



Aquatic, Terrestrial and Landscape Conservation Design Tools and Products of the North Atlantic LCC

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Science Coordinator, North Atlantic LCC

Chesapeake Bay FWS Partners Meeting

Annapolis, MD

September 10, 2015



North Atlantic  Landscape Conservation Cooperative



Outline

- Individual tools and products
 - Aquatic
 - NAACC
 - Fish Habitat Tool
 - Terrestrial & wetland
 - Designing Sustainable Landscapes
 - Terrestrial Resilience
- Conservation design – putting it all together

North Atlantic Aquatic Connectivity Collaborative

Assessing road-stream crossings to improve river and stream continuity across the North Atlantic U.S.



Products/Outcomes

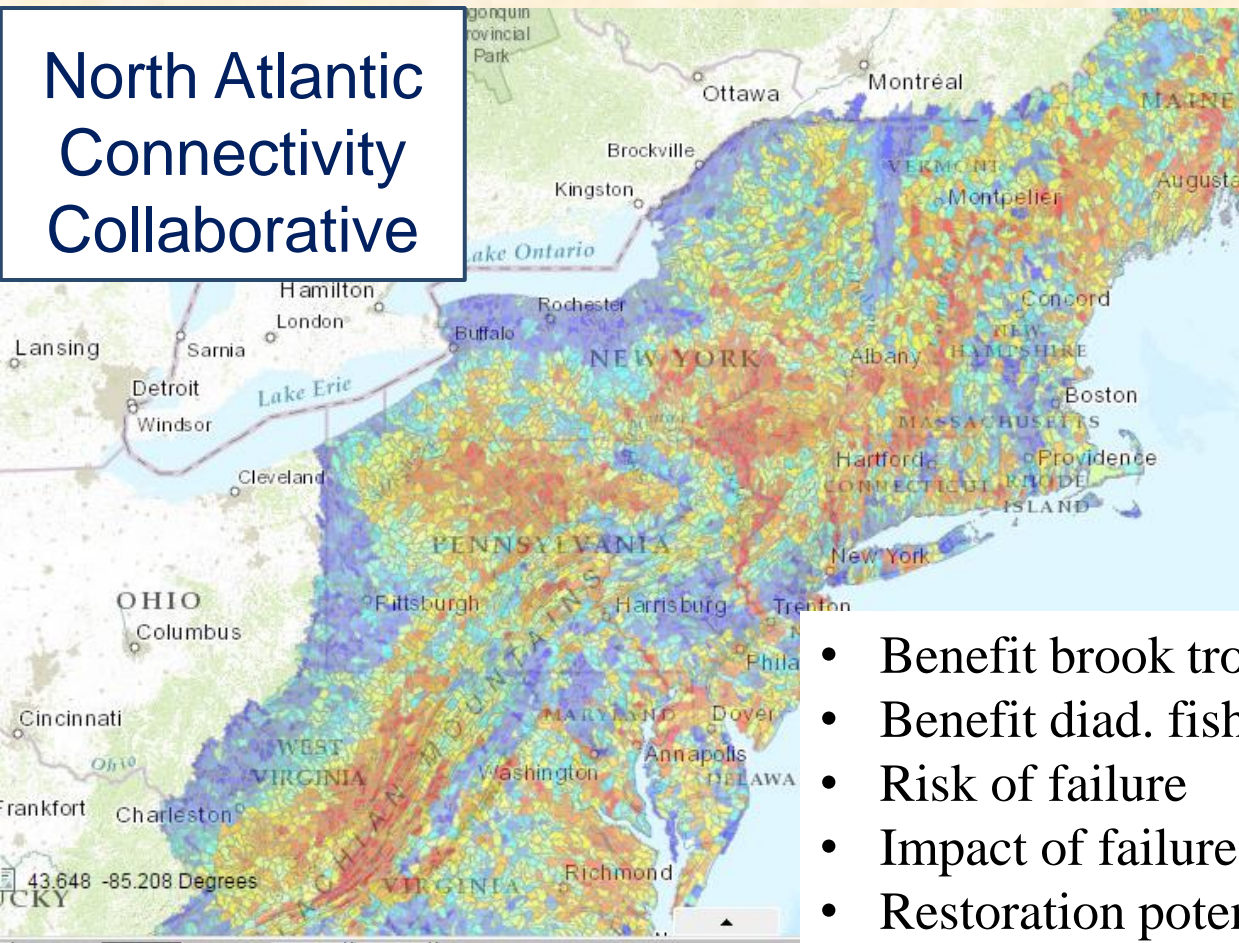
- Regional network of practitioners
- Linking natural resources, transportation, emergency management sectors
- Standard road-stream crossing survey protocol and training
- Regional online database
- Support for targeted crossing assessments
- Tools to prioritize crossings for upgrade based on increasing ecological benefit and resiliency to floods



Habitat Restoration:

Where should we focus effort to restore Aquatic Connectivity and Flood Resilience?

North Atlantic
Connectivity
Collaborative



- Benefit brook trout
- Benefit diad. fish
- Risk of failure
- Impact of failure
- Restoration potential



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Regional Road Stream Crossings Database



North Atlantic Aquatic Connectivity Collaborative

[Search Crossings](#) [Login](#)

Location:

All States [1806] ▼

All Streams ▼

All Watersheds ▼

Personnel:

Any Observer ▼

Any Coordinator ▼

Other:

Survey ID:

Crossing Code:

All Evaluations ▼

25 per page ▼

Dates:

Last updated from ...

7/12/2015

Last updated until ...

9/9/2015

Date observed from ...

6/3/2014

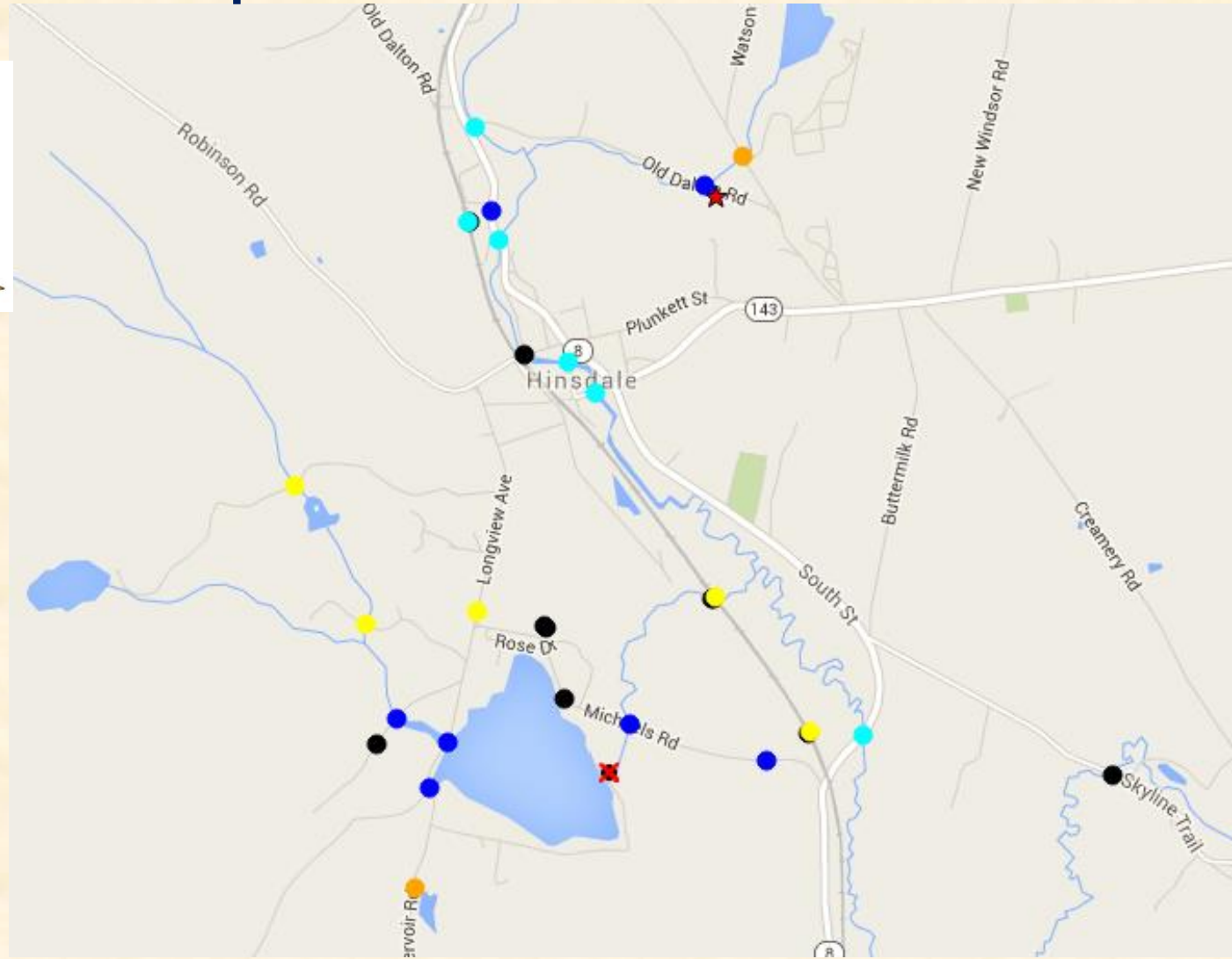
Date observed until ...

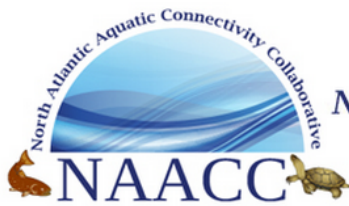
9/9/2015

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Example of map results from database





General Information for Road-Stream Crossing
 Crossing Code: **xy4245086272961734** Aquatic Score: **0.59**
 Terrestrial Passability Score: **0.1**
 (Data entry checked: No data)



[0645-020C_20101111_L.jpg](#)



[0645-020C_20101111_O.jpg](#)

Coordinator: Carrie Banks (last login: 05-04-2015)		Crossing Code: xy4245086272961734	First entered: 06-08-2011
Stream/River: Unnamed Trib to Bronson Brook	StreamID: No data	Road: Trouble Street	Town: Cummington, MA
Date observed in field: 11-11-2010	Last updated: 06-08-2011	NHD-HUC8 Watershed: Westfield	
Observer: Carrie Banks	Location: Adj to DFW Wildlife Management Area	Flow condition: Average flow	
GPS: Lat: 42.45095 , Long: -72.96161	GPS to crossing distance (meters): 14.1	NY ID: No data	
Photo IDs: No data	Phone: 413-268-3129	Email: carrie.banks@state.ma.us	

Road/Railway Characteristics:

Road Surface:	Unpaved
Road Type:	1-Lane Road
Comment:	No data

Crossing/Stream Characteristics (during generally low-flow conditions)

Crossing type:	Single Culvert
Condition of crossing:	Fair
Does the stream at the crossing contain fish?	Don't know
Is the stream flowing (in the natural channel)?	Yes
Crossing span:	Mild Constriction
Scour pool:	None
Crossing alignment matches stream?	No data
Comment:	No data



A Goal of Project:

Field surveys



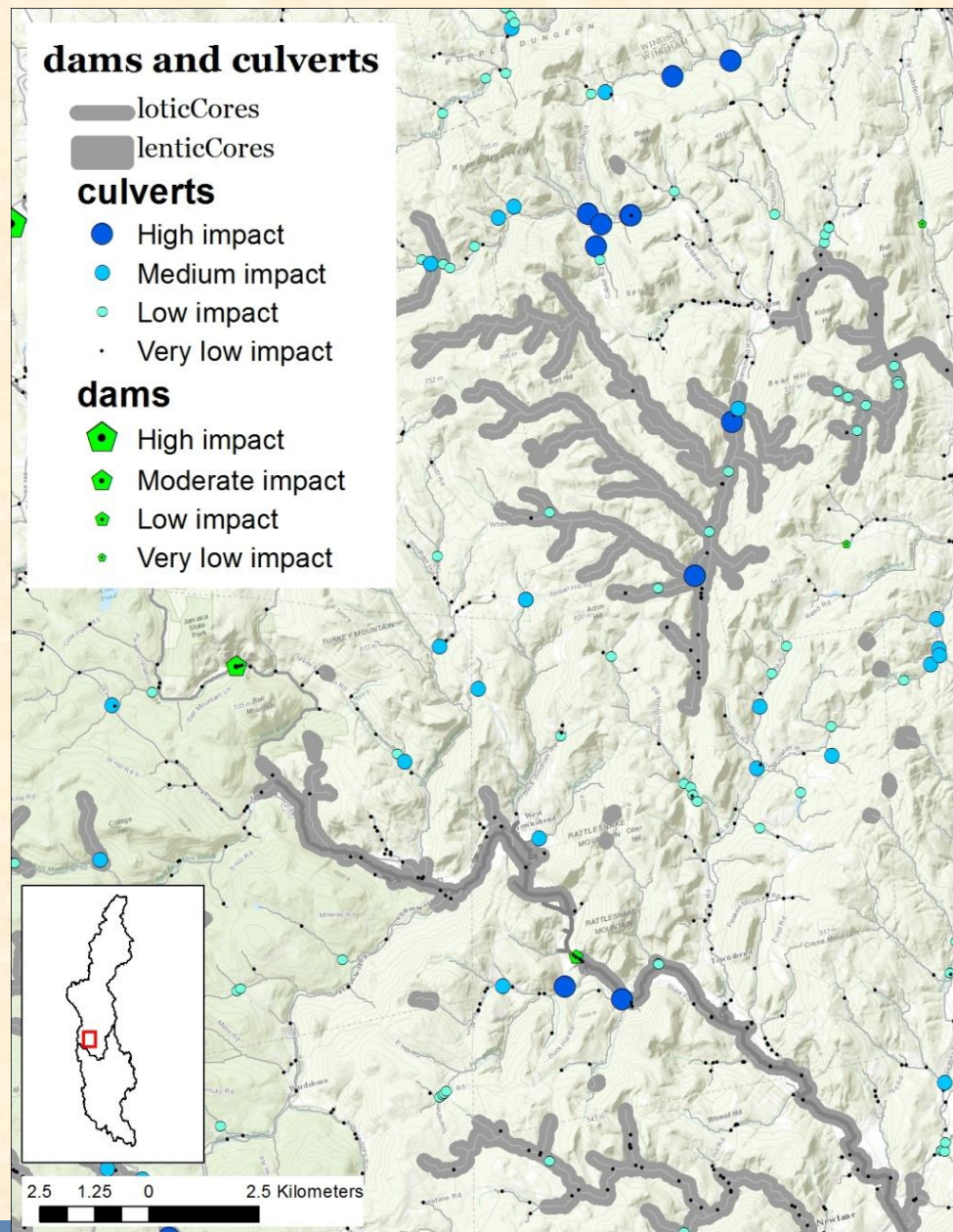
Aquatic passability & resilience scores



Connectivity assessment



Prioritization of benefits to upgrades across stream network



Fish Habitat Assessment Project Team

- Oversight and Coordination



North Atlantic LCC

U.S. Fish and Wildlife Service – Julie Devers,
Callie McMunigal, Meredith Bartron



Atlantic Coastal Fish Habitat Partnership – Emily
Greene, Lisa Havel



Eastern Brook Trout Joint Venture – Steve Perry,
Mark Hudy



- Tool Development:

Fritz Boettner

Jason Clingerman

Todd Petty

North Atlantic  Landscape Conservation Cooperative



Goals of Brook Trout Assessment and Decision Support Tool

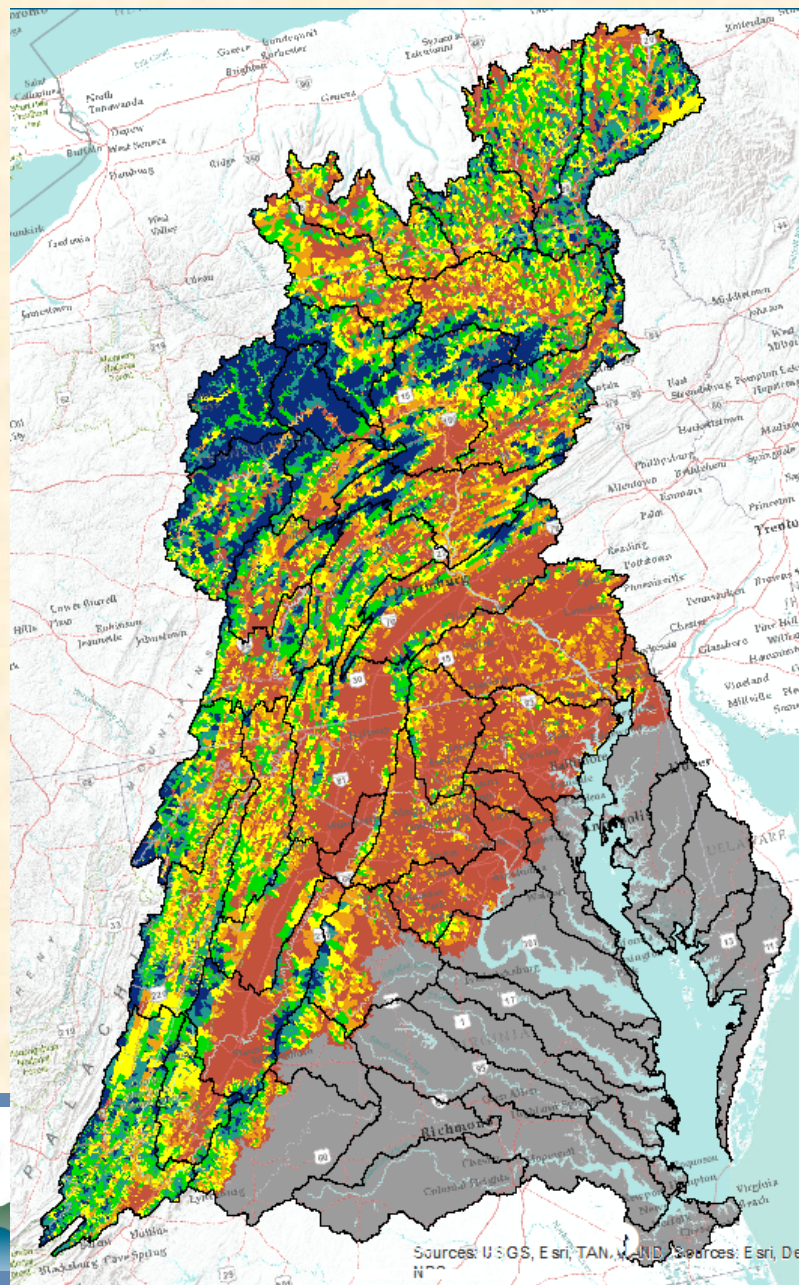
To support the management outcome of the **Chesapeake Bay Watershed Agreement:**

“Restore and sustain naturally reproducing brook trout populations in Chesapeake headwater streams with an eight percent increase in occupied habitat by 2025.”



Quick preview for 1:30 Training

Brook Trout Current Condition



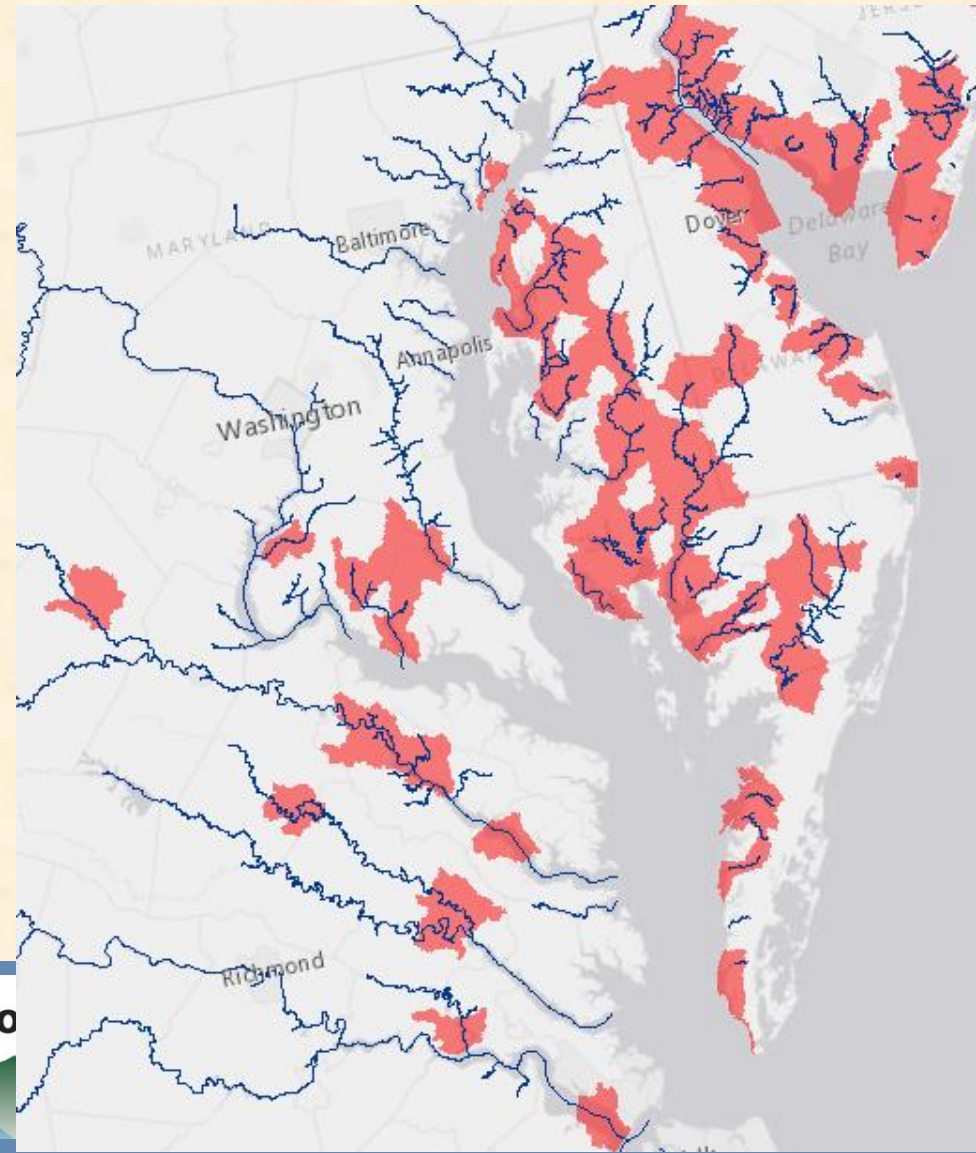
North Atlantic  Landscape



Sources: USGS, Esri, TAN, and other sources; Esri, Del

River Herring Also Incorporated into Fish Habitat Tool

Assessment developed by TNC (Erik Martin and colleagues) depicting top 5% of habitat for river herring (alewife and blueback herring)



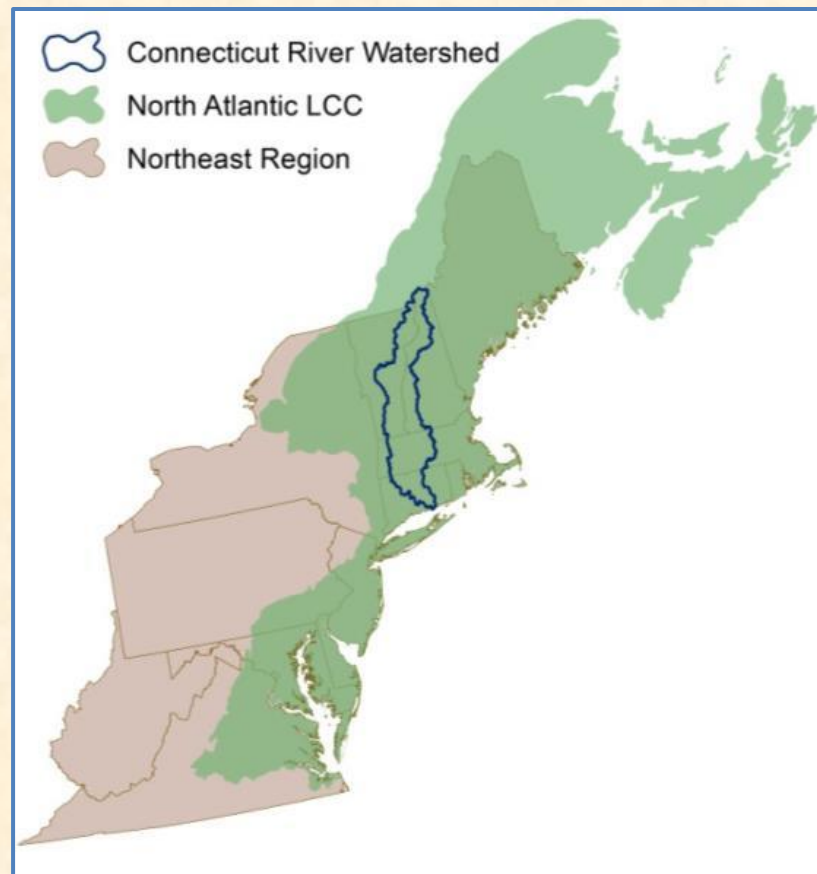
North Atlantic  Landscape Co



Designing Sustainable Landscapes in the Northeast

P.I.: Kevin McGarigal,
UMass Amherst
Full Northeast U.S. region

2011-present



<http://www.umass.edu/landeco/research/dsl/dsl.html>


North Atlantic  Landscape Conservation Cooperative

Datasets on Conservation Planning Atlas

<http://nalcc.databasin.org/>

North Atlantic Landscape Conservation Cooperative
Conservation Planning Atlas

Search by keyword or location | 

powered by DATA BASIN 

Get Started Browse Create My Workspace

NORTH ATLANTIC LCC CPA | DATASETS | NORTHEAST INDEX OF ECOLOGICAL INTEGRITY, 2010

Northeast Index of Ecological Integrity, 2010

Uploaded by North Atlantic LCC Oct 6, 2014 (Last modified Apr 14, 2015)

 Download... [Open in Map](#)

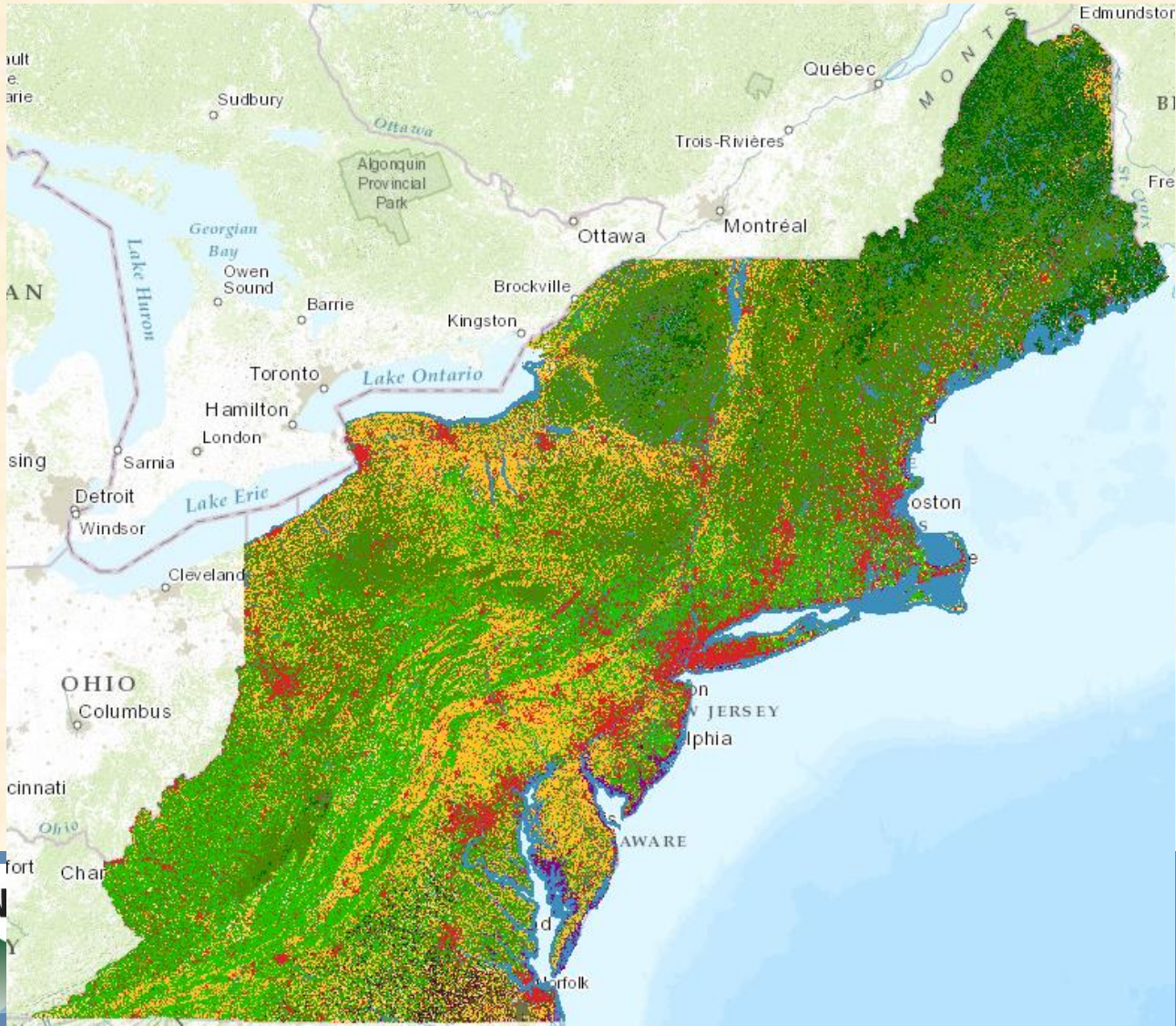


Description:
This dataset depicts the ecological integrity of locations (represented by 30 m grid cells) throughout the northeastern United States based on environmental conditions existing in approximately 2010. Ecological integrity is defined as the ability of an area (e.g., local site or landscape) to sustain important ecological functions over the long term. In particular, the functions include the long-term ability to support biodiversity and the ecosystem processes necessary to sustain biodiversity.

The Index of Ecological Integrity (IEI) is expressed on a relative scale (0 to 100) for ecological systems mapped on a modified version of the Northeast Terrestrial Habitat Map developed by the Nature Conservancy and the northeastern states. Ecological systems are recurring groups of biological communities found in similar environments at scales from tens to thousands of acres and typically persisting for 50 or more years. Examples of the more than 100 mapped systems include "Acadian-Appalachian Montane Spruce-Fir Forests" and "Northern Atlantic Coastal Plain Tidal Salt Marsh."

For purposes of calculating the index, related or similar ecological systems were grouped into about [more](#)

Key Building Block: Northeast Terrestrial Habitat Map



NEAFWA –
RCN, led by
TNC

Improvements
supported by
NALCC

Ecosystems: Ecological Integrity (UMass)

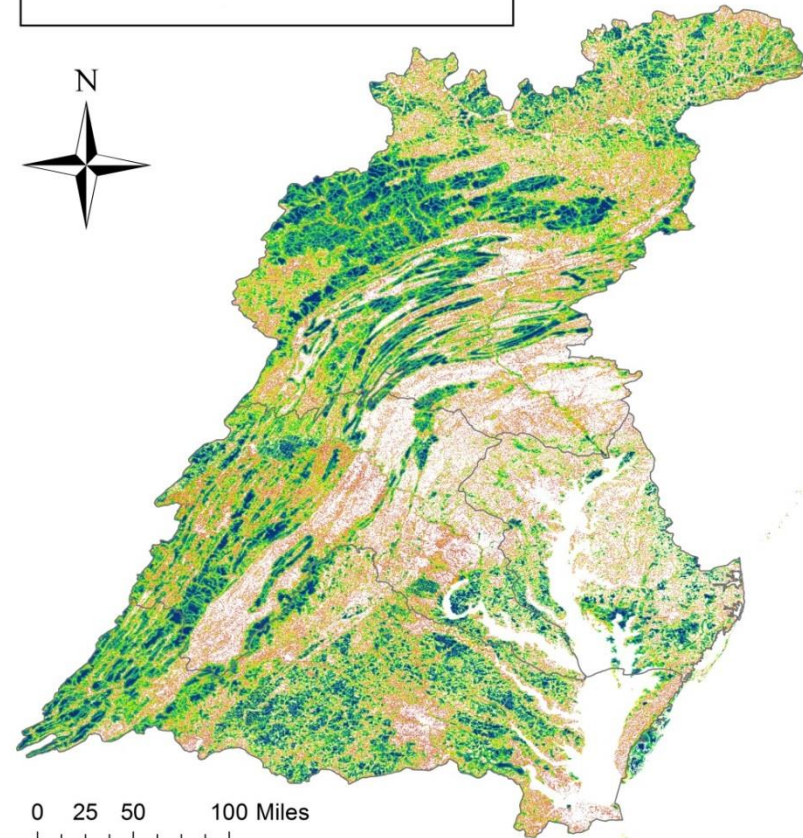
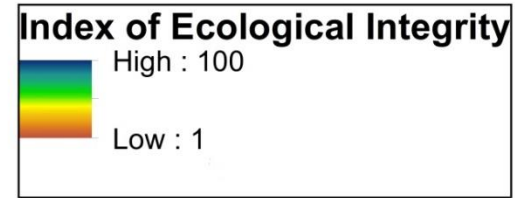
Intactness

Resiliency

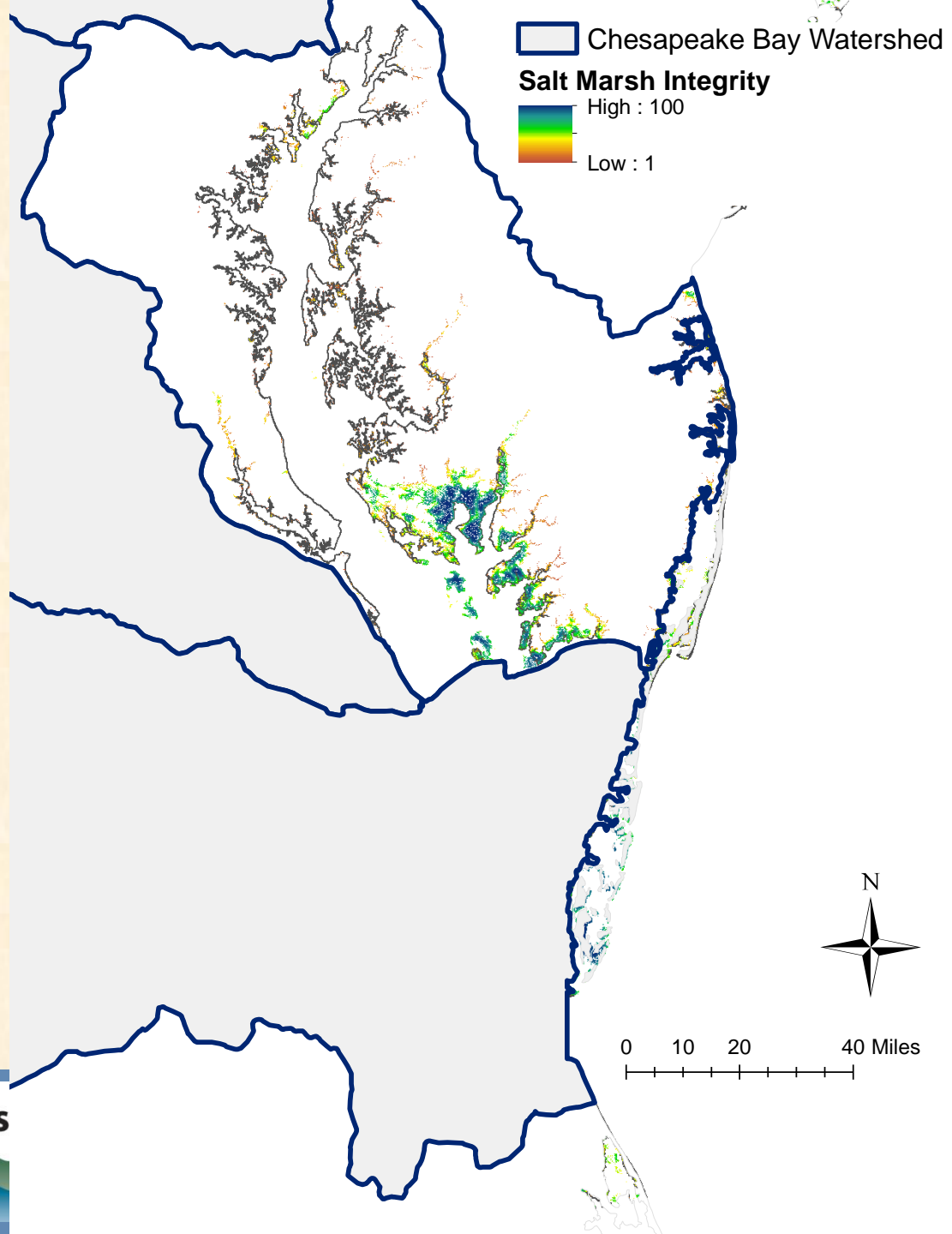
Ecological
Integrity

- **Intactness**...freedom from human impairment (anthropogenic stressors)
- **Resiliency**...capacity to recover from or adapt to disturbance and stress

Assessed for each of the 100+ ecosystem types in Northeast Terrestrial Habitat Map

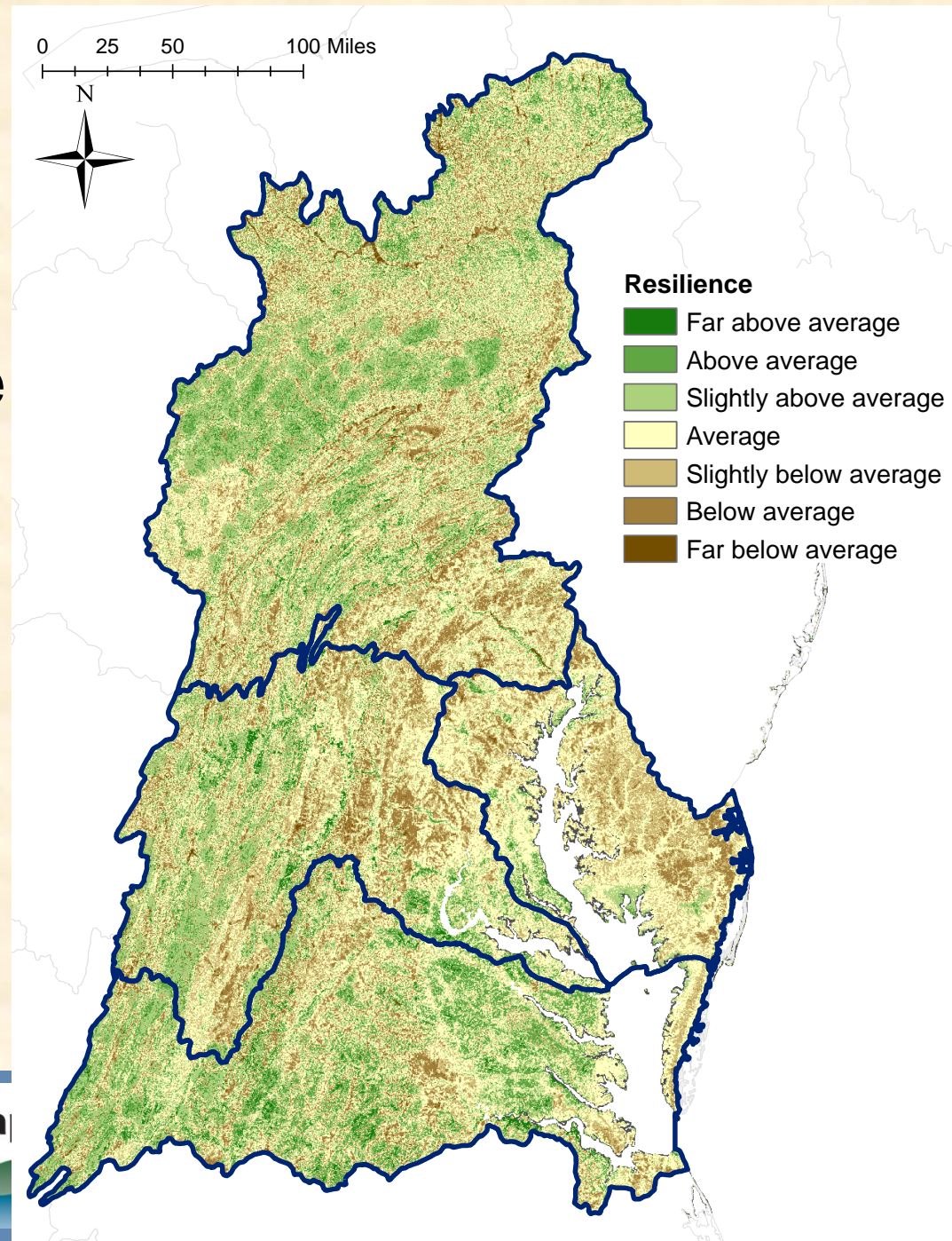


Land Protection Planning: Highest Integrity Examples of Saltmarshes

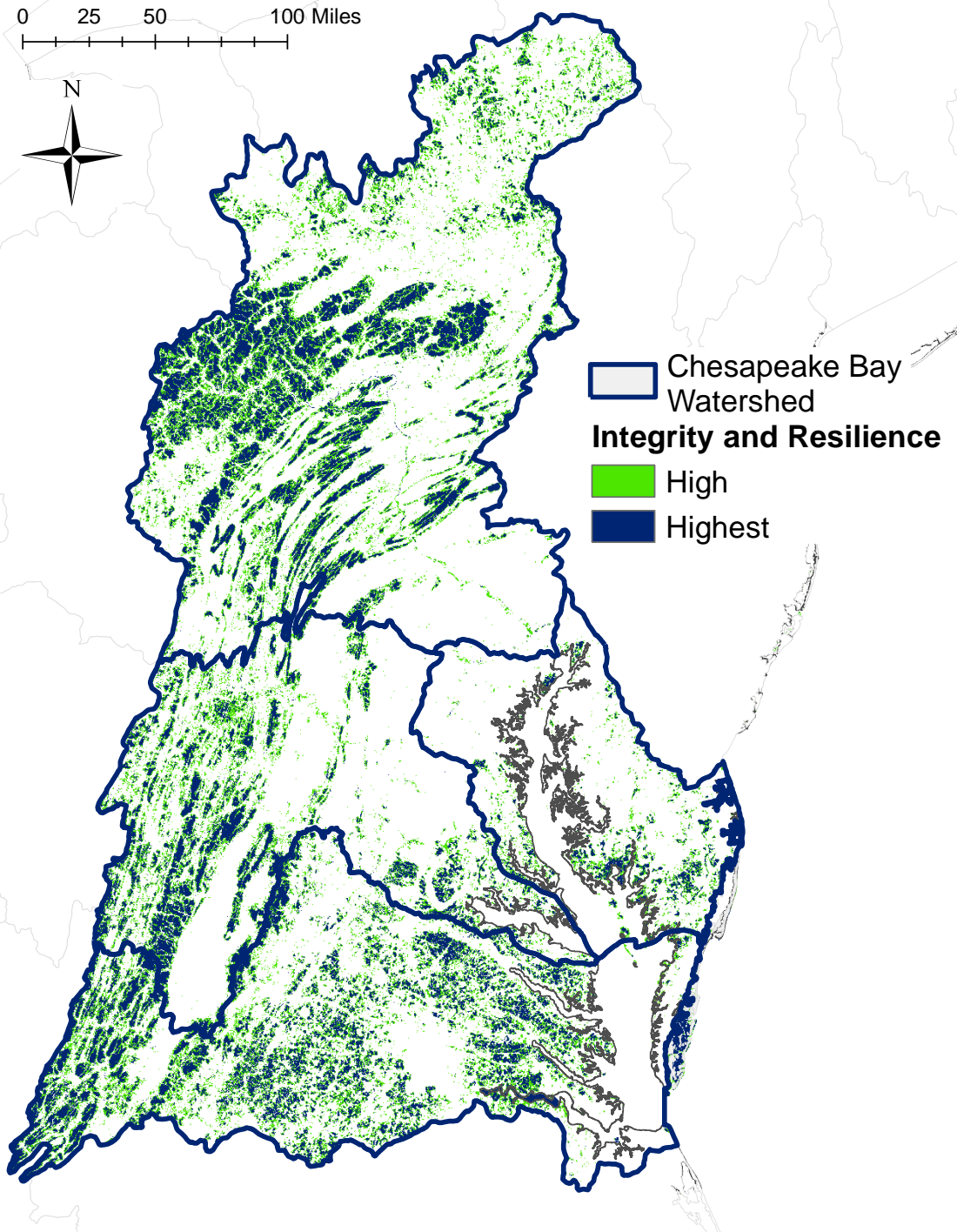


Land Protection Planning for the Long Term

- Terrestrial Resilience (“Conserving the Stage”)
- Developed by TNC
- Sites expected to have long term resilience to climate change



Example of how
Integrity and
Resilience can be
combined



North Atlantic  Lands





Representative (Surrogate) Species



- North Atlantic LCC Region (2011)
- Criteria:
 - Species typify lifecycle or habitat requirements for a larger group of species
 - All major ecosystem (habitat) types represented
 - Sensitivity to landscape change within focal region
 - Feasibility of monitoring & modeling



30 Surrogate Species for Northeast



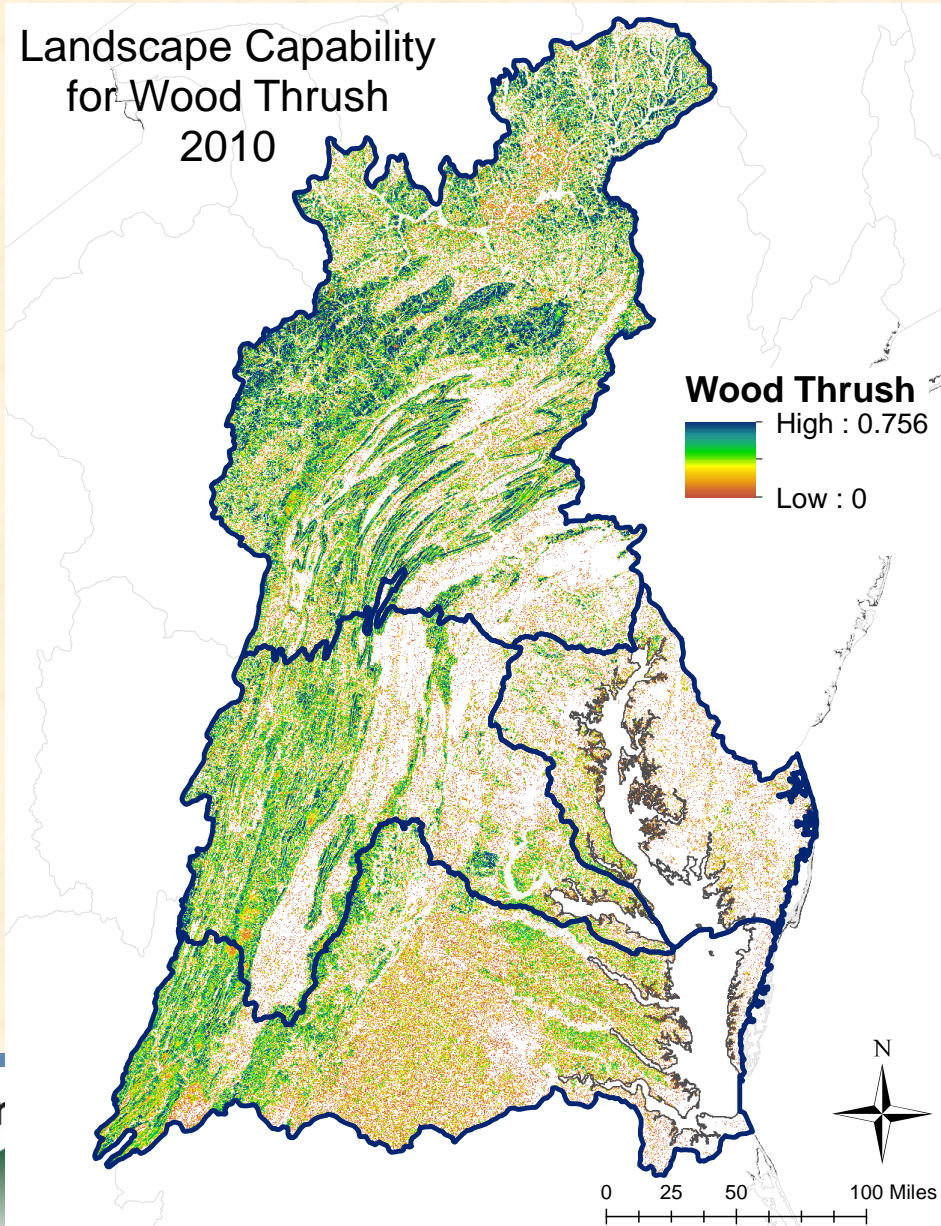
Representative (Surrogate) Species



Habitat capability models based on:

- Known habitat associations and effects of stressors
- +
- Actual field data (e.g., Breeding Bird Survey routes) where available

North Atlantic Landscape Cor

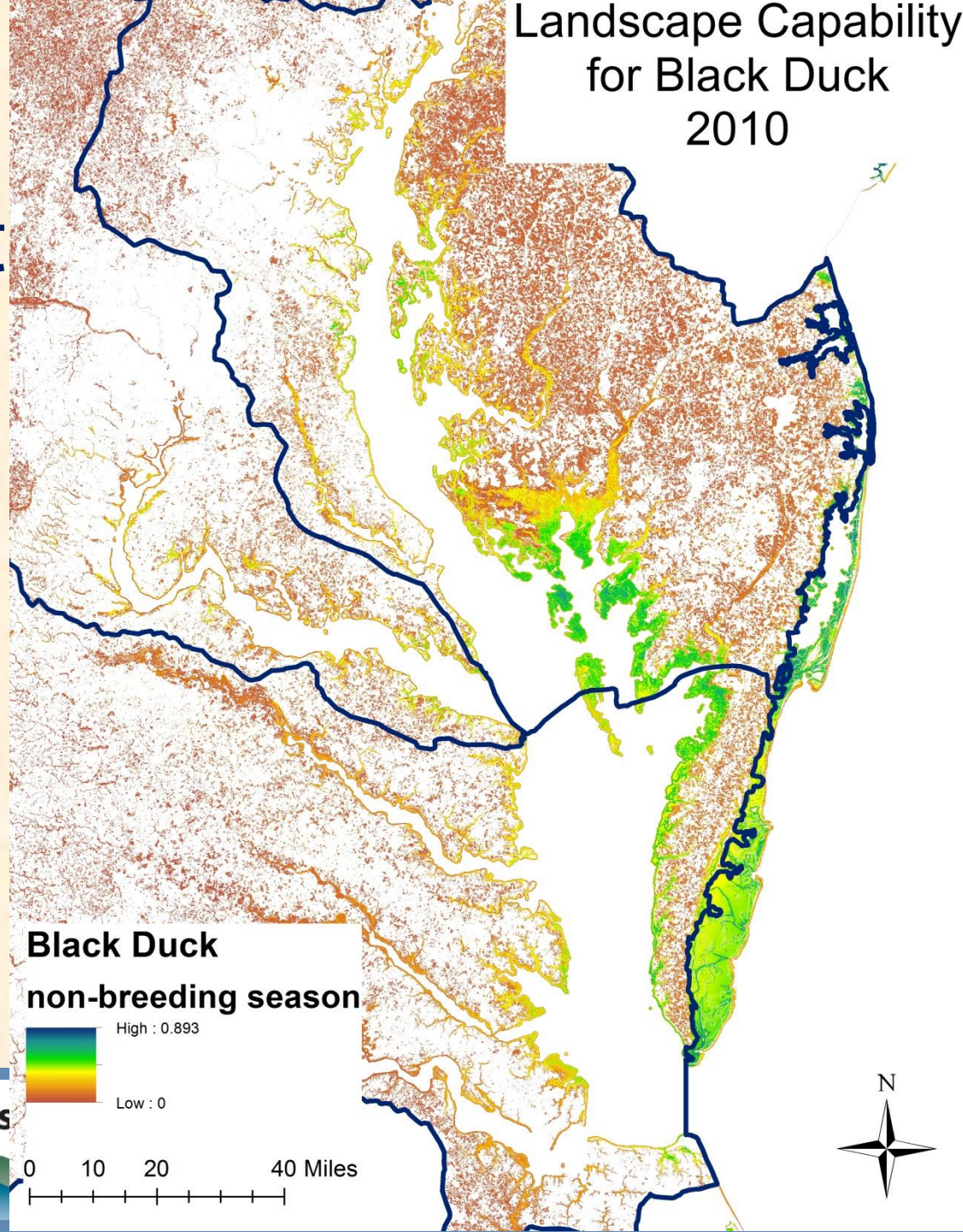


Black duck wintering habitat in Chesapeake Bay

Review of model by Black
Duck and Atlantic Coast
Joint Ventures scheduled
for Oct. 2015

Landscape Capability
for Black Duck
2010

North Atlantic  Lands



Summary – Potential Contributions of NALCC Tools to Chesapeake Bay Management Strategy

In concert with Bay-specific tools

Management Strategy	North Atlantic LCC Tools
Black duck	Assessment and prioritization of black duck and marsh habitats
Brook trout	Assessment and prioritization of brook trout habitat
Fish passage	North Atlantic Aquatic Connectivity Collaborative
Wetlands	Prioritization of existing wetlands
Stream health	Index of Ecological Integrity; fish habitat tools

Plus putting it all together with Landscape Conservation Designs

Part 2 of Presentation

Why landscape-level conservation?

An **interconnected, resilient network** of lands and waterways has many benefits for society:

- Fish and wildlife populations
- Clean water
- Flood and erosion control
- Storm protection
- Forest and farm products
- Recreation and tourism
- Quality of life
- Employment





NATIONAL *fish, wildlife & plants*
CLIMATE ADAPTATION STRATEGY

Goal 1

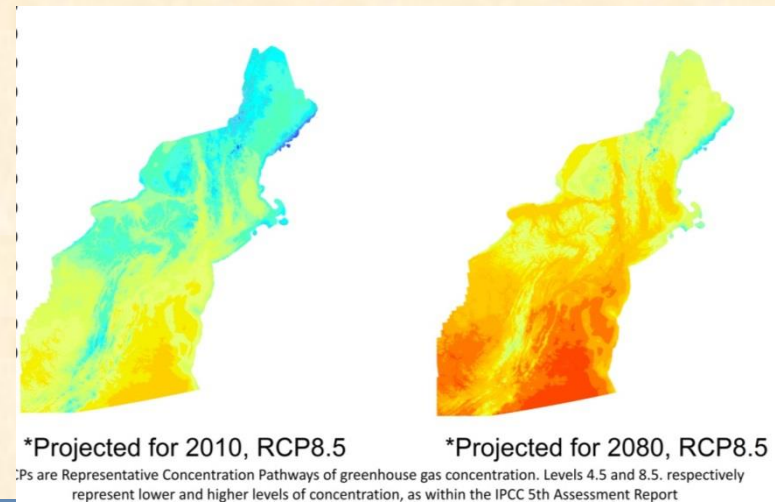
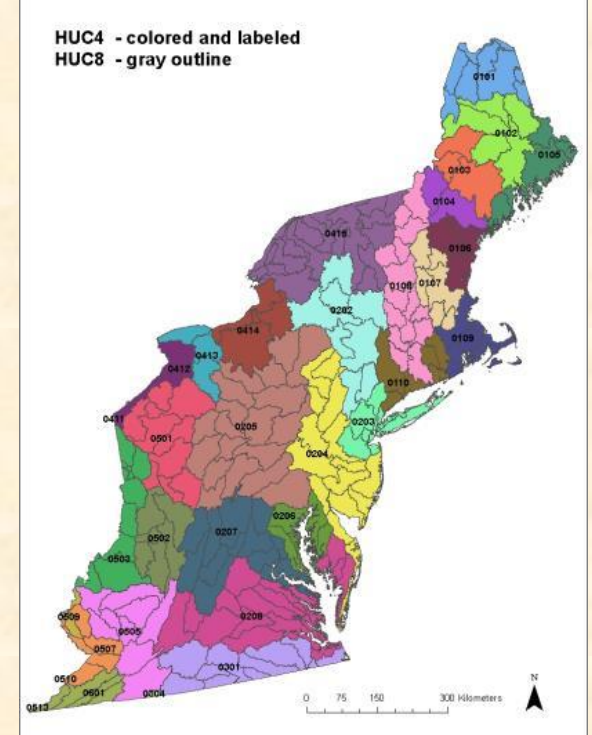
Conserve habitat to support healthy fish, wildlife, and plant populations and ecosystem functions in a changing climate.

Strategy 1.1

Identify...an ecologically-connected network of terrestrial, freshwater, coastal, and marine conservation areas that are likely to be resilient to climate change and to support a broad range of fish, wildlife, and plants under changed conditions.

Multiple Scales of Conservation Plan. & Design

- Spatial scales that match partnerships and decisions being made
- Ability to have scales inform each other
 - Regional context for watershed, state and local actions
- Plan based on both current and projected future conditions
 - Climate change
 - Urban growth
 - Relevant time intervals

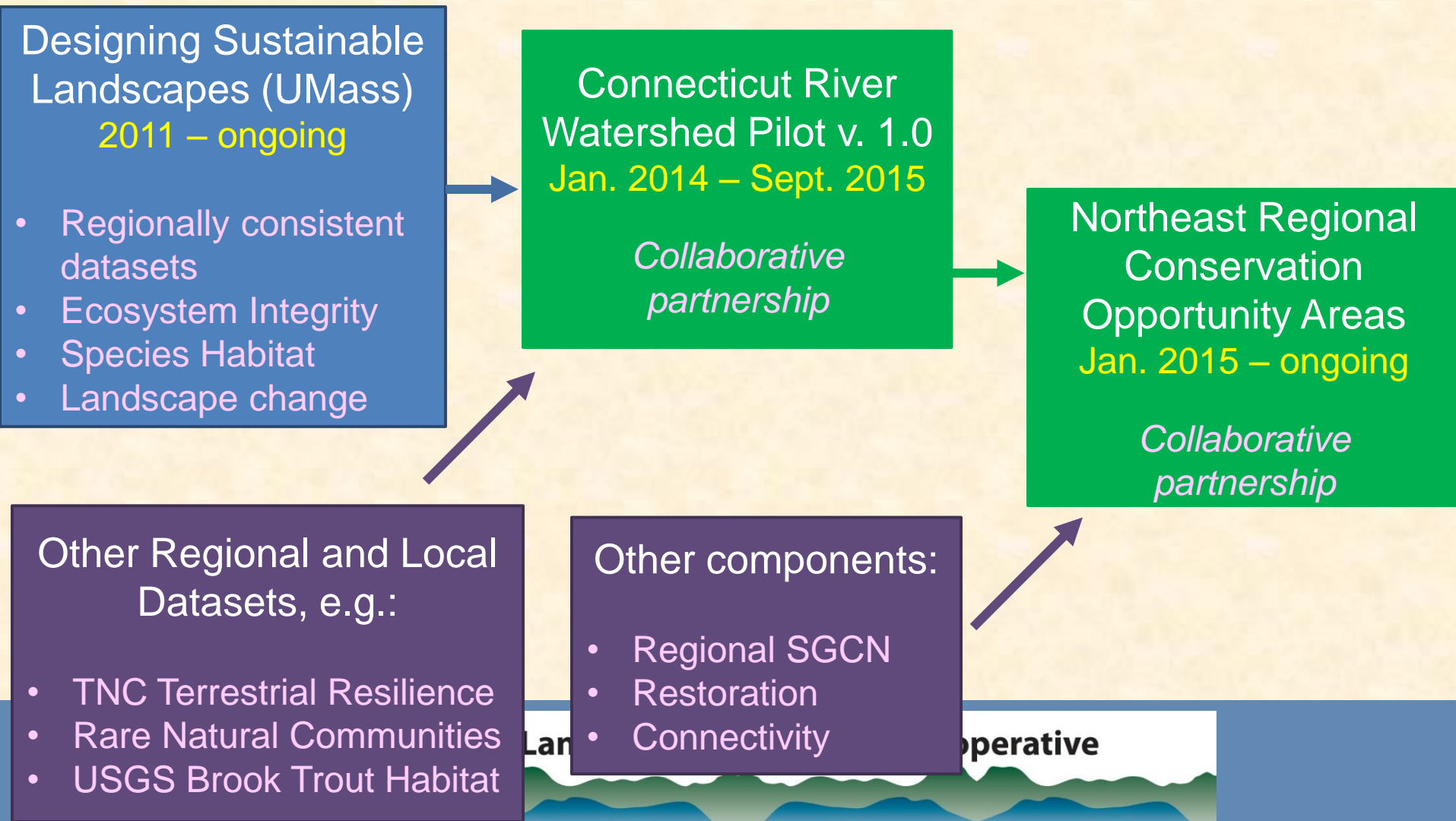


Key (conservation) Questions to be Answered by Landscape Conservation Information and Tools

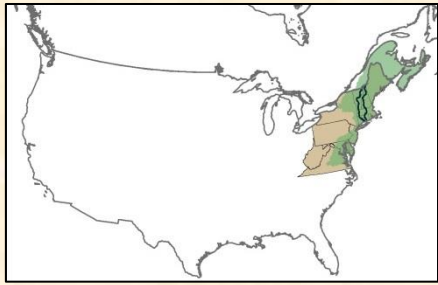
- Where should we invest in **land protection**, and how much?
- How should we **manage** protected lands?
- Where should we invest in **ecological restoration**?
- Where should we focus **species protection and restoration**?
- Where and how should we influence local **land use / open space planning**?
- Where should **infrastructure** go to have least impact?





Landscape Conservation Design in the North Atlantic LCC



The Connecticut River Watershed



-  Connecticut River Watershed
-  North Atlantic LCC
-  Northeast Region



Collaborative conservation design effort, January 2014 - present

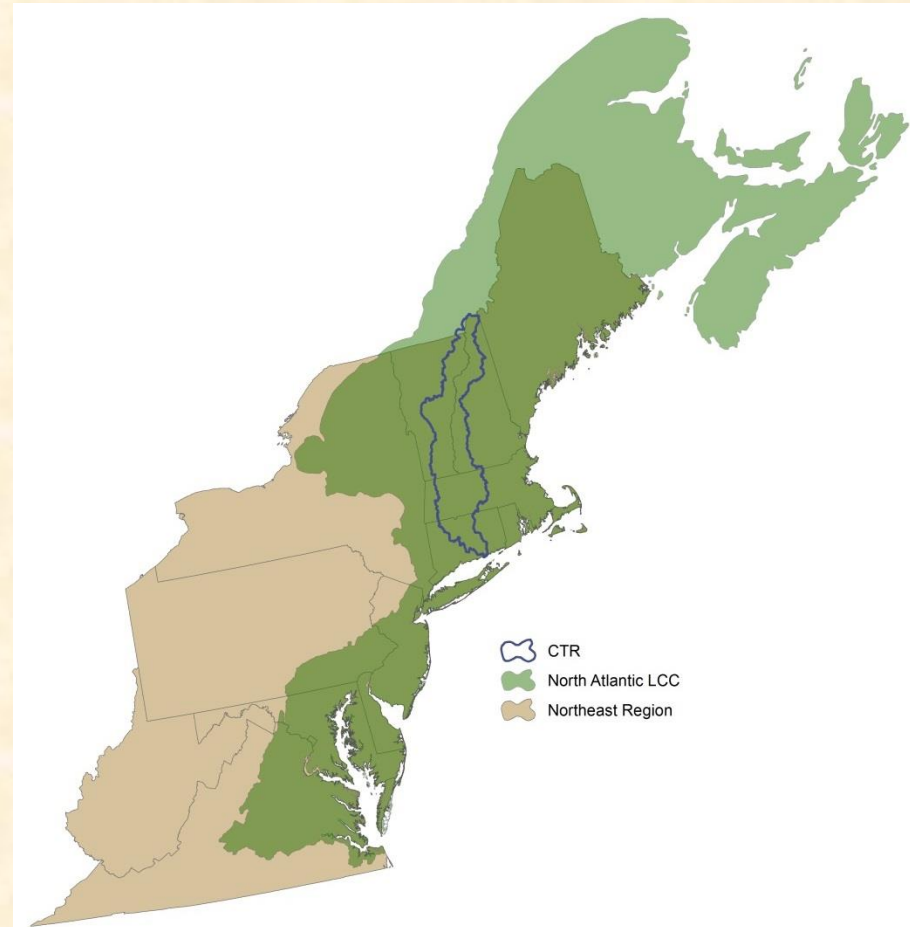


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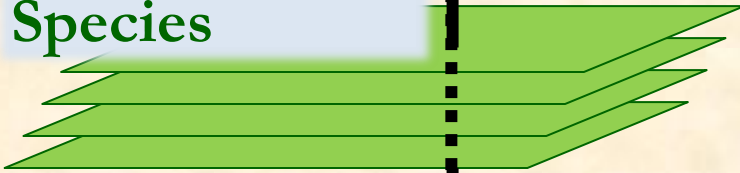
Landscape Scale Conservation Design Pilot in Connecticut River Watershed

- A planning process
 - a collaborative effort among partners, which includes agreeing on common priorities
- A set of products
 - spatial plans for conservation decisions in an adaptive framework



Integrating the Elements

Surrogate
Species



Rare Natural
Communities
and Floodplains



Ecological
Integrity and
Resilience



Planning team – species
& ecosystem objectives

UMass - Optimization



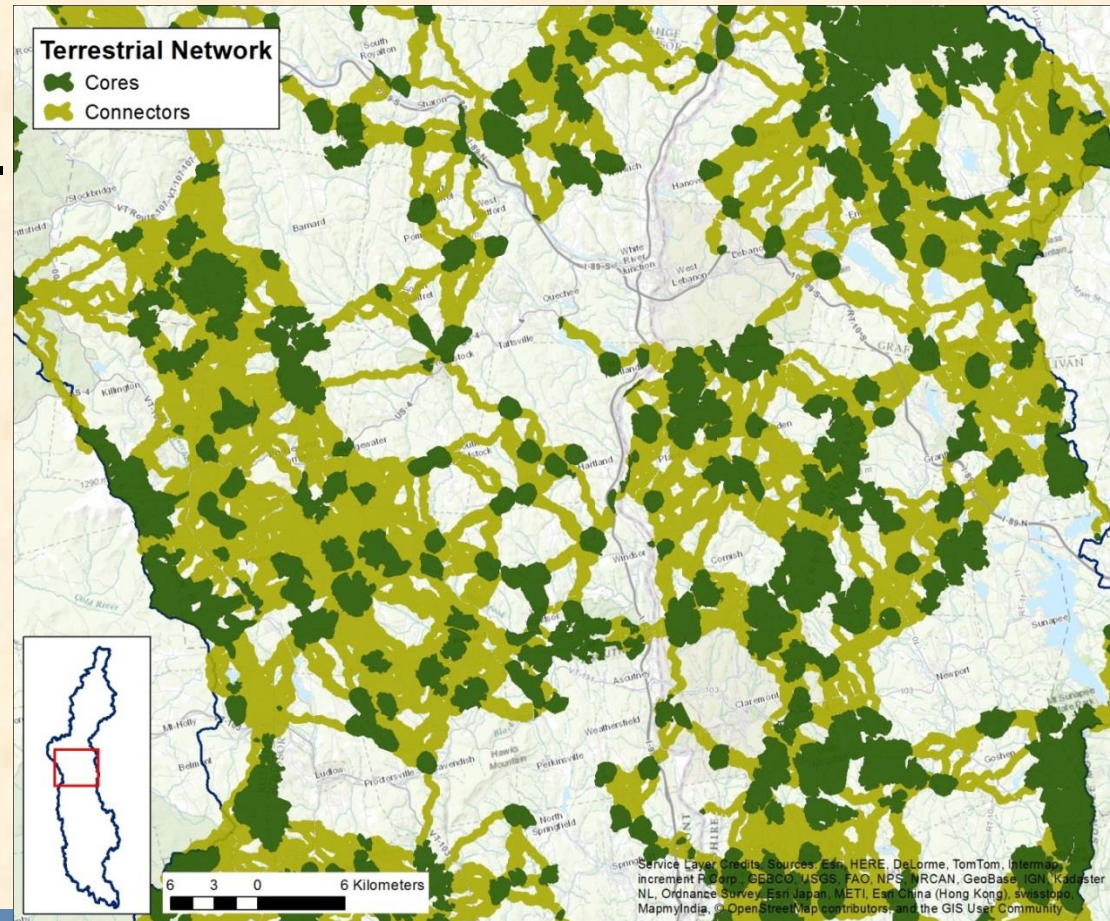
**Landscape
Conservation
Design**

North Atlantic  Landscape Conservation Cooperative

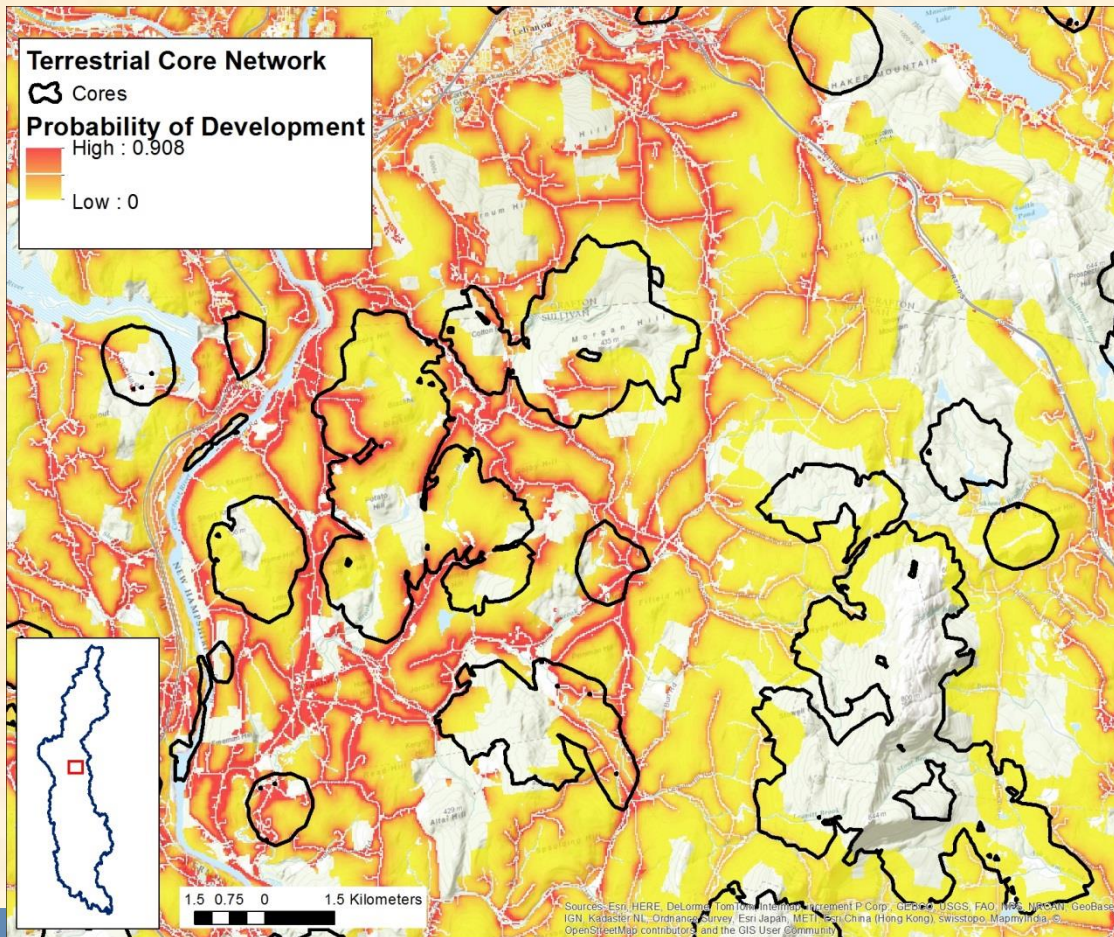


Two major outputs from design process

1. Terrestrial core-connector network
2. Aquatic cores and zones of influence

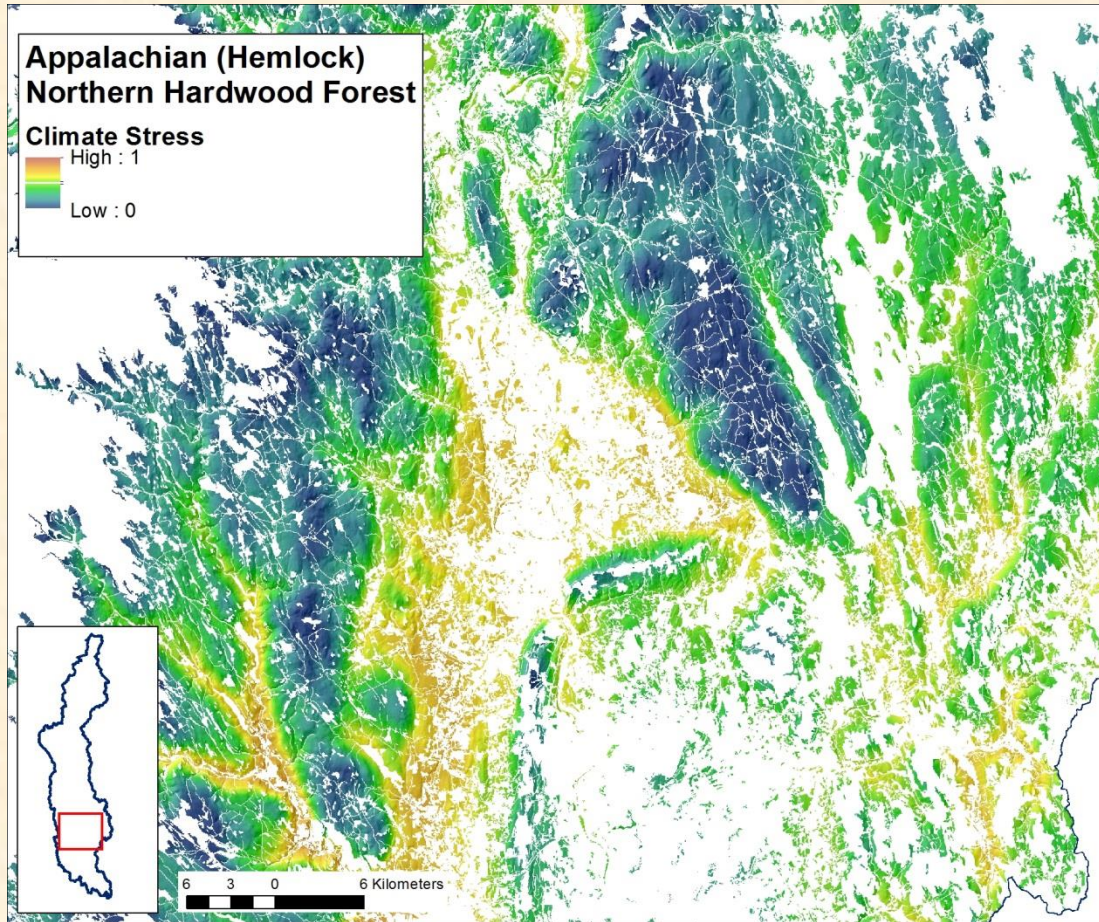


Besides Core-Connector Network, Many Products are Available, e.g.: Probability of Development



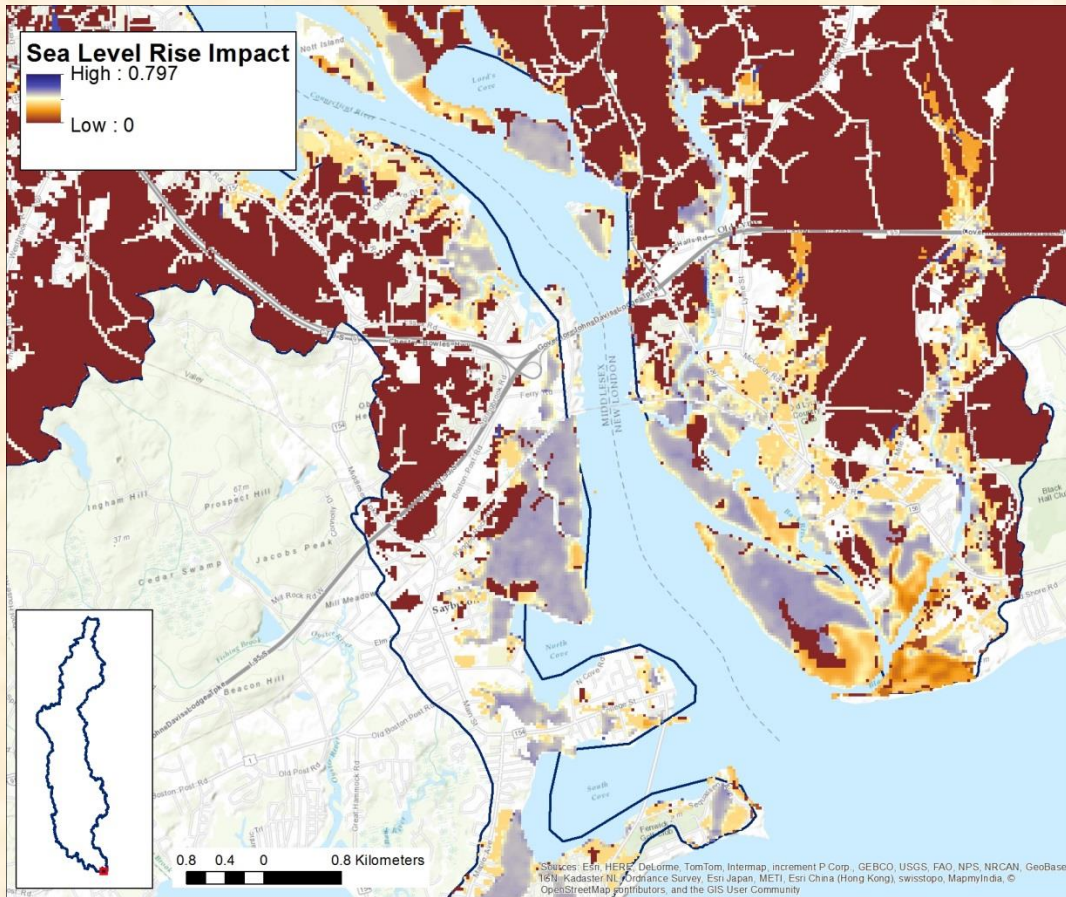
Focus land conservation on areas that have high integrity and habitat and are relatively more likely to be developed (2010-2080 time frame).

Suggestions for Using the Products: Climate Stress



Focus conservation of species habitat and ecosystems on areas most resilient (least stressed by) climate change

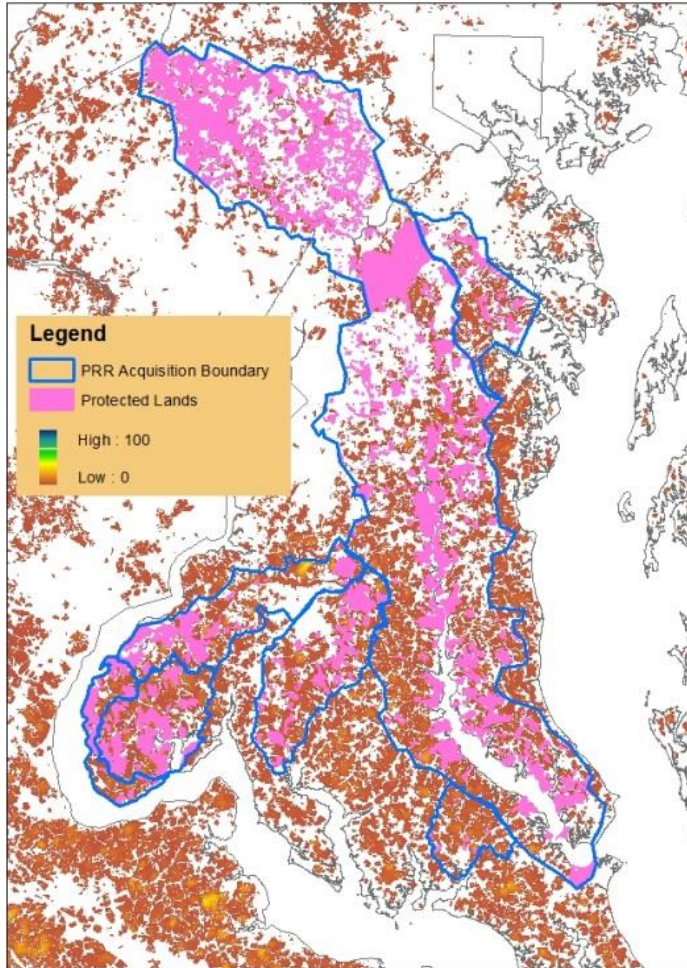
Suggestions for Using the Products: Sea Level Rise



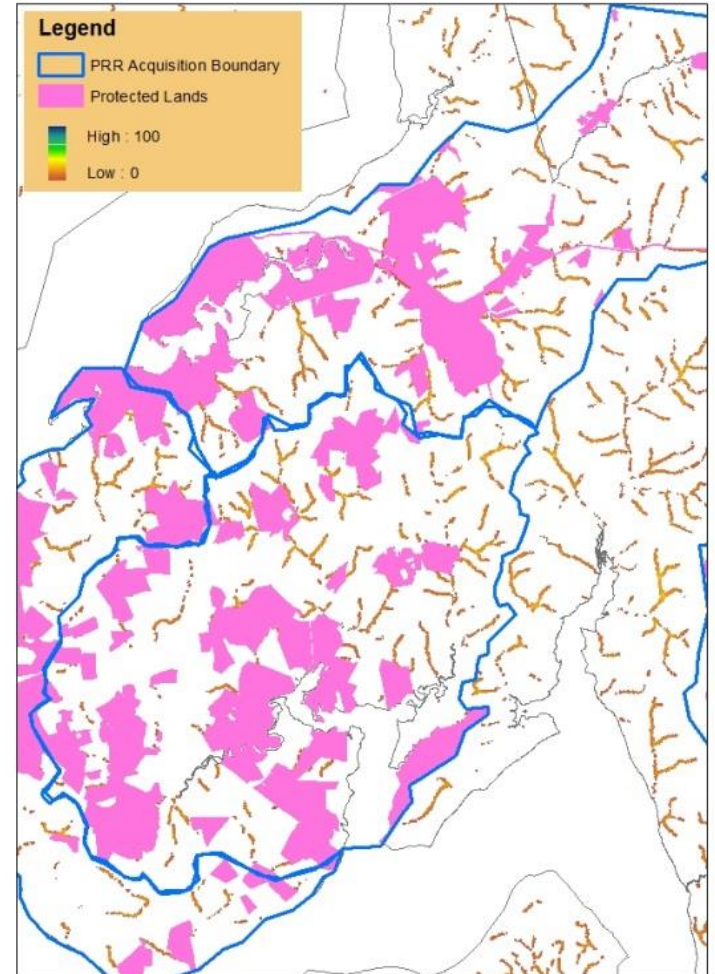
Prioritization, restoration and protection of marshes and adjacent uplands for migration.

Potential Applications in Patuxent Research Refuge

PRR - Woodcock Landscape Capability



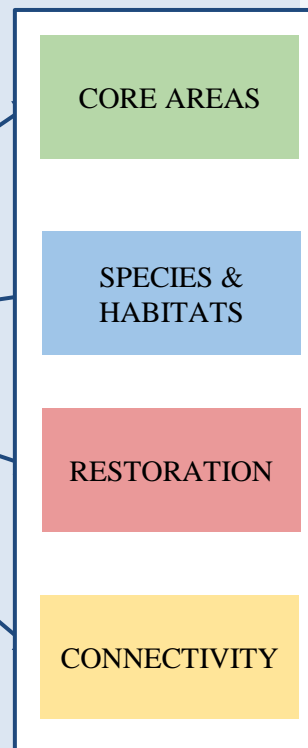
PRR - Louisiana Waterthrush Landscape Capability



Regional Conservation Opportunity Areas (RCOAs) Version 1.0

RCOAs will identify a **connected** network of **resilient** and **ecologically intact** habitats that will support **biodiversity** under changing conditions

RCN &
LCC
SCIENCE



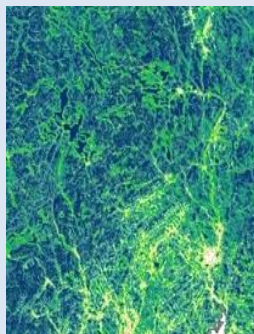
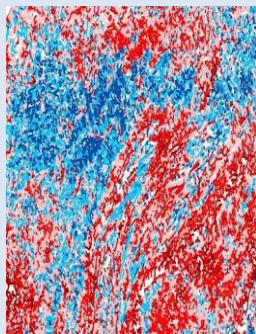
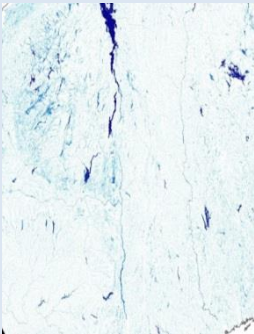
Regional
Conservation
Opportunity
Areas

RCOAs complement state efforts by providing a regional context...which species and habitats depend on my state the most?

Products and Uses

Products

An atlas with methodology documentation
Data and Tools to plan conservation



Example Uses

- Prioritize restoration & land management
- Inform land protection
- Complement/Confirm state priority areas
- Regional context for state decisions
- Guide SWAP implementation and RCNs