

Using SLAMM to Predict Future Salt Marsh Habitat

1

The Nature
Conservancy



Protecting nature. Preserving life.™

Kevin Ruddock

Sapowet Marsh Tiverton
Photo by Rob Hancock

Why is Tidal (Salt) Marsh Important?

2



Forage habitat
Nursery habitat
Nesting sites
Migratory stopovers
Carbon sink

Why is Tidal (Salt) Marsh Important?

3



**Reduce
Storm
damage**
\$2,931/
acre/year

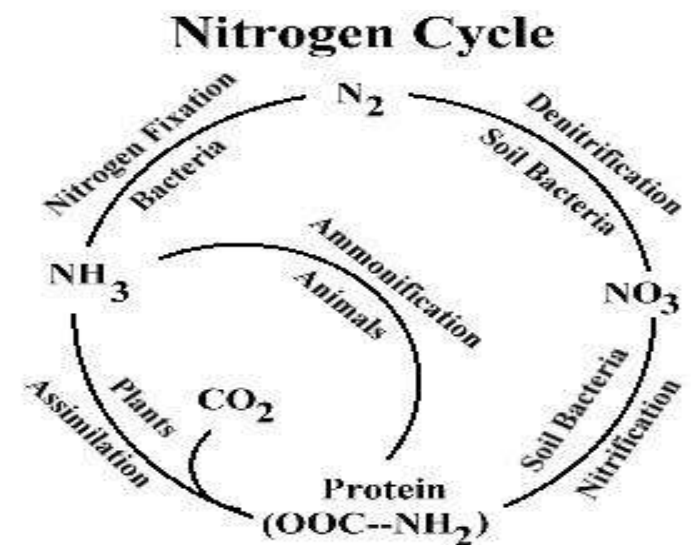


Why is Tidal (Salt) Marsh Important?

4



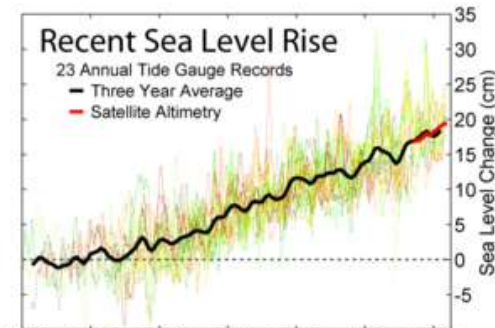
**Clean water:
trap sediments
sequester nitrogen**



Tidal Marsh is Threatened

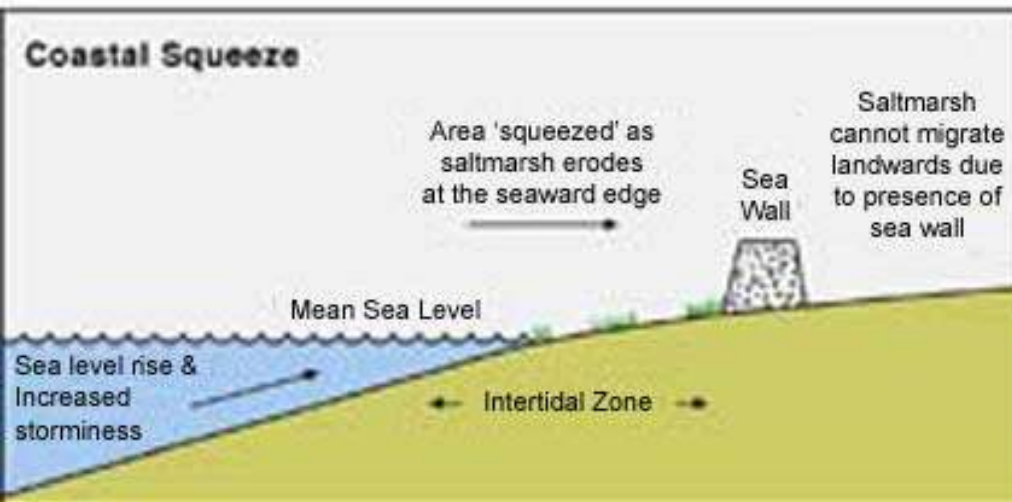
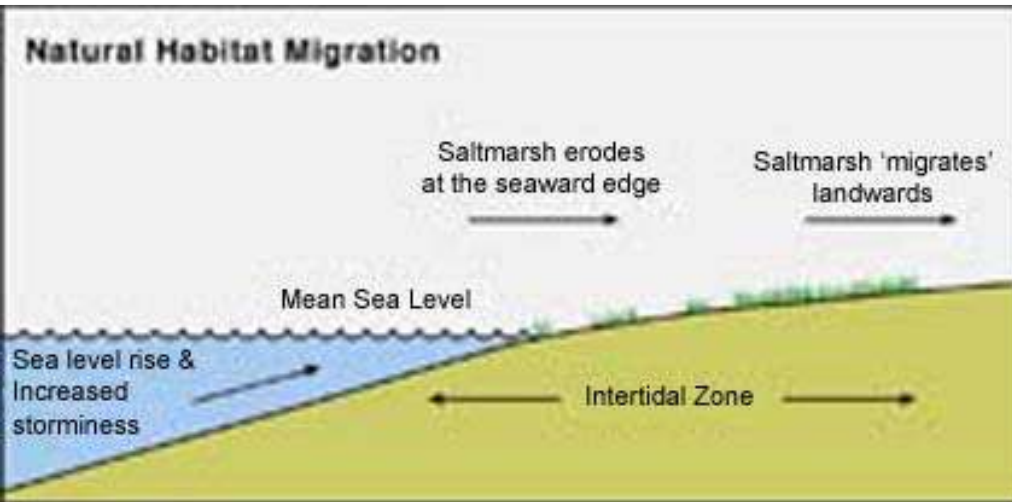
5

**Coastal development
and sea level rise
squeeze out salt
marsh habitat**



Opportunities for Upland Migration and Restoration

6



**With the proper conditions,
salt marsh can migrate upland**

**We can model likely future
habitat**



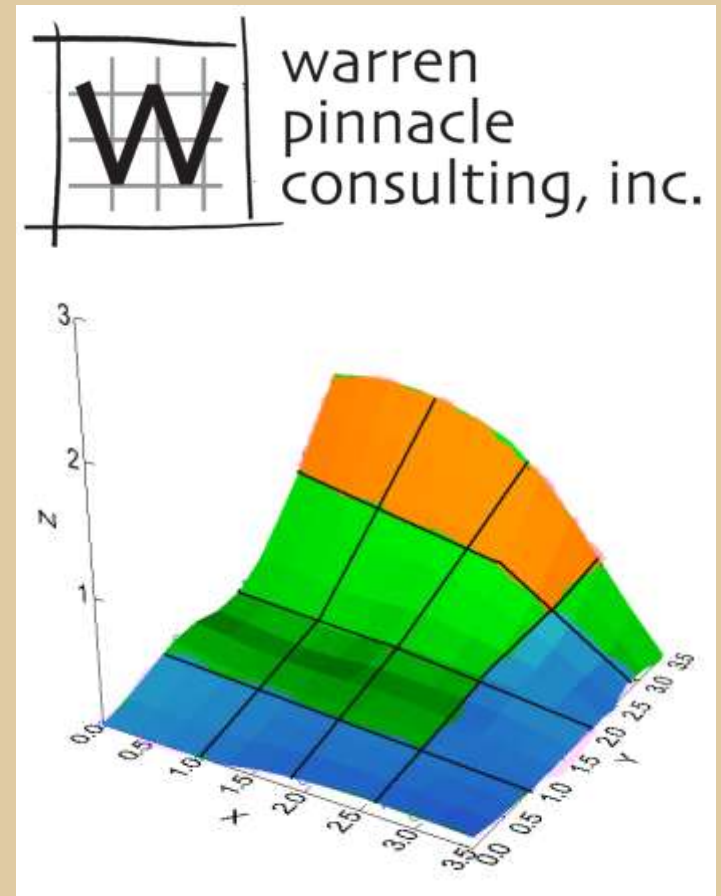
Sea Level Affecting Marshes Model (SLAMM)

7

**Simulates the dominant
processes involved in wetland
conversions during long term
sea level rise**

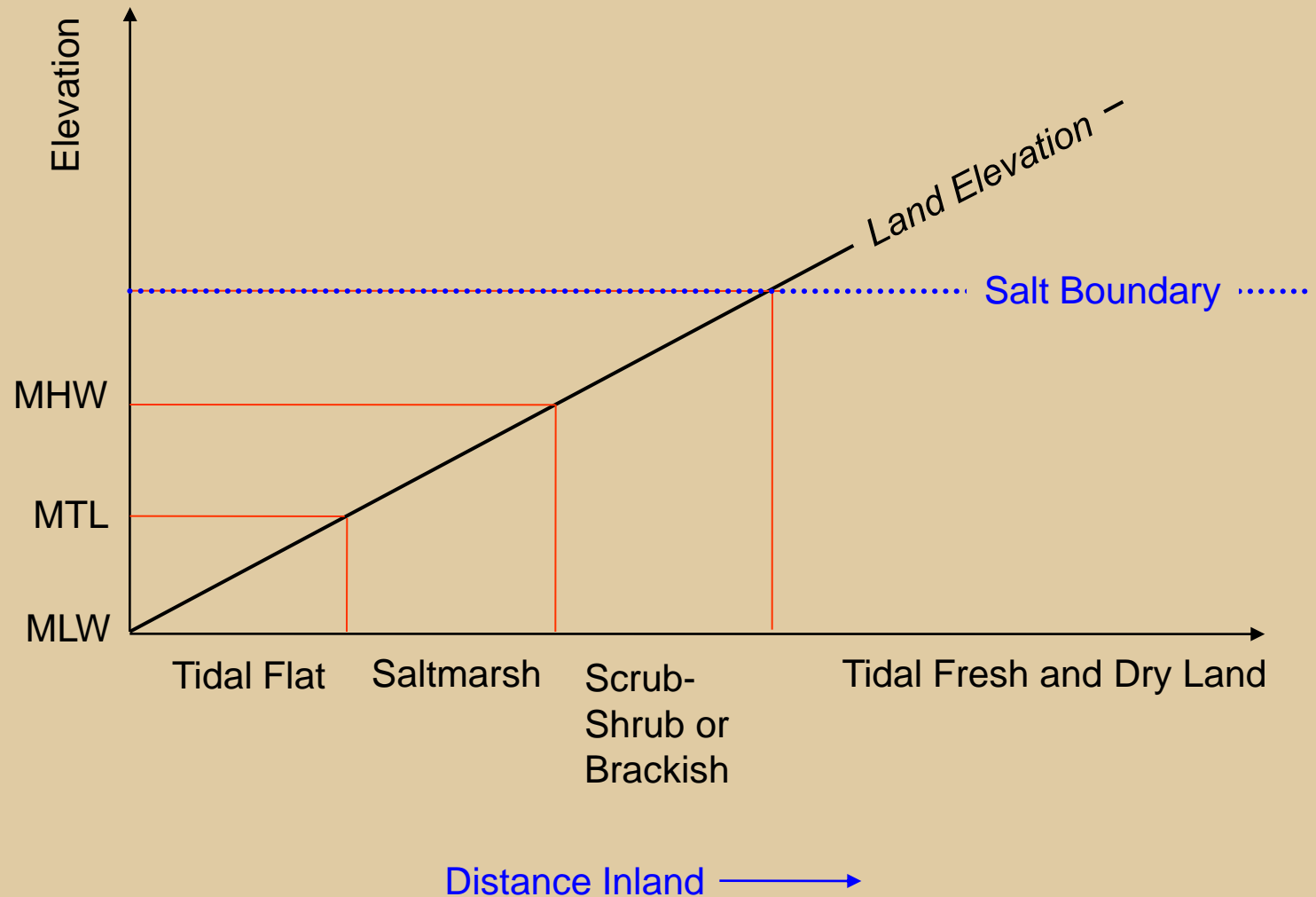
**Applied and improved since
1985**

Used throughout the world



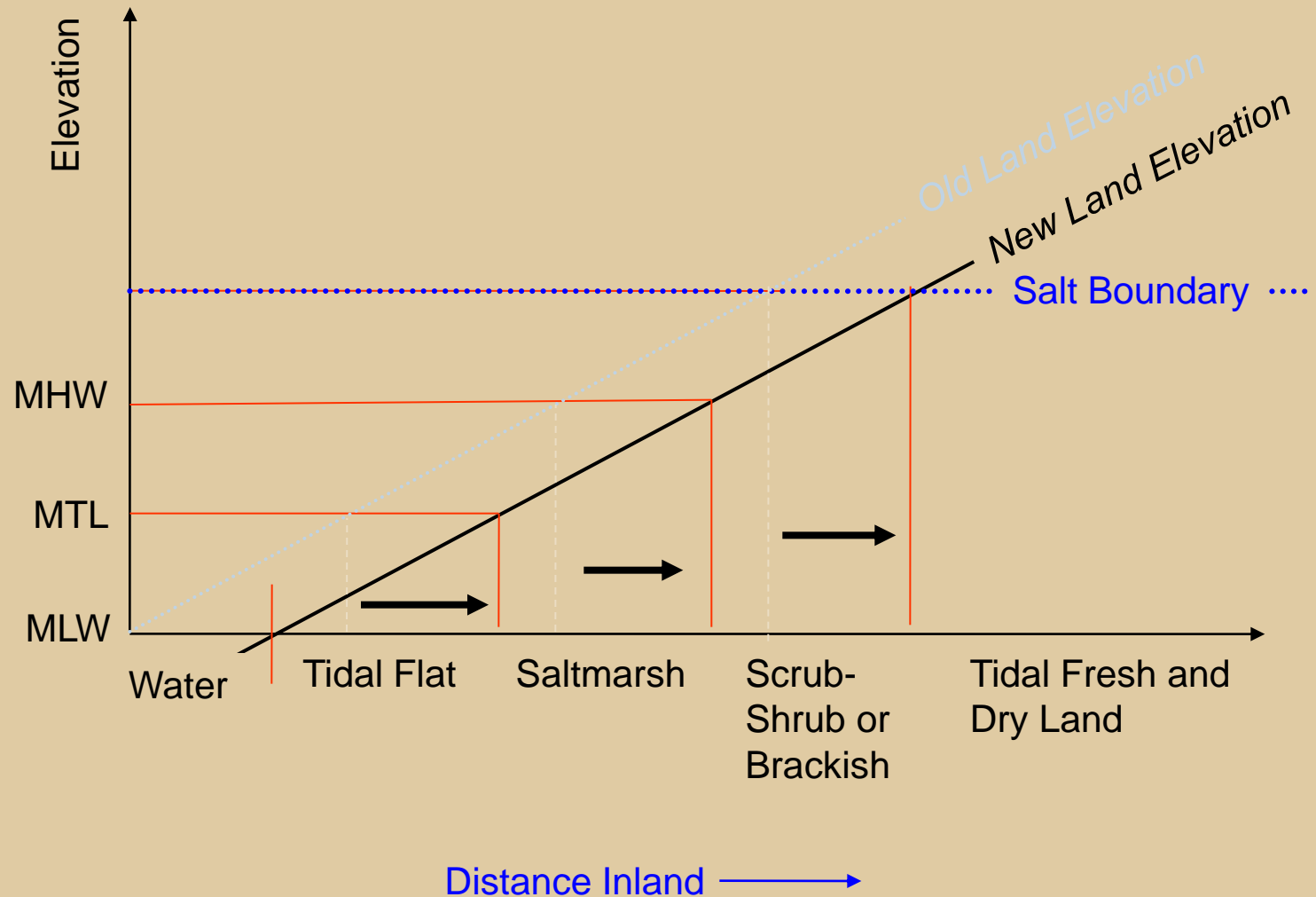
Sea Level Affecting Marshes Model (SLAMM)

8



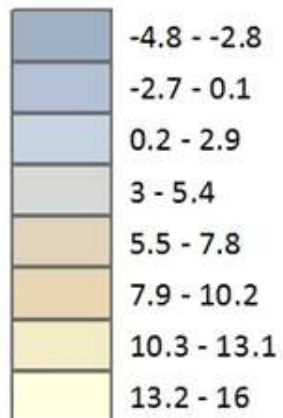
Sea Level Affecting Marshes Model (SLAMM)

9

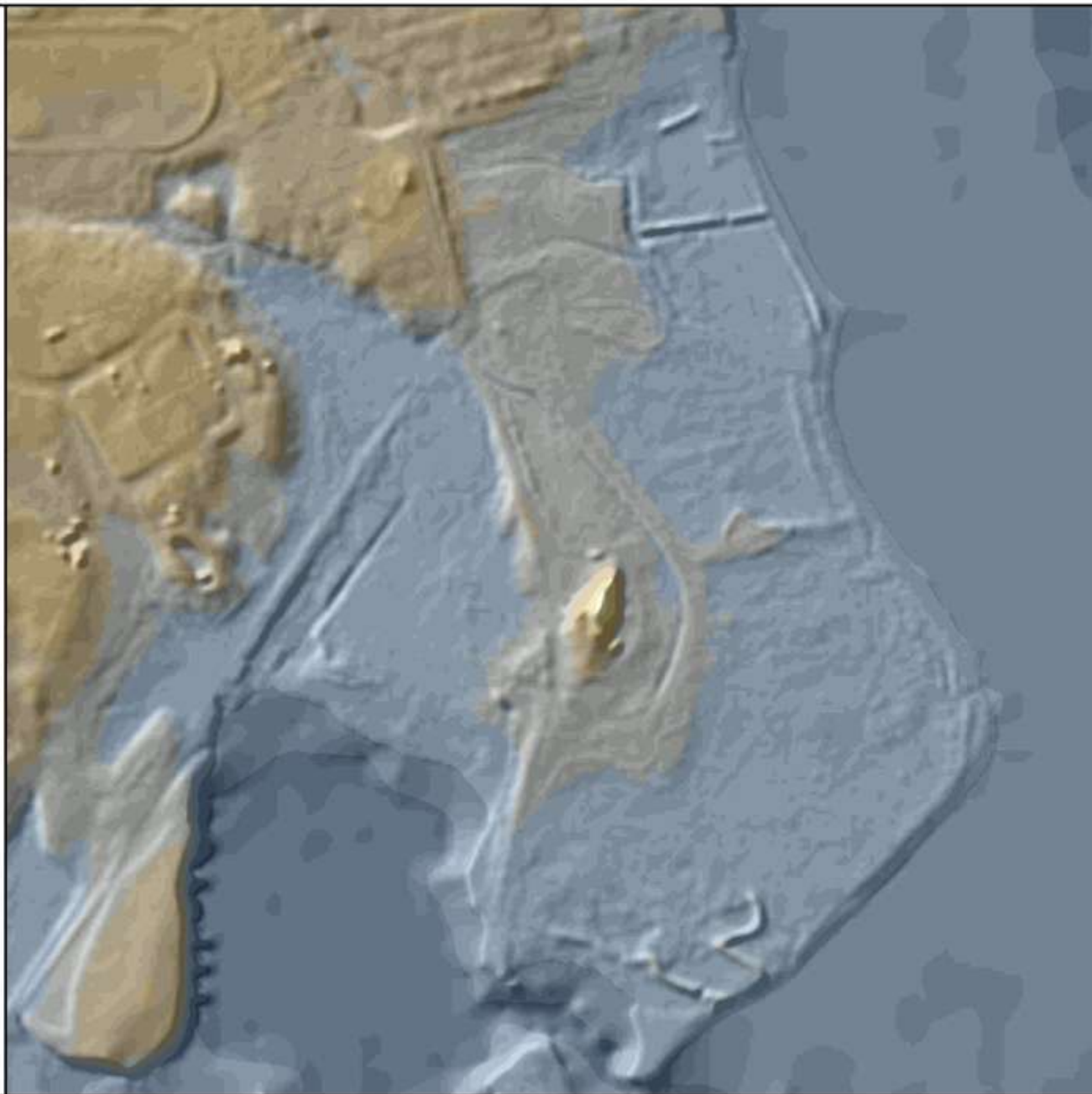


LiDAR

Elevation (ft)



0 500 1,000
Feet

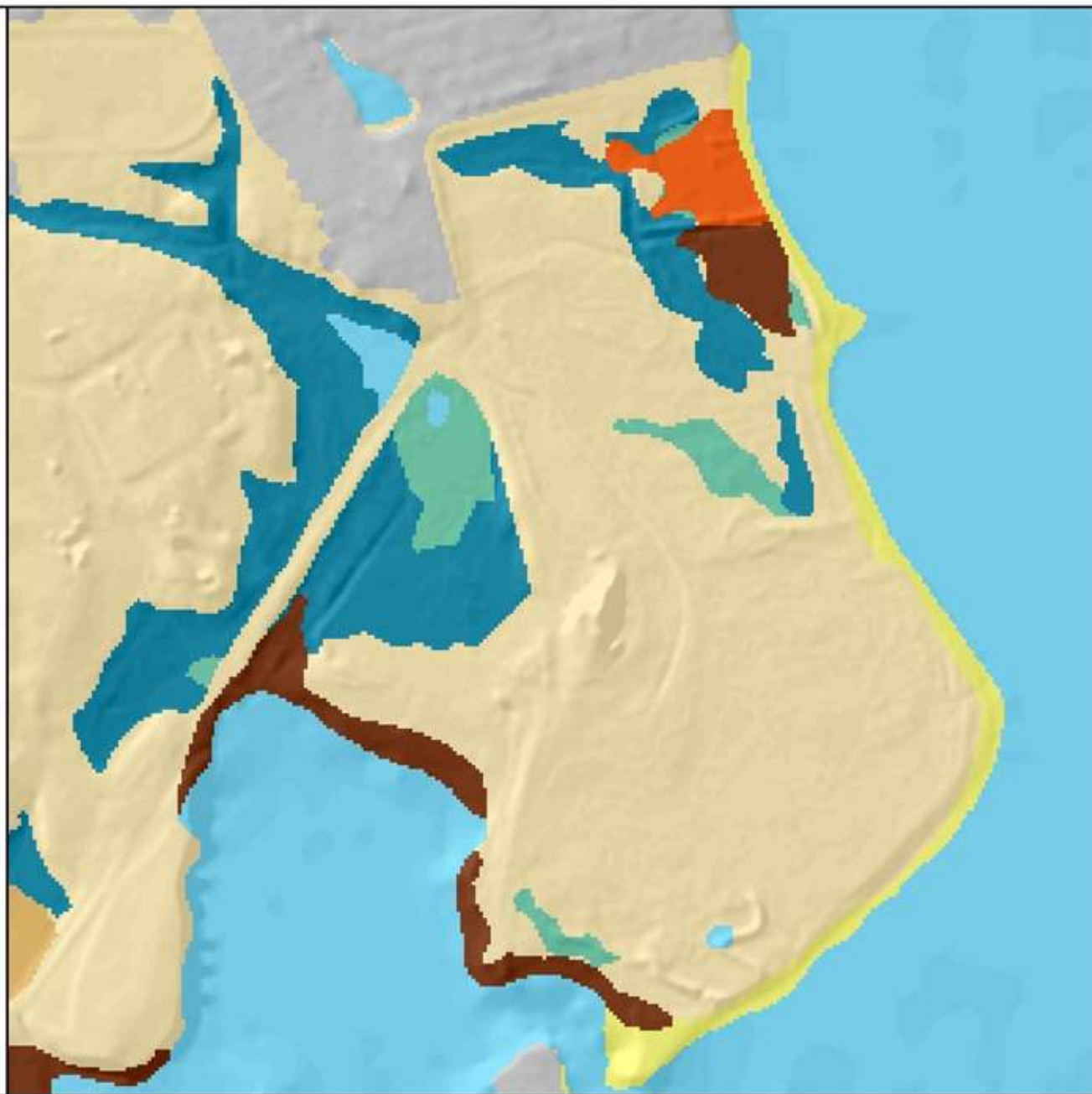


Wetlands

- Dev Dry Land
- Undev Dry Land
- Swamp
- Fresh Marsh
- Transitional Marsh
- Salt Marsh
- Brackish Marsh
- Tidal Flat
- Rocky Intertidal
- Open Water
- Beach



0 500 1,000
Feet

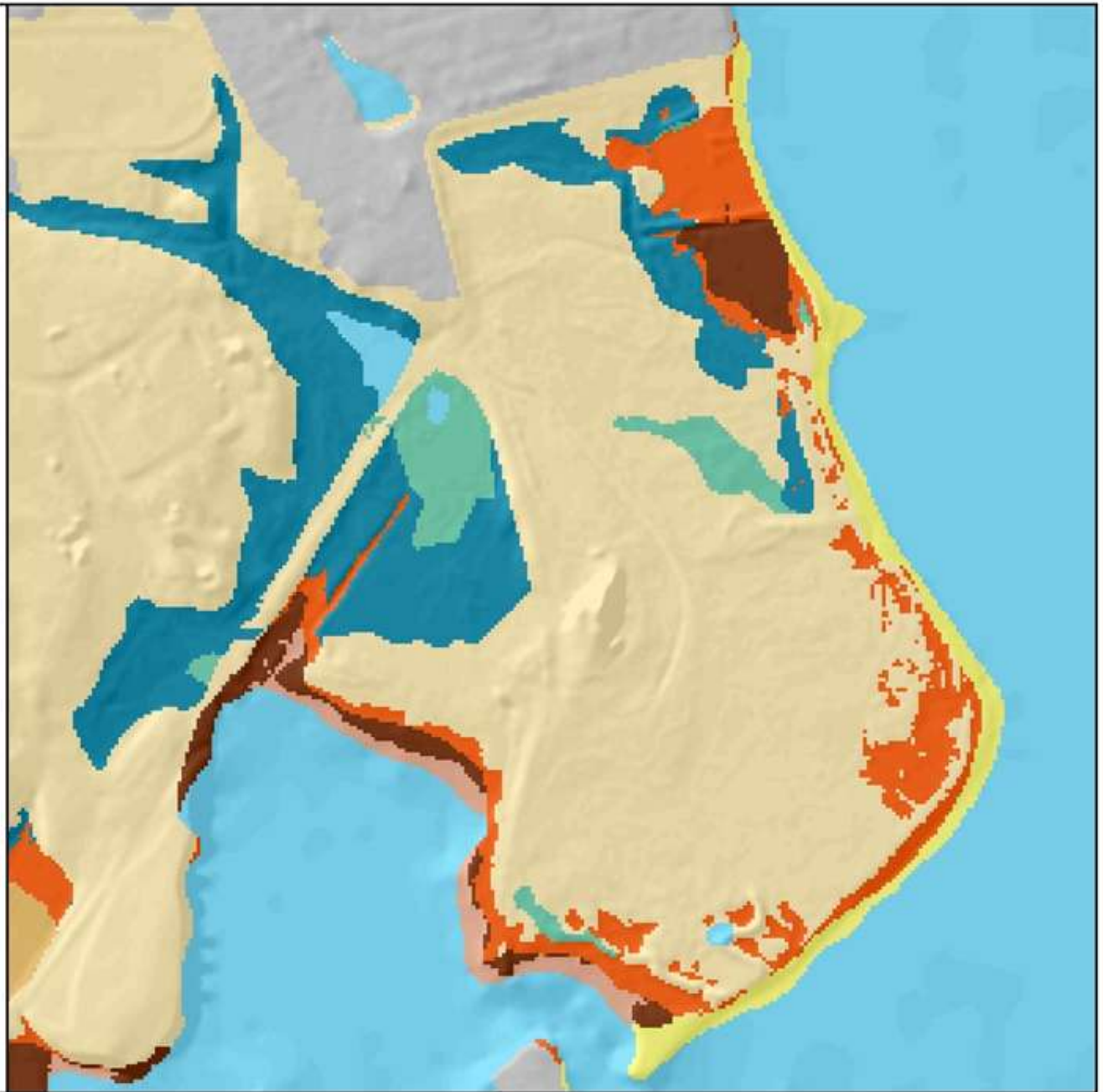


1 foot SLR

- Dev Dry Land
- Undev Dry Land
- Swamp
- Fresh Marsh
- Transitional Marsh
- Salt Marsh
- Brackish Marsh
- Tidal Flat
- Rocky Intertidal
- Open Water
- Beach



0 500 1,000
Feet

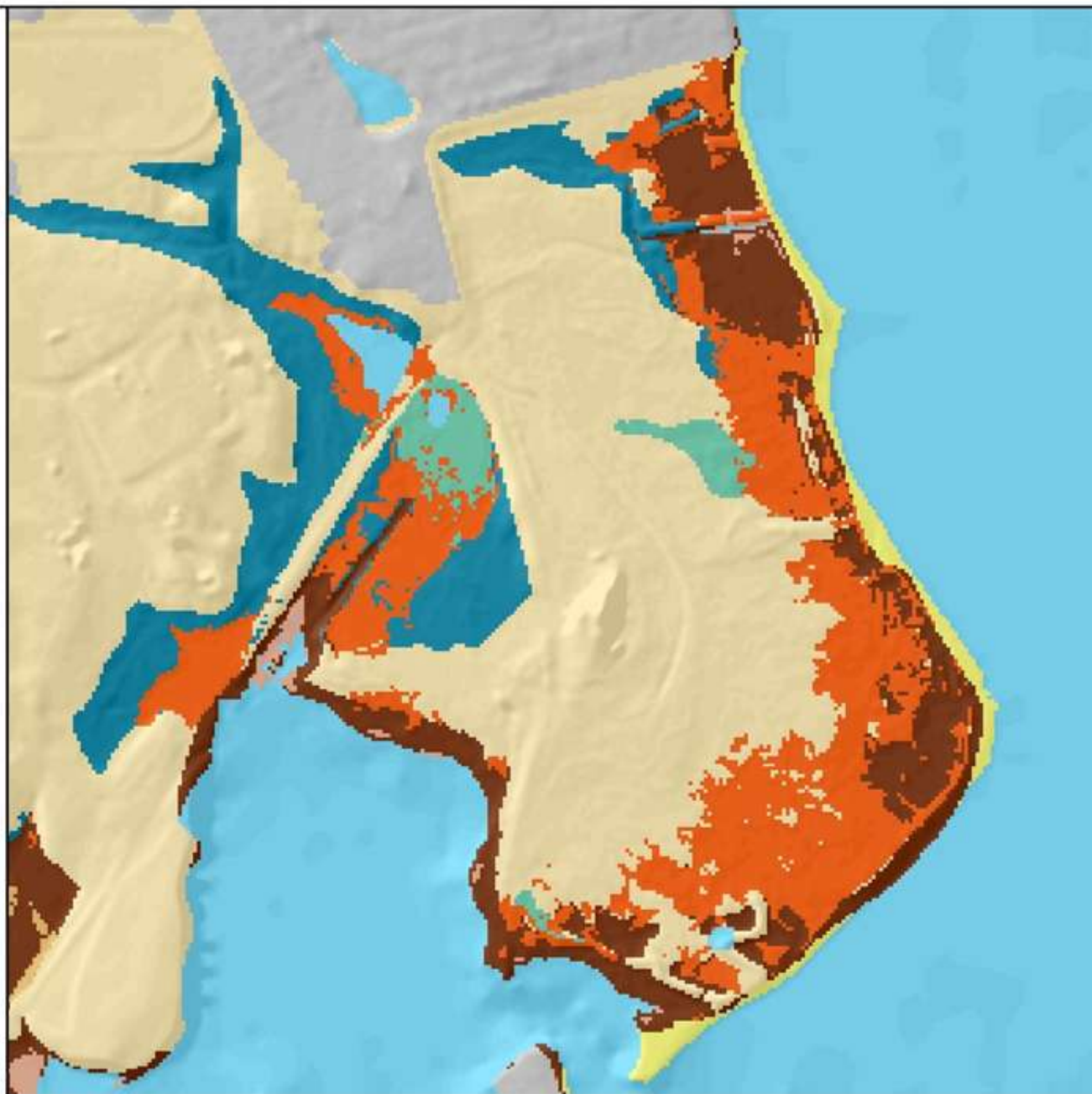


3 foot SLR

- Dev Dry Land
- Undev Dry Land
- Swamp
- Fresh Marsh
- Transitional Marsh
- Salt Marsh
- Brackish Marsh
- Tidal Flat
- Rocky Intertidal
- Open Water
- Beach



0 500 1,000
Feet

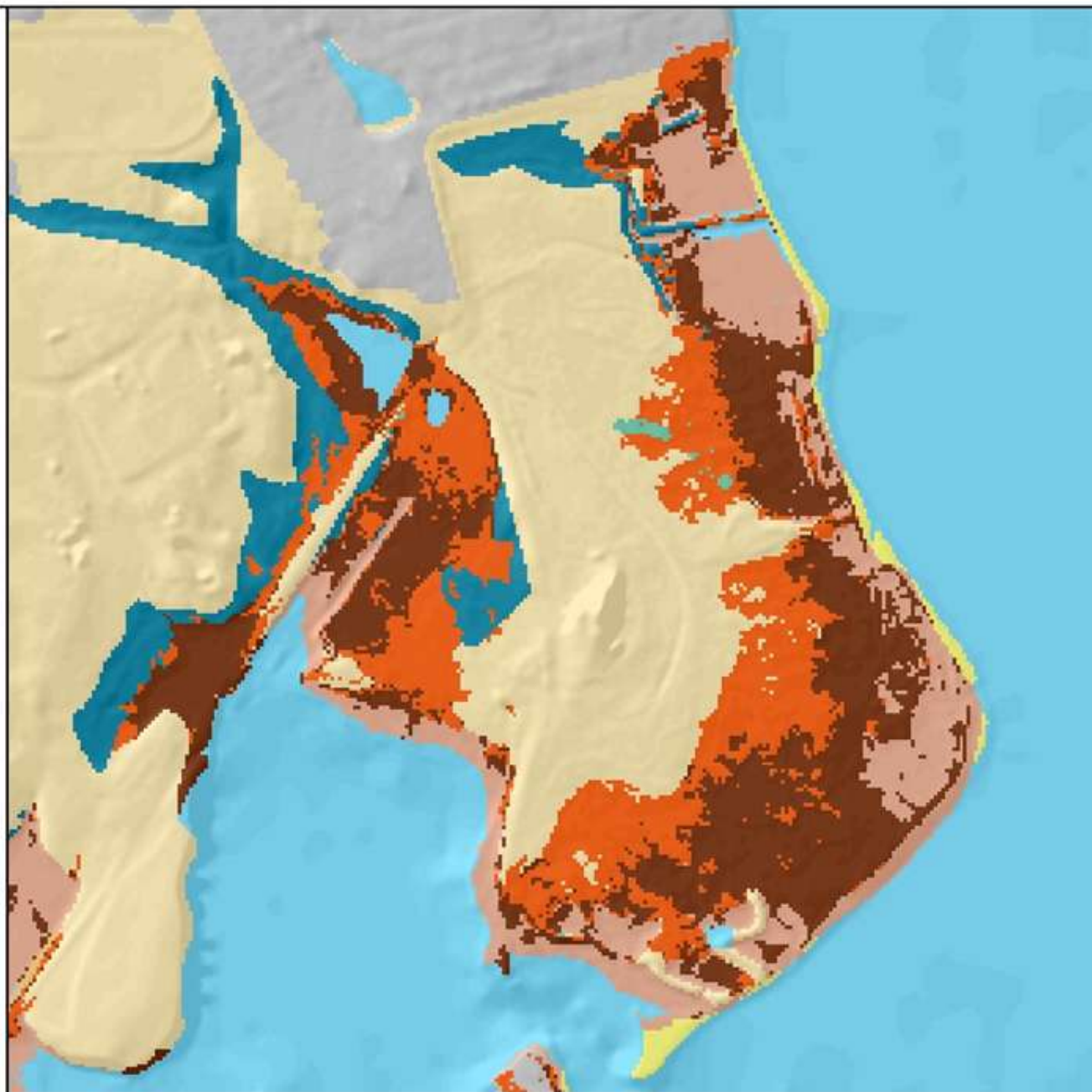


5 foot SLR

- Dev Dry Land
- Undev Dry Land
- Swamp
- Fresh Marsh
- Transitional Marsh
- Salt Marsh
- Brackish Marsh
- Tidal Flat
- Rocky Intertidal
- Open Water
- Beach



0 500 1,000
Feet



Model Parameters

15

Parameter	Global		SubSite 1	
Description	Narragansett Bay		Narrow River	
NWI Photo Date (YYYY)	1996			
DEM Date (YYYY)	2006			
Direction Offshore [n,s,e,w]	East		South	
Historic Trend (mm/yr)	2.6			
MTL-NAVD88 (m)	-0.055			
GT Great Diurnal Tide Range (m)	1.25		0.11	
Salt Elev. (m above MTL)	1	1.3	0.088	0.1144
Marsh Erosion (horz. m /yr)	1.8			
Swamp Erosion (horz. m /yr)	1			
T.Flat Erosion (horz. m /yr)	0.5			
Reg. Flood Marsh Accr (mm/yr)	1.6	6	1.6	6
Irreg. Flood Marsh Accr (mm/yr)	1.6	6	1.6	6
Tidal Fresh Marsh Accr (mm/yr)	1.6	6	1.6	6
Beach Sed. Rate (mm/yr)	0.5			
Freq. Overwash (years)	5			
Use Elev Pre-processor [True,False]	FALSE			

1 foot SLR



0 500 1,000
Feet



3 foot SLR



0 500 1,000
Feet



5 foot SLR

- New Salt Marsh
- Persistent Salt Marsh
- Salt Marsh Loss
- Parcel Boundaries
- Developed Land
- MHHW plus 5 feet
- Protected Open Space



0 500 1,000
Feet



Map Atlas and Data

19



Coordinate System: Rhode Island State Plane
Datum: North American 1983
Units: U.S. Feet



1:10,000



Map Date: 11/01/2011

Modeled Salt Marsh 3 Foot Sea Level Rise

- New Salt Marsh
- Persistent Salt Marsh
- Salt Marsh Loss

- MHHW plus 3 feet
- Parcel Boundaries
- Developed Land
- Protected Open Space

North Kingstown Vulnerability Analysis: Modeled Salt Marsh at 3 foot SLR



Map B3

Next Steps

20

Identify sites for:

Conservation

Restoration

**Complete SLAMM for
entire RI coast**



Thank You