STRATEGIC SHALLOW WATER PLACEMENT PILOT PROJECT

Photo: Pete Kauhanen, SFEI

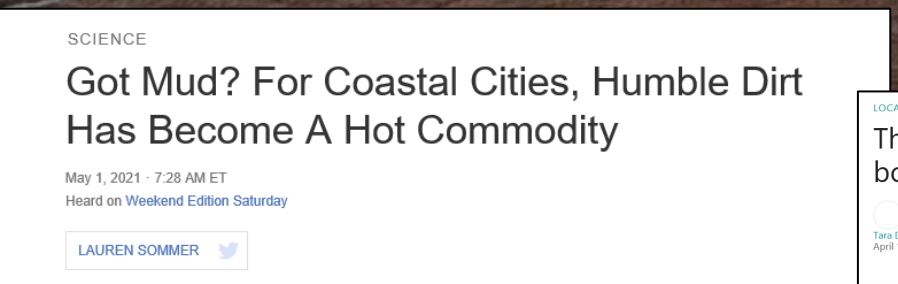
PRESENTER: SPENCER H. HARPER, PE, CFM
SAN FRANCISCO DISTRICT, USACE
PACIFIC CHAPTER WEDA FALL 2022 MEETING
OCTOBER 29, 2022

Problems

- A change in sediment regime, sea level rise, and localized erosion will lead to a long-term loss of mudflats and marshes in the San Francisco Bay.
- Dredged sediment is critical for adaptation/restoration of marshes and mudflats that protect us from rising seas and storms.

Opportunities

- Strategic shallow water placement may offer one of many possible solutions to the problem of losing mudflats and marshes.
- Potential to lower the cost of beneficial reuse of dredge material by using natural processes to bring the material onshore.

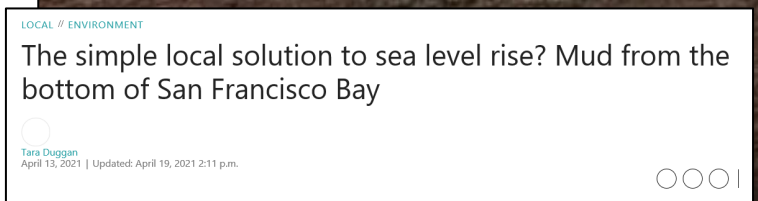

SCIENCE

Got Mud? For Coastal Cities, Humble Dirt Has Become A Hot Commodity

May 1, 2021 · 7:28 AM ET

Heard on Weekend Edition Saturday

LAUREN SOMMER


LOCAL // ENVIRONMENT

The simple local solution to sea level rise? Mud from the bottom of San Francisco Bay

Tara Duggan

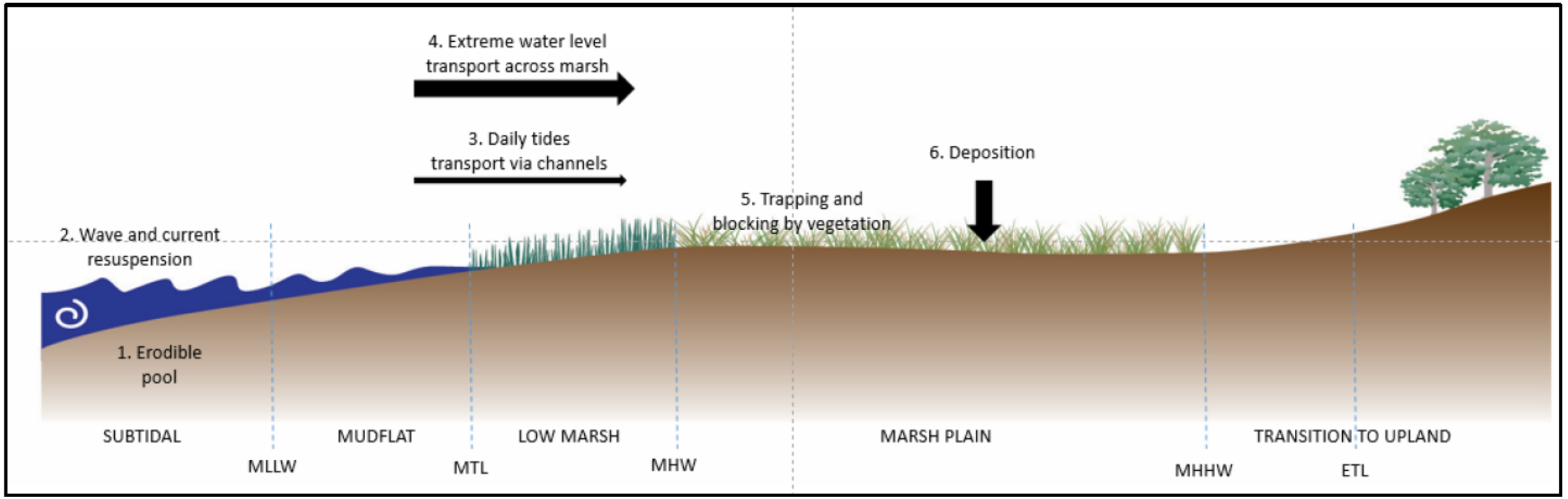
April 13, 2021 | Updated: April 19, 2021 2:11 p.m.

SECTION 1122 OF WRDA 2016

BENEFICIAL USE OF DREDGED MATERIAL PILOT PROGRAM

- Section 1122 of WRDA 2016 requires USACE to establish a pilot program to carry out 10 projects for the beneficial use of dredged material
- $50 mil Proposal by State Coastal Conservancy with BCDC requested funds for **both** direct and strategic placement
- Working group drafted a framework to recommend ways to assess impacts, site suitability, logistics, monitoring (SFEI)
- SF District was funded to do strategic shallow water placement pilot project to test new innovative method

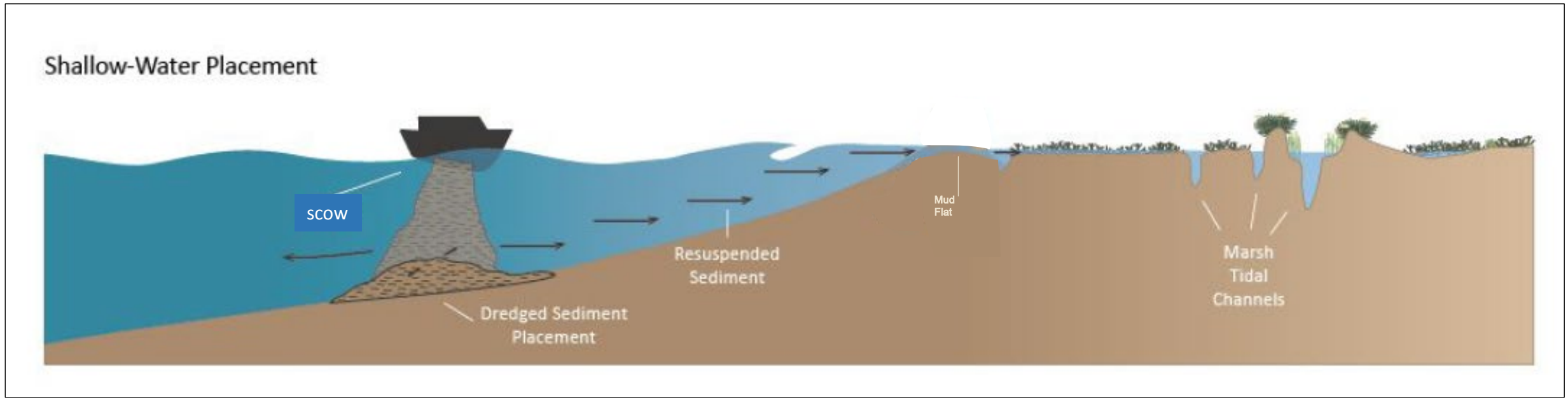
INORGANIC SEDIMENT SUPPLY TO MARSHES (CONCEPTUAL FRAMEWORK)



SFEI framework, 2017 draft

STRATEGIC SHALLOW WATER PLACEMENT PILOT

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



SFEI framework, draft, 2017

SUCCESS CRITERIA: “PROOF OF CONCEPT”

- What will make this effort successful?
  - Retaining Sediment in the San Francisco Bay System
  - Completion of a successful contract with available existing equipment to give a basis for cost comparison
  - Placement without significant impact to ecological function of shallows
  - Delivery to mudflats, and eventually marshes, and restoration ponds
  - Testing a tool that will become more useful as the century progresses

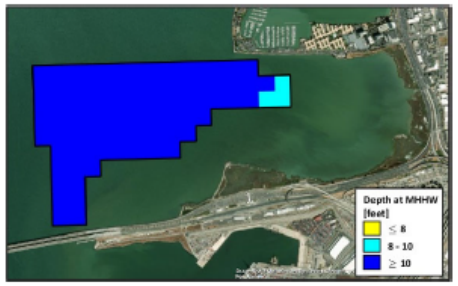
1. SCREENING OF SITES

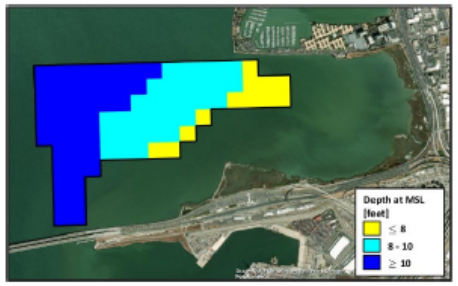
- **Site selection criteria** ★
  - Eroding or drowning marsh, lack of natural sediment supply
  - Sufficient wind-wave action to resuspend sediment placed
  - Open to tidal exchange
  - Wind-wave shore-normal approach
  - Proximity to a Federal Channel
  - Water shallow enough to get scow close to shore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

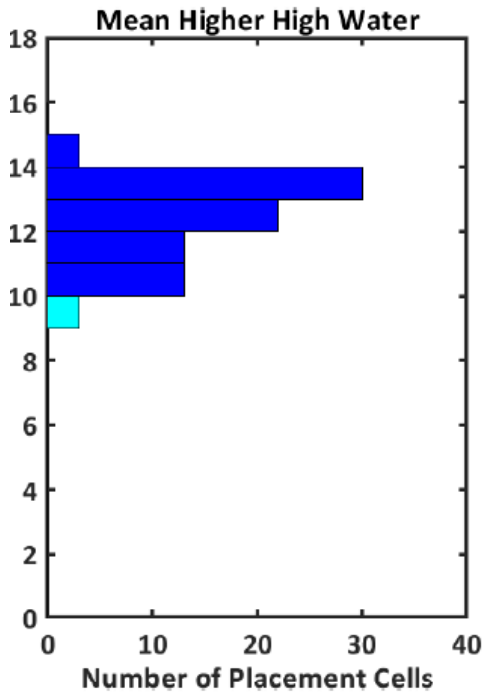
2. MODELING

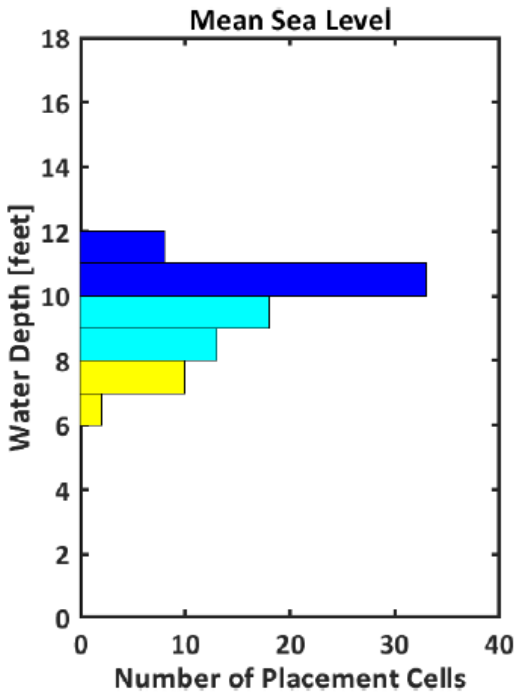
- Modeling using UnTRIM Bay-Delta model
- Dual Phased Modeling Approach
  - **Phase 1 – Site Selection**
    - Emeryville or Eden Landing
    - Evaluate placement scenarios
    - 100,000 yd^3
  - **Phase 2 – Placement Variations**
    - 50k, 75k, 125k yd^3
    - Seasonal differences
    - Footprint variations
    - Sediment sources (Oakland, Redwood City, hybrid)

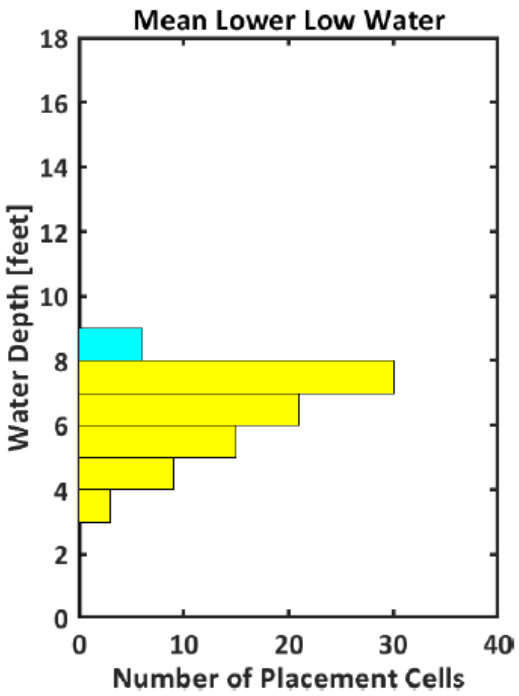
PLACEMENT STRATEGIES (EMERYVILLE EXAMPLE)







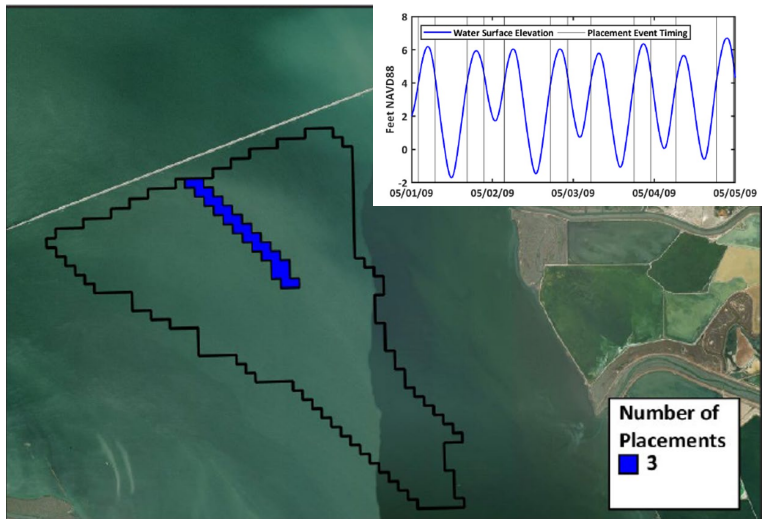




ANCHOR QEA

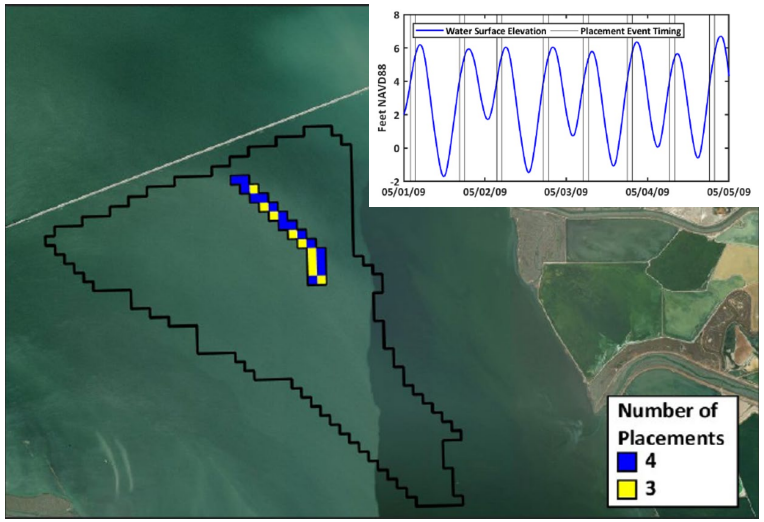
PHASE 1 PLACEMENT SCENARIOS

Deep Placement



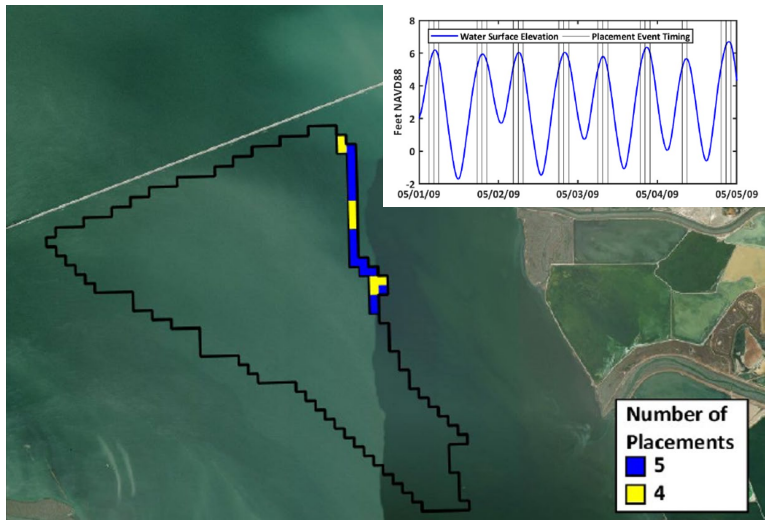
- Placement every 5 hours
- 25 days (72 @ 1,400 cy)
- Placement depths of 11 to 14 feet

Middle Placement with Tidal Timing



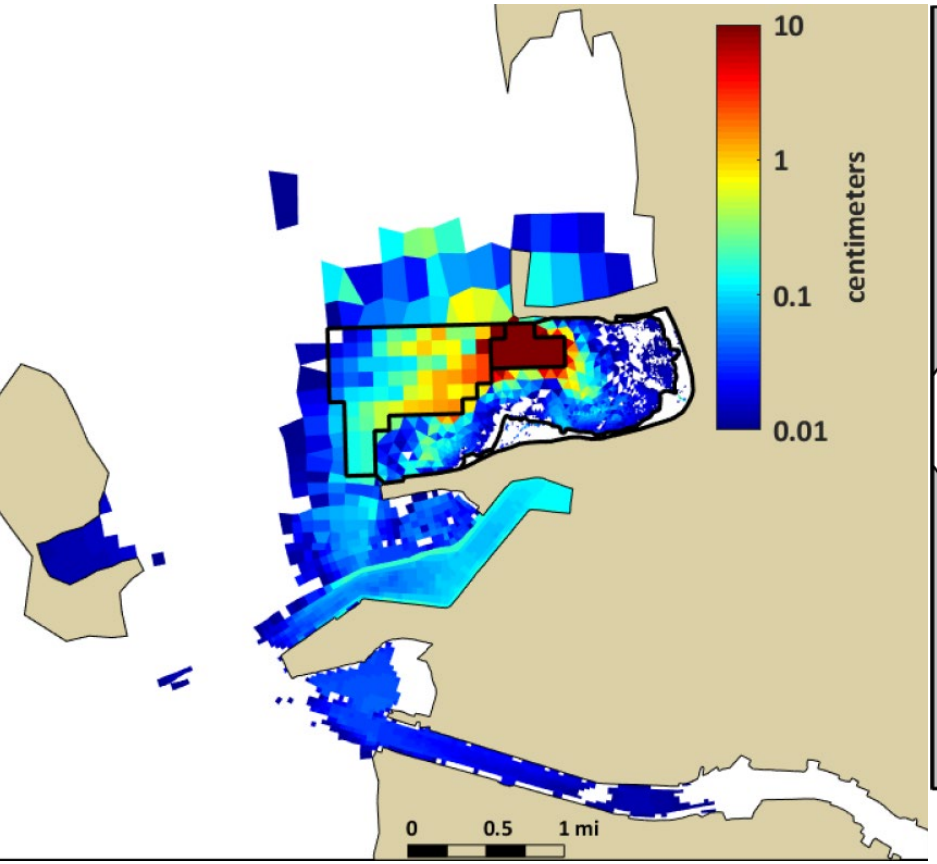
- Placement every 1.5 hours
- 23 days (87 @ 1,150 cy)
- Placement depths of 10 to 13 feet

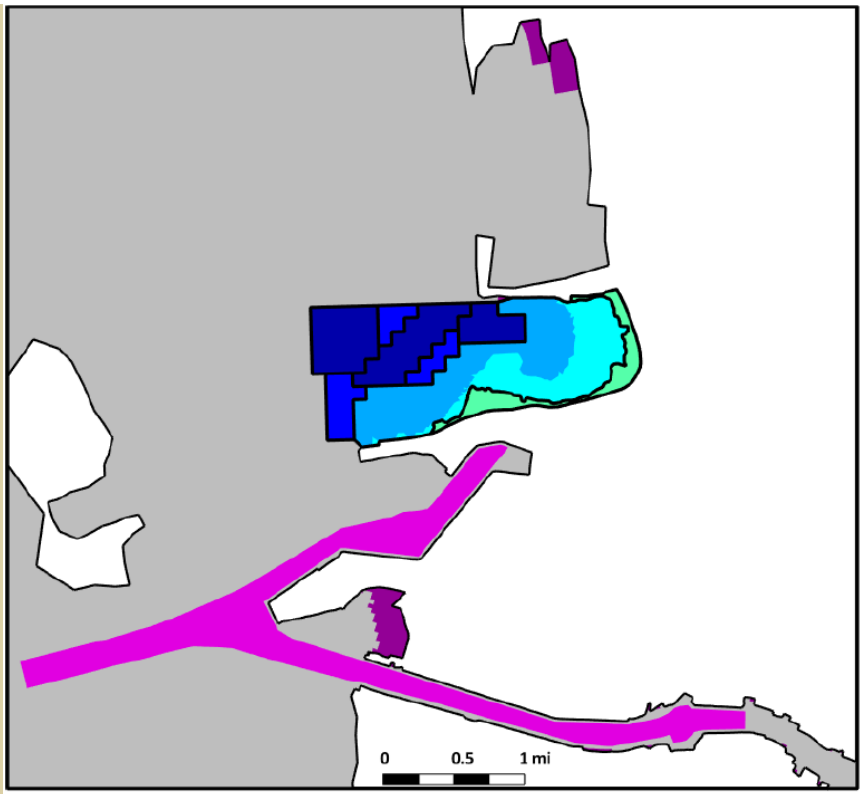
Shallow/ East Placement

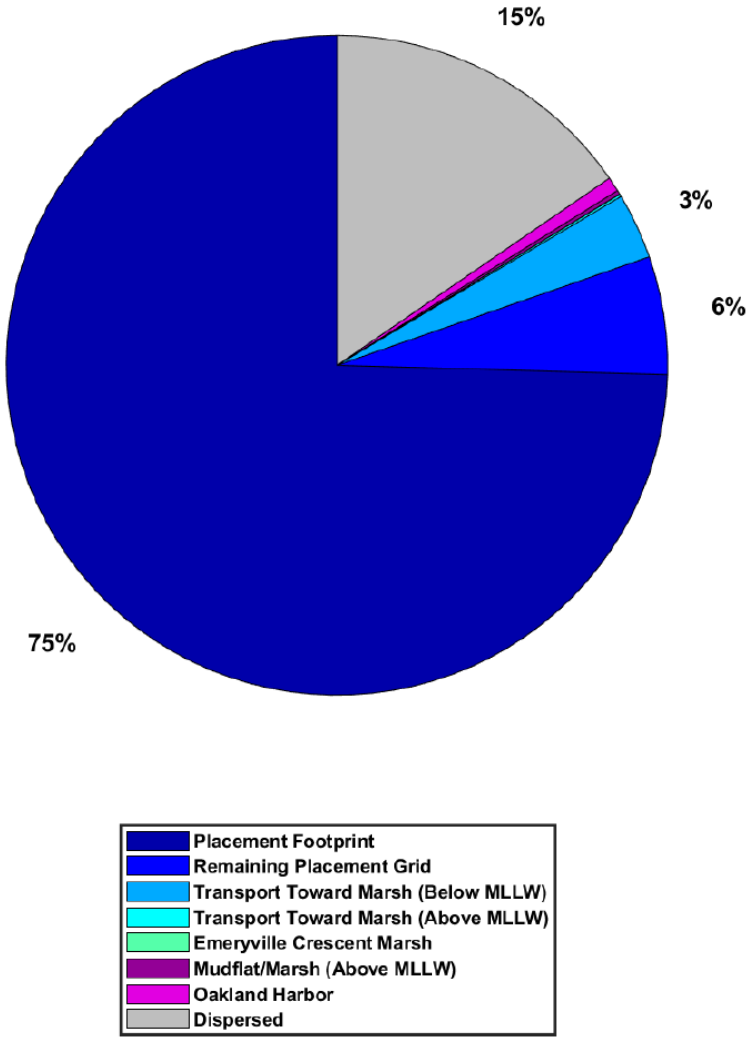


- Placement every 1.5 hours
- 25 days (112 @ 900 cy)
- Placement depths of 9 to 12 feet

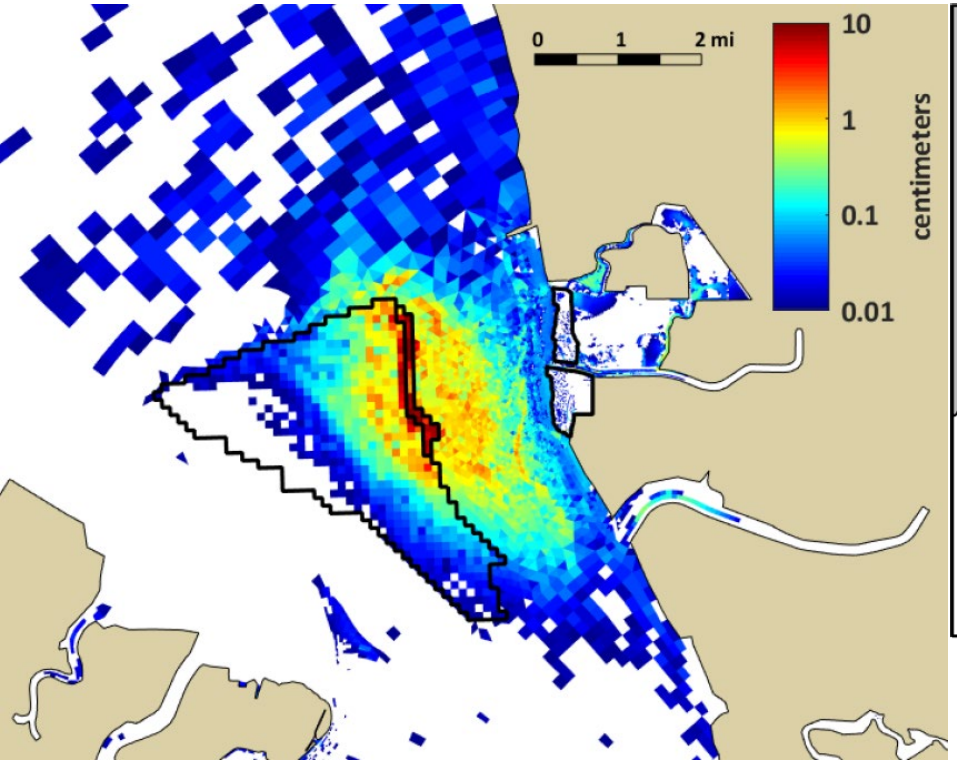
VISUALIZATION: EMERYVILLE SHALLOW/EAST END OF 2-MONTH SIMULATION

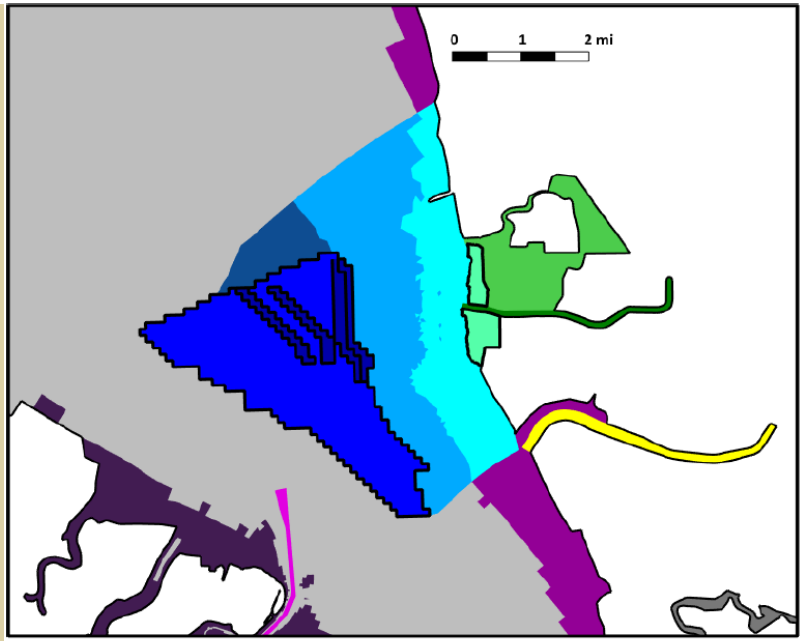




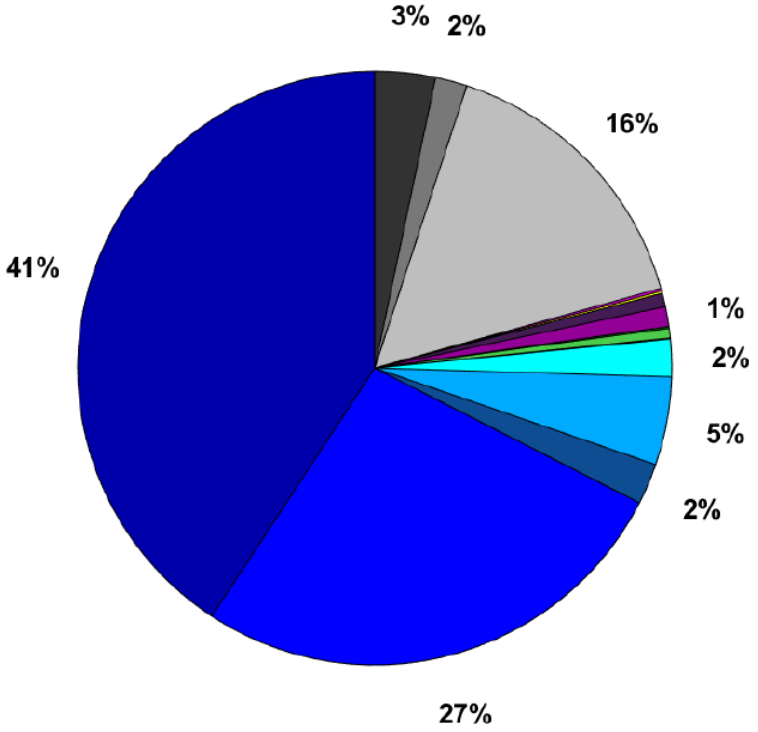


VISUALIZATION: EDEN LANDING SHALLOW/EAST END OF 2-MONTH SIMULATION





- Placement Footprints
- Remaining Placement Grid
- North of Placement Footprints
- Transport Toward Marsh (Below MLLW)
- Transport Toward Marsh (Above MLLW)
- Eden Landing Marsh
- Remaining Eden Landing
- Old Alameda Creek
- South Bay Mudflat/Marsh (East, Above MLLW)
- South Bay Mudflat/Marsh (West, Above MLLW)
- Alameda Flood Control Channel
- Redwood City Harbor
- Dispersed South Bay (Bay Bridge to Dumbarton)
- Dispersed South of Dumbarton Bridge
- Dispersed North of Bay Bridge



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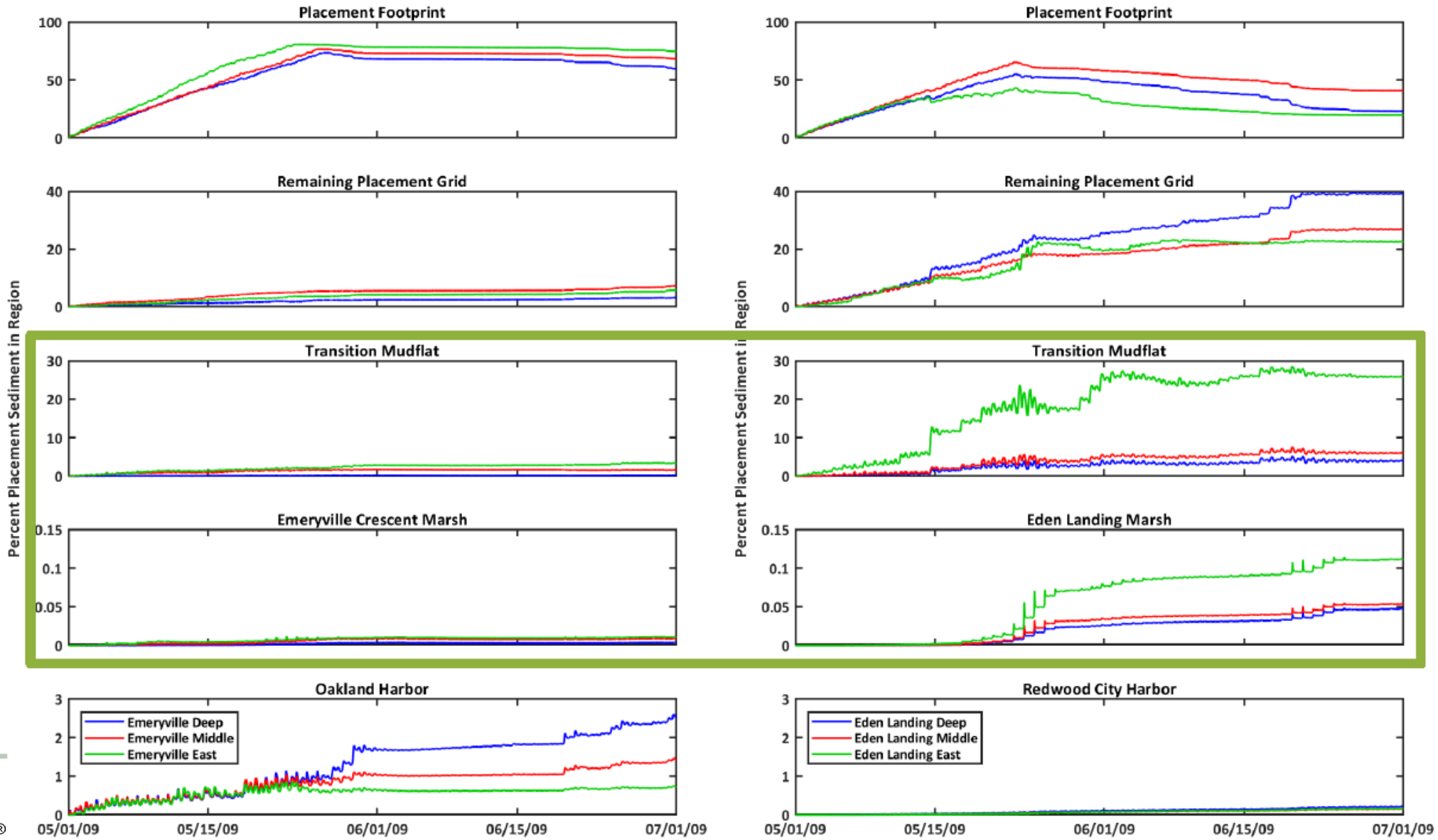
Note y-axis scales are different

Scenario Results: Emeryville and Eden Landing



Scenario Results: Emeryville and Eden Landing

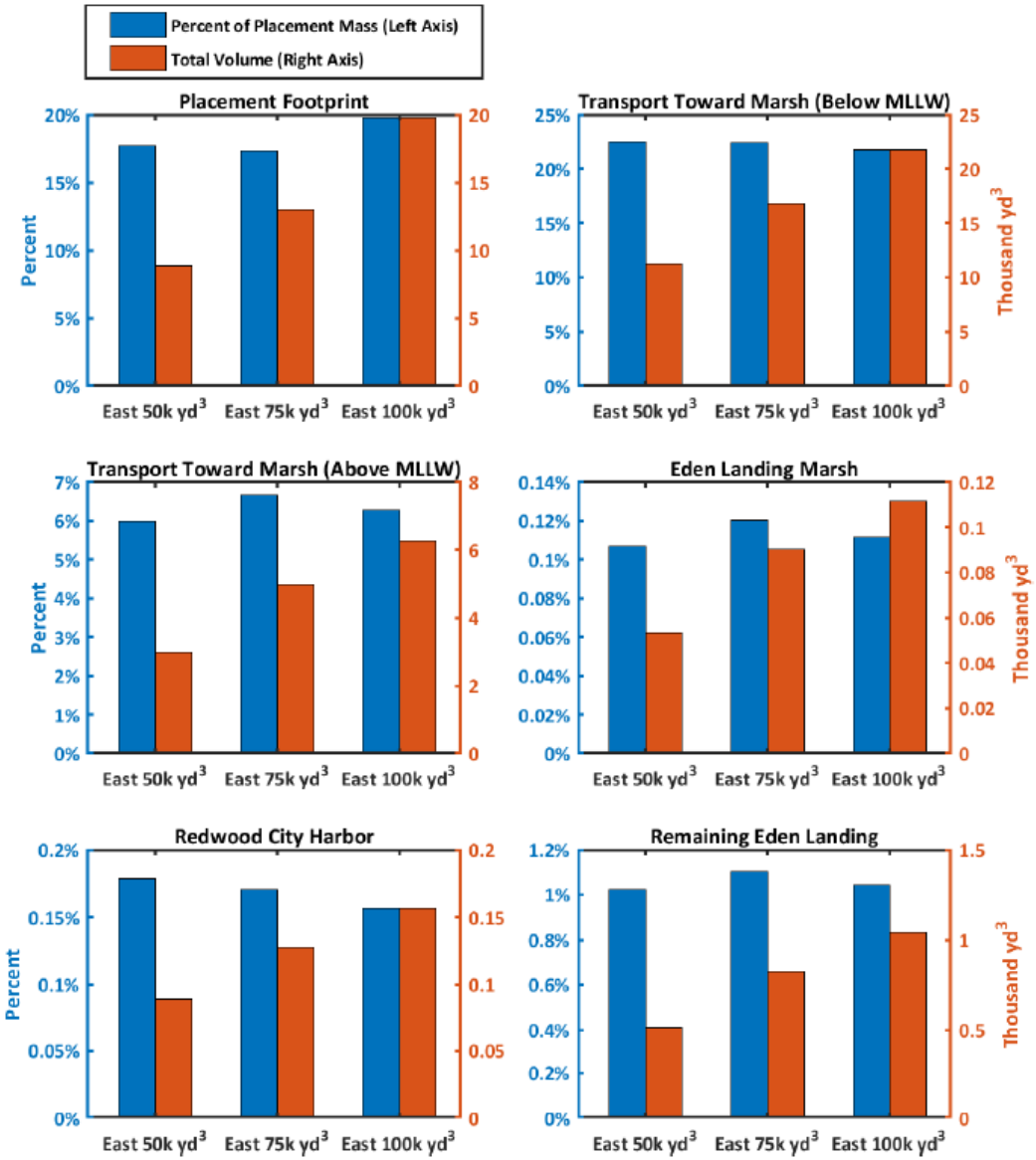
- Percentage of dredged material in various regions at end of simulation

Scenario	Placement Footprint	Remaining Placement Grid	Transition Mudflat	Marsh	Remaining Eden Landing	Ancillary Mudflat (Above MLLW)	Oakland Harbor/ Redwood City Harbor	Dispersed (Below MLLW)
Emeryville Deep	60%	3%	<1%	<1%	NA	<1%	3%	35%
Emeryville Middle	68%	7%	1%	<1%	NA	<1%	1%	22%
Emeryville Shallow/ East	75%	6%	3%	<1%	NA	<1%	<1%	16%
Eden Landing Deep	23%	39%	4%	<1%	<1%	5%	<1%	34%
Eden Landing Middle	41%	27%	6%	<1%	<1%	4%	<1%	26%
Eden Landing Shallow/East	20%	22%	26%	<1%	1%	5%	<1%	32%

Dispersed is any dredged material not in the other noted regions

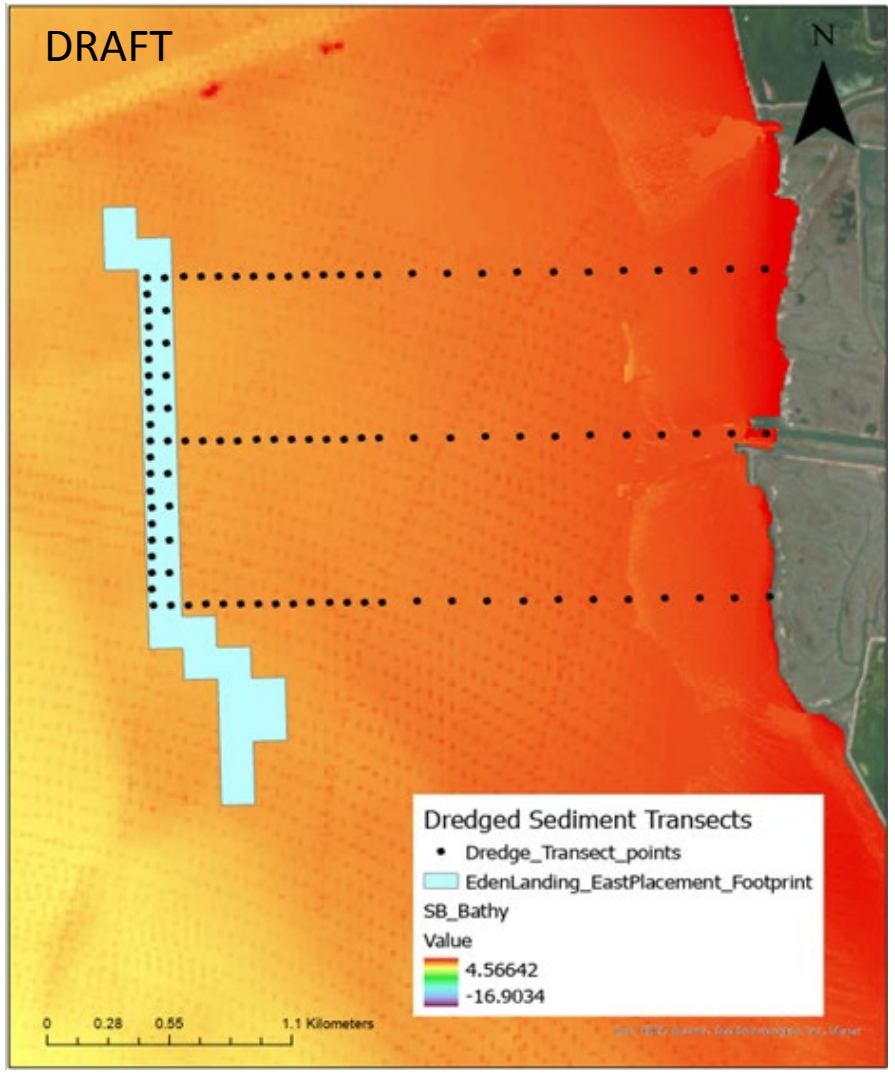
Phase 2 – Placement Variation Results

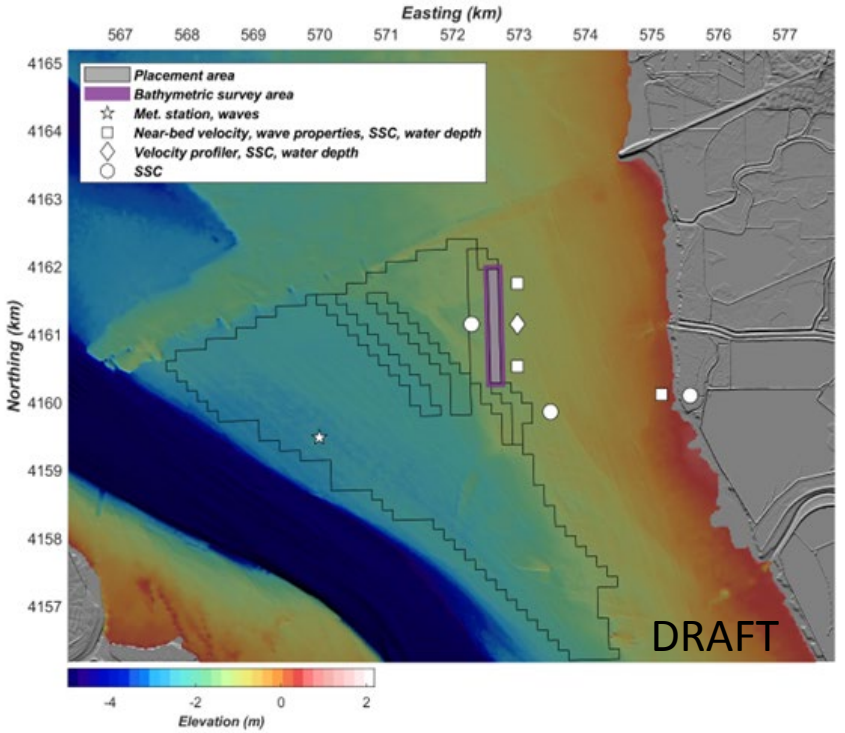
- Comparison of scenarios with 50k, 75k and 100k yd^3 placement volumes show similar percentage of sediment fate across the analysis regions
- Selection of 100k yd^3 placement volume during summertime
  - Optimize volume of sediment that reaches target marsh and mudflats and balance impacts to benthic habitat
  - Summertime circulation patterns are more effective at transporting sediment towards marsh.

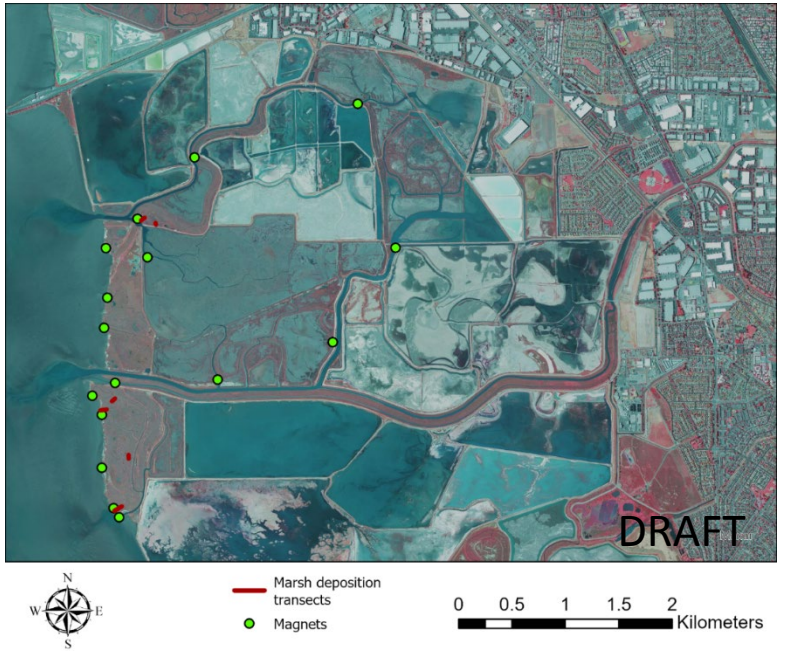


DRAFT MONITORING PLAN

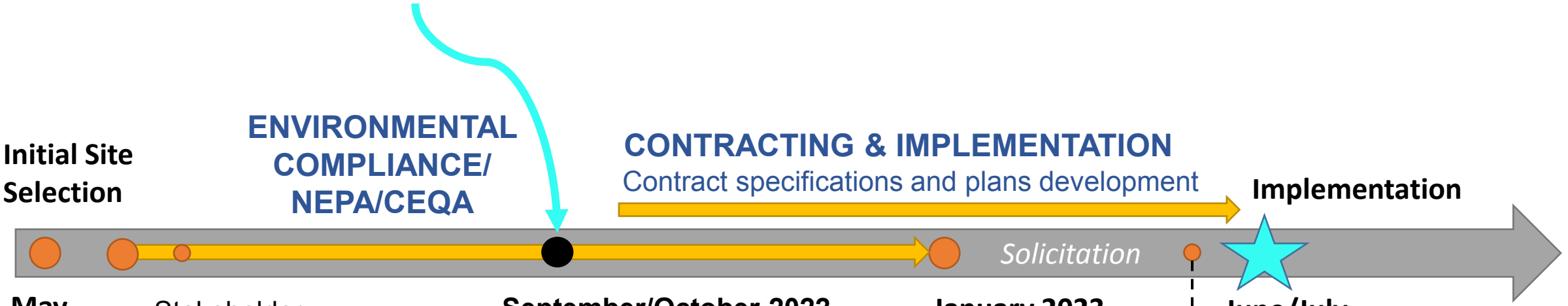
- **Pre-project**
  - Water depth and elevation
  - Suspended sediment, wave conditions
  - Eelgrass surveys
  - Sediment transport rates
  - Background marsh/mudflat gain or loss
- **Post-project**
  - Water depth and elevation
  - Benthic habitat, eelgrass
  - Sediment transport rates
  - Marsh/mudflat gain or loss
  - Magnetic Particle Tracking Study







PROJECT DELIVERABLES TIMELINE



May 2022

- Stakeholder and Public meetings in **May/June 2022**
- Resource Agency Working Group meeting **23 May 2022**

September/October 2022

- Draft NEPA/CEQA document public/MSC review
- Draft permit applications included in NEPA/CEQA draft release

January 2023

- 95% Design and BCOES
- Final report with final permits

June/July 2023

Monitoring to begin 2 months prior to implementation and continue for a year afterwards

THANK YOU

SECTION 1122 PROJECT TEAM

Arye Janoff, John Dingler – Plan Formulators
Tiffany Cheng – Coastal Engineer
Peter Mull – Project Manager
Tessa Beach – Environmental Branch Chief
Julie Beagle – Environmental Planning Section Chief
Fanny Chan – Civil Engineer
Evyan Sloane, SCC – Project Sponsor
Brenda Goeden, BCDC – Project Technical Advisor

Photo: Pete Kauhanen, SFEI

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Waterboard – CEQA lead
State Coastal Conservancy – Non-federal Sponsor

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