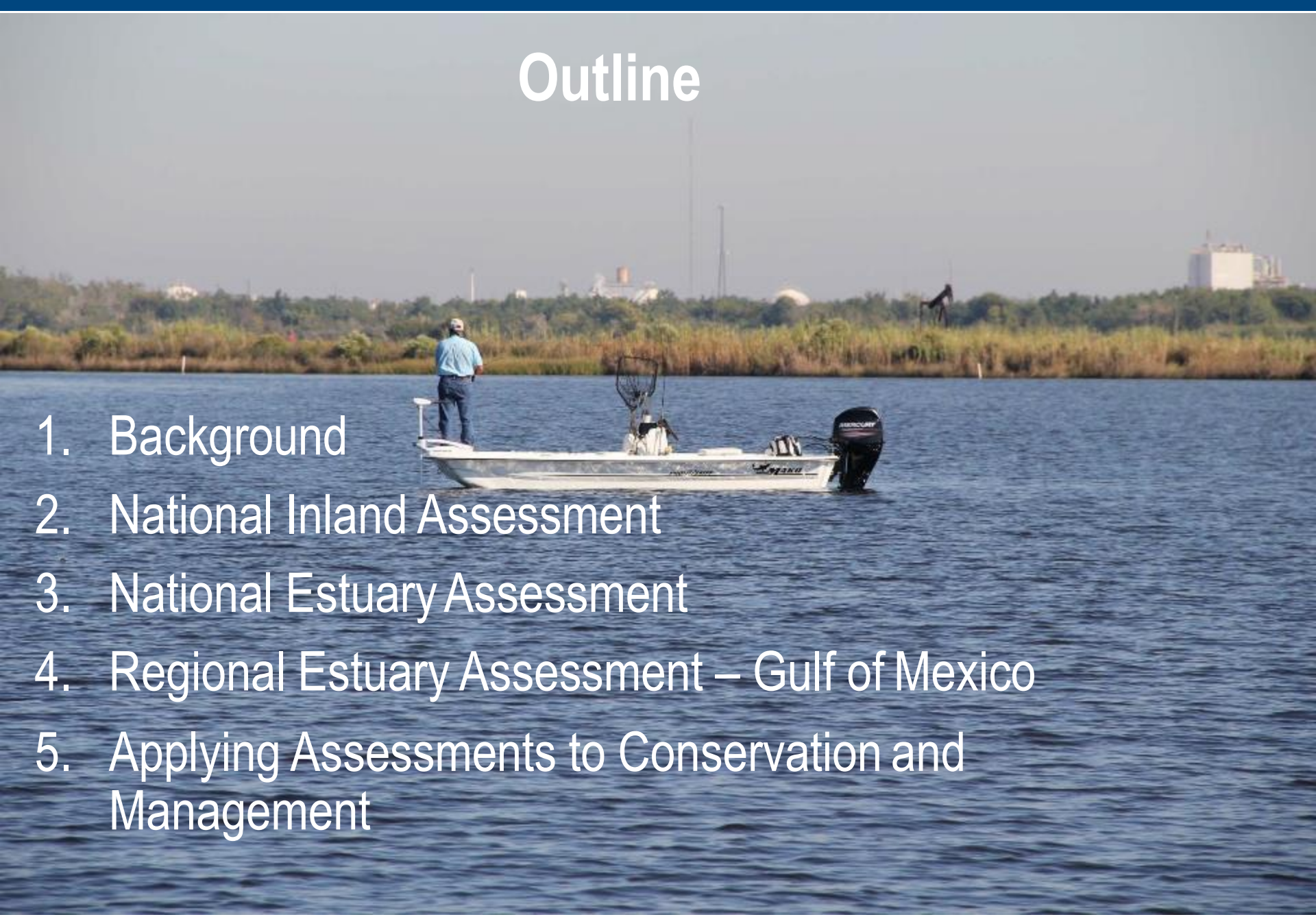
National Fish Habitat Partnership 2015 National Fish Habitat Assessment Overview

Bruce Vogt
NOAA Chesapeake Bay Office

Chesapeake Fish Habitat Workshop
2018

Outline



1. Background
2. National Inland Assessment
3. National Estuary Assessment
4. Regional Estuary Assessment – Gulf of Mexico
5. Applying Assessments to Conservation and Management






Mission:

Protect, restore and enhance the nation's fish and aquatic communities through **20 partnerships** that foster fish habitat conservation and improve the quality of life for the American people

- ***Implements voluntary and non-regulatory*** **landscape-scale fisheries conservation using the best science**
- ***Leverages*** **federal and privately raised funds to build regional partnerships**
- ***Partner Coalition*** **of 450+ agencies and organizations**

NATIONAL FISH HABITAT PARTNERSHIP

National Fish Habitat Partnership

- Develop national conservation goals
- Establish criteria for *Fish Habitat Partnerships*
- Measure and communicate progress
- **Produce *"Status of Fish Habitats in the United States"* report every 5 years**
  -Partnerships produce finer level assessments
- Increase public and private focus on aquatic habitat
- Recommend the best use of funds
- Advocate policy
- Guide Board member and staff resources

NATIONAL FISH HABITAT PARTNERSHIP

TOM CHAMPEAU

Director of Freshwater Fisheries Management (Board Chair), Florida Fish and Wildlife Conservation Commission

SEAN STONE

Executive Director - Building Conservation Trust, Coastal Conservation Association

PETER AARRESTAD

Director - Inland Fisheries Division, Connecticut Department of Energy and Environmental Protection

STAN ALLEN

Sr Program Manager, Pacific States Marine Fisheries Commission

MIKE ANDREWS

Vice President and Senior Conservation Fellow, The Nature Conservancy

DAN ASHE

Director, U.S. Fish and Wildlife Service

DOUG BEARD

Chief - U.S. Geological Survey, National Climate Change and Wildlife Science Center

TOM LANG

President, Fish Habitat Section, American Fisheries Society

DOUG BOYD

Sport Fishing & Boating Partnership Council

CHRISTY PLUMER

Conservation Director, Theodore Roosevelt Conservation Partnership (TRCP)

BENITA BEST-WONG

Director Office of Wetlands, Oceans, and Watersheds, EPA, Office of Water

MIKE LEONARD

Conservation Director, American Sportfishing Association

CHRIS MOORE

Executive Director (Board Vice-Chair), Mid-Atlantic Fishery Management Council

DOUG NYGREN

Fisheries Division Director, Kansas Department of Wildlife, Parks, and Tourism

SAM RAUCH

Deputy Assistant Administrator for Regulatory Programs

RON REGAN

Executive Director, Association of Fish and Wildlife Agencies

ROB HARPER

USDA Forest Service

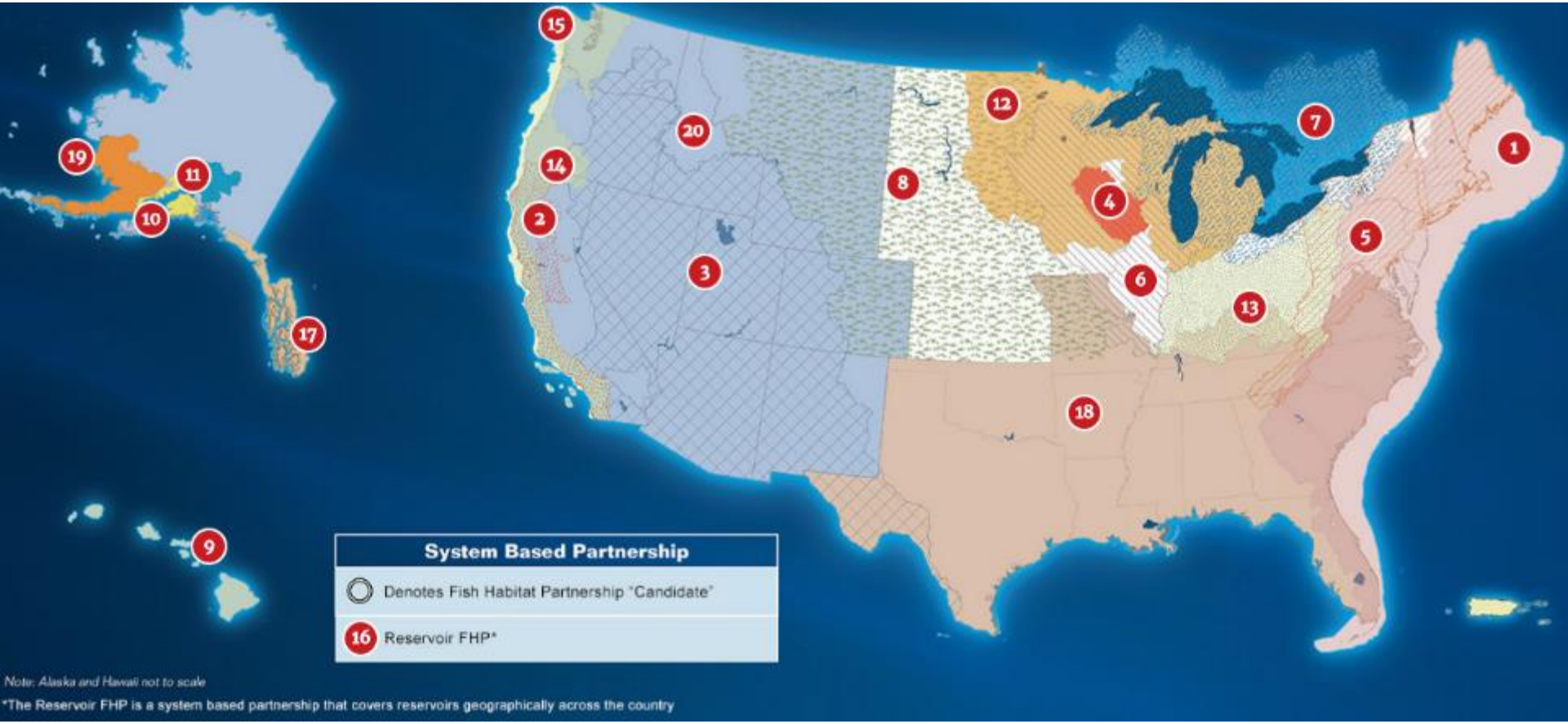
ED SCHRIEVER

Deputy Director - Operations, Idaho Department of Fish & Game

CHRIS WOOD

President and Chief Executive Officer, Trout Unlimited

Fish Habitat Partnerships



NATIONAL FISH HABITAT PARTNERSHIP

http://assessment.fishhabitat.org/

THROUGH A FISH'S EYE:
THE STATUS OF THE FISH HABITATS IN THE UNITED STATES 2015

This report summarizes the results of an unprecedented nationwide assessment of human effects on fish habitat in the rivers and estuaries of the United States. The assessment assigns a risk of current habitat degradation scores for watersheds and estuaries across the nation and within 14 sub-regions. The results also identify some of the major sources of habitat degradation.

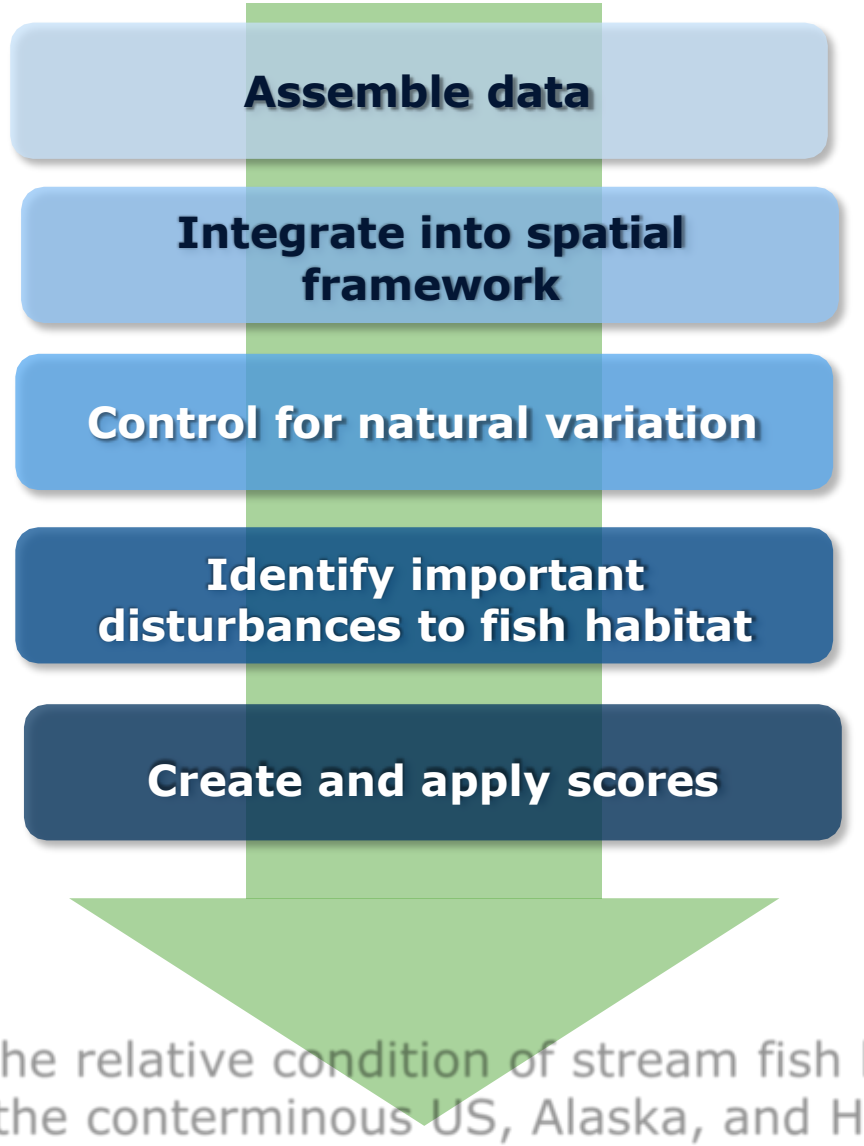
Navigate this report by:

Report Content ▾ Region of Interest ▾

Three Products for 2015

1. Inland Stream Assessment
2. National Estuary Assessment
3. Regional Estuary Assessment-Gulf of Mexico

KEY ELEMENTS OF 2015 ASSESSMENT APPROACH



What is the relative condition of stream fish habitats across the conterminous US, Alaska, and Hawaii?

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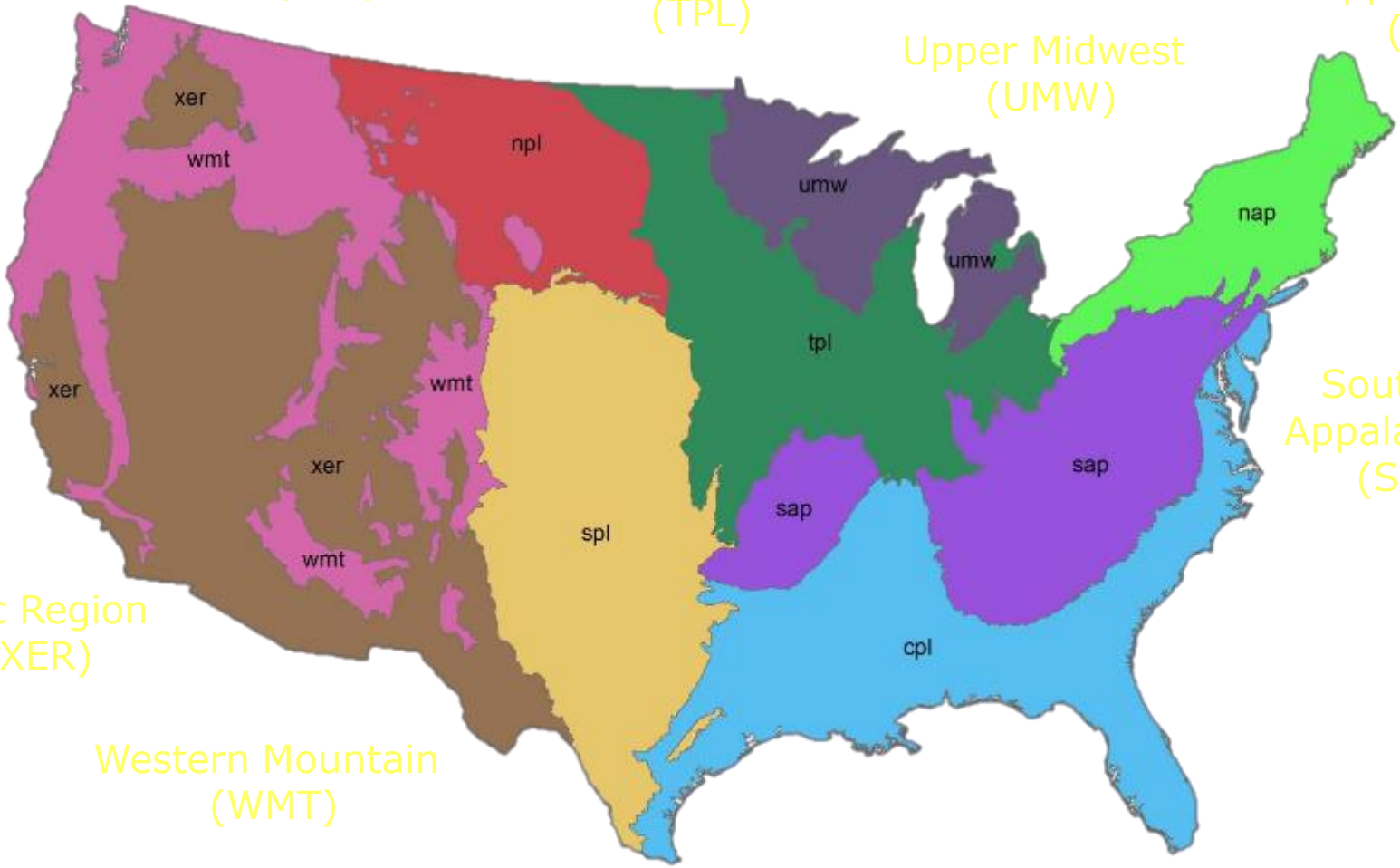
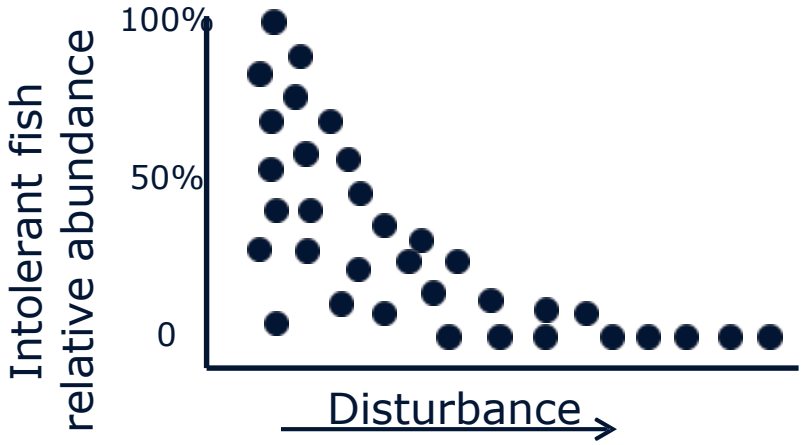
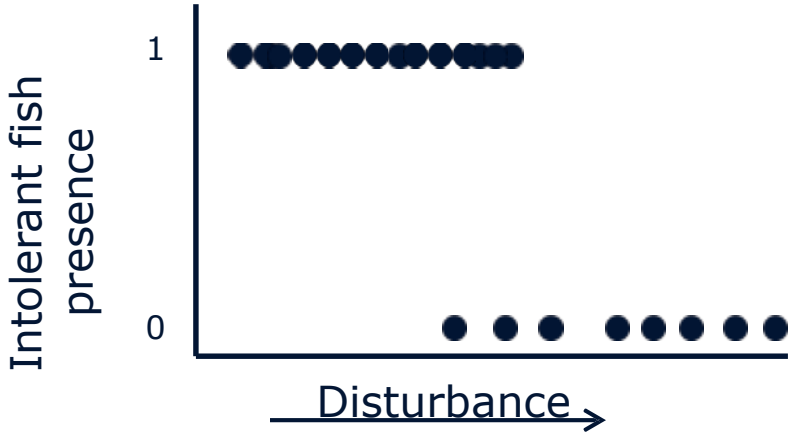
CONTERMINOUS US ECOREGIONS



FISH ASSEMBLAGE DATA:





Relative abundance is better indicator of changing fish assemblages with disturbance

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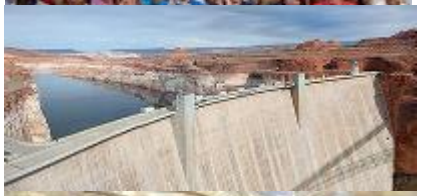
LANDSCAPE DISTURBANCE DATA:



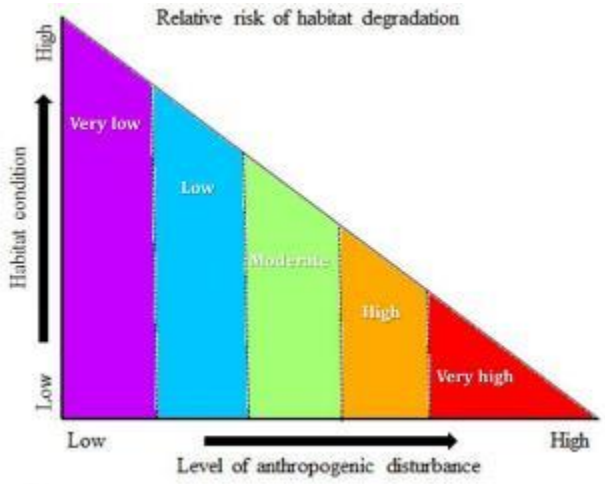



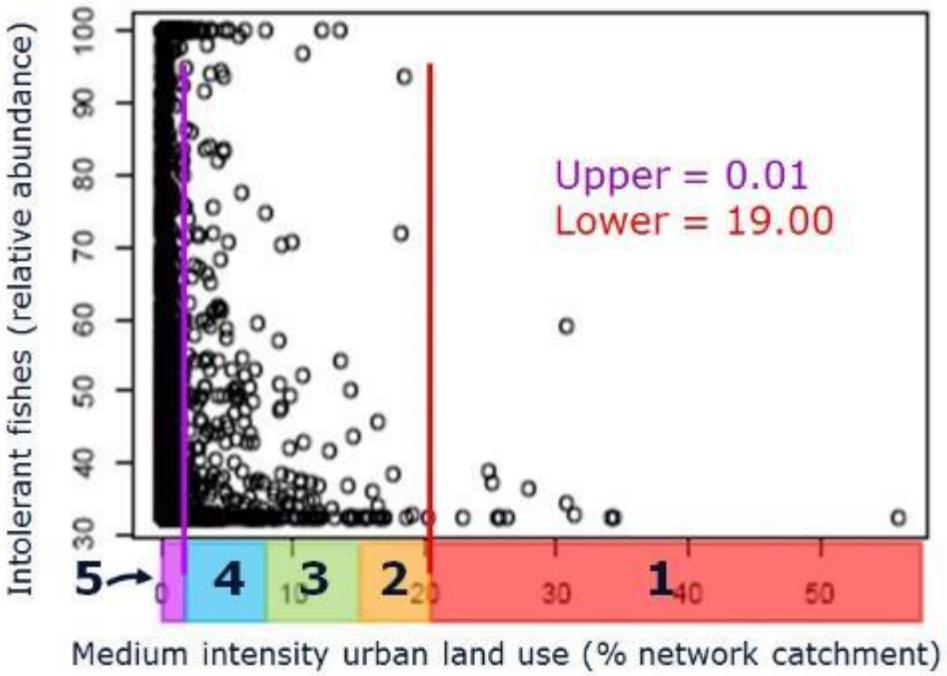

Open/low intensity urban land use (%)*
Medium intensity urban land use (%)*
High intensity urban land use (%)*
Impervious surface (%)*
Pasture/hay land use (%)*
Cultivated crops land use (%)*
Population density (#/km^2)
Road length (m/km^2)*
Road crossings (#/km^2)*
Dams and fragmentation metrics (#/km^2)*
Mines (Mineral, Coal*, Uranium*) (#/km^2)
Toxics release inventory sites (#/km^2)
National pollution discharge elimination system sites (#
EPA superfund national priorities sites (#/km^2)
Water withdrawal (MGY)*
Nutrient and sediment pollution (kg/km/yr)*

*updated or new from 2010

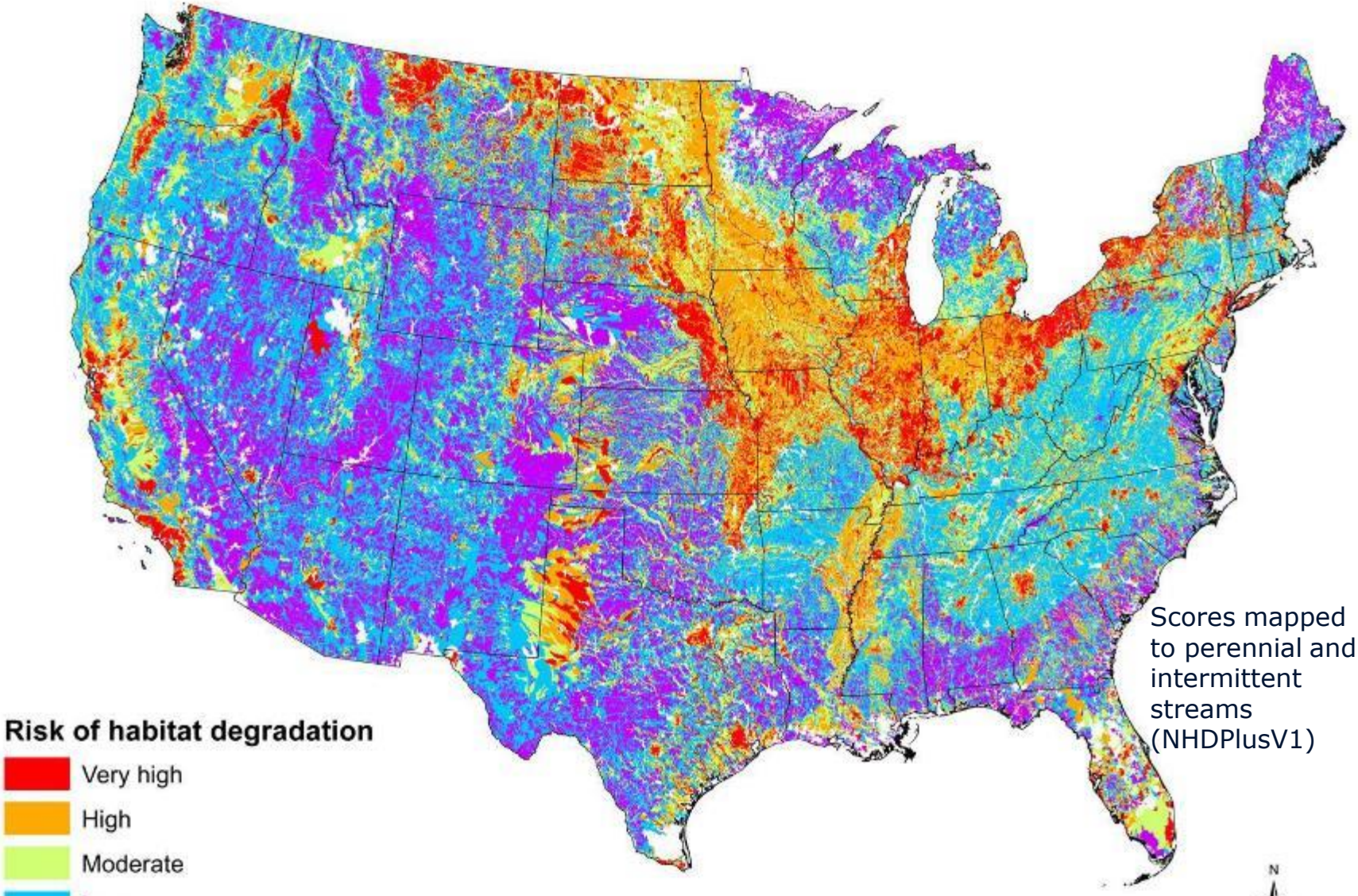
DETERMINING SCORES:

EACH FISH METRIC AND EACH LANDSCAPE DISTURBANCE WITH SIGNIFICANT THRESHOLD





2015 ASSESSMENT OF STREAM FISH HABITATS FOR THE CONTERMINOUS UNITED STATES



Scores mapped to perennial and intermittent streams (NHDPlusV1)

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Mid Atlantic Drivers of Degradation

Overall most severe disturbances **to all stream reaches**

- Low intensity urban land use
- Crop land use
- Road length density
- Pasture and hay land use
- Road cross density

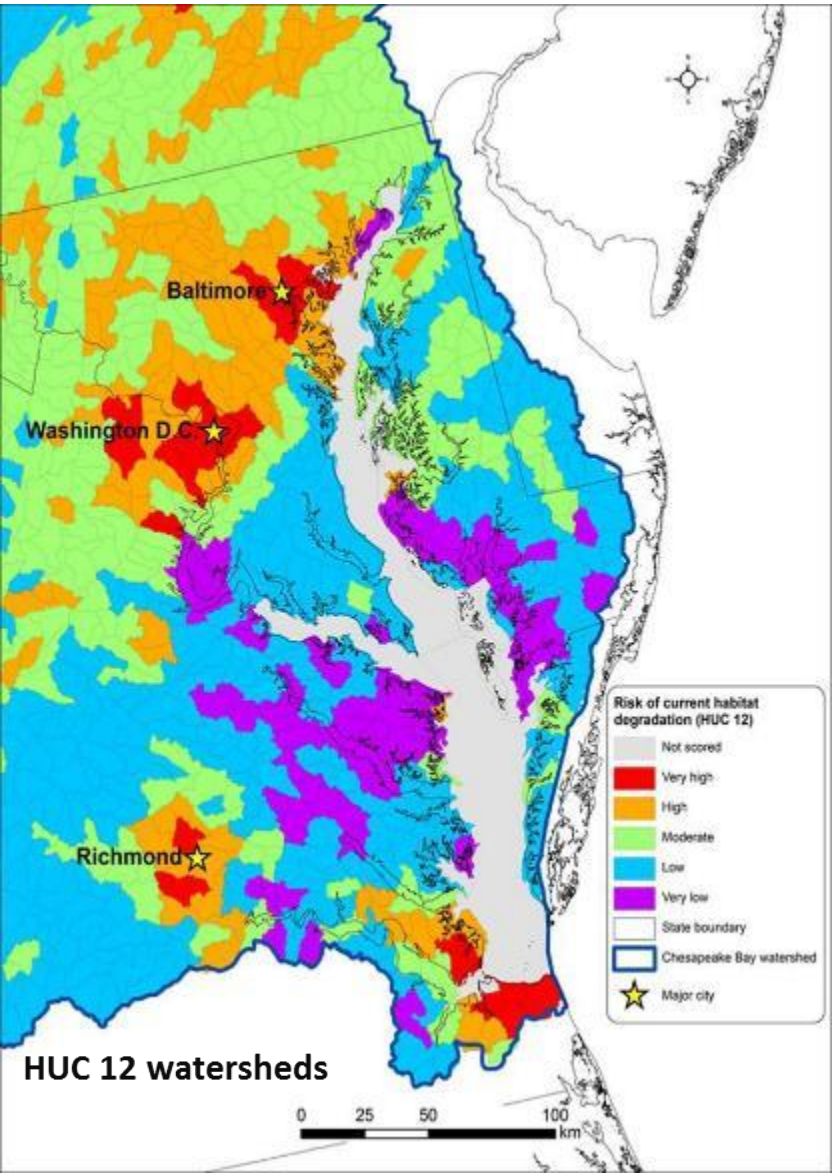
Creeks

- Low intensity urban land use
- Road length density
- Crop land use

Rivers

- Pasture and hay land use
- Upstream dam density
- Low intensity urban land use

Chesapeake Bay



Limiting disturbances to fish habitat in the Chesapeake Bay

- Agriculture (pasture/hay)
- Urbanization
- Mining (coal and mineral)
- Nutrients (N and P)

NATIONAL FISH HABITAT PARTNERSHIP

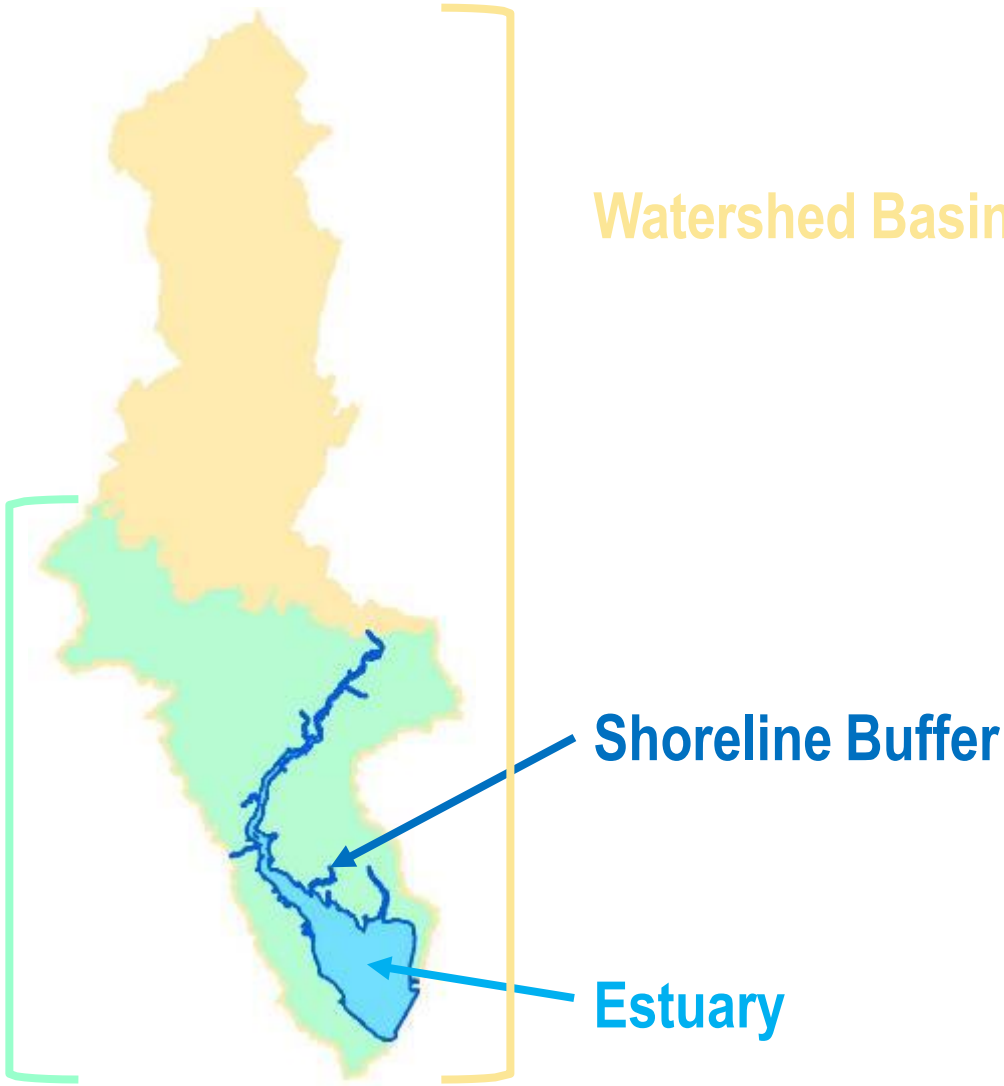
Data Not in the Inland Assessment

- Intensive logging
- Locations experiencing grazing
- High density animal farming
- Regional habitat stresses (e.g., oil drilling)
- Water diversions from streams
- Fish passage issues with culverts
- Small dams (less than six feet high)
- Legacy land uses, such as historic mining operations


National Estuary Assessment

Integrating Data to the Spatial Framework

Example: Delaware Bay



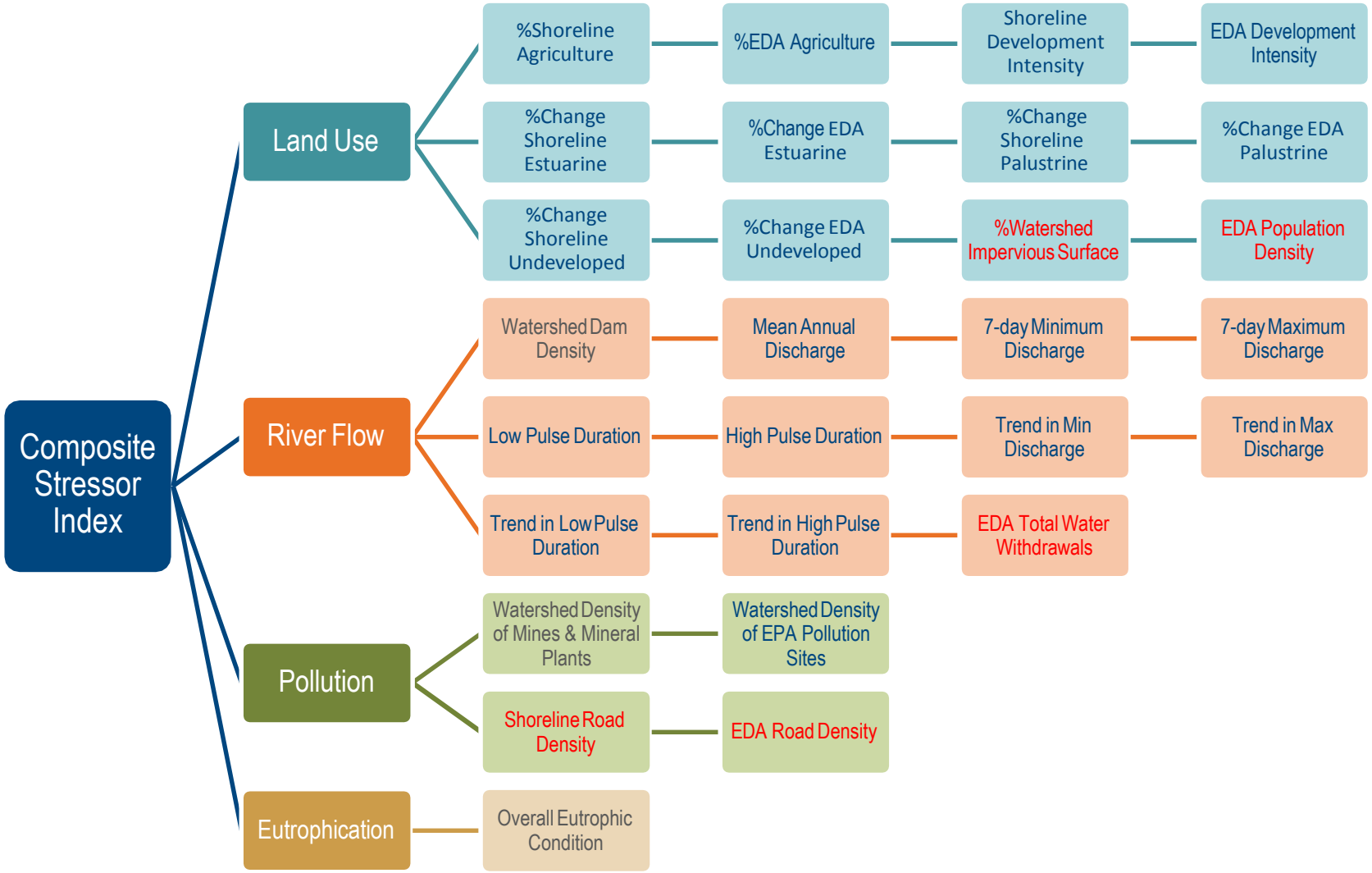
Methods Overview

Stressor Variables

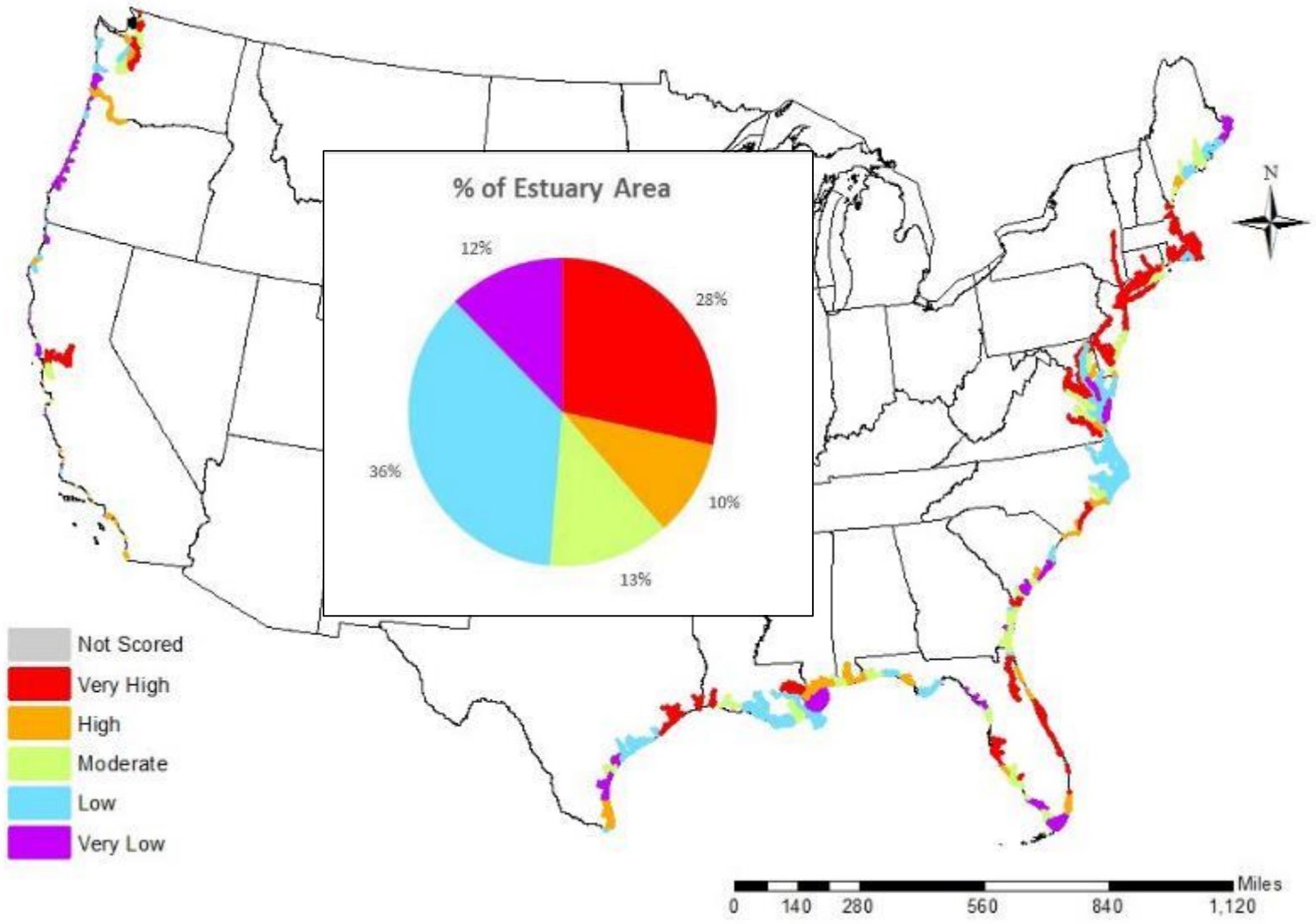
Sub-Indices of Disturbance

Composite Stressor Index

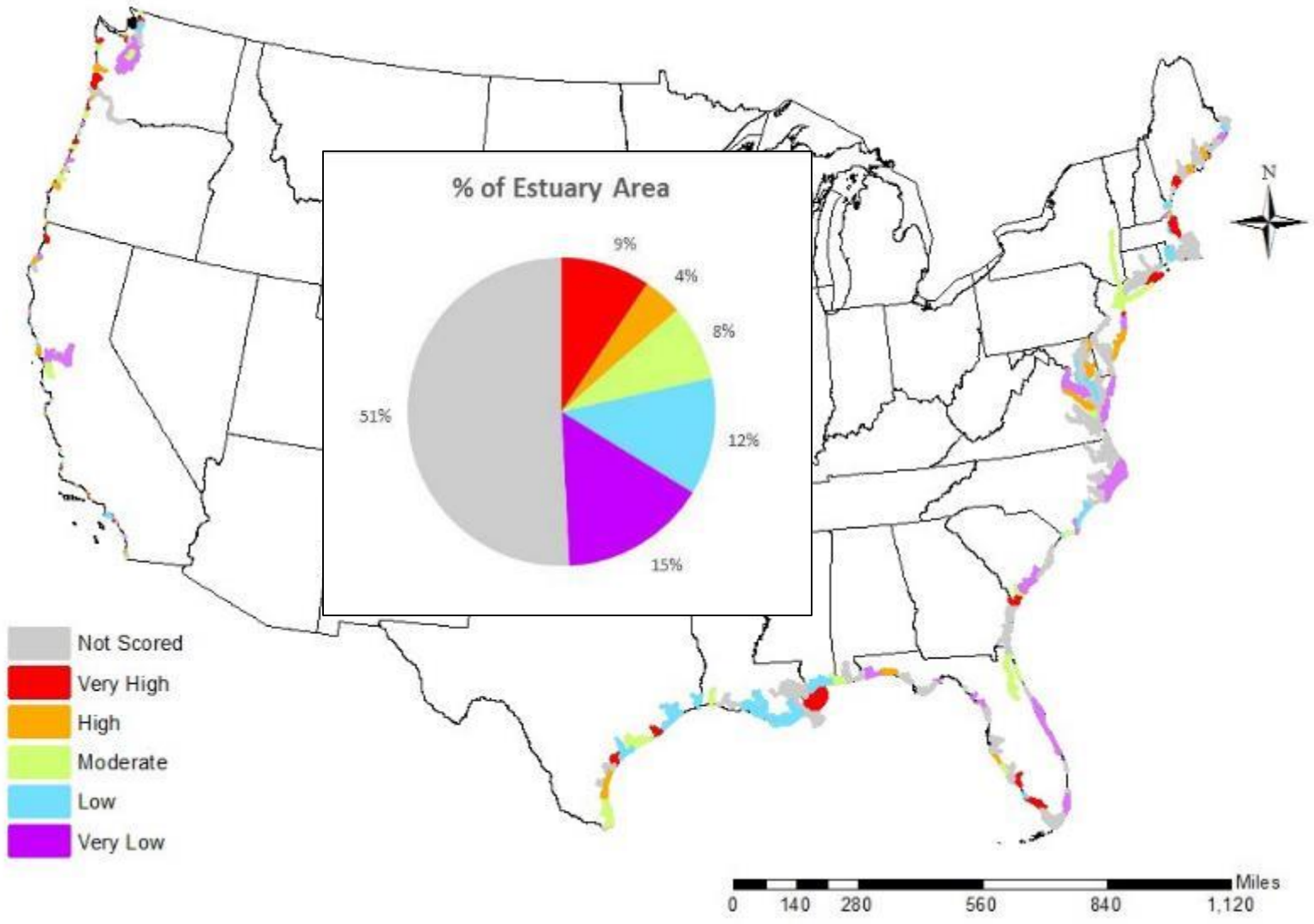
National Estuary Assessment Update



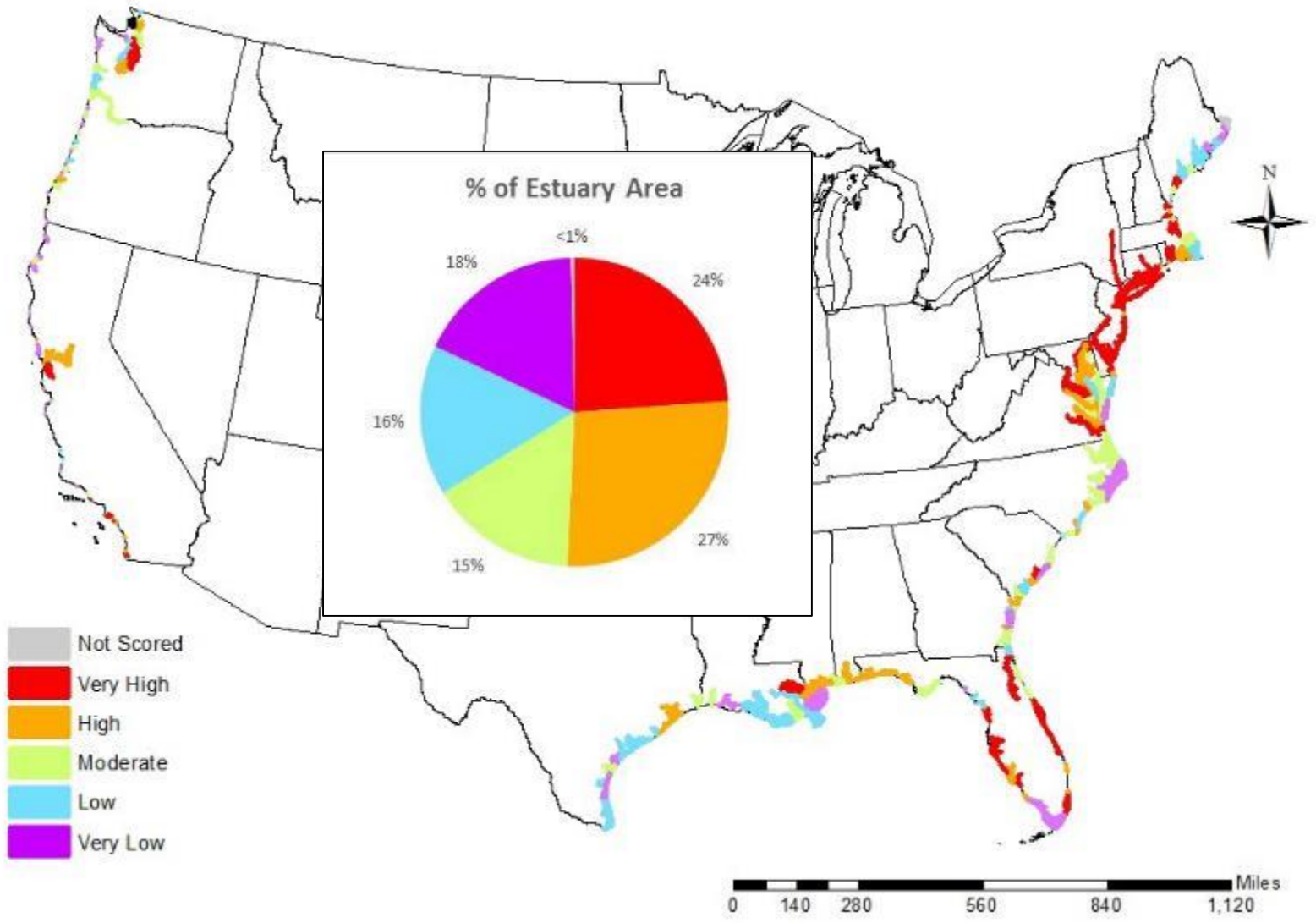
Results: Land Use Sub-Index of Disturbance



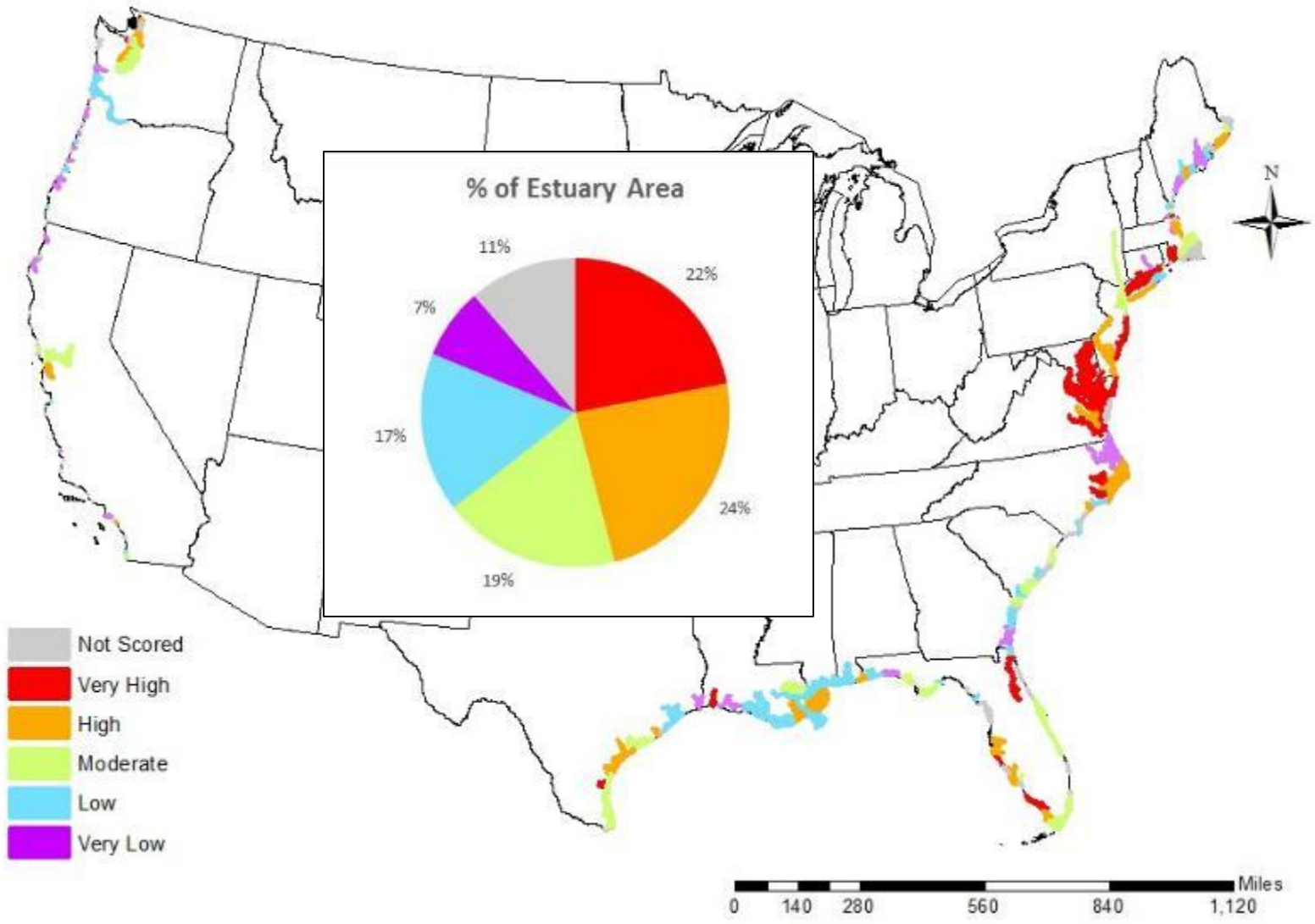
Results: River Flow Sub-Index of Disturbance



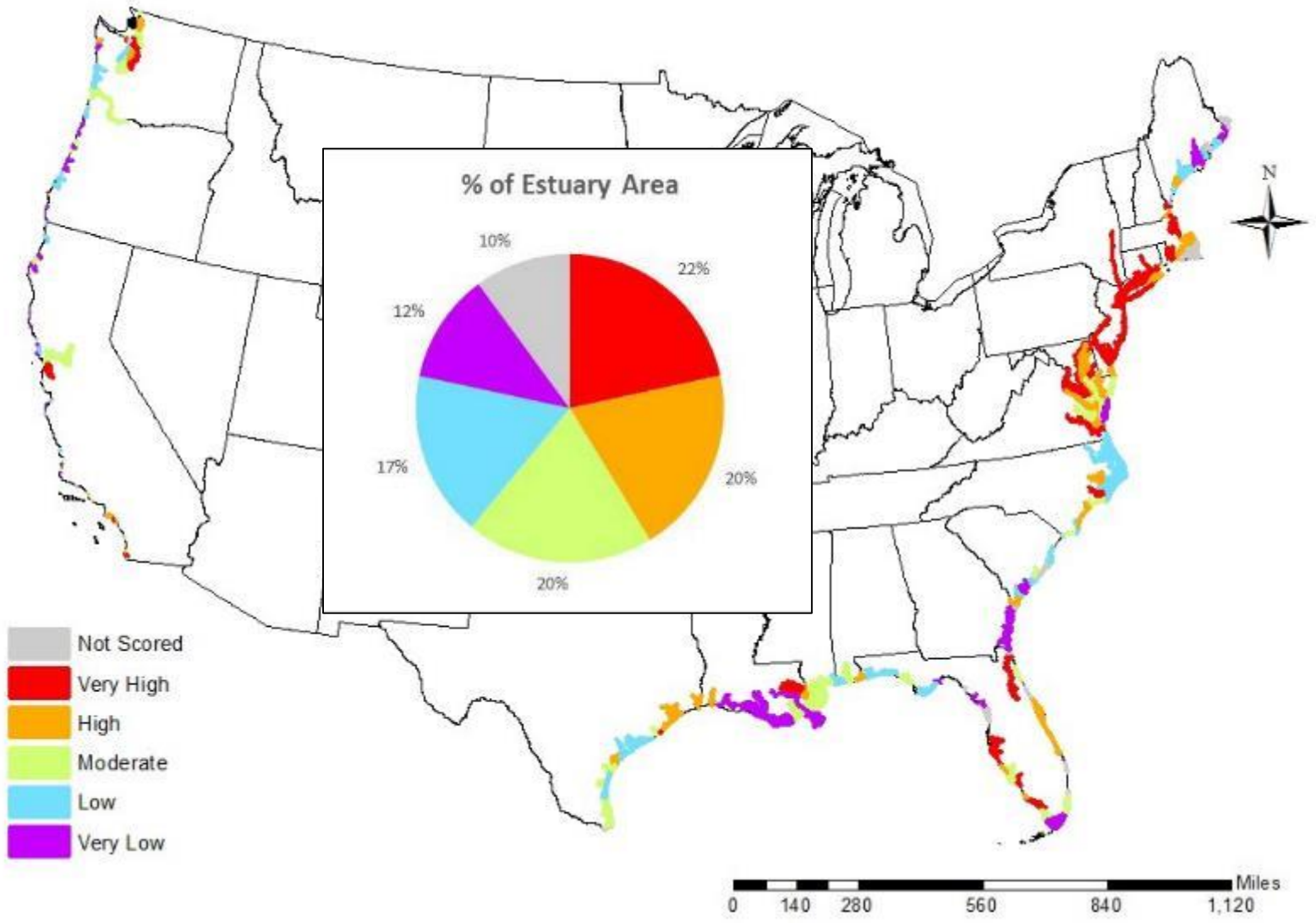
Results: Pollution Sub-Index of Disturbance



Results: Eutrophication Sub-Index of Disturbance

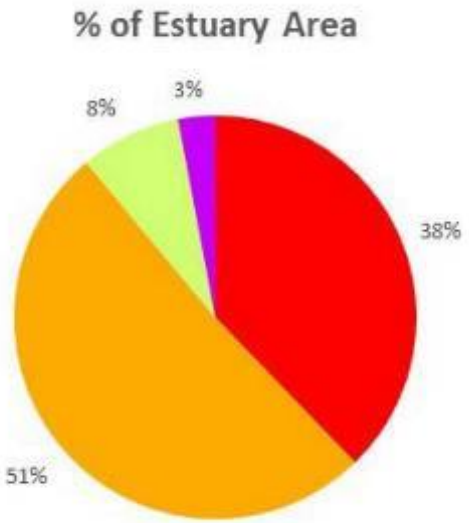


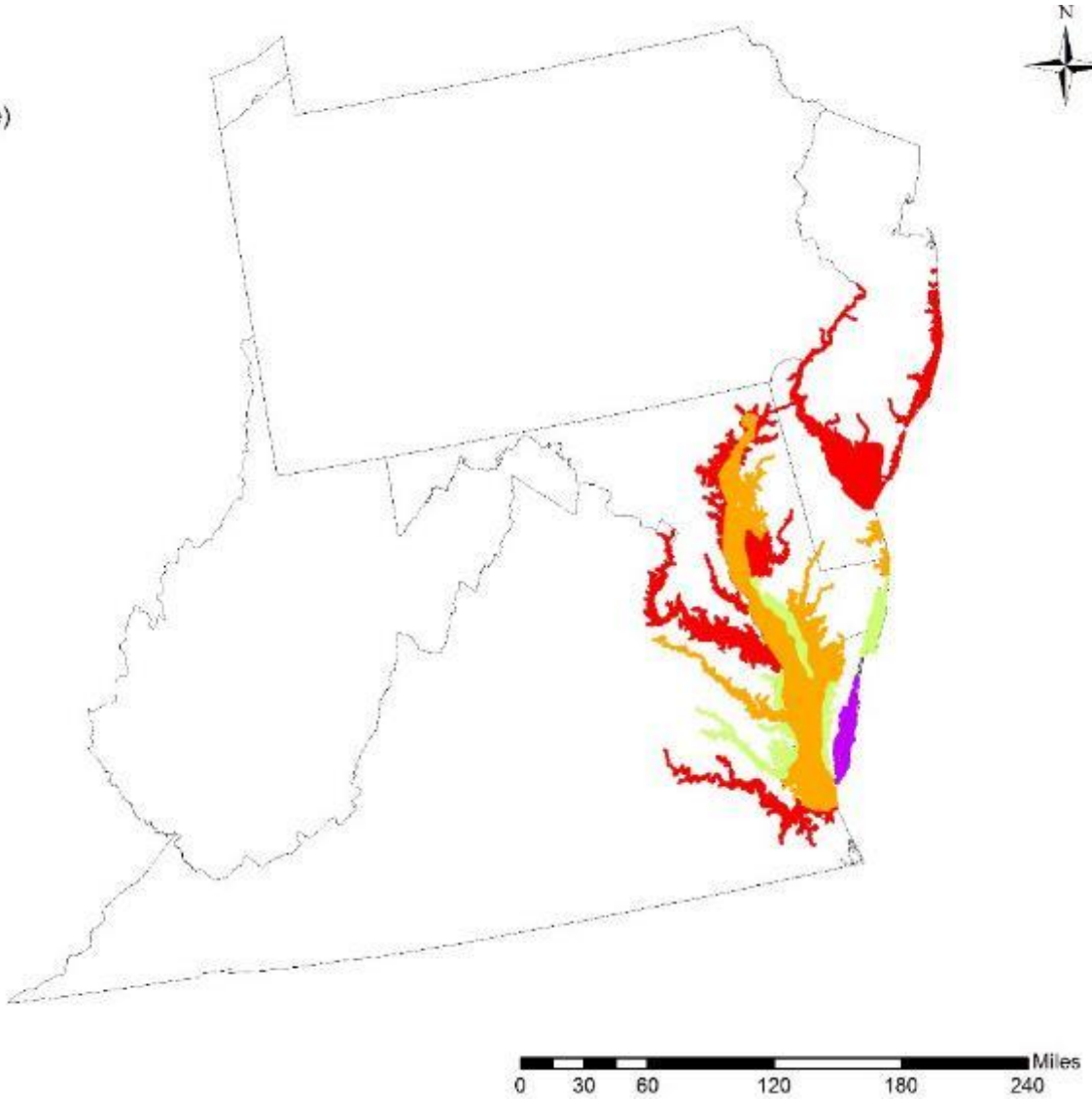
Results: Cumulative Disturbance Index

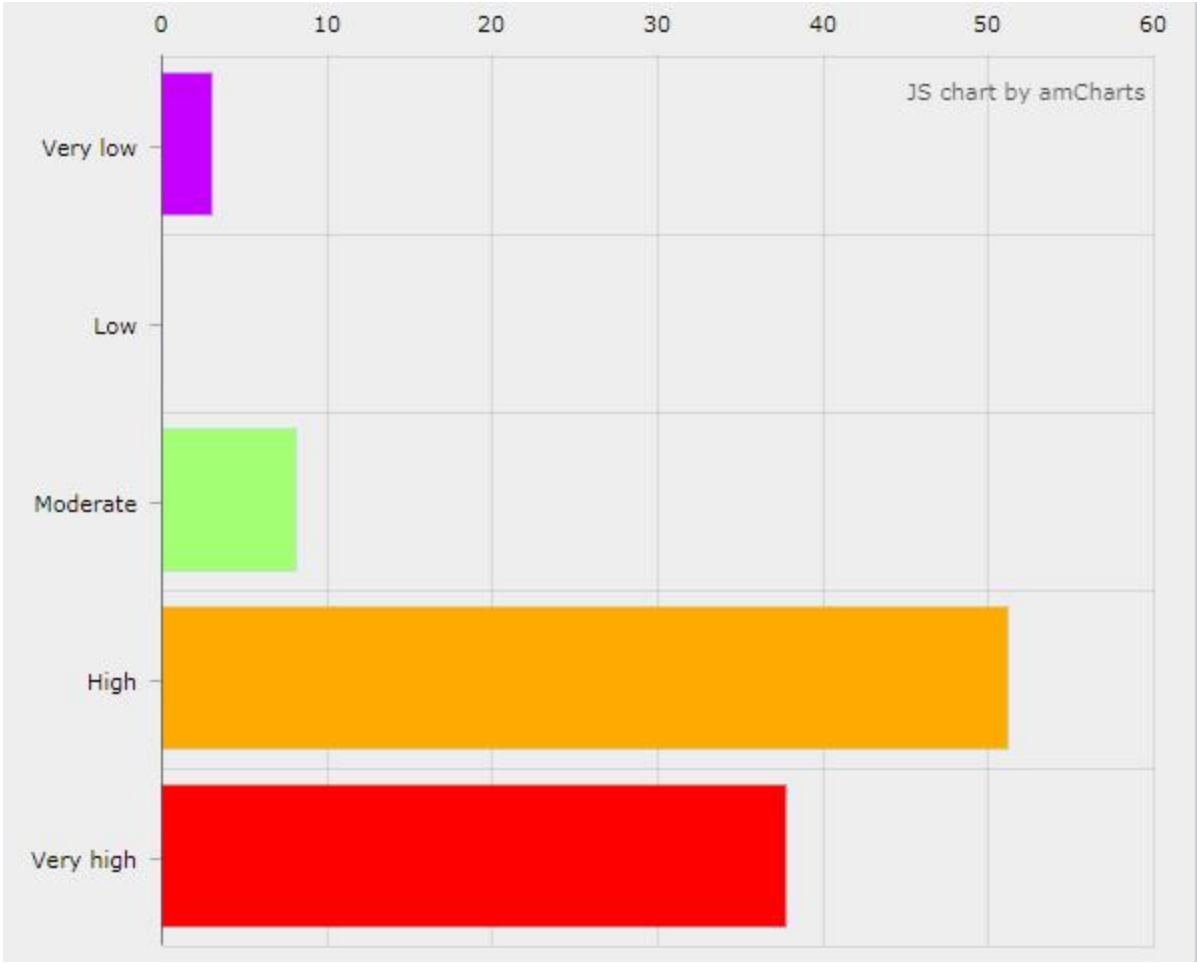


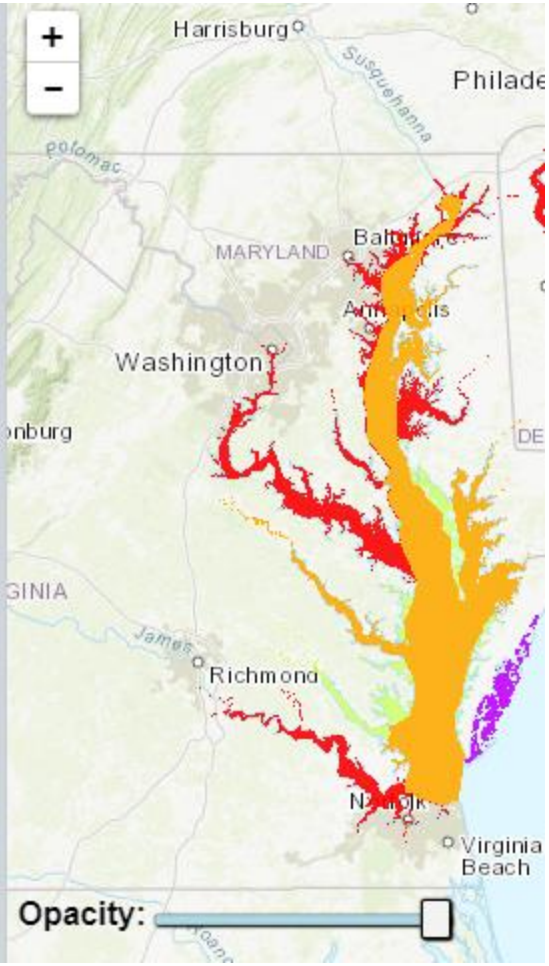
Mid-Atlantic States

(Pennsylvania, New Jersey, West Virginia, Virginia, Maryland, Delaware)






0
10
20
30
40
50
60
JS chart by amCharts
Very low
Low
Moderate
High
Very high

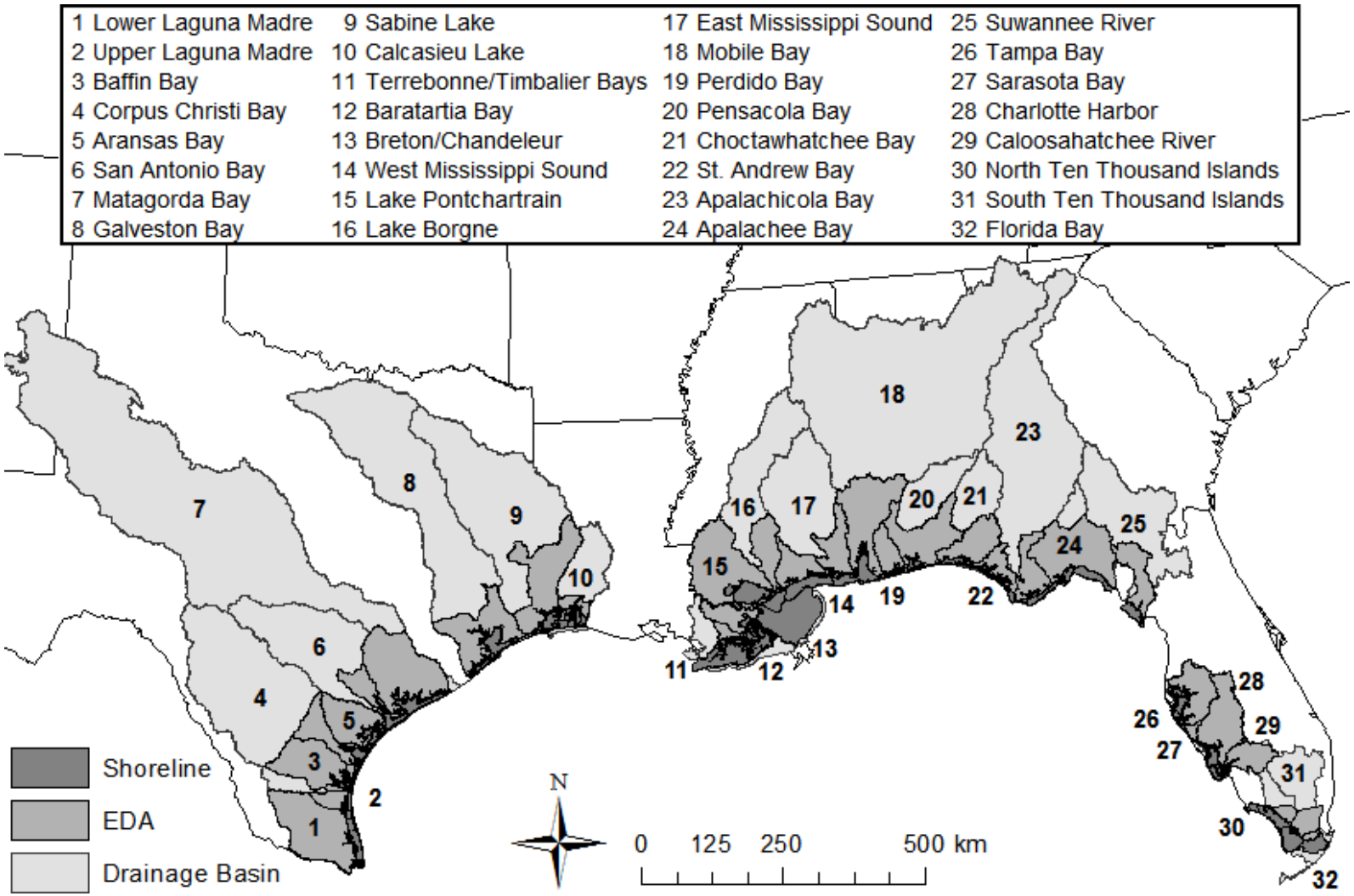

Harrisburg
Philade
Susquehanna
Potomac
MARYLAND
Washington
Richmond
Virginia Beach
Opacity:

Data Not Included in Estuary Assessment

- Benthic habitat loss
- Shoreline armoring
- Status of living (biogenic) habitats (e.g. shellfish beds)

Regional Estuary Assessment
Gulf of Mexico

Study Area


1 Lower Laguna Madre
2 Upper Laguna Madre
3 Baffin Bay
4 Corpus Christi Bay
5 Aransas Bay
6 San Antonio Bay
7 Matagorda Bay
8 Galveston Bay
9 Sabine Lake
10 Calcasieu Lake
11 Terrebonne/Timbalier Bays
12 Baratartia Bay
13 Breton/Chandeleur
14 West Mississippi Sound
15 Lake Pontchartrain
16 Lake Borgne
17 East Mississippi Sound
18 Mobile Bay
19 Perdido Bay
20 Pensacola Bay
21 Choctawhatchee Bay
22 St. Andrew Bay
23 Apalachicola Bay
24 Apalachee Bay
25 Suwannee River
26 Tampa Bay
27 Sarasota Bay
28 Charlotte Harbor
29 Caloosahatchee River
30 North Ten Thousand Islands
31 South Ten Thousand Islands
32 Florida Bay
Shoreline
EDA
Drainage Basin
N
0 125 250 500 km

Summary of Modeling Approach

1. **Screen** each estuary-level stressor one at a time

2. Develop **multi-stressor models**, using the most significant stressors identified in the screening step

3. Compare actual conditions to **least disturbed condition** to assess anthropogenic impacts

Estuary-Level Stressors

Normalization Factors

A_E = Estuary Area
Q = Flow
V = Estuary Volume
Q_x = V/Exchange Rate
A_L = Land Area (%Land Use)

Estuary Variables (no normalization)
Estuary Salinity (%)
Estuary Openness (% open to sea)
Hypoxic Condition (categorical, 1-3)
Toxic Algal Condition (categorical, 1-3)
Eutrophic Condition (categorical, 1-3)

Watershed Variables	Unit	/A_E	/Q	/V	/Q_x	/A_L
Shoreline Urban	km²	x				x
Shoreline Hard	km²	x				x
Shoreline Crop	km²	x				x
Shoreline Agriculture	km²	x				x
Shoreline Developed	km²	x				x
Shoreline Wetlands	km²	x				x
EDA Urban	km²	x	x	x	x	x
EDA Hard	km²	x	x	x	x	x
EDA Crop	km²	x	x	x	x	x
EDA Agriculture	km²	x	x	x	x	x
EDA Developed	km²	x	x	x	x	x
Basin Urban	km²	x	x	x	x	x
Basin Hard	km²	x	x	x	x	x
Basin Crop	km²	x	x	x	x	x
Basin Agriculture	km²	x	x	x	x	x
Basin Developed	km²	x	x	x	x	x
EDA Toxic Releases	#	x	x	x	x	
EDA NPDES Sites	#	x	x	x	x	
EDA Population	#	x	x	x	x	
Basin Population	#	x	x	x	x	
N Load	kg/d	x	x	x	x	

Screening Model Results

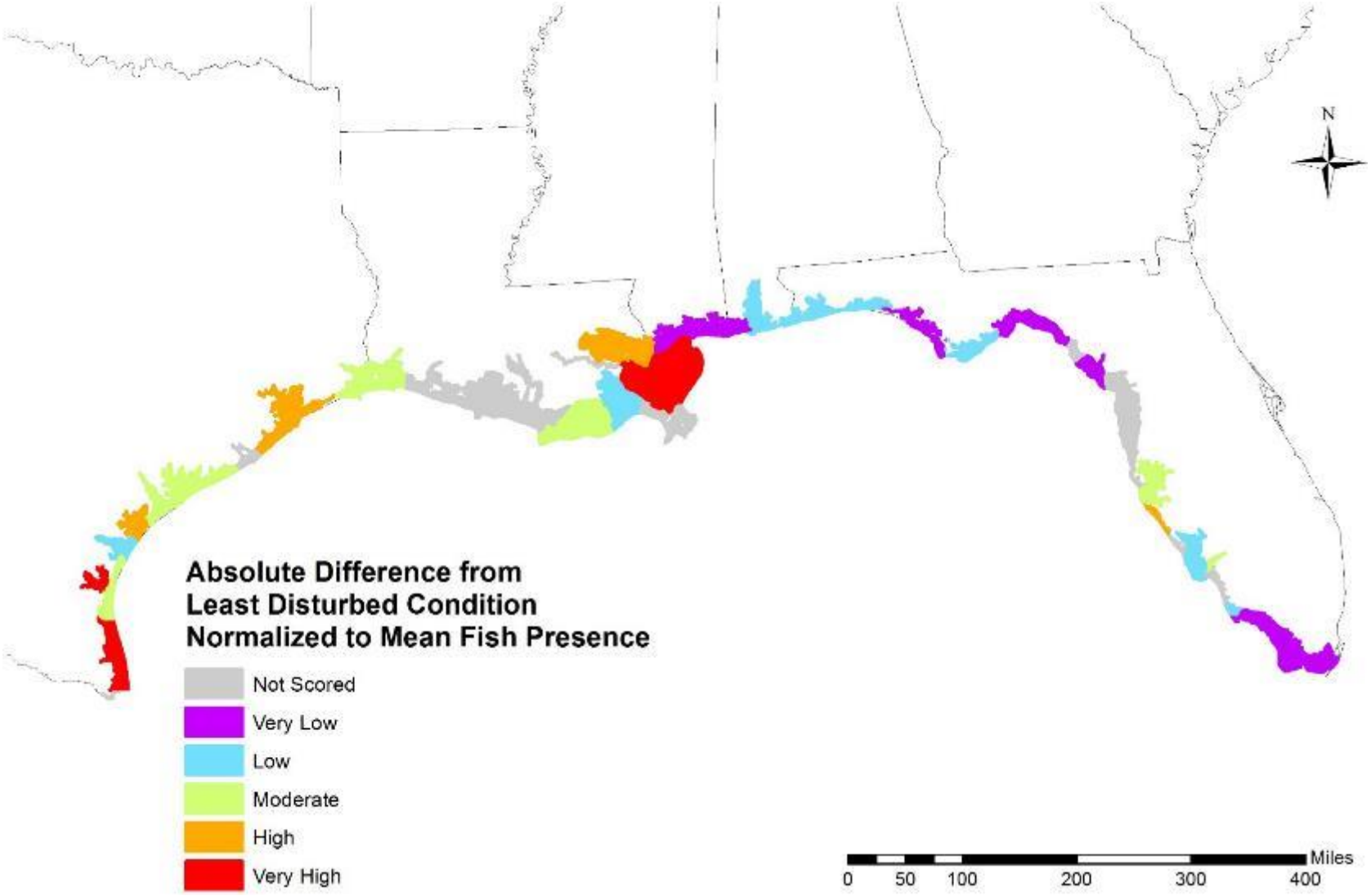
Significant Anthropogenic Stressors

- %Basin Developed
- EDA Hard / Exchange Rate
- N Load / Flow
- %Shoreline Agriculture
- EDA Toxic Releases / Estuary Area

Multi-Stressor Fish Models

Example: Silver perch

$$P(y) = \text{logit}^{-1}(-3.66 + 0.02*\text{temperature} + 0.04*\text{salinity} - 0.001*\text{salinity}^2 - 0.06*\text{distance-to-shore} - 0.42*\text{EDA toxic releases}/A_E + \beta_{\text{season}} + \alpha_{\text{estuary}} + \alpha_{\text{state}} + \alpha_{\text{program}})$$


N
Absolute Difference from
Least Disturbed Condition
Normalized to Mean Fish Presence
Not Scored
Very Low
Low
Moderate
High
Very High
Miles
0
50
100
200
300
400

Applying Assessments to Conservation and Management

What Do the Assessments Tell Us?

Estuary status – Which estuaries are most affected by anthropogenic stress?

- *Estuaries with the worst relative condition could be considered high priority for restoration*
- *Estuaries in good condition may be targets for conservation*
- *More detailed, finer-scale assessments of estuaries on both ends of the spectrum will help provide additional information to guide management actions*

What Do the Assessments Tell Us?

Anthropogenic stressors – What are the key stressors affecting estuary habitats and the species that depend on them?

- *Estuary conservation measures must extent beyond shorelines and EDAs to be effective*
- *Different types of development are more significant in terms of estuary habitat impacts*
- *Scale of some available data is limiting*
- *Food web impacts difficult to interpret*

What Do the Assessments Tell Us?

Species models – Can we use indicator species to track stressor response?

- *Some species have consistently positive responses to stressors – potential for use as indicators of poor estuary habitat condition*

What Do the assessments NOT Tell Us?

1. **Causation –** What are the mechanistic responses of populations to anthropogenic stress?
2. **Trends** – Which estuaries are improving or worsening in status?
3. **Stressor effects *within* estuaries** – How are key stressors affecting different habitat types?
4. **Absolute condition** – What is estuary status relative to pre-development reference condition?