

COOPER'S POINT CONVEYANCE IMPROVEMENTS, CIRCULATION STUDY, DESIGN, AND PERMITTING

June 26, 2024

Introduction

- 12 years of experience
- Located in Tampa, Florida
- Areas of focus
 - Quantitative ecology
 - Threatened and endangered species surveys
 - Environmental due diligence
- Currently pursuing a PhD in Environmental Engineering at the University of Florida
- Fun Fact: Love to travel in a 1960's canned ham camper with my fiancé and dogs!



AGENDA

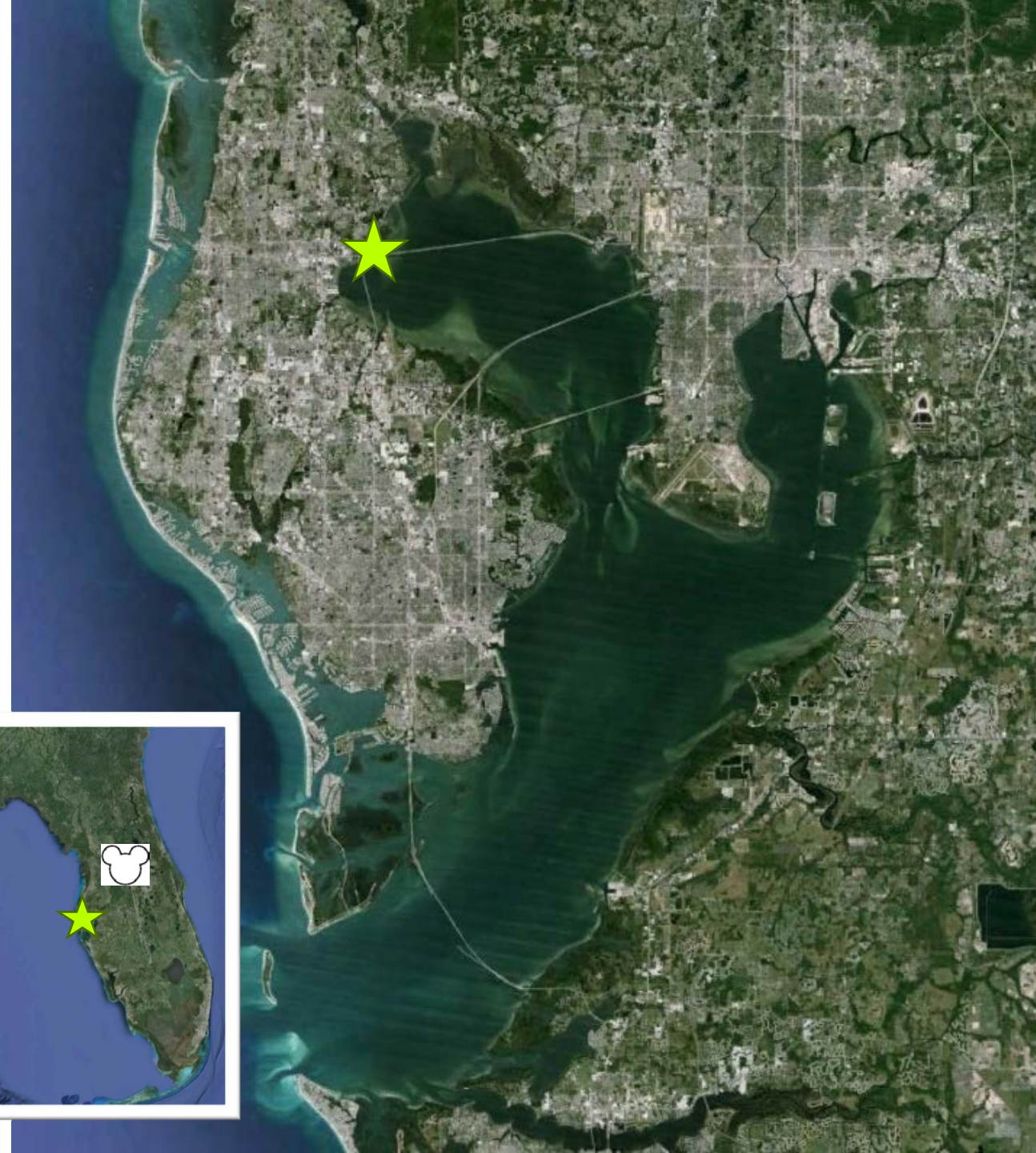
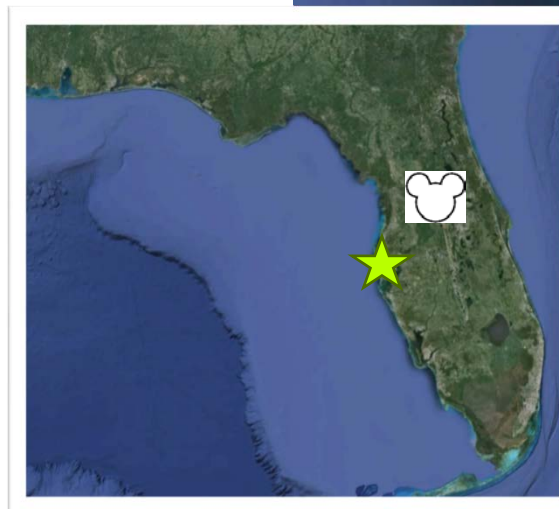
- 01 Background
- 02 Water Quality/Environmental
Concerns
- 03 Project Elements
- 04 Project Analysis

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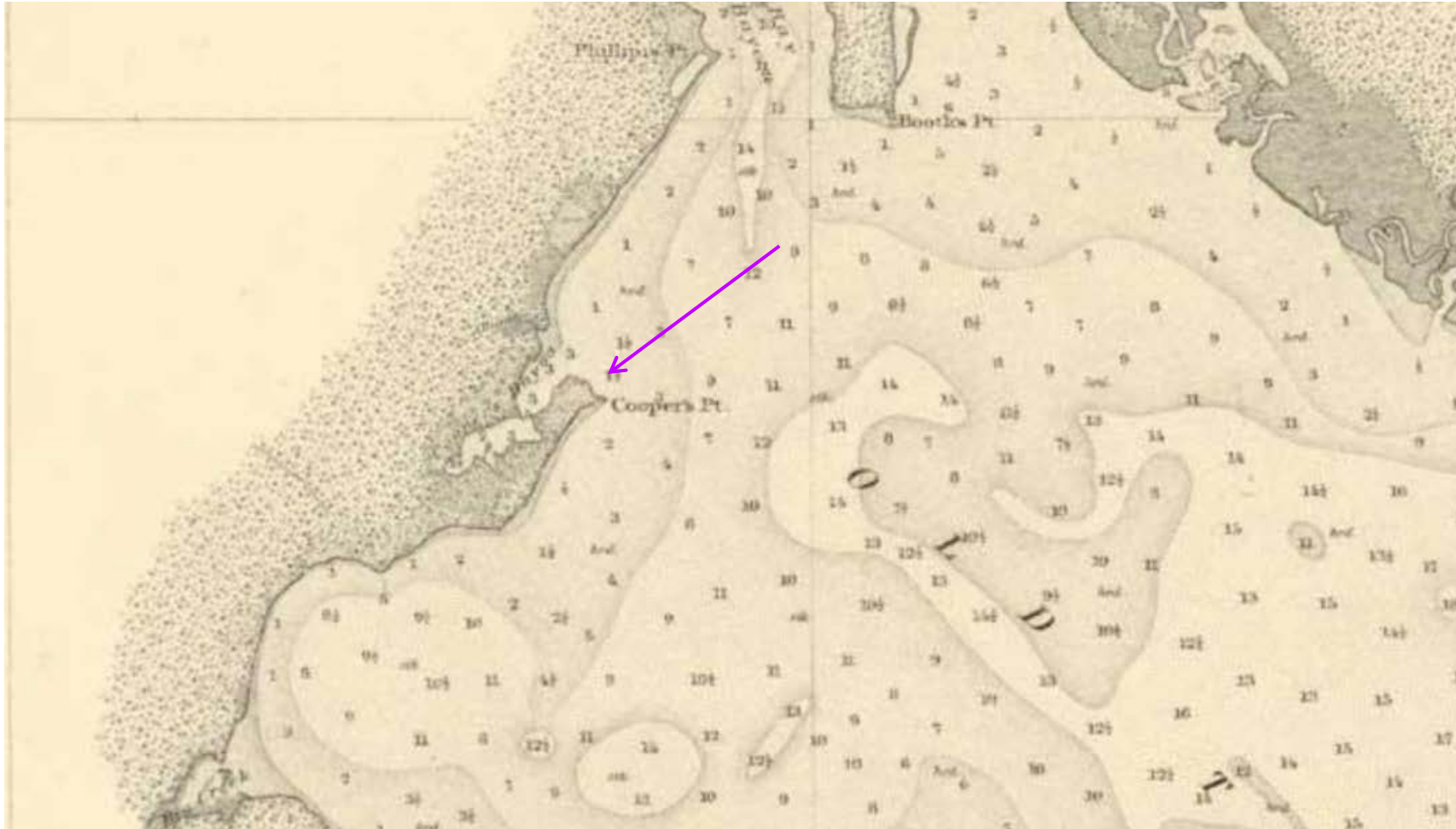
BACKGROUND

- 1970s – Tampa Bay essentially dead due to nutrient loads and algae
- 1990-2020s - Focused recovery has been a national success story
- However... Seagrass has *NOT* recovered in the vicinity of Cooper's point
- To facilitate recovery in this area a different approach is needed

TAMPA BAY WATERSHED

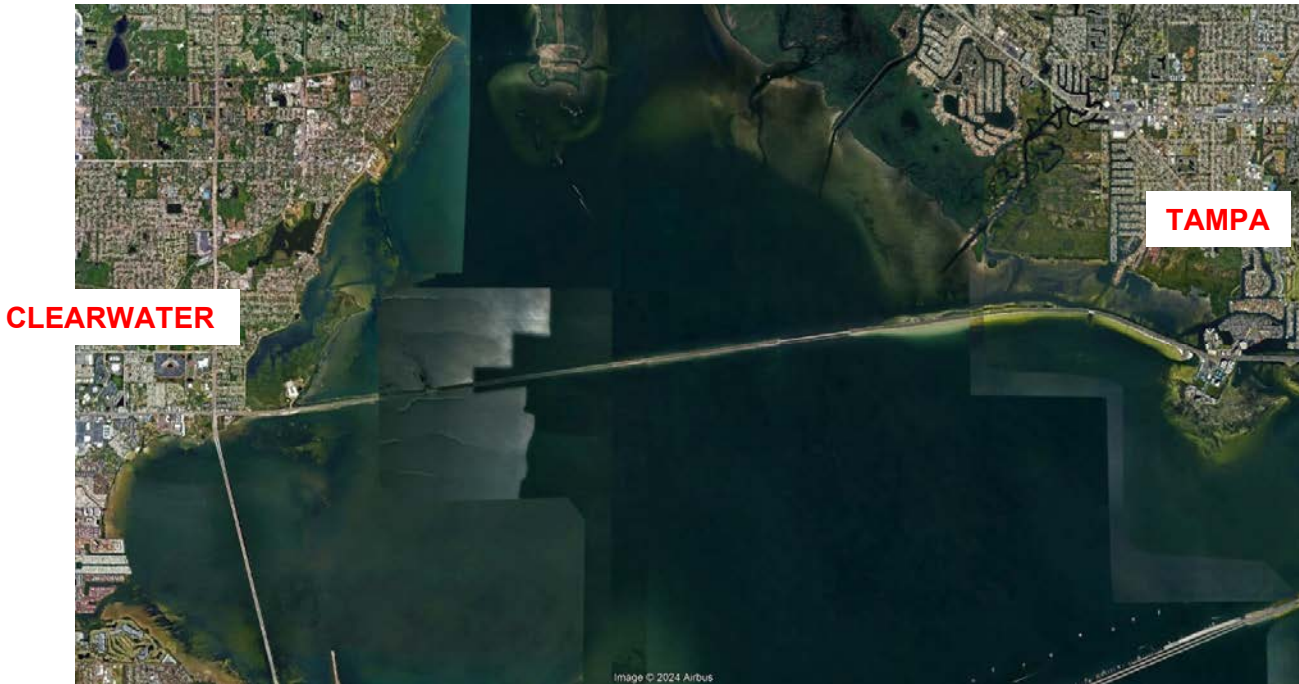


Historic Data: Tale of Two Cooper's



Historic Charts of Cooper's Bayou (1886)

Historic Data: Tale of Two Cooper's



Historic Photo of Courtney Campbell Causeway
(1934)

Historic Data: Tale of Two Cooper's



1942



2023

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WATER QUALITY/ENVIRONMENTAL CONCERNS

Cooper's Point Priority Issues



2009 *Pyrodinium* bloom



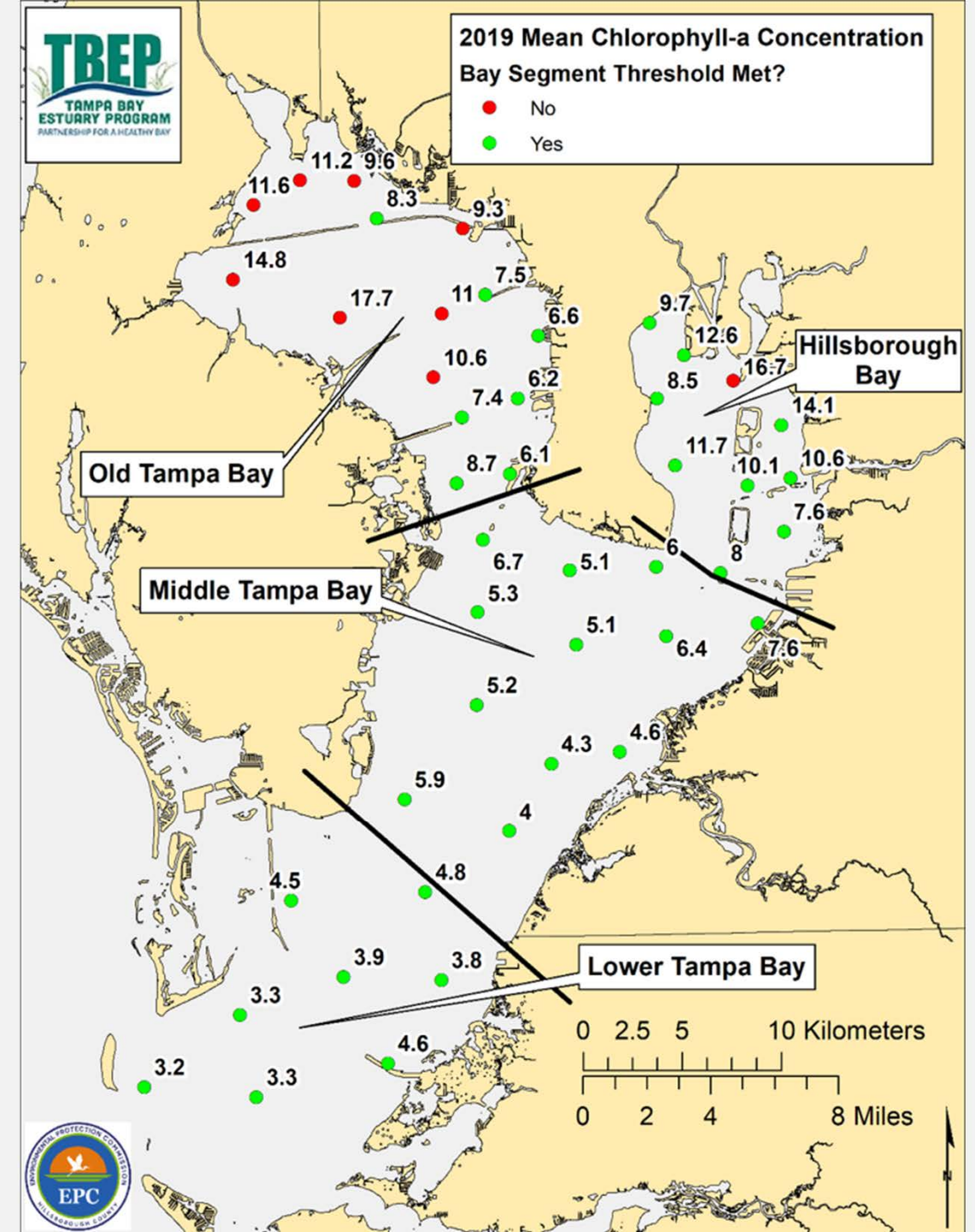
Poor Water Quality



Safety Harbor
Sediment Muck

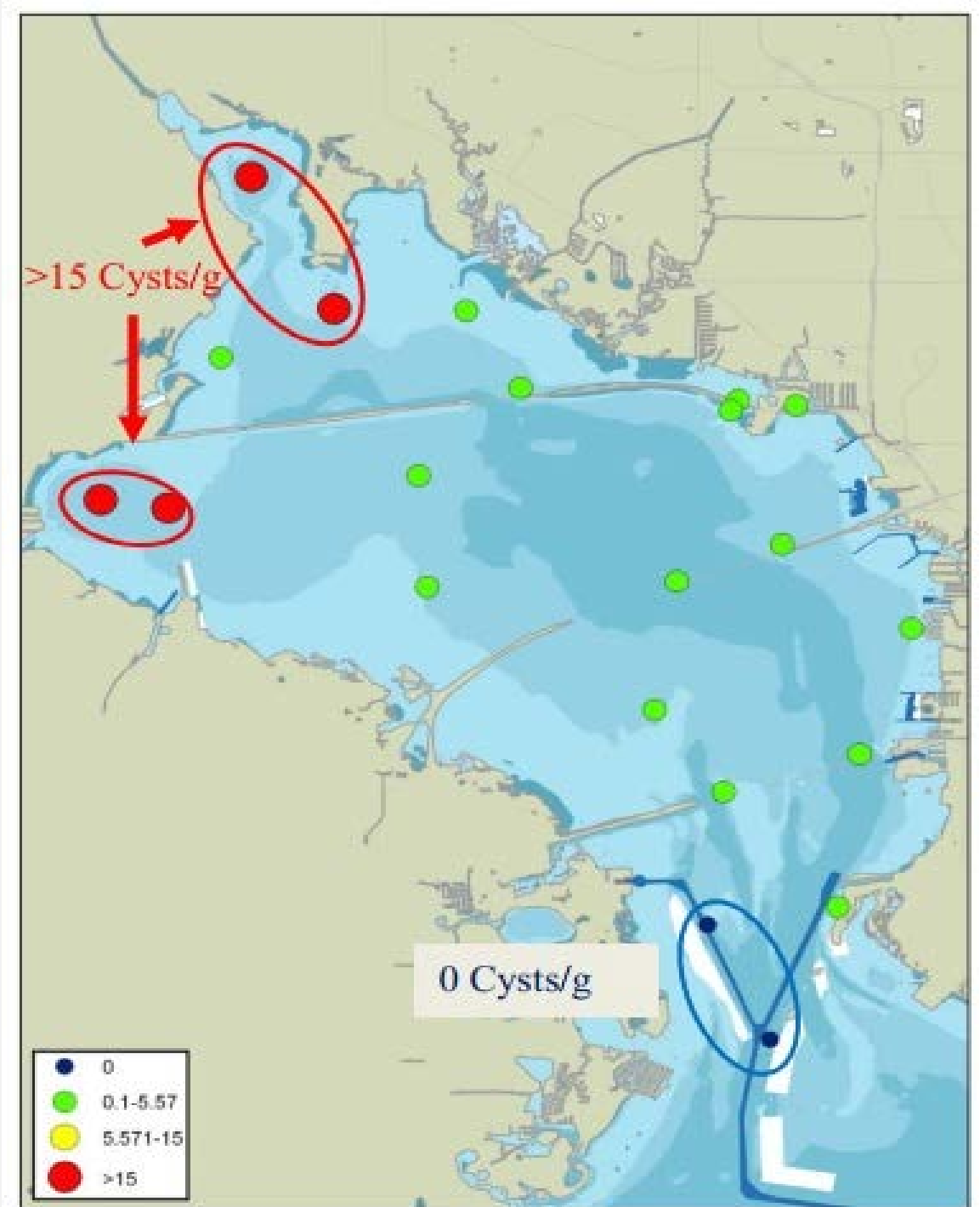
- The threshold for chlorophyll-a is 8.5
 - 2017 – 9.7 - 13.8
 - 2018 – 11.3 – 16.8
 - 2019 - 11.2 – 14.8
- Only region of Old Tampa Bay that consistently does not meet threshold

CHLOROPHYLL-A



- Annual blooms of *P. bahamense* since 2000
 - Blooms are concentrated the most in Cooper's Point
- Strategies to reduce blooms
 - Increase flushing
 - Reduce residence time
 - Muck removal

BLOOMS



Cooper's Point Priority Issues



Mosquito Ditching and Spoil Piles

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PROJECT ELEMENTS



SUMMARY OF BENEFITS

- Increase in flushing
- Decrease in residence time
- Potential functional lift in seagrass
- Mangrove restoration
- Potential decrease in algal blooms



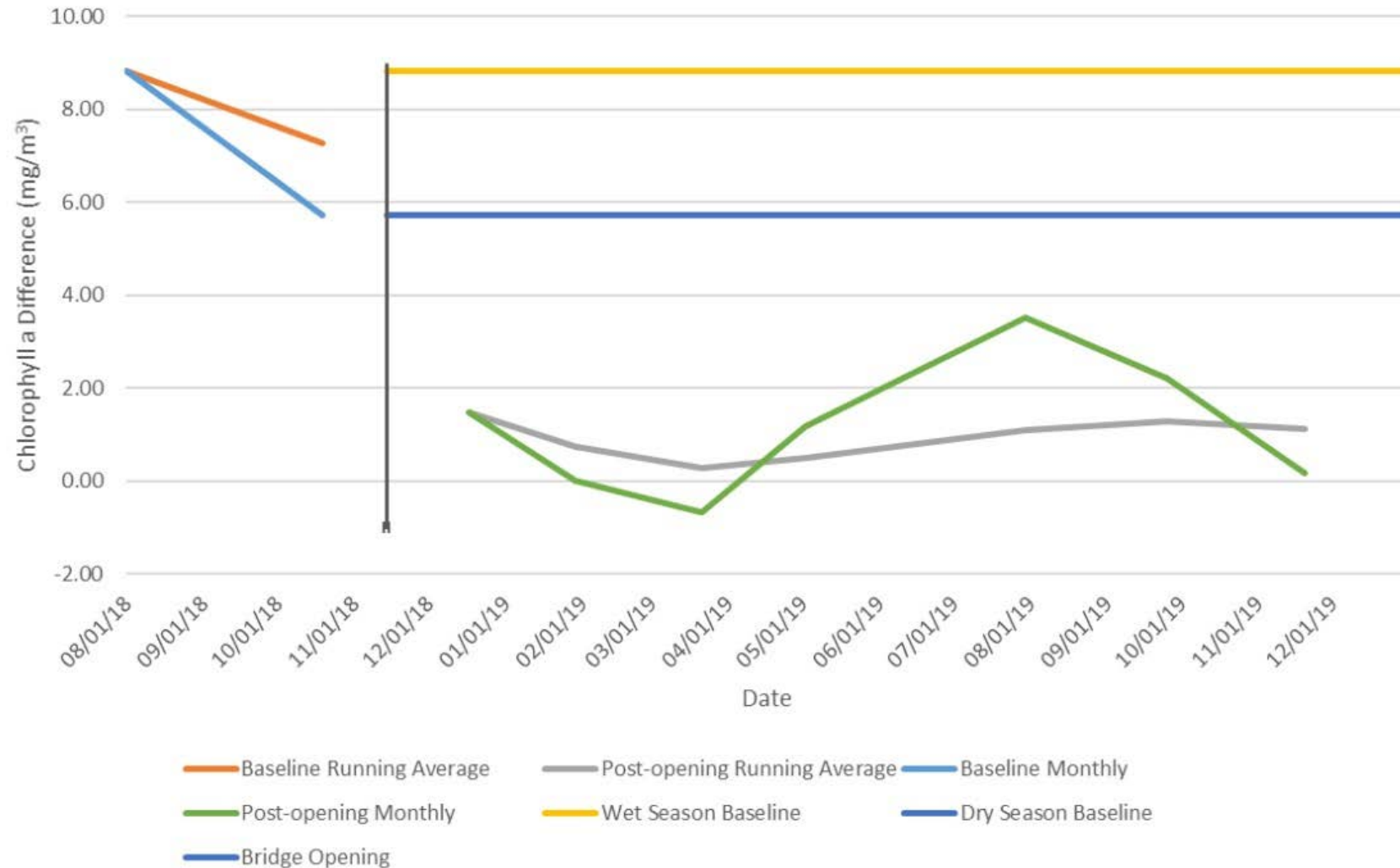
OLD TAMPA BAY WATER QUALITY IMPROVEMENTS



Using dye to test water flow after opening of the Courtney Cambell Causway to improve circulation in the bay

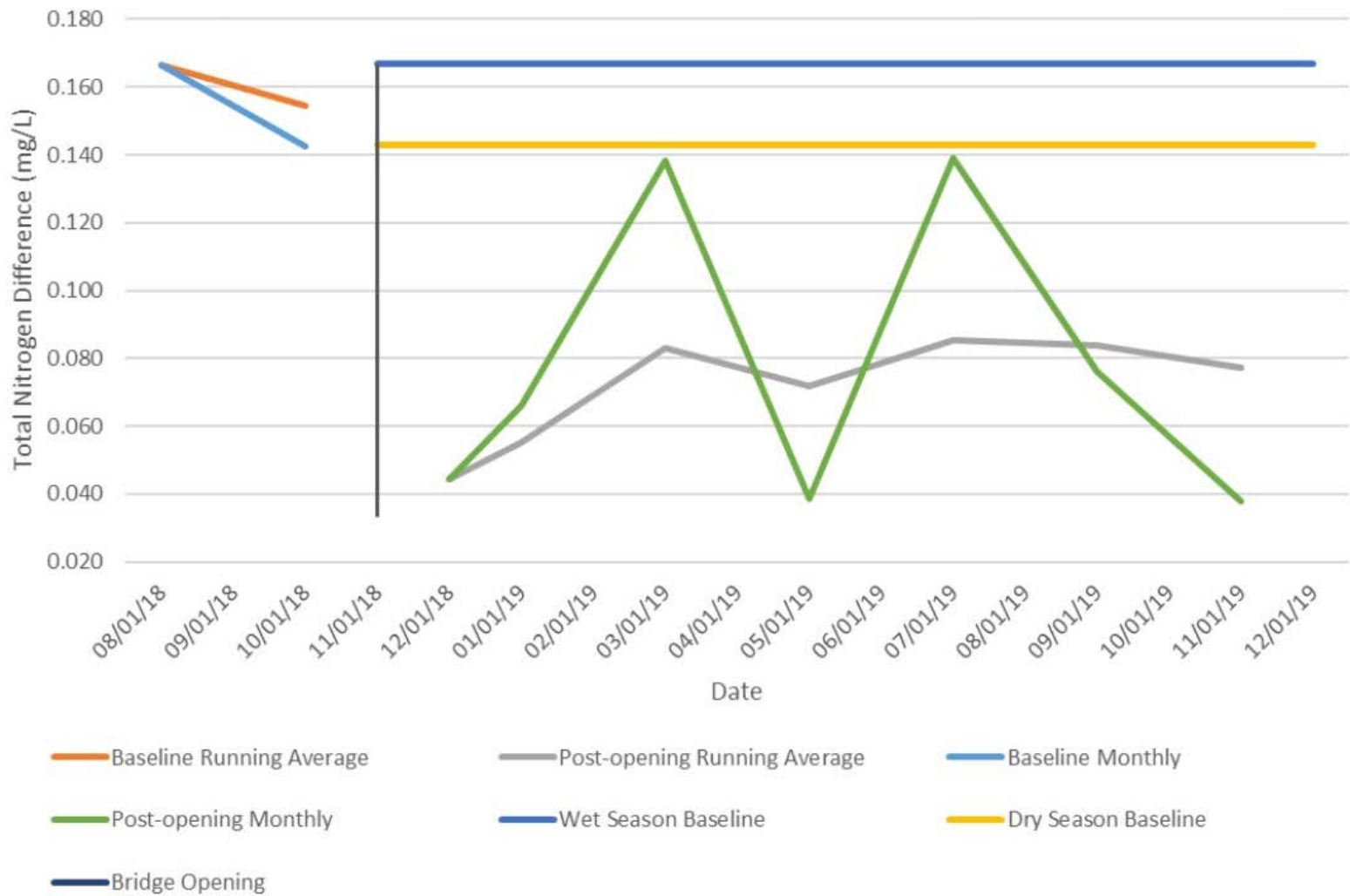
Success Monitoring Criteria

Strata C – D Chlorophyll-a Difference Comparison



Success Monitoring Criteria

Strata C – D TN Difference Comparison



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PROJECT ANALYSIS

Analysis Performed to Date

- Master Plan
- Circulation Study/Hydrodynamic Modeling
- Baseline Environmental Survey
- Plan Development and Permitting

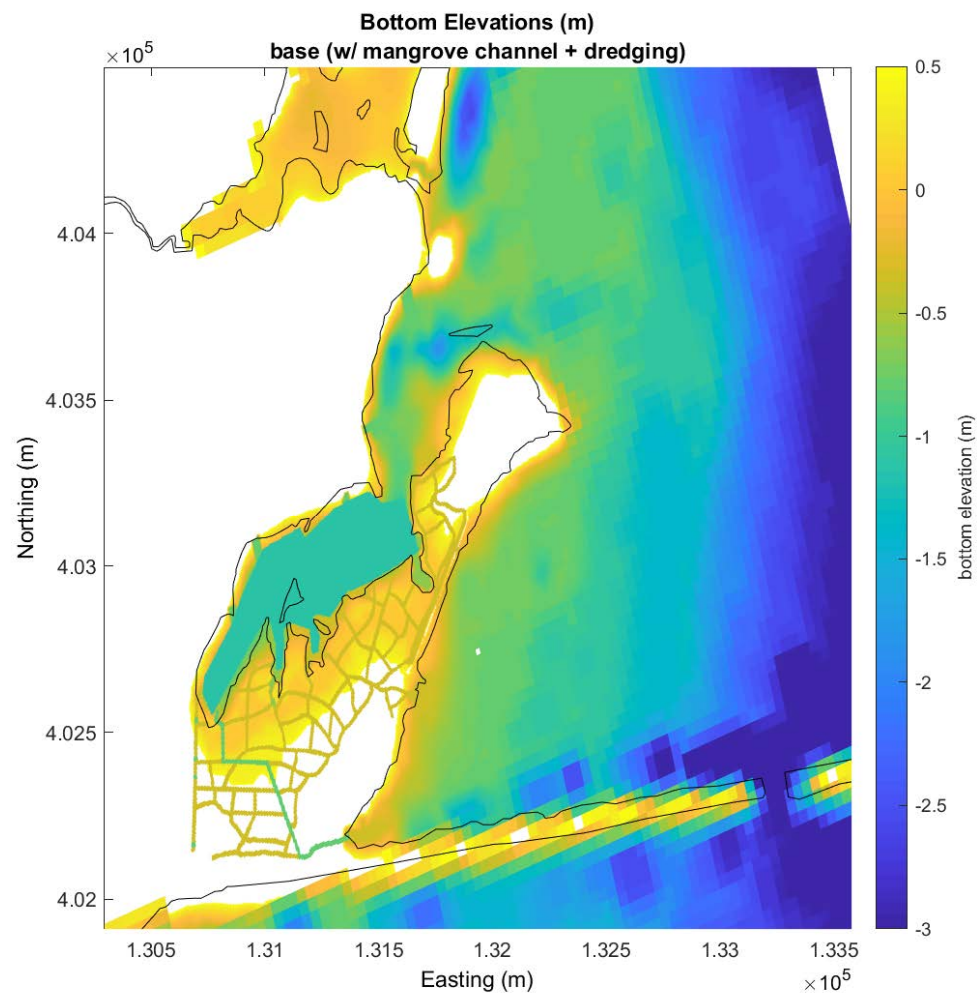


Hydrodynamic / Flushing

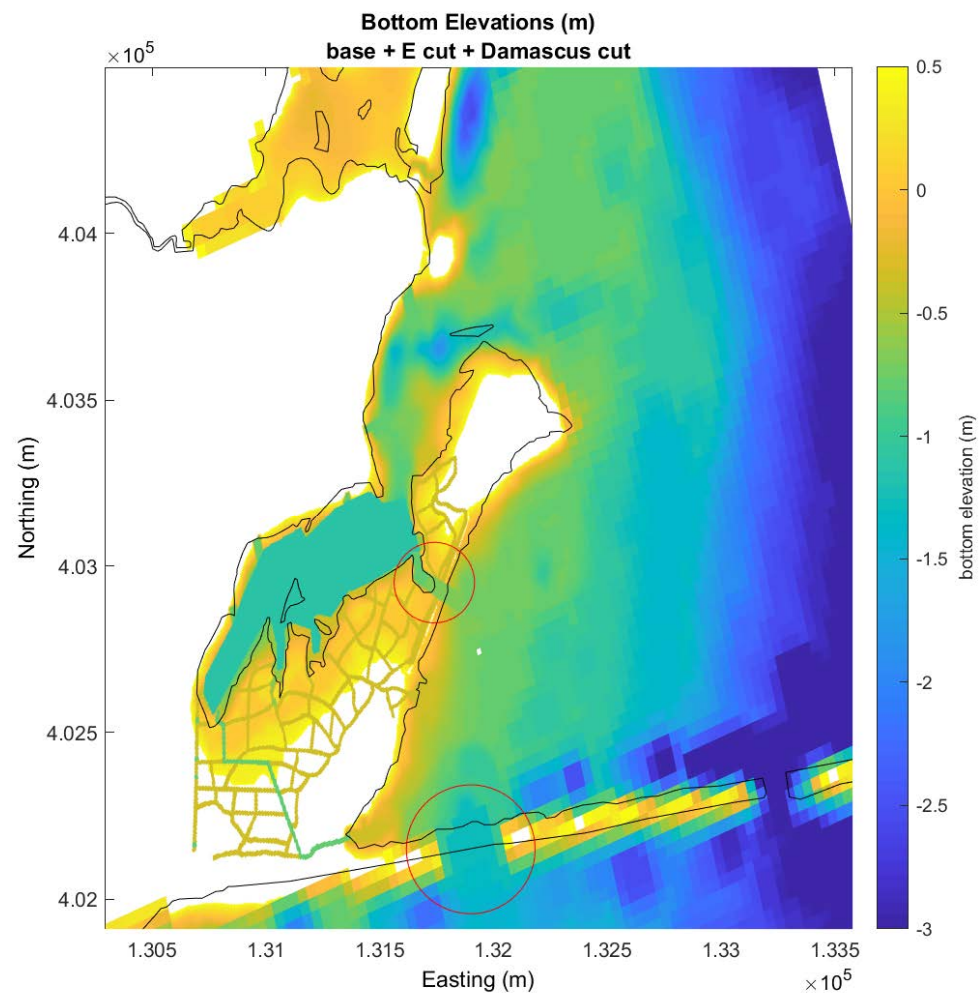
- Delft3D model – simulates tidal circulation, freshwater inflows, and constituent transport
 - Model domain encompasses Old Tampa Bay, with increasing spatial detail within Cooper's Bayou
 - Bathymetry from previous model as well as USGS elevation DEM if necessary
 - Tidal boundary at Gandy Bridge
 - Freshwater inflows within Bayou
- Conservative tracer to quantify residence time
- Residence time defined as the time to reach 10% of initial concentration of tracer (i.e., a 90% reduction)
- Compare design alternatives to base conditions to gauge flushing improvement



Model Configurations

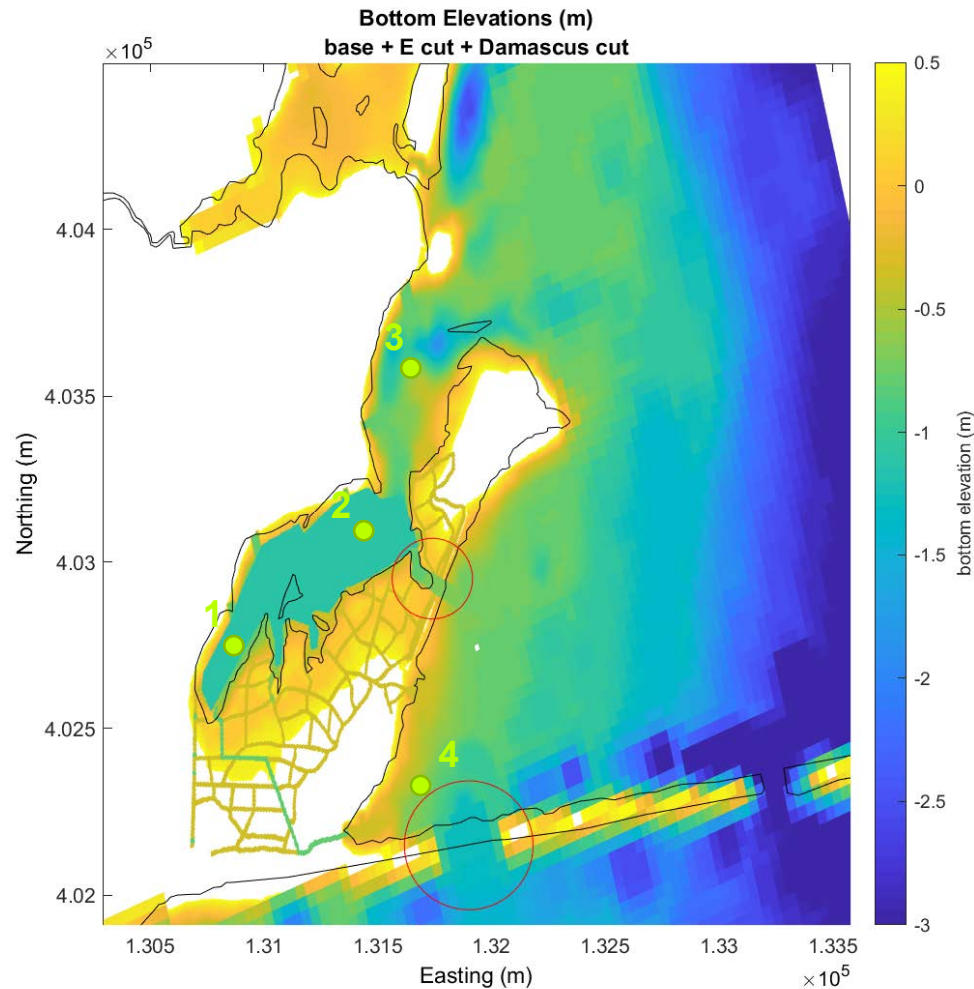


Base Conditions



Design Scenario

Flushing Improvements



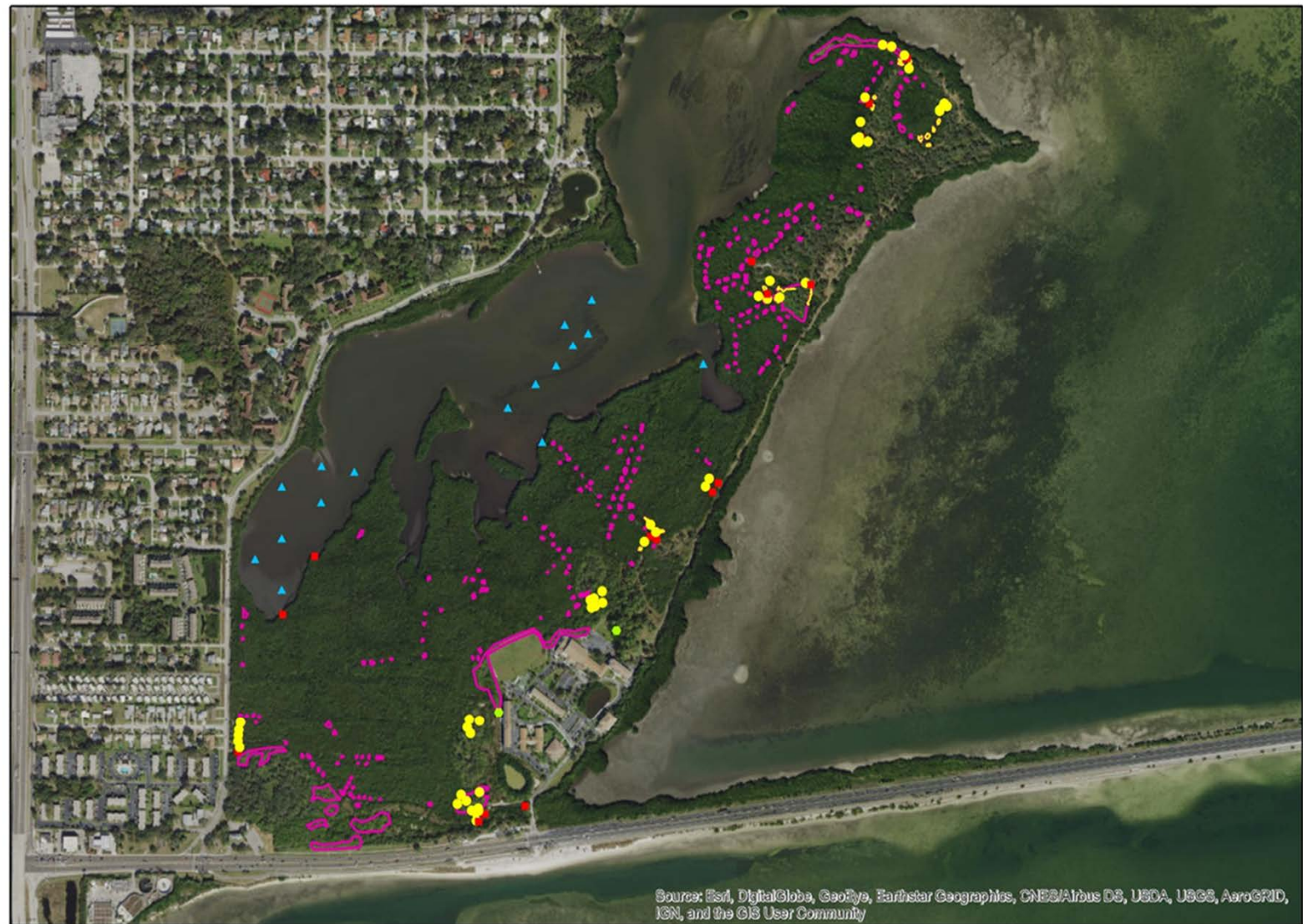
Location	Residence Time (Days)	Reduction (%)*
1	2.42	-27
2	2.08	-24
3	1.67	-37
4	0.17	-77

* Evaluated multiple design configurations; results are for 'optimized' alternative:

- 350-ft opening through SR60
- 120-ft opening through Cooper's Point

- Mangrove swamp characterization
- Spoil pile delineation / characterization
- Mosquito ditch delineation
- Seagrass and submerged aquatic vegetation assessment

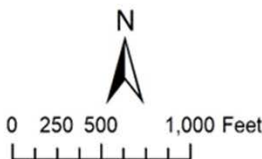
EXISTING CONDITION ASSESSMENT



Cooper's Bayou
Environmental Baseline Survey
Pinellas County, Florida

Data Collection Points

- ▲ SAV
- Mosquito Ditch
- Spoil Pile
- Photo Interp



Document Path: J:\West Florida Sciences\City of Clearwater\Coopers Bayou\GIS\MXD\2019.09.20 Data Collected.mxd

- 38 spoil piles field verified during survey
- Piles range from 0.003 and 1.12 acres
- 60% of piles contained Brazilian pepper
- Range from 10 in – 4 feet in elevation
- 214 spoil piles aurally interpreted
- Total of 4.17 acres across site

MANGROVES – SPOIL PILES



- 11 mosquito ditches field verified
- Ranged from 14-in to 80-in in width
- Ranged from 10 in to 5 feet in depth
- Many with obstructions limiting flushing

MANGROVES – MOSQUITO DITCHES



Seagrass Baseline Assessment

16 sample plots within middle and lower Cooper's Bayou

Seagrass edge of bed survey and quadrat sampling adjacent to Eastern Cut and Courtney Campbell Cut Alternatives



Seagrass Historic Trends



1988



1992



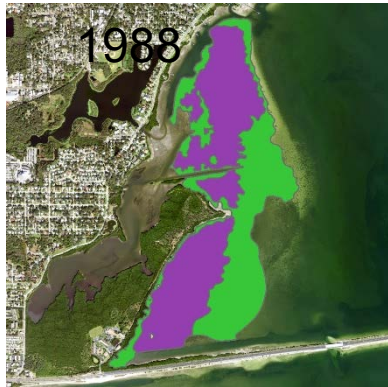
1996



2001



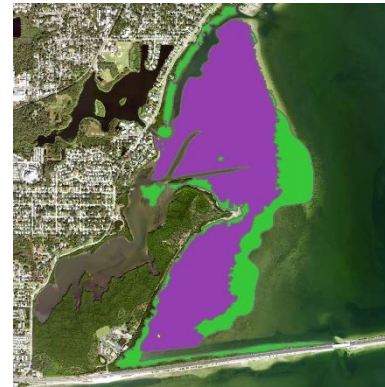
2010



2012



2014



2016

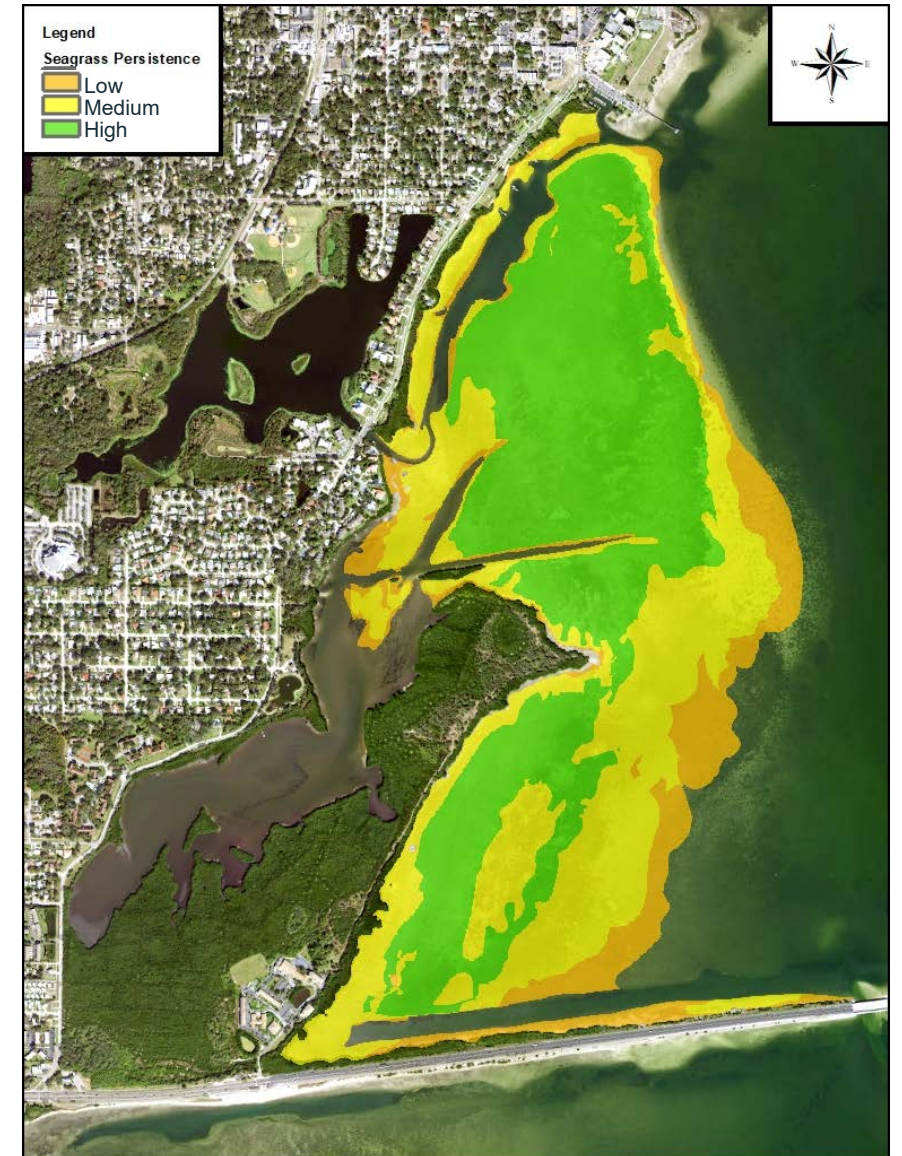
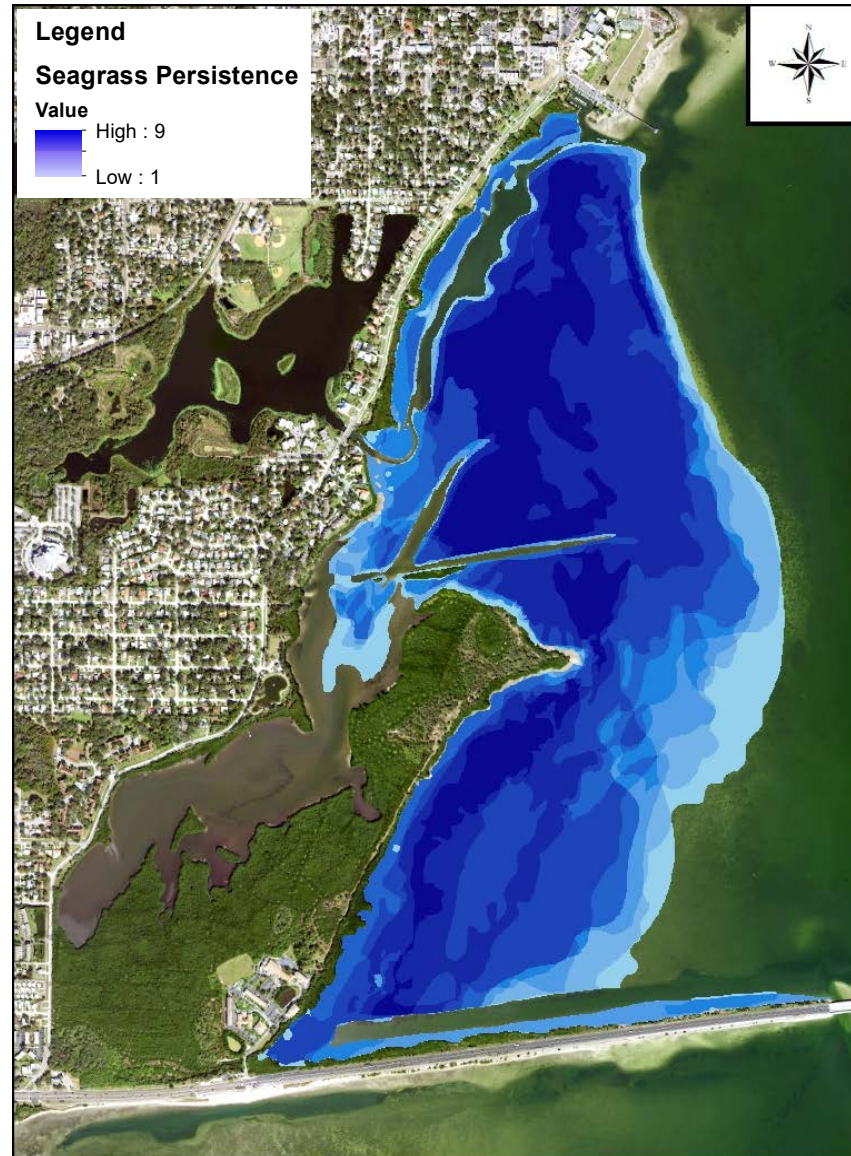


2018

Seagrass Persistence

Years Analyzed:

1988
1992
1996
2001
2010
2012
2014
2016
2018



Dredging Preparation

- Site Visit(s)
- Collaboration with Sciences and Cultural Resources
- Desktop Review for Available Resources
- Survey – Bathymetric and Topographic
- Geotechnical



Dredging Alternatives

- Client's Needs vs Wants
- Focused on further enhancing the ecological uplift while being economical.
- Beneficial Use of Dredged Material



Alternatives

1
2
3

Constructability

Least Difficult
Moderately Difficult
Most Difficult

Cost

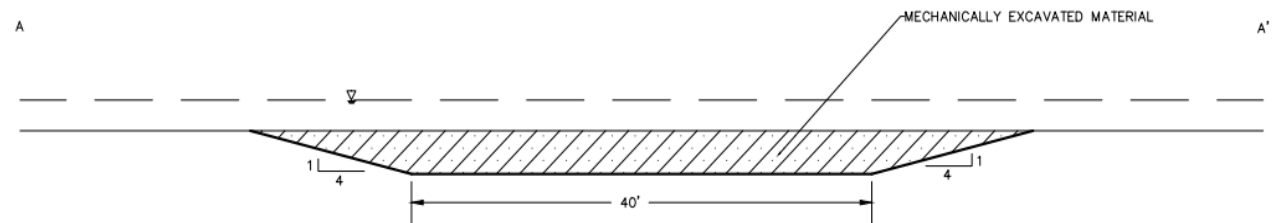
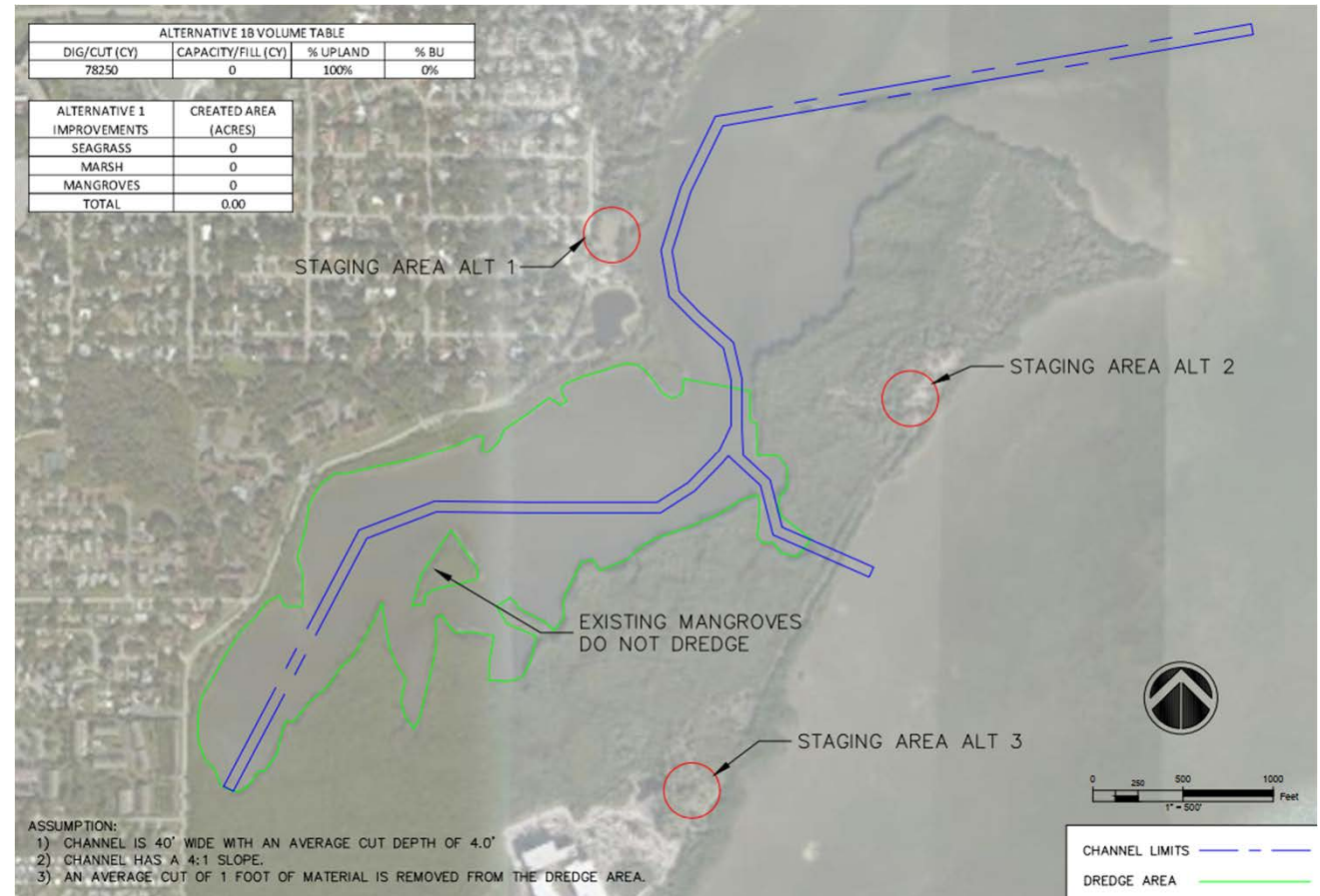
Most Expensive
Moderately Expensive
Least Expensive

Beneficial Use

0%
25-50%
100%

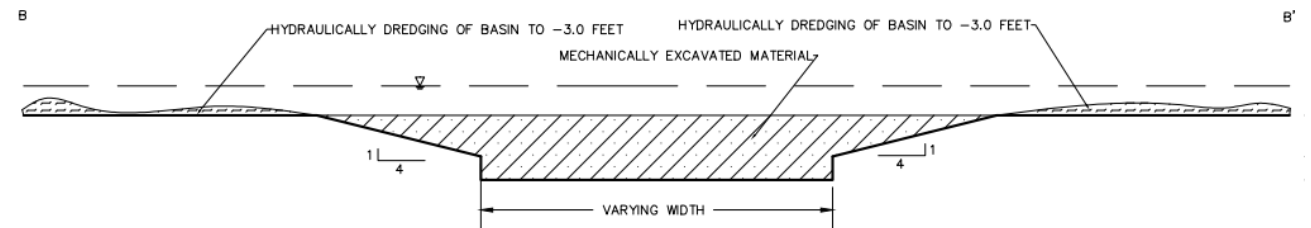
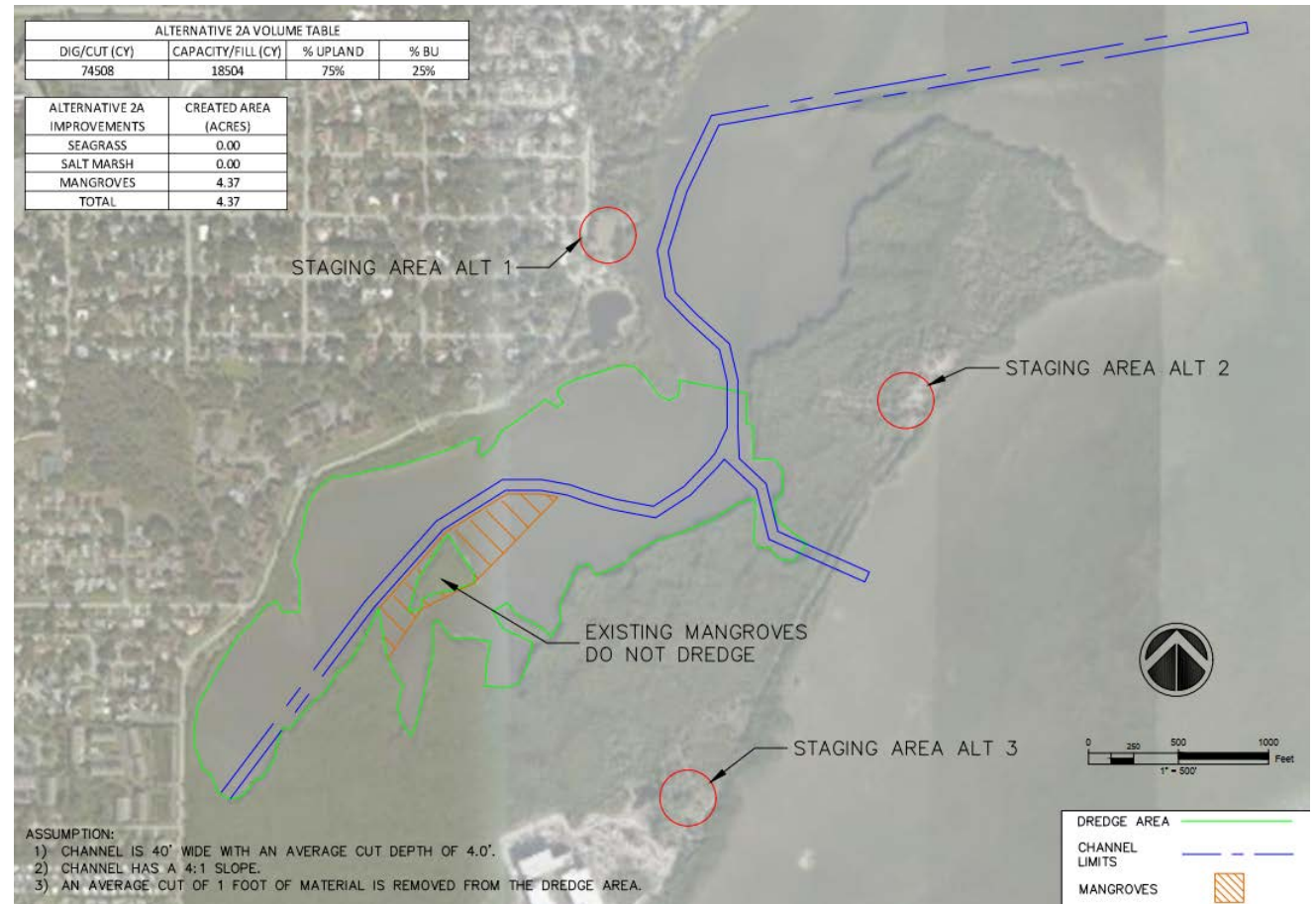
Alternative 1

- 100% of Material to Landfill
- **Most Expensive Alternative**
- **Least Complicated to Construct**
- Channelizing Cooper's Bayou
 - Width: 40 feet
 - Elevation: -6 feet NAVD88
 - Slope: 4:1
- Deepening Cooper's Bayou
 - Removal of 1-2 feet across project site
 - Elevation: -3 feet NAVD88



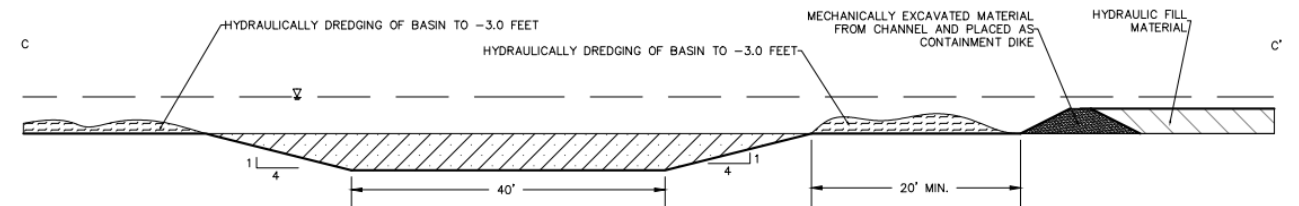
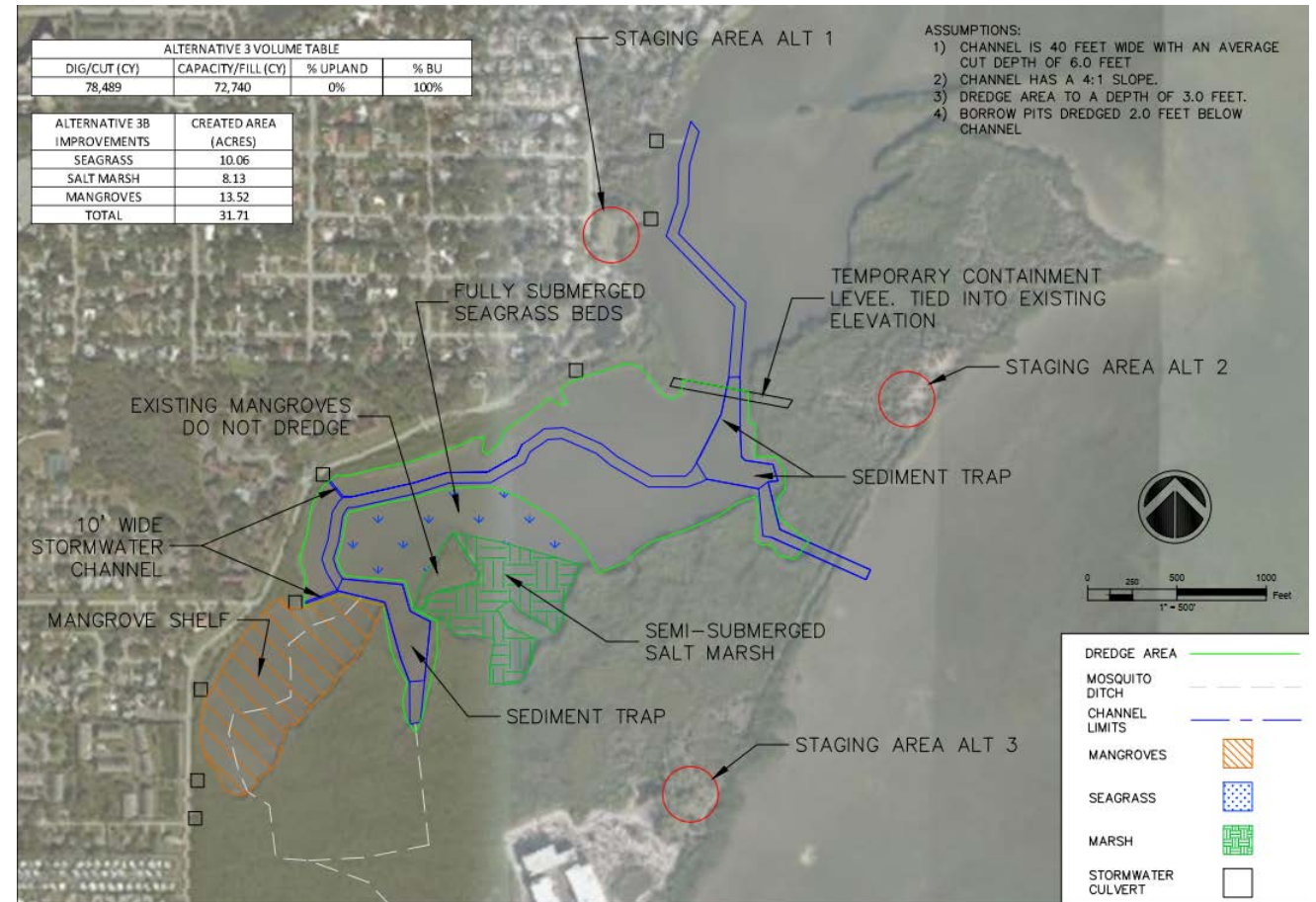
Alternative 2

- Beneficially Use 25% of Dredged Material
- Lesser Expensive Option
- More Complicated to Construct
- Channelizing Cooper's Bayou
- Deepening Cooper's Bayou
- Promotes Habitat
 - Mangrove - 4.4 Acres



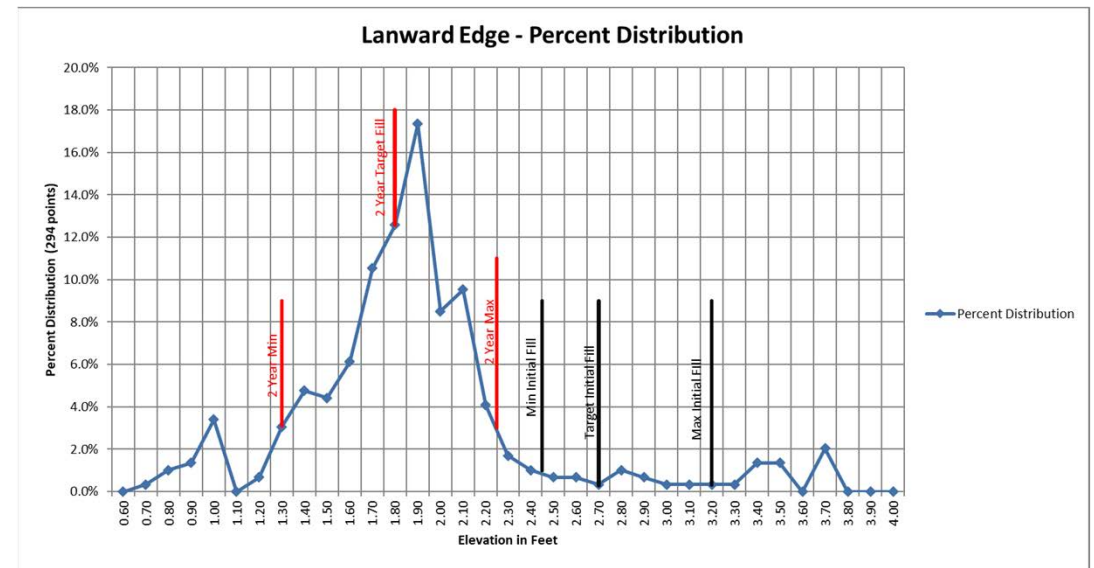
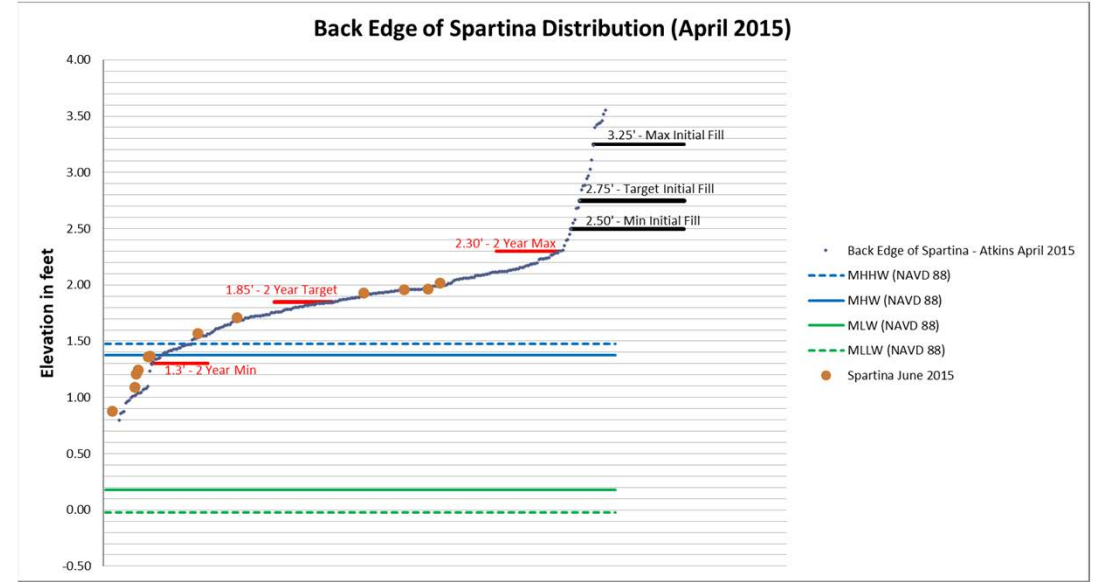
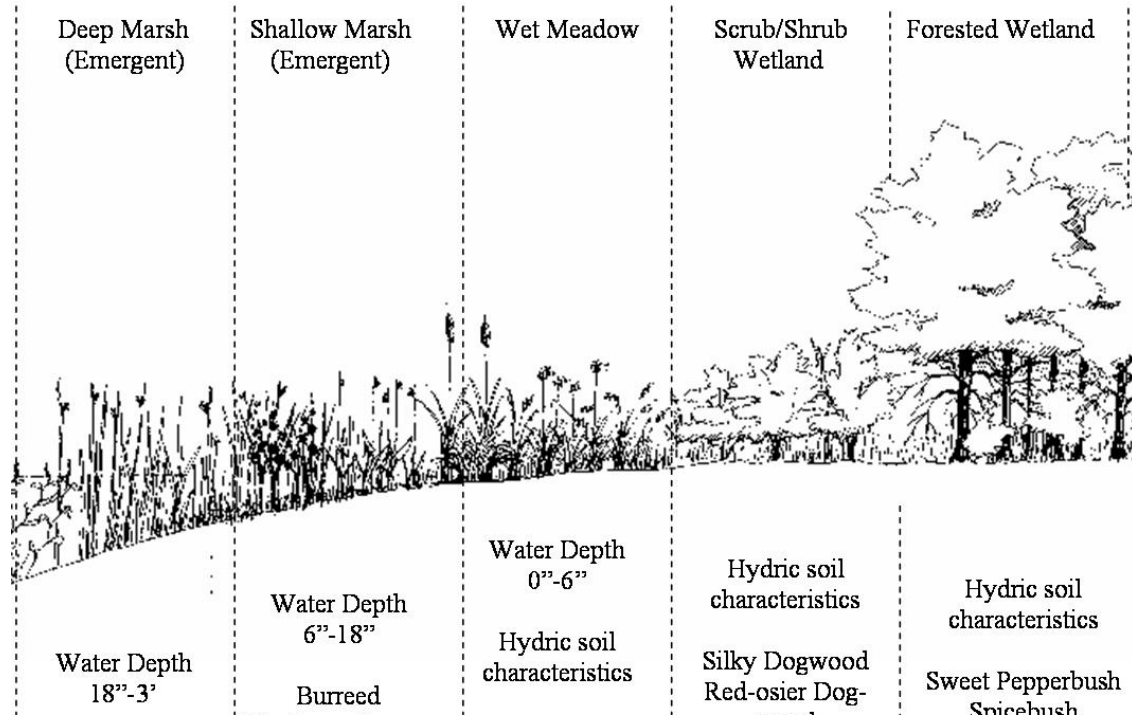
Alternative 3

- **Client Preference**
- **Beneficially Use 100% of Dredged Material**
- **Least Expensive Option**
- **Most Complicated to Construct**
- Channelizing Cooper's Bayou
- Deepening Cooper's Bayou
- Sediment Traps
 - Elevation: -8 feet NAVD88
- Promotes Habitat
 - Mangrove – 13.5 Acres
 - Seagrass – 10.1 Acres
 - Salt Marsh – 8.1 Acres



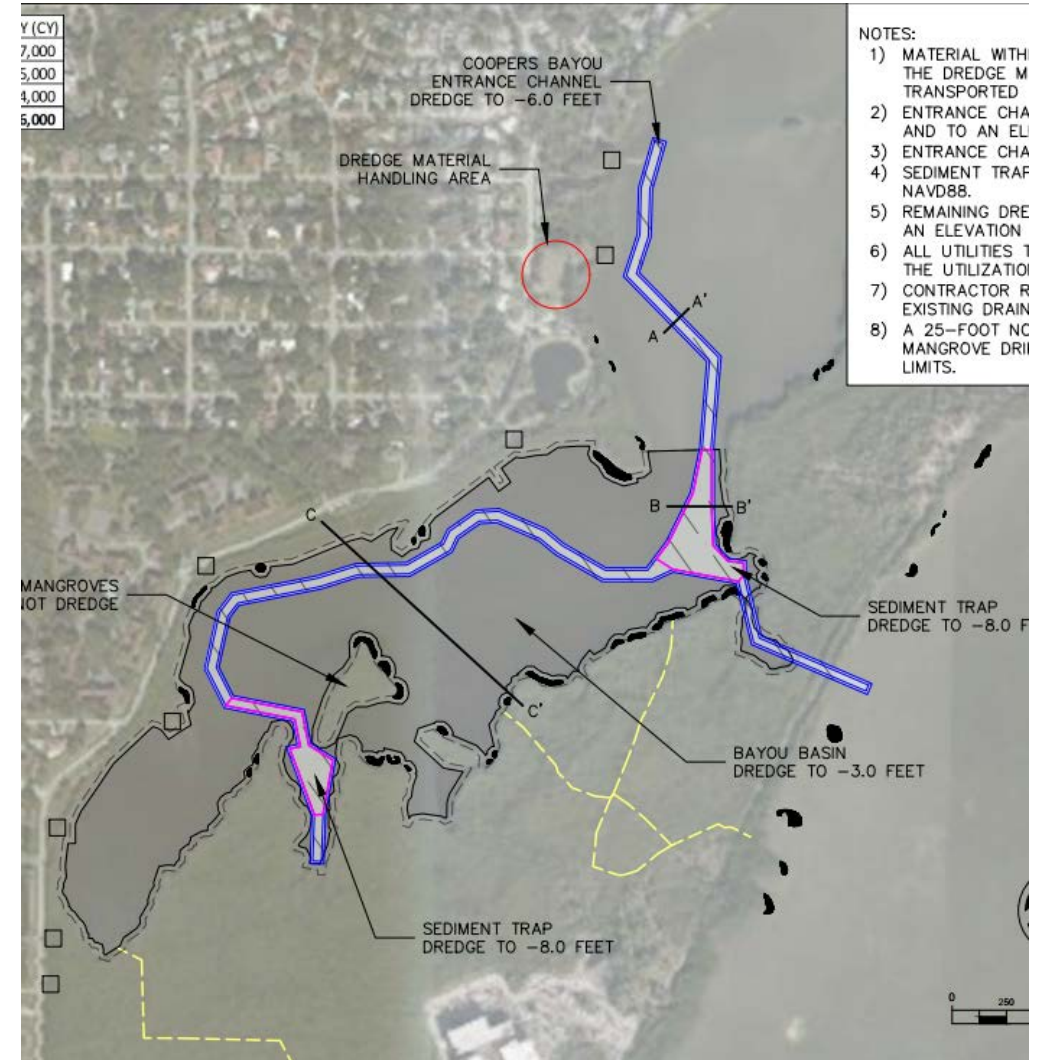
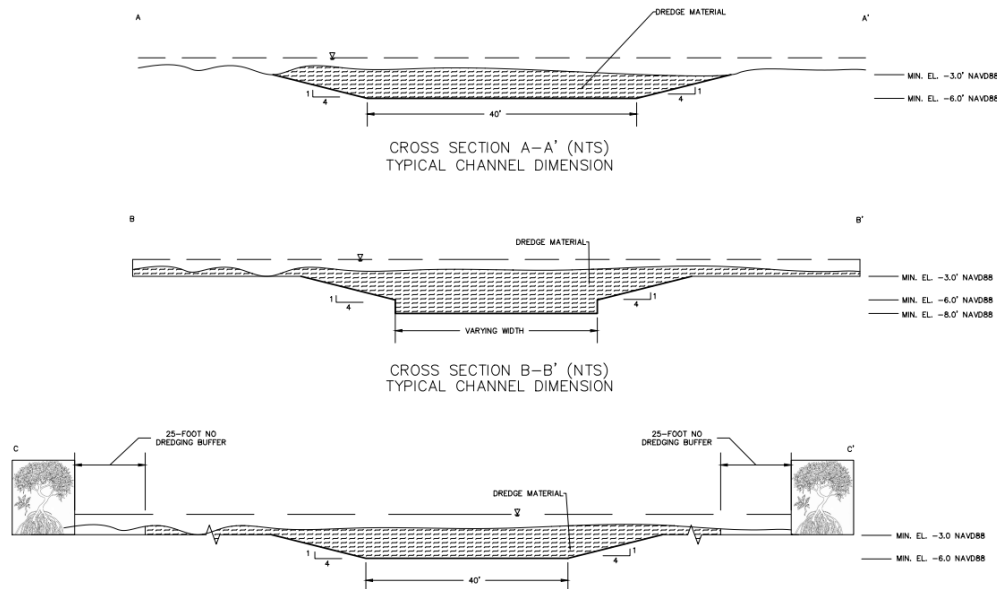
Design Objectives

Wetland Cross Section (with typical plant species for each zone)



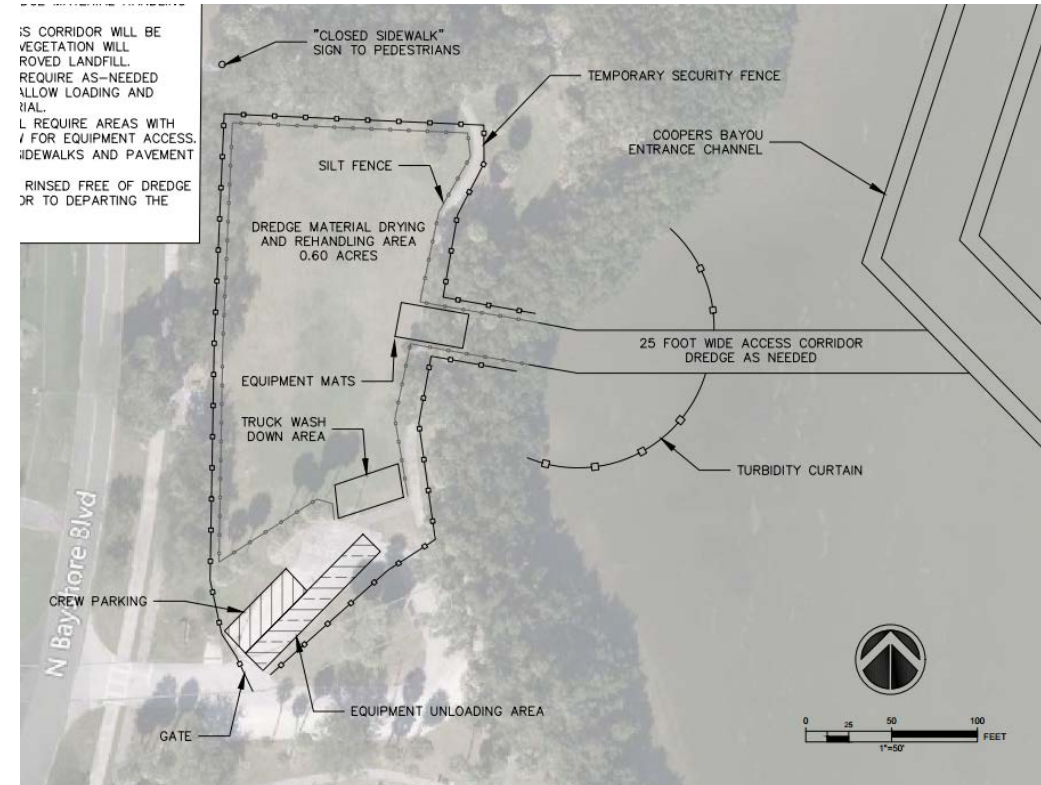
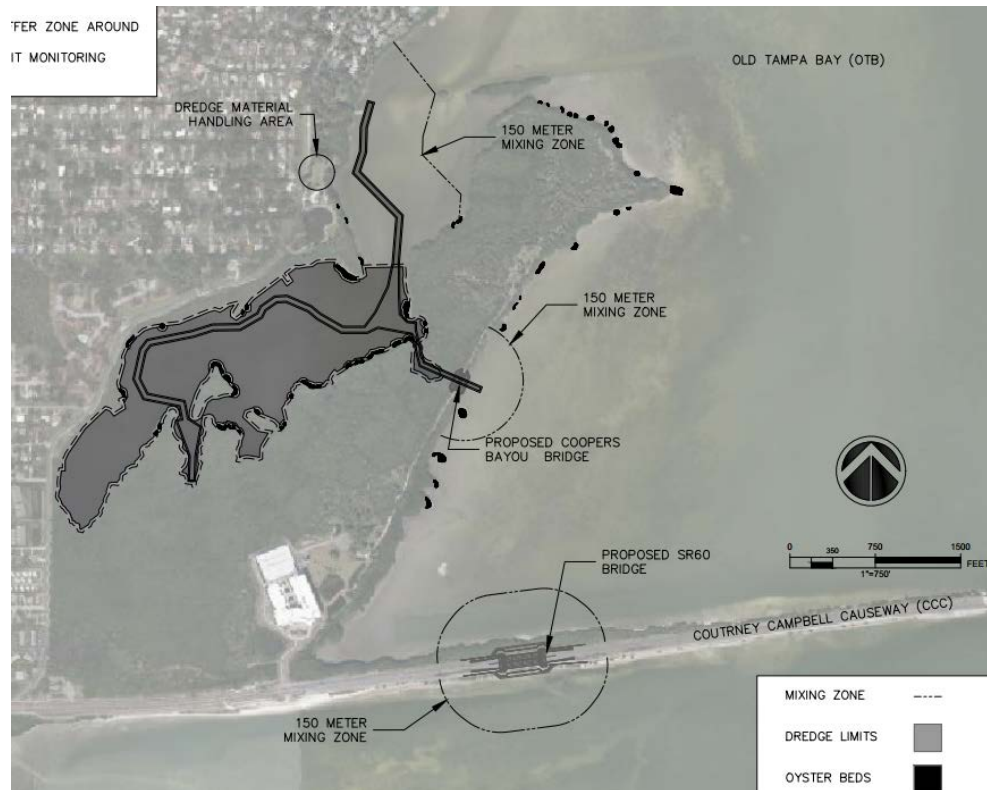
Agency Selected Alternative

- **Most Simplistic Option**
- Includes the sediment traps
- Material to Landfill
- Avoid Environmental Resources



Additional Elements

- Staging Area and Site Access
- Reducing Water Quality Impacts



- Reducing Impacts to Environmental Resources
- Construction Duration (Daily and Full) Term
- Navigational Issues

Next Steps

- Progress Approved Permitted Design to an IFC plan set and specifications.
 - Update Bathymetric Conditions
 - Geotechnical Sediment and Toxicity Analysis
 - Refine Staging Area and Site Access
 - Bid Packaging and Solicitation





QUESTIONS AND ANSWERS

thank you

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