



NBWA 2024

Baylands Resilience Framework and the Beneficial Use of Sediment

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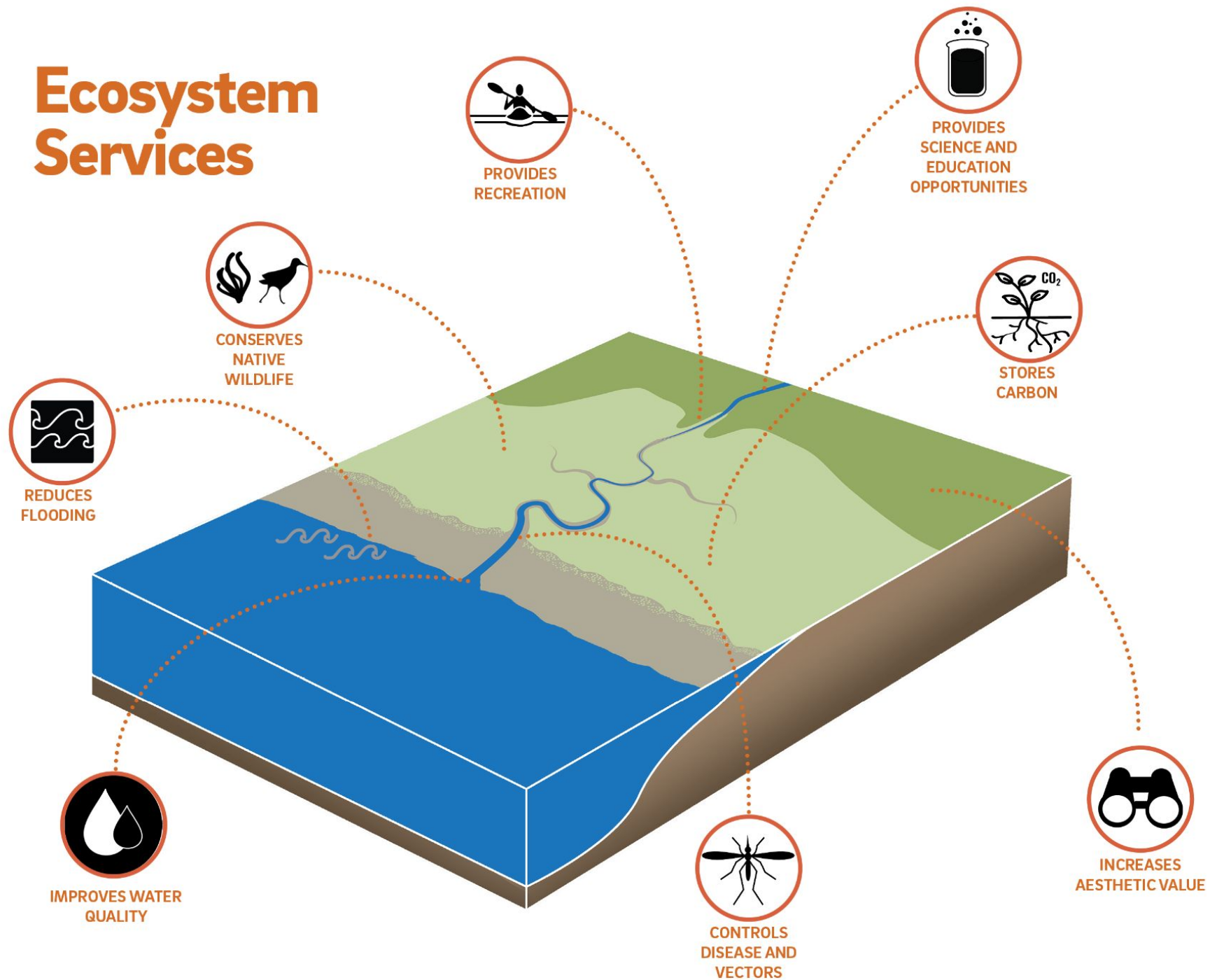
San Francisco Estuary Institute



Photo: Justin Lewis, courtesy of Sonoma Land Trust



Ecosystem Services

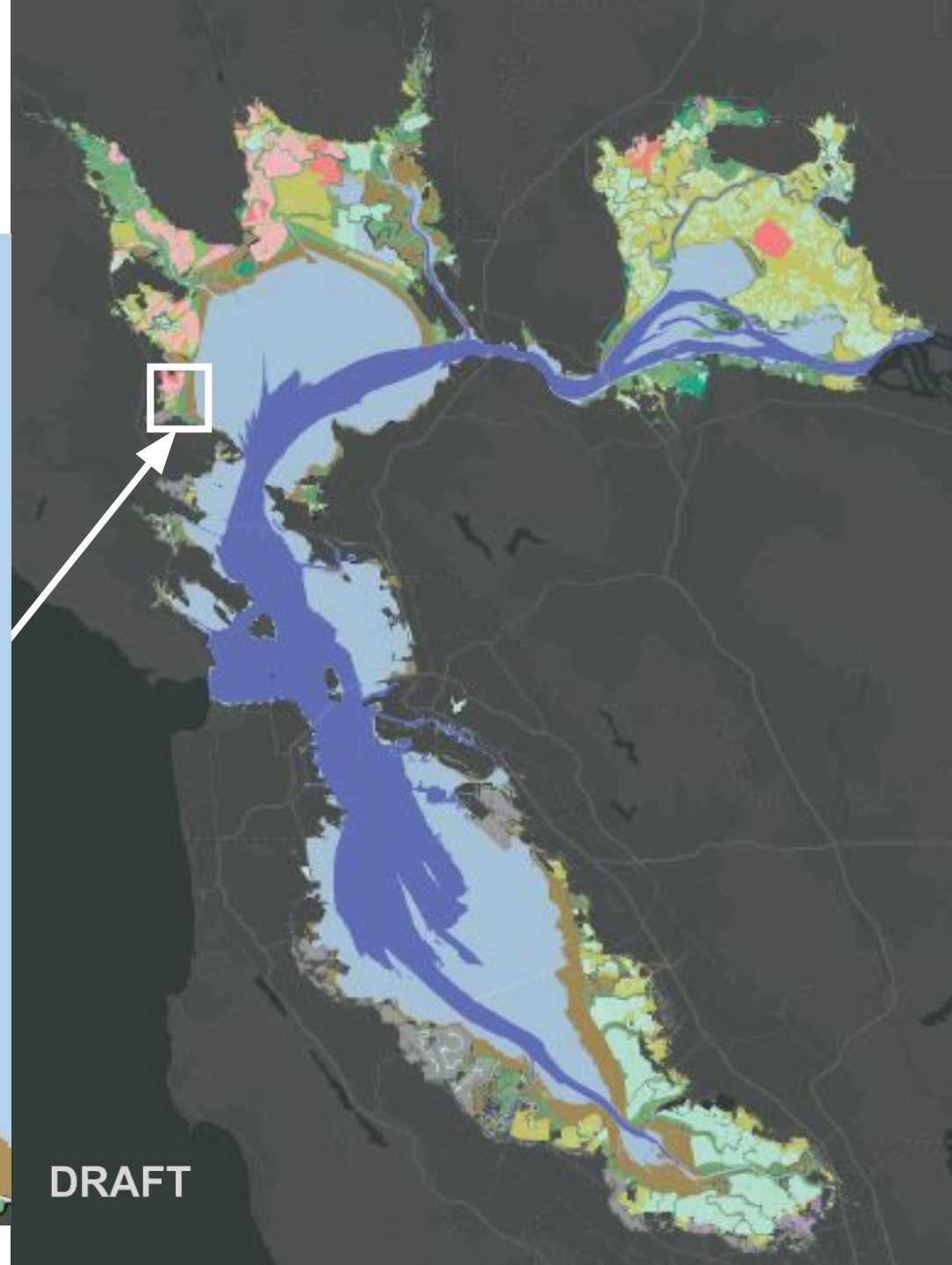
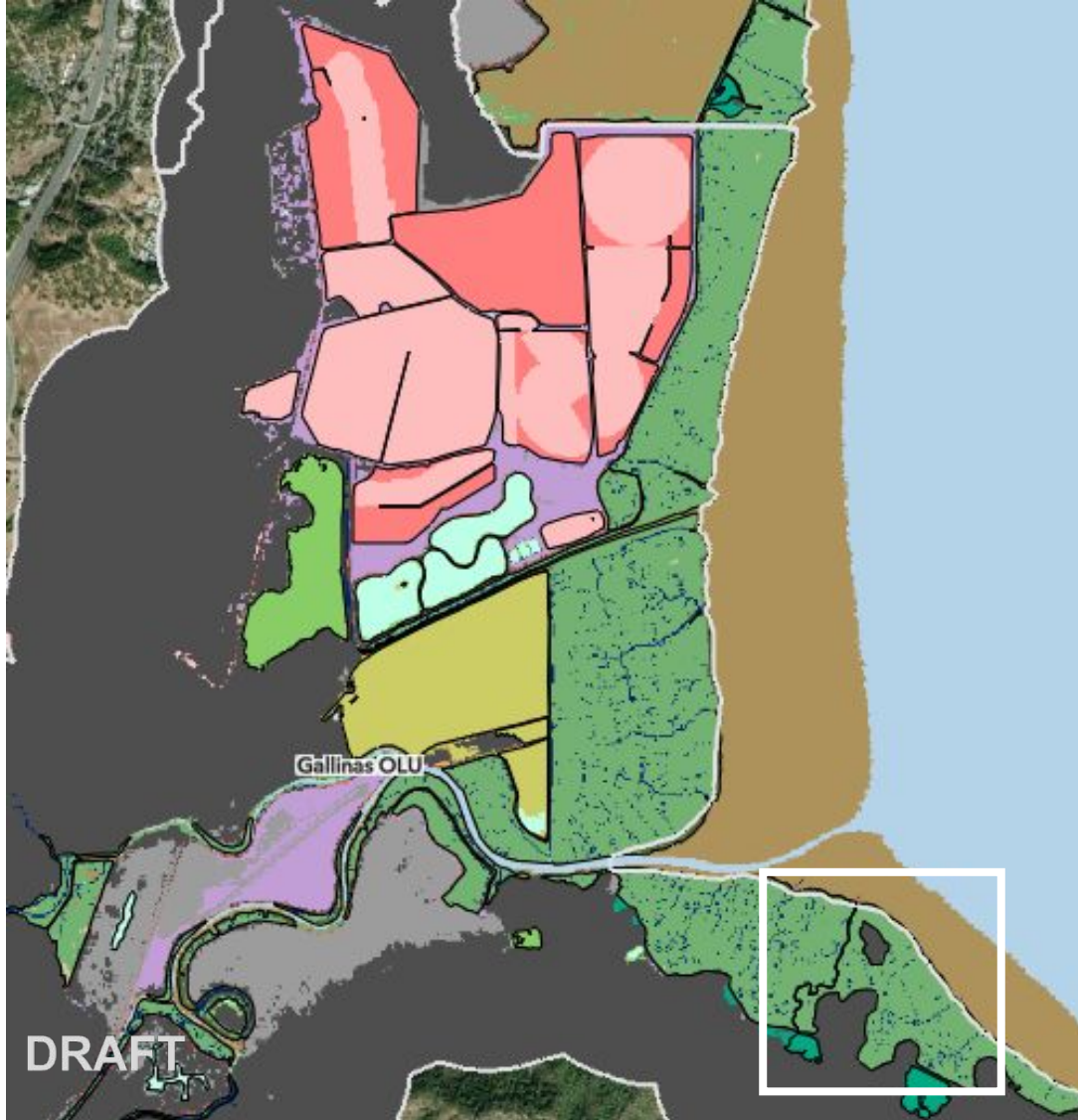


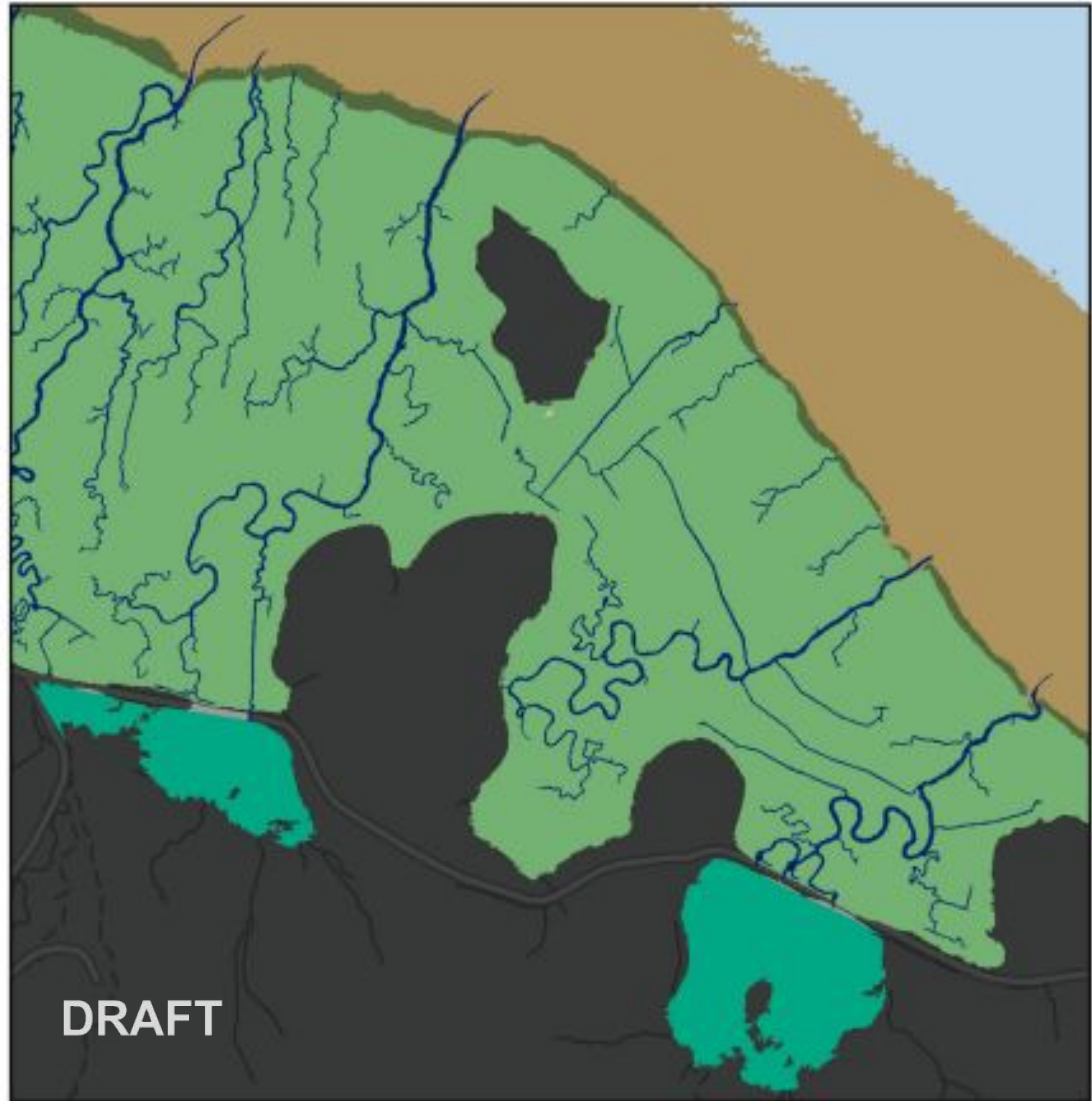
Baylands Resilience Metrics: Purpose

- What characteristics of the baylands provide services to wildlife and communities?
- Will the baylands continue to provide these services as climate changes and sea-level rise?
- How can we use restoration and adaptation (e.g. sediment placement) to maintain and increase these services?

Baylands Habitat Map 2020

- Shallow Subtidal
- Deep Subtidal
- Tidal Flat
- Tidal Pond/Panne
- Intertidal Channel
- High Marsh
- Low Marsh
- Beach
- Muted Tidal Marsh
- Managed Marsh
- Undetermined Other Marsh
- Other Open Water
- Low-Intensity Agriculture
- High-Intensity Agriculture
- Developed/Urban
- Undetermined Non-Aquatic
- Levee
- Dune
- Upland





Baylands Resilience Framework

ECOSYSTEM SERVICE

Benefit provided by ecosystems to people

E.g. **Wildlife support**

ELEMENT

Factor contributing to providing an ecosystem service

E.g. **Connectivity within the complete marsh**

METRIC

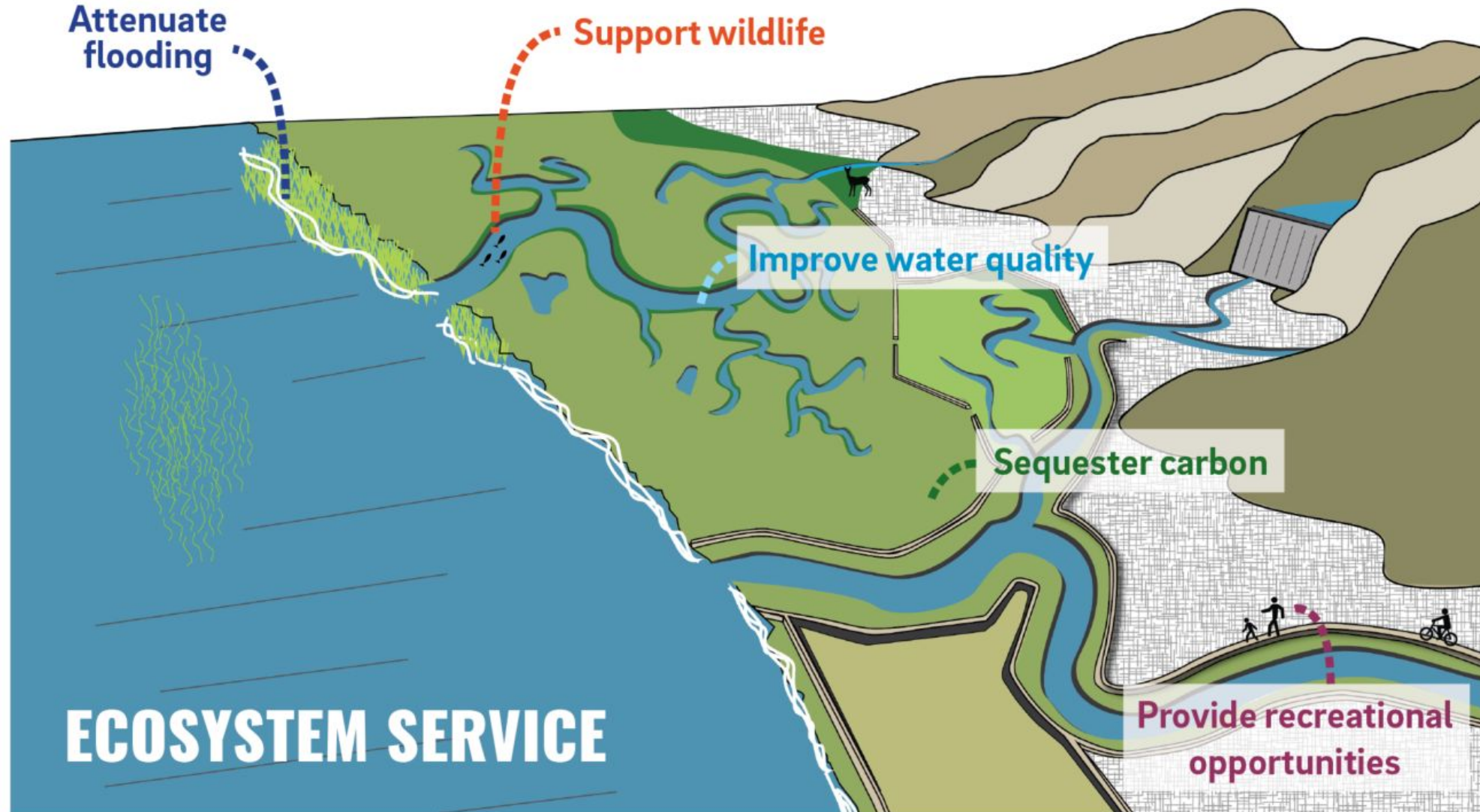
Quantifiable factor to measure an element

E.g. **Percent connectivity to upland transition zone**

Metrics inform development of targeted projects to increase bayland resilience

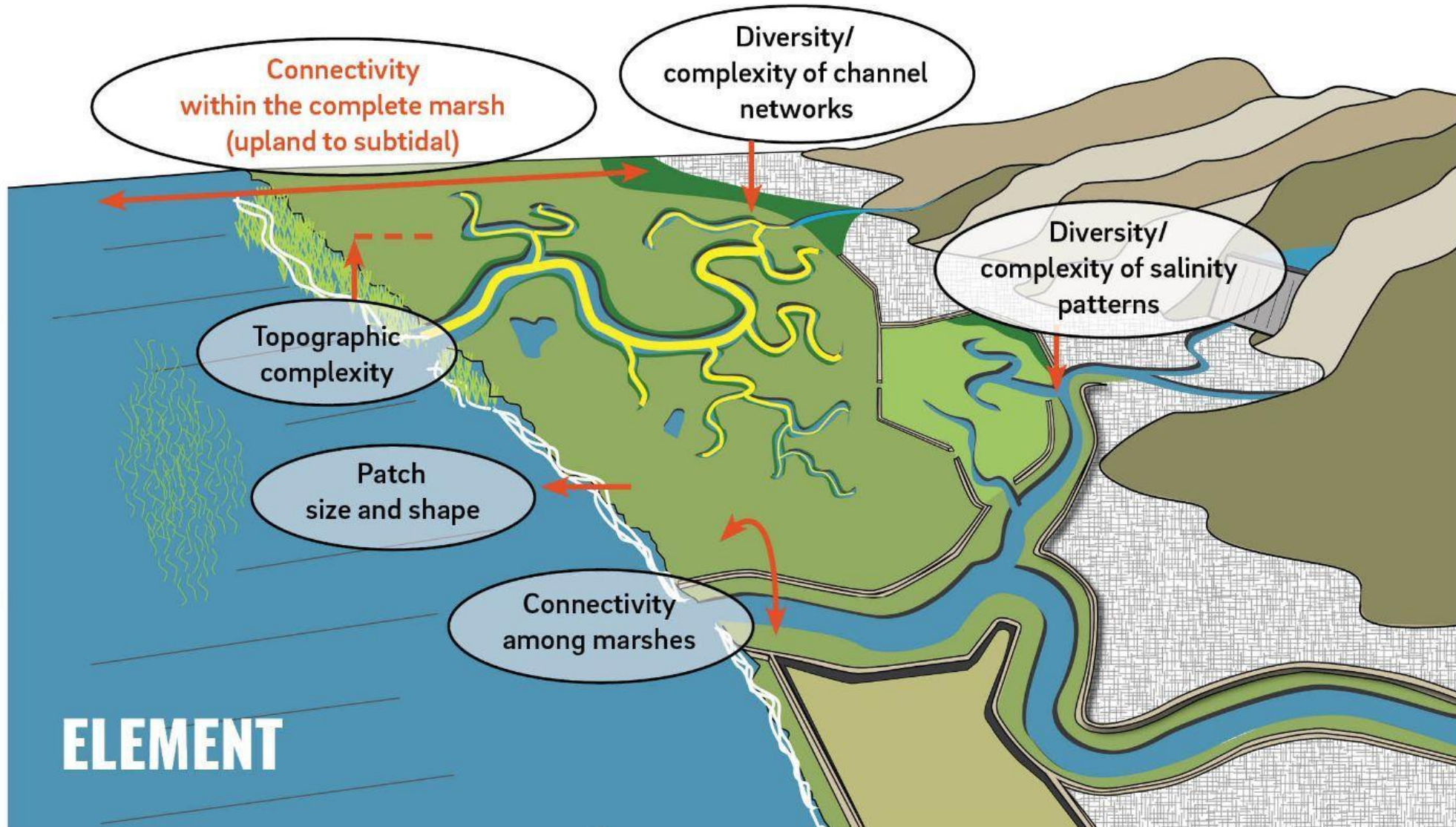
What does “baylands resilience” mean?

As sea levels rise, marshes and mudflats continue to...



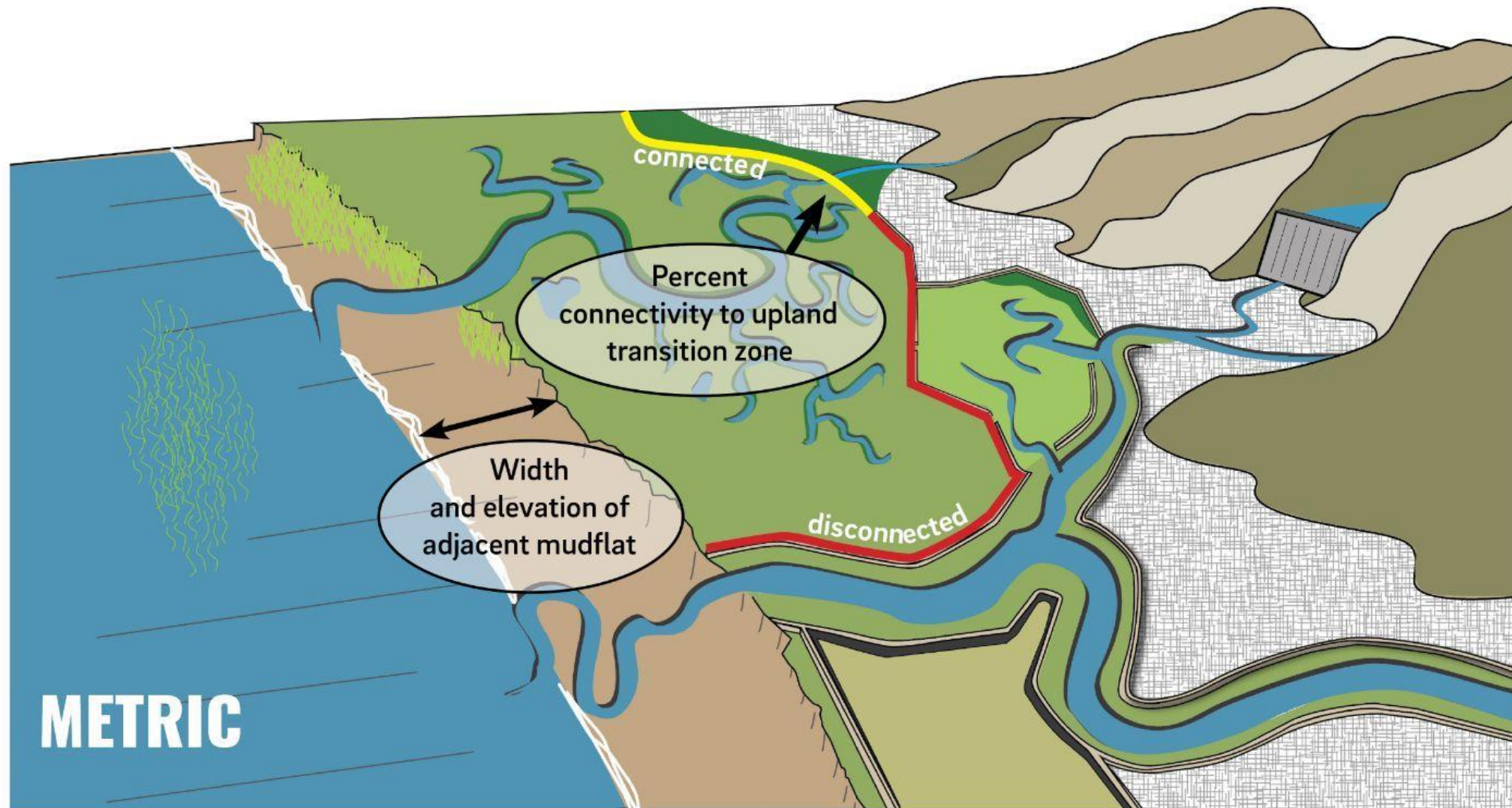
What does “supporting wildlife” mean?

Example elements of resilience include...



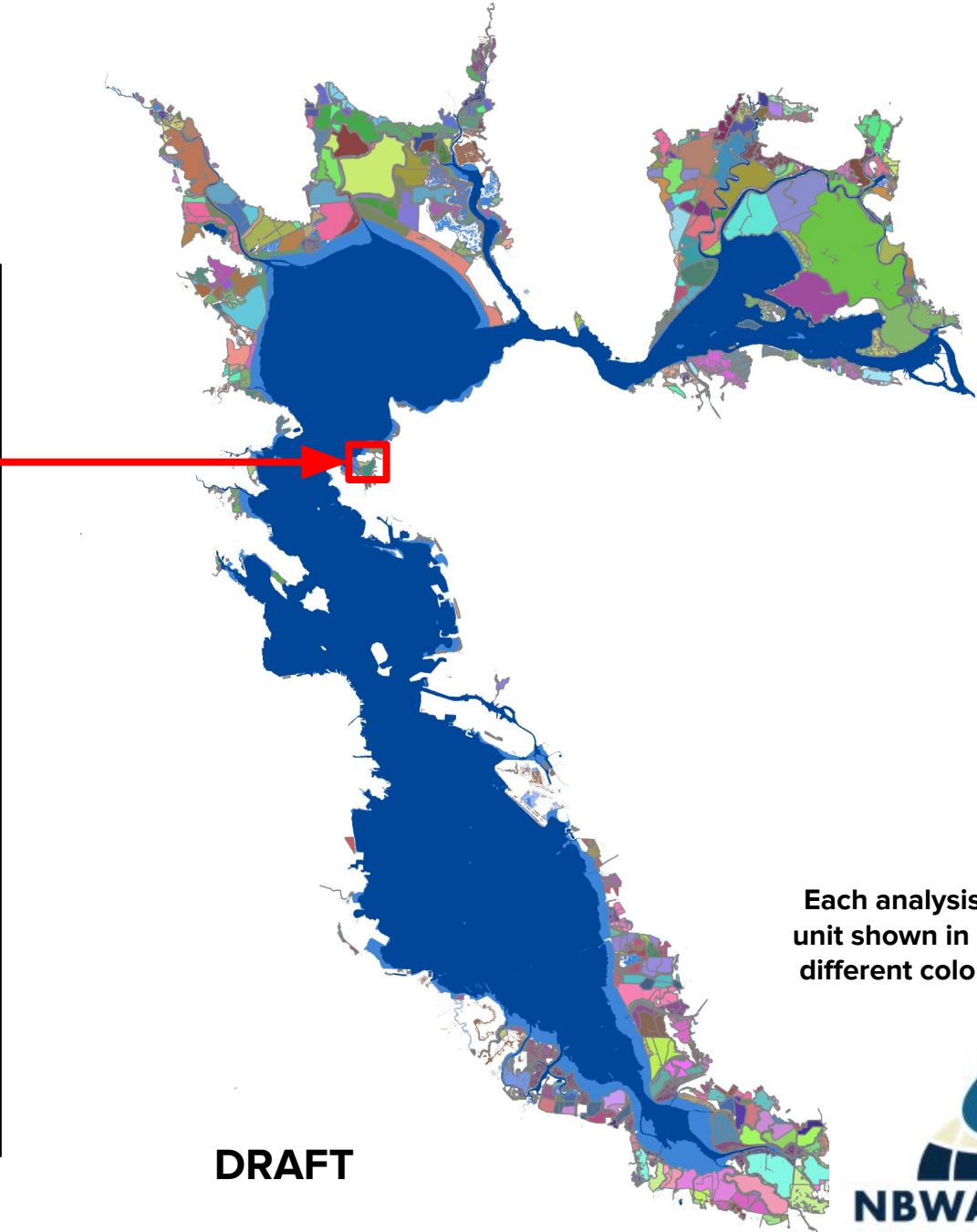
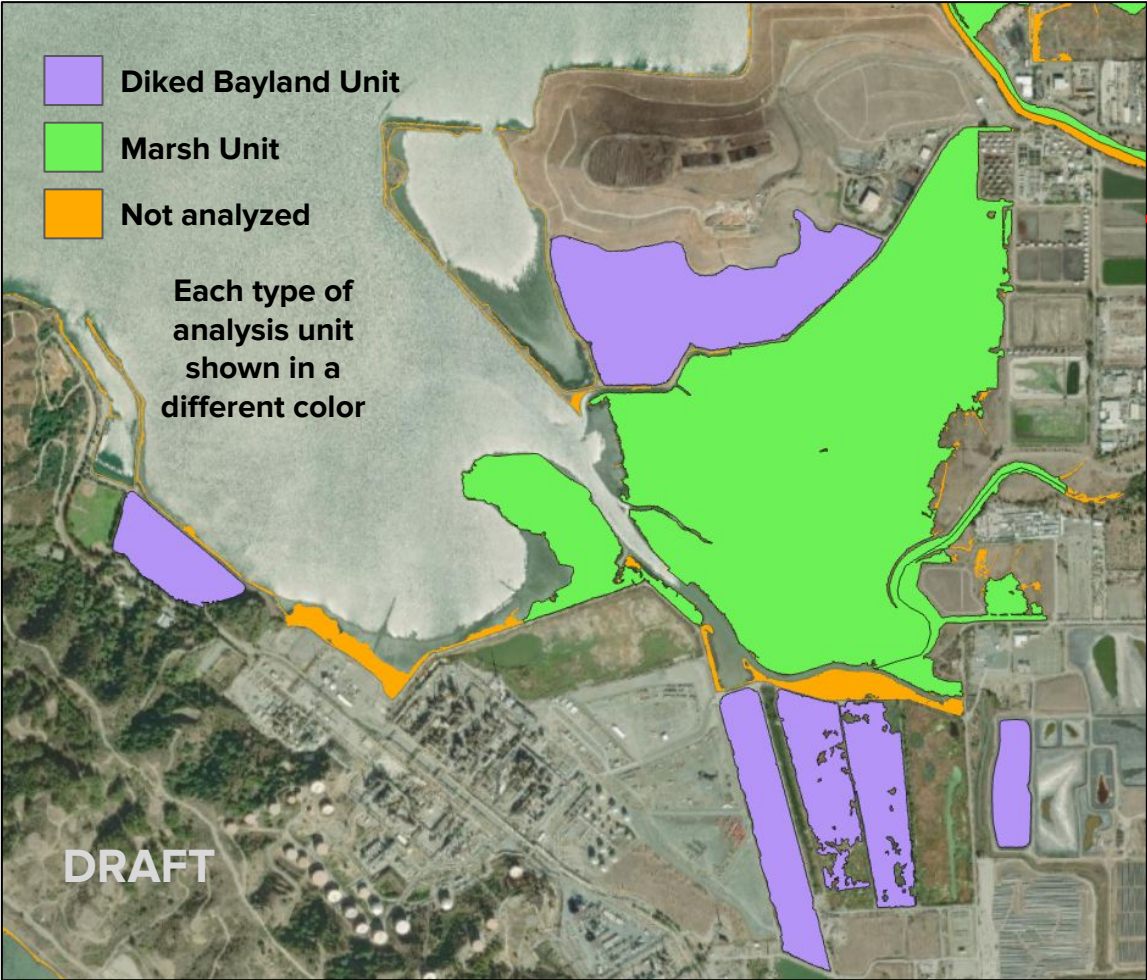
What does “connectivity within the complete marsh” mean?

Example metrics to quantify this element include...

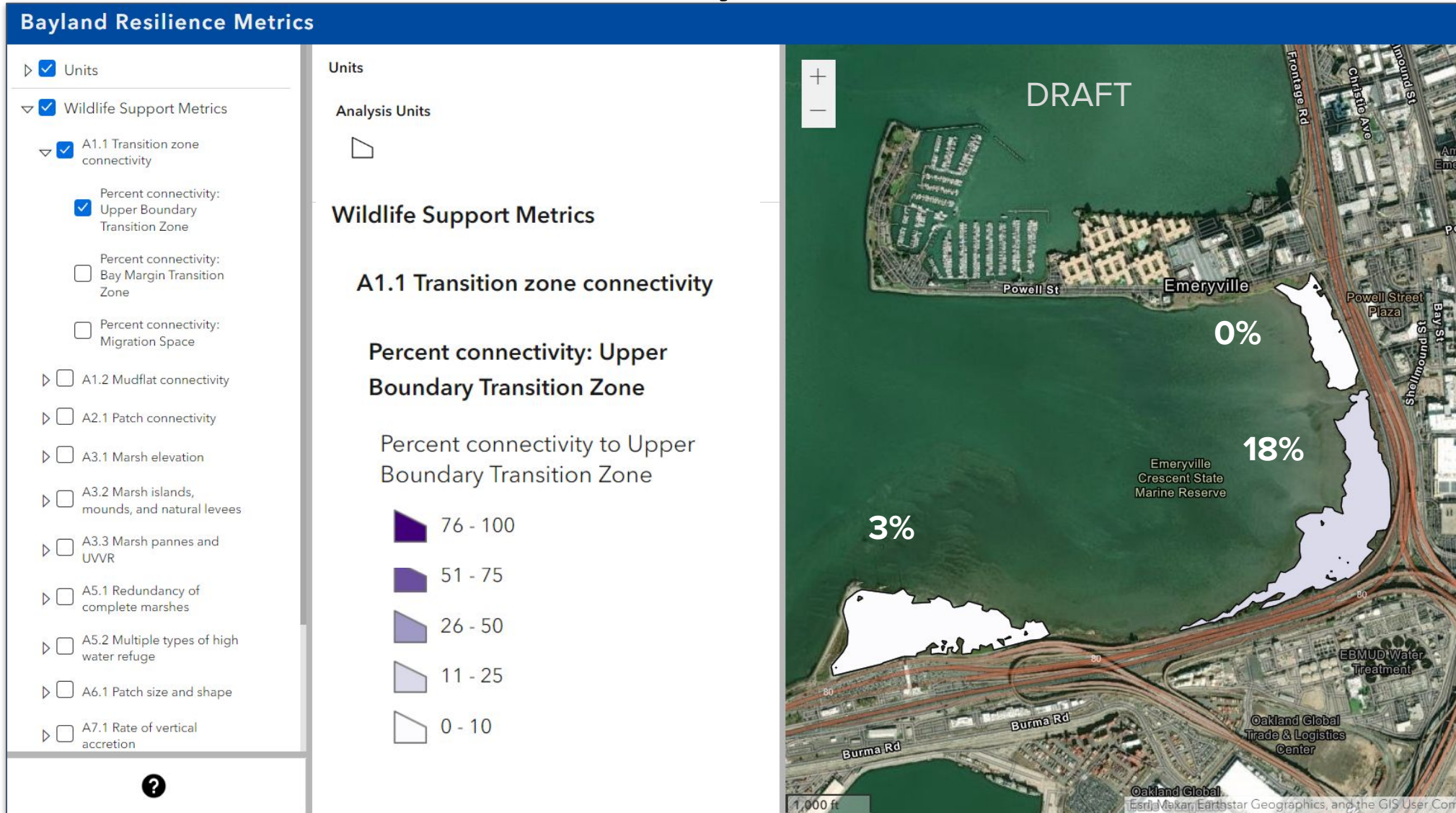


METRIC

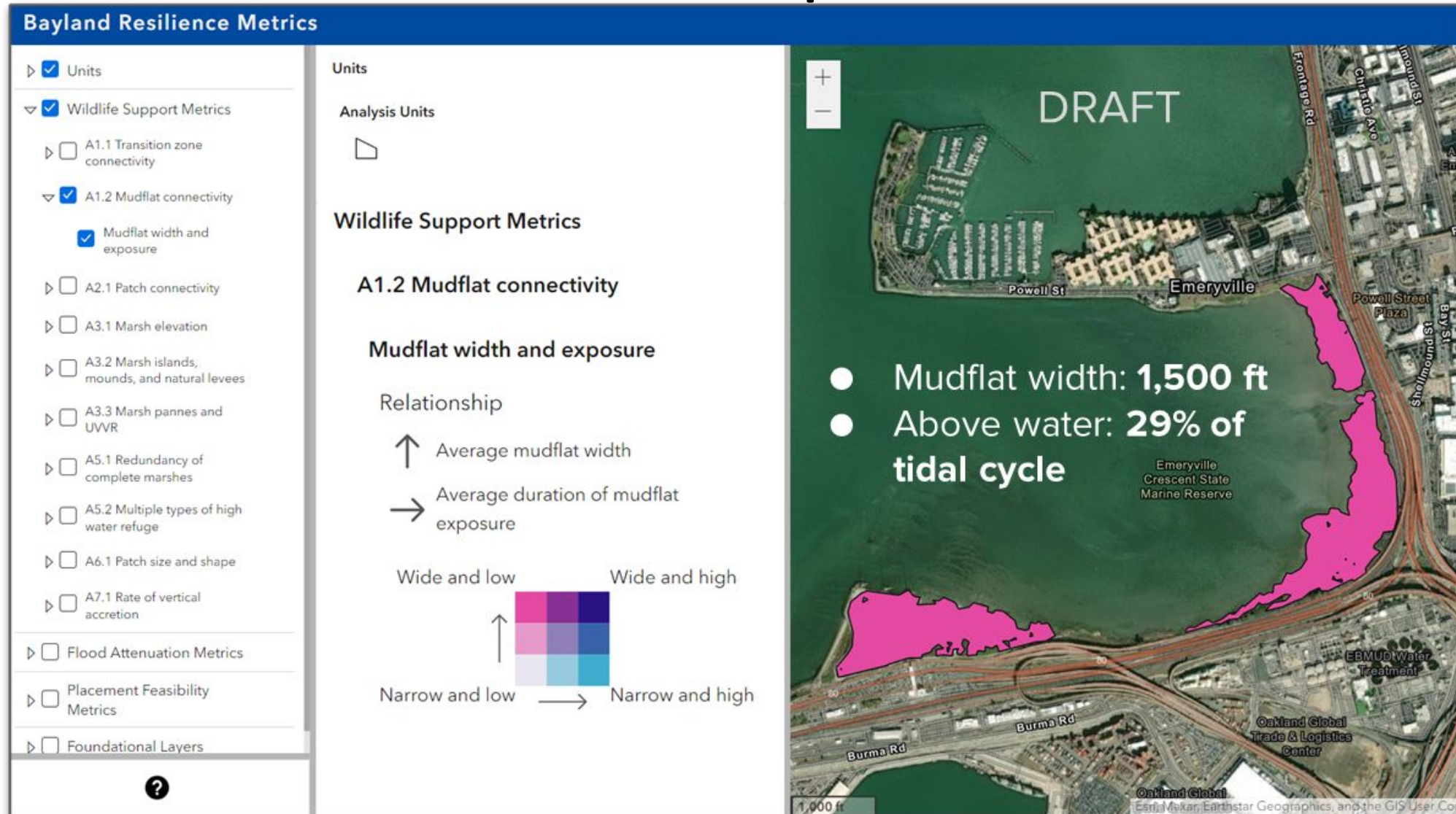
Analysis Units



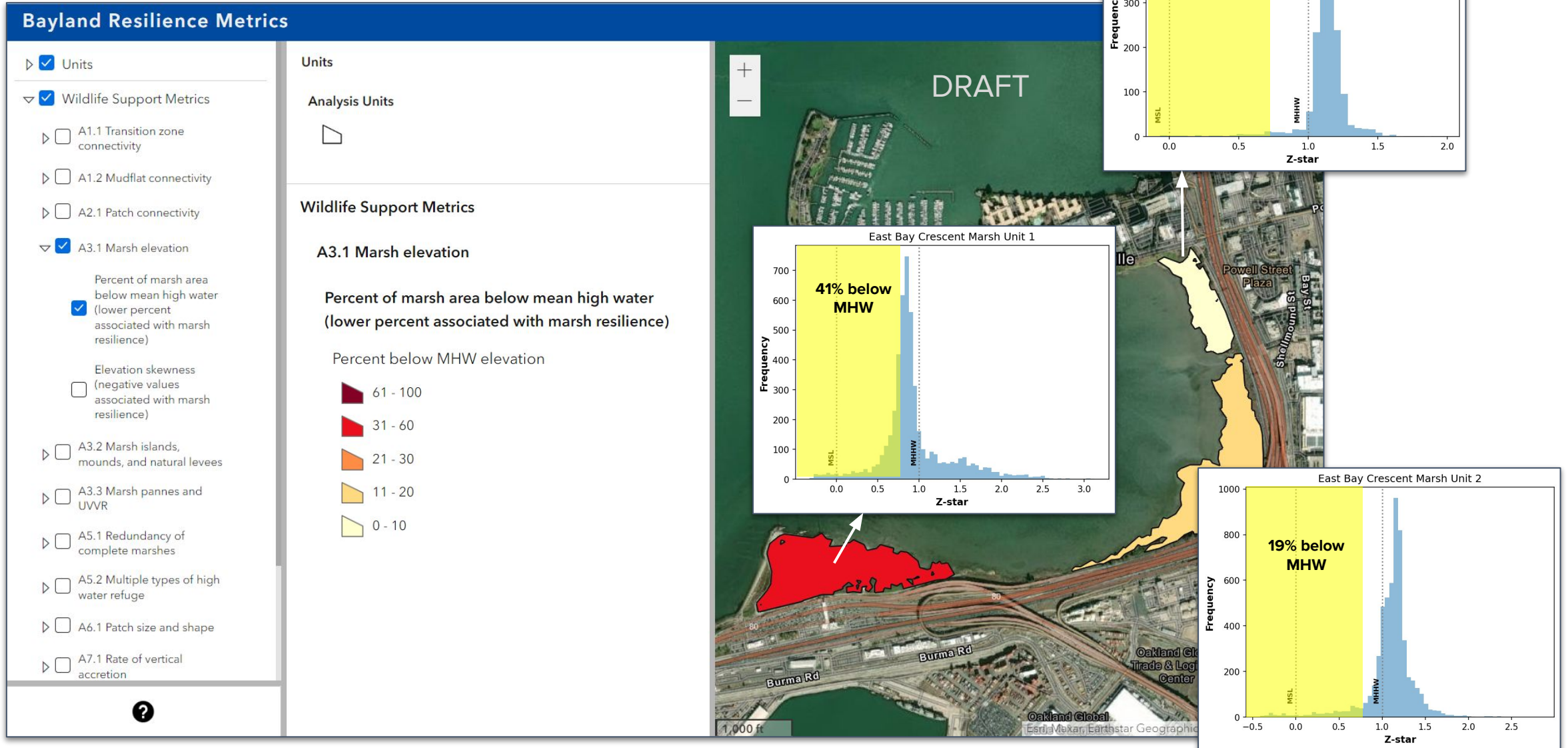
Percent connectivity to transition zone



Mudflat width and exposure

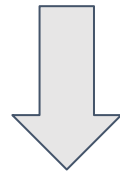


Marsh elevation



Takeaways from stacking the metrics

1. Very minimal opportunity for upland migration
2. Adjacent mudflats wide but low in elevation
3. At least one of the marshes is low in elevation relative to tidal frame

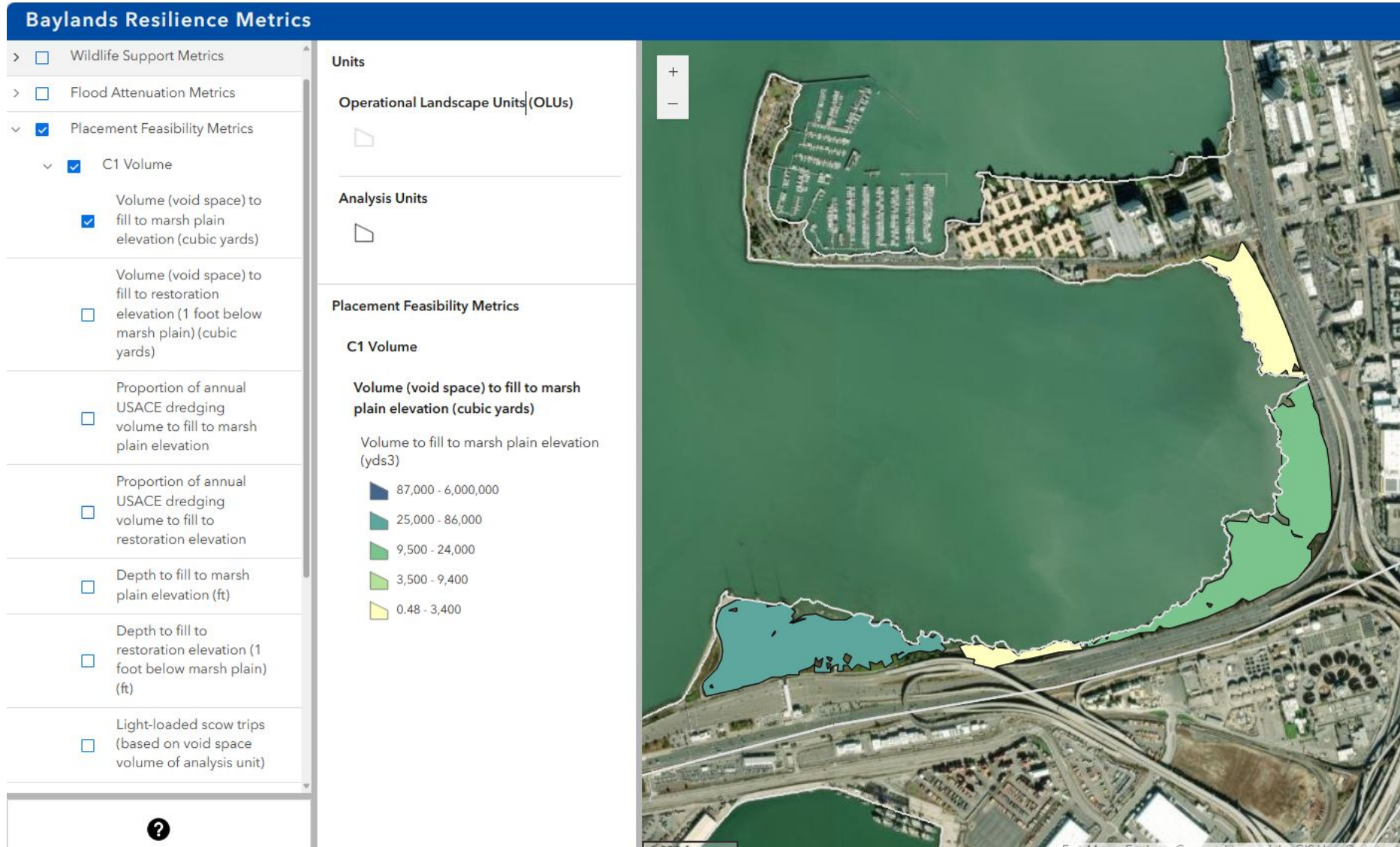


Need to focus on vertical resilience

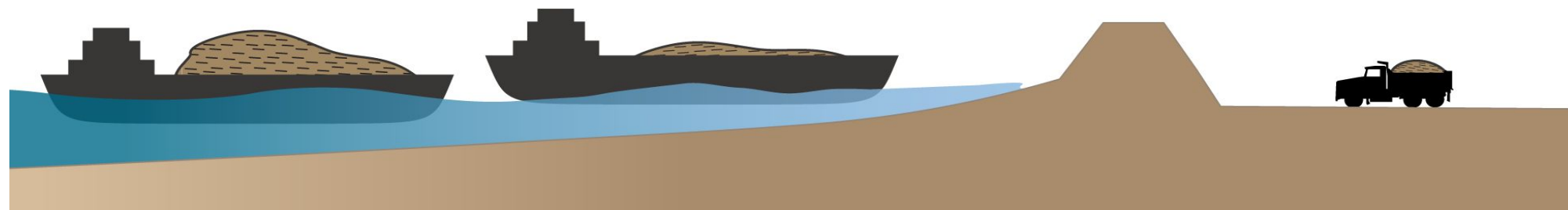
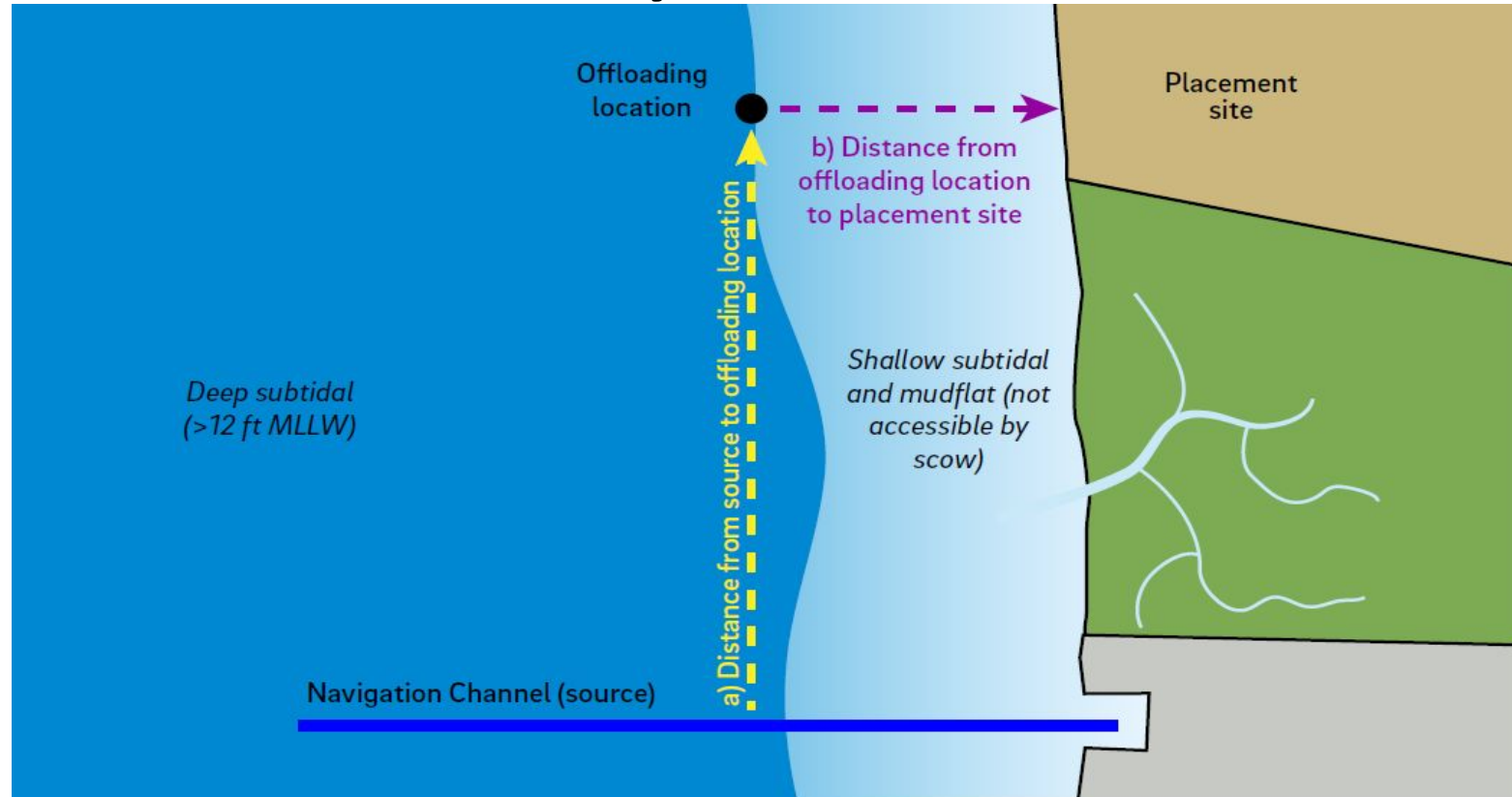


Sediment placement as a potential adaptation strategy
(shallow water placement, thin layer placement)

Volume to fill to marsh elevation



Placement Feasibility

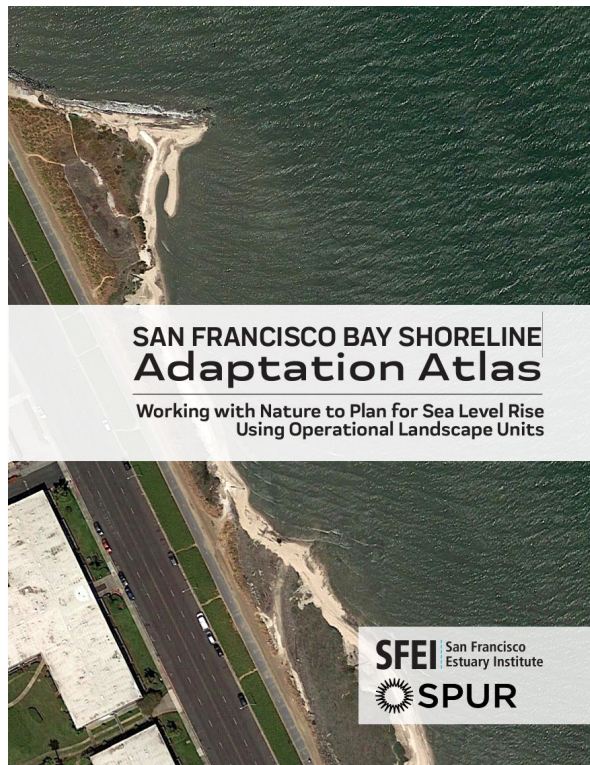


Applications

- **USACE Regional Dredge Material Management Plan:**
identify where placement is most beneficial
- **Wetlands Regional Monitoring Program:**
two-way data exchange
- **San Francisco Bay Restoration Authority**
guide and evaluate the effectiveness of investments
- **Regional Shoreline Adaptation Plans:**
inform the development of local adaptation plans

More of this coming

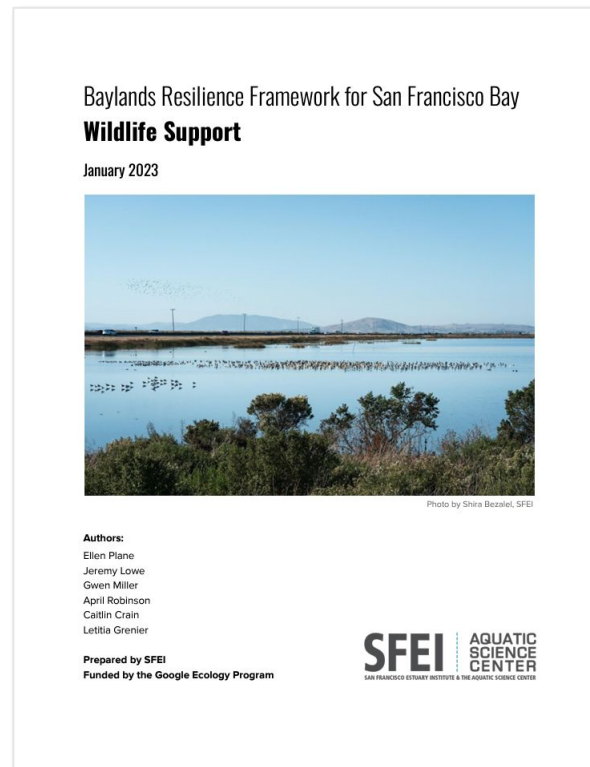
- **Subregional OLU summary narratives (2024-25)**
- **Regional summaries of metrics (2024-25)**
- **Additional channel metrics (2024-25)**
- **Decision support tools (2025-26)**
- **Update of Baylands mapping (2025-26)**



www.sfei.org/adaptationatlas

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- Regional Water Quality Control Board
- Google Ecology Program
- US Army Corps of Engineers



www.sfei.org/projects/baylands-resilience-framework



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