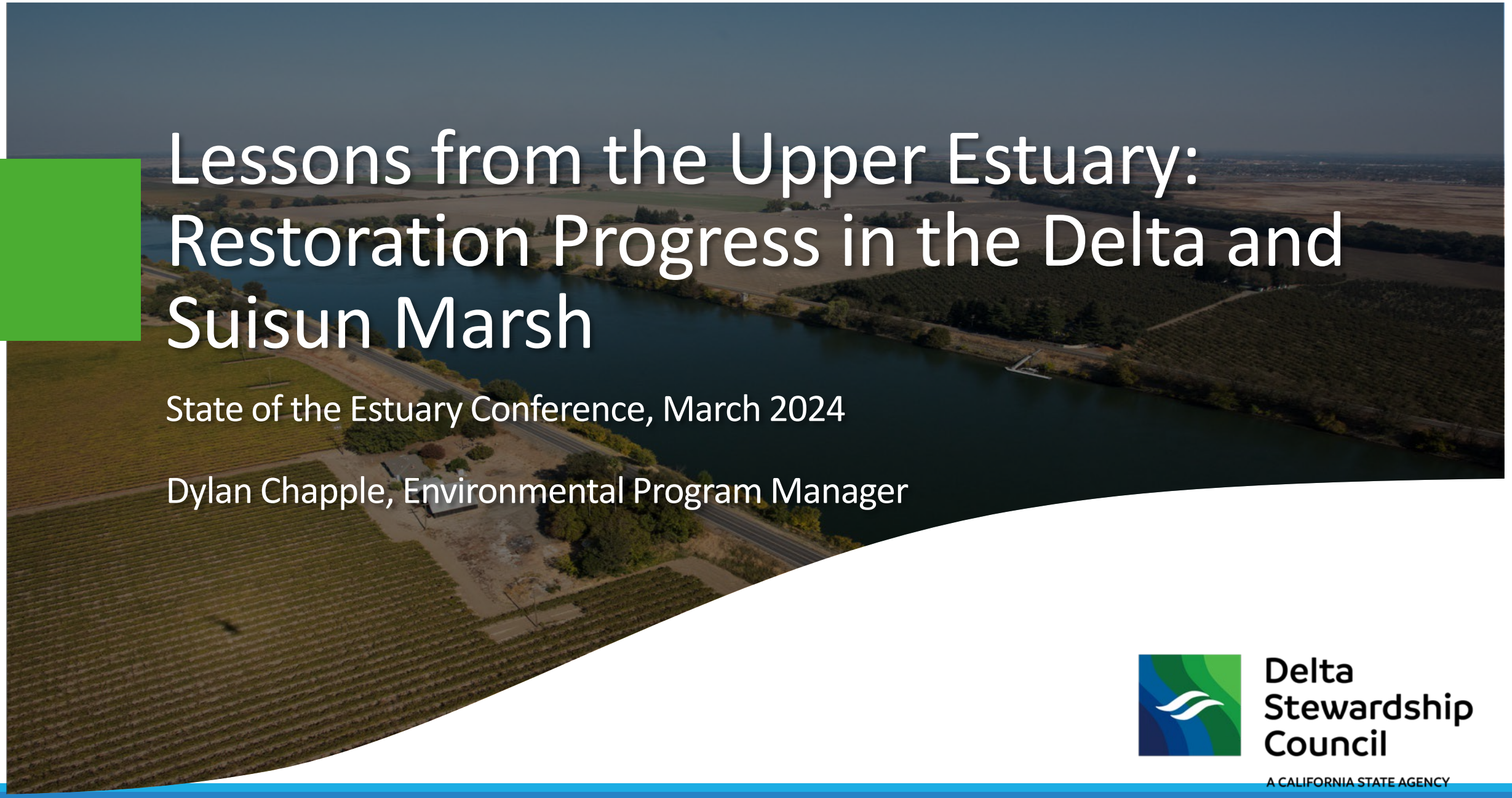


Lessons from the Upper Estuary: Restoration Progress in the Delta and Suisun Marsh

State of the Estuary Conference, March 2024

Dylan Chapple, Environmental Program Manager

Delta Stewardship Council

A CALIFORNIA STATE AGENCY

California's Delta and Suisun Marsh

- **"Upper Estuary"**
- **500,000 residents**
- Habitat for over **700 species**
- **Supports 80%** of California's commercial fishery species; recreational fishing area
- Water supply for **26 million people**
- Irrigates over **4 million acres** (45% of US fruits & vegetables)

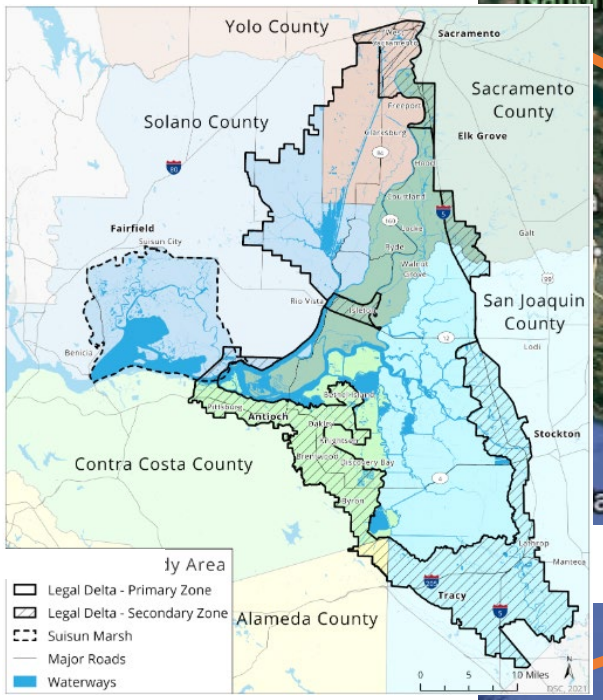


Image: Google

Pre-European Delta

Ancestral and current un-ceded territory of Bay Miwok, Coast Miwok, Plains Miwok, Maidu, Nisenan, Ohlone, Patwin, Pomo, Wappo, Wintun, and Yokuts

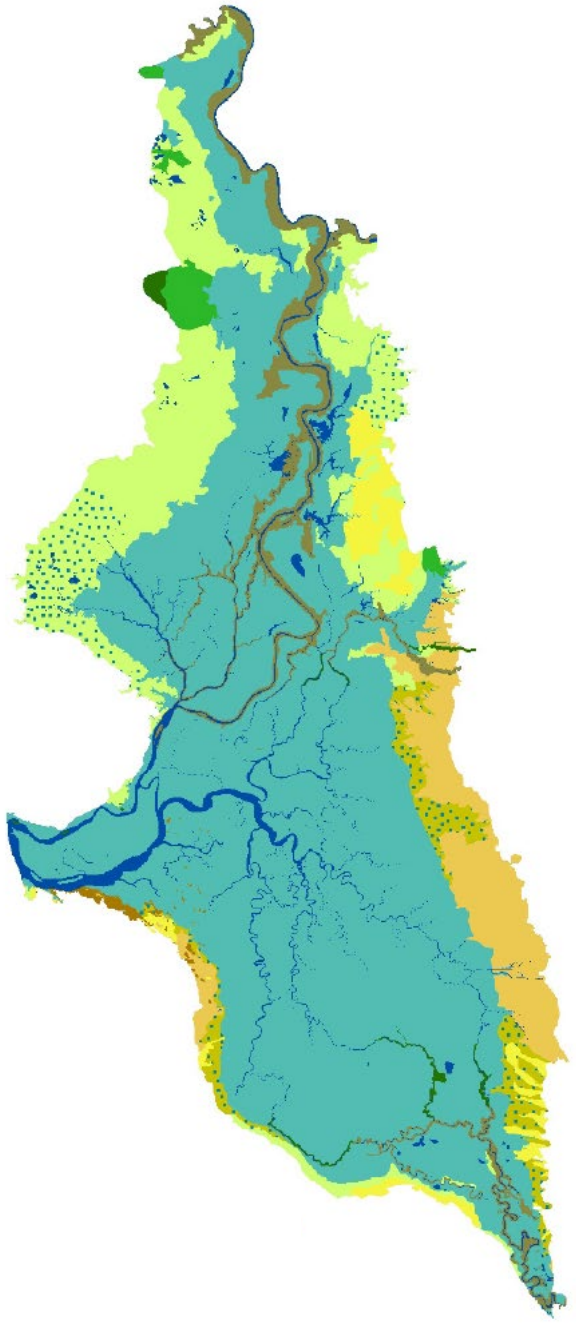


Image: SFEI/ASC

Pre-European vs. Modern

- ~96% of tidal wetlands lost
- Removal of traditional management practices
- Complete alteration of watershed hydrology and ecosystem connectivity

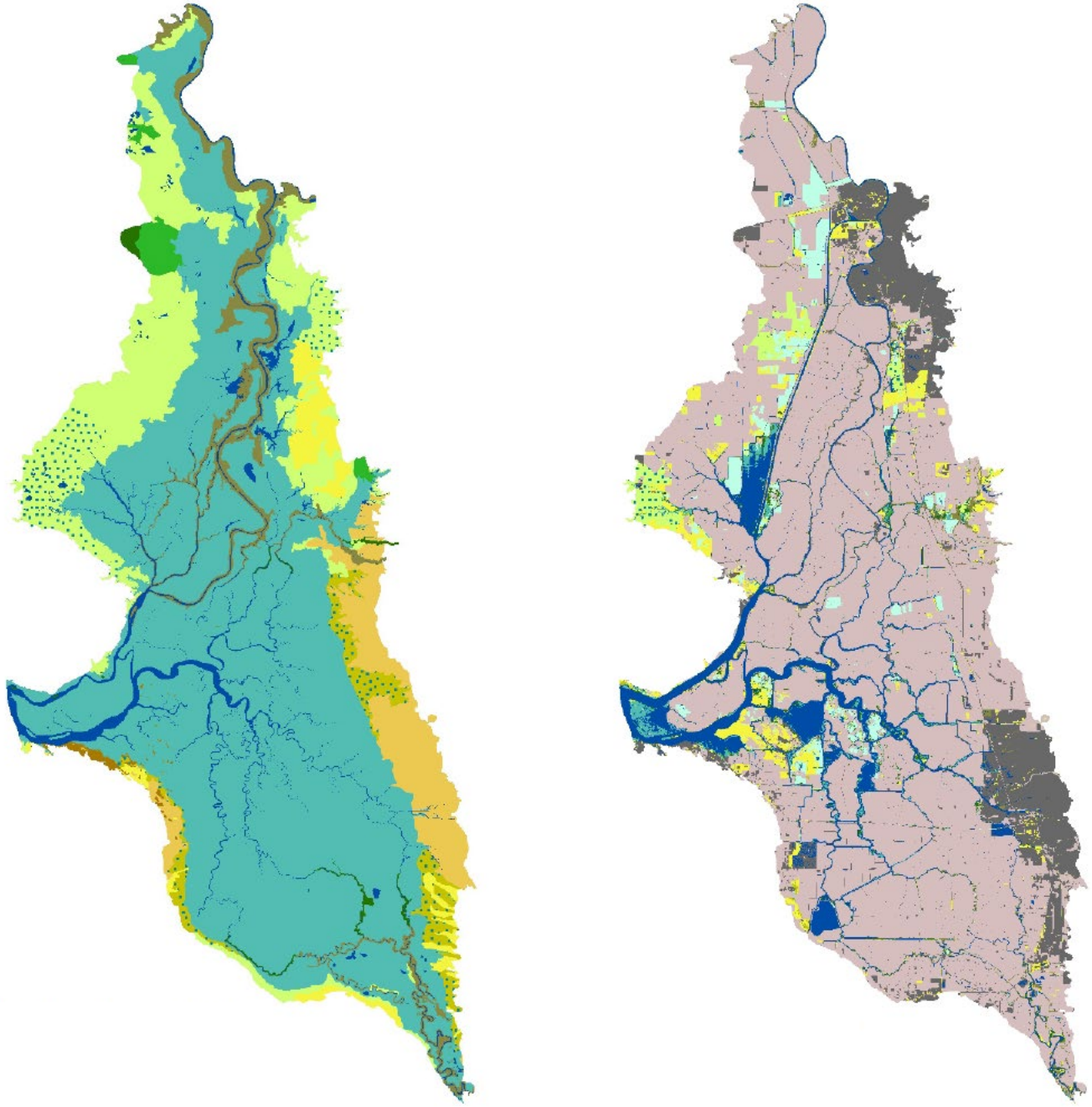


Image: SFEI/ASC

Delta Plan Chapter 4 Amendment

- **Targets: 60-80k acres** of restoration by **2050** above **2007** baseline

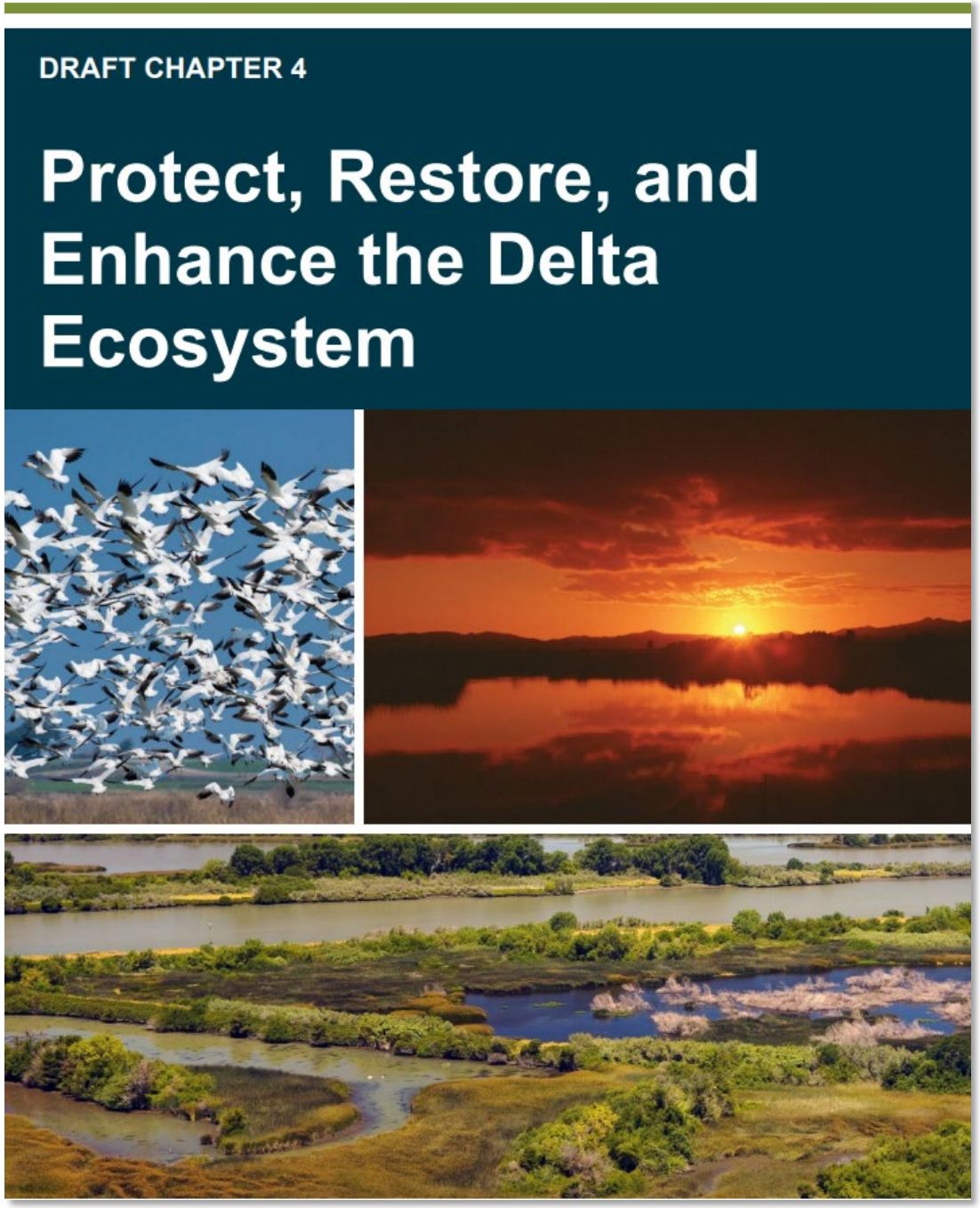
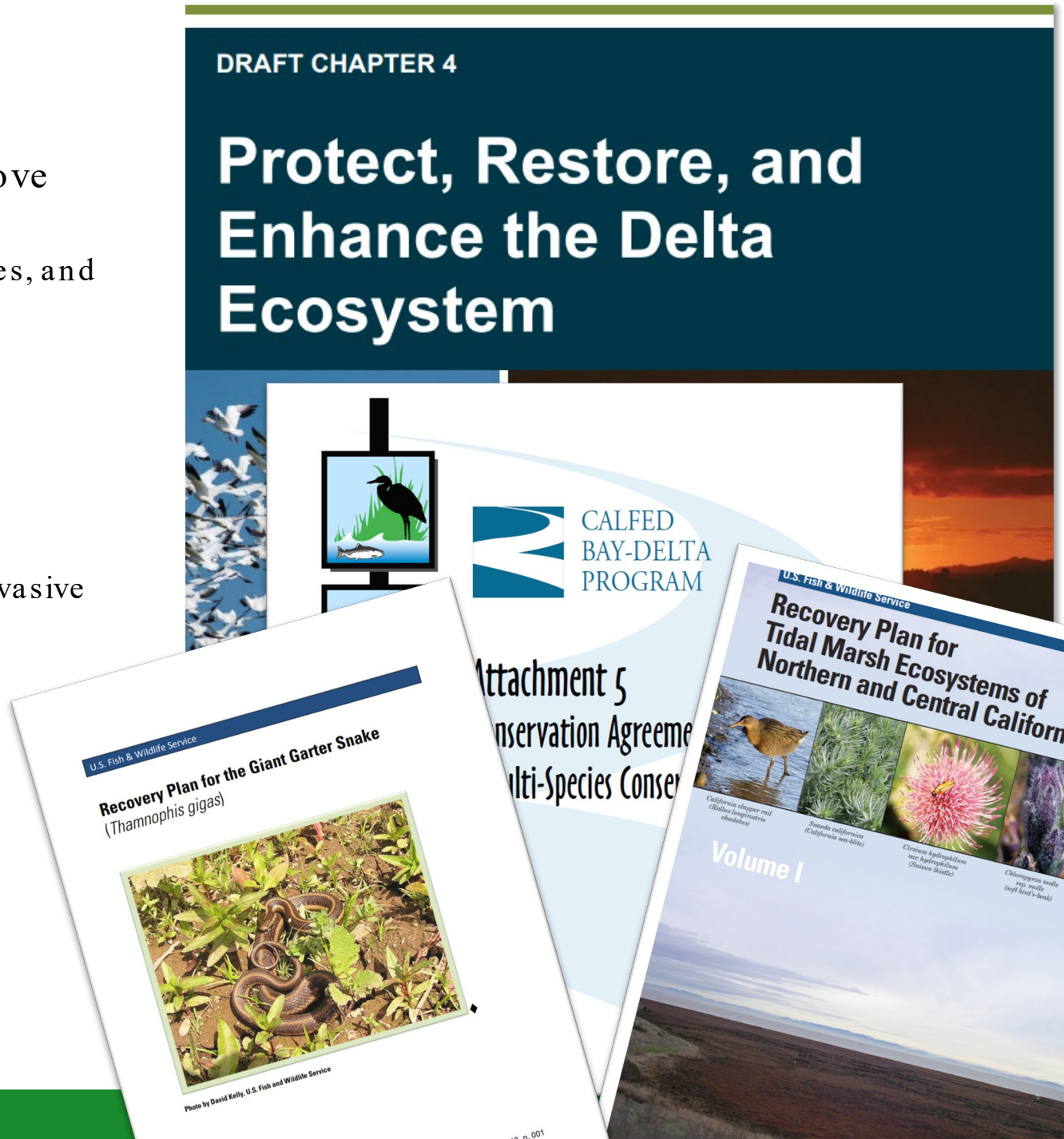


Image: DSC

Delta Plan Chapter 4 Amendment

- **Targets: 60-80k acres** of restoration by **2050** above **2007** baseline
  - Informed by 14 recovery plans, conservation strategies, and species-specific resiliency plans
- **Five core strategies:**
  - More natural, functional flows
  - Restore ecosystem function
  - Protect land for restoration
  - Protect native species, reduce impact of nonnative invasive species
  - Improve institutional coordination
- **Other Considerations:**
  - Good neighbor checklist
  - Compatible with adjacent land uses
  - Tribal involvement
  - Social benefits



Delta Plan Current Conditions

Ecosystem Type	Historic Ac.	2007 Baseline Ac.
Non-tidal wetlands (Seasonal Wetland Wet Meadow, Nontidal Wetland, Alkali Seasonal Wetland, *many acres of subsidence reversal projects*)	116,524	5,800
Riparian (+ Floodplain) (Willow Riparian Scrub/Shrub, Valley Foothill Riparian, Willow Thicket)	51,427	14,200
Tidal Wetland (Brackish (Suisun), Fresh (Delta))	530,541	19,900

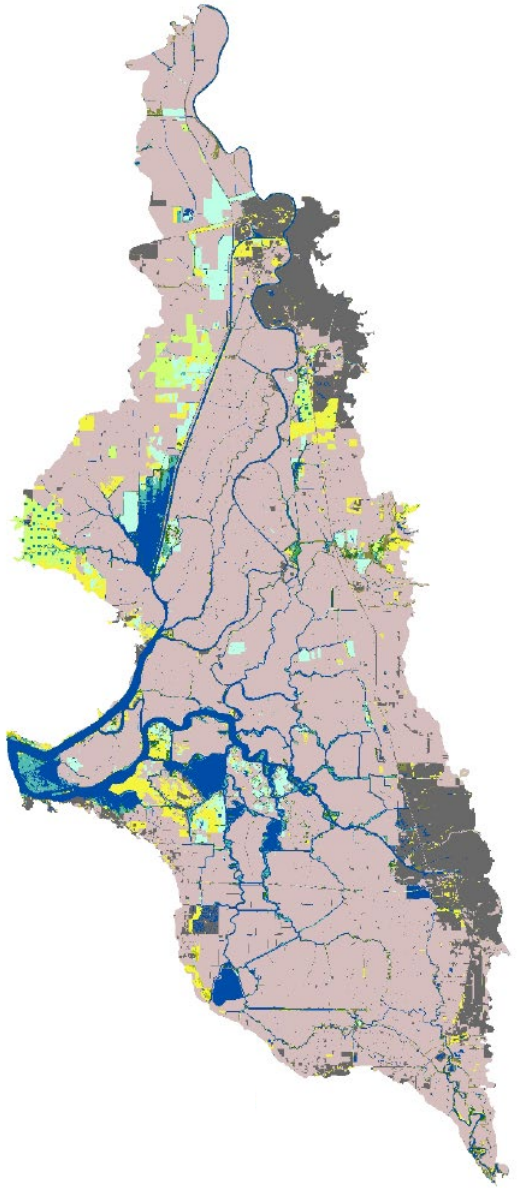


Image: SFEI

Delta Plan 2050 Restoration Targets

Ecosystem Type	Historic Ac.	2007 Baseline Ac.	Target Ac. Net Increase from Baseline	2050 Target Total Area
Non-tidal wetlands (Seasonal Wetland Wet Meadow, Nontidal Wetland, Alkali Seasonal Wetland, *many acres of subsidence reversal projects*)	116,524	5,800	**19,230**	24,330
Riparian (+ Floodplain) (Willow Riparian Scrub/Shrub, Valley Foothill Riparian, Willow Thicket)	51,427	14,200	**16,300**	30,500
Tidal Wetland (Brackish (Suisun), Fresh (Delta))	530,541	19,900	**32,500**	52,400

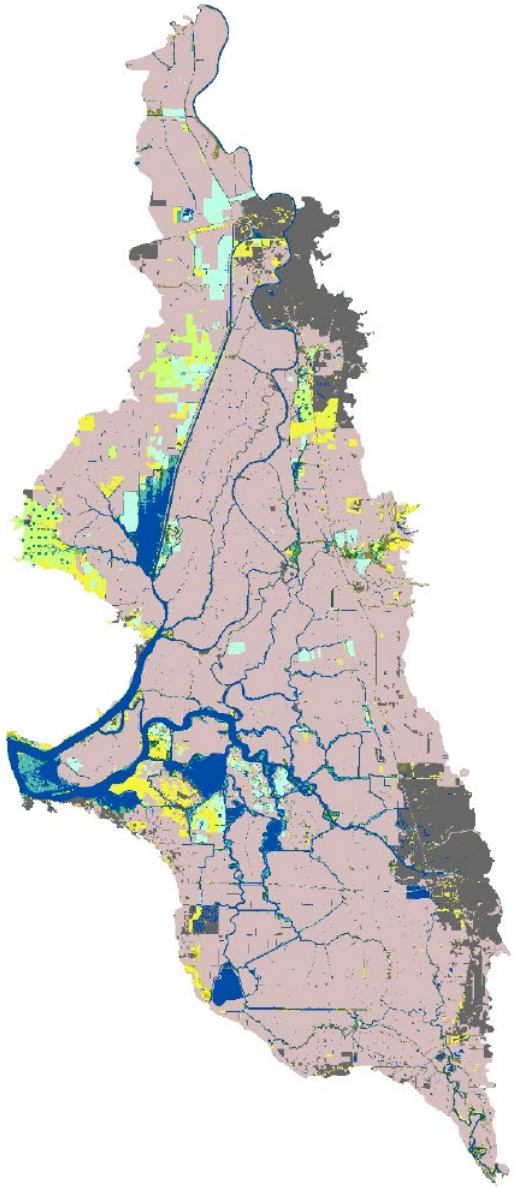


Image: SFEI

Restoration Progress Review: Scope

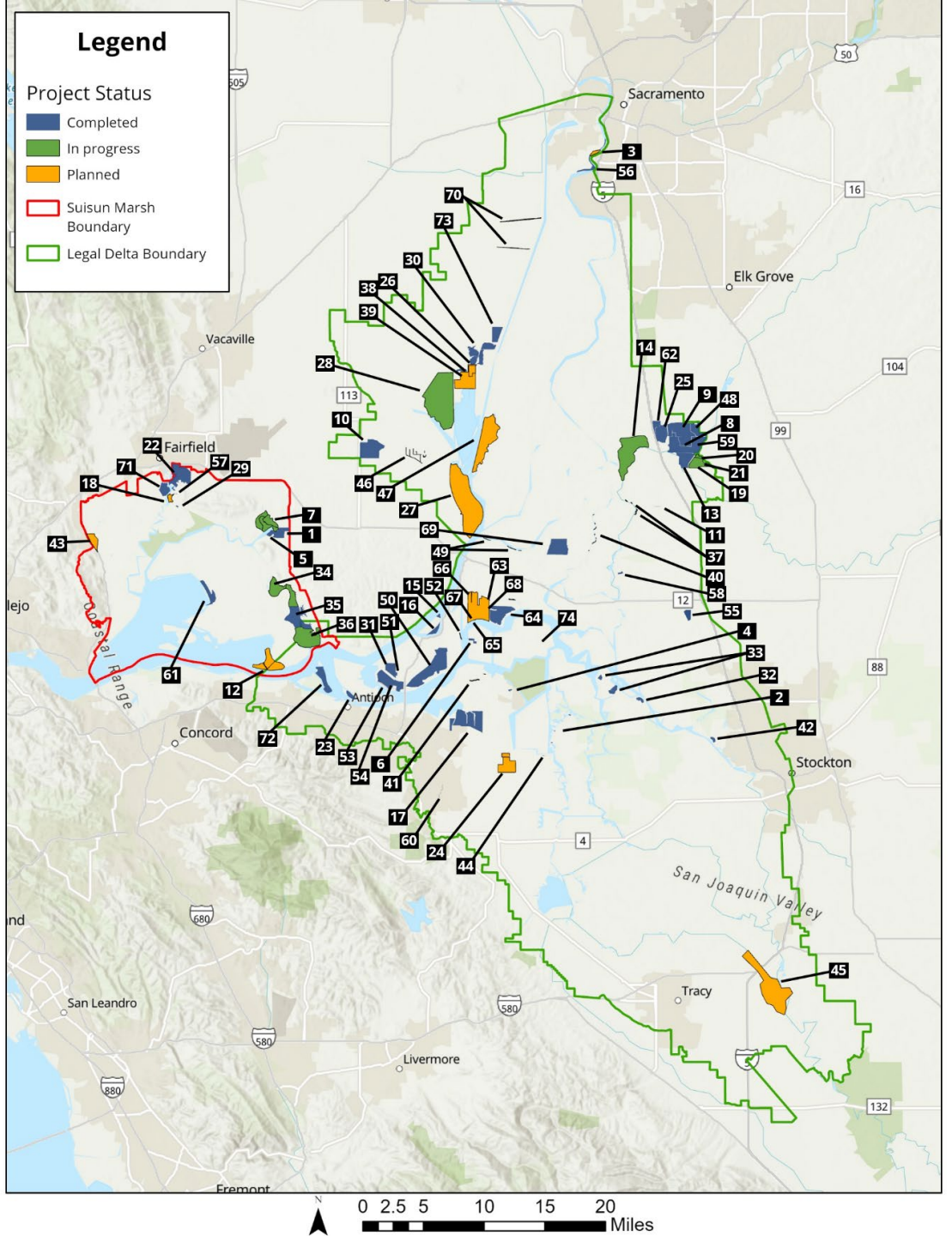
- **What progress has been made towards the Delta Plan Restoration Targets and what has motivated it?**

- **Spatial:** Legal Delta and Suisun Marsh (Delta Plan Boundaries)

- **Projects:**
  - Spatially explicit with acreages identified
  - Reestablishment of physical and/or biological processes

- **Phase:** Completed, In Progress, and Planned

- **Literature review:** science and management across restoration types



Data Sources

Eco Atlas

- Ecosystem types with measurable progress
- Initial projects: **n=178**
- Projects meeting scope: **n=63**
- Projects from other sources: **n=18**
- **Total projects included: n=81**

Other Sources

- DSC Covered Actions
- Expert Interviews

Documents

- Agency reports
- CEQA documents
- EcoRestore project fact sheets
- Bond Accountability reports
- If no official documents available: online articles, press releases, other media

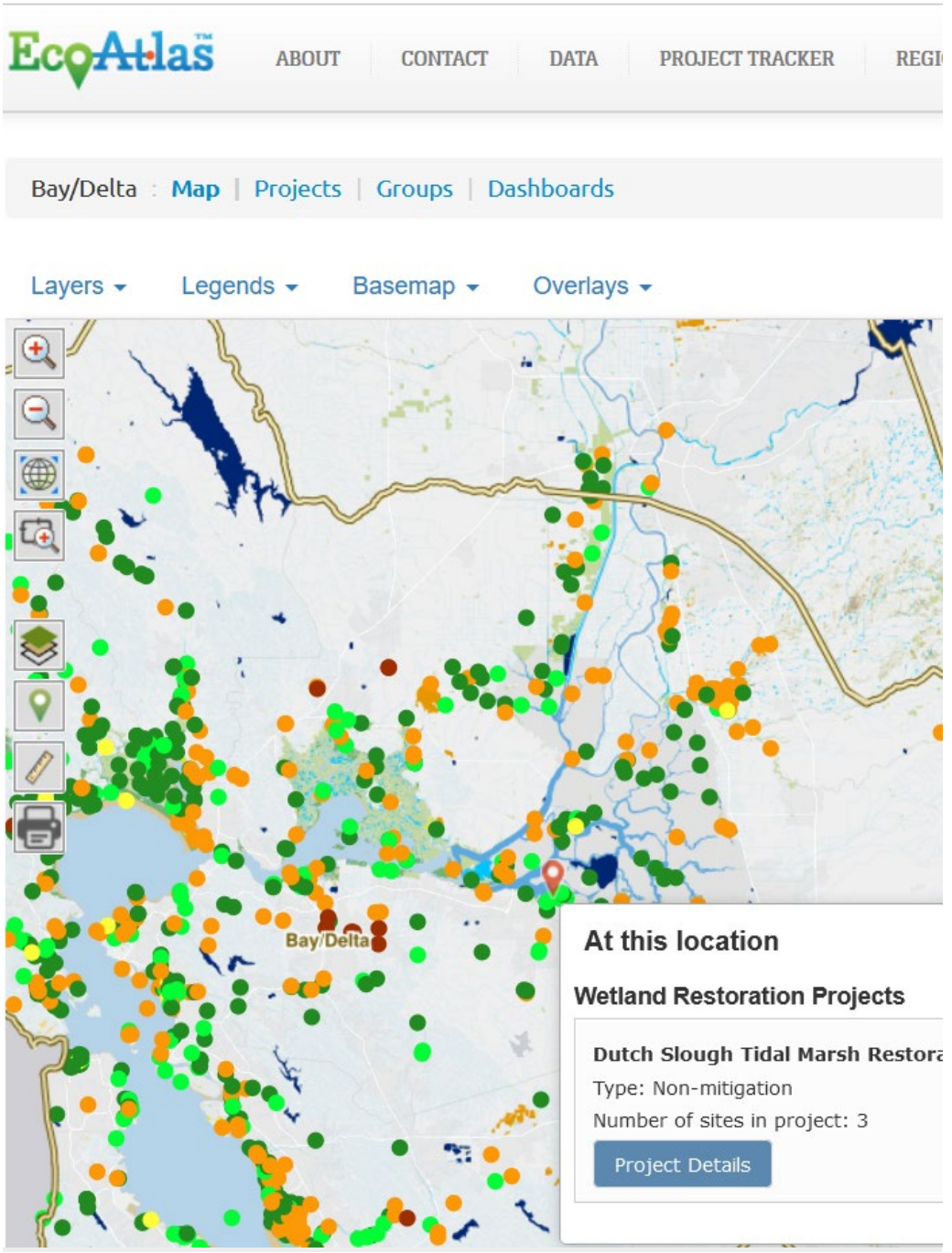
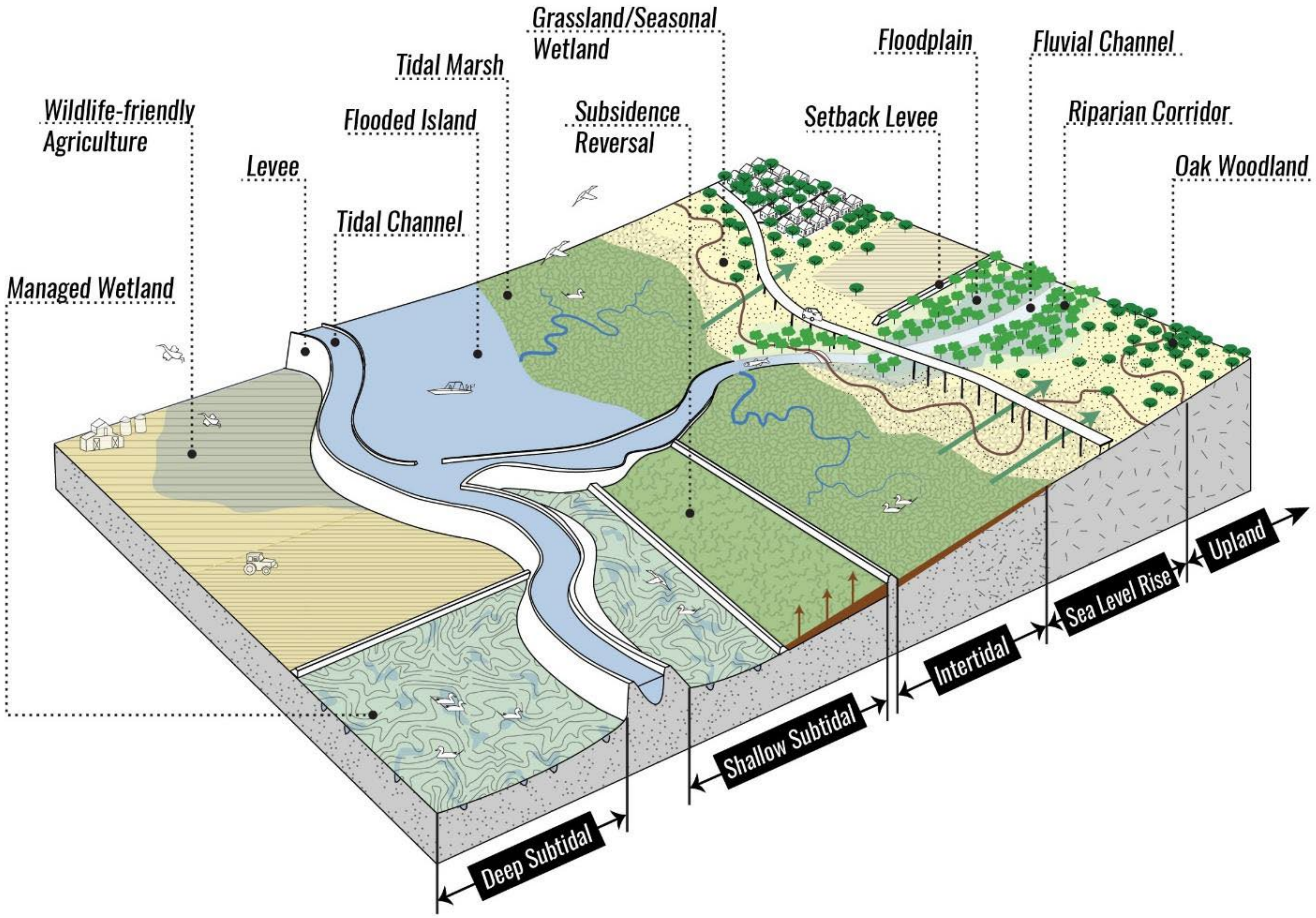
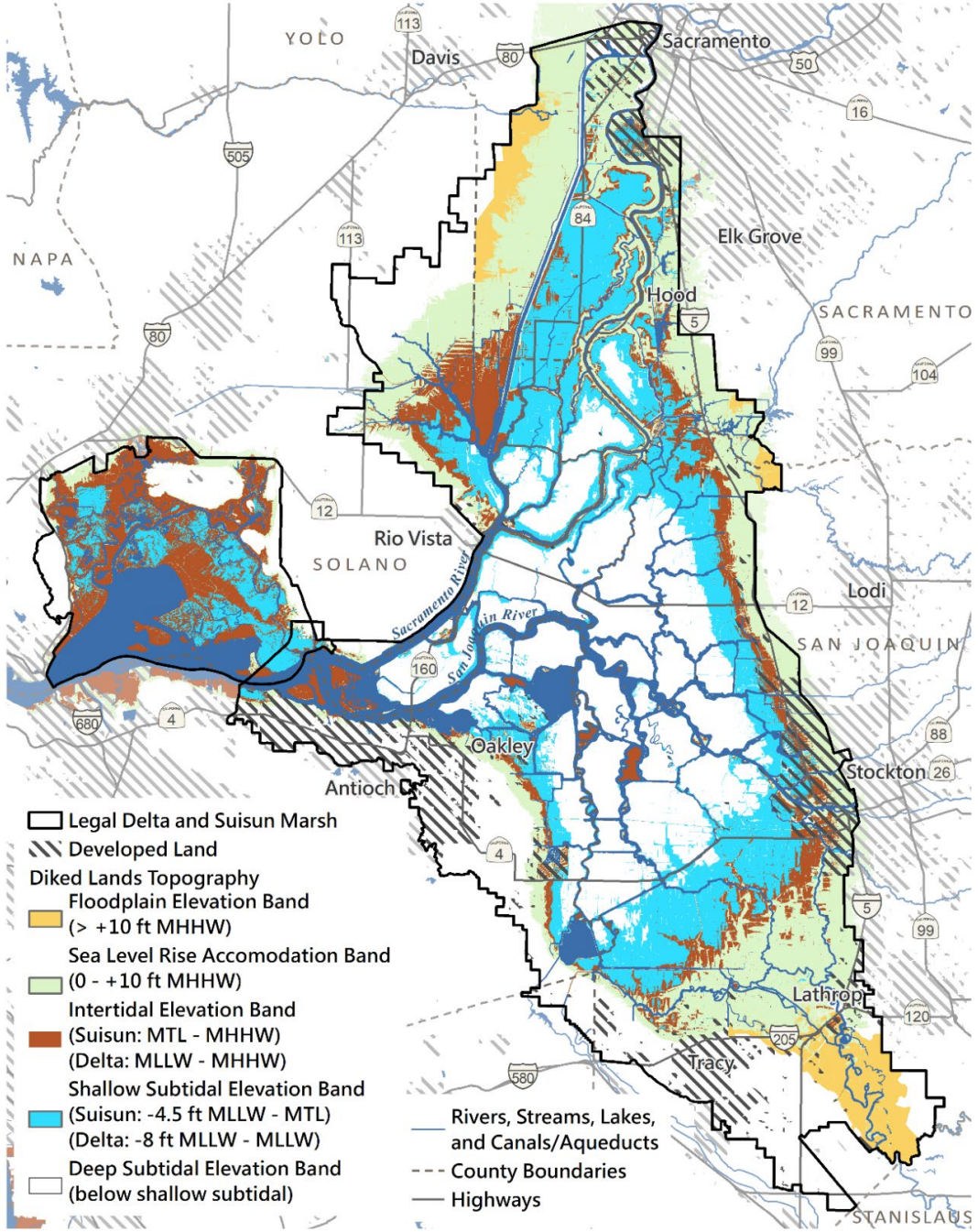


Image: SFEI

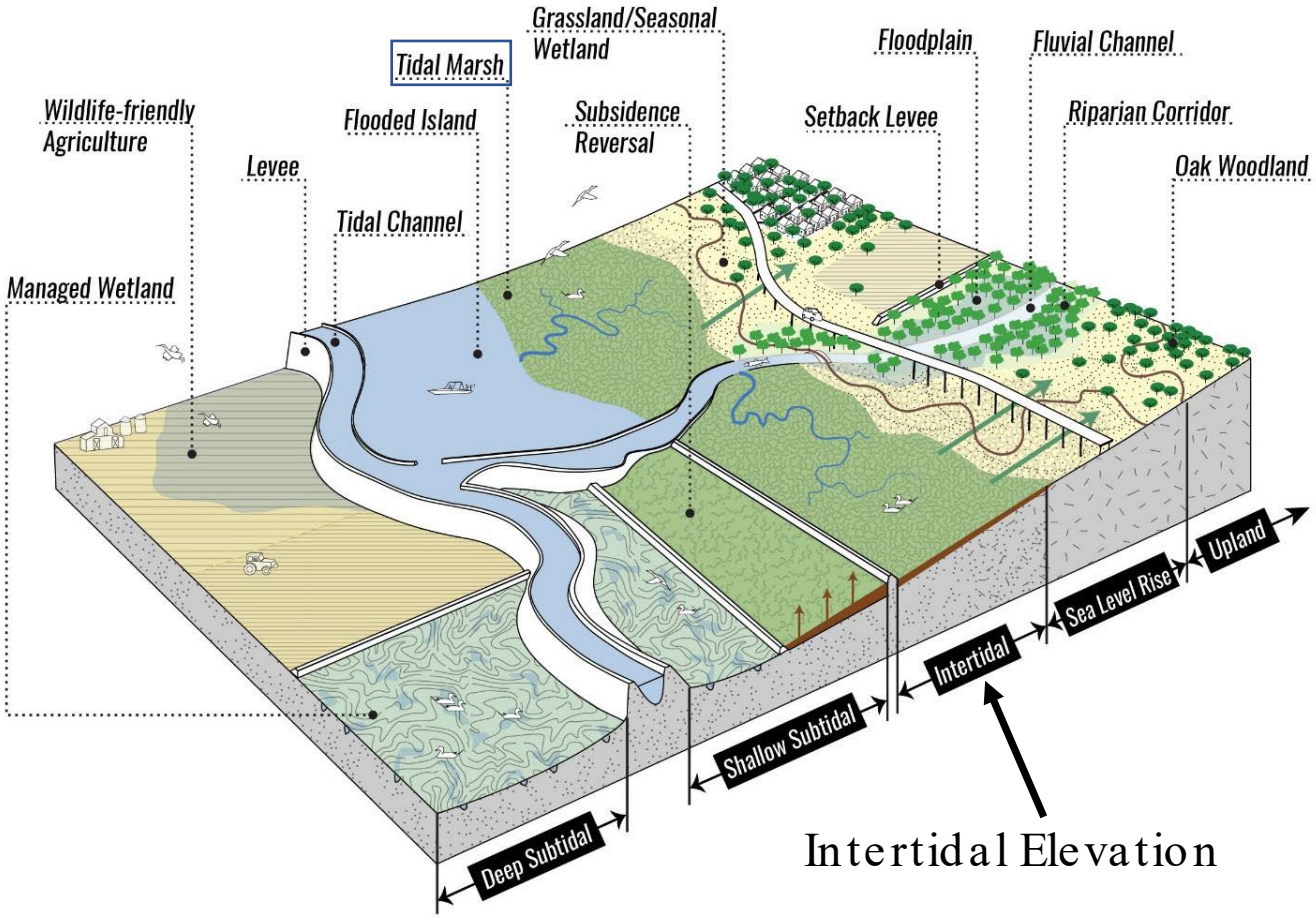
Elevation is Destiny for Restoration

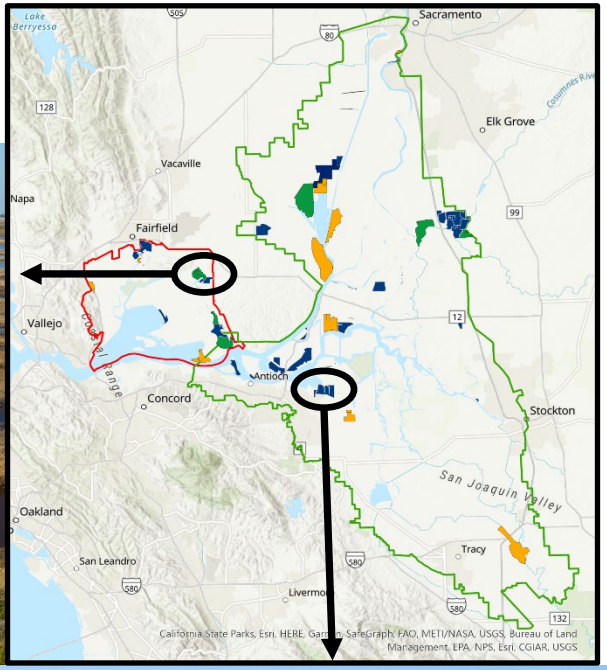




Images: DSC

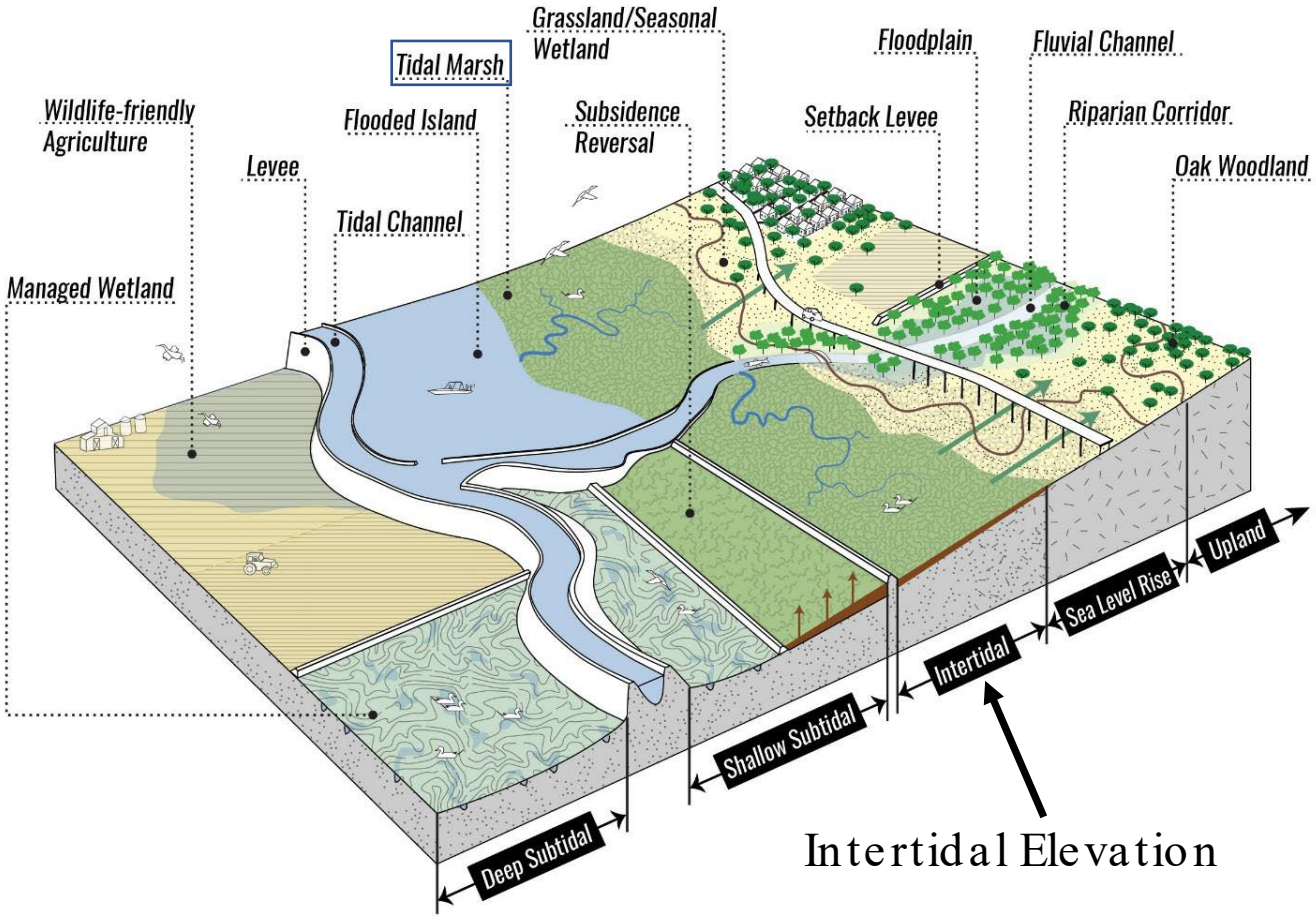
Tidal Wetland: daily tidal inundation, tidal channels
32,500 acre Delta Plan Target





Images: DSC, DWR

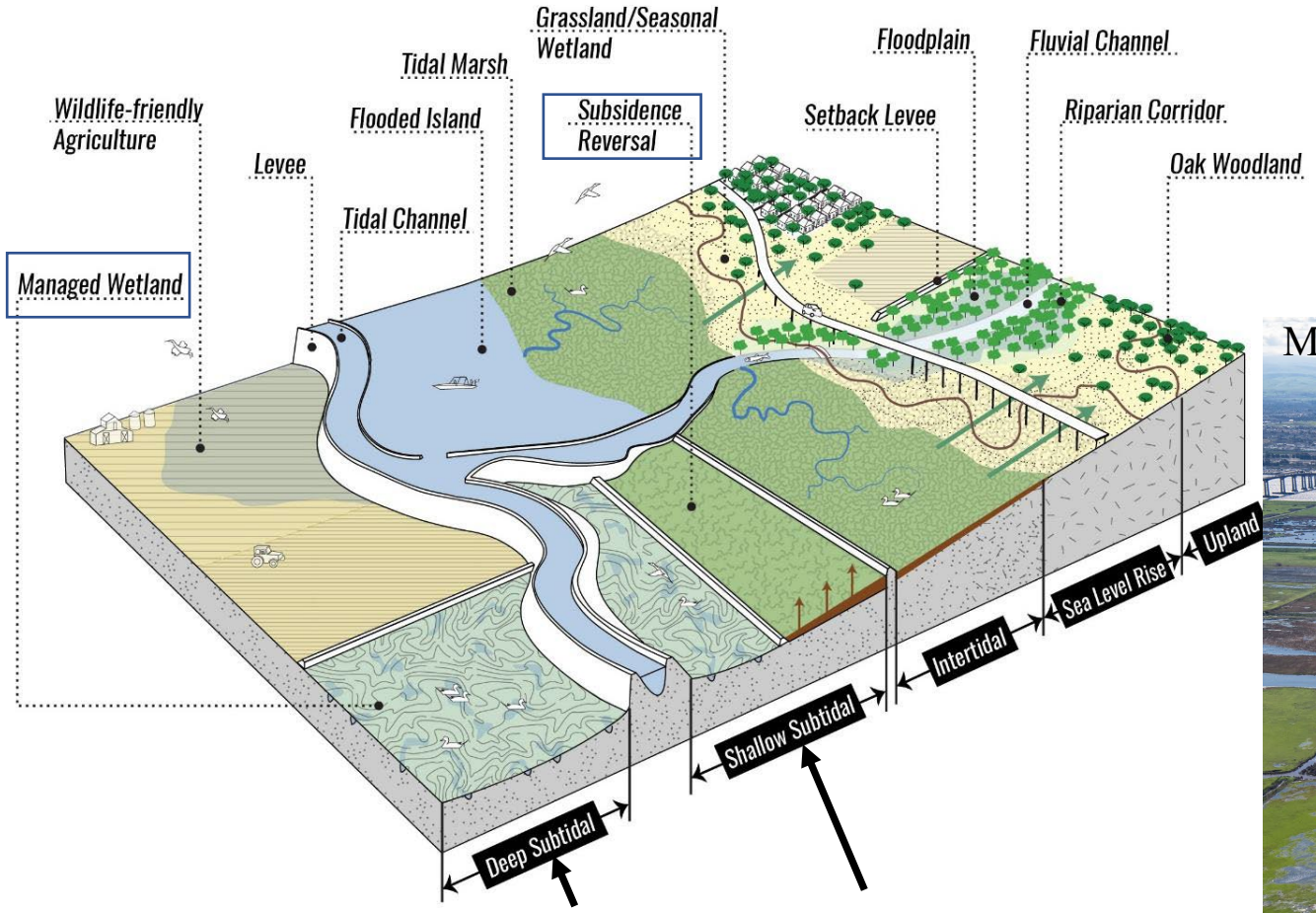
Tidal Wetland: daily tidal inundation, tidal channels
32,500 acre Delta Plan Target



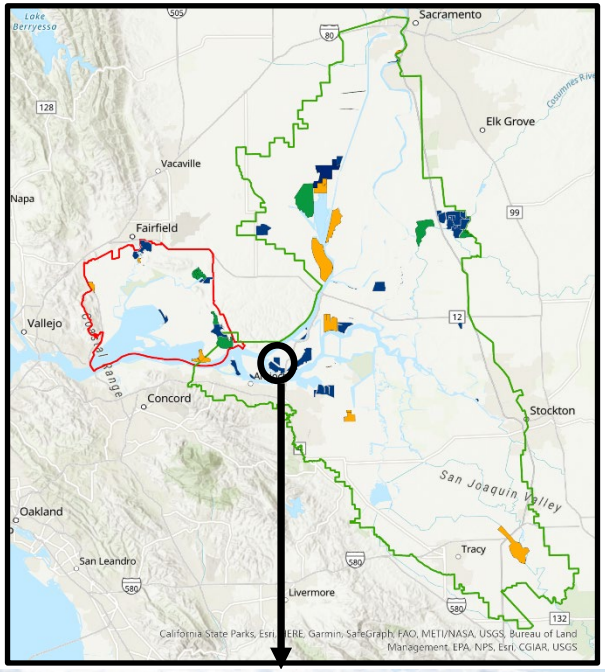
- <u>Completed post 2008:</u> 5729 acres
- <u>In-progress:</u> 5234 acres
- <u>Planned:</u> 3422 acres

Images: DSC, DWR

Non-Tidal Wetland: no direct connection to rivers or tides, often subsidence-reversal projects
19,500 acre Delta Plan Target



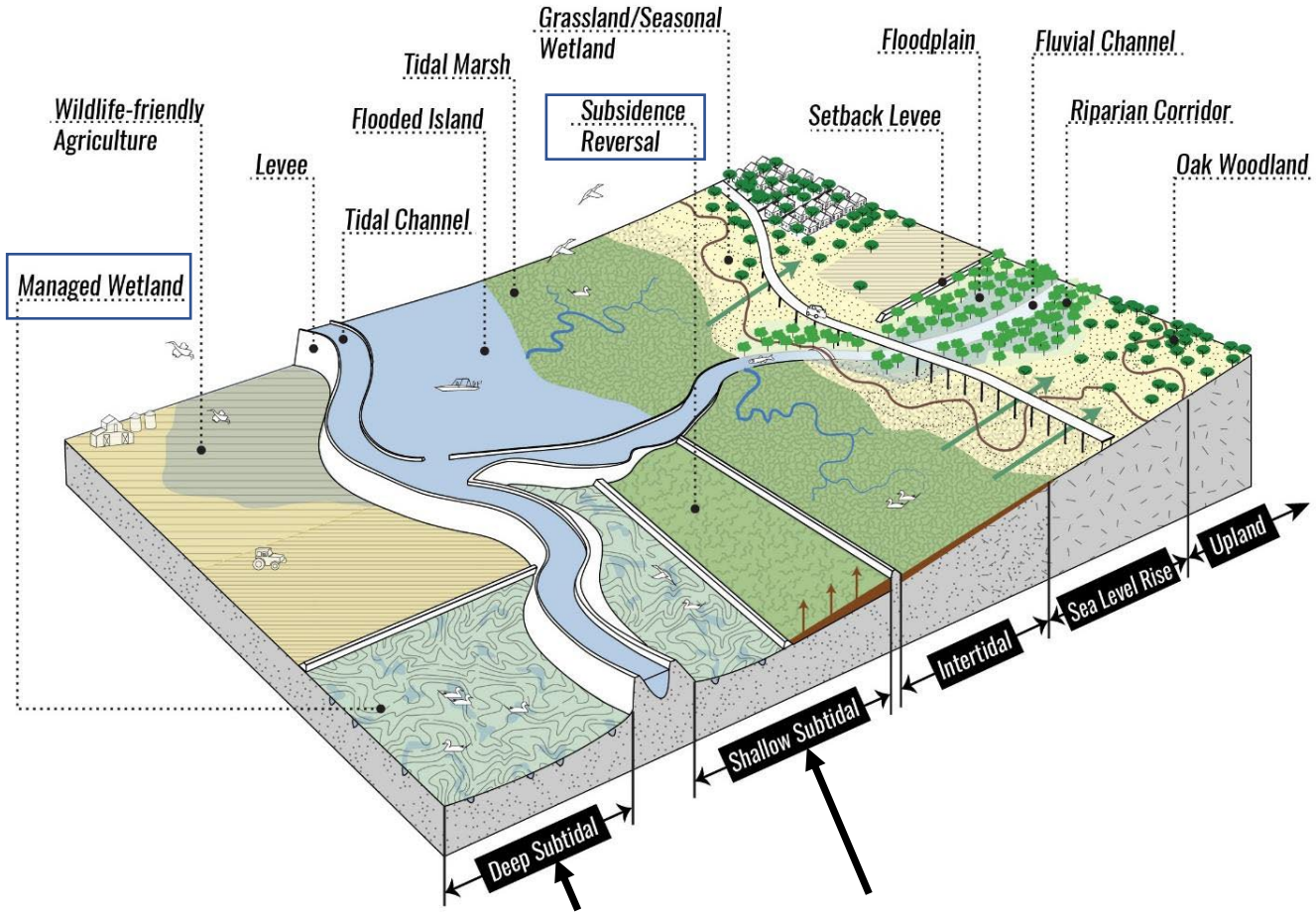
Deep/Shallow Subtidal Elevation



Mayberry Wetland, Whale's Mouth Wetland, Sherman Island

Images: DSC, DWR

Non-Tidal Wetland: no direct connection to rivers or tides, often subsidence-reversal projects
19,500 acre Delta Plan Target

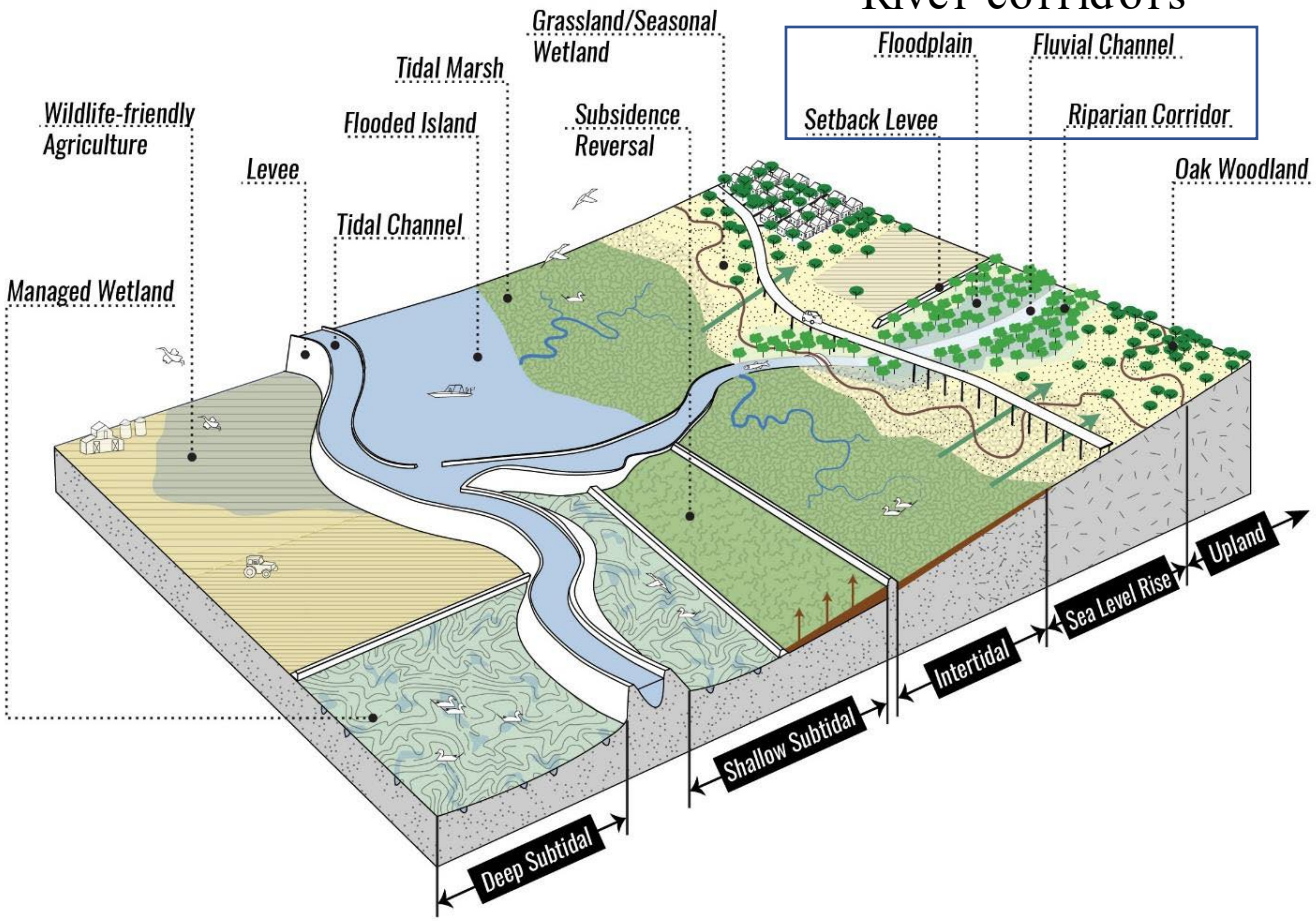


Deep/Shallow Subtidal Elevation

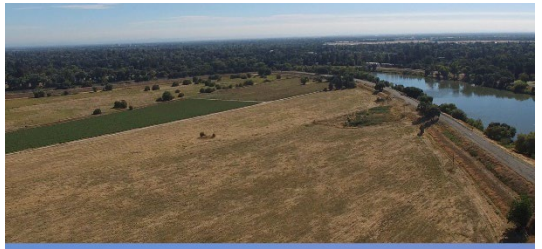
- Completed post 2008: 2777 acres
- In-progress: 18 acres
- Planned: 5613 acres

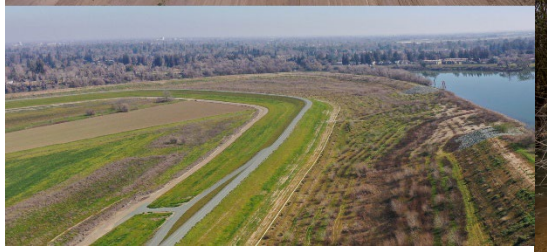
Images: DSC, DWR

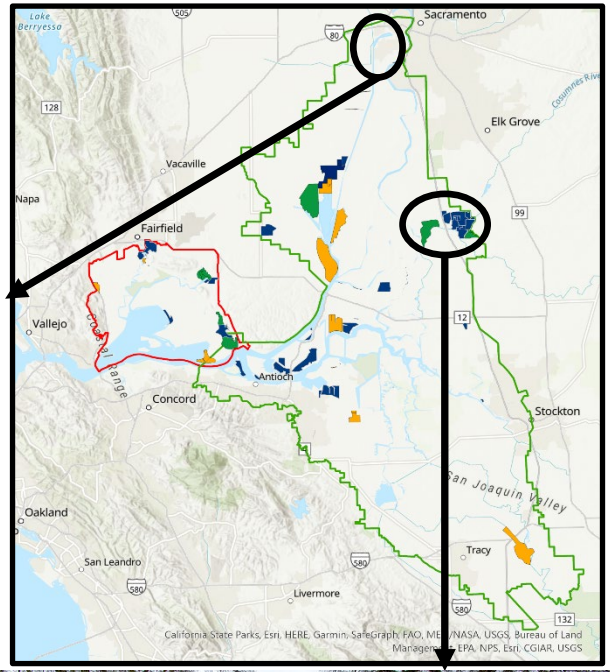
Riparian and Floodplain: Connected to river corridors, along levee edges, and groundwater-wetted areas
16,300 acre Delta Plan Target



Southport Levee, West Sacramento



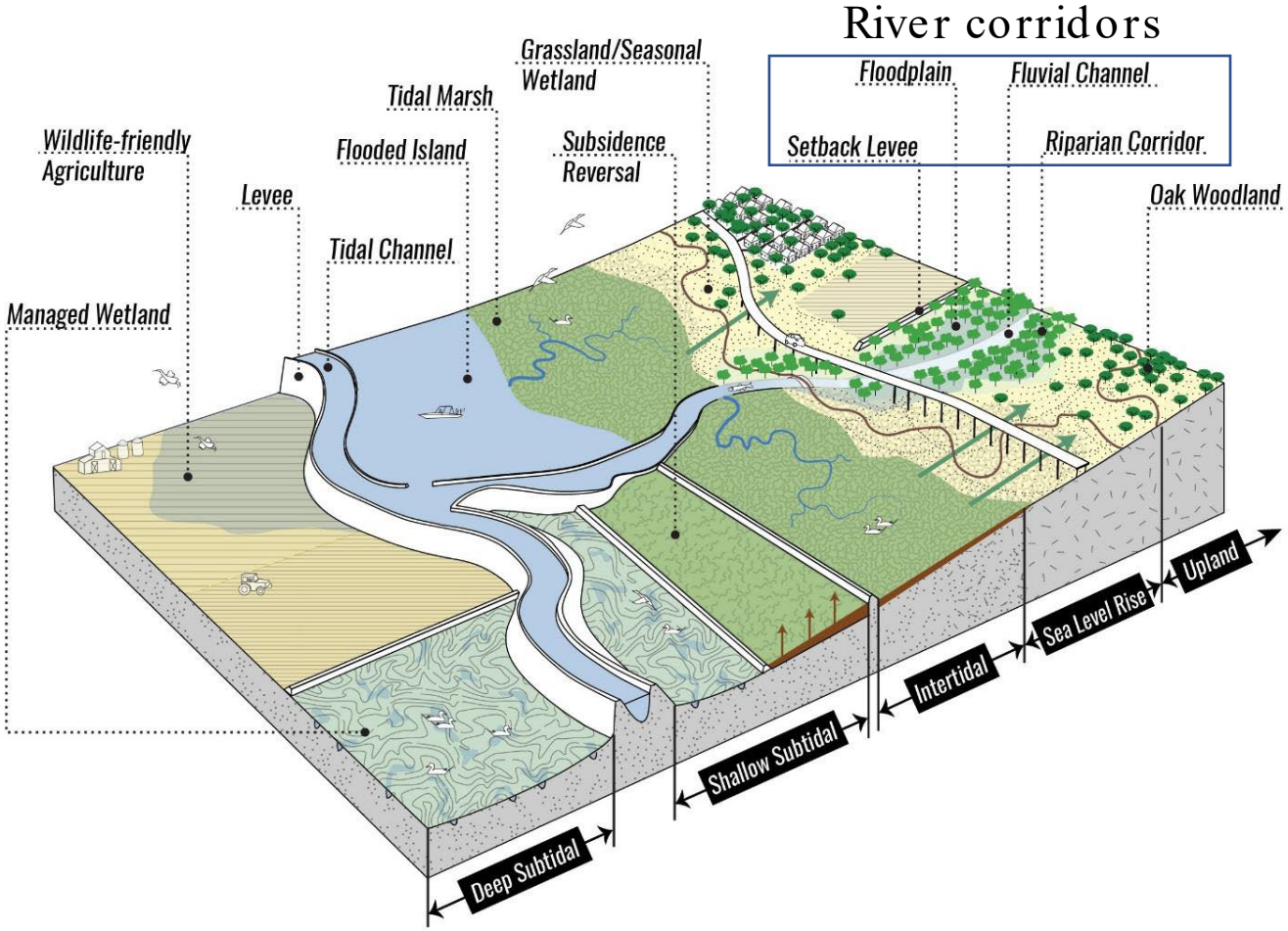




Cosumnes River Preserve, Galt

Images: DSC, DWR

Riparian and Floodplain: Connected to river corridors, along levee edges, and groundwater-wetted areas
16,300 acre Delta Plan Target



- <u>Completed post 2008:</u> 940 acres
- <u>In-progress:</u> 738 acres
- <u>Planned:</u> 851 acres

Images: DSC, DWR

Completed, In Progress, and Planned Restoration Acreage

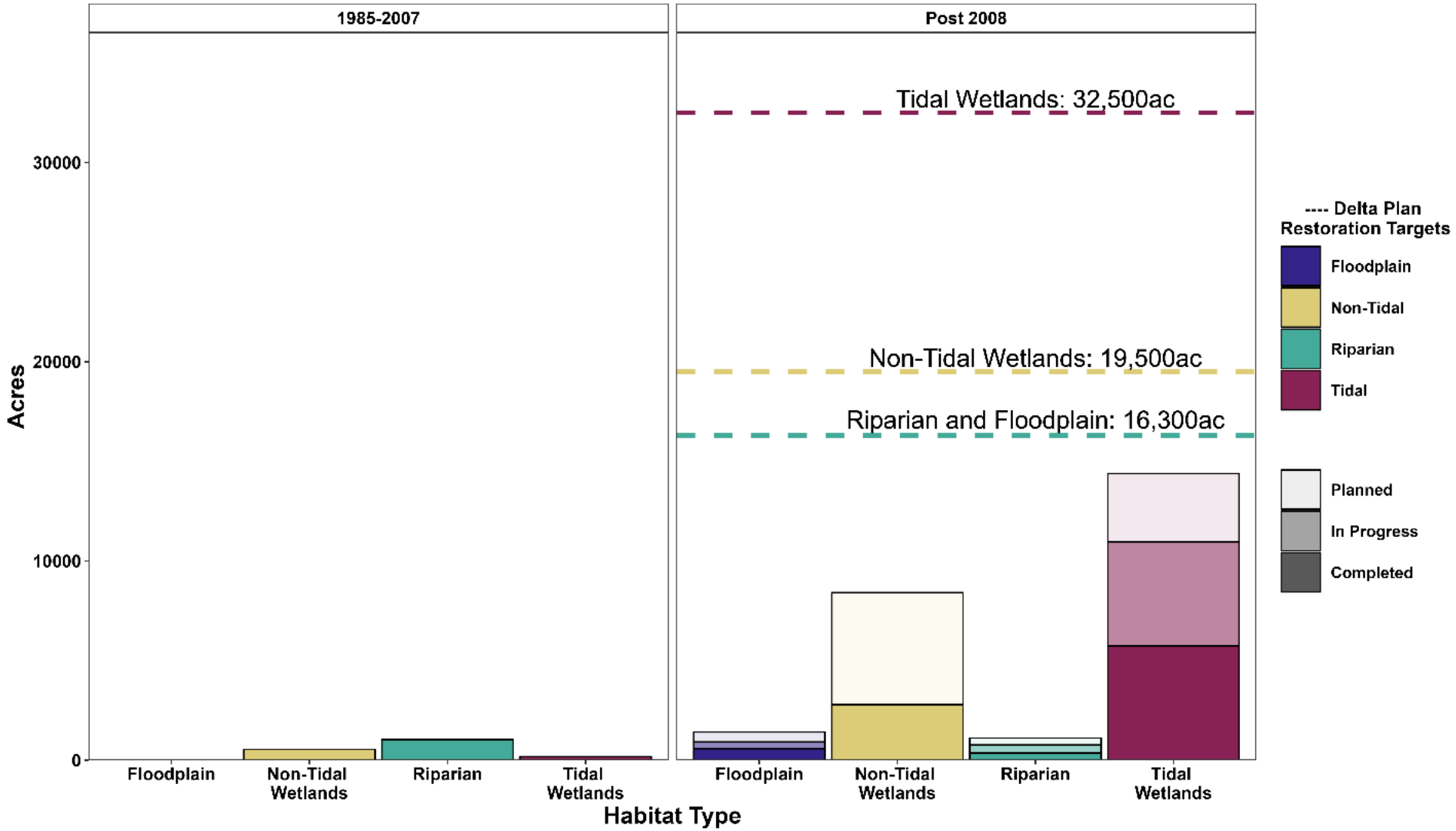
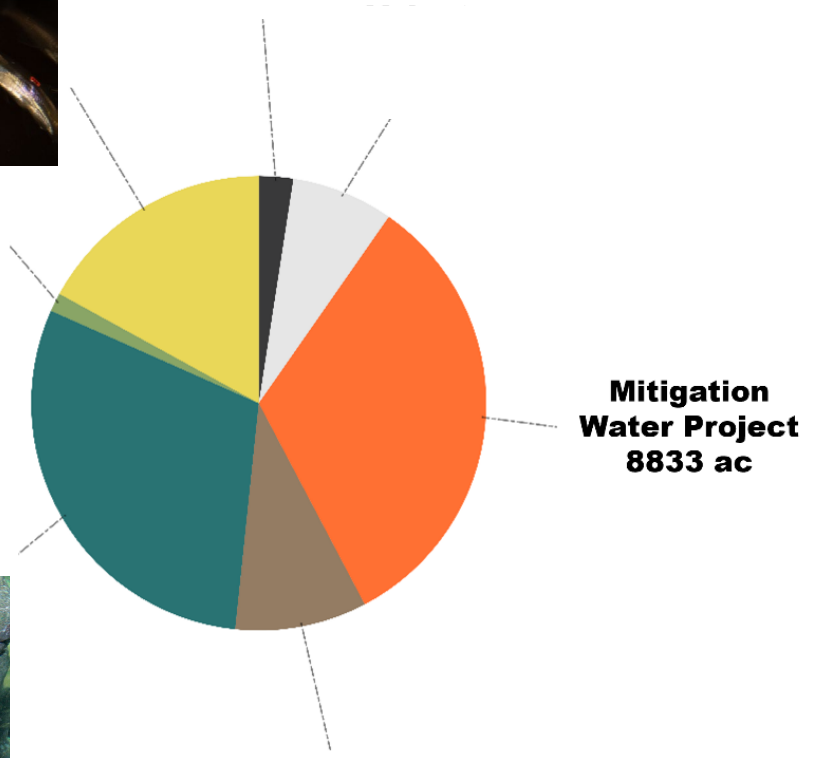
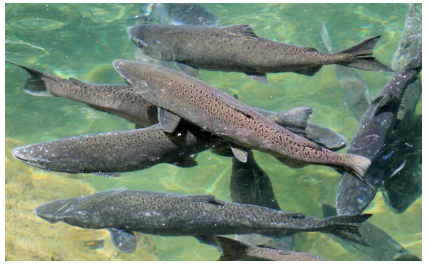


Image: DSC

Restoration Motivations: Water Project Mitigation

- Federally Endangered Species: Delta Smelt, Chinook Salmon, Steelhead, and Green Sturgeon
- 8,000 acres of tidal wetland mitigation required for water project operations by USFWS and NOAA ESA Biological Opinions
- 800 additional acres of tidal wetland restoration for Longfin Smelt
- Led by DWR, monitored by CDFW



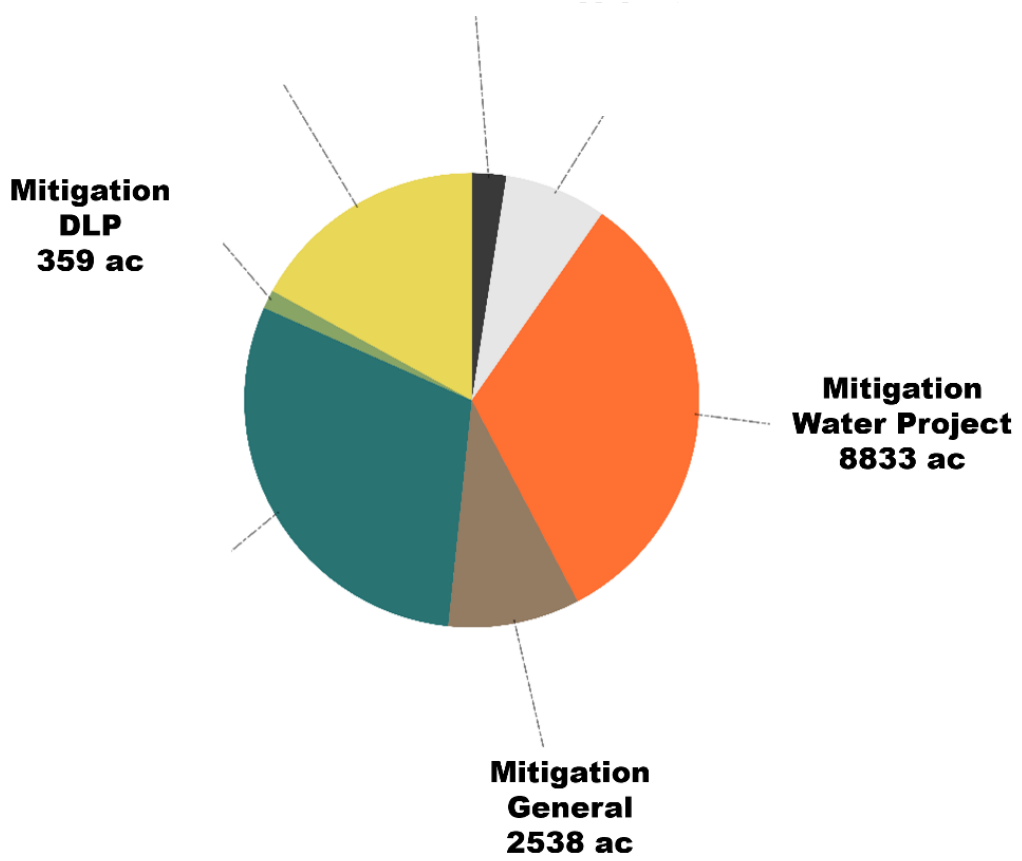


Acreage across completed, in-progress and planned projects

Image: DSC

Restoration Motivations: All Mitigation

- Other mitigation required by CEQA & NEPA
- 43% (11,730 acres)

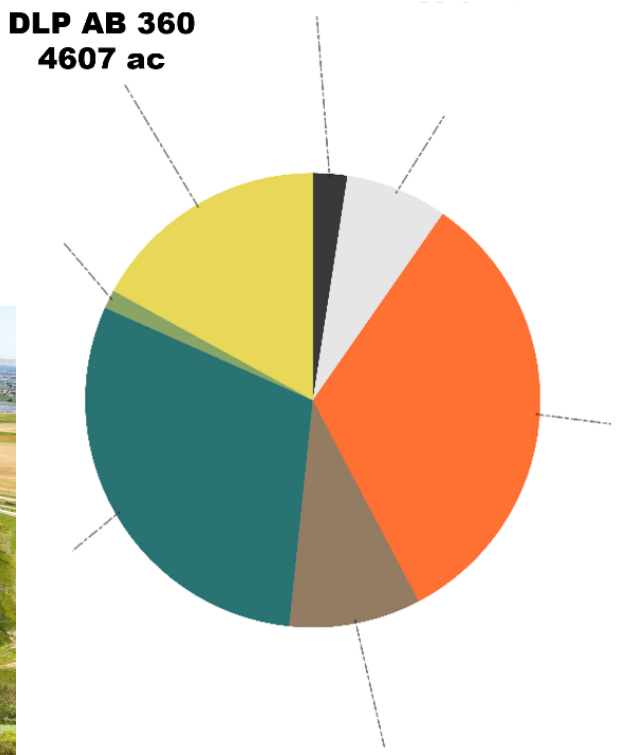


Acreage across completed, in-progress and planned projects

Image: DSC

Restoration Motivations: DWR Delta Levees Program AB 360

- DWR Delta Levees Program
- AB 360 "ecological uplift"
- 17% (4607 acres)

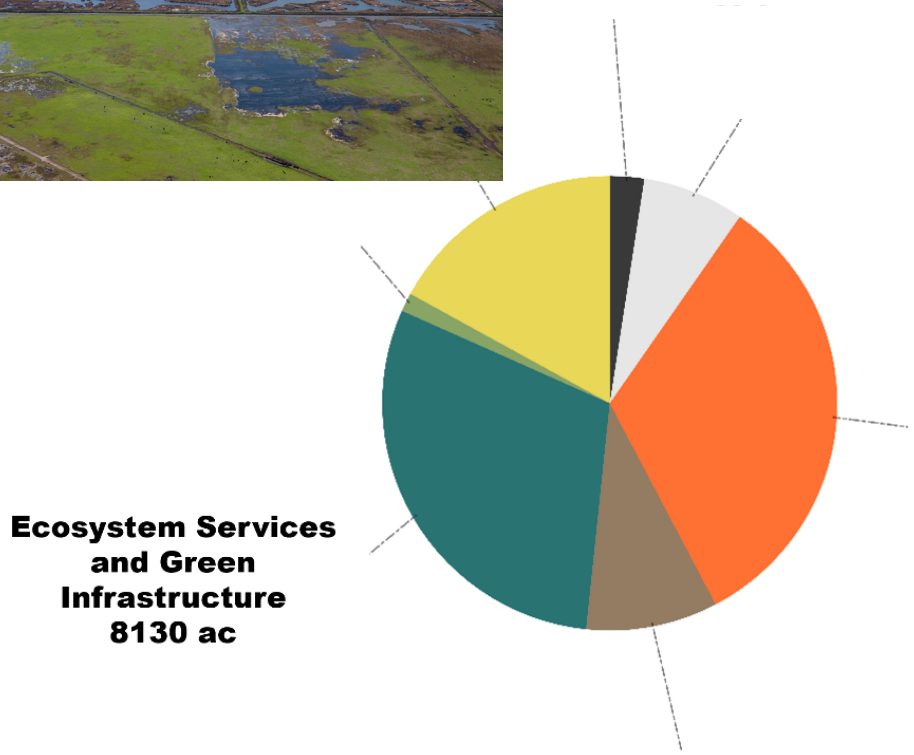


Acreage across completed, in-progress and planned projects

Image: DSC

Restoration Motivations: Ecosystem Services and Green Infrastructure

- Restoration for specific ecosystem services
- Mostly non-tidal wetlands for subsidence reversal
- 3,500 acres are planned Metropolitan Water District project on Webb Tract
- **30% (8130 acres)**

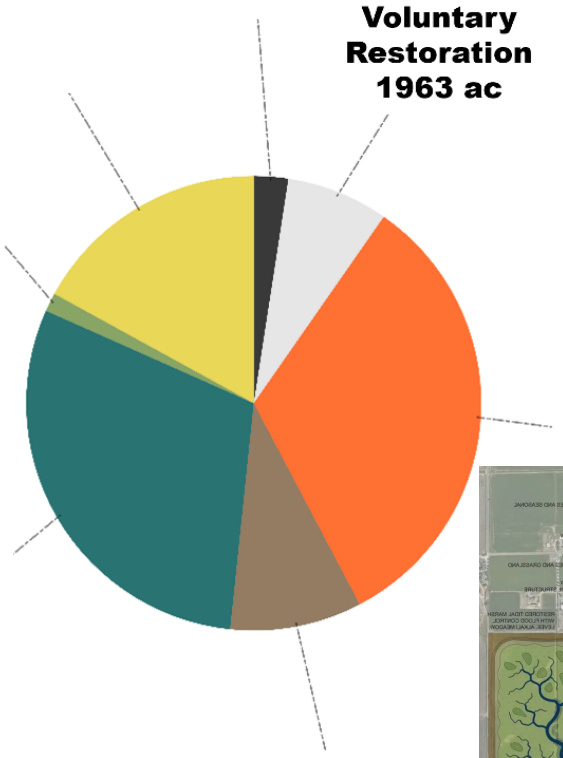


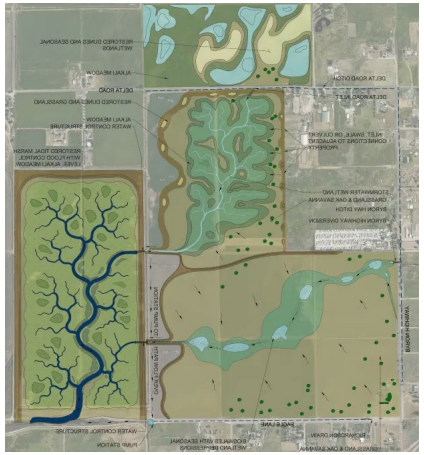
Acreage across completed, in-progress and planned projects

Image: DSC

Restoration Motivations: "Voluntary" restoration

- Non-required restoration for ecological benefit
- **7% (1963 acres)**
- Contrast to SF Bay and California at large, which accounts for 40% of national voluntary restoration (Gittman et al. 2019)





Acreage across completed, in-progress and planned projects

frontiers in Marine Science

POLICY AND PRACTICE REVIEWS
published: 28 August 2019
doi: 10.3389/fmars.2019.00511

Voluntary Restoration: Mitigation's Silent Partner in the Quest to Reverse Coastal Wetland Loss in the USA

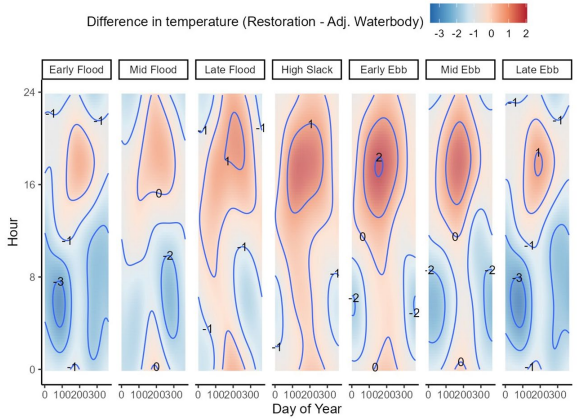
Rachel K. Gittman[1], Christopher J. Baillie[1], Katie K. Arkema[2,3], Richard O. Bennett[4], Jeff Benoit[5], Seth Blitch[6], Julien Brun[7], Anthony Chatwin[8], Allison Colden[9], Alyssa Dausman[10], Bryan DeAngelis[11], Nathaniel Herold[12], Jessica Henkel[13], Rachel Houge[14], Ronald Howard[15], A. Randall Hughes[16], Steven B. Scyphers[16], Tisa Shostik[17], Ariana Sutton-Grier[18] and Jonathan H. Grabowski[16]*

Image: DSC

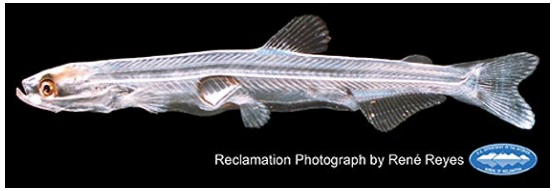
Preliminary Insights: DWR/CDFW Fish Restoration Program

Invertebrate Productivity

Temperature refugia



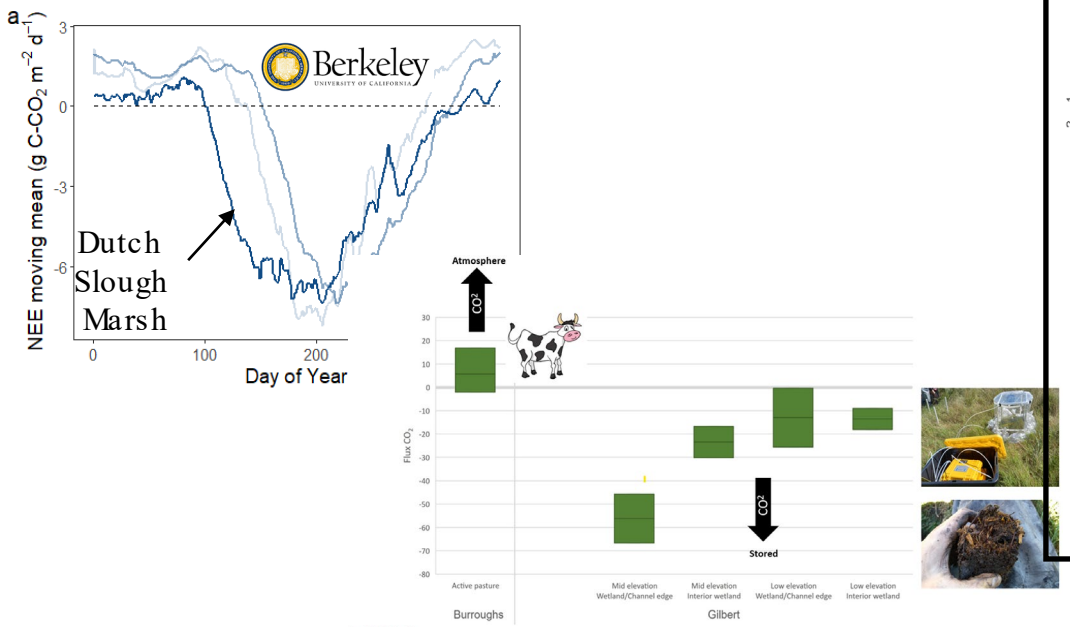
Presence of salmon and smelt



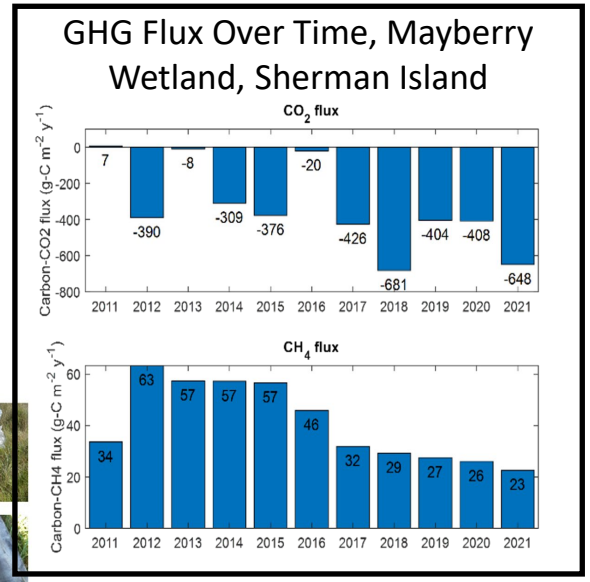
Invertebrate photos: CDFW; Temperature graph: Danny Cox, CDFW

Preliminary Insights: Dutch Slough and Mayberry Wetlands

Tidal Carbon Sequestration



Non-Tidal Methane Production



Terrestrial Species Use

UC DAVIS
UNIVERSITY OF CALIFORNIA

USGS

Figures: Baldocchi Lab, UCB; Thorne Lab, USGS; UC Davis MWFB

Science and Management Gaps

- Analysis of restoration outcomes
- Tribal involvement and co-management (Hankins 2018, Zedler and Stevens 2018)
- Community involvement
- Progress for Oak Woodland, Vernal Pool, and Stabilized Interior Dune
- Future funding

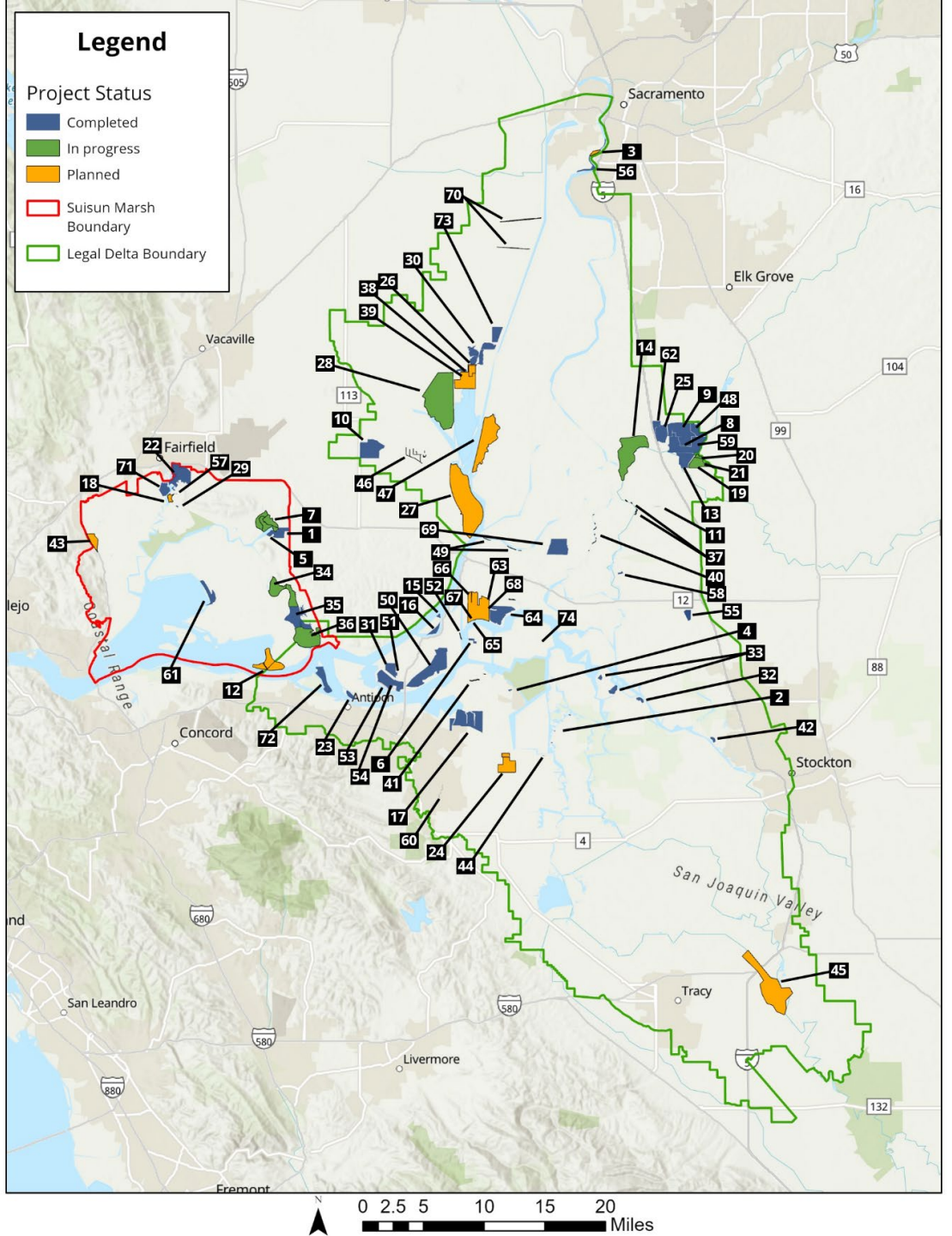


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Image: DSC

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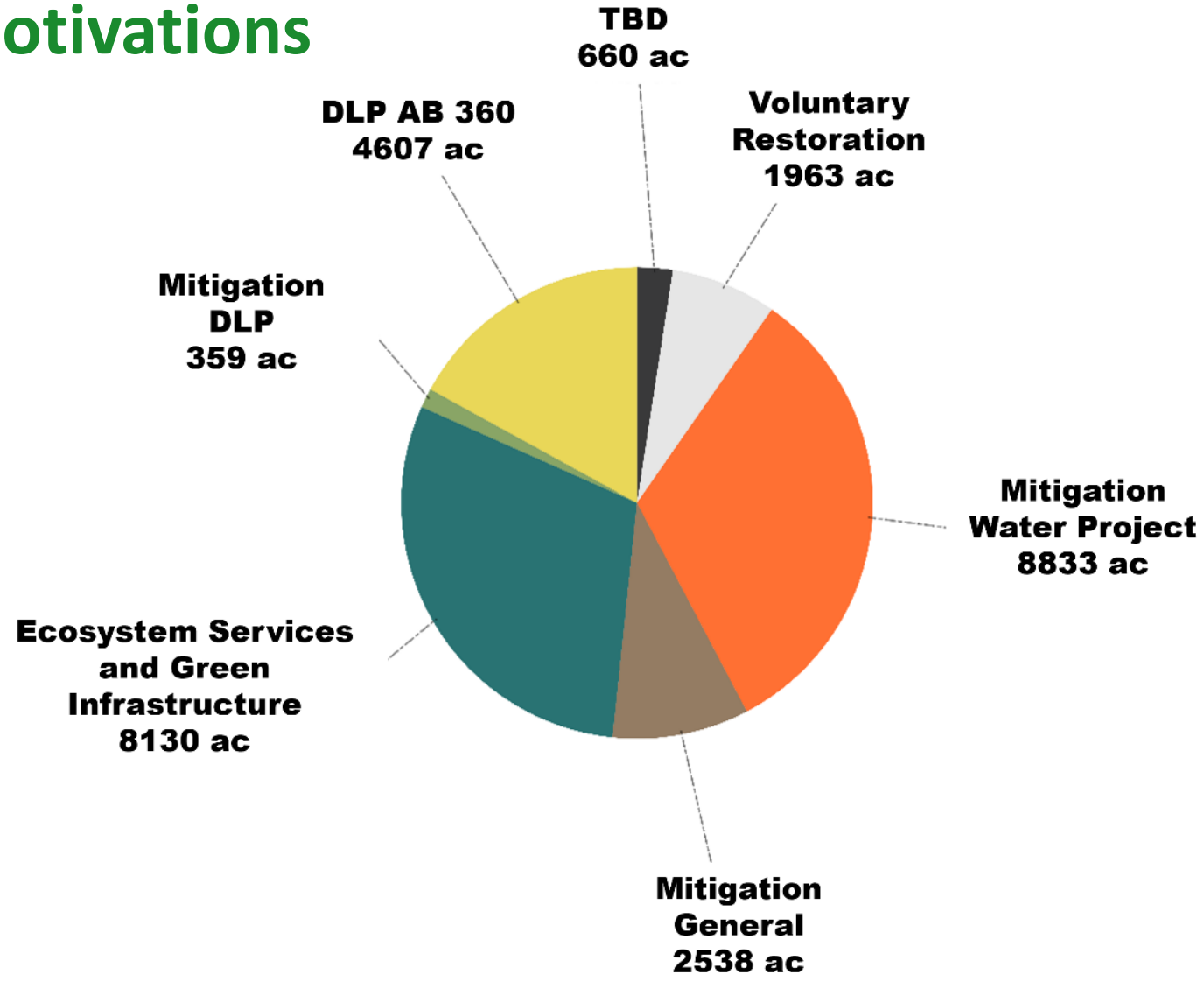
Restoration Motivations



Acreage across completed, in-progress and planned projects

Image: DSC