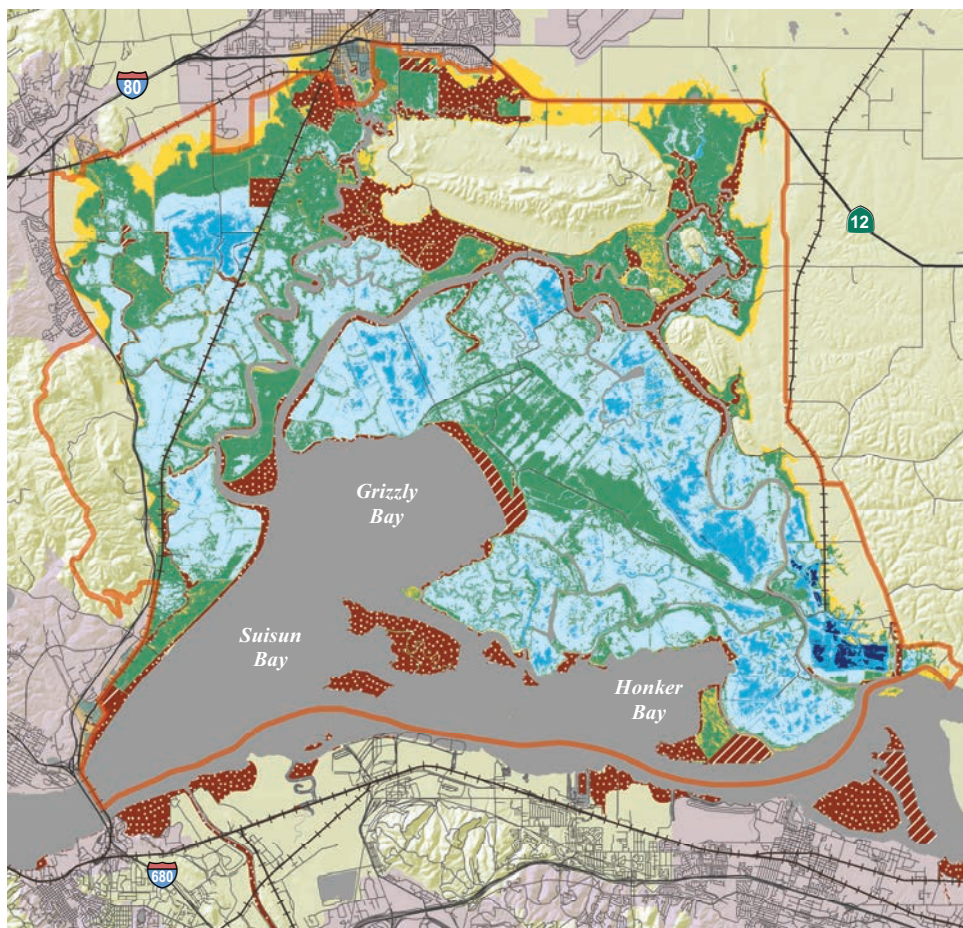
MAP 5. Grizzly Island reclamation of Gold Rush sediments, 1870–2007. Successive dikes built after the Swamp Land Reclamation Act captured gold-mining sediment moving through the estuary. Dates refer to map publication, not levee installation. Present-day topography and bathymetry are shown. (Geospatial data sources: U.S. Geological Survey 1949 [1980], 1953a [1980], 1953b [1980]; Metsker 1953; U.S. Bureau of Land Management 1993; Gesch et al. 2002; California Department of Water Resources 2007; Boul et al. 2009; Foxgrover et al. 2012.)



MAP 6. Hydrologic infrastructure and wetland types in Suisun Marsh today.
(Geospatial data sources: Gesch et al. 2002; CalAtlas 2012; Foxgrover et al. 2012; San Francisco Estuary Institute 2012; California Department of Water Resources 2013; Contra Costa County 2013; Solano County 2013.)

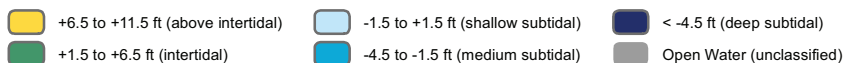


MAP 7. U.S. Coast Survey navigational chart for Suisun Bay; surveys were conducted in 1856–67 (Bache 1872).



2005

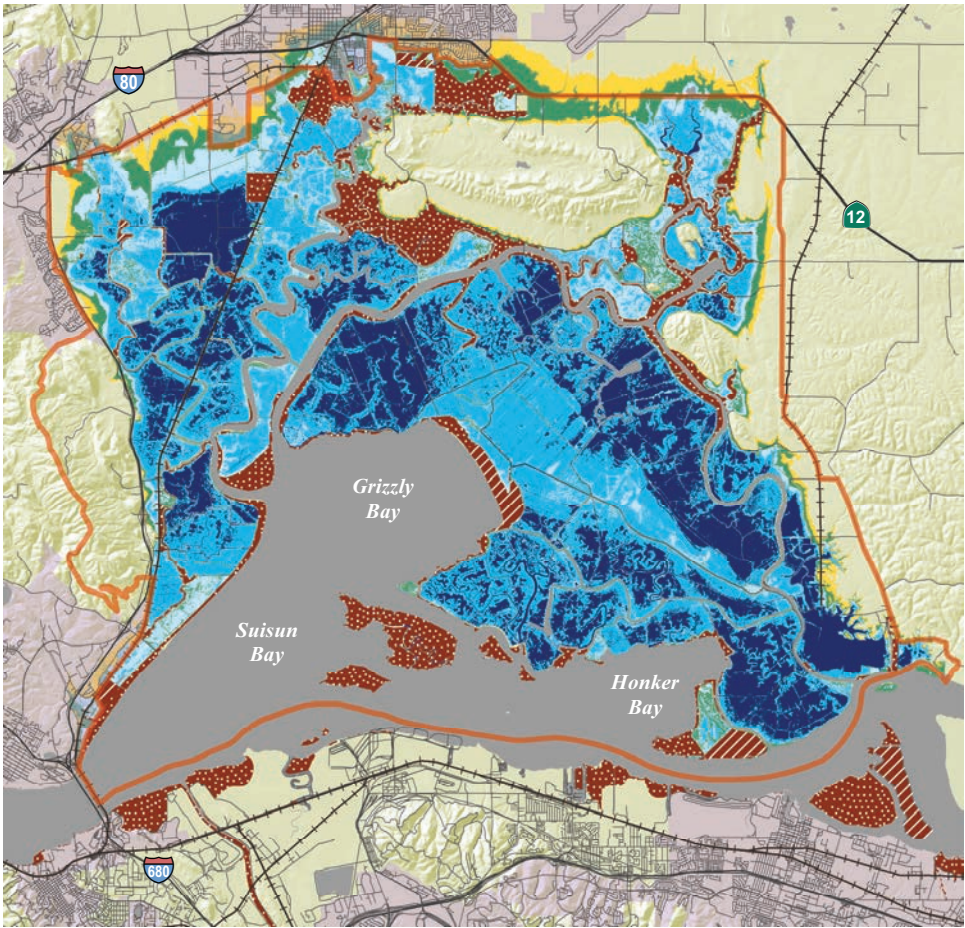
Elevation of Diked Lands Relative to Mean Sea Level



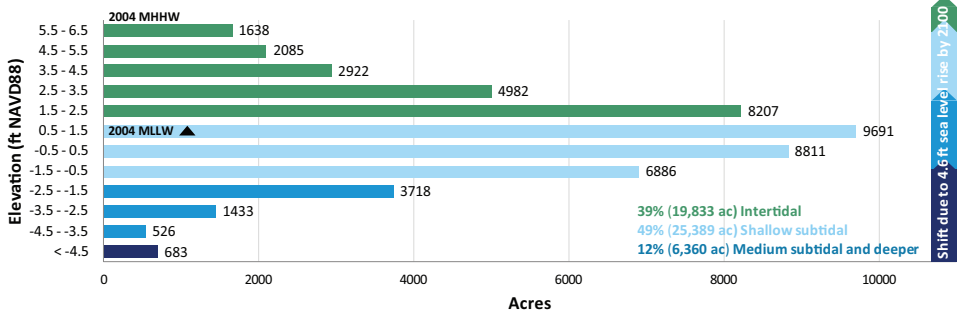
Other Features



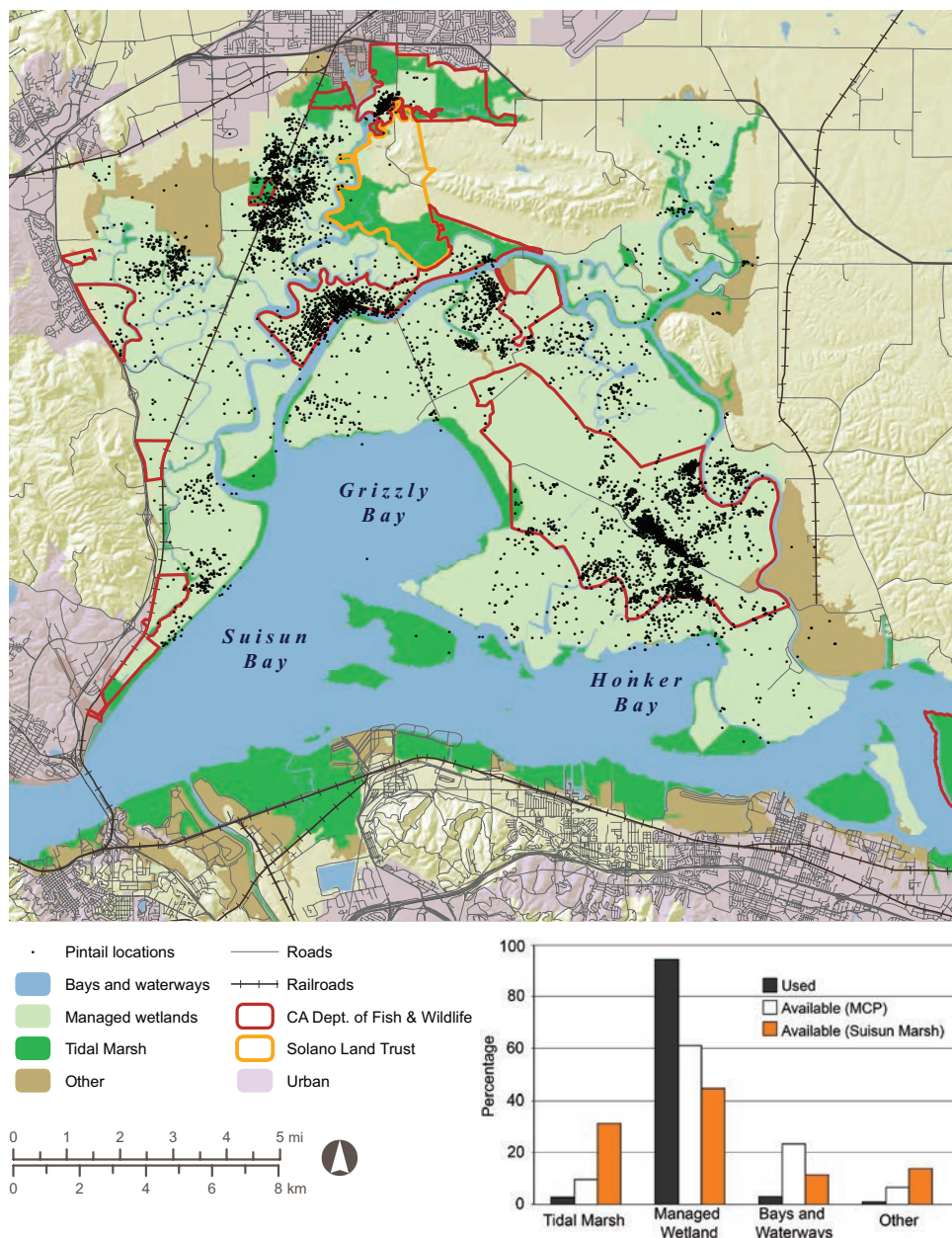
MAPS 8 and 9. Elevation of Suisun Marsh in relation to present sea level (map 8) and in relation to expected 1.4-m sea-level rise by 2100 (map 9). (Geospatial data sources: Gesch et al. 2002; California Department of Water Resources 2007; CalAtlas 2012; Foxgrover et al. 2012; San Francisco Estuary Institute 2012; California Department of Water Resources 2013; Contra Costa County 2013; Solano County 2013.)



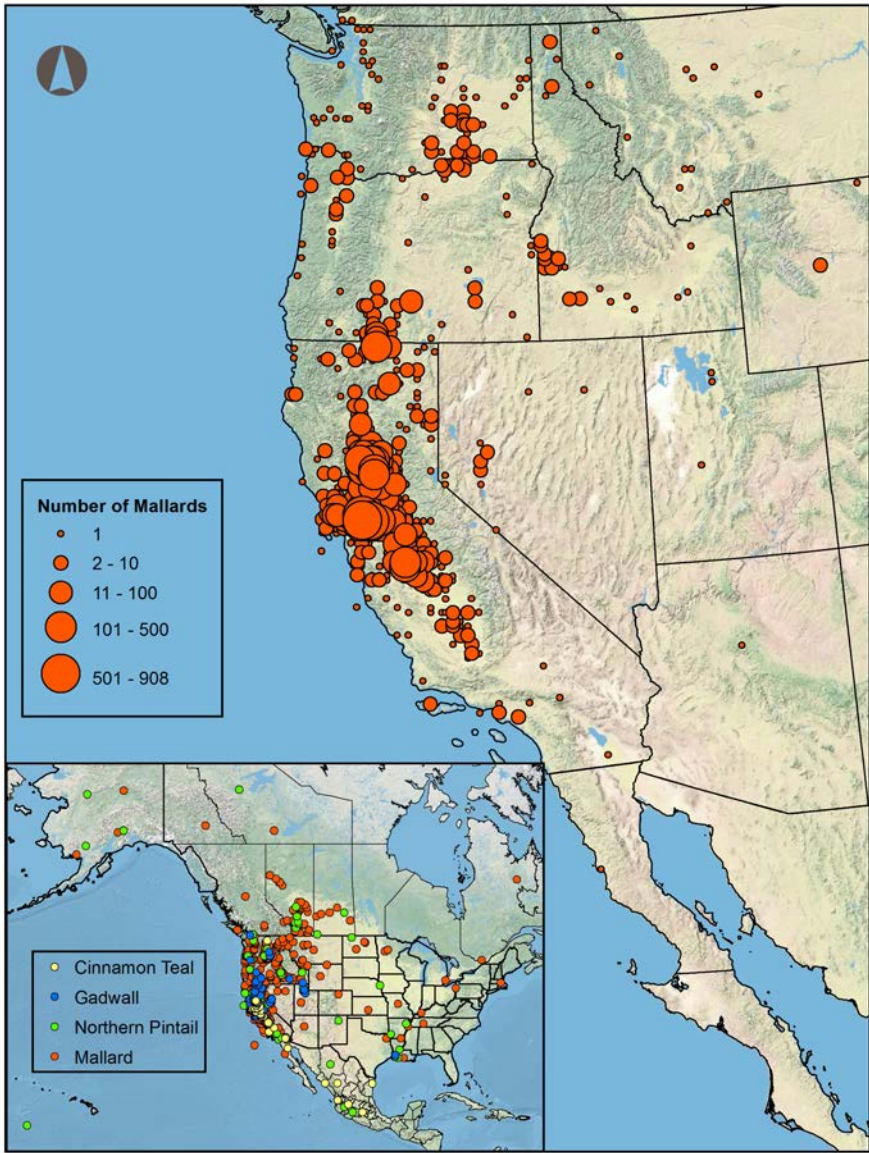
ca. 2100



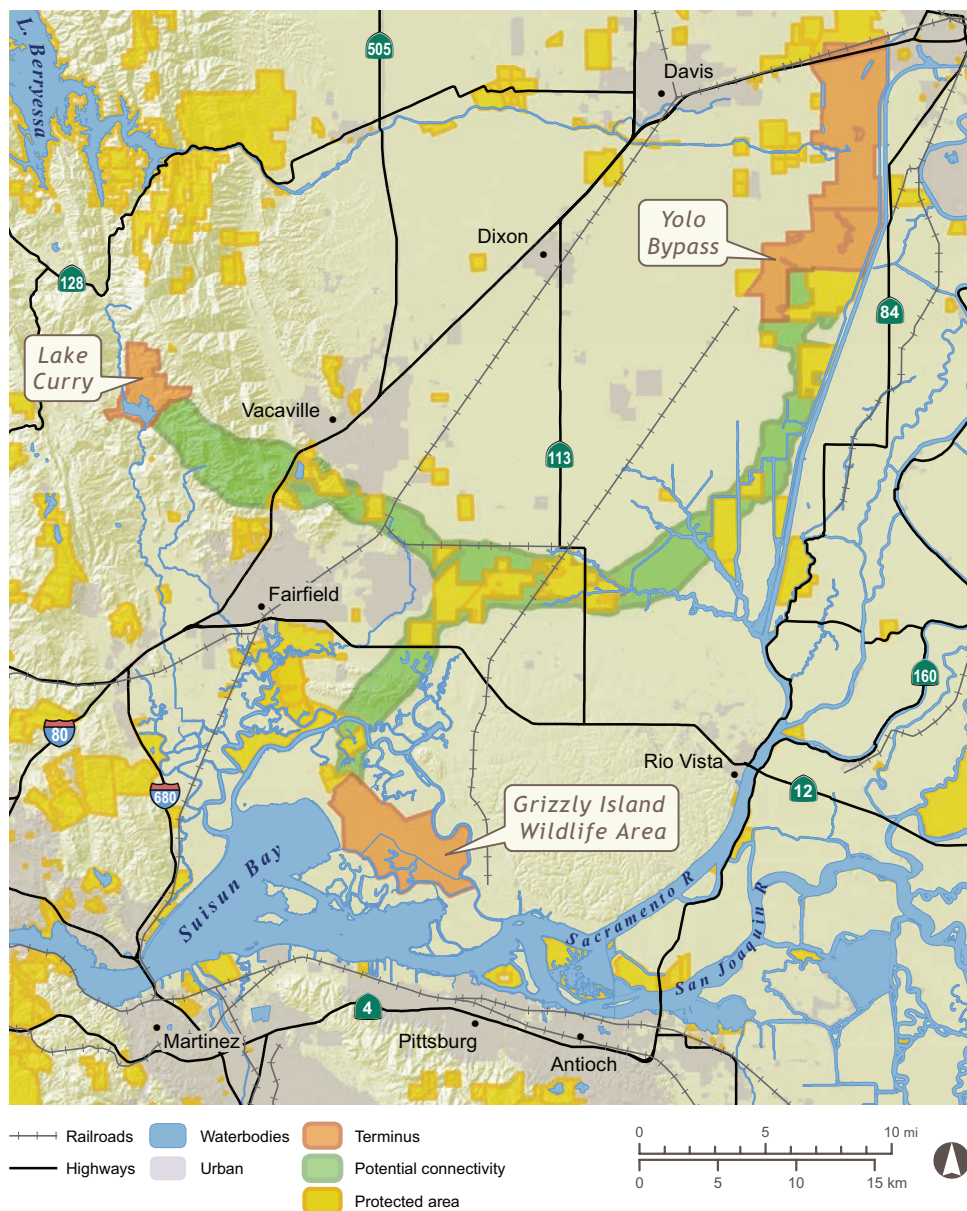
Distribution of existing elevations of diked lands in Suisun Marsh. The median elevation of diked lands in the Marsh is about mean lower low water (MLLW, 1.5 ft); 39% of the diked land is above MLLW, 49% is between zero elevation and -3 ft, and 12% is more than 3 ft below MLLW (for spatial distribution of these diked land elevations, see map 8 in color insert). Arrow on right shows how the areal distribution of tidal lands would shift with sea-level rise by 2100.



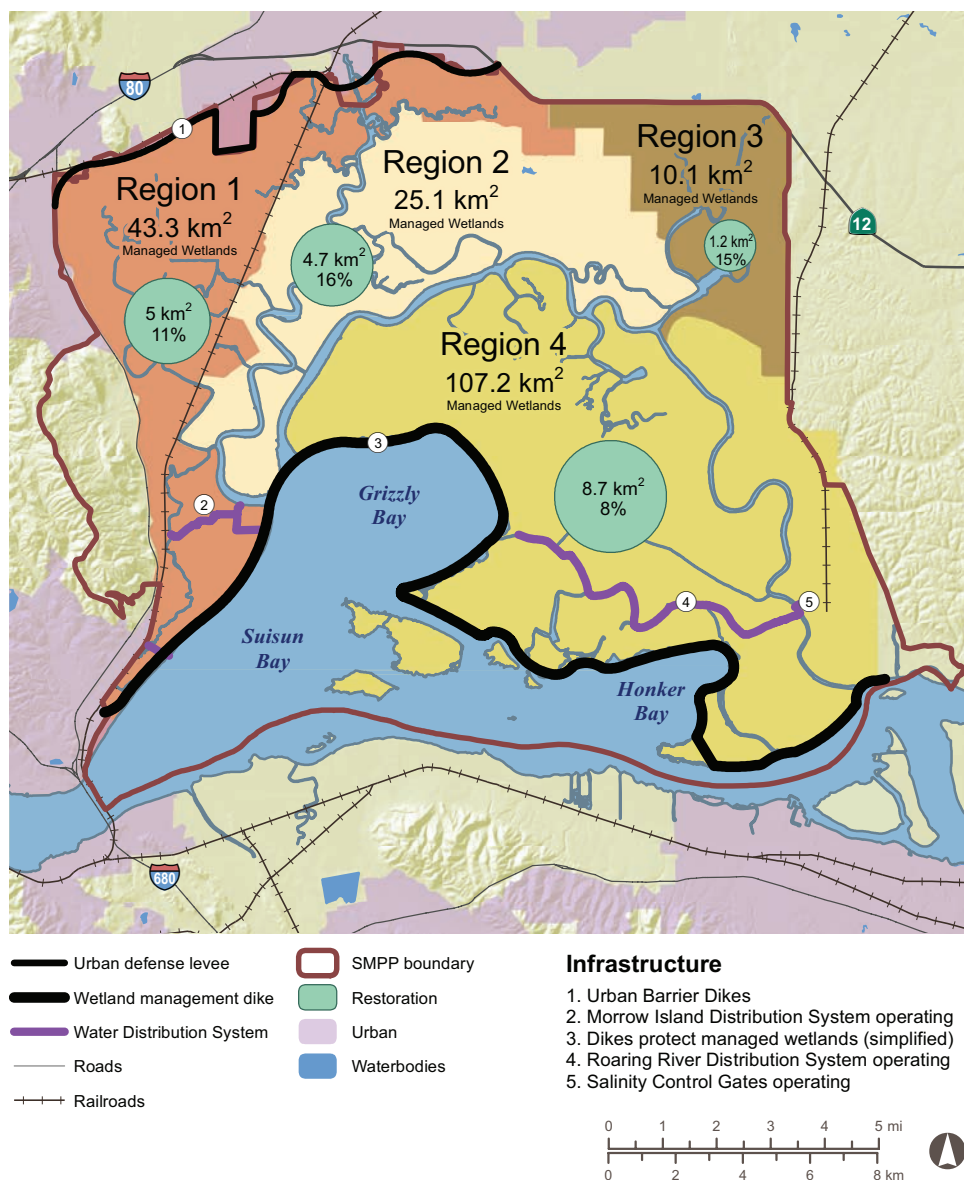
MAP 10. Locations ($N = 7,825$) of 215 radiomarked female northern pintail in Suisun Marsh habitats from August to February during winters 1990–93. The graph shows habitat use by radiomarked pintails in relation to habitat availability in the Marsh. Used habitats are represented by the percentage of radiomarked pintail locations found within each habitat type. Habitat availability was estimated two ways, as those habitats available within (1) the Suisun Marsh Basin boundary as pictured in figure 1.1 and (2) the minimum convex polygon (MCP) depicting the home range of the entire population of 215 radiomarked pintails. Habitats were categorized as tidal marsh, managed wetlands, bays and waterways, and other habitat (which included uplands and grazed lands). (Waterfowl data provided by authors. Geospatial data sources: Gesch et al. 2002; CalAtlas 2012; San Francisco Estuary Institute 2012; Contra Costa County 2013; Solano County 2013.)



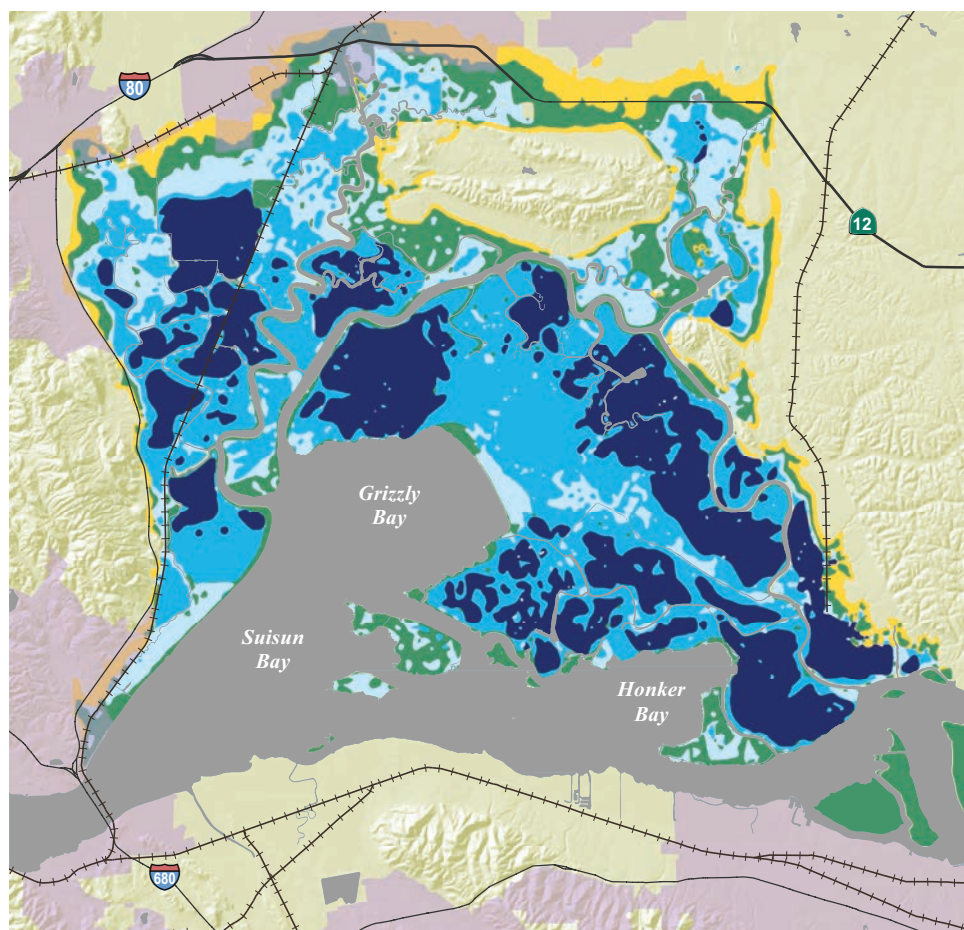
MAP 11. Location and abundance of ducks captured and banded in Suisun Marsh during late summer (May–September) and recovered ($N = 9,368$) since 1932 in North America. The main map shows recovered mallard (orange; $N = 8,367$), northern pintail (green; $N = 670$), gadwall (blue; $N = 246$), and cinnamon teal (yellow; $N = 85$) in North America. Ducks were banded within the Suisun Marsh by the California Department of Fish and Wildlife and California Waterfowl Association, and band recoveries were thereafter managed by the U.S. Geological Survey's Bird Banding Lab.



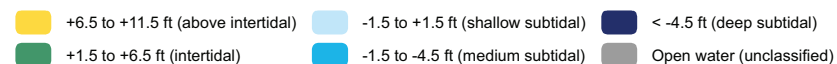
MAP 12. Potential pathways of movement for tule elk between Grizzly Island, Yolo Bypass, and the Vaca Hills. The program used chooses the best routes from Grizzly Island to other potential refuge (terminus) areas.



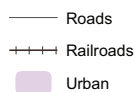
MAP 13. The Fortress Marsh scenario. The regions and amount of proposed restored marsh area (circles) follow the Suisun Marsh Plan of Protection (2010). This scenario envisions Suisun Marsh being maintained as close to its present-day state as possible (Gesch et al. 2002; San Francisco Bay Conservation and Development Commission 2010; CalAtlas 2012; Contra Costa County 2013; Solano County 2013).



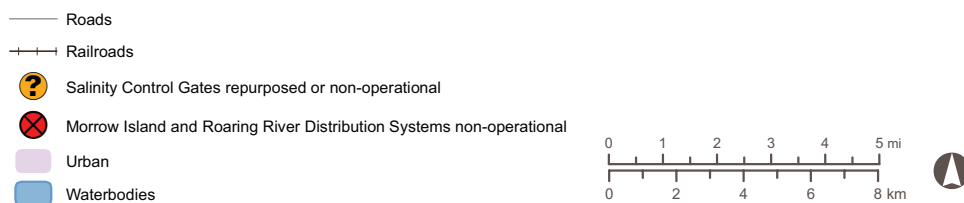
Elevation Relative to Estimated 2100 Mean Sea Level



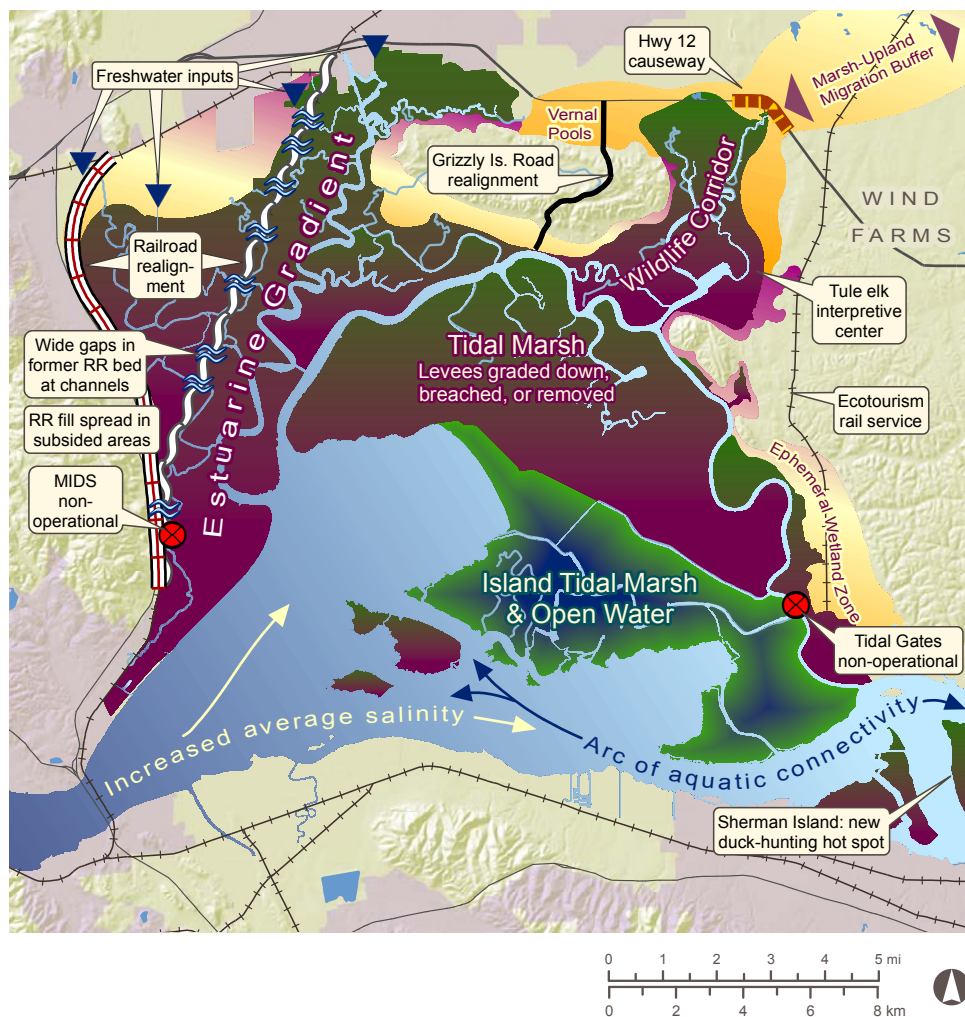
Other Features



MAP 14. The Flooded Marsh scenario. Without proactive efforts to reverse subsidence, much of the Marsh may be inundated in the future (California Department of Water Resources 2007; CalAtlas 2012; Contra Costa County 2013; Solano County 2013).



MAP 15. The Planned Accommodation Marsh scenario. This would be a mixed-use marsh meeting many objectives (CalAtlas 2012; Contra Costa County 2013; Solano County 2013).



MAP 16. The EcoMarsh scenario. Increased habitat connectivity restores regional function (CalAtlas 2012; Contra Costa County 2013; Solano County 2013).