The North and South Rivers:

Modeling the Effects of Sea-Level Rise on Coastal Wetlands

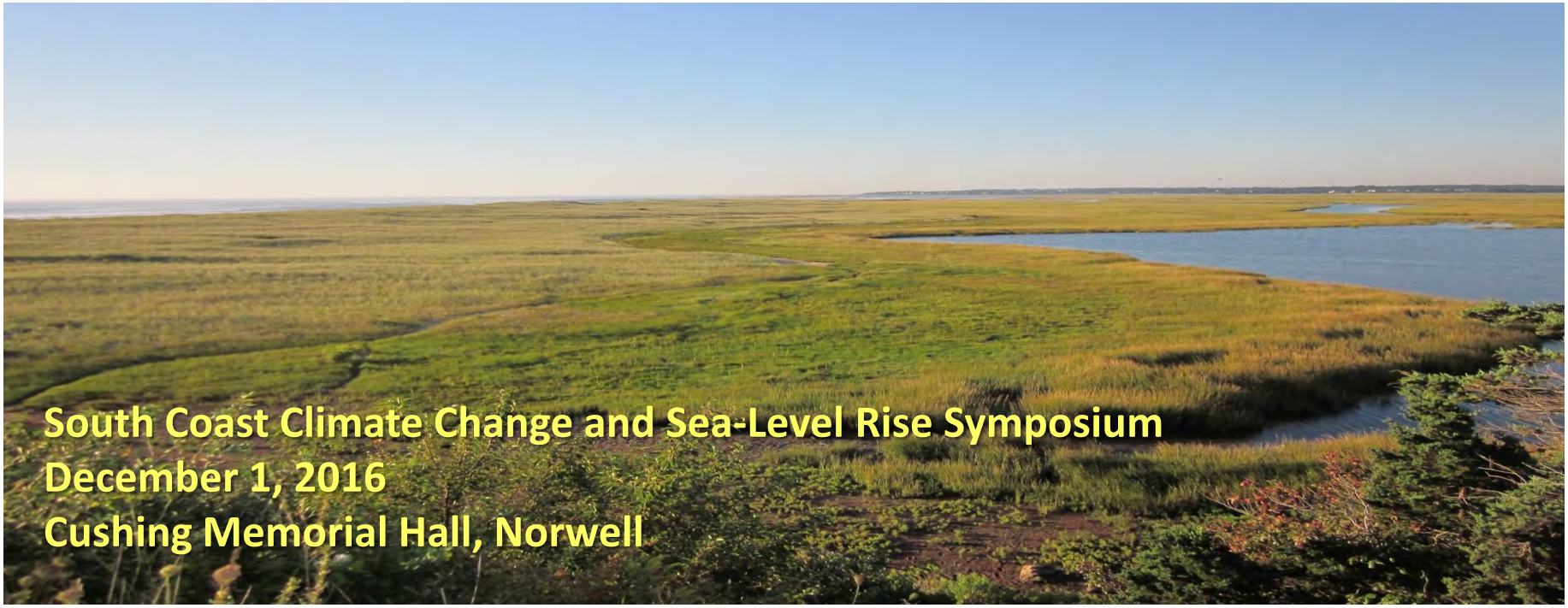
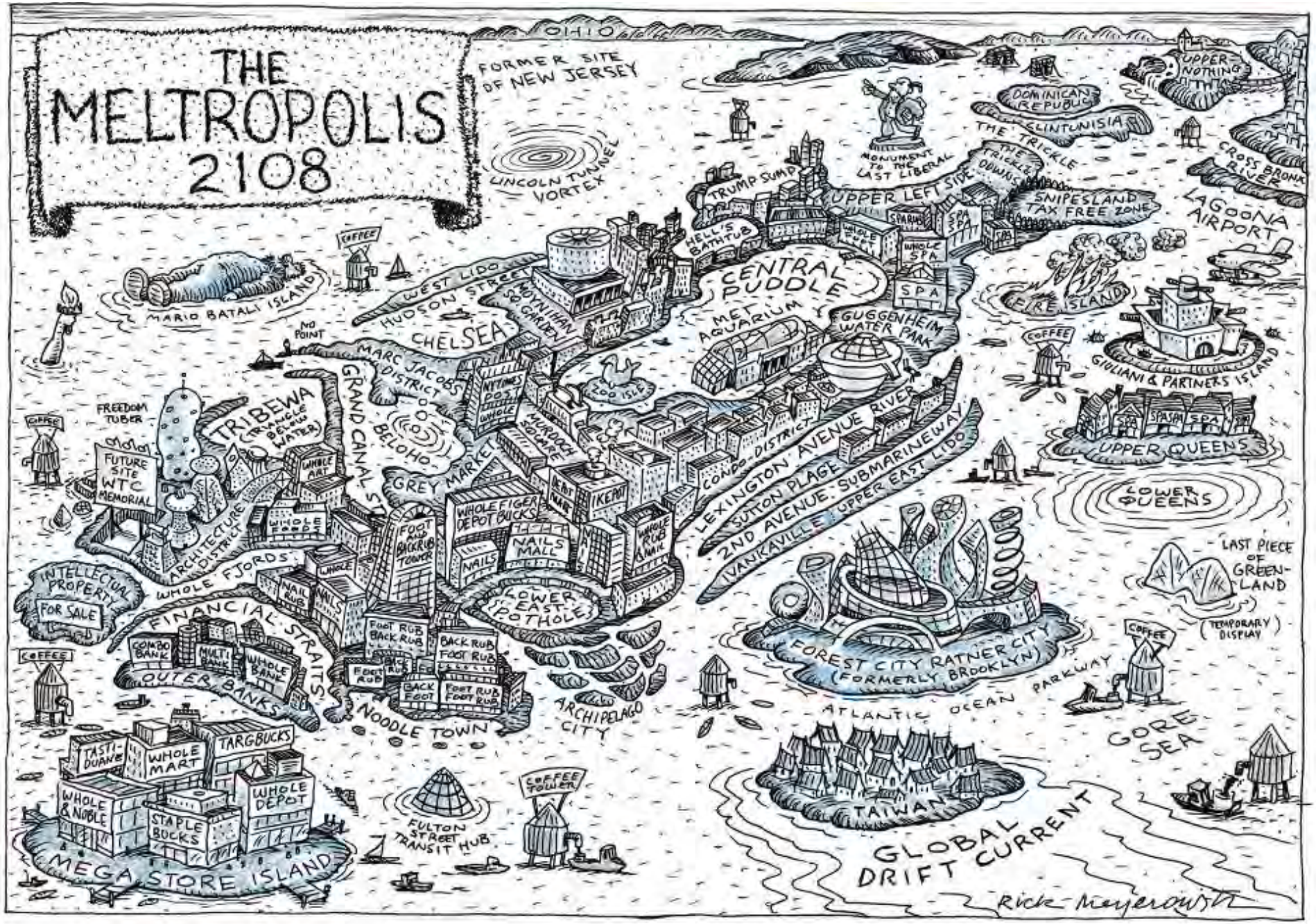


Photo credit: Mike McHugh, MassDEP

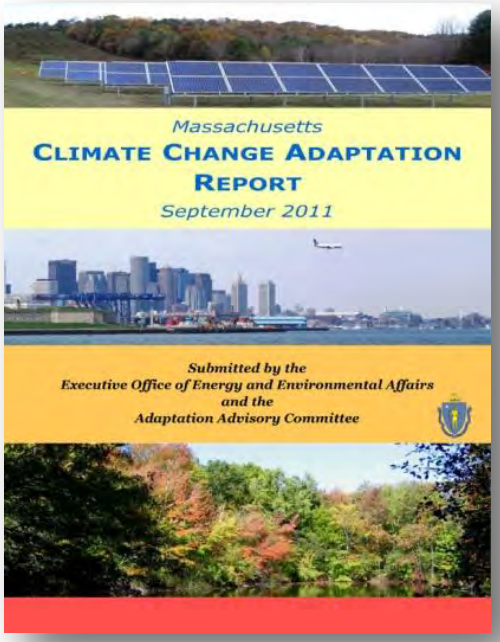
Marc Carullo
Massachusetts Office of Coastal Zone Management



Rick Meyerowitz, 2008. From *Forecast* by Nicholas Blechman.

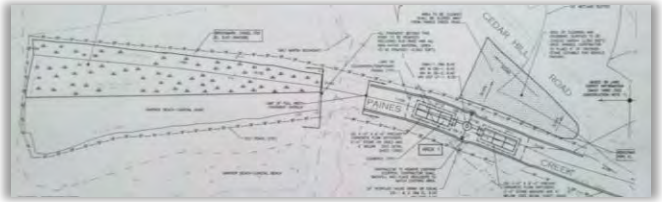
Project Objectives

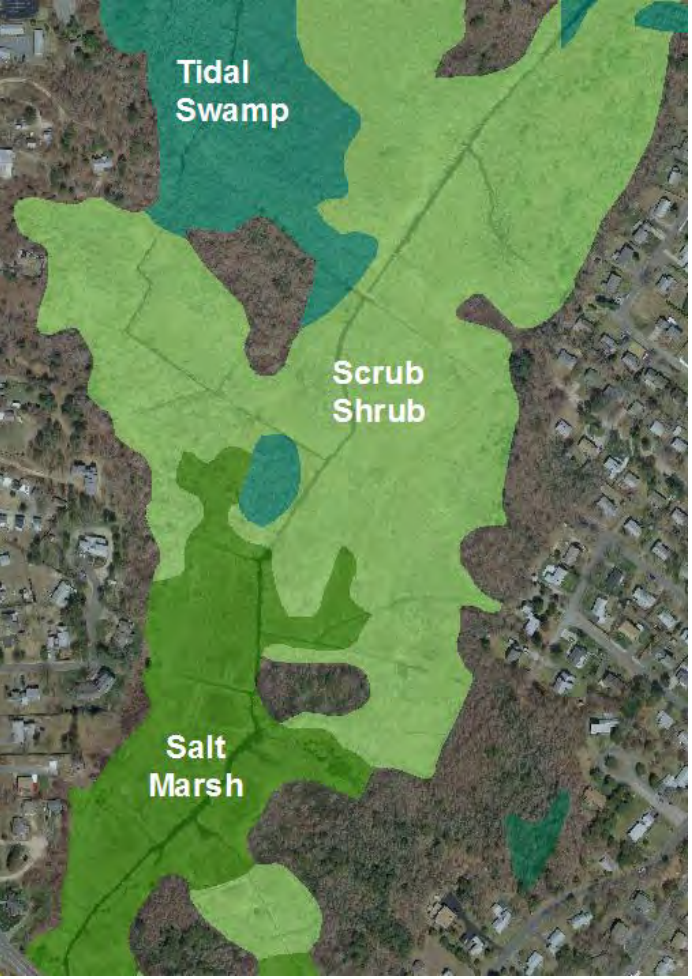
Understand potential for coastal wetland **habitat conversion/loss** under multiple scenarios of SLR



Identify and assess opportunities for and barriers to **marsh migration**

Engage stakeholders to better incorporate wetlands into **adaptation strategies** and planning efforts





Resilient Habitat: Tidal marsh advances landward as sea level rises

Four scenarios with estimates of SLR by 2100

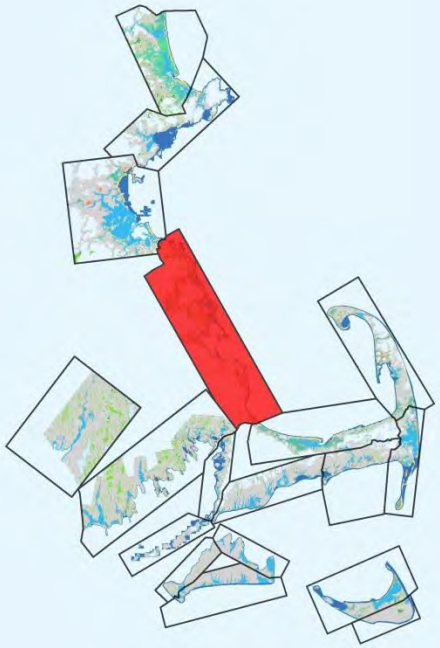
United States National Climate Assessment (Parris et al. 2012), adjusted for local subsidence

Projected Scenario	Total Sea Level Rise (Boston)
Lowest	0.249 m (0.82 feet)
Intermediate Low	0.706 m (2.32 feet)
Intermediate High	1.385 m (4.54 feet)
Highest	2.164 m (7.10 feet)

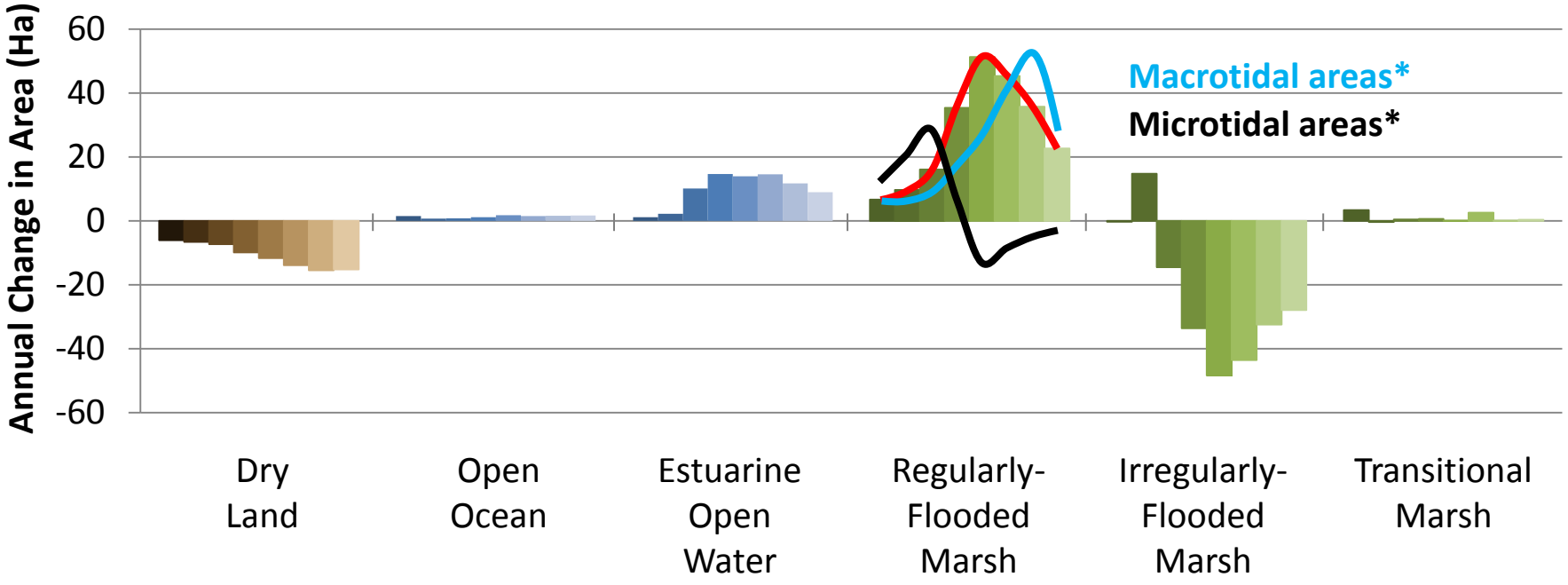
Plymouth

South Shore

SLAMM Project Panel



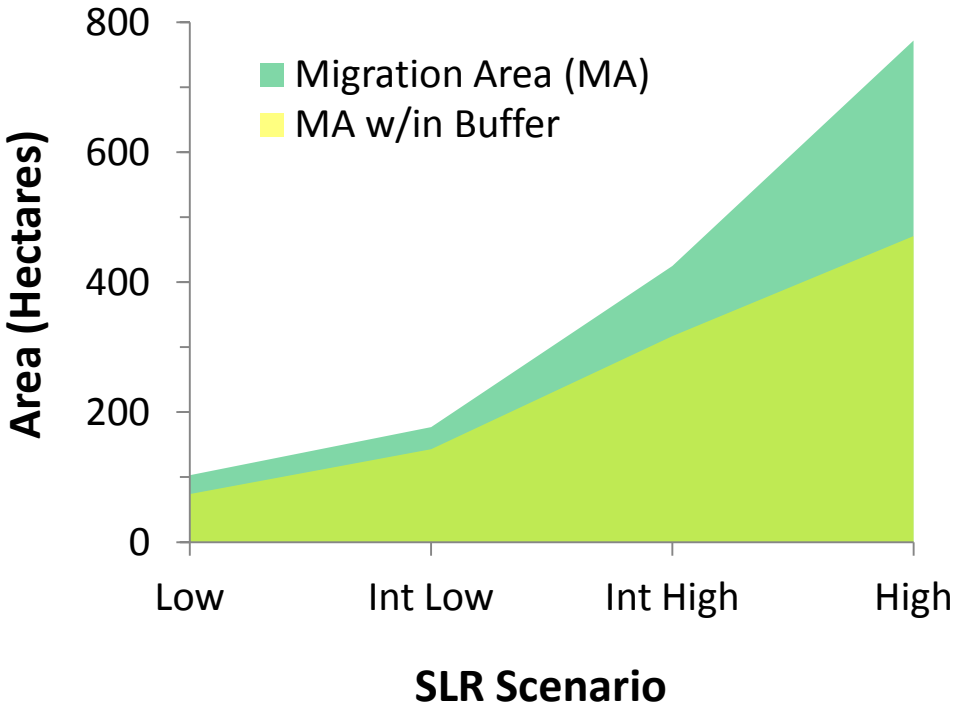
Average annual change by decade* from 2011-2100 in wetland area for the Plymouth/South Shore panel.



Potential Upland Marsh Migration w/in 100 ft Buffer

South Shore | 2030-2100

Intermediate High SLR Scenario

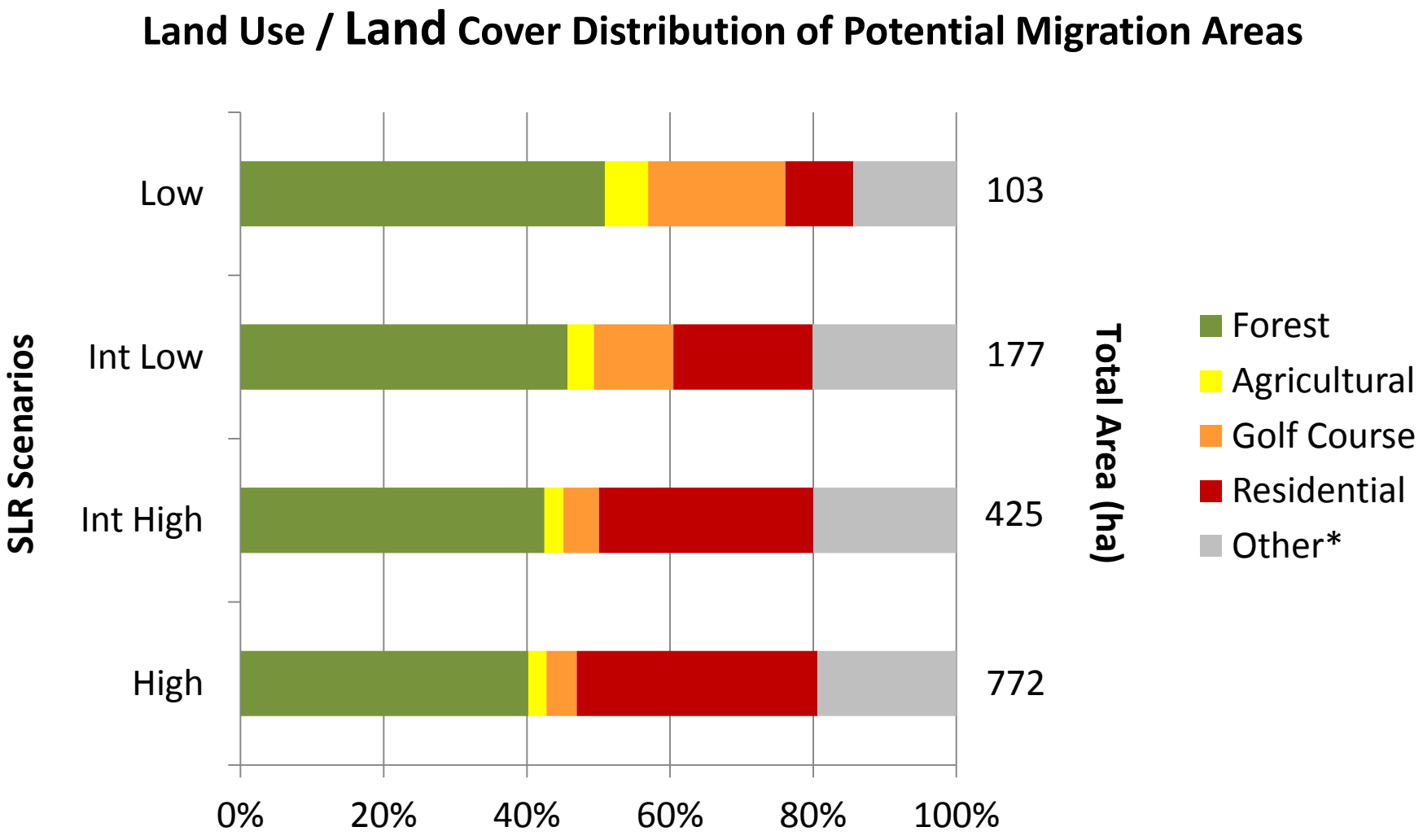


North River, Marshfield

DRAFT

Upland Marsh Migration

South Shore | 2030-2100



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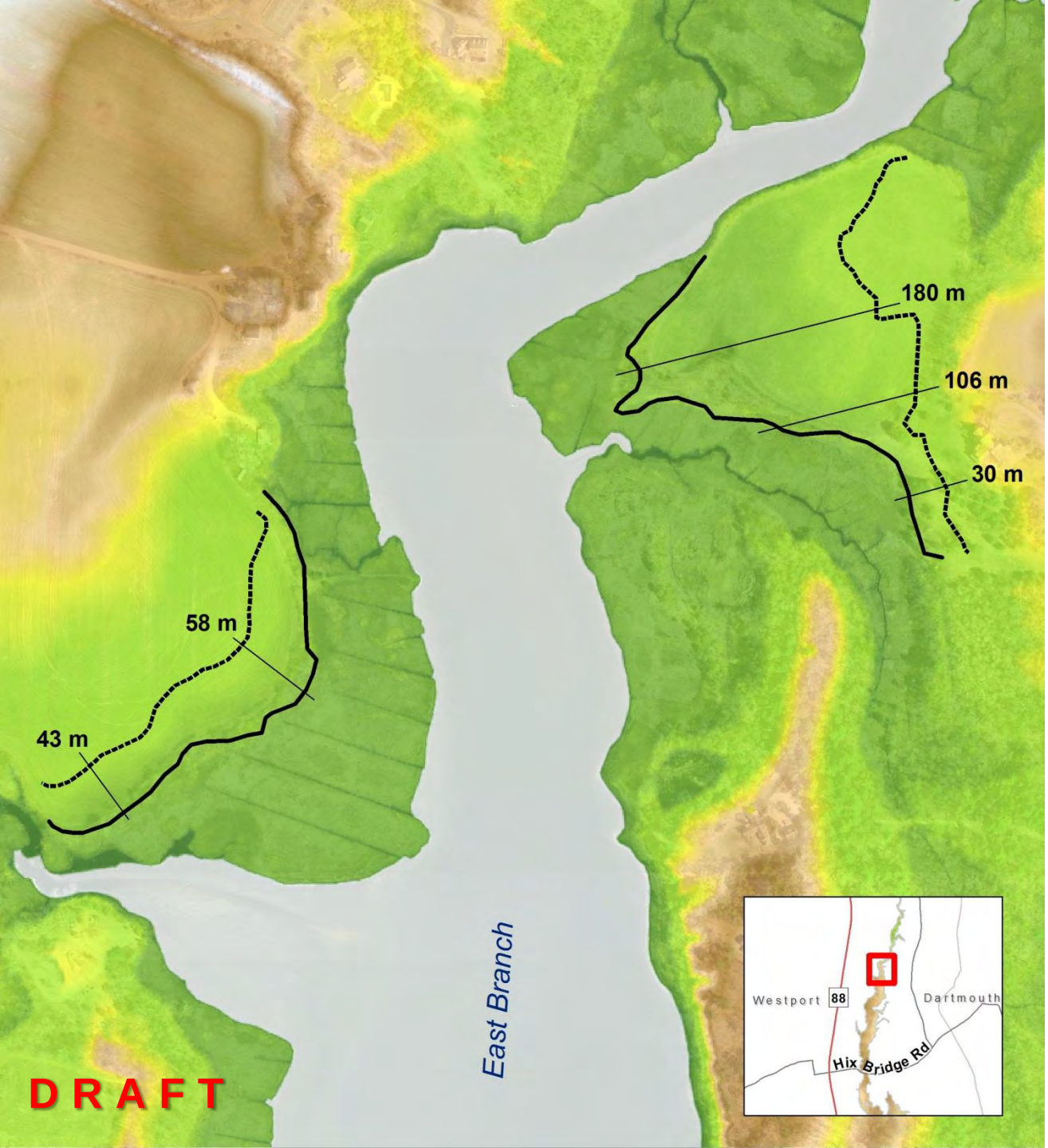


Marsh Migration Potential

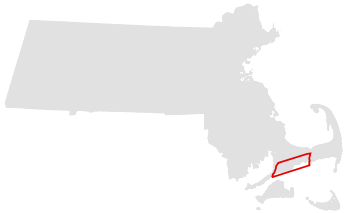
**For illustrative purposes only*

Lidar DEM

12 m
5 m
-2 m

Marsh-Upland Border

2011
2100



Westport River - East

Buzzards Bay West

Intermediate High SLR

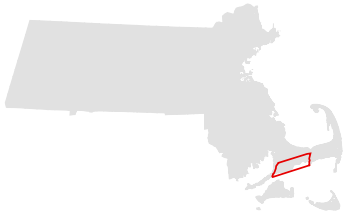
Static accretion

Marsh Migration Potential

**For illustrative purposes only*

Select SLAMM Classes

- Trans. Marsh/Scrub-Shrub
- Regularly-Flooded Marsh
- Irregularly-Flooded Marsh
- Tidal Flat



Westport River - East

Buzzards Bay West

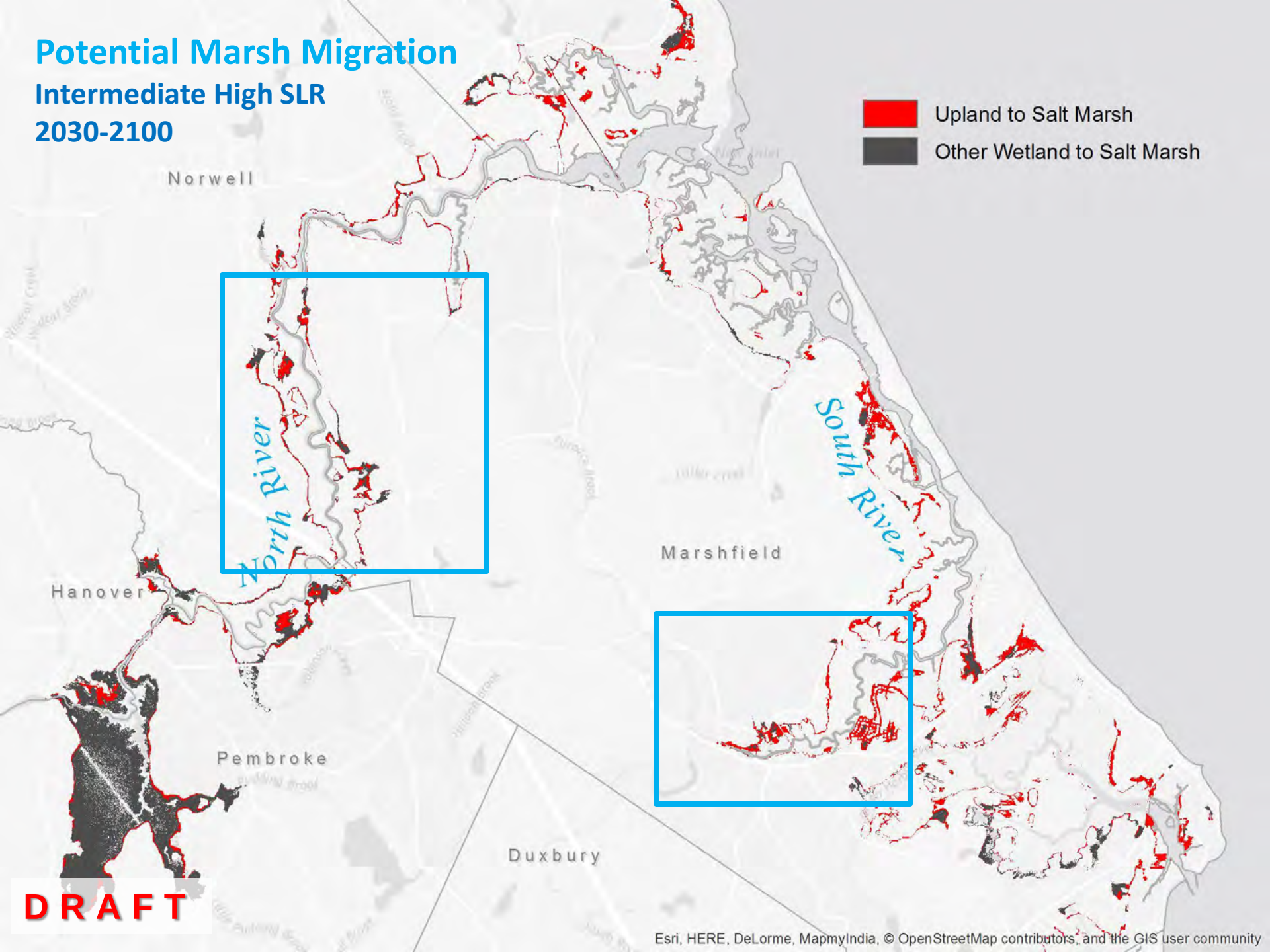
Intermediate High SLR

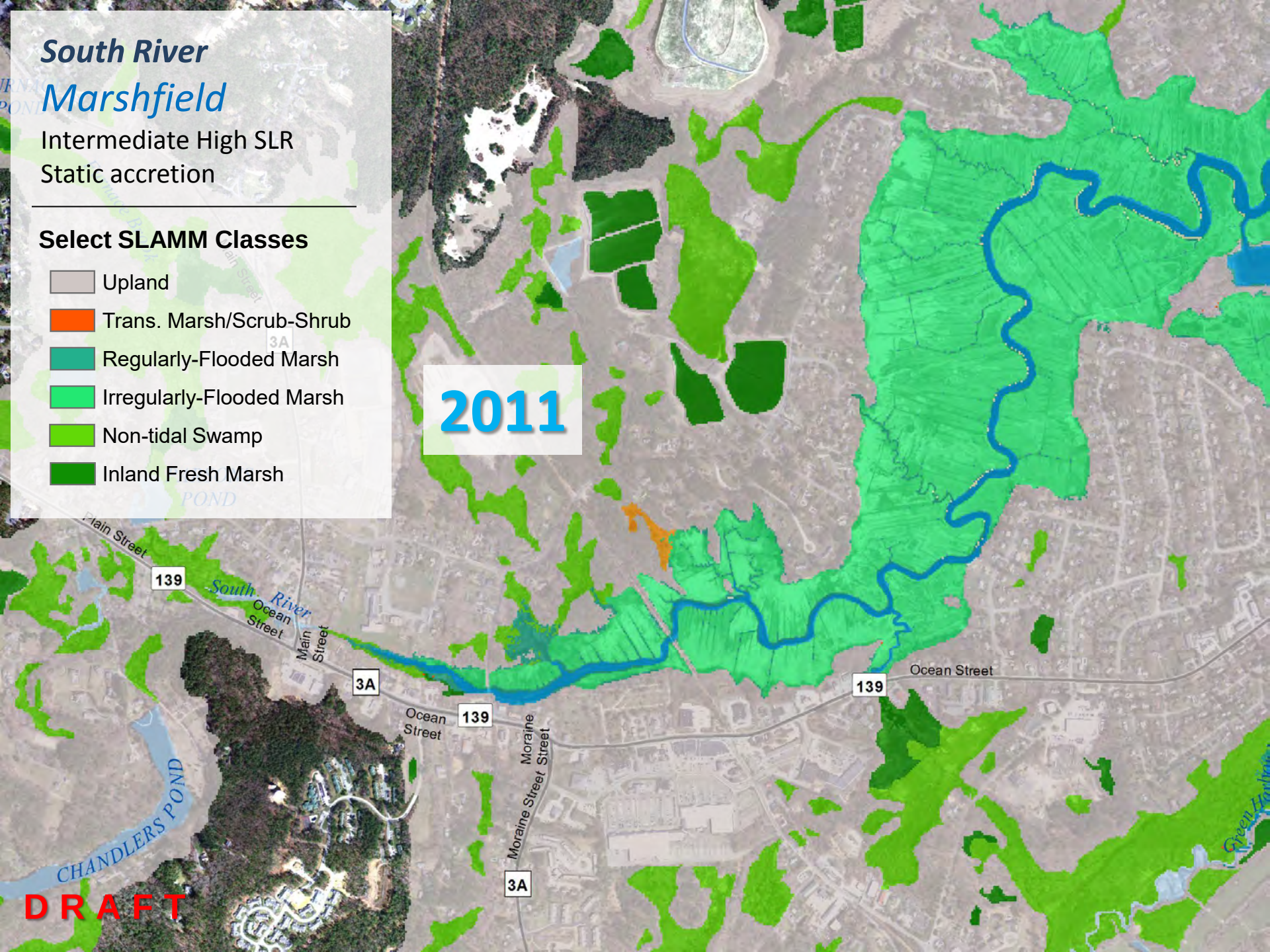
Static accretion

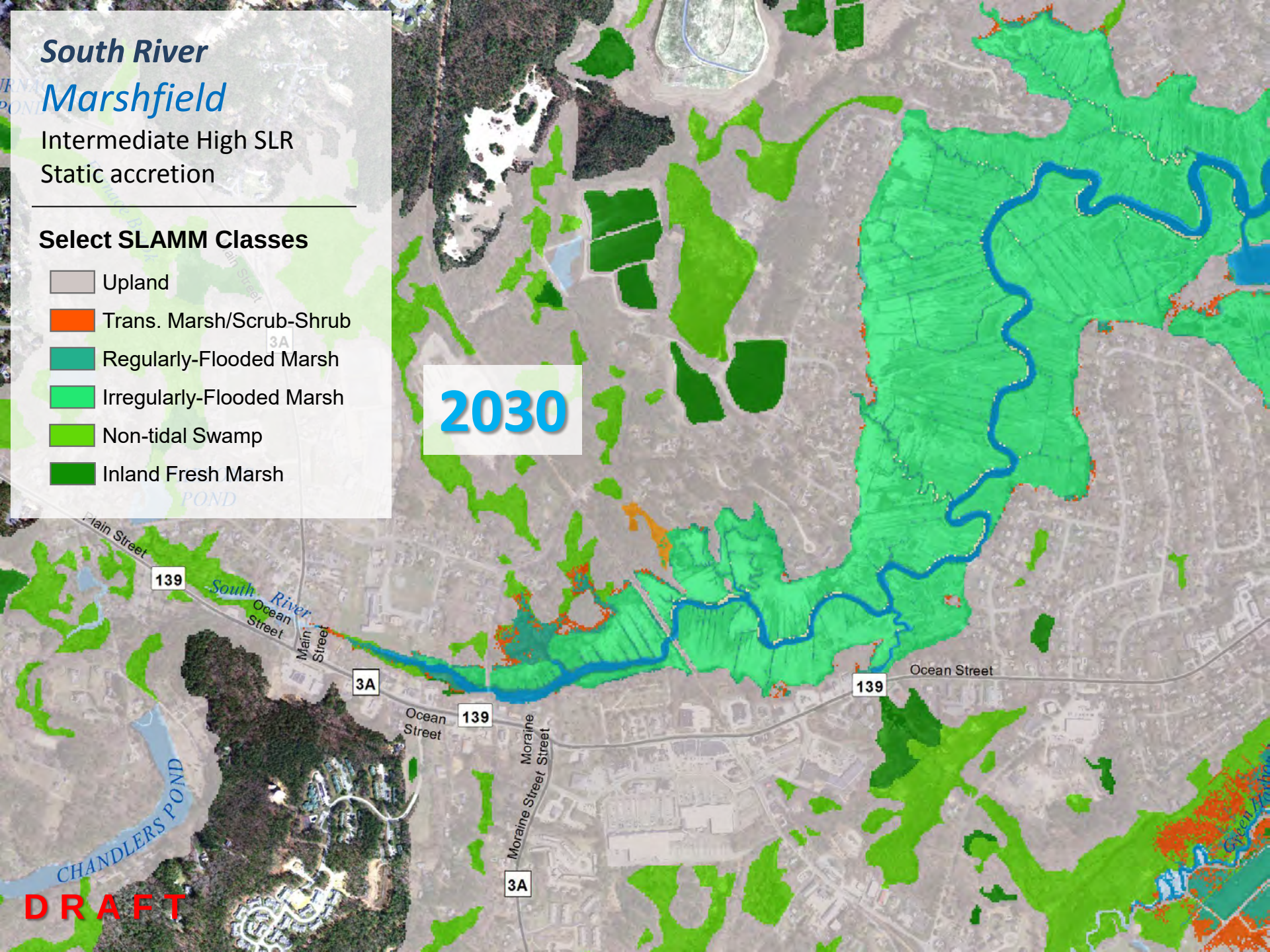
Potential Marsh Migration

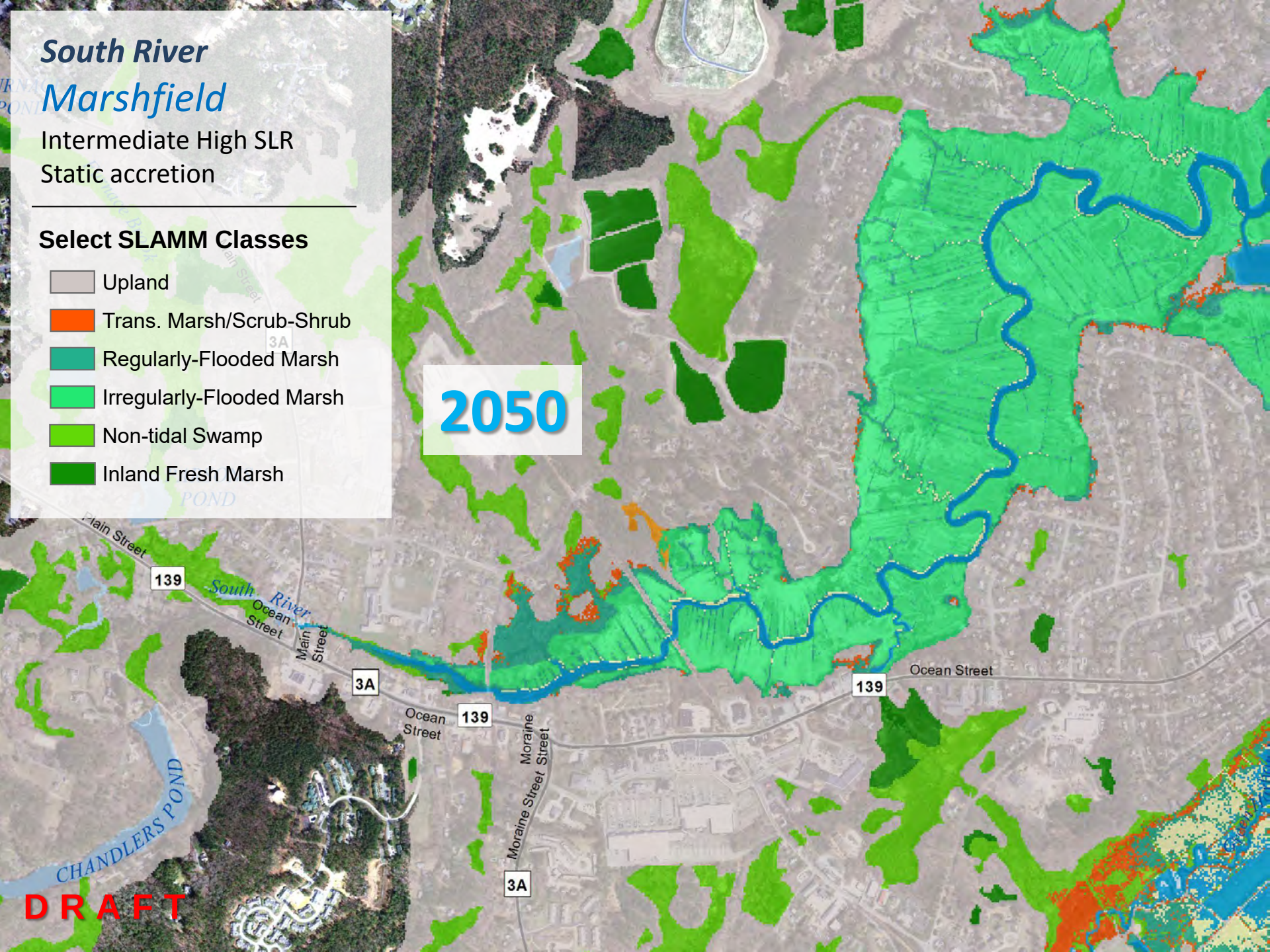
Intermediate High SLR

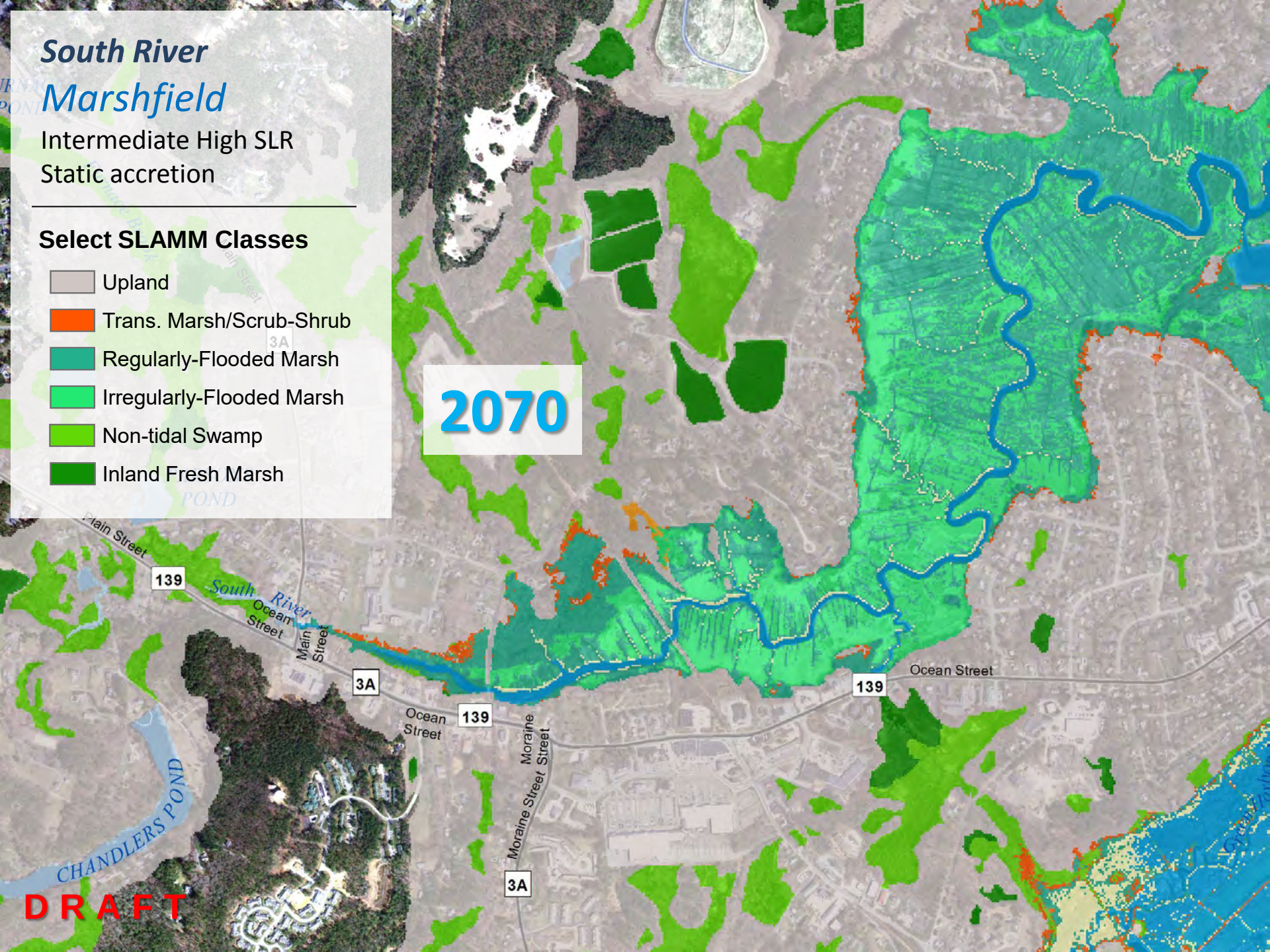
2030-2100




South River
Marshfield
Intermediate High SLR
Static accretion
Select SLAMM Classes
Upland
Trans. Marsh/Scrub-Shrub
Regularly-Flooded Marsh
Irregularly-Flooded Marsh
Non-tidal Swamp
Inland Fresh Marsh
2011
Plain Street
139
South River
Ocean Street
Main Street
3A
Ocean Street
139
Moraine Street
Moraine Street
3A
139
Ocean Street
CHANDLERS POND
DRAFT


South River
Marshfield
Intermediate High SLR
Static accretion
Select SLAMM Classes
Upland
Trans. Marsh/Scrub-Shrub
Regularly-Flooded Marsh
Irregularly-Flooded Marsh
Non-tidal Swamp
Inland Fresh Marsh
2030
Plain Street
139
South River
Ocean Street
Main Street
3A
Ocean Street
139
Moraine Street
Moraine Street
3A
Ocean Street
139
CHANDLERS POND
DRAFT


South River
Marshfield
Intermediate High SLR
Static accretion
Select SLAMM Classes
Upland
Trans. Marsh/Scrub-Shrub
Regularly-Flooded Marsh
Irregularly-Flooded Marsh
Non-tidal Swamp
Inland Fresh Marsh
2050
Plain Street
139
South River
Ocean Street
Main Street
3A
Ocean Street
139
Moraine Street
Moraine Street
3A
Ocean Street
139
CHANDLERS POND
DRAFT


South River
Marshfield
Intermediate High SLR
Static accretion
Select SLAMM Classes
Upland
Trans. Marsh/Scrub-Shrub
Regularly-Flooded Marsh
Irregularly-Flooded Marsh
Non-tidal Swamp
Inland Fresh Marsh
2070
Plain Street
139
South River
Ocean Street
Main Street
3A
Ocean Street
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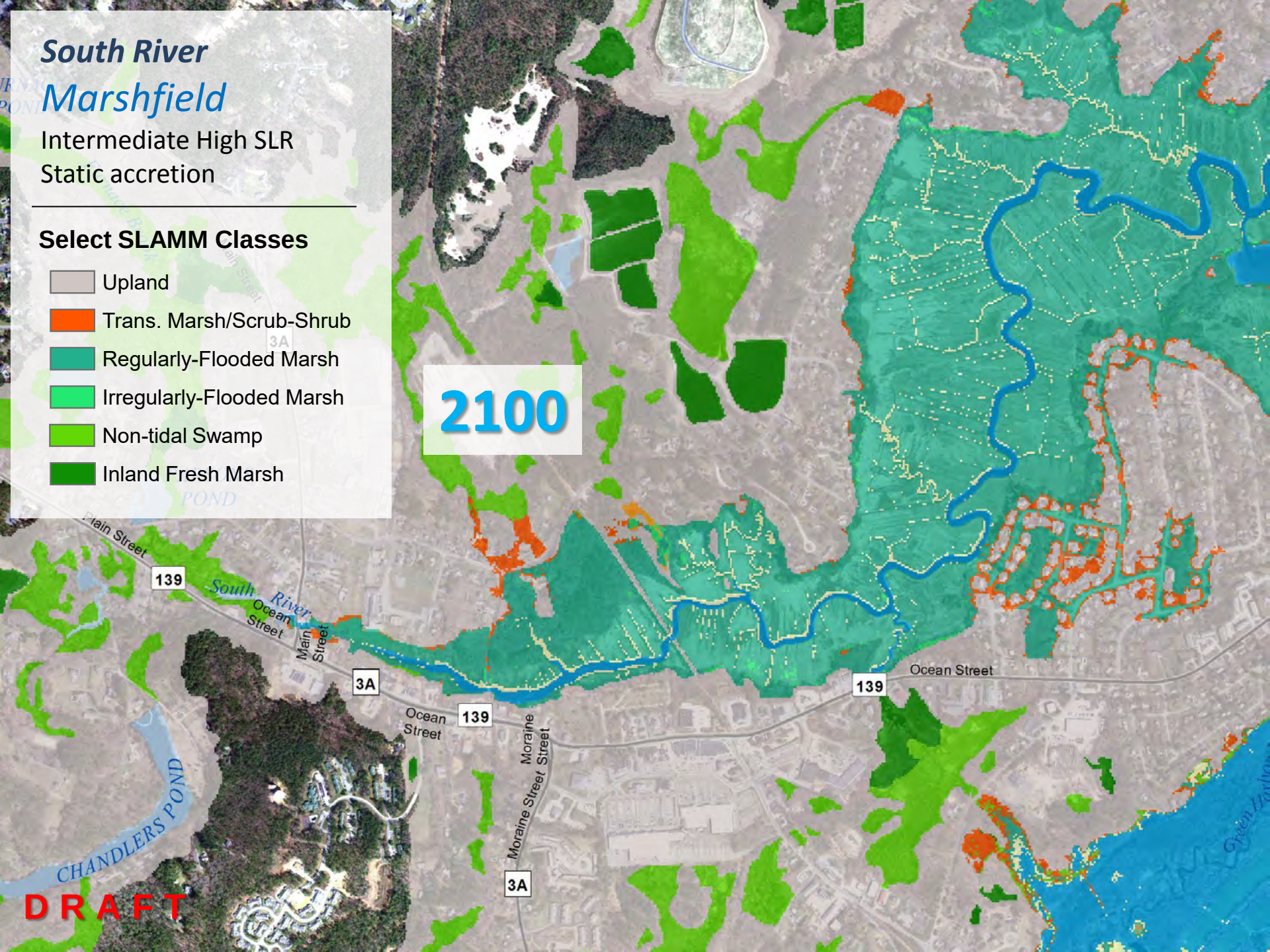
Moraine Street
Moraine Street
3A
139
Ocean Street
CHANDLERS POND
DRAFT


South River
Marshfield
Intermediate High SLR
Static accretion
Select SLAMM Classes
Upland
Trans. Marsh/Scrub-Shrub
Regularly-Flooded Marsh
Irregularly-Flooded Marsh
Non-tidal Swamp
Inland Fresh Marsh
2100
Plain Street
139
South River
Ocean Street
Main Street
3A
Ocean Street
139
Moraine Street
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Ocean Street
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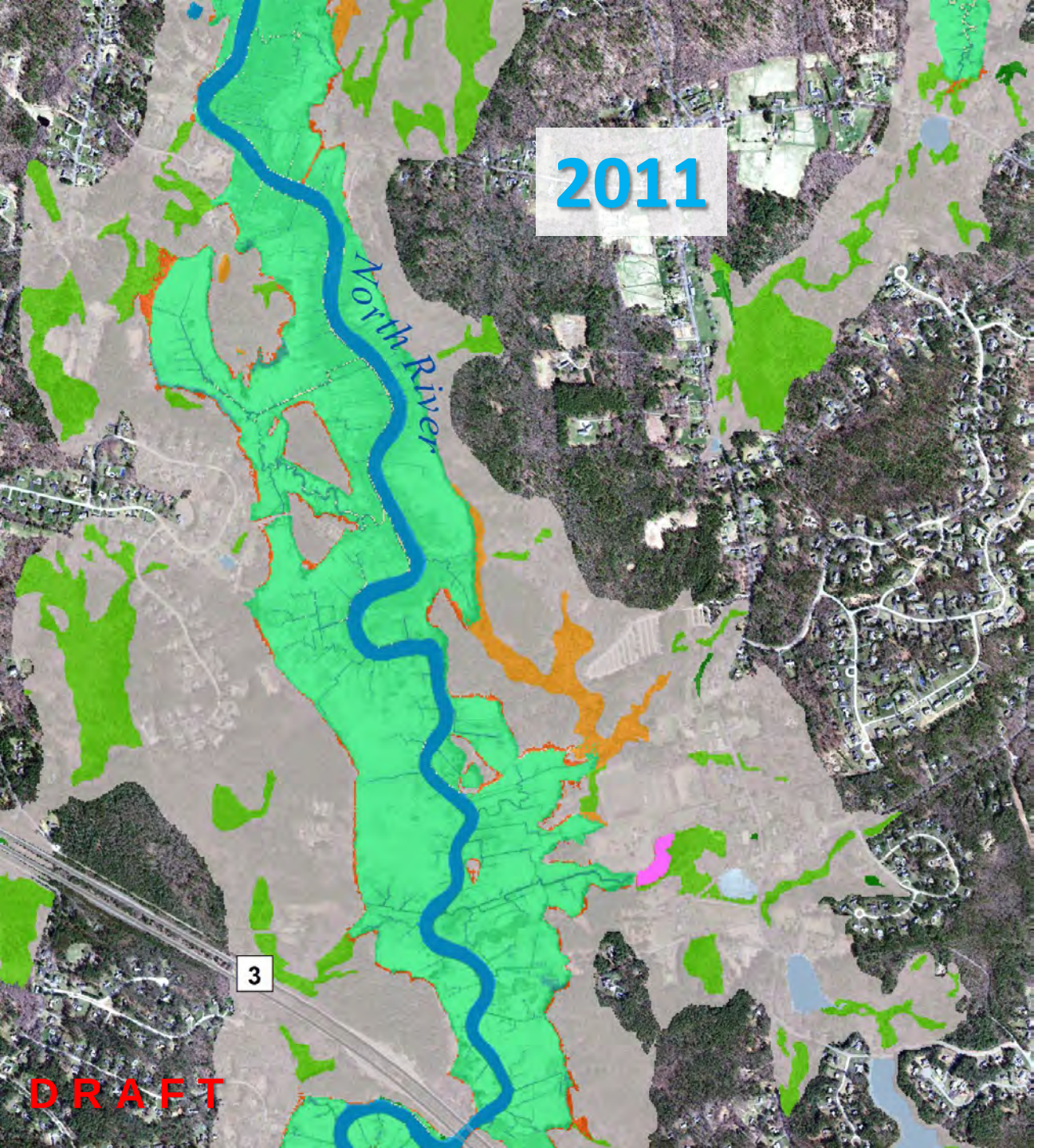
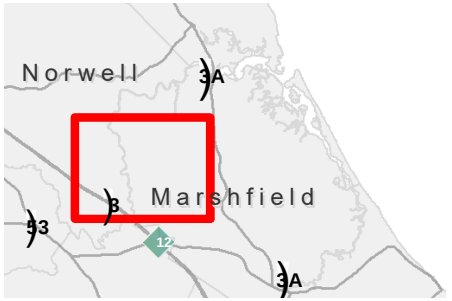
CHANDLERS POND
DRAFT





Select SLAMM Classes

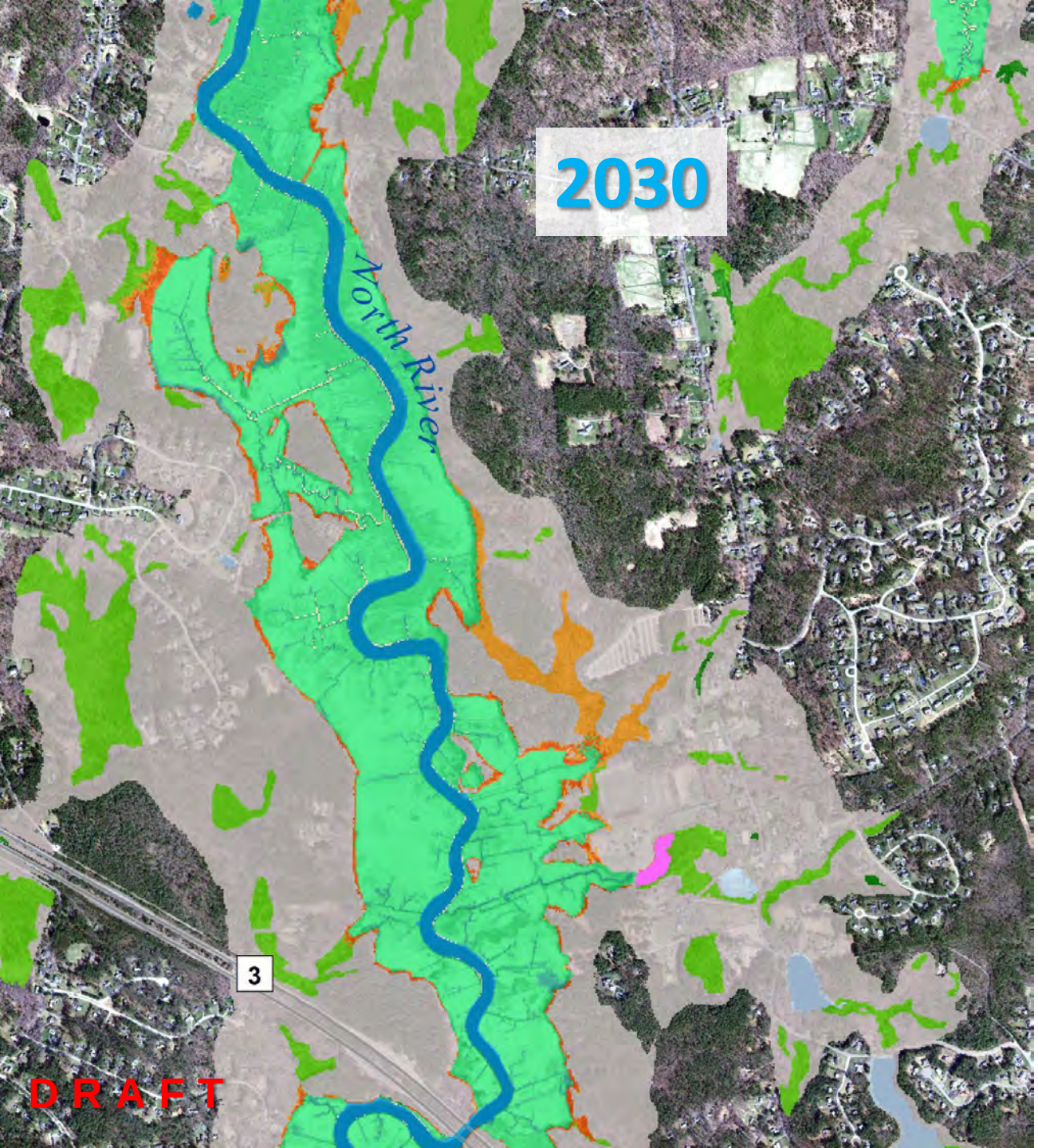
- Upland
- Trans. Marsh/Scrub-Shrub
- Regularly-Flooded Marsh
- Irregularly-Flooded Marsh
- Tidal Swamp
- Non-tidal Swamp
- Inland Fresh Marsh

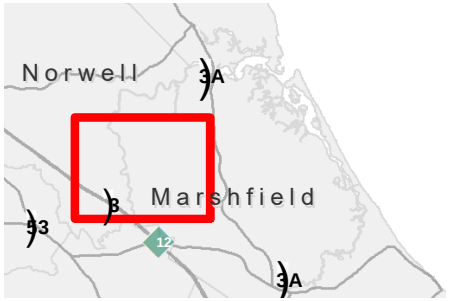
North River

Marshfield/Norwell

Intermediate High SLR

Static accretion





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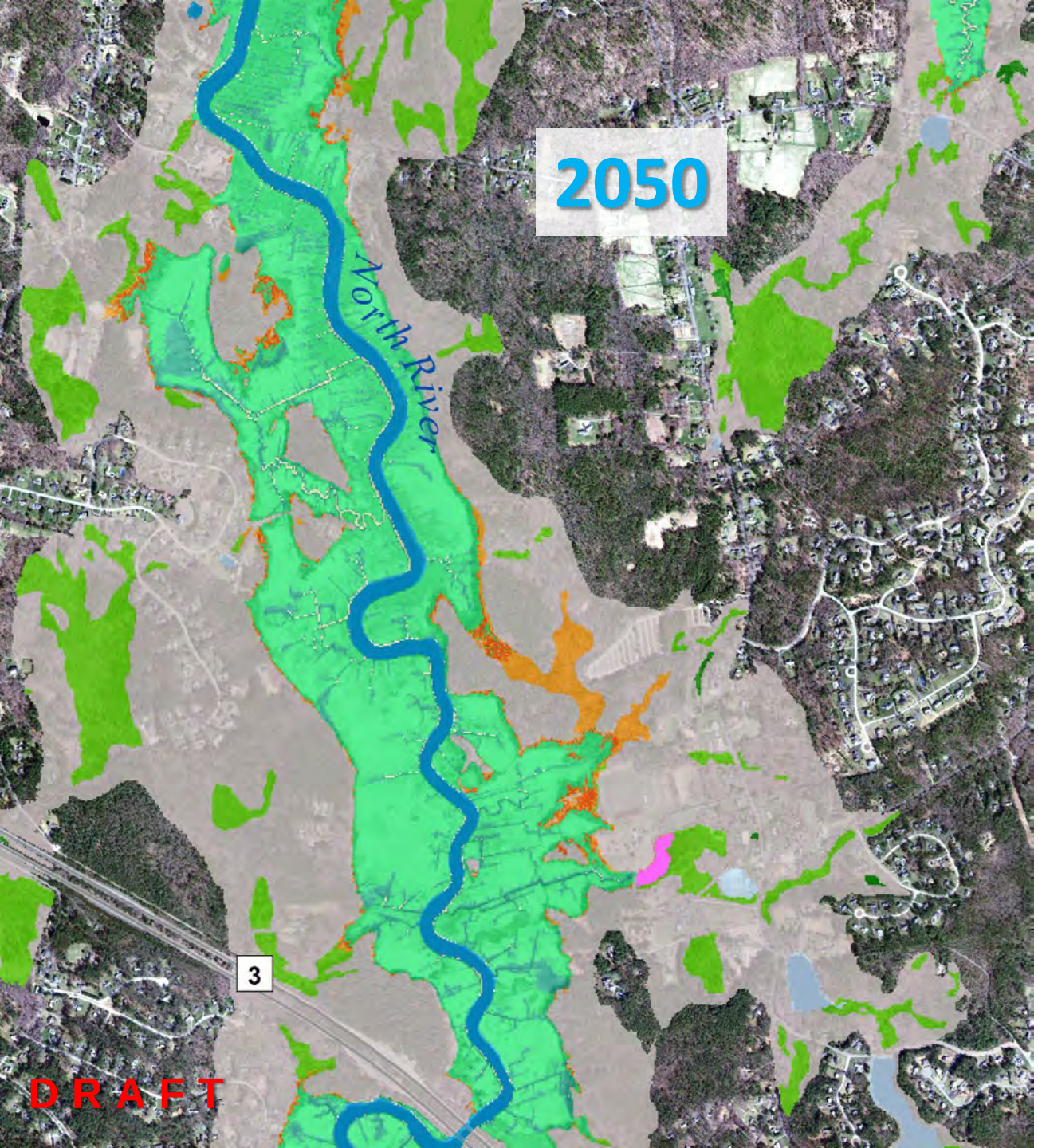
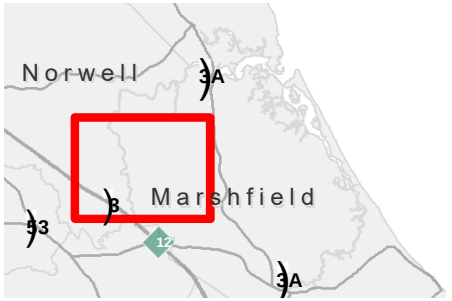
North River

Marshfield/Norwell

Intermediate High SLR

Static accretion





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North River

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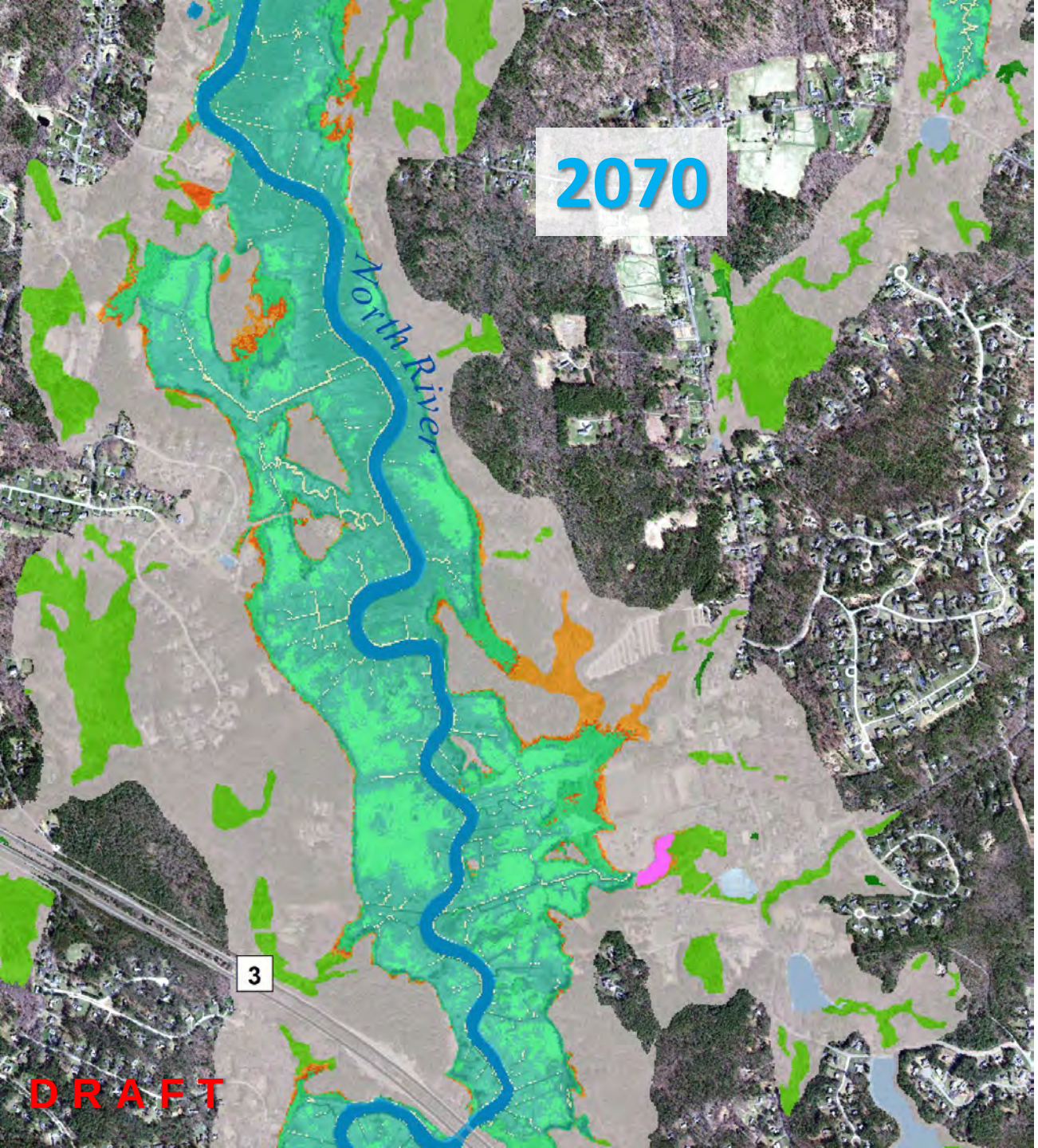

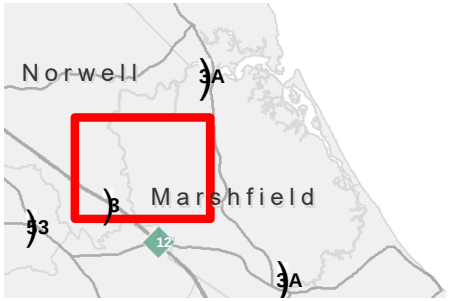

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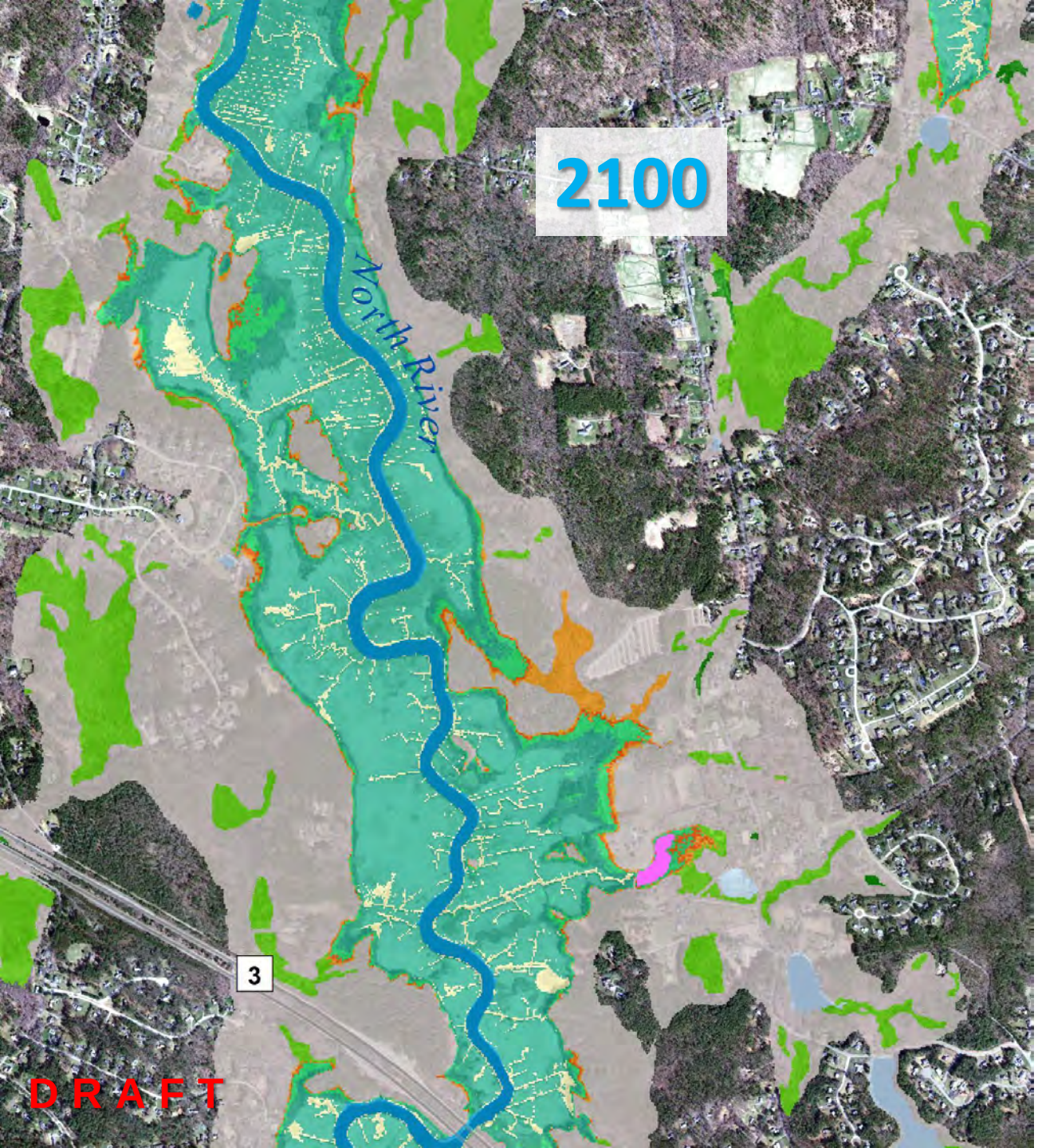
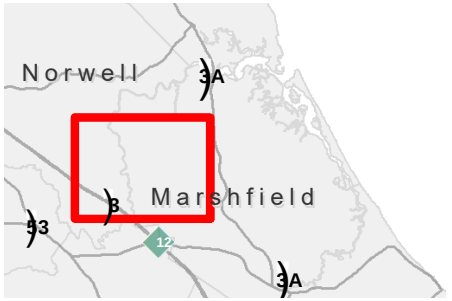
North River

Marshfield/Norwell

Intermediate High SLR

Static accretion





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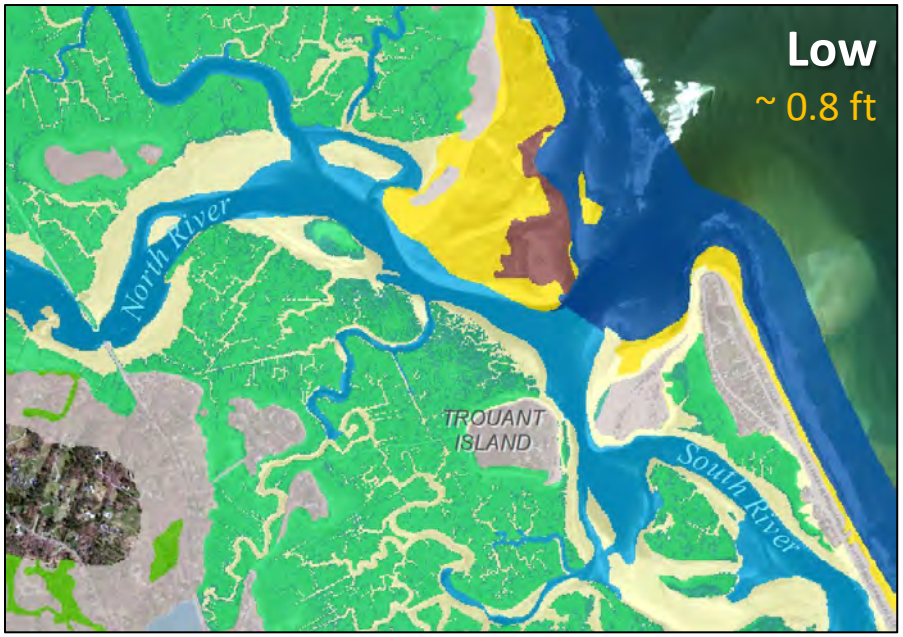
North River

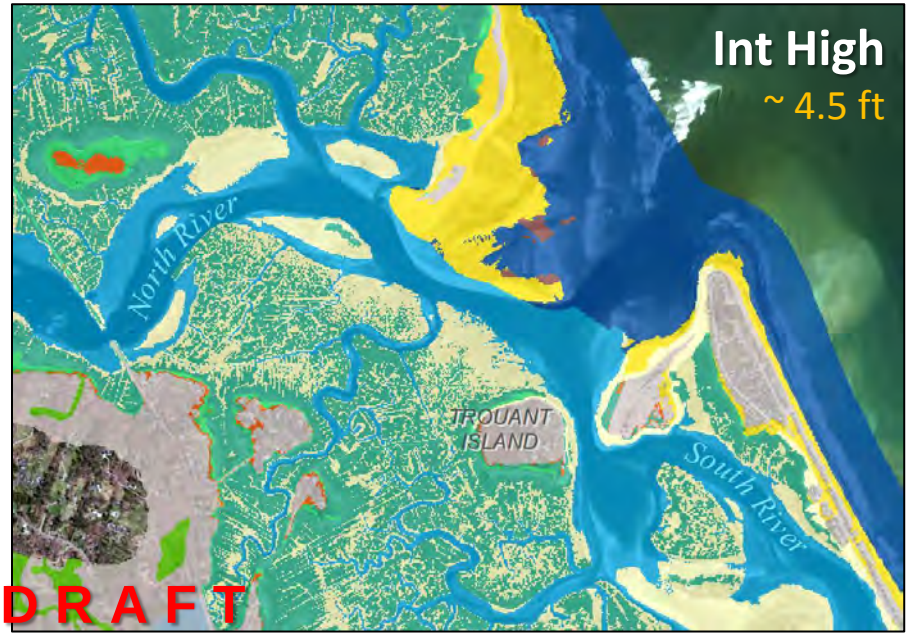
Marshfield/Norwell

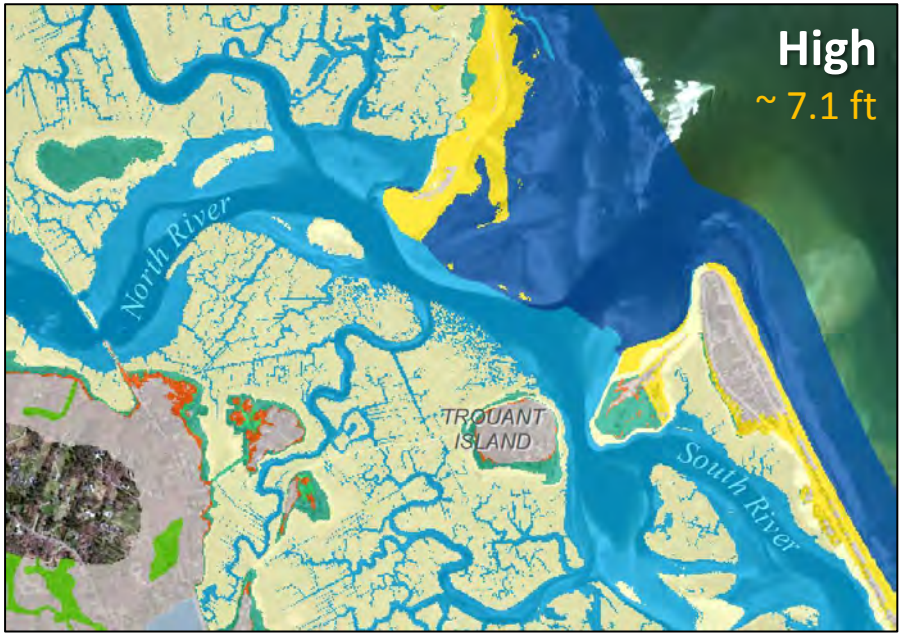
Intermediate High SLR

Static accretion

Potential Wetland Distribution by 2100 Under Four SLR Scenarios





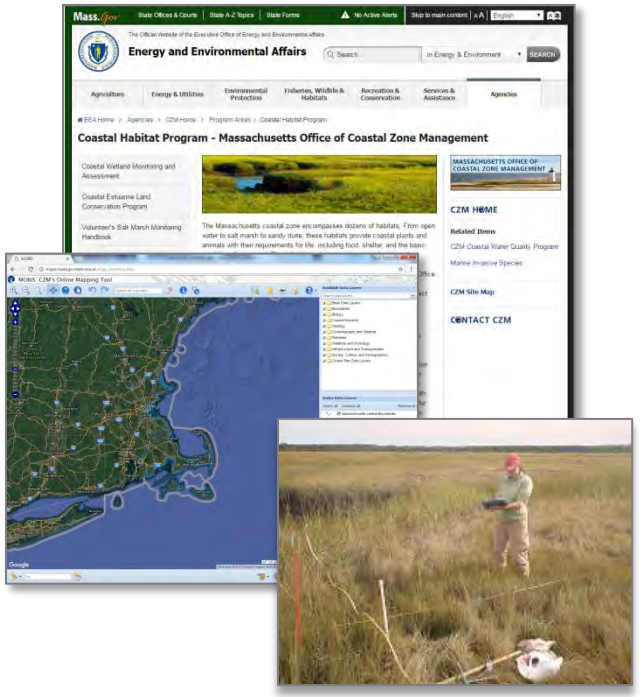


**SLR values for Boston*


Outreach &
Education
Blue Carbon
Accounting
Species
Conservation
Anticipated
Outcomes
Restoration
Policy
Land
Management

Next Steps

- Project website
  - Final SLAMM report
  - Executive summary
  - Additional data analyses and summaries
- Esri Story Map and MORIS
- Stakeholder meetings
- Long-term monitoring projects
  - Remote sensing and field-based



Acknowledgements

Funding

- U.S. EPA Region 1
- NOAA Office for Coastal Management

Project Team

- MA CZM
- MA DFG - Division of Ecological Restoration (MA DER)
- Marine Biological Laboratory (MBL)
  Plum Island Ecosystems Long Term Research (PIE LTER) Project
- MassDEP
- Woods Hole Group

Data Contributors

- MBL/PIE LTER
- USFWS – Parker River NWR
- NPS – Cape Cod NS
- MassDOT
- MA DER
- Waquoit Bay NERR
- NOAA (CO-OPS)
- Woods Hole Group
- University of South Carolina
  Jim Morris

Warren Pinnacle Consulting, Inc. – SLAMM 6.2
James Morris, University of South Carolina – MEM 5.4.1