



# Taking the Lead on Climate Change: Climate Resilience for Land Conservation



"Climate change is resulting in the the sixth wave of extinctions..., the largest since the loss of the dinosaurs 65 million years ago."

- Center for Biological Diversity

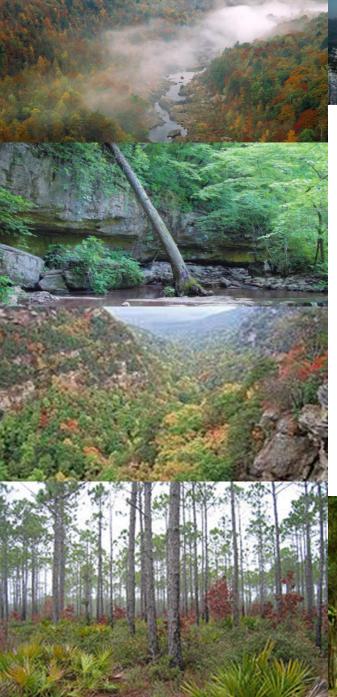






## Land protection plays a critical role

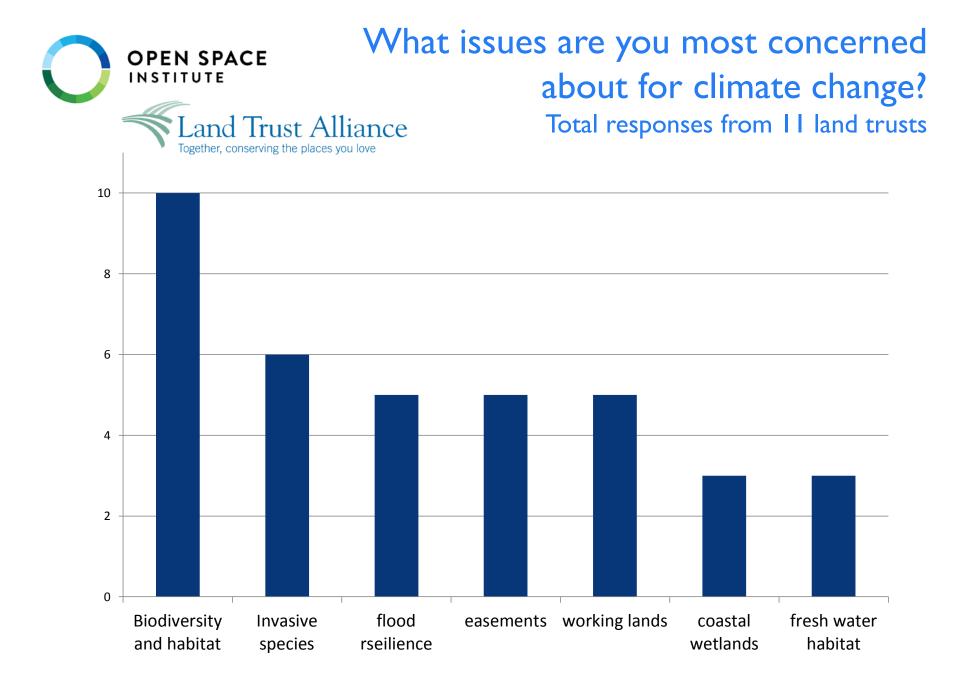
- Reducing land use change
- Protecting carbon sinks
- Ensuring plants and wildlife survive



## **RESPONSE:**

To permanently protect a network of connected, and biologically intact sites representing the full diversity of physical and biological features.







#### NATIONAL fish, wildlife & plants CLIMATE ADAPTATION STRATEGY

# HASE FOUNTAIN Goal 1

#### Strategies

Strategy 1.1: Identify areas for 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.

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



# Characteristics of Resilient Sites

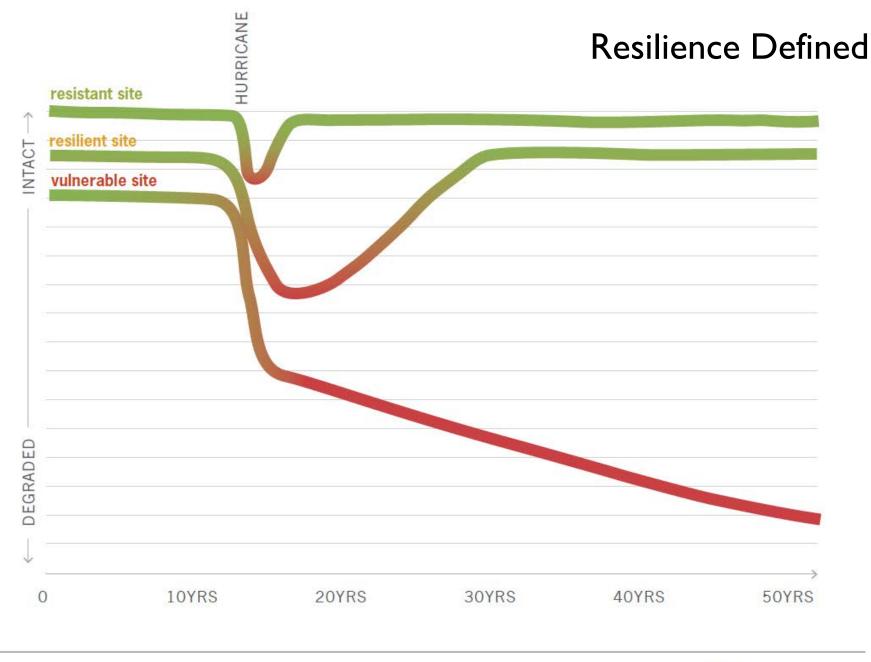
Identifying resilient landscapes for land protection



### **Resilience Defined**

**Climate Resilience** 

The ability of a species, habitat or ecosystem to adjust to an environmental disturbance caused by climate change by moderating potential damages, taking advantage of opportunities, or coping with consequences.



6. Vulnerability

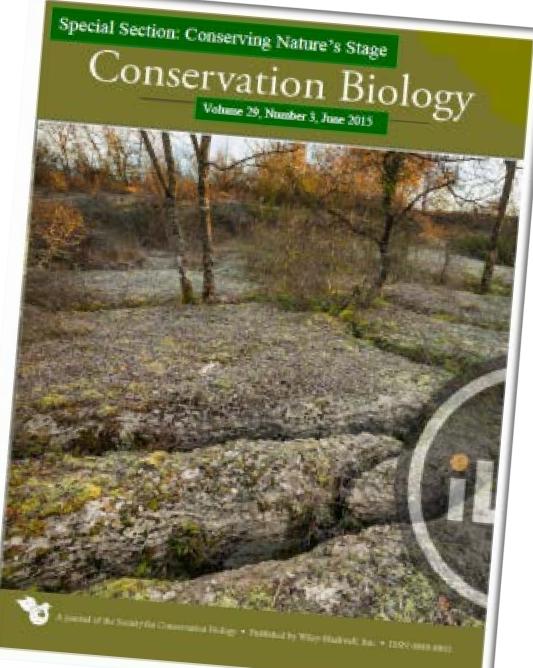




# Ensuring features

# Not species based

# Avoids predictions





## Four Characteristics of Climate Resilience

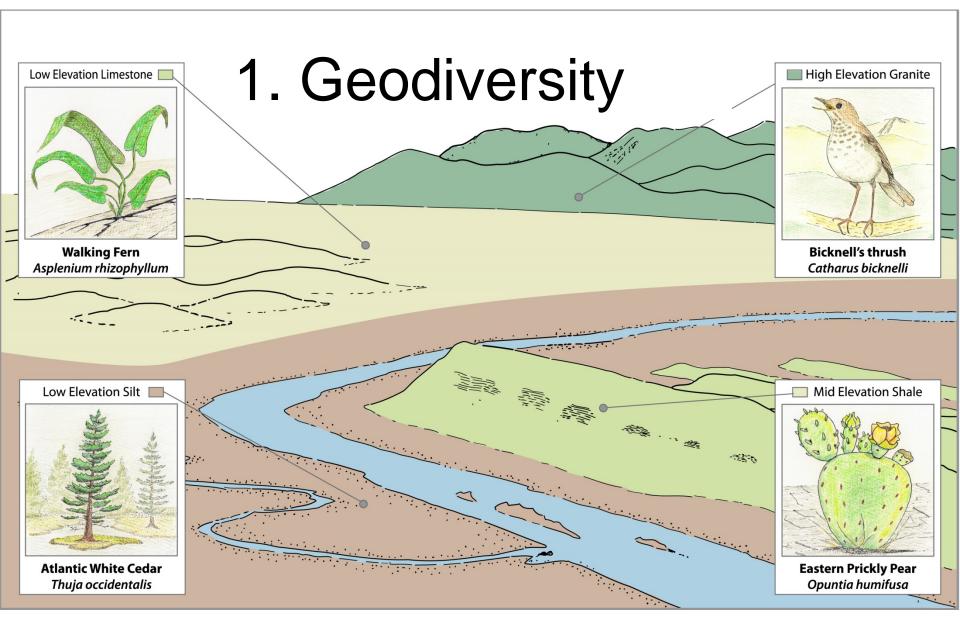
Geodiversity (geology + elevation)

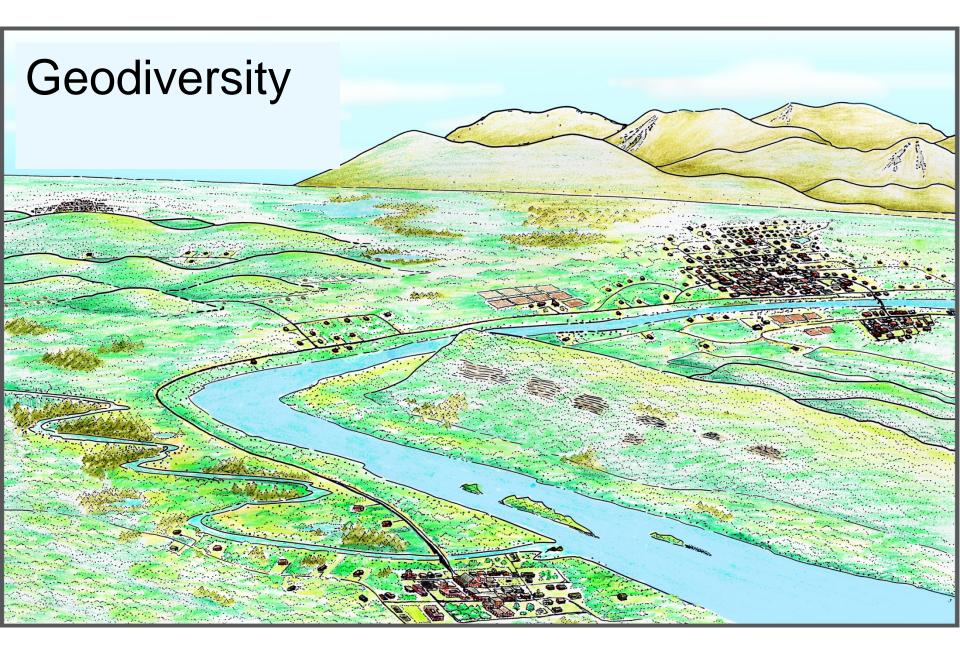
Diverse

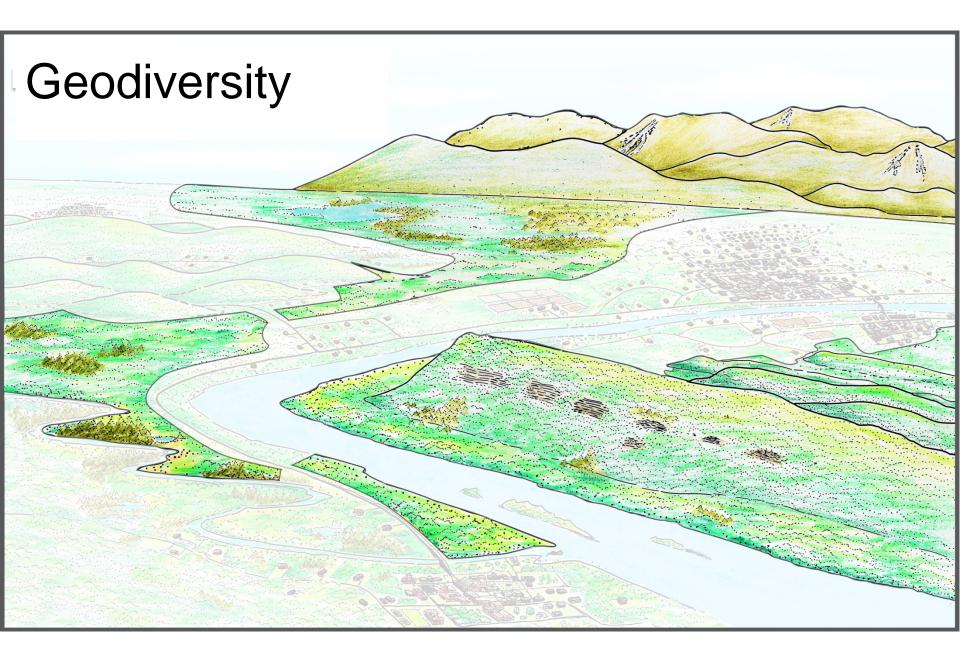
ecosystems

and habitats

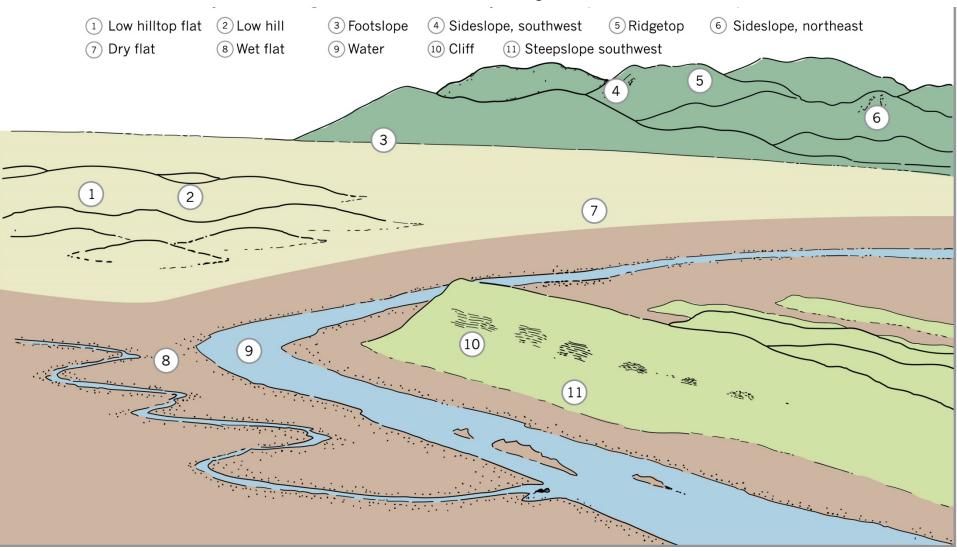
- Landform diversity
- Connectedness
- Intact biological condition



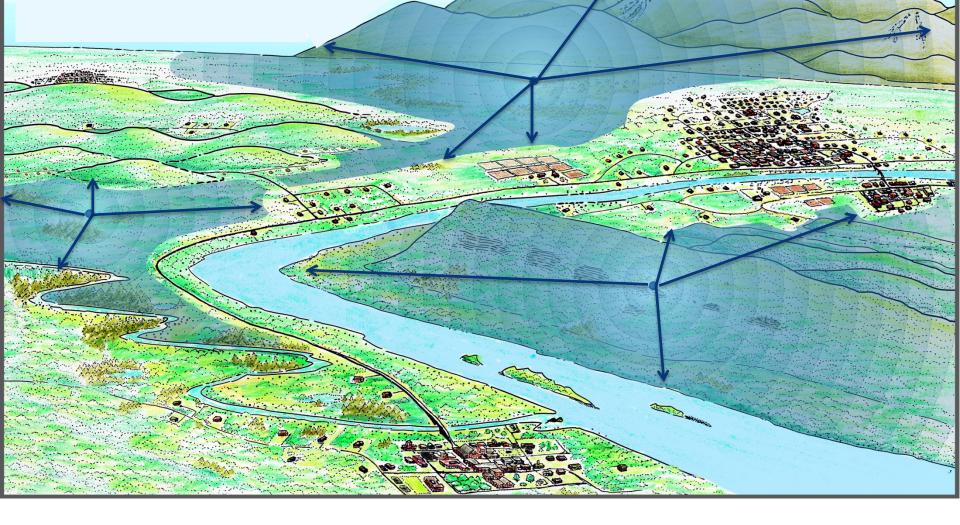




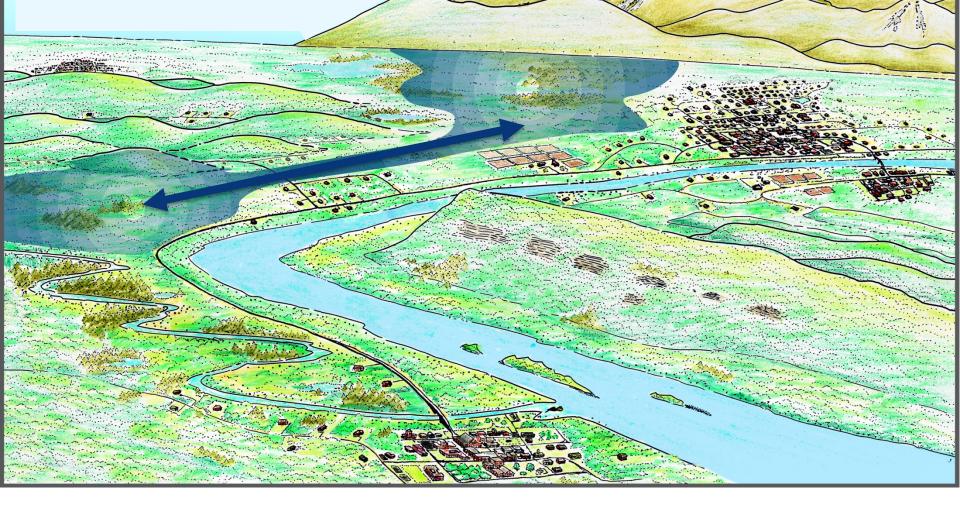
# 2. Landform Diversity



## 3. Connectedness – Local



## 3. Connectedness – Regional



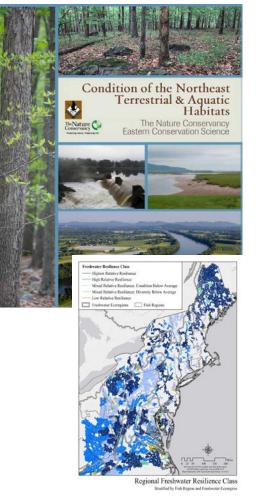


#### Terrestrial Resilience Permeability/Regional Flow

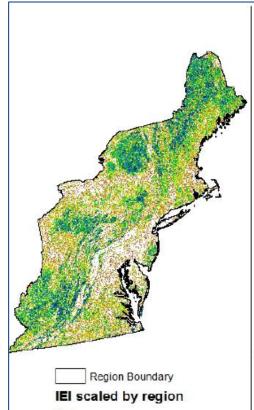


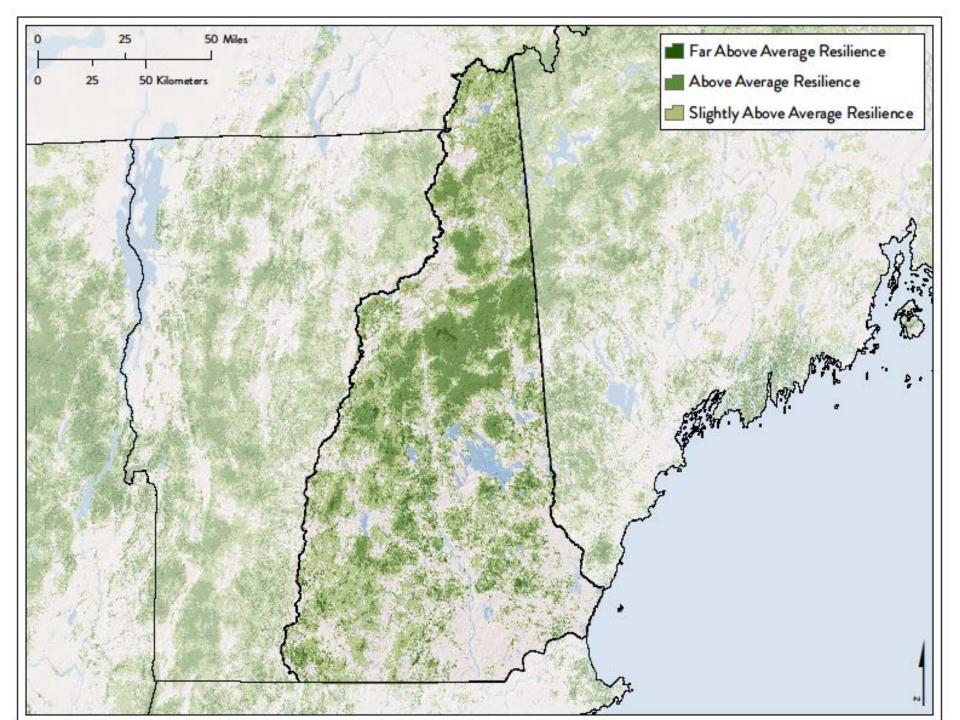


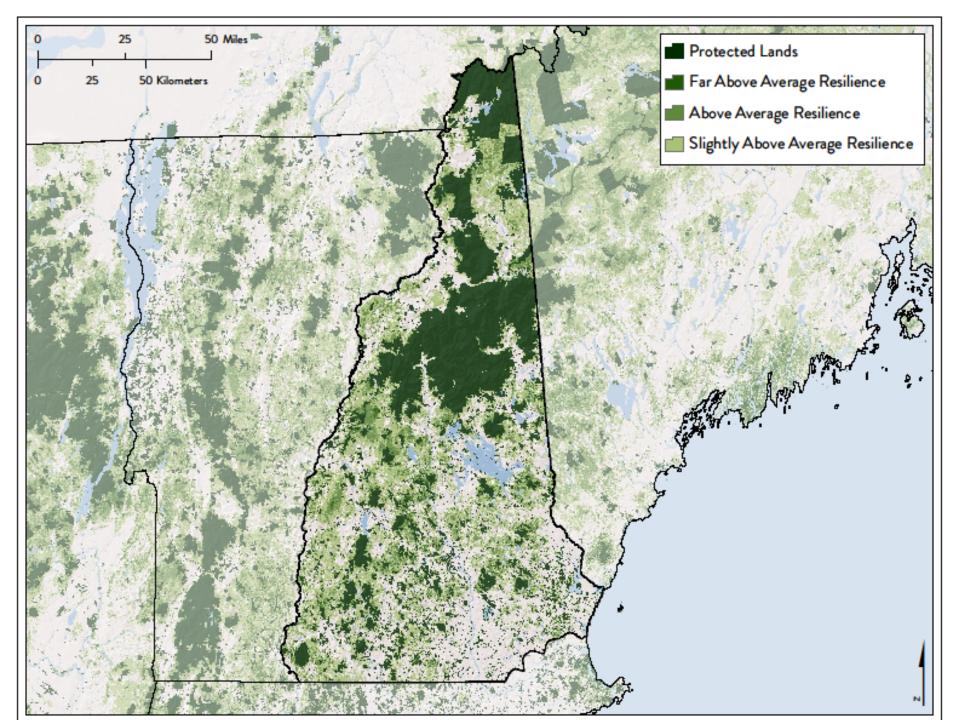
Condition Analysis Fresh Water Resilience Northeast Habitat

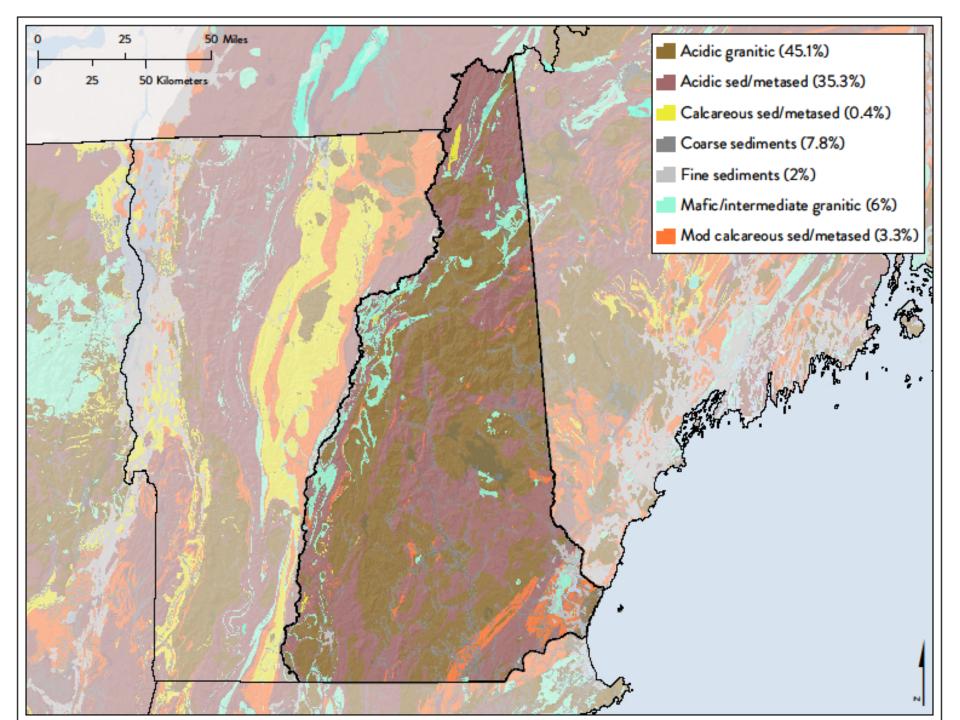


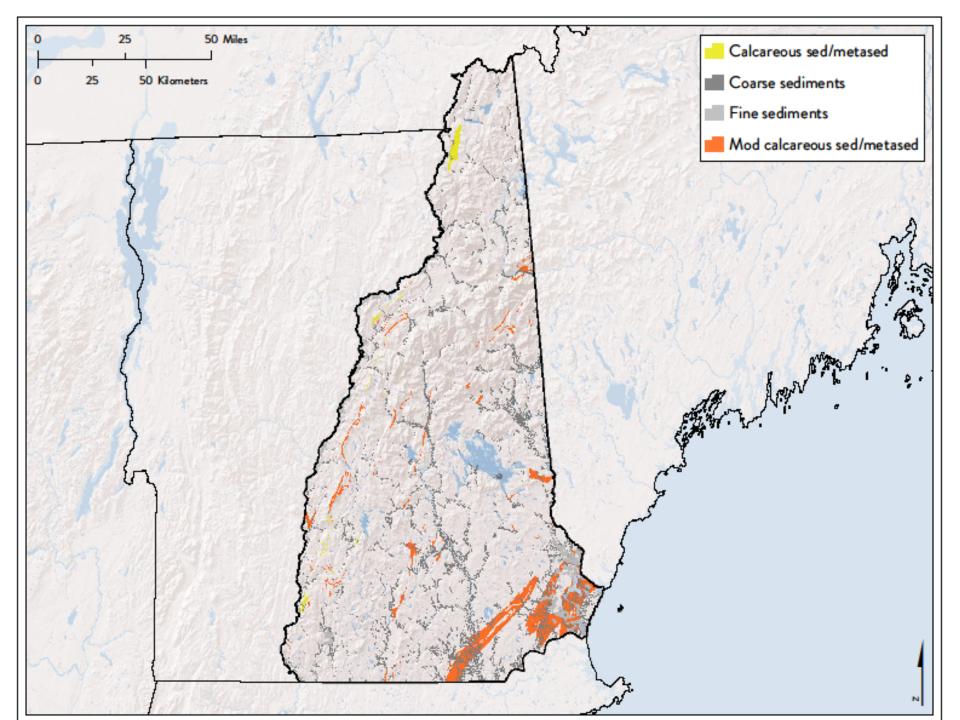
#### Index of Ecological Integrity

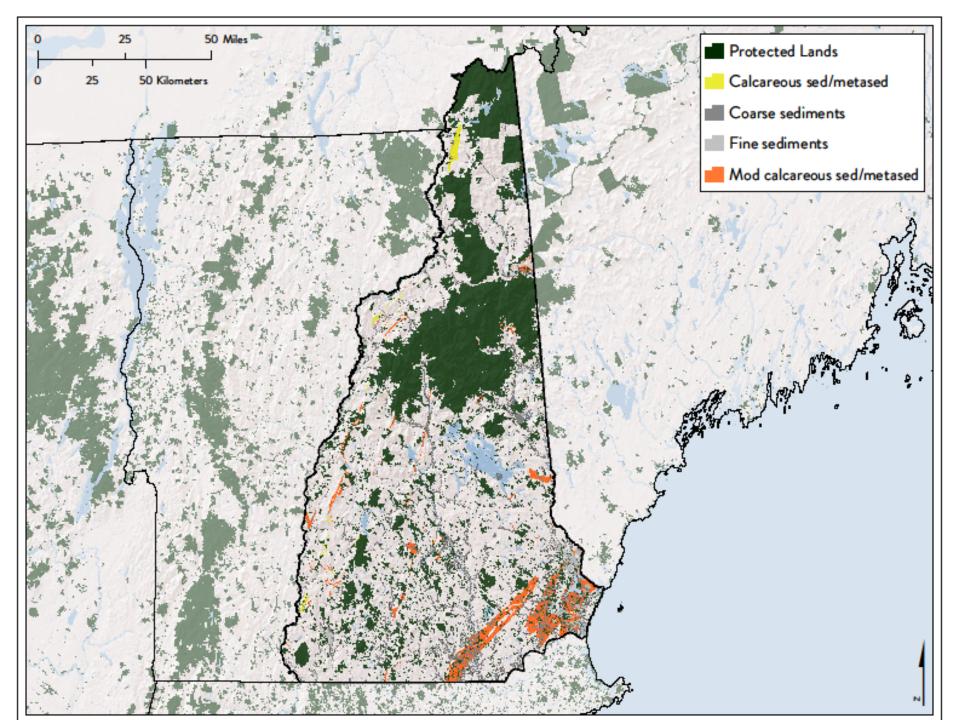










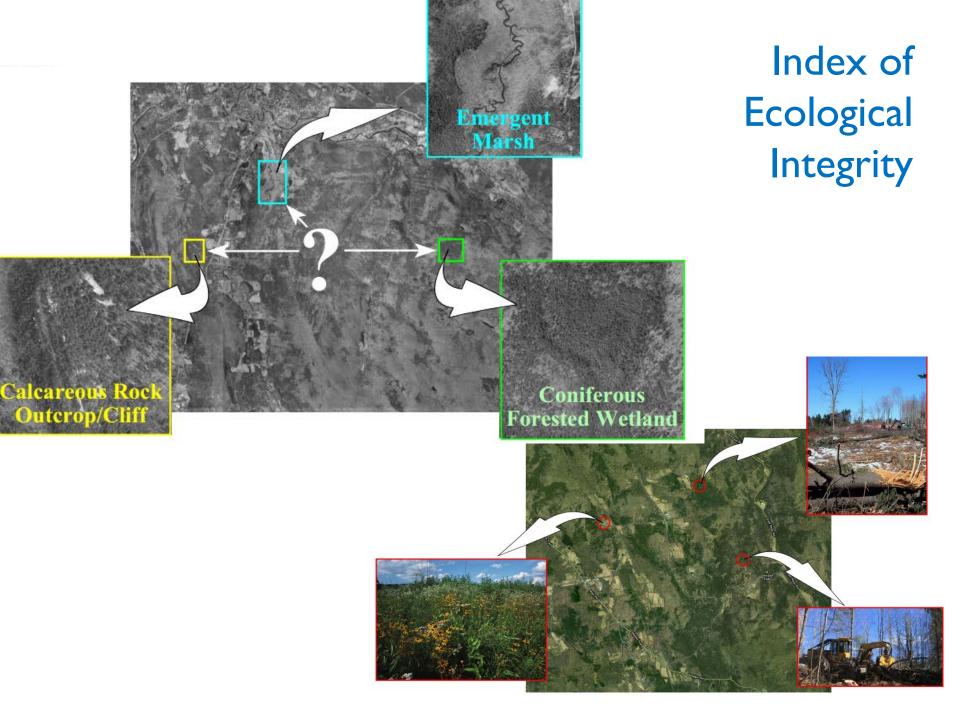




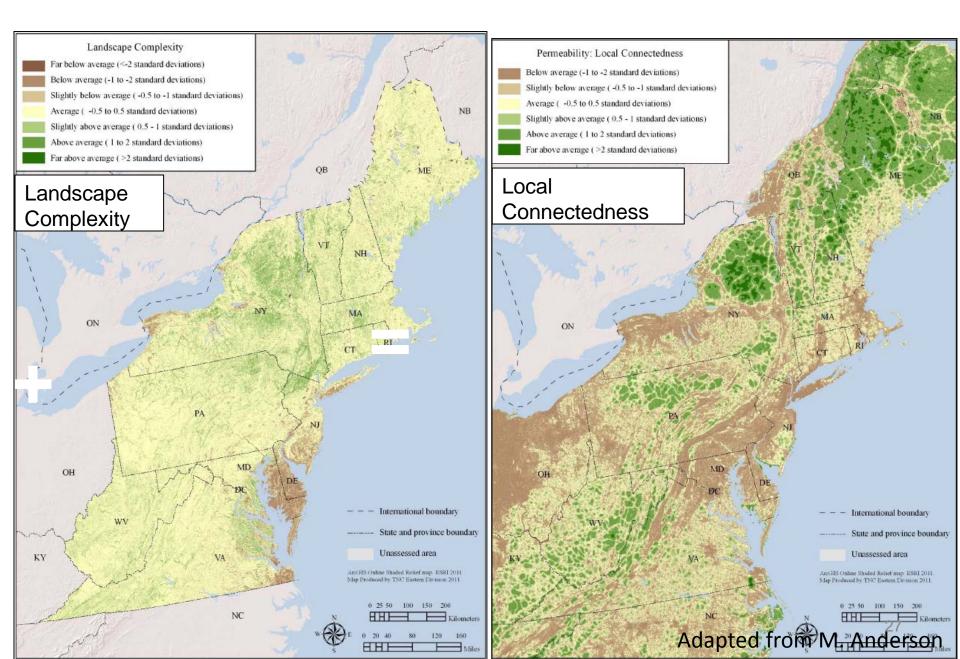
## Index of Ecological Integrity

<u>Intactness</u> – the freedom from human impairment (anthropogenic stressors), measured as a combination of a number of stressor metrics.

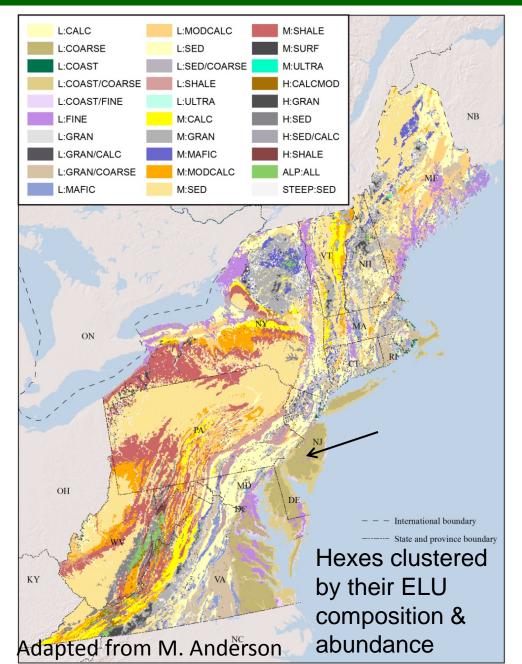
<u>Resiliency</u> – the capacity to recover from disturbance and stress, measured as a combination of the connectedness and similarity to neighboring natural areas.



## **TNC** Terrestrial Resilience



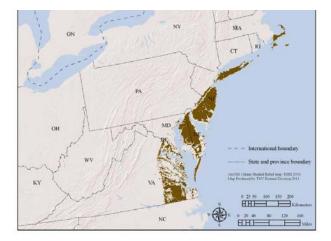
## **Northeast Geophysical Settings**

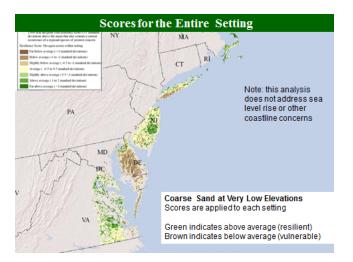


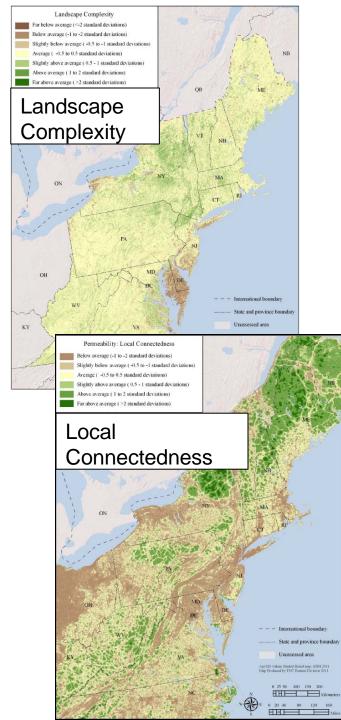
#### 30 types: Geology & Elevation

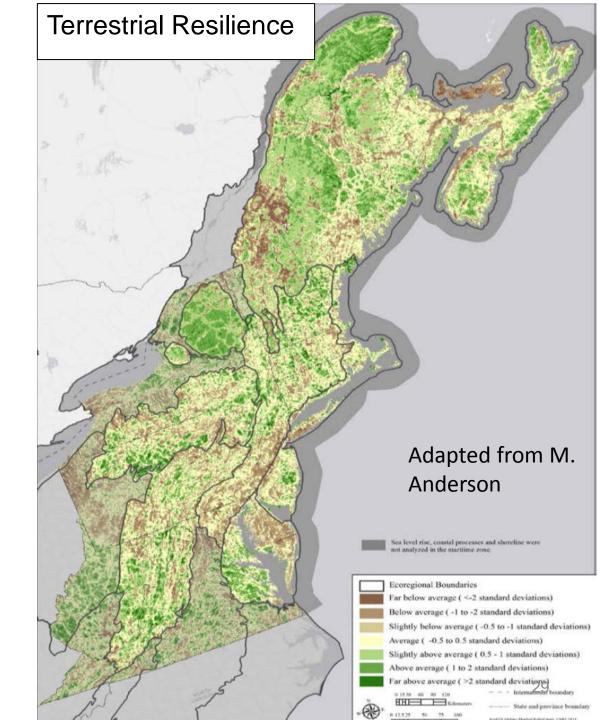
#### Coarse Sand at Low Elevation

Evaluate the relative resilience one setting at a time



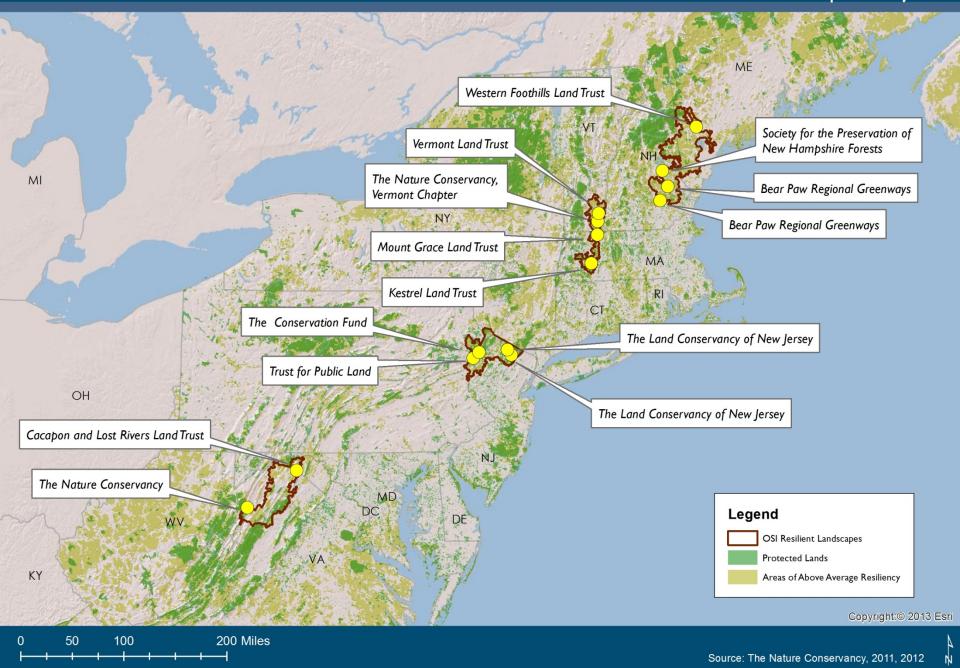








#### OSI Resilient Landscapes Initiative Capital Projects





#### **NEW ENGLAND**

Appalachian Mountain Club Mount Agamenticus to the Sea and the State of Maine Bear-Paw Regional Greenways Vermont Land Trust Massachusetts Audubon Society Highstead Vermont Land Trust

#### NEW YORK

Wildlife Conservation Society Columbia Land Conservancy Black Rock Forest Consortium

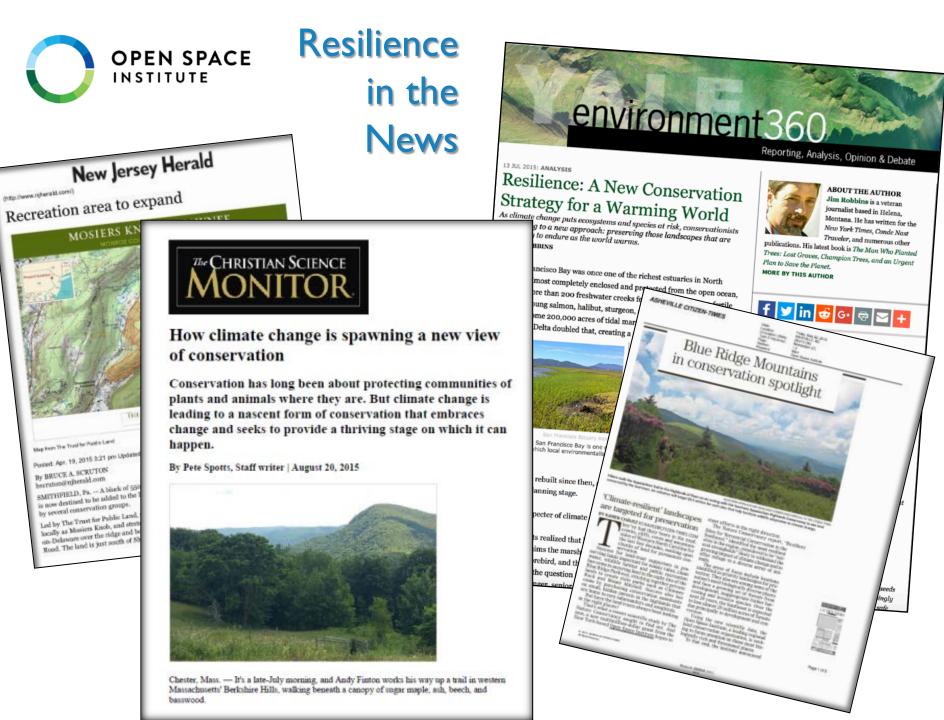
<u>NEW JERSEY</u> New Jersey Conservation Foundation



## CONSERVING NATURE IN A CHANGING CLIMATE:

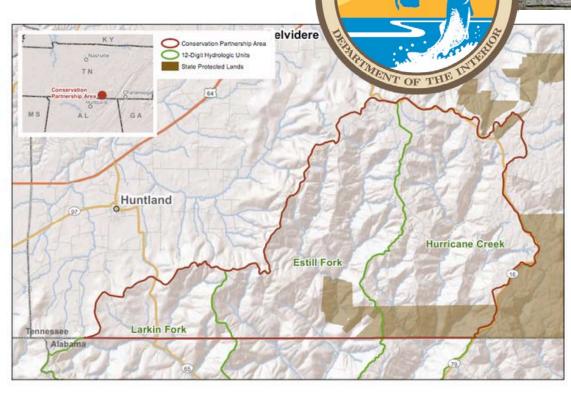
A Guide for Land Trusts in the Northeast







# Paint Rock Watershed, TN



U.S. SH & WILDLIFE

SERVICE

## GEORGE WASHINGTON National Forest

U.S. DEPARTMENT OF AGRICULTURE

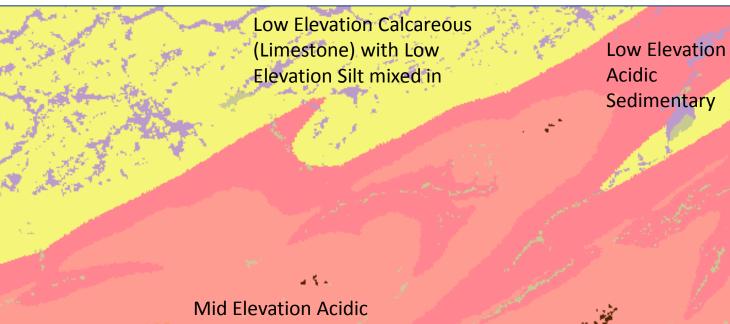




#### **Interactive Exercise**

- A. Geology vs Land use: Observations? (0,1)
- B. What's locally connected? Does the data agree? (1,2)
- C. What areas have a diversity of landforms? Does the data agree? (3,4)
- D. Does the final TNC Resilience score make sense? (5)
- E. How does the TNC Resilience and Index of Ecological Integrity (IEI) compare? (5,8)
- F. How do the habitat types influence the IEI scores? (7,8)

#### Geophysical Settings (Geology + Elevation)



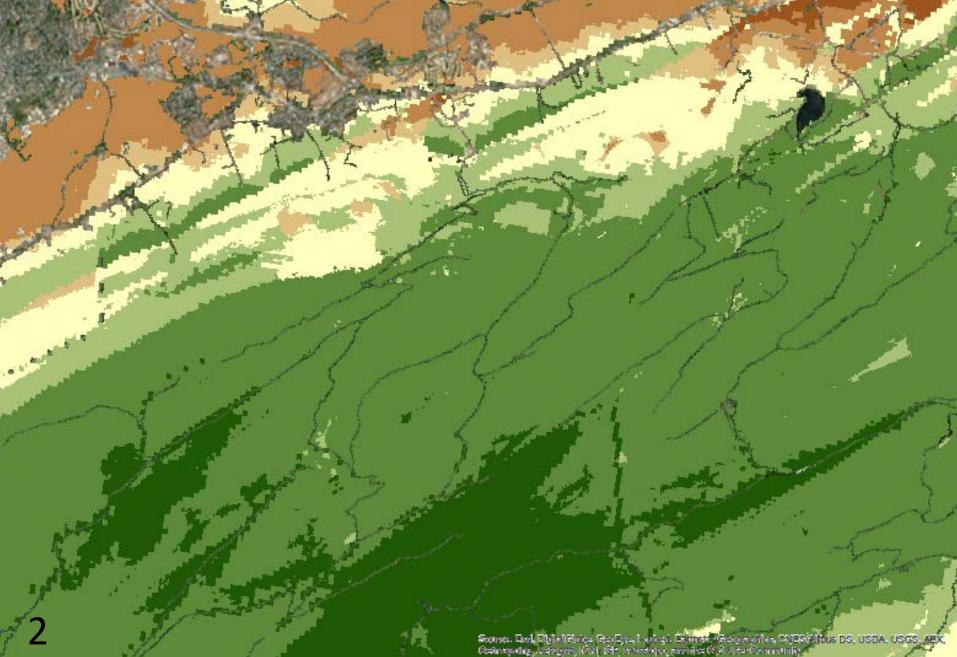
Mid Elevation Moderately
Calcareous (Limestone)

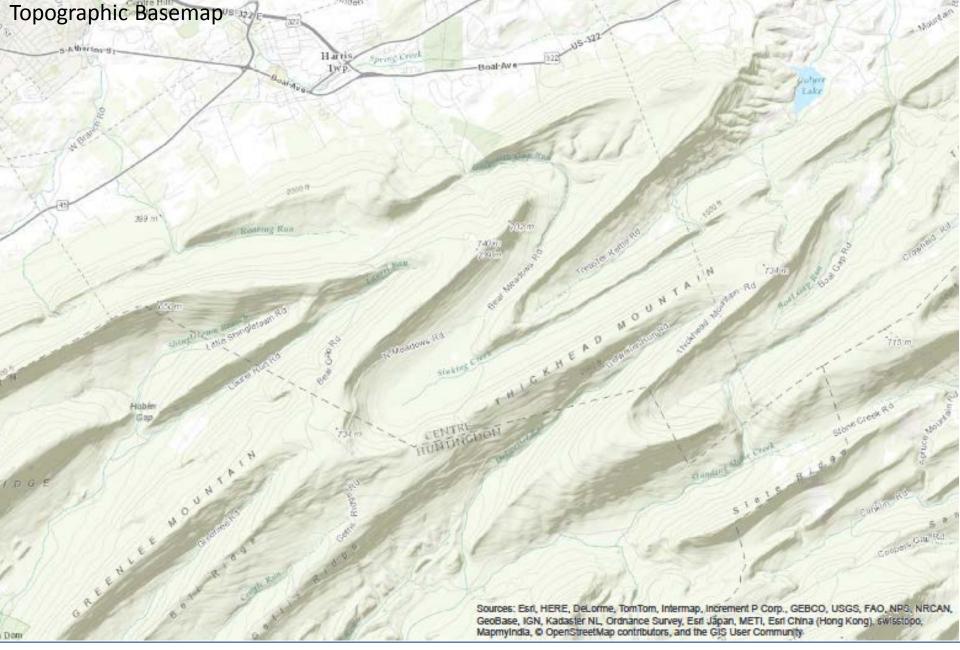
Sedimentary

Source: Esrl, Digital Globe, GeoEye, Houbed, Earthster Geographics, CNES/Airbus DS, USDA, USGS, AEX, Geimapping, Aerogrid, IGN, IGP, swisstopo, and the GLS User Community.



## Local Connectedness





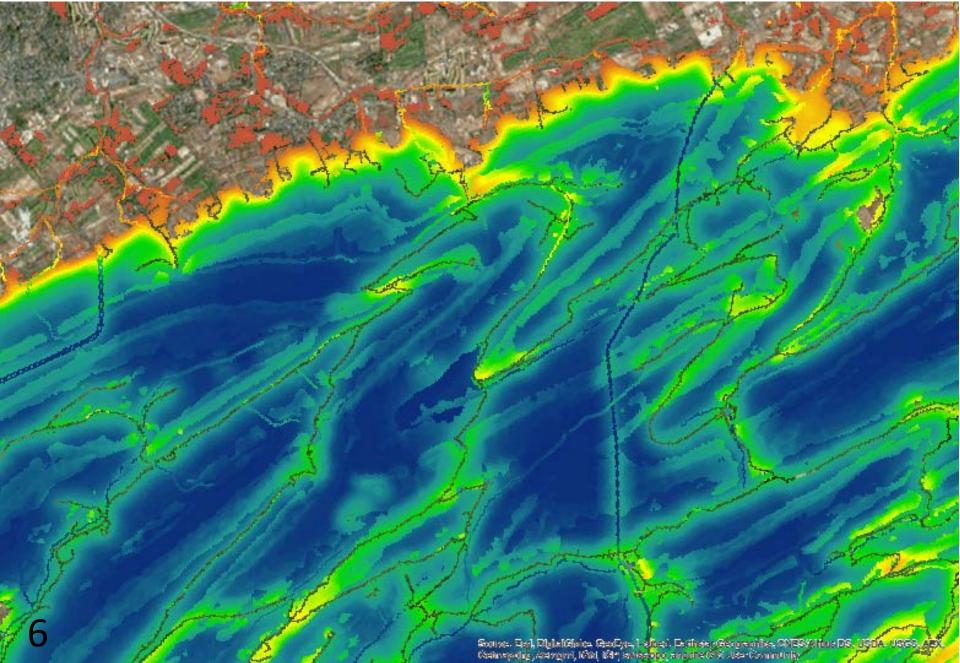
## Landscape Diversity (Landform Complexity included)

Sources: Esr, HERE, DeLorme, TomTom, Internap, Increment P Cord., GEBCO/USGS, FAO, NPS/NRCAU, GeoBase, IGN, Kadaster NL, Ordnance S (Nev, Esr, Japan, METI, Esr, China, Hong Corg), swissicoc Mapmyindia, & OpenStreetMap contributors, and the GIS User Community

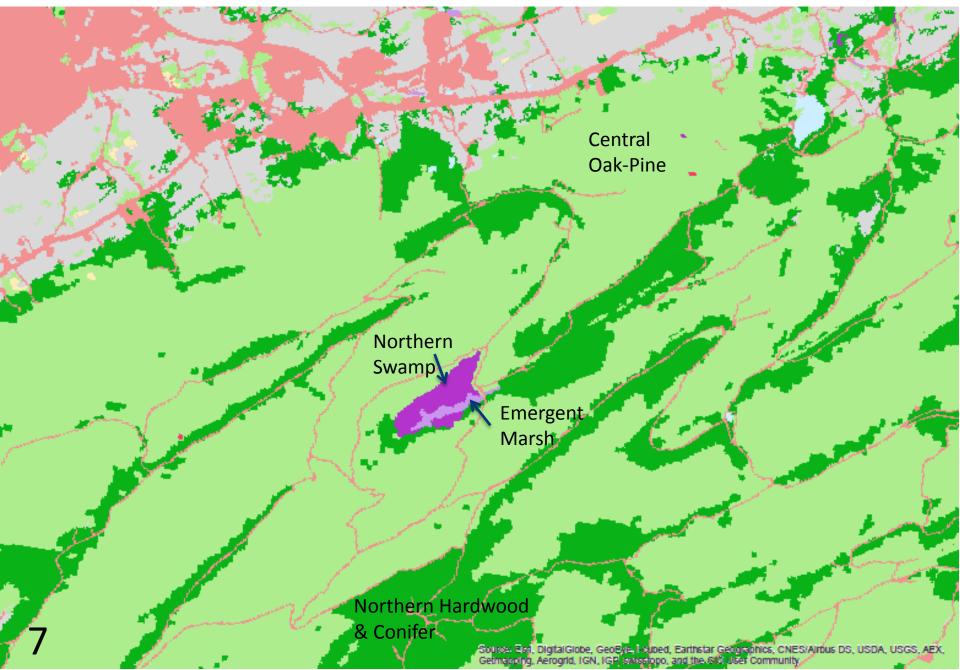
### Overall Resilience Score

Source: Bs/LDb1clGister GeoEve, Housed, Earthstar Geographics, CNES/Hous DS, USDA, USGS, CBX, Geographic, Aarogho, IGN-IGP sylestopo, and the CIS User Community

## Index of Ecological Integrity



## Habitat Types - Macrogroups





# Data Exercise

## CONSERVING NATURE IN A CHANGING CLIMATE:

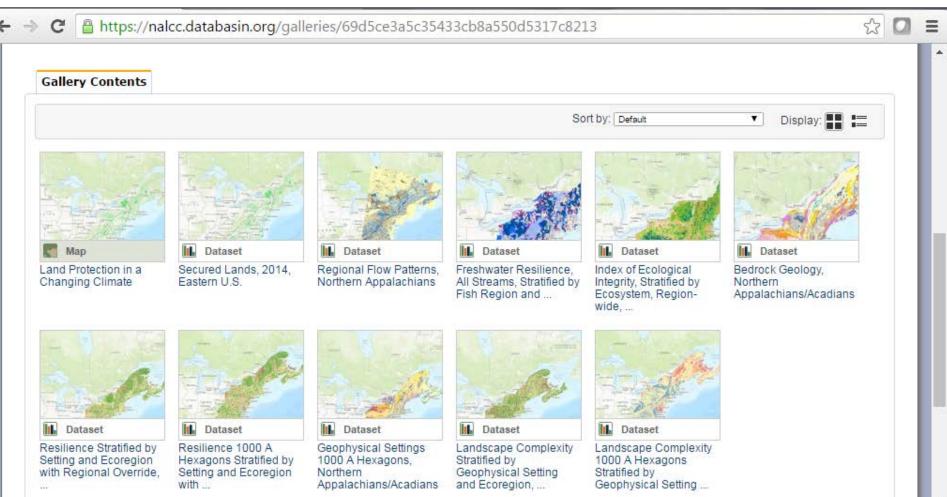
A Guide for Land Trusts in the Northeast



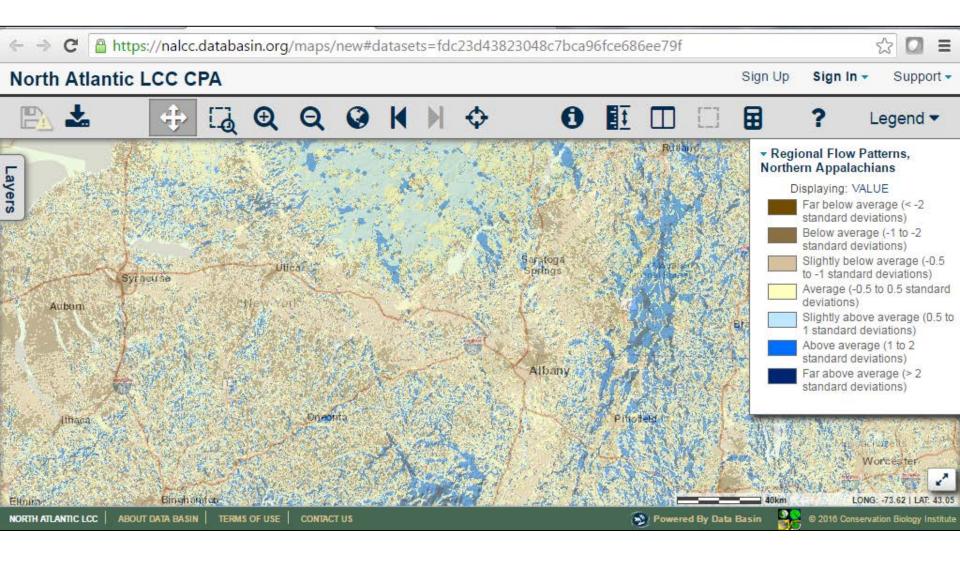


☆ 🖸 = C https://nalcc.databasin.org/galleries/ -Find a gallery that aggregates the information you need Search galleries **Recent Galleries** Land Protection in a Changing Climate Ask OSI for help with this. Two Deux North Atlantic LCC (Last modified April 27, Countries Pays 2016) One Una allery Gallery Gallery **Gallery** Gallery Appalachian LCC Two Countries One Designing Connect the Sustainable Forest Connecticut Habitats and Landscapes Species: Increasing Datasets Gallery Gallery Gallery Gallery 1 Gallery -Gallery 10 Gallery Ecoregional Wildlands Network Resilience to Priority Locations for Human Footprint Future Human Ecoregional Design Climate Change and Conservation Action Footprint Connectivity Models Assessment Landscape Permeability





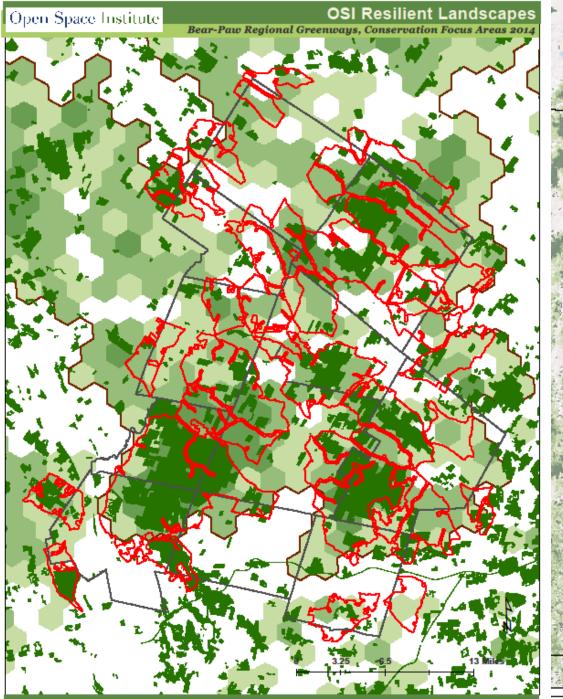


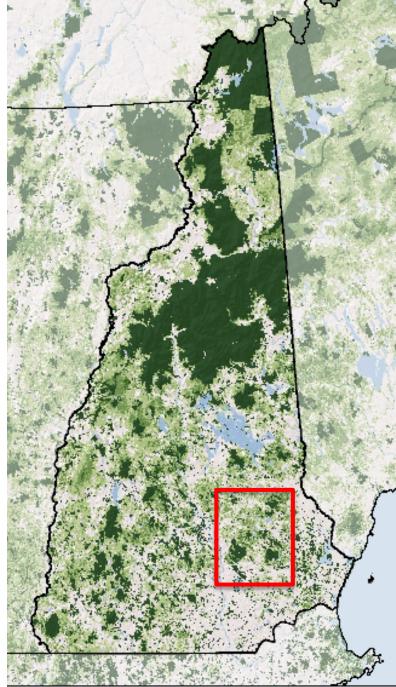


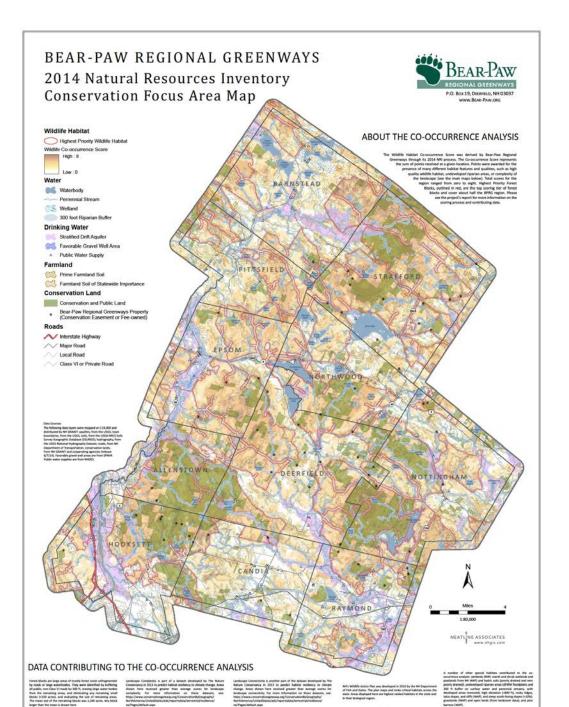


# Bear Paw Regional Greenway

Climate Resilient Conservation Plan

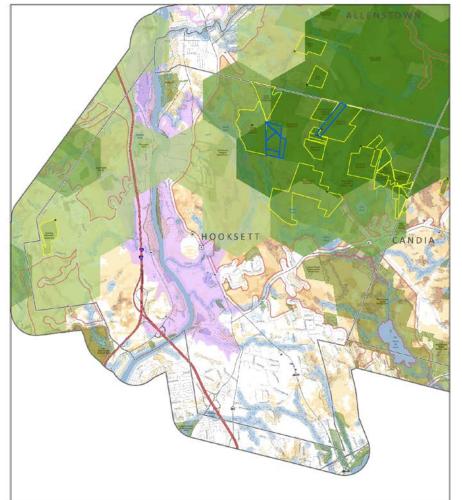






#### **BEAR-PAW REGIONAL GREENWAYS** 2014 Natural Resources Inventory





#### BEAR-PAW CONSERVATION FOCUS AREAS

Water

Waterbody

Farmland

Percenial Steam

🔵 300 foor Reparan Buffer

C Prime Farmland Sol

Internitional Stream (K) Wotland

#### Hooksett, NH

#### Wildlife Habitat Highest Priority Wildlife Habitat



#### **Drinking Water** Stratified Drift Agulfer

Favorable Gravel Well Area a Public Water Supply

#### BEAR-PAW REGIONAL GREENWAYS P.O. Box 19, DEERFIELD, NH 03037 www.BEAR-PAW.ORG



NEATL NE ASSOCIATES

Roads

Conservation Land

M Interstate Highway

Nater Road

Conservation and Public Land

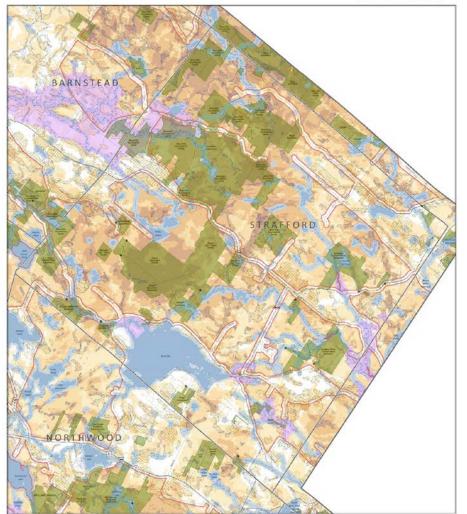
Bear-Pow Regional Greenways Property (Conservation Easement or Free-owned)





#### **BEAR-PAW REGIONAL GREENWAYS** 2014 Natural Resources Inventory





#### BEAR-PAW CONSERVATION FOCUS AREAS

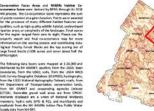
#### Strafford, NH



#### BEAR-PAW REGIONAL GREENWAYS P.O. Box 19, DEERFIELD, NH 03037 NEATL NE ASSOCIATES WWW.BEAR-PAW.ORG

#### Conservation Land Conservation and Public Land Bear-Paw Regional Greenways Property (Conservation Easement or Fee-owned) . international Stream Roads M Interstate Highway Major Road / Local Road Familand Soil of Statewid Importance Class VLOT PRVATE ROAD

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← → 🗙 🗋 climatechange.lta.org 53 Conservation in a Changing Climate Get Started Land Types Climate Impacts Regions Case Studies Library About Take a Self Assessment Build Resilience learn · Plan - Climate Change and Land Trusts Adapt Featured Case Study: In eastern Maine Inspire Downeast Lakes Lake Trust's carbon project covers more than 19,000 acres of the trust's 33,700 Farm Cove Community Forest. The project has registered nearly 200,000 offsets. Each offset is equivalent to one ton of carbon dioxide. Read More » Downeast Lakes climatechange.lta.org/get-started/





# One page summary:

What is your vision for developing a climaterelevant plan for future acquisitions, how would you plan to use it and how would it fit into existing strategic planning efforts?





## Criteria for Circuit Rider Assistance

- $\checkmark$  Participation in today's training
- Use of an existing strategic conservation plan
- Exposure to climate resilience concepts
- □ Staff resources, including available time and GIS capacity
- □ Board & staff commitment to addressing climate change
- Leverage of resources (in kind or otherwise)
- □ Potential to inform the work of partners
- Importance of the geographic focus area for increasing resilience