# *MAPTITE*
## *Integrating Land Elevations and Water Levels for Habitat Restoration*

# Galen Scott / Robb Wright

## March 7th, 2006

# MAPTITE Supports the Methodology Described in Guidance Document from May 2004

"This document is for coastal restoration professionals ... who need to know **whether and how** to use geodetic positioning tools, water level information, and other technologies to support restoration project planning and implementation."

Addressing Elevation and Inundation Issues in Habitat Restoration Planning and Implementation

A Guidance Document

# DRAFT
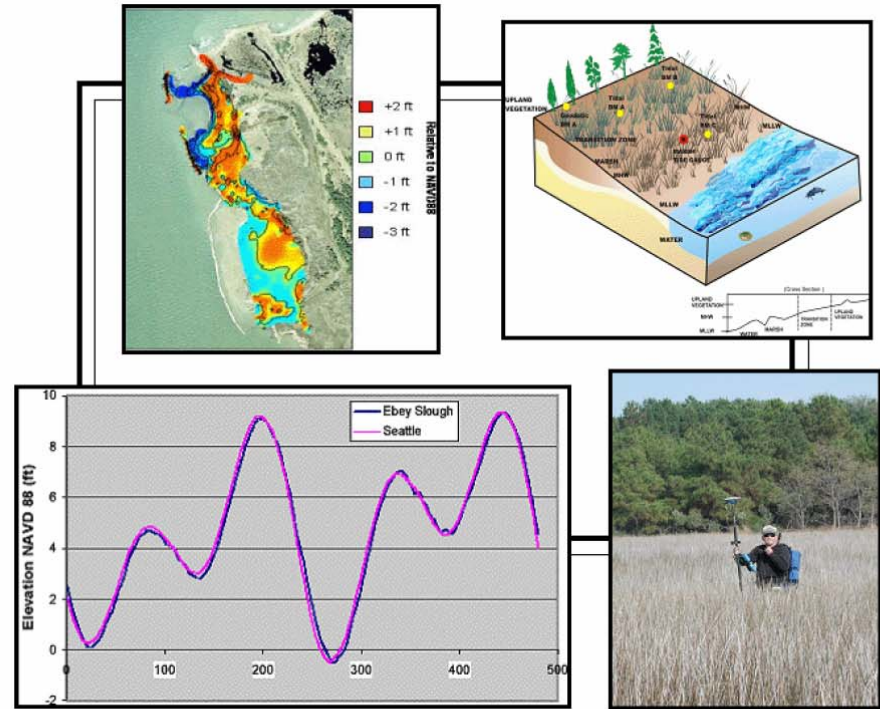
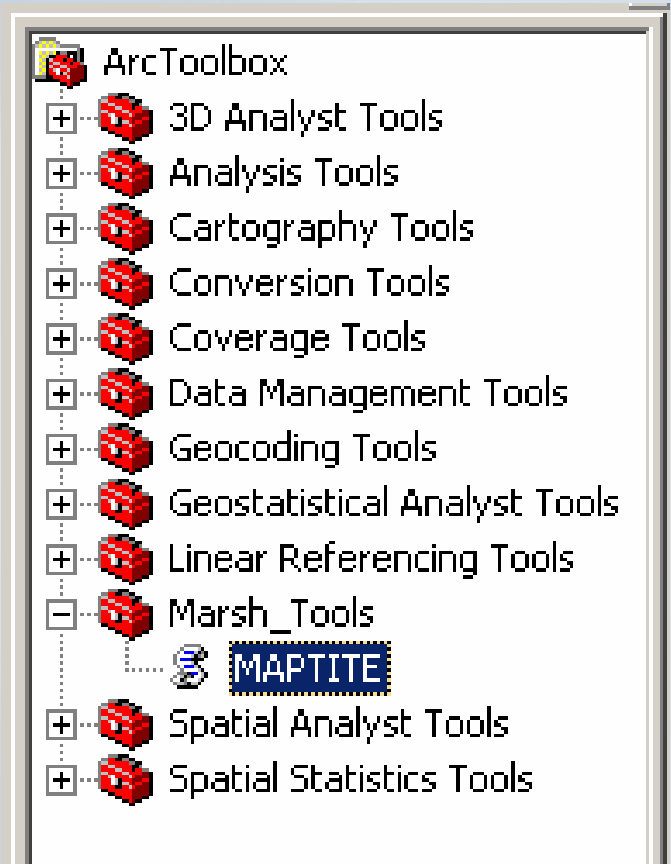National Oceanic and Atmospheric Administration

# MAPTITE 0.9 - What is it?

**M**arsh
**A**nalysis &
**P**lanning
**T**ool
**I**ntegrating
**T**ides &
**E**levations



ArcToolbox
- 3D Analyst Tools
- Analysis Tools
- Cartography Tools
- Conversion Tools
- Coverage Tools
- Data Management Tools
- Geocoding Tools
- Geostatistical Analyst Tools
- Linear Referencing Tools
- Marsh_Tools
  - MAPTITE
- Spatial Analyst Tools
- Spatial Statistics Tools

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# MAPTITE 0.9 - What is it?

A script run from ArcToolbox to automate the process of connecting tidal datums and land elevations to produce planting zones.
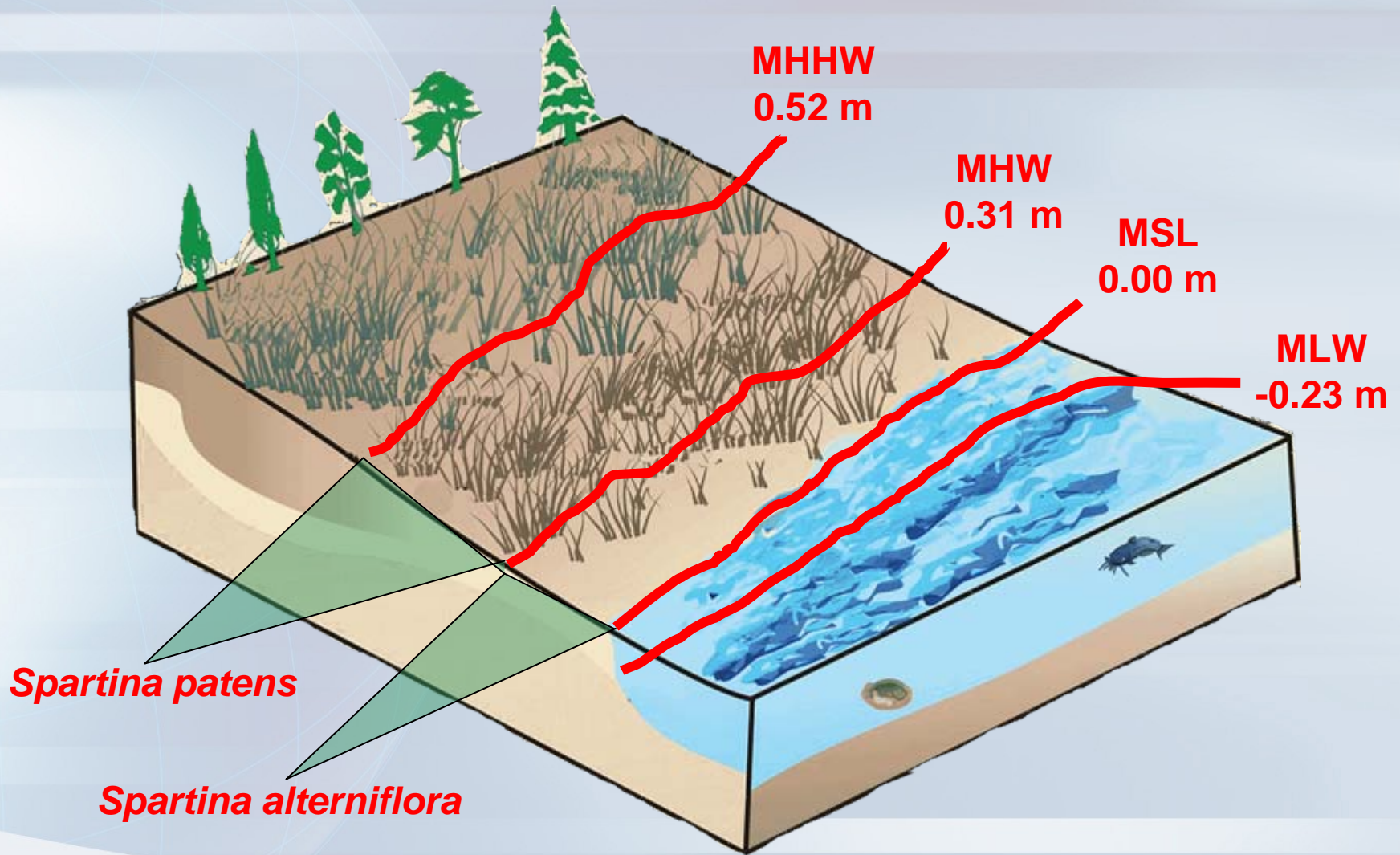


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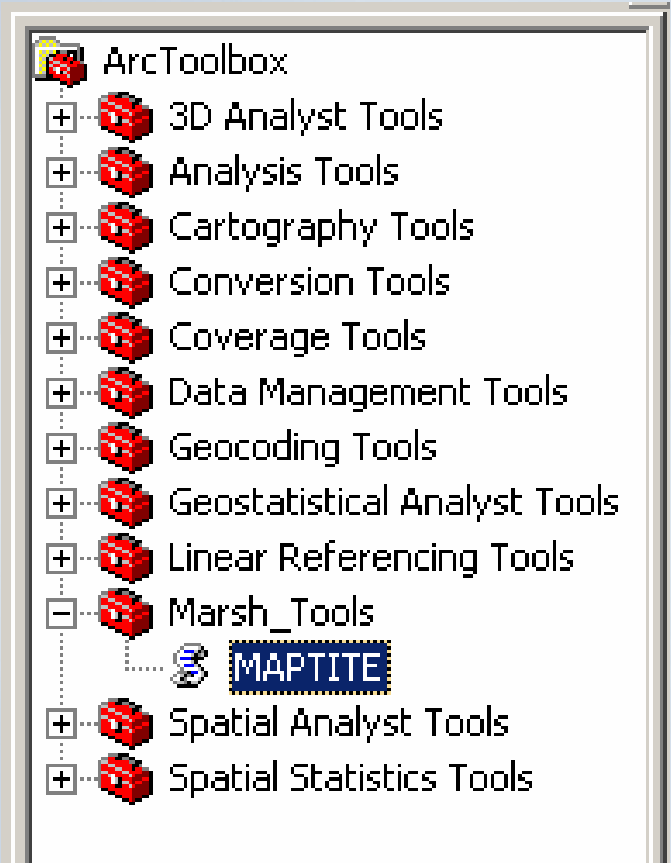
# MAPTITE Partners

- **Center for Operational Oceanographic Products and Services (CO-OPS)**
  - **Methodology, Tides and Tidal Datums**

- **National Geodetic Survey (NGS)**
  - **Elevations & Geodetic Datums**

- **NOS Special Projects (SPO)**
  - **ArcGIS scripting and software development**

- **National Aquarium in Baltimore**
  - **Restoration and plant ecology**

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# Planting Zones by Tidal Datums



MHHW
0.52 m

MHW
0.31 m

MSL
0.00 m

MLW
-0.23 m

*Spartina patens*

*Spartina alterniflora*

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# Barren Island Study Site



1200 m

# Methods of Analysis
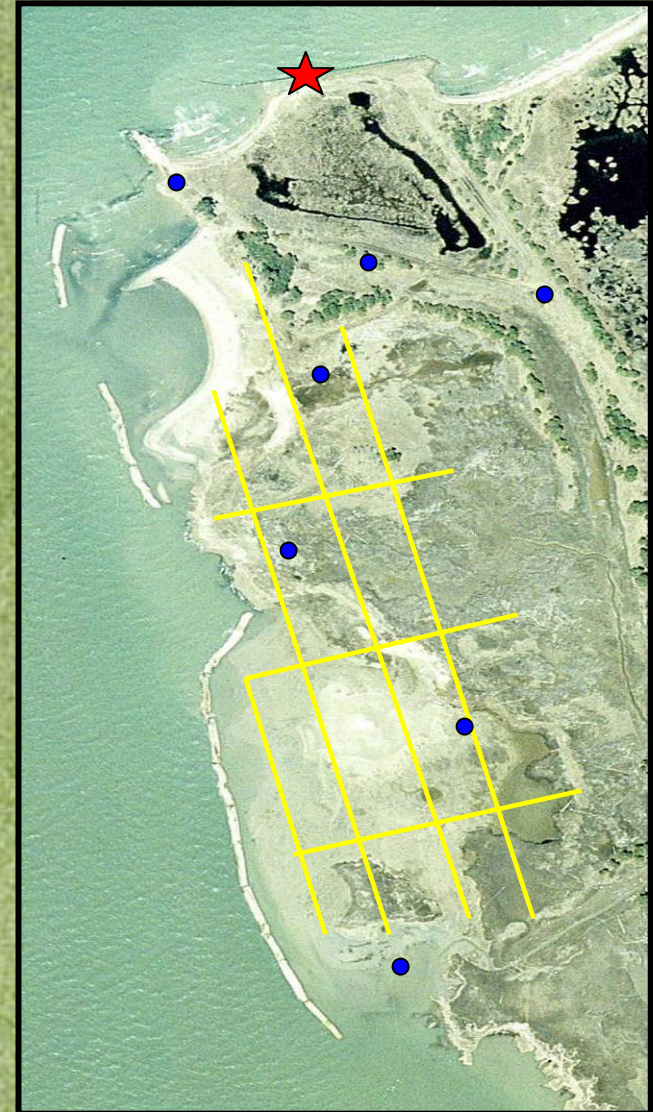


- ## Biological Analysis

  **National Centers for Coastal Ocean Science & National Aquarium in Baltimore**

- ## Geodetic Analysis

  **National Geodetic Survey**

- ## Tidal Analysis

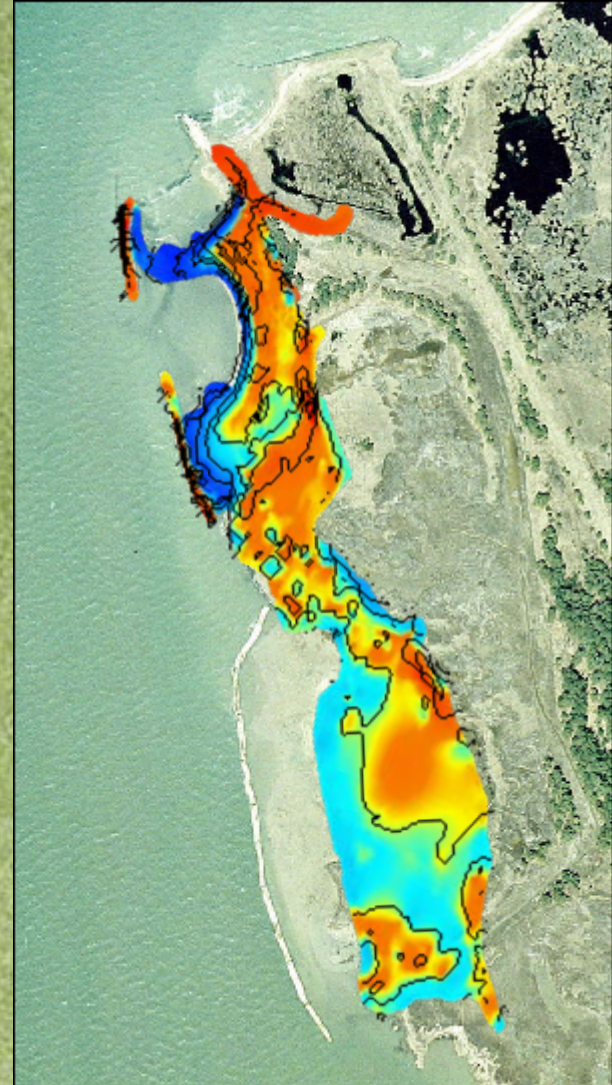  **CO-OPS**
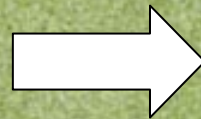
# Geodetic Analysis



Deep-rod bench marks installed for vertical stability

Height Mod survey to connect benchmarks to reference frame

Kinematic GPS overlaid on the aerial photo
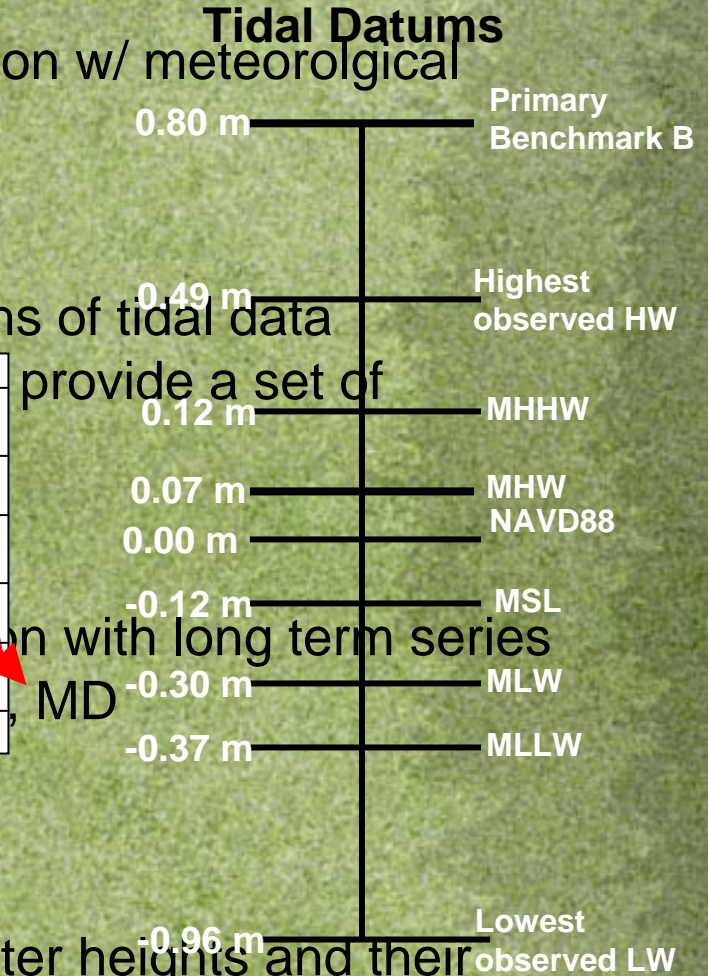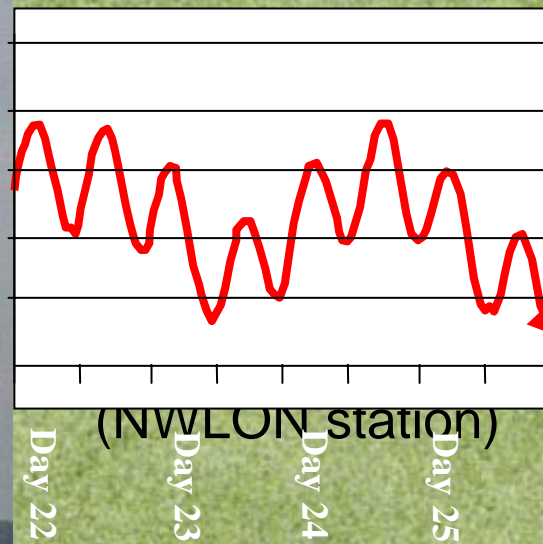
# Geodetic Analysis



Digital Elevation Model
(DEM)

# Tidal Analysis

- Pressure Tide station w/ meteorlgical sensors

- Collected 10 months of tidal data ... provide a set of ... n with long term series , MD (NWLON station)

- Determine high water heights and their frequency and duration of inundation relative to the marsh surface

**Tidal Datums**

| | |
|---|---|
| 0.80 m | Primary Benchmark B |
| 0.49 m | Highest observed HW |
| 0.12 m | MHHW |
| 0.07 m | MHW |
| 0.00 m | NAVD88 |
| -0.12 m | MSL |
| -0.30 m | MLW |
| -0.37 m | MLLW |
| -0.96 m | Lowest observed LW |

Relative to NAVD88

Based on 10 months of tidal data from 1/2002 – 2/2003

Day 22   Day 23   Day 24   Day 25

# Inputs to MAPTITE

- **Digital Elevation Model**
  - Vertical adjustment to MSL

- **Tidal Datum Elevations**
  - MHHW, MHW, MSL, MLW, MLLW relative to NAVD88

- **Plant Species Data**
  - Elevation ranges and plant spacing

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# MAPTITE Outputs

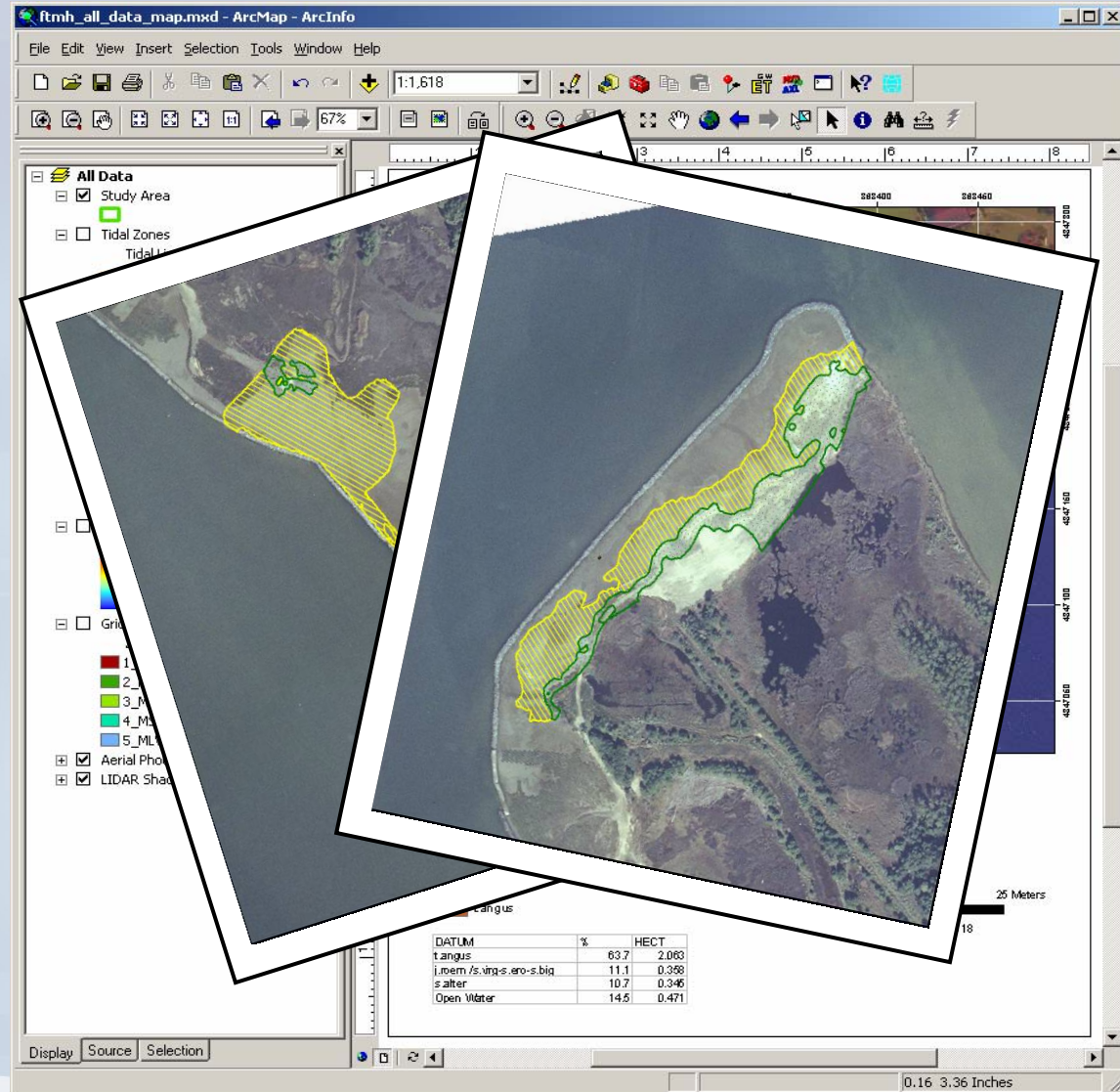- **ArcGIS project file**

  - contains the generated layers

- **Tidal Zone isolines**

  - Area statistics for tidal zones

- **Planting Zones for each vegetation species**

  - Individual layers and overlapping zones

  - Area statistics for planting zones



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# Need to Calibrate and Validate

- MAPTITE is available for beta testing.

- Need to work with partners to collect elevations, tides, and plant species distribution data at reference sites and compare to model output.

- Will test different elevation data collection and DEM production methods to best match actual natural species distributions

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**Contact Info:**

## Elevations & Geodetic Datums:
**Galen Scott - NGS**
Galen.Scott@noaa.gov
(301) 713-3198 x131

## Tides and Tidal Datums:
**Kristen Tronvig – CO-OPS**
Kristen.Tronvig@noaa.gov
(301) 713-2877 x 155

## Methodology & Data Interpolation:
**Craig Martin – CO-OPS**
Craig.Martin@noaa.gov
(301) 713-2877 x 133

## ArcGIS and Technical Questions:
**Robb Wright - SPO**
Robb.Wright@noaa.gov
(301) 713-3000 x 118

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