Designing Sustainable Coastal Habitats

STAC Workshop Report
April 16-17, 2013
Easton, Maryland

STAC Publication 14-003

http://www.chesapeake.org/stac/

Climate Change and Chesapeake Bay Habitats

Donna Marie Bilkovic

Atlantic Coastal Fish Habitat Partnership Steering Committee Meeting

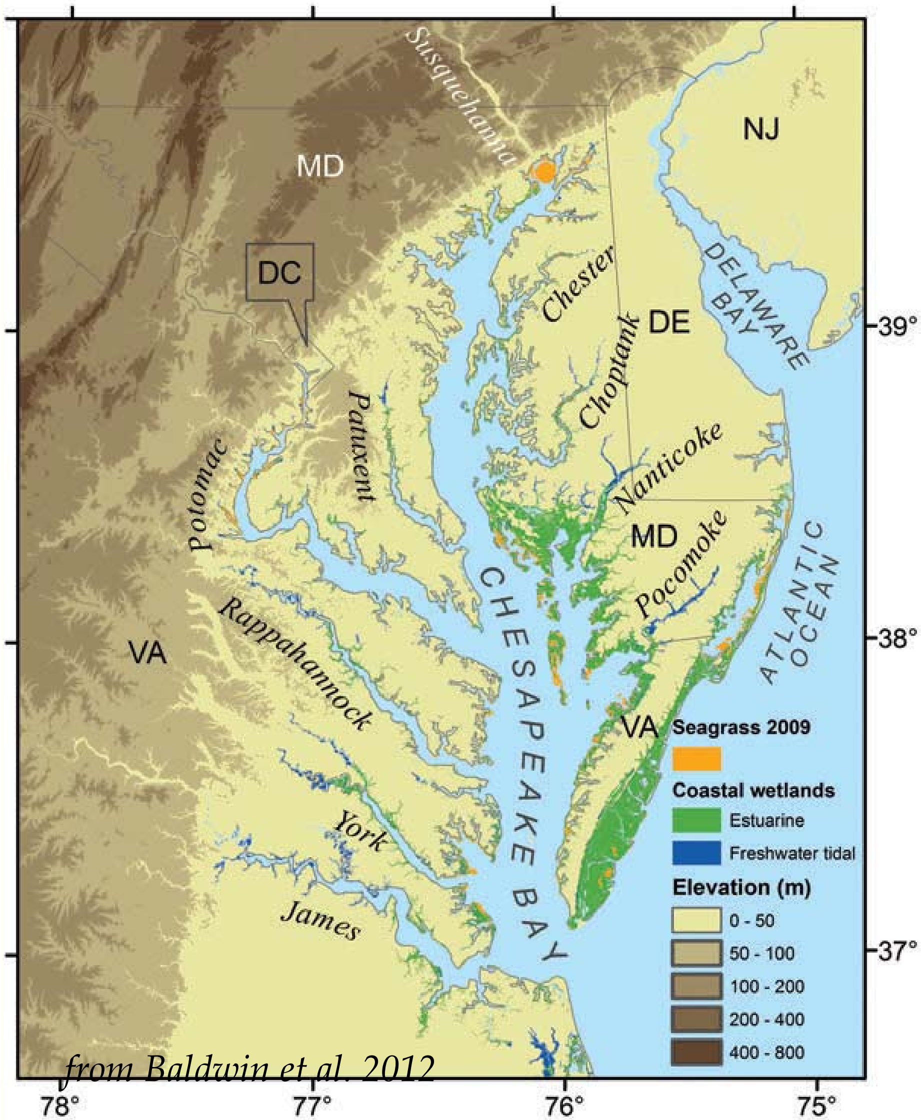
27 October 2014

Virginia Institute of Marine Science
www.ccrm.vims.edu
donnab@vims.edu

VIMS | William & Mary
Virginia Institute of Marine Science

Existing coastal wetlands – Chesapeake Bay

VIMS | William & Mary
Virginia Institute of Marine Science



from Baldwin et al. 2012

Total Bay Coastal Wetlands
~~595,000 ha

NON-TIDAL COASTAL WETLANDS

State	Coastal (ha)	%
VA	**260,627**	**64**
MD	**136,558**	**90**

Havens, regional assessment

TIDAL FRESHWATER WETLANDS

State	(ha)
Delaware	823
Maryland	**10,345**
Virginia	**16,000**
North Carolina	1,200
South Carolina	26,115
Georgia	19,040

After: Mitsch & Gosselink 2000

BRACKISH & SALT MARSH

Salt Marsh	**27,438**
Brackish marsh	**123,651**

***SAV (2012)* ~ 19,500 ha**

Two principal drivers of bay habitat persistence, human use and climate, are constantly changing

Human Use

Climate Change

Climate Change can affect coastal wetlands through multiple ways

Temperatures can change plant growth and assemblages

Storms can physically remove SAV beds and marsh plants

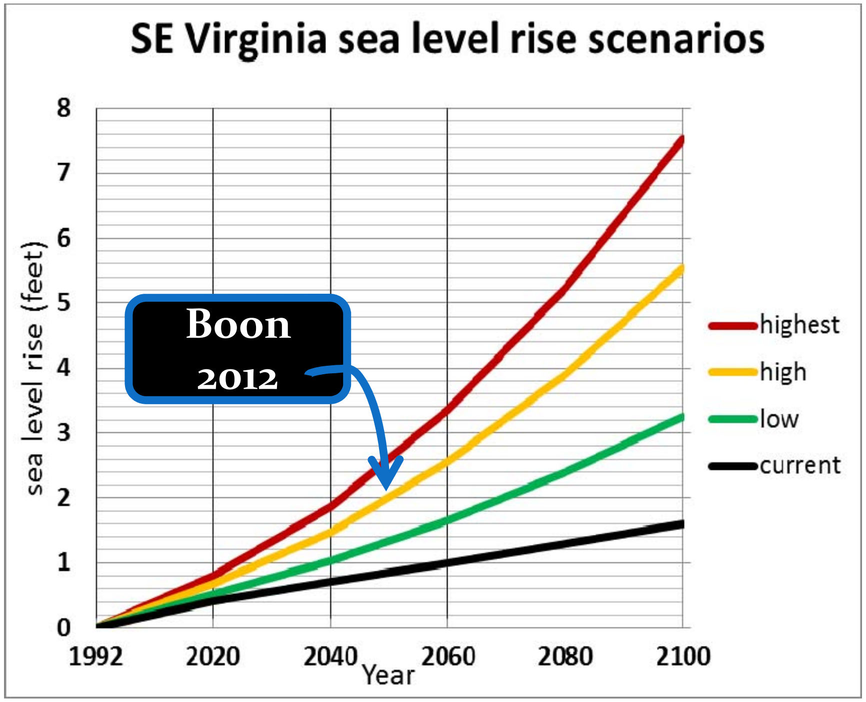
Changing weather patterns can affect local salinity

Runoff can add to turbidity and nutrient levels

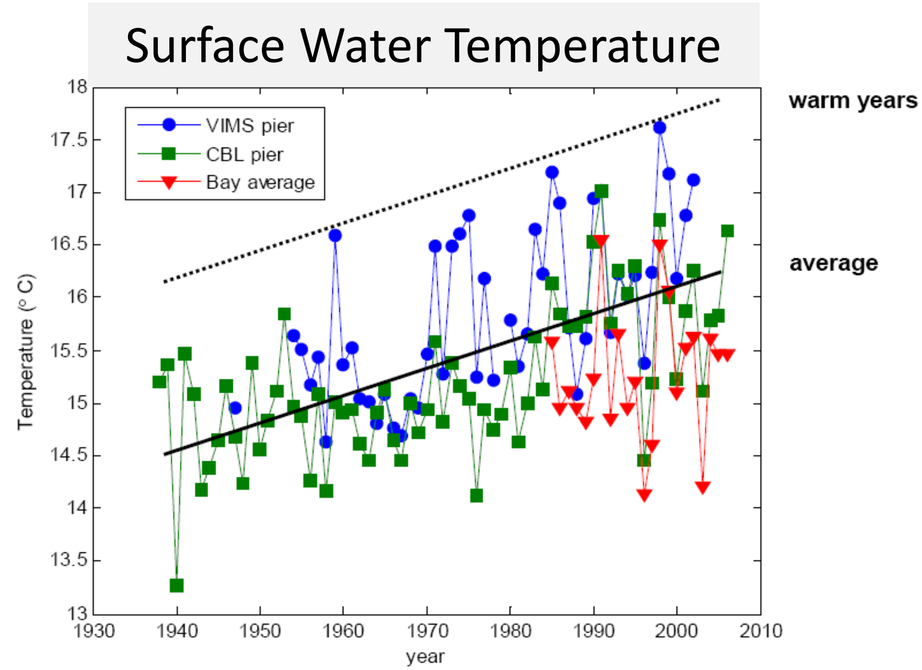
Sea level rise can increase water depth & reduce available habitat

Shoreline protection can prevent landward migration

Climate Projections for Chesapeake Bay



- SE VA Average Rate is 4.42 mm/yr & accelerating (~3.4 mm/yr baywide)
- **SE VA is likely to see a 2–3 ft rise by 2050**

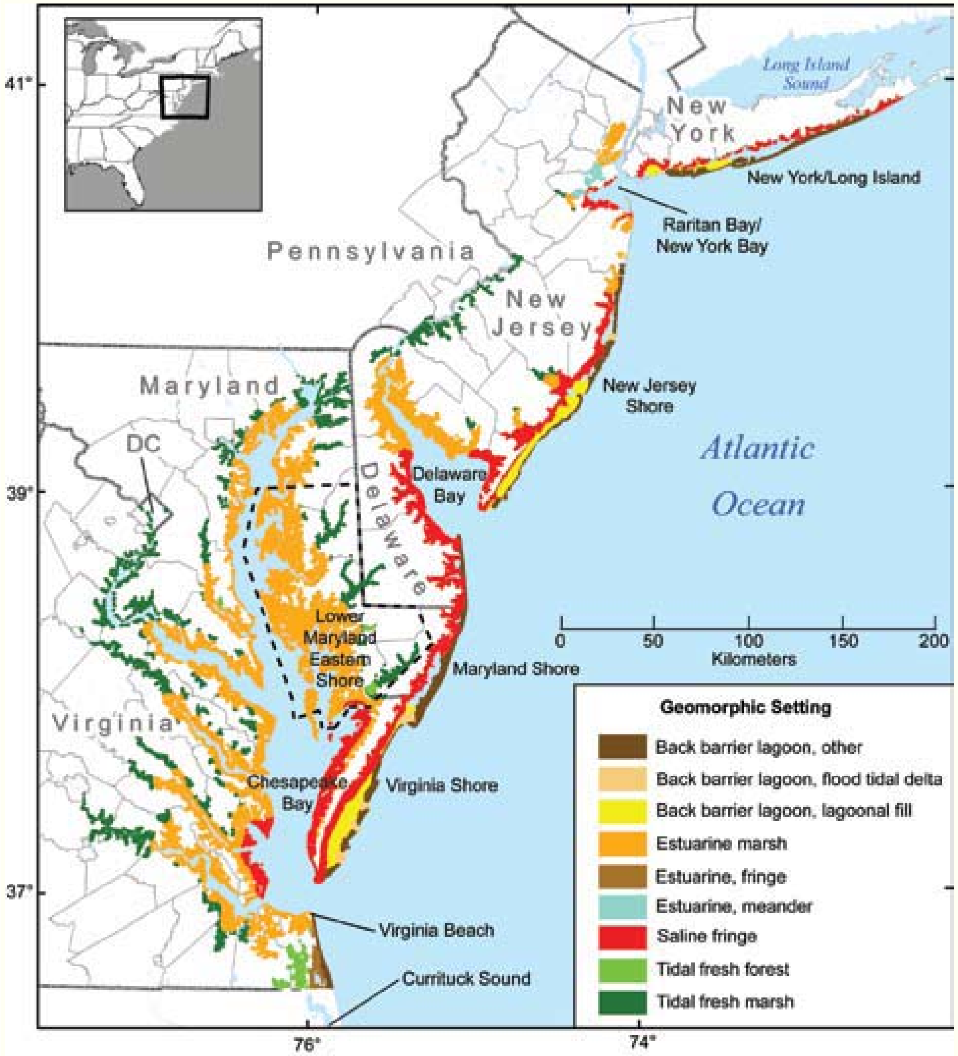


- Both mean and max annual temps have increased by more than 1°C (1.8°F) over the past 5-6 decades
- Seasonal warming occurring ~3 weeks earlier than in the 1960s
- **Expected increase of 2 – 6° C by 2100**

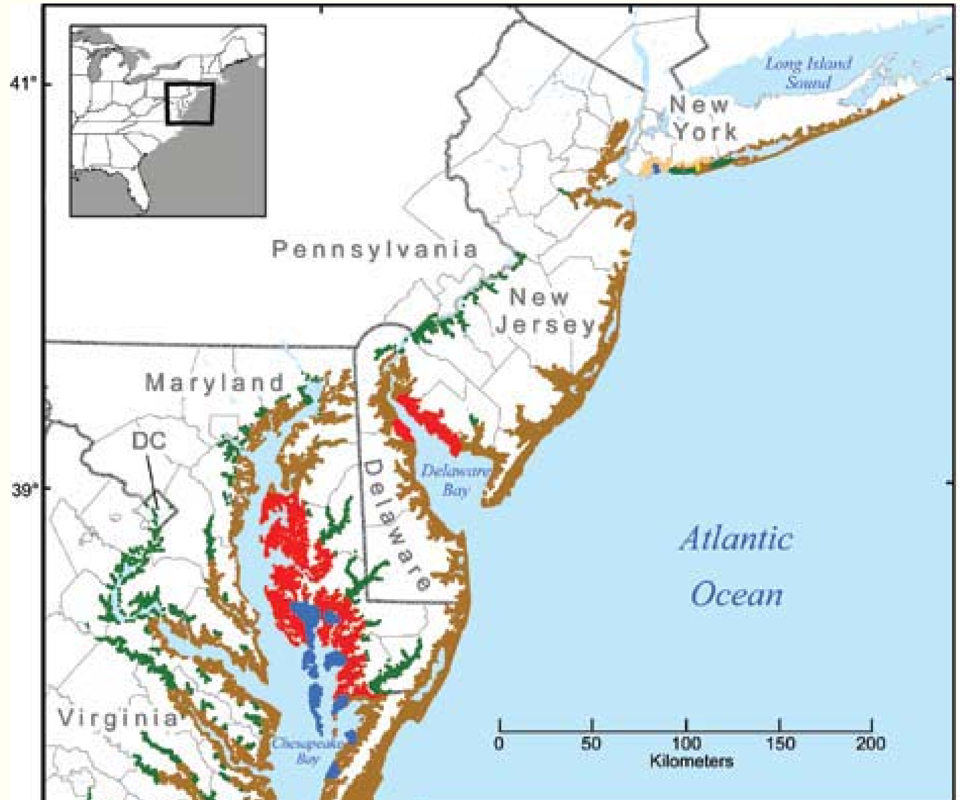
__Sources: Pyke et al. 2008__. Climate change and the Chesapeake Bay, CBP STAC Report. __Austin 2002__, AFS Symposium 32. __Boon 2012.__ Evidence of sea level acceleration at US and Canadian tide stations, Atlantic Coast, North America. JCR 28.6

Tidal wetlands and Sea level rise

Geomorphic settings of mid-Atlantic tidal wetlands



Conversion of tidal wetlands to open water



Will Wetlands Be Converted to Open Water?

Rate of Sea Level Rise								
Current rate	Yes	?	?	No	No	No	No	No
Current + 2 mm/yr	Yes	Yes	Yes?	?	No	No	No	No
Current + 7 mm/yr	Yes	Yes	Yes	Yes	Yes	Yes?	?	No

? = Wetlands would be marginal   Yes? = Wetland would be marginal or lost

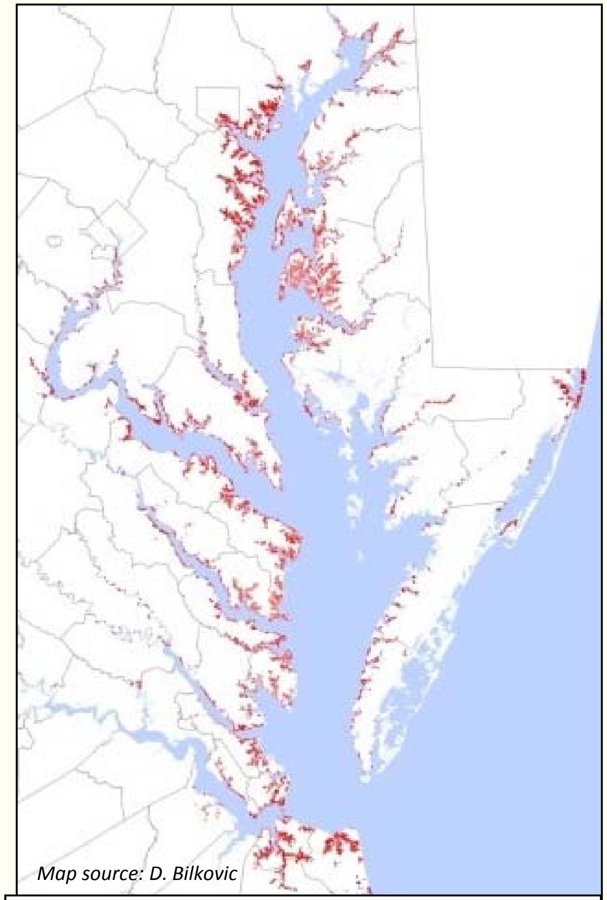
Geomorphic settings have differing hydrodynamics, sediment sources, & vegetative communities

Wetland response to sea level rise expected to vary with geomorphic setting

CCSP 2009: Cahoon et al. 2009; data source: Reed et al., 2008; map source: Titus et al., 2008

The Problem with Shoreline Hardening

VIMS | William & Mary
Virginia Institute of Marine Science



Map source: D. Bilkovic

<u>Chesapeake Bay</u>

18% of tidal shoreline hardened

VA: *11%* ***MD***: *28%*

32% riparian land developed

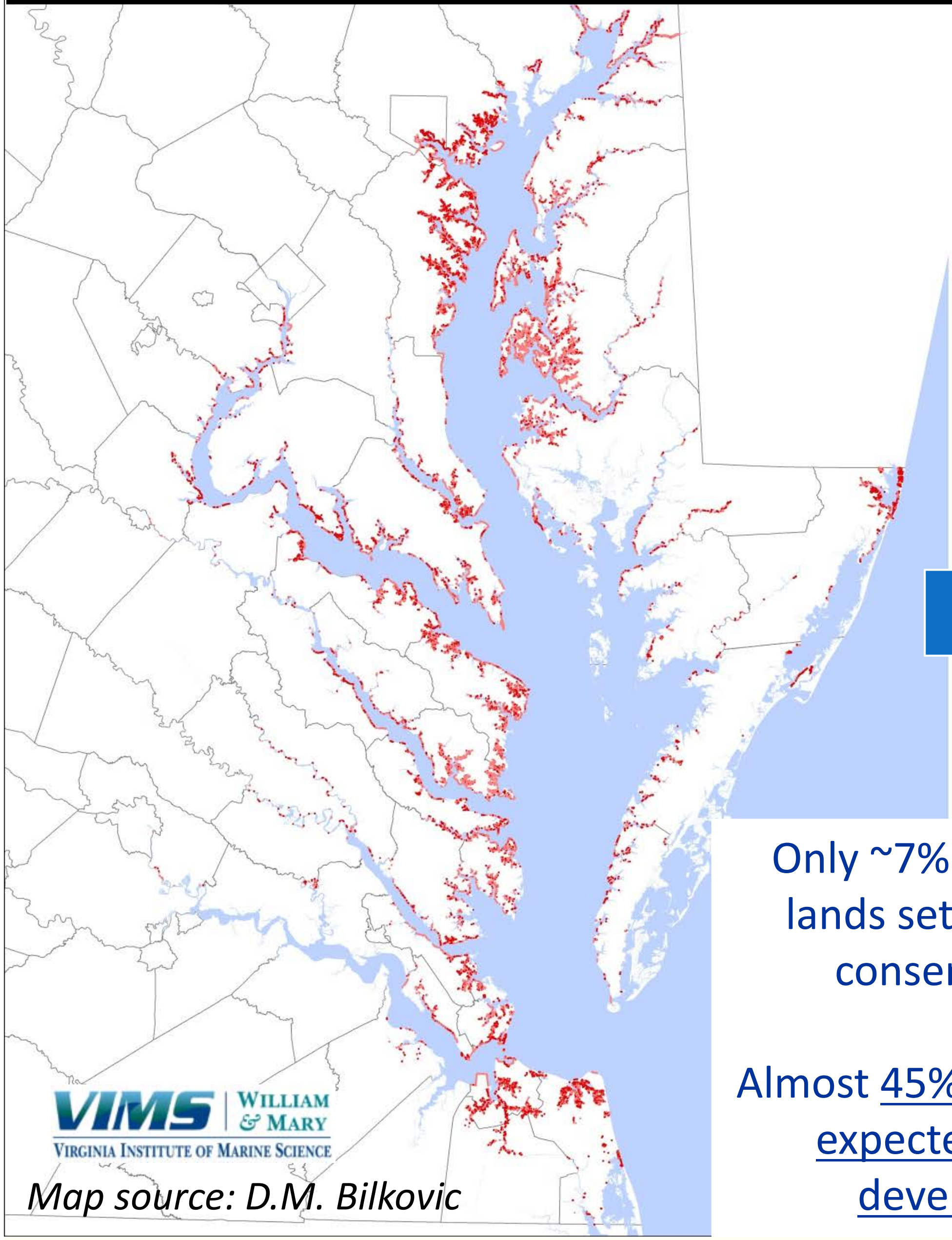
~5 km² of artificial substrate introduced (*intertidal impacted*)

- Habitat loss & fragmentation – forest, wetlands (Peterson and Lowe 2009; Dugan et al 2011)
- Sediment supply & transport altered, increased scouring, turbidity (Bozek and Burdick 2005, NRC 2007)
- Increase in invasive spp (Chambers et al 1999)
- Decrease fish & benthos, marsh bird diversity, terrapin presence (Peterson et al 2000, Chapman 2003, King et al 2005, Bilkovic et al 2006, Seitz et al 2006, Bilkovic & Roggero 2008, Morley et al 2012, Isdell in review)
- Prevents natural migration of habitats with SLR
- Evidence of Low Thresholds (e.g. >5% riprap–no increase in SAV (*Patrick et al 2014*)

Coastal Development: Status and Future Trends

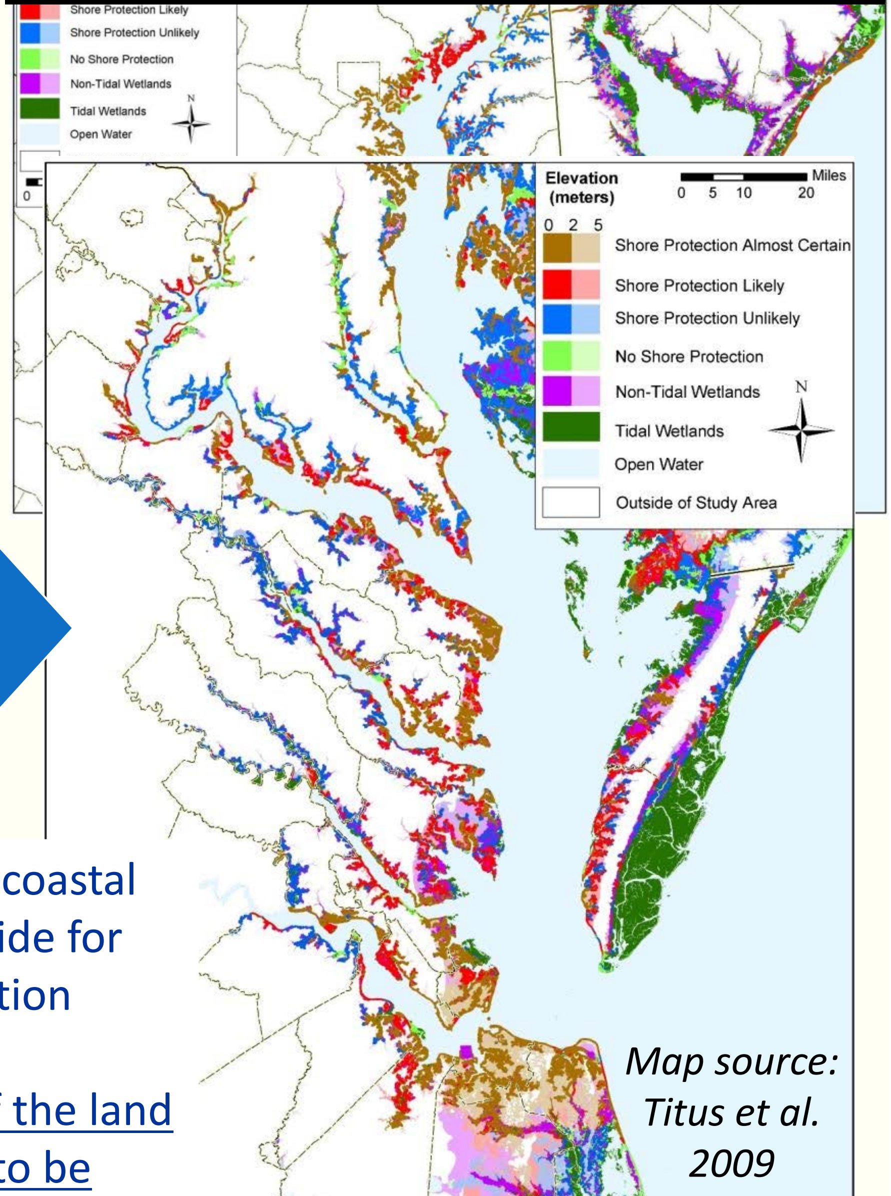
VIMS | William & Mary
Virginia Institute of Marine Science

Current shoreline hardening – Bulkhead/Riprap



Map source: D.M. Bilkovic

Future shore protection

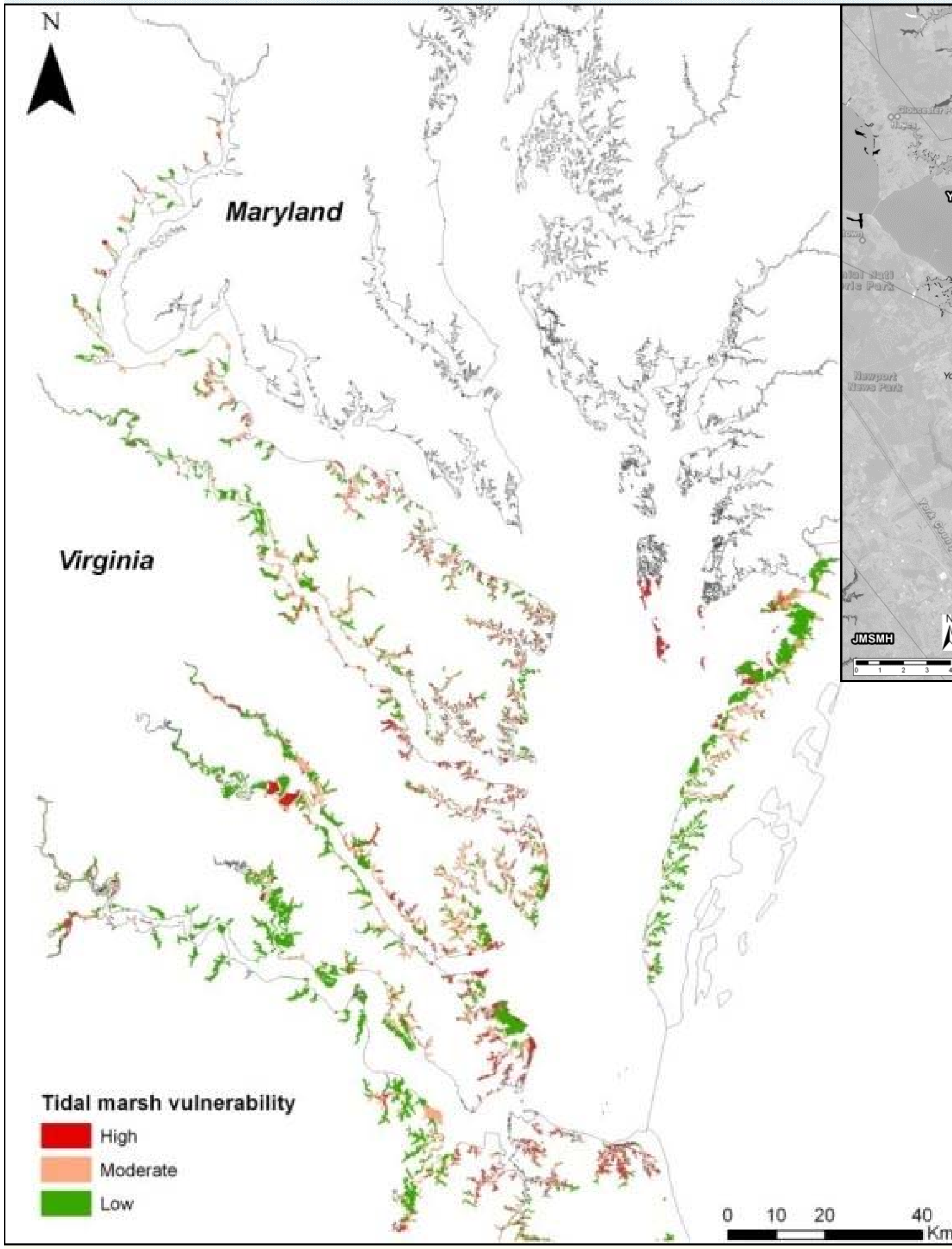


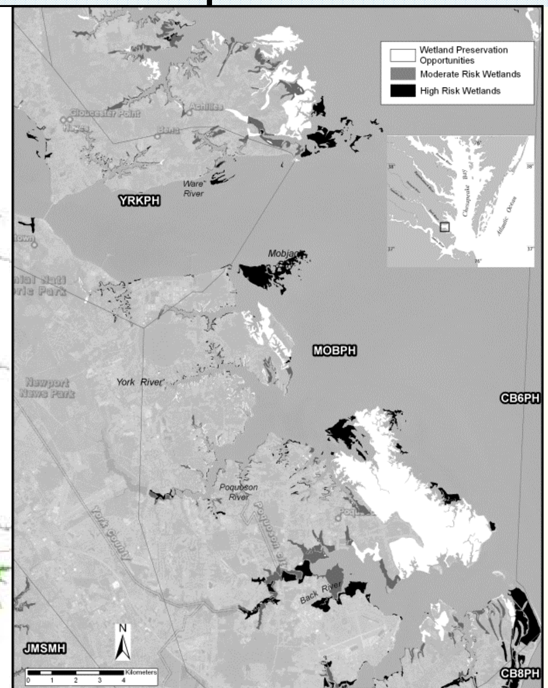
Map source: Titus et al. 2009

Only ~7% of coastal lands set aside for conservation

Almost <u>45% of the land expected to be developed</u>

Tidal Marshes – SLR & shoreline development





Tidal marshes in the meso-polyhaline reaches at highest risk due to land development & SLR

Nearly 40% of Virginia marshes are vulnerable to SLR due to adjacent development

High Risk Marsh

Bilkovic et al. 2009 Vulnerability of shallow tidal water habitats in Virginia to climate change. **http://ccrm.vims.edu/research/climate_change/index.html**

Continuum of shoreline protection approaches

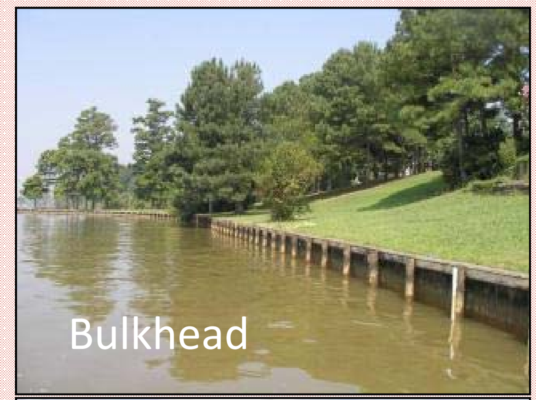
Estuarine & coastal shorelines

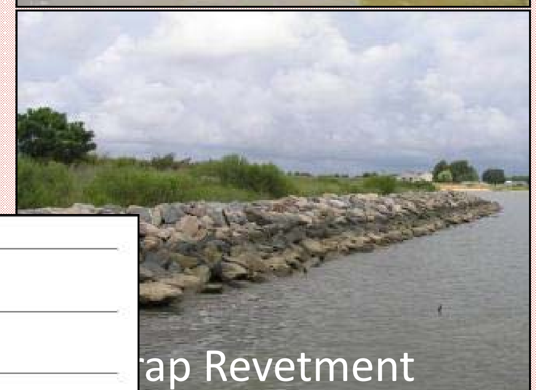

Eastern Shore: The Virginia Coast Reserve

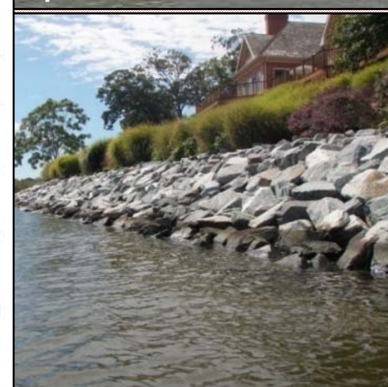

Tabbs Creek, VA

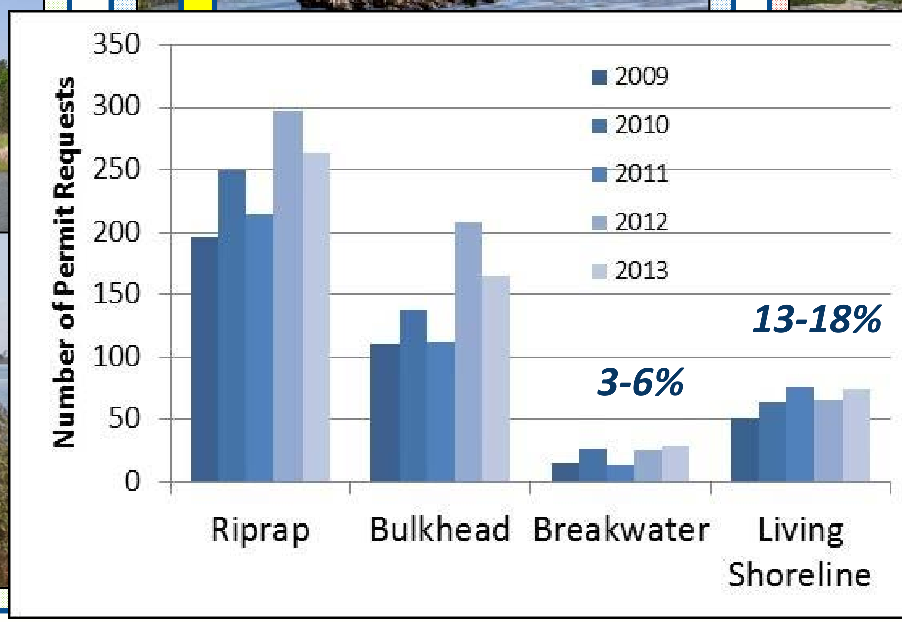
Minimally-Moderately altered

Highly altered









Nekton assemblages & productivity in living shorelines depend on availability of suitable habitat

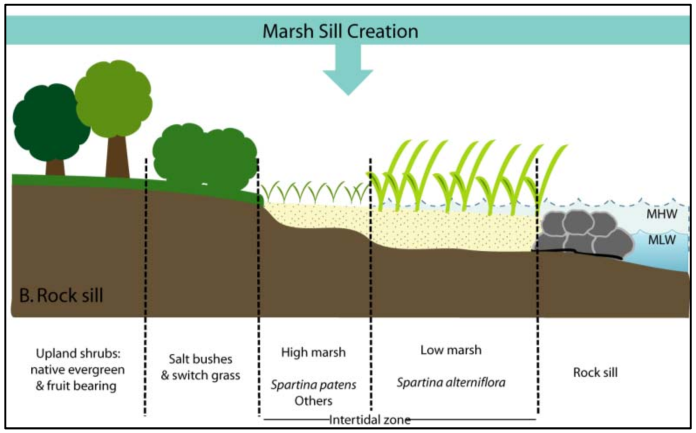
Nekton assemblages less diverse at armored shorelines than natural marshes & nekton <u>utilization</u> increases when armored shorelines are converted to living shorelines (diversity & density)

Assumed energy transfer to higher trophic levels not yet verified

- The role that living shorelines may play as fish and shellfish nursery habitat has not yet been measured. We need to demonstrate enhanced growth and protection from predation compared to other habitats

Persistent aquatic environment seaward from marsh edge may be essential

- *Sediment accretion landward of living shoreline structures may limit suitable habitat over time*



Davis et al 2008; Hardaway et al 2007, Seitz et al. 2006, Bilkovic & Roggero 2008…

Ribbed Mussels and Marshes

Ecosystem Engineers

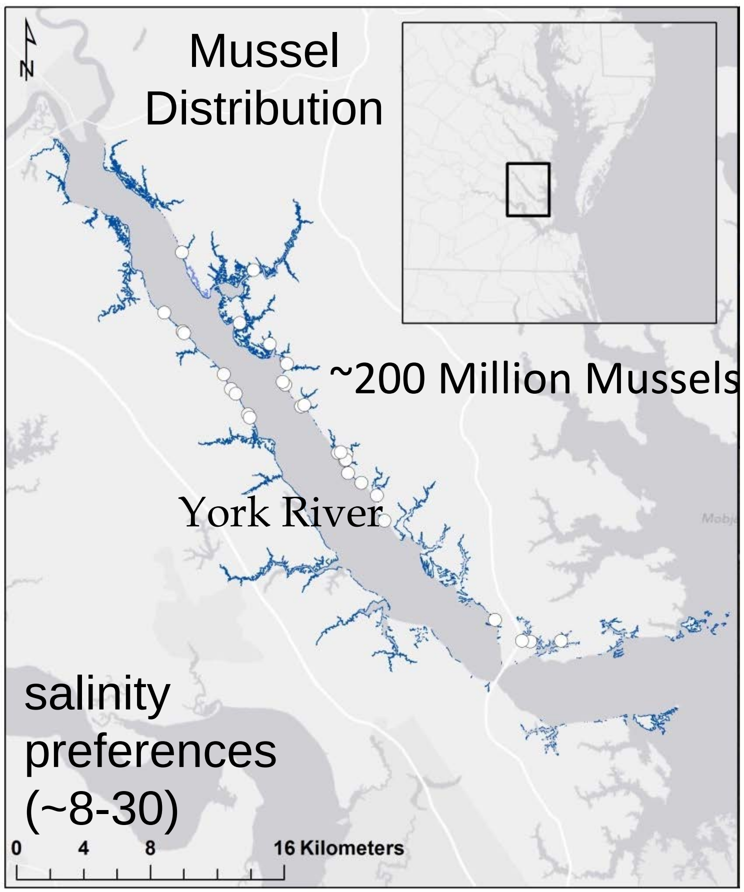
Filter water

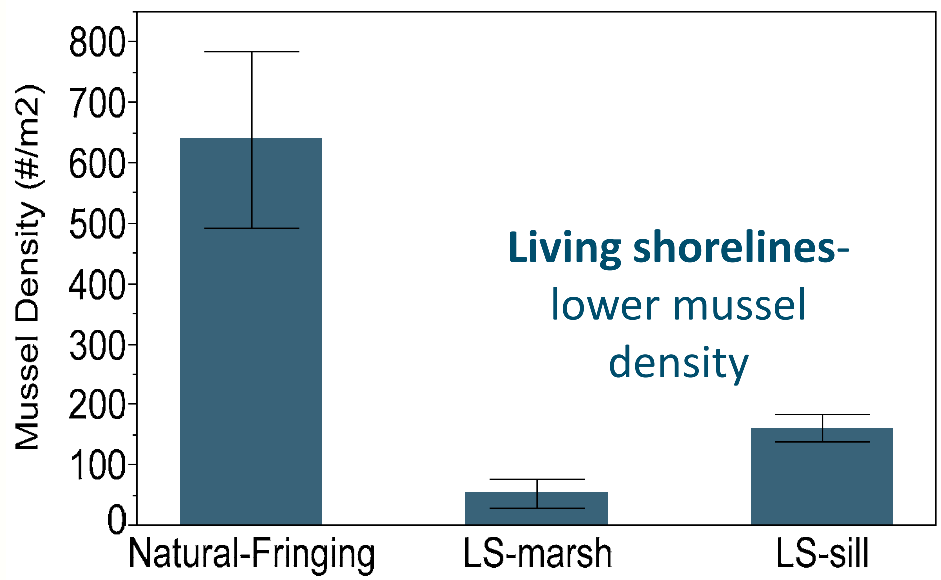
Accrete sediment, Stabilize shore

Promote marsh plant growth

Enhance nutrient dynamics

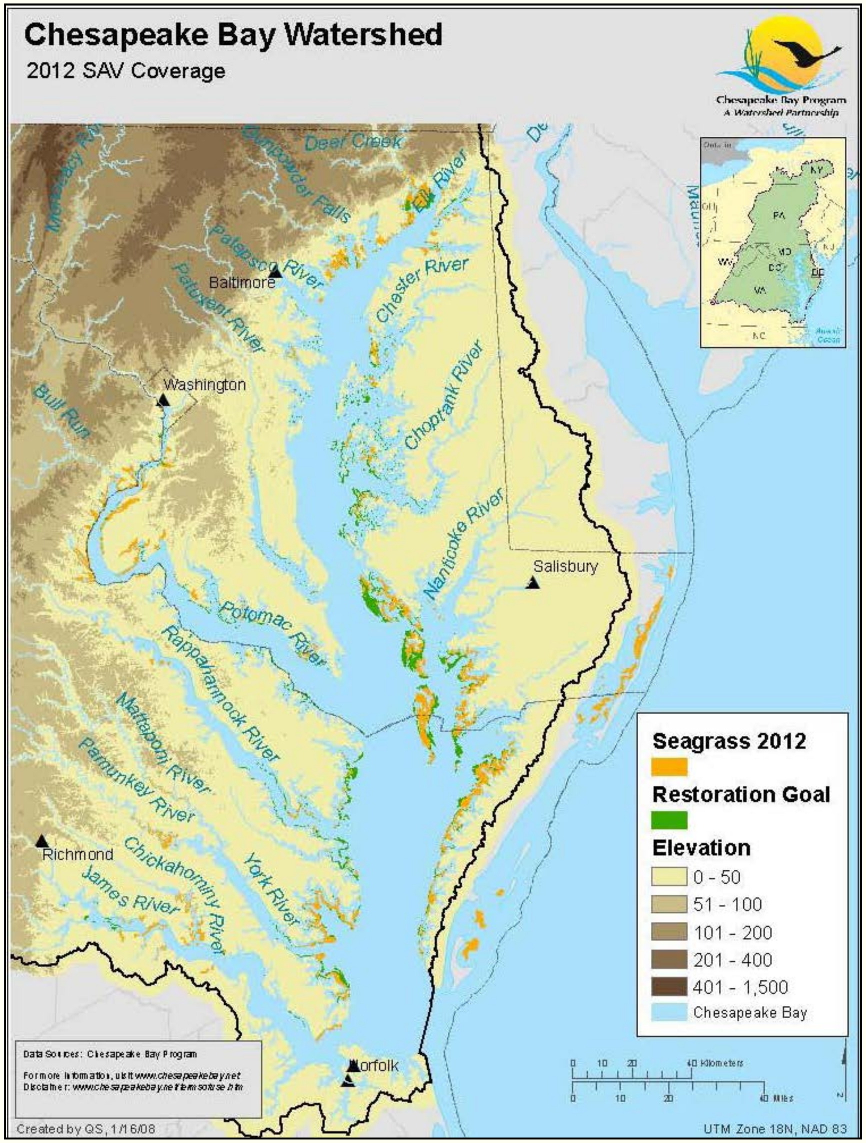
Important Prey item

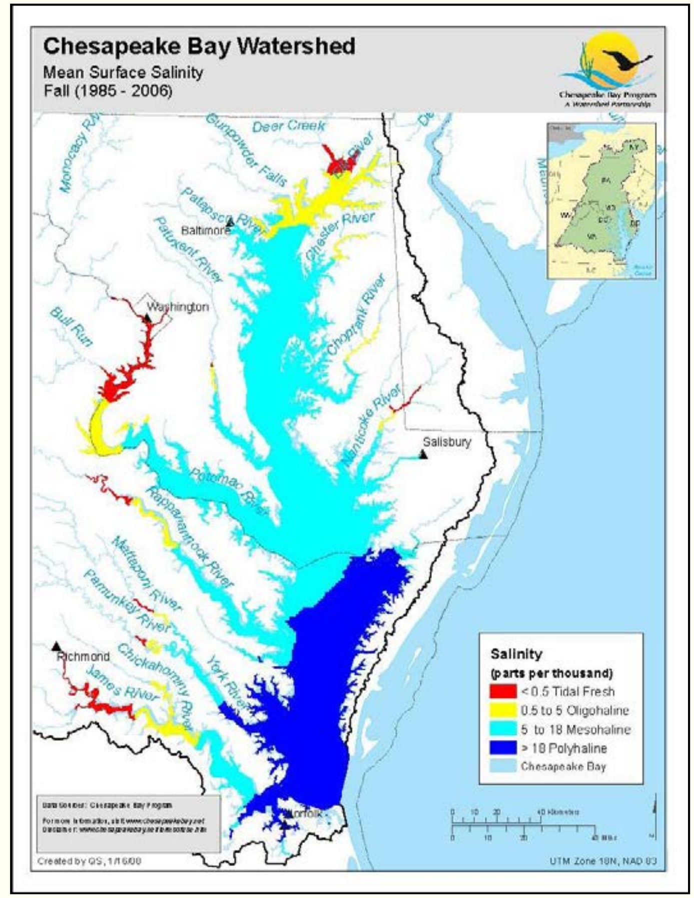




Submerged Aquatic Vegetation

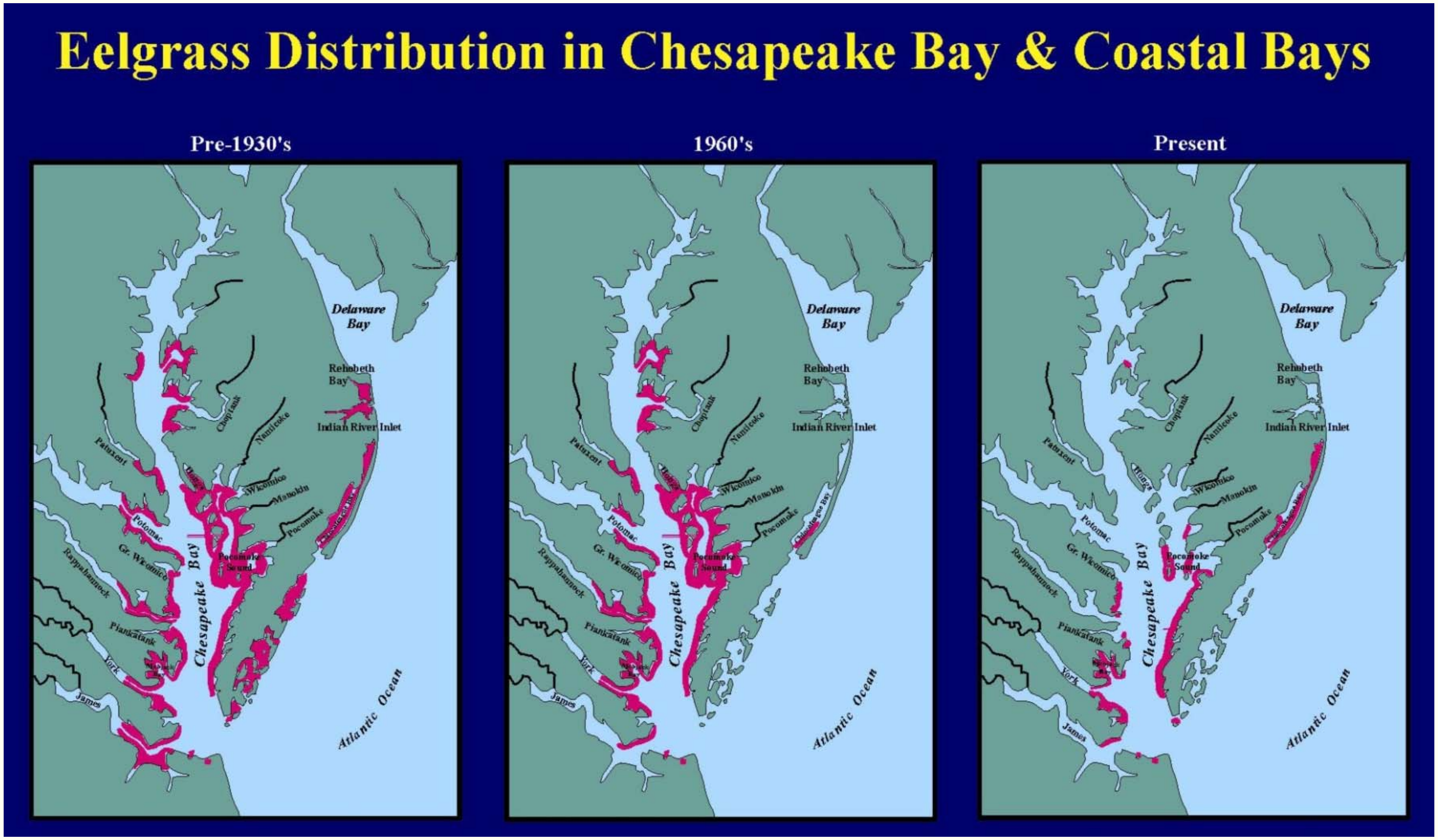
~ 20 SAV species are commonly found throughout Chesapeake Bay





SAV communities can be grouped by salinity tolerances

- *Zostera marina* –eelgrass (Polyhaline)
- *Ruppia maritima*–widgeongrass (Meso)



Stresses related to climate change that affect eelgrass survival include:

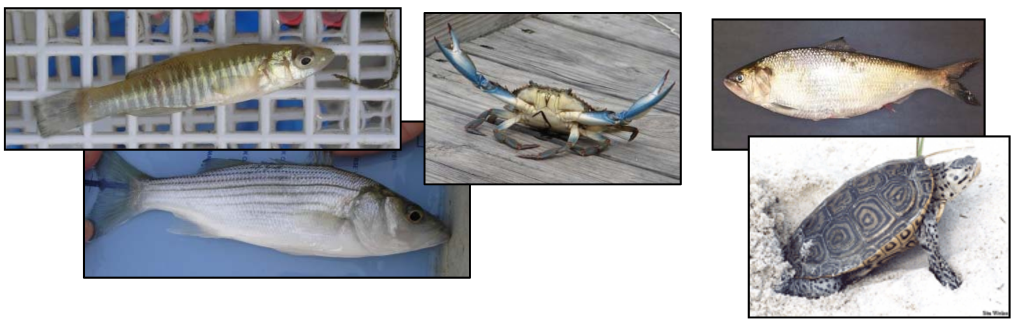
- Increased frequency and duration of high summer water temps , > 30°C (86°F)
  -Massive baywide decline observed during 2005 from >30°C
- Increased rainfall = Increased runoff of sediments and nutrients = decreased light availability
- Light requirements of eelgrass increase with increasing temps
- Increased storm intensity and frequency
- Increased water level/shl hardening = declines in habitat area

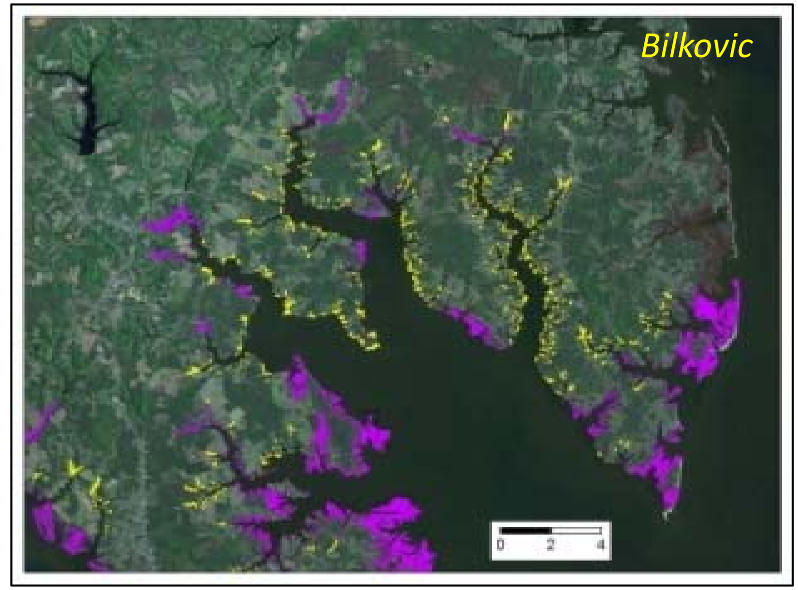
Map source: Ken Moore

Recommendations and Research Needs

- **More detailed data on sediment processes & Shallow water bathymetry**

- **Landscape-level influences on bay habitat resilience** - Better understanding of the extent that landscape setting moderates habitat connectivity, functionality, and species distribution





Fragmentation patterns of marshes
Dispersed wetlands (yellow) tend to occur in areas of developed land use

- **Align implementation & monitoring of habitat restoration activities with living resource objectives**.

Thank You!

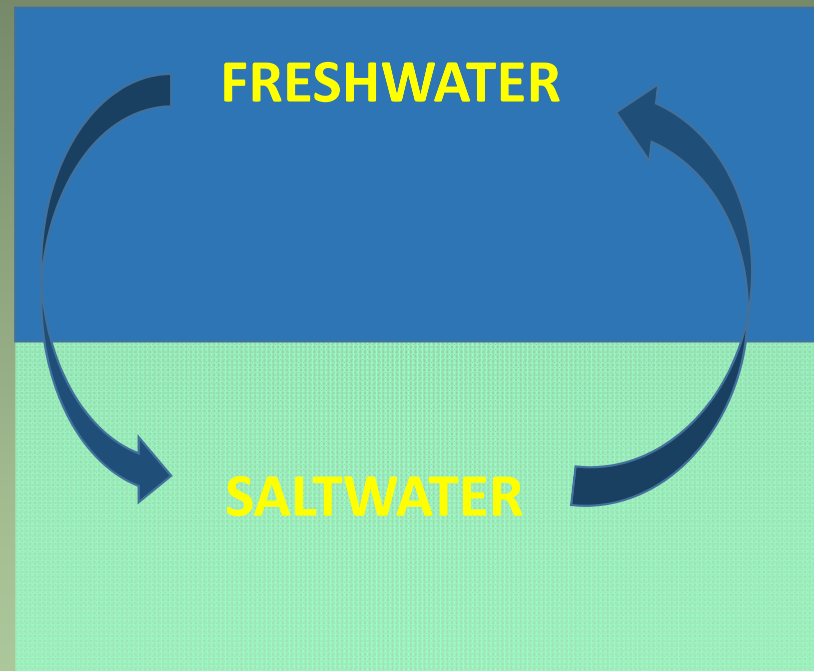
donnab@vims.edu

RUMINATIONS ON THE IMPACT OF CLIMATE CHANGE ON DIADROMOUS FISH HABITAT

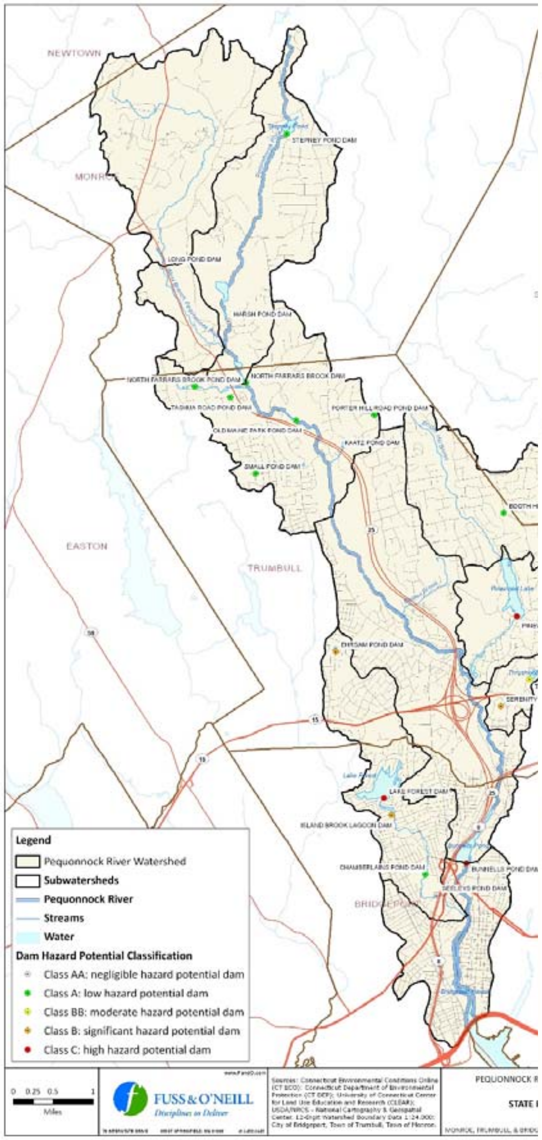
Stephen Gephard
Inland Fisheries Division
Diadromous Fish Program

Connecticut Department of ENERGY & ENVIRONMENTAL PROTECTION

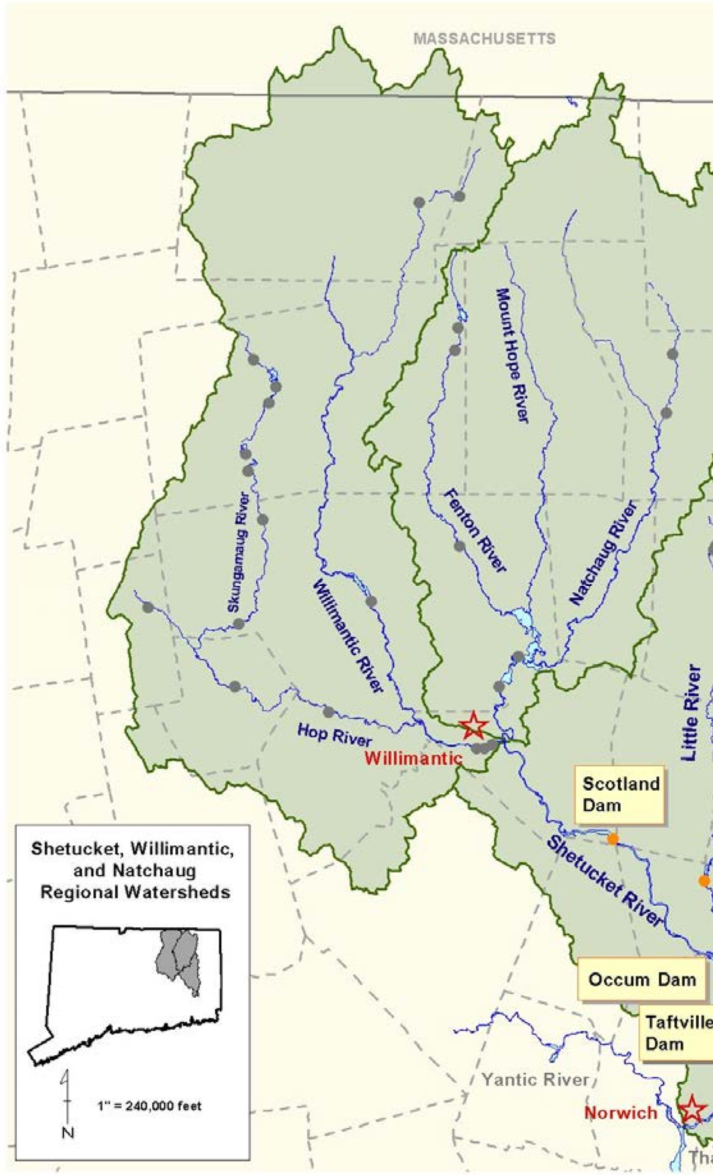
DIADROMOUS



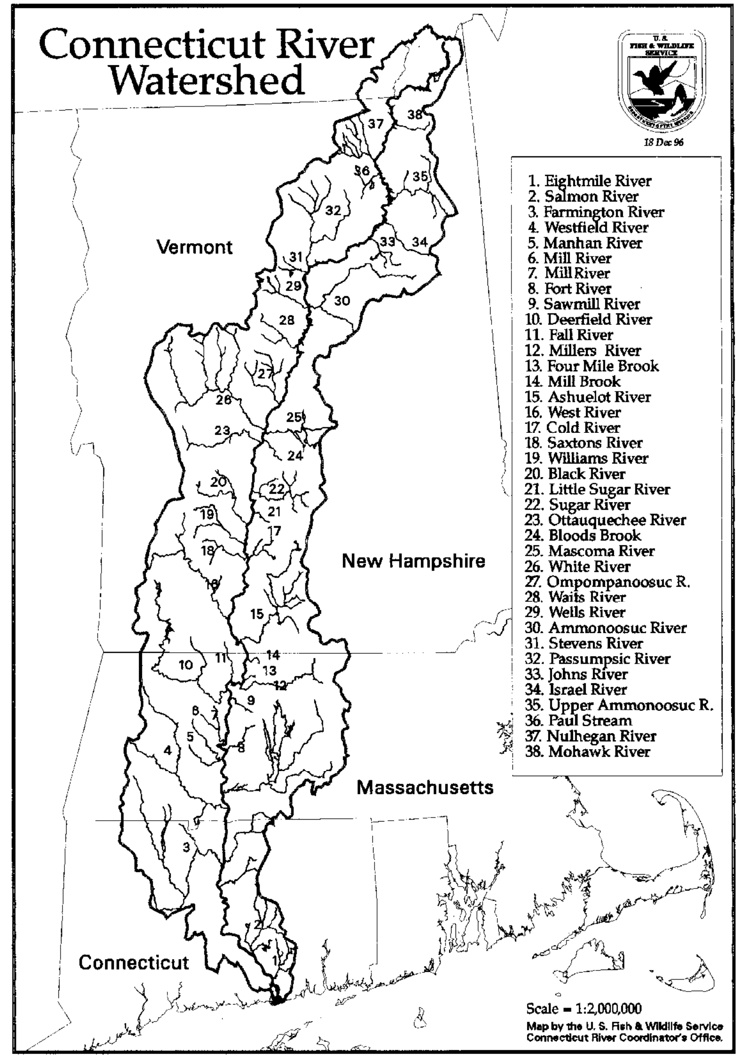
- Atlantic salmon
- Sea-run brook trout
- Sea-run brown trout
- American shad
- Hickory shad
- Gizzard shad
- Alewife
- Blueback herring
- White perch
- Striped bass
- Atlantic sturgeon
- Shortnose sturgeon
- Rainbow smelt
- Sea lamprey
- American eel



NEWTOWN
EASTON
TRUMBULL
Legend
Pequonnock River Watershed
Subwatersheds
Pequonnock River
Streams
Water
Dam Hazard Potential Classification
Class AA: negligible hazard potential dam
Class A: low hazard potential dam
Class BB: moderate hazard potential dam
Class B: significant hazard potential dam
Class C: high hazard potential dam
Miles
FUSS & O'NEILL



MASSACHUSETTS
Mount Hope River
Fenton River
Natchaug River
Skungamaug River
Willimantic River
Hop River
Willimantic
Little River
Scotland Dam
Shetucket River
Occum Dam
Taftville Dam
Yantic River
Norwich
Shetucket, Willimantic, and Natchaug Regional Watersheds
1" = 240,000 feet
N

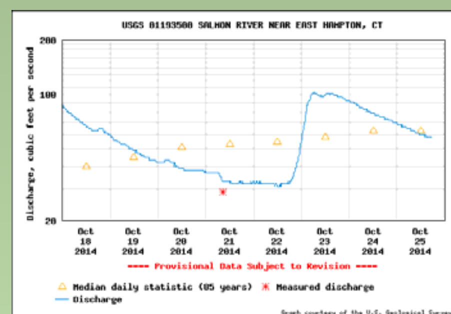


Connecticut River Watershed
18 Dec 96
Vermont
New Hampshire
Massachusetts
Connecticut
1. Eightmile River
2. Salmon River
3. Farmington River
4. Westfield River
5. Manhan River
6. Mill River
7. Mill River
8. Fort River
9. Sawmill River
10. Deerfield River
11. Fall River
12. Millers River
13. Four Mile Brook
14. Mill Brook
15. Ashuelot River
16. West River
17. Cold River
18. Saxtons River
19. Williams River
20. Black River
21. Little Sugar River
22. Sugar River
23. Ottauquechee River
24. Bloods Brook
25. Mascoma River
26. White River
27. Ompompanoosuc R.
28. Waits River
29. Wells River
30. Ammonoosuc River
31. Stevens River
32. Passumpsic River
33. Johns River
34. Israel River
35. Upper Ammonoosuc R.
36. Paul Stream
37. Nulhegan River
38. Mohawk River
Scale = 1:2,000,000
Map by the U. S. Fish & Wildlife Service Connecticut River Coordinator's Office.

Major Stressors associated with Climate Change:

(Habitat only)

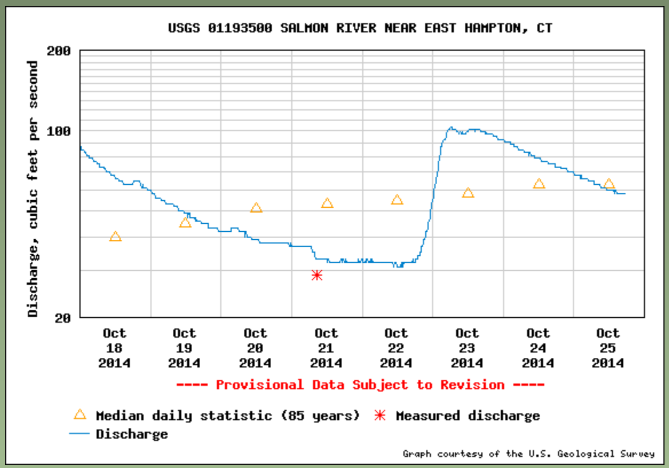
- Sea level rise
- Rise in water temperature
- Modified hydrograph
- Changing plant communities



Changing plant communities

- SAV and other plant communities key to juvenile habitat
- Changes in these communities likely linked to other stressors
- Hard to predict
- Current invasion of non-natives probably bigger threat
- Climate change may exacerbate this trend.

Conservation action: conserve native plant beds and the streambeds that support them.

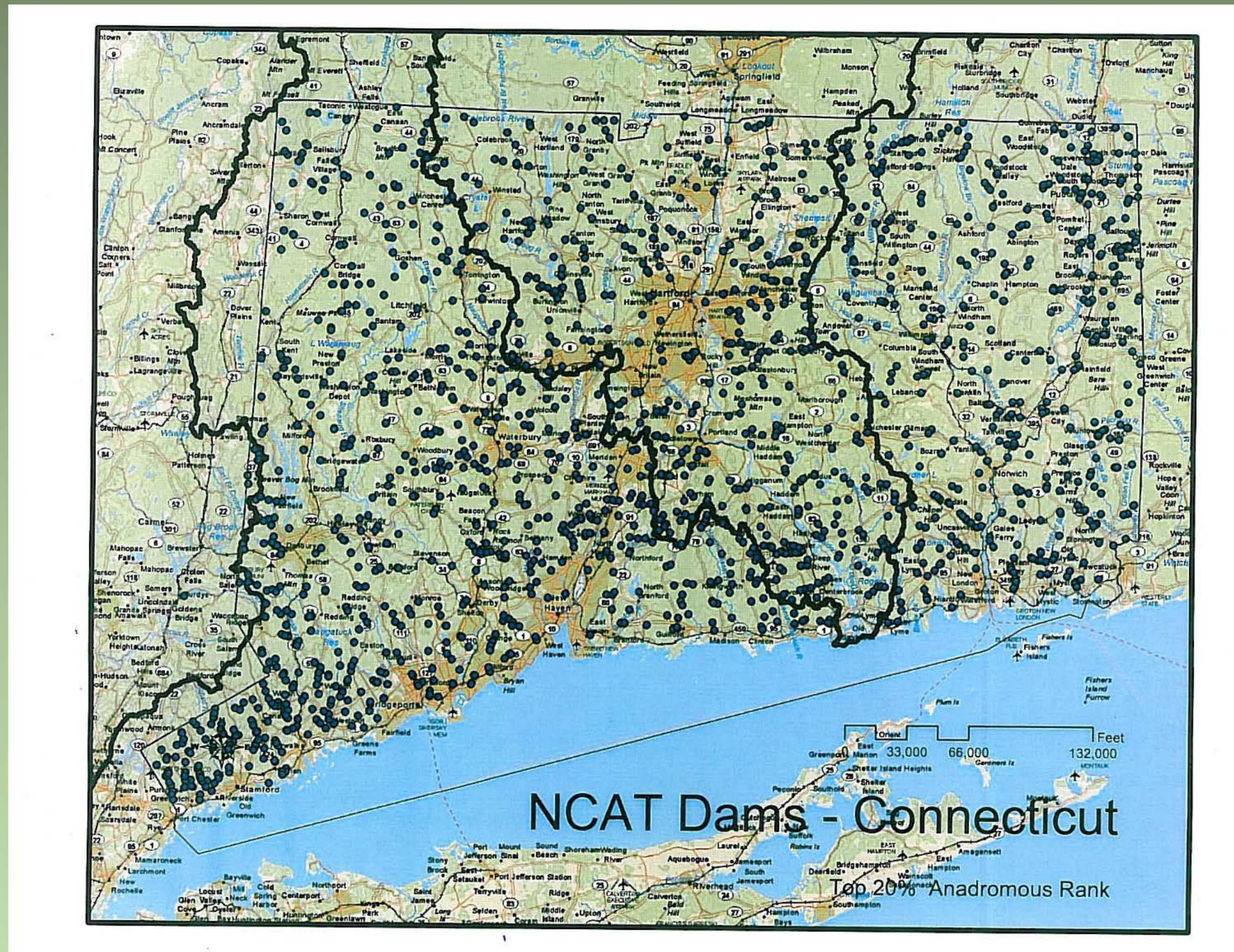


Changing Hydrograph

- More extremes– larger floods, more severe droughts
- Northeast- greater mean annual discharges
- Shifted peaks– late winter

Diadromous fish runs have evolved to adapt to the hydrograph of natal rivers. Rapid changes that outpace evolution can result in a mismatch and a reduction in fitness.

1,600 OF THE 4,000 DAMS IN CONNECTICUT



- Dams alter the hydrograph
- Unlikely tool to mitigate the impacts of climate change
- Coupled with the impact of climate change, dams further destabilize the rivers' flow pattern and make it difficult for fish to adapt. Moving target.
- BUT… maybe more severe storms will reduce the number of dams!!!

Due to dams, fishways are an important component of diadromous fish habitat.

Fishways were designed to be compatible with the present day hydrograph and hydrological parameters of the watershed and site. Changes to these parameters will alter the fishways' effectiveness.

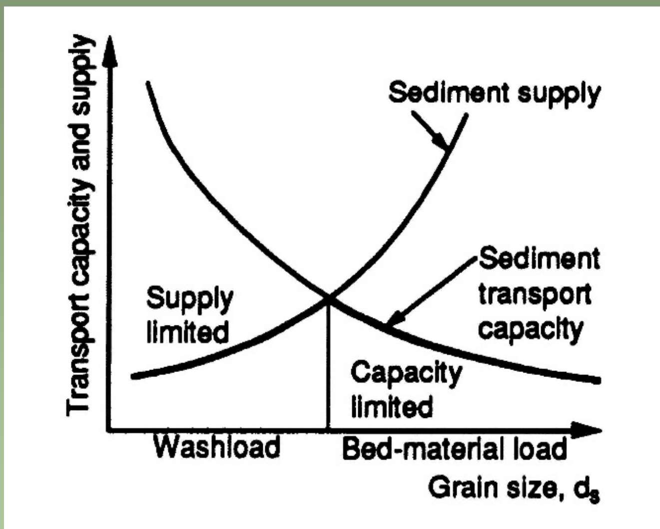
Too little water, fish cannot use.

Too much water, fish cannot use.

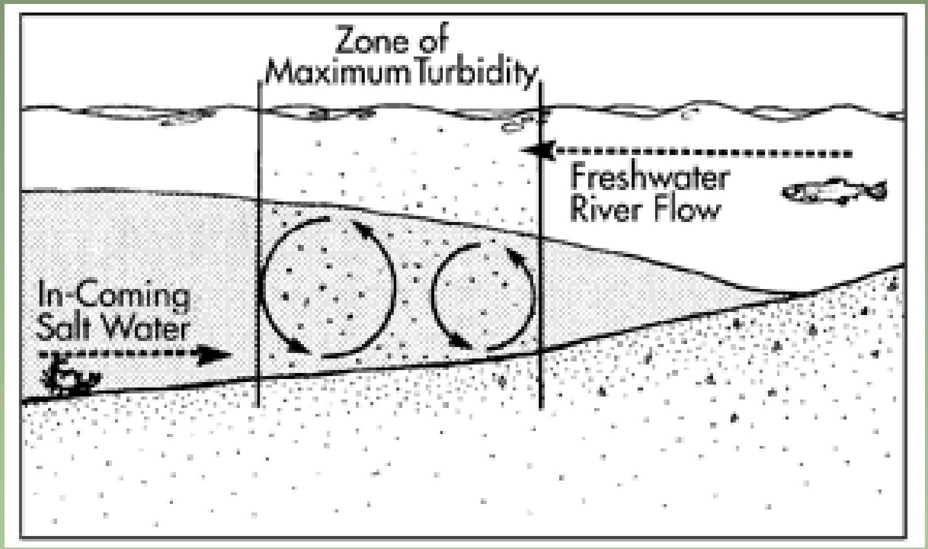
Storms damage habitat

Damage repairs damage habitat

Sediment transport– changes and both localized and regional impacts



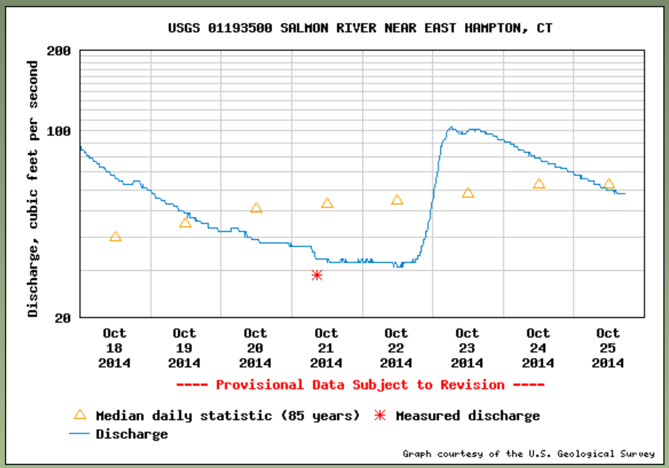
Changes to freshwater discharge will alter the fresh-salt interface in the estuary



Estuarine transients like Atlantic salmon, adult American shad, sea lamprey, trout may have to shift how they adapt to freshwater but the impact is likely to me minimal.

Estuarine residents like sturgeons, rainbow smelt, and hickory shad may experience greatly impacts and loss of habitat.

Some species can fall in both categories- sturgeons and American eel.



Changing Hydrograph

Conservation actions:

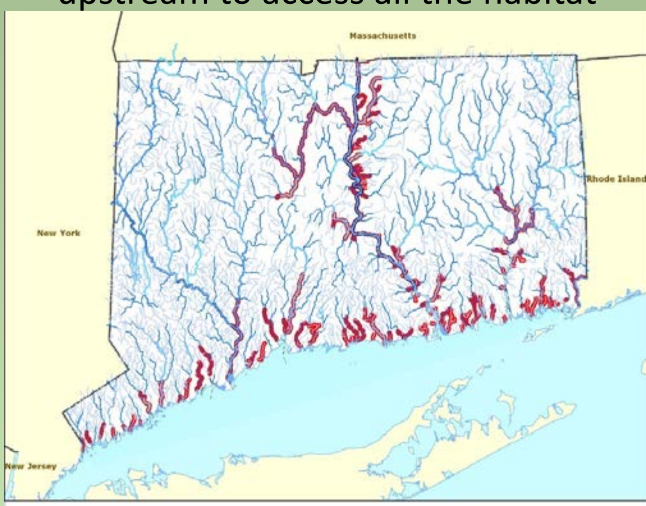
1. Promote dam removals.
2. Design greater range of flexibility in fishways.
3. Protect riparian zones and remove hard surface to allow rivers to roam.
4. Resist quick fix projects in response to flood damage

(5. Conserve genetic diversity in fish populations)

Rising water temperatures

- Loss of northern species at edge of range– e.g. Atlantic salmon, rainbow smelt
- Expansion of more southern species at edge of range– e.g. hickory and gizzard shad
- Mostly biological impacts– iteroparity rate, productivity rates, migration time period, bioenergetics.
- Habitat impacts may be limited to access to habitat:

Alosines may not be able to penetrate as far upstream to access all the habitat



Migratory delays caused by fishways may be exacerbated and upstream habitat are underseeded.

Rising water temperatures

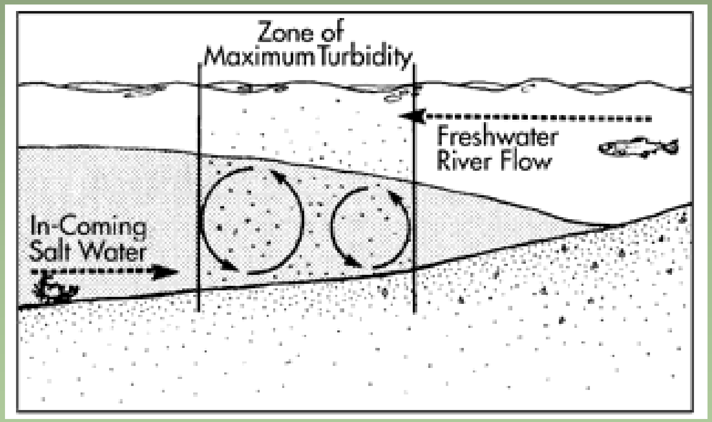
- Loss of northern species at edge of range– e.g. Atlantic salmon, rainbow smelt
- Expansion of more southern species at edge of range– e.g. hickory and gizzard shad
- Mostly biological impacts– iteroparity rate, productivity rates, migration time period, bioenergetics.
- Habitat impacts may be limited to access to habitat:

Conservation actions:

1. Promote dam removals.
2. Continue to improve fishway design.
3. Promote riparian forest plantings to mitigate solar warming at a local level

Sea Level Rise

- Shift in estuarine boundaries– increase in estuarine waters?
- Possible counteracting factor to increased freshwater discharge for some factors.



- Similar species-by-species impacts as estuarine impacts by changed hydrograph
- For large river estuaries, just an upstream shift?
- For smaller streams, estuaries could be up against a “wall” and the estuary footprint could shrink.
- Head of tide dams could act as a wall.

Alewives access freshwater, coastal ponds to spawn. Some ponds were created by humans for ice ponds etc. and these have become important spawning/nursery habitat. Small dams will be quickly overtopped by saltwater and lost as spawning habitat.

Some migratory obstacles that now challenge fish like alewives and smelt may be inundated by rising water levels.

Fishways designed for the current sea level may not be as effective at higher sea levels. Submerged entrances are not good at attracting fish.

Conservation actions:

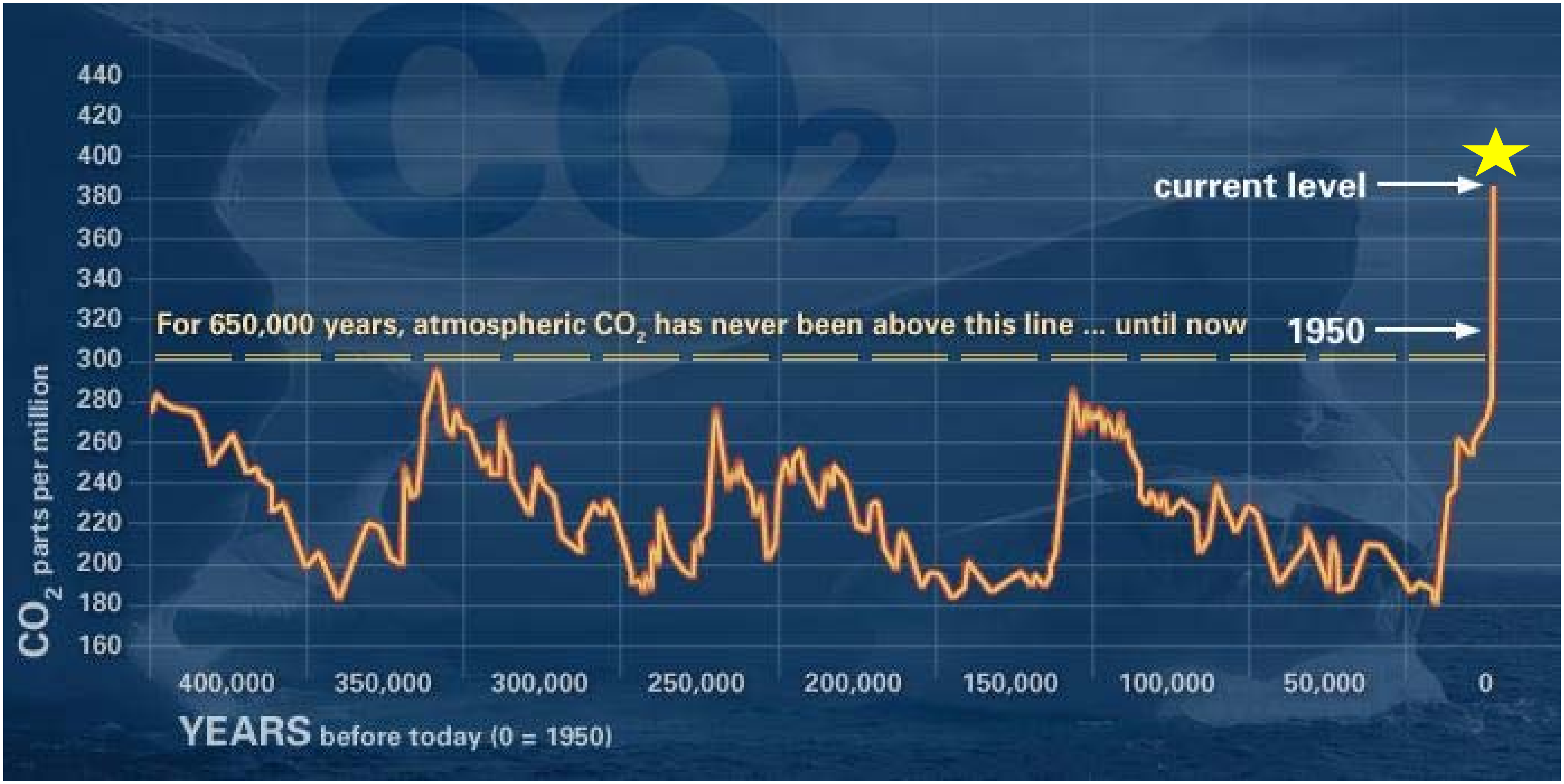
1. Promote dam removals.
2. Design taller fishway entrances; retrofit taller entrances for existing fishways.
3. Protect and preserve upstream spawning ponds; reconnect runs to additional habitat to compensate for loss of downstream habitat.
4. Minimize/reverse streambank armoring to allow streams to overspill present-day banks so they may expand fish habitat into surrounding terrain.

Potential Effects of Sea Level Rise on Florida's Coastal Ecosystems and Implications for Species

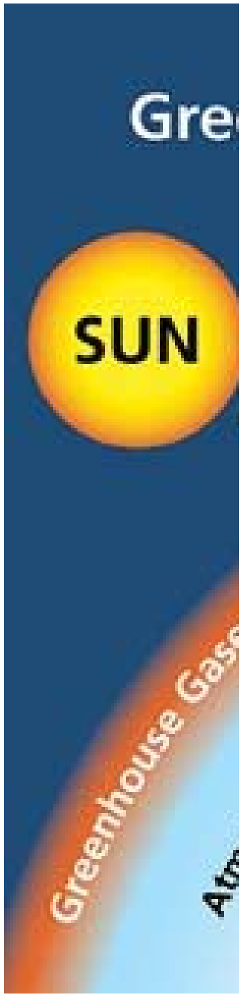
Kent Smith
Habitat and Species
FWC

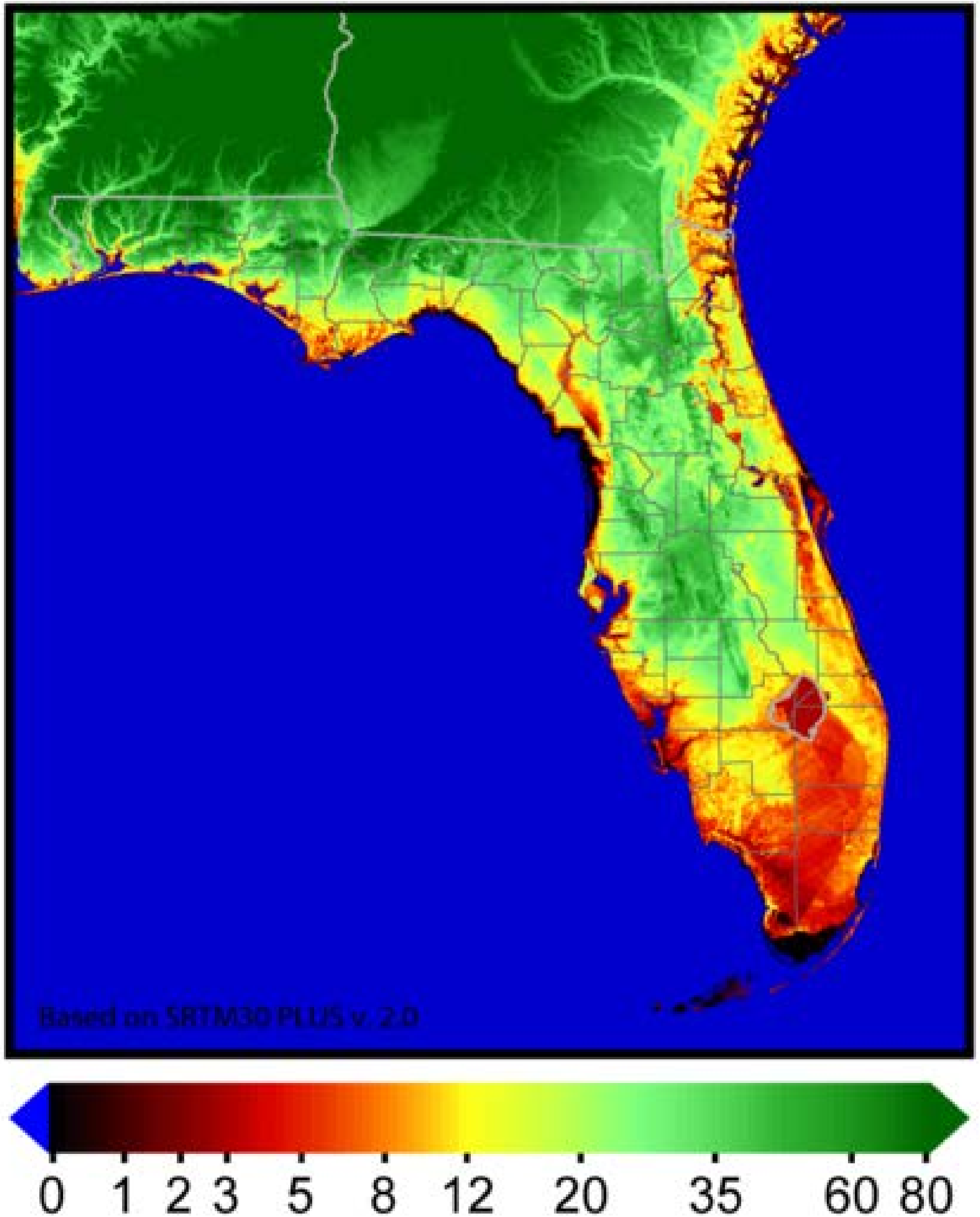
Florida Sea Grant College Program
Sea Grant Florida

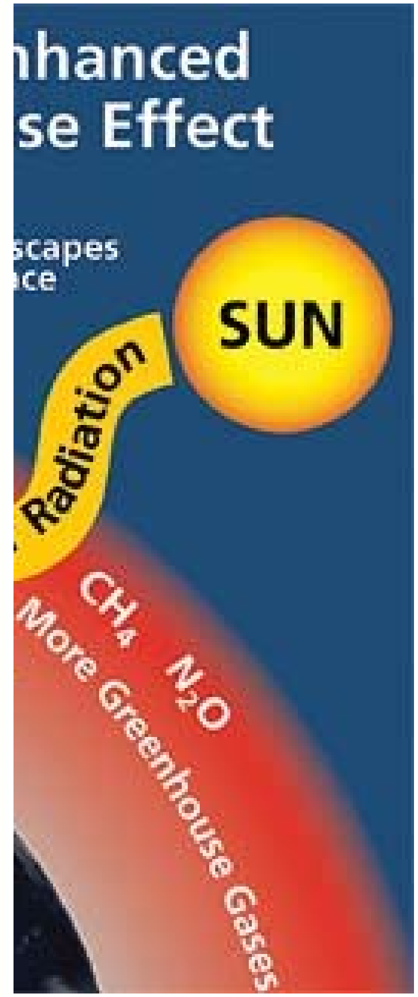
Carbon dioxide (CO_2) has increased since the Industrial Revolution



Sea Level Risks - Florida







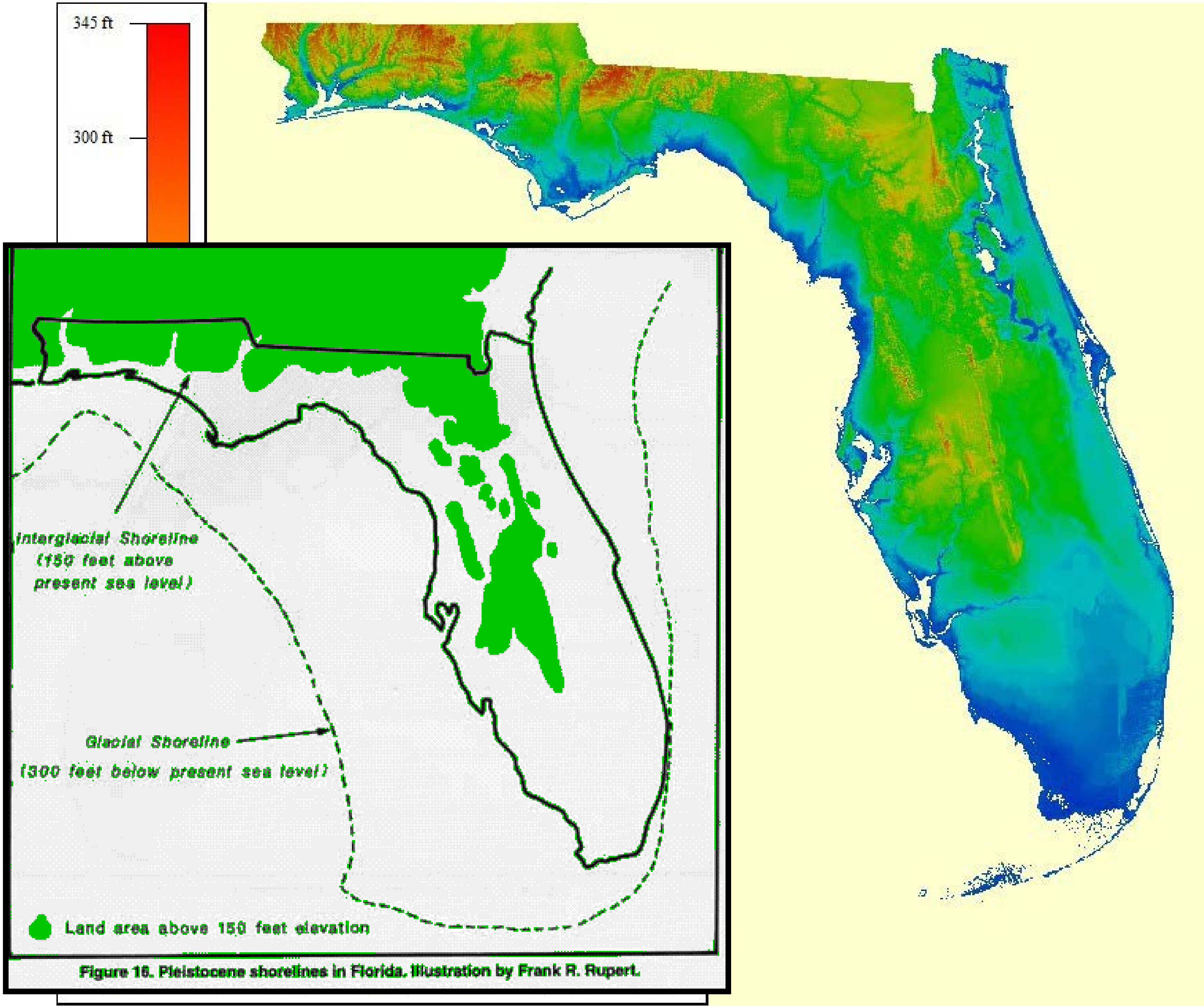
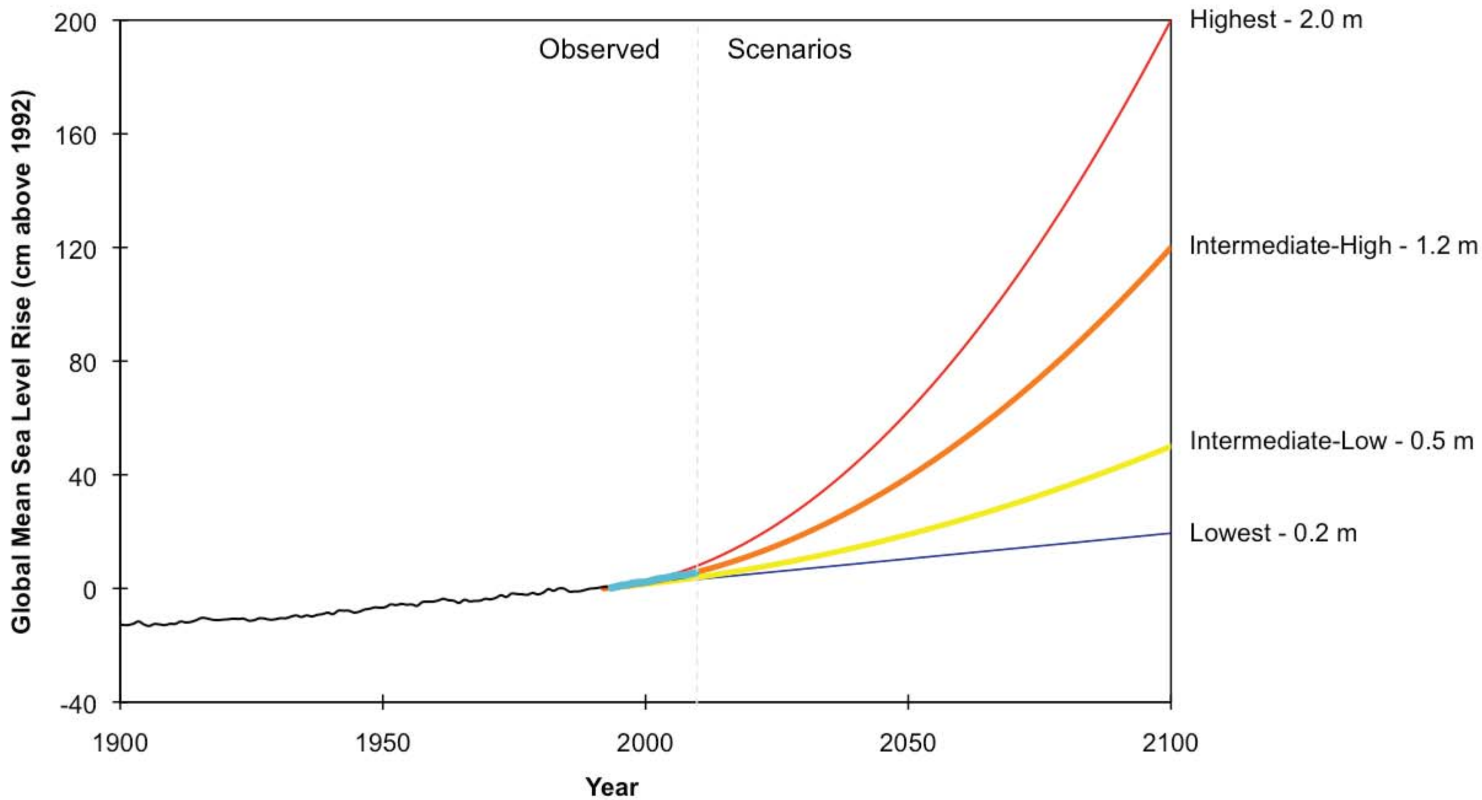


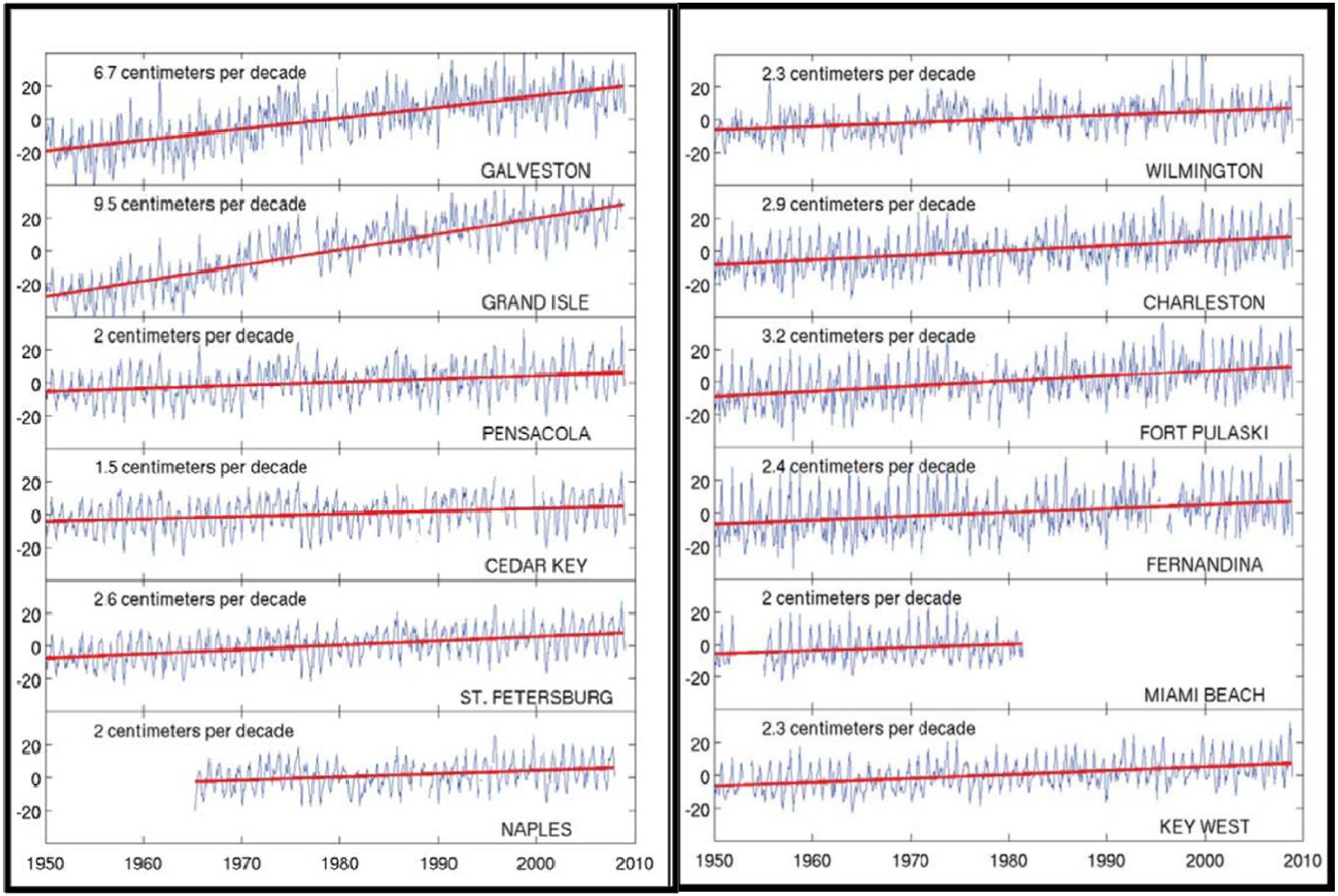
Figure 16. Pleistocene shorelines in Florida. Illustration by Frank R. Rupert.



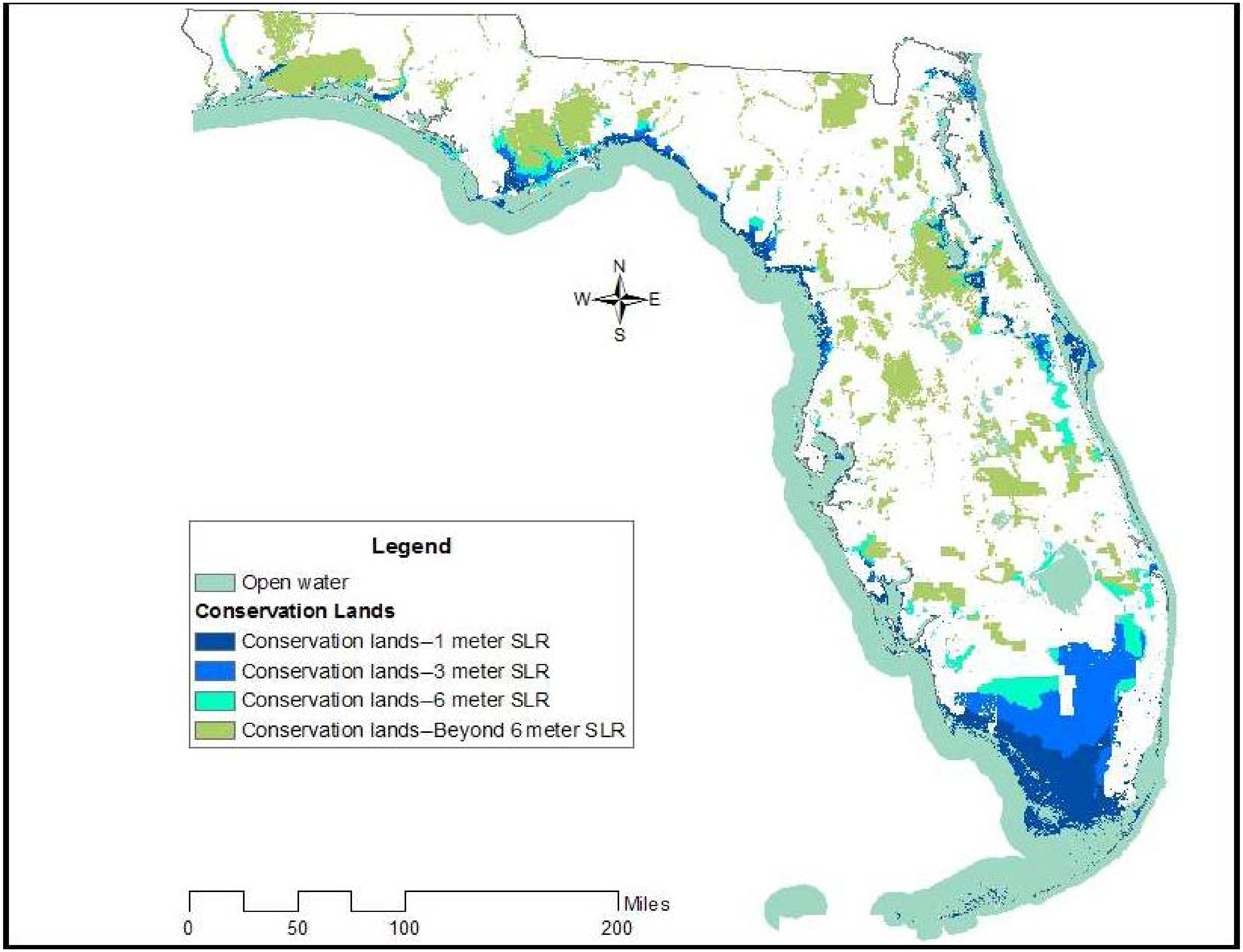
Scenario	SLR by 2100 (m)*	SLR by 2100 (ft)*
Highest	2.0	6.6
Intermediate-High	1.2	3.9
Intermediate-Low	0.5	1.6
Lowest	0.2	0.7

* Using mean sea level in 1992 as a starting point.

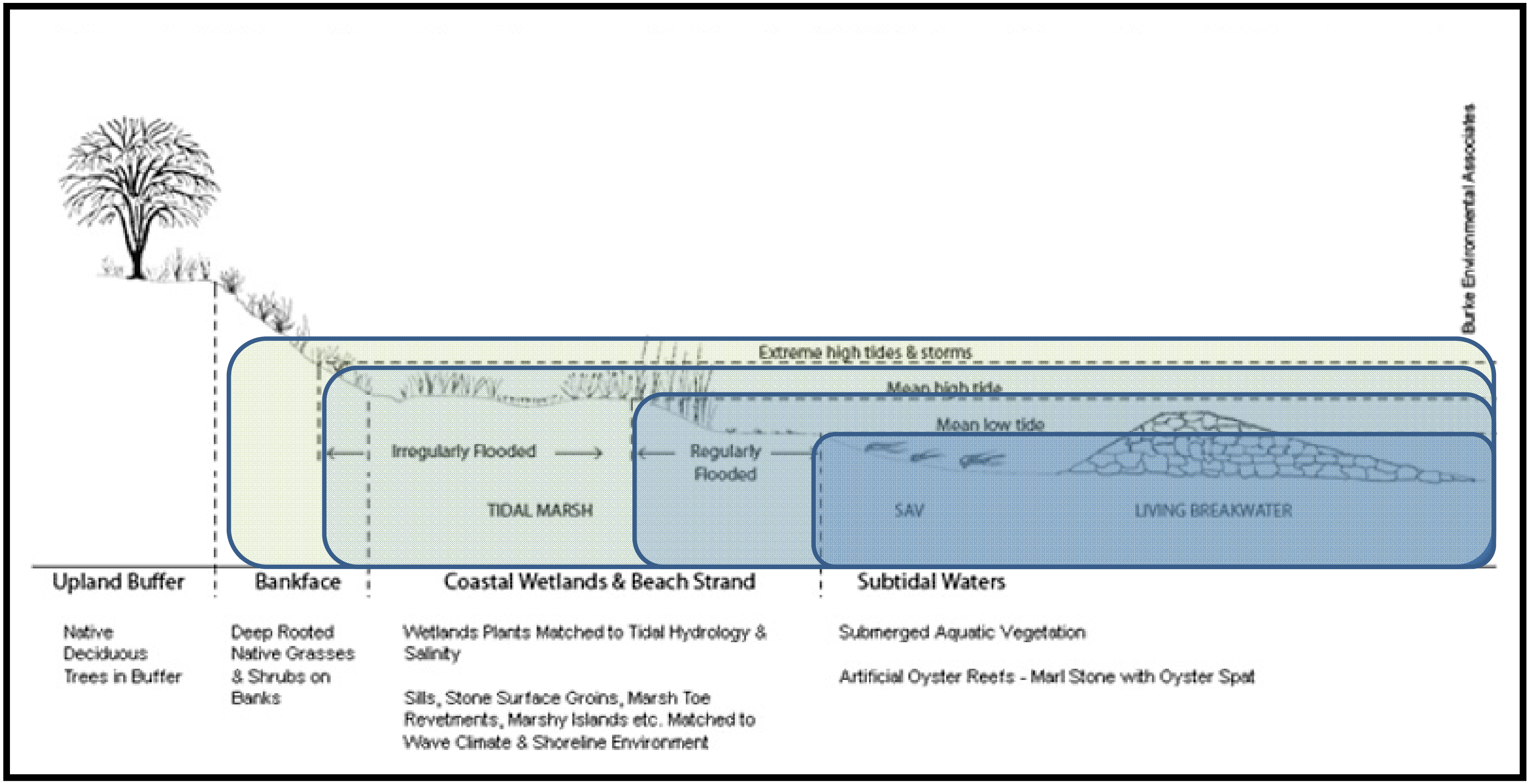
Tide Gauge Readings, Gulf of Mexico 1950-2010



UF | IFAS Extension
UNIVERSITY of FLORIDA

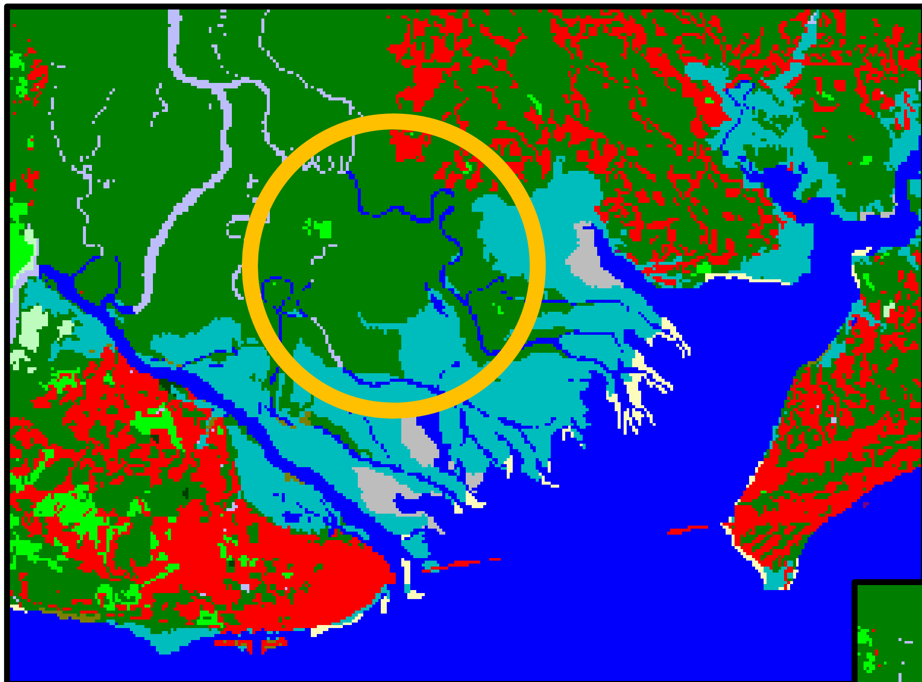

N
W
E
S
Legend
Open water
Conservation Lands
Conservation lands–1 meter SLR
Conservation lands–3 meter SLR
Conservation lands–6 meter SLR
Conservation lands–Beyond 6 meter SLR
Miles
0
50
100
200

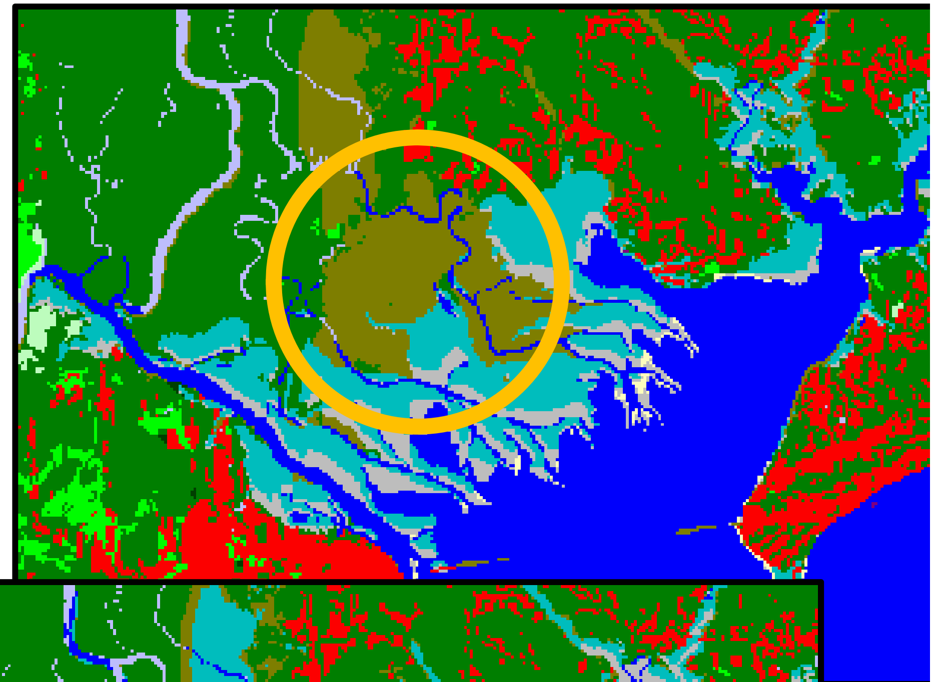
Changes to tidal regimes

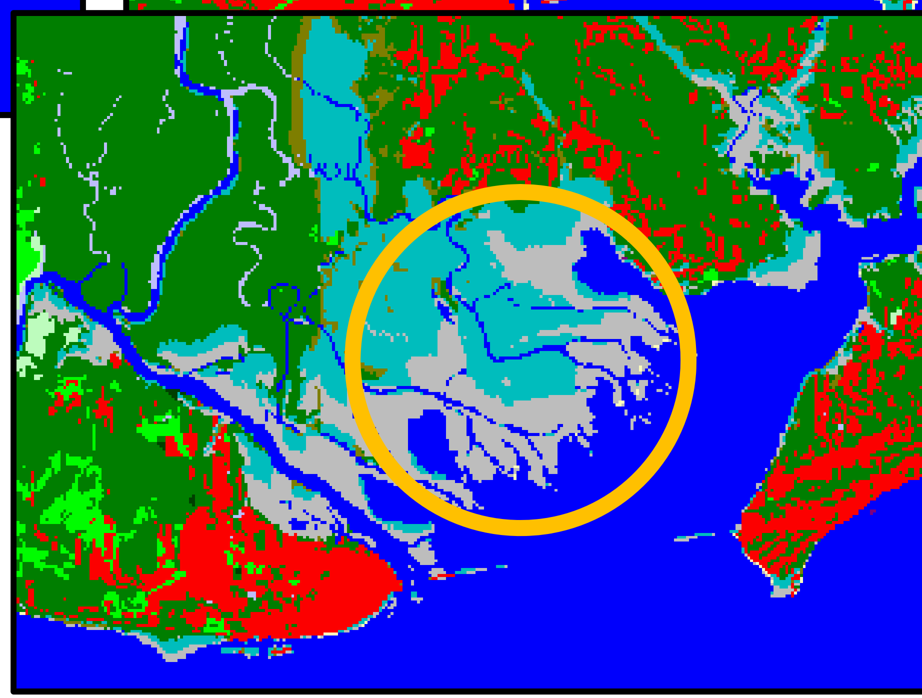


From www.habitat.noaa.gov

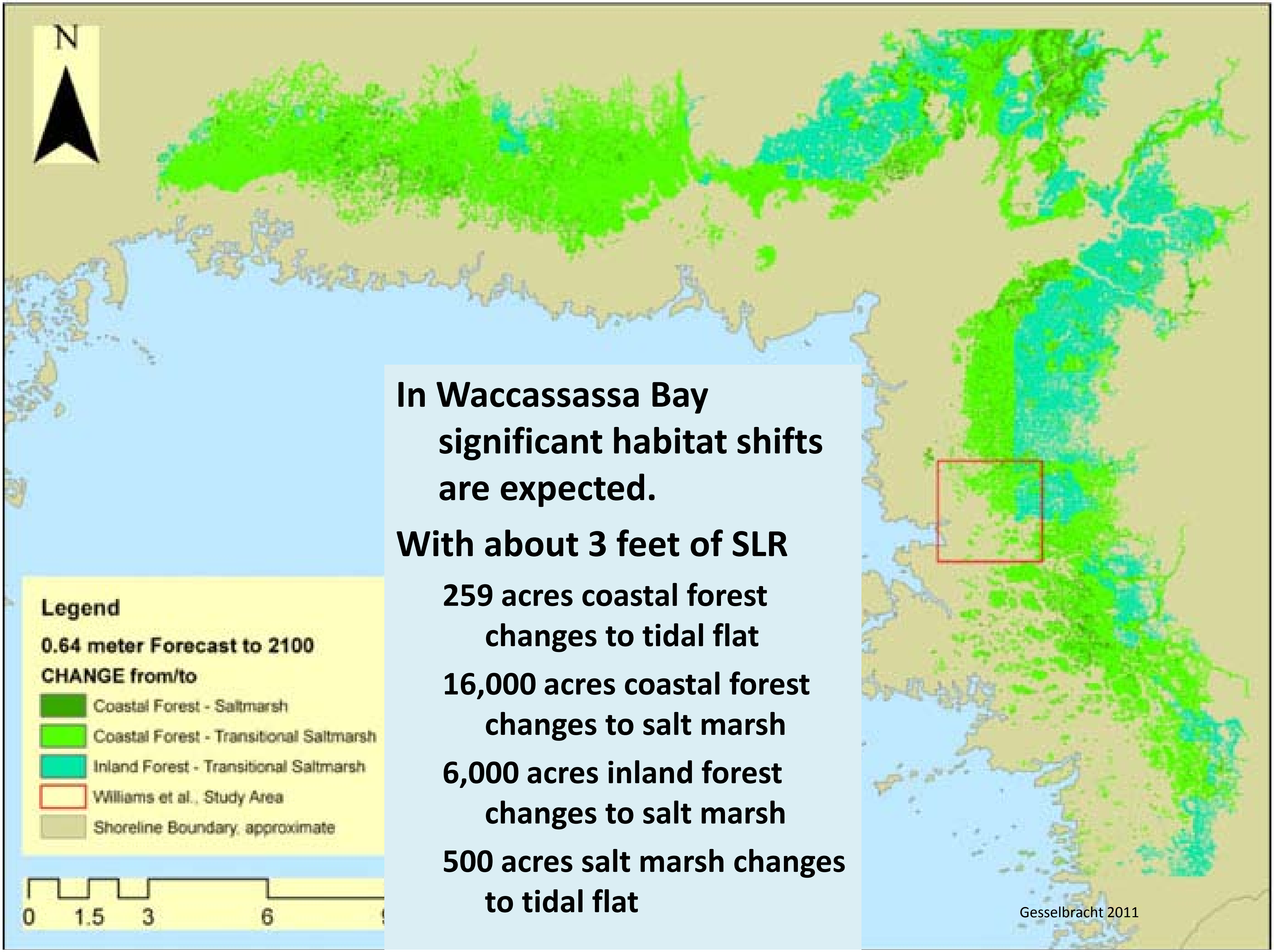
Ecosystems Change







	0.4 m SLR
Undeveloped Dry Land	-26.31%
Swamp	-9.72%
Transitional Salt Marsh	4544.96%
Regularly Flooded Marsh	-25.26%

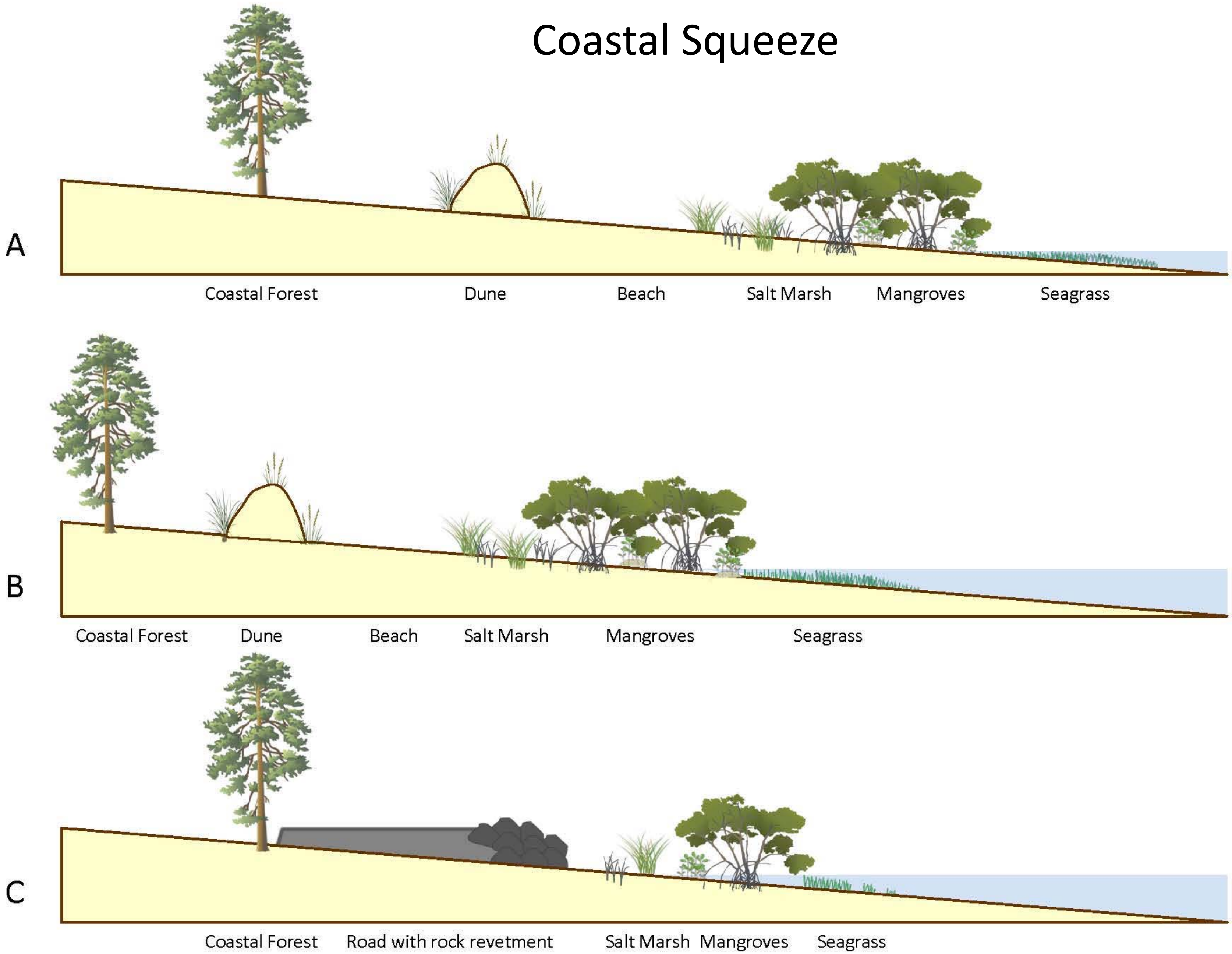


In Waccassassa Bay significant habitat shifts are expected.

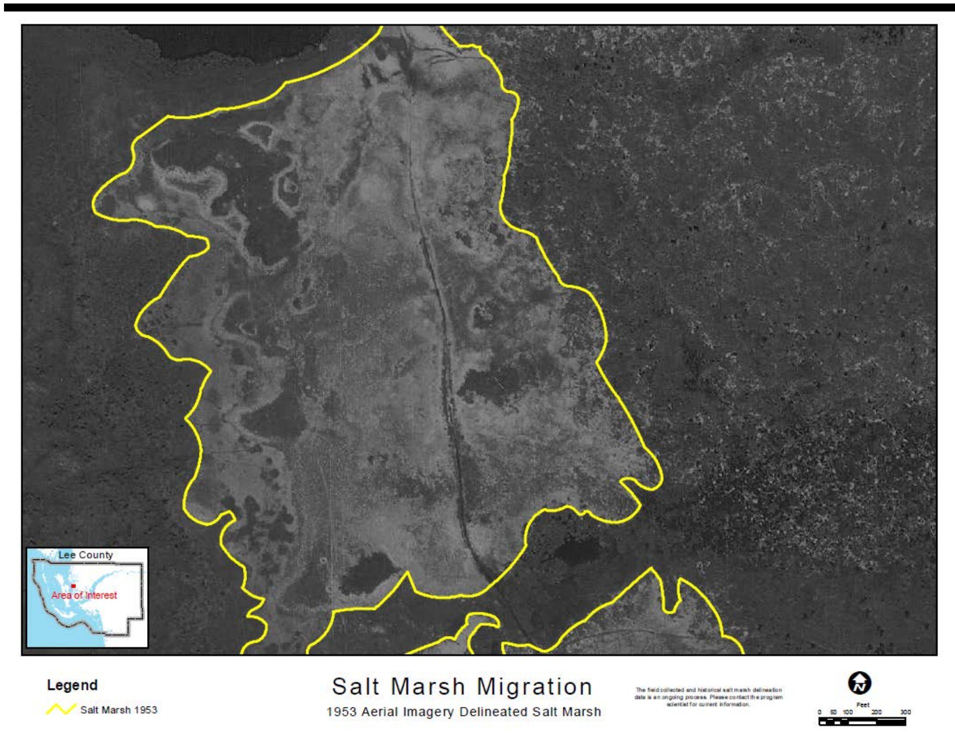
With about 3 feet of SLR

- **259 acres coastal forest changes to tidal flat**
- **16,000 acres coastal forest changes to salt marsh**
- **6,000 acres inland forest changes to salt marsh**
- **500 acres salt marsh changes to tidal flat**

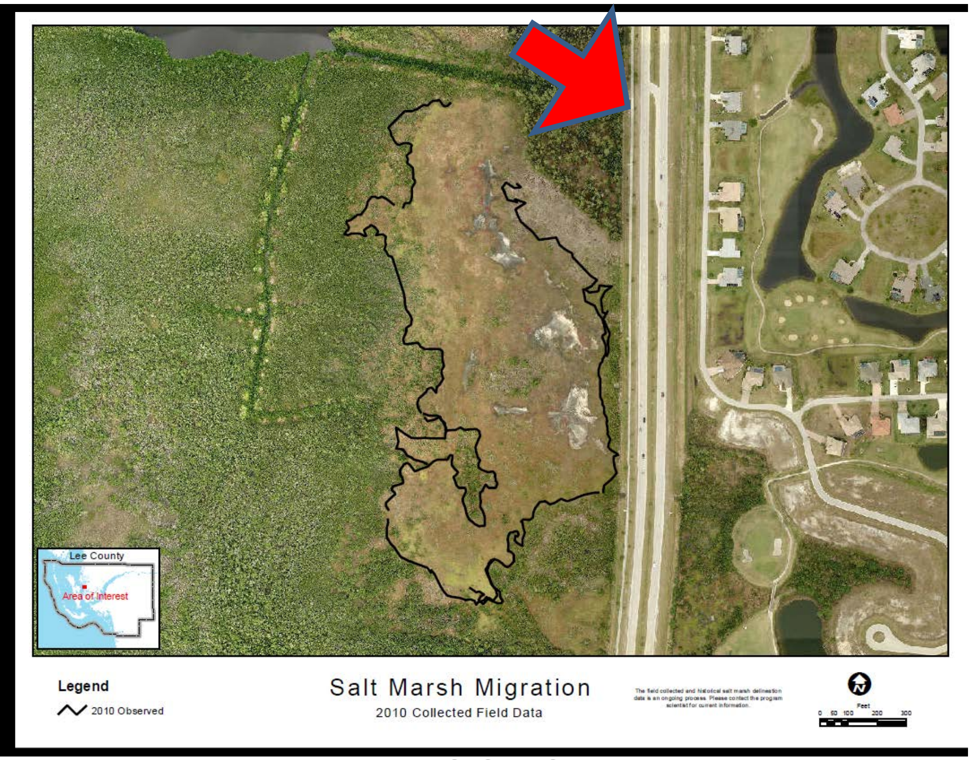
Coastal Squeeze



Salt Marsh Migration

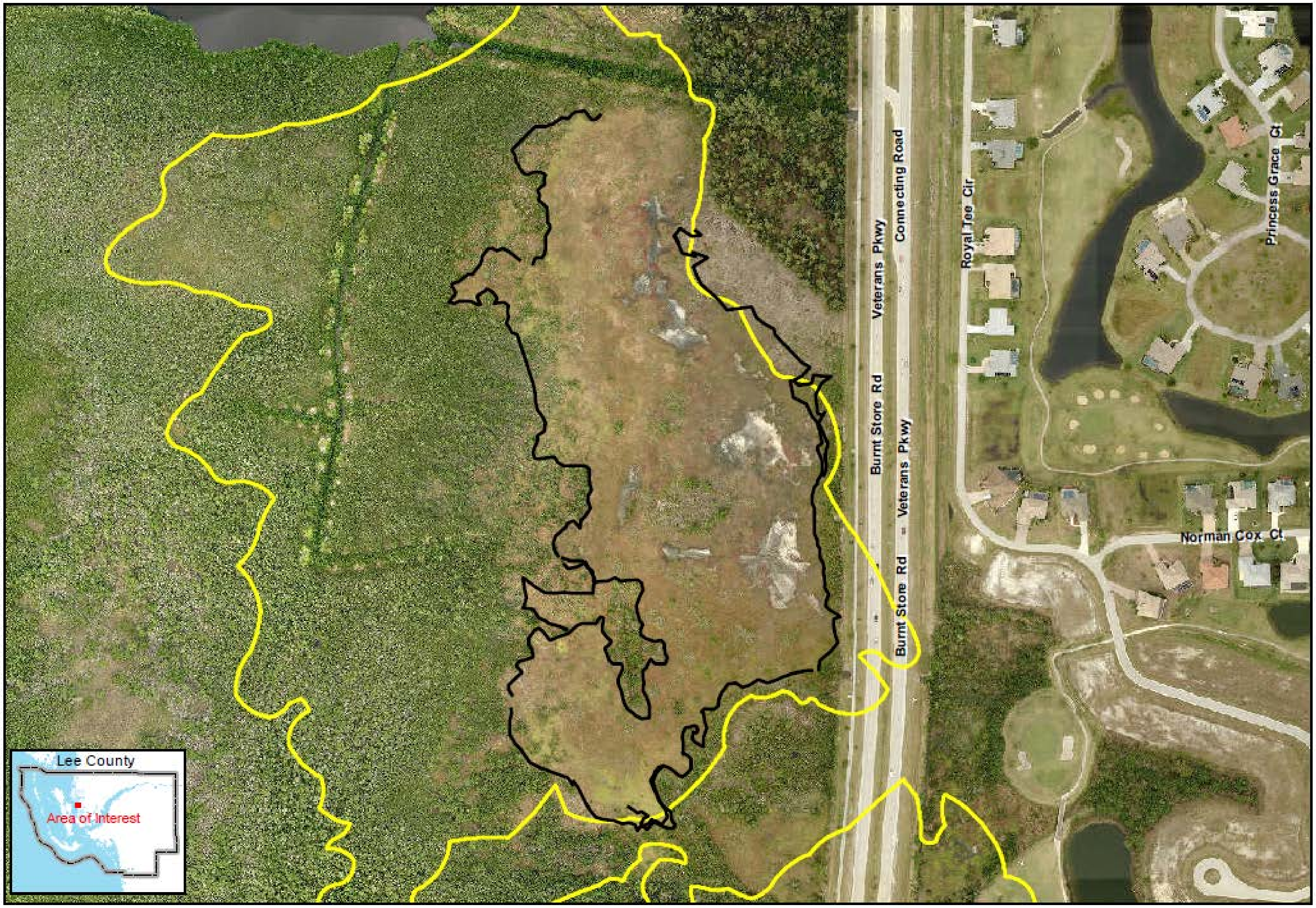


1953



2010

SWFRPC 2011



Legend

2010 Observed

Salt Marsh 1953

Salt Marsh Migration

1953 Aerial Imagery Derived Delineation
2010 Field Collected Data Points

The field collected and historical salt marsh delineation data is an ongoing process. Please contact the program scientist for current information.

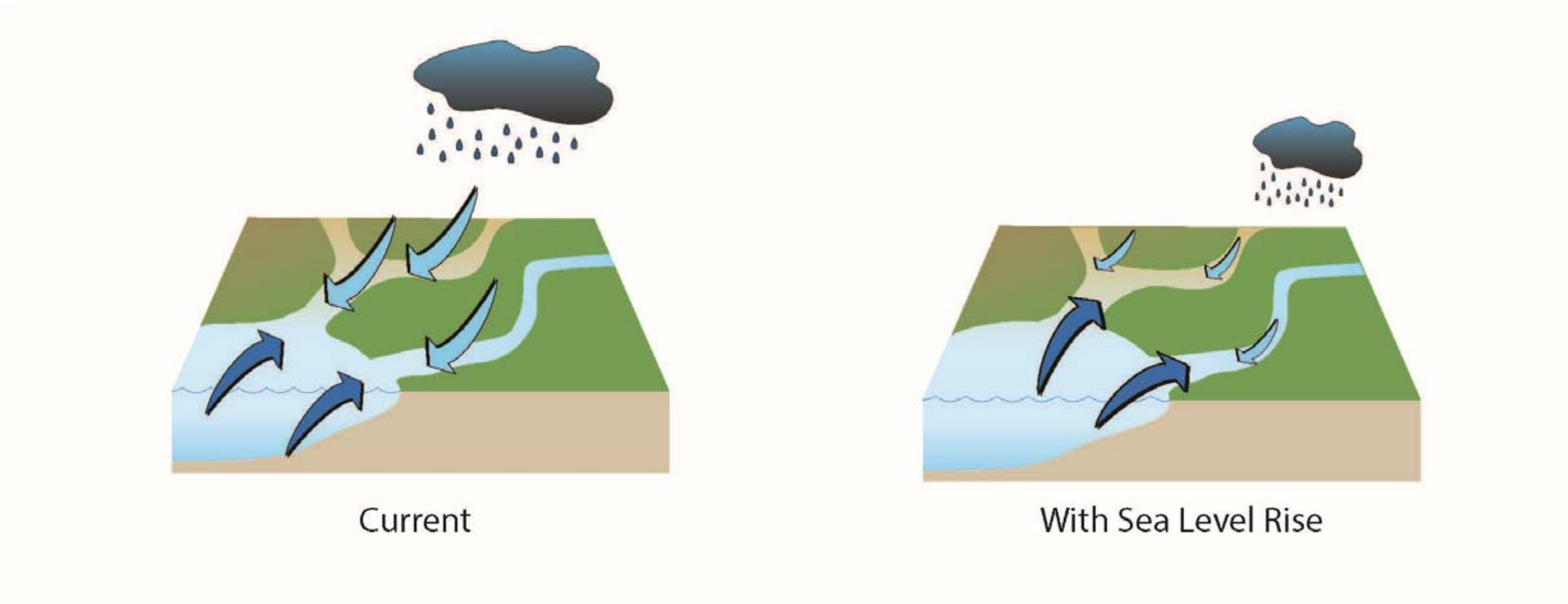
N

Feet

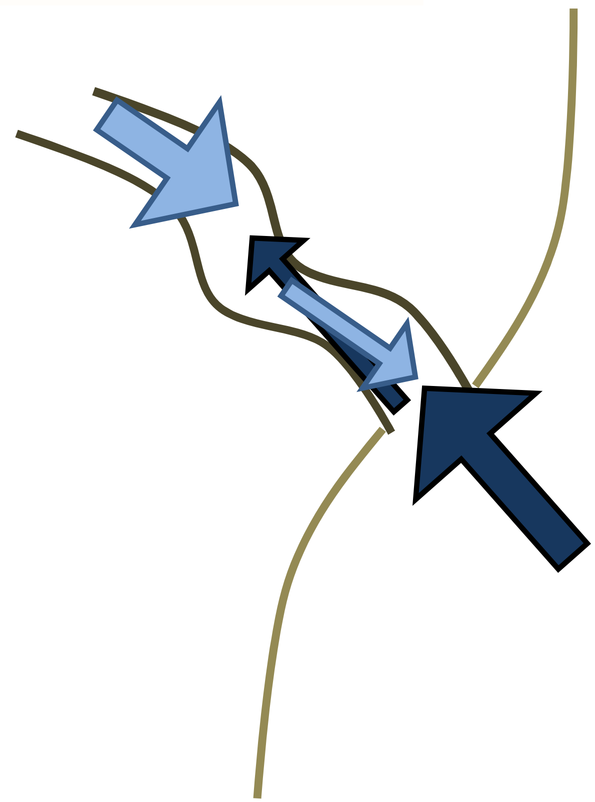
0 50 100 200 300

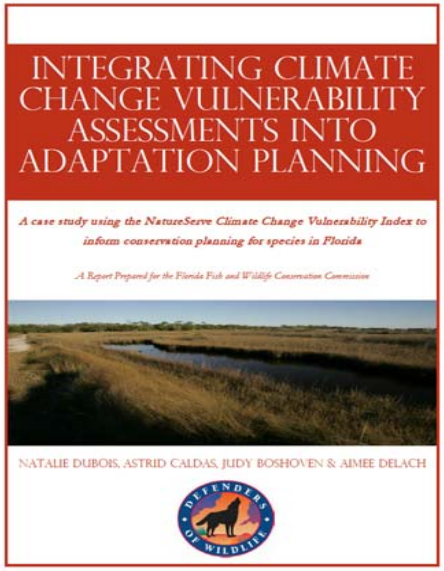
SWFRPC 2011

Ecosystems Change

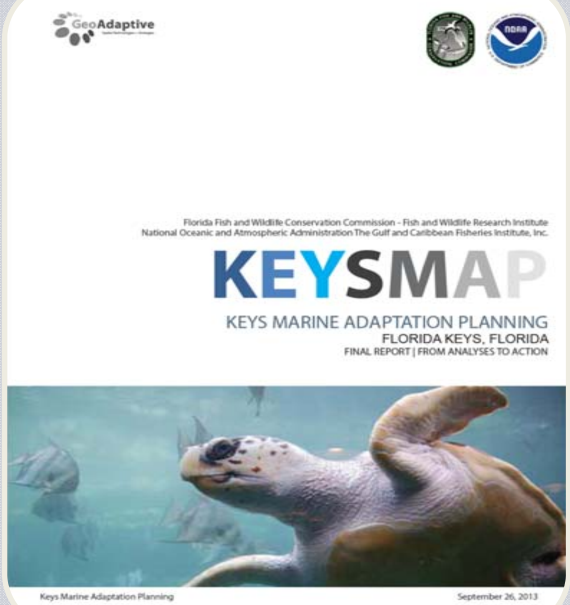


Lower stream flow from reduced precipitation and more groundwater use + higher sea level => less fresh water in the estuary and salinity moving further upstream.

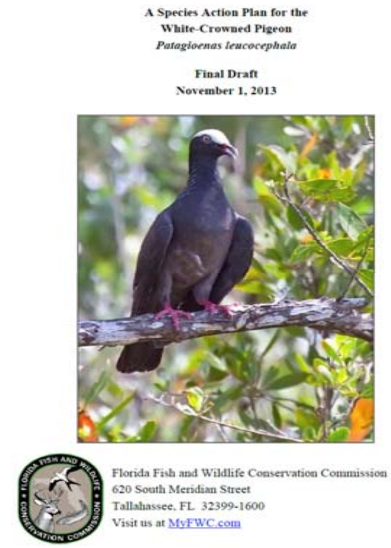




Vulnerability Assessments



Scenario Planning



Imperiled Species Management Plan

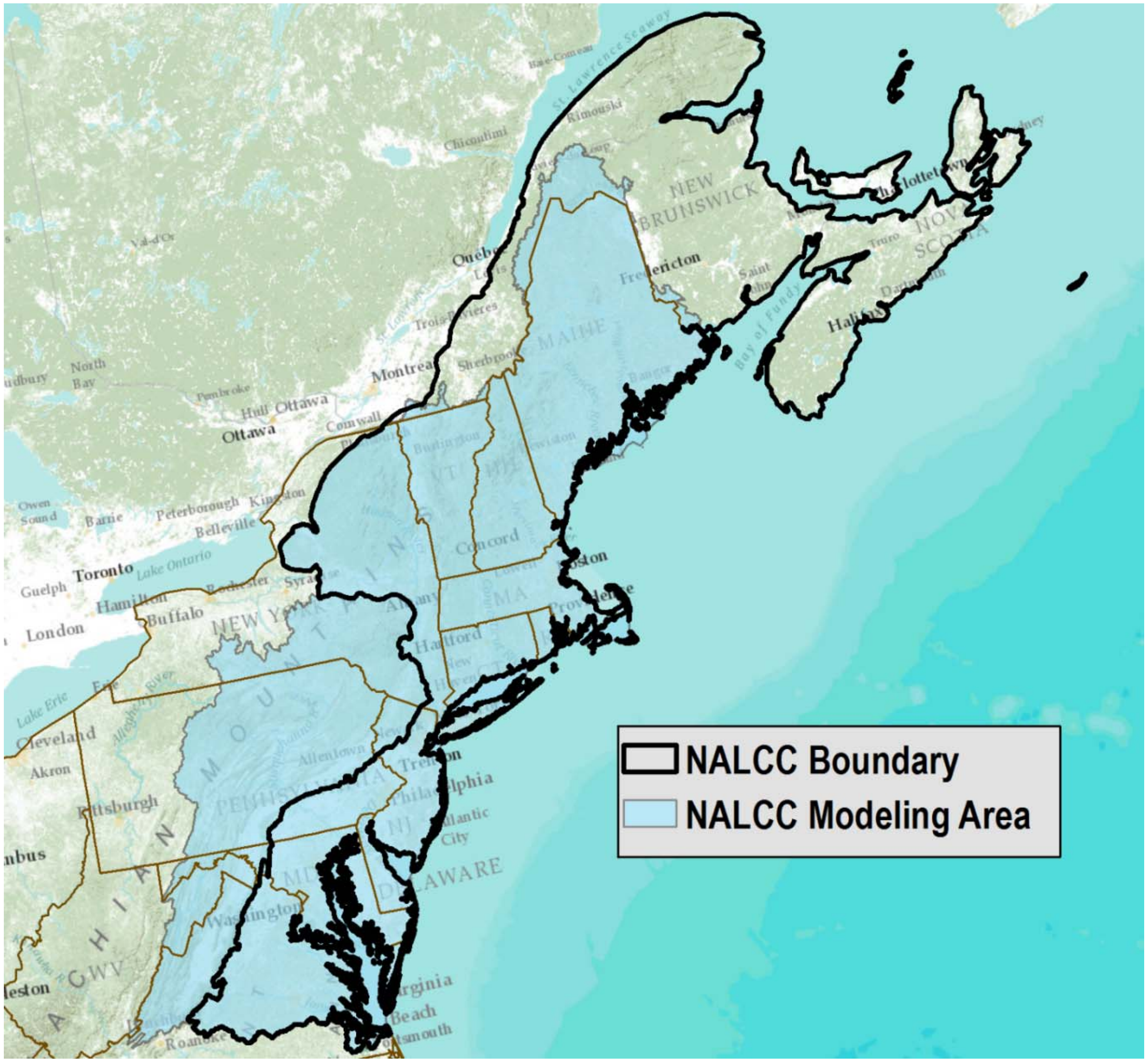
How can we preserve our vital coastal and aquatic ecosystems?

- Identify and maintain places where ecosystems can move upland.
  - Planning/Zoning
  - Natural Resource Adaptation Action Areas (Comprehensive Plan)
  - Removal of abandoned infrastructure
- Restore degraded habitats
  - Oyster reef restoration
  - Exotic species removal
  - Living shorelines

Climate Change Resources

- Florida Climate Institute https://floridaclimateinstitute.org/
- Florida Sea Grant https://www.flseagrant.org/climatechange/
- CAKE (Climate Adaptation Knowledge Exchange http://www.cakex.org/
- Climate Central http://www.climatecentral.org/
- NOAA's Digital Coast SLR Viewer http://www.csc.noaa.gov/digitalcoast/tools/slrviewer
- NOAA Tides and Currents http://tidesandcurrents.noaa.gov/
- SLAMM View http://www.slammview.org/
- Skeptical Science http://www.skepticalscience.com/
- RealClimate http://www.realclimate.org/

NALCC Aquatic Habitat Assessment



Updated Scope of Work

- Task 1. Inland model (Chesapeake Bay watershed brook trout model)
- Task 2. Estuarine case study (Narragansett Bay winter flounder model)
- Task 3. Diadromous species case study
- Task 4. Decision support tool

Task 2. Estuarine Case Study
Winter Flounder Model

Progress and Details

Modeling Approach:

Boosted Regression Trees

INPUT

Predictor Data
- o Local condition variables (temp, substrate)
- o Estuary condition (eutrophication)
- o Nearby condition (shoreline condition)

Response Data
- o Fish Data
  - Assemblage
  - Abundance
  - Presence Absence
  - Diversity/Health

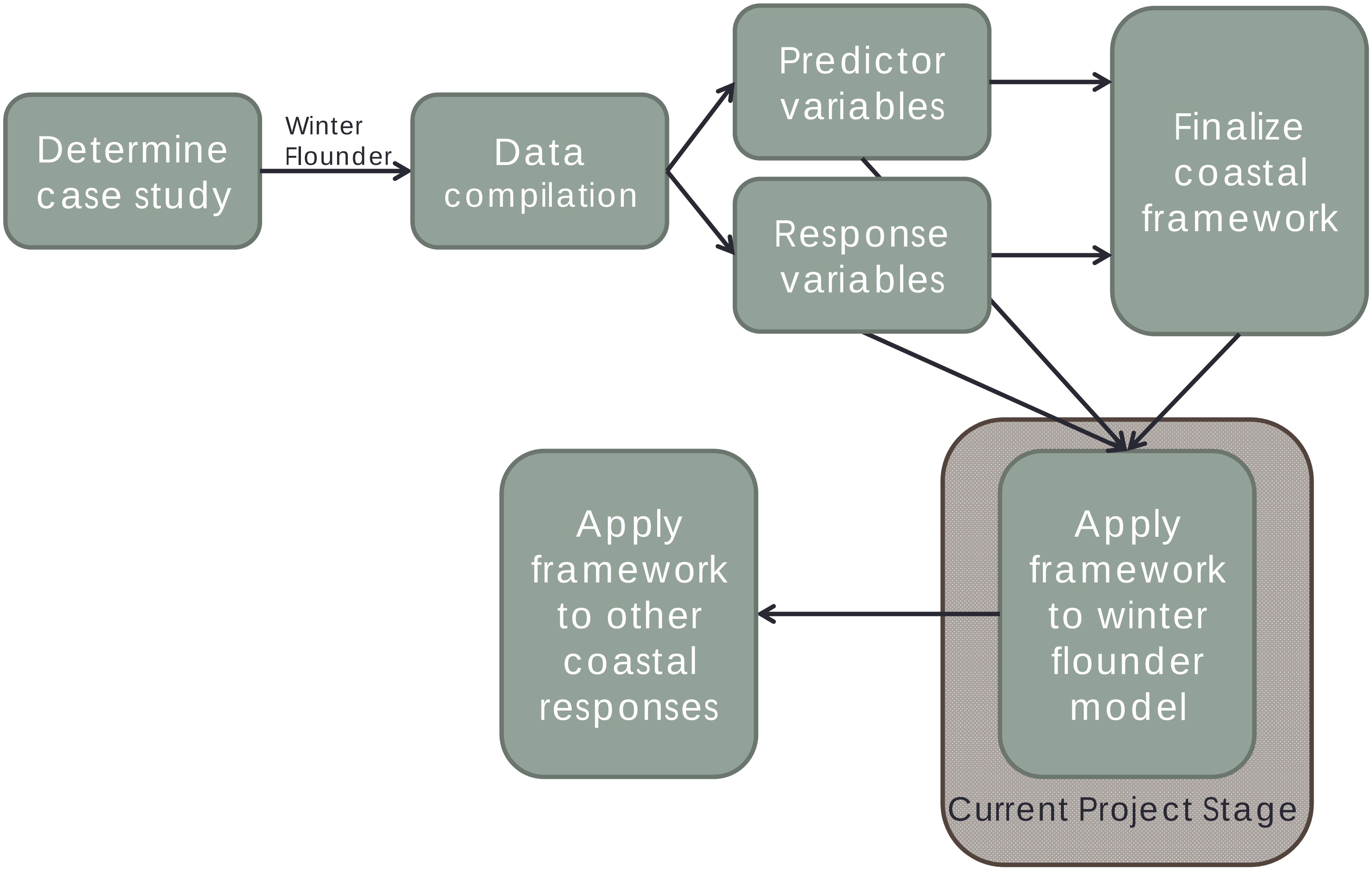
BRT

OUTPUT

Model Results
- o Response variable predictions @ hexagon grid scale
- o Predictor variable importance weightings
- o Predictor variable response functions

Post-Modeling Results
- o Habitat Quality Index (NQI)
- o Anthropogenic Stressor Index (ASI)
- o NQI and ASI can be summarized from hexagon grid up to other management units

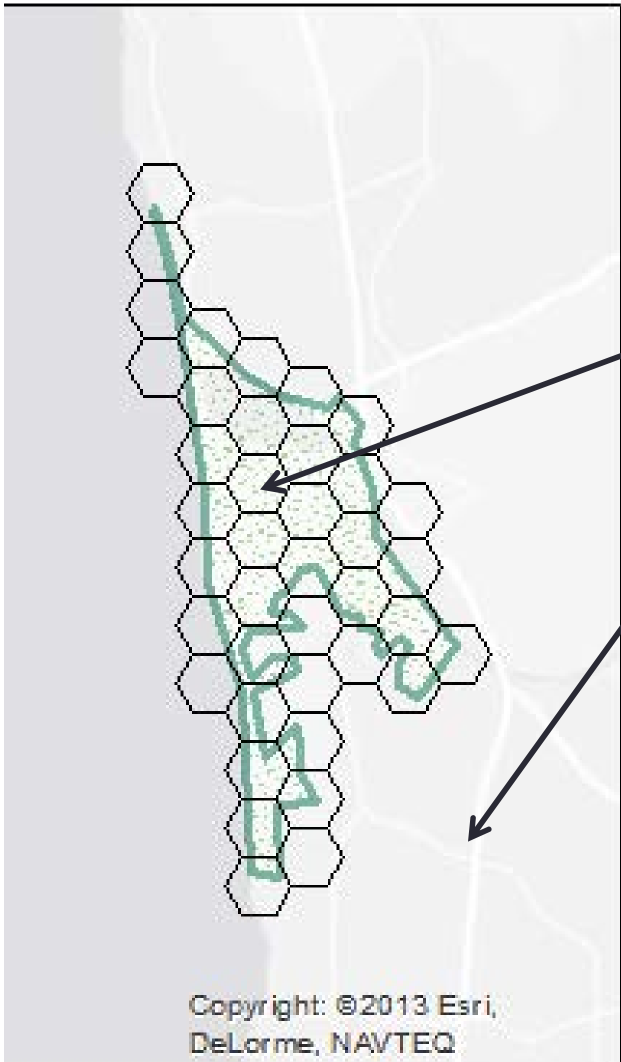
Estuarine/Coastal Modeling Process



Assessment Objectives

- **Predictions** of winter flounder where not sampled
- **Examine relationships** between habitat variables (predictors) and winter flounder abundance (response)
- **Quantify natural quality and stress** from relationships indicated from model results

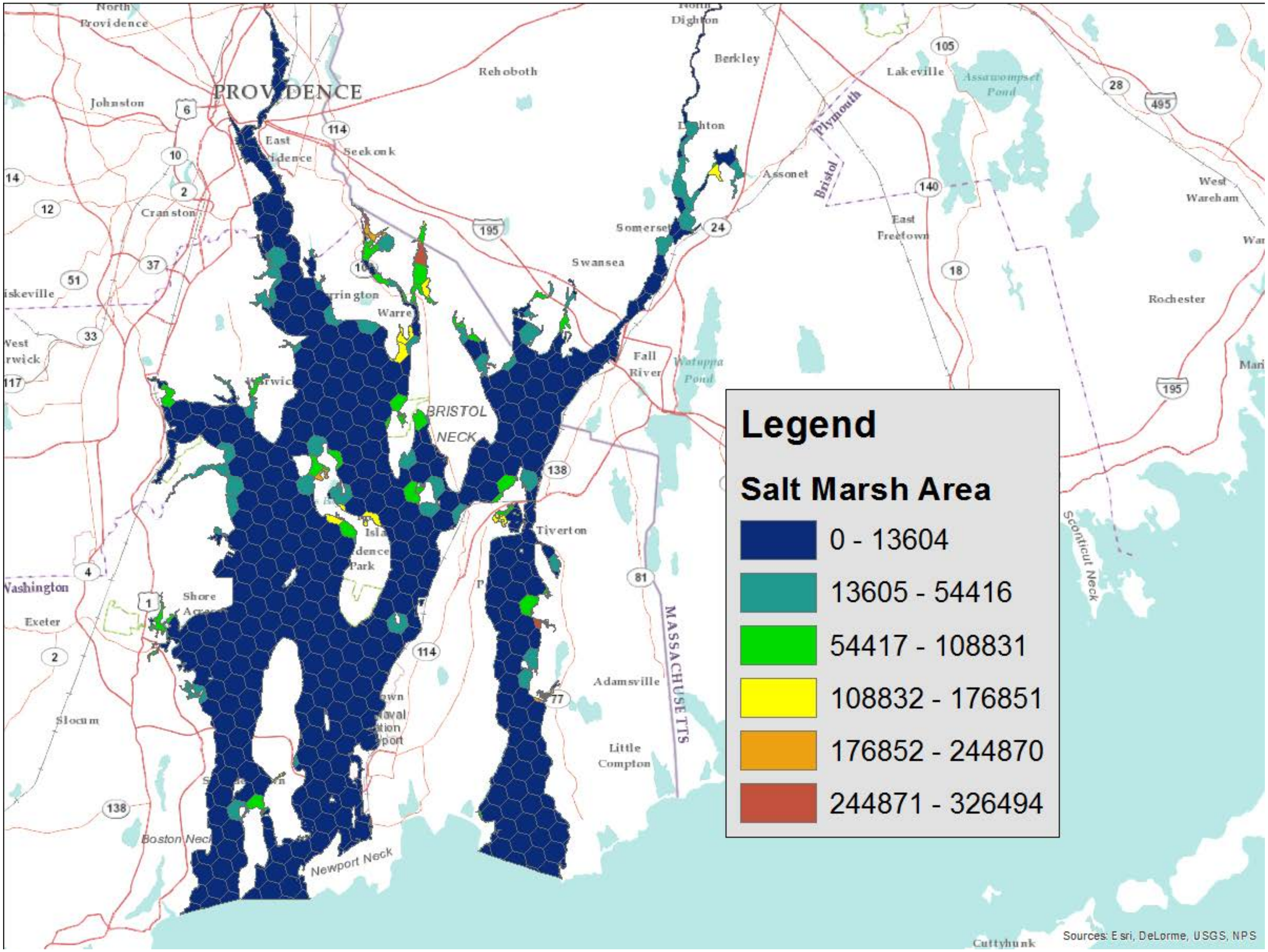
Model Input – Predictor Data



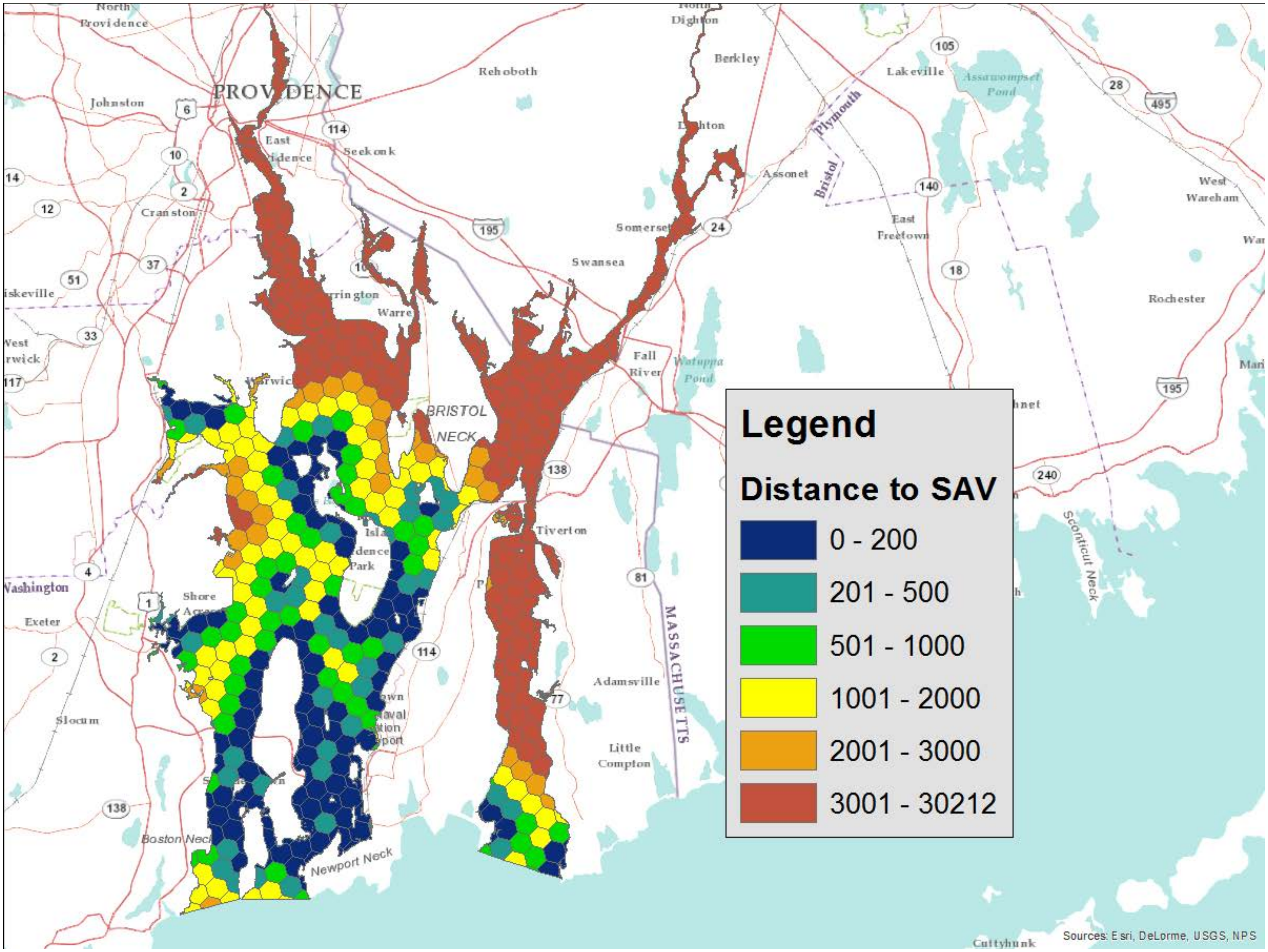
hexagons

- Local conditions within each hexagon (depth, substrate)
- Nearby conditions (shoreline development, distance to seagrass, etc)

Model Input – Predictor Data



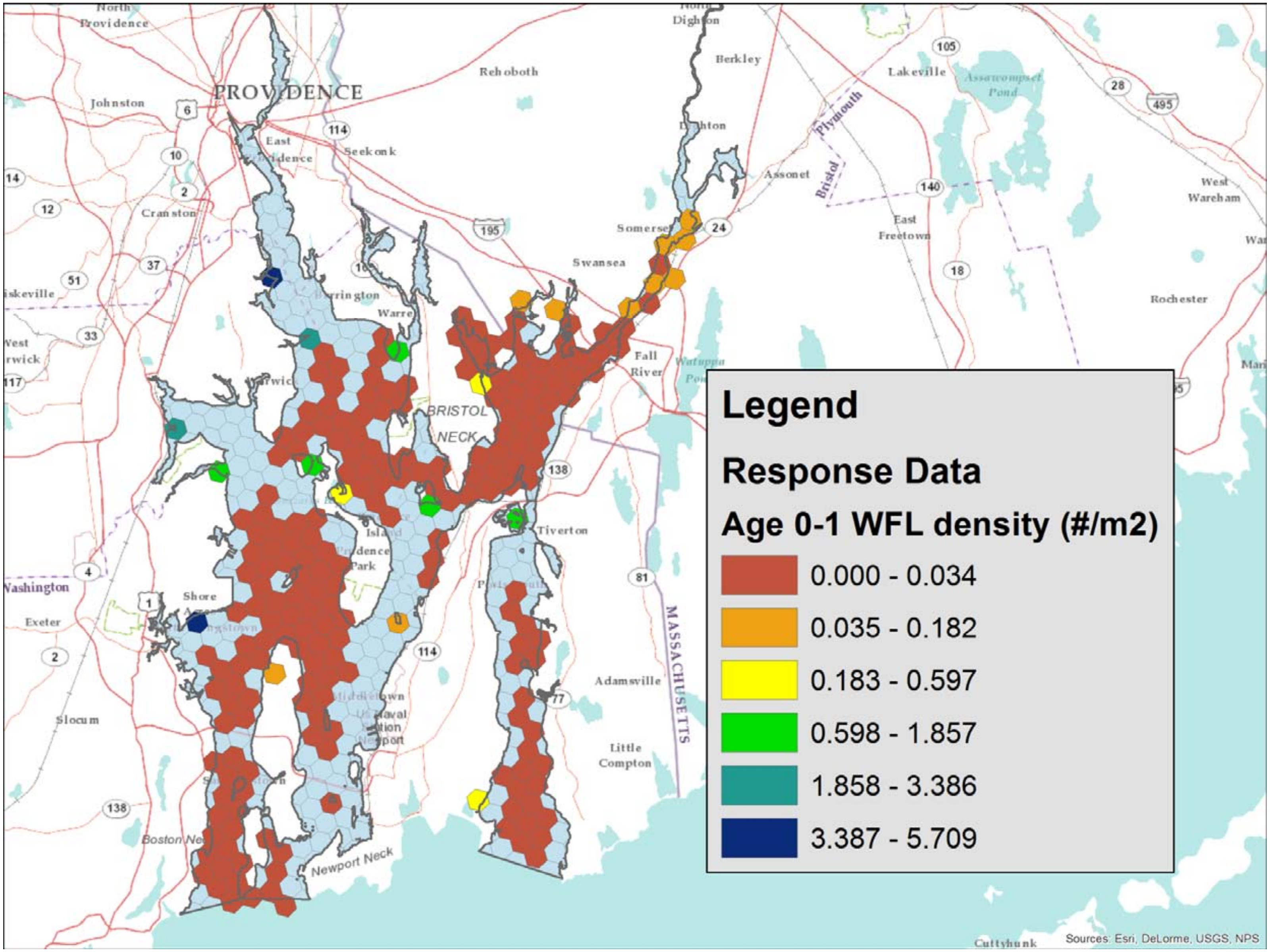
Model Input – Predictor Data



Model Input – Predictor Data

- **Bathymetry**
  - Min/Max
  - Distance to ‘deep’ water
- **Distance to shoreline**
- **Aquatic habitat type**
  - Percent of each habitat type in each hexagon
- **Substrate**
  - Percent sand, mud, gravel bottom
- **SAV**
  - Amount within hexagon
  - Distance to nearest SAV
- **Hardened shoreline**
  - Amount within hexagon
  - Distance to nearest hard shore
- **Impervious surfaces**
  - Amount within hexagon
  - Amount within 2km buffer
- **Outfalls**
  - Distance to nearest outfall
- **Nutrient**
  - Total Nitrogen
  - Total phosphorus
- **NO Temp and DO**

Model Input – Response Data



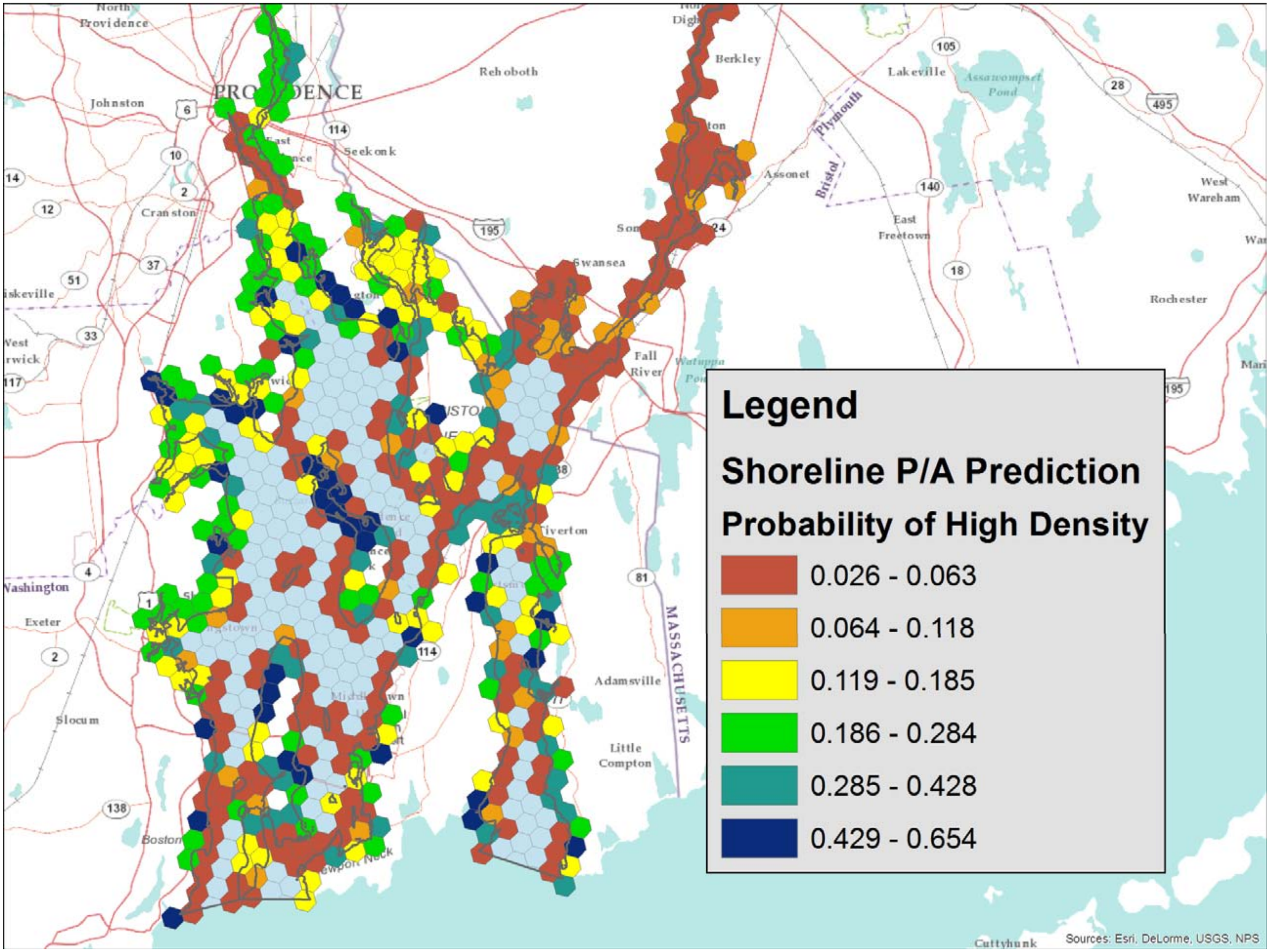
Response data format

- **YOY/age-1 fish (0 – 22 cm)**
  - Fish have not migrated out of the bay
- **Data from 2001+**
  - Data is relatively consistent annually
  - Data from each station averaged across timeframe
- **Density measure**
  - Standardized between seine and trawl
  - Number of fish/m^2 - changed to fish/100m^2

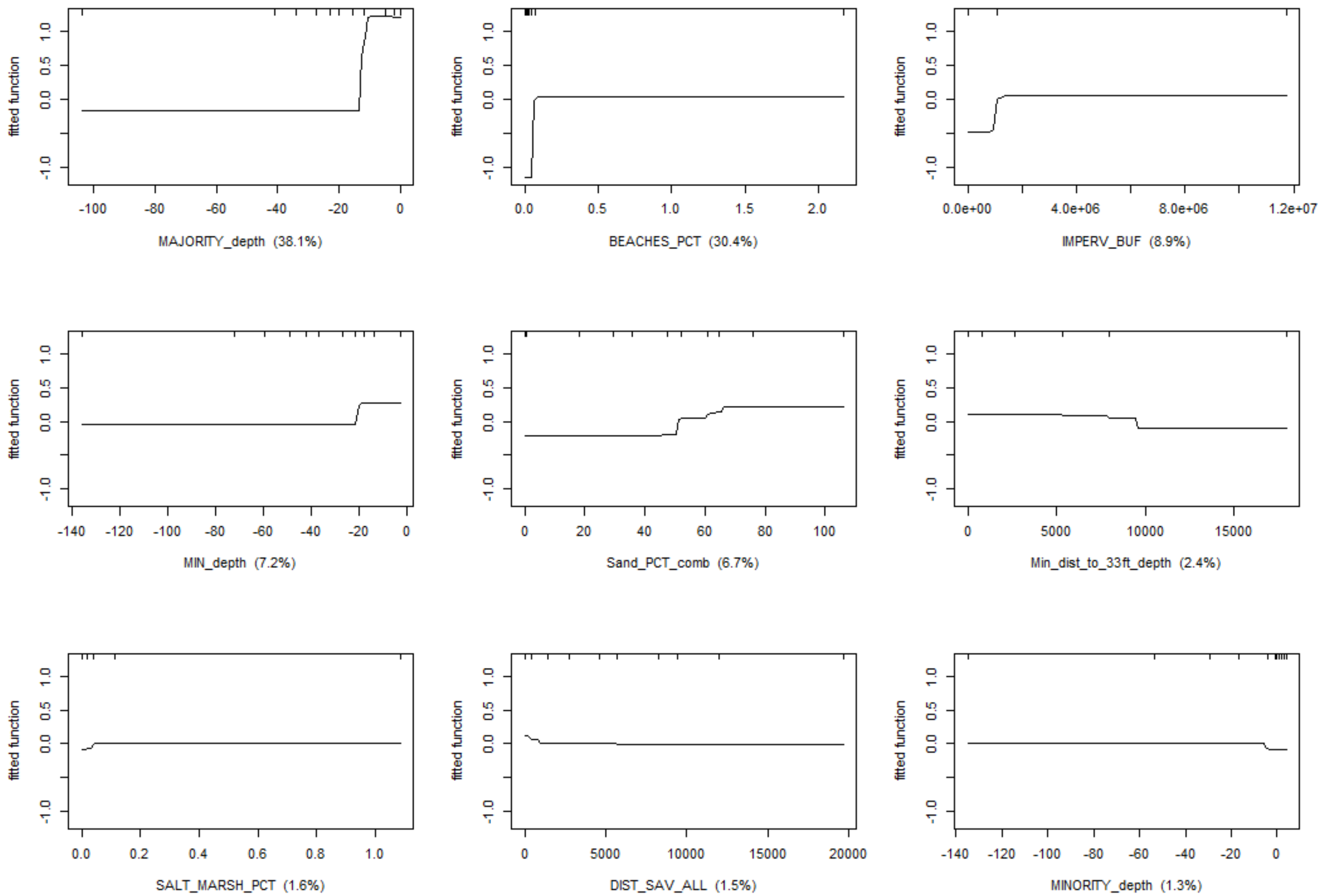
Iterative Process

- **First conference call in July – 4th prototype**
  - Seine and trawl
  - Cleaned up the data
  - Shoreline only
  - Predicted density (continuous) vs. probability of high density (tiered)

4th Prototype – Predictions



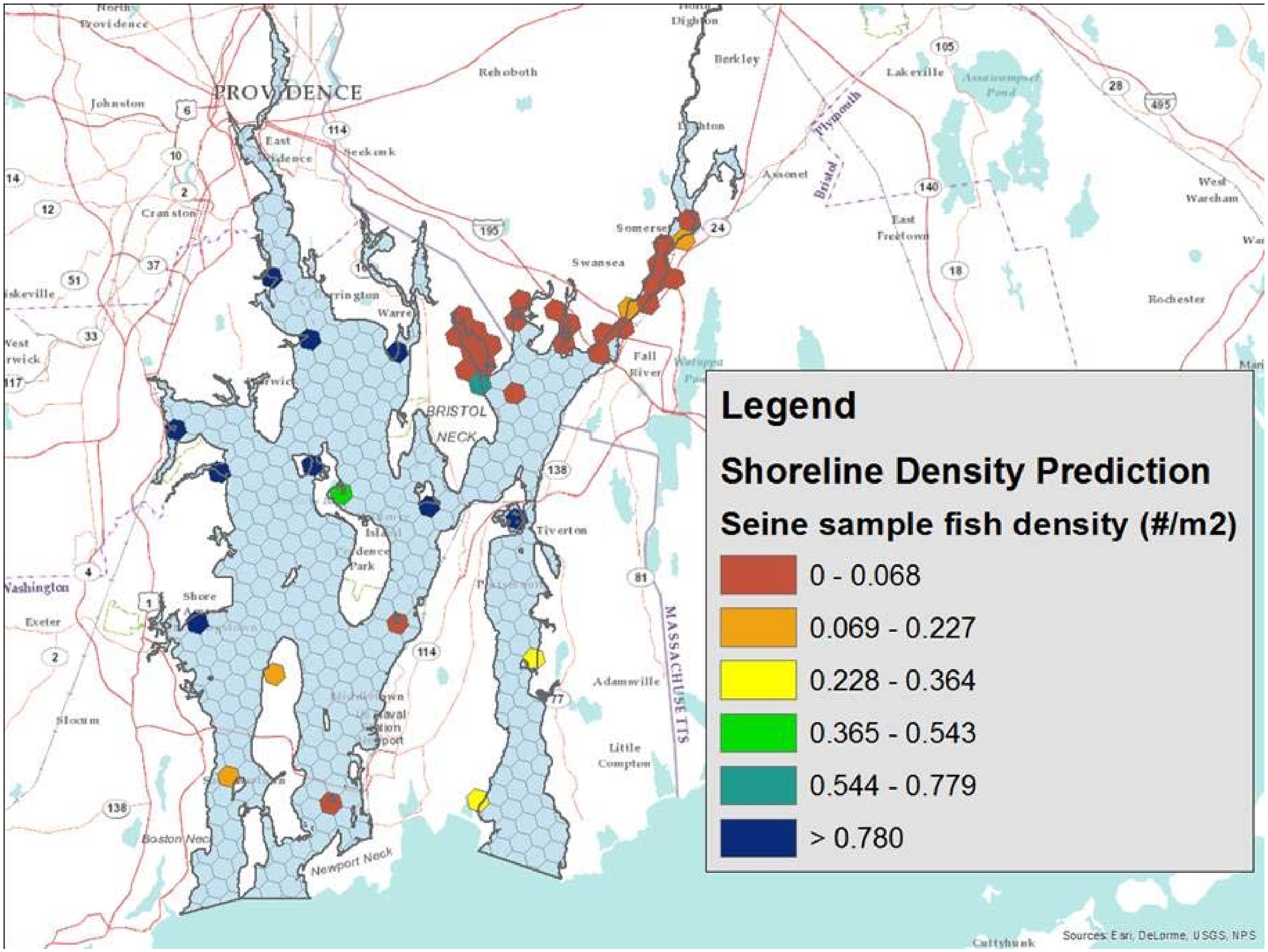
4th Prototype – Predictor variables and function plots



Iterative Process

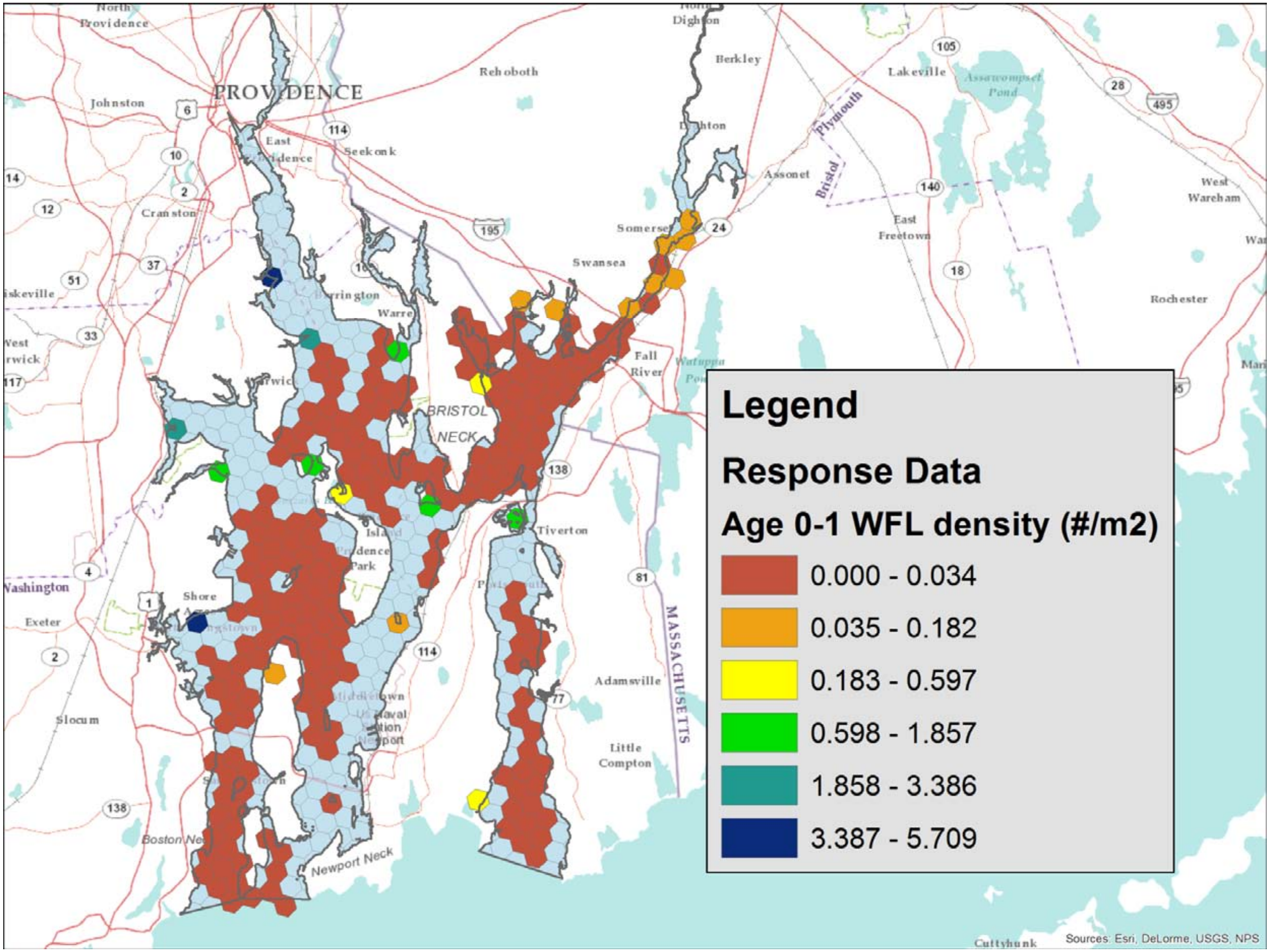
- **Second conference call in October**
  - Seine and Trawl vs. seine only
  - More data cleanup – transformed data

Seine Data

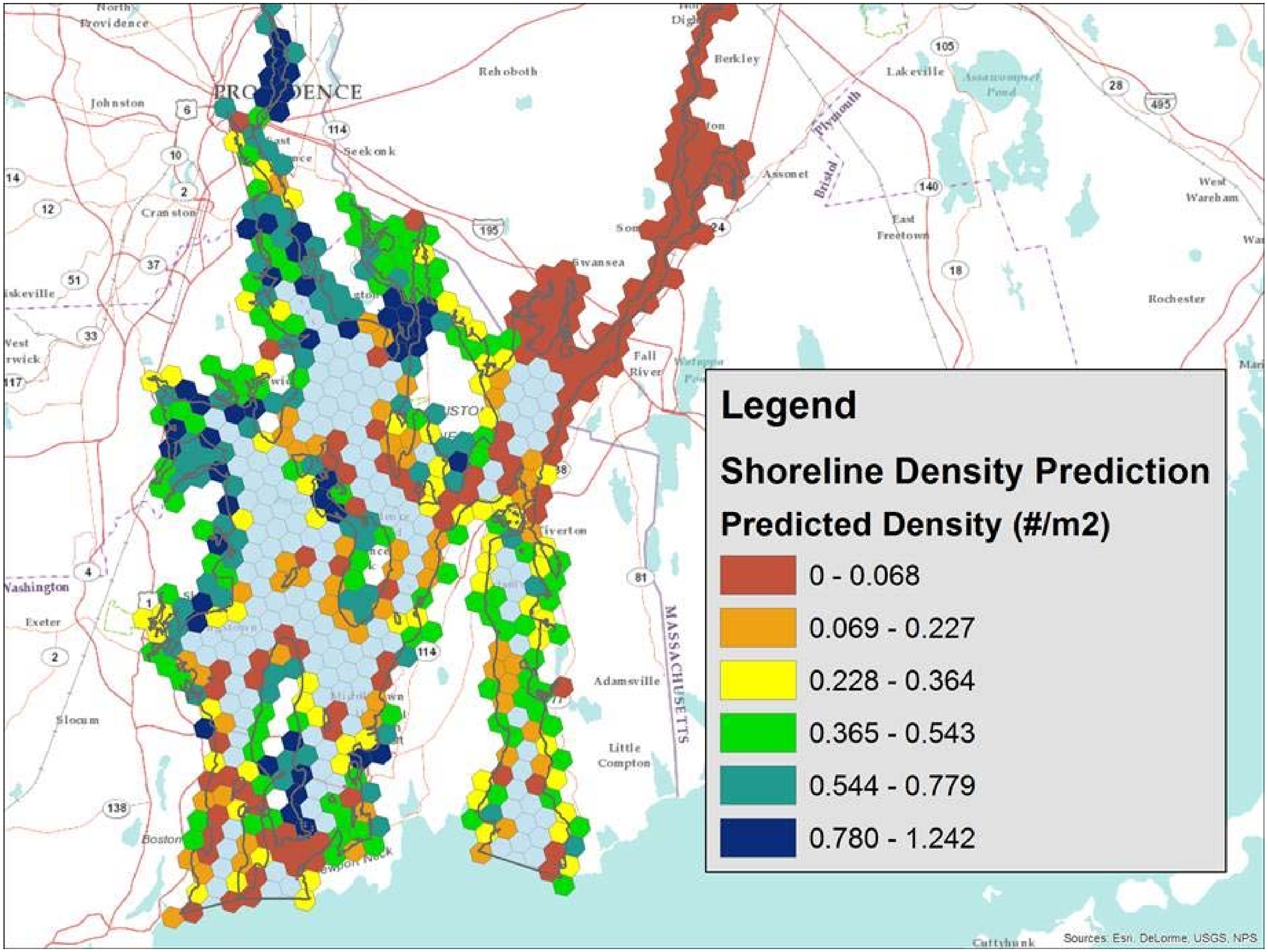


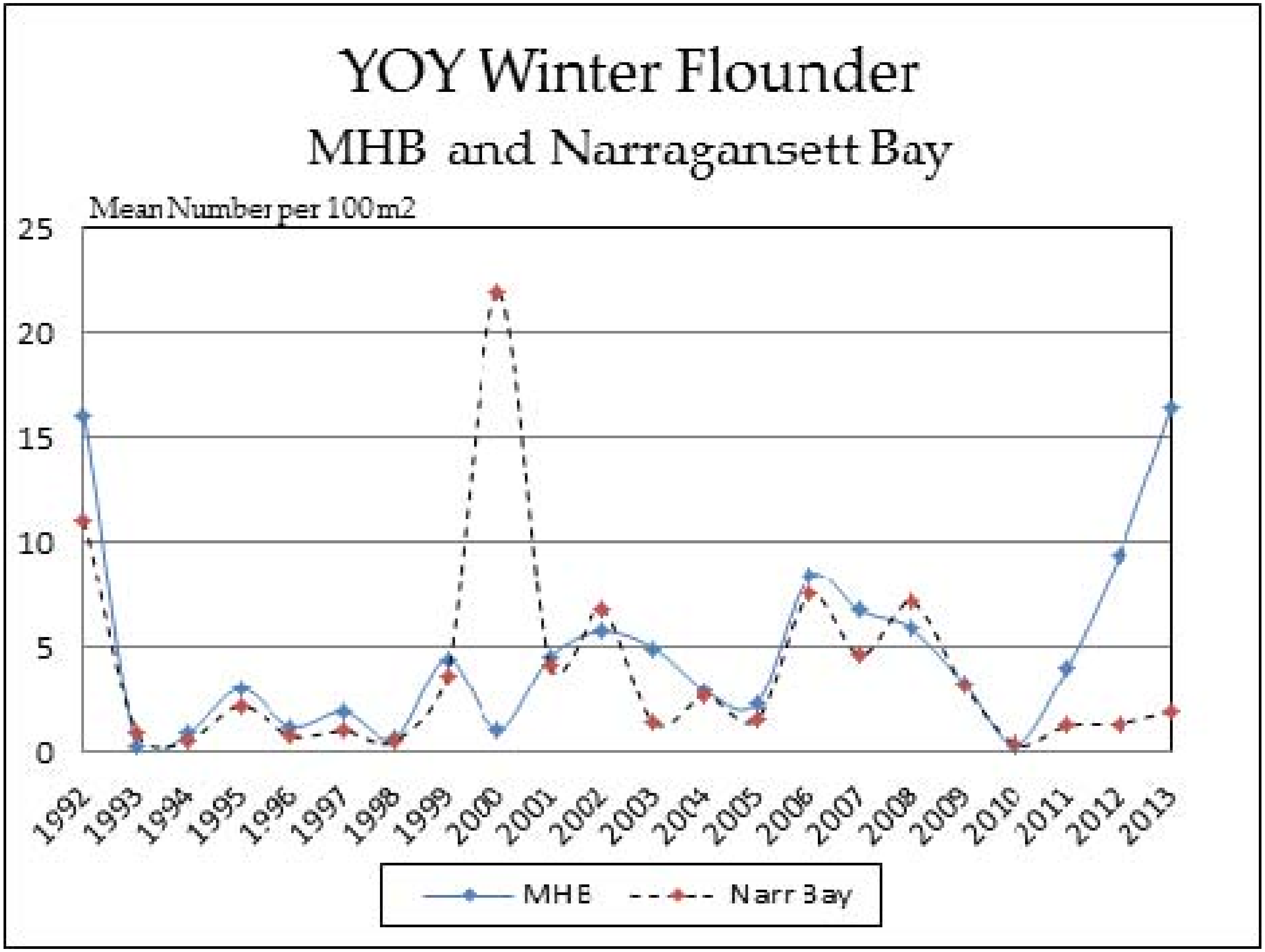
Legend
Shoreline Density Prediction
Seine sample fish density (#/m2)
0 - 0.068
0.069 - 0.227
0.228 - 0.364
0.365 - 0.543
0.544 - 0.779
> 0.780
PROVIDENCE
BRISTOL NECK
Newport Neck
MASSACHUSETTS
Sources: Esri, DeLorme, USGS, NPS

Model Input – Response Data



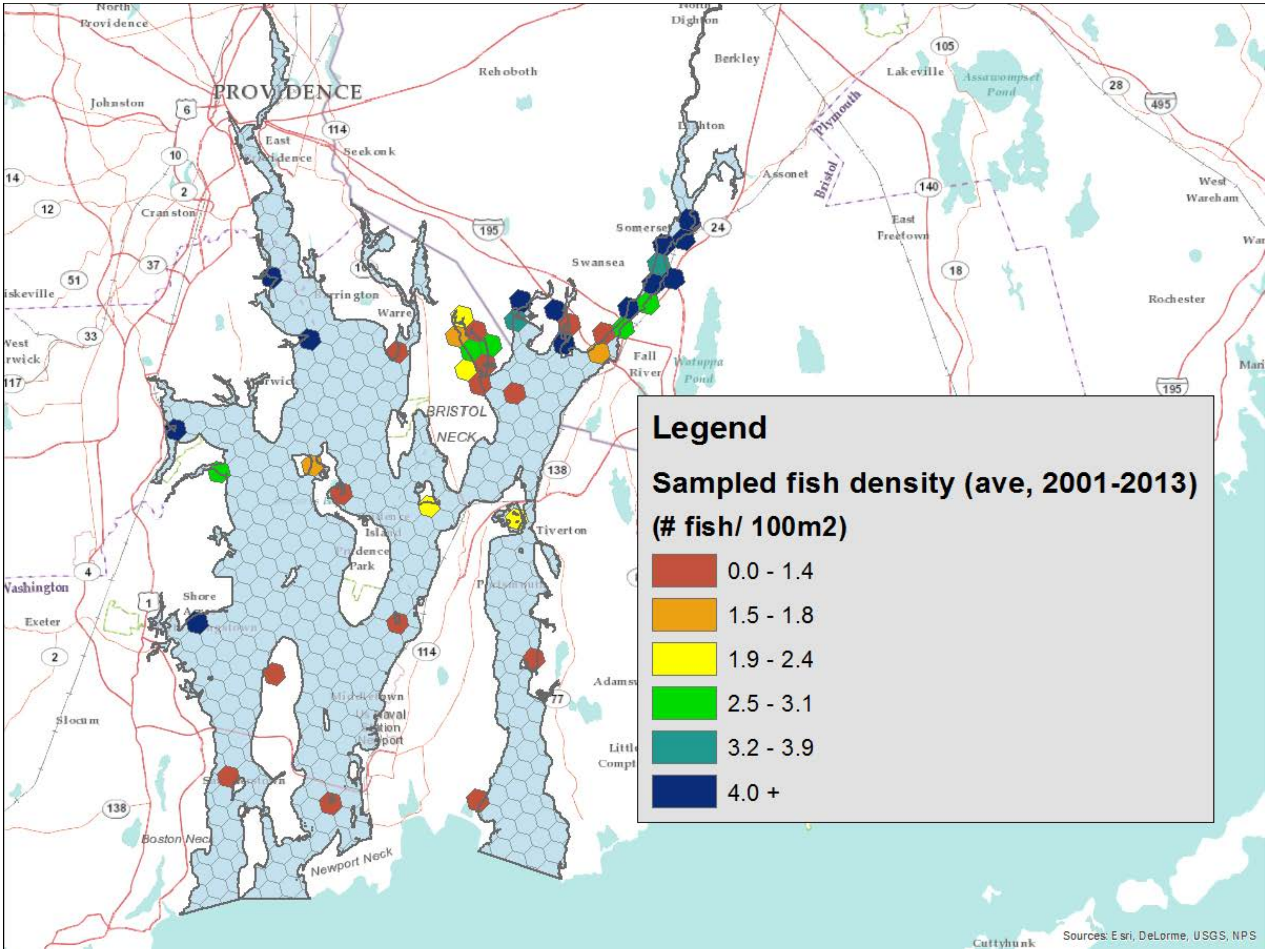
6th Prototype – Predictions



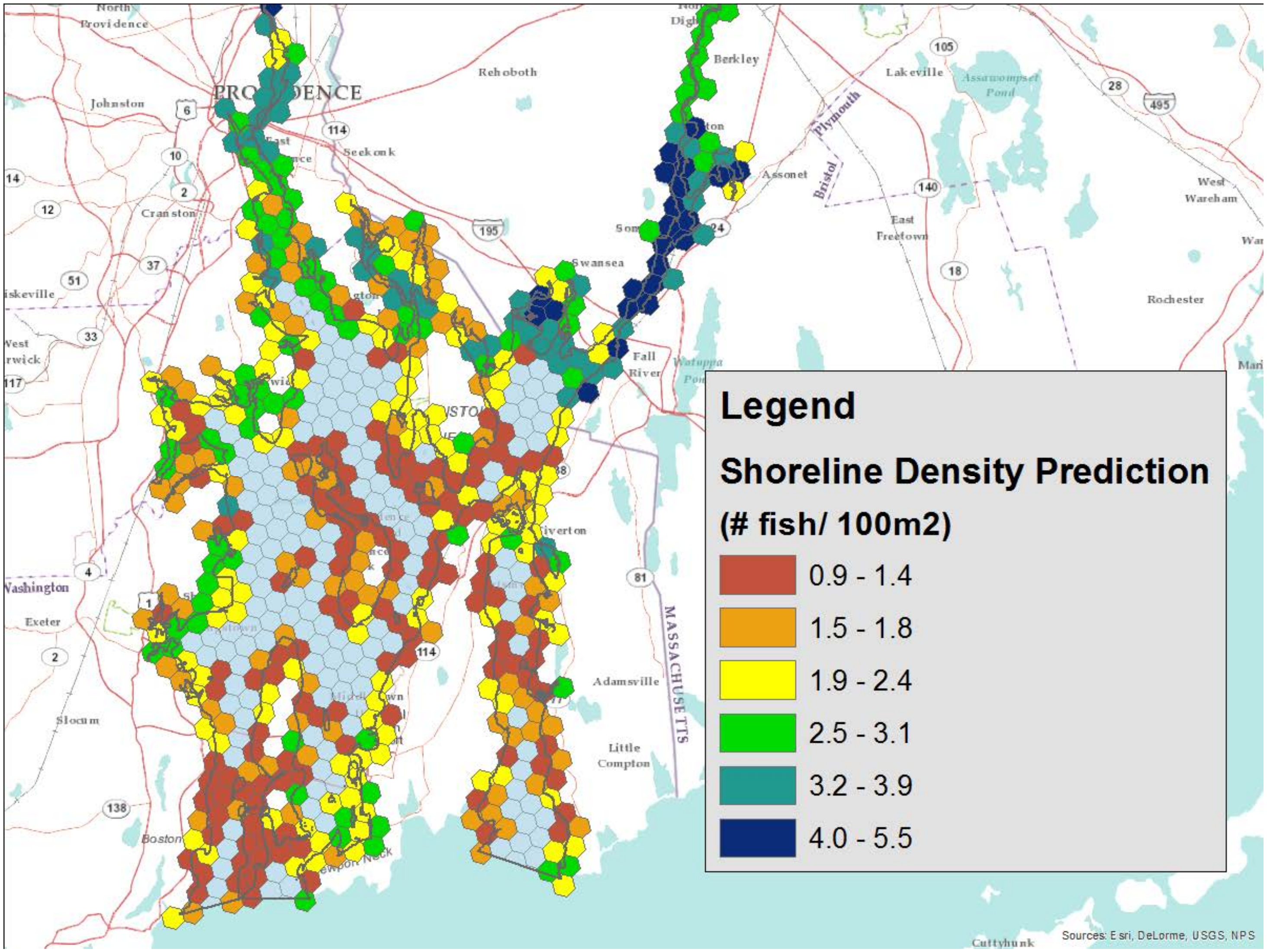


YOY Winter Flounder
MHB and Narragansett Bay
Mean Number per 100 m2
25
20
15
10
5
0
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
MHE
Narr Bay

Seine Data - corrected



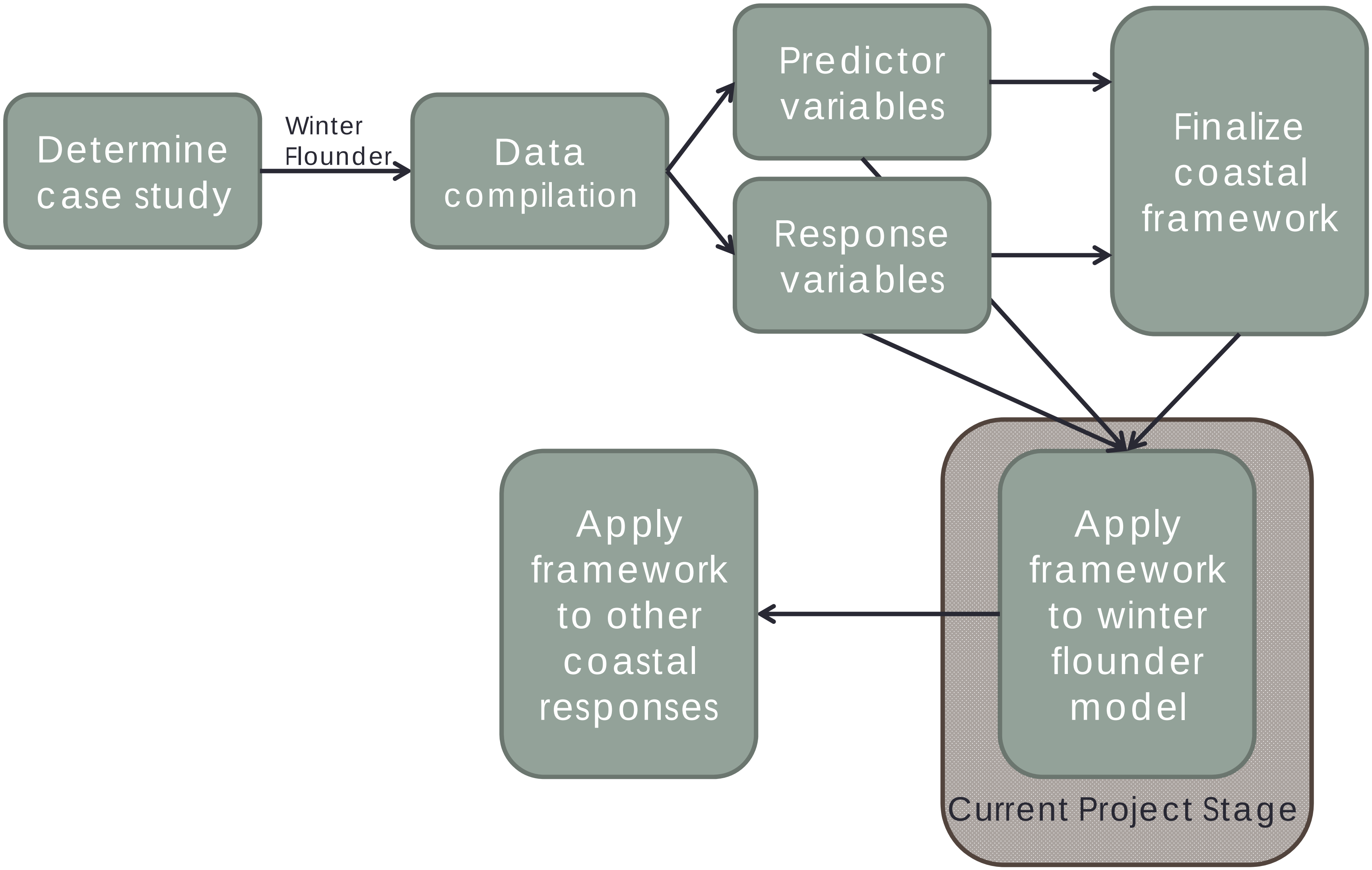
7th prototype – shoreline – seine only – preliminary view



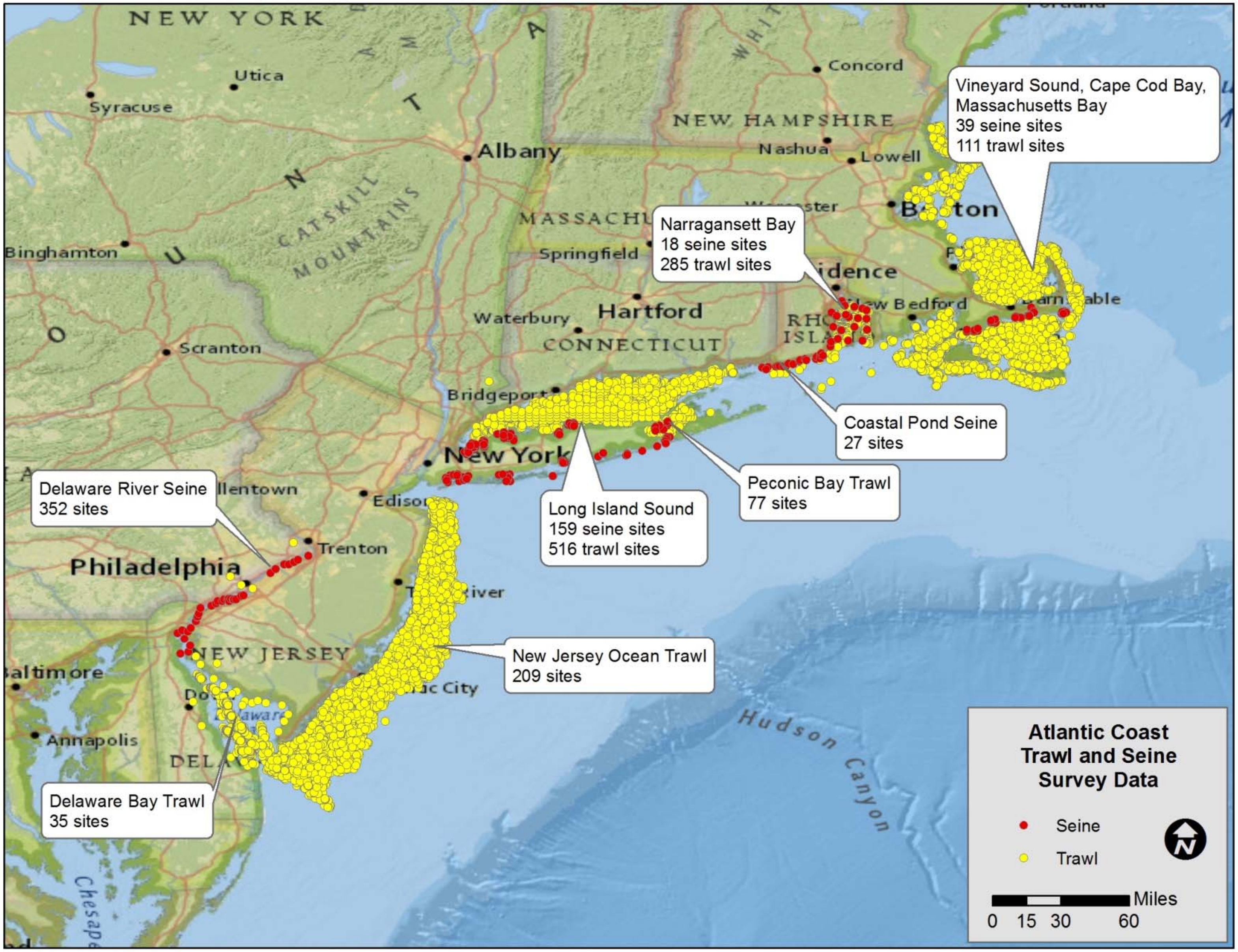
Next Steps

- Clean up seine only model
  - Consider timeframe
- Other models
  - Whole bay
  - Trawl and seine
  - Predicted density vs. probably of high density

Estuarine/Coastal Modeling Process



Apply Coastal Framework



Updated Scope of Work

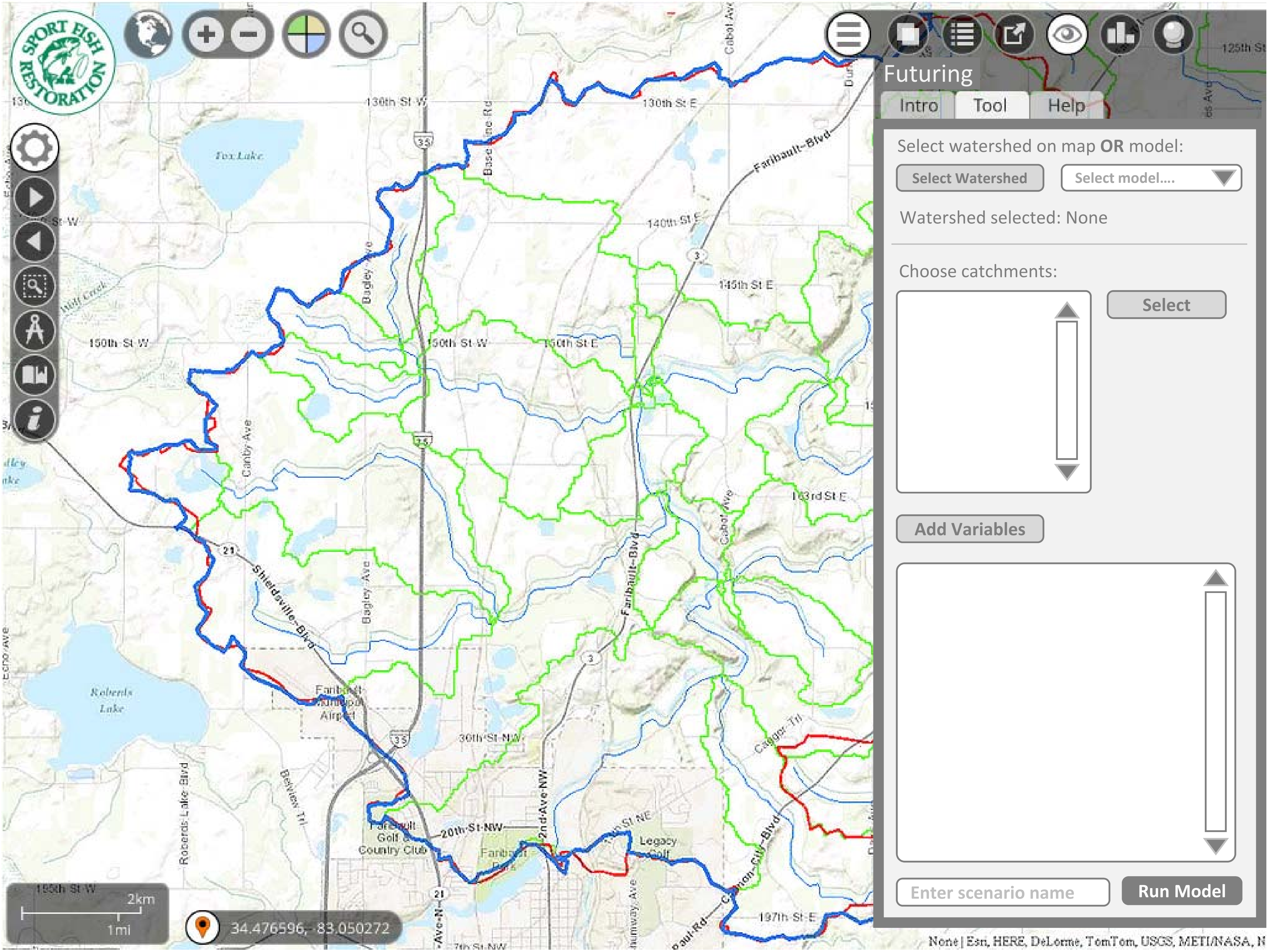
- Task 1. Inland model (Chesapeake Bay watershed brook trout model)
- Task 2. Estuarine case study (Narragansett Bay winter flounder model)
- **Task 3. Diadromous species case study**
- Task 4. Decision support tool

Task 3. Diadromous species case study

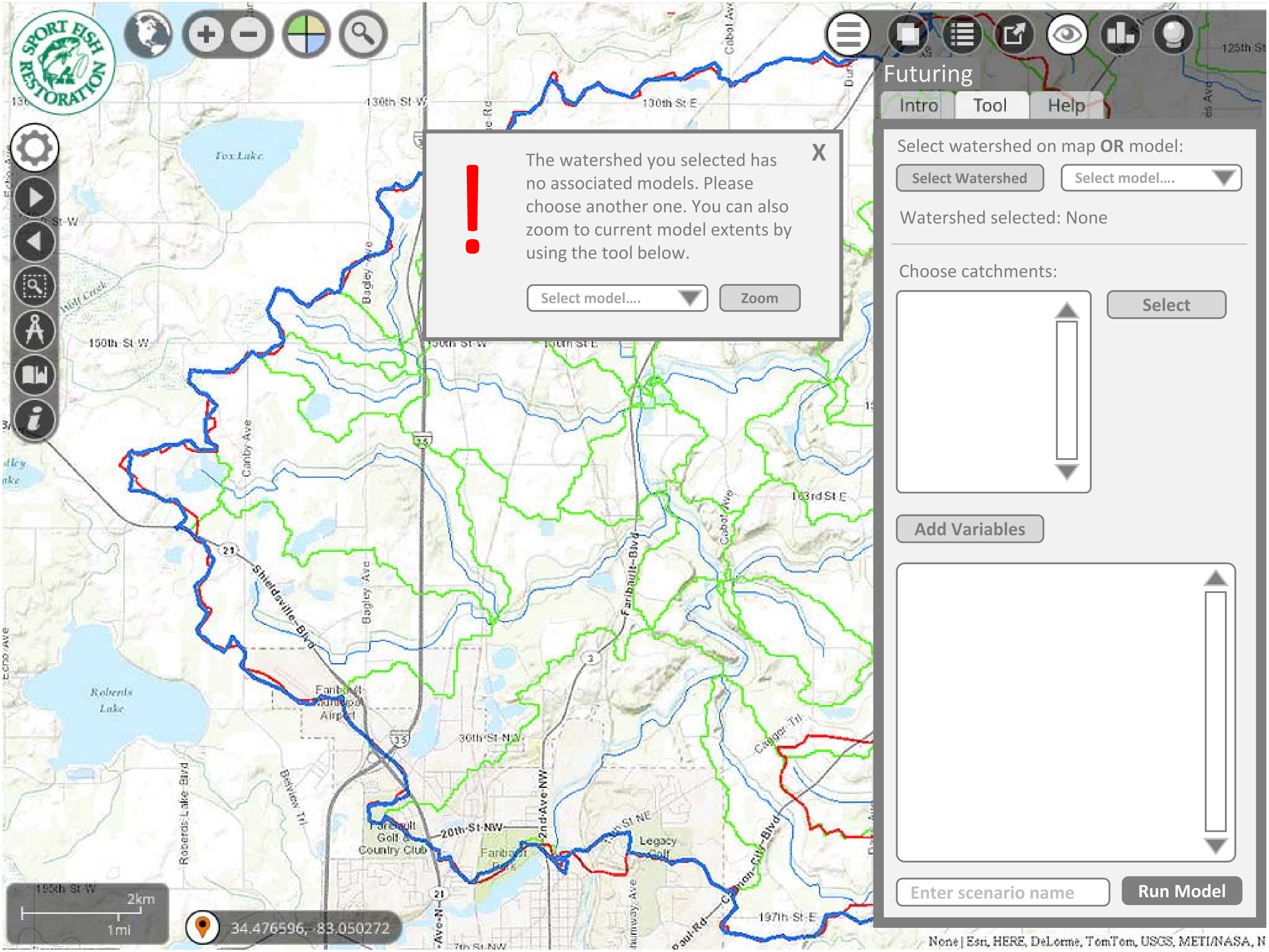
- River Herring
- Collect data – ASMFC, Northeast Aquatic Connectivity, Agency data
- Examine other prioritization efforts
  - Northeast Aquatic Connectivity
  - Dauwalter et al.

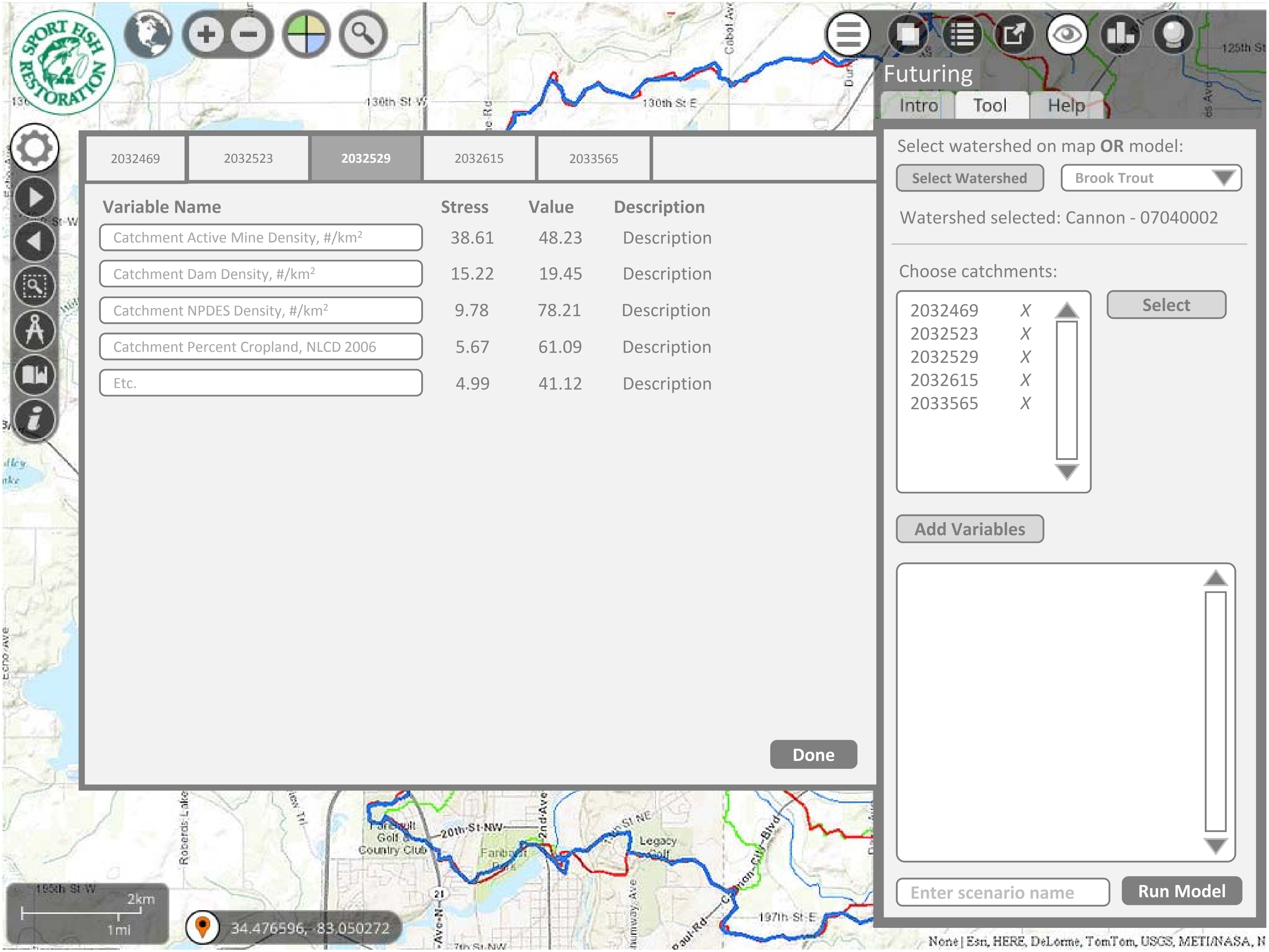
Updated Scope of Work

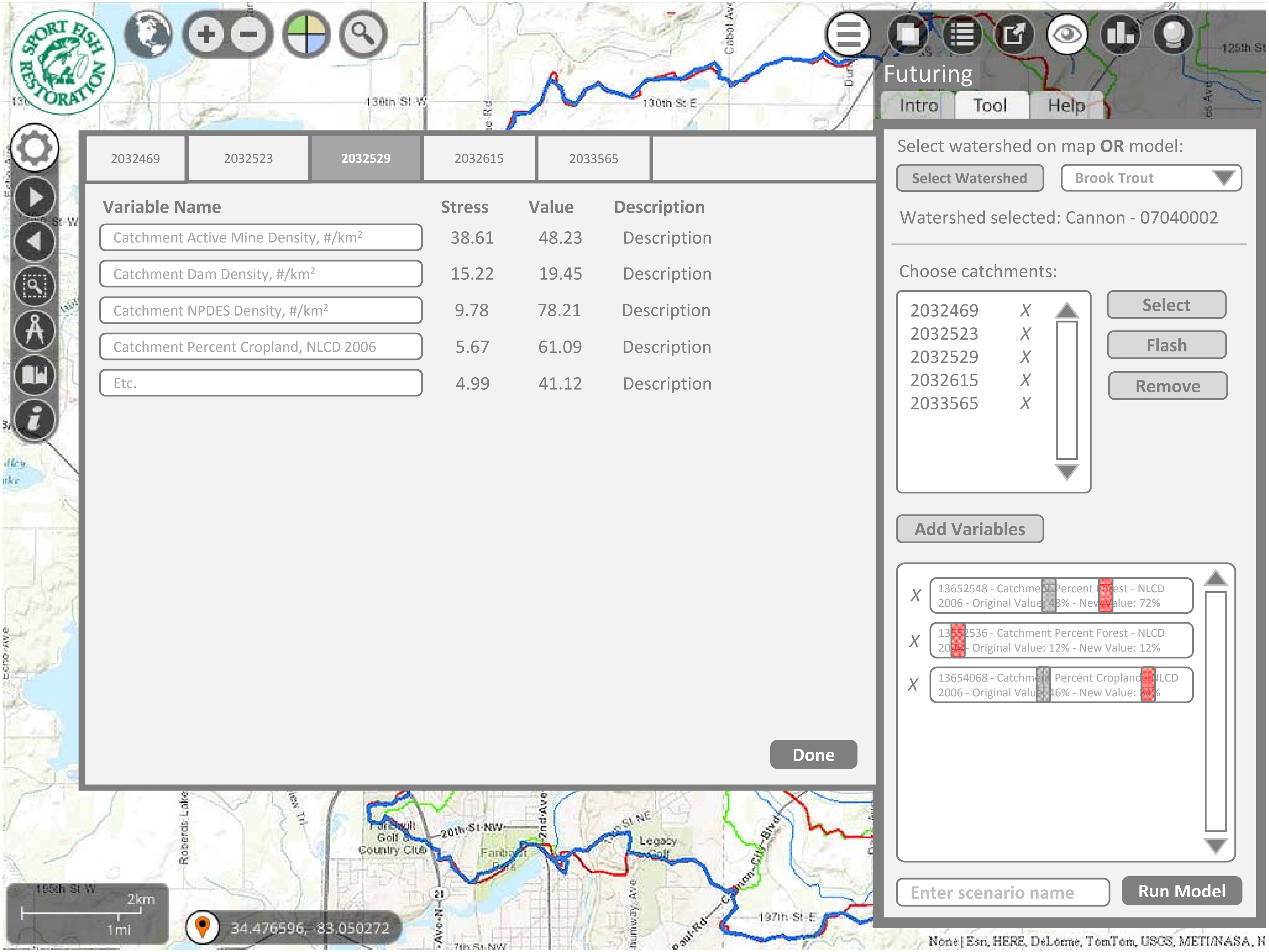
- Task 1. Inland model (Chesapeake Bay watershed brook trout model)
- Task 2. Estuarine case study (Narragansett Bay winter flounder model)
- Task 3. Diadromous species case study
- **Task 4. Decision support tool**



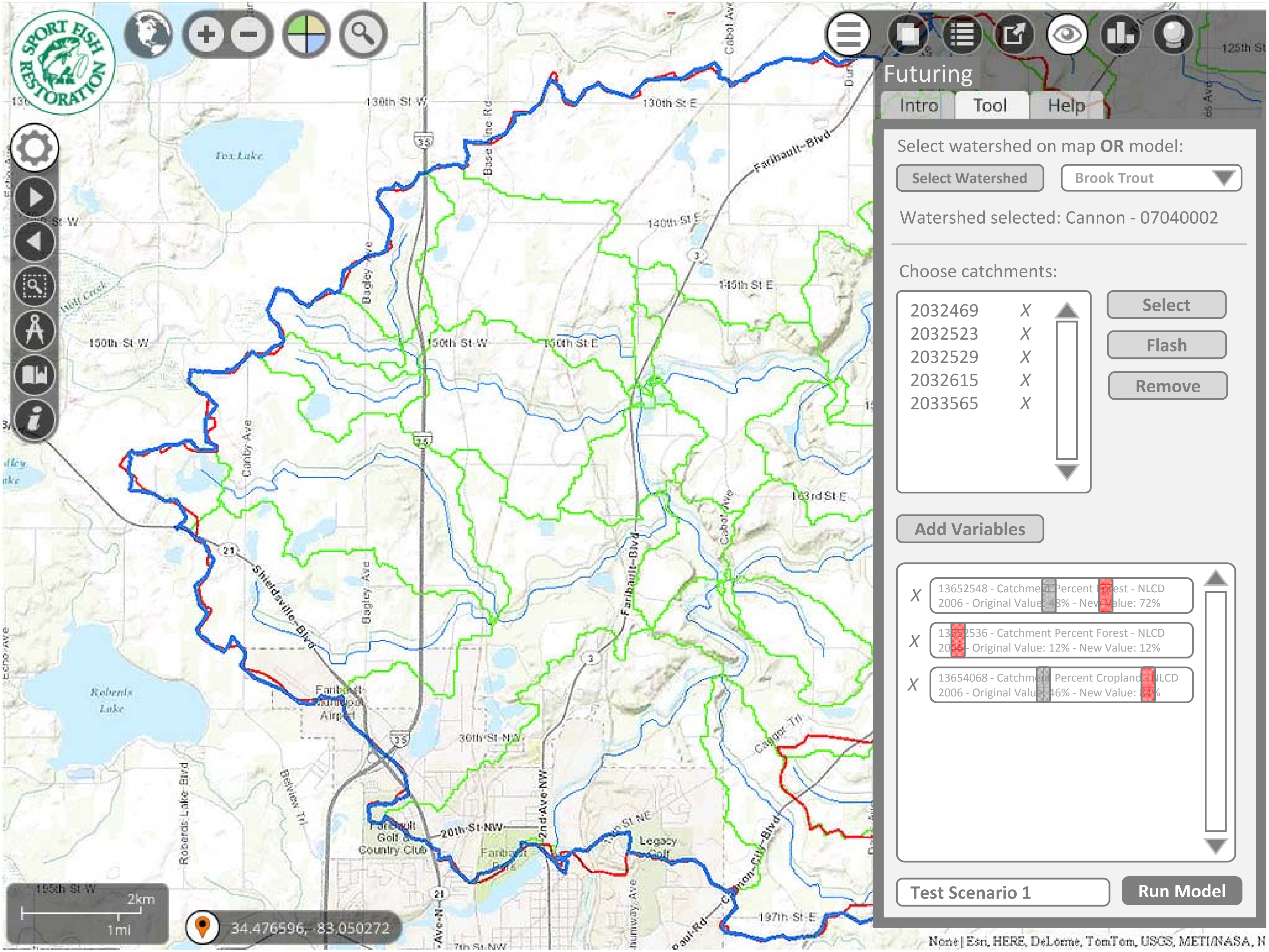
SPORT FISH RESTORATION
Futuring
Intro
Tool
Help
Select watershed on map OR model:
Select Watershed
Select model....
Watershed selected: None
Choose catchments:
Select
Add Variables
Enter scenario name
Run Model
2km
1mi
34.476596, -83.050272
Fox Lake
Roberts Lake
130th St W
130th St E
140th St E
145th St E
150th St W
150th St E
163rd St E
197th St E
20th St NW
30th St NW
Faribault Blvd
Shieldsville Blvd
Canby Ave
Bagley Ave
Cabot Ave
Cagger Trl
Roberts Lake Blvd
2nd Ave NW
Faribault Golf & Country Club
Faribault Municipal Airport
Legacy Golf
125th St
None | Esri, HERE, DeLorme, TomTom, USGS, METI/NASA, N


Futuring
Intro
Tool
Help
Select watershed on map OR model:
Select Watershed
Select model....
Watershed selected: None
Choose catchments:
Select
Add Variables
Enter scenario name
Run Model
The watershed you selected has no associated models. Please choose another one. You can also zoom to current model extents by using the tool below.
X
Select model....
Zoom
2km
1mi
34.476596, -83.050272
None | Esri, HERE, DeLorme, TomTom, USGS, METI/NASA, N


SPORT FISH RESTORATION
Futuring
Intro
Tool
Help
Select watershed on map OR model:
Select Watershed
Brook Trout
Watershed selected: Cannon - 07040002
Choose catchments:
2032469 X
2032523 X
2032529 X
2032615 X
2033565 X
Select
Add Variables
Enter scenario name
Run Model
2032469
2032523
2032529
2032615
2033565
Variable Name
Stress
Value
Description
Catchment Active Mine Density, #/km²
38.61
48.23
Description
Catchment Dam Density, #/km²
15.22
19.45
Description
Catchment NPDES Density, #/km²
9.78
78.21
Description
Catchment Percent Cropland, NLCD 2006
5.67
61.09
Description
Etc.
4.99
41.12
Description
Done
2km
1mi
34.476596, -83.050272
None | Esri, HERE, DeLorme, TomTom, USGS, METI/NASA, N



SPORT FISH RESTORATION
Futuring
Intro
Tool
Help
Select watershed on map OR model:
Select Watershed
Brook Trout
Watershed selected: Cannon - 07040002
Choose catchments:
2032469 X
2032523 X
2032529 X
2032615 X
2033565 X
Select
Flash
Remove
Add Variables
13652548 - Catchment Percent Forest - NLCD 2006 - Original Value: 48% - New Value: 72%
13652536 - Catchment Percent Forest - NLCD 2006 - Original Value: 12% - New Value: 12%
13654068 - Catchment Percent Cropland - NLCD 2006 - Original Value: 46% - New Value: 84%
Enter scenario name
Run Model
2032469
2032523
2032529
2032615
2033565
Variable Name
Stress
Value
Description
Catchment Active Mine Density, #/km² 38.61 48.23 Description
Catchment Dam Density, #/km² 15.22 19.45 Description
Catchment NPDES Density, #/km² 9.78 78.21 Description
Catchment Percent Cropland, NLCD 2006 5.67 61.09 Description
Etc. 4.99 41.12 Description
Done
2km
1mi
34.476596, -83.050272
None | Esri, HERE, DeLorme, TomTom, USGS, METI/NASA, N


SPORT FISH RESTORATION
Futuring
Intro
Tool
Help
Select watershed on map **OR** model:
Select Watershed
Brook Trout
Watershed selected: Cannon - 07040002
Choose catchments:
2032469 X
2032523 X
2032529 X
2032615 X
2033565 X
Select
Flash
Remove
Add Variables
X 13652548 - Catchment Percent Forest - NLCD 2006 - Original Value: 48% - New Value: 72%
X 13652536 - Catchment Percent Forest - NLCD 2006 - Original Value: 12% - New Value: 12%
X 13654068 - Catchment Percent Cropland - NLCD 2006 - Original Value: 46% - New Value: 84%
Test Scenario 1
Run Model
2km
1mi
34.476596, -83.050272
Fox Lake
Roberds Lake
130th St W
130th St E
140th St E
145th St E
150th St W
150th St E
163rd St E
Faribault Blvd
Shieldsville Blvd
Canby Ave
Bagley Ave
Cabot Ave
Roberds Lake Blvd
Cannon City Blvd
20th St NW
30th St NW
2nd Ave NW
197th St E
Faribault Municipal Airport
Faribault Golf & Country Club
Legacy Golf
None | Esri, HERE, DeLorme, TomTom, USGS, METI/NASA, N

ACFHP
Implementation Plan
Evaluation of Success

Mystic, Connecticut – October 27, 2014

Protection Objective 1: Ensure adequate and effective fish movement past existing or potential barriers to maintain connectivity within Sub-regional Priority Habitats.

STRATEGIC ACTIONS:

1. Coordinate with partners to synthesize existing information in order to identify and prioritize watersheds for conservation where fragmentation of, or barriers to, fish dispersal are a potentially critical threat to be addressed.

Tasks:

1. Consult with appropriate ASMFC entities(diadromous species management entity; Fish Passage Working Group; TCs for each diadromous species) to determine whether there are existing priority lists for restoration, subregionally.

Lead: Cheri Patterson with Pat Campfield & Wilson Laney

Status:

3. Compile existing lists, i.e, American Rivers in NC through the Aquatic Connectivity Team, is presently compiling a list of priority barriers. In NH, get Restoration Partners priority list; compile FERC filed diadromous fish restoration plans for watersheds in which they have been prepared; TNC NE Connectivity Project

Lead: Cheri Patterson with Stephanie Lindloff, Julie Devers, Pat Geer, Kent Smith

Status:

7. Determine (Science and Data Committee task) what scale of watershed (HUC 8?, HUC 12?) ACFHP wishes to address.

Lead: Stephanie Lindloff

Status:

Does the survey cover this?

Protection Objective 4: Minimize or reduce adverse impacts to Subregional Priority Habitats associated with coastal development and water dependent activities (e.g. recreational boating, and marine transportation).

STRATEGIC ACTION:

1. Identify current work being done on this objective (e.g. guidance on dredging and low impact development) and determine how ACFHP can best partner with these efforts.

TASKS:

2. Communicate impacts to audiences that can make a difference; eg, for recreational boating scouring impacts, communicate with Recreational Boating and Fishing Foundation to disseminate our guidance; also state boat annual licensing offices within DNRs or other state agencies

Lead: Chris Powell with Mark Rousseau & Rachel Muir

Status:

This is currently being carried out via the NMFS-funded conservation moorings project (Jamestown, RI)

- Outreach at a fishing show last year
- Presentation to Jamestown Harbor Commission
- Interpretative Sign for mooring project
- No work on dredging

Protection Objective 6: Increase public awareness of the threats facing Subregional Priority Habitats and the protection measures available to avoid and minimize those threats.

Strategic Action: Develop and disseminate public outreach materials on the adverse impacts of human activities on fish and fish habitat as well as ways to avoid and minimize those impacts.

Tasks:

Compile pertinent existing outreach materials from state, federal, and other groups, and distribute this information to boating courses, ACFHP website, glossy card with ACFHP logo, or through existing federal networks.

Lead: Wilson Laney with Mark Rousseau, Rachel Muir, Jimmy Johnson & FWCC Intern (Spring 2013)

This is currently being carried out via:

- NMFS-funded conservation moorings project (currently being carried out in Jamestown, RI)
- Whitewater to Bluewater Fish Passage Barrier Factsheet
- Funded On-the-Ground Project Fact Sheets
- Website

Habitat Restoration Objectives

Restoration Objective 1: Restore and enhance hydrological or physical connections between Sub-regional Priority Habitats to promote fish utilization and improve overall aquatic health.

STRATEGIC ACTIONS:

2. Restore tidal hydrology in priority wetland areas (e.g. repairing or removing culverts or berms restricting flow or separating wetlands).

3. Identify priority areas in each subregion where Priority Habitats have been degraded or eliminated by past alterations to hydrology, and where conditions for restoration of habitats exist.

5. Coordinate with partners to compile fish movement/habitat restoration techniques and guidance documents to aid partners in the planning, design, implementation, and monitoring of effective fish movement improvement projects.

Restoration Objective 1: Strategic Action 2: Restore tidal hydrology in priority wetland areas (e.g. repairing or removing culverts or berms restricting flow or separating wetlands).

TASKS:

2. Fund on-the ground projects through USFWS-NFHAP funding

Lead: Julie Devers

Status:

This is currently being carried out via:

- Endorsed projects
  - West River, CT
  - Exeter/Squamscott River, NH

- Funded projects
  - Shoreys Brook, ME
  - Scoy Pond, NY
  - Goose Creek Dam, SC

**Restoration Objective 1: **Strategic Action 3: Identify priority areas in each sub-region where Priority Habitats have been degraded or eliminated by past alterations to hydrology, and where conditions for restoration of habitats exist.

TASKS:

1. Determine where partners are already working to remove barriers, to identify priorities and gaps.

Lead: Cheri Patterson with Pat Campfield & Wilson Laney

Status:

This is currently being carried out via:

Atlantic Coastal Fish Habitat Partnership Restoration Practitioners Survey

Restoration Objective 1: Strategic Action 5: Coordinate with partners to compile fish movement/habitat restoration techniques and guidance documents to aid partners in the planning, design, implementation, and monitoring of effective fish movement improvement projects.

Tasks: Compile existing technical guidance, identify gaps and means to address, then update current information.

Lead: Pat Campfield with Stephanie Lindloff

Status:

Restoration Objective 2: Restore Subregional Priority Habitats, such as replanting eelgrass beds or restoring oyster beds, in locations where threats have been minimized or removed (does not include dam or other barrier removal).

STRATEGIC ACTIONS:

1. Restore Sub-regional Priority Habitats in each sub-region where:

   (a) they have been damaged or destroyed by past declines in water quality or human activities, such as dredging, filling, development, or vessel operation; AND

   (b) conditions for restoration of habitats exist; AND

   (c) goal(s) of habitat restoration can be maintained.

TASKS:

1. Establish funding mechanisms and or ideas for funding mechanisms to do on the ground work. Seek additional funding for ACFHP, eg. NOAA grants, FWS-NFHAP etc. (figure out what admin components are needed).

Lead: Pat Campfield/Commission & George Schuler/TNC

1. Compile list of projects by survey of the committee and or partners (NEP state management plans and etc) on what sub-regional priority habitats they are focusing and specifics on restoration sites.

Lead: Dawn McReynolds

1. Develop assessment criteria to in order to prioritize?

Lead: ?

This is currently how we prioritize our funding.

Science & Data Objectives

Science and Data Objective 2: Work to achieve ACFHP Science and Data Needs (ACFHP, 2011) and fulfill science and data responsibilities established by NFHAP.

STRATEGIC ACTIONS:

1. Develop additional products and conduct continuing analysis of the Species-habitat Matrix.

2. Continue to synthesize, update, and fill in information gaps in the Assessment, and identify new applications.

3. Beginning with the results of the Assessment and the work conducted by the National Fish Habitat Science and Data Committee, refine data and associated GIS layers to produce maps and other products that can be used to inform the goals and objectives laid out in this plan and to develop time-bound, spatially-explicit, and quantitative conservation objectives in future Plans or revisions to the Strategic Conservation Plan.

Science and Data Objective 2: Strategic Action 1: Develop additional products and conduct continuing analysis of the Species-habitat Matrix.

TASKS:

1. Identify number of publications and specific journals to submit manuscript for the existing matrix
2. Prepare outline
3. Prepare publication(s); submit for review to all coauthors
4. Peer-review

Lead: Jake Kritzer

Status:

Completed

Science and Data Objective 2: Strategic Action 2: Continue to synthesize, update, and fill in information gaps in the Assessment, and identify new applications.

TASKS:

1. Check with Moe to see if fits under his work plan

2. Subcommittee conference call to ID work plan

3. ID funding sources if needed

Lead: Moe Nelson?

Science and Data Objective 2: Strategic Action 3: Beginning with the results of the Assessment and the work conducted by the National Fish Habitat Science and Data Committee, refine data and associated GIS layers to produce maps and other products that can be used to inform the goals and objectives laid out in this plan and to develop time-bound, spatially-explicit, and quantitative conservation objectives in future Plans or revisions to the Strategic Conservation Plan.

Check with Moe to see if fits under his work plan

Tasks:

1. Review habitat assessments that have been done for the FHPs in Region 3 and 6 and determine if ACFHP would like a similar product.

Lead: Julie Devers & ACFHP Coordinator

2. If steering committee and science and data committee are interested, determine if the organization that worked on the habitat assessments in Region 3(I think it was Downstream Stategies) is available and how much they would charge.

Lead: Science & Data Working Group & Habitat Assessment Subcommittee

3. Subcommittee conference call to take ideas from the National Assessment and Midwest FHP's assessments and make a work plan to make them useful at a regional scale and for coastal habitats. Workplan would include action items and a timeline.

Lead: Science & Data Working Group & Habitat Assessment Subcommittee

4. ID funding sources

Lead: ACFHP Coordinator

The spirit of these tasks has been met

Communication & Outreach
Objectives

Communications and Outreach Objective 1: Develop or maintain physical or virtual information or avenues for communicating information to partners and the broader conservation community.

STRATEGIC ACTIONS:

1. Maintain a website that meets the needs of partners and the broader conservation community.

3. Attend events such as conferences or meetings to promote ACFHP's mission and activities and encourage new partners to join.

Communications and Outreach Objective 1: Strategic Action 1: Maintain a website that meets the needs of partners and the broader conservation community.

TASKS:

1. Update the Funding, Conference, Other Events, Funded Projects, Endorsed Projects, and Outreach pages

2. Send out periodic Breaking News items and maintain archives

Lead: ACFHP Coordinator

Ongoing

Communications and Outreach Objective 1: Strategic Action 3: Attend events such as conferences or meetings to promote ACFHP's mission and activities and encourage new partners to join.

TASKS:

- Present at American Fisheries Society Annual Meeting and/or Restore America's Estuaries Conference

Lead: ACFHP Coordinator with Steering Comm. members

Emily & Chris tended ACFHP booth at NE Saltwater Fishing Show in Providence, RI

Lisa will present & exhibit at RAE next week

Communications and Outreach Objective 2: Develop or maintain relationships with partners and the broader conservation community.

STRATEGIC ACTIONS:

2. Cooperate and exchange lessons learned with other landscape or regional partnerships and the National Fish Habitat Board.

3. Promote the missions of ACFHP and NFHAP by participating in NFHAP's legislative strategy to further the objectives of all fish habitat partnerships and coordinate such activities with the legislative staff in each partner organization.

Communications and Outreach Objective 2: Strategic Action 2: Cooperate and exchange lessons learned with other landscape or regional partnerships and the National Fish Habitat Board.

TASKS:

2. Develop individual FHP and joint messaging strategies that would identify key target audiences and generate core messages for members of the partnerships to communicate clearly and consistently with those audiences.

Lead: ACFHP Coordinator

Completed: Whitewater to Bluewater

- Website
- Fish Passage Barrier Factsheet

Communications and Outreach Objective 2: Strategic Action 3: Promote the missions of ACFHP and NFHAP by participating in NFHAP's legislative strategy to further the objectives of all fish habitat partnerships and coordinate such activities with the legislative staff in each partner organization.

TASKS:

- *No 2012 tasks identified for this action*

Finance Objectives

Finance Objective 2: Secure operational funding for ACFHP.

STRATEGIC ACTIONS:

2. Secure project funding opportunities.

Lead: Julie Devers

3. Identify private partners who can assist in providing matching funds to support operational and on-the-ground project activities.

Lead: ACFHP Coordinator & NGOs specifically TNC Fellow

Finance Objective 2: Strategic Action 2: Secure project funding opportunities.

TASKS:

2. Solicit, rank, and submit a list of priority projects to FWS for FY13 NFHP funding

Lead: Julie Devers

3. Apply for NOAA Community Based Restoration funding

Lead: ACFHP Coordinator & Pat Campfield

THEN…

1. Endorse applicable projects for NFWF/NOAA protection funding 1.

Lead: ACFHP Coordinator & Lou Chiarella

- 1 & 2: ongoing
- 3: cannot complete because NOAA no longer requires intermediary to distribute funding

Finance Objective 2: Strategic Action 3: Identify private partners who can assist in providing matching funds to support operational and on-the-ground project activities.

TASKS:

- Identify a short list of foundations and schedule a phone call or meeting

Lead: ACFHP Coordinator & NGOs - specifically TNC Fellow

The list was generated but there haven't been phone calls or meetings

Ocean Acidification

Federal Programs related to OA

- FOARMA – Federal Ocean Acidification Research and Monitoring
  - (http://oceanacidification.noaa.gov/AboutUs/FOARAMAct.aspx)
- IWGOA – Interagency Working Group on Ocean Acidification
  - (http://oceanacidification.noaa.gov/IWGOA.aspx)
- OAP – Ocean Acidification Program
  - (http://oceanacidification.noaa.gov/Home.aspx)
- SECOORA - Southeast Coastal Ocean Observing Regional Association
  - (http://secoora.org)
- NE-CAN - Northeast Coastal Acidification Network
  - (http://www.neracoos.org/necan)

State Commissions and Task Force

- Washington State – 2012
  - http://www.ecy.wa.gov/water/marine/oceanacidification.html
  - http://www.ecy.wa.gov/water/marine/oa/2012panel.html

- Maine – 2014
  - http://www.maine.gov/legis/opla/oceanacidificationmtgmatrls.htm

- Maryland – 2014
  - http://mddnr.chesapeakebay.net/mdoatf/index.cfm

Two Scenarios

- Open ocean acidification

vs.

- Coastal (estuarine) ocean acidification

Two Scenarios

- Open ocean acidification
  - CO_2 derived from atmosphere & deep sea
  - Deep water
    - Organics/decay are lost from system

vs.

- Coastal (estuarine) ocean acidification
  - Significant CO_2 input from organisms
  - Shallow water
    - Organics/decay remains in system

Data

- pCO_2 (partial pressure) preferred
- pH will work in coastal waters

- Open ocean acidification
  - Fluctuation is low (less than 1 unit diurnal)

vs.

- Coastal (estuarine) ocean acidification
  - Can fluctuate (~3 units in a few hours)
  - Correlates with DO

CO_2 drivers vary spatially

- Tidal fluctuation example (SERC)
  - Sites 1 km apart (Rhode River)
  - At pier, CO_2 fluctuation temperature driven
    - varies between 7.5 & 8.0
  - At marsh, CO_2 fluctuation decomposition & tidal driven
    - Varies between 6.5 & 7.5

- Synergistic effects of hypoxia and acidification

Biological response

- ↑ acidification affects organisms other than shellfish
  - ↓ larval survival, growth, development, behavior – ↑ vulnerability to predators
    - energetics, hormone regulation, genetics, etc.?
  - ↑ otolith size –hearing and movement/orientation/balance?
  - Fish seem “stupider” (coral reef studies)
    - settle to reef at wrong time of day/night
    - wrong behavioral responses to predators
  - Sharks less able to detect prey –olefactory impairment?
  - ↑ in blue crab hardening time

- Effects to ecosystem services?
  - ↓ oyster biofouling when ↓pH – the shells are white/clean
    - ↓ oyster reef community abundance, diversity, and ecological processes

- Measure OA at ecologically relevant scales for organisms – where they live

Conservation Mooring Project
Update to ACFHP Steering Committee

October 2014 – Mystic, CT

Working together to conserve coastal, estuarine-dependent, and diadromous fish habitat

Conservation Moorings Project
" A Quick Review"

- NOAA – Funding agency
- ACFHP Received a $20,000 grant for this project
- Previous projects: Vinyard Haven & Buzzards Bay
- Current Project: Jamestown, Rhode Island

Why are we doing this project?
Impacts of conventional moorings in SAV

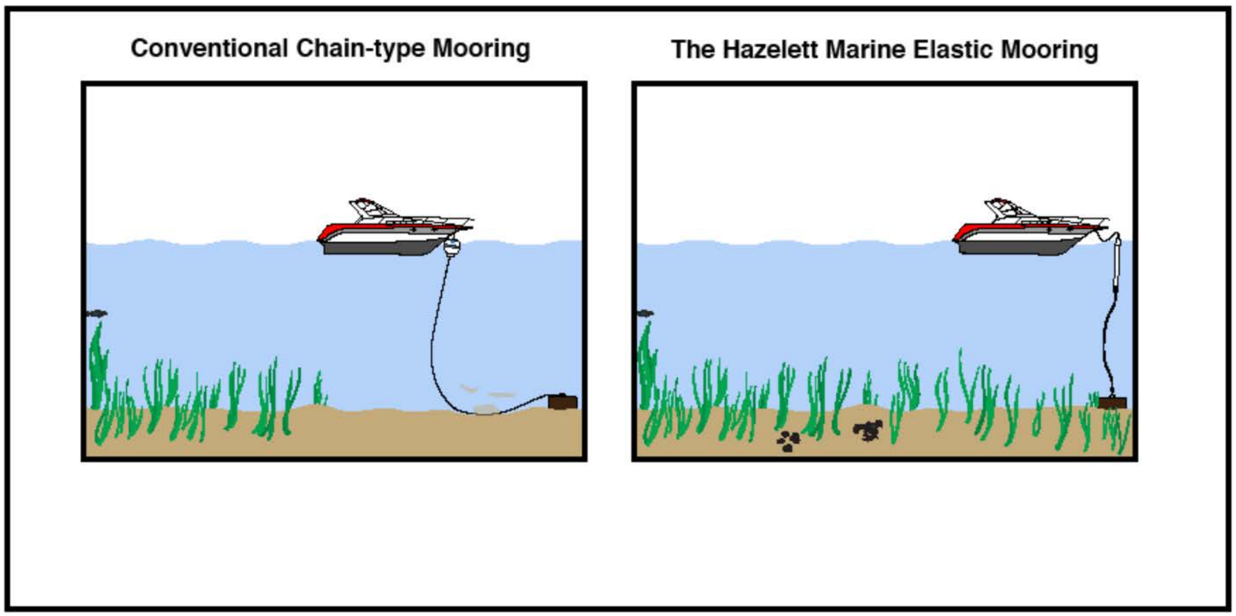
- Indirect impacts
  - chain scour
  - increased turbidity
  - reduced light penetration

- Direct impacts
  - chain scour
  - concrete anchor blocks

Conventional Moorings

“Haloing” by chain sweep of conventional moorings destroying SAVs

Conventional vs Conservation Mooring



Conservation Mooring
Ideal - Embedded Helix Mooring

We will install a Helix anchor where possible – otherwise the mooring block will remain in place.

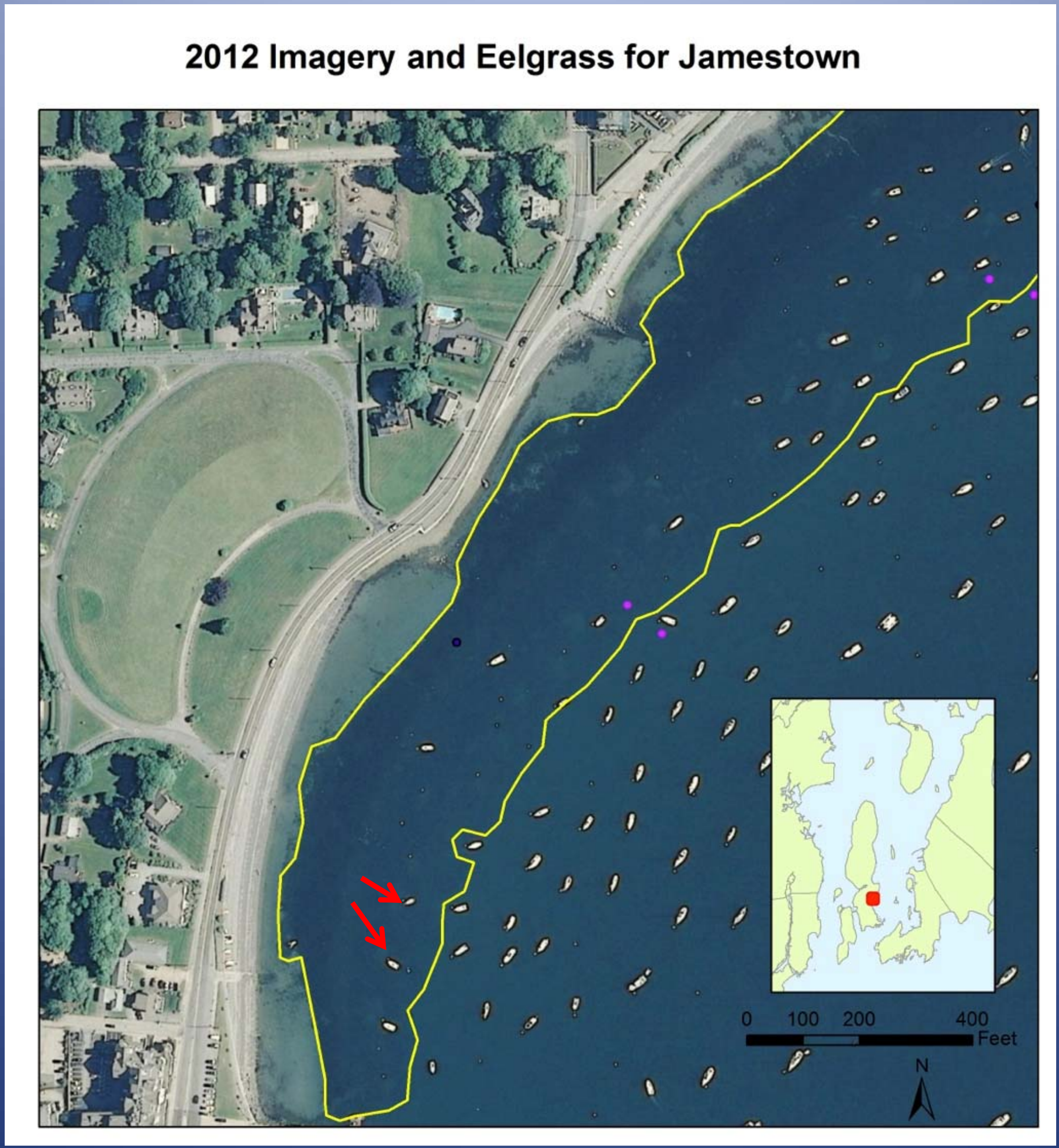
Project Partners

- Atlantic Coastal Fish Habitat Partnership -Lead
- NOAA- Funding
- Town of Jamestown - Harbor Commission
- Town of Jamestown - Conservation Commission
- RIDEM Div. of Fish & Wildlife – Monitoring
- Aquidneck Mooring Service - Hardware & Installation
- Conanicut Marine Services - 2 moorings
- Clark Boatyard – 1 moorings
- Jamestown Boatyard – 1-2 mooring

Selection of Retrofit Moorings

- Review 2012 aerial photos of mooring areas
- Select candidate moorings at three marinas
- Diver survey to confirm candidates – June 2014
- Pre-installation eelgrass survey of selected moorings to retrofit

Conanicut Marine – Selected Moorings



Clark Boatyard - Selected Mooring

Jamestown Boatyard - Selected Moorings

Conservation Mooring
Pre-Installation Eelgrass Survey Data Sheet

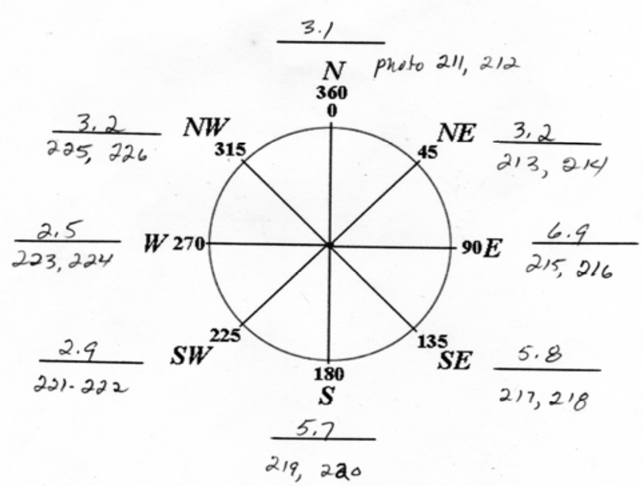
Atlantic Coastal Fish Habitat Partnership
Conservation Mooring Retrofit Project

Preliminary Eelgrass & Mooring Haloing Survey

Mooring Identification: CMS-13. Survey Date: 20 Aug 2014

Time: 10:30 Water Depth: 10-12

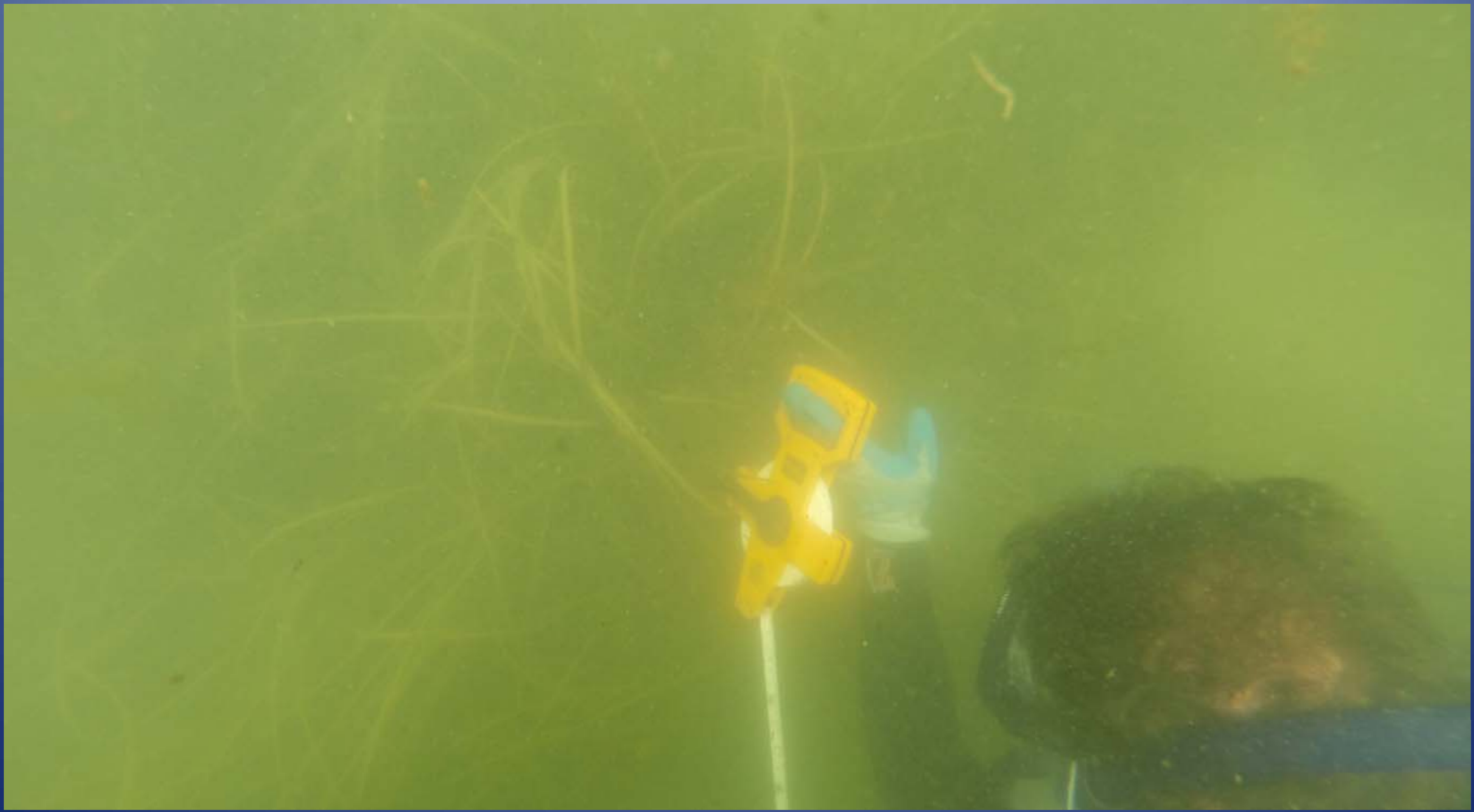
Preliminary Mapping – Distance to edge of existing eelgrass in **meters** from the center of the mooring block/anchor for each compass point.



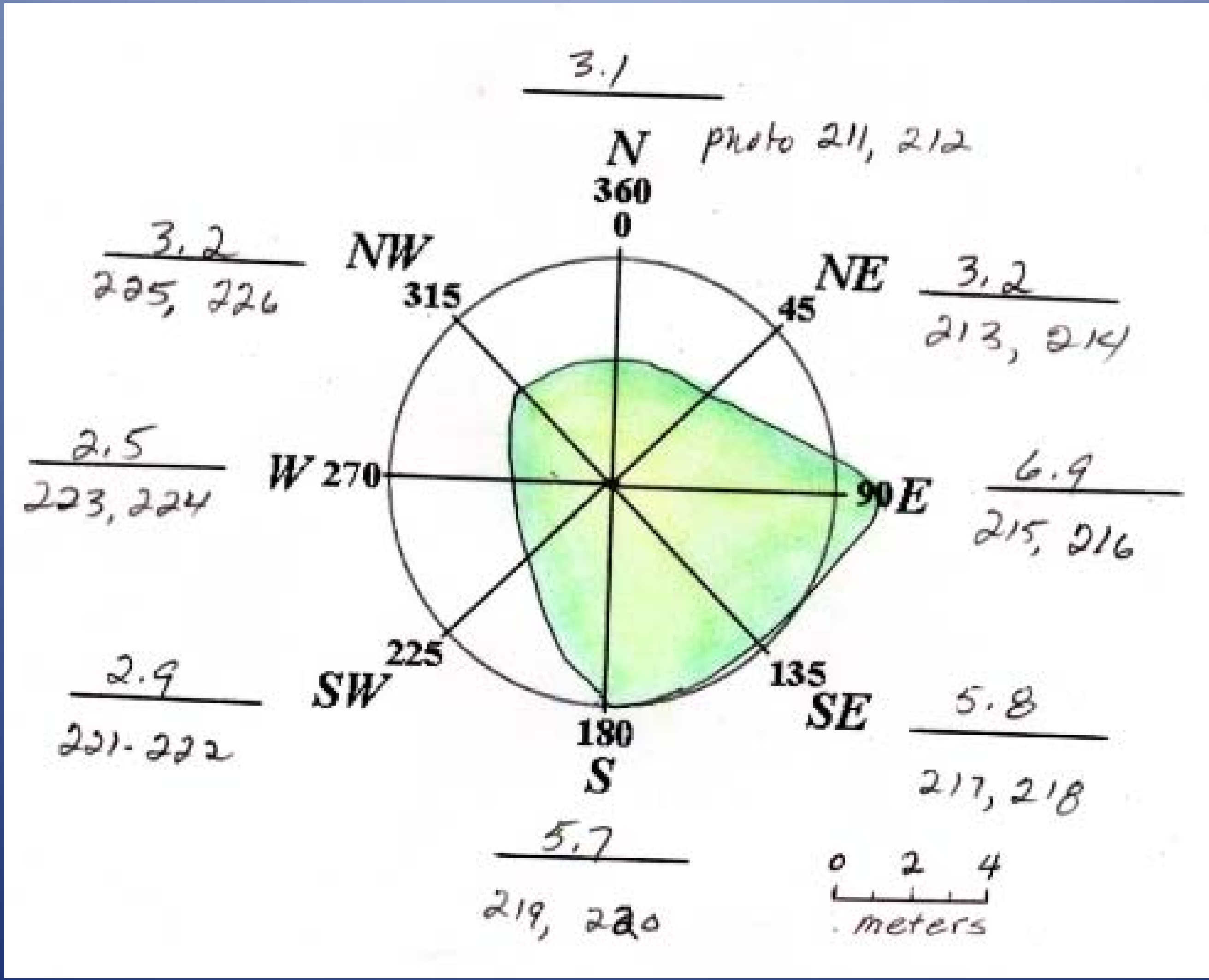
Comments: Photo# 211 – 226 - Eric - 3 videos over Area of # 11, 12, 13

Divers: Scott, U., Katie Eric S.

Conservation Mooring Retrofit Project
Pre-Installation Eelgrass Suevey



Conservation Mooring
Pre-Installation Eelgrass Survey Map



Estimated Cost per Conservation Mooring

Conservation Moorings Hardware & Labor:

Helix Embedded Anchor	$800
Conservation Mooring System	$1720
Total	**$2520**
Labor - Remove old system if necessary (Exchange Labor for old gear)	$250-400
Labor - Install Helix embedded anchor	$400
Total	**$400**
Grand Sub-Total	**$2920**
Less Donation (10% discount)	$292
Estimated Final Cost/Mooring	**$2628**

Note: These costs will be lower due to shallow water systems.

Estimated Project Budget

Con. Mooring Hdw. & Installation	$2628 each Lower cost
Total Four Moorings	$10,512
Interpretative Sign	$1500
Workshops (Travel, Materials, Announce)	$1500
Administration & Overhead	$ 4000
Misc. (additional educational materials and/or salary)	$2500
TOTAL PROJECT COST	$20,012

Conservation Mooring Interpretative Sign Draft
To be located on the East Ferry waterfront in Jamestown

Protecting eelgrass fish habitat through the use of conservation moorings

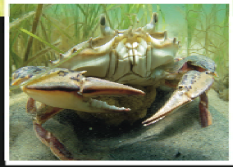
The National Oceanic and Atmospheric Administration has partnered with the Atlantic Coastal Fish Habitat Partnership, the Rhode Island Division of Fish and Wildlife, Town of Jamestown Conservation Commission, Clarks Boat Yard, Conanicut Marine Services Inc., Jamestown Boat Yard, and Aquidneck Mooring Company to protect fish habitat around Conanicut Island (Jamestown). Through this partnership, four traditional boat moorings systems were replaced with alternative conservation moorings that significantly reduce adverse impacts to important eelgrass fish habitat.

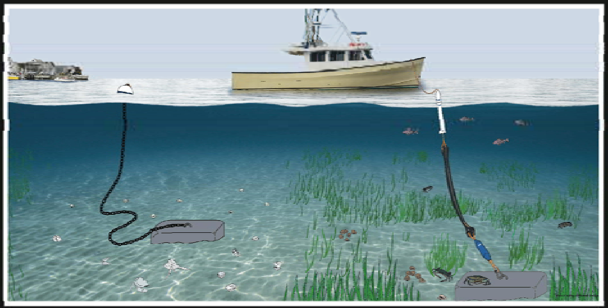
What are conservation moorings?

A conservation mooring is a mooring system designed to avoid contact with the seafloor, thereby reducing physical damage to eelgrass. The system uses an elastic connection, akin to a bungee cord, to connect the surface buoy with the anchoring device. This eliminates any chain sweep that physically damages or eliminates the eelgrass. Depending on the seafloor, helical (i.e. screw-like) anchors may be used to replace traditional concrete mooring blocks. These significantly reduce the environmental footprint within the eelgrass habitat, and allow for eelgrass growth in the previously affected area.

Monitoring to assess eelgrass habitat recovery

Prior to installing conservation moorings, the status of eelgrass habitat around each of the existing traditional moorings was documented. After installation, the level of eelgrass recovery will be monitored and documented. This monitoring effort will help researchers understand the effectiveness of this technology as a coastal resource management tool.





Importance of eelgrass habitat

Eelgrass is an extremely valuable spawning and nursery habitat for a variety of fish and invertebrate species, including winter flounder, summer flounder, and bay scallop. It is also an important species at the bottom of the food chain. Eelgrass habitat has been declining throughout the Northeast due to poor water quality, increased turbidity and physical alterations such as dredging, filling, and boating related activities.

Impacts to eelgrass habitat from moorings

Eelgrass habitat is vulnerable to a number of boating related activities, including prop damage and the use of traditional chain moorings. When placed within or adjacent to eelgrass beds, traditional chain moorings can severely damage habitat through physical removal of the eelgrass shoots, causing a "haloing" effect. Additionally, disturbance to the seafloor by mooring chains suspends sediment, increasing turbidity which reduces water clarity. This diminishes the amount of light penetration critically important to eelgrass growth and survival.

Project Timeline

- Project Cost Estimates – Done
- Interpretative Sign Design – Final Draft Done
- Final Site Selection – Summer 2014
- Pre-SAV Monitoring - RI F&W – Completed summer 2014
- MOU with Town and boatyards – Spring 2015 (If needed)
- System Installation – Spring/summer 2015
- Order Interpretative Sign – Spring 2015
- Interpretative Sign Installation - Summer 2014
- Post-SAV Monitoring – RI F&W – Summer 2015 & 2016
- Preliminary Report to NOAA - Winter 2015
- Final Report to NOAA – Winter 2016

Thank You !

ATLANTIC COASTAL
FISH HABITAT PARTNERSHIP

Questions?

Implementation Action Restoring Priority Habitats

Dawn McReynolds, Emily Greene, Russ Babb, Mark Rousseau,
Jimmy Johnson, Cheri Patterson

Strategic Plan

Restoration Objective 2: Restore Subregional Priority Habitats, such as replanting eelgrass beds or restoring oyster beds, in locations where threats have been minimized or removed (does not include dam or other barrier removal).

B.2.1 Strategic Action: Restore Subregional Priority Habitats in each subregion where:

(a) they have been damaged or destroyed by past declines in water quality or human activities, such as dredging, filling, development, or vessel operation; AND (b) conditions for restoration of habitats exist; AND (c) goal(s) of habitat restoration can be maintained.

Task: **(1) Compile list of restoration partners/practitioners (e.g. NEPs, state management plans, ACFHP MOU signatories , etc.)**

-260 restoration practitioners for each east coast state

(**Nothing for Virginia or South Carolina**)

Task (2) survey the practitioner regarding the focus and priorities in their planning area (e.g., priority habitats, priority threats, and priority implementation actions)

In order to:

- -understand priority linkages
- -Assist practitioners with common goals to:
- -Alert them to funding opportunities
- -Spread the word to larger audience
- -Connect them with data, tools, information of interest on habitat restoration
- -Help partnering and share ideas

Survey

https://www.surveymonkey.com/s/ACFHP_Restoration_Practitioners_Survey

(1) Which habitats are you currently working to restore? Please check the THREE habitats on which you currently dedicate the majority of your time.

(Marine and Estuarine Shellfish Beds, Coral and Live/Hard Bottom, Macroalagae, SAV, Tidal Vegetation,Unvegetated Coastal Bottom or Riverine bottom)

(2) Which habitats do you anticipate working to restore over the next five years? Please check the THREE habitats on which you anticipate dedicating the majority of your time.

(3) Which habitats do you anticipate working to restore over the next five years? Please rank each of the choices below with a range between very unlikely to very likely.

(4) For each habitat type, which local, state, regional, or federal restoration strategy or goal are you primarily seeking? # acres, # barriers, # miles, not guides by goal or strategy or other

Survey Questions

(5) Which statement below best describes current progress towards the strategy or goal you are primarily seeking to achieve for each habitat listed? From unlikely to succeed at goal to exceed and other category.

(6) Which of the following threats are you currently working to address for each habitat type? Please check all that apply. (listed our threat objectives) ex obstructions fish passage , water quality etc

(7) In your opinion, are there particular habitats in need of restoration, or threats in need of correction, which are currently under addressed in your geographic and along the east coast? (300 character limit)

(8) Using the following scale, please rank how strongly you agree or disagree with how a Fish Habitat Partnership can help achieve your habitat restoration objectives. (strongly agree to strongly disagree) Funding, technical expertise, outreach, compile technical manuals on subject, science decision support tools

(9)Please list any other activities that a Fish Habitat Partnership can do to help achieve your habitat restoration objectives. (300 character limit)

(10) Please enter your name and contact information. This will only be used to contact you if further information is needed.

Status and Next Steps

Survey was emailed results due Oct 15

260 + emailed = 79 responses

Nest steps :

possibly another email blast of the survey?

Other mechanisms for getting this information (RAE conference?)

Ideas?

Atlantic Coast Diadromous Fish Habitat Prioritization

October 27, 2014
Mystic, CT

emartin@tnc.org

Photos: Taunton River, © Alison Bowden /TNC   Alewife © Margaret Pizer /TNC

Overview

- **Objective(s):**
  1. Identify priority areas for potential diadromous fish restoration & protection activities (“cores”).
  2. Inform *Alosine* goal setting process

- **Species:**
  - Alewife
  - Blueback herring
  - American shad
  - Atlantic & Shortnose sturgeon
    - Lots of movement
    - Poor understanding of counts & spawning areas
    - Listed spp – very few left
    - Ports are a major issue

Goals

- Where are 'core' populations / habitats
- What actions needed to reach desired conditions?
- How many fish?
  - Establish monitoring – need a meaningful number
  - For example NFWF RH initiative 10-yr Goal (300% increase across index sites in 10 years, 3-yr avg baseline.)

State	River	Survey Started	2006-08 Average	High	Year	Low	Year	1984-86 Average	1985 Level
Maine	Androscoggin	1983	54,694	104,520	2002	601	1983	21,632	26,895
New Hampshire	Cocheco	1976	22,598	79,385	1992	477	1984	1,354	974
	Lamprey	1972	50,958	66,333	2004	1,380	1973	47,067	54,546
	Oyster	1976	15,501	157,024	1992	395	1977	34,106	4,116
Massachusetts	Monument	1980	113,373	671,839	2000	74,664	2006	199,974	178,031
Rhode Island	Gilbert-Stuart	1980	36,188	290,814	2000	7,776	2005	27,280	16,492
Connecticut	Connecticut	1967	63	630,000	1985	21	2006	543,491	1,985
South Carolina	Santee-Cooper	1986	181,510	1,865,394	2001	36,671	2004	164,333	187,000
Total			300,860					1,039,027	

Target species	Metric	2006-08 Average[2]	10-year goal (2019)
River Herring	# spawning adults at index sites	300,860	1,039,237

Table 1. Projected river herring population increase with NFWF's 10-year investment.

Cores

- Identify a suite of places essential to the continuation of the species*
  - Strong populations (#s & demographics) and/or restoration opportunities
  - Assess threats
  - Develop site specific and range-wide recovery actions
  - Restore habitat and abate threats to all life stages
  - Identify core populations stratified by biological units
- How to define a '*core*' given limited data?
- Identify cores to inform TNC work, not in a vacuum
  - Informed by others
  - Inform & be useful others

*Bowden, A.A. Towards a comprehensive strategy to recover river herring on the Atlantic seaboard: lessons from Pacific salmon. – ICES Journal of Marine Science, doi:10.1093/icesjms/fst130"

River herring / shad: Unit of Analysis

- Unit of analysis
  - subwatersheds (HUC12)
  - ~100 km^2
  - Fine enough to narrowly focus efforts
  - Feasible unit for a coastwide analysis

- Multiple potential activities:
  - Connectivity / fish passage (dams/culverts)
  - Wetland restoration
  - SAV
  - Riparian buffers

River herring / shad: Study Area

- Subwatersheds (HUC12) within Basins (HUC8) with current or historical presence of:
  - Alewife
  - blueback herring
  - American shad
- Based on Nature Serve data

Conceptual Approach

- Each subwatershed assessed for a suite of abiotic & biotic variables – "metrics"
- Understand the suitability for each subwatershed for sustaining & restoring river herring and shad populations
- Develop a relative prioritization

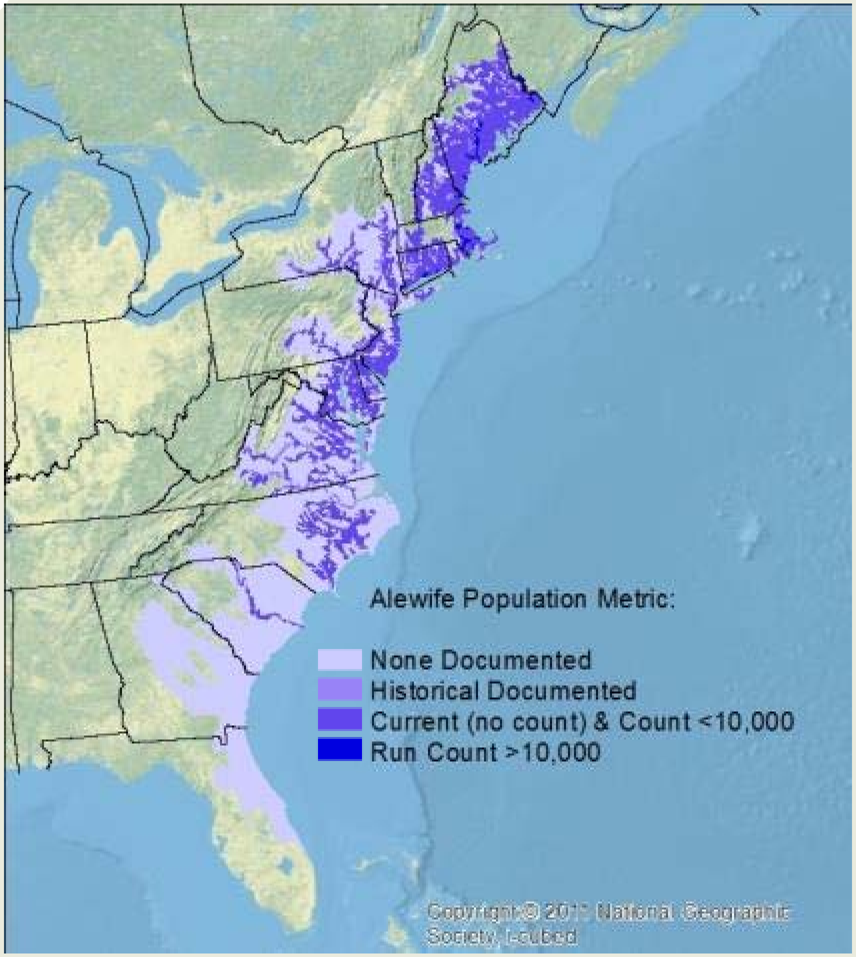
Metrics

Metric Category	Metric Description
Population	Integrated presence / run count metric. Separate metric for each spp using spp specific data where: 0 = none documented 1 = historical presence documented 2 = current presence (no count) and count <=10,000 3 = count: >10,000
Habitat Quantity & Access	Area of Lakes and Ponds with no dams associated within each HUC
Habitat Quantity & Access	% of reaches within HUC12 that have connectivity (no barriers) to the ocean
Habitat Quantity & Access	% of Active River Area within each HUC that is occupied by NWI wetlands (any)
Habitat Quantity & Access	Area of estuarine emergent marsh within each HUC
Habitat Quantity & Access	Average anadromous scenario result for NE Aquatic Connectivity / SEACAP dams within HUC 12. HUC12s with no dams are assigned a mean score (10), to neither "help" nor "hurt" their score.
Water Quality	% of reaches in HUC whose cumulative watershed % impervious surface is >8%
Water Quantity	Dam storage - mean annual flow: % of flowlines within each HUC i>= 30%

Population

- **Alewife**
  - None documents
  - Historically documented
  - Current (no count or <10,000)
  - Current (Count >10,000)

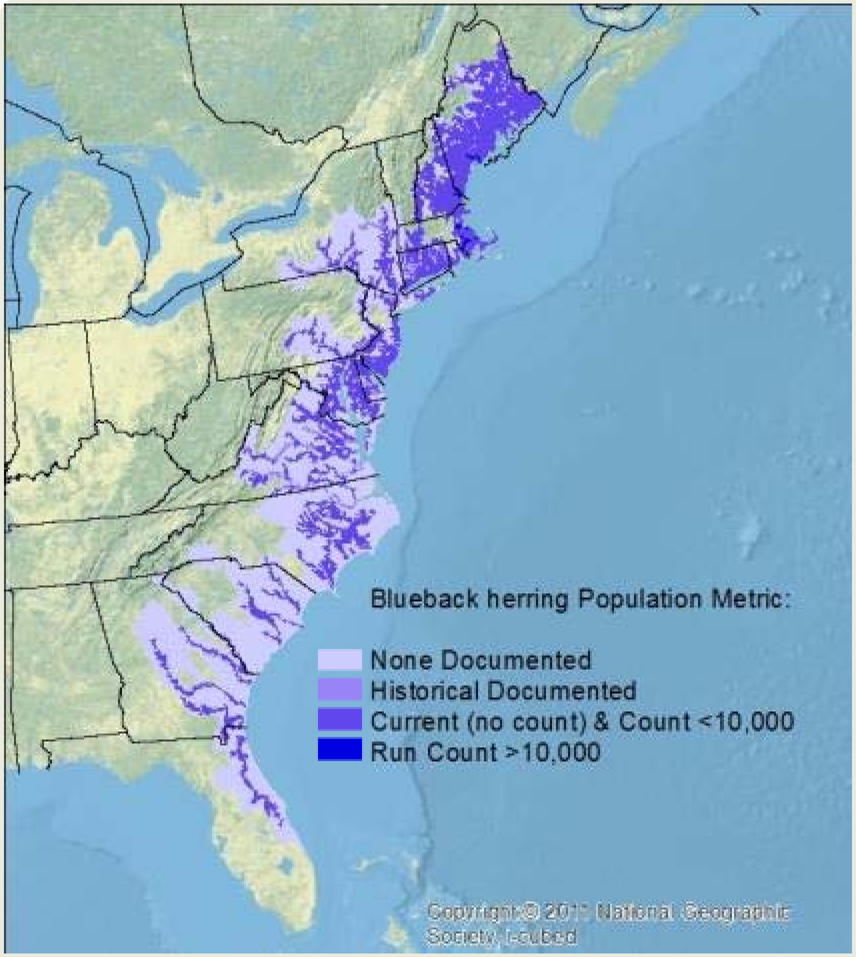
©TNC/ M Pizer



Population

- **Blueback herring**
  - None documents
  - Historically documented
  - Current (no count or <10,000)
  - Current (Count >10,000)

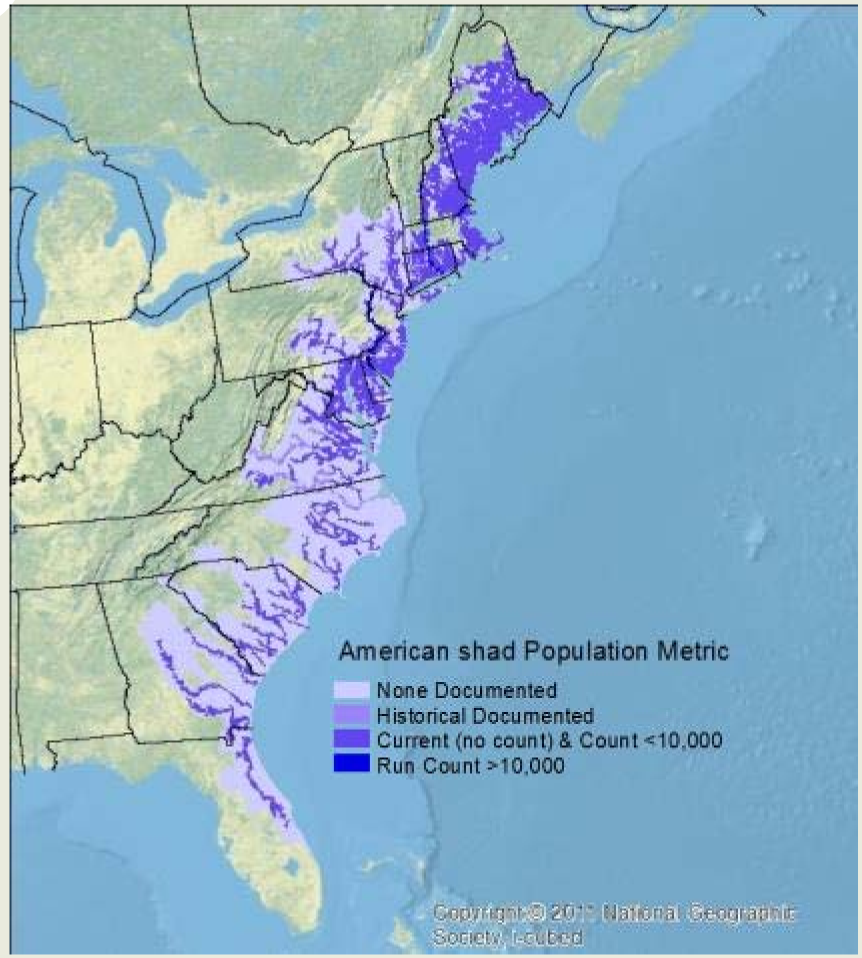
©flickr Creative Commons user Mary Chaffee



Population

- **American shad**
  - None documents
  - Historically documented
  - Current (no count or <10,000)
  - Current (Count >10,000)

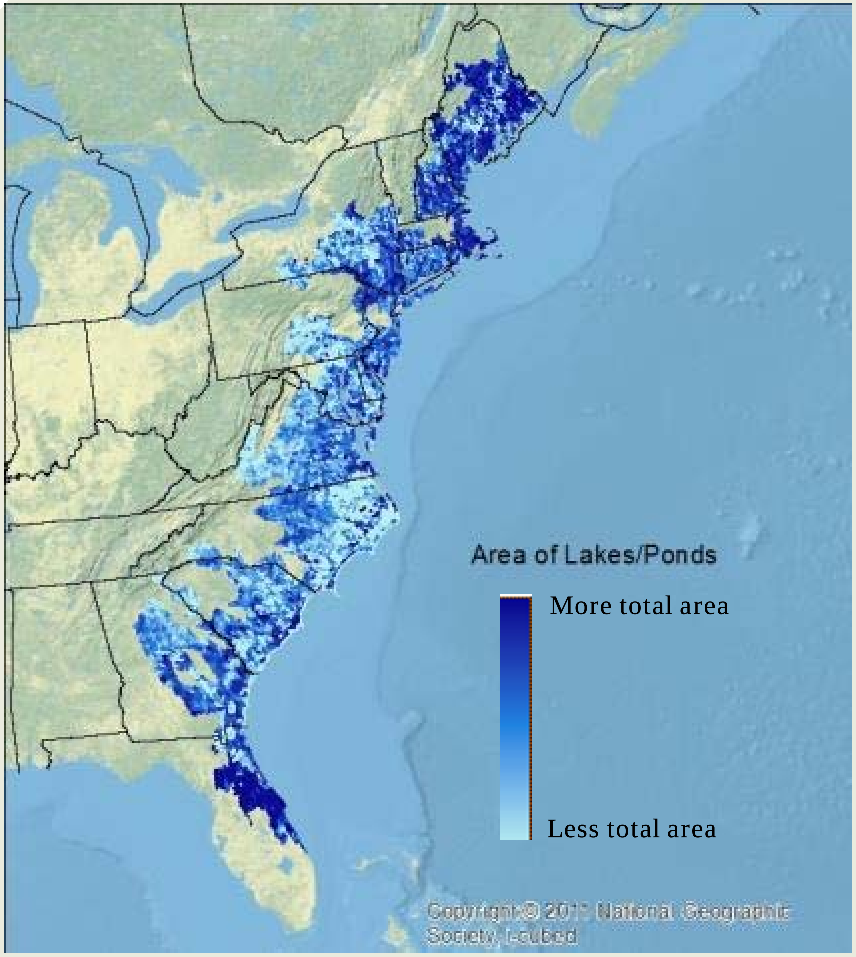
©flickr Creative Commons user Chesapeake Bay Program



Habitat Quantity & Access

- Spawning habitat – *slow water*
  - Area of lakes and ponds
  - Glaciated areas

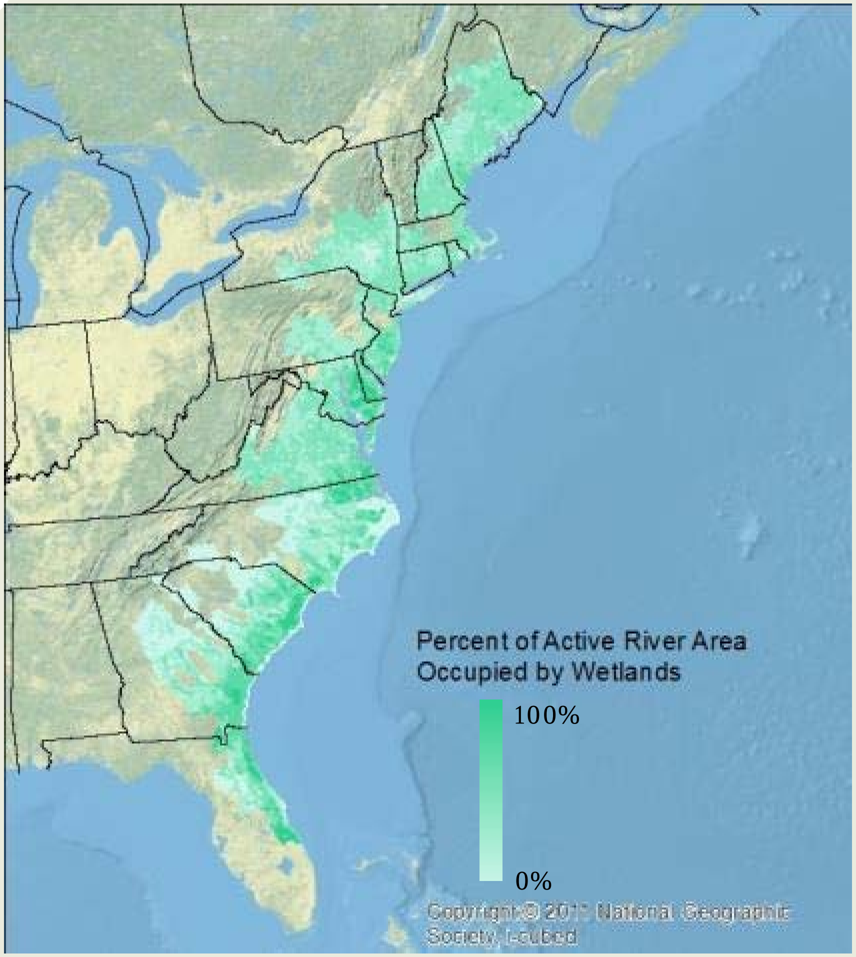
©flickr Creative Commons Dana Moos



Habitat Quantity & Access

- Spawning habitat – *slow water*
  - % of Active River Area occupied by wetlands

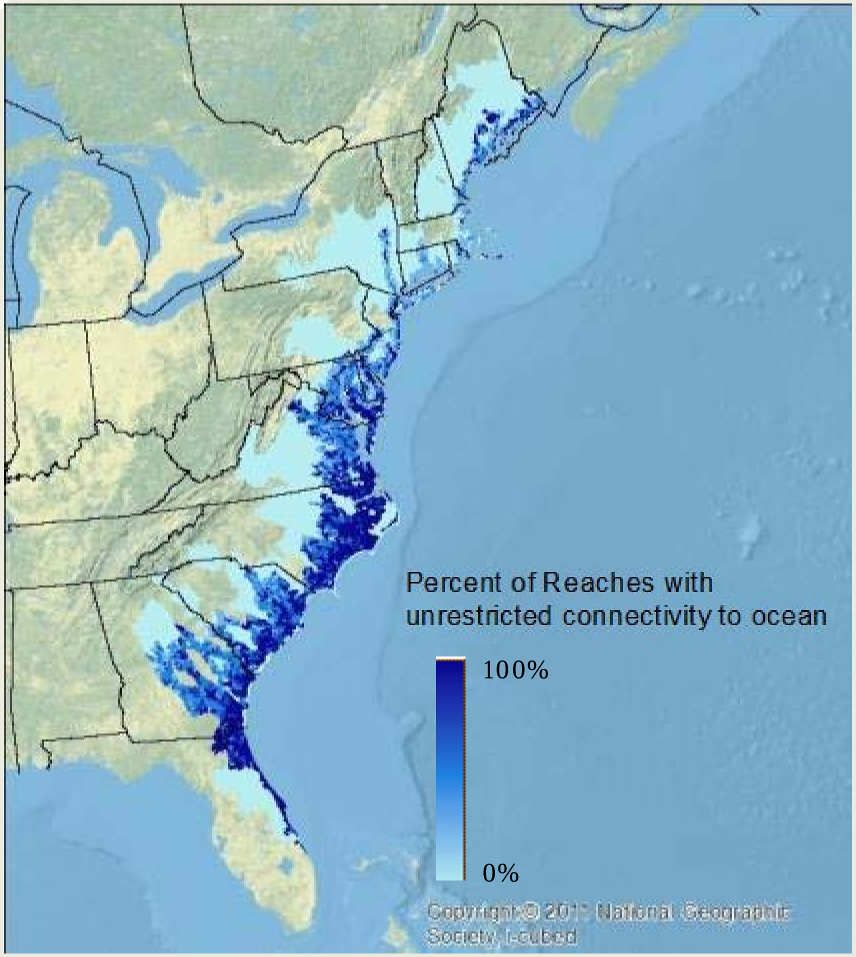
©TNC



Habitat Quantity & Access

- Connectivity to the ocean

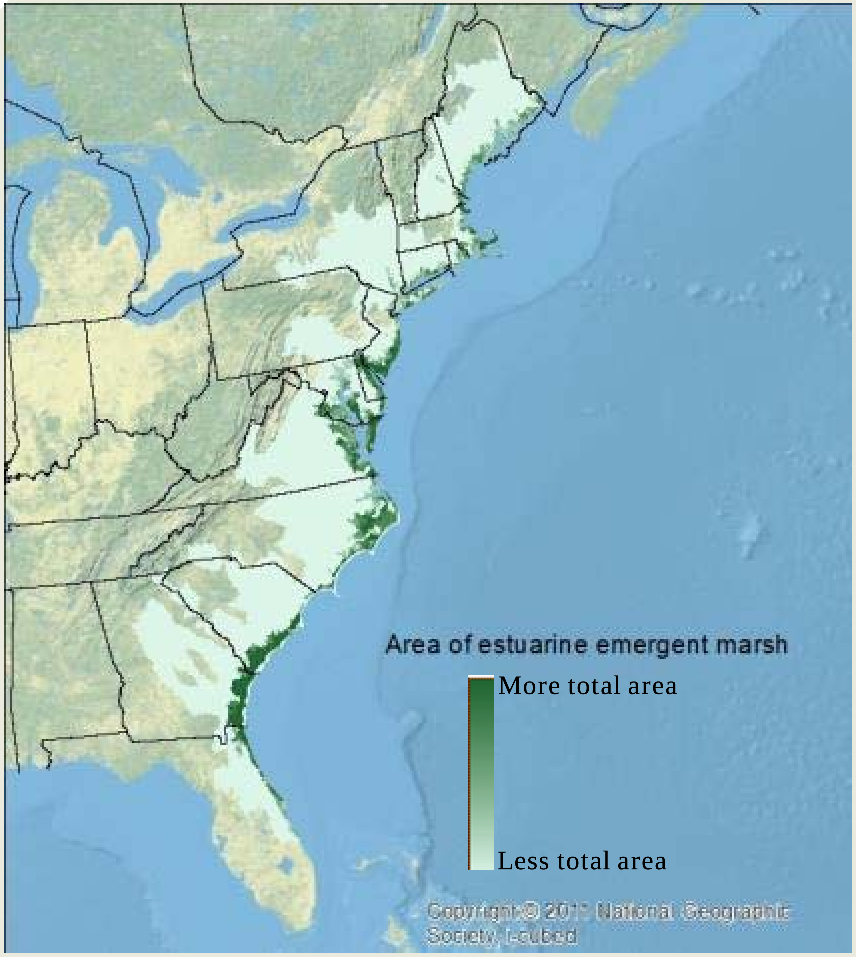
©flickr Creative Commons Wayne Boardman



Habitat Quantity & Access

- Area of estuarine emergent marsh
  - Juvenile habitat
  - Habitat complexity

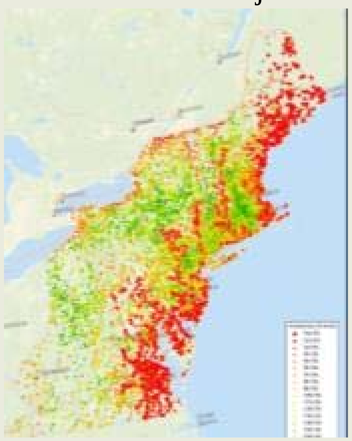
©flickr Creative Commons user US Fish & Wildlife Service NE Region



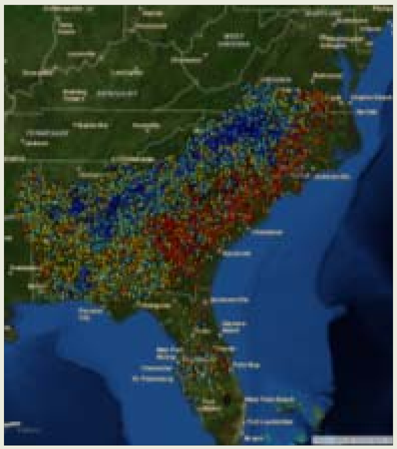
Habitat Quantity & Access

- Dams
  - Average anadromous fish scenario result from:

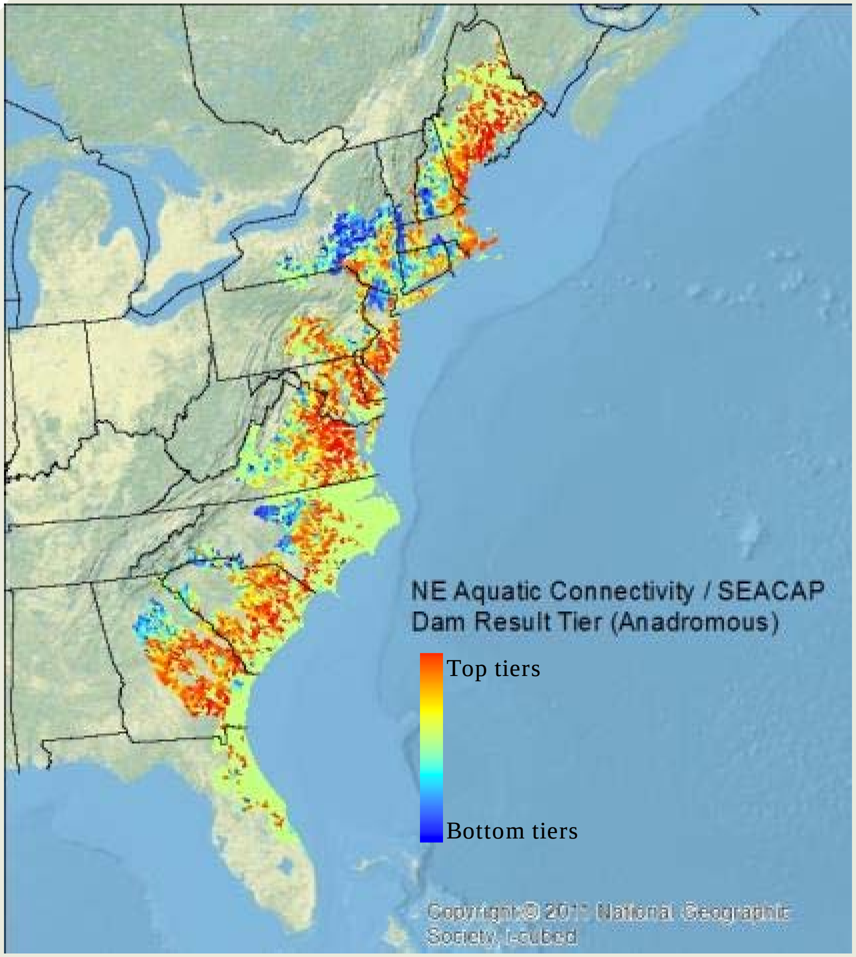
NE Aquatic Connectivity Assessment Project



SE Aquatic Connectivity Assessment Project (draft)



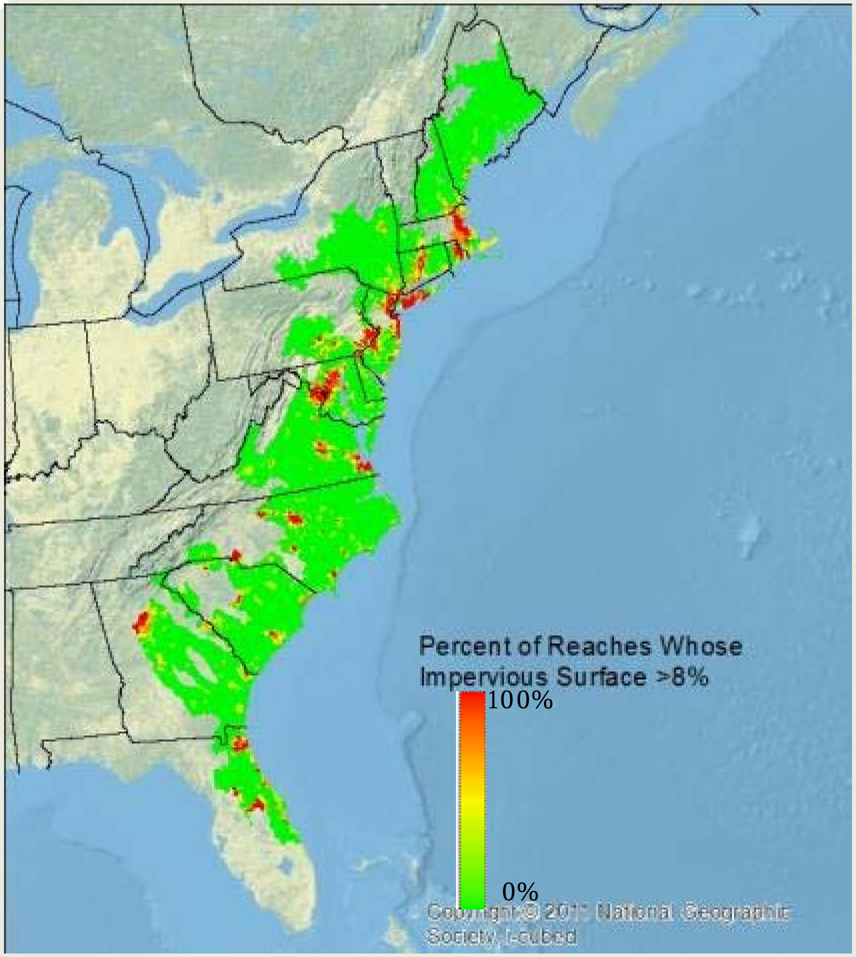
  - Subwatersheds with high priority dam passage projects



Water Quality

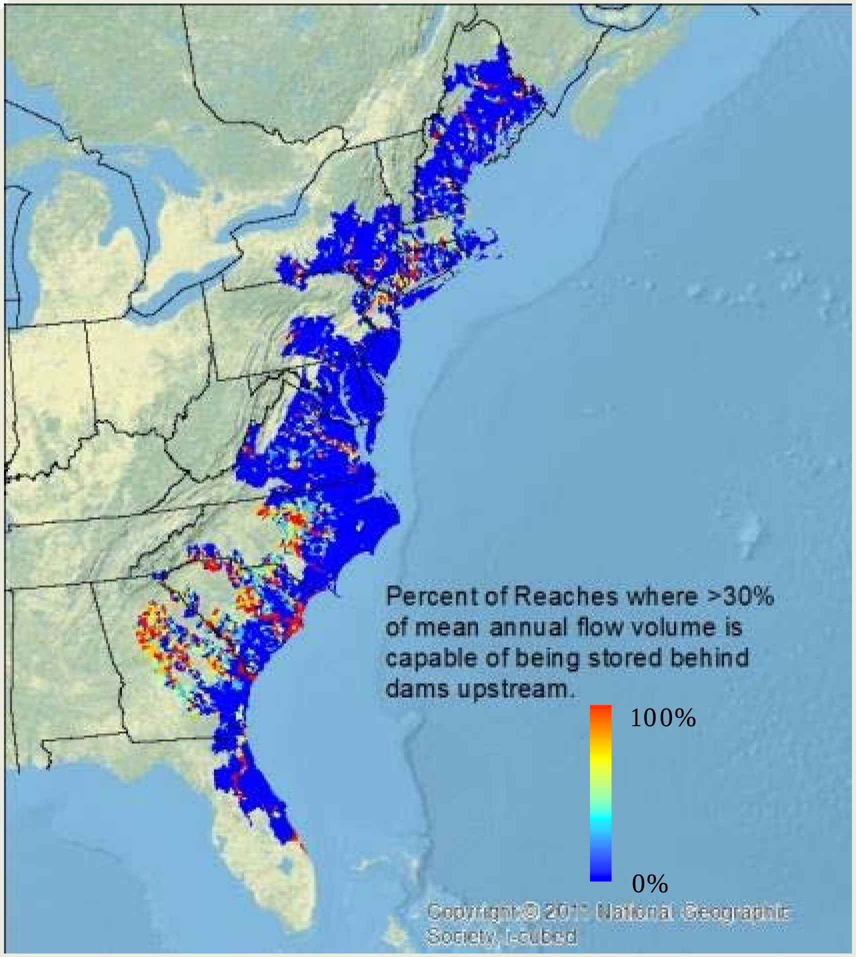
- Percent impervious surface

©flickr Creative Commons user Thierry Draus



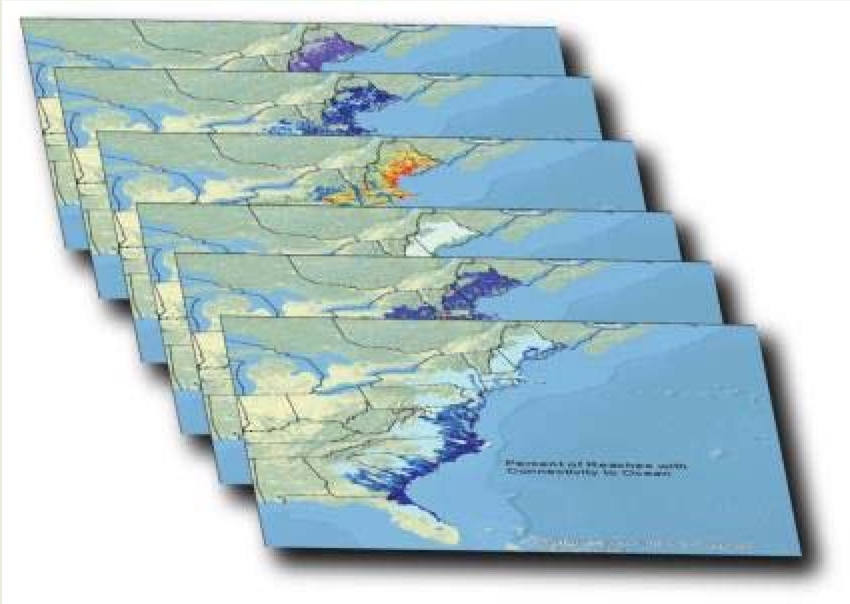
Water quantity

- Flow alteration
  - Metric used in TNC Freshwater resilience study (*Anderson et al 2013*)



Combine Metrics

- Combine Metrics
- Hypothetical 'best' would have:
  - No flow alteration
  - No impervious surface
  - Large runs
  - 100% ocean connectivity
  - The most wetlands
  - Etc, etc…
- Not all metrics are of equal importance.



Assign Metric Weights

Metric Category	Metric Description	Alewife Scenario Weight
Population	Integrated presence / run count metric. Separate metric for each spp using spp specific data where: 0 = none documented 1 = historical presence documented 2 = current presence (no count) and count <=10,000 3 = count: >10,000	25
Habitat Quantity & Access	Area of Lakes and Ponds with no dams associated within each HUC	10
Habitat Quantity & Access	% of reaches within HUC12 that have connectivity (no barriers) to the ocean	10
Habitat Quantity & Access	% of Active River Area within each HUC that is occupied by NWI wetlands (any)	20
Habitat Quantity & Access	Area of estuarine emergent marsh within each HUC	10
Habitat Quantity & Access	Average anadromous scenario result for NE Aquatic Connectivity / SEACAP dams within HUC 12. HUC12s with no dams are assigned a mean score (10), to neither "help" nor "hurt" their score.	10
Water Quality	% of reaches in HUC whose cumulative watershed % impervious surface is >8%	10
Water Quantity	Dam storage - mean annual flow: % of flowlines within each HUC i>= 30%	5

	Sum of weights	100

Metric weighting as iterative process – calibrate draft results for each scenario to known priorities

Assign Metric Weights

Metric Category	Metric Description	Alewife Scenario Weight	Blueback Scenario Weight
Population	Integrated presence / run count metric. Separate metric for each spp using spp specific data where: 0 = none documented 1 = historical presence documented 2 = current presence (no count) and count <=10,000 3 = count: >10,000	25	35
Habitat Quantity & Access	Area of Lakes and Ponds with no dams associated within each HUC	10	0
Habitat Quantity & Access	% of reaches within HUC12 that have connectivity (no barriers) to the ocean	10	10
Habitat Quantity & Access	% of Active River Area within each HUC that is occupied by NWI wetlands (any)	20	20
Habitat Quantity & Access	Area of estuarine emergent marsh within each HUC	10	10
Habitat Quantity & Access	Average anadromous scenario result for NE Aquatic Connectivity / SEACAP dams within HUC 12. HUC12s with no dams are assigned a mean score (10), to neither "help" nor "hurt" their score.	10	10
Water Quality	% of reaches in HUC whose cumulative watershed % impervious surface is >8%	10	10
Water Quantity	Dam storage - mean annual flow: % of flowlines within each HUC i>= 30%	5	5
	Sum of weights	100	100

Metric weighting as iterative process – calibrate draft results for each scenario to known priorities

Assign Metric Weights

Metric Category	Metric Description	Alewife Scenario Weight	Blueback Scenario Weight	American Shad Scenario Weight
Population	Integrated presence / run count metric. Separate metric for each spp using spp specific data where: 0 = none documented 1 = historical presence documented 2 = current presence (no count) and count <=10,000 3 = count: >10,000	25	35	45
Habitat Quantity & Access	Area of Lakes and Ponds with no dams associated within each HUC	10	0	0
Habitat Quantity & Access	% of reaches within HUC12 that have connectivity (no barriers) to the ocean	10	10	5
Habitat Quantity & Access	% of Active River Area within each HUC that is occupied by NWI wetlands (any)	20	20	20
Habitat Quantity & Access	Area of estuarine emergent marsh within each HUC	10	10	5
Habitat Quantity & Access	Average anadromous scenario result for NE Aquatic Connectivity / SEACAP dams within HUC 12. HUC12s with no dams are assigned a mean score (10), to neither "help" nor "hurt" their score.	10	10	10
Water Quality	% of reaches in HUC whose cumulative watershed % impervious surface is >8%	10	10	10
Water Quantity	Dam storage - mean annual flow: % of flowlines within each HUC i>= 30%	5	5	5
	Sum of weights	100	100	100

Metric weighting as iterative process – calibrate draft results for each scenario to known priorities

Ranking

- Simple & transparent
- *Relative* prioritization
- Hypothetical scenario with 2 metrics:
  - Area Lakes & Ponds
    - Weight = 75
  - Area Estuarine wetland
    - Weight = 25

1

Raw Values	HUC12	Area Lakes Ponds (m^2)	Area Estuarine Wetland (m^2)
	10101010101	239,541	2,572
	10101010102	342,654	62,525
	10101010103	572,594	6,233
	10101010104	125,213	87,425

2

Ranked Values	HUC12	Area Lakes/ Ponds (rank)	Area Estuarine Wetland (rank)
	10101010101	3	4
	10101010102	2	2
	10101010103	1	3
	10101010104	4	1

3

% Ranked Values	HUC12	Area Lakes Ponds (% rank)	Area Estuarine Wetland (% rank)
	10101010101	33	0
	10101010102	66	66
	10101010103	100	33
	10101010104	0	100

4

Multiply by Weight	HUC12	Area Lakes Ponds	Area Estuarine Wetland
	10101010101	33 * 0.75	0 * 0.25
	10101010102	66 * 0.75	66 * 0.25
	10101010103	100 * 0.75	33 * 0.25
	10101010104	0 * 0.75	100 * 0.25

5

Weighted Rank Values	HUC12	Area Lakes Ponds (weighted rank)	Area Estuarine Wetland (weighted rank)
	10101010101	25	0
	10101010102	50	16.6
	10101010103	75	8.3
	10101010104	0	25

6

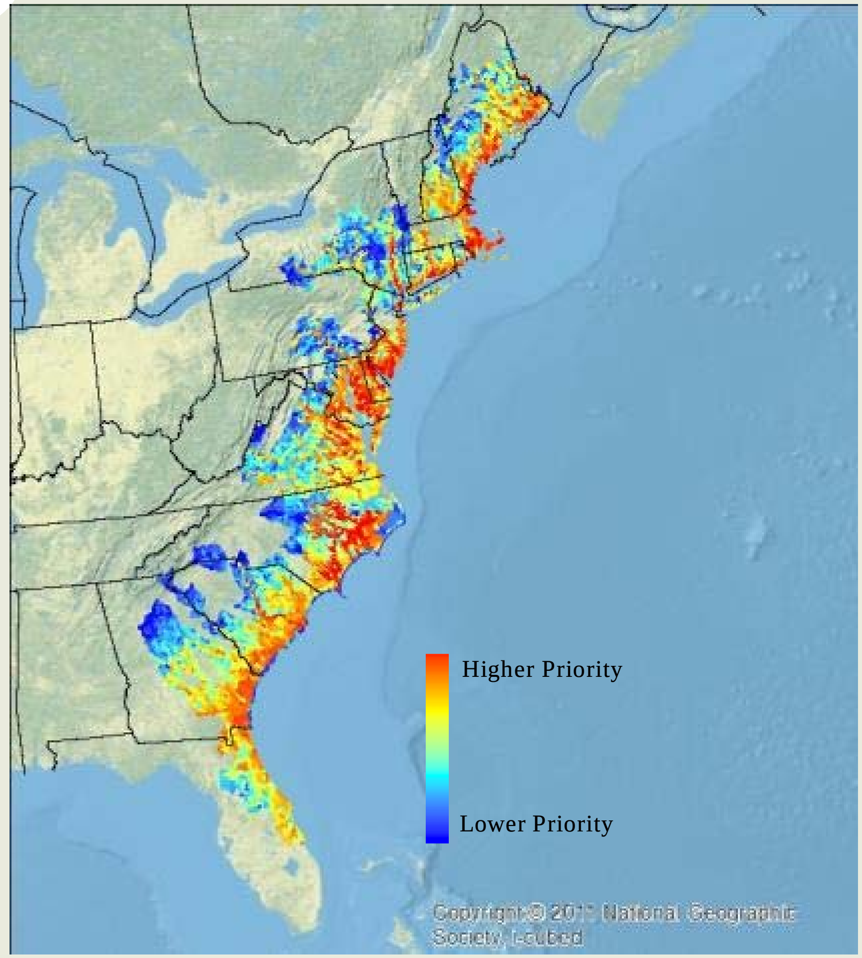
Combined Score	HUC12	Combined Score
	10101010101	25
	10101010102	66.6
	10101010103	83.3
	10101010104	25

7

Final Rank	HUC12	Final Rank
	10101010101	3
	10101010102	2
	10101010103	1
	10101010104	3

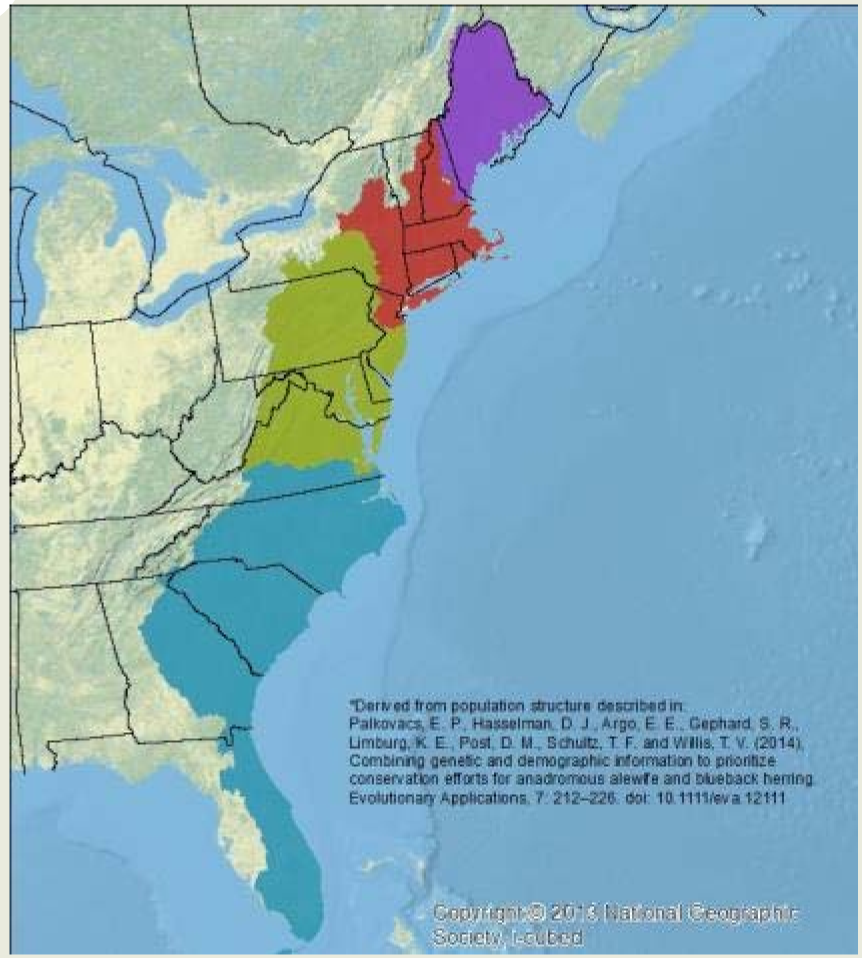
Example Output

- Subwatersheds prioritized 1 – n
- Binned into 5% Tiers
- Warm colors – greater opportunities for restoration and protection
  - *based on the metric & weights selected*
- Is it 'fair' to compare a subwatershed in Maine to one in Florida?



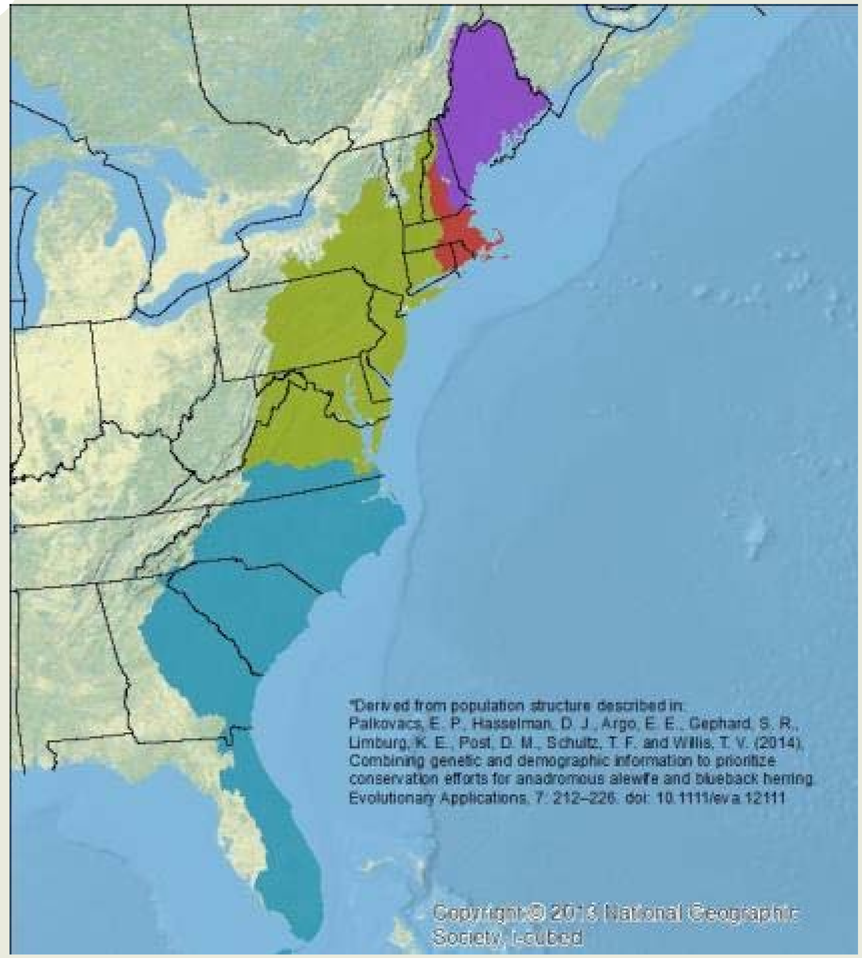
Stratification

- Alewife
- Derived from population structure described in:
  - Palkovacs, E. P. et al (2014)
  - Modified to align with our data



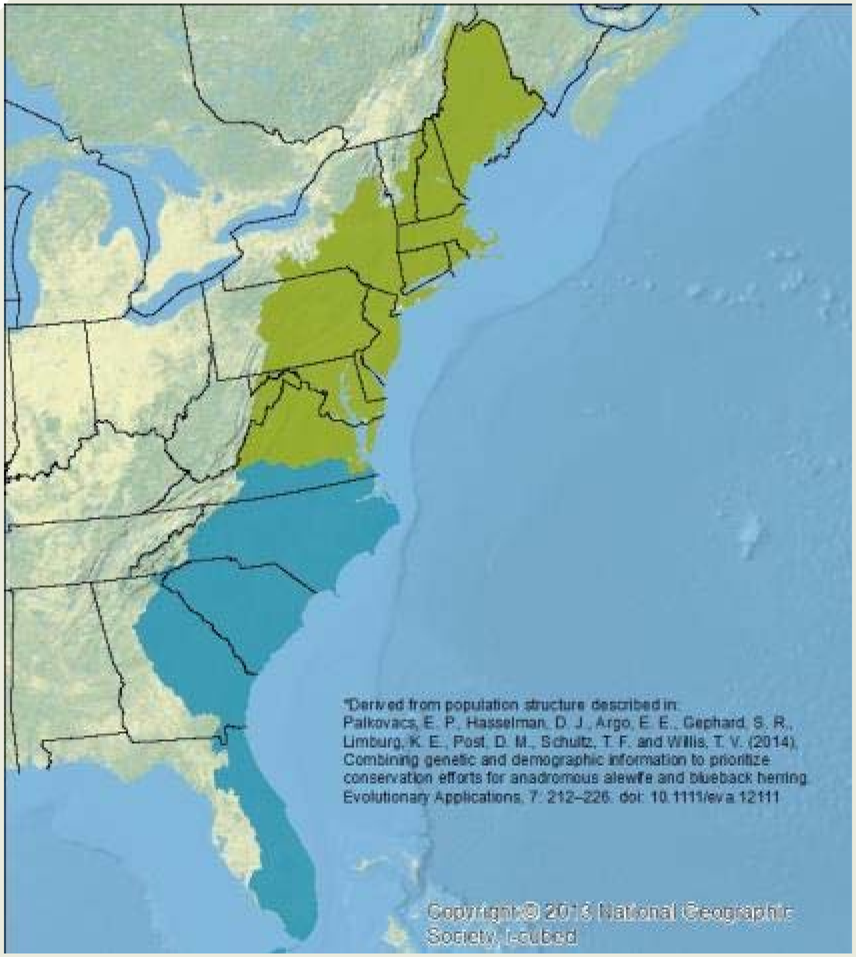
Stratification

- Blueback Herring
- Derived from population structure described in:
  - Palkovacs, E. P. et al (2014)
  - Modified to align with our data

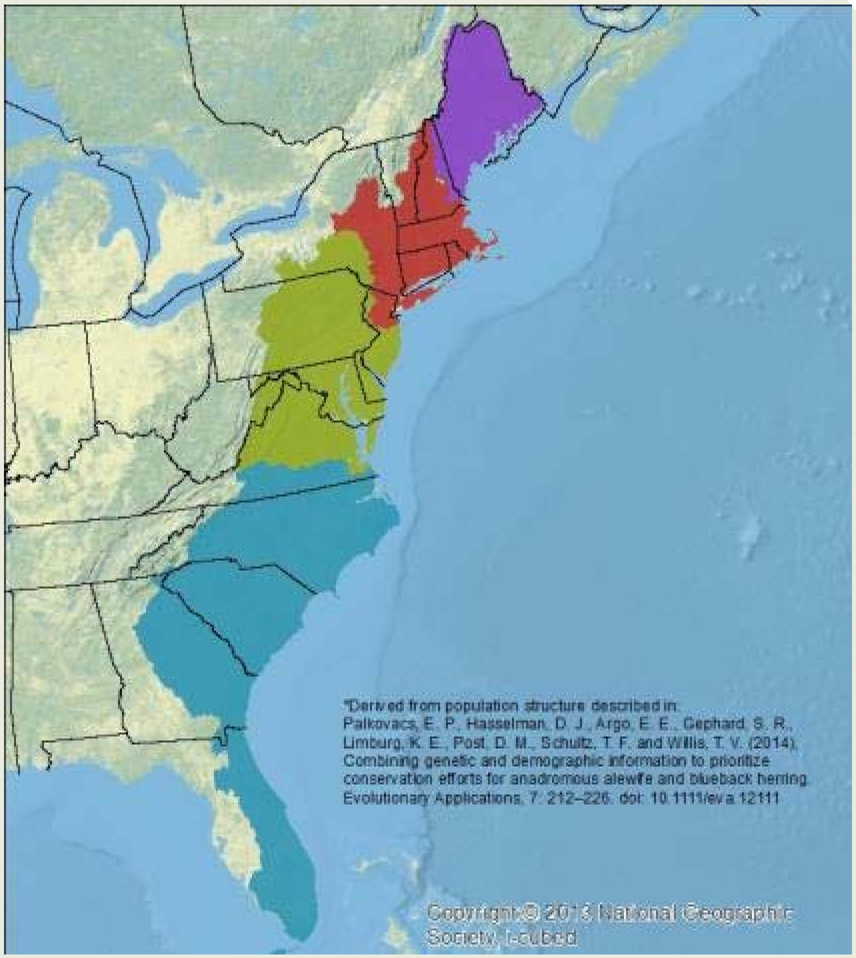


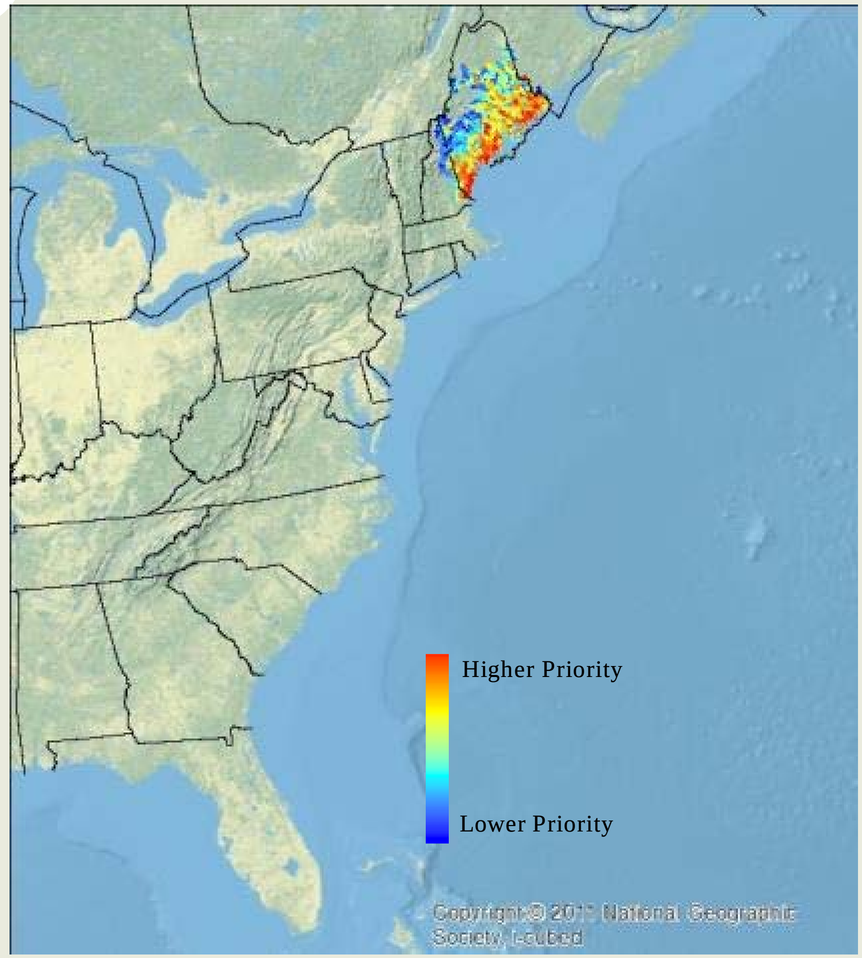
Stratification

- American shad
- Derived from population structure described in:
  - Hassleman, D.J., et al (2013)
  - Modified to align with our data

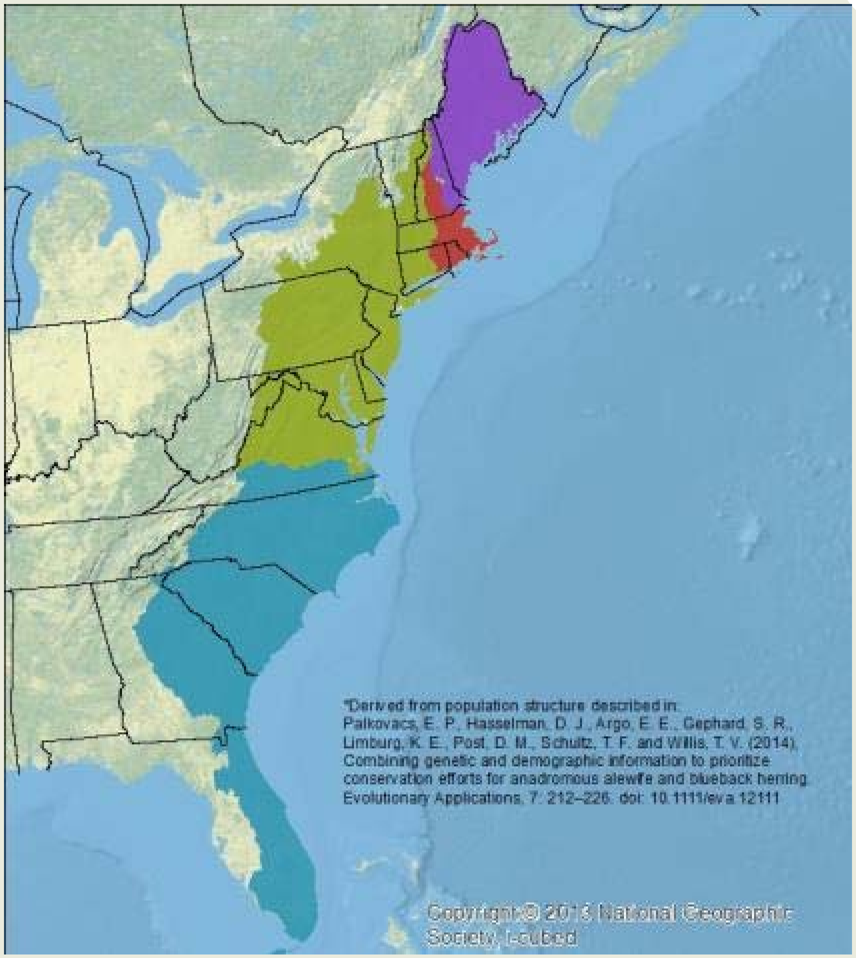


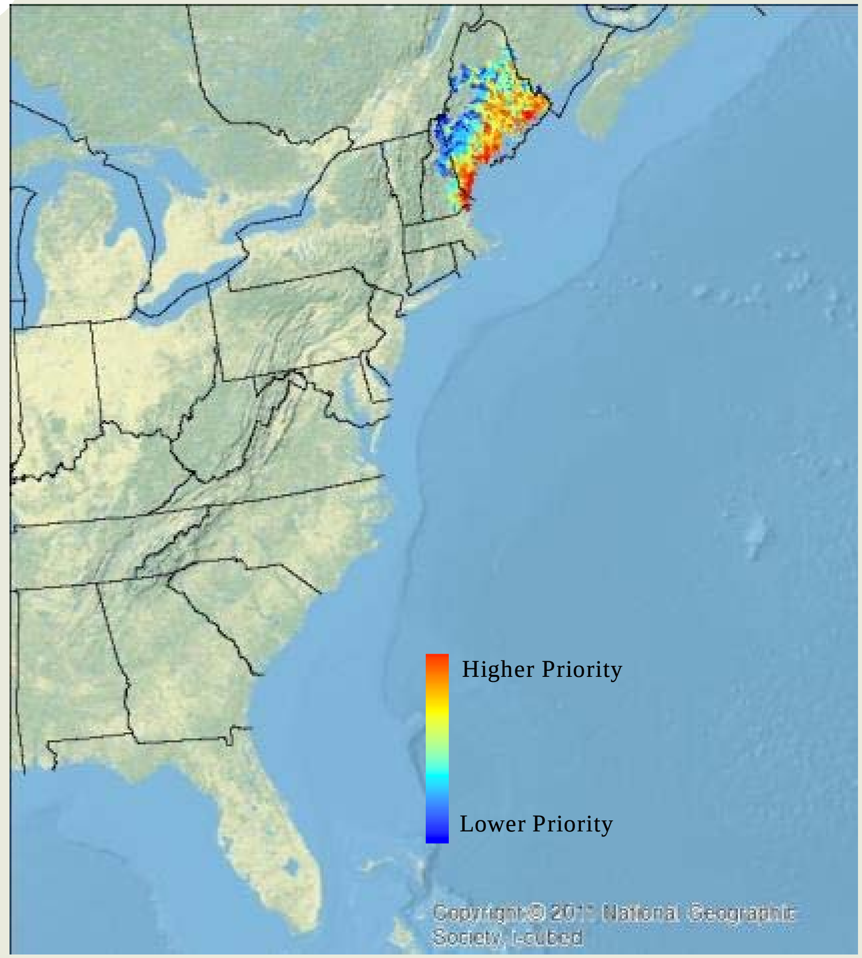
Results - Alewife



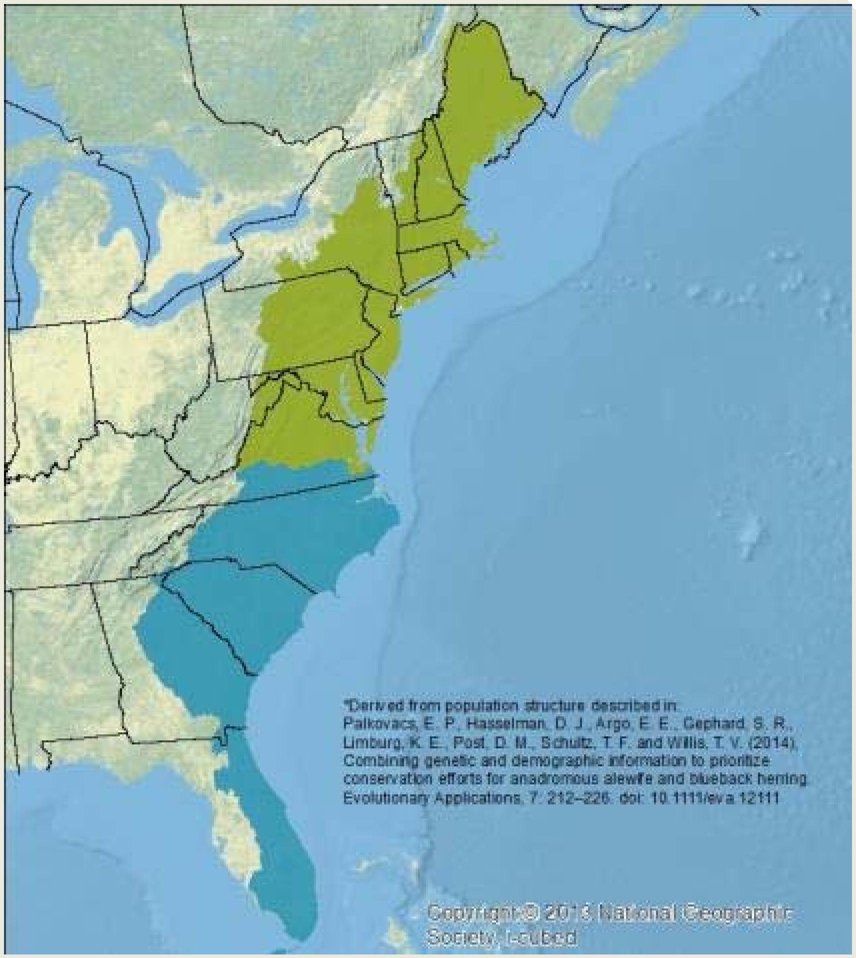


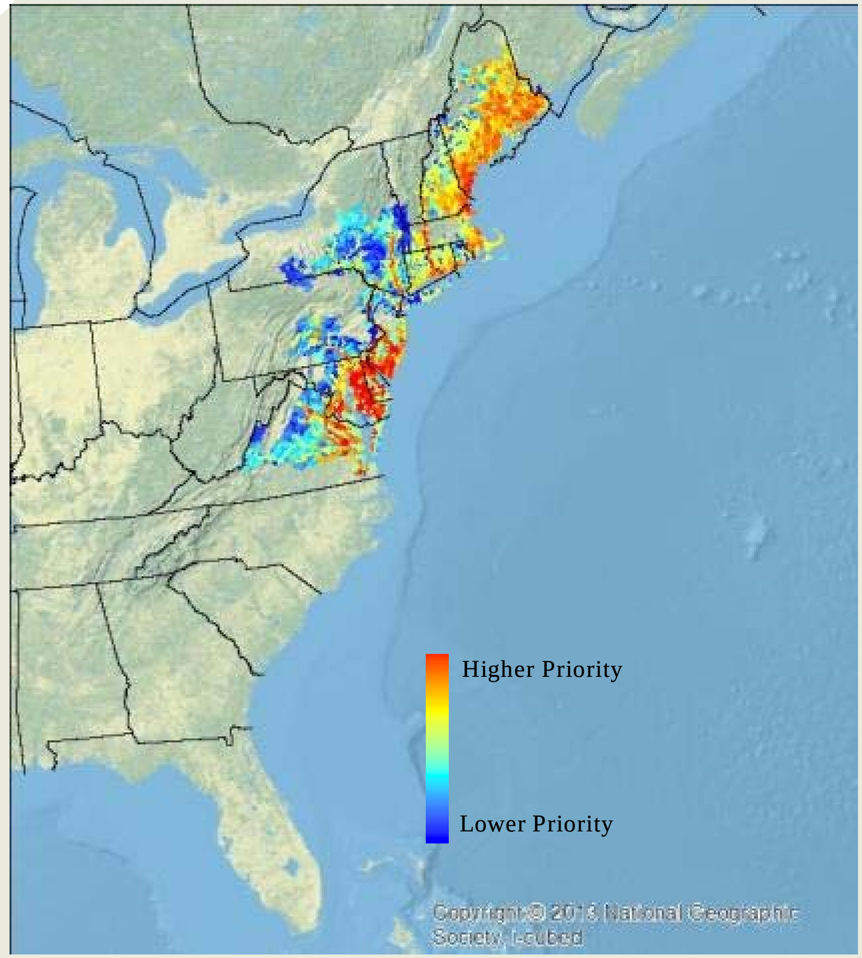
Results – Blueback - NNE





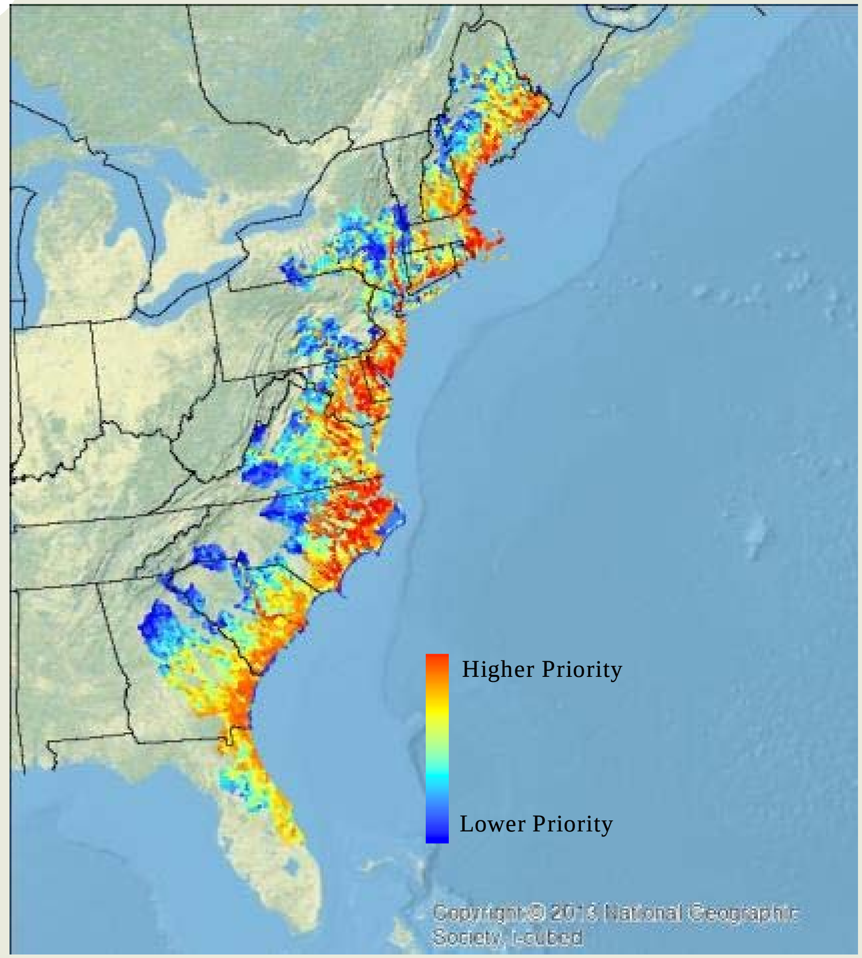
Results – American Shad - NE





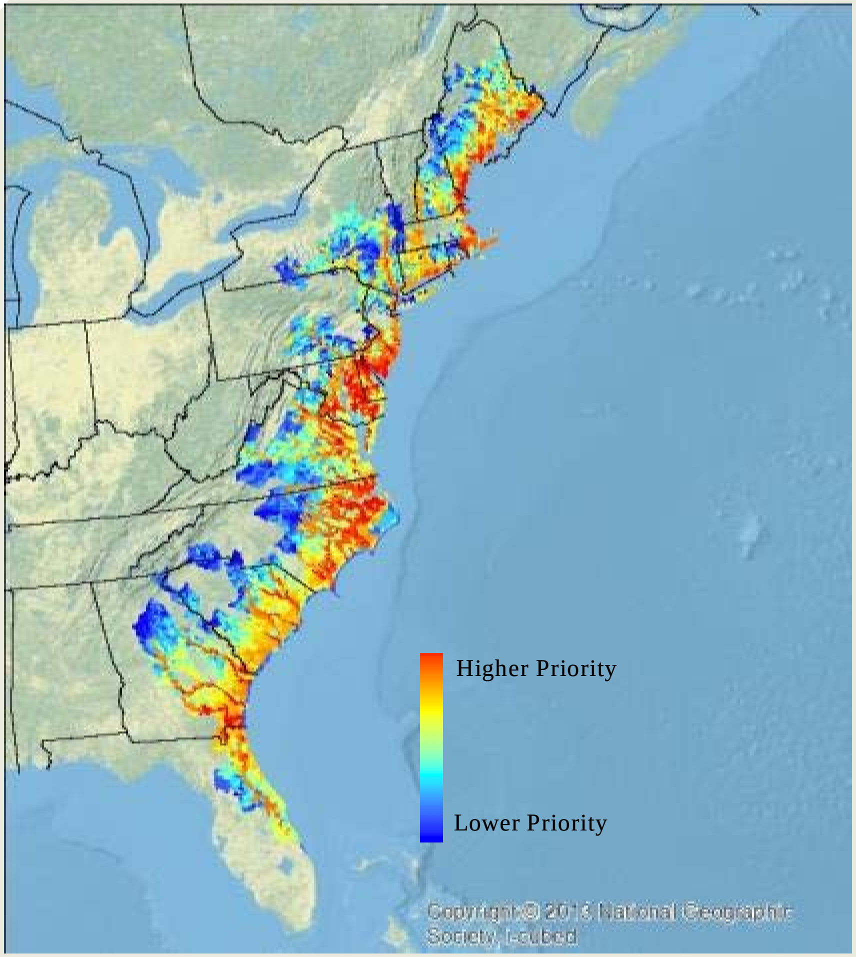
Results - Alewife

- Stratified by alewife genetic populations (Palkovacs et al)
- Binned into 5% Tiers
- Top Tier (red) = more restoration potential
- Lower Tiers (blue) = less restoration potential



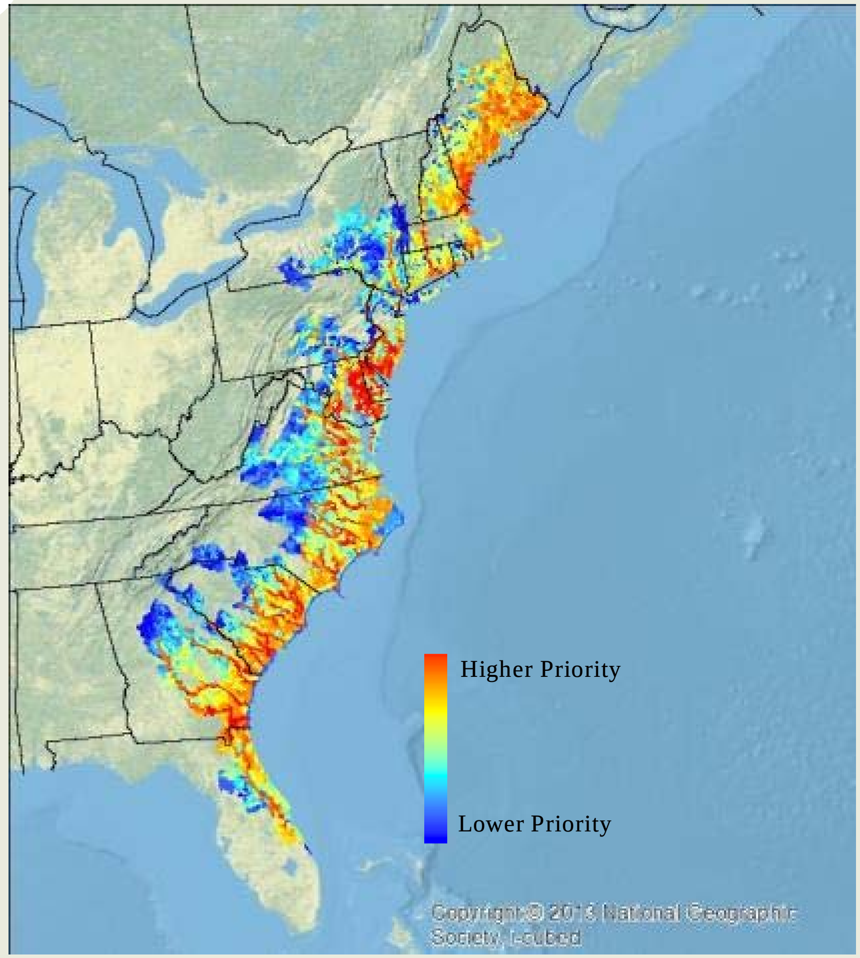
Results - Blueback

- Stratified by blueback herring genetic populations (Palkovacs et al)
- Binned into 5% Tiers
- Top Tier (red) = more restoration potential
- Lower Tiers (blue) = less restoration potential

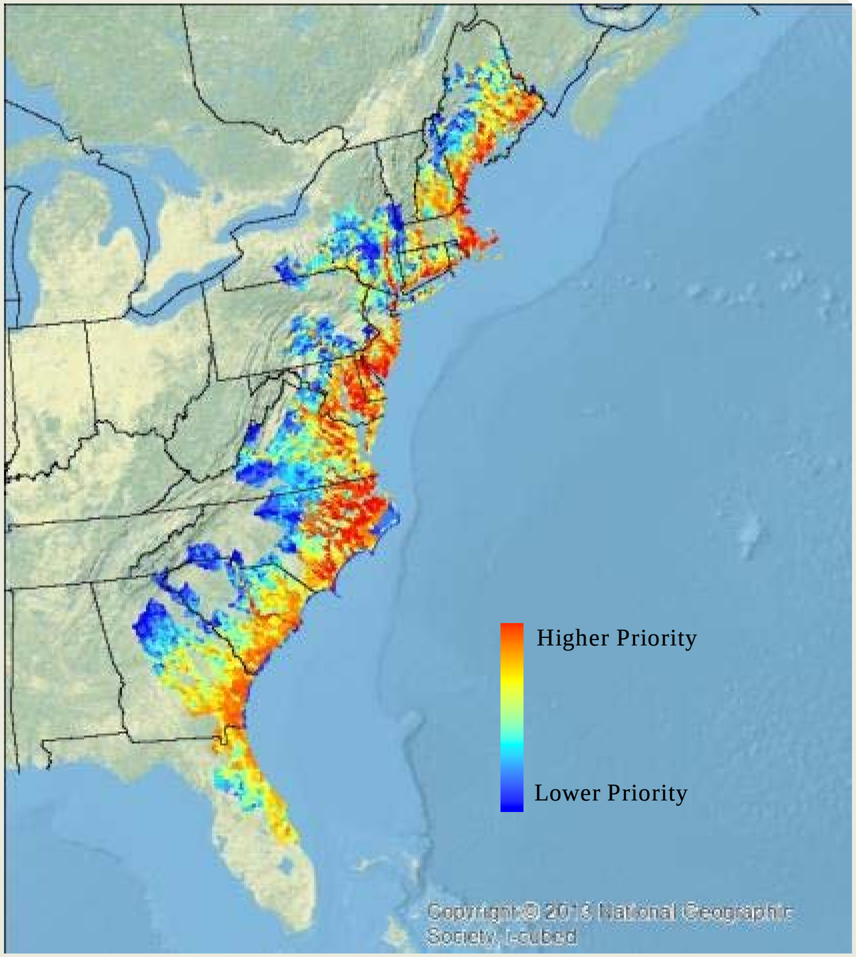


Results – American Shad

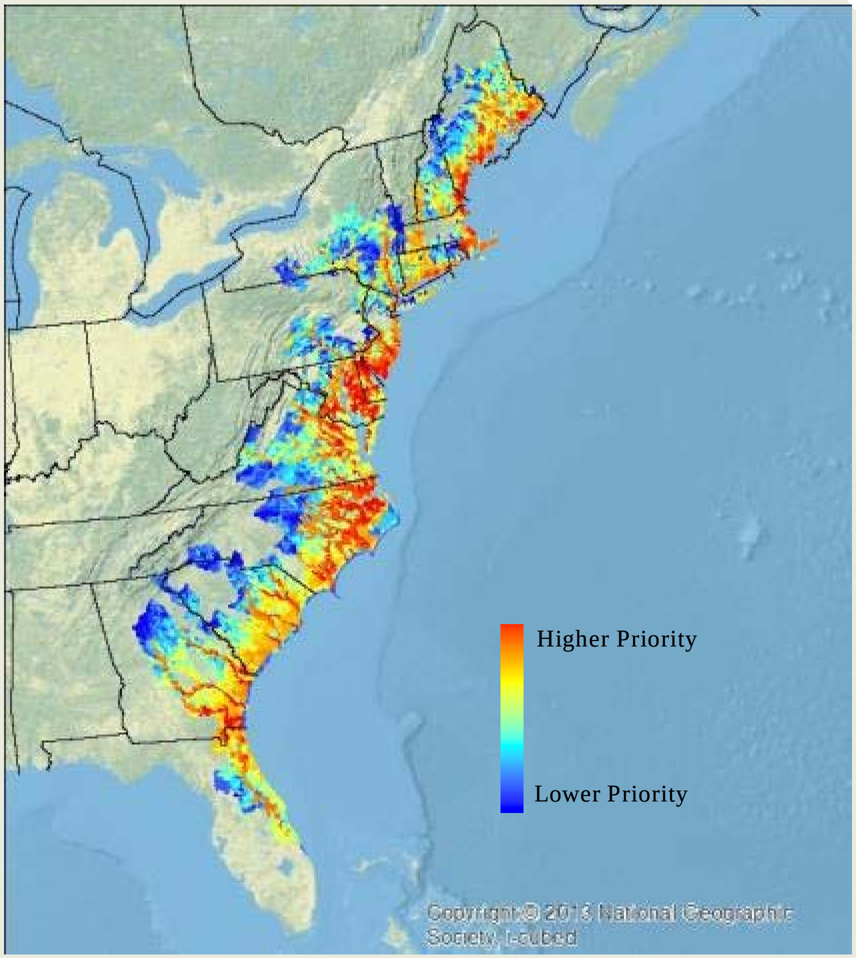
- Stratified by American shad genetic populations (Hassleman et al)
- Binned into 5% Tiers
- Top Tier (red) = more restoration potential
- Lower Tiers (blue) = less restoration potential



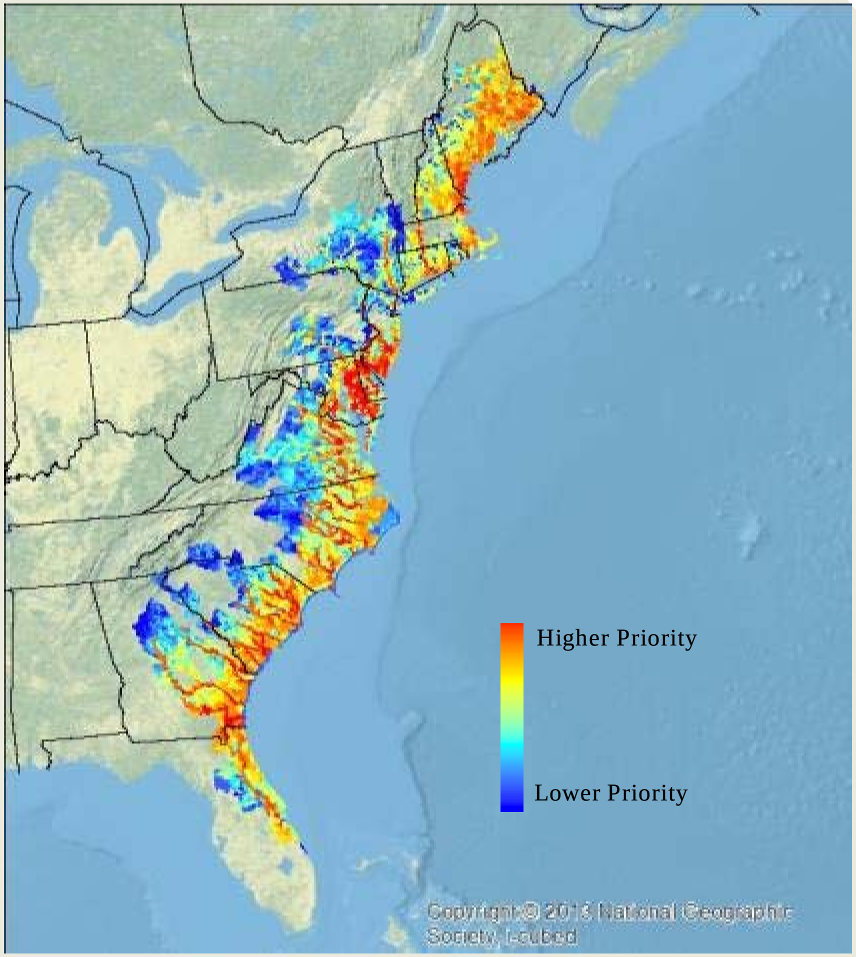
Results – Alewife – Top Tier (5% Bin)



Results - Blueback –Top Tier (5% Bin)



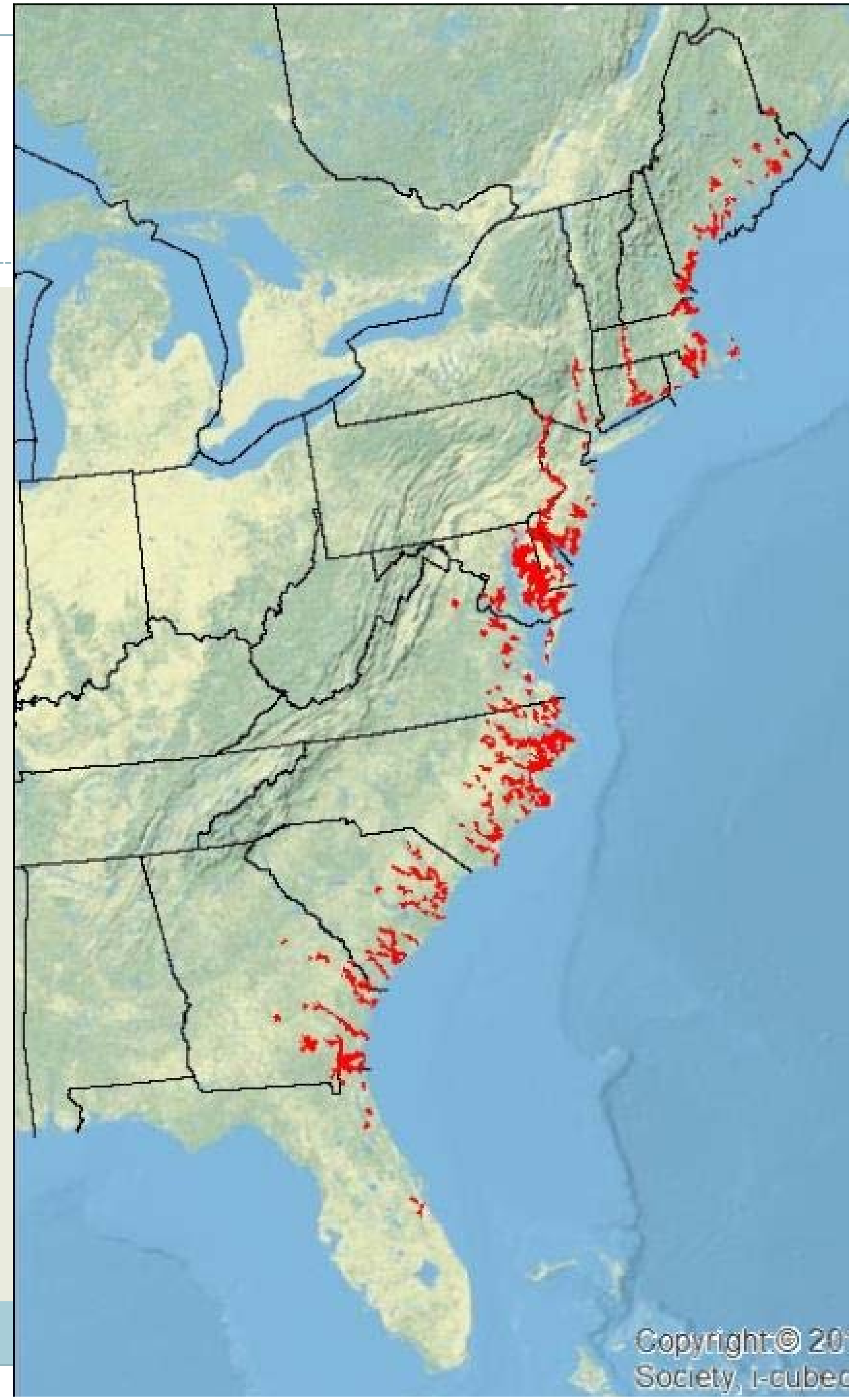
Results – American Shad – Top Tier (5% Bin)



Presentation of Results

Combined Result

- Alewife + blueback herring + American shad
- Top 5% for 1 or more of the three species



Combined Result

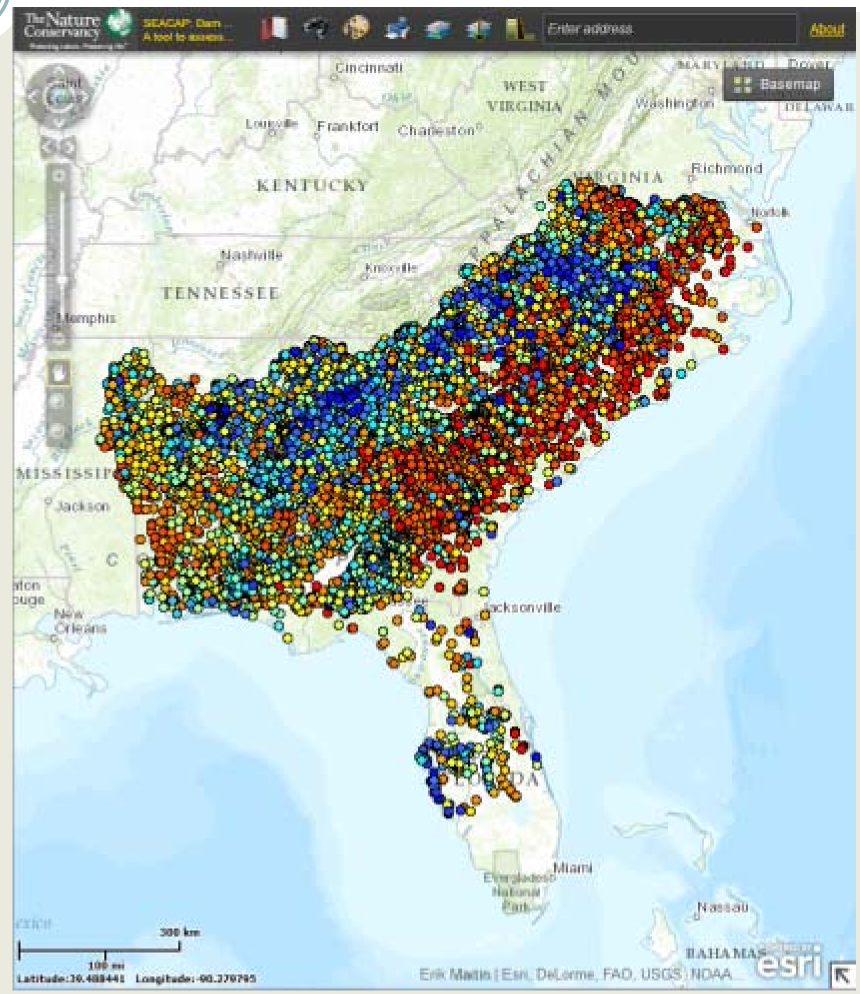
- Alewife + blueback herring + American shad
- Top 10% for 1 or more of the three species

Caution: these results…

- Are **not** a replacement for site-specific knowledge and field work
- Do **not** incorporate every possible aspect of diadromous fish needs
- **Are** a screening-level tool
- Use the **best available** data
- **Help** inform on-the-ground decision making

Fish Passage Prioritization Tools

- Northeast completed in 2012
- Southeast to be complete Dec 2014
- Dam prioritization analysis / tools available for Eastern seaboard
- *One* of the tools that can be used to identify potential recovery actions
- TNC eager to share / demonstrate the use of these products & tools with the agency staff at the appropriate levels



Questions / Feedback

Erik Martin

emartin@tnc.org

207-619-3745

Sturgeon

Sturgeon

- Atlantic + Shortnose

- Depicts:
  - Current & historical habitat
  - Principal ports (threats)

- Not prioritized
  - Lots of movement
  - Poor understanding of counts & spawning areas
  - Listed spp – very few left

Shortnose Sturgeon

- Count data estimated as part of 2010 Biological Assessment for Shortnose
- Considered an informative piece, but should not necessarily guide restoration activities

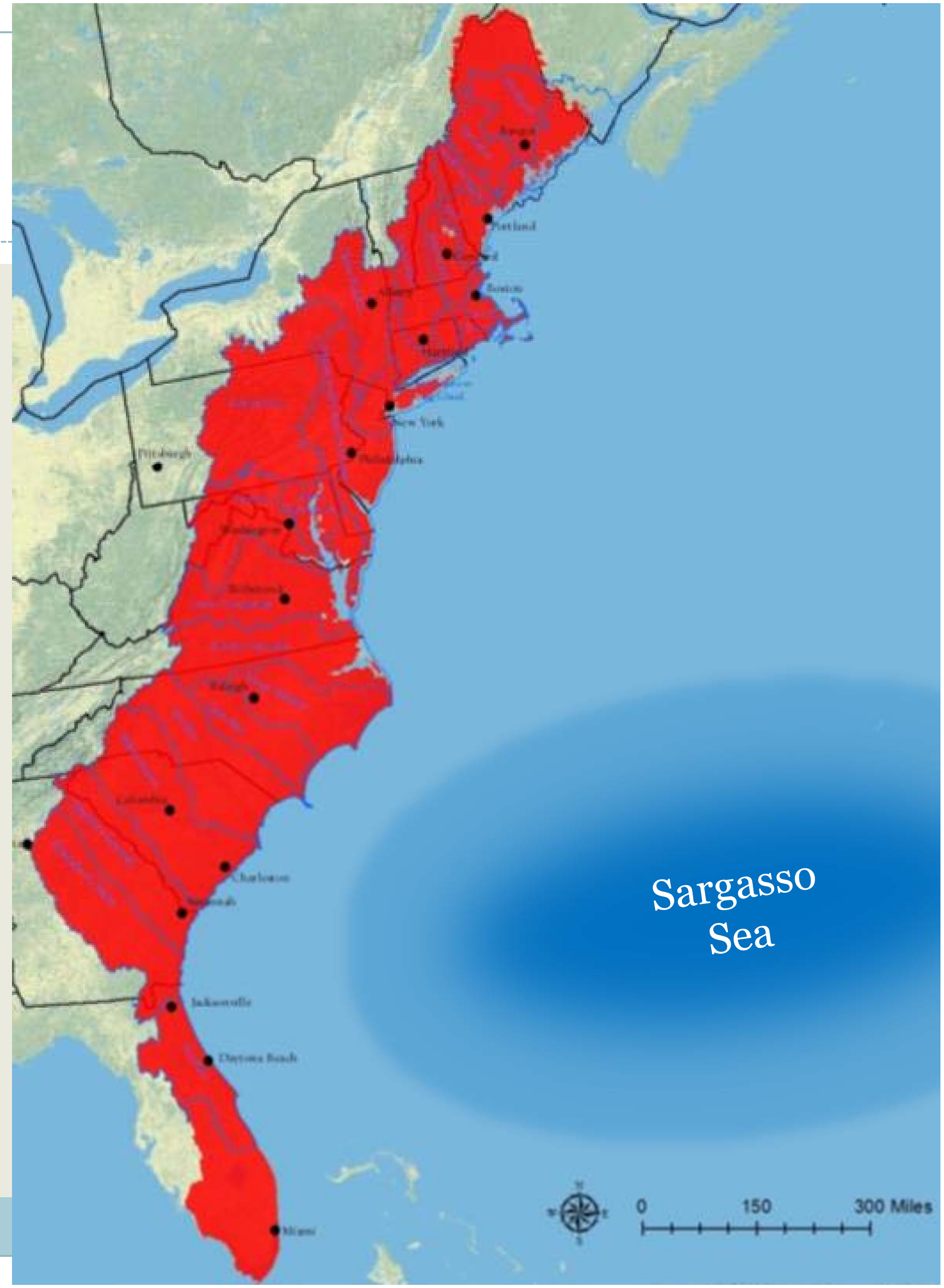
Other Diadromous Fish

- Salmon

- We did not prioritize
  - Range within Atlantic Coast Whole System is very limited
  - Already much salmon restoration effort underway

Other Diadromous Fish

- Eel
- Not prioritized
  - Very ubiquitous in freshwater
  - Single population
  - Strategies best focused on direct impacts rather than habitat limitations
    - Hydro dam mortality
    - Fishing
  - Likely to benefit from projects meant to benefit other diadromous species



Atlantic Coast Diadromous Fish Prioritization

Results – June 2014

http://bit.ly/U6dHPa

ACFHP PROJECT REVIEW

2015 applications for NFHAP funding

Overview

- ACFHP requested applications August 20, 2014
- Deadline for applications – October 3, 2014
- 3 Applications received
- Review Team:
  - Mark Rousseau – North Atlantic
  - Dawn McReynolds – Mid-Atlantic
  - Jimmy Johnson – South Atlantic
  - Kent Smith – South Florida
  - David O'Brien – Science & Data Committee
  - Marek Topolski – Science & Data Committee

Project Information

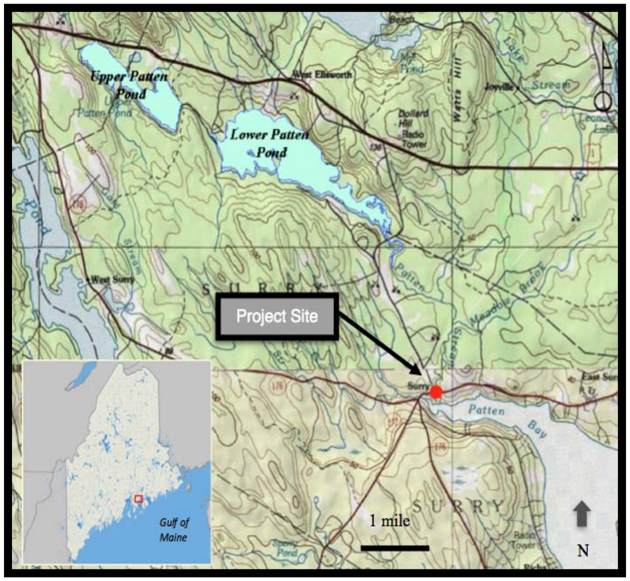
- 3 Applications
- Total Request: $122,300
- Total Partner funding (match): $256,848 (plus $401,308 from NFWF - which brings us to $658,156)
- States: ME, MA, DE
- Regions
  - North Atlantic – 1 project – fishway installation
  - Mid Atlantic – 2 projects – 1 fish ladder design, 1 dam removal

Rank	ACFHP #	Project Name	Score	Request	Partner
1	1501	Renewing Diadromous Fish Passage, Patten Stream, Surry, ME NFHP	188	$50,000	$184,548
2	1503	Cotton Gin Mill Dam Removal and Fish Passage Project, Satucket River, East Bridgewater, MA NFHP	178	$50,000	$50,000 + $401,308 from NFWF Sandy relief funds
3	1502	Delaware Inland Bays Fish Passage Proposal for Burton Pond on Herring Creek	119	$22,300	$22,300

Review Team Concerns

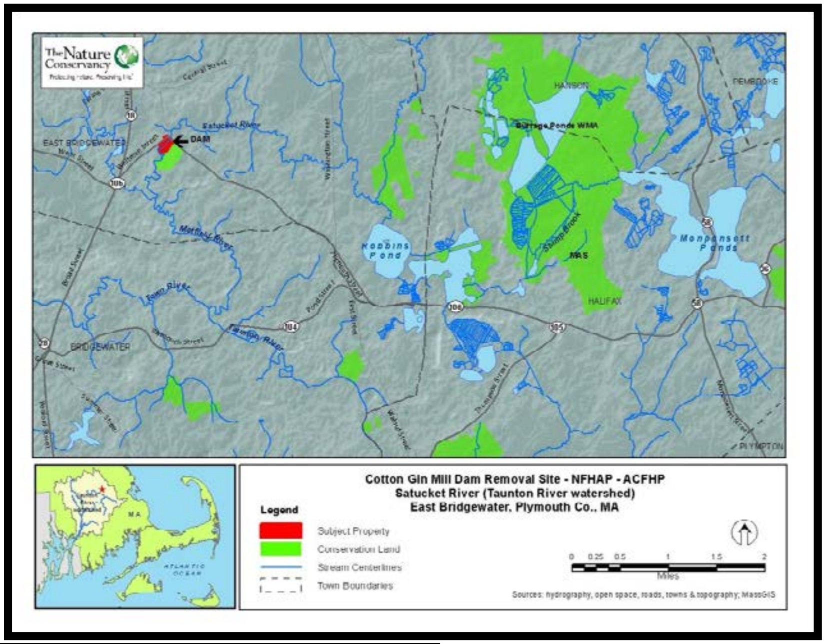
- Only 3 proposals this year: we incorporated requirements from legislation, including a criterion that asked for <50% of the matching funds be from federal sources
- 1503 is still in the design phase, reviewers have some concerns about dam owner approval of design and final cost of the project
- 1502 is a design project – lots of questions

1501 Renewing Diadromous Fish Passage, Patten Stream, ME



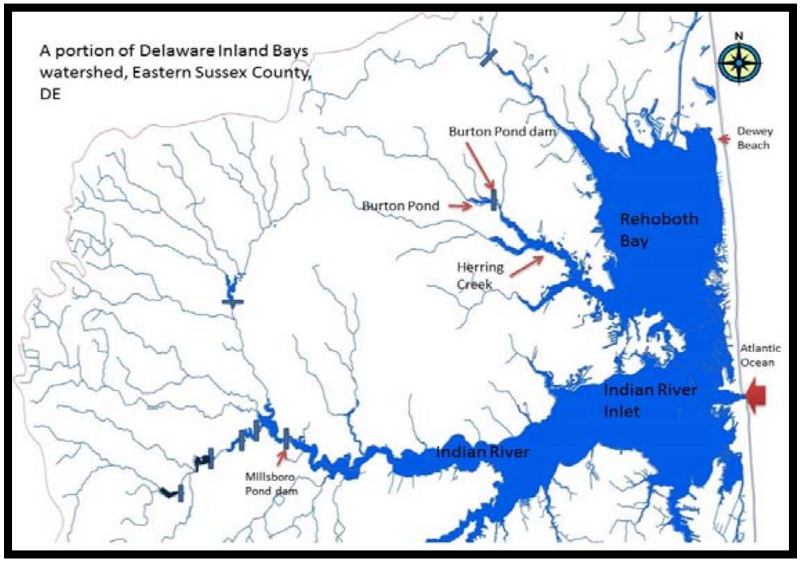
- Request: $50,000
- Partners: $184,548
- Replacement of Route 172 now blocks a channel in the stream previously used by alewives & other native species
- The crossing is in good condition but slightly undersized, so a fishway (higher rock weirs) is more suitable economically and ecologically
- This project is a collaborative effort between the Town of Surry and seven other partners to restore access to 20 stream miles & 1,200 alewife spawning acres

1503 Cotton Gin Mill Dam Removal & Fish Passage Project, Satucket River, MA



- Request: $50,000
- Partners: $50,000 + $401,308 = $451,308
- An obsolete dam built in the mid-1800's is blocking flow of the Satucket River
- The dam hinders water flow, which affects sediment movement, temperature regulation, and fish movement
- Removing this dam would be a collaborative effort between TNC, MA DER, and the dam owner to restore 4.4 river miles & 124 spawning acres

1502 Delaware Inland Bays Fish Passage, Burton Pond, DE



- Request: $22,300
- Partners: $22,300
- There is a dam built in the 1920’s on Herring Creek blocking fish passage farther upstream
- The dam owner has indicated that removal is not going to happen, so a fish ladder is the next best option
- Funds for this project will go toward designing & acquiring the permits for the fish ladder that will be installed at a future date. Partners include DE DOT and DE Division of Fish & Wildlife. It will eventually restore 16.7 km and 4,409 acres.

Discussion

- 1503 and 1501 were recommended for funding by the subcommittee
- Funding requests for each FHP at 150%
  - Keep 1502 on the list
  - Put out an additional RFP right now
  - Look at proposals from years past
  - Put out a quick turn around RFP for design/feasibility projects in the spring

National Fish and Wildlife Foundation
River Herring Project Update
C. Shumway, MRWC Oct 27, 2014

Goals, Objectives, Location, Timeline

Partners: ACFHP (Lisa Havel, Caroly Shumway (MRWC), Cheri Patterson), TNC (Mari-Beth De-Lucia, Alison Bowden, Erik Mariir
Timeline: Revised from Nov. 30, 2014 to Jan. 31, 2015. Report due March-April, 2015
We will work with other on-river herring efforts to ensure integration and avoid duplication

Goal: Developing river habitat restoration priorities for river herring in:

- ✓Chesapeake Bay watershed,
- Delaware River;
- Hudson River;
- Connecticut River;
- Santee-Cooper River; and
- Gilbert-Stuart River(aka Narrow River; aka Pettascquamscutt River)

Work Accomplished to Date:

- **Work completed to date: One workshop on the Chesapeake Bay drainages (May 7-8, 2014): White Paper, Report**
- All other areas will be addressed via webinar, outreach to key stakeholders/experts and potential smaller supplemental in-person meetings.
- One webinar for public outreach.

To Do:

- Oct 31, 2014: Revise Chesapeake report
- Biweekly calls to make progress on CT River, Santee-Cooper, Gilbert-Stuart
- CT River – Alison Bowden coordinating with other efforts
- Jan workshop for Delaware and Hudson
- Report March-April, 2015: Intro, Approach, Key Threats Priority Restoration and Habitat Needs

Chesapeake Bay Workshop
May 7-8,2014

Objective of Workshop

To develop a set of ranked "actionable" habitat-focused strategies/projects to restore river herring in key watersheds of the Chesapeake Bay.

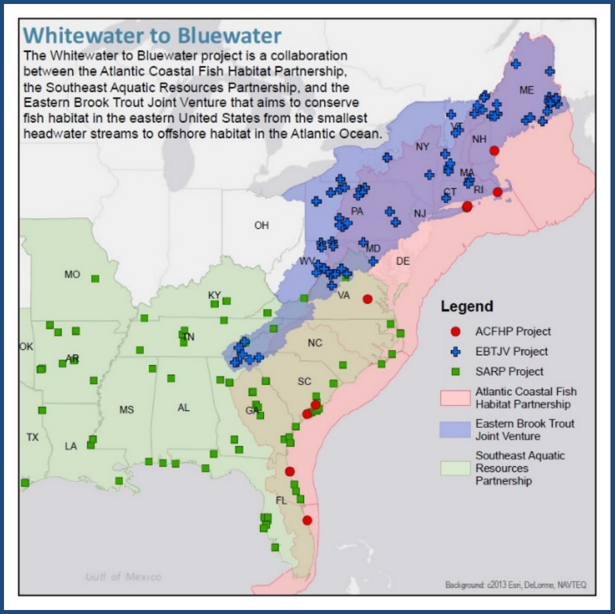
Threats to River Herring

* Dams and Other Barriers (H)
* Water Quality (M)
* Dredging (M)
* Water Withdrawal/Outfall (M)
* Wetland Alterations (M)
* Climate Change and Climate Variability (M)

Draft Priority Rivers, Chesapeake Bay Watershed

Identified by National Fish and Wildlife Federation (NFWF) and Smithsonian Environmental Research Center (SERC)

* **Eastern Shore**
* Chester River
* Choptank River
* Nanticoke River
* Marshyhope Creek
* Pocomoke River
*
* **Western Shore**
* Lower Susquehanna River
* Deer Creek, Octoraro Creek
* Lower Potomac River
* Anacostia River, Upper Beaverdam Creek, Accotink Creek, Pohick Creek, Mattawoman Creek, Reeder Run, Nangemoy Creek, Port Tobacco Creek, Wicomico River
* Rappahannock River
* Lower James River
* Chickahominy River, Appomattax River



WHITEWATER TO BLUEWATER (W2B) PARTNERSHIP

Conserving fish habitat from the rivers to the sea

SARP, EBTJV & ACFHP COLLABORATION

Advance our Partnership's in three primary areas:

1) Science & Data
2) Outreach & Communications
3) Organizational Development & Capacity Building

Science & Data:

Objective 1: Collectively advance each partnership's habitat assessments through identification of mutual data needs, data acquisition, and landscape-level-analysis techniques for the benefit of fish, mussels, and other aquatic animals. Assist the National Fish Habitat Science and Data Committee in improving the 2015 status report by identifying major data gaps in region-specific fish population, habitat, and human impact monitoring data.

Enhanced FHP Communications

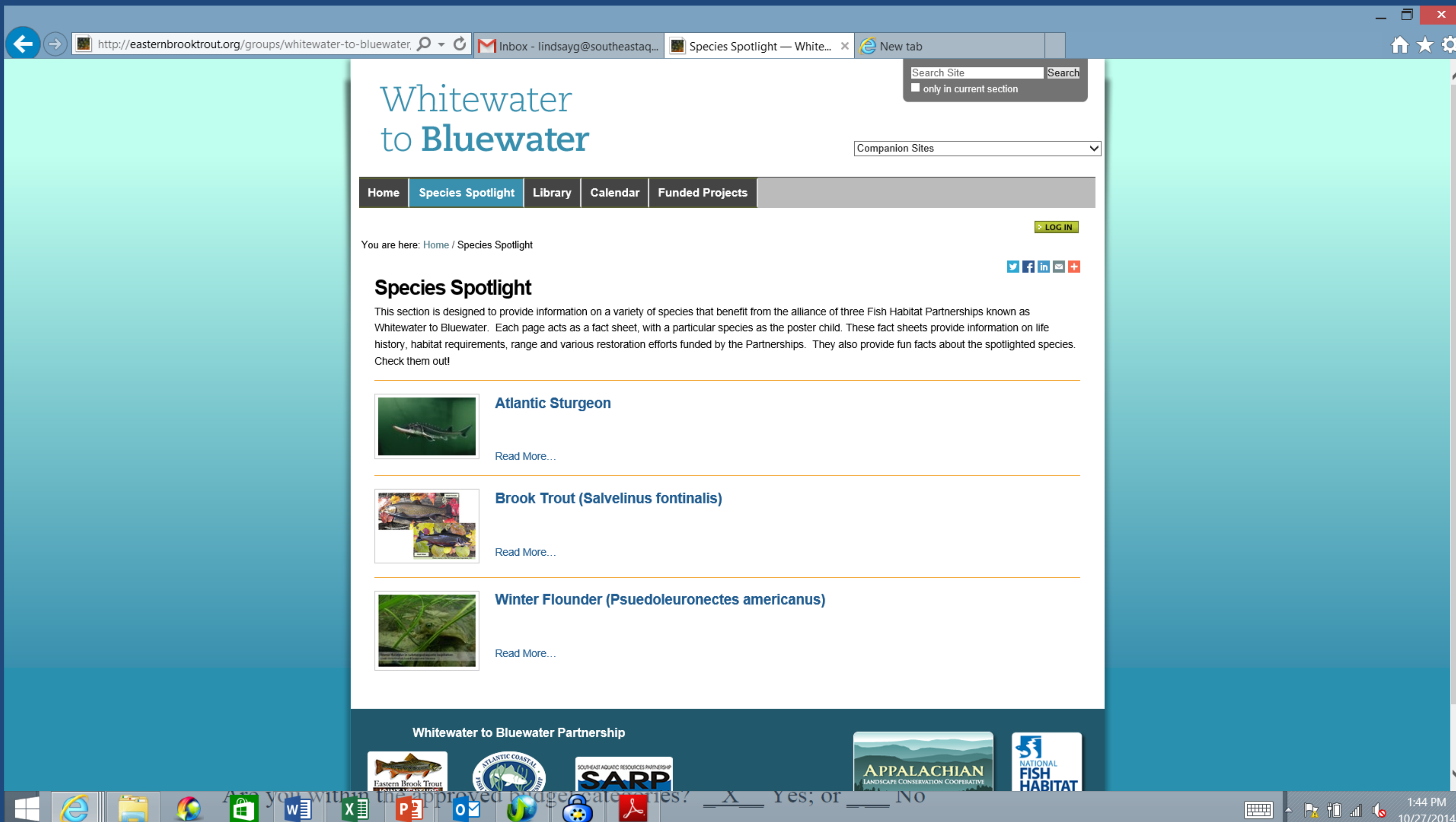
Objective 2: Coordinate ACFHP, SARP, and EBTJV partner engagement and outreach activities to strengthen and expand an already robust base of on-the-ground conservation partners. Assess the structure and function of the three FHPs and identify and implement strategies to enhance their organizational capacity.

Sub-objective 2.1: Develop and implement a streamlined communications strategy and outreach products for the three Eastern U.S. Fish Habitat Partnerships that highlights both synergies and distinguishing characteristics across the individual FHPs, and identifies FHP needs that would be best served individually and those that would benefit from a collective message.

Joint communications and outreach, including:

- Development of a joint communications strategy
- W2B website
  - Species Spotlight
  - Projects map
- FHP Communications Check-up with Water Words That Work
- Joint messaging and the creation of a fish passage barrier removal template ongoing!

www.http://easternbrooktrout.org/groups/whitewater-to-bluewater



Are you within the approved budget categories? __X__ Yes; or ____ No

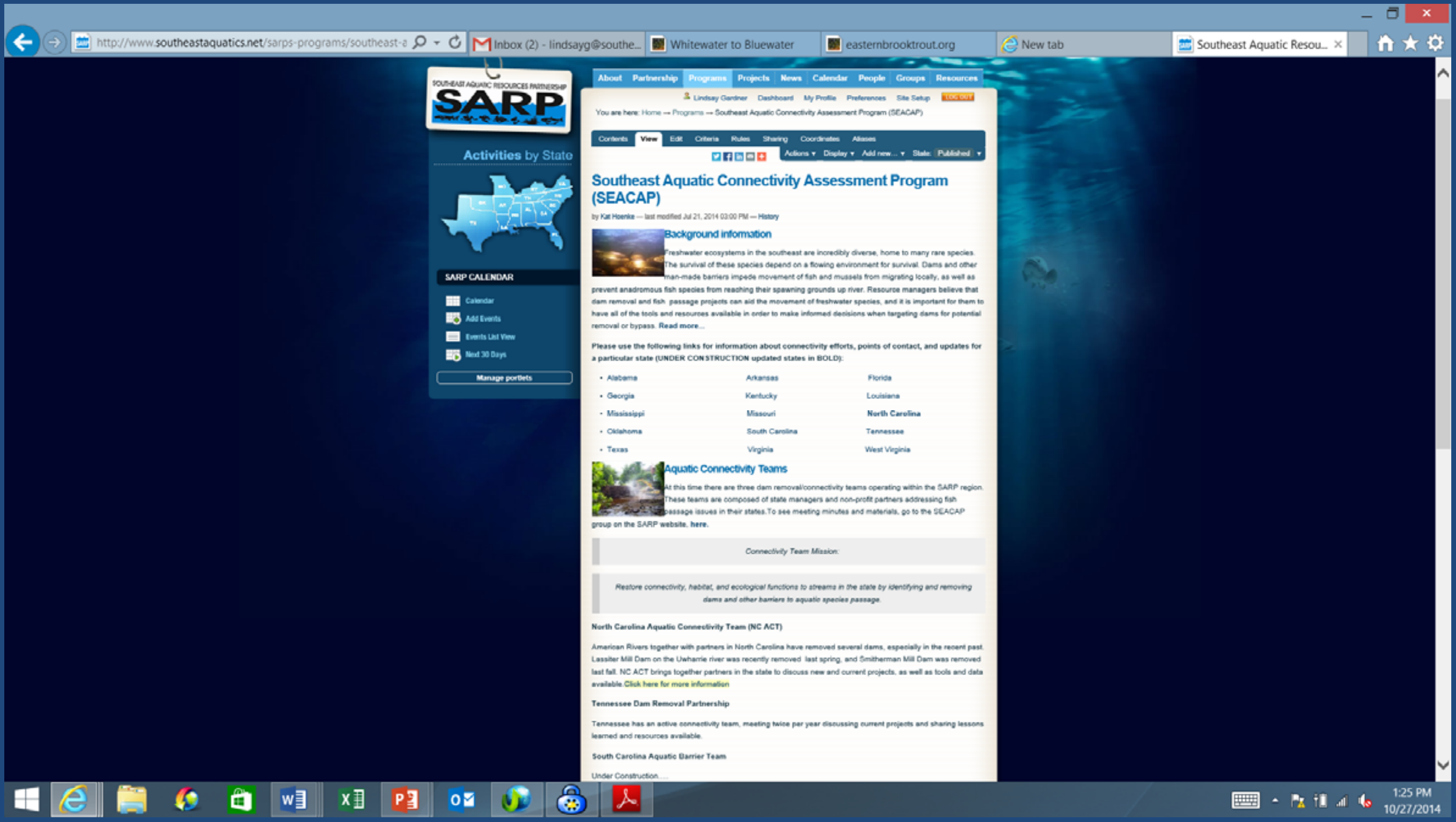
Organizational Development & Capacity Building

Objective 3: Retain and enhance critical capacity to implement each of the individual FHP's Partnership Strategic Plans by facilitating completion of prioritized, on-the-ground, partner-led fish habitat conservation projects that achieve measurable results towards National Fish Habitat Action Plan goals and interim strategies and are easily communicated and understood.

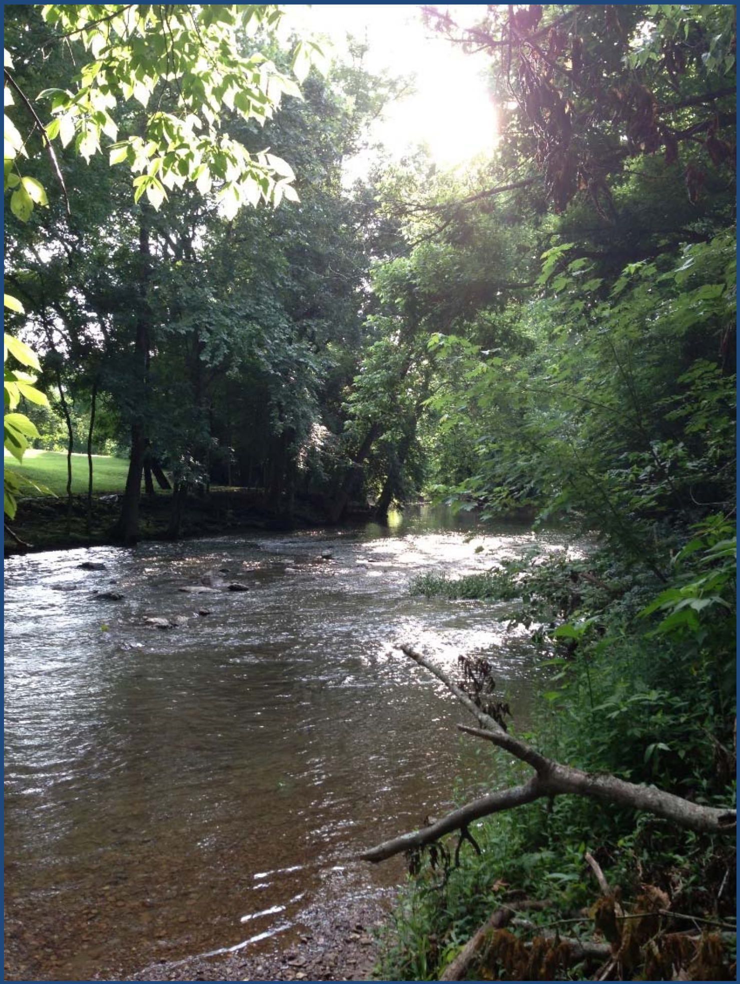
Sub-objective 3.1: Support regular meetings of the individual FHPs to engage with partners, identify opportunities to implement the FHP Strategic Plans, and prioritize actions toward protection and restoring function of eastern aquatic habitats.

Continued Momentum

- 2015 - In three eastern FHPs, creation of an Aquatic Connectivity Assessment Program



For More Information…



Lindsay Gardner
SARP Program & Communications Manager
615-730-8178
lindsayg@southeastaquatics.net