Status of the Development of a Multidimensional Coastal Wetland Migration and Maintenance Data Layer for NJ ResTOrS

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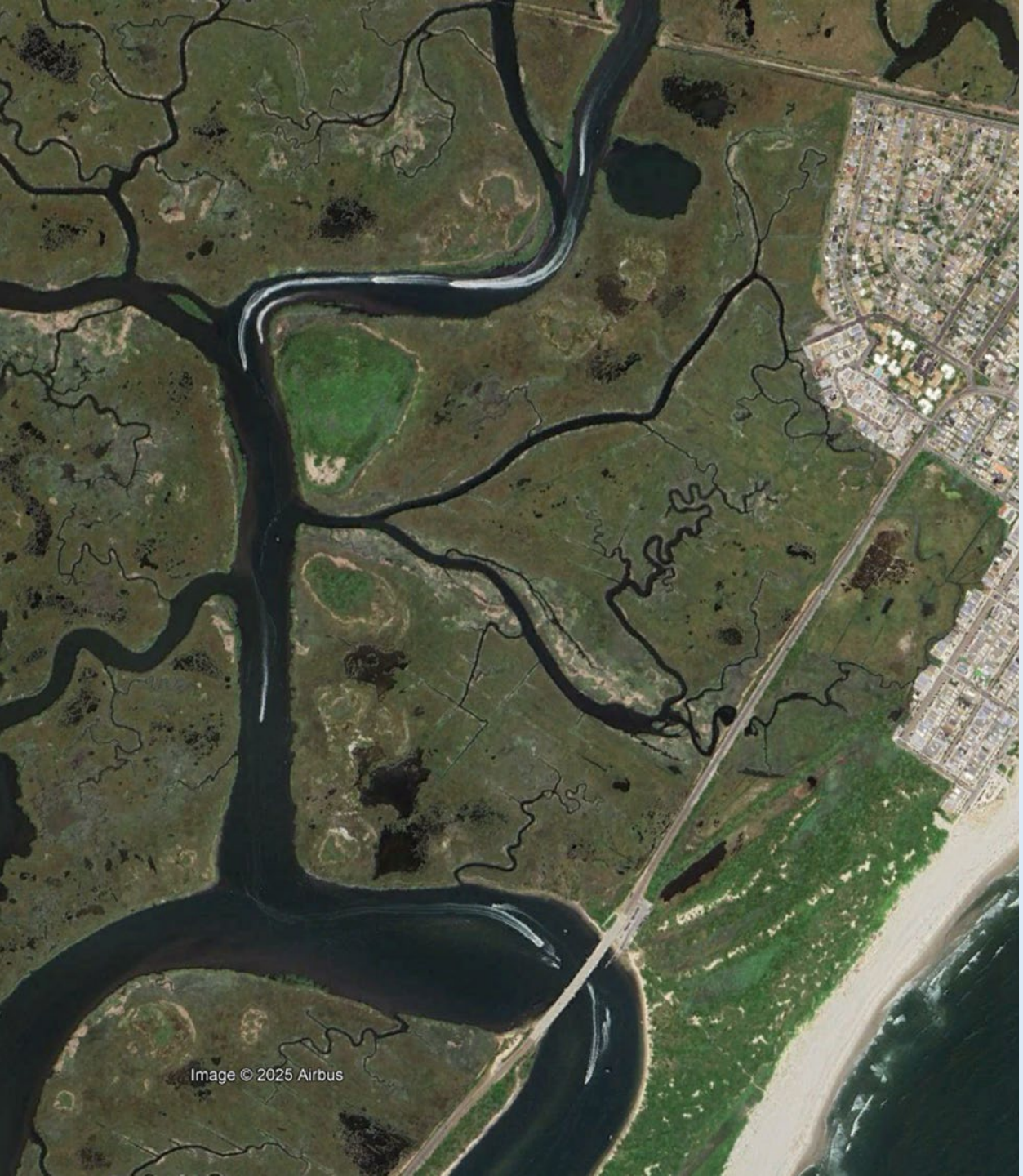
2025 Coastal Ecological Restoration Technical Workshop
Bordentown, NJ September 11, 2025



Outline

- Project Goals
- NJ ResTOrS
- CZM309 Y41 & Y42 Tasks & Stakeholder Input
- Proposed Data Layers & Draft Structure
- Next Steps

Project Goals

- Investigate/aggregate/integrate various existing data layers to understand site-specific salt marsh dynamics related to sediment maintenance and migration potential as it relates to restoration strategies
  - *Sediment Availability* (coastal & riverine)
  - *Vertical Trajectory* (SET & marker horizon data)
  - *Horizontal Trajectory* (landward marsh migration, erosion)
- Develop Composite Score layer
- Incorporate into NJResTOrS

Three phases:

Y41 – Compile & evaluate data, establish TAC

Y42 – Develop conceptual data layer, seek stakeholder input

Y43 – Develop Tier 2 composite layer, include in NJResTOrS

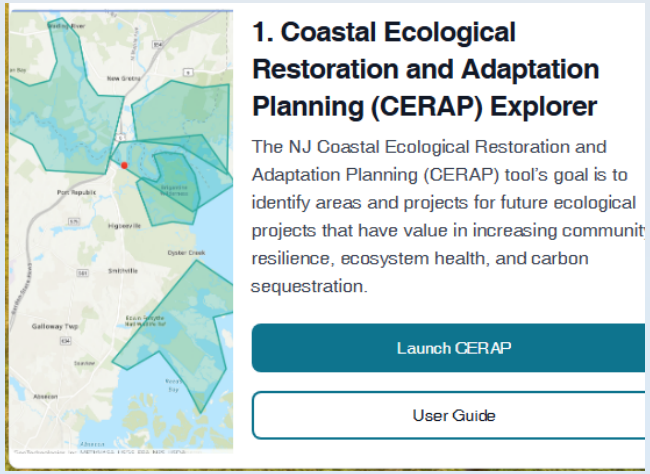
New Jersey Restoration Tool Organization Suite

Developed by Rutgers University for the Coastal Ecological Restoration and Adaptation Plan (CERAP) for NJ's coastal marshes, estuaries, and back bays.

NJResTOrS

Integrates decision support tools (scope through evaluation)

Location



1. Coastal Ecological Restoration and Adaptation Planning (CERAP) Explorer

The NJ Coastal Ecological Restoration and Adaptation Planning (CERAP) tool's goal is to identify areas and projects for future ecological projects that have value in increasing communit resilience, ecosystem health, and carbon sequestration.

Launch CERAP

User Guide

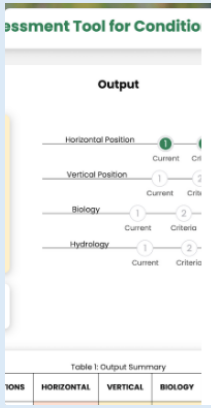
Issue ID

2a. Marsh Explorer

The Marsh Explorer includes maps of hydrological alterations and condition metrics related to marsh health and long-term status under continued sea level rise.

Launch Marsh Explorer

User Guide



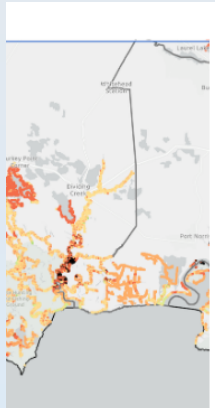
2b. Wetlands Assessment Tool for Condition & Health (WATCH)

The goal of WATCH is to provide a method to evaluate the condition and trajectory of a tidal wetland site to inform decision-making, restoration project prioritization, and the selection of restoration tactics.

Launch WATCH

User Guide

Restoration Approach



3a. Living Shorelines Explorer

If marsh edge erosion has been identified as an issue in the Marsh Explorer or WATCH tools, then the next step may be to employ the Living Shorelines tool to help determine the most appropriate nature-based solutions for selected locations.

Launch Living Shorelines

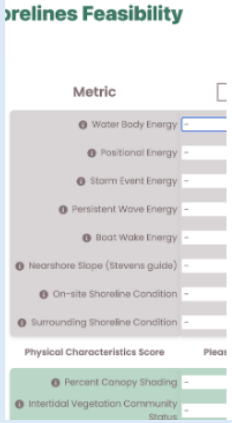
User Guide

3b. Marsh Futures Mapper

Landscape evaluation, single/multiple tactic evaluation, faunal considerations, and ESS intervention type.

...future release

User Guide



3c. Feasibility Model

The Living Shoreline Feasibility Model (LSFM) is an integrative tool that evaluates a suite of metrics to assess considerations involved in constructing and maintaining a living shoreline at a specific location.

Launch Feasibility Model

User Guide

https://njrestors.rutgers.edu/

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CZM309 Y41 & Y42 Tasks

Y41

- Established TAC
- Compiled existing GIS data
- Evaluated current state of marsh migration modeling
    - Rutgers Univ. & Duke Univ. habitat mapping under 1-ft & 2-ft SLR scenarios

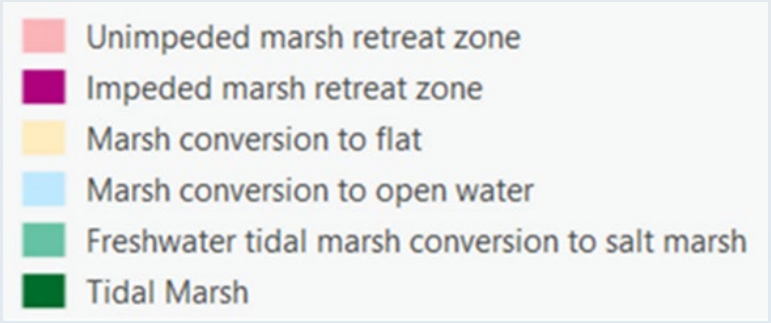
Y42

- Develop conceptual data layers (Tiered approach)
- Seek stakeholder input

Model Differences

Rutgers University

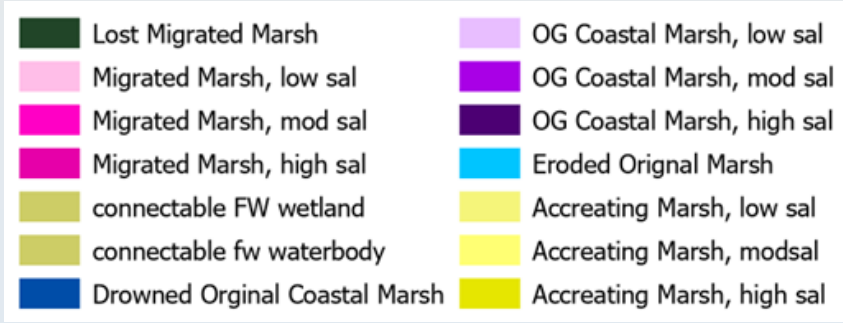
- Finer scale (10 m resolution)
- Habitat classifications
  (6 including marsh retreat zone, marsh conversion)



- Vertical sediment accretion
  (NJ Specific: 4mm/yr)
- Land elevation data
  (NJ DEM 2014-2018)
- Horizontal marsh erosion
  (Included in marsh retreat combined data layer)
- SLR timelines (1-ft, 2-ft, 3-ft at 2050)

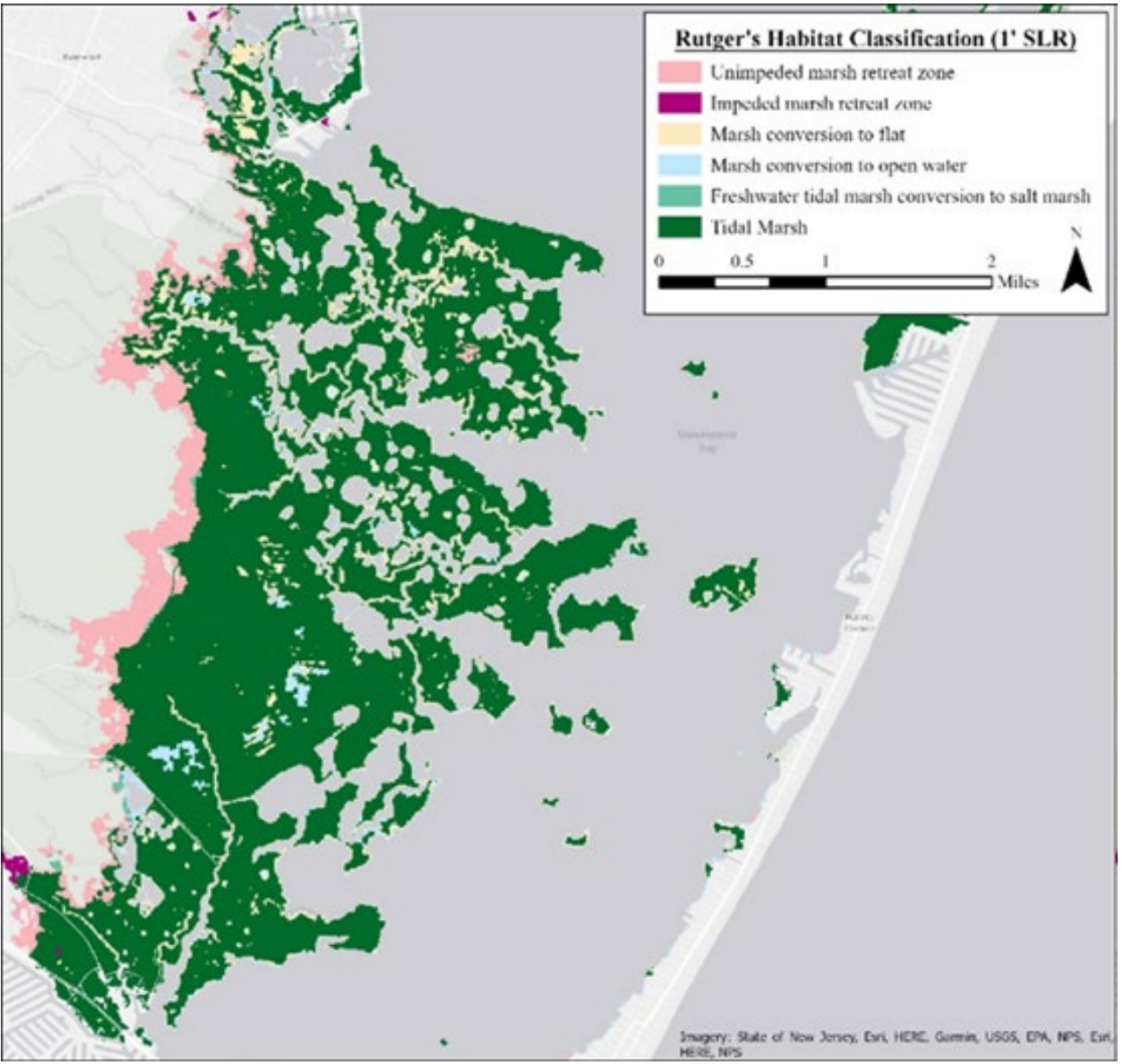
Duke University

- Coarser scale (30 m resolution)
- Habitat classifications
  (14 including variations based on low, med, high salinity)

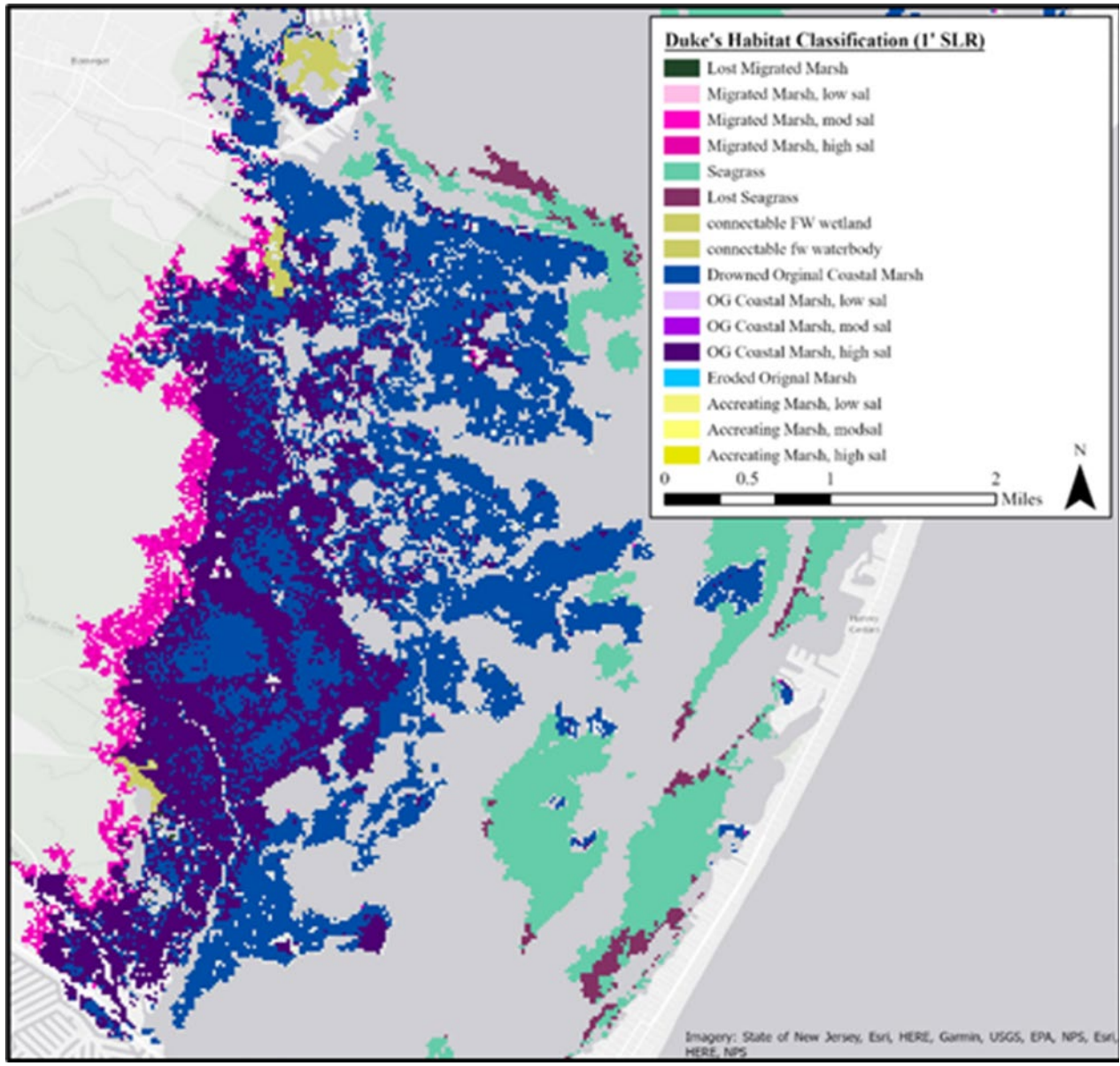


- Vertical sediment accretion
  (Global suspended sediment concentration and tidal range)
- Land elevation data
  (Extracted from NOAA 1/9arc-second bathy-topo elevations)
- Horizontal marsh erosion
  (Estimated from size of water body [fetch] and tidal range)
- SLR timelines (at 83% chance exceedance 1-ft 2061, 2-ft at 2107, 3-ft n/a)

Rutgers University (a) and Duke University (b) Model Outputs for 1-ft SLR



(a) Rutgers predicts tidal marshes to keep up w/ SLR = conversion to open water or unvegetated flat = 19,236 acres



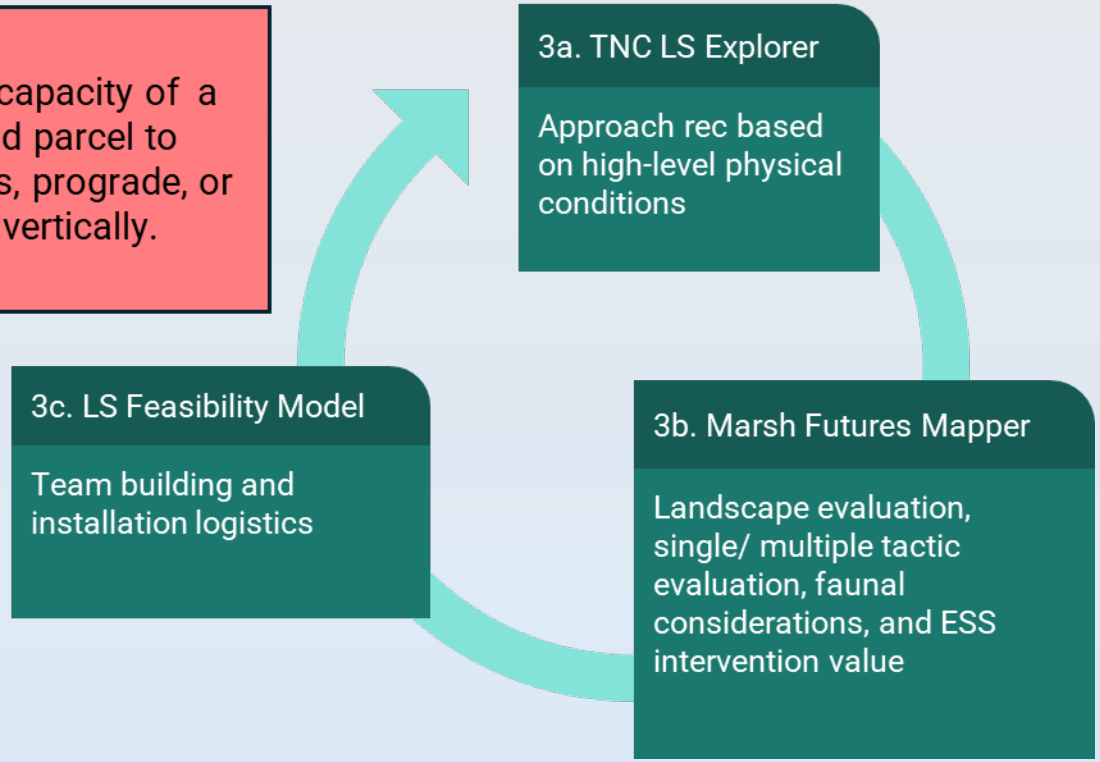
(b) Duke predicts more tidal marsh loss through marsh conversion to open water or unvegetated flat = 111,924 acres

Where this fits in NJResTOrS

Existing AOI
or
CERAP Search
or
BIRP Search
(Islands)

1.CERAP
2.TNC Marsh Explorer
3.BIRP (Island)
4.WATCH (Quantitative, Data Required)
5.NJ Reference Wetland Tool

Existing capacity of a wetland parcel to transgress, prograde, or build vertically.



New composite data layer

Draft Structure & Logic: Inspirations

WATCH (Moody et al)

Based on user entered sediment info – accumulation, suspended sediment, shoreline integrity, accumulation resilience

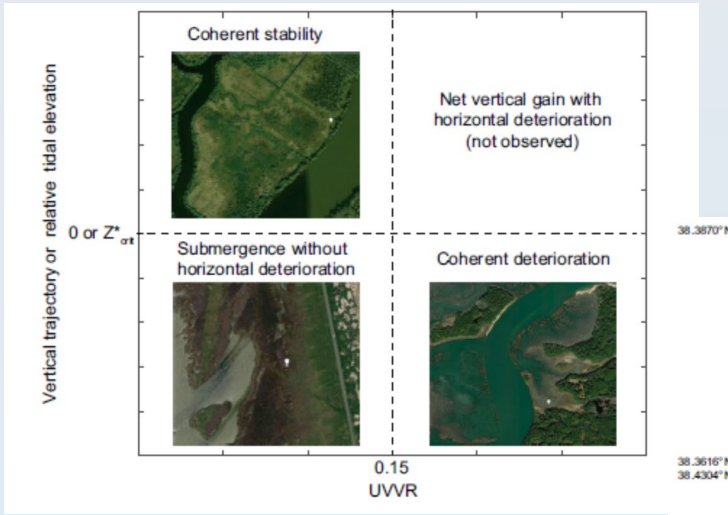
From users entered data in WATCH				Criteria range									
Attribute association	Metric	Method	Value	Low	High	Current Violation							
vertical	surface accumulation (v)	MH, sediment grid/plate (above MHW)	5	0	4	1	A	B	C				
horizon	shoreline accumulation (H)	MH, sediment grid/plate (below MHW)	5	2	10	0				D	E		
hydro	Suspended sedi (TSS)	TSS, SSC	6	5	10	0						F	
bio	Decomp	van post (qual)	fibric			-							
bio	Decomp	decomp rate (quant)		2	5	-							

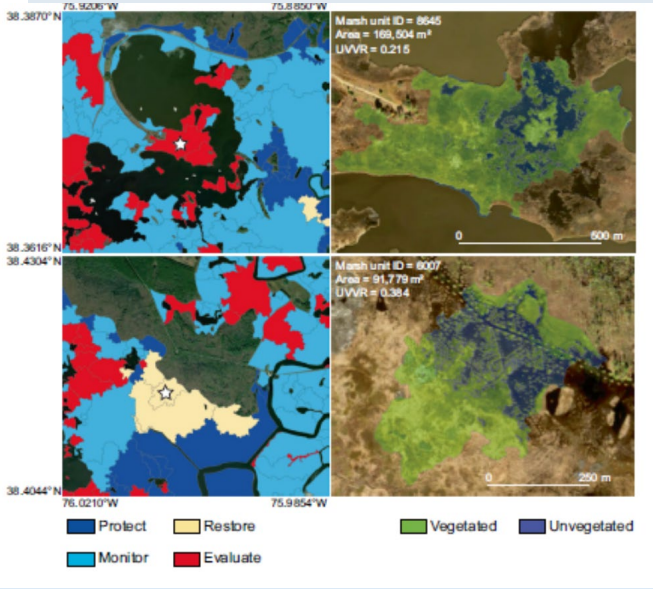
Uniques combos of violoations that code output						
		Top/side	0,0	0,1	1,0	1,1
A	sediment accumulation	V & H	Good platform & low marsh building	Building concentrated on platform	Building concentrated in low marsh (1 & 0)	Poor platform & low marsh building
B	High marsh sediment delivery	V & TSS	Good platform building & sedimentation potential	Platform building not sourced from TSS	Investigate subsidence, surface accretion, & decomp (1,0)	Poor platform building & sedimentation potential
C	High marsh integrity	V & Decomp	Good platform resilience	Platform building but potentially soft/unstable	Investigate subsidence, surface accretion, & TSS (1,0)	Poor platform resilience
D	Low marsh sediment delivery	H & TSS	Good sediment delivery to low marsh	Low marsh building not sourced from TSS	Investigate hydrodynamics & sediment trapping efficiency	Poor sediment delivery to low marsh
E	Low marsh/shoreline integrity	H & Decomp	Good low marsh resilience	Low marsh building but potentially soft/unstable	Investigate hydrodynamics & sediment trapping efficiency	Poor low marsh resilience
F	Accumulation resilience	TSS & Decomp	Good H & V building potenitial	Investigate source and composition of TSS	Investigate sediment trapping efficiency, surface accretion, & vegetation qualities	Poor H & V building potenitial

Output given to user for the site for the wich the data in the top table was entered	
Sediment Considerations:	
A	Building concentrated in low marsh (1 & 0)
B	Investigate subsidence, surface accretion, & decomp (1,0)
C	Platform building but potentially soft/unstable
D	Good sediment delivery to low marsh
E	Low marsh building but potentially soft/unstable
F	Investigate source and composition of TSS

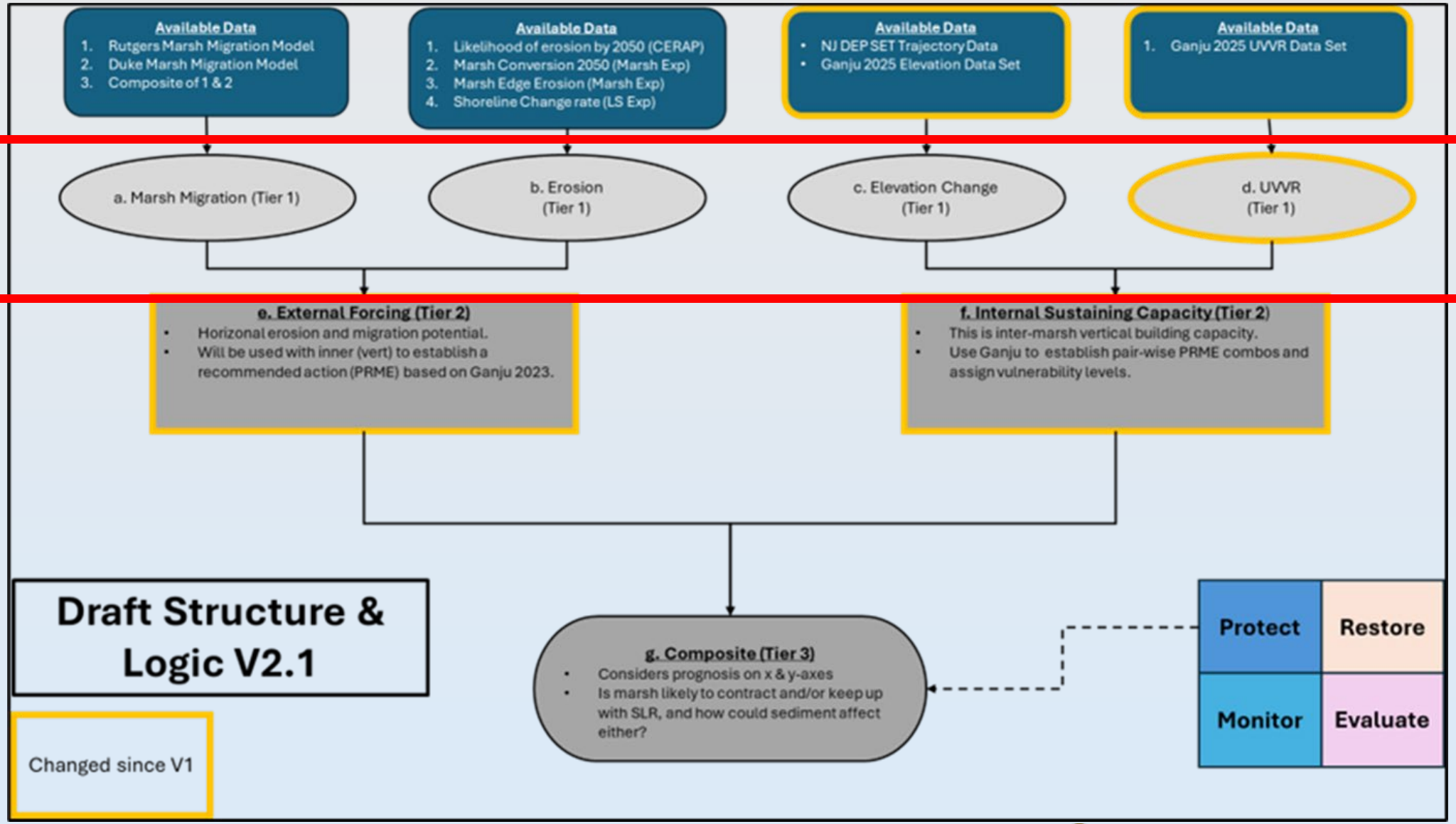
PRME & UVVR (Ganju et al)

Based on elevation and vegetation cover for vertical stability – correlates with sed trapping, vertical growth constrained when vegetative cover declines

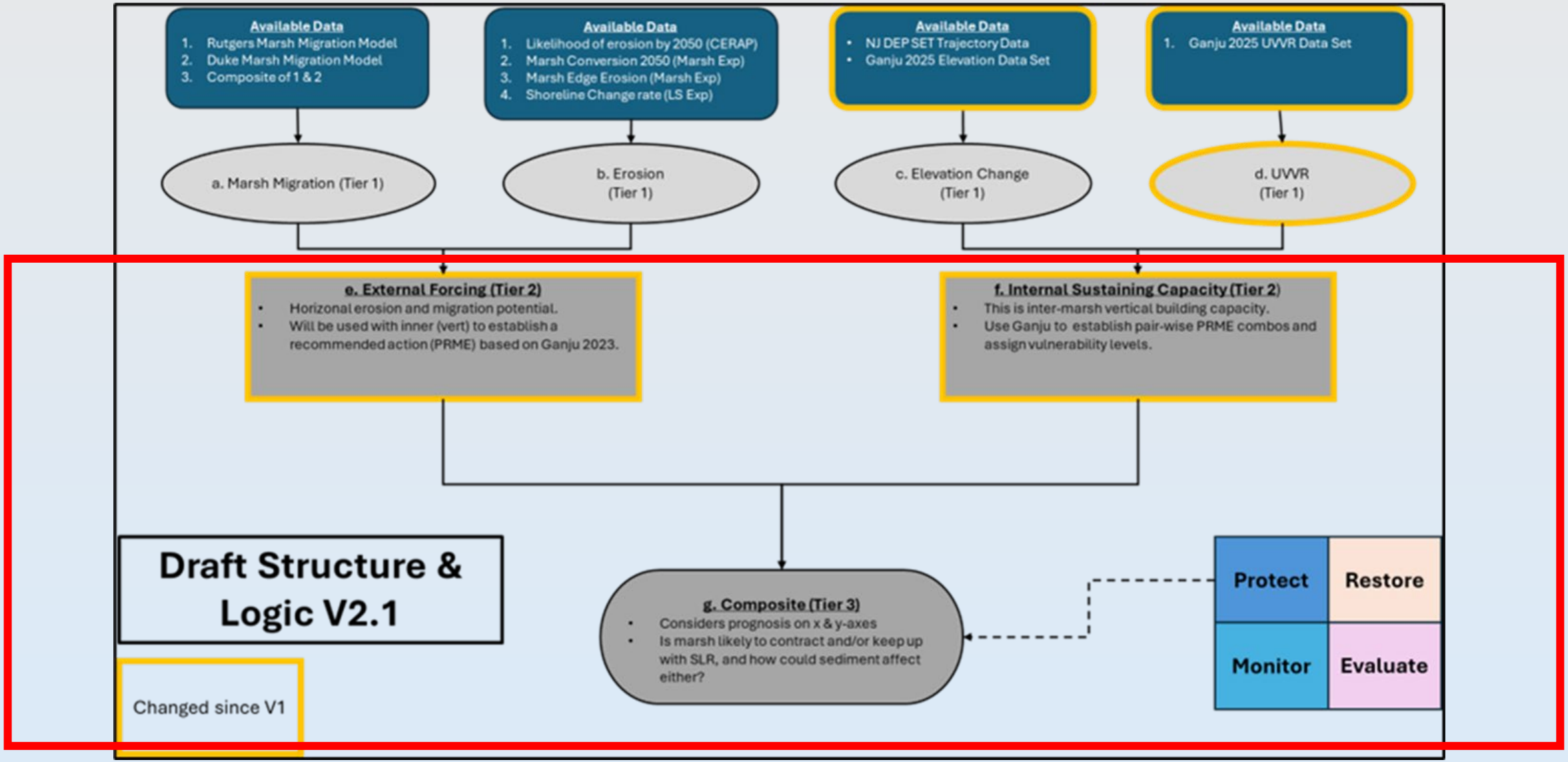




Draft Structure & Logic: Data Layers



Sediment Availability Tier 2 & Tier 3 Data Layers



Selected Data Sources

Marsh Unit Base Layer

USGS CMUs (not available for Delaware Bay)

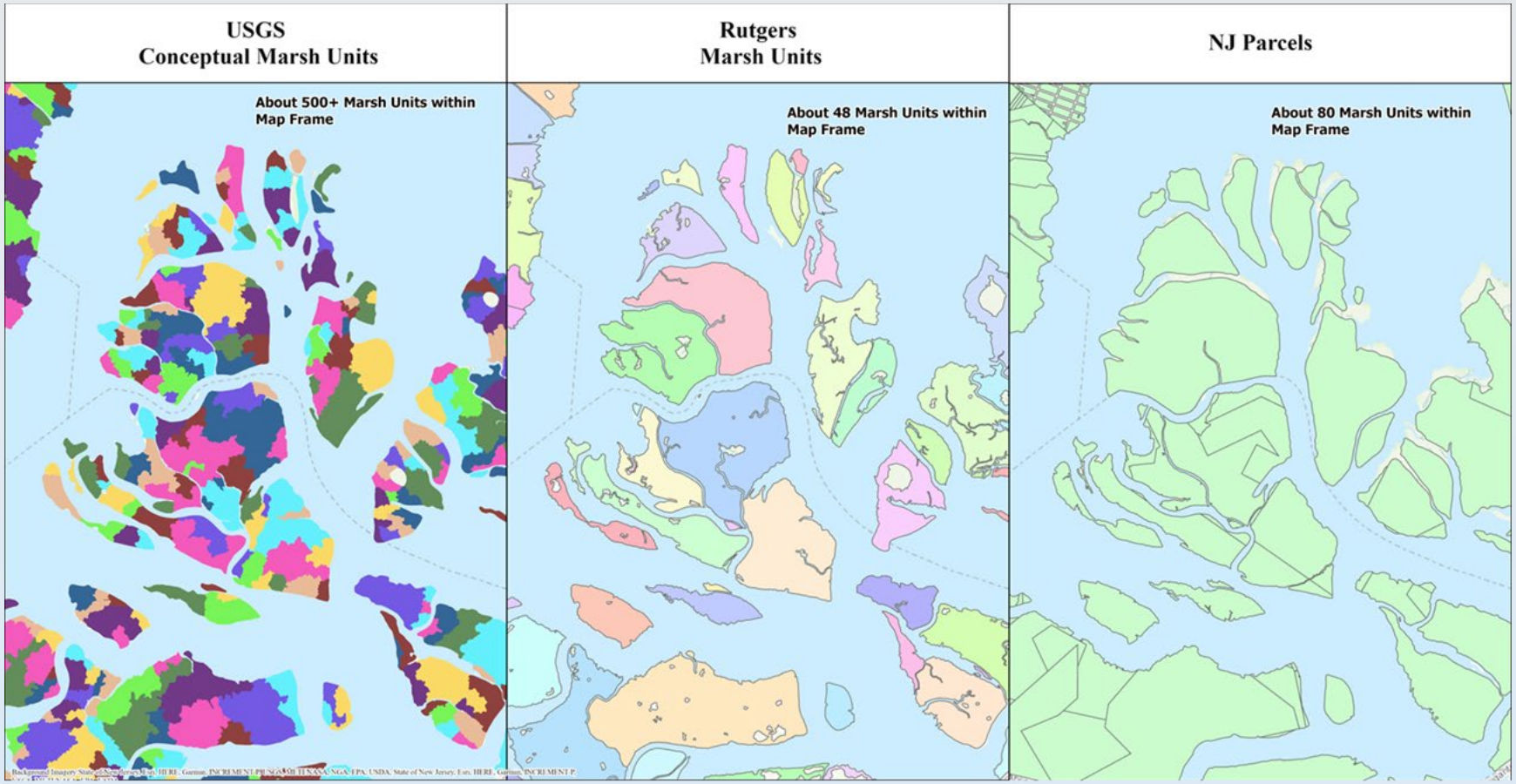
Shoreline Change (data layer to be updated, CERAP likelihood of erosion by 2050)

Marsh Migration (components from the Rutgers Marsh Migration Model)

Elevation Change

NJDEP SET (trajectory data as attribute to CMU 2025 elevation)

Unvegetated/Vegetated Ratio (UVVR) (quantify elevation and vegetative cover)



Next Steps

- **Continue receiving Stakeholder feedback**
  Submit comments to:
  kimberly.mckenna@stockton.edu
  joshua.moody@dep.nj.gov

- **Complete Y43 Tasks: meet with TAC, finalize data layer attributes & scoring of composite data layer, integration into NJ ResTOrS**