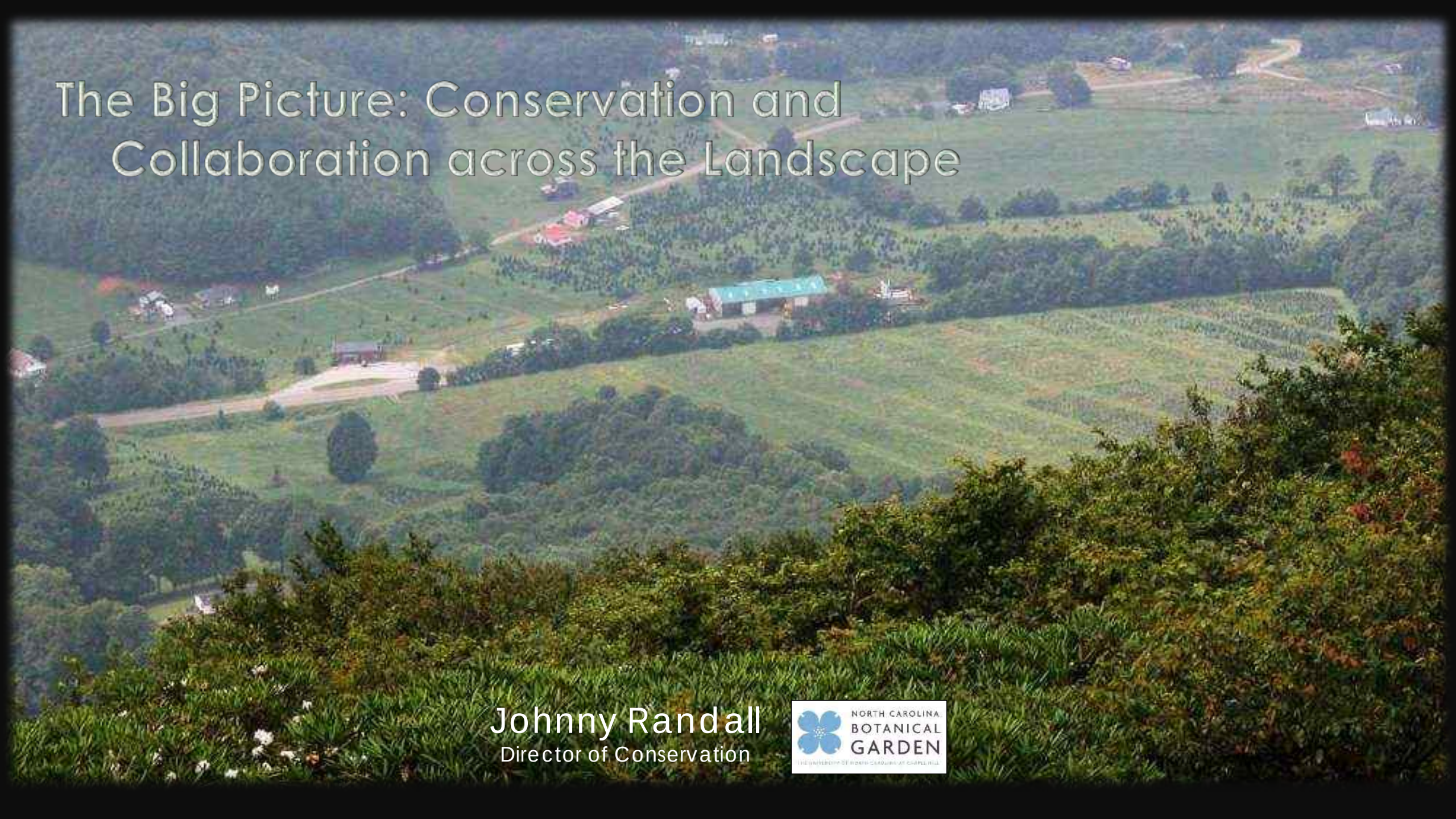
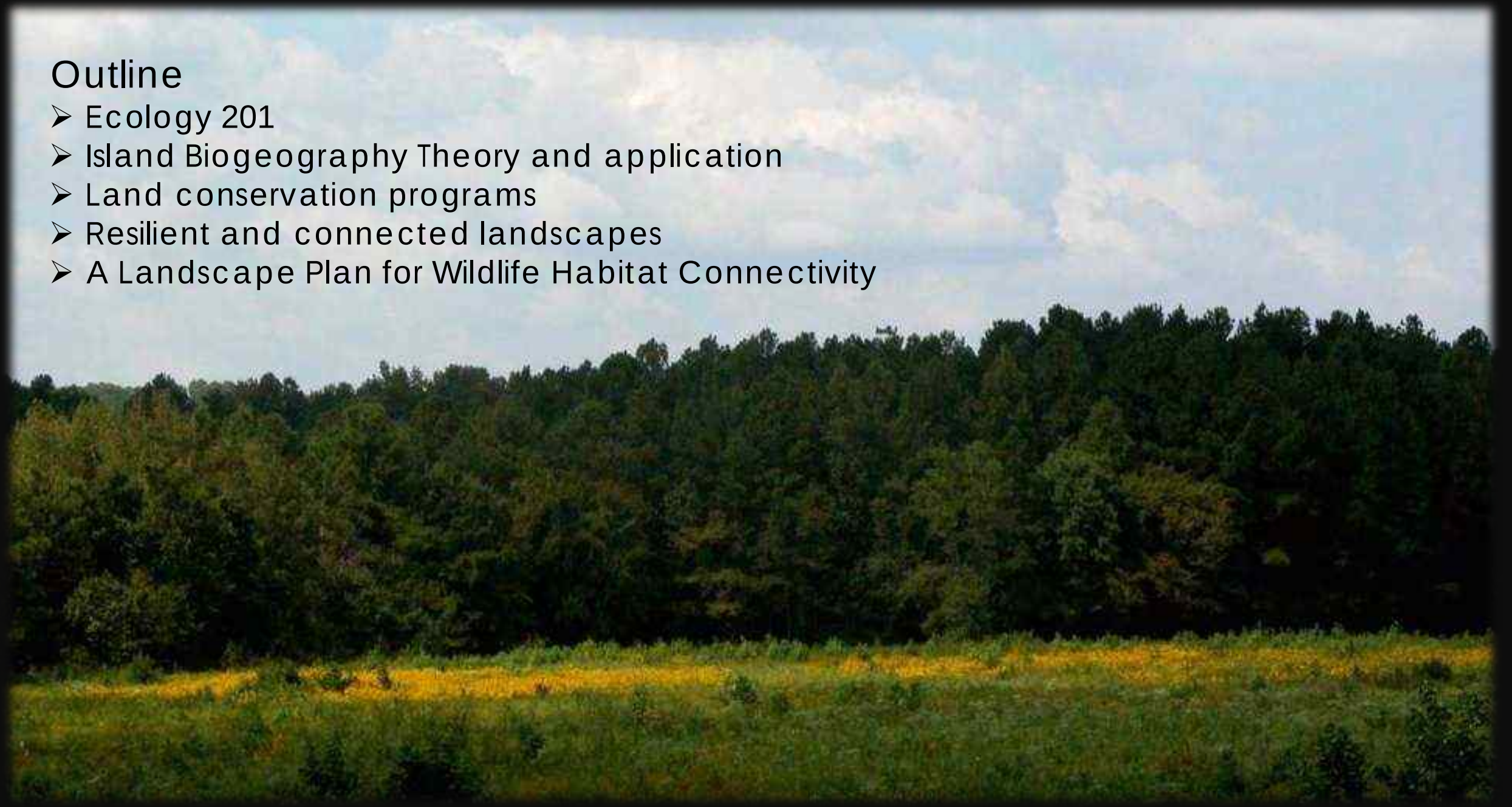
# The Big Picture: Conservation and Collaboration across the Landscape



Johnny Randall
Director of Conservation

NORTH CAROLINA BOTANICAL GARDEN



# Outline

- Ecology 201
- Island Biogeography Theory and application
- Land conservation programs
- Resilient and connected landscapes
- A Landscape Plan for Wildlife Habitat Connectivity

# PARTNERS IN CONSERVATION


New Hope Creek Corridor Advisory Committee








NatureServe







# Acknowledgements

## Dr. Julie Tuttle
## Plant Ecologist and Project Coordinator


The Partners for Green Growth Program of the North Carolina Wildlife Resources Commission and Orange County for funding this project.

The Botanical Garden Foundation for administering the project.

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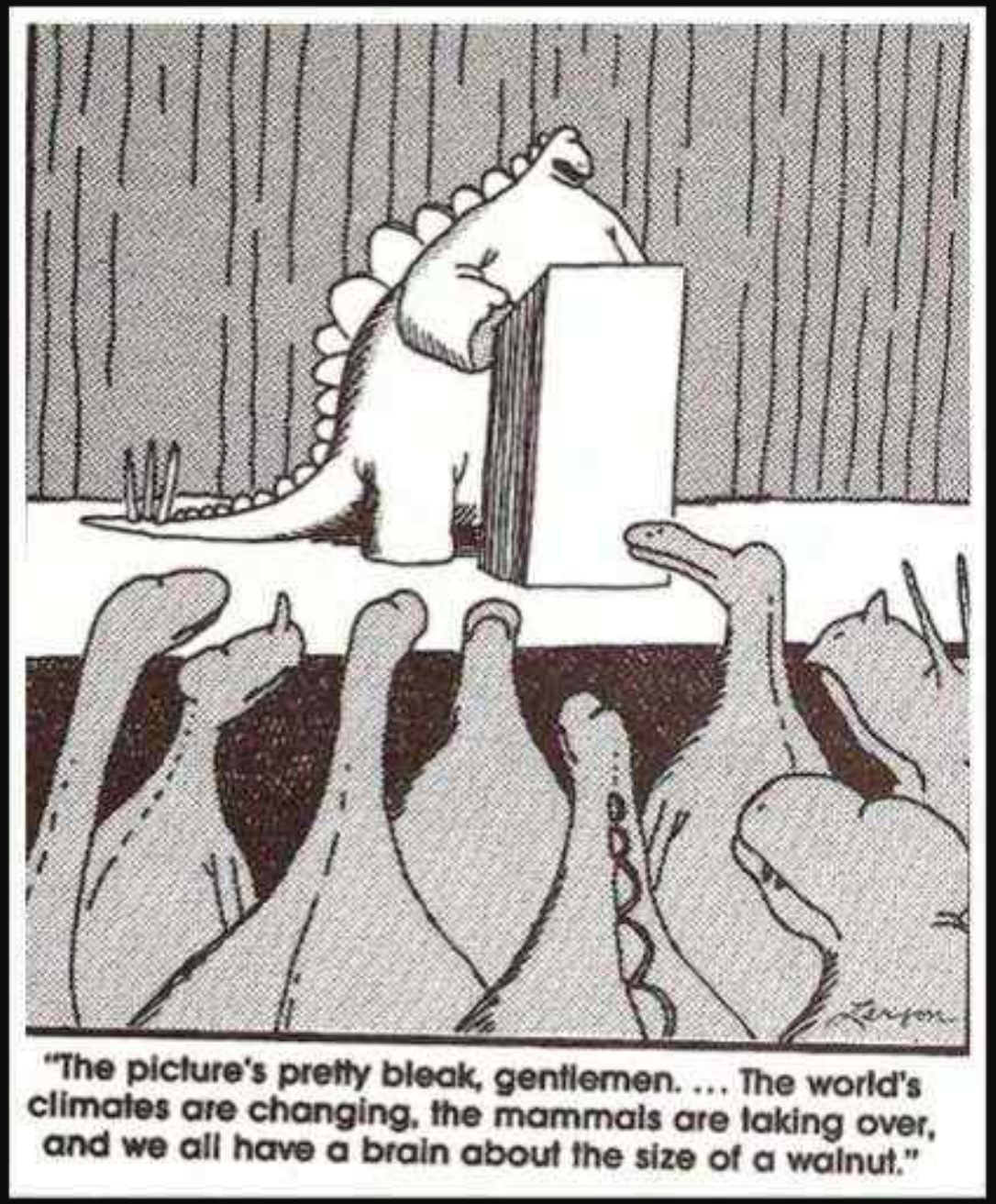
Members of the Eno-New Hope Landscape Conservation Group for sharing their time, expertise, insight, avice, and collaboration on all aspects of this project, especially:

| | |
|---|---|
| Misty Buchanan[2] | North Carolina Natural Heritage Program |
| Celeste Burns[13] | Durham County Open Space & Real Estate |
| Brian Buzby | North Carolina Conservation Network; Durham Open Space & Trails Commission |
| Sara Childs[12] | Duke Forest, Duke University; Eno River Association Board |
| Deborah Fowler | Wake County Parks, Recreation & Open Space |
| John Goebel | New Hope Creek Corridor Advisory Committee |
| Steve Hall | Biologist/Ecologist; retired North Carolina Natural Heritage Program |
| Ed Harrison | New Hope Creek Corridor Advisory Committee |
| Bob Healy | New Hope Creek Corridor Advisory Committee; Duke University |
| Bo Howes[13] | Triangle Land Conservancy |
| John Kent | New Hope Creek Corridor Advisory Committee; StreamWatch |
| Jane Korest | Durham County Open Space & Real Estate |
| Kim Livingston[13] | Eno River Association |
| Brooke Massa[123] | North Carolina Wildlife Resources Commission; Chatham Conservation Partnership; PlanWake Advisory Committee |
| Olivia Munzer[2] | North Carolina Wildlife Resources Commission |
| Milo Pyne | NatureServe; Eno River Association Board |
| Johnny Randall[123] | North Carolina Botanical Garden, UNC-Chapel Hill |
| Chuck Roe | Southern Conservation Partners; Wake Open Space & Parks Advisory Committee; PlanWake Advisory Committee |
| Bradley Saul | Orange County Commission for the Environment |
| Jenna Schreiber | Duke Forest, Duke University |
| Pete Schubert | Eno River Association Board |
| Rich Shaw[3] | Orange County Natural & Cultural Resources; New Hope Creek Corridor Advisory Committee |
| Tom Struhsaker | Conservation Biologist; Duke University |
| Ron Sutherland[2] | Wildlands Network |
| Julie Tuttle[23] | Ecologist; UNC-Chapel Hill |
| Allison Weakley[23] | Town of Chapel Hill Stormwater Management; Chatham County Planning Board; Chatham Conservation Partnership |
| Travis Wilson | North Carolina Wildlife Resources Commission |




*We have Star Wars technologies –*
*Medieval political systems –*
*and Stone Age emotions.*

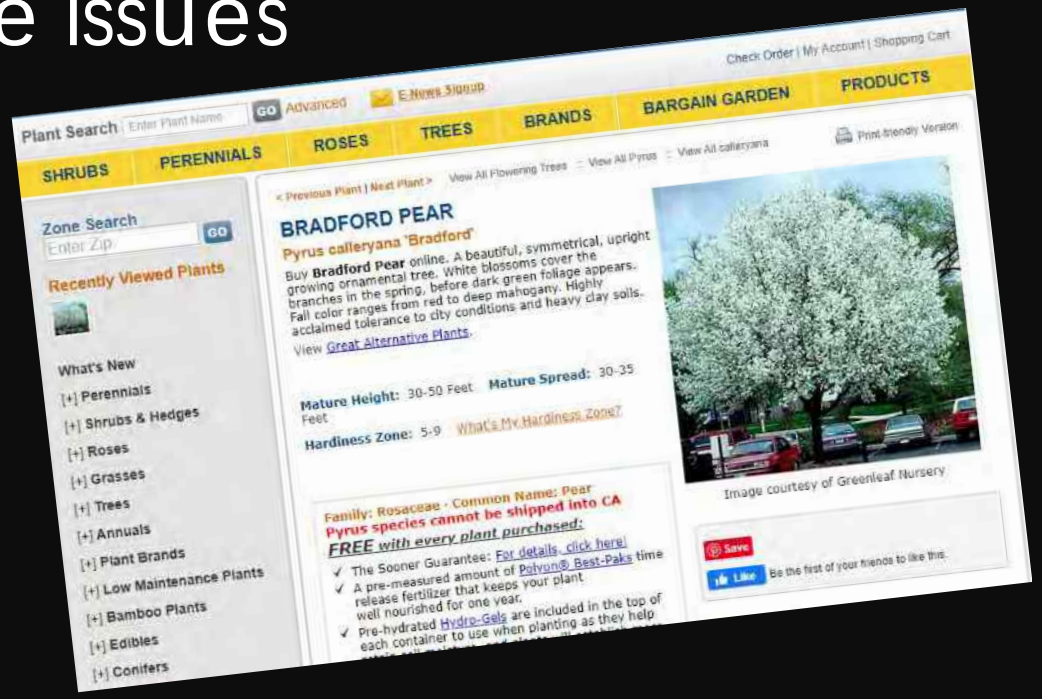
EO Wilson

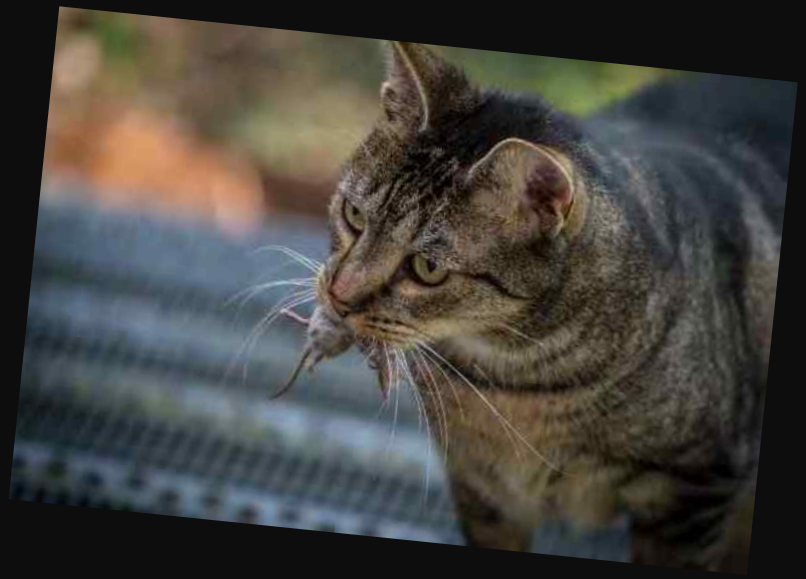
Bird’s Eye View

Dallas TX
metropolitan area

May 5, 2018

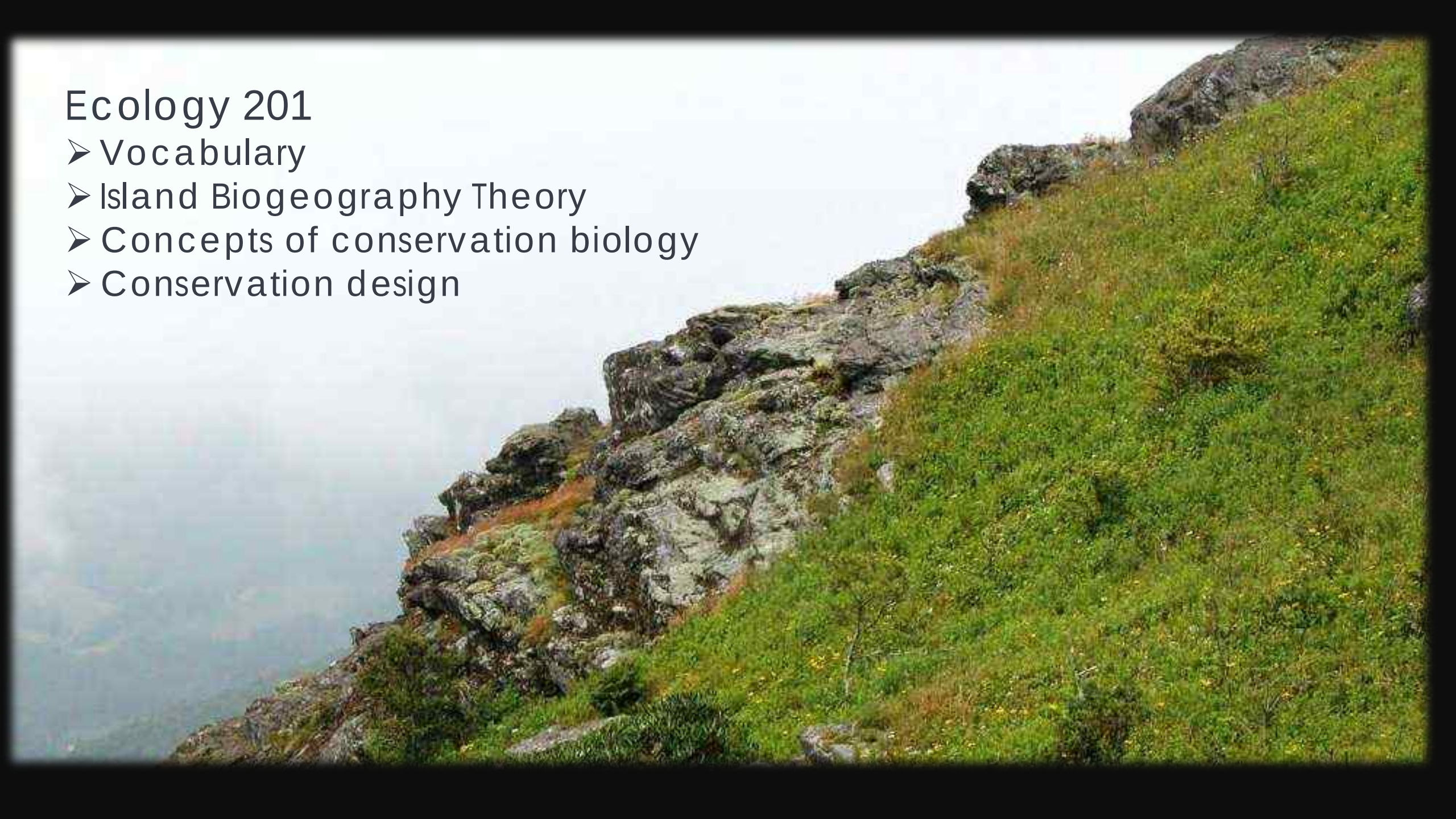
# The Anthropocene and pervasive issues

# Ecology 201

- Vocabulary
- Island Biogeography Theory
- Concepts of conservation biology
- Conservation design



# Vocabulary

Corridor: Avenues along which wide-ranging animals can travel, plants can propagate, genetic interchange can occur, populations can move in response to environmental changes and natural disasters, and threatened species can be replenished from other areas.

The Ninth Circuit Court of Appeals, 1997

Vagility: The degree to which an organism or taxon can or does move or spread within an environment.

Core and Matrix

Connectivity: The extent to which a species or population can move among landscape elements in a mosaic of habitats.

Hilty, Lidicker, and Merenlender, 2006

Refugia

Guild (or ecological guild): is any group of species that exploit the same resources, or that exploit different resources in related ways

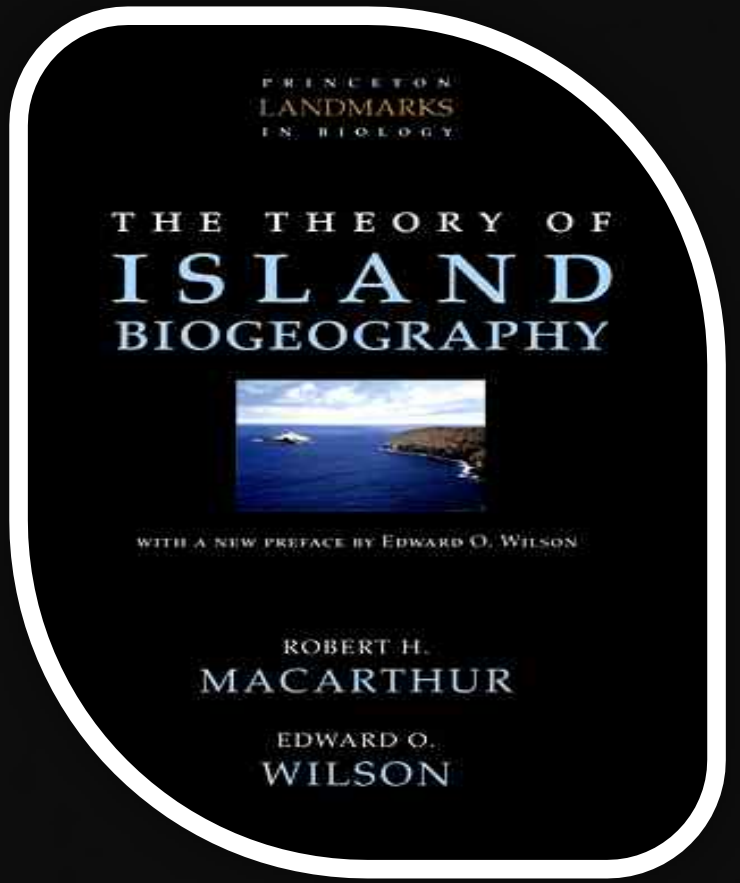
Patch

Barrier

Permeability: the quality of a heterogeneous land area to provide for passage of animals

Resilience

# ISLAND BIOGEOGRAPHY AS A FOUNDATION PARADIGM IN CONSERVATION DESIGN



# Island Observations

Islands have fewer species than samples within contiguous continental areas based on size

Isolated islands have fewer species than less isolated islands of the same size

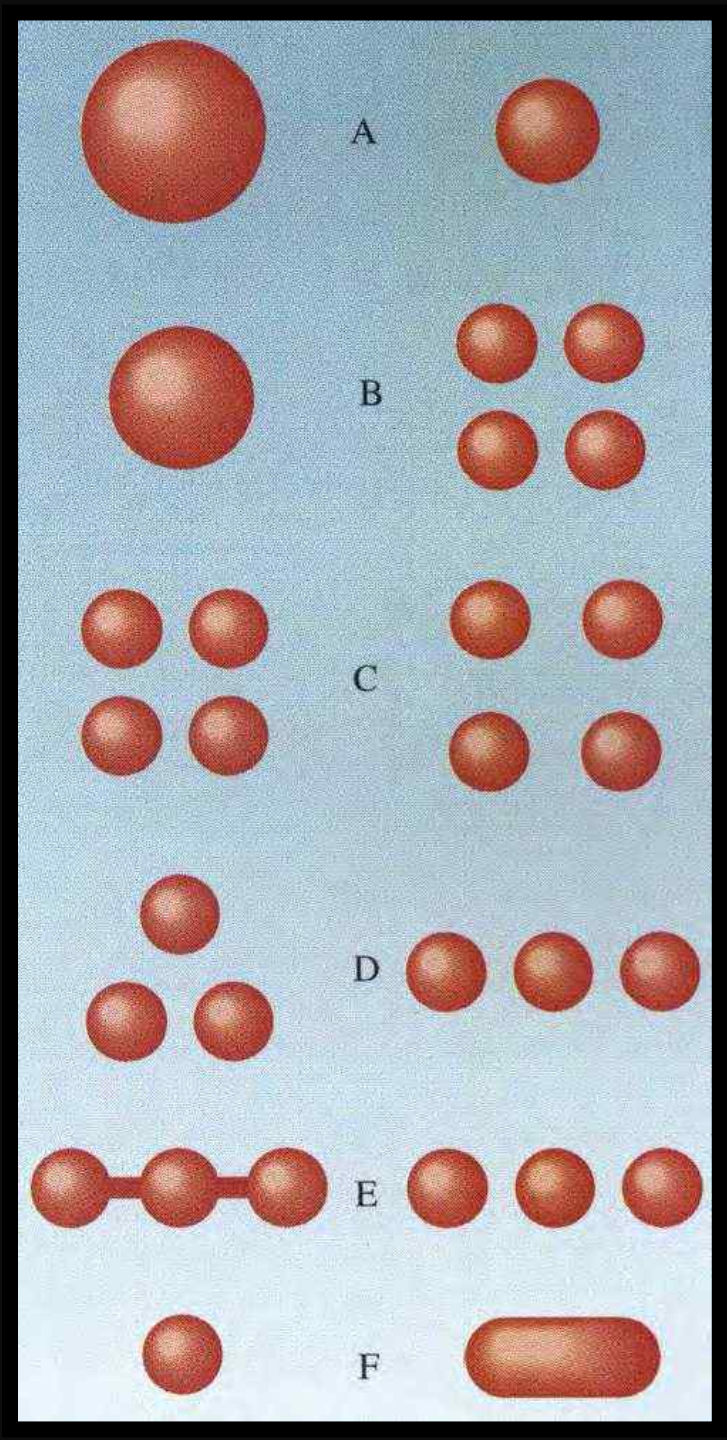
Islands have even fewer species as they get smaller

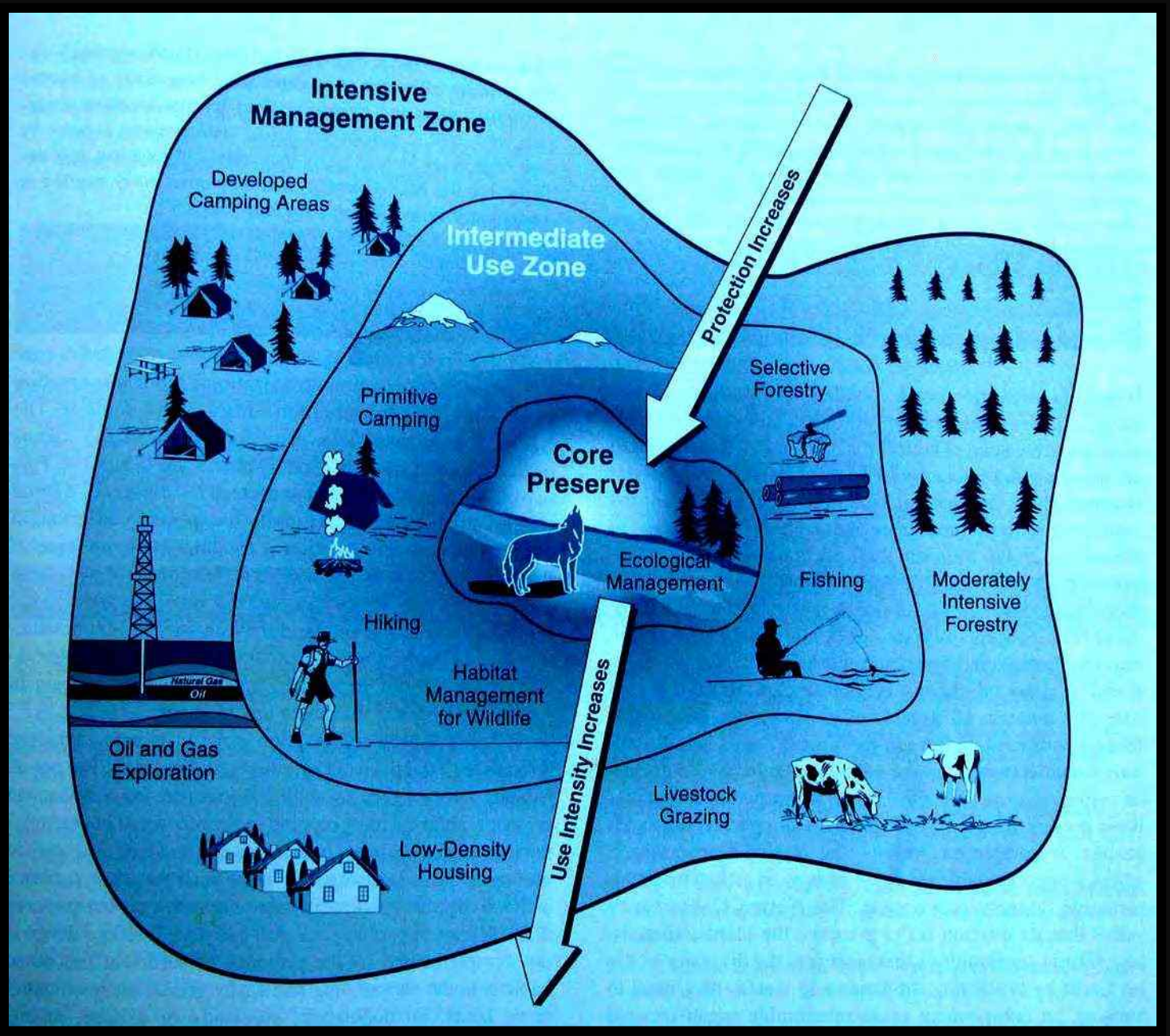
# HABITAT LOSS AND FRAGMENTATION

- A large block of contiguous habitat is broken into numerous smaller patches
- The remaining patches decrease in size and number
- Patch distance (and isolation) increases
- Patch habitat quality decreases
- Edge effects increase
- All patches more vulnerable to "invasion"

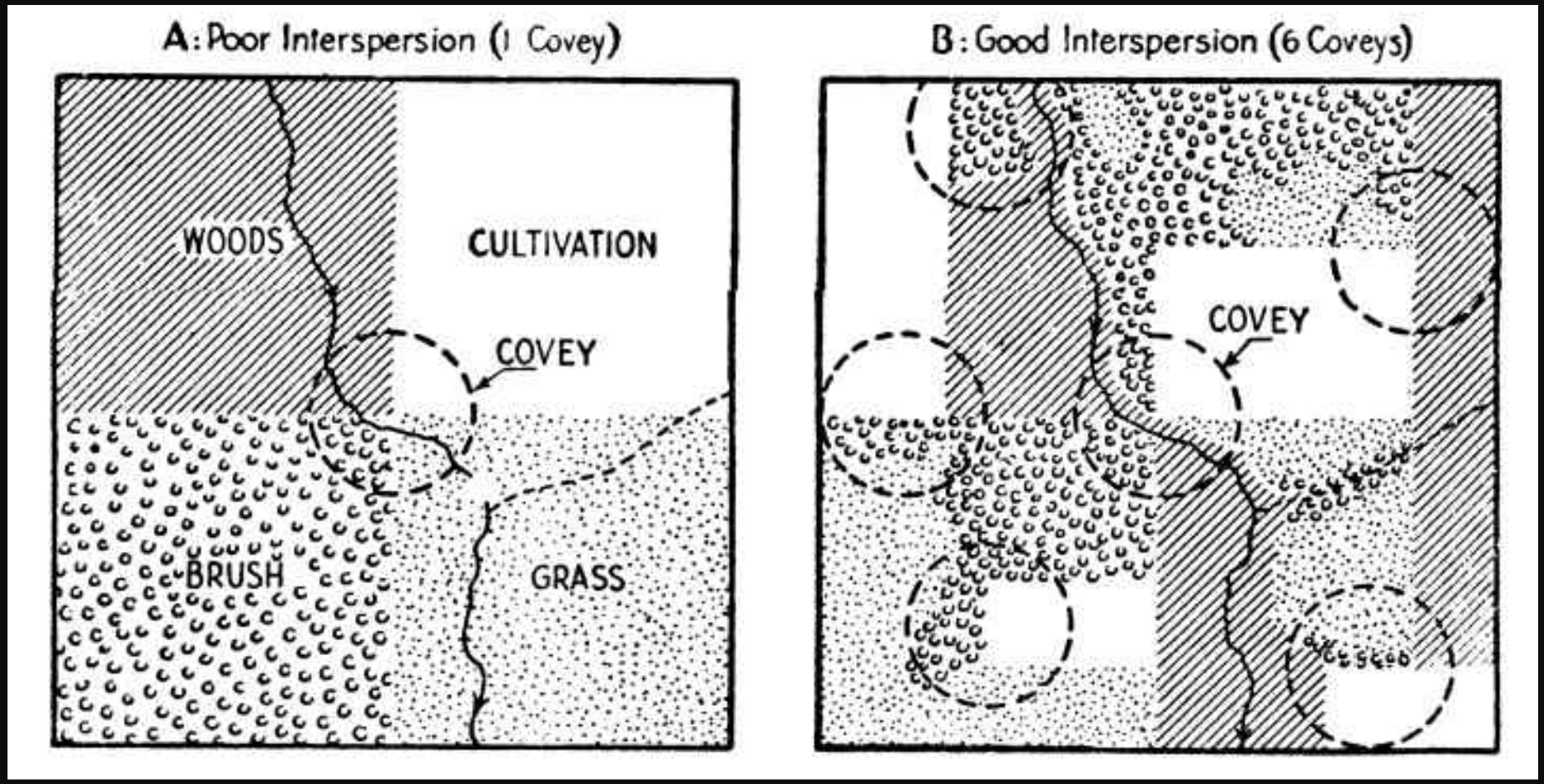
# IBT & NATURE PRESERVE DESIGN

- Large is better than small
- Undivided is better than divided
- If divided, close is better than far
- If divided, distances should be equal
- Corridors are better than no corridors
- Circular is better than narrow
  (low perimeter to area ratio)
  - Edge effects






Old school preserve design: *We can have it all!*




# LEOPOLD 1933: CONSERVATION DESIGN AND BOBWHITE QUAIL MANAGEMENT

# Triangle Green Print - 2005

*The Triangle GreenPrint Project (Phase 3)*

**Triangle GreenPrint Progress Report**

*Tracking Progress Toward Creating a Linked Regional Green Space Network in the Triangle*

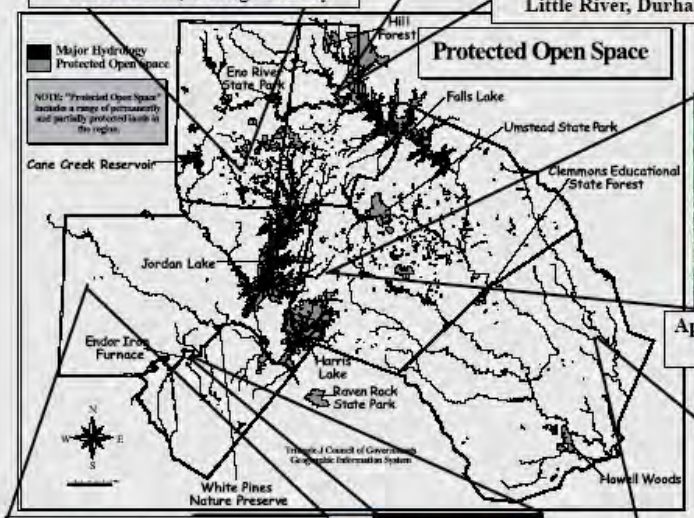
*Triangle J Council of Governments* tlc *Triangle Land Conservancy*

*North Carolina Department of Environment and Natural Resources*

(September 2005)

Cheek Farm, Orange County

Little River, Durham County




Apex Park System, Wake County

Working Lands, Chatham County

Johnston County Park

Endor Iron Furnace, Lee County

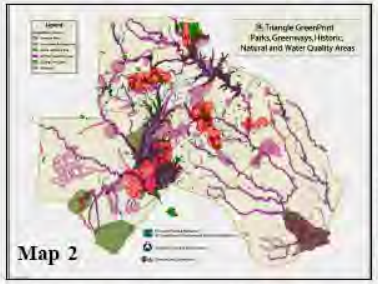
*Triangle GreenPrint Progress Report* *September 2005* 7

Map 1

**Existing Protected Green Space**

**Table 1: This table calculates the rate at which land is currently being protected in the Triangle.**

| | |
|---|---|
| Total Acres in Six-County Study Area | 2,125,500 |
| Estimated Protected Green Space on June 30, 2002 | 163,600 |
| Estimated Protected Green Space on Dec. 31, 2004 | 170,600 |
| Change in Protected Acres over 2.5-Year Period | 7,000 |
| Est. Avg. Annual Protection Rate During that Period | 2,800 |
| Current Protected Land as % of Total Acreage in Triangle | 8% |

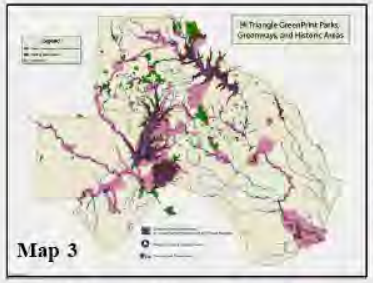


Map 2

**Full Triangle GreenPrint Vision**

**Table 2: This table calculates the amount of land that would need to be protected in order to implement the full Triangle GreenPrint vision for a linked regional network of green space.[3]**

| | |
|---|---|
| Land in GreenPrint Areas | 771,400 |
| Minus Existing Protected Green Space in this Area | 131,300 |
| Minus Groundwater Recharge Areas | 64,500 |
| Minus 90% of Regional Connector Search Areas | 67,100 |
| Minus 90% of Special Landscapes | 57,600 |
| Minus 80% of Park Connectors | 20,200 |
| Plus Additional Unprotected Natural Heritage Areas | 18,900 |
| Plus 5% of Current Use Value Farm and Forest Land | 37,000 |
| Total Target Land Protection Acreage | 486,600 |
| Protected Land as % of Total Acreage in Triangle | 31% |



Map 3

**Backbone of GreenPrint Vision**

(Maps by September Barnes, TJCOG)

**Table 3: This table calculates the amount of land that would need to be preserved in order to protect the backbone of a linked regional network of green space over the next generation (25 years).[4]**

| | |
|---|---|
| Land in GreenPrint Parks, Greenways, Historic Areas | 365,100 |
| Plus Wake Neuse Corridor | 3,000 |
| Minus Existing Protected Green Space in this Area | 105,200 |
| Minus Portion Just Outside Region | 16,100 |
| Minus 80% of Primary Park Connectors | 32,400 |
| Minus 80% of Secondary Park Connectors | 28,300 |
| Minus 67% of Let 'Lones | 28,200 |
| Total Target Land Protection Acreage Over 25 Years | 157,900 |
| Protected Land as % of Total Acreage in Triangle | 15% |
| Avg. Annual Regional Land Protection Target | 6,300 |
| Target Protection Rate Divided by Current Rate | 2.2 |

(Data Analysis by Triangle J Council of Governments)

*Triangle GreenPrint Progress Report* *September 2005* 3

As I leave my fourth and last term as governor of the great state of North Carolina, I declare that we shall preserve one million acres by 2010!

# North Carolina Million Acre Initiative

- Home
- Our objectives
- Our progress
  - Million Acre lands
  - Data
  - Annual reports
- Funding and protection programs
- Internet resources
- Contact us

## Our progress

When the Million Acre Initiative began in January 1999, approximately 2.8 million acres — 9% of the state — were permanently protected in North Carolina. At least 112,000 additional acres have been permanently protected during the initiative's first two years. Upon reaching the million acre goal in 2009, North Carolina will contain at least 3.8 million acres of land are permanently protected through the federal, state and local governments, and private, nonprofit groups. That's approximately 12% of the state's 31 million acres of land.

Below are links that track our progress toward one million acres. Click on a selection for details.

Million Acre lands
Click here to read about some of the lands that are protected as part of the Million Acre Initiative.

Data
Click here for a map of permanently protected lands in North Carolina, as well as a pie chart showing who owns these lands.

Reports
Click here to read the initiative's annual reports.


The second iteration of Million-Acre Initiative


**Land for Tomorrow is a statewide coalition of community leaders, conservation, and wildlife organizations, and parks and recreation advocates with a common goal: increasing land and water conservation in North Carolina.**

Contact Us | Directions | Fast Facts

cleanwater
MANAGEMENT TRUST FUND

Home | About CWMTF | Applicants | Grant Recipients | Trustees | Staff | Funded Projects | Media & Reports

**Quick Links**

What's New:

- 2016 Applications Posted! Click here to sign up to receive CWMTF announcements by email

Board awards over $19M awarded to 2015 projects. See more below.

Board Meetings

Next Meeting: March 2nd

- 2016 Meeting Schedule

Committee Meetings

No meetings scheduled at this time

2015 Grant Cycle

- 2015 CWMTF Awards
- 2015 Application List

2014 Grant Cycle

- 2014 CWMTF Awards - FINAL
- 2014 Application List

2013 Grant Cycle

- 2013 CWMTF Awards
- 2013 NHTF Awards
- 2013 CWMTF Application List
- 2013 NHTF Application List

Site updated: 01/13/2016

## **2016 Grant Applications Posted!! Deadline February 1st.**

## Grant Workshop Materials Posted

Our December 9th grant workshop was a success! Over 100 people participated in the workshop in order to learn more about our applications, scoring criteria and grant administration. We have posted the presentations from that workshop below for the participants as well as anyone else who may find the information useful.

Acquisition Presentation
Infrastructure Presentation
Natural Heritage Presentation
Natural Heritage Help Document

## Welcome to the Clean Water Management Trust Fund

Established in 1996, the Clean Water Management Trust Fund provides grant assistance to conservation non-profits, local governments and state agencies for the protection of surface waters in North Carolina. CWMTF funds projects that (1) enhance or restore degraded waters, (2) protect unpolluted waters, and/or (3) contribute toward a network of riparian buffers and greenways for environmental, educational, and recreational benefits, (4) provide buffers around military bases to protect the military mission, (5) acquire land that represents the ecological diversity of North Carolina, and (6) acquire land that contributes to the development of a balanced State program of historic properties.

### Important Changes to CWMTF per Session Law 2013-360,section 14.3:

The General Assembly and Governor have made some important changes to the Clean Water Management Trust Fund through the passage of the 2013-2014 budget. You can read the full version of the session law here. The section pertaining to CWMTF begins on page 189. Here is a brief summary:

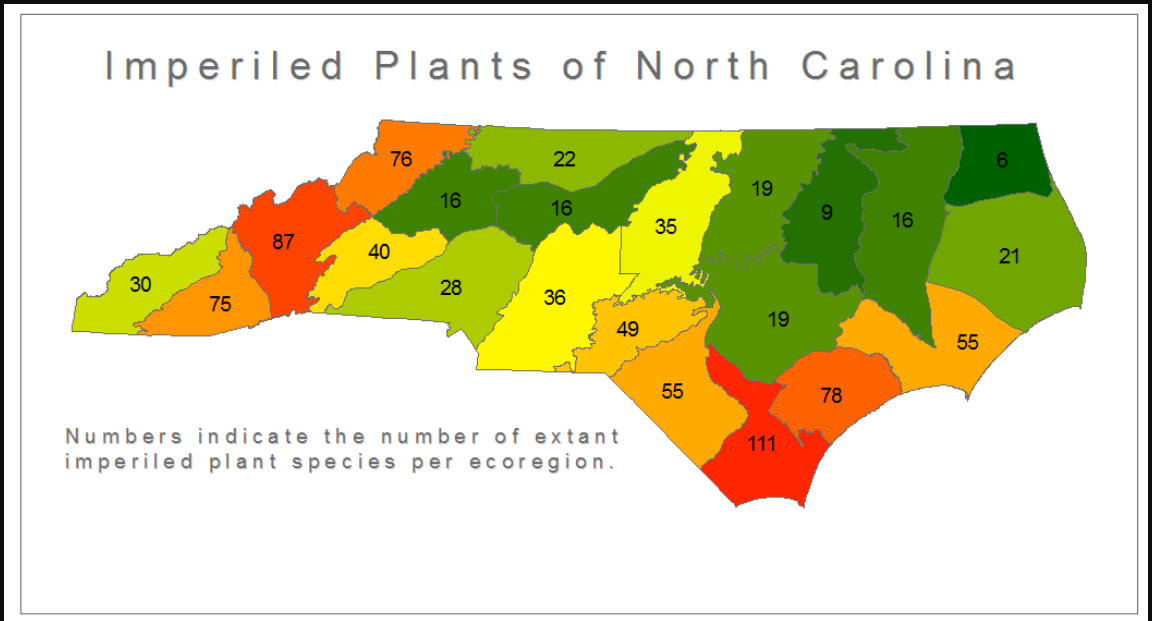
- The Natural Heritage Trust Fund has been repealed and the CWMTF has been authorized to acquire lands with ecological, cultural and historic significance to the State of North Carolina.
- The CWMTF has been authorized to provide buffers around military bases.
- The CWMTF is no longer authorized to make grants to fund wastewater improvement or conventional stormwater projects. These programs will be administered by the new Division of Water Infrastructure and the State Water Infrastructure Authority. Additional information regarding this program is available at: http://portal.ncdenr.org/web/wq/ffs/fap/cwsrf
- The CWMTF has been moved into the Department of Environment and Natural Resources.
- The CWMTF is now appropriated recurring funds and in addition receives a portion of the special registration fee for personalized and some specialty license plates (see right).
- The number of board members has been reduced from 21 to 9 members.

### Find out how you can help support the mission of the Clean Water Management Trust Fund:


In 1898 Carl Schenck, forester for the Biltmore Estate, opened the first school in the United States devoted to teaching sustainable forestry practices. You can support North Carolina's continuing legacy of land stewardship by choosing the official First in Forestry license plate for your vehicle. Ten dollars from each purchase of this specialty license plate goes directly to the CWMTF for our efforts to protect our state's natural resources.

Click here to go to the NC DMV website to learn more.

In addition to the First in Forestry plate, the Clean Water Management Trust Fund also receives revenue from the sale of personalized plates and any of the out-of-state collegiate plates.




North Carolina's Plant Conservation Program Preserves
- approximately 13,500 acres
- home to 66 imperiled plant species

# Resilient and Connected Landscapes

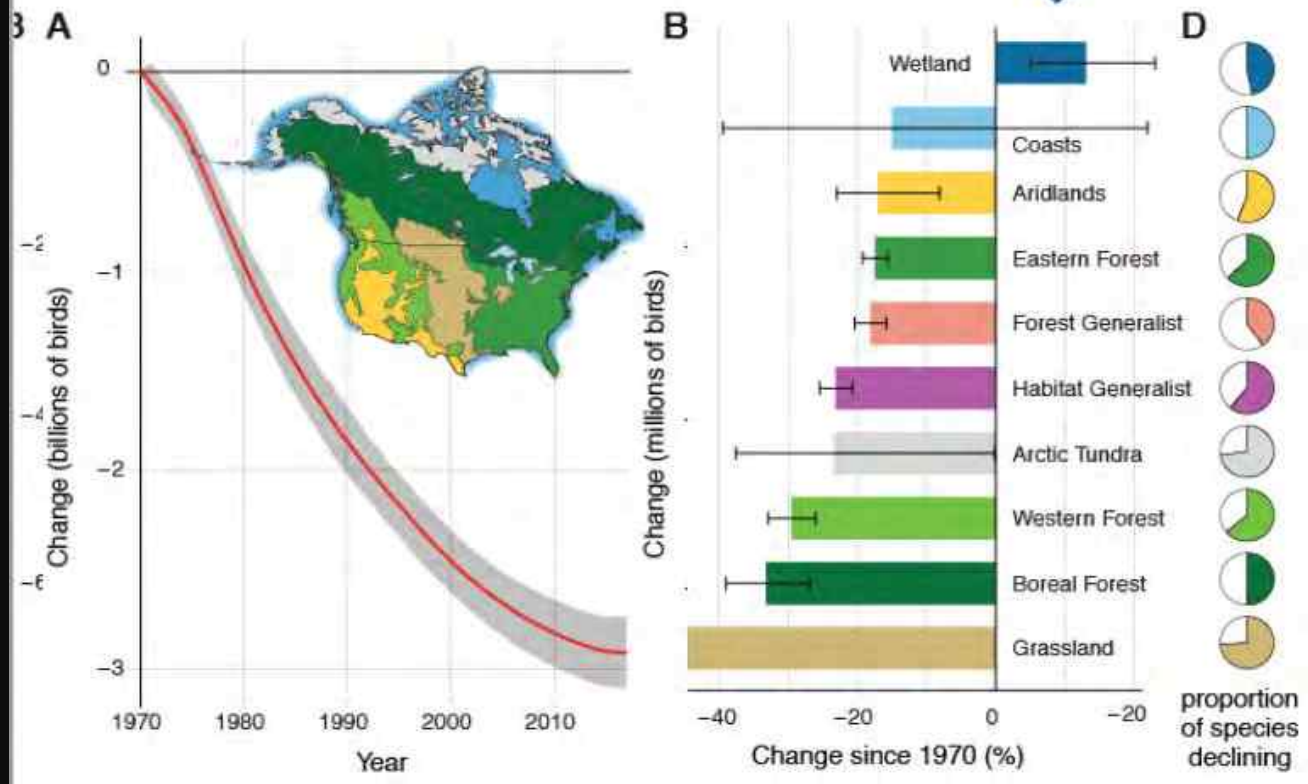
## *for sustaining diversity under Climate Change*

Mark Anderson PhD
The Nature Conservancy

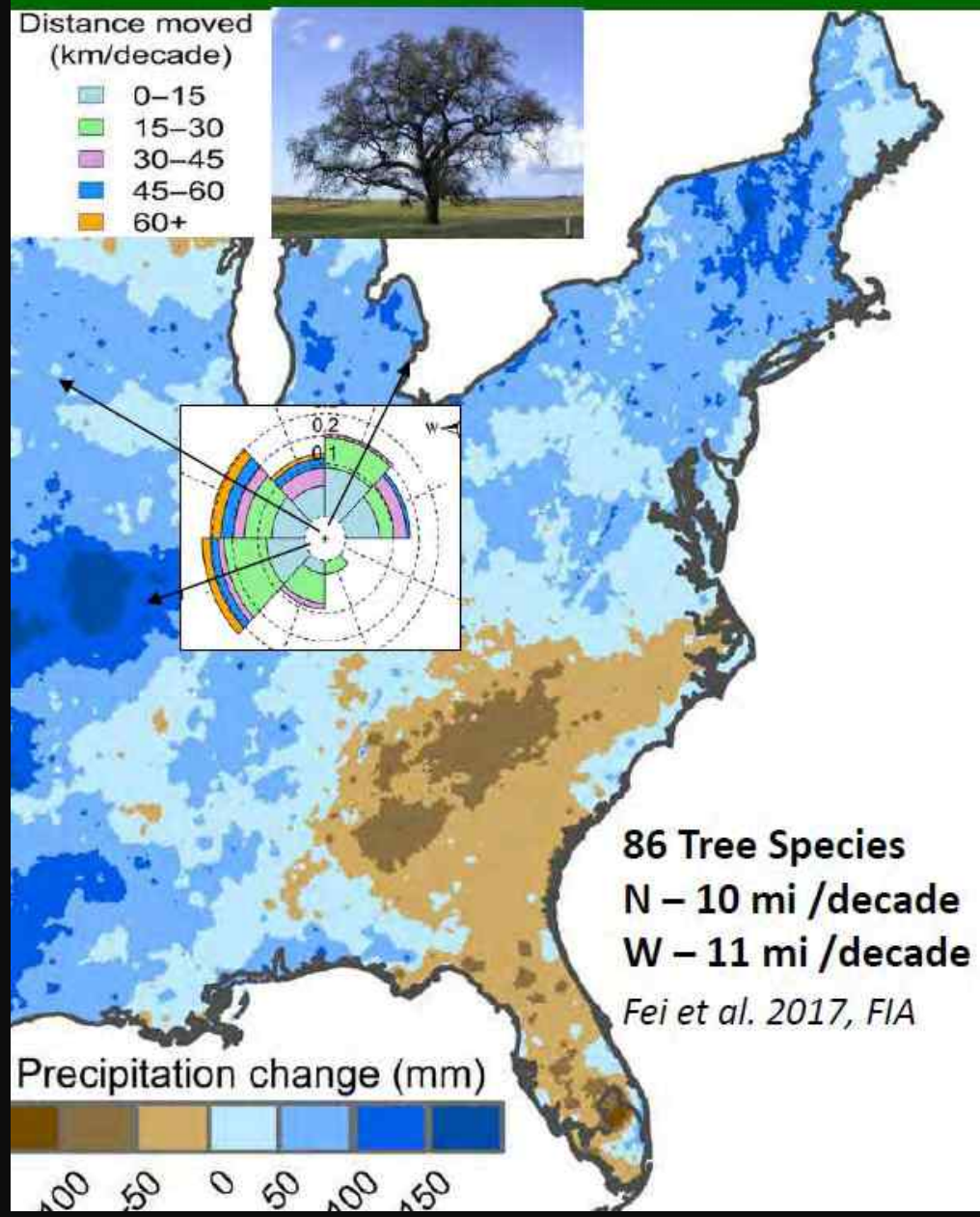
# Abundance Crisis

**Mammals** : Global biomass down 82%
**Amphibians:** 30% now T &E
**Butterflies**: Abundance down 35%/ 40 yr
**NA Birds:** Abundance down 29%
or 3 Billion birds since 1970

**Wetland Birds Up**: Thanks to Adaptive Harvest Management and billions $ on wetland protection and restoration




# Nature is Dynamic



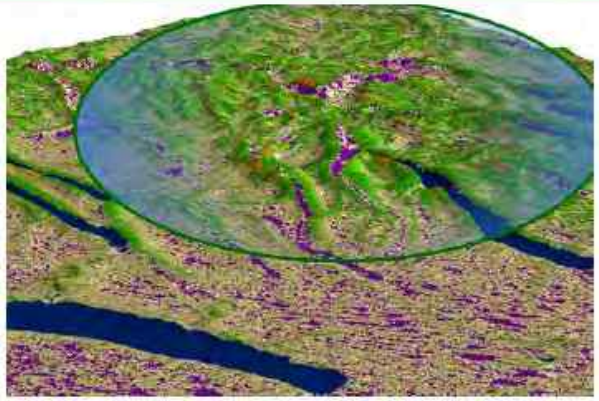

**86 Tree Species**
**N – 10 mi /decade**
**W – 11 mi /decade**
*Fei et al. 2017, FIA*



*Chen et al. 2015, Science*

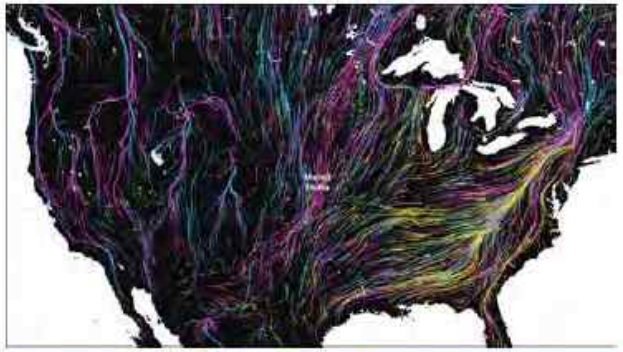
Median residence times range from **200-700** years (overall **500** years) and are shorter during times of warming *McGuire et al. in prep*

# Three Ingredients



## Resilient Sites

Land with many connected *microclimates* representing all physical environments



## Permeable Landscape

A *connected* landscape that allows movement and facilitates range shifts

## Resilient Systems

*Intact* habitats, unique communities and rare species populations

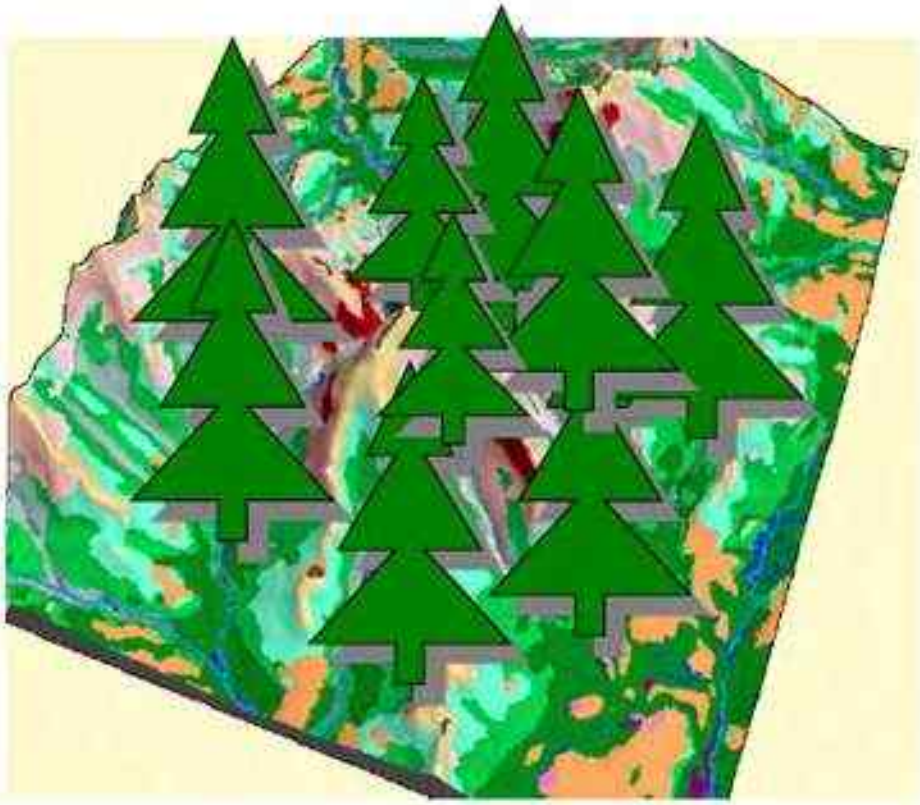
# Climate-Resilient Sites

## Many Microclimates

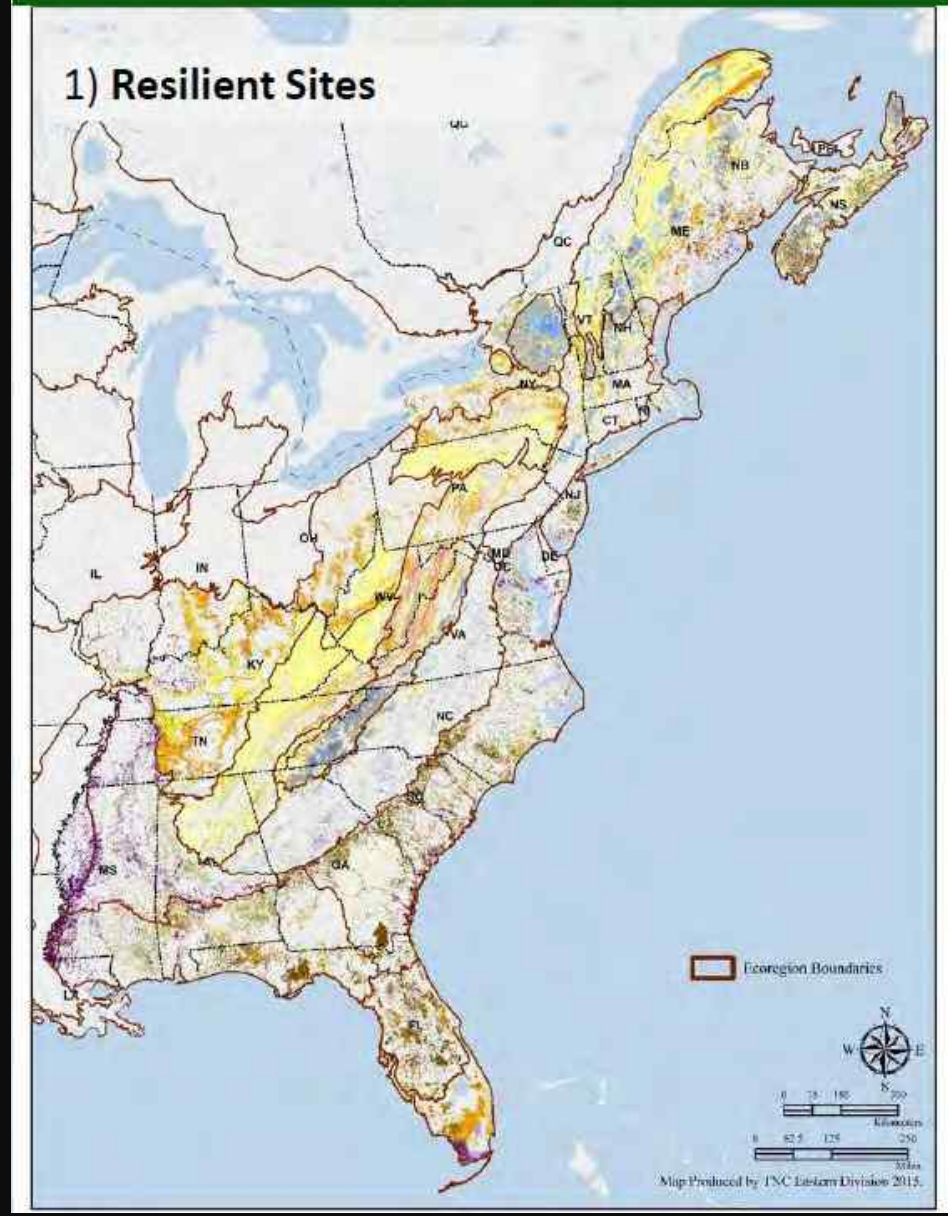
Create climate options

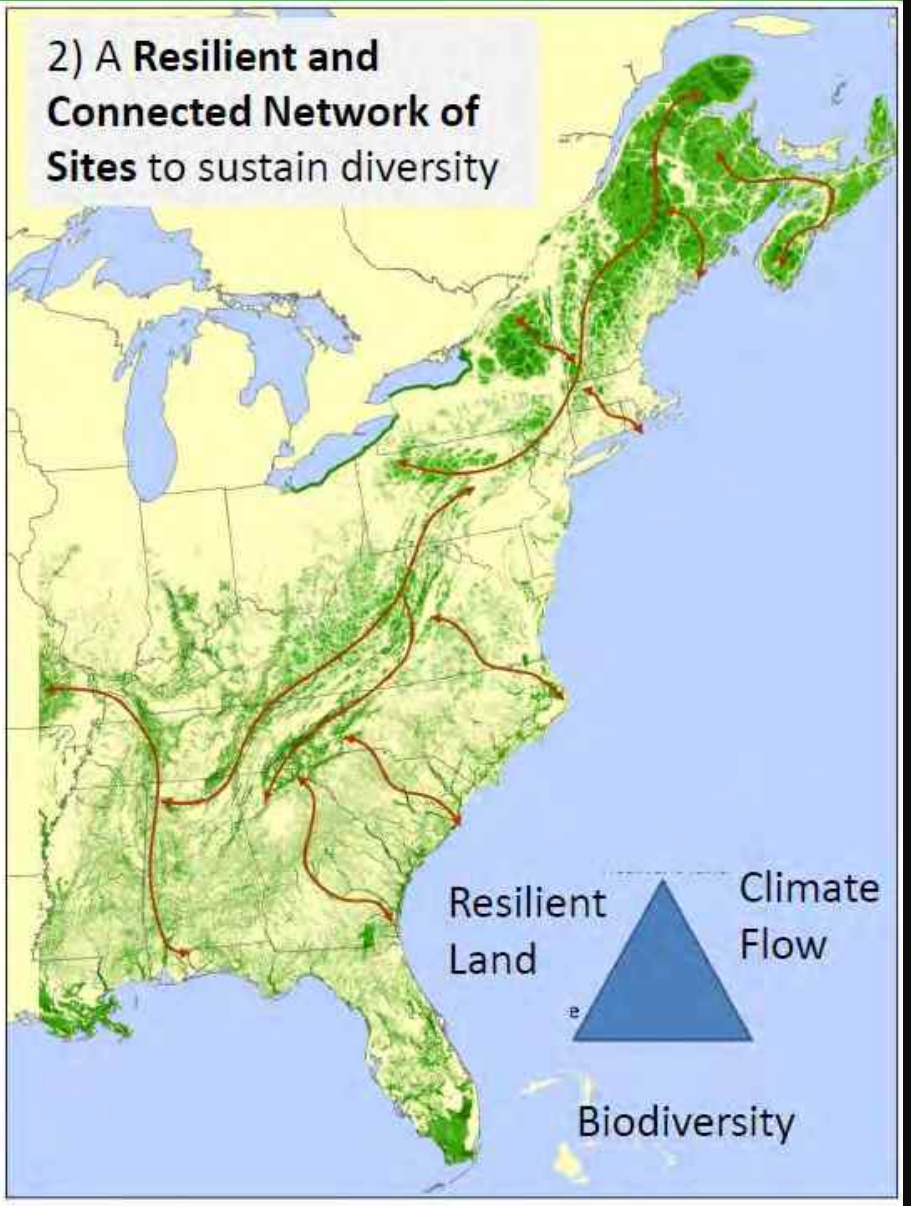
## Highly Connected

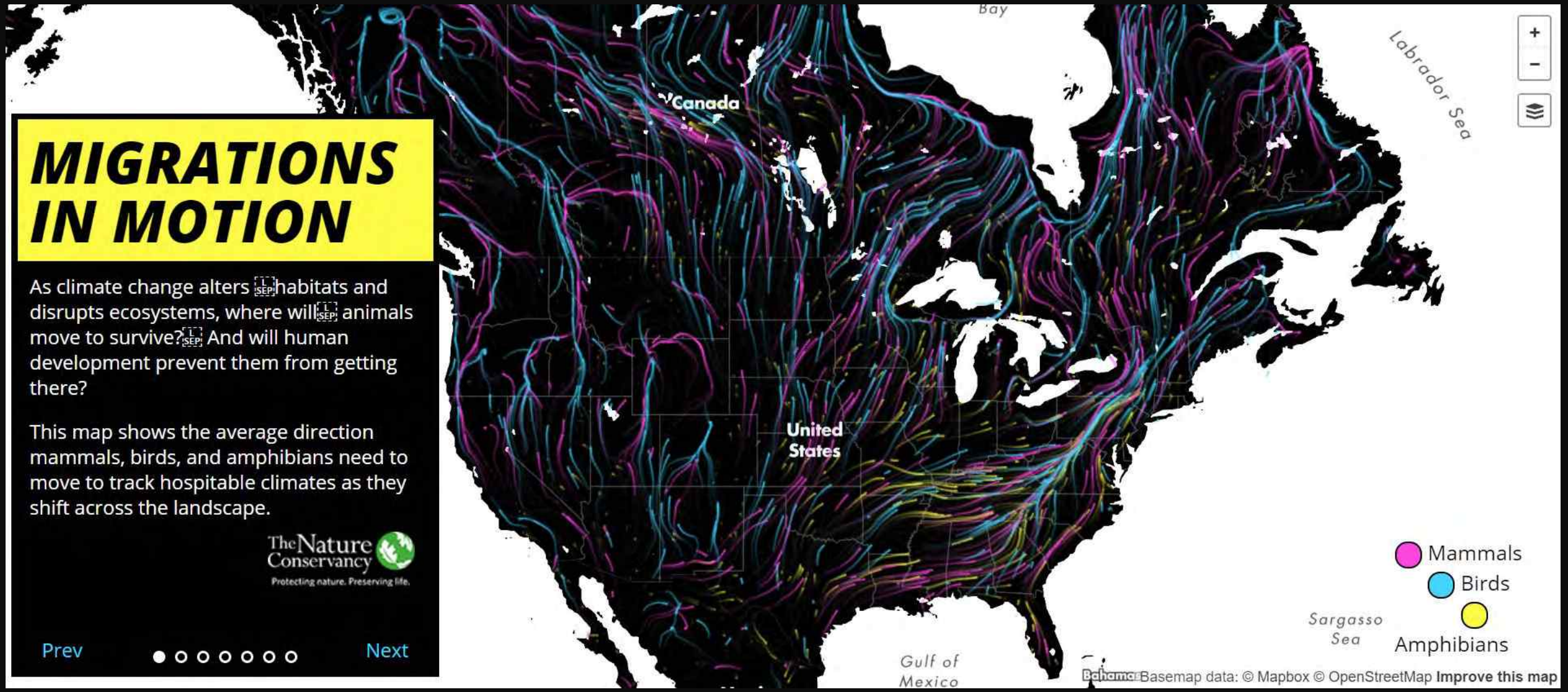
Allows species to move



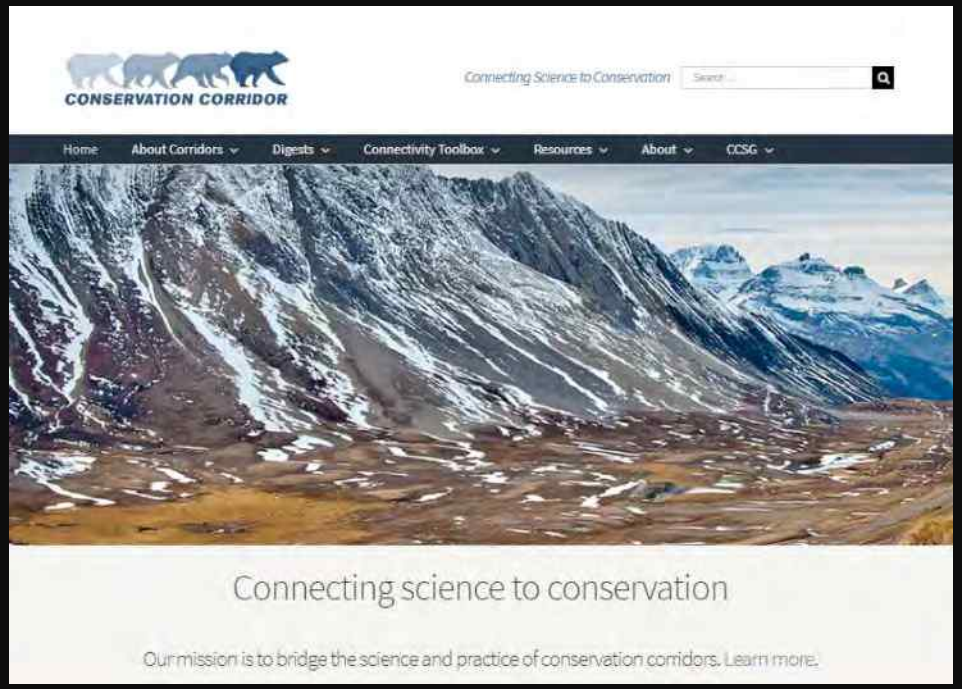
# Maintaining a Permeable Landscape



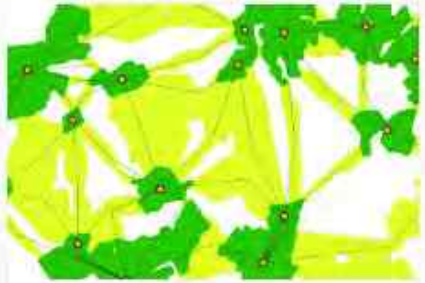



http://maps.tnc.org/migrations-in-motion/#4/40.95/-98.31




Learn More About Corridors and Their Role in Conservation Efforts

CORRIDORS



Learn More About Connectivity Programs and Tools

TOOLBOX

CONNECTIVITY CONSERVATION Specialist Group

Connectivity Conservation Specialist Group

LEARN MORE

# Half-East: Wildlands Network Takes the First Step in Our Planet's Fight for Life

Posted on July 21, 2017 by Maggie Ernest

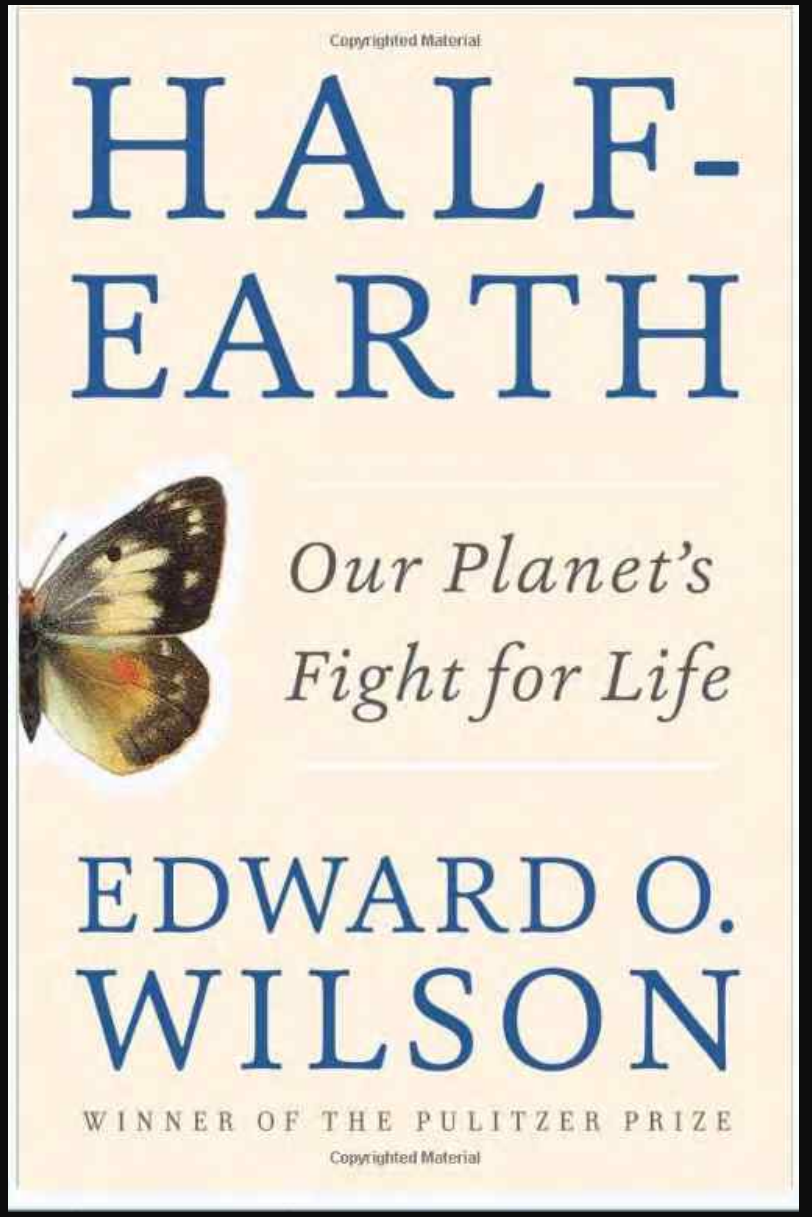
*Wildlands Network Releases Cutting-Edge Vision Map for Eastern North America*

We often find ourselves transfixed, unable to move forward.

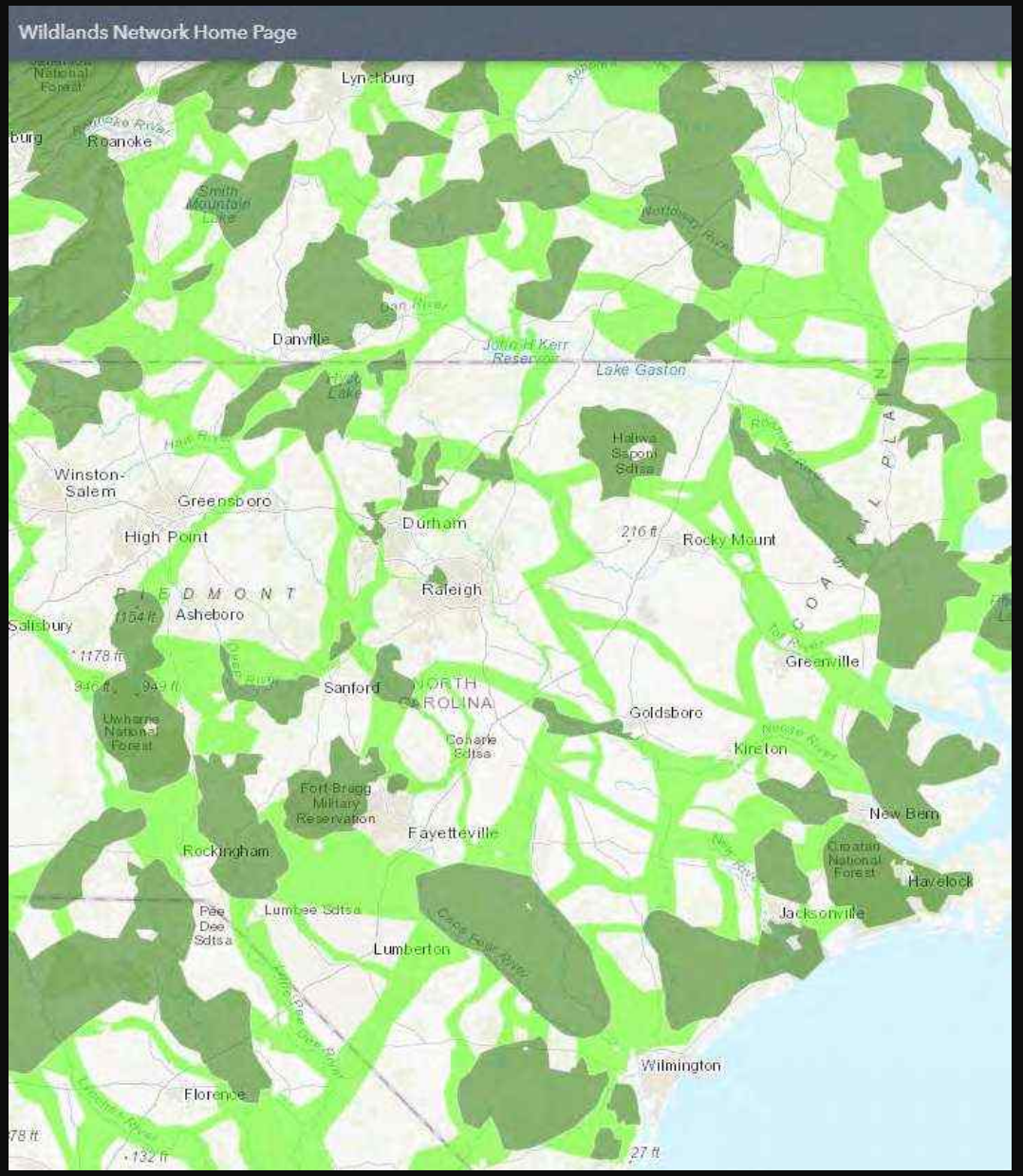
This is an unfortunately common occurrence—the writer who can't find the words to start their story, the dancer who won't walk out to center stage, the presenter who trips over their speech… Sometimes the hardest thing to do is to just get started, to take that first step forward.

So is this fact of life true in the world of conservation. **We are often so overwhelmed, so paralyzed by the scale and complexities of Mother Nature's woes that we don't know how or where to start.** A climate in chaos, an unprecedented extinction crisis, relentless pollution poisoning our air and water – the assault on our planet seems infinite. And it's true: there are times we conservationists rub our tired eyes and think, "How can I possibly make a difference? How can I help Nature survive the challenges of today, tomorrow, and decades from now?"

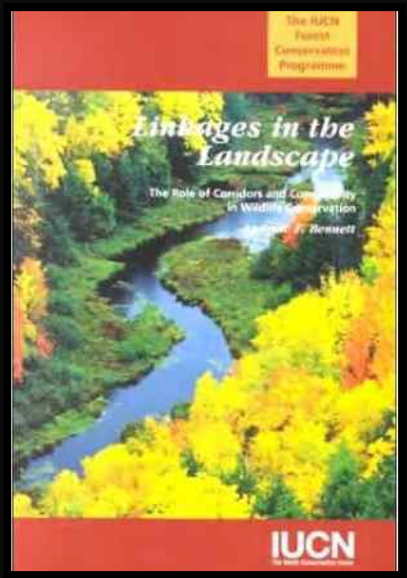
In the face of Mother Nature's woes, Wildlands Network's Maggie Ernest goes to work, deploying cameras in a red wolf study. Photo: Ron Sunderland

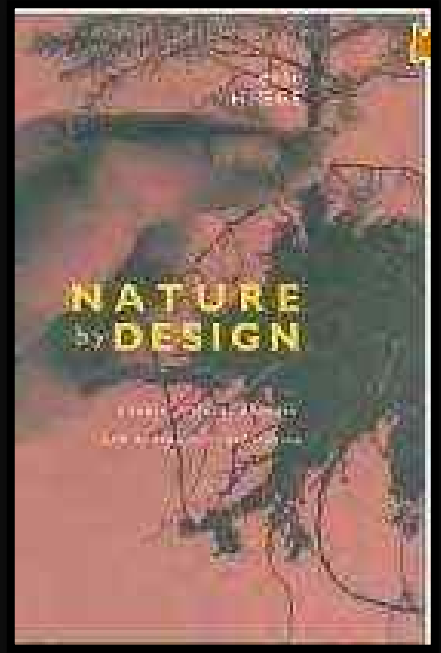


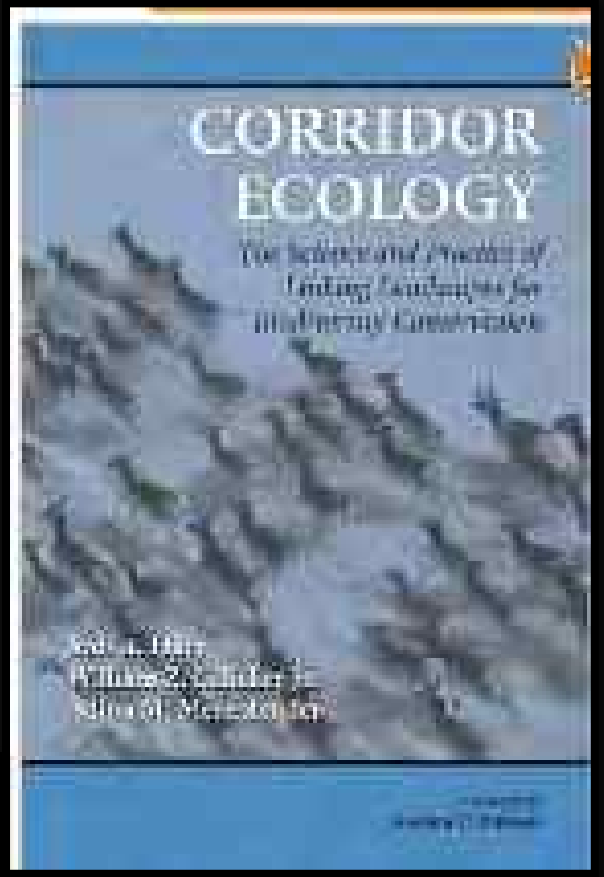


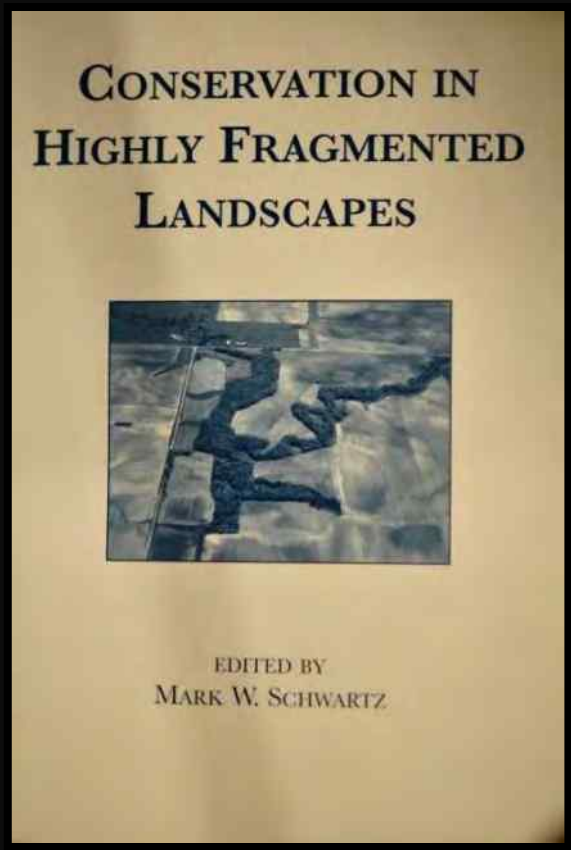


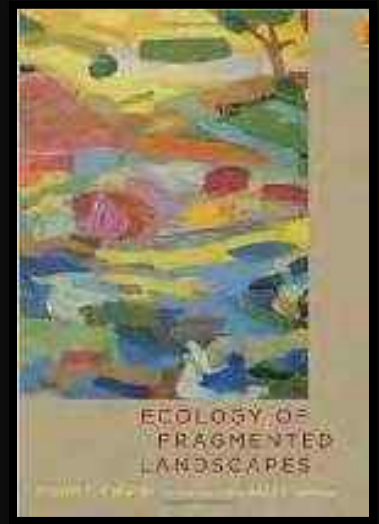

Wildlands NETWORK

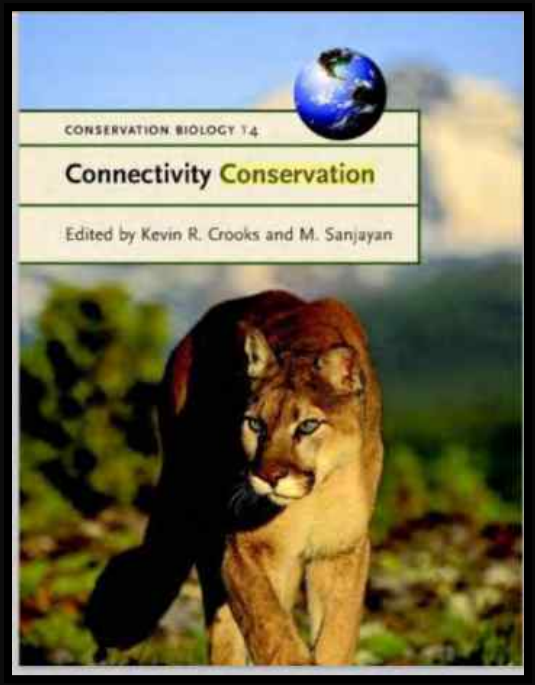


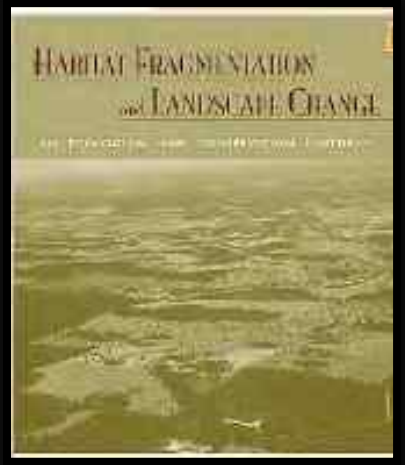



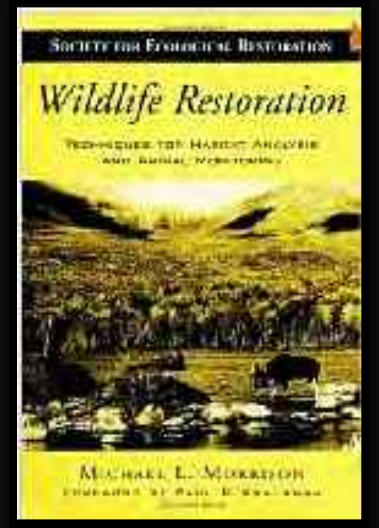







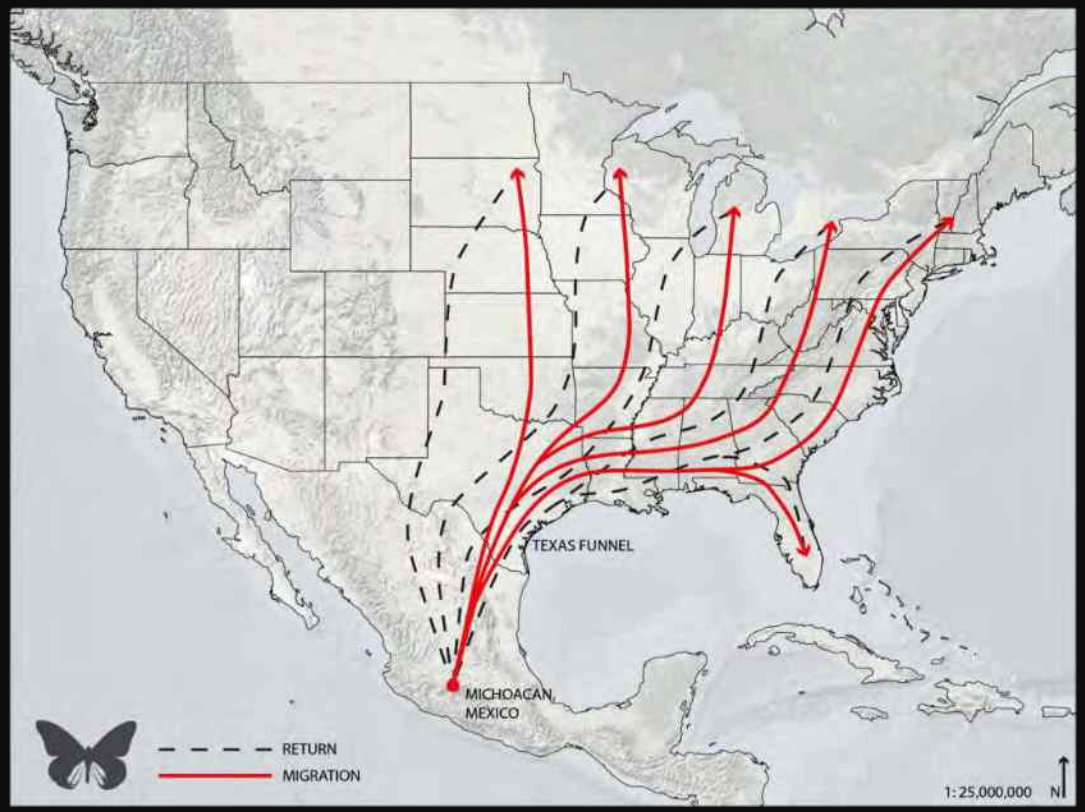

No shortage of information…

# Some types of corridors

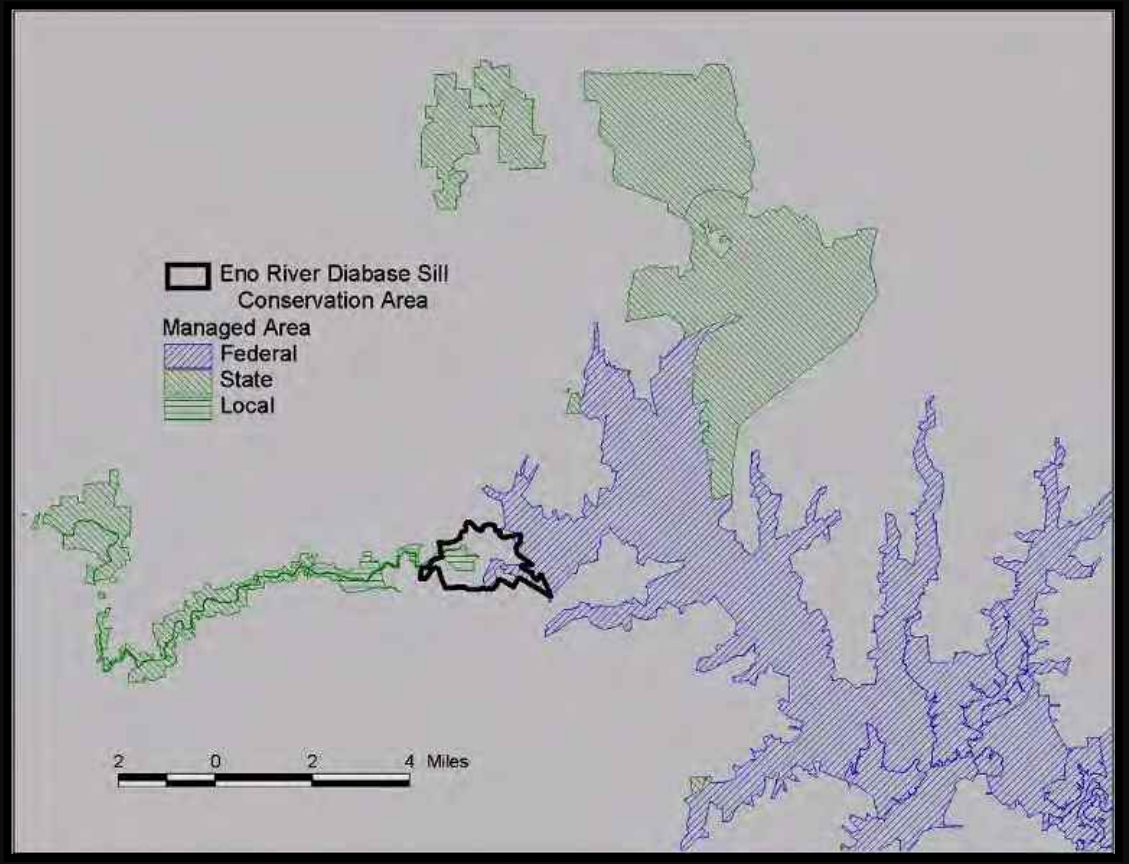
- Unplanned corridors
  - Roadsides
  - Fencerows
  - Utility rights-of-way

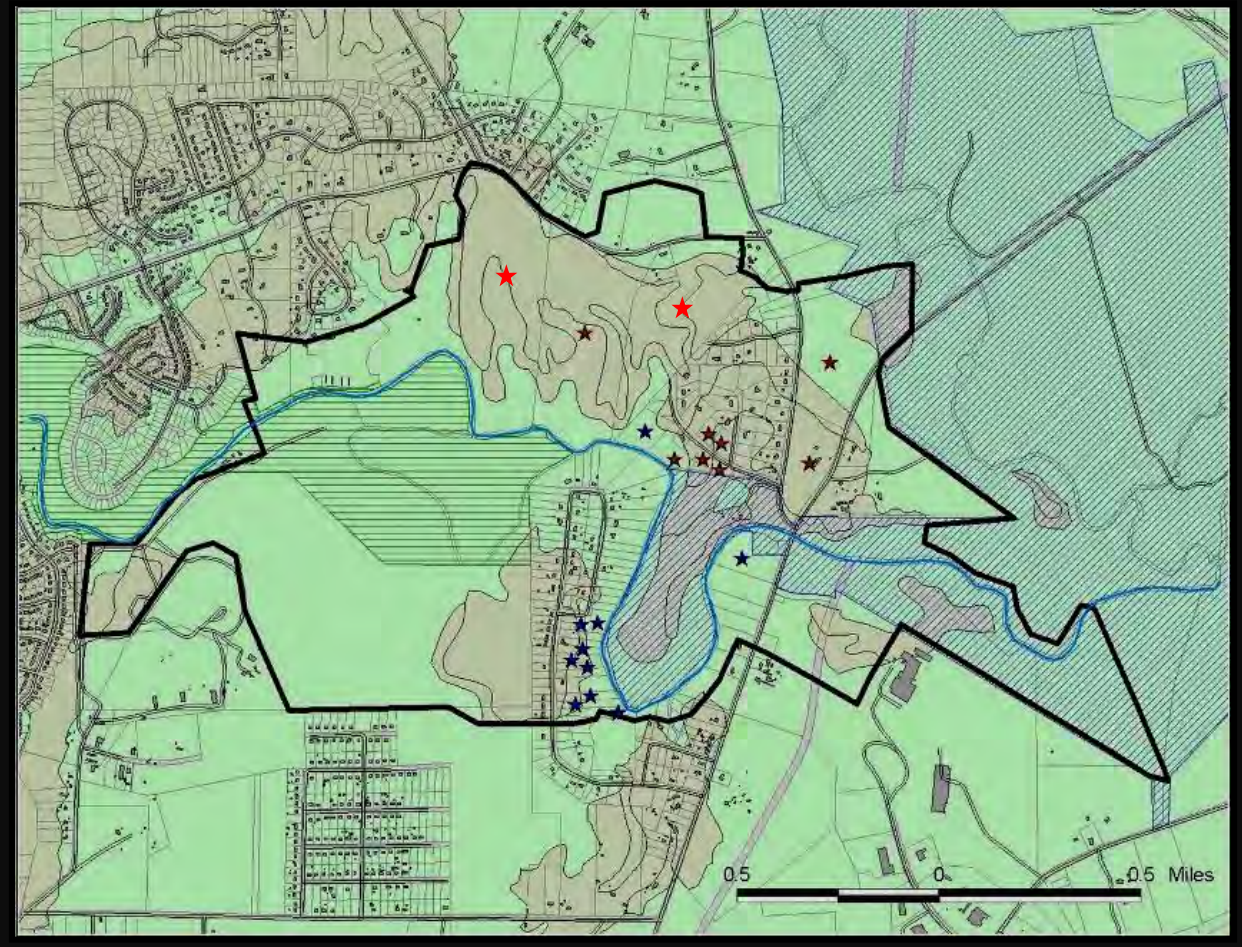
- Planned corridors
  - Riparian zones
  - Individual species conservation areas
  - Community integrity enhancement
  - Greenways

# The monarch, the milkweed, and the goldenrod corridor




# PENNY'S BEND NATURE PRESERVE AND ENO RIVER DIABASE SILL MACROSITE CONSERVATION

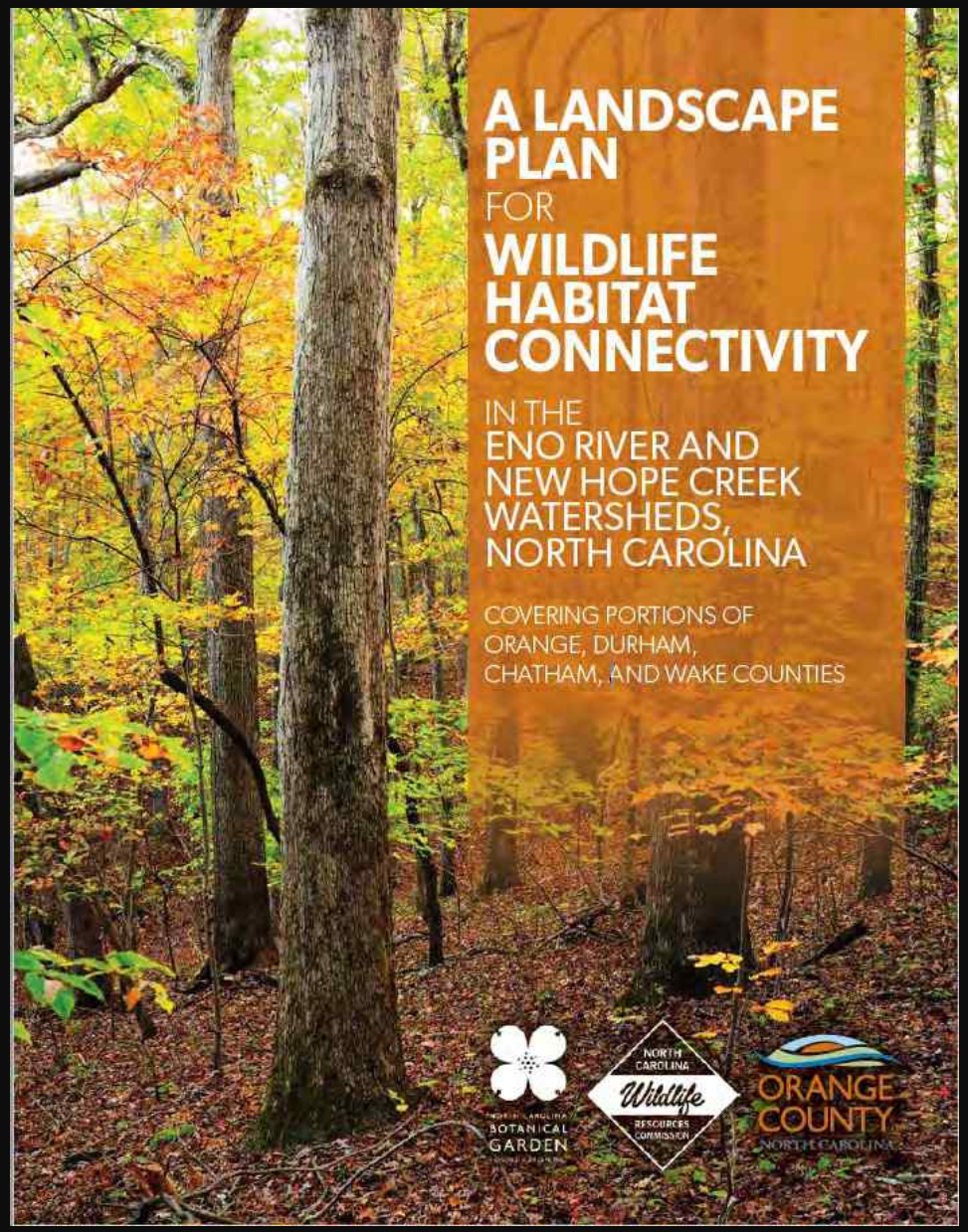


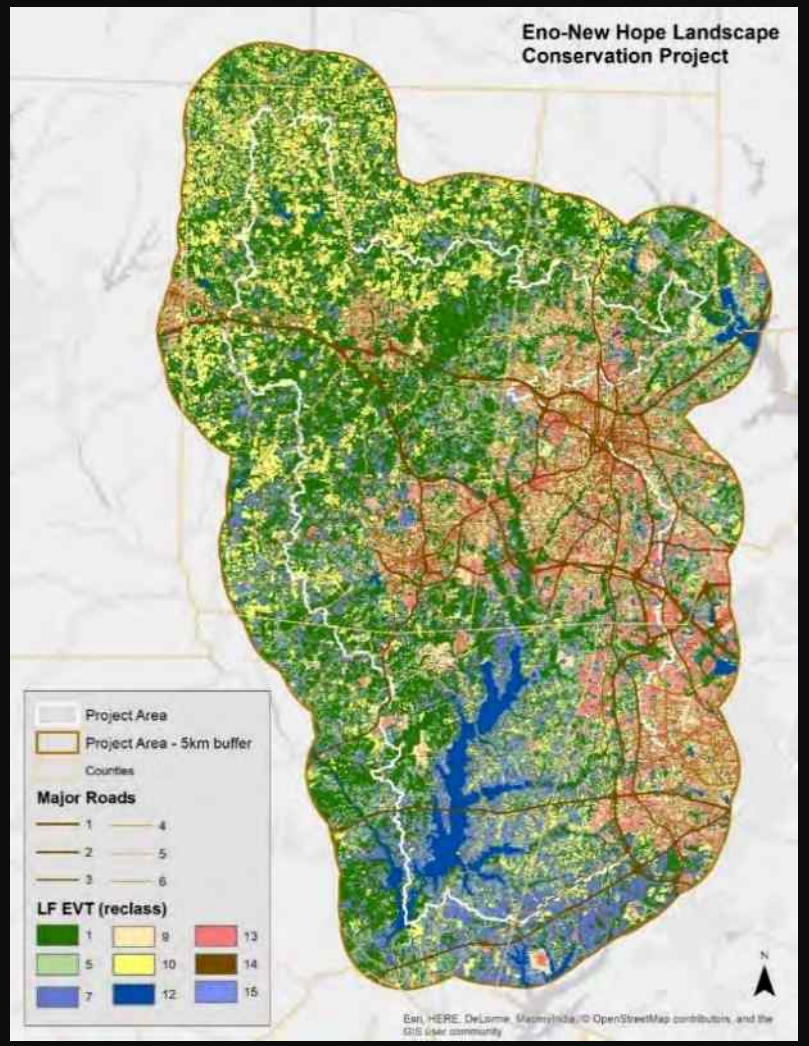

Principle partners:
NC Plant Conservation Program (NCDA)
Eno River Association
NC Botanical Garden

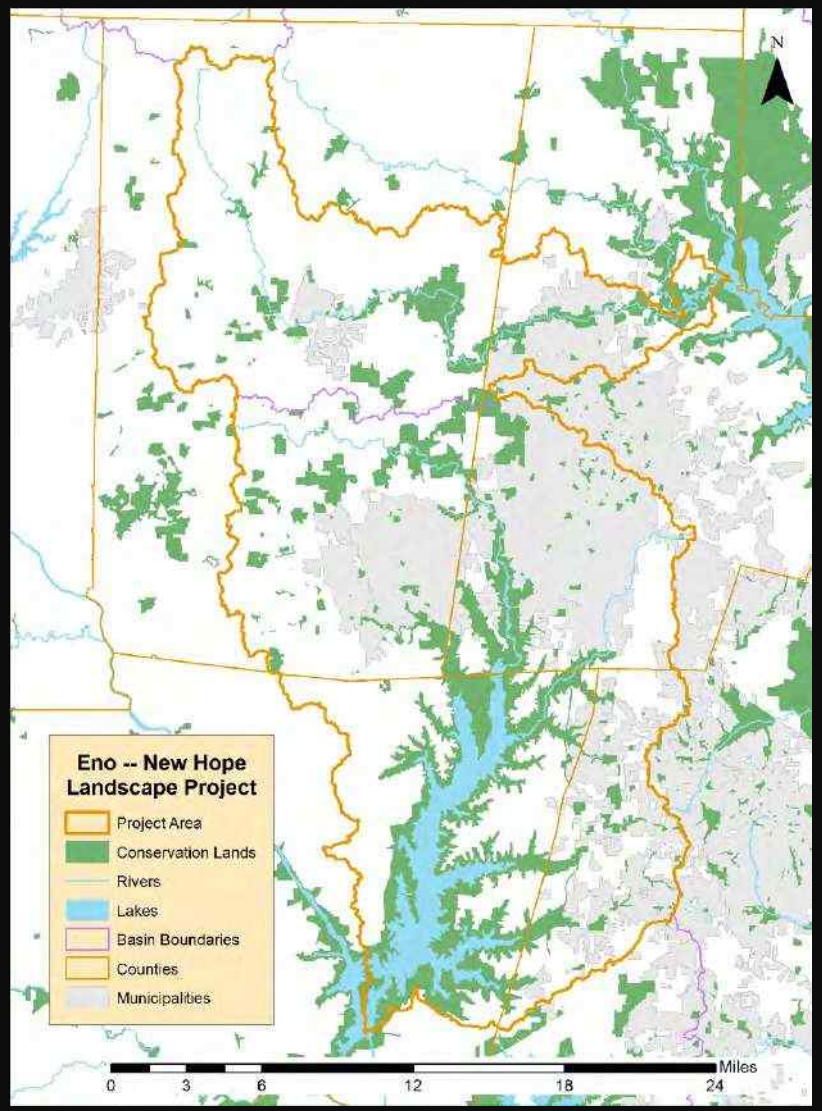
# ENO-NEW HOPE LANDSCAPE CONSERVATION PROJECT

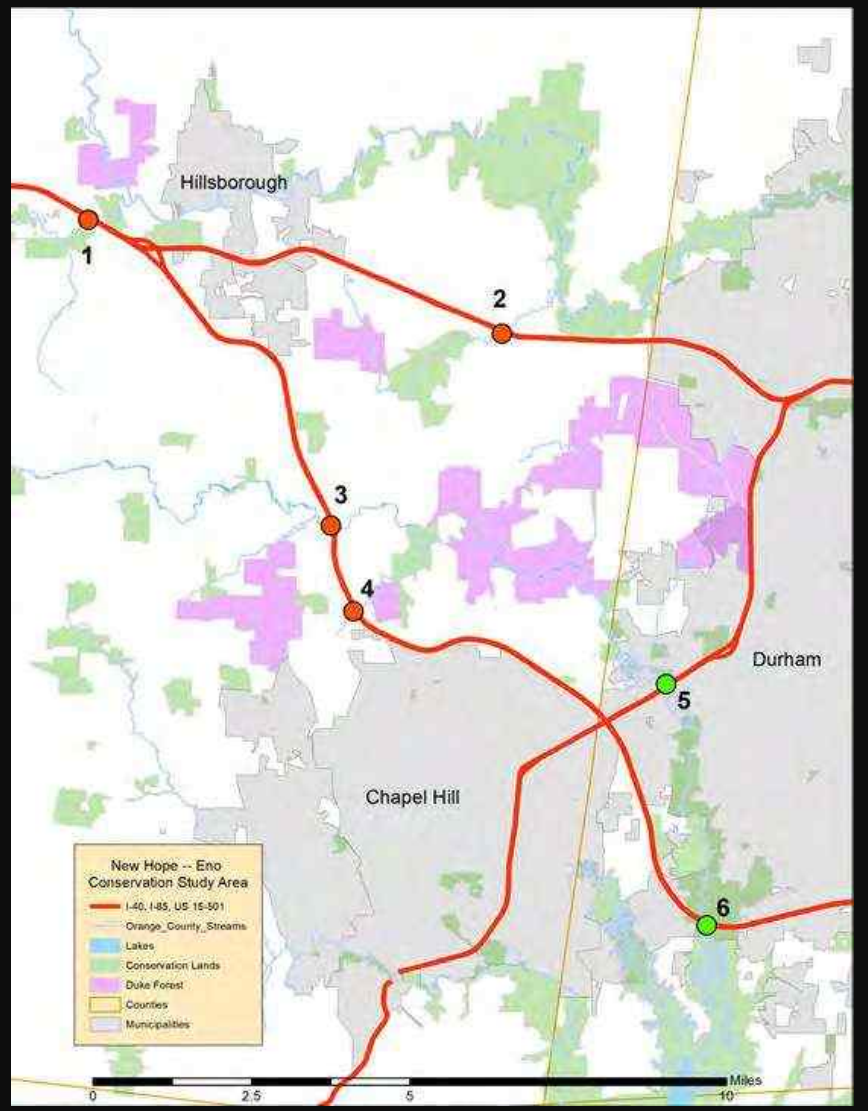
- Funding from:
  - NC Wildlife Resources Commission through the Partners for Green Growth program
  - Orange County
- Administered through the North Carolina Botanical Garden Foundation, Inc.



# THE PROBLEM…



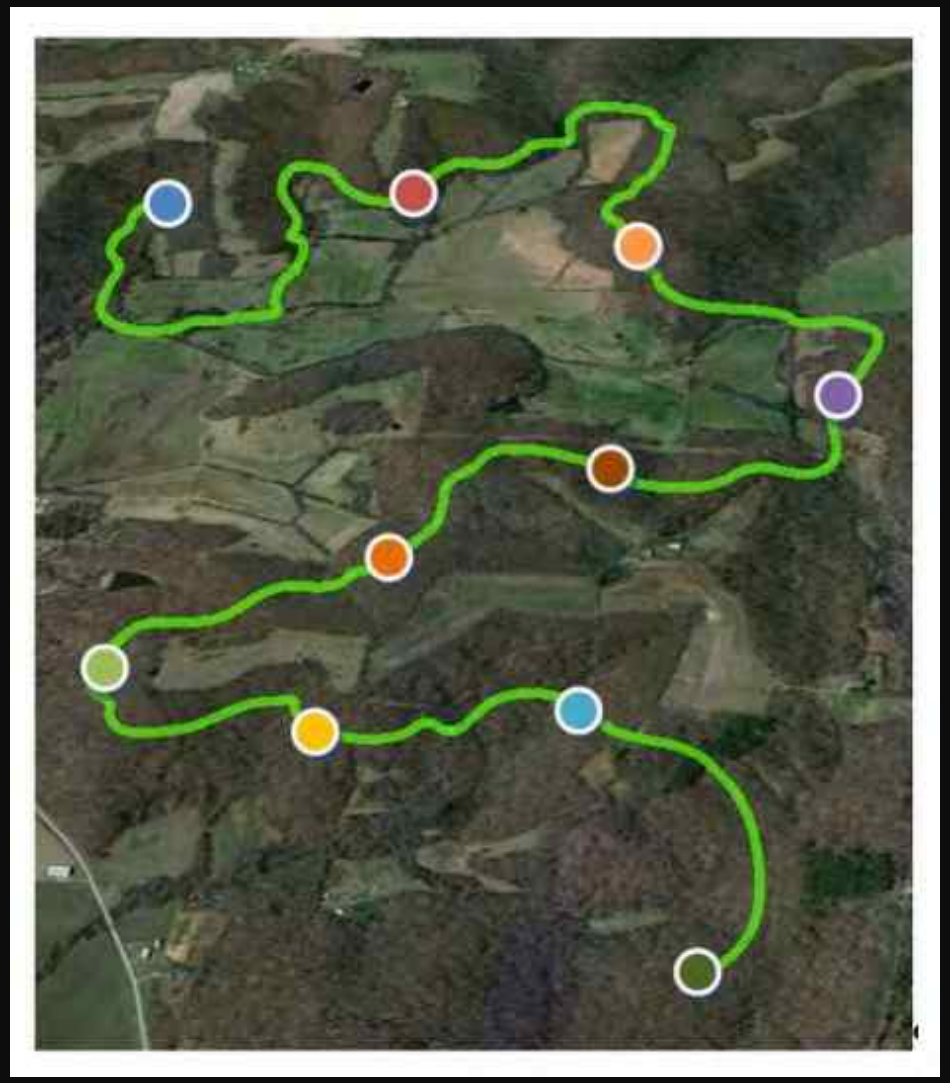

Map by Stephen Hall

# APPROACH: LANDSCAPE CORRIDOR ANALYSIS

## Roadmap for Assessing Connectivity

LANDSCOPE AMERICA:

ROADMAP FOR ASSESSING HABITAT CONNECTIVITY



1 - Characterize Goals and Scope

2 - Identify and Engage Partners

3 - Identify Targets of Connectivity Planning

4 - Characterize Biology and Ecology

5 - Identify Barriers to Connectivity

6 - Choose Modeling Approach and Tool(s)

7 - Develop Model Inputs

8 - Review and Validate Results

9 - Interpret and Summarize Results

10 - Incorporate Into Decision-Making

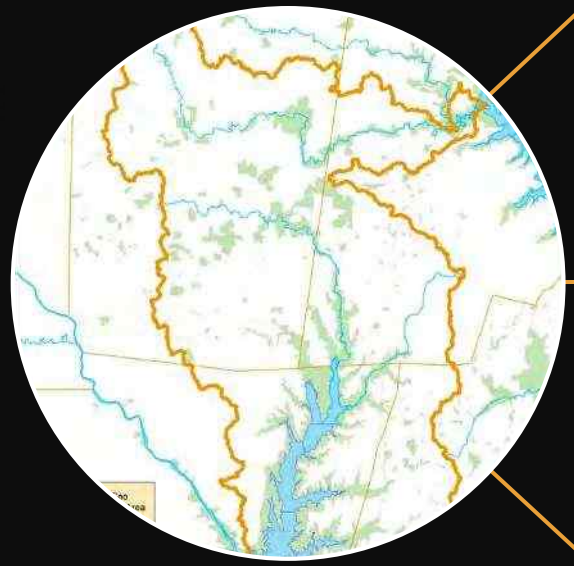
http://www.landscope.org/focus/connectivity/

# PROJECT SCOPE

## OBJECTIVE: LANDSCAPE CONSERVATION REPORT / PLAN

(DURHAM, CHATHAM, ORANGE, WAKE)

1. MAP OF HIGH-PRIORITY LANDSCAPE CORRIDORS
2. LIST OF CONSERVATION PARTNERS
3. REPORT WITH RECOMMENDATIONS BASED ON GREEN GROWTH TOOLBOX



**Corridors**

- Landscape wildlife corridors
- Prioritization

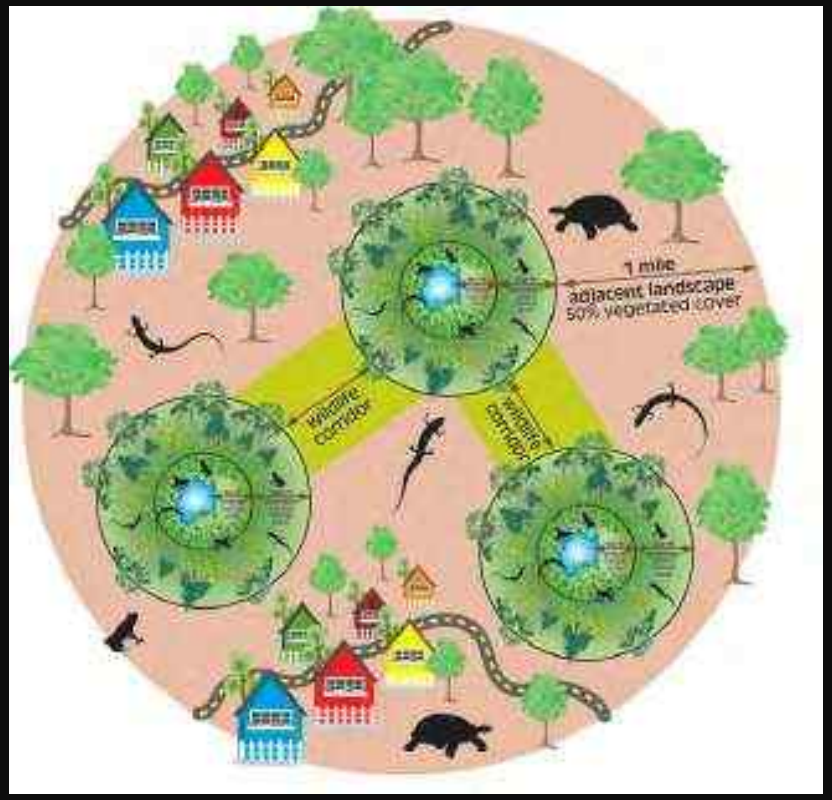
**Connectivity**

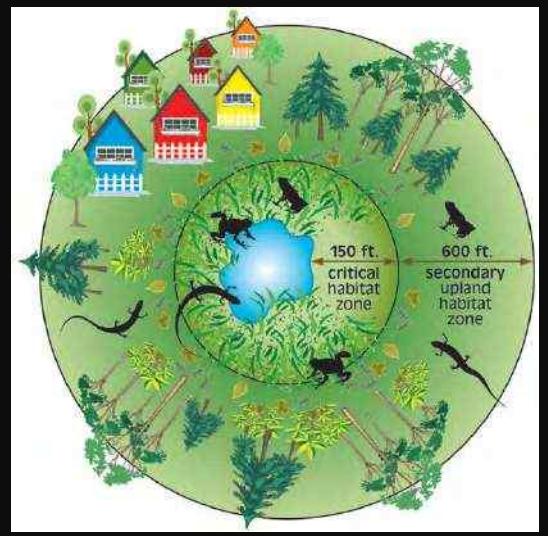
- Natural communities
- Within and between watersheds
- Focal species, habitat guilds

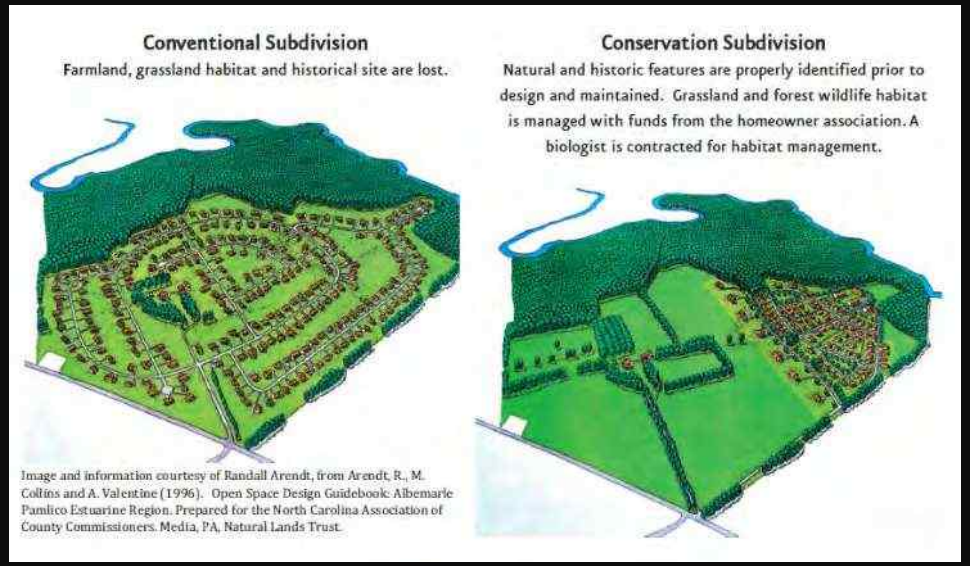
**Species**

- NC WRC SGCN
- NC NHP Tracked & Watch List

# DEVELOP RECOMMENDATIONS BASED ON GREEN GROWTH TOOLBOX PRINCIPLES AND GUIDELINES




Green Growth Toolbox, NC WRC
https://www.ncwildlife.org/Conserving/Programs/Green-Growth-Toolbox

# MAPS: SPECIES DATA

**CRITERIA:**

- SPECIES KNOWN TO OCCUR IN OUR PROJECT AREA
- POPULATIONS RESIDE IN OUR AREA YEAR-ROUND
- NC WRC SPECIES OF GREATEST CONSERVATION NEED
- NC NHP TRACKED OR WATCH LIST SPECIES

SPECIES **GROUPED** INTO LANDSCAPE HABITAT GUILDS

(AFTER HALL, SP, LANDSCAPE HABITAT INDICATOR GUILDS)

Four-toed salamander (S. Hall)

**Species/guild characteristics:**

- Habitat (type, size, shape, context)
- Barriers
- Separation/movement distances (for suitable and unsuitable habitat)
- Other related biological/ecological info

# Guild/species biological and ecological information related to habitat and connectivity needs

| Habitat Type | Taxonomic Groups | Focal Species | Habitat and Movement Characteristics | | | | Barriers to movement | Sensitivity to development and fragmentation | Primary stressors |
|---|---|---|---|---|---|---|---|---|---|
| | | | *Patch size* | *Composition* | *Short-term dispersal* | *Longer-term dispersal* | | | |
| Wet-to-mesic hardwood forests | amphibians, (riparian breeding birds and odonates) | Four-toed salamander | 5 ha | **breeding:** boggy streams, ephemeral wetlands, usually in floodplains or uplands near headwater streams **non-breeding:** mesic hardwood forests, mixed hardwood/pine near wetlands | within ~0.5 km of breeding pools | 3 km | Large streams and rivers, roads, suburban and urban development | High sensitivity | Floodplain and wetland modification, human disturbances, water pollution, roads |
| Dry-to-wet mixed hardwood/pine forests | reptiles, amphibians, (forest breeding birds) | Box turtle | 20 ha | **breeding**: upland mixed hardwood/pine, successional (herb, shrub, and woody) **non-breeding**: bottomland hardwood, successional | 1 km | 3-5 km | High-traffic-volume roads, large rivers, urban development | Moderate sensitivity | Roads, habitat loss |
| Sparsely settled mixed hardwood/ pine habitats | generalist species of large and small mammals, reptiles, (birds) | Bobcat | 60 ha | **breeding:** upland and bottomland mixed hardwood/ pine, successional, with logs, fallen trees, or rock shelters for denning **non-breeding:** upland and bottomland mixed hardwood/pine, successional | wide-ranging (50 km) | wide-ranging (200 km) | None; avoidance of buildings and development | Moderate sensitivity | Roads, dense development, human disturbances |

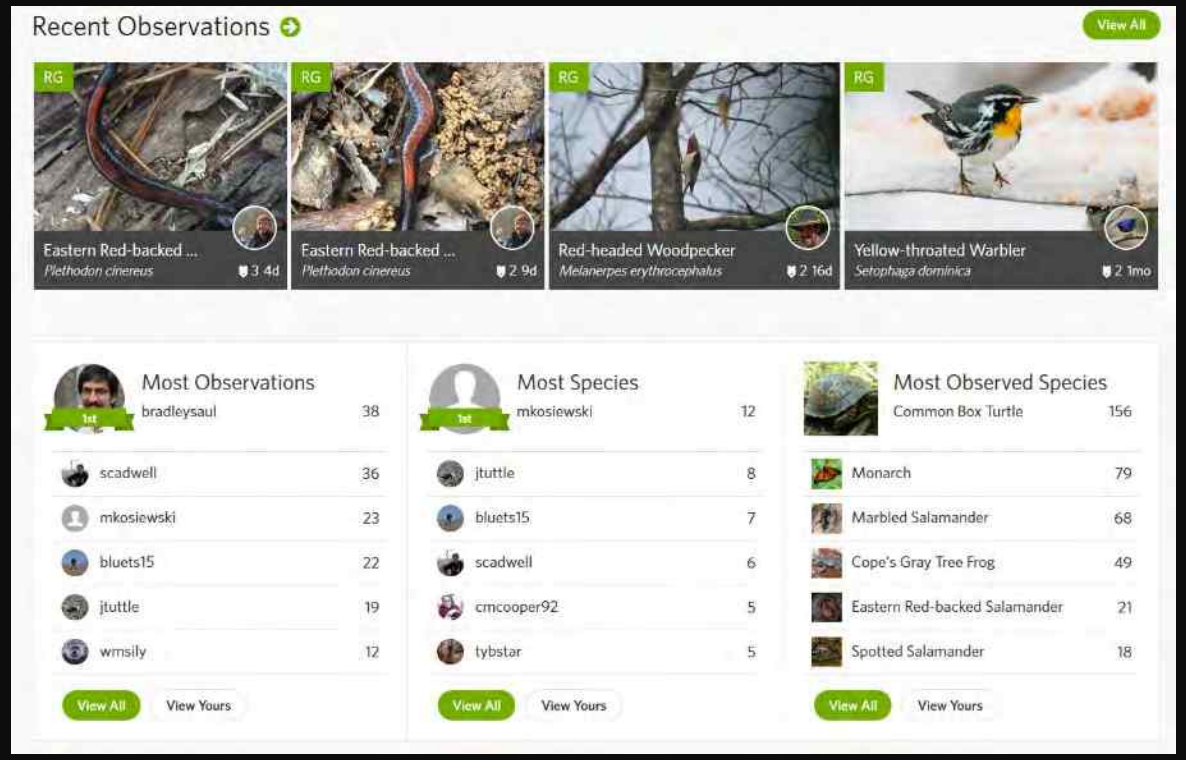
# SPECIES

- ~57 TERRESTRIAL SPECIES
- ~17 AQUATIC SPECIES
- 22+ HABITAT GUILDS

- HABITAT AREAS AND ON-THE-GROUND CORRIDORS FOR 3 FORESTED GUILDS THAT ENCOMPASS MANY OF THE OTHER GUILDS AND SPECIES.

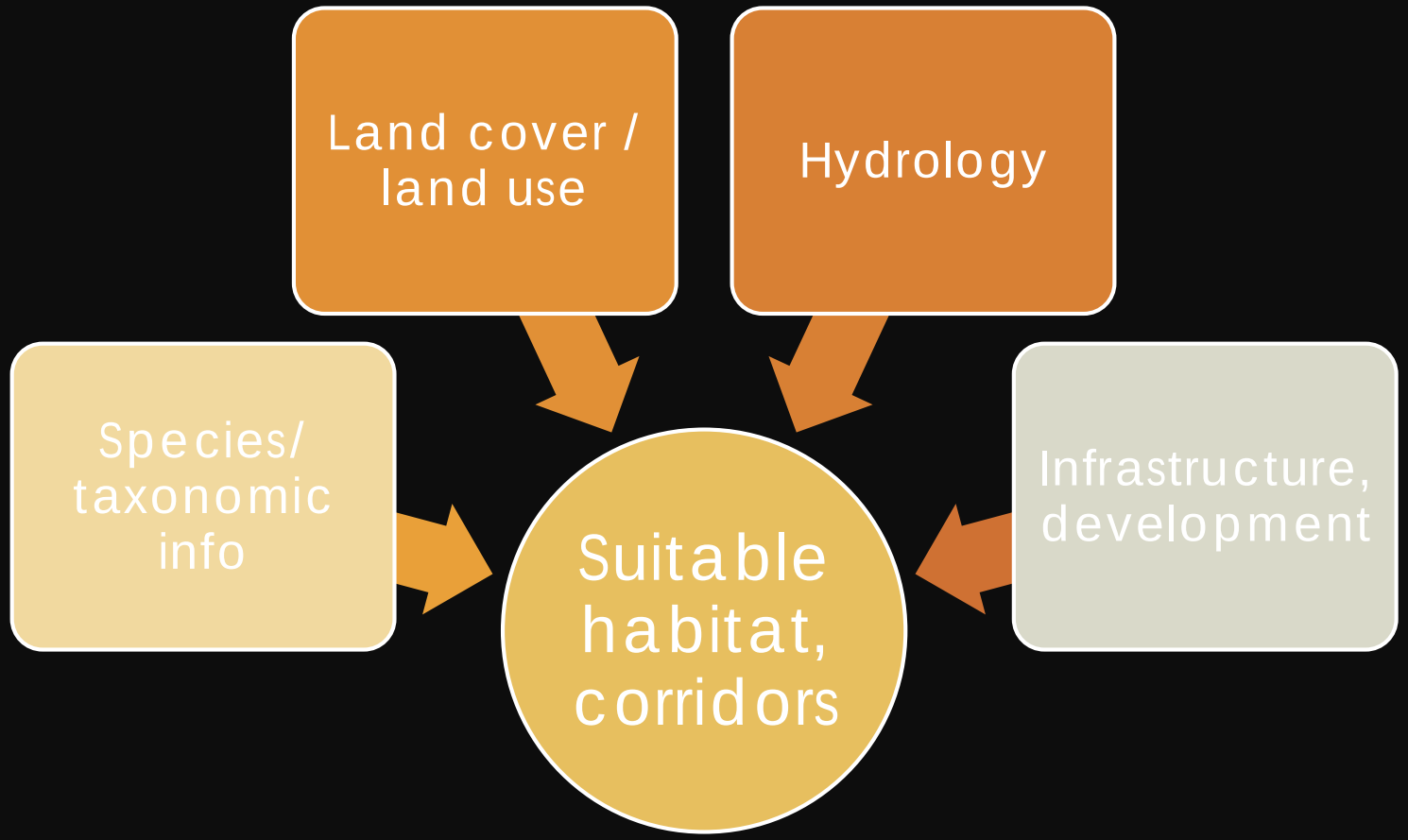
- SEE INATURALIST PROJECT, "WILDLIFE OF THE ENO AND NEW HOPE CREEK WATERSHEDS," FOR SPECIES LIST AND OBSERVATIONS FOR SEVERAL SPECIES IN THE PROJECT AREA
- HTTPS://WWW.INATURALIST.ORG/PROJECTS/WILDLIFE-OF-THE-ENO-RIVER-AND-NEW-HOPE-CREEK-WATERSHEDS-NC

iNaturalist



# HABITAT AND CORRIDOR MAPPING

- PARTITION LANDSCAPE INTO SUITABLE HABITAT, UNSUITABLE HABITAT, AND **BARRIERS**
- IDENTIFY CONNECTED HABITAT NETWORK



# MAPS: MODIFIED LAND COVER

**HABITAT**

2014 EXISTING VEGETATION TYPE (LANDFIRE)

NC WETLANDS (NWI)

NC FLOODPLAINS (NC FMP)

(STREAMS) (VARIOUS)

**Barriers**

Roads, Traffic volume (NCDOT)

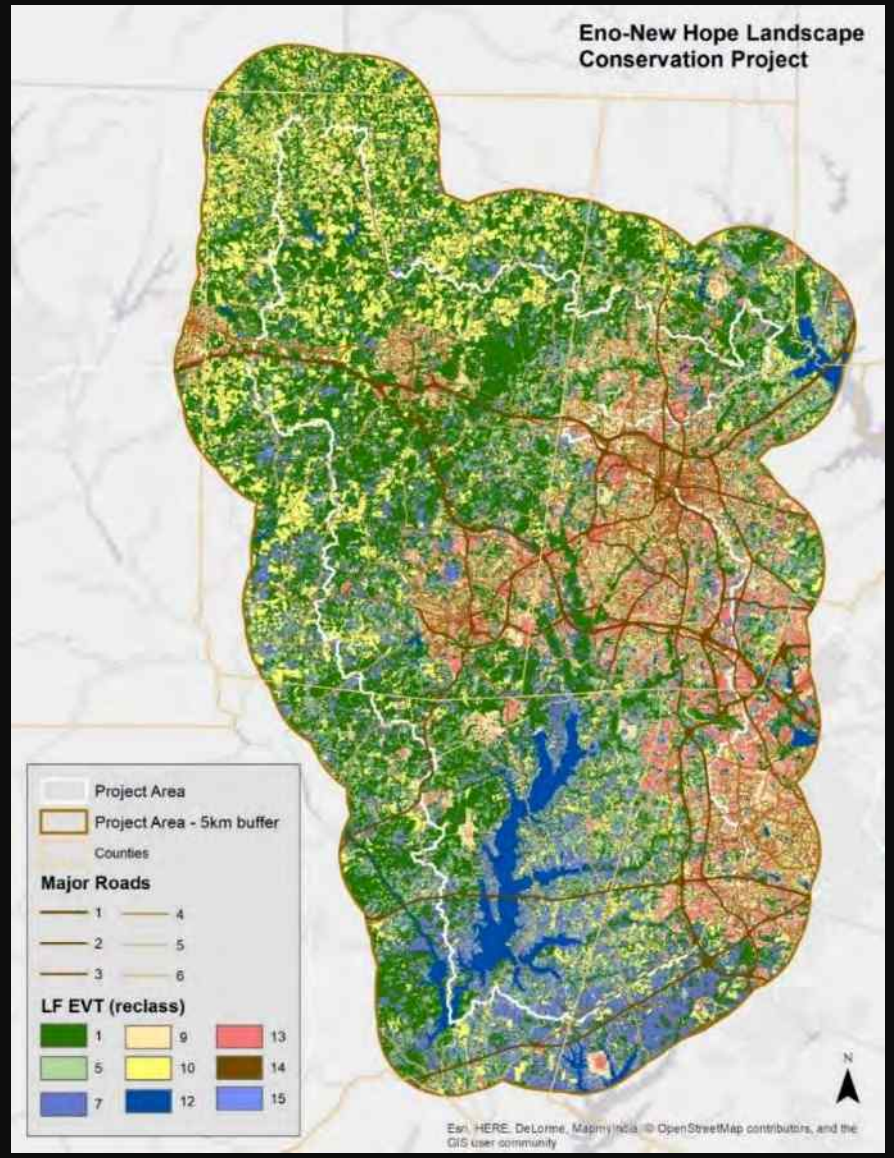
Building footprints (counties, towns)

Urban/developed areas (LANDFIRE)

**Underpass infrastructure**

Bridges, culverts, (pipes) (NCDOT)

Stream-Road crossings




LANDFIRE Program: https://www.landfire.gov

# LANDSCAPE ASSESSMENT: HABITAT NETWORK

**SUITABLE HABITAT**

PATCH SIZE

PATCH CONNECTIVITY (SEPARATION DISTANCE)

**Corridor network**

Network analysis

(simple!...getting there is harder)

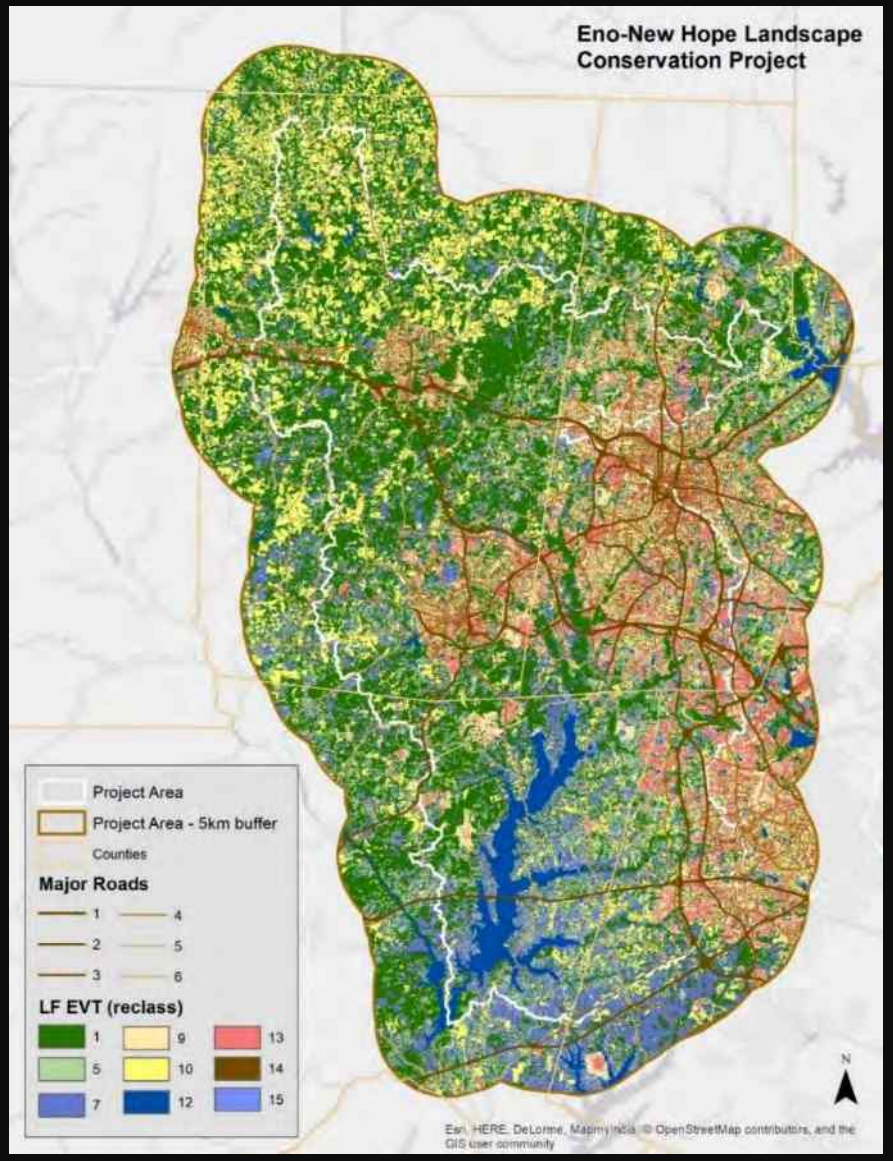
**Prioritization**

Connectivity value

Species occurrences & habitat within separation distance

NC NHP Natural Areas

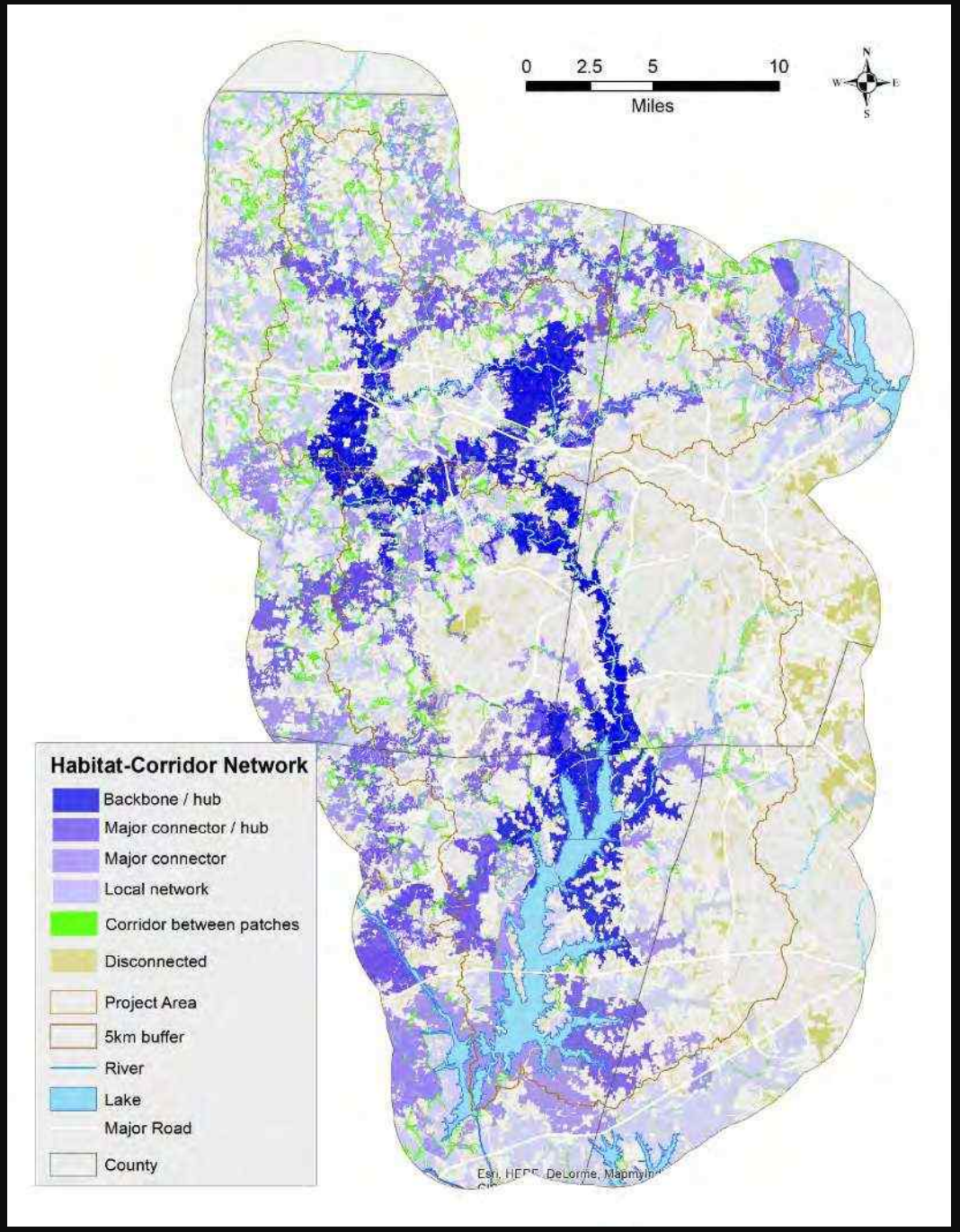
Vulnerability & opportunity



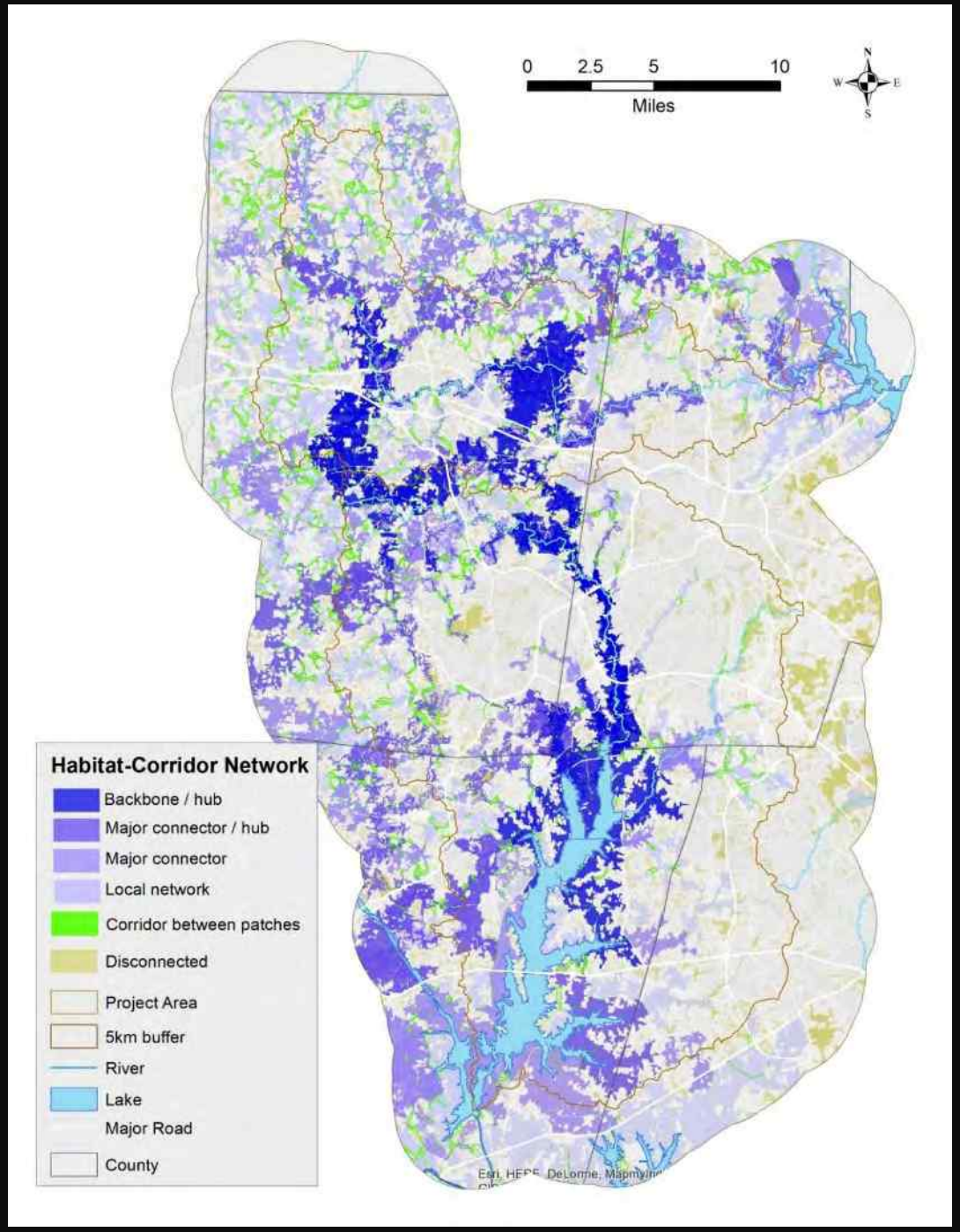

LANDFIRE Program: https://www.landfire.gov

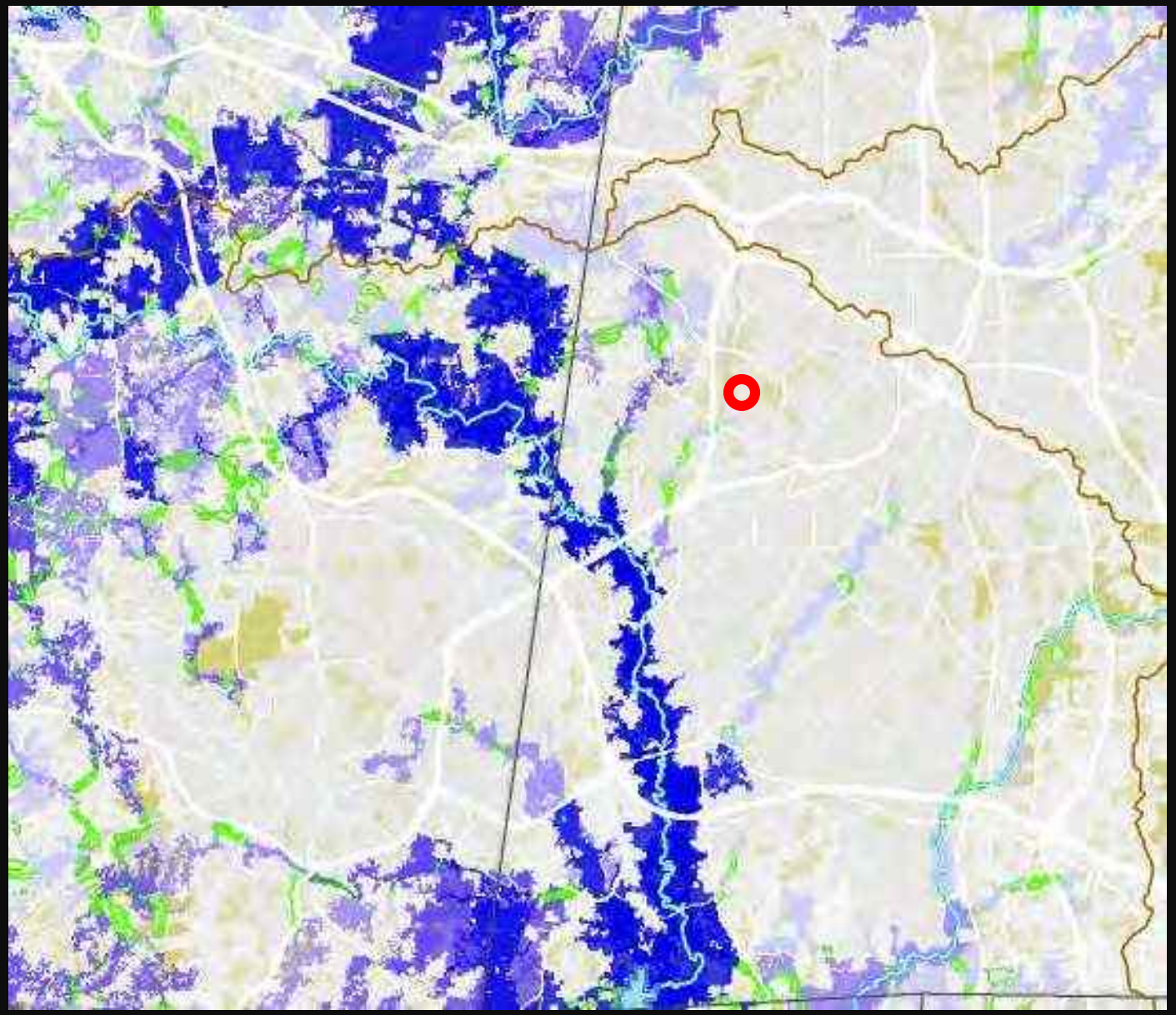
# PROJECT RESULTS: MAPS

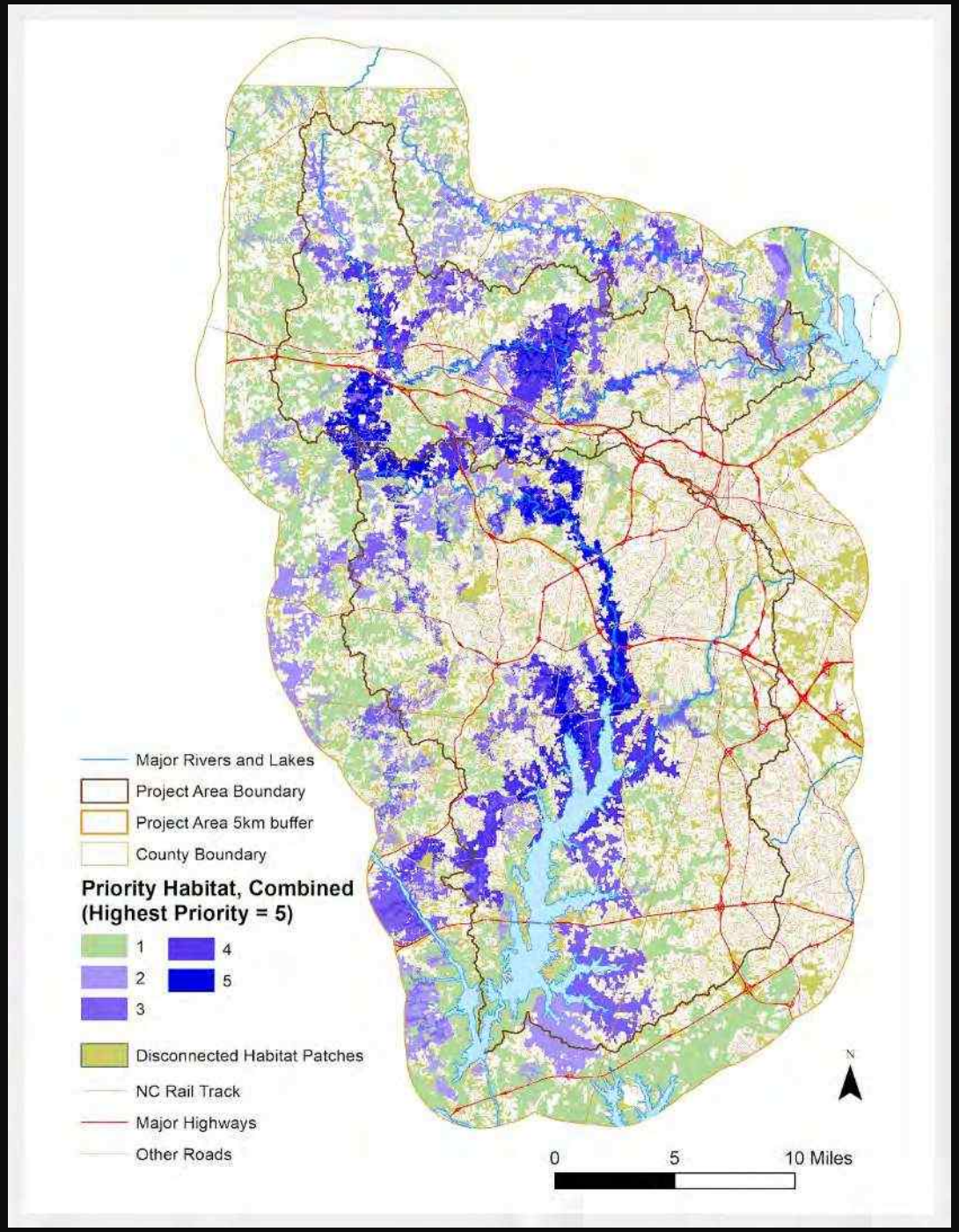
- PRIORITIZED NETWORK OF LANDSCAPE HABITAT AND CORRIDORS
- COMBINED FOR 3 SPECIES GUILDS



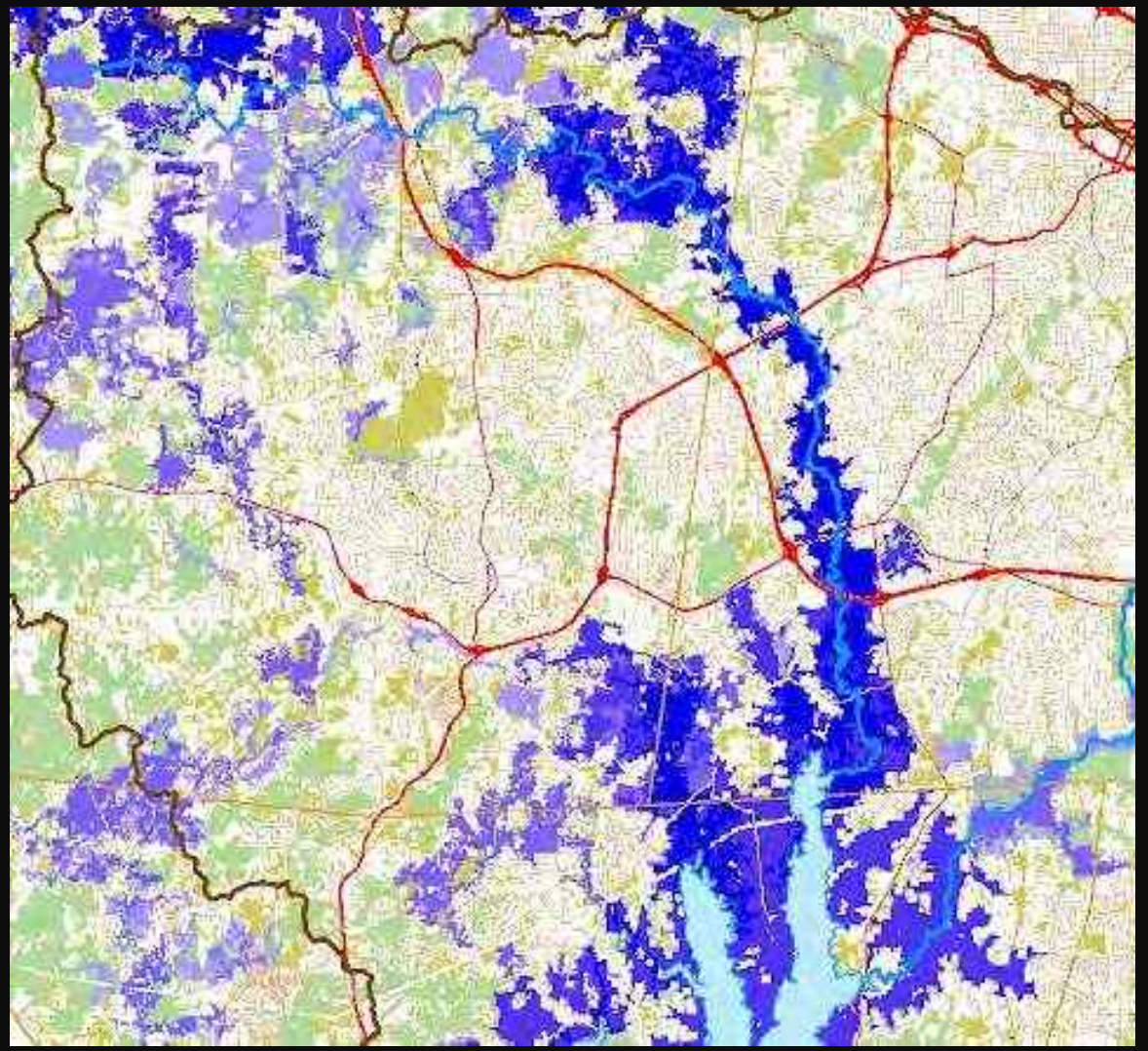
# You are here


0 2.5 5 10
Miles
N
W
E
S
Habitat-Corridor Network
Backbone / hub
Major connector / hub
Major connector
Local network
Corridor between patches
Disconnected
Project Area
5km buffer
River
Lake
Major Road
County

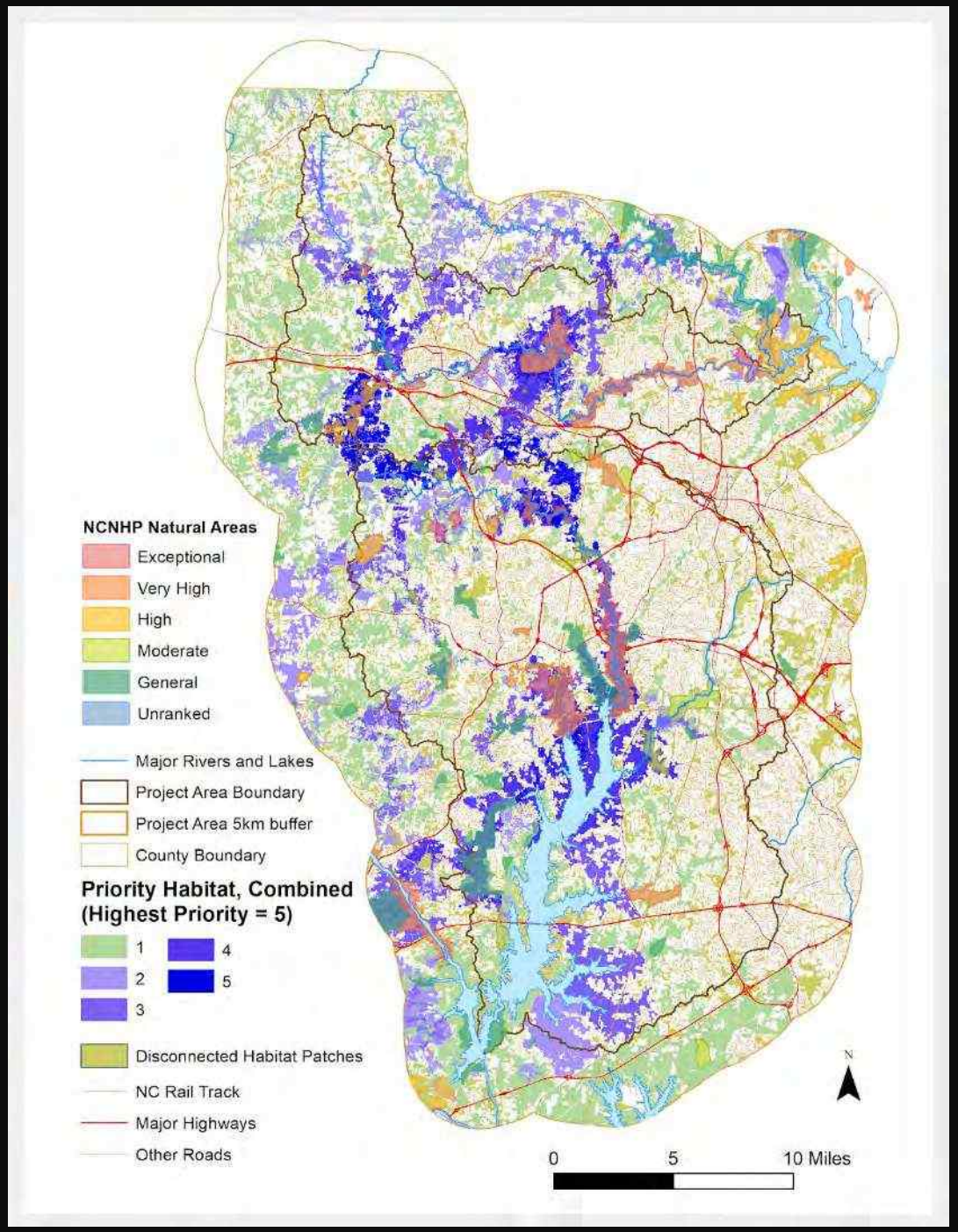


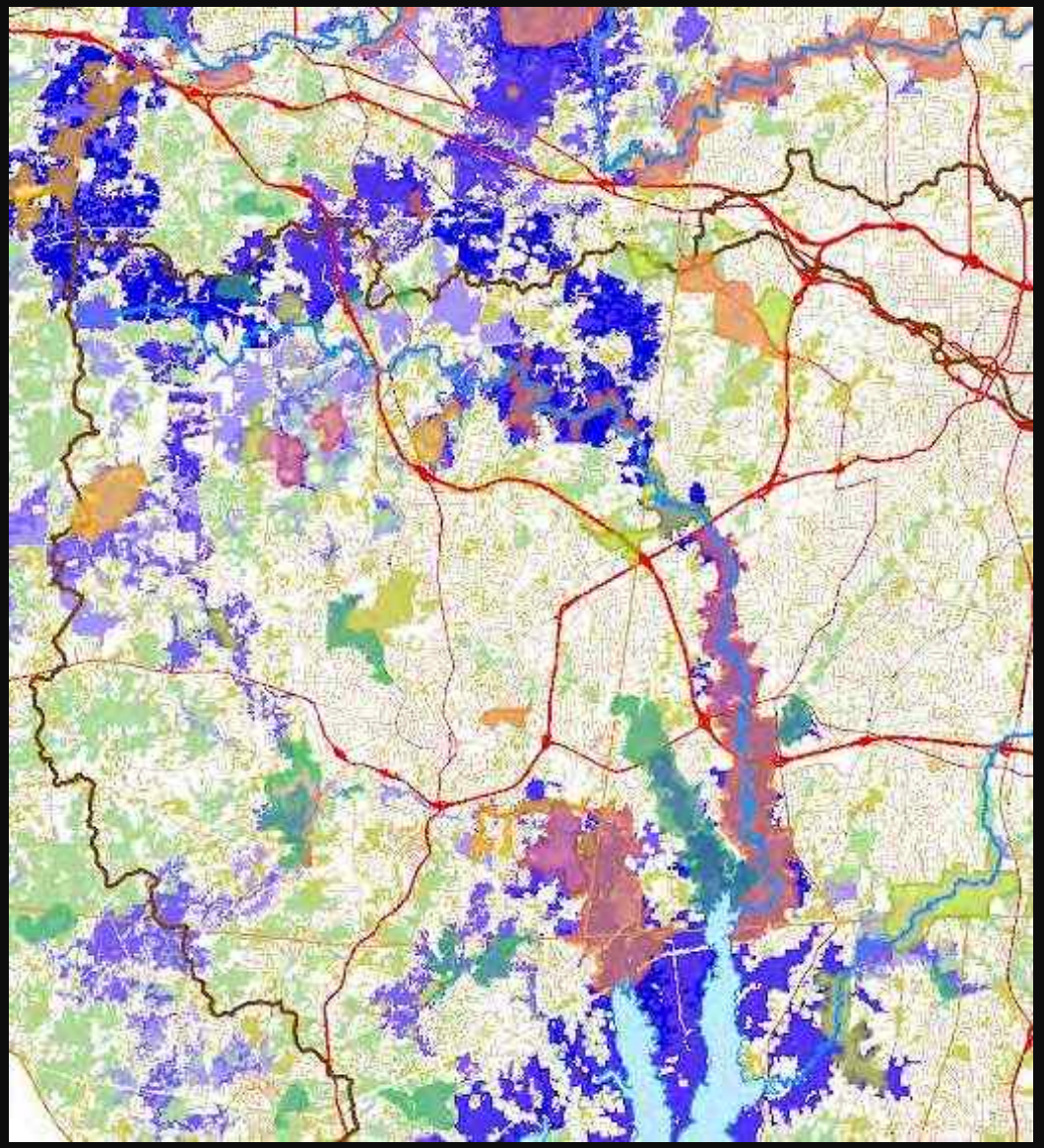



GIS-based corridor analysis for the project area, shown here as the priority habitat network for the three habitat guilds combined, assigned to five priority classes based on natural breaks in the habitat connectivity importance values.



NC Natural Heritage Program Natural Areas overlaid on the results of corridor analysis for the priority habitat network of the three habitat guilds combined

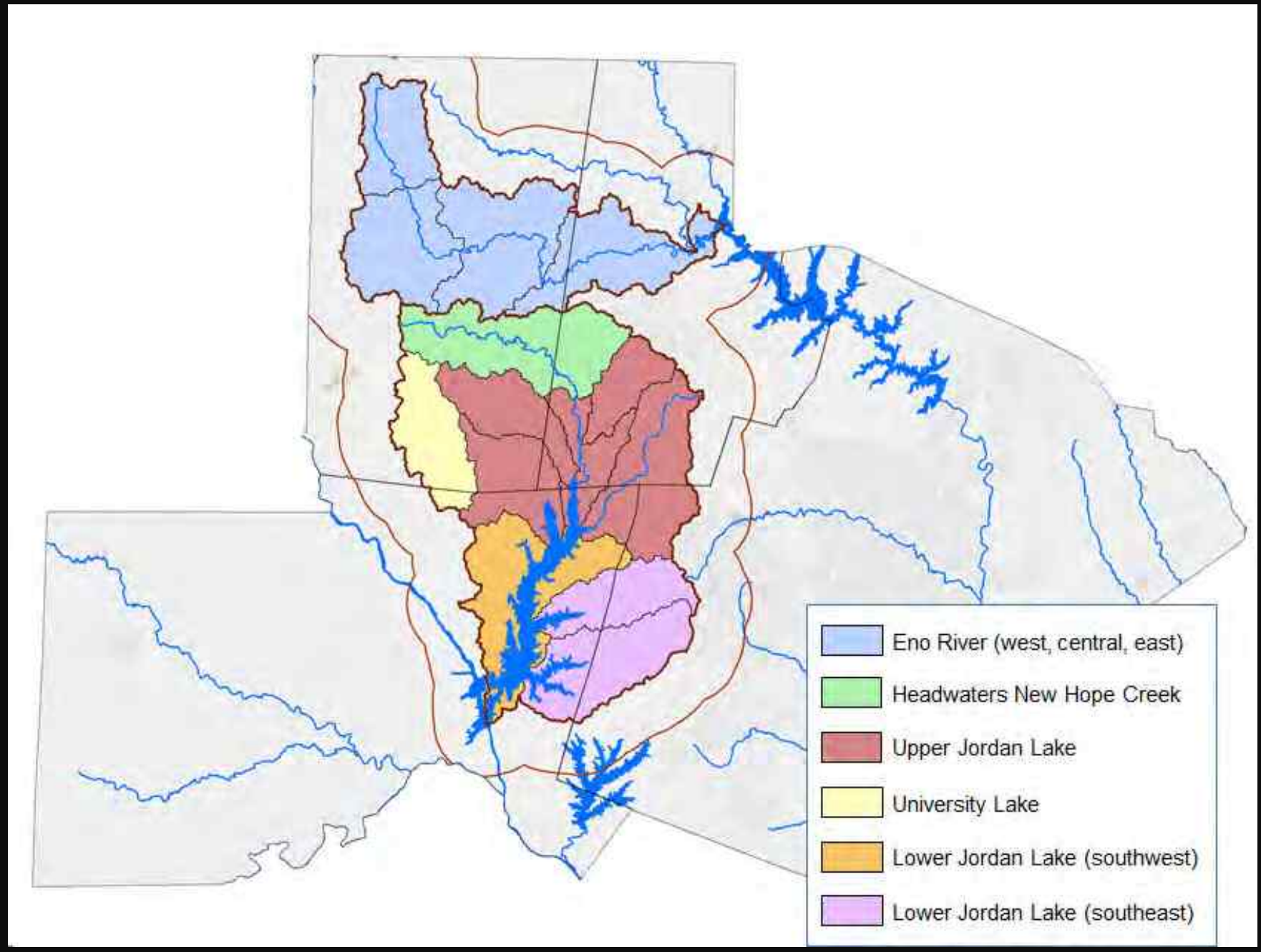


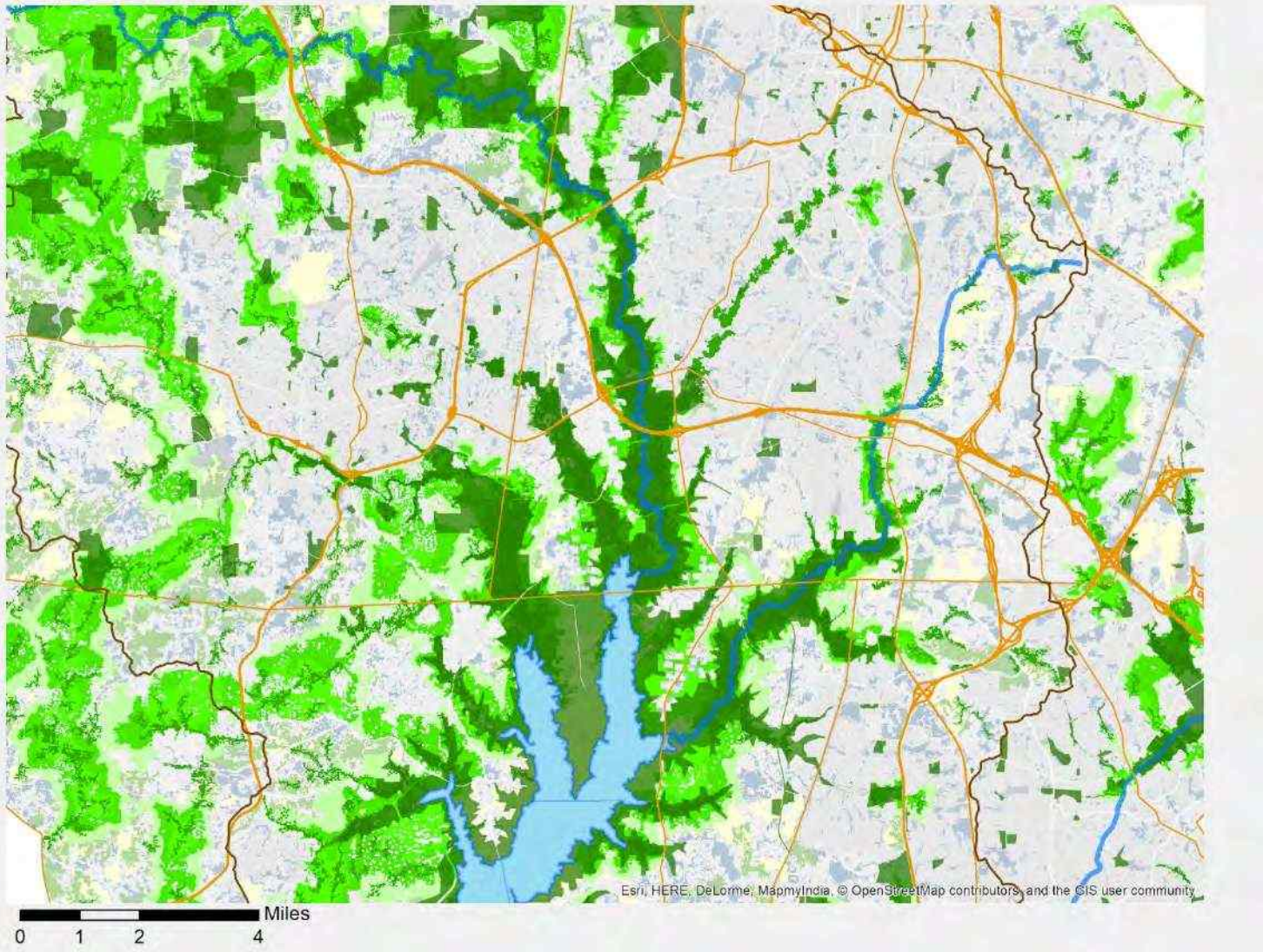
# REPORT AND POLICY RECOMMENDATIONS

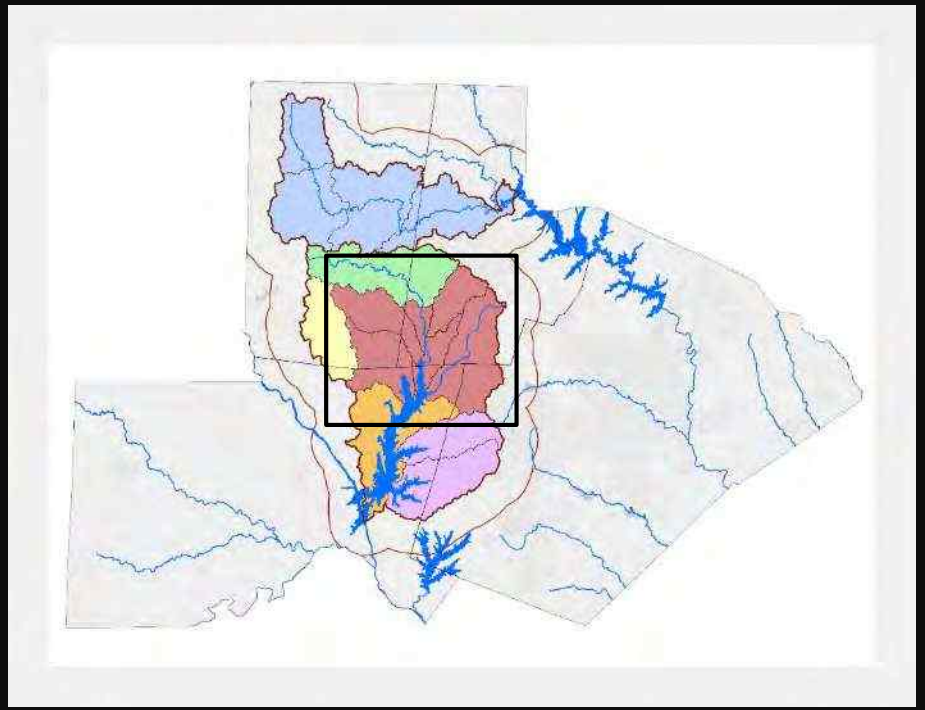
- SYNTHESIZE EXISTING POLICY AND ORDINANCES ACROSS JURISDICTIONS, E.G.:
- "CONSERVE HIGH-PRIORITY NATURAL AREAS AND WILDLIFE HABITATS, INCLUDING WETLANDS, RIVERS AND STREAMS, FLOODPLAINS, STEEP SLOPES, PRIME FORESTS, **WILDLIFE CORRIDORS**, AND OTHER CRITICAL HABITATS."
- "…DEVELOP A PLAN **TO INTERCONNECT OPEN AND GREEN SPACES** WHERE POSSIBLE, INCLUDING MANY OF THE LARGER AREAS DESIGNATED FOR OPEN SPACE IN OPEN SPACE PLANS AND LARGE UNDEVELOPED LARGE TRACTS TO **REDUCE ISOLATION RESULTING FROM FRAGMENTATION**."
- "PROTECT, ACQUIRE, AND MAINTAIN NATURAL/UNDEVELOPED OPEN SPACES AND HISTORIC SITES IN ORDER TO **PROTECT WILDLIFE CORRIDORS**, PROVIDE RECREATION, AND ENSURE SAFE PEDESTRIAN AND BICYCLE CONNECTIONS…"
- "DEVELOP AN OPEN SPACE FRAMEWORK PLAN (OR PLANS) TO INFORM DECISIONS THAT ACCOMPLISH THE FOLLOWING: **CONNECT WILDLIFE AREAS/CORRIDORS**, IMPROVE WATER QUALITY, IMPROVE AIR QUALITY, AND BALANCE ECOSYSTEMS."

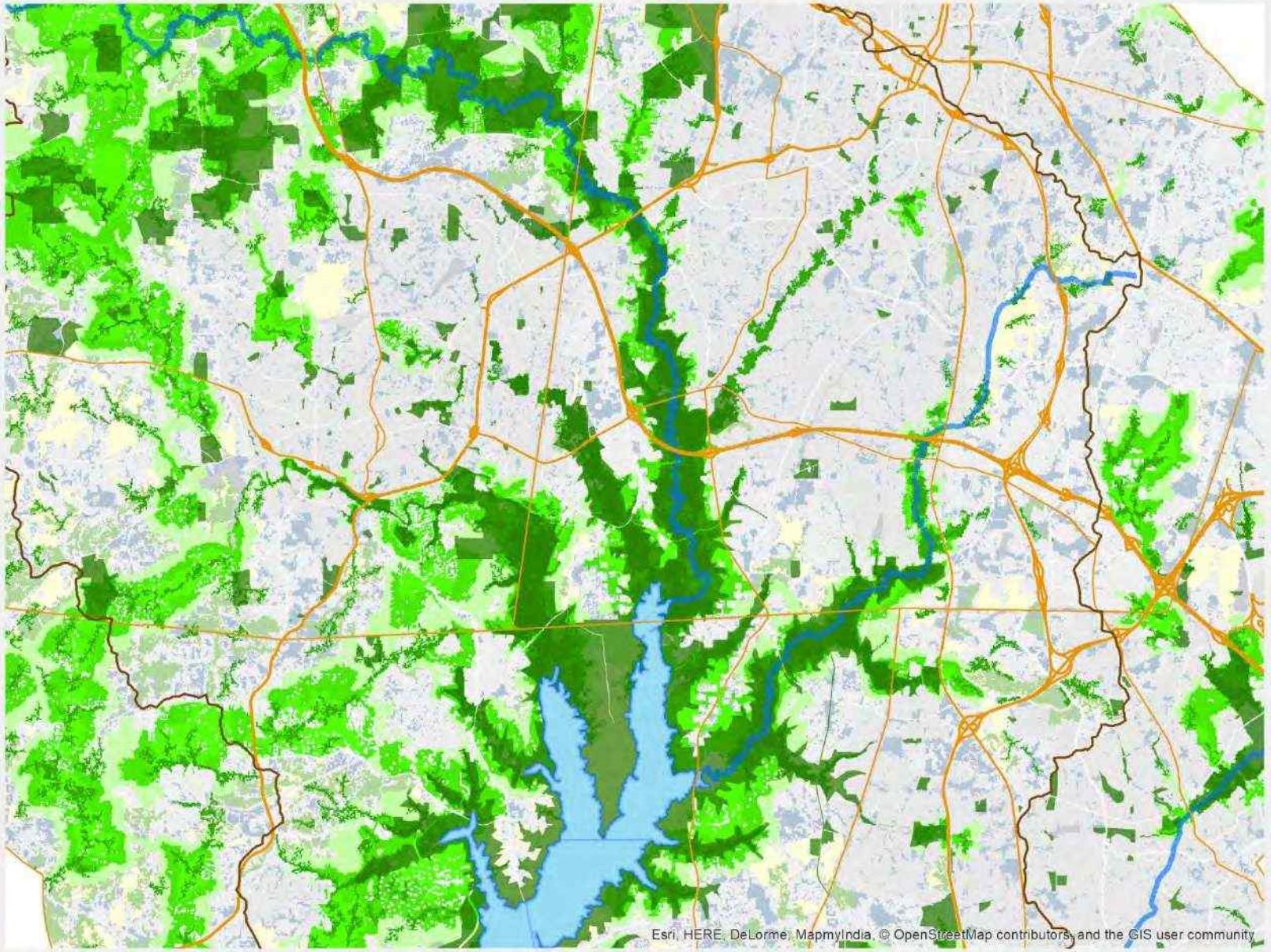
# Regions within the Eno-New Hope Landscape Conservation Project Area



# Upper Jordan Lake (New Hope Creek)






ENH Project Area

County Boundary

Major Highway or barrier portion of road

Major River or Stream

Lake

Managed Area (Conservation Land)

**Corridor Network**

**Animal movement cost**

Lower

Medium

Higher

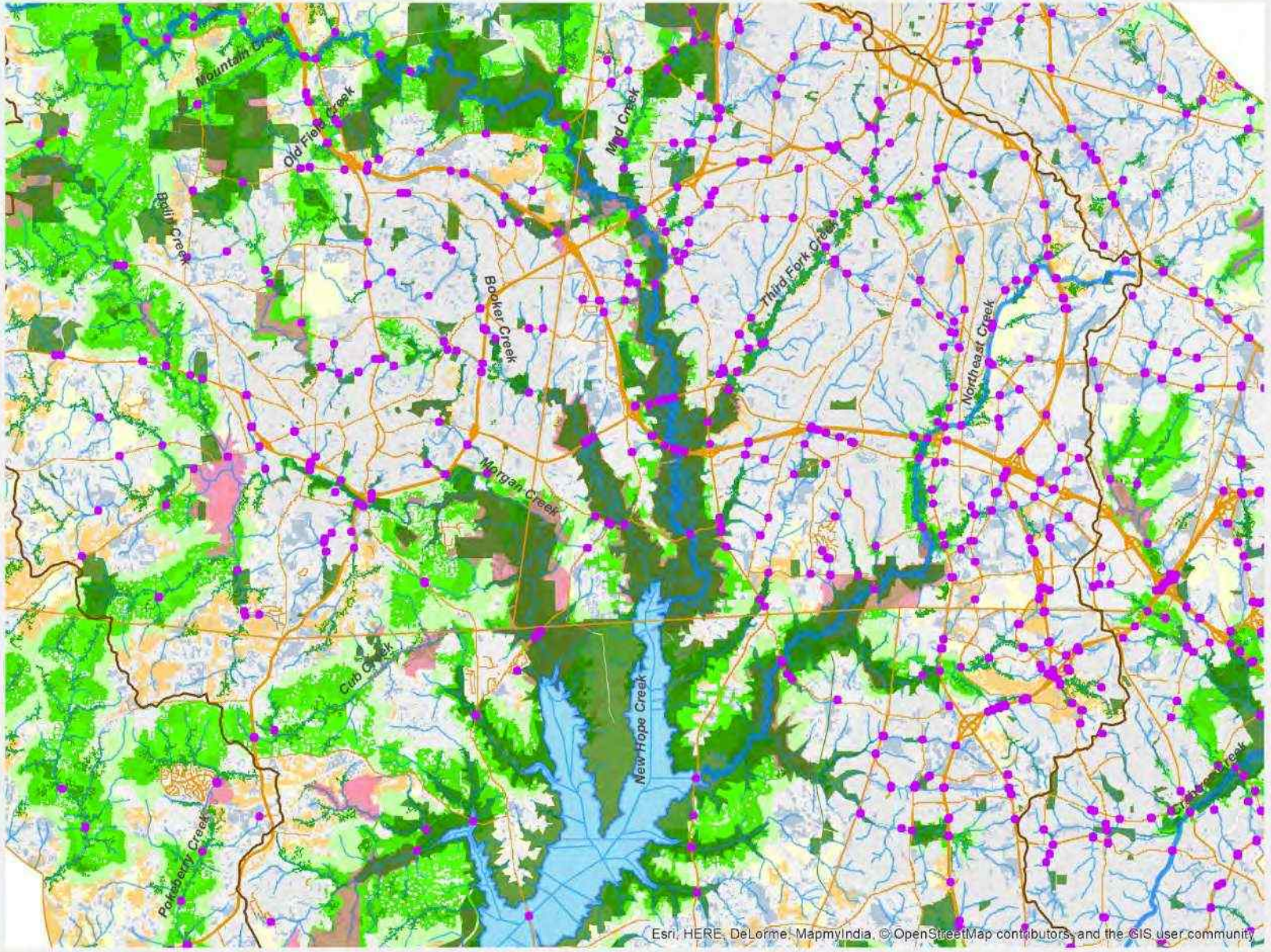
Wet-Mesic Hardwood Forest Habitat

**Additional Habitat Areas**

Dry-Wet Mixed Forest Habitat

Sparsely Settled Mixed Forest Habitat

Habitat (any type) below area threshold




ENH Project Area

County Boundary

Major Highway or barrier portion of road

Underpass
(barrier roads & DOT structures only)

Major River or Stream

Lake

NHP Natural Area

Managed Area (Conservation Land)

## Corridor Network

### Animal movement cost

Lower

Medium

Higher

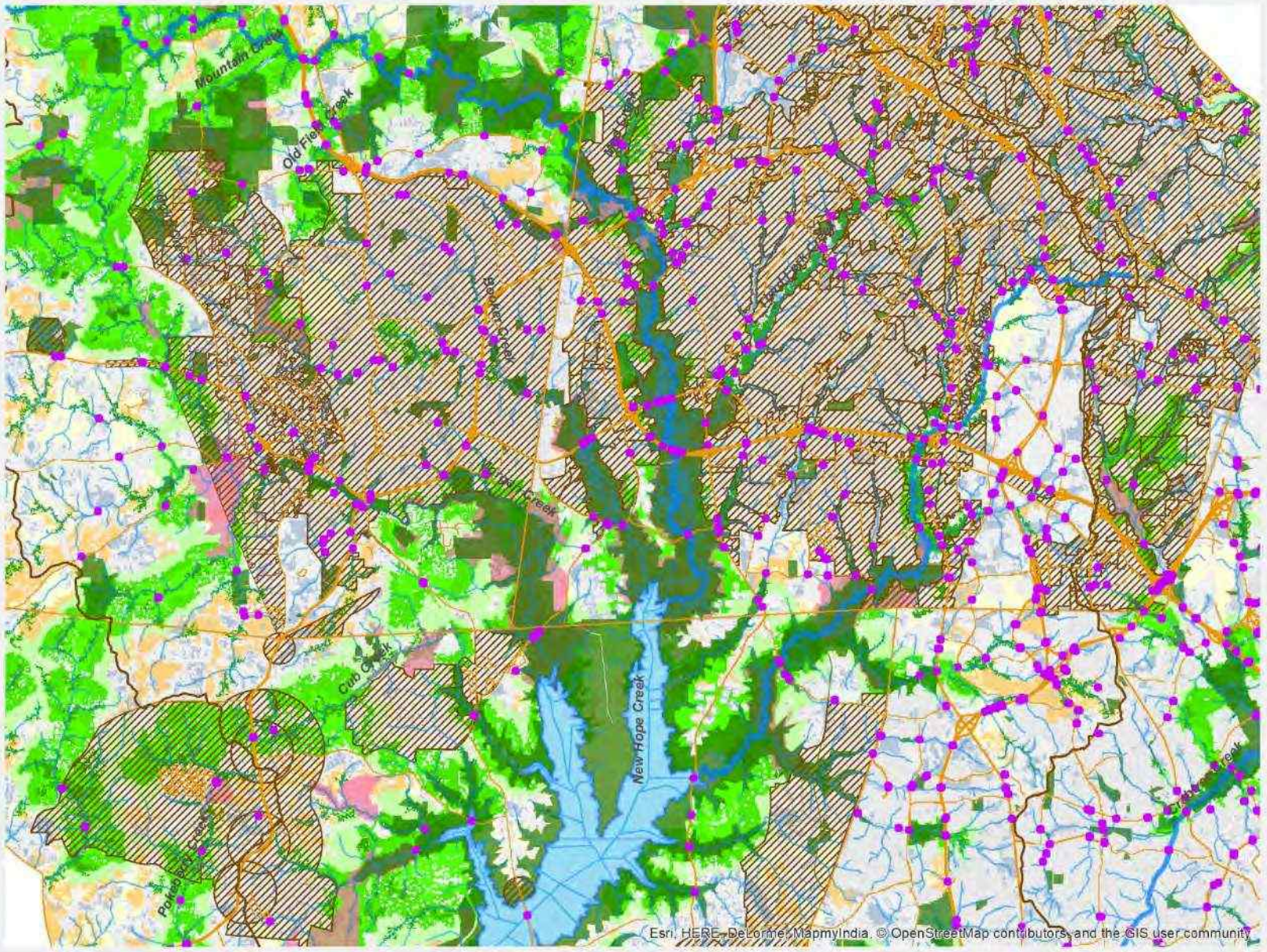
Wet-Mesic Hardwood Forest Habitat

### Additional Habitat Areas

Dry-Wet Mixed Forest Habitat

Sparsely Settled Mixed Forest Habitat

Habitat (any type) below area threshold




ENH Project Area

County Boundary

Major Highway or barrier portion of road

Underpass
(barrier roads & DOT structures only)

Future Land Use Vulnerability?

Major River or Stream

Lake

NHP Natural Area

Managed Area (Conservation Land)

## Corridor Network

### Animal movement cost

Lower

Medium

Higher

Wet-Mesic Hardwood Forest Habitat

### Additional Habitat Areas

Dry-Wet Mixed Forest Habitat

Sparsely Settled Mixed Forest Habitat

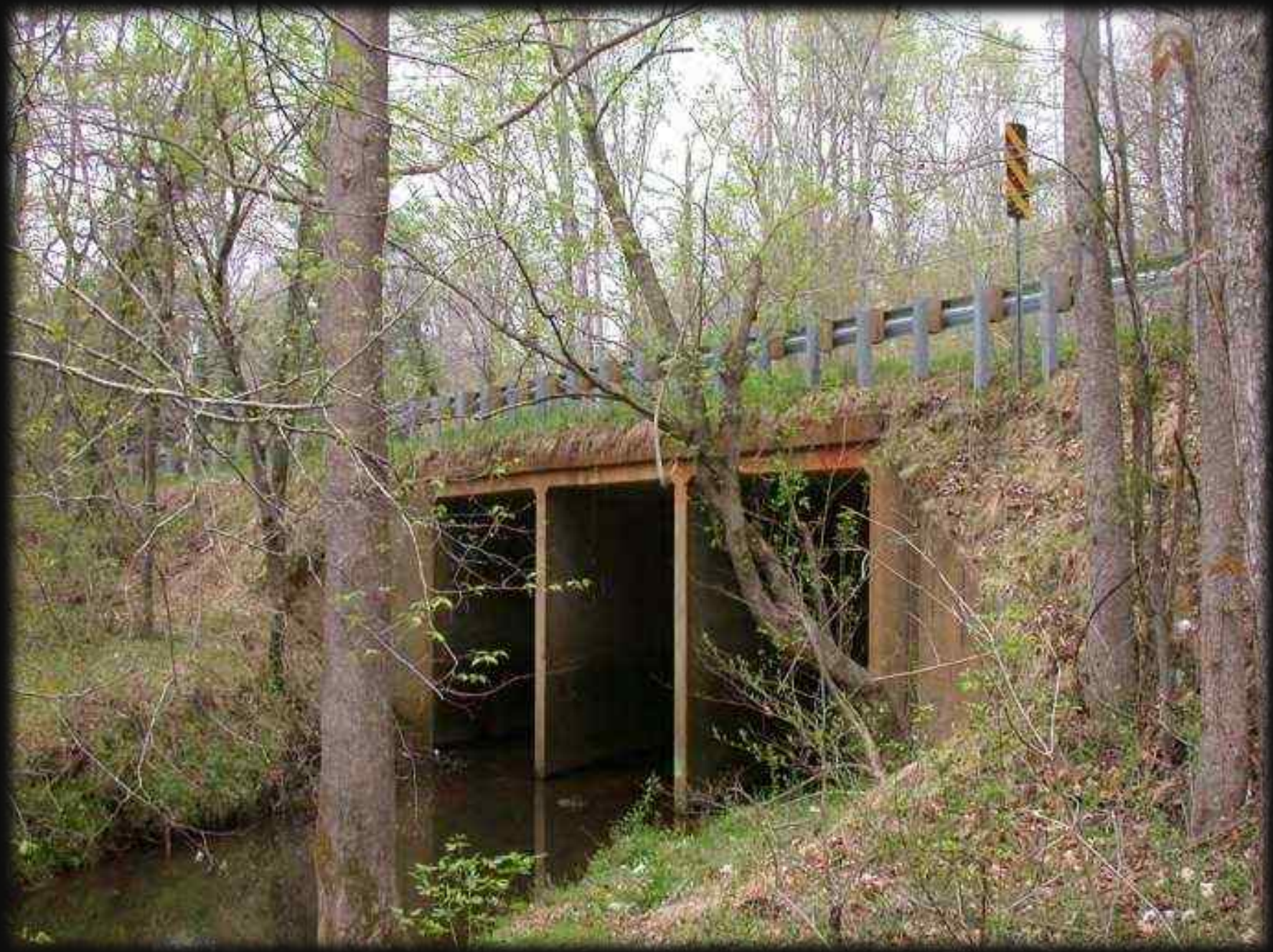
Habitat (any type) below area threshold

# NEXT STEPS: COMMUNICATION & IMPLEMENTATION

- MEMBERS OF THE ENO-NEW HOPE LANDSCAPE CONSERVATION GROUP WILL:
  - PRESENT PROJECT FINDINGS AND RECOMMENDATIONS TO LOCAL GOVERNMENT DECISION-MAKERS, PLANNERS, ADVISORY BOARDS, AND THE PUBLIC
  - WORK WITH LOCAL GOVERNMENT DECISION-MAKERS, DEPARTMENTS, AND INTERESTED LAND OWNERS TO SUPPORT LANDSCAPE HABITAT CONNECTIVITY USING PROJECT RESULTS AND A RANGE OF LAND CONSERVATION STRATEGIES AND TOOLS.

# Next step 1 is coming up soon!

# TEST QUESTION 1- PLEASE INTERPRET THIS SCENE?

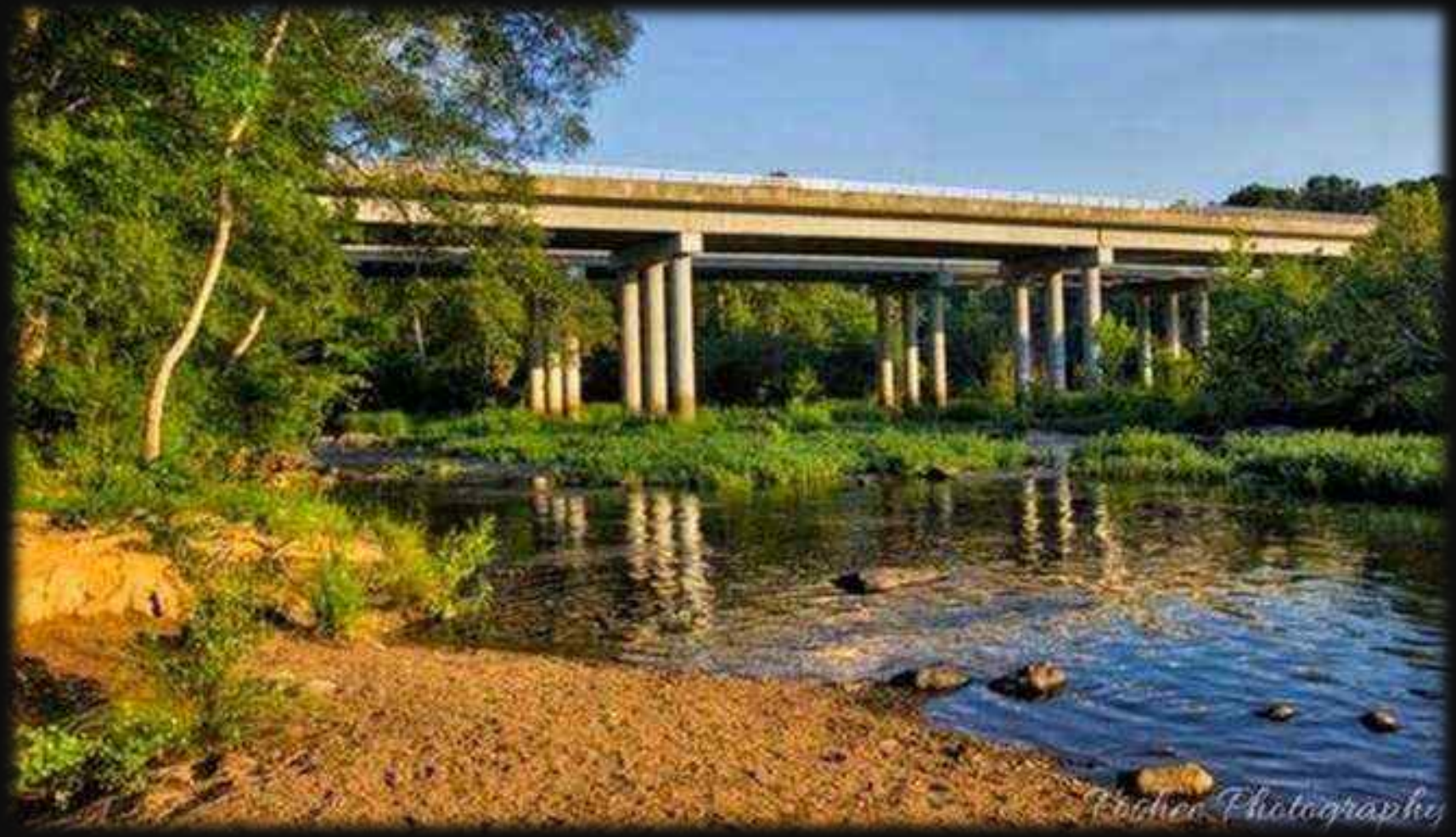


Question 2:
What's wrong with this picture?

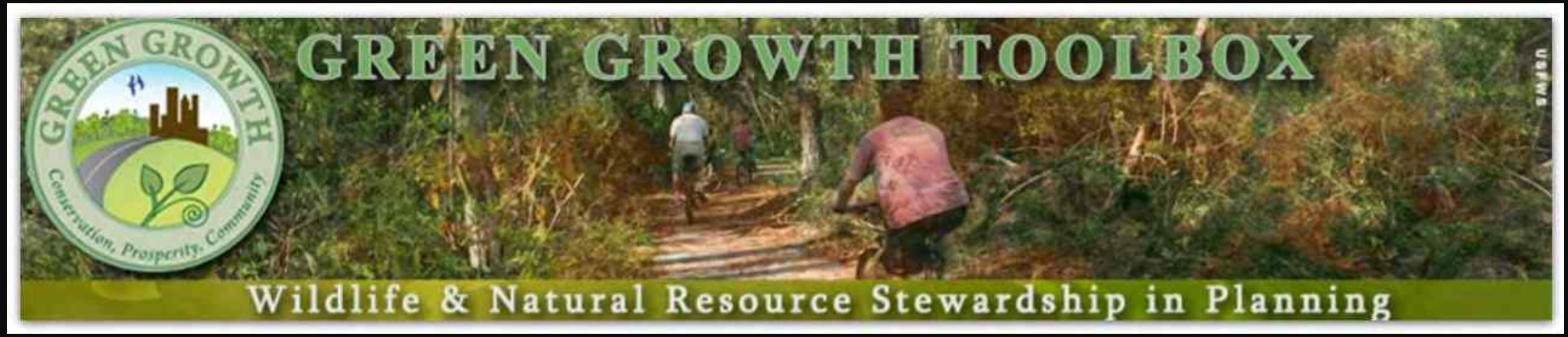
# Box culvert

Morgan Creek
at Dairyland Rd
Orange County

# Question 3: What's wrong with this picture?



New Hope Creek & 15/501 bridge





There's no excuse for poor planning!

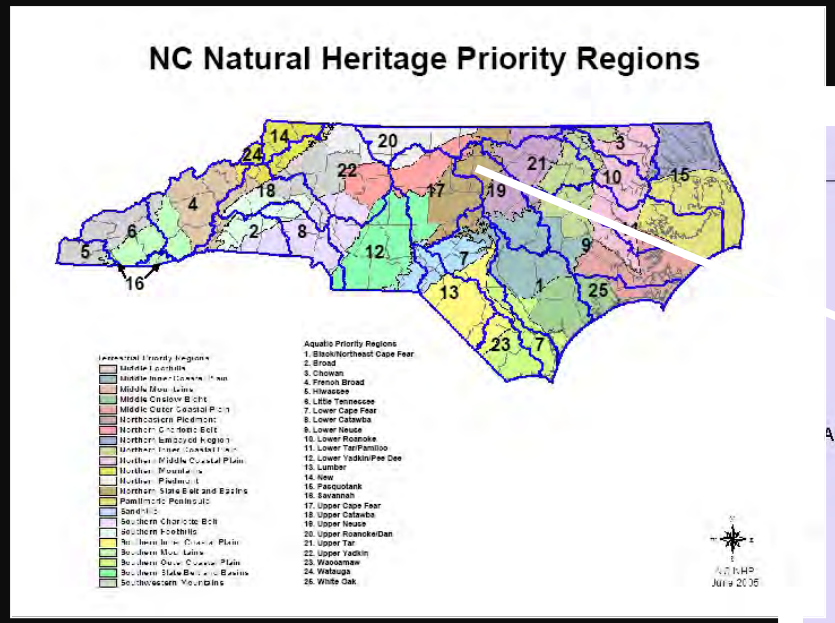
NCBG

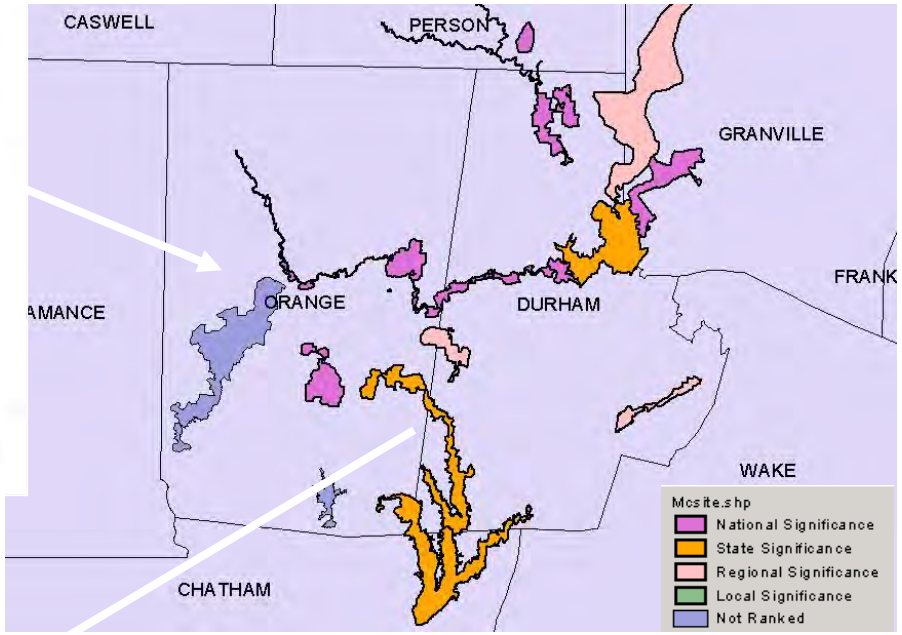
Mason Farm Biological Reserve

# MASON FARM BIOLOGICAL RESERVE

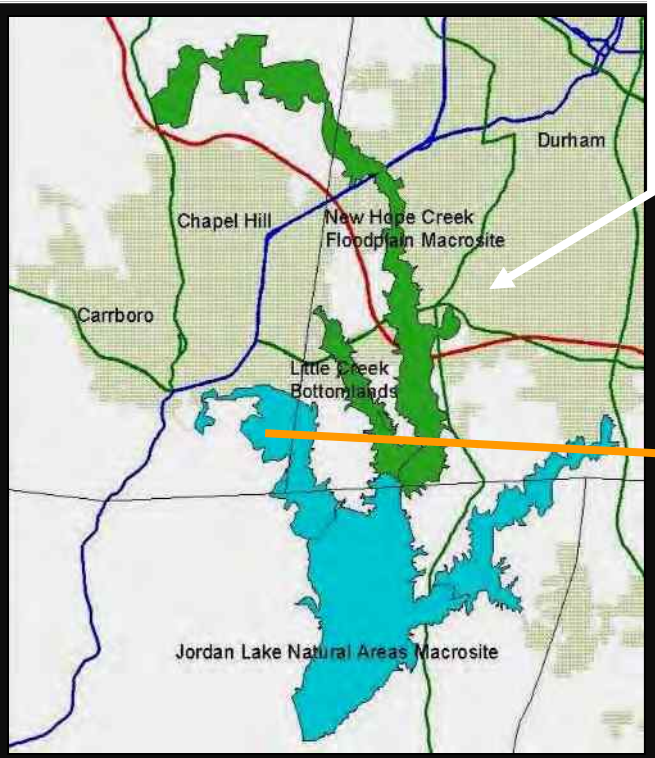
- MFBR and other NCBG lands ca. 700 acres
- 600-acres of adjacent undeveloped private land
- 41,000-acre New Hope Gameland to the south
- 800 species of plants
- 216 species of birds
- 29 species of mammals
- 28 species of fish
- 28 species of reptiles
- 23 species of amphibians
- 115 species of butterflies

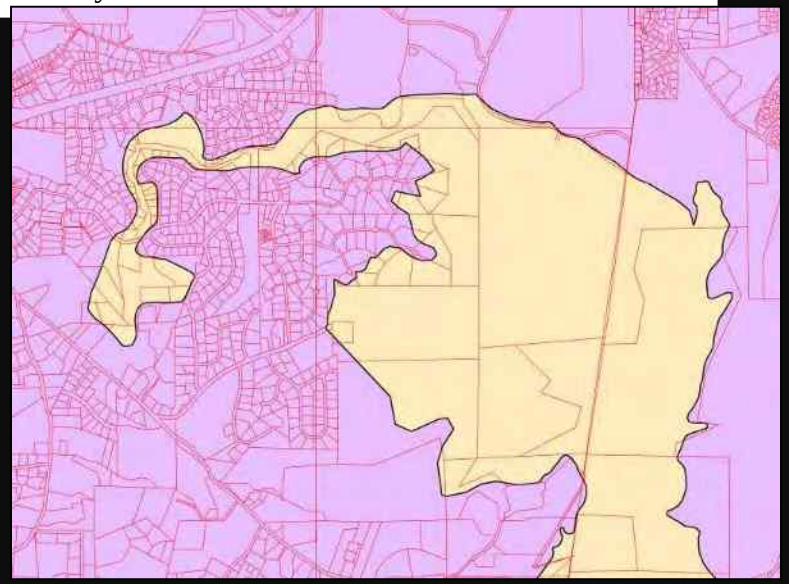
# Let the Macrosites be your guide…

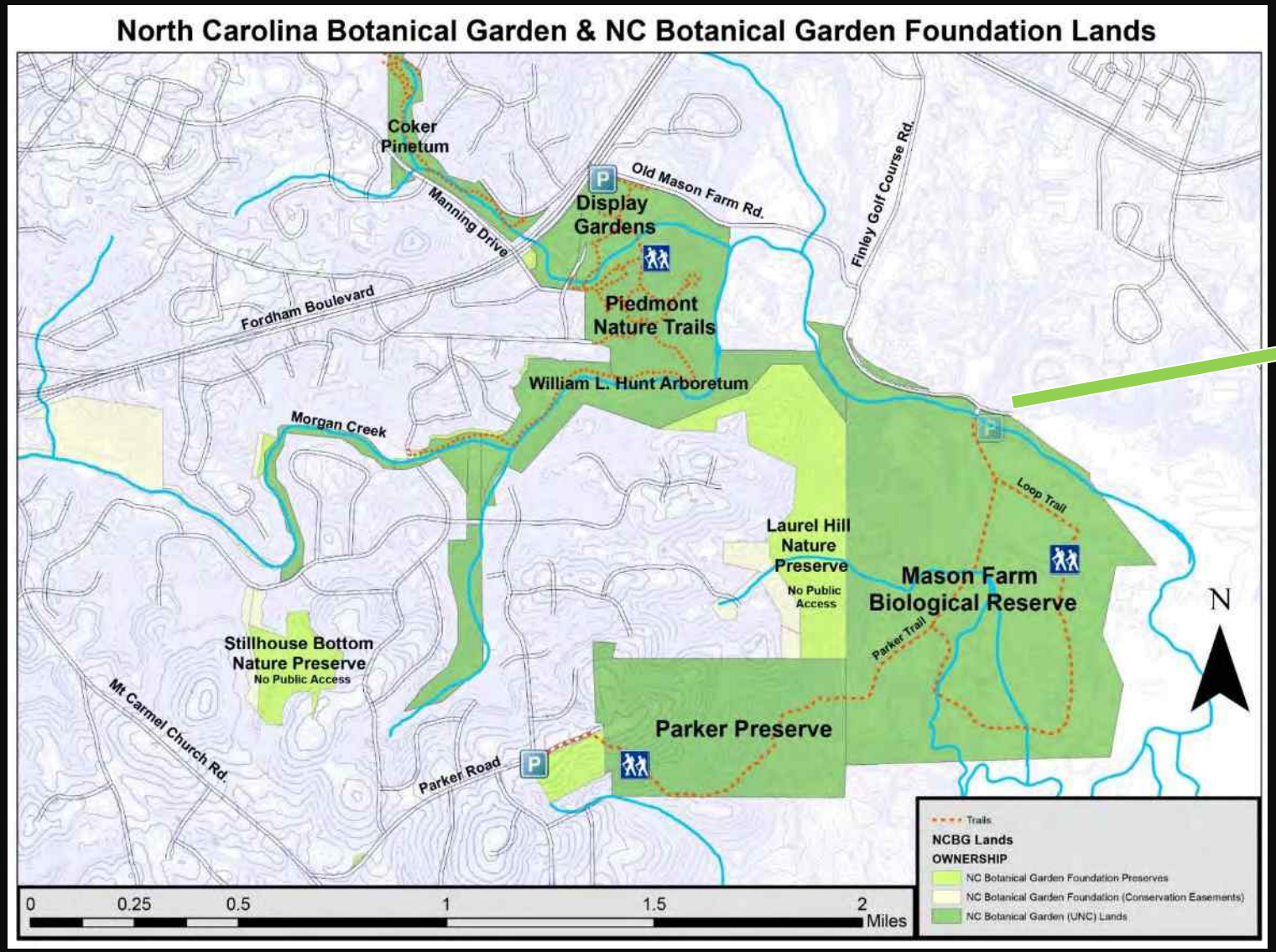


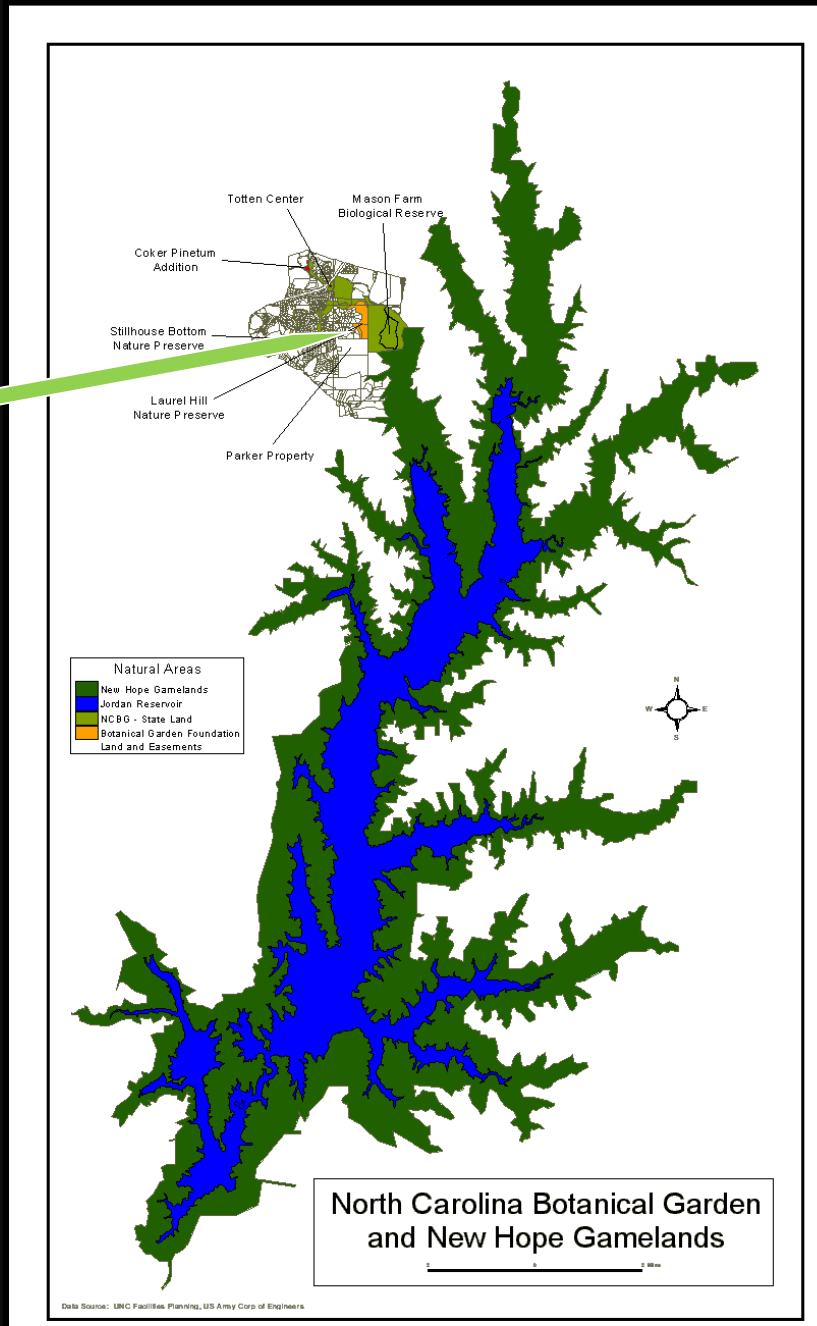




Updated Orange County Macrosites

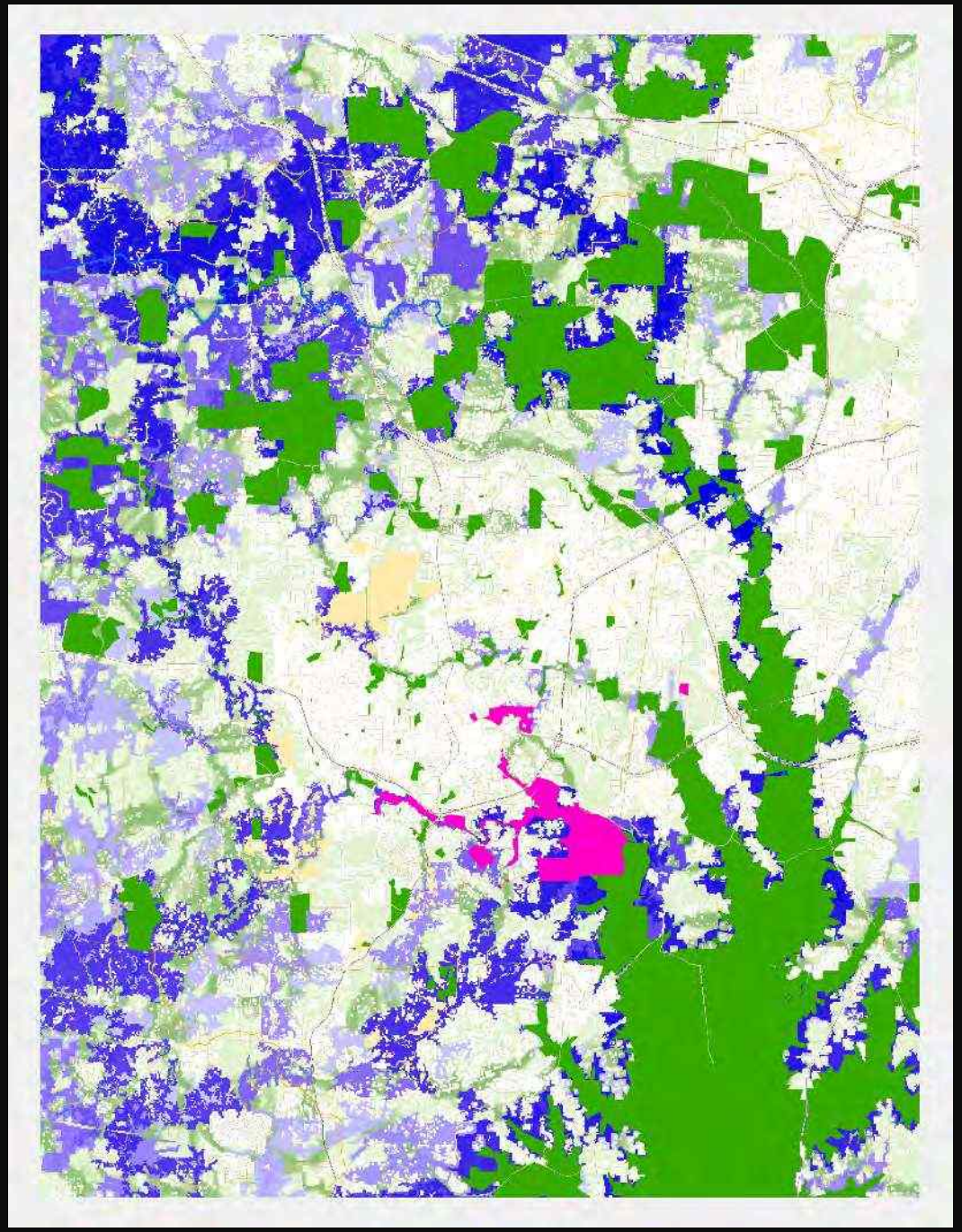


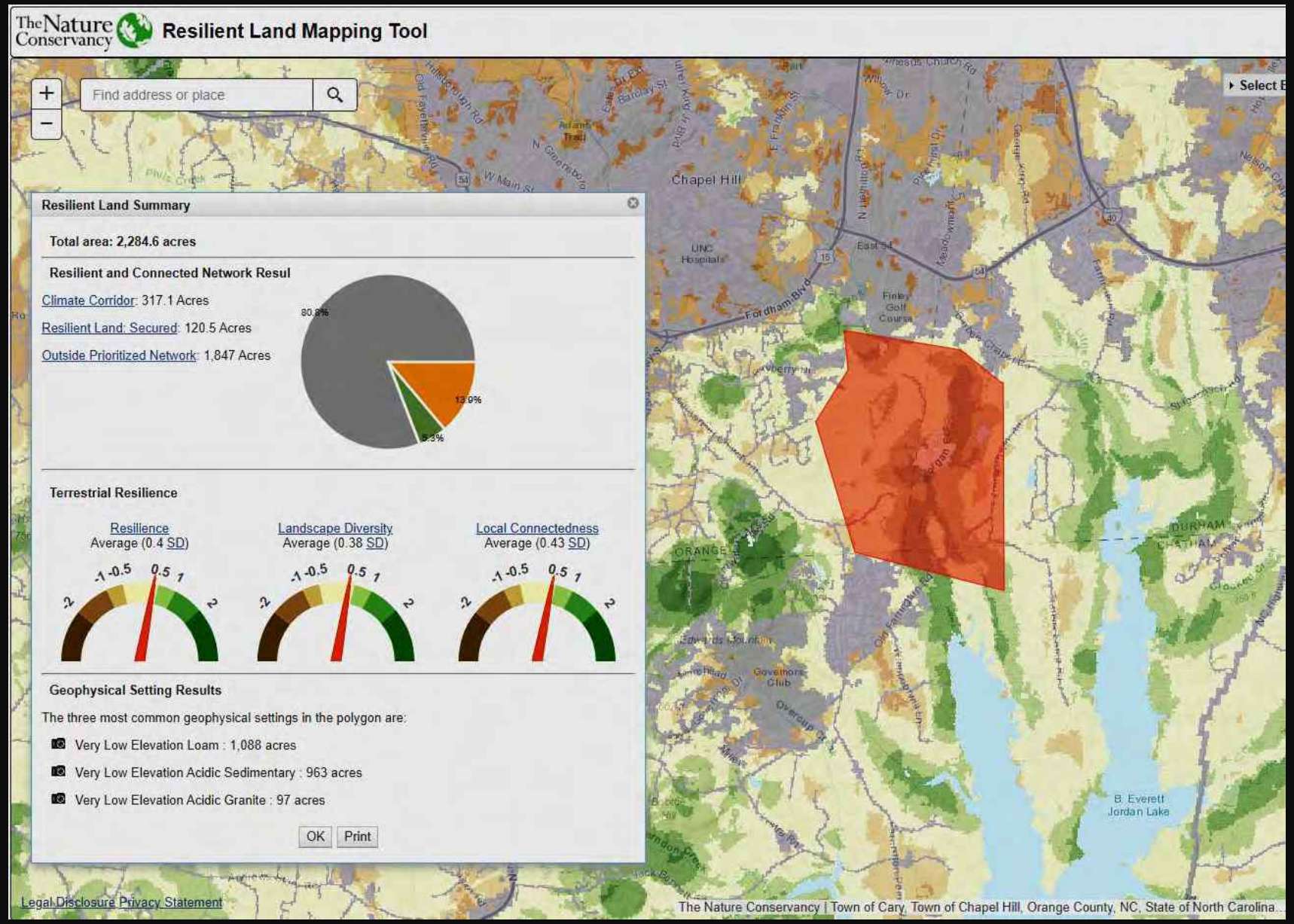

North Carolina Botanical Garden & NC Botanical Garden Foundation Lands
Coker Pinetum
Manning Drive
Old Mason Farm Rd.
Display Gardens
Finley Golf Course Rd.
Fordham Boulevard
Piedmont Nature Trails
William L. Hunt Arboretum
Morgan Creek
Loop Trail
Laurel Hill Nature Preserve
No Public Access
Mason Farm Biological Reserve
Parker Trail
Stillhouse Bottom Nature Preserve
No Public Access
Mt Carmel Church Rd.
Parker Preserve
Parker Road
N
Trails
NCBG Lands
OWNERSHIP
NC Botanical Garden Foundation Preserves
NC Botanical Garden Foundation (Conservation Easements)
NC Botanical Garden (UNC) Lands
0
0.25
0.5
1
1.5
2
Miles


Totten Center
Mason Farm Biological Reserve
Coker Pinetum Addition
Stillhouse Bottom Nature Preserve
Laurel Hill Nature Preserve
Parker Property
Natural Areas
New Hope Gamelands
Jordan Reservoir
NCBG - State Land
Botanical Garden Foundation Land and Easements
North Carolina Botanical Garden and New Hope Gamelands
Data Source: UNC Facilities Planning, US Army Corp of Engineers

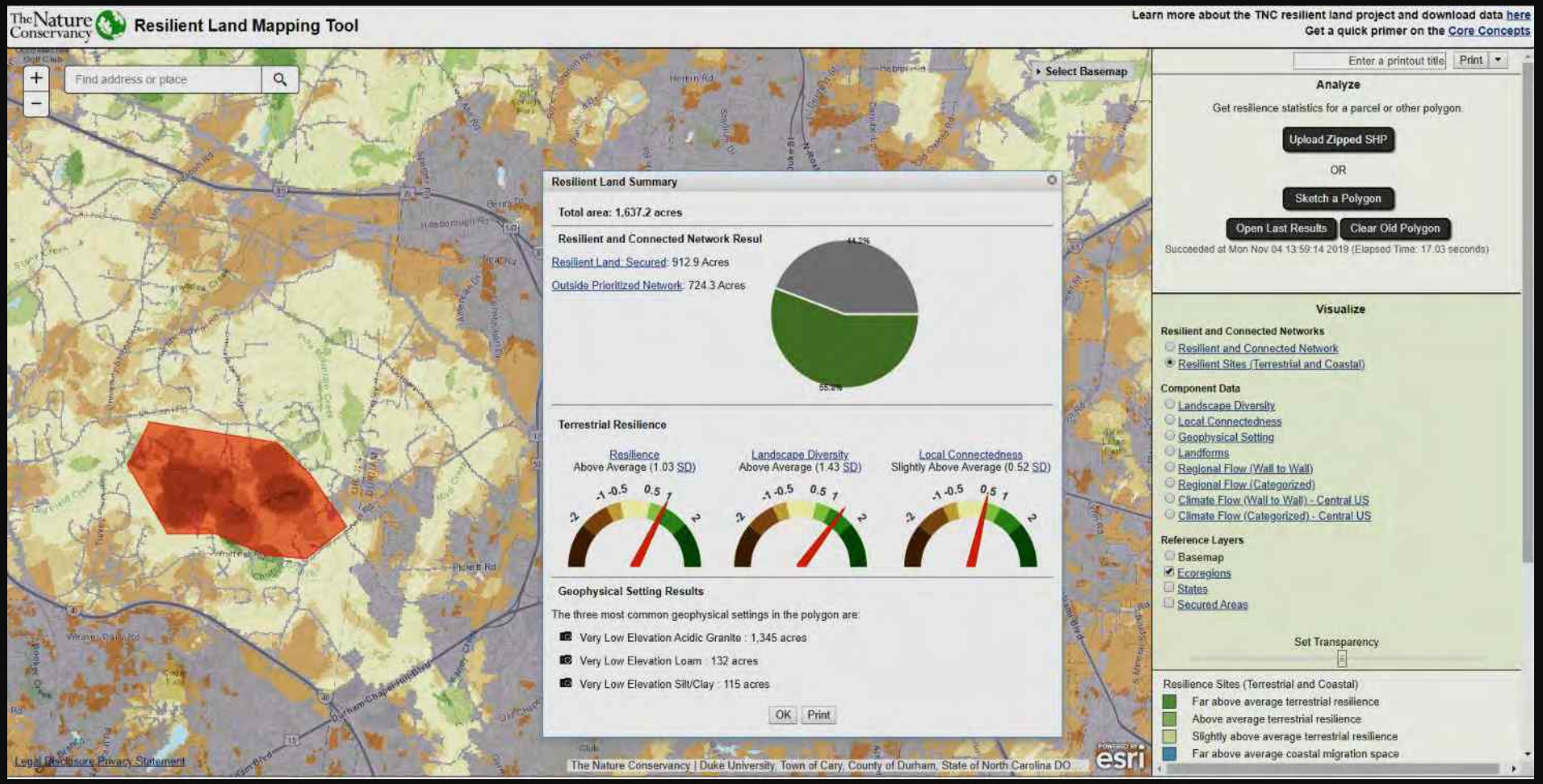
# LANDSCAPE CONSERVATION PROJECT RESULTS & THE ROLE OF NCBG CONSERVATION LANDS



# TNC Resilient Land Tool & Mason Farm



# TNC Resilient Land Tool & Duke Forest




New Hope Creek in Duke Forest

http://maps.tnc.org/resilientland/

E.O. Wilson Biodiversity Foundation paulaehrlich@eowilsonfoundation.org