Identifying transition zone connection opportunities

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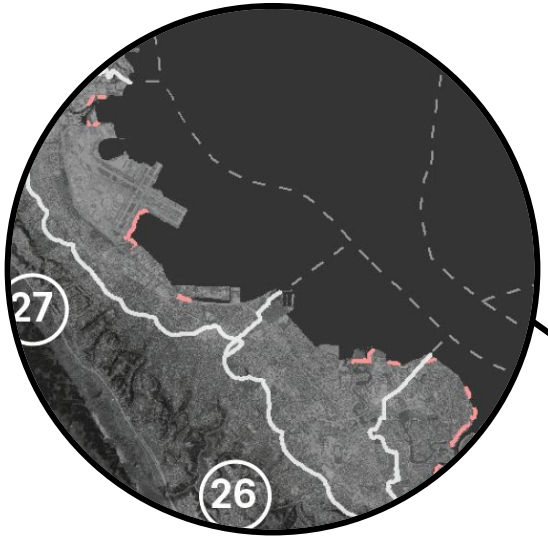
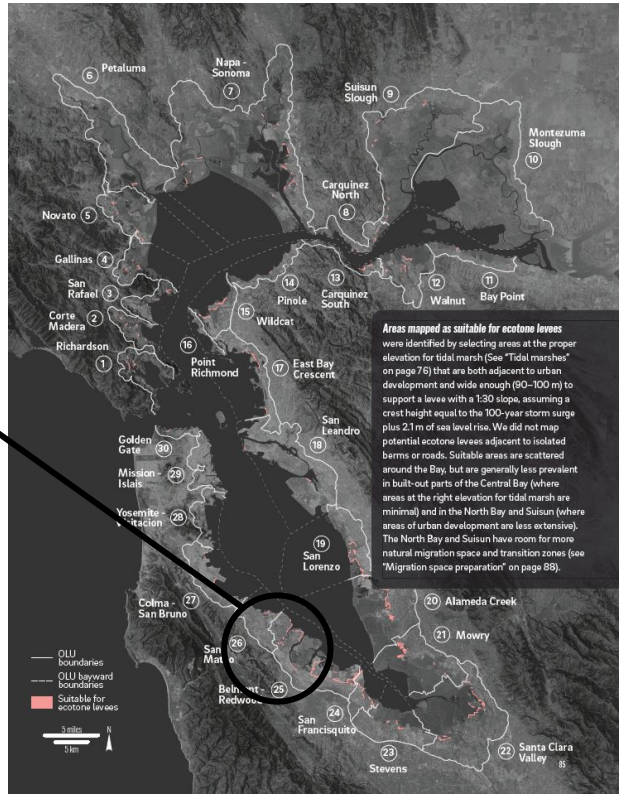
Adaptation Atlas: Ecotone Levees

- Areas between tidal marshes and developed areas
- Provide a narrow band of transition zone for high tide refuge, wave attenuation, marsh migration

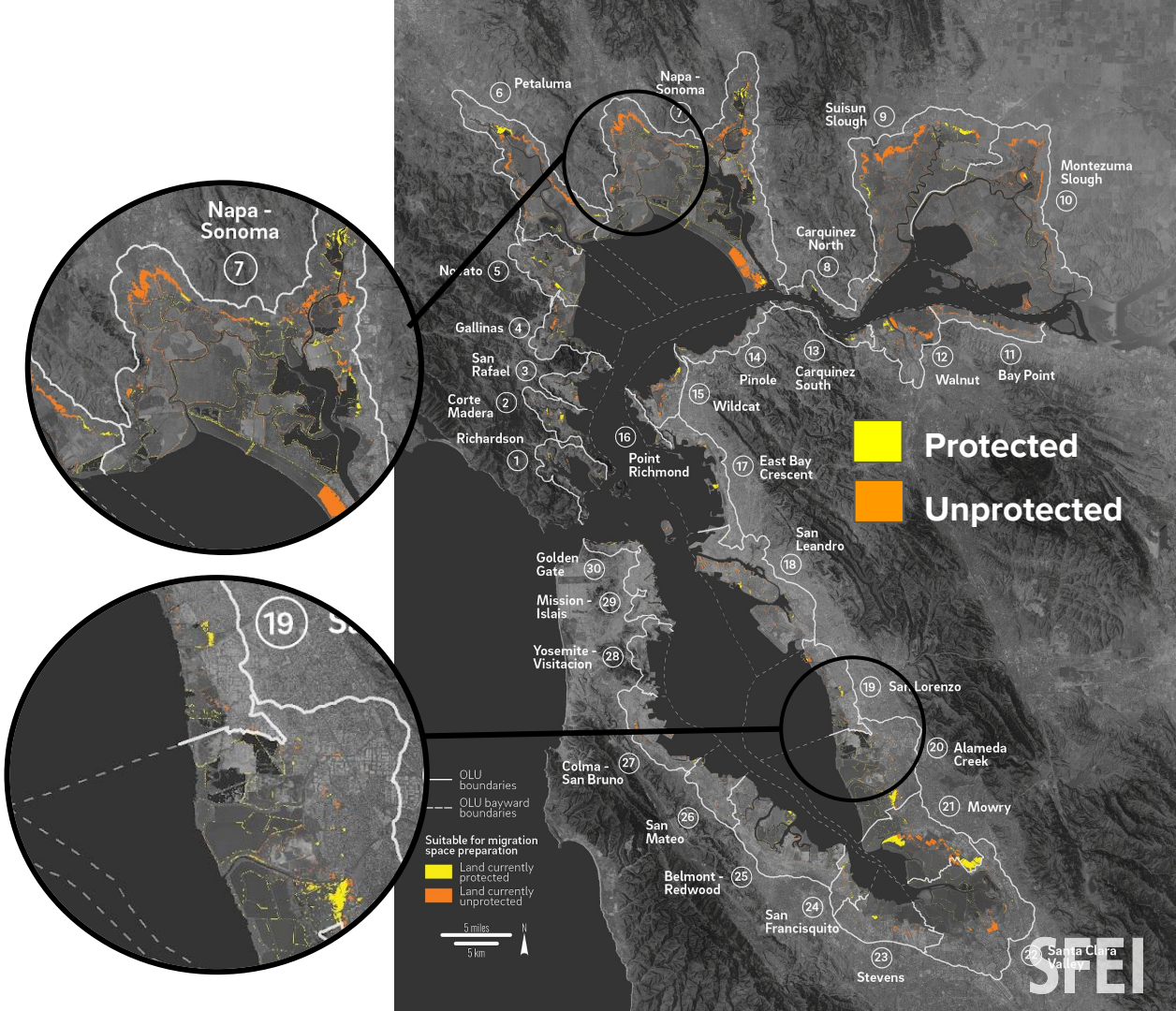




Suitable for ecotone levee

Adaptation Atlas: Migration Space

- Areas that are above tidal range now, but will be within tidal range in the future
- Tidal marshes could migrate as sea levels rise if land is protected



Getting To Implementation

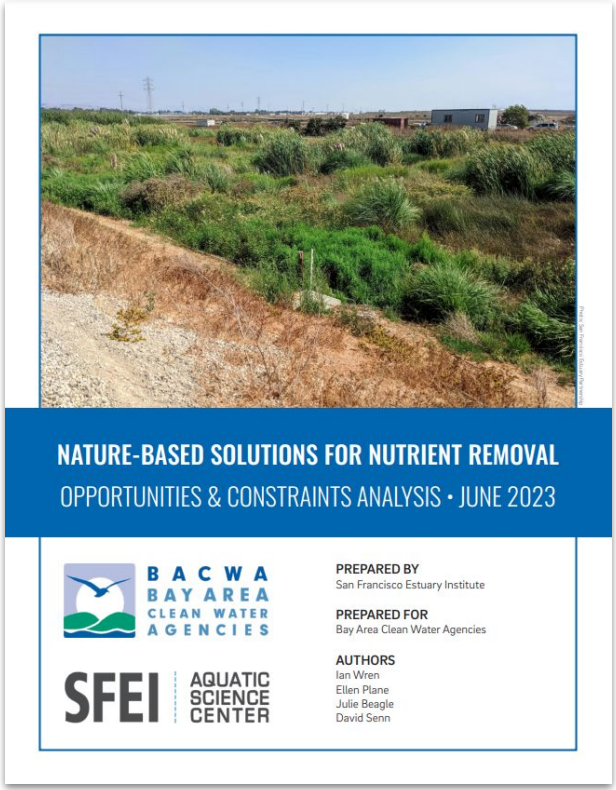
Suitability analysis in Adaptation Atlas identified:

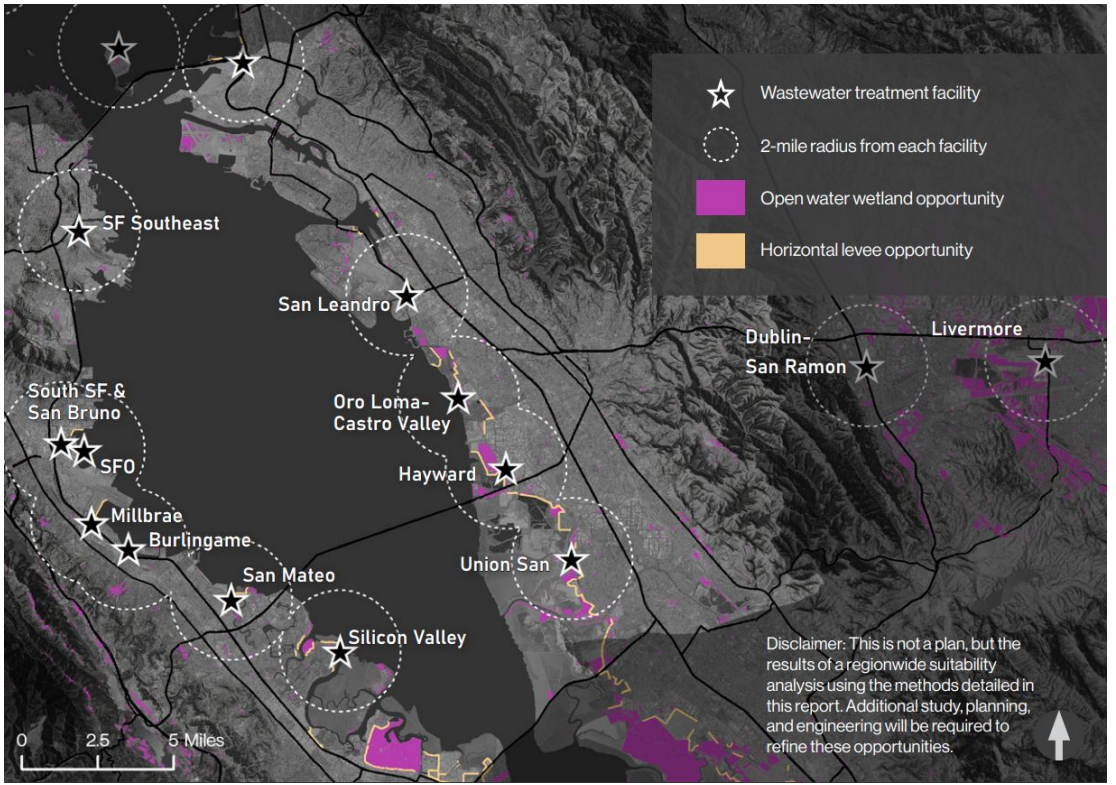
- **224** ecotone levee opportunities
- over **15,000 ac** of possible migration space

Where can these projects be implemented? Where will they improve resilience?

1. Linking horizontal levee mapping to **nutrient removal** driver
2. Mapping **connectivity** of transition zones to marshes and diked baylands

Horizontal levee implementation opportunities





Choosing where to use limited resources

- Fill material for horizontal levees is limited
- Treated wastewater can be used as a resource in baylands restoration

Fairfield-Suisun Sewer District

Sherman Island

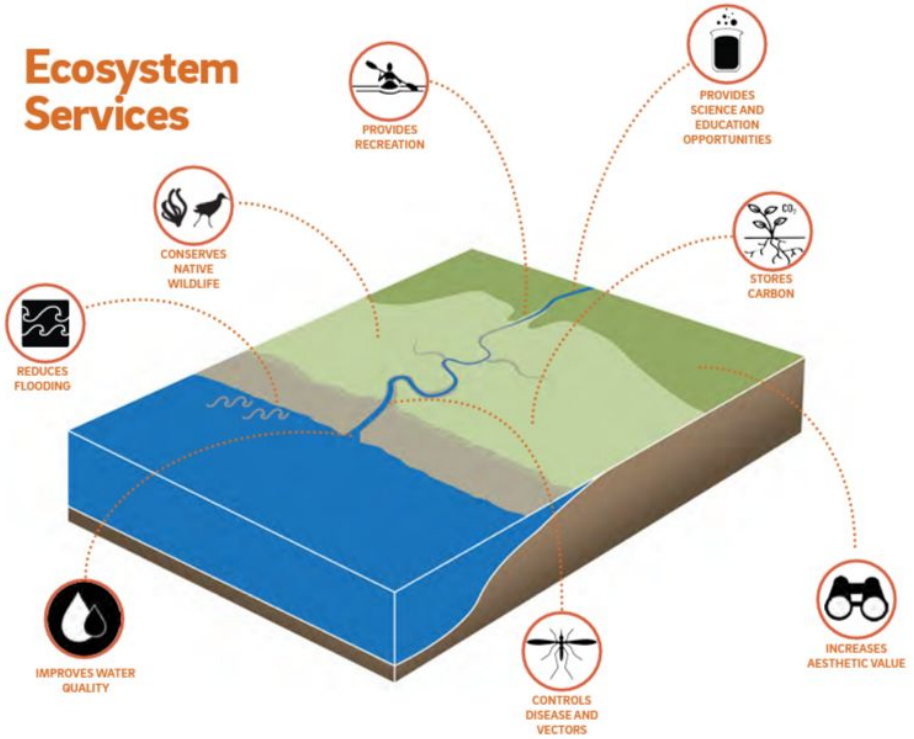
Improving connectivity to natural transition zones

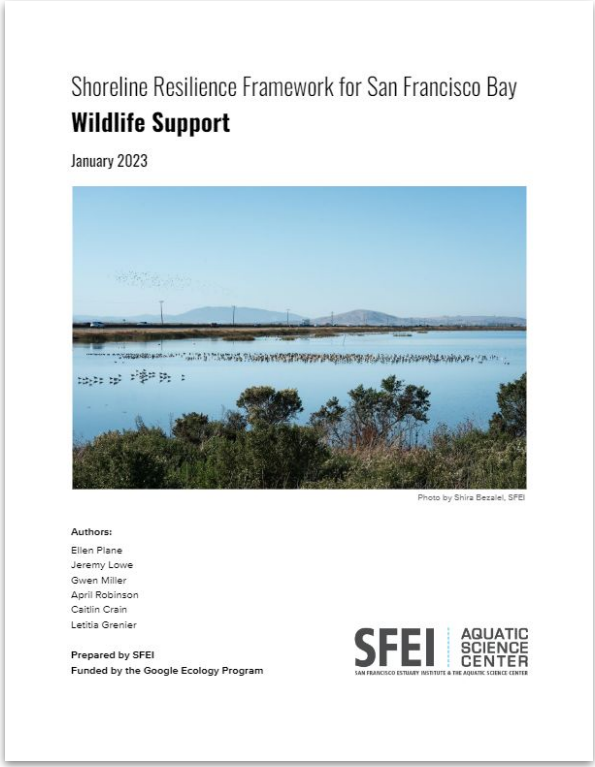
Purpose of the **Shoreline Resilience Framework**

1. Define and map shoreline resilience
2. Provide regional resource to aid in adaptation and restoration decision making
3. Track changes in shoreline resilience over time

In collaboration with WRMP, Regional Board, USACE, Google, and additional partners

Approach to mapping shoreline resilience





Shoreline Resilience Framework for San Francisco Bay

Wildlife Support

January 2023

Photo by Shira Bezalel, SFEI

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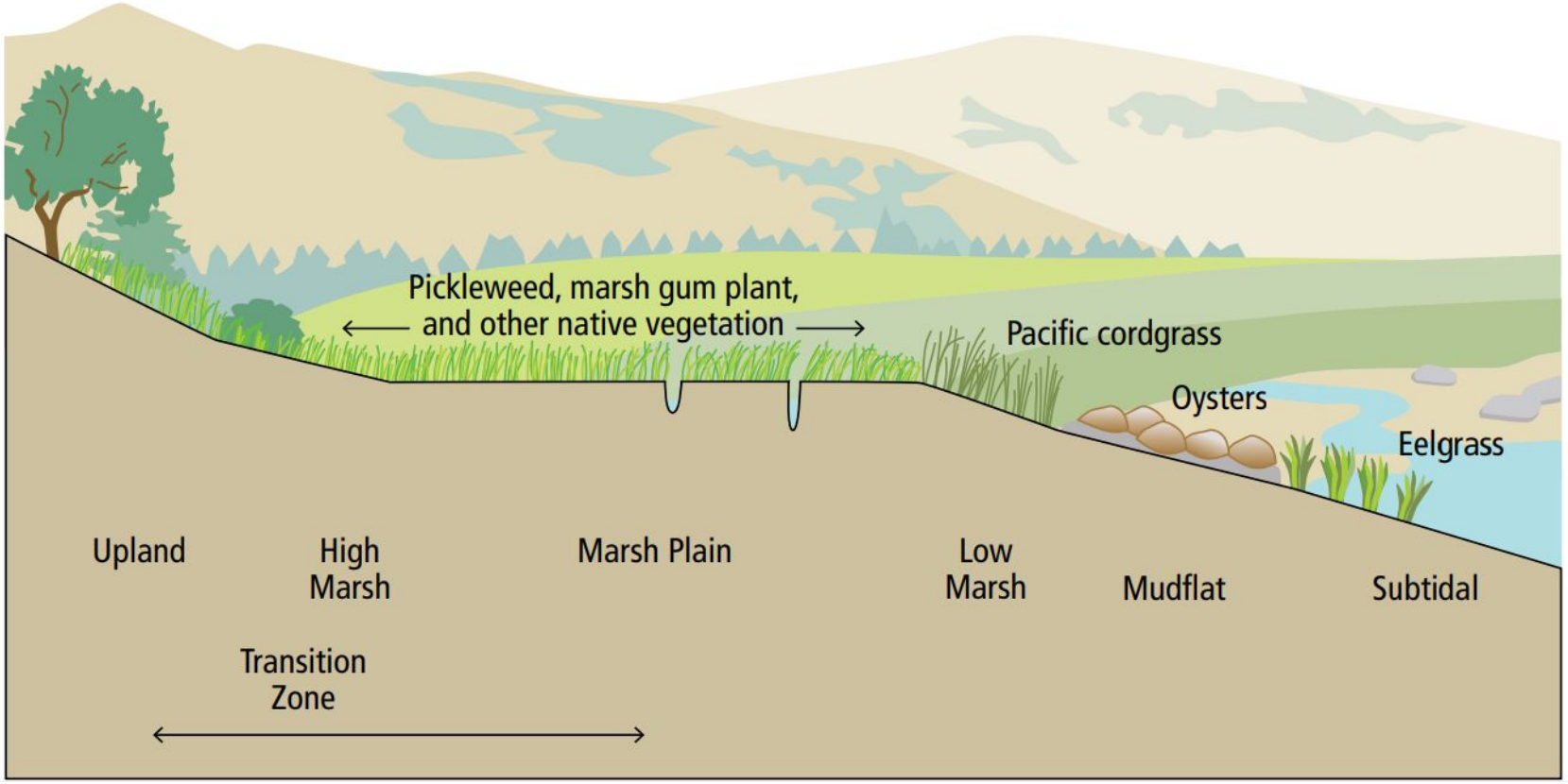
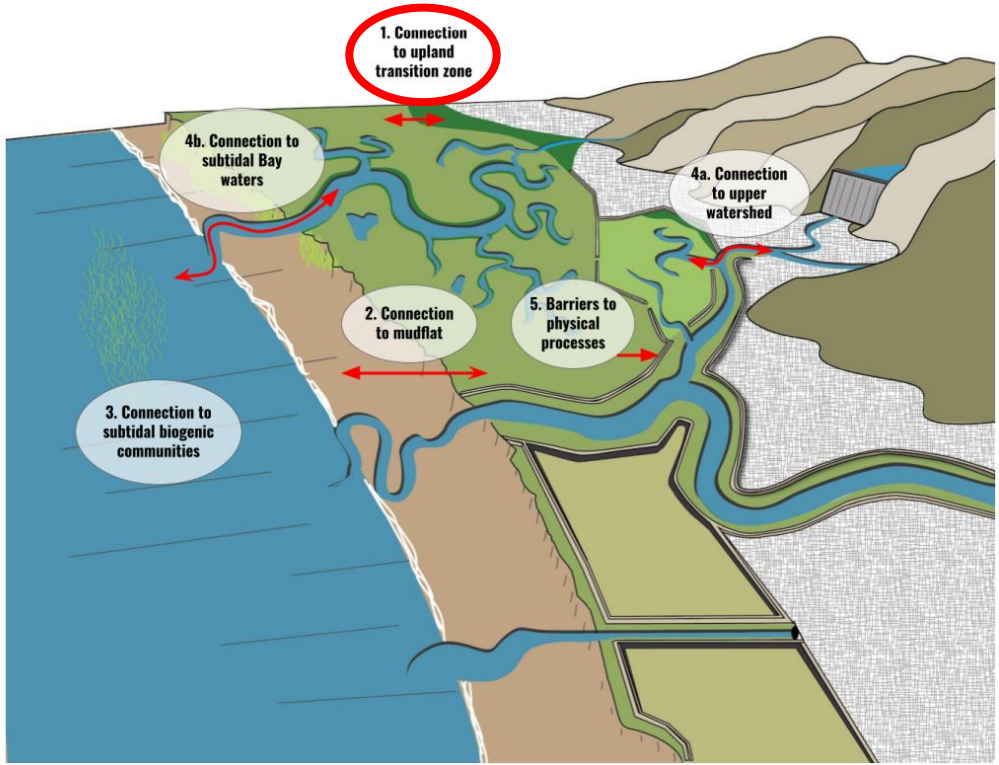
Elements of shoreline resilience for wildlife support

1. Connectivity within the complete marsh
2. Connectivity among marshes
3. Diversity/complexity of channel networks
4. Topographic complexity
5. Diversity/complexity of salinity patterns
6. Redundancy
7. Spatial scale
8. Time scale

Connectivity within the complete marsh



A key resilience metric: transition zone connectivity



Elements of connectivity within the complete marsh, from the *Shoreline Resilience Framework for Wildlife Support*

Three ways to map the transition zone

1. **Bay Margin Transition Zone (Fulfrost and Associates, SFBBO)**
    - Based on tidal elevation modeling
    - Best for identifying existing transition zone habitat
2. **Marsh Migration Space (Adaptation Atlas)**
    - Based on sea-level rise projections and satellite imagery (development)
    - Best for identifying future marsh migration zones
3. **Upper Boundary Transition Zone (Robinson et al 2017)**
    - New mapping created for Shoreline Resilience Framework
    - Best for identifying area supporting broad suite of transition zone services

Example output: good transition zone connectivity

Bay Margin: 96% connectivity

Bay Margin Transition Zone

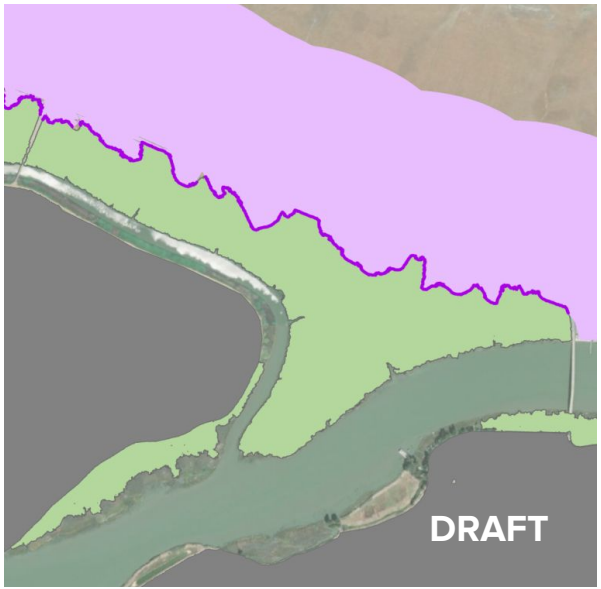
Connectivity at back of marsh

Migration Space: 85% connectivity

Marsh Migration Space

Connectivity at back of marsh

Upper Boundary: 90% connectivity



Upper Boundary Transition Zone

Connectivity at back of marsh

Belden's Landing, Suisun Bay

Example output: poor transition zone connectivity

Bay Margin: 60% connectivity

Bay Margin Transition Zone

Connectivity at back of marsh

Migration Space: 0% connectivity

Marsh Migration Space

Connectivity at back of marsh

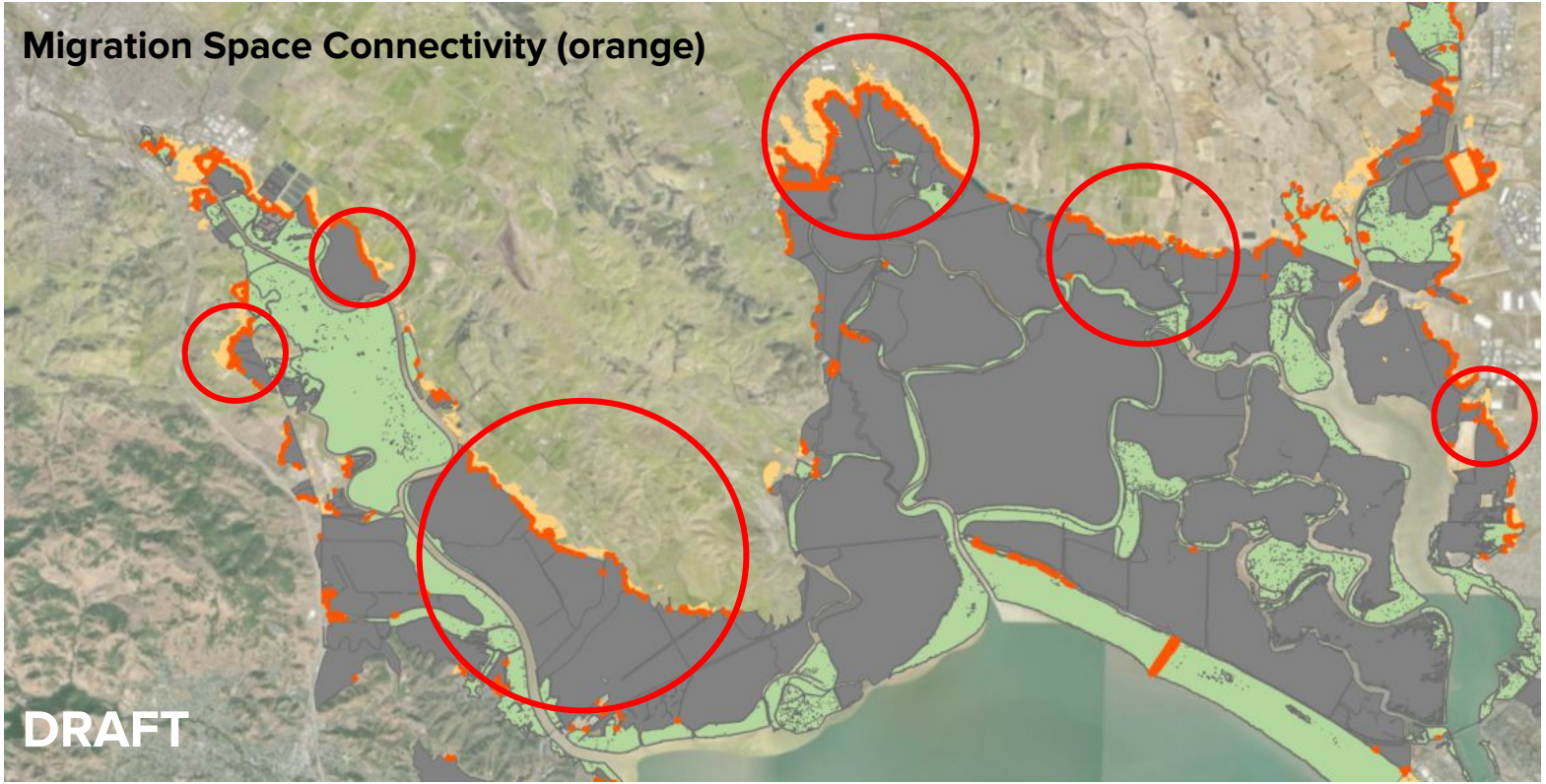
Upper Boundary: 0% connectivity

Upper Boundary Transition Zone

Connectivity at back of marsh

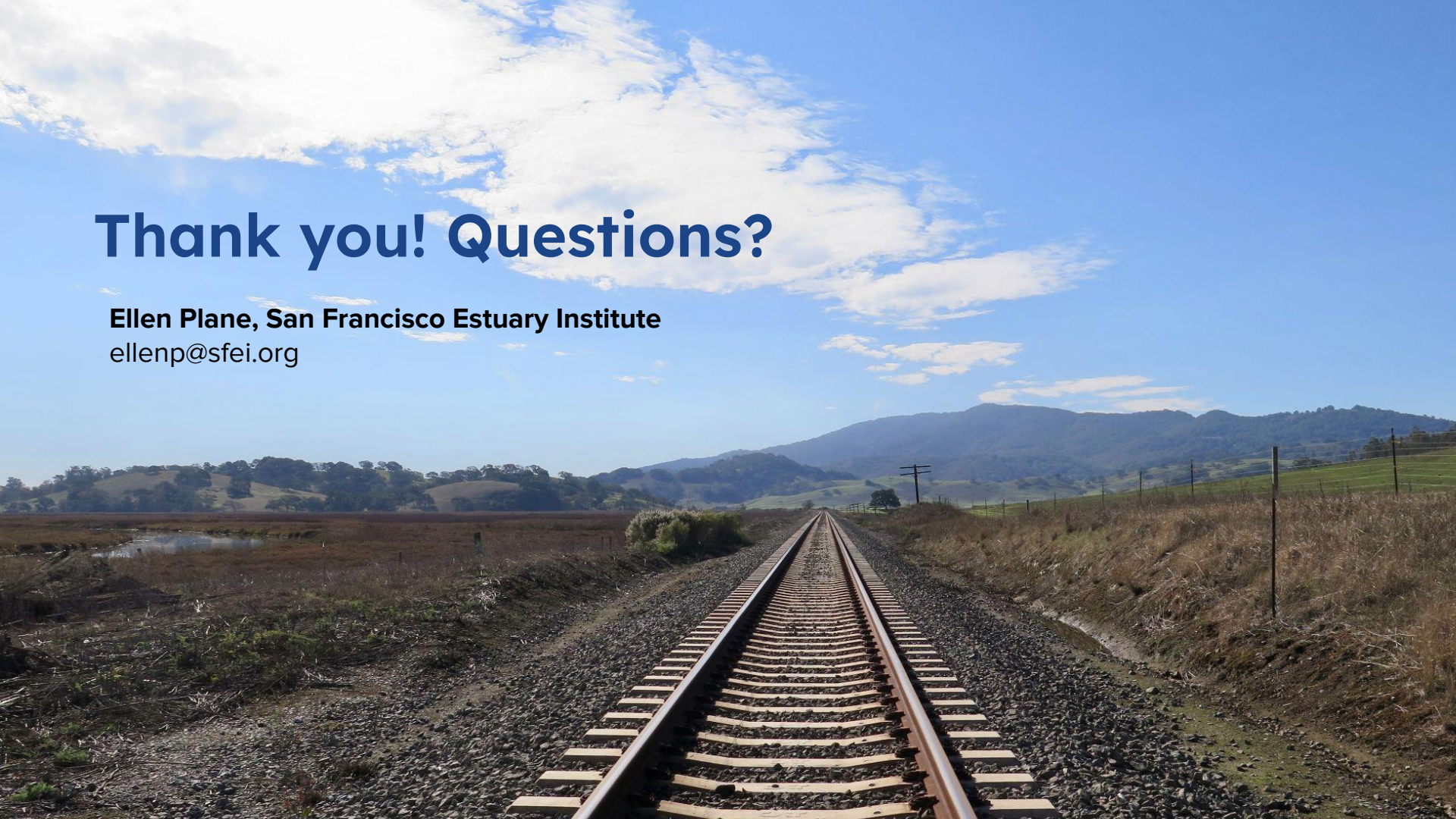
Strawberry Cove, Marin County

Identifying complete marsh restoration sites



Applying results to improve shoreline resilience

- USACE Regional Dredge Material Management Plan
  - Provide quantitative justification for federal cost share for beneficial reuse
  - Help identify future priority sites for sediment placement projects
- Support development of WRMP indicators
- Expand analysis in response to regional needs
- Build metrics into an online decision support tool (proposed)



Thank you! Questions?

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