

# Sedimentation Analysis to Support Alternative Configuration of Ferry Pier

*Vallejo Ferry Terminal  
Vallejo, CA*

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Photo courtesy: [marinas.com](https://www.marinas.com)



# Background

- The San Francisco Bay Area Water Emergency Transport Authority (WETA) operates the Vallejo Ferry Terminal.
- Sedimentation increases operational costs due to maintenance dredging.
- Alternative Pier configuration could reduce dredge events and improve operational efficiency.



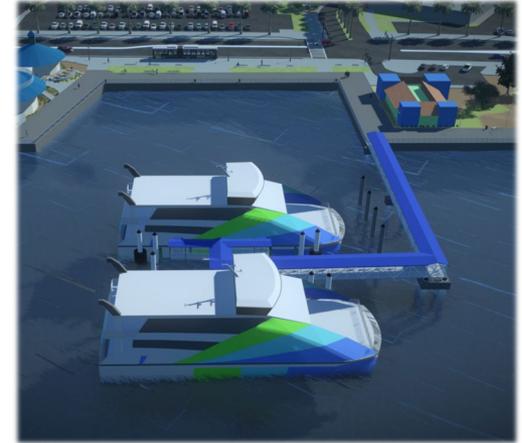
# Project Purpose



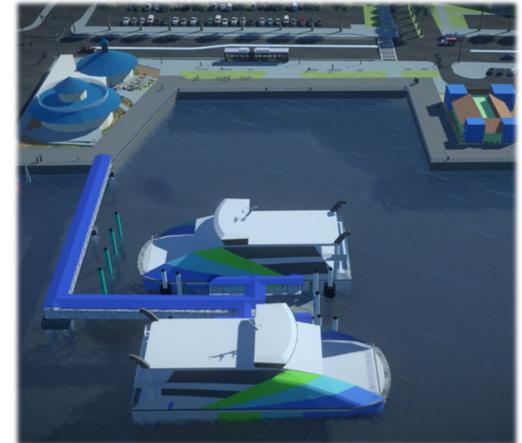
# Study Approach

- Assess sedimentation rates from bathymetric surveys
- Develop hydrodynamic model
- Simulate existing and modeled pier alternatives
- Evaluate site response for each alternative

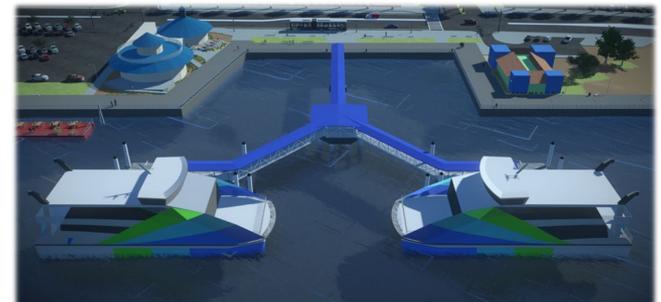
**Alternative 1**



**Alternative 2**

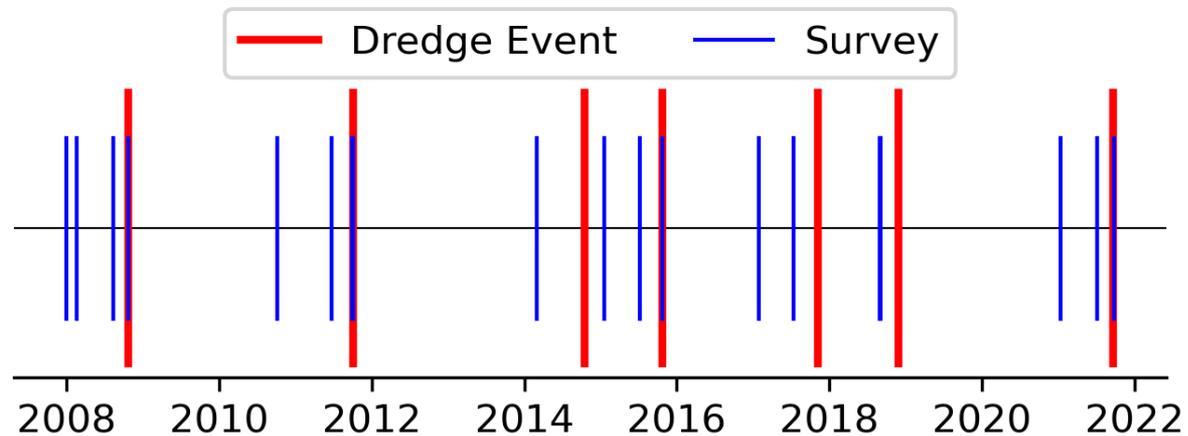


**Alternative 3**



# Sedimentation Analysis

Dates between Surveys	# of Surveys	Time Span (days)	Average Dep Rate (ft/year)
21 Feb 2008 – 12 Aug 2008	2	173	-0.03
24 Oct 2008 – 29 Sep 2011	4	1070	0.63
6 Oct 2011 – 2 Mar 2014	2	878	0.02
21 Jan 2015 – 10 Jul 2015	2	170	0.00
26 Oct 2015 – 27 Jan 2017	3	627	0.77
12 Jan 2021 – 6 Jul 2021	2	175	0.80

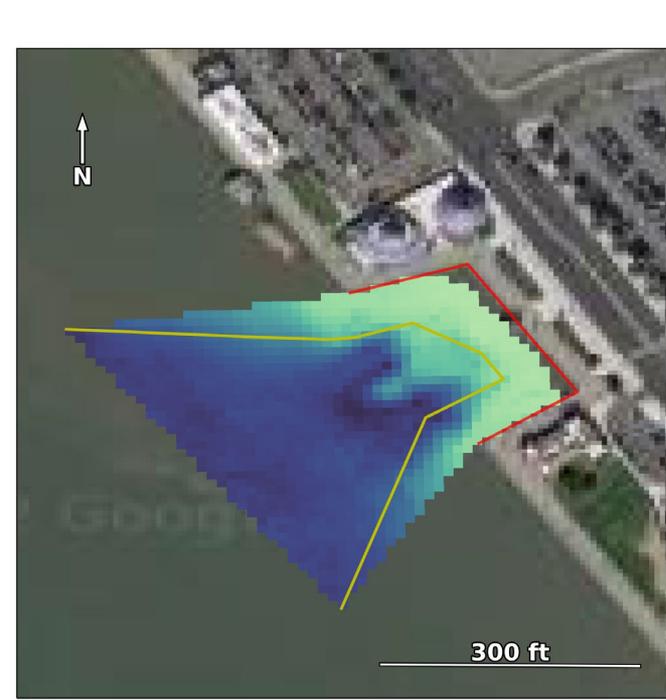
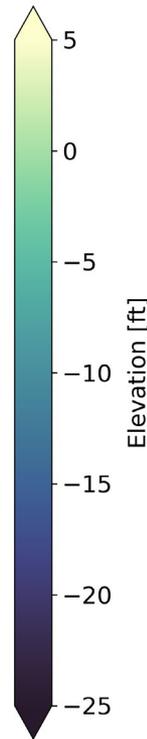


# Bathymetric Surveys

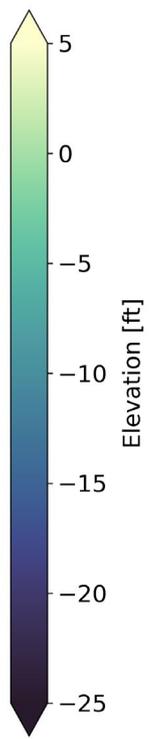
- Bathymetric survey data provided bed elevations to compute deposited sediment volumes



**Typical Post-Dredge Condition**

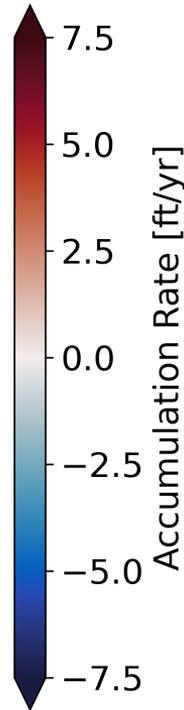
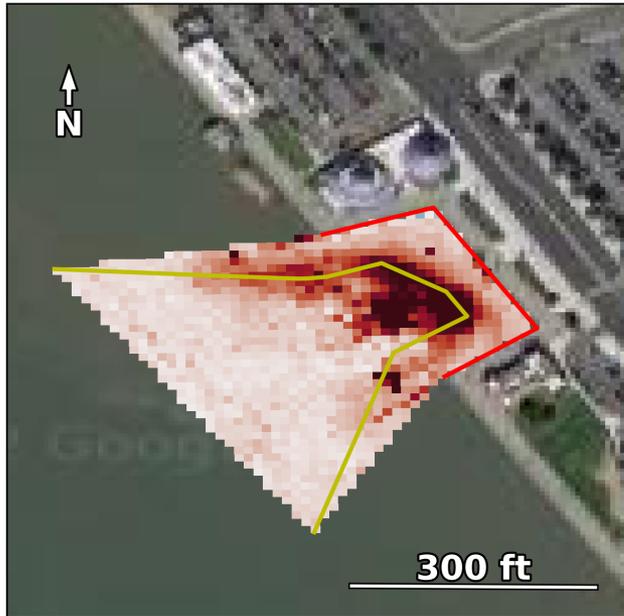


**Typical Pre-Dredge Condition**

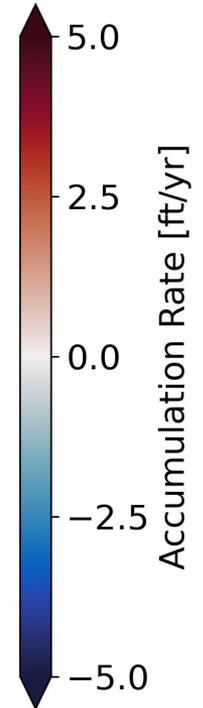
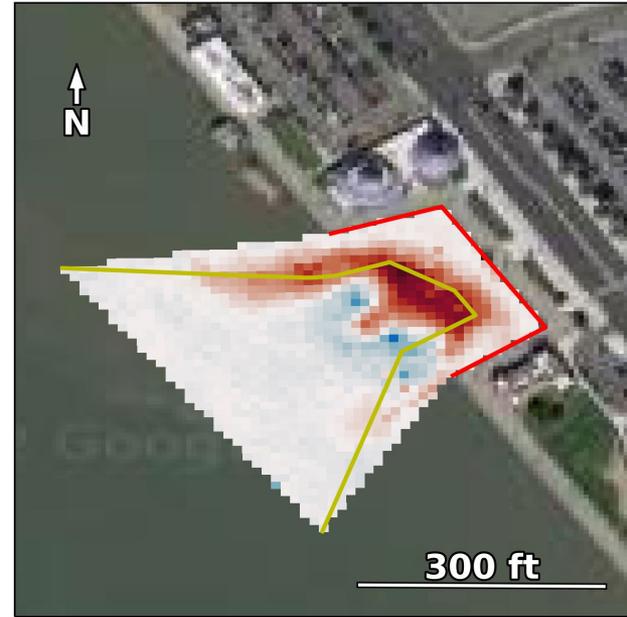


# Sedimentation Analysis Results

Maximum Accumulation



Mean Accumulation

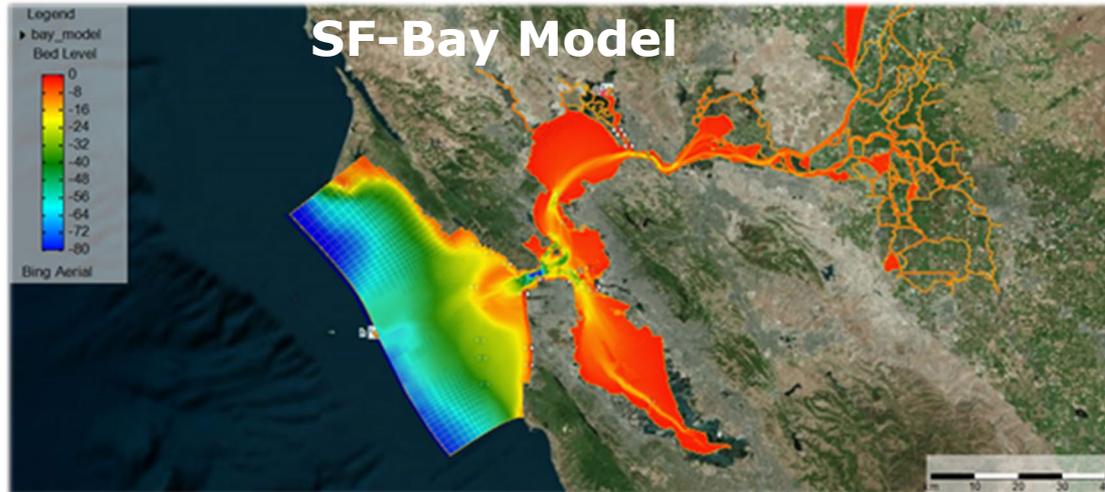


Deposition Rate	Max (ft/year)	Mean (ft/year)
Full Study Area	4.5	0.2
In Basin	4.5	2.1
Out of Basin	1.8	-0.1

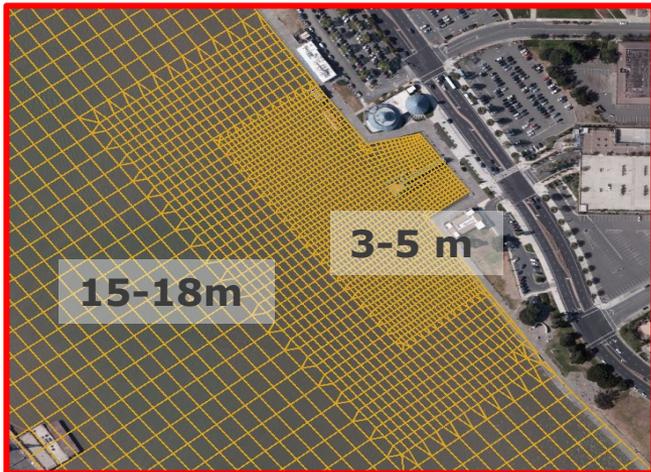
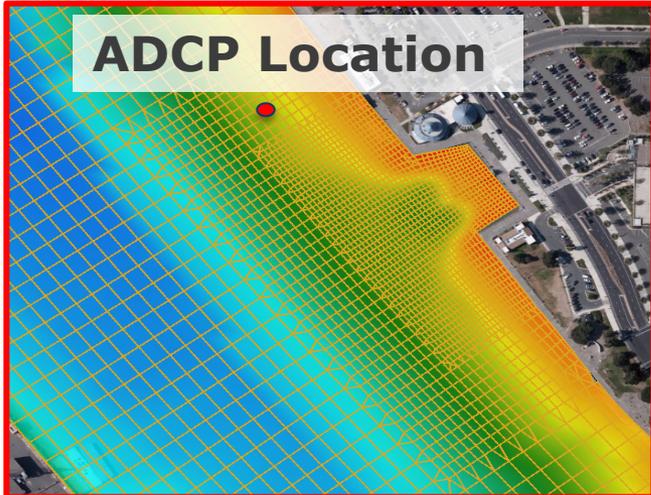


**Red- Inside**  
**Blue: Outside**

# Hydrodynamic Models

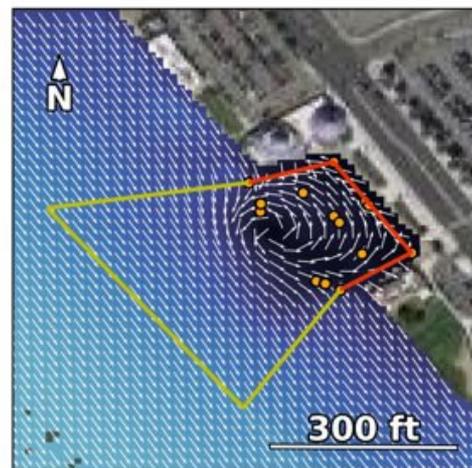
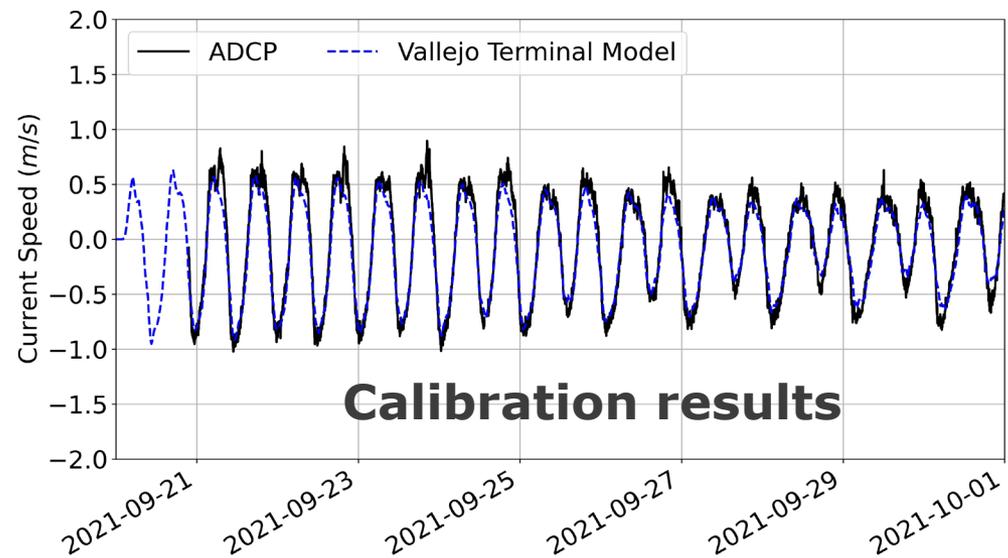


# Site Model- Mare Island Strait

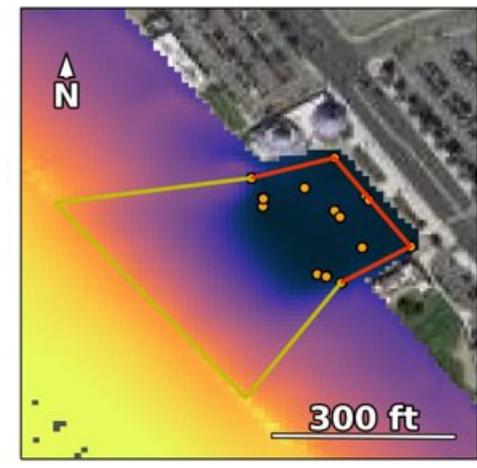
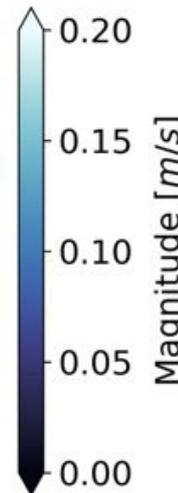


# Model Results

- Model produced results of current velocity and bed shear stress
- Model calibrated with velocity data
- Model of existing conditions provided basis for comparison of alternatives



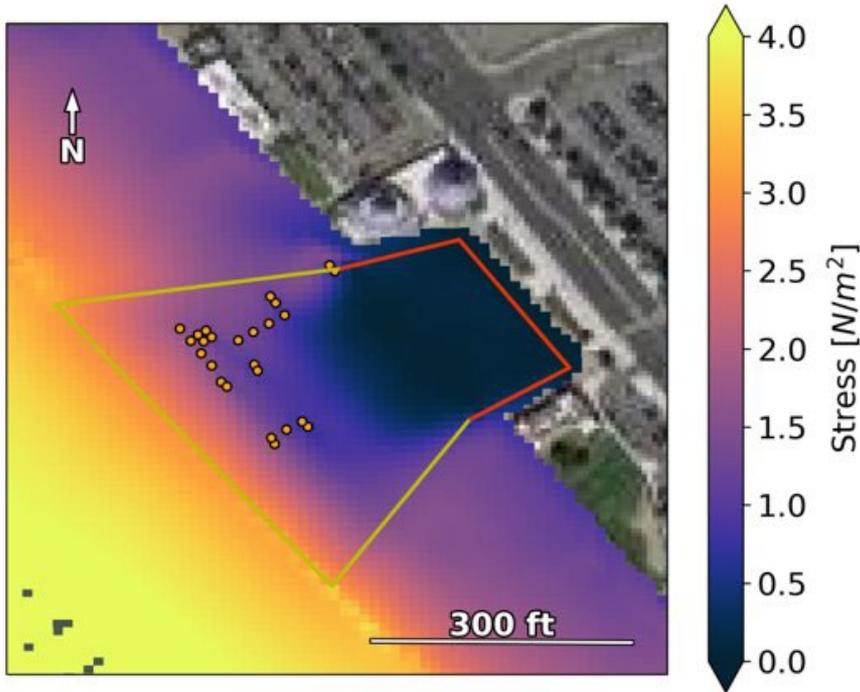
Spatial Velocity Variability



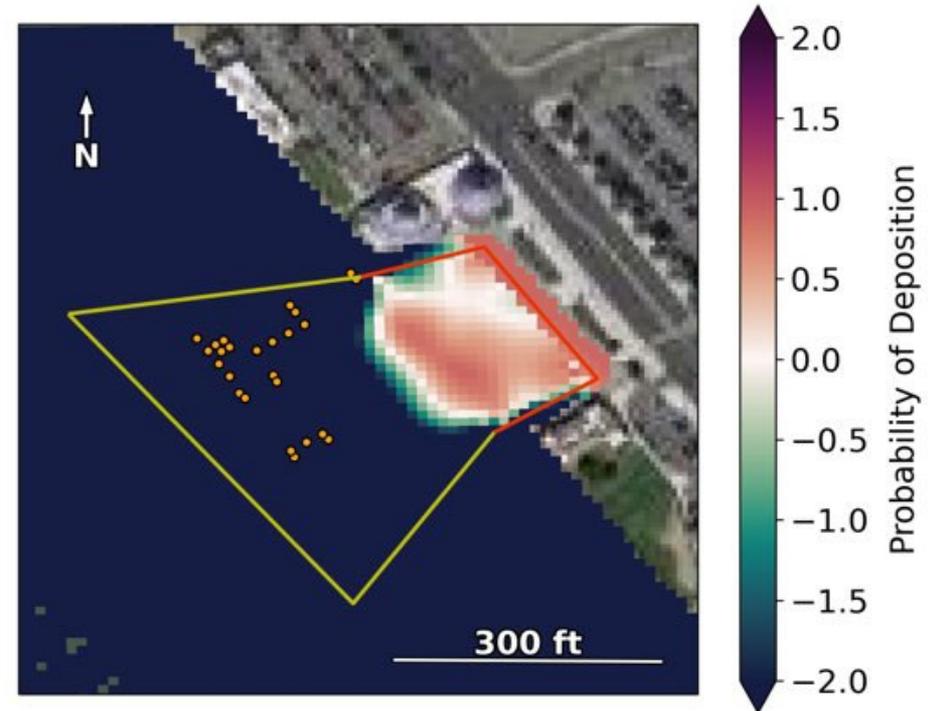
Maximum Shear Stress

# Probability of Deposition

The change in shear stress between the two cases is used to scale the present day deposition rate and determine the anticipated deposition rate for the alternative.



Shear Stress  
Alternative 2

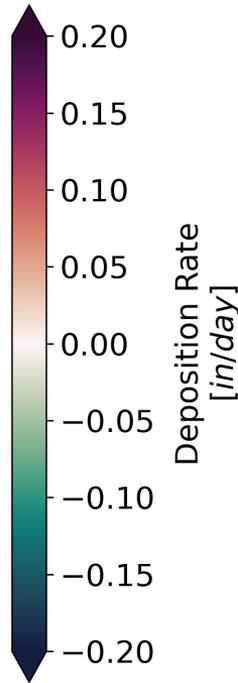


Probability of  
Deposition

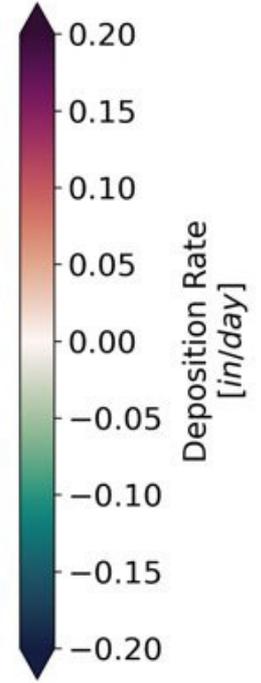
# Ferry Terminal Configuration Results



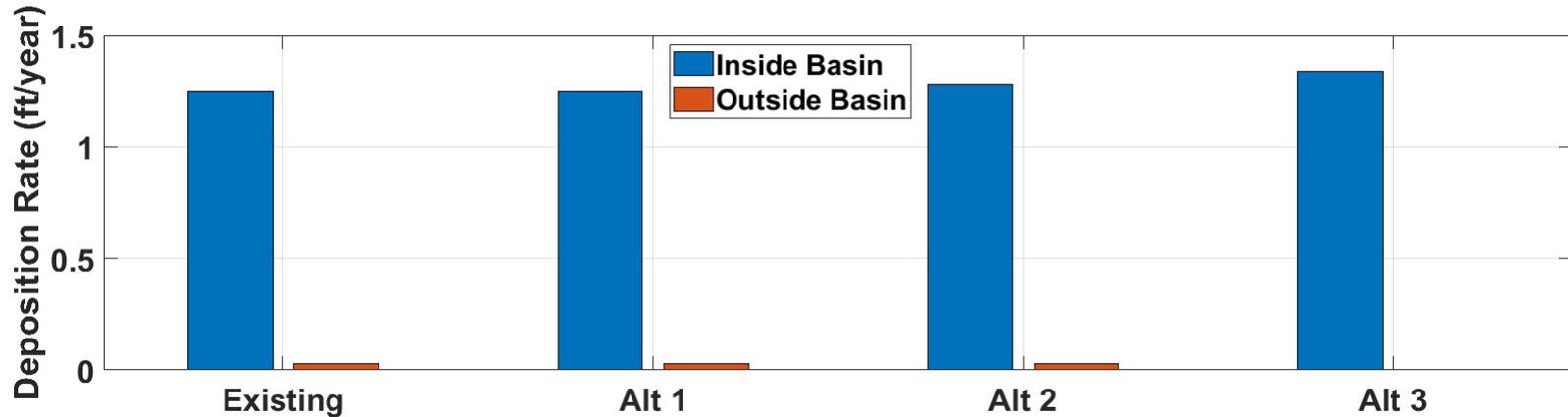
Scaled deposition rate due to Alternative 1



Scaled deposition rate due to Alternative 2



# Conclusions



- Results indicate alternative configurations could reduce the need for dredging due to increased flows and less deposition potential around the Ferry Pier
- **Thank you to Foth, WETA, and Bay Marine Services for support, collaboration, and guidance on this project.**