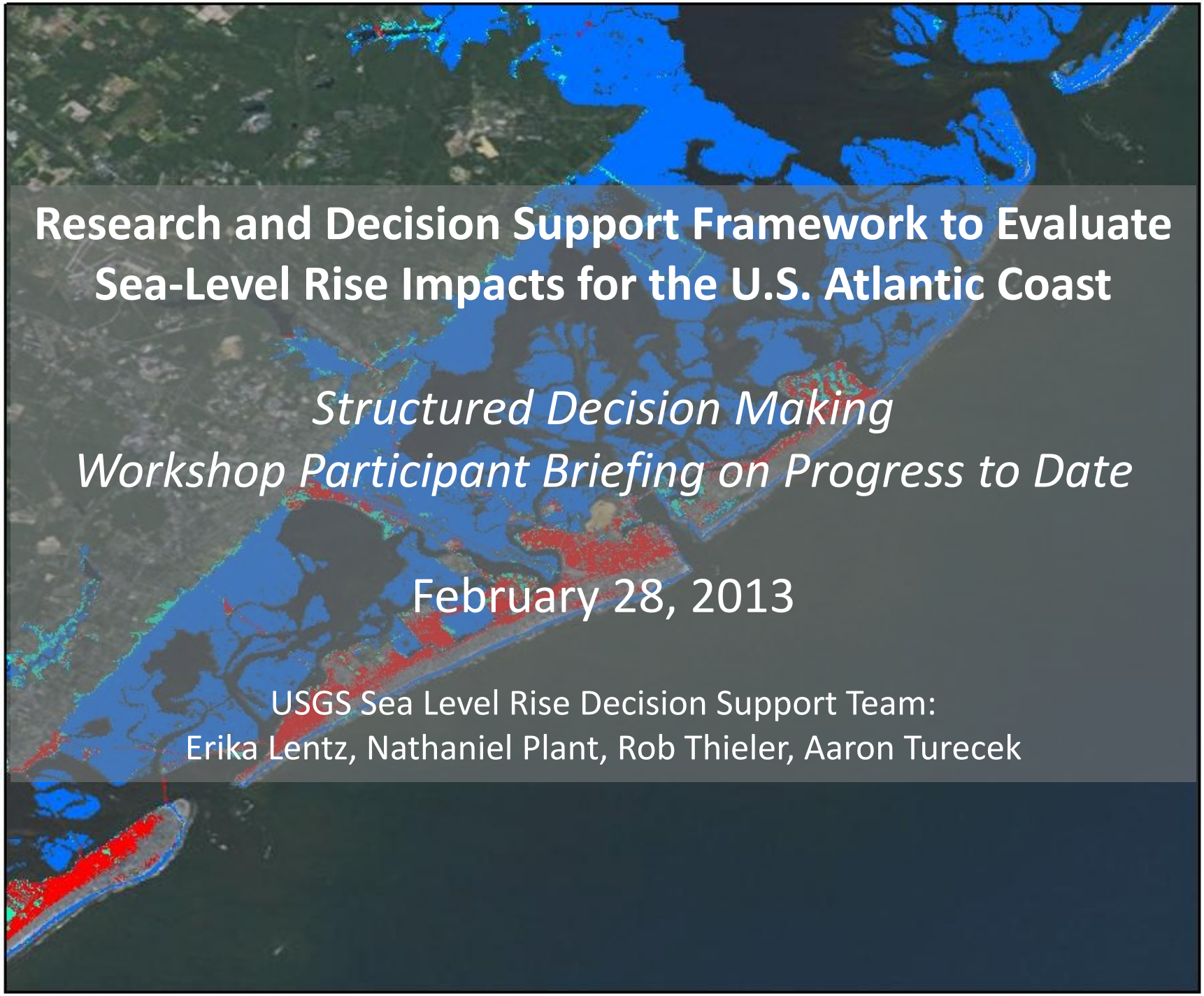


Research and Decision Support Framework to Evaluate Sea-Level Rise Impacts for the U.S. Atlantic Coast

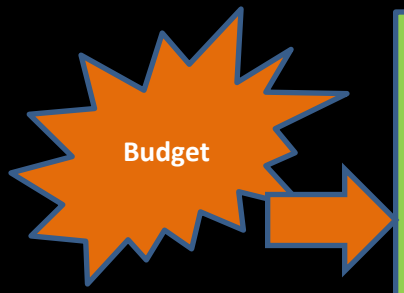
Structured Decision Making
Workshop Participant Briefing on Progress to Date

February 28, 2013

USGS Sea Level Rise Decision Support Team:
Erika Lentz, Nathaniel Plant, Rob Thieler, Aaron Turecek

Outline

- Recap from SDM workshop
- USGS sea level rise project decision support approach
  - Geospatial outputs
  - Dual modeling filter : coarse vs. fine
- Integration with habitat outputs



Optimize the allocation of conservation efforts in a spatially explicit manner in order to sustain ecological values of beaches/tidal marshes across the NALCC in the face of storm impacts and sea level rise

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(Carbon + Protection of Human Infrastructure+ Rec Measure)

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(Pr Persist Beach Complex + Pr Persist Marsh Complex)

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(Δ Suitability Spp Beach + Δ Suitability Spp Marsh)

Predictions
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Universe of Alternatives
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(Maintain high-quality habitat)

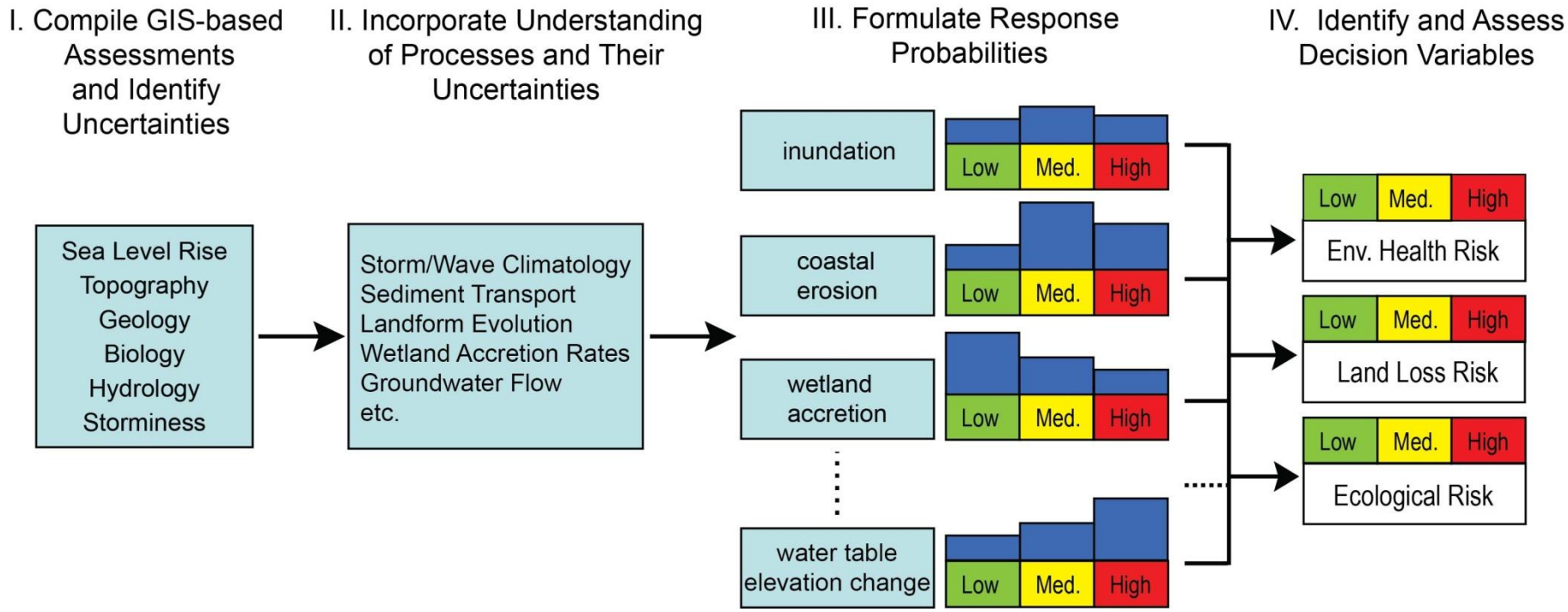
Manage Existing - Resiliency
(Management to habitat in conservation status to improve resiliency to effects)

Key is understanding where we will experience:

1. Inundation
2. Land loss (erosion)
3. Landform migration

BEFORE *habitat model integration . . .*

USGS Decision Support Approach (from http://wh.er.usgs.gov/slr/decisionsupport.html)



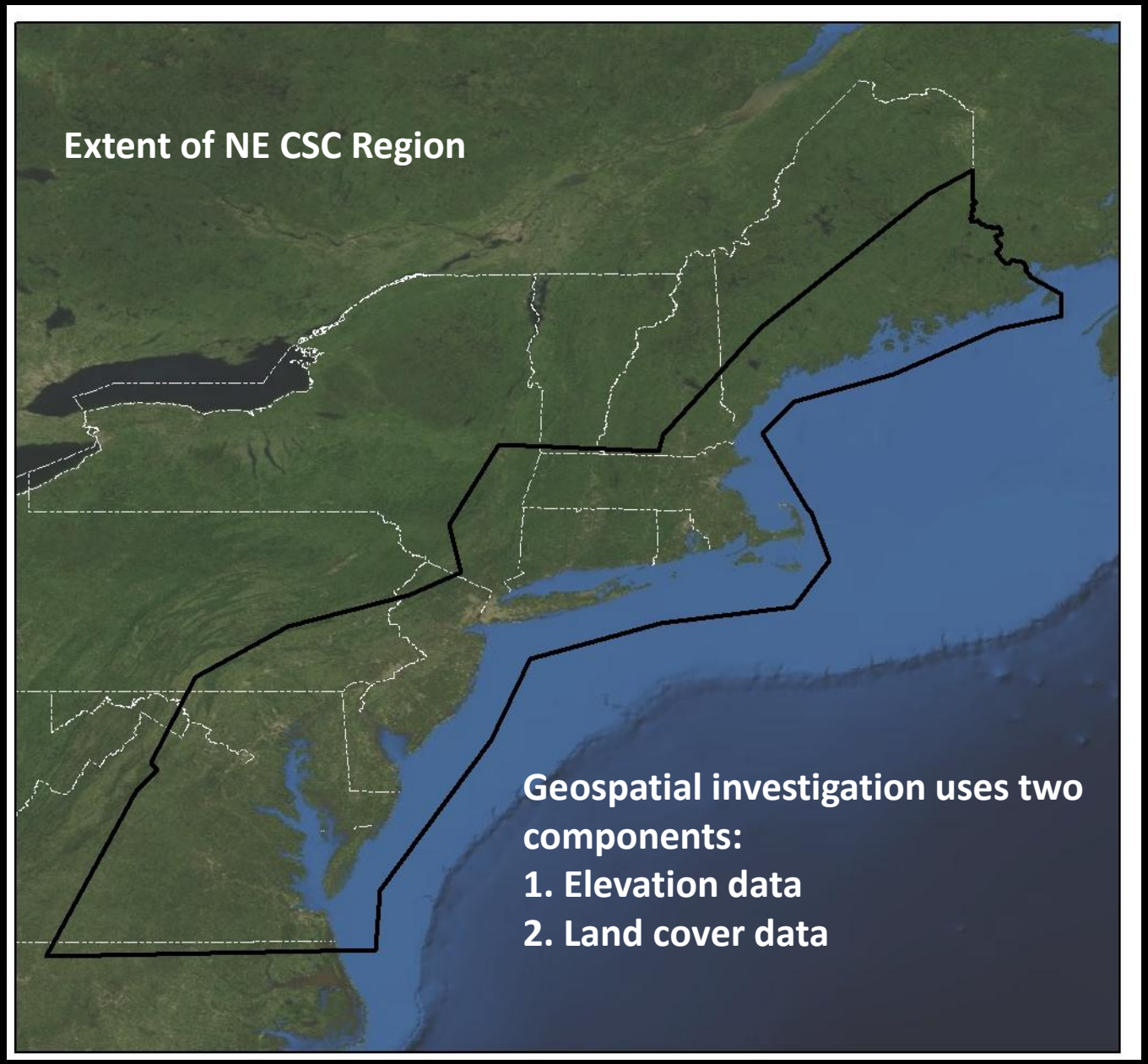
Dual Modeling Filter:

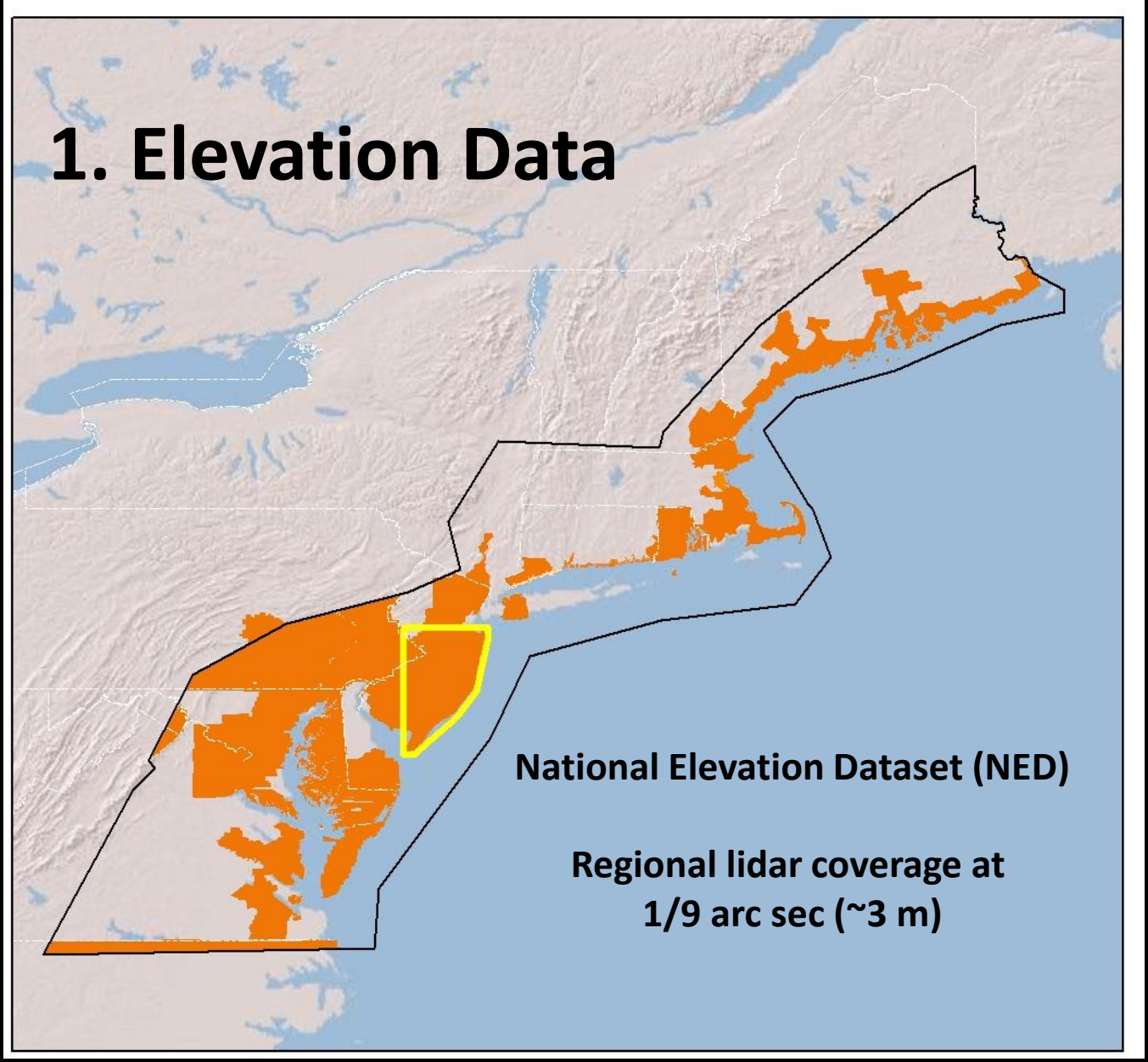
Coarse:

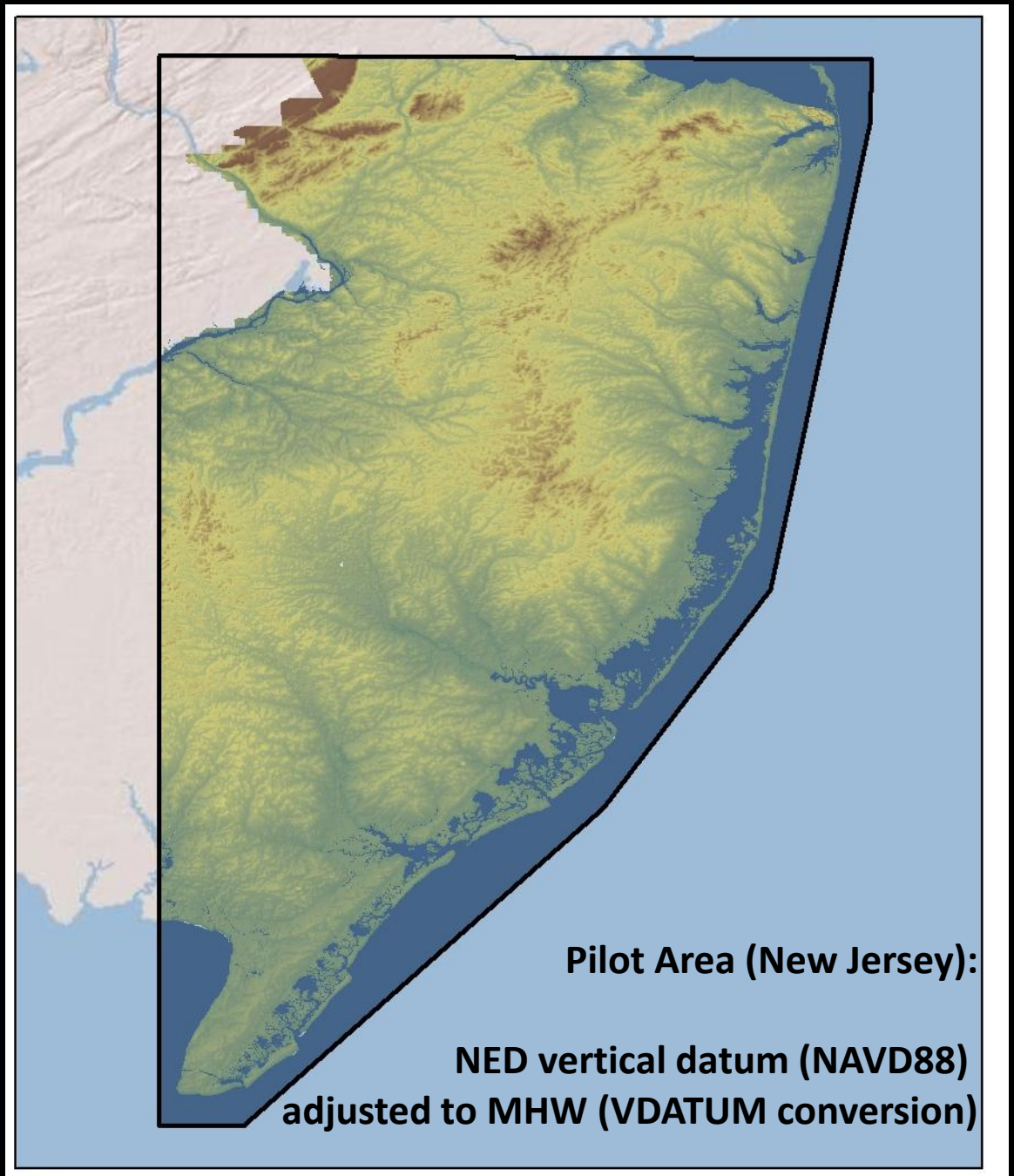
- Regional focus on dominant coastal response type (inundation vs. dynamic)
- Single time step
- Morphological/physical process assessments and predictions
- Geospatial mapping and decision support model

Fine:

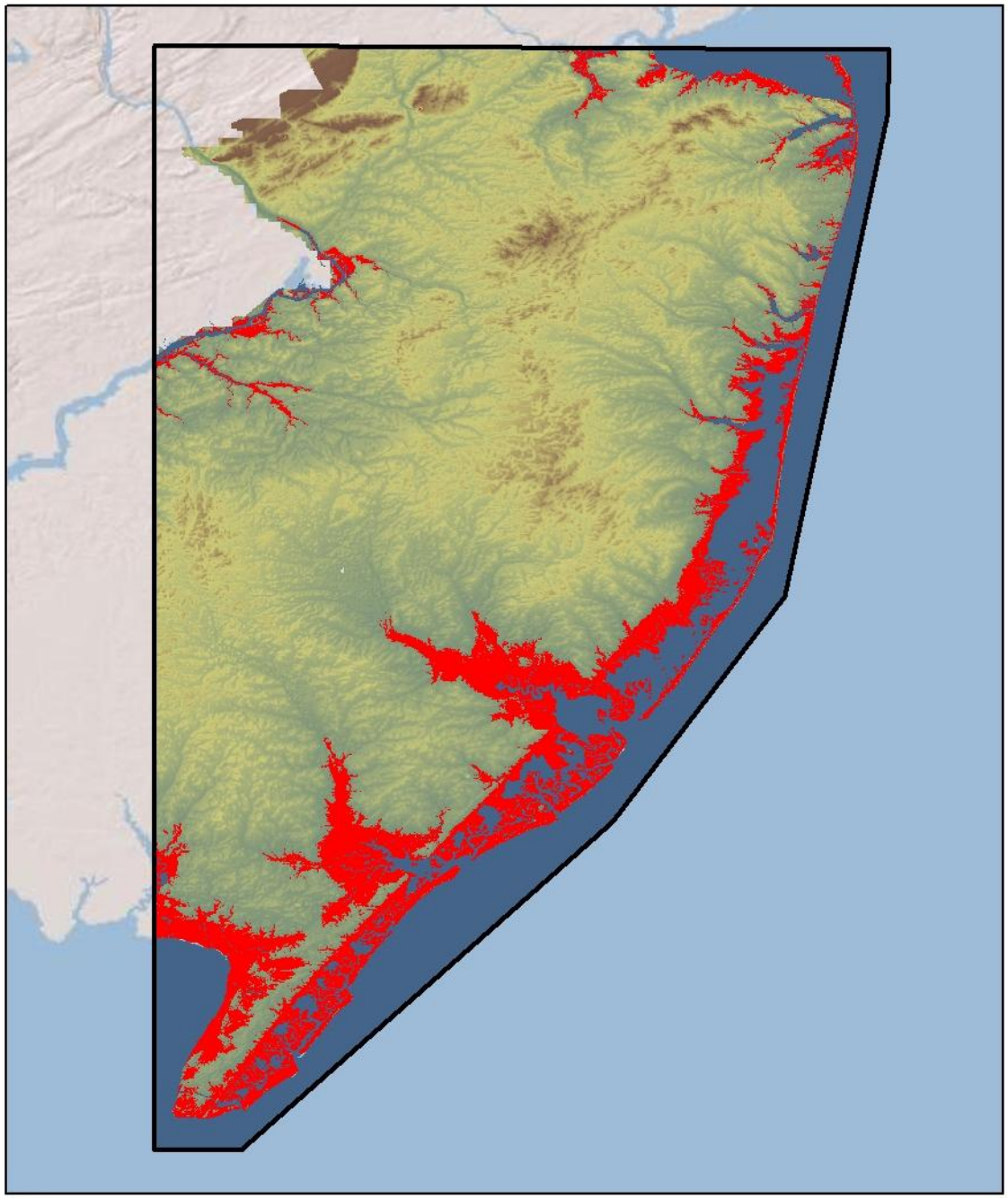
- Localized iterative approach to evaluate dynamic response to event-driven impacts
- Morphological/physical process assessments and predictions
- Decision support model


Extent of NE CSC Region
Geospatial investigation uses two components:
1. Elevation data
2. Land cover data

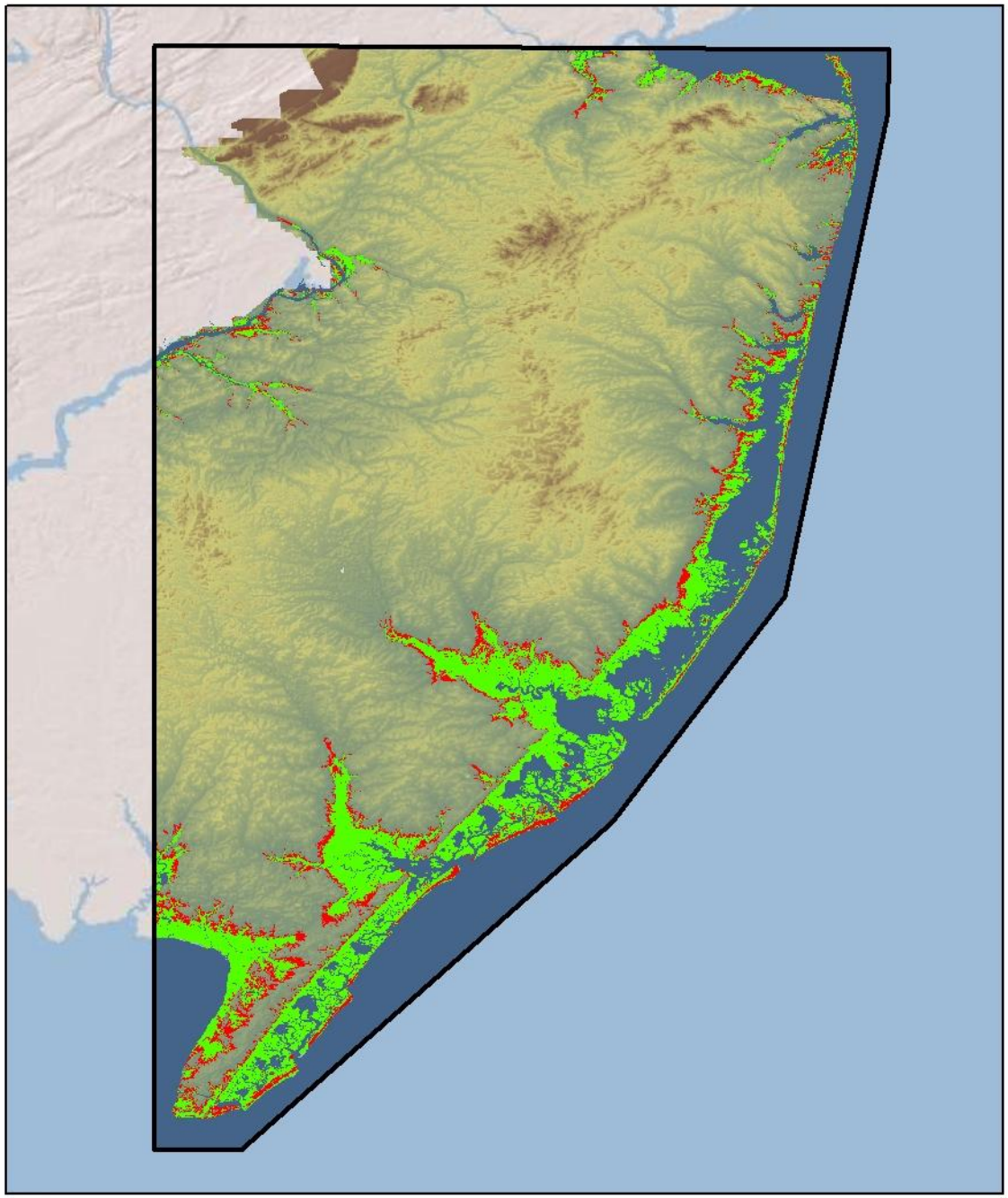

1. Elevation Data
National Elevation Dataset (NED)
Regional lidar coverage at
1/9 arc sec (~3 m)


Pilot Area (New Jersey):
NED vertical datum (NAVD88)
adjusted to MHW (VDATUM conversion)

Identify SLR response-type (inundation vs. dynamic)

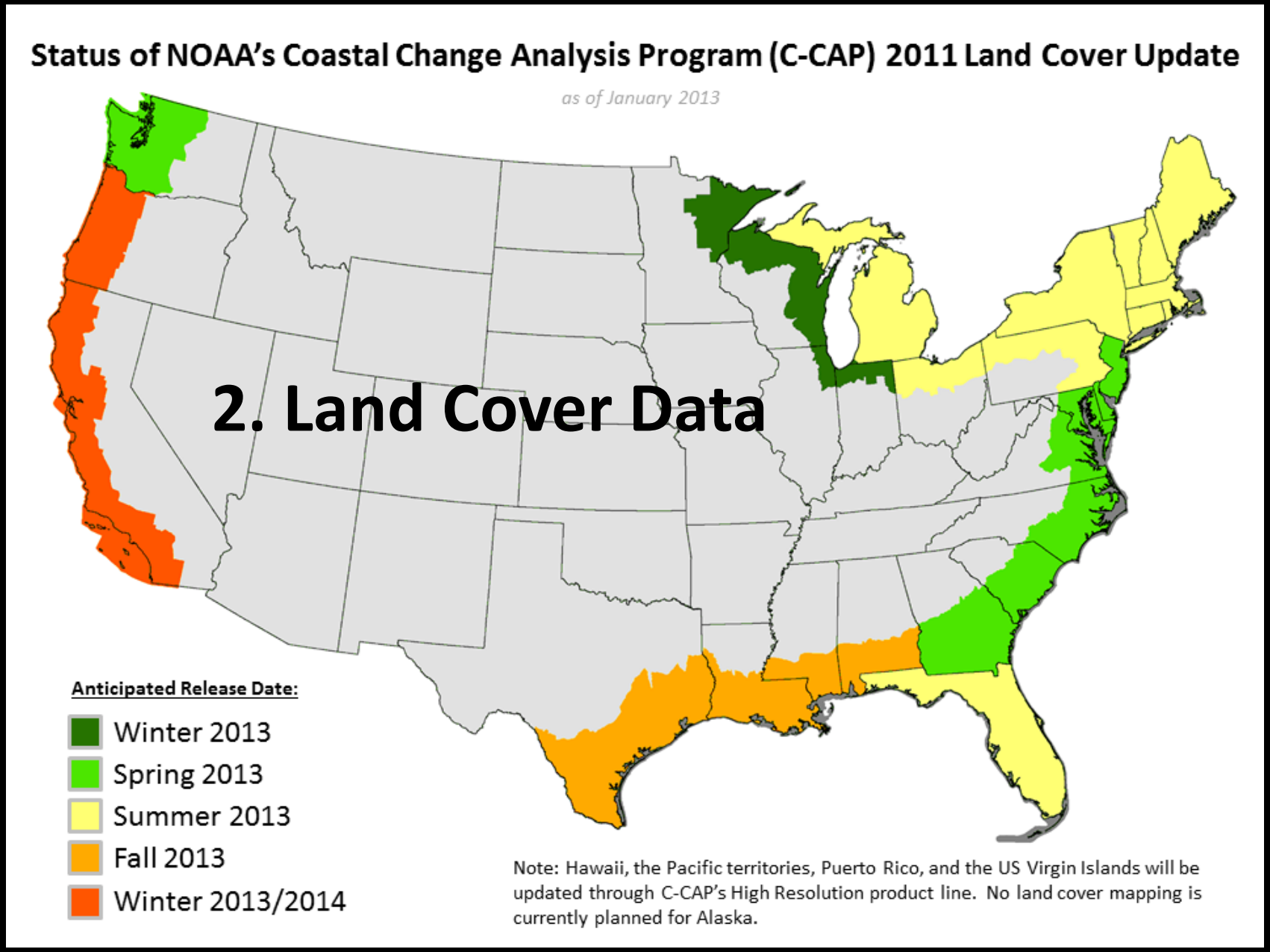


Elevation data trimmed by 95% confidence interval on DEM (≥ 5% or greater chance of flooding)

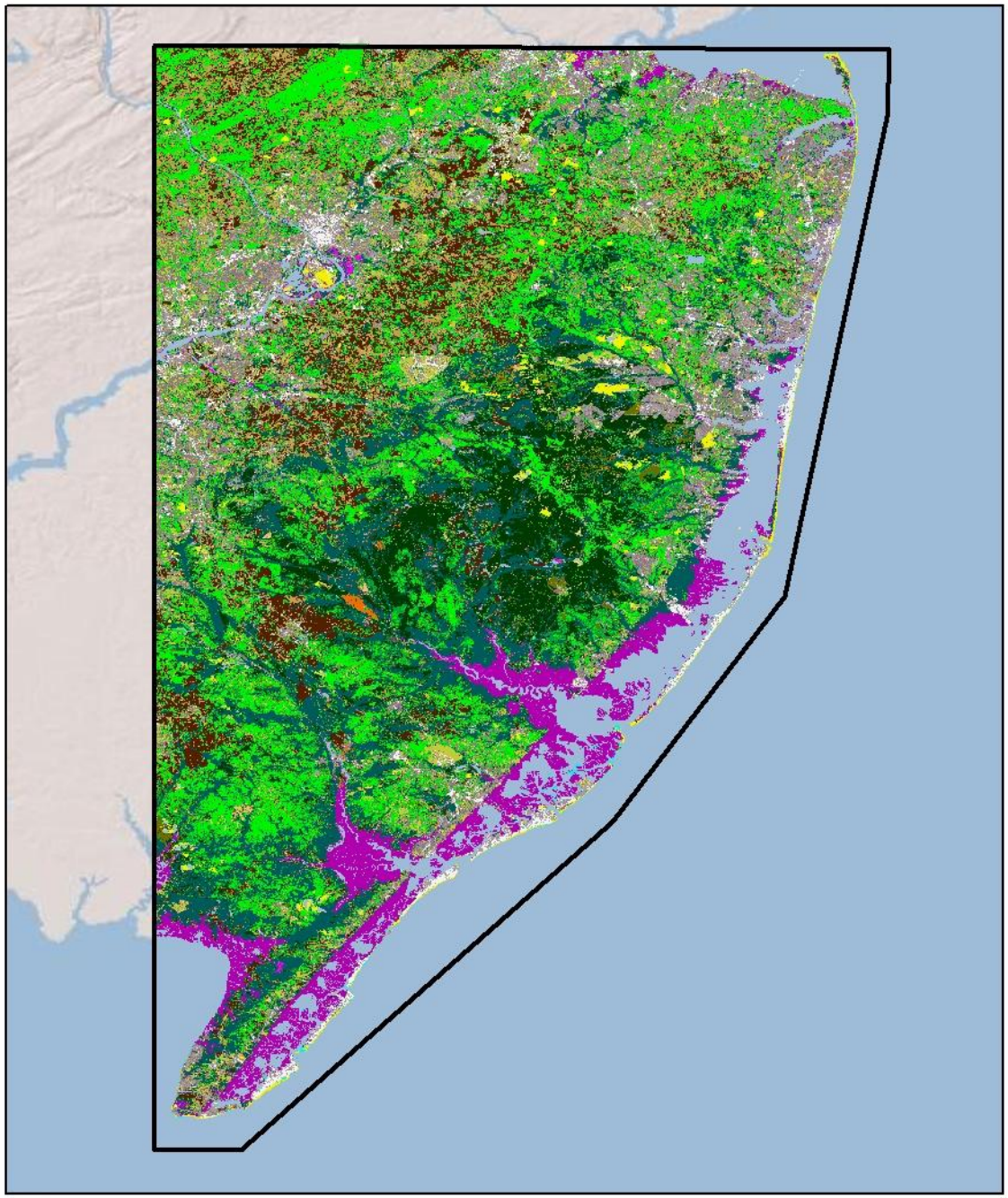


Elevation data trimmed by 68% (green) and 95% (red) confidence interval on DEM (≥ 32% or ≥ 5% greater chance of flooding, respectively)

Resolution: 30 m pixels
Accuracy: 85% target accuracy



Source: http://www.csc.noaa.gov/digitalcoast/_/img/maps/ccap_2011_status_20130122.png

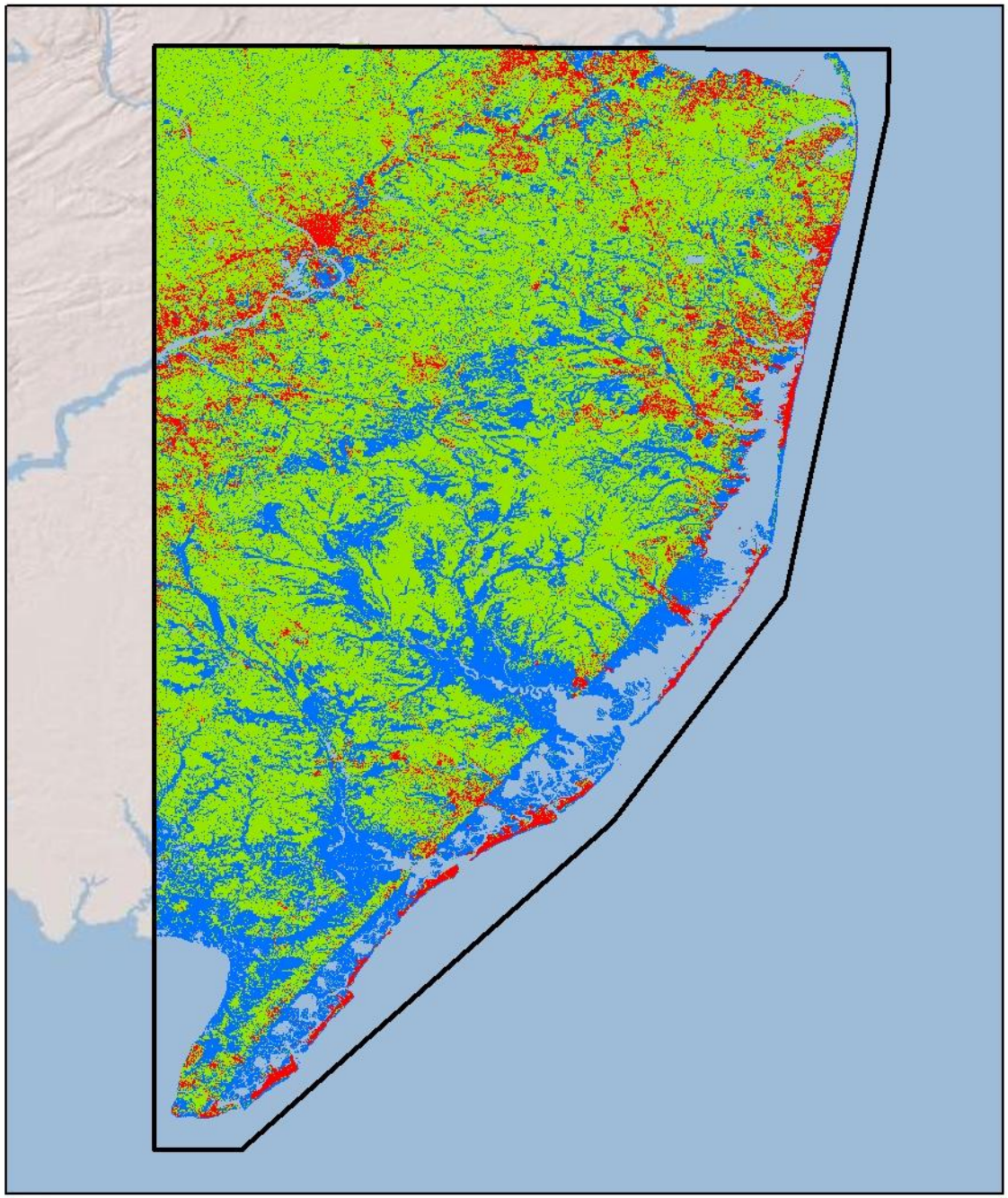


Coastal Change Analysis Program (C-CAP) Regional Land Cover Data

Resolution: 30 m pixels
Accuracy: 85% target accuracy

Land Cover Classification Scheme

- Developed - High Intensity
- Developed - Medium Intensity
- Developed - Low Intensity
- Developed - Open Space
- Cultivated
- Pasture / Hay
- Grassland
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Scrub / Shrub
- Palustrine Forested Wetland
- Palustrine Scrub / Shrub Wetland
- Palustrine Emergent Wetland
- Estuarine Forested Wetland
- Estuarine Scrub / Shrub Wetland
- Estuarine Emergent Wetland
- Unconsolidated Shore
- Bare Land
- Water
- Palustrine Aquatic Bed
- Estuarine Aquatic Bed
- Tundra
- Snow / Ice



C-CAP data subdivided into three classes:

Inundation

Uncertain

Dynamic

- Developed - High Intensity
- Developed - Medium Intensity
- Developed - Low Intensity
- Developed - Open Space
- Cultivated
- Pasture / Hay
- Grassland
- Deciduous Forest
- Evergreen Forest
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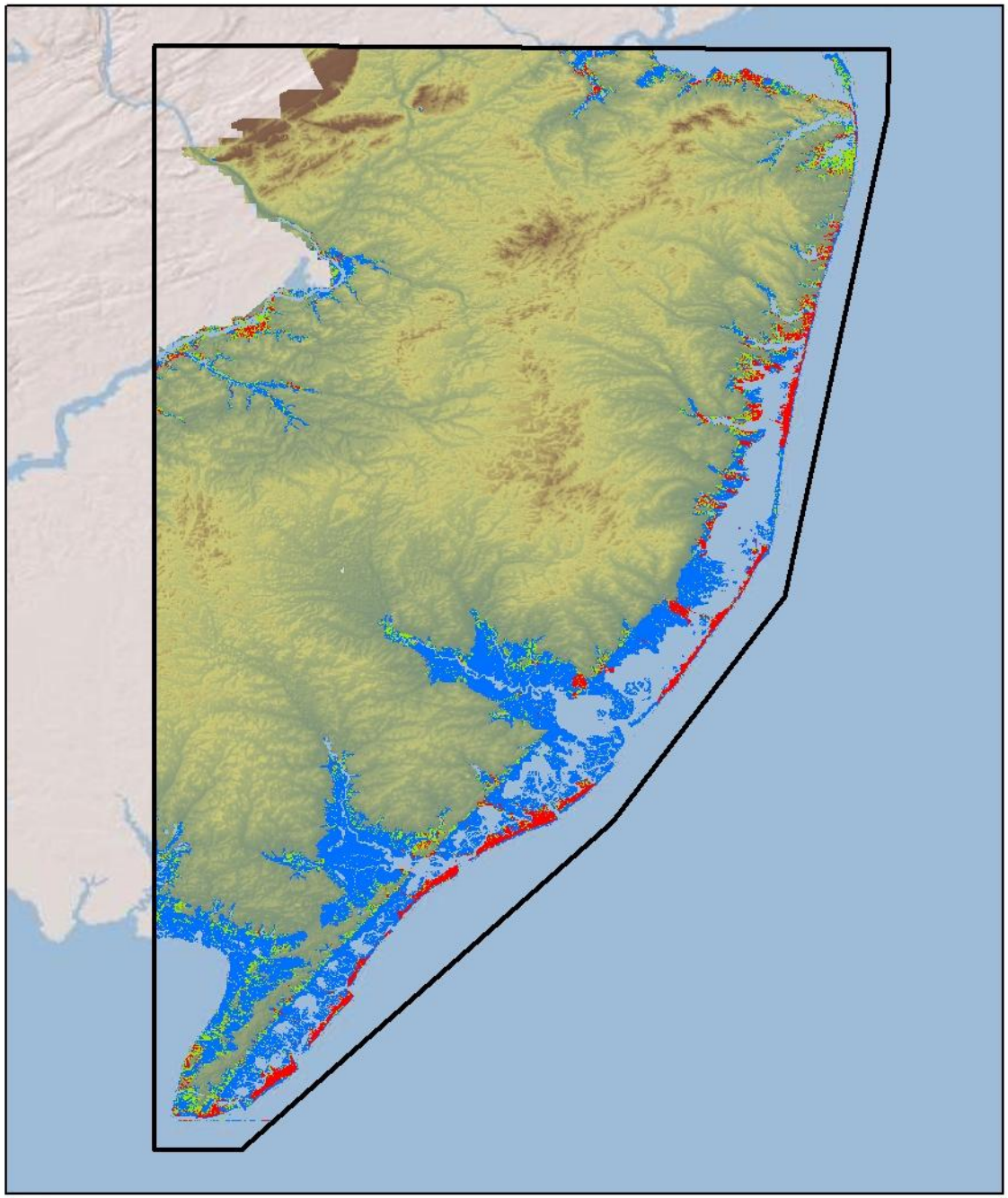
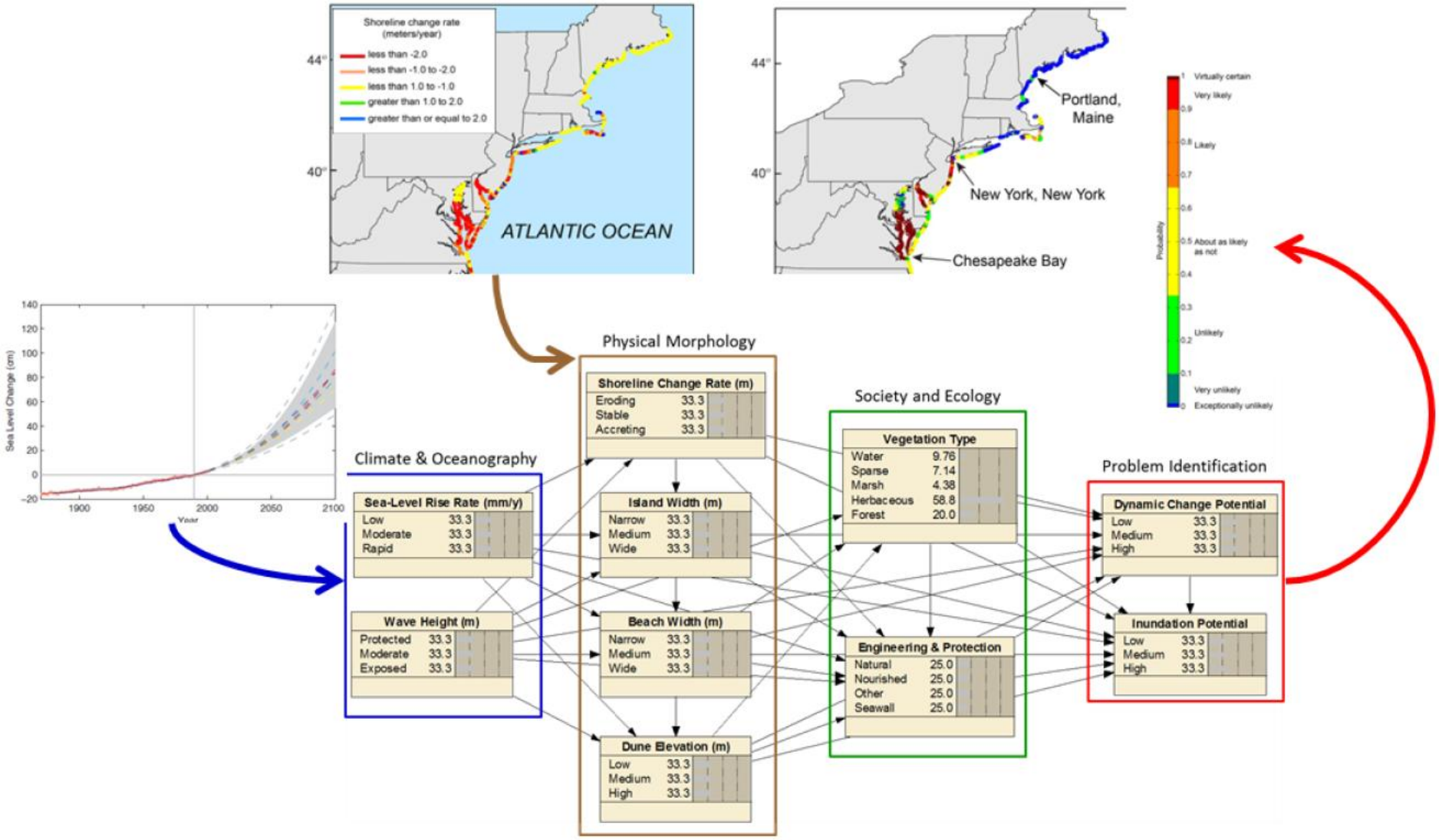
Identify SLR response-type (inundation vs. dynamic)

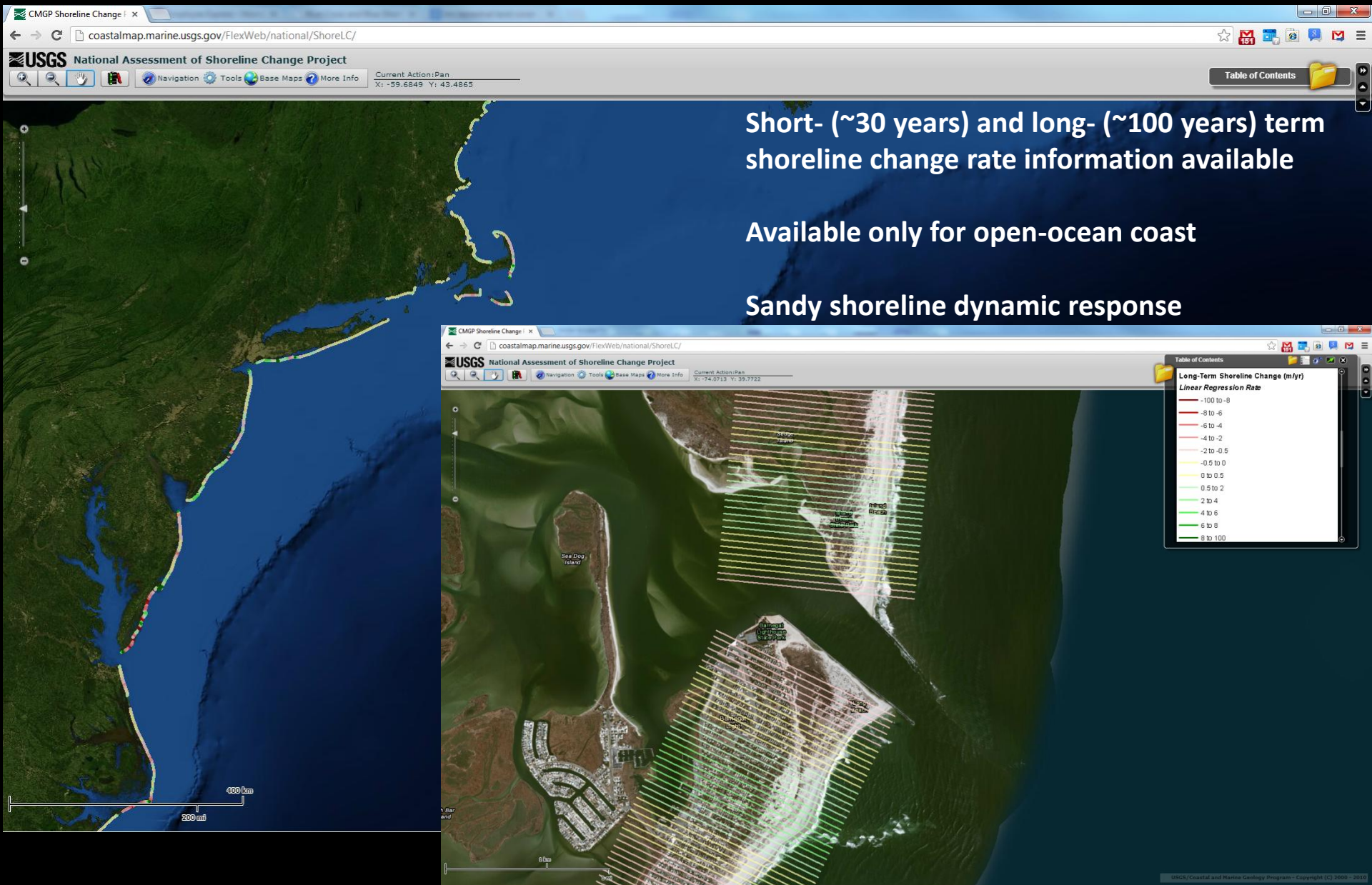


Elevation + Land Cover = land cover response sub-classes at 95% confidence interval

CSC Coarse Filter Approach



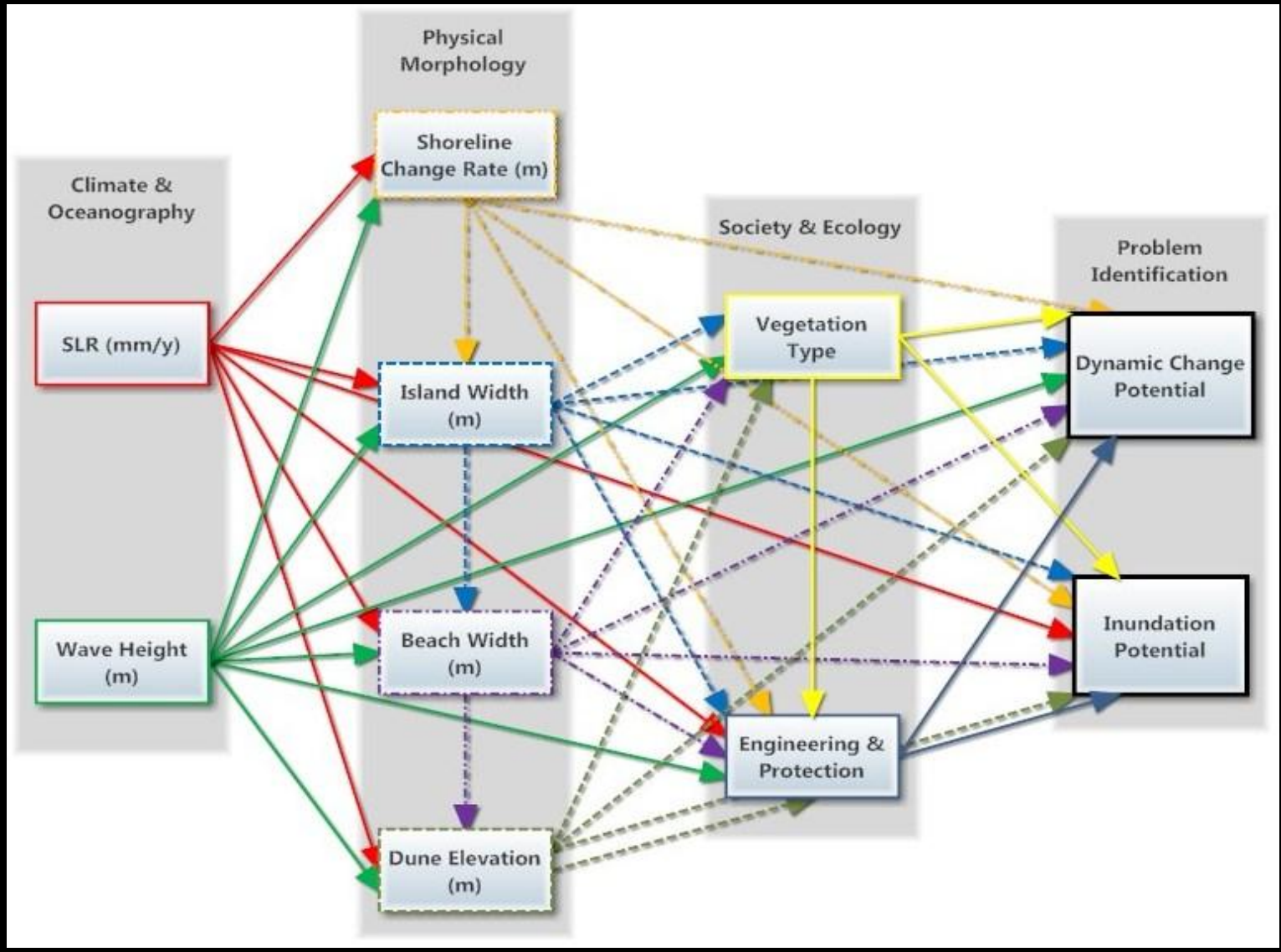
National Assessment of Shoreline Change Transects



Modeling Investigation: COARSE

Identify SLR response-type (inundation vs. dynamic)

Decision Support Model (in progress)



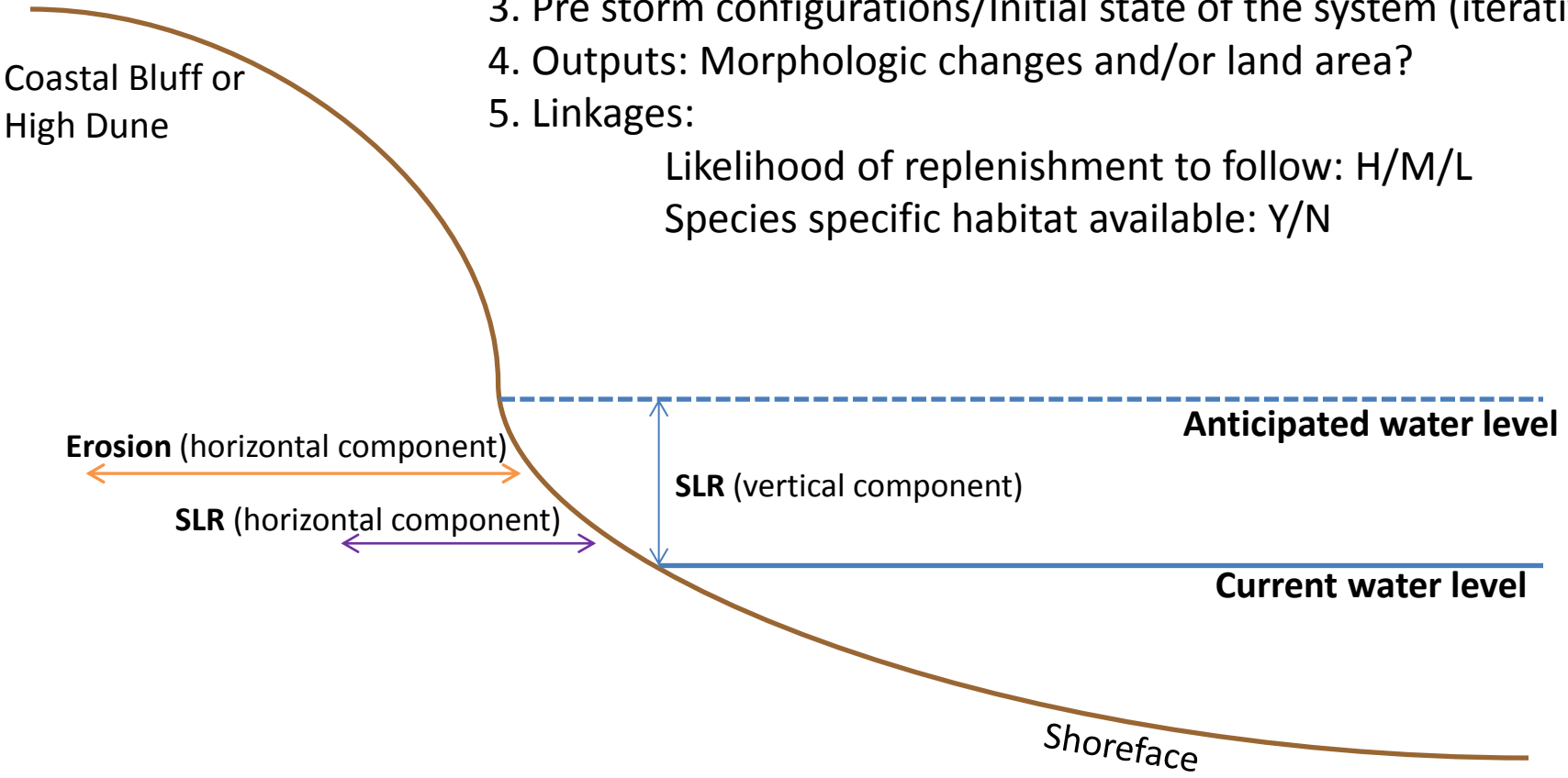
Fine Filter: Storm/species vulnerability scale

Objectives:

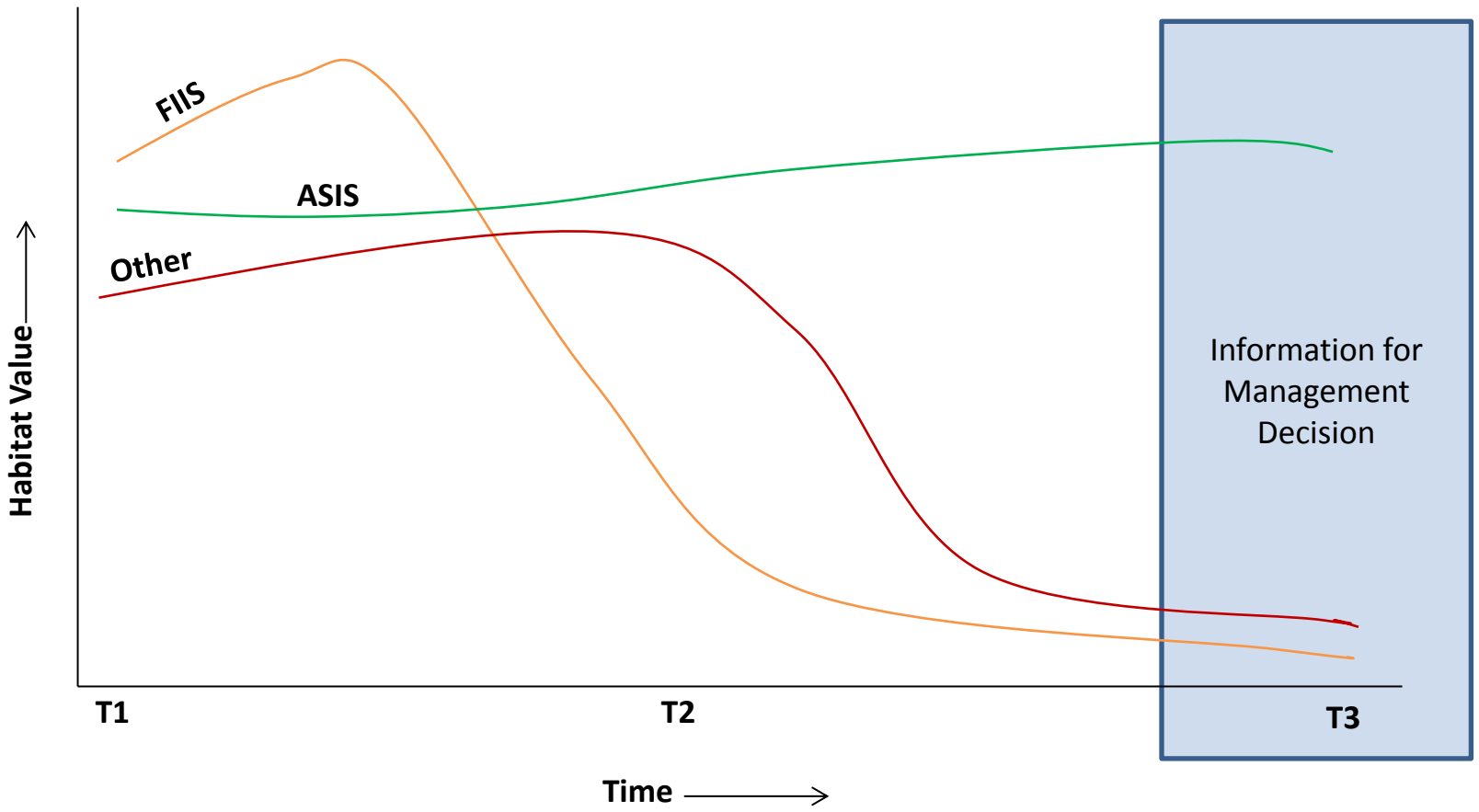
- Evaluate dynamic response type to event-driven parameters (time-steps)
- Determine where:
  - Erosion becomes limiting over SLR
  - Development hinders dynamic response (inundation)
- Make model iterative

Model Components

1. Drivers: waves/storminess parameter, (local) SLR rate
2. (Longer-term) change rates of features
3. Pre storm configurations/Initial state of the system (iterative)
4. Outputs: Morphologic changes and/or land area?
5. Linkages:
   - Likelihood of replenishment to follow: H/M/L
   - Species specific habitat available: Y/N



Identify dynamic response-type (SLR vs. erosion)



Decision Support Integration

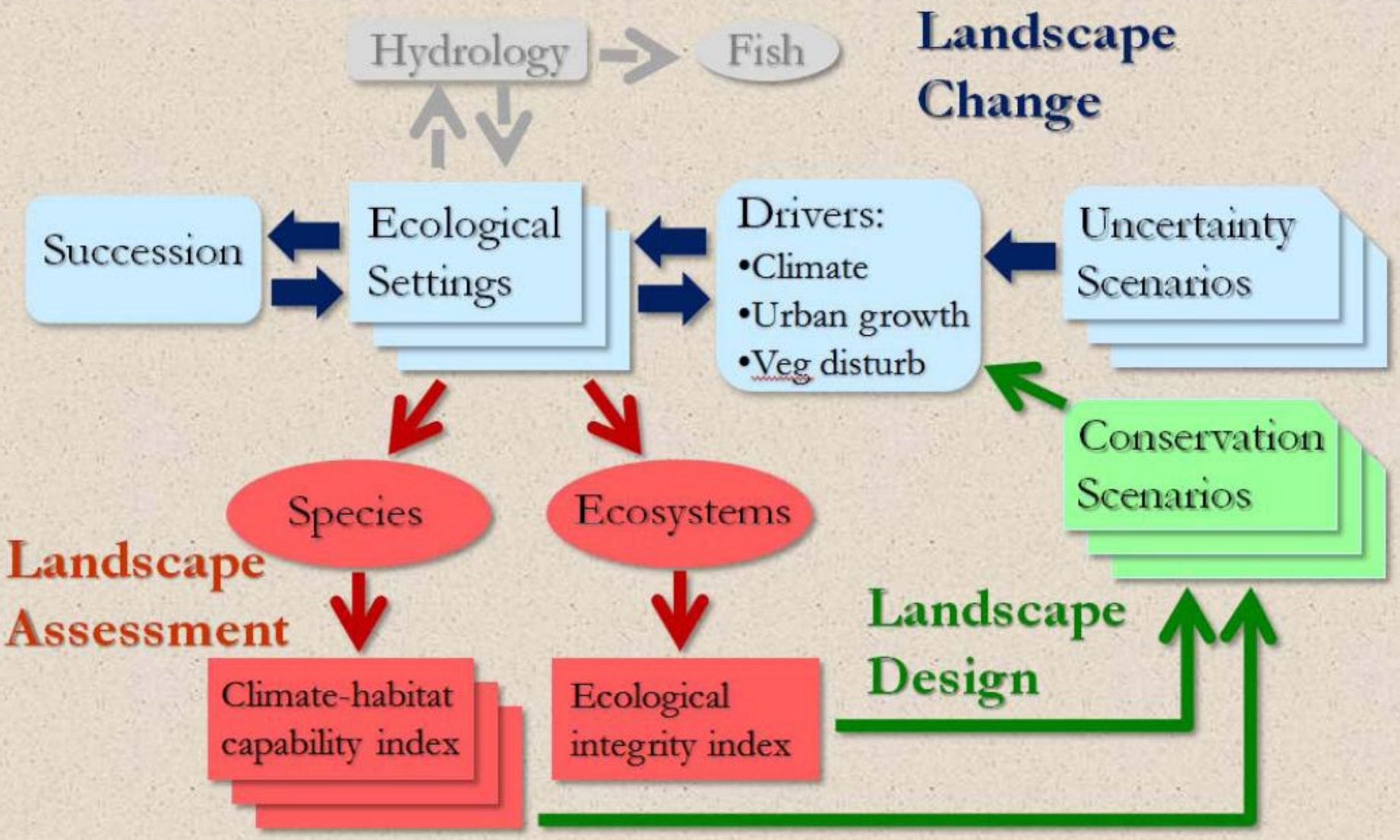
Modeling/mapping provides opportunity to link with:

- Habitat quality information (UMASS-DSL)
- Species response (i.e. piping plover habitat)
- Human response (i.e. development of social dynamics/response)

The Approach

From K. McGarigal DSL Workshop 10/2012

LCAD model



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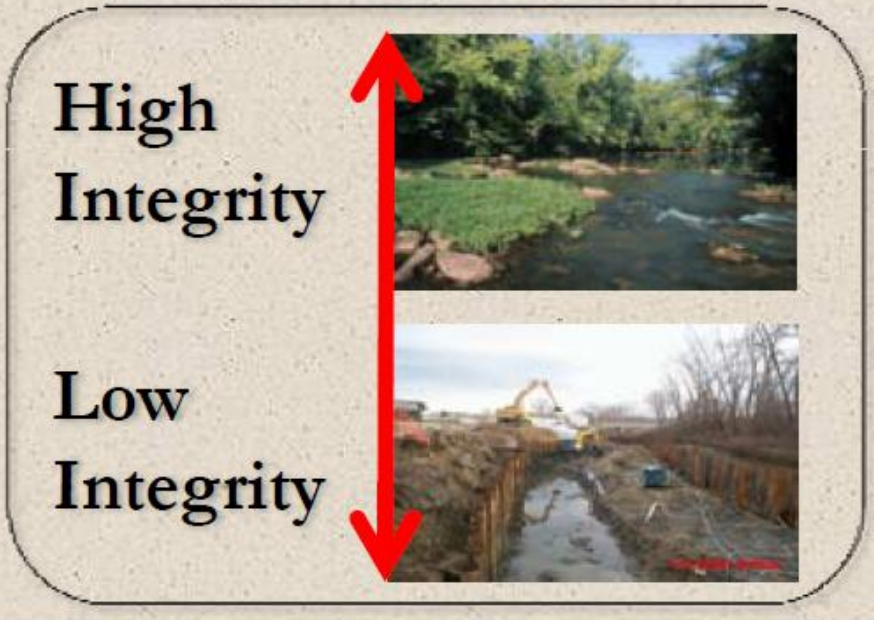
Landscape Assessment

Coarse filter

Our coarse filter is based on the concept of *ecological integrity* applied to the suite of *ecological systems*



- *Ecological integrity* refers to the capability of an area to sustain ecological functions over the long term, especially in the face of disturbance and stress

The Approach

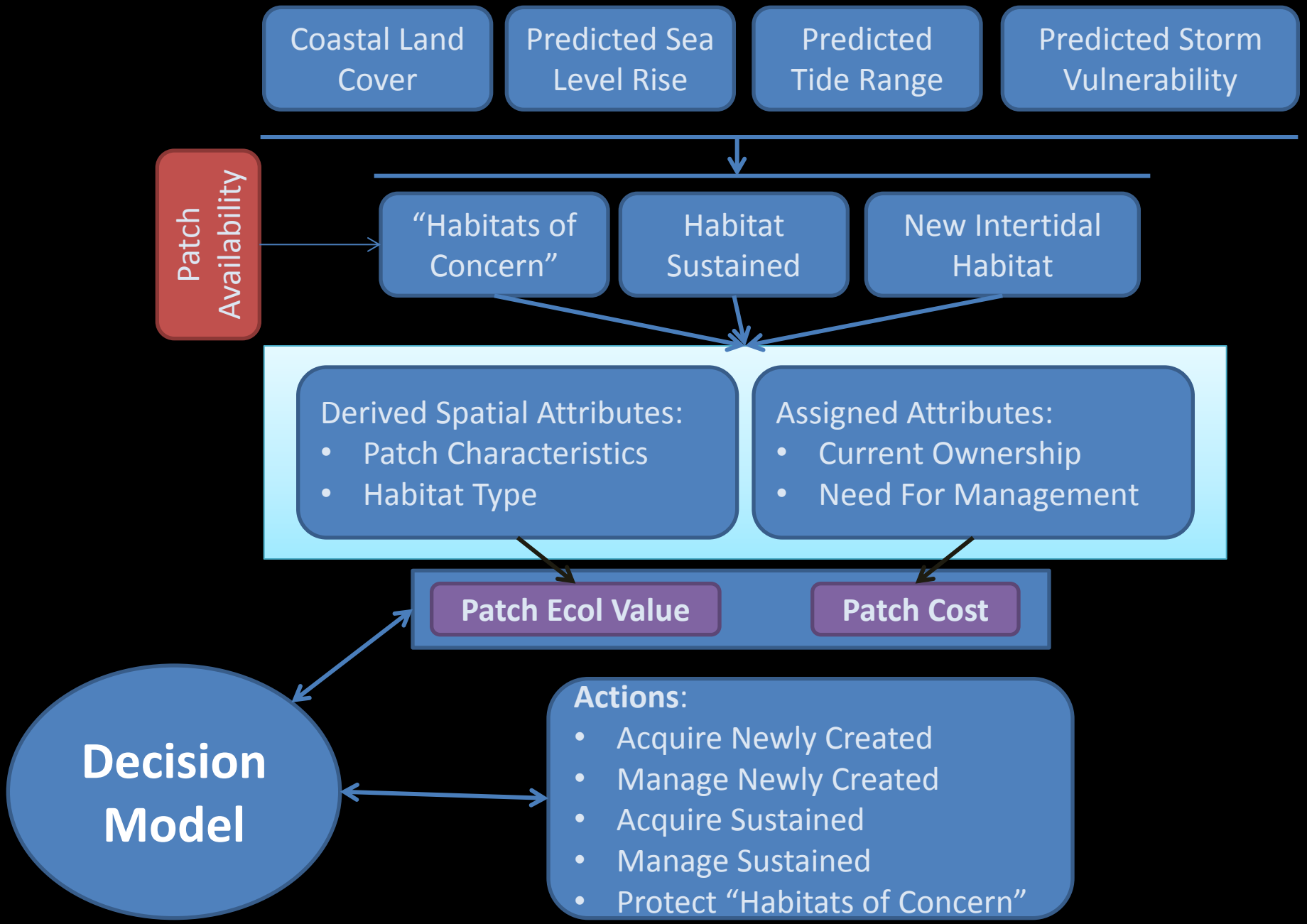
From K. McGarigal DSL Workshop 10/2012

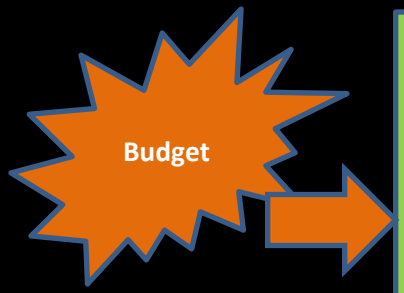
Landscape Assessment

Fine filter

Our fine filter is based on the concept of *climate & habitat capability* applied to a suite of *representative species*

- *Habitat capability* refers to the ability of the environment to provide the local resources (e.g., food and cover) needed for survival and reproduction in sufficient quantity, quality and accessibility to meet the life history requirements of individuals and local populations


Coastal Land Cover
Predicted Sea Level Rise
Predicted Tide Range
Predicted Storm Vulnerability
Patch Availability
"Habitats of Concern"
Habitat Sustained
New Intertidal Habitat
Derived Spatial Attributes:
• Patch Characteristics
• Habitat Type
Assigned Attributes:
• Current Ownership
• Need For Management
Patch Ecol Value
Patch Cost
Decision Model
Actions:
• Acquire Newly Created
• Manage Newly Created
• Acquire Sustained
• Manage Sustained
• Protect "Habitats of Concern"



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