Pilot Project: Strategic Shallow-Water Placement

Beneficial Use of Dredged Sediment in the San Francisco Bay Area

STORMS, FLOODING AND SEA LEVEL DEFENSE CONFERENCE 2023

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ENGINEERING WITH NATURE (EWN)

An engineering philosophy that uses natural and engineering processes to deliver economic, environmental, and social benefits, including:

- Flood, coastal storm, and erosion risk mitigation
- Ecosystem restoration
- Equitable outcomes for EJ communities
- Recreation
- Climate resilience

Nature-based solutions referred to as Natural and Nature-based Features (NNBF) in EWN context.

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PROVING GROUND NETWORK

Proving Grounds

Implement. Document. Share.

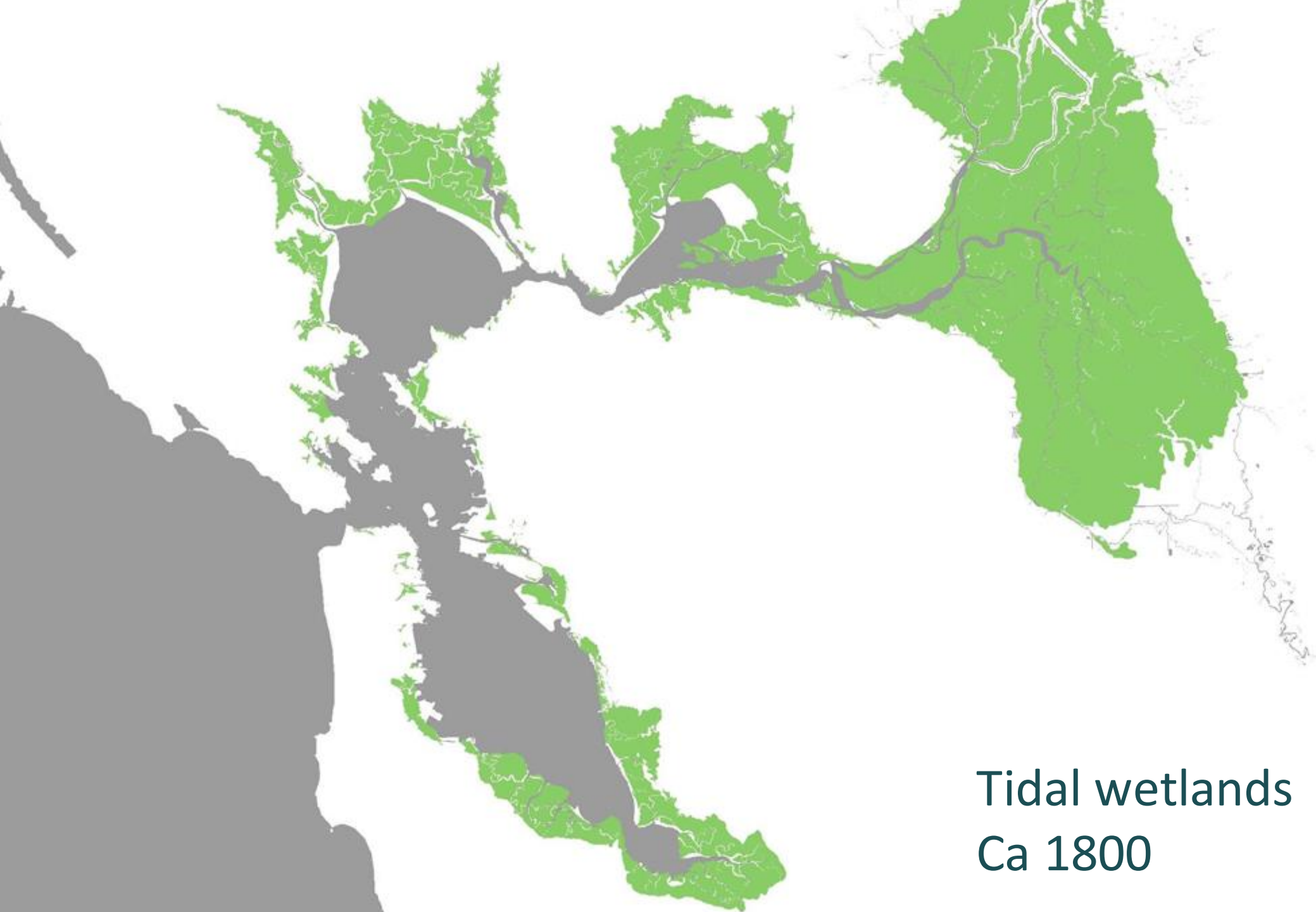
EWN Proving Grounds are USACE districts and divisions committed to the broad integration of EWN principles and practices into all business lines in the form of constructed projects. Proving grounds are places where innovative ideas are tested on the ground, throughout USACE missions. They document processes, project milestones, and lessons learned in the implementation of EWN measures so others can learn from their experience.

Mobile District

San Francisco District

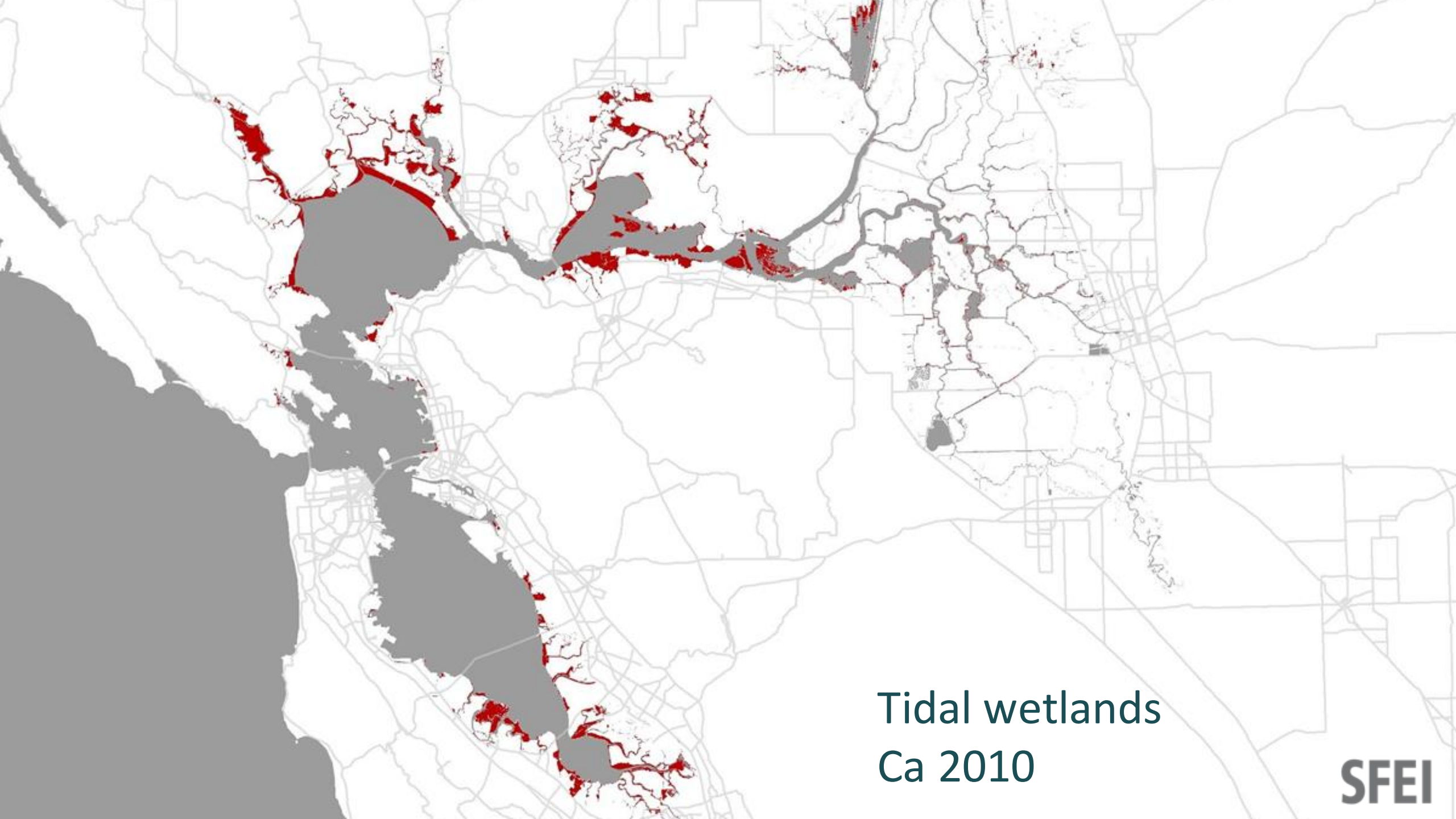
St. Louis District

https://ewn.erdc.dren.mil/



Tidal wetlands
Ca 1800

SFEI


Tidal wetlands
Ca 2010

SEDIMENT IS A RESOURCE

- USACE dredges navigation channels yearly
- Historically “cheaper” to take the material offshore
- We need to reuse the sediment in a smart way, collaboratively if we want to design with nature for climate resilience

The Mercury News | San Francisco Bay: Protection from costly…

NEWS › ENVIRONMENT

San Francisco Bay: Protection from costly disasters is being thrown away, scientists say

Sea level rise threatens billions in flood damage, but dredged mud to raise shoreline isn’t being used

USACE NAVIGATION – CHALLENGES & OPPORTUNITIES

Challenges

- Equipment challenges
  - Hard to get material to other sites (long distance pipelines)
  - Small enough scows to get close to shore for shallow water placement
- Timing of receiving sites coming online
- Federal standard remains, but environmental benefits can be counted, accounting for all the costs
- Quantifying the benefits of strategic placement

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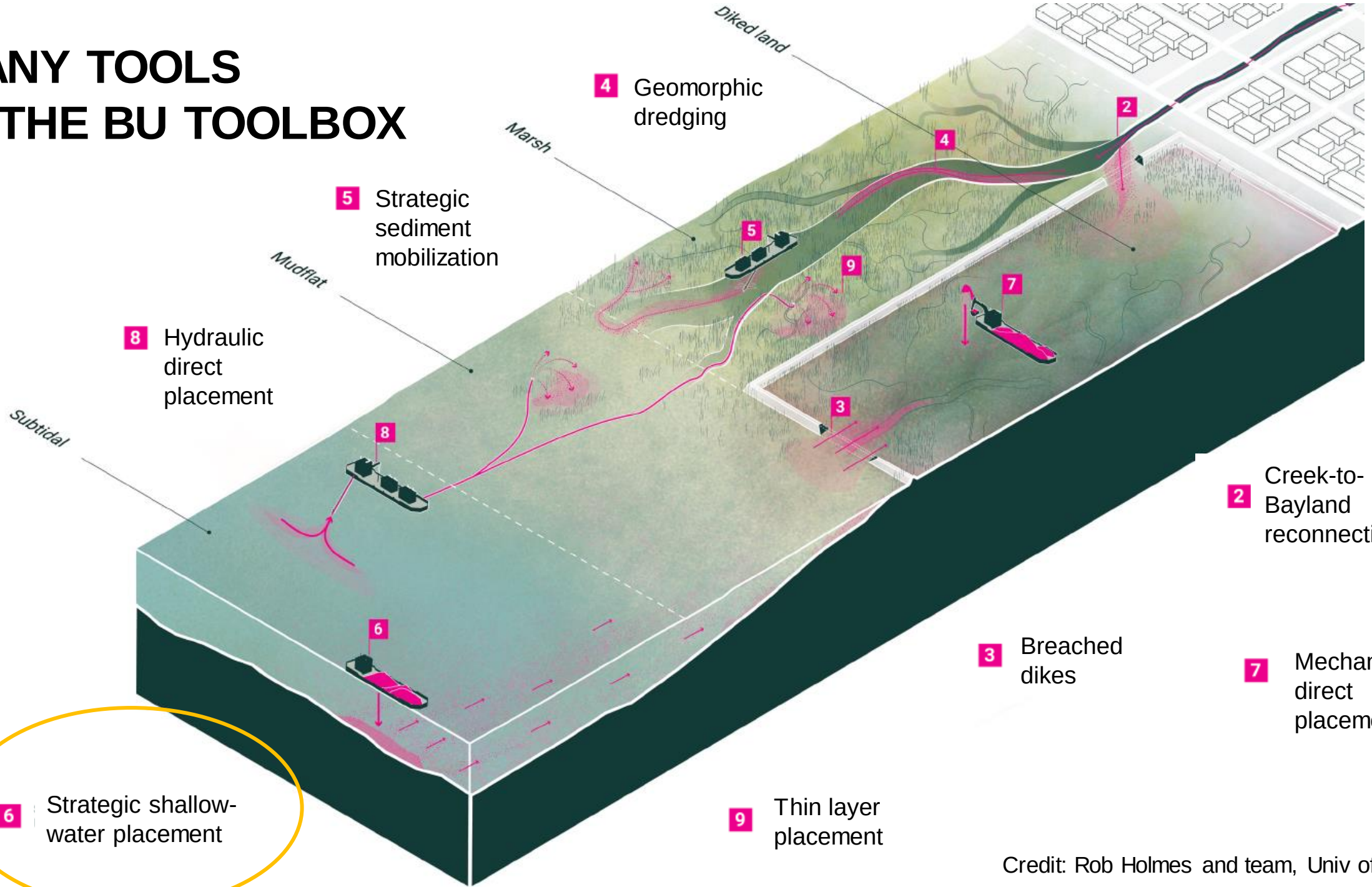
MANY TOOLS IN THE BU TOOLBOX



4 Geomorphic dredging

5 Strategic sediment mobilization

8 Hydraulic direct placement

2 Creek-to-Bayland reconnection

3 Breached dikes

7 Mechanical direct placement

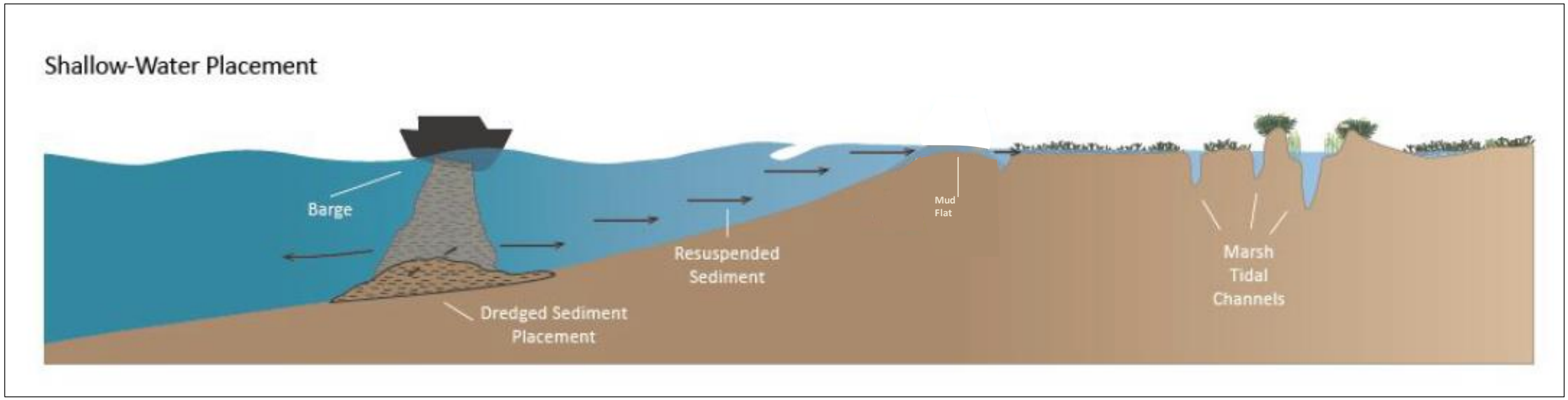
6 Strategic shallow-water placement

9 Thin layer placement

Credit: Rob Holmes and team, Univ of Auburn

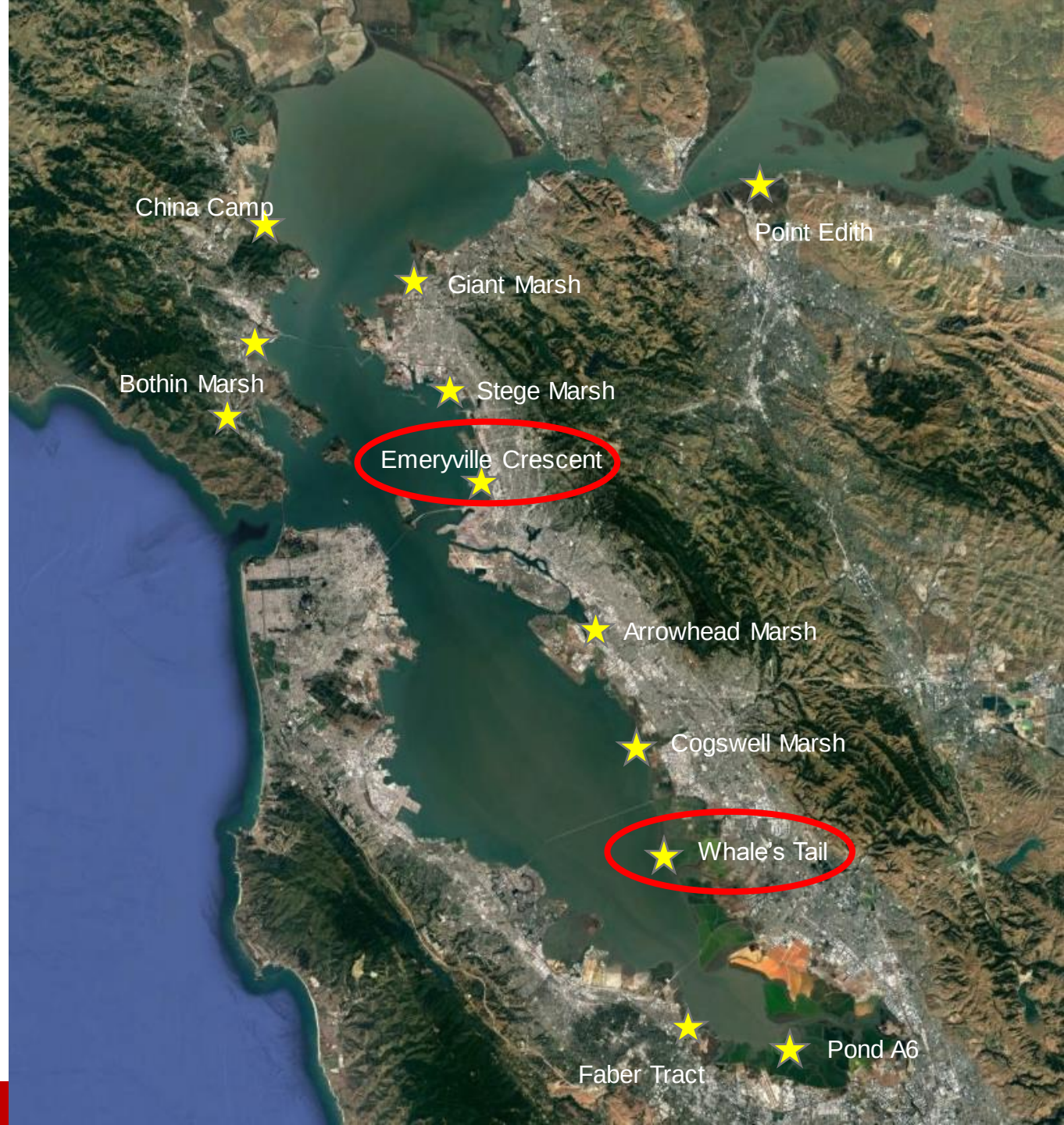
SECTION 1122 SHALLOW WATER PLACEMENT

- Using natural transport processes to move material onshore
- Creates resilience for mudflats and marshes
- Innovative, moves towards regional goals
- Monitoring impacts and effectiveness



SCREENING OF SITES

- **Site selection criteria**
  - Eroding or drowning marsh, lack of natural sediment supply
  - Sufficient wind-wave action to resuspend sediment placed
  - Open to tidal exchange
  - Wind-wave shore-normal approach
  - Proximity to a Federal Channel
  - Water deep enough to get scow close to shore
  - Lower populations of critical species
  - Avoiding large eelgrass beds/nearshore reef projects
  - Flood protection for EJ/disadvantaged communities



MODELING

- Modeling using UnTRIM Bay-Delta model and sediment transport model to simulate existing conditions and placement alternatives
- **First Round – Site Selection**
  - Determine whether Emeryville or Eden Landing is most suitable for this pilot study
  - Evaluate different placement strategies
    - Testing 100,000 yd^3 total
    - Placement locations
- **Second Round –sensitivity analysis**
  - Different volumes
  - Seasonal differences
  - Size of placement footprint
  - Sediment sources

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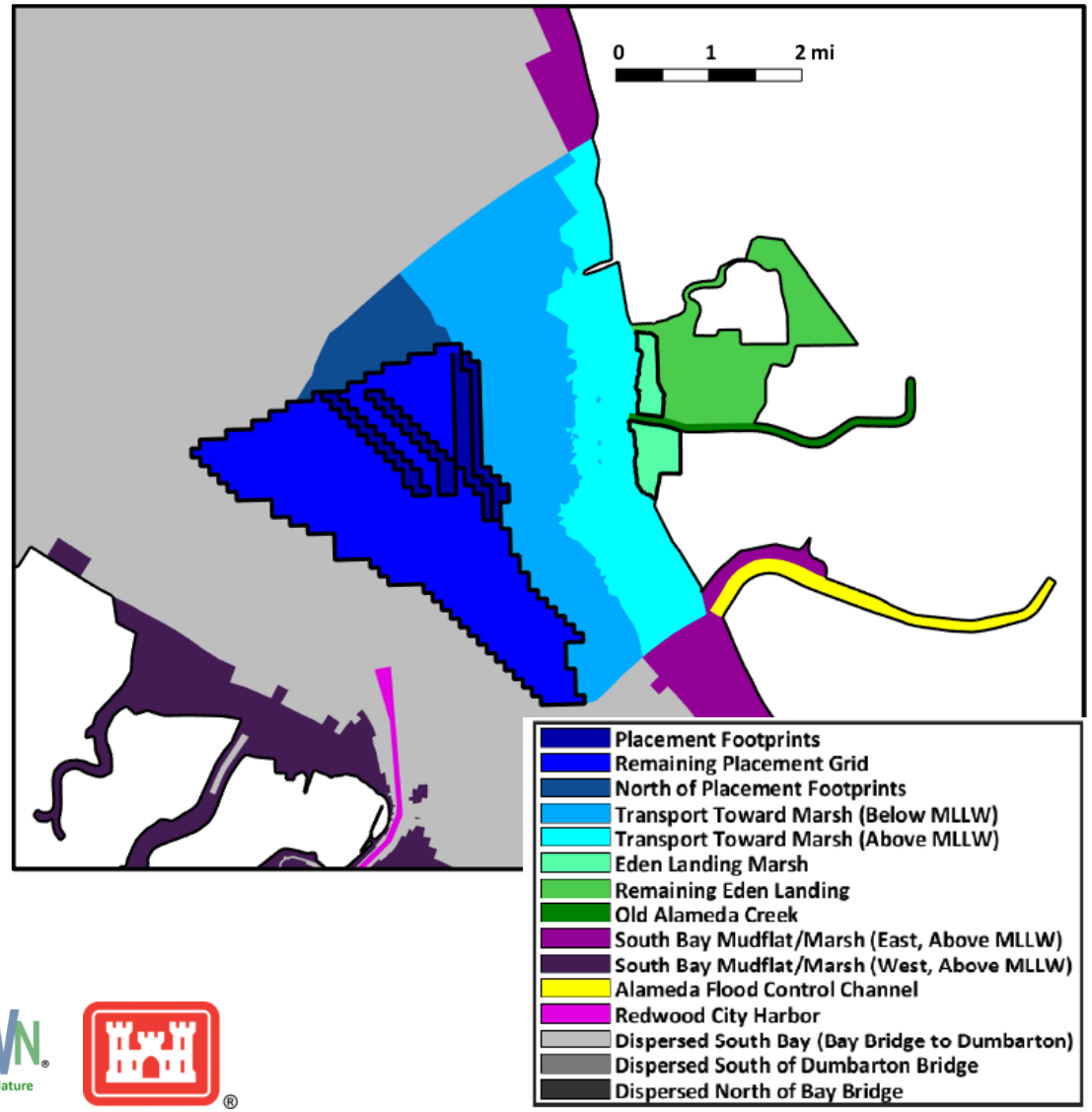
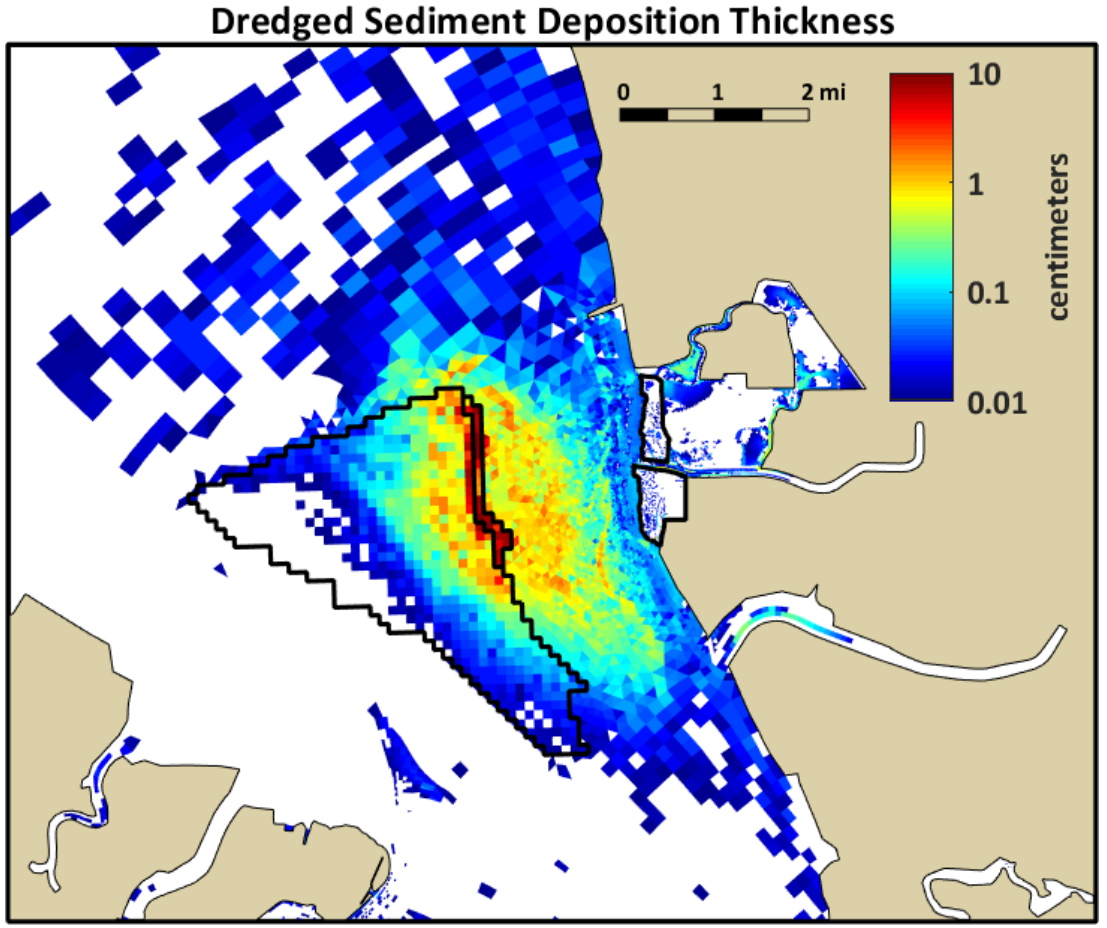
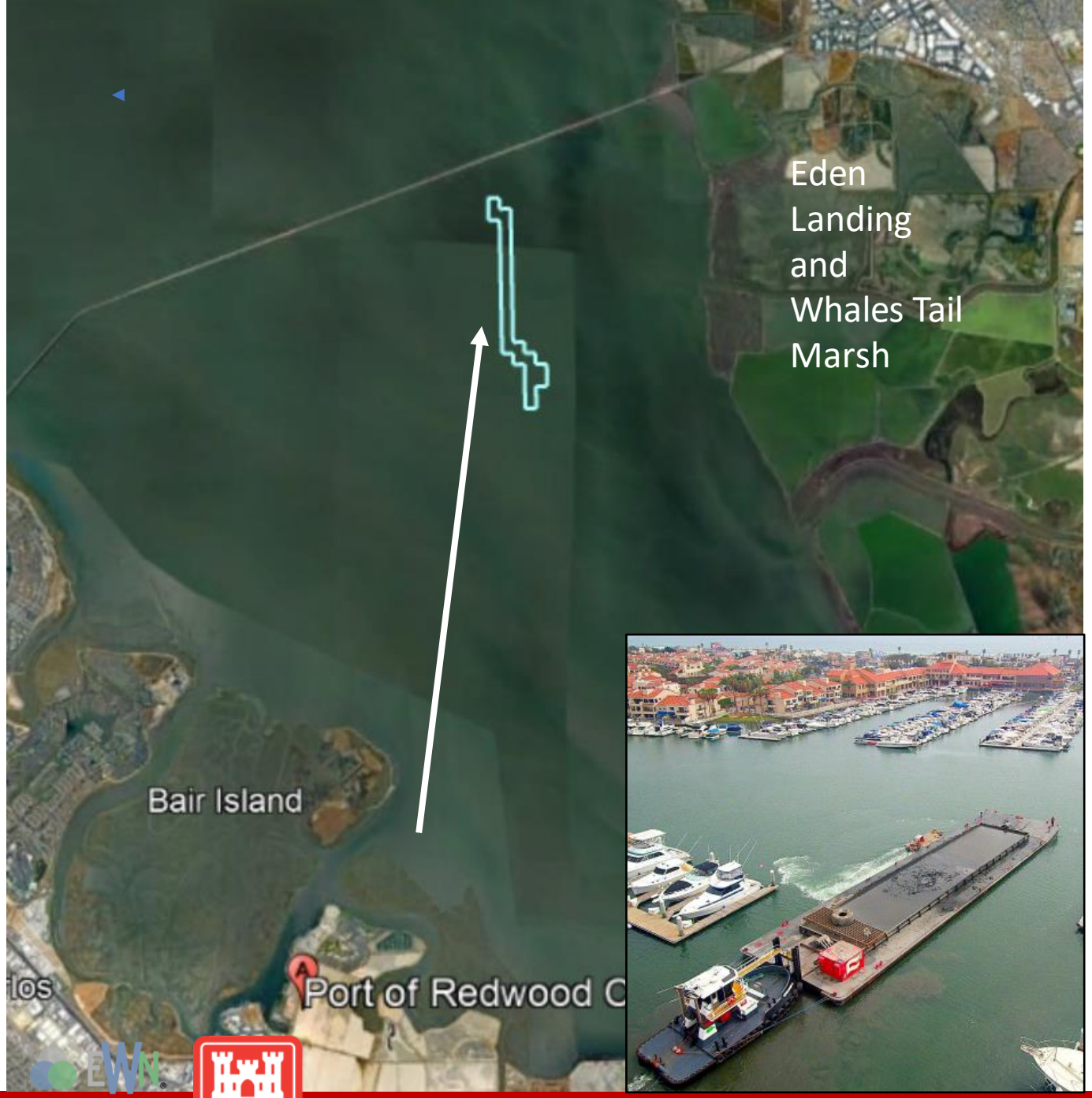
EDEN LANDING MODELING RESULTS
SCENARIO: 100K YD^3 PLACEMENT IN SUMMERTIME







RECOMMENDED PLAN

- Placement Site: Eden Landing (shallow)
- Volume: 100,000 yd^3
- Material from Redwood City Harbor Federal Dredging
- ~112 scow trips from RWC dredging diverted to 1.5 miles offshore of Eden Landing
- Placement site is 138 acres, absolute depth is 9-12 ft MLLW
- Sept-Oct 2023

US Army Corps of Engineers: San Francisco District

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https://curtinmaritime.com/fleet/arrow-pt-loadlined-split-hulled-dump-scow/

DEFINING SUCCESS

- What will make this effort successful?
  - Implementation of **novel placement method**
  - Placement without significant impact to ecological function of shallows
  - Material not going to disposal site; **keeping dredged material in the system**
  - **Delivery to mudflats**, and eventually marshes, and restoration ponds
  - Community engagement
  - Development of **monitoring methods** for shallow water placement projects
  - Completion of a **successful contract** with available existing equipment
  - **Testing a tool** useful in maximizing BU for Regional Dredged Material Management Plan and beyond

THANK YOU

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