

CREATING TIDAL WETLAND MARSHES WITH DEEP LAYERS OF DREDGED MATERIAL

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Beneficial Use of Dredged Material Restoring and Creating Tidal Wetlands

- ▶ Thin Layer Placement
- ▶ Moderate DM Thickness
- ▶ Deep DM Thickness
- ▶ All Have Unique Challenges and Benefits



Beneficial Use of Dredged Material Restoring and Creating Tidal Wetlands

- ▶ Restoring / Creating Tidal Wetlands using DM is challenging:
 - DM bulking shrinking
 - Strict Vegetation Elevations
 - Tidal channels, flushing



Low Marsh (<i>Spartina alterniflora</i>)	1.0 – 1.8 ft MLLW
High Marsh (<i>Spartina patens</i>)	1.8 – 2.4 ft MLLW

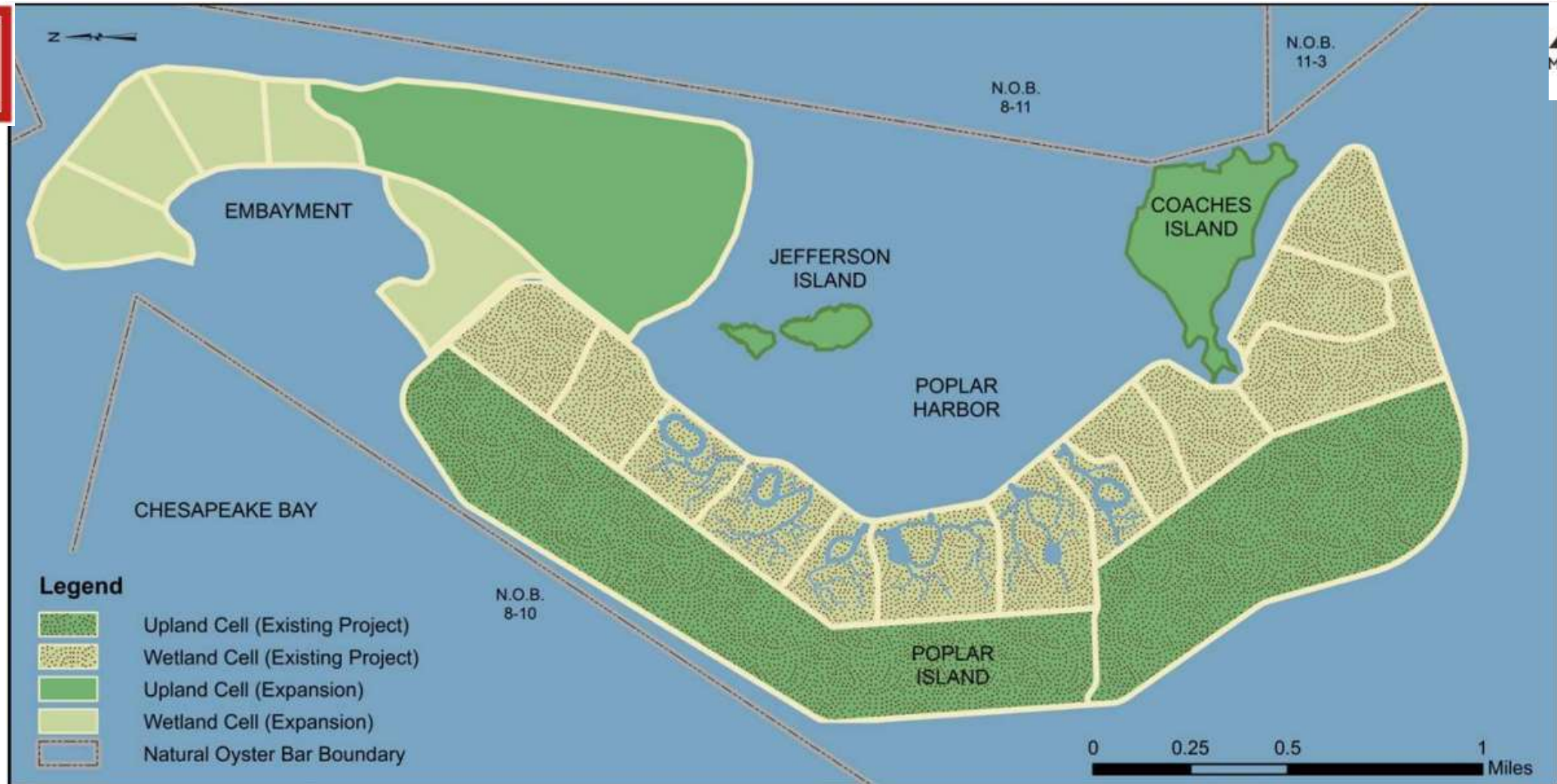


Poplar Island ERP



- ▶ Approx. 40 miles south of Baltimore
- ▶ Provides maintenance dredging capacity for the dredging of Baltimore Harbor Approach Channels
- ▶ Annual placement of approx. 2 million CY/year
- ▶ Acreage split into 50% tidal wetlands and 50% uplands placement cells

PIERP – Wetland & Upland



Poplar Island ERP

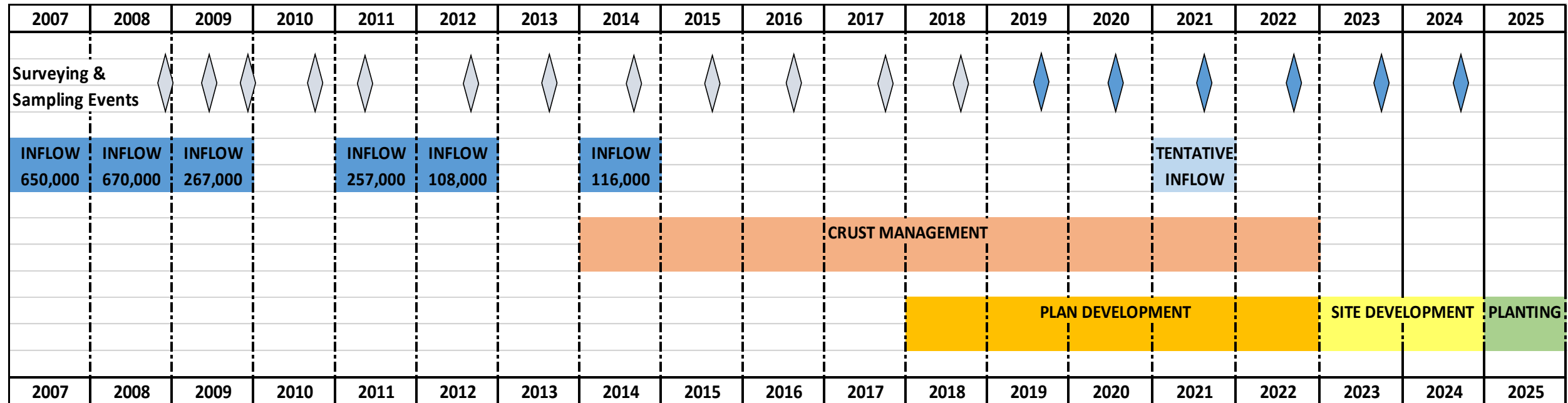


Poplar Island Aerial Photo

Poplar Island
May 2003



Development Timeline

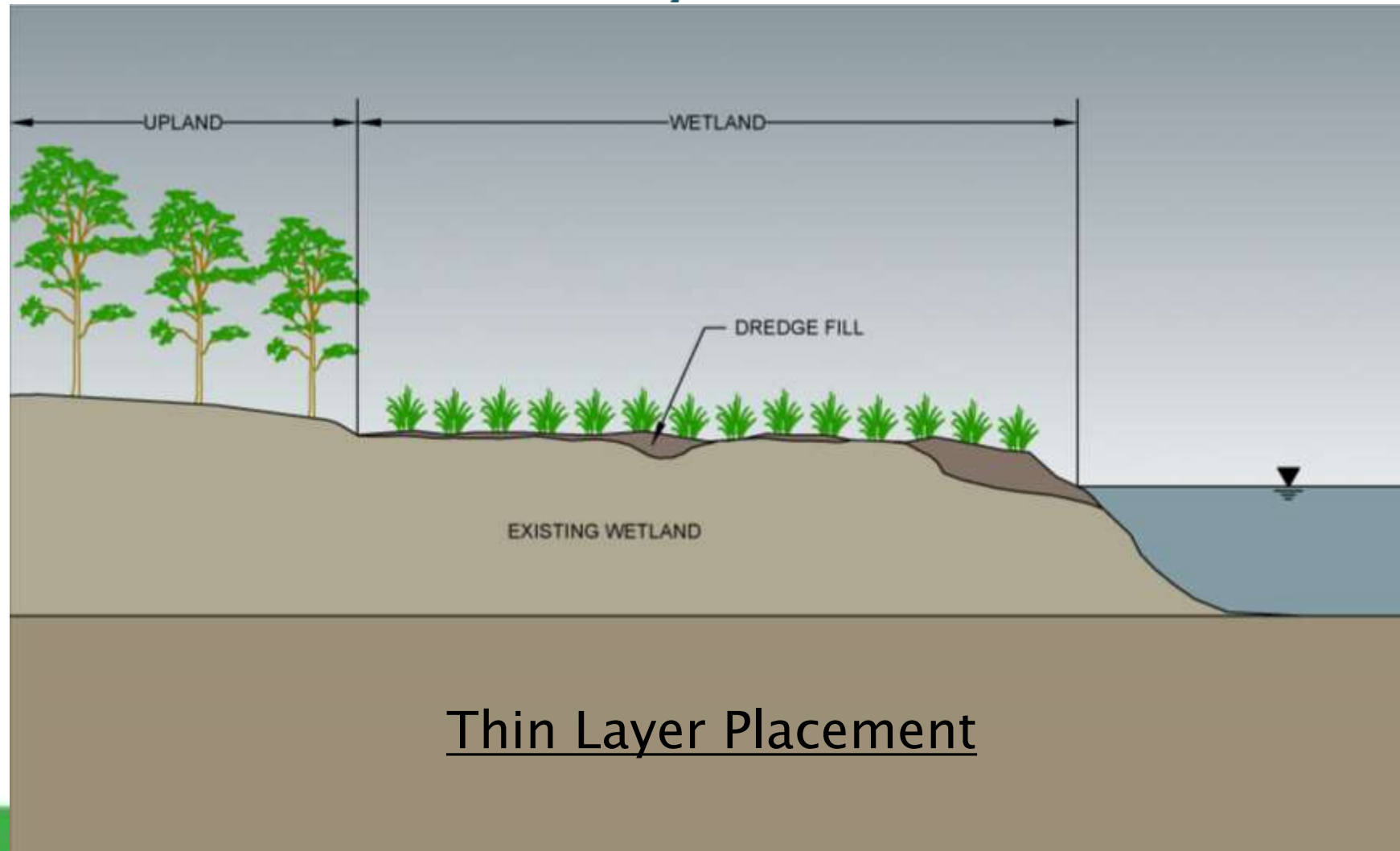


- Crust Management – In progress, to be ongoing through 2022 or later
- Inflow – Winter of 2020/2021
- Marsh plane development (assumes elevations are stable) – 2023

Poplar Island Wetland Cell 5CD

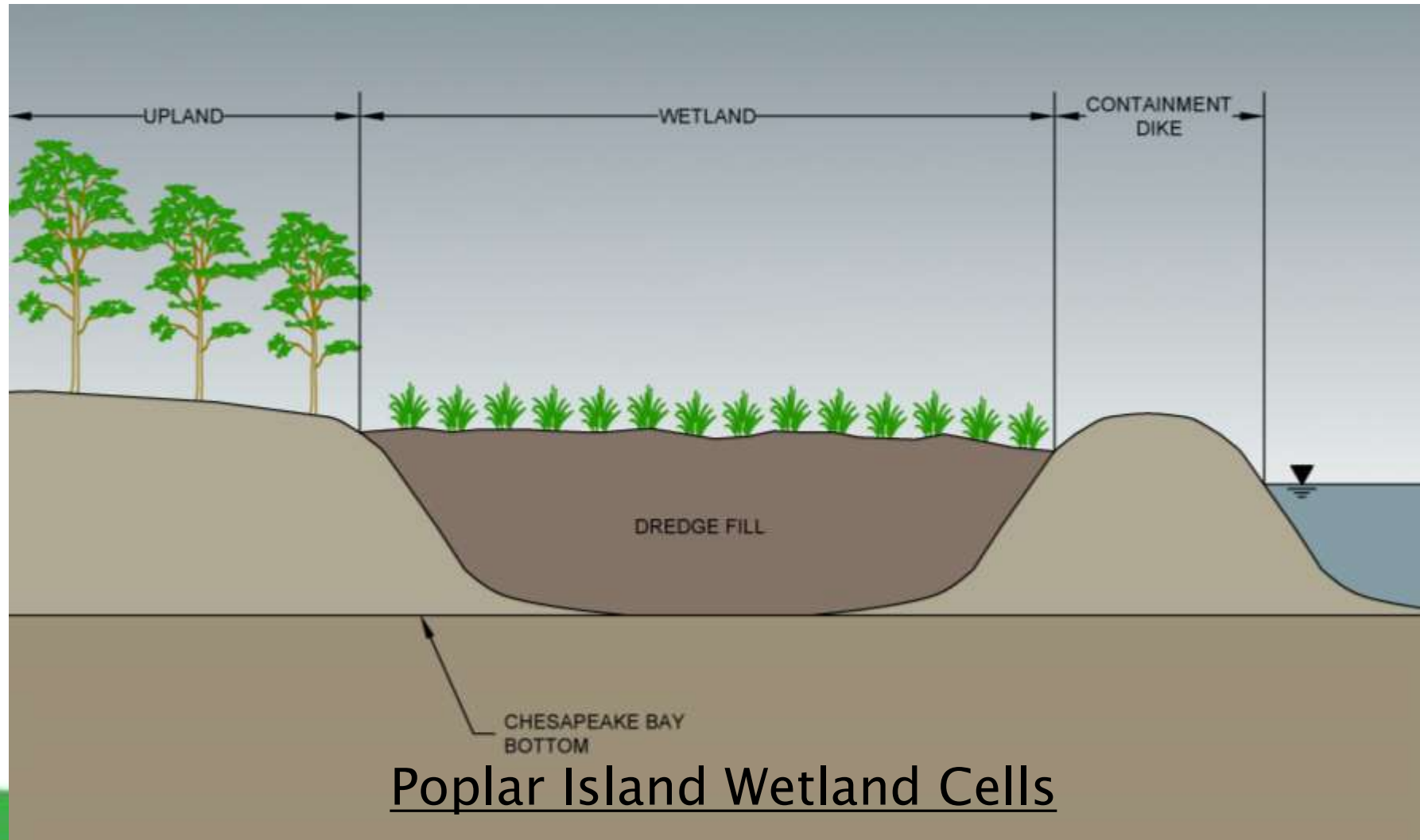


Restore and Create Wetlands – Thin Layer Placement



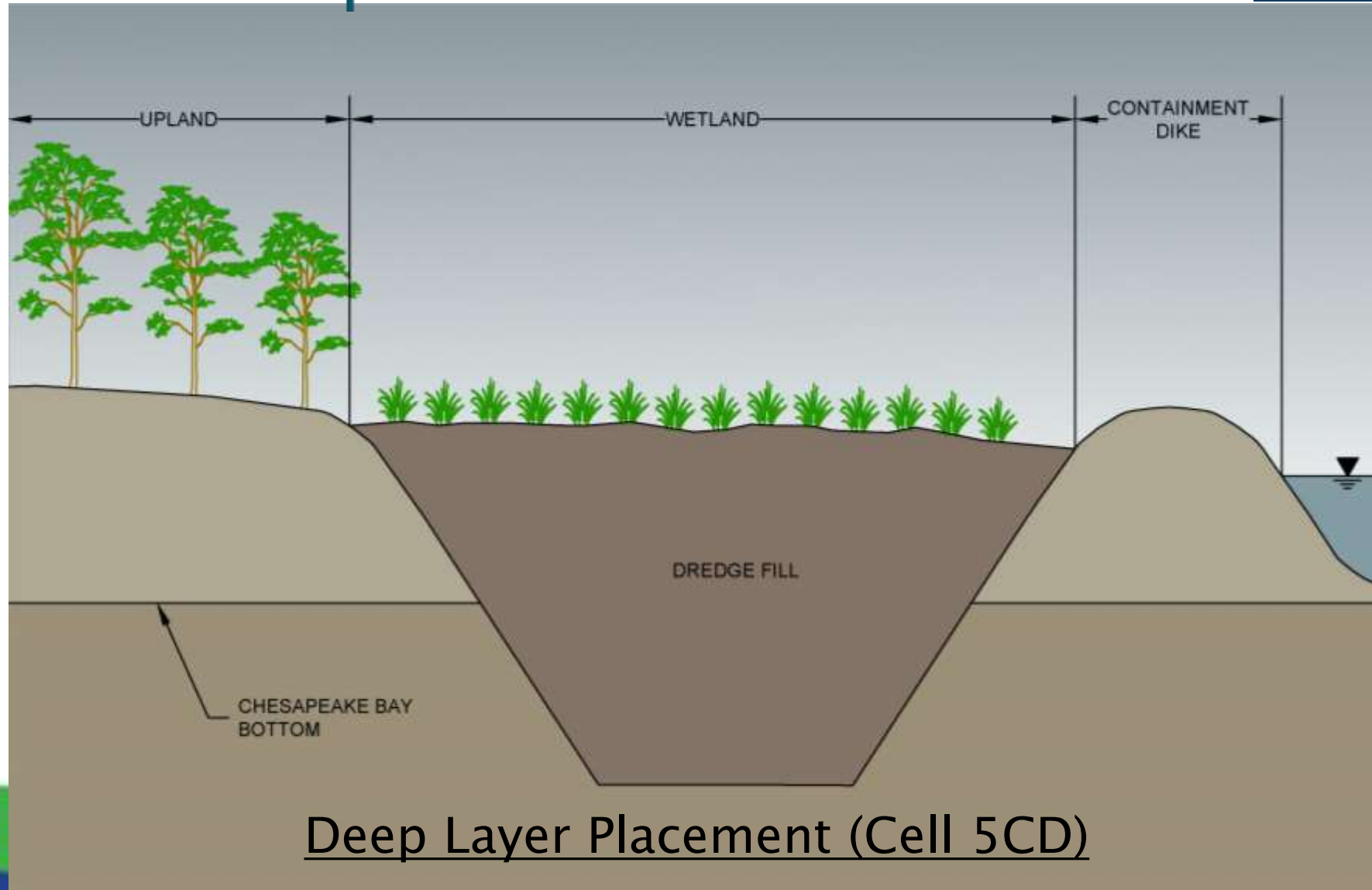
Thin Layer Placement

Restore and Create Wetlands – Typical Poplar Wetland Cell



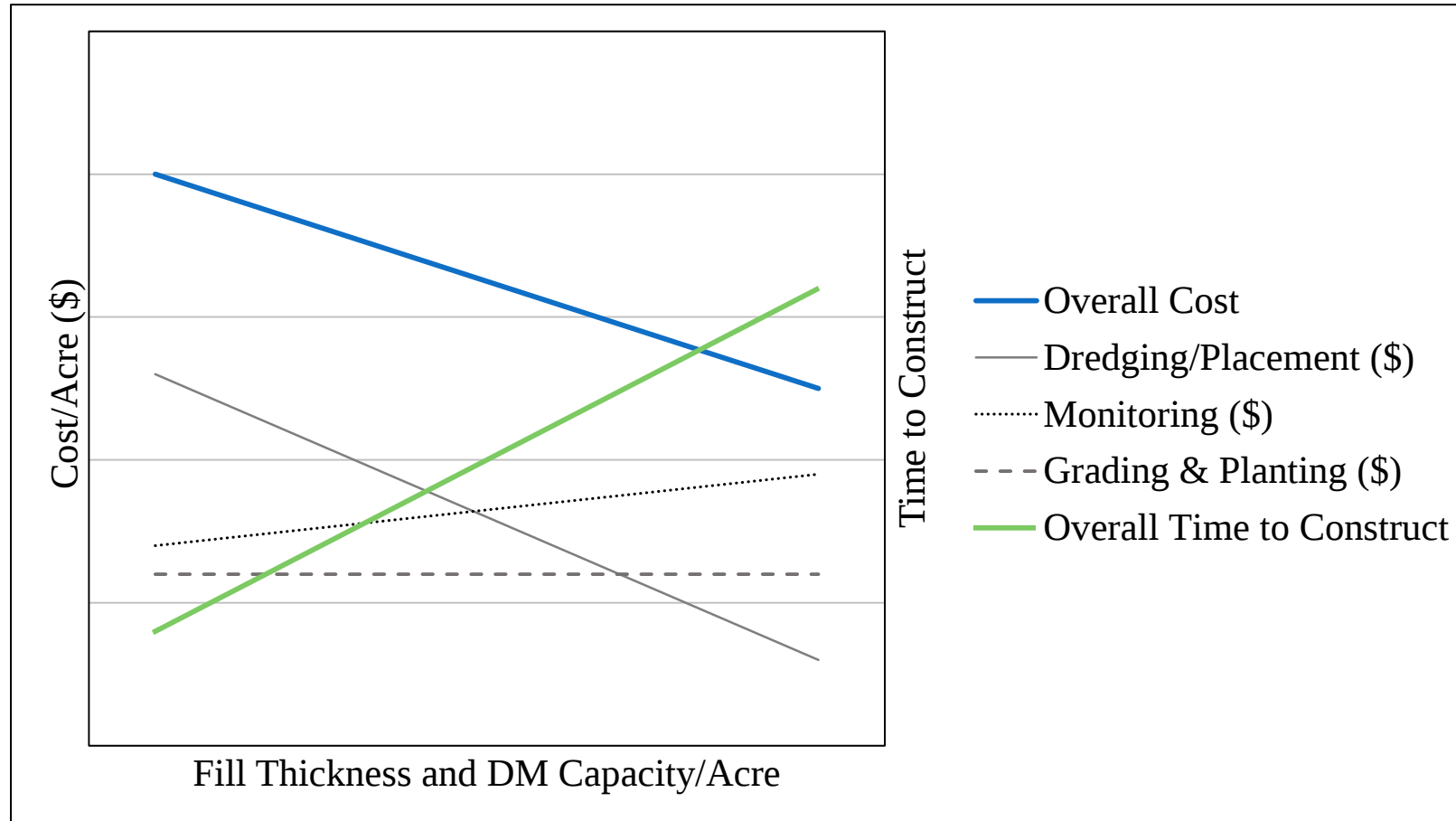
Poplar Island Wetland Cells

Restore and Create Wetlands – Poplar Wetland Cell 5 CD

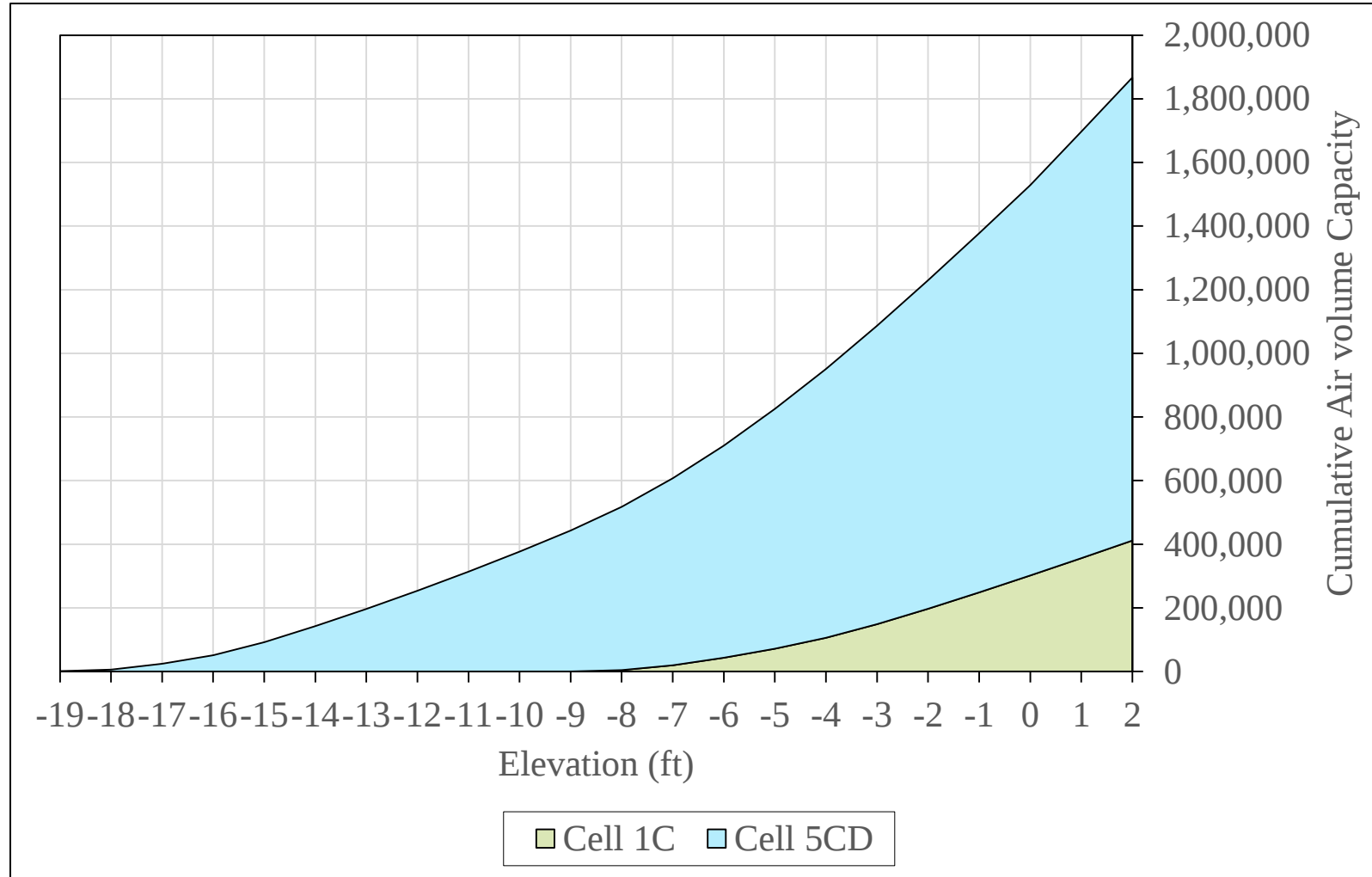


Deep Layer Placement (Cell 5CD)

DM Thickness and Economy of Scale



Typical Cell 1C vs Cell 5 CD Elevation Volume Relationships

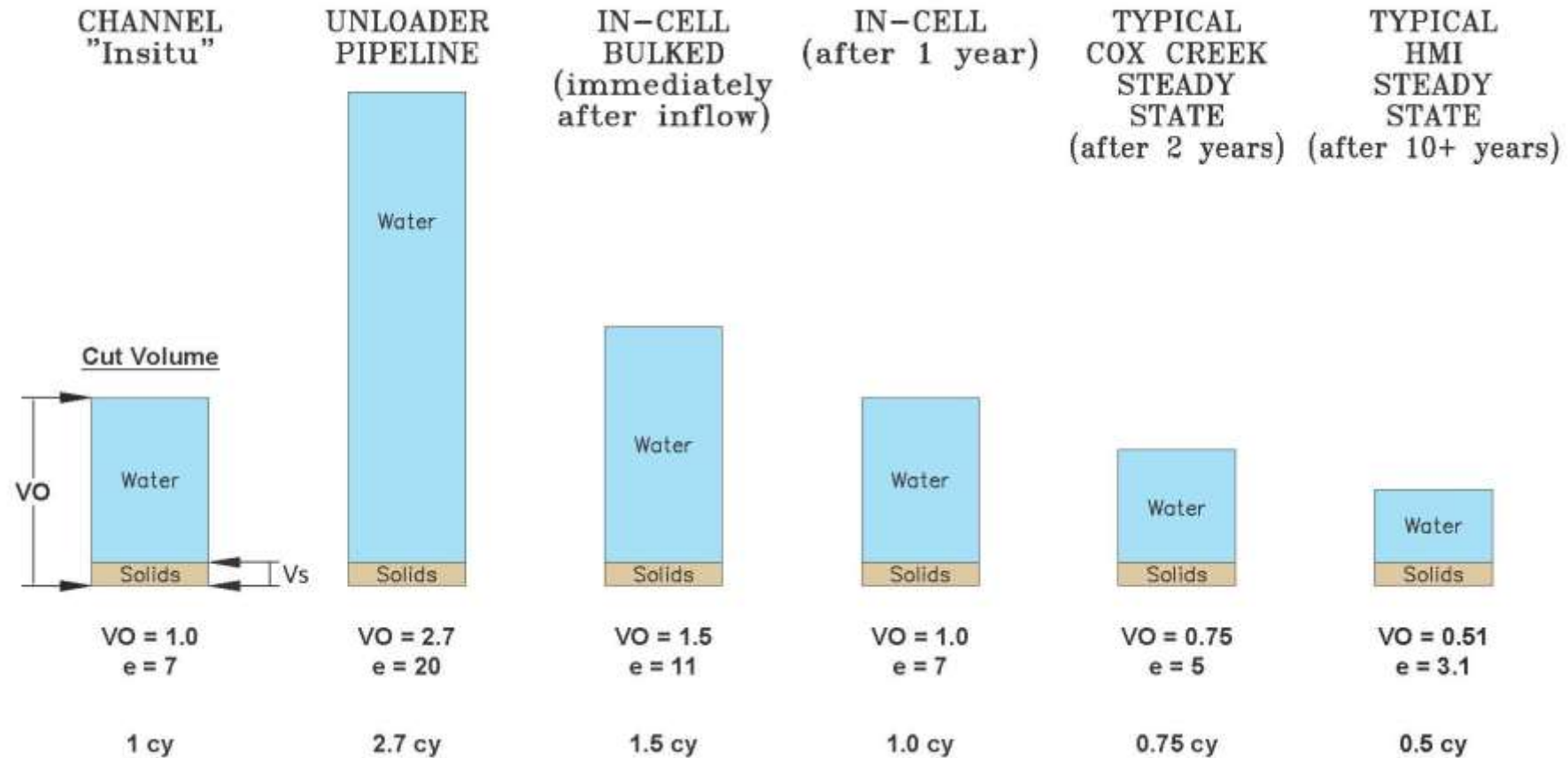


Dredged Material has a Lot of Water

- ▶ The “volume occupied” (VO), is used to describe the changes in volume over time that occur in DM as it is dredged and placed in a DMCF
 - VO changes over time as the DM consolidates
 - VO at time $t = V_t/V_{cut} = (e_t + 1)/(e_{cut} + 1)$



DM Volume Change



Long-Tube Test

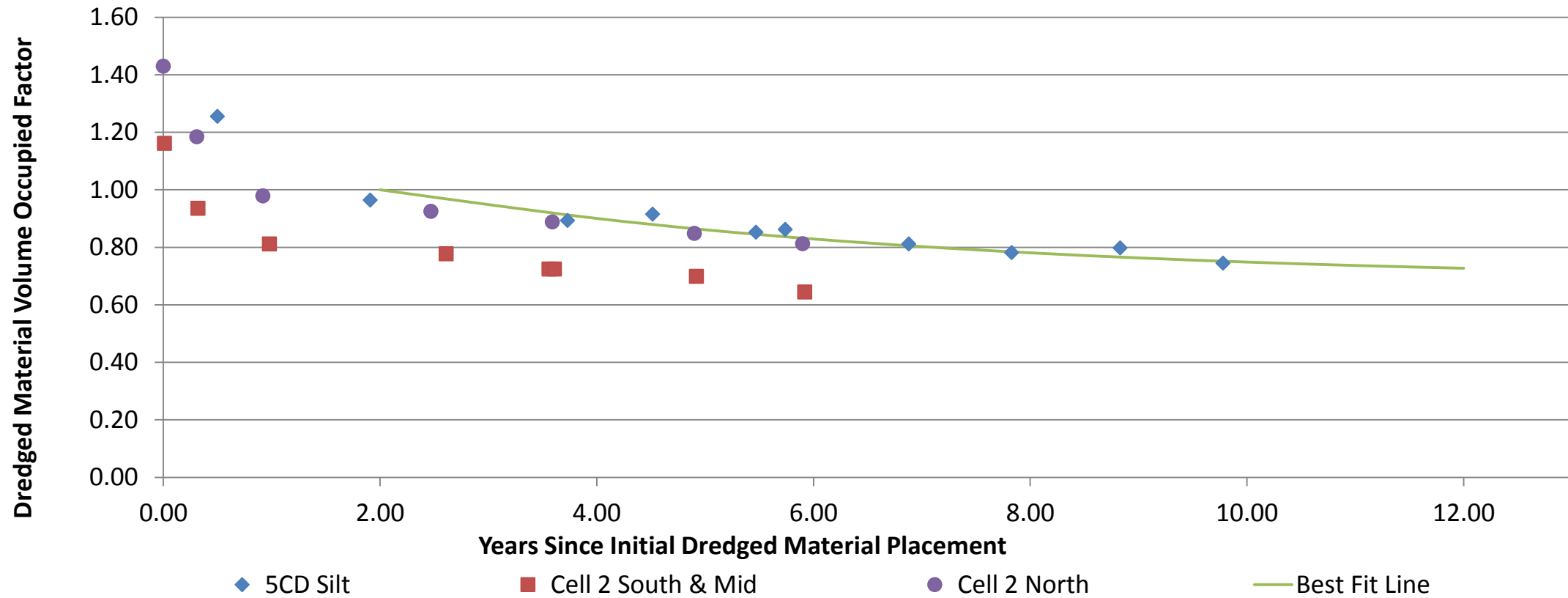


Surveying and Sampling Methods



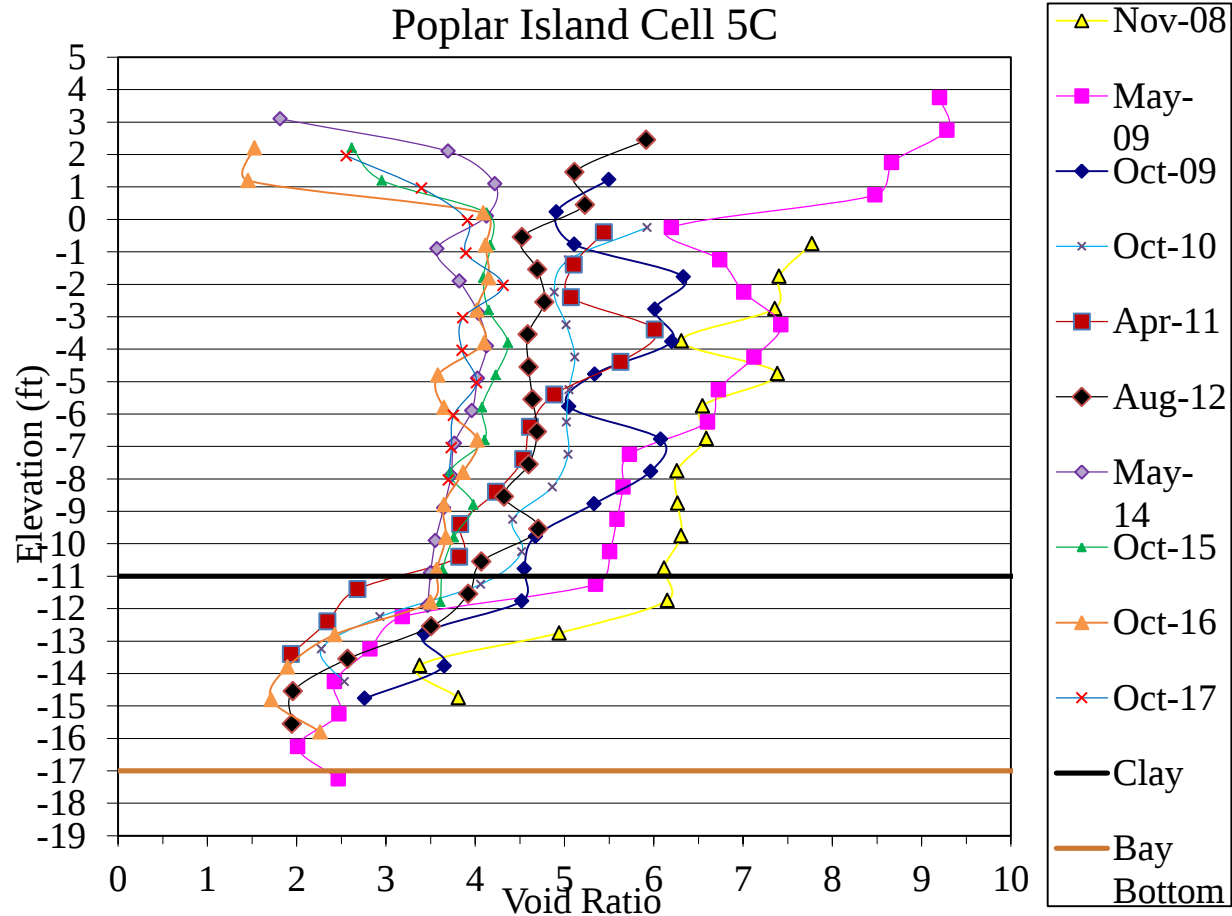
Site Specific “Steady State”

Cell 5CD Consolidation

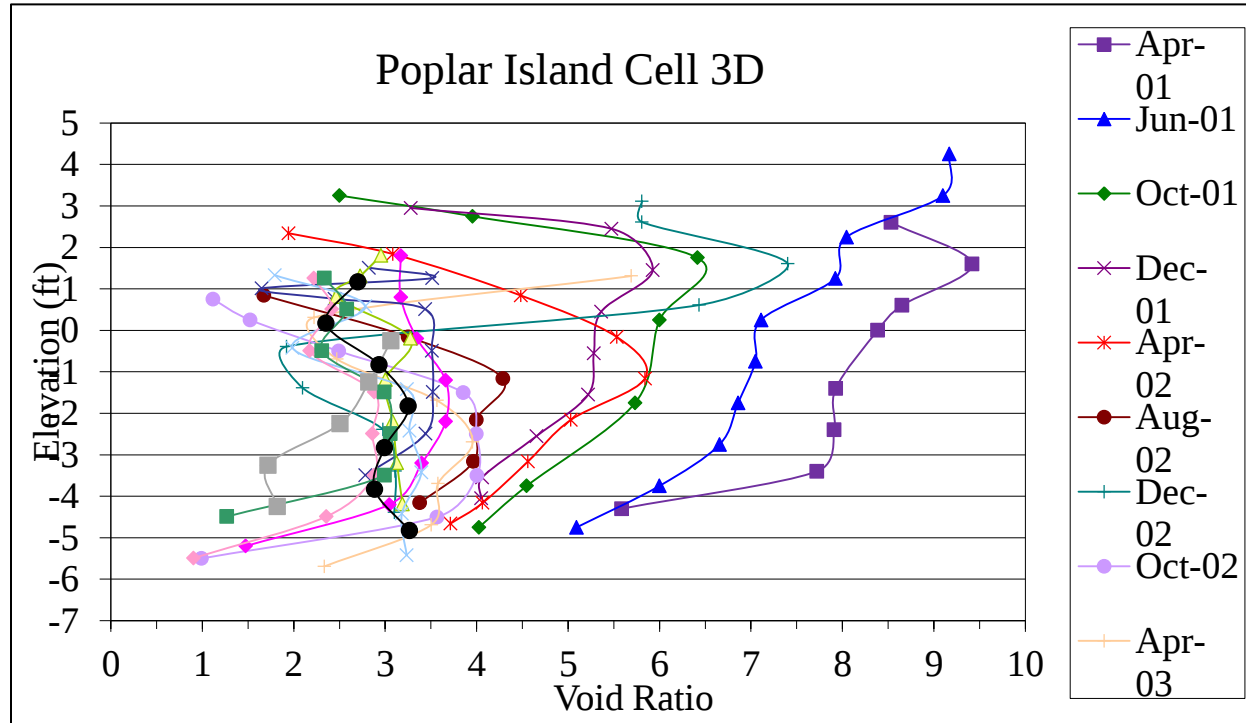


Drainage Paths

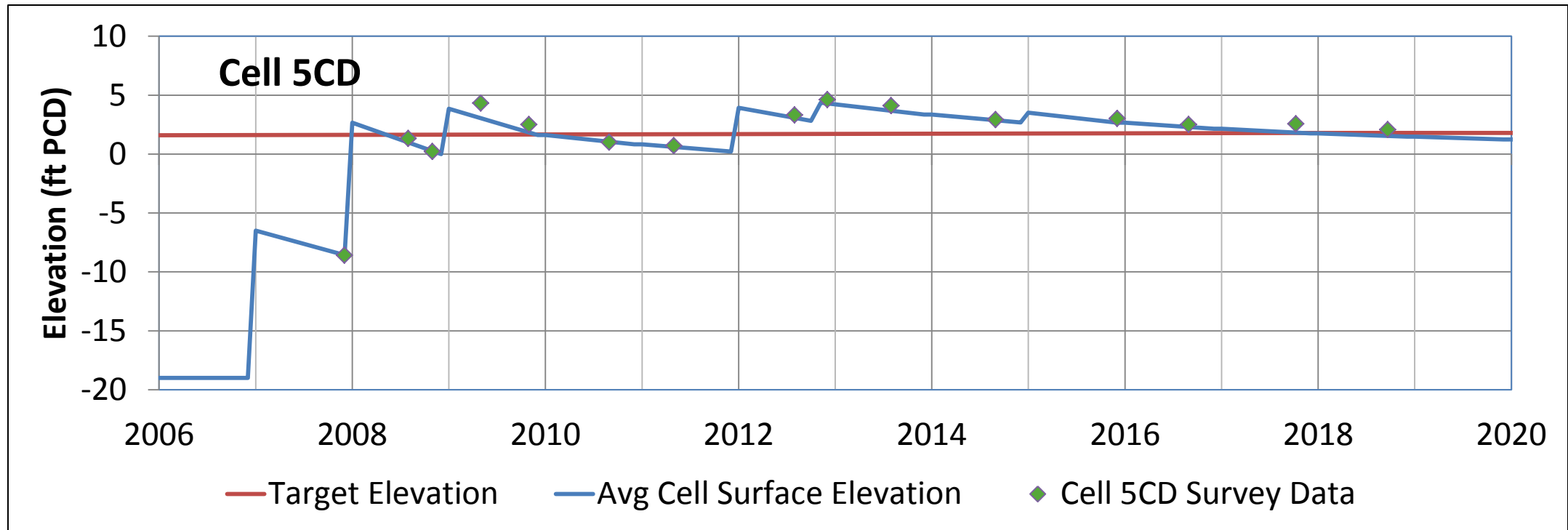
Poplar Island Cell 5C



Poplar Island Cell 3D



Predicting Marsh Elevations



22

Questions



Benchmarks of success:

- ▶ Consolidation monitoring
- ▶ Consolidation Rates
- ▶ Target Elevations