

Using Eco-Logical to Identify Priorities for Conservation and Mitigation

Wednesday, March 16, 2011

2:00 - 3:30 PM Eastern

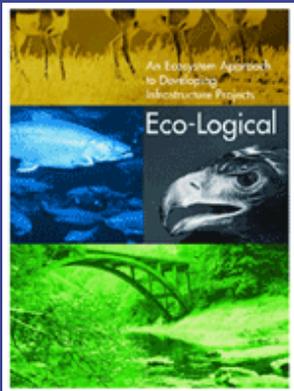
Presenters

Sharon Osowski Morgan, U.S. Environmental Protection Agency – Region 6

Amy Boyers, Houston-Galveston Area Council

Allison Weakley, North Carolina Department of Environment and Natural Resources

Moderated by Mary Gray, FHWA Office of Project Development and Environmental Review



Regional Ecological Assessment Protocol (REAP): Ecological Information for Transportation Planning in the South Central United States



Using Eco-Logical to Identify Priorities for Conservation and Mitigation

Sharon L. Osowski, Ph.D.

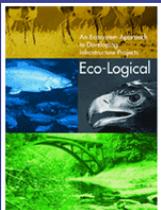
US Environmental Protection Agency Region 6

March 16, 2011

REAP Purpose

2

- ***Purpose:*** To identify ecologically important resources across the EPA Region 6 in order to support *greater collaborative approaches* to strategic, ecosystem management.
- 3 key ecological aspects: Diversity, Rarity, Sustainability. Combined into a Composite Layer



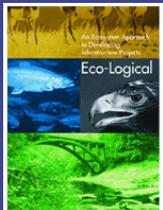
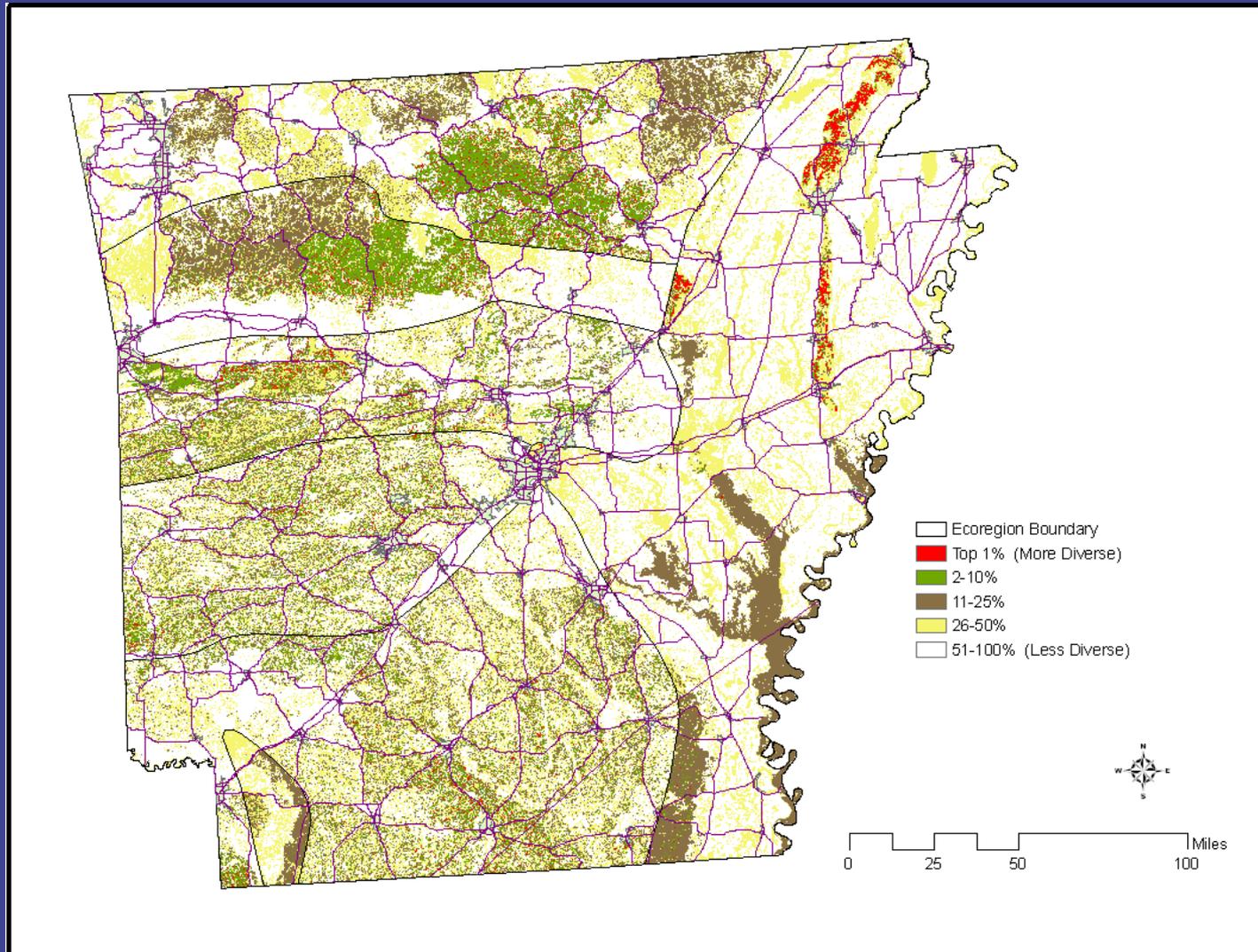
March 16, 2011

Arkansas Diversity

3

Habitats & landscape

What areas have the most diverse land cover?

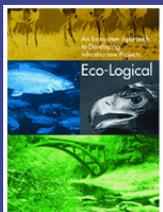
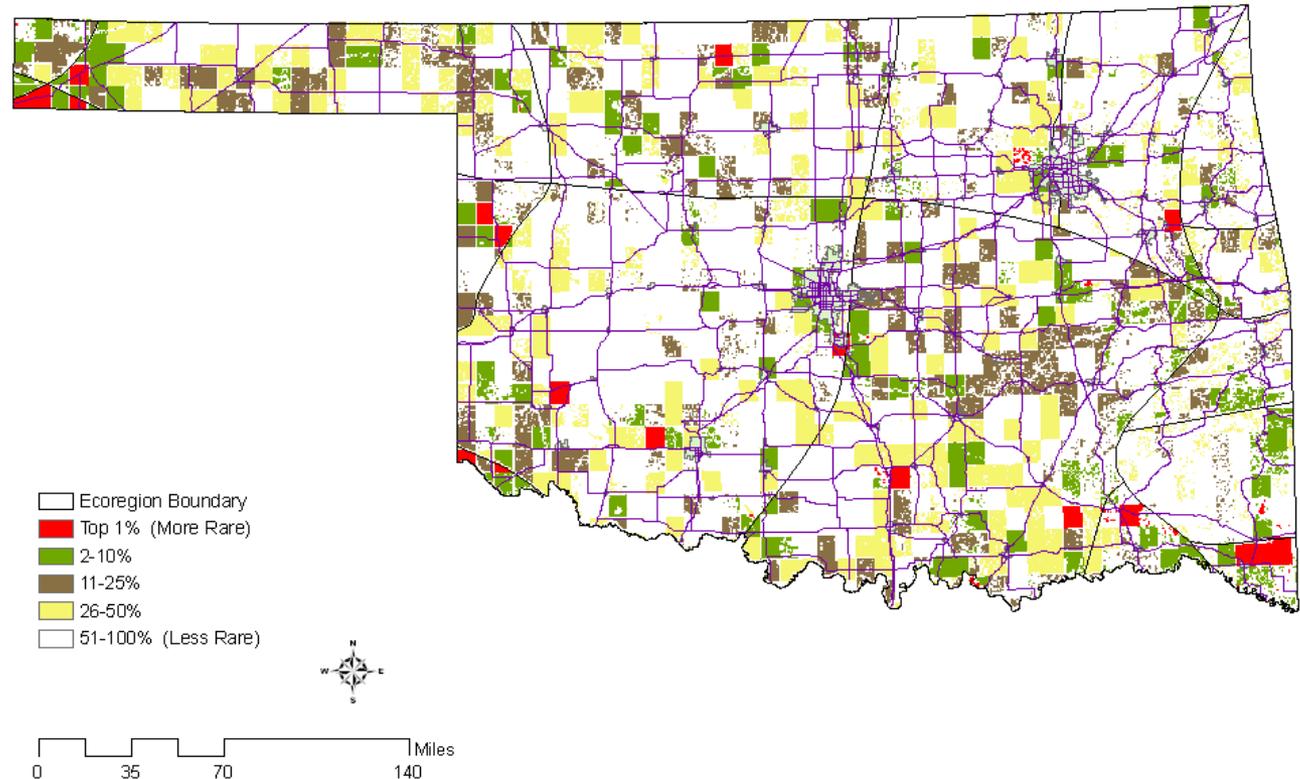


Oklahoma Rarity

4

Species & Communities

What areas have the greatest number of rare species and vegetation?

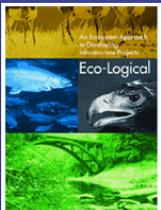
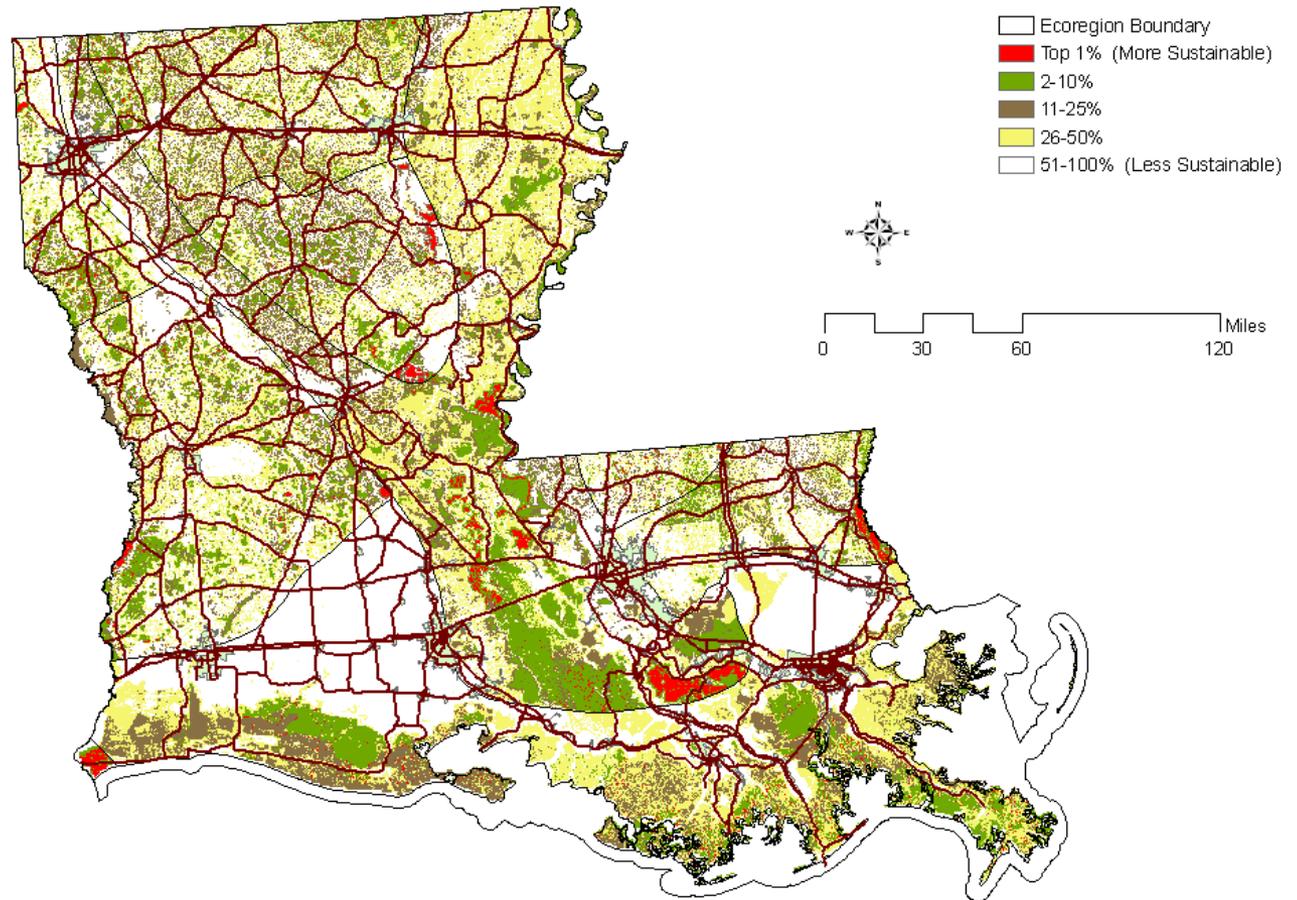


Louisiana Sustainability

5

Stressors & Fragmentors

What areas can sustain ecosystems w/o human intervention?

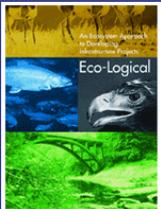
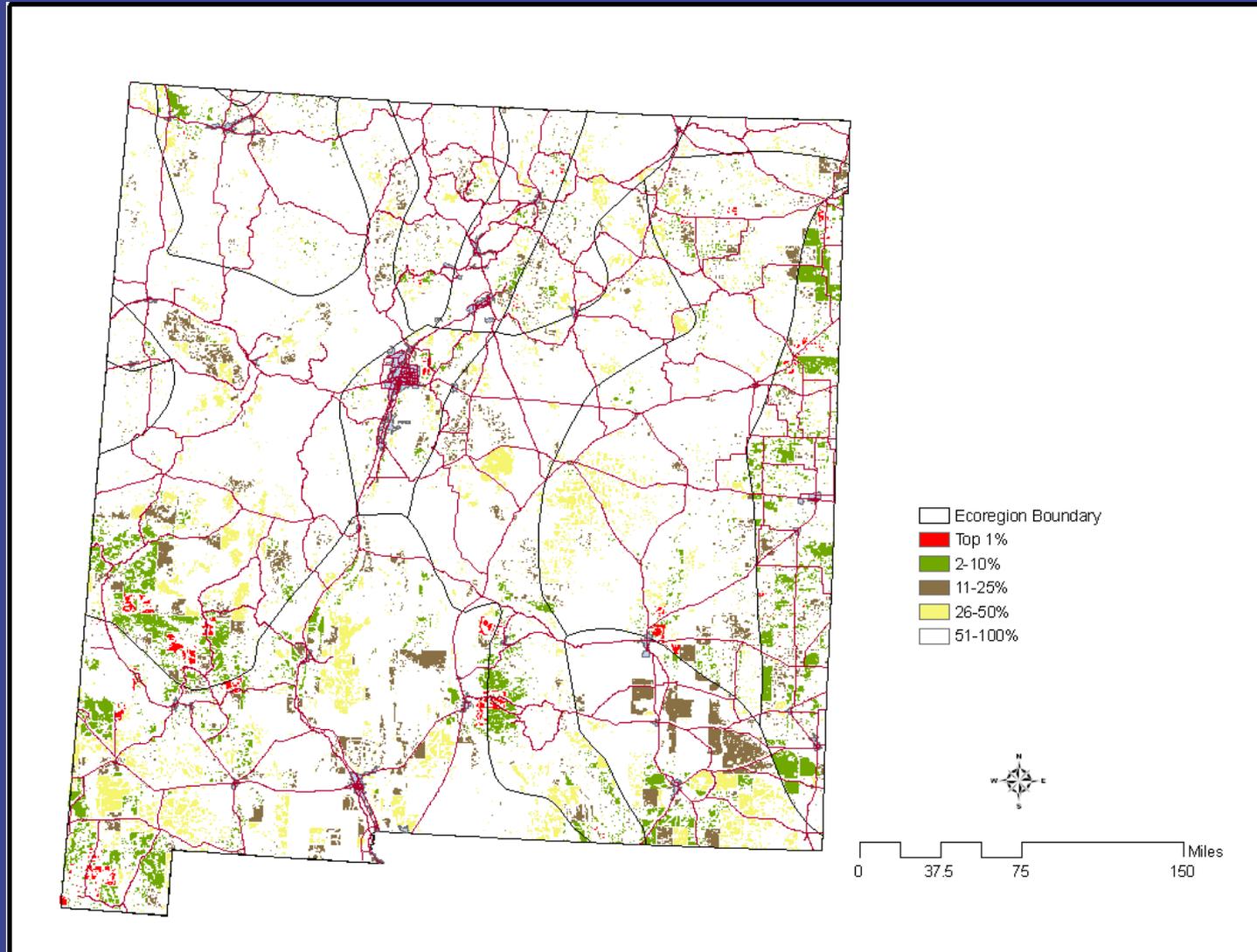


New Mexico Composite

6

Stressors & Fragmentors

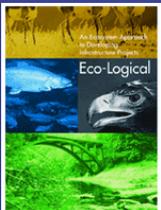
What areas can sustain ecosystems w/o human intervention?



Potential Uses

7

- Long Range Planning: community visioning, transportation planning
- Short term planning: complex projects, mitigation
- NEPA analysis & assessment
- SAFETEA-LU environmental requirements
- Integrate with other tools (e.g., NEPAssist)



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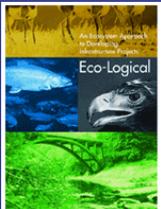
Contact Info

8

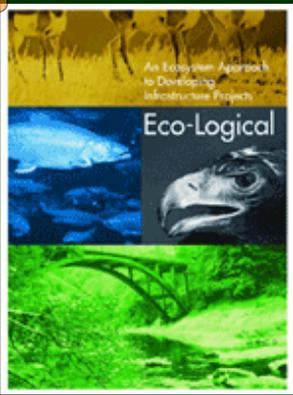
Sharon Osowski Morgan
214-665-7506
osowski.sharon@epa.gov

TEAP Report:

<http://www.epa.gov/region6/6en/xp/enxp2a4.htm>



March 16, 2011



***Creating a Regional Decision Support System for
the Houston-Galveston Region***

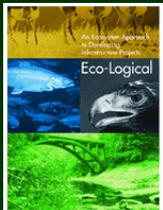
Amy Boyers, Houston-Galveston Area Council

March 16, 2011



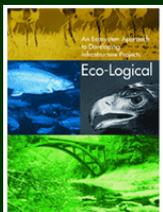
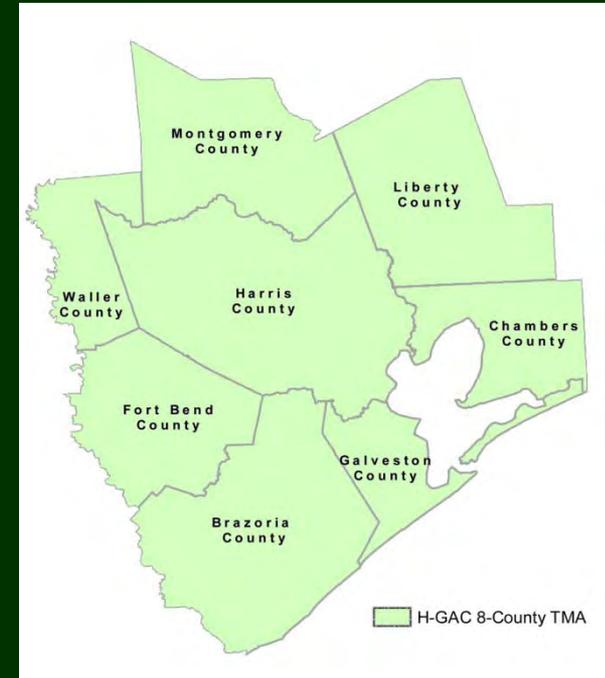
Acknowledgements

- This material is based upon work supported by the Federal Highway Administration under Cooperative Agreement No. DTFH61-08-H-00011. Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the Author(s) and do not necessarily reflect the view of the Federal Highway Administration.
- Financial support was also provided by the National Association of Regional Councils, Galveston Bay Estuary Program, Texas Commission on Environmental Quality and the U.S. Environmental Protection Agency.
- Special thanks to Texas Forest Service and Texas Sea Grant/Texas Coastal Watershed Program.



What is H-GAC?

- Metropolitan Planning Organization for 8-county area
- Occupies 9,020 square miles, larger than state of New Jersey (8,722 square miles)
- Forecasted population of more than 9 million by 2035

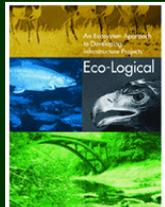




Project Need

4

- Balancing growth and mobility needs
- Lack of ecosystem approach to long-range planning

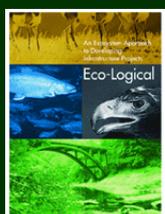




Purpose of Eco-Logical

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- Decision support system for regional planning
- Inventory of high value environmental resources
- Data clearinghouse for organizations and the public



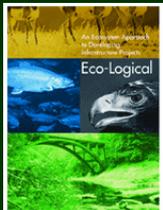
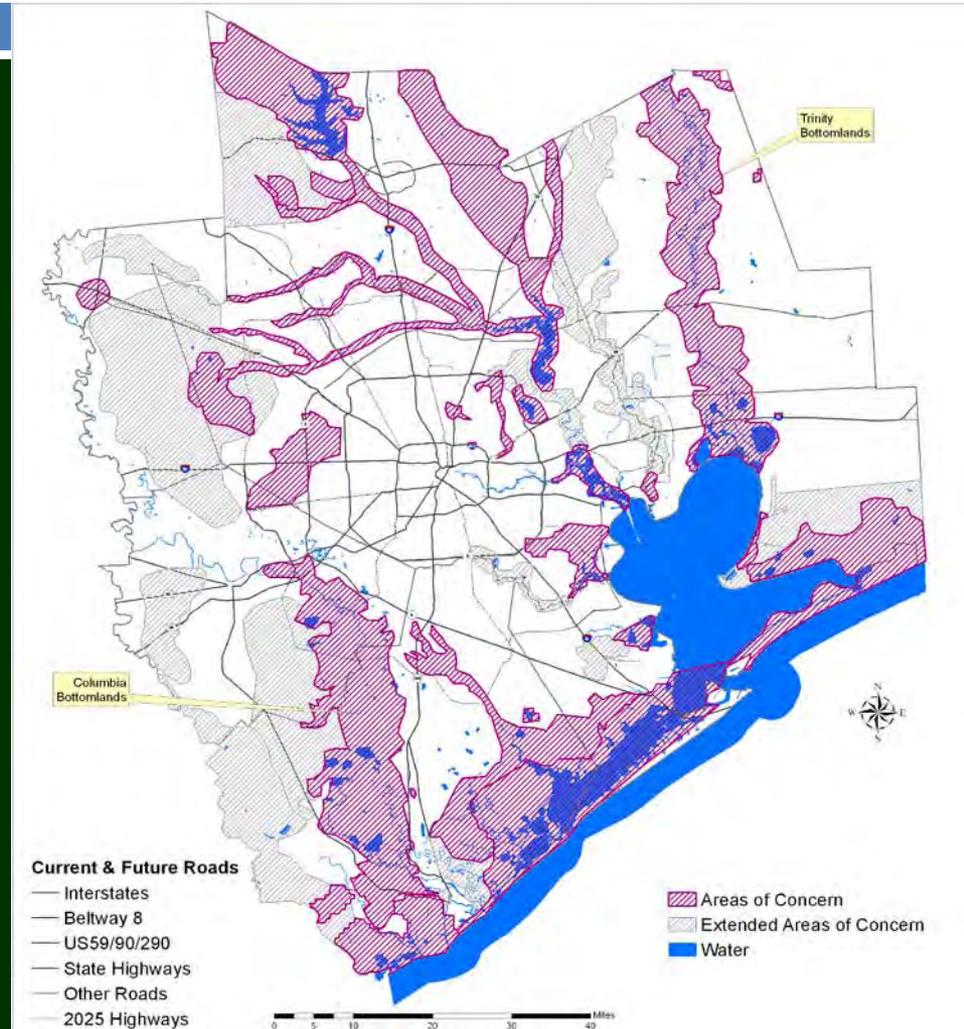
Bridging
OUR COMMUNITIES

2035



THE 2035 HOUSTON-GALVESTON
REGIONAL TRANSPORTATION PLAN

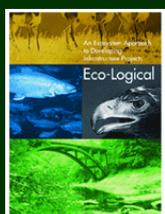
RTP Conservation Areas of Concern



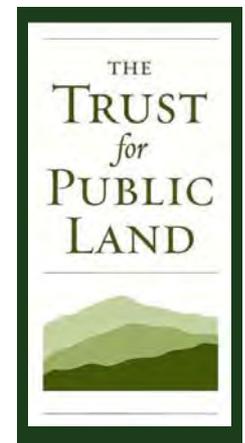


Project Process

- Committee
- Mapping
- Metrics
- GIS Integration
- Outreach
- Adoption



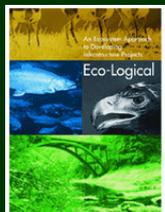
Partners





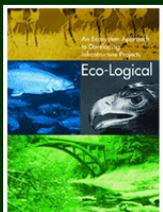
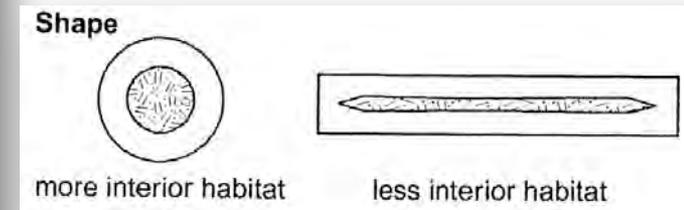
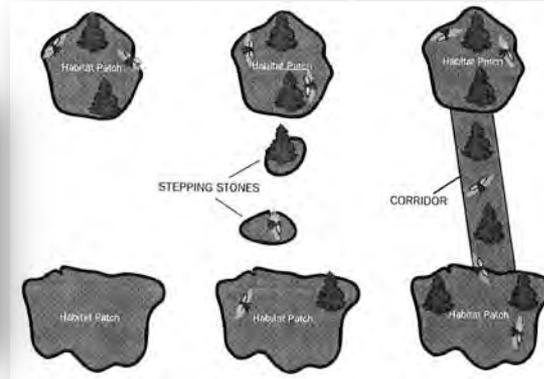
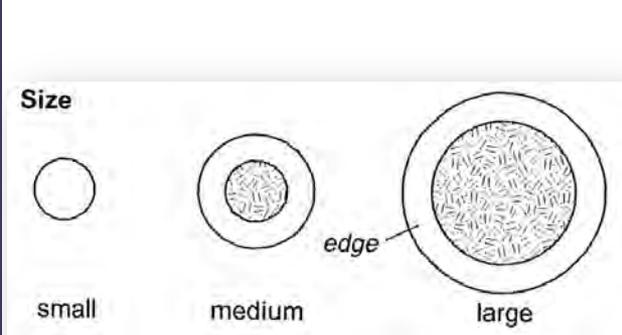
Ecotypes

- Committee
- Mapping
- Metrics
- GIS Integration
- Outreach
- Adoption



Metrics

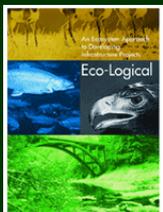
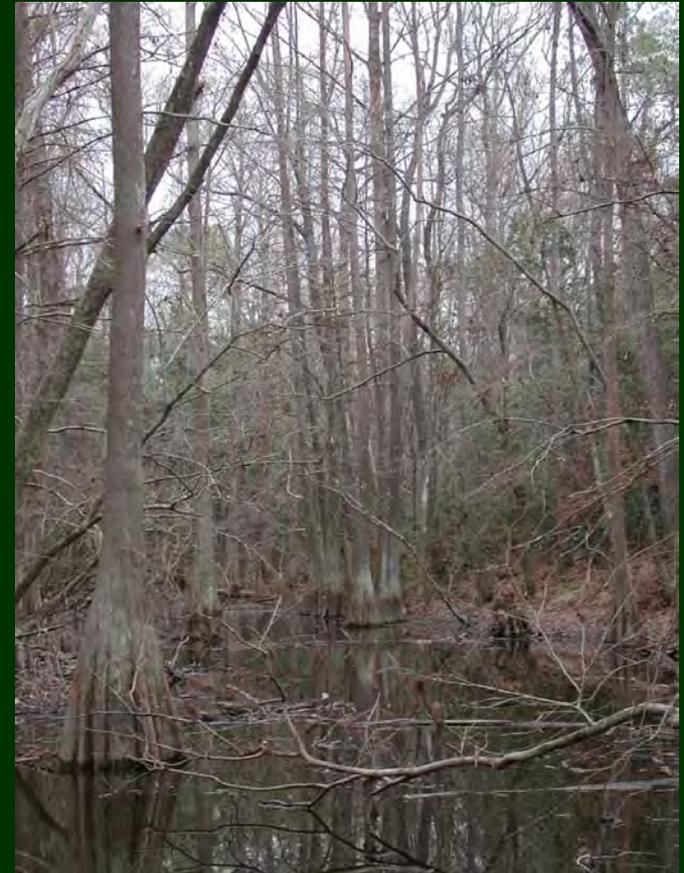
- Adjacency
- Size
- Shape
- Isolation
- Threatened & Endangered Species





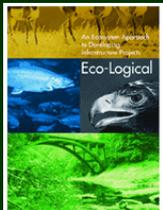
Intended Uses

- Long-range transportation
- Identifying conservation priorities
- Scenario analysis
- Public awareness



Project Limitations

- Scale
- Generalized ecotype classifications
- Metrics, data limitations
- Subjective quality rating
- Not appropriate for site-specific evaluation

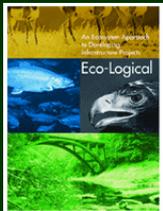


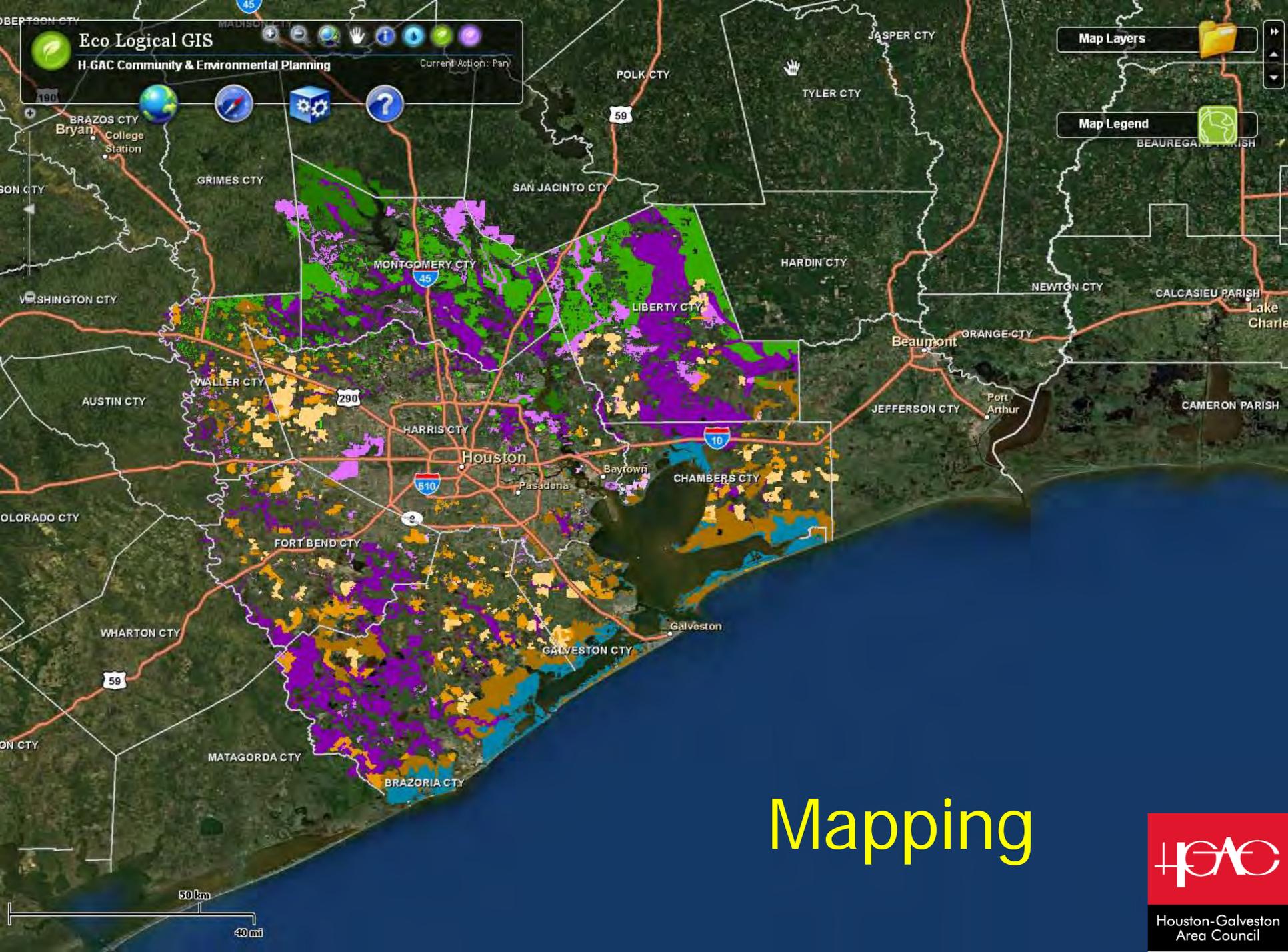


Risks and Challenges

14

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Eco Logical GIS
H-GAC Community & Environmental Planning
Current Action: Pan

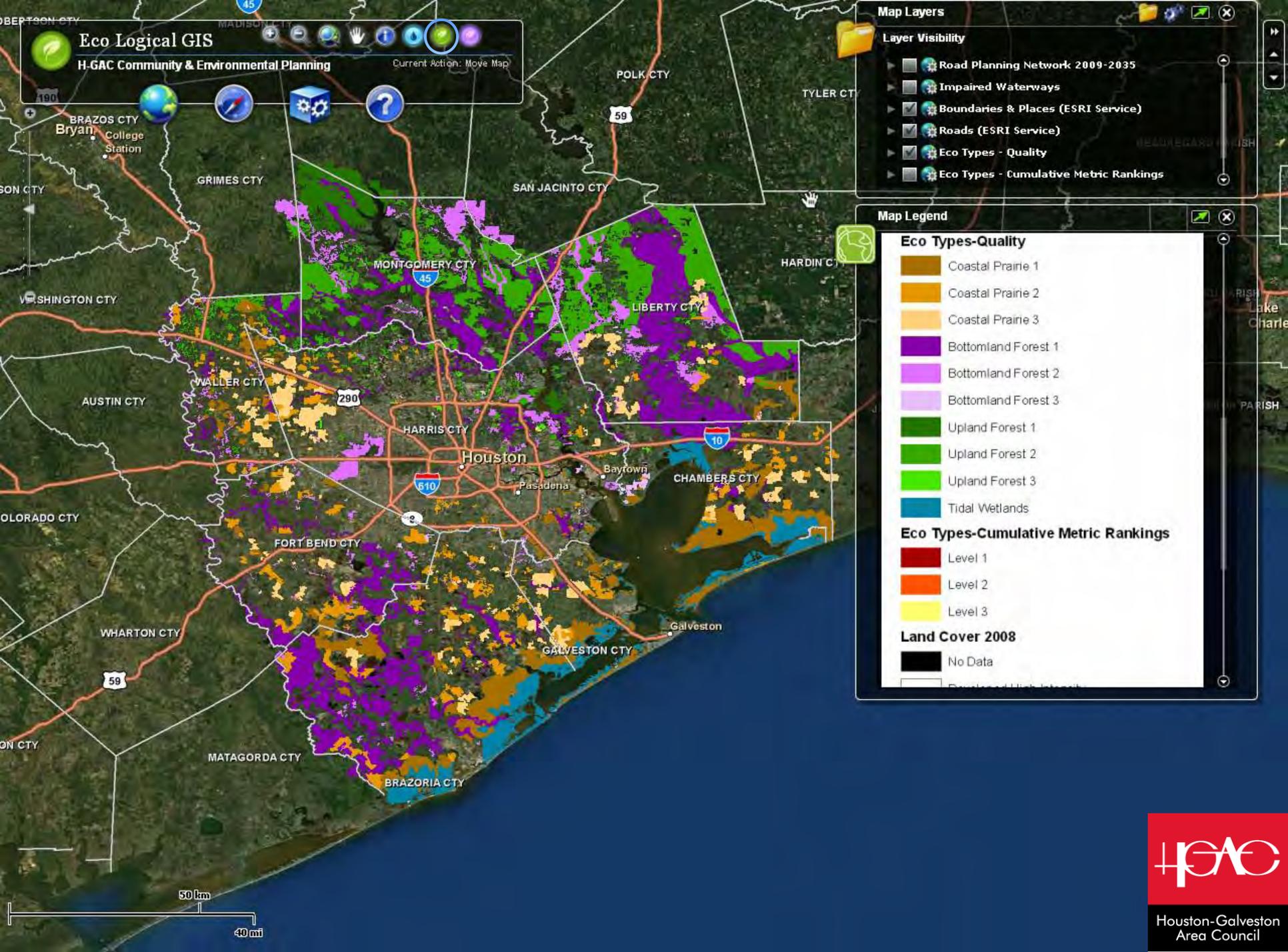
45 59 190 290 610 10

Map navigation icons: Home, Back, Forward, Refresh, Search, Help, Settings, etc.

Map Layers

Map Legend

Mapping



Eco Logical GIS

H-GAC Community & Environmental Planning

Current Action: Move Map

Map Layers

Layer Visibility

- Road Planning Network 2009-2035
- Impaired Waterways
- Boundaries & Places (ESRI Service)
- Roads (ESRI Service)
- Eco Types - Quality
- Eco Types - Cumulative Metric Rankings

Map Legend

Eco Types-Quality

- Coastal Prairie 1
- Coastal Prairie 2
- Coastal Prairie 3
- Bottomland Forest 1
- Bottomland Forest 2
- Bottomland Forest 3
- Upland Forest 1
- Upland Forest 2
- Upland Forest 3
- Tidal Wetlands

Eco Types-Cumulative Metric Rankings

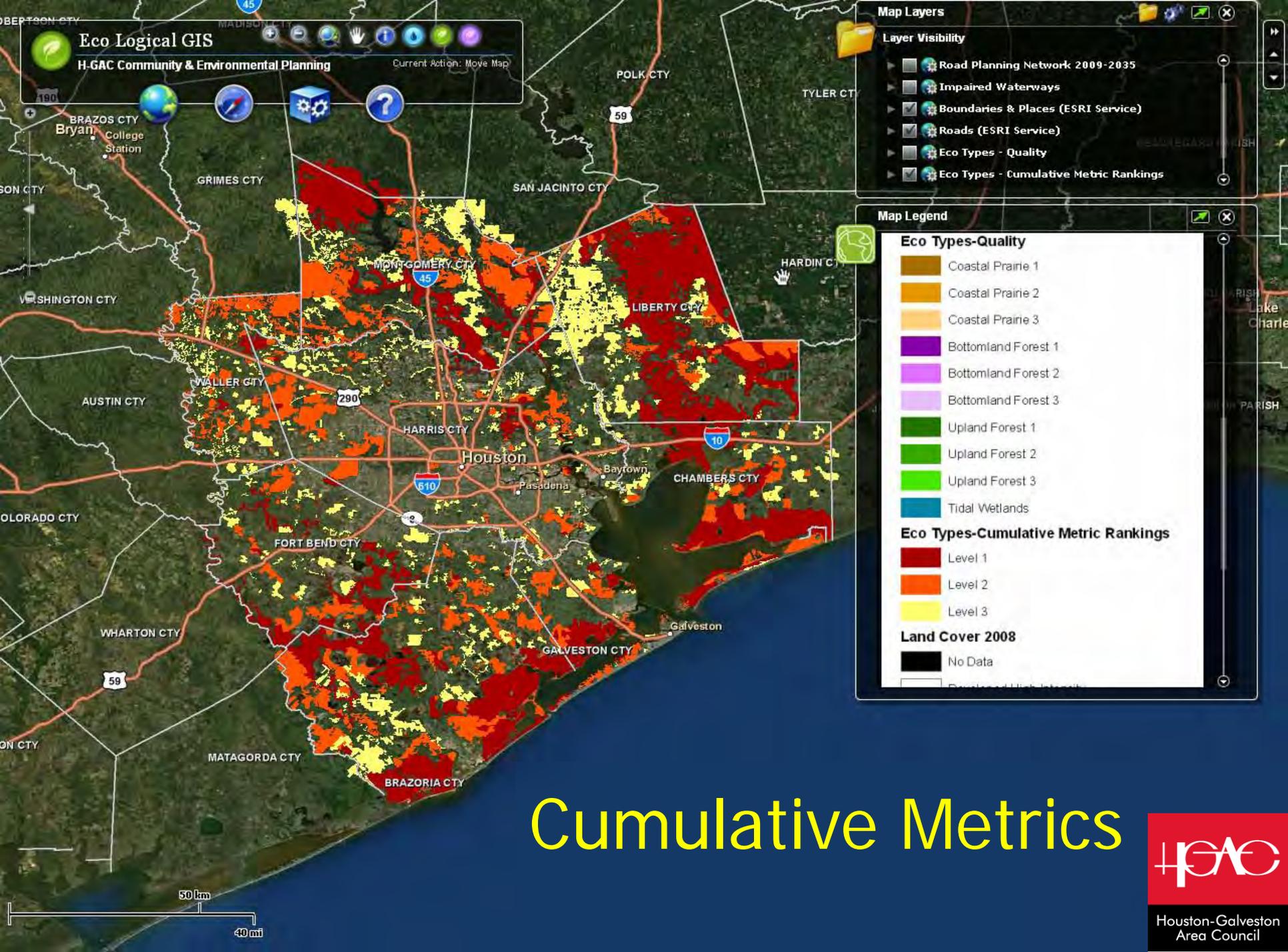
- Level 1
- Level 2
- Level 3

Land Cover 2008

- No Data



Houston-Galveston Area Council



Eco Logical GIS

H-GAC Community & Environmental Planning

Current Action: Move Map

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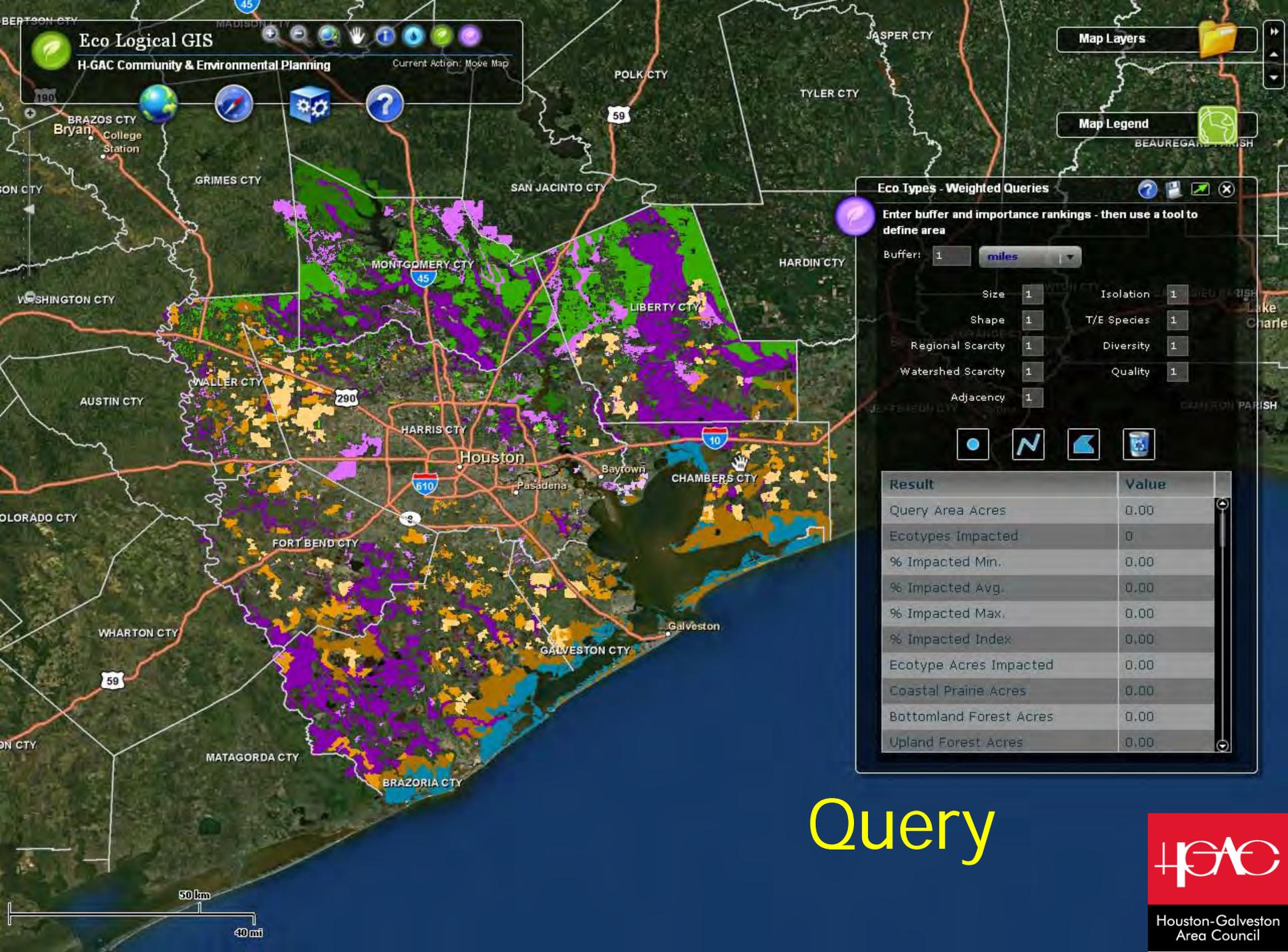
Eco Types-Cumulative Metric Rankings

- Level 1
- Level 2
- Level 3

Land Cover 2008

- No Data

Cumulative Metrics



Eco Logical GIS

H-GAC Community & Environmental Planning

Current Action: Move Map

Map Layers

Map Legend

Eco Types - Weighted Queries

Enter buffer and importance rankings - then use a tool to define area

Buffer:

Size	<input type="text" value="1"/>	Isolation	<input type="text" value="1"/>
Shape	<input type="text" value="1"/>	T/E Species	<input type="text" value="1"/>
Regional Scarcity	<input type="text" value="1"/>	Diversity	<input type="text" value="1"/>
Watershed Scarcity	<input type="text" value="1"/>	Quality	<input type="text" value="1"/>
Adjacency	<input type="text" value="1"/>		

Result	Value
Query Area Acres	0.00
Ecotypes Impacted	0
% Impacted Min.	0.00
% Impacted Avg.	0.00
% Impacted Max.	0.00
% Impacted Index	0.00
Ecotype Acres Impacted	0.00
Coastal Prairie Acres	0.00
Bottomland Forest Acres	0.00
Upland Forest Acres	0.00

Query

Eco Types - Weighted Queries

Enter buffer and importance rankings - then use a tool to define area

Buffer: 1 miles

- Size 1
- Shape 2
- Regional Scarcity 3
- Watershed Scarcity 1
- Adjacency 3
- Isolation 3
- T/E Species 2
- Diversity 3
- Quality 2

Result	Value
Query Area Acres	29,403.72
Ecotypes Impacted	9
% Impacted Min.	7.61
% Impacted Avg.	32.29
% Impacted Max.	100.00
% Impacted Index	290.62
Ecotype Acres Impacted	13,805.08
Coastal Prairie Acres	0.00
Bottomland Forest Acres	7,016.25
Upland Forest Acres	6,788.83

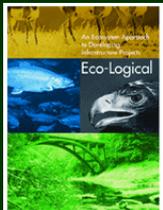
Thank You

20

www.h-gac.com/go/eco-logical

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North Carolina's Strategic Conservation Planning: *Identifying Priorities for Conservation and Mitigation*



**Allison Weakley, Conservation Planner
NC Natural Heritage Program, NCDENR
March 16, 2011**

NC Natural Heritage Program

The NCNHP inventories, catalogues, and supports conservation of the rarest and the most outstanding elements of the natural diversity of our state. These elements of natural diversity include those plants and animals which are so rare or the natural communities which are so significant that they merit special consideration as land-use decisions are made.





One NC *Naturally*

**Working together
through conservation
to map a healthy
and prosperous future**

www.onencnaturally.org

NC Conservation Planning Tool (CPT)



- **Identify, evaluate, and prioritize** an interconnected network of essential ecosystem resources and functions essential for conservation statewide
- **Coordinate** conservation efforts
- **Inform** planning and funding decisions
- **Guide** conservation efforts



Working together through conservation to map a healthy and prosperous future.

- Home
- Site Map
- FAQs
- DENR Home
- About Us
- Contacts
- ncgov



Features

- Progress Updates
- Newsletter
- Listserv signup
- Conservation Planning Tool
- Climate Change
- Commissions and Councils
- Sustainable Communities
- Sustainable Development
- For Kids

One NC Naturally Conservation Planning Tool

The CPT is composed of multiple assessment layers that can be used independently. This planning tool supports land use planning efforts throughout North Carolina.

- Interactive Map Viewer
- Assessment Overview
- Data Download for GIS Professionals
- Detailed Report
- Printable PDF Maps
- Proactive Planning slideshow
- Other Planning Efforts
- Printable Brochure



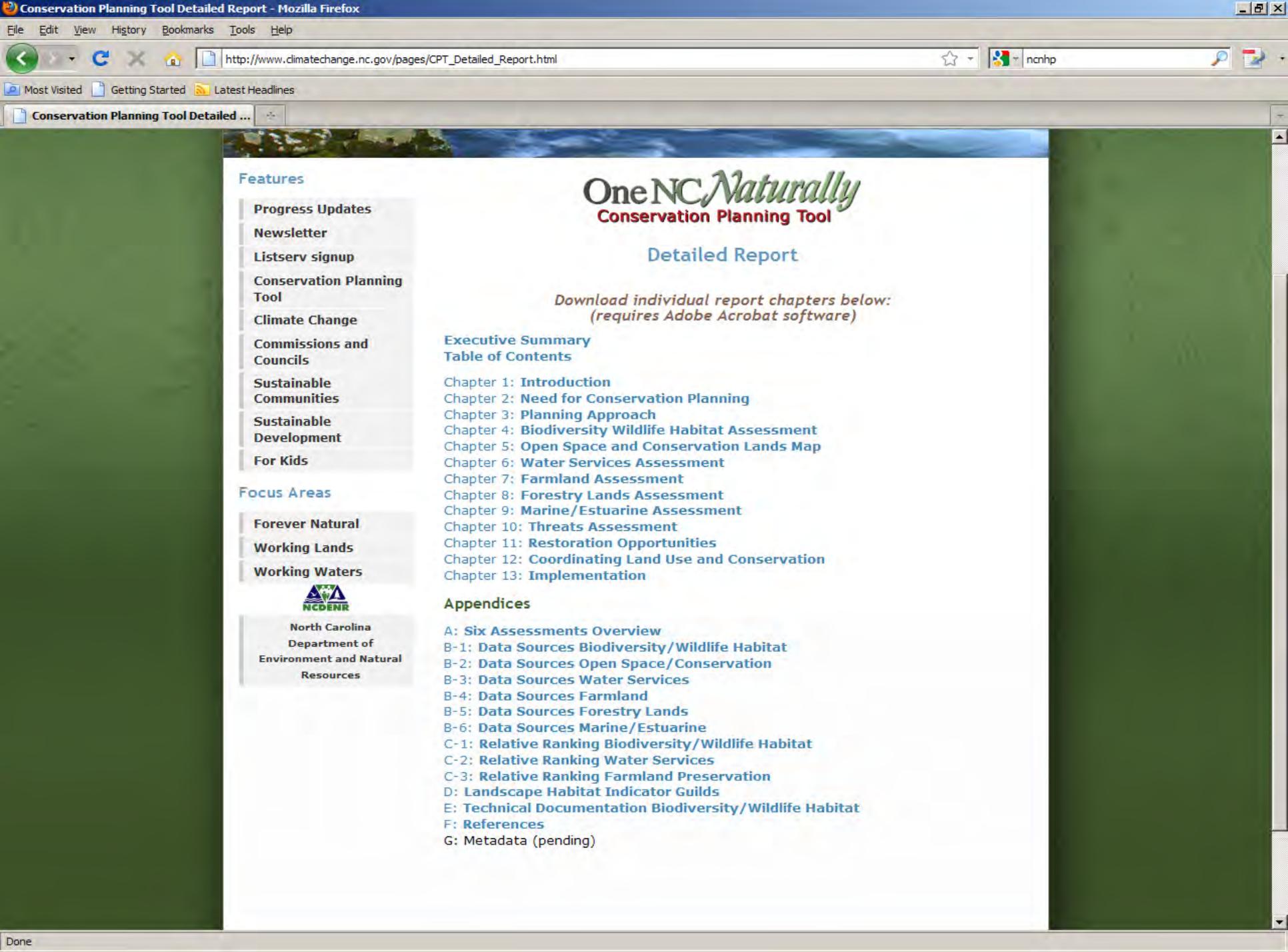
Focus Areas

- Forever Natural
- Working Lands
- Working Waters



North Carolina
Department of
Environment and Natural
Resources

Working together through conservation to map
a healthy and prosperous future



Features

- Progress Updates
- Newsletter
- Listserv signup
- Conservation Planning Tool
- Climate Change
- Commissions and Councils
- Sustainable Communities
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- For Kids

Focus Areas

- Forever Natural
- Working Lands
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North Carolina Department of Environment and Natural Resources

One NC Naturally Conservation Planning Tool

Detailed Report

Download individual report chapters below:
(requires Adobe Acrobat software)

Executive Summary Table of Contents

- Chapter 1: **Introduction**
- Chapter 2: **Need for Conservation Planning**
- Chapter 3: **Planning Approach**
- Chapter 4: **Biodiversity Wildlife Habitat Assessment**
- Chapter 5: **Open Space and Conservation Lands Map**
- Chapter 6: **Water Services Assessment**
- Chapter 7: **Farmland Assessment**
- Chapter 8: **Forestry Lands Assessment**
- Chapter 9: **Marine/Estuarine Assessment**
- Chapter 10: **Threats Assessment**
- Chapter 11: **Restoration Opportunities**
- Chapter 12: **Coordinating Land Use and Conservation**
- Chapter 13: **Implementation**

Appendices

- A: **Six Assessments Overview**
- B-1: **Data Sources Biodiversity/Wildlife Habitat**
- B-2: **Data Sources Open Space/Conservation**
- B-3: **Data Sources Water Services**
- B-4: **Data Sources Farmland**
- B-5: **Data Sources Forestry Lands**
- B-6: **Data Sources Marine/Estuarine**
- C-1: **Relative Ranking Biodiversity/Wildlife Habitat**
- C-2: **Relative Ranking Water Services**
- C-3: **Relative Ranking Farmland Preservation**
- D: **Landscape Habitat Indicator Guilds**
- E: **Technical Documentation Biodiversity/Wildlife Habitat**
- F: **References**
- G: **Metadata (pending)**

Biodiversity/Wildlife Habitat Assessment

- Prioritizes aquatic and terrestrial species and habitats
- Considers landscape function and connectivity – core areas and connectors
- Includes lands important for ecosystem processes



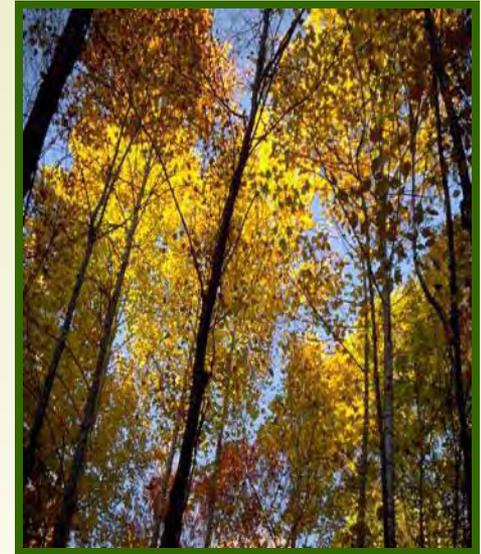
Open Space and Conservation Lands Map

- Shows lands that are in permanent conservation and actively managed for conservation.
- Includes both existing lands and planned lands – e.g., conservation easements, parks, trails, other recreation areas.



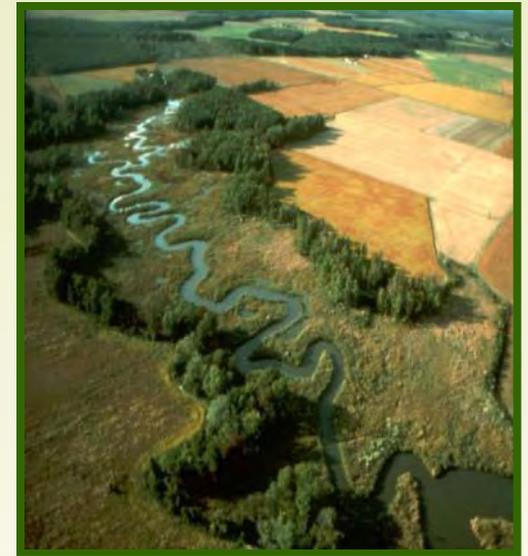
Forestry Lands Assessment

- Prioritizes high value forestry lands that are important for sustaining the forest products sector of our economy and providing ecosystem services.
- Considers threats to forestry lands by assessing risk from pests, disease, wildfire, and development.



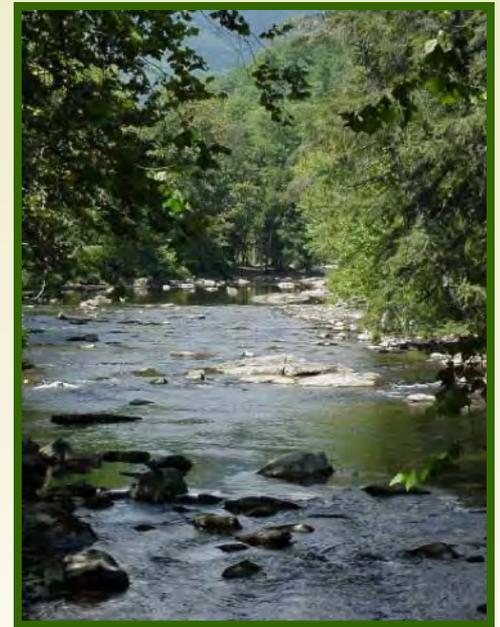
Farmland Assessment

- Prioritizes viable and threatened agriculture lands.
- Considers agriculture infrastructure, existing farm operations, and productivity and community compatibility.



Water Services Assessment

- Prioritizes lands that are most critical to protect water resources for North Carolina's residents.
- Considers water quality, water quantity, and water consumption.



Marine and Estuarine Assessment

- Considers Coastal Habitat Protection Plan (CHPP) priority areas.
- Includes 6 fish habitats (oyster beds, submerged aquatic vegetation, hard and soft bottom, shell bottom, and riparian wetlands), spawning and nursery areas, water quality.



Essential Ecosystem Resources & Functions

Biodiversity / Wildlife

- Terrestrial
- SNHAs
- EOs
- LHI Guilds
- IBAs

- Aquatic
- ASNHAs
- EOs
- Riparian Buffers
- Wetlands
- ORWs
- HQWs
- Priority watersheds
- Stream BioClass
- SAVs
- Fish nursery areas
- Shellfish production
- Anadromous fish spawning areas

Water Services

- Drinking water classifications
- Future water supplies
- ORWs
- HQWs
- UWLs
- Benthos
- Fish communities
- Trout waters
- Wetlands
- Riparian buffers
- 100 year floodplain
- Groundwater recharge areas
- SWAP susceptibility
- Shellfish sanitation
- Recreational waters
- Designated rivers

Open Space & Conservation Lands

- Existing Federal Lands
- Existing State Lands
 - Parks
 - Trails
 - Nature areas
 - Recreation areas
 - Cultural sites
 - Boat access
 - Game lands
- Planned Parks
- Planned Trails
- Land trust properties and easements
- NCEEP easements
- CREP priority watersheds

Marine / Estuarine

- SAV
- Shell bottom
- Hard bottom
- Soft bottom
- Riparian wetlands
- Oyster beds
- Crab sanctuaries
- Fish nursery areas
- Shellfish harvesting waters
- Anadromous fish spawning areas
- Shellfish density
- Water quality

Farmland

- Viabile Aq Land
- Feed mills
- Tractor supply
- Fertilizer dealers
- Pesticide dealers
- Farmers markets
- Livestock markets
- Processing facilities
- Produce packers
- Soil productivity
- VADs
- Military bases
- Conservation lands
- Preserved farms
- Co. cash receipts
- Co. w/ Farm plans
- Animal operations

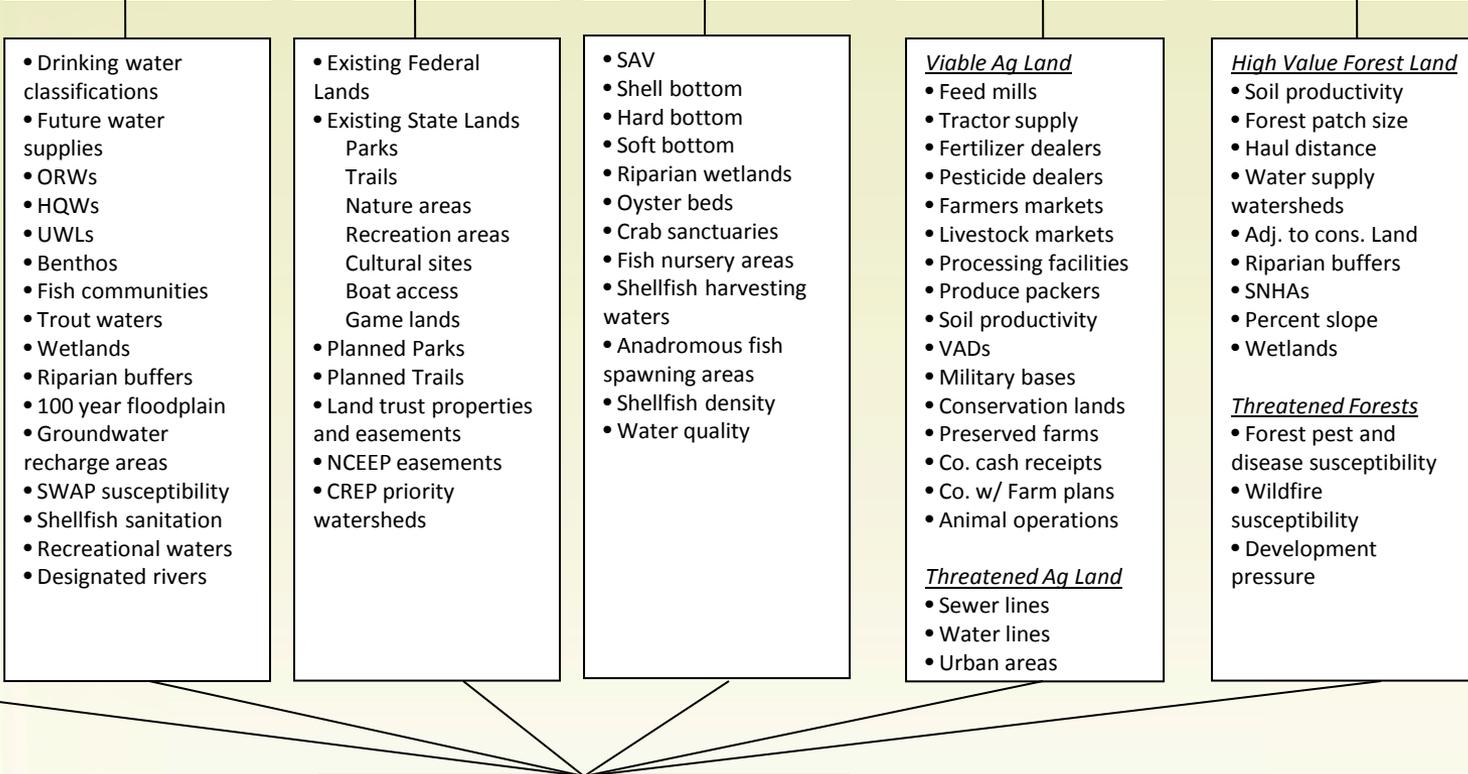
- Threatened Aq Land
- Sewer lines
- Water lines
- Urban areas

Forestry

- High Value Forest Land
- Soil productivity
- Forest patch size
- Haul distance
- Water supply watersheds
- Adj. to cons. Land
- Riparian buffers
- SNHAs
- Percent slope
- Wetlands

- Threatened Forests
- Forest pest and disease susceptibility
- Wildfire susceptibility
- Development pressure

NC Conservation Planning Tool

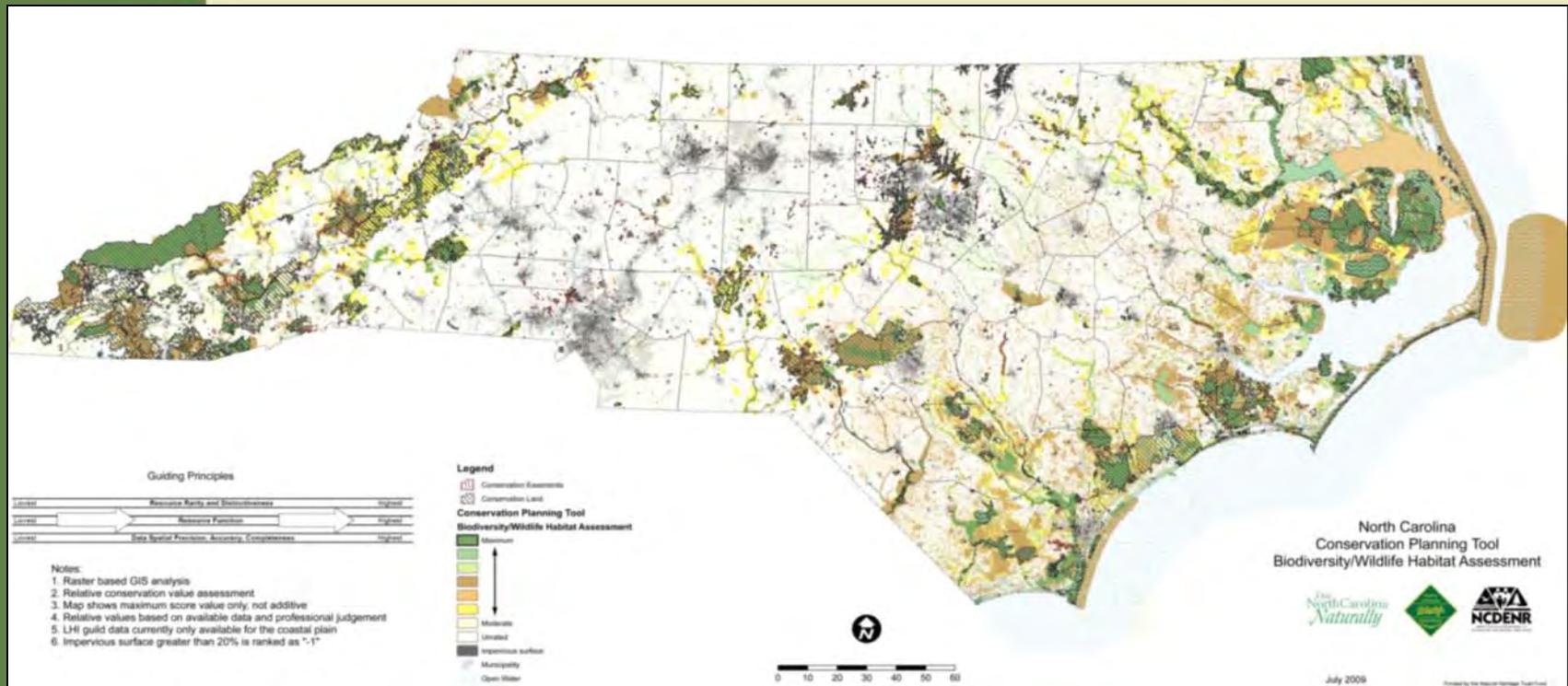


Guiding Principles for Data Used in Assessments



- Resource rarity & distinctiveness
- Resource function
- Data precision, accuracy, & completeness

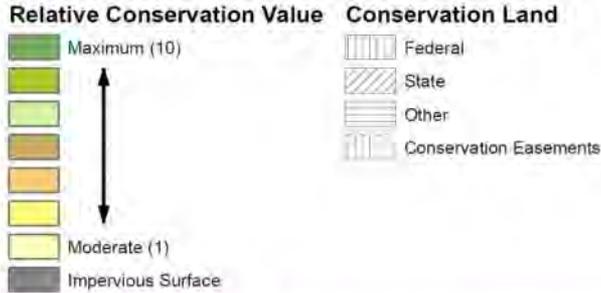
Biodiversity/Wildlife Habitat



- ◆ Raster-based GIS analysis
- ◆ Maximum score (10 point scale)
- ◆ Relative ranking
- ◆ Existing data & professional judgment

LEGENDS FOR CPT ASSESSMENT LAYERS

Biodiversity/Wildlife Habitat Assessment Legend



Individual Landscape Habitat Indicator Guilds (LHIGs) were mapped and ranked based on empirical data and spatially show core wildlife habitat areas and connectivity

Identify Tool results for the Biodiversity/Wildlife Habitat Assessment		
Category Name	Value	Individual Input Layers
NHP	10	Significant Natural Heritage Areas – National or State Significance (N.C. Natural Heritage Program)
NHP	8	Significant Natural Heritage Areas -Regional Significance
NHP	6	Significant Natural Heritage Areas - Local Significance
NHP	5	Element Occurrences – High ranking
NHP	4	Element Occurrences – High ranking - Other
Wetlands	7	Coastal Region Evaluation of Wetland Systems /CREWS – Exceptional ranking (N.C. Division of Coastal Management)
Wetlands	6	Coastal Region Evaluation of Wetland Systems /CREWS – Substantial ranking (N.C. Division of Coastal Management)
Wetlands	5	National Wetlands Inventory (U.S. Fish & Wildlife Service)
Wetlands	2	Coastal Region Evaluation of Wetland Systems /CREWS – Beneficial ranking (N.C. Division of Coastal Management)
Guilds	1-10	Landscape Habitat Indicator Guilds (N.C. Natural Heritage Program)
DWQ	10	Outstanding Resource Waters (N.C. Division of Water Quality)
DWQ	9	BioClass Excellent
DWQ	8	High Quality Waters
DWQ	7	BioClass Good
DWQ	1	All other streams
FishHabitat	9	Native Brook Trout (N.C. Wildlife Resources Commission)
FishHabitat	8	Anadromous Fish Spawning Areas (N.C. Division of Marine Fisheries)
FishNursery	8	Fish Nursery Areas (N.C. Division of Marine Fisheries)
Watersheds	7	Stream buffer tributaries to Threatened & Endangered Species (N.C. Wildlife Resources Commission)
Watersheds	3	Priority Watersheds (N.C. Natural Heritage Program, Wildlife Resources Commission, The Nature Conservancy)
Marine	8	Oyster Sanctuaries (N.C. Division of Marine Fisheries)
Marine	6	Submerged Aquatic Vegetation
Marine	10	Significant Habitat Area (N.C. Division of Marine Fisheries)
Marine	9	Significant Habitat Area (N.C. Division of Marine Fisheries)
Hardbottom	8	Open Shellfish /Shellbottom/MSA (N.C. Division of Marine Fisheries)
Hardbottom	7	Hard Bottom
Hardbottom	5	Closed Shellfish /Shellbottom/MSA
IBA	6	Important Bird Area (Audubon)
Impervious	99	Impervious Surface above 20% (U.S. Environmental Protection Agency)

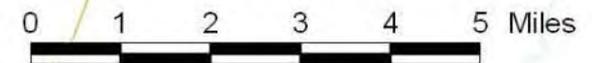
Piedmont Wet Hardwood and Mixed Forests



Core Area Rank =
Observed/Expected
= 12/14 birds+butterflies = 86% = A



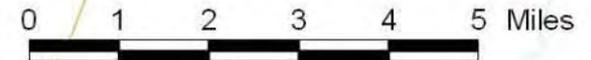
- Observed Indicator Species**
- Acronicta betulae*
 - Acronicta rubricoma*
 - Acronicta vinnula*
 - Aix sponsa*
 - Asterocampa celtis*
 - Asterocampa clyton*
 - Cisthene kentuckiensis*
 - Enodia anthedon*
 - Libytheana carinenta*
 - Nerice bidentata*
 - Oporornis formosus*
 - Parapamea buffaloensis*
 - Polygonia comma*
 - Polygonia interrogationis*
 - Protonotaria citrea*
 - Satyrodes appalachia*
 - Seiurus motacilla*
 - Setophaga ruticilla*



Piedmont Wet-Mesic Hardwood and Mixed Forests



Core Area Rank =
11/12 vertebrates = A



Piedmont Dry-Wet Hardwood and Mixed Forests



Core Area Rank = 14/15 guild members = A



Sparsely Settled Mixed Habitats



Core Area Rank =
2/4 guild members = C



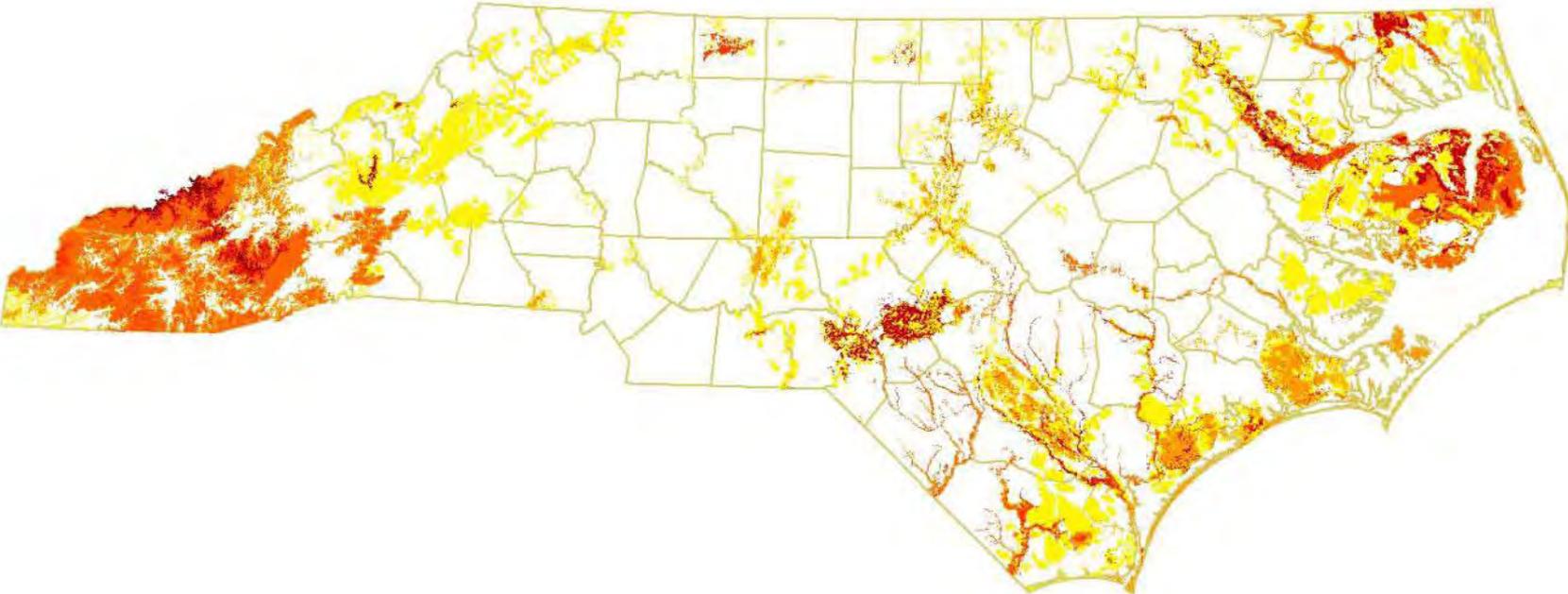


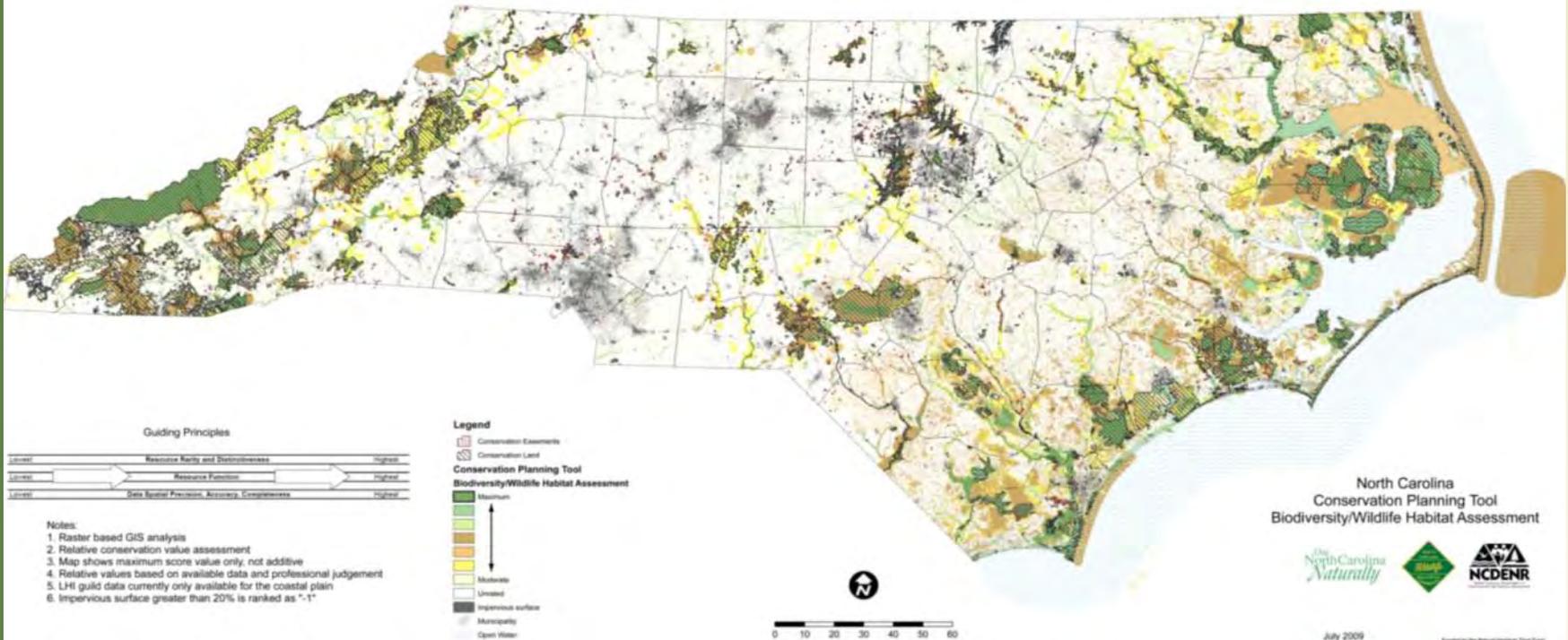
Final LHIG Score (per pixel) =
 $\sum \text{SRANK} \cdot \text{Core Area Rank}$



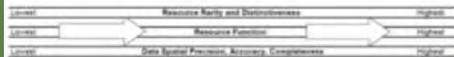


Landscape Habitat Indicator Guilds mapped in North Carolina





Guiding Principles



Notes:

1. Raster based GIS analysis
2. Relative conservation value assessment
3. Map shows maximum score value only, not additive
4. Relative values based on available data and professional judgement
5. LHI guild data currently only available for the coastal plain
6. Impervious surface greater than 20% is ranked as "-1"

Legend

Conservation Elements
 Conservation Land
Conservation Planning Tool
Biodiversity/Wildlife Habitat Assessment
 Maximum
 Moderate
 Unrated
 Open Water
 Impervious surface
 Municipality

North Carolina
Conservation Planning Tool
Biodiversity/Wildlife Habitat Assessment



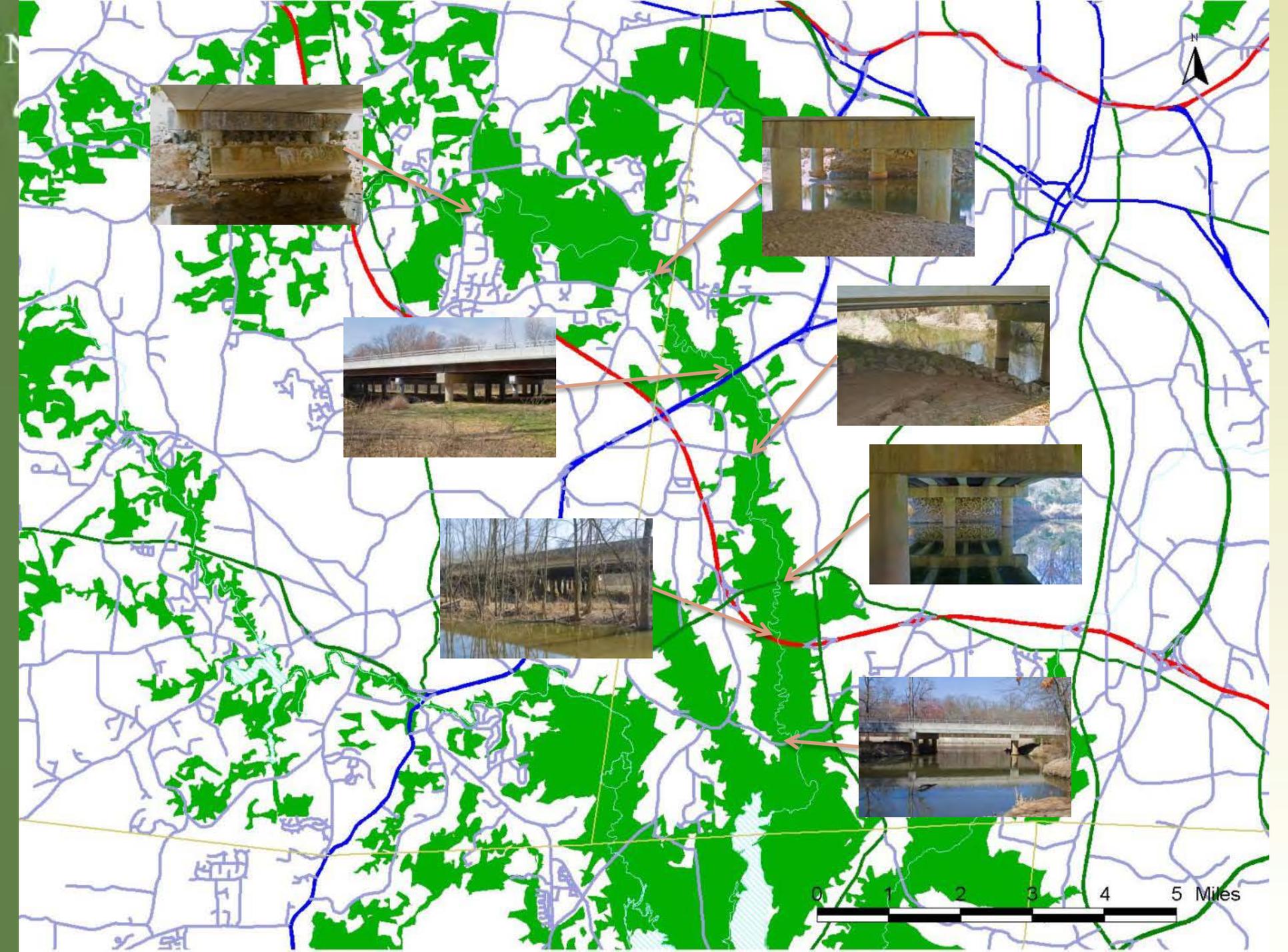
July 2009

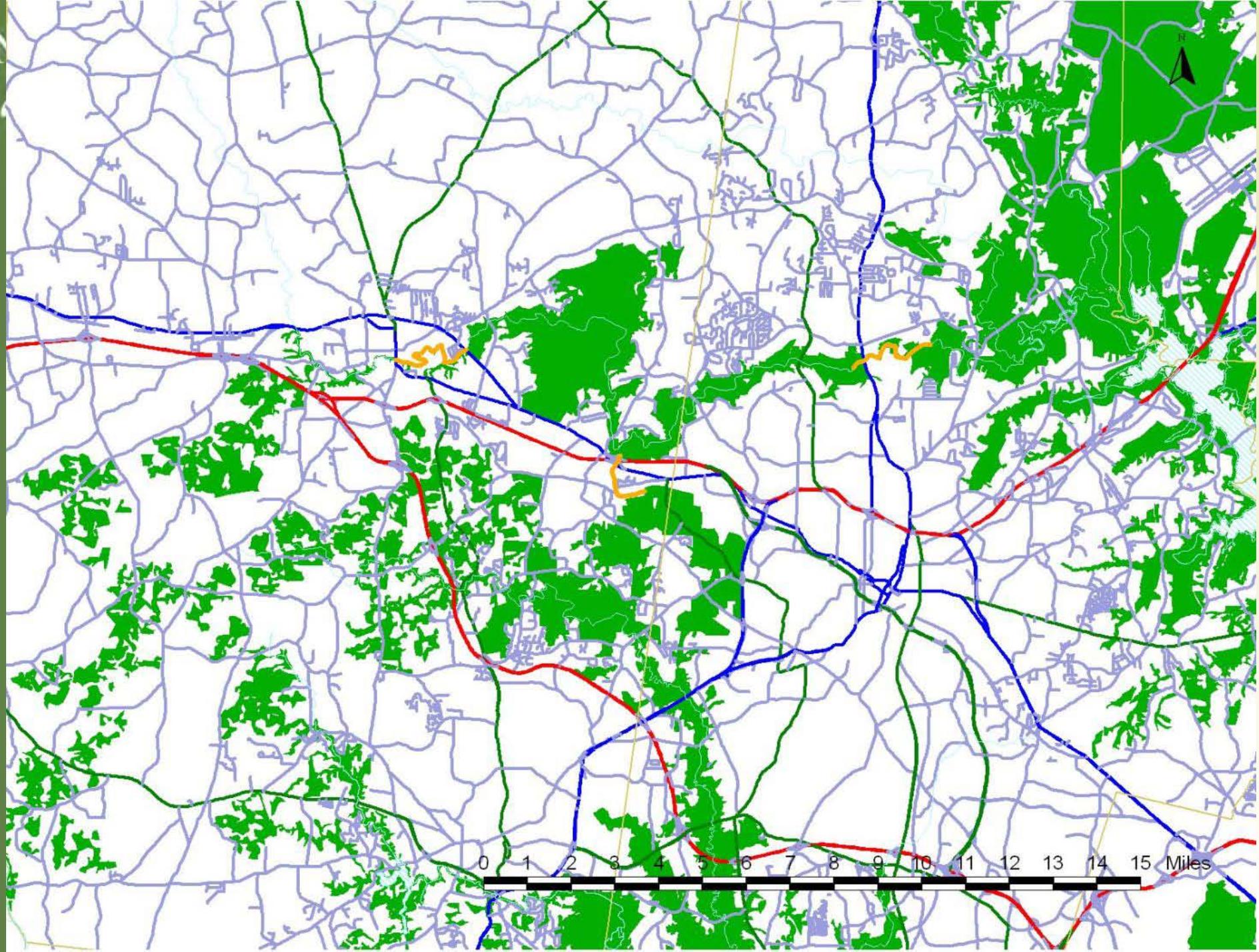
Funded by the National Wildlife Federation

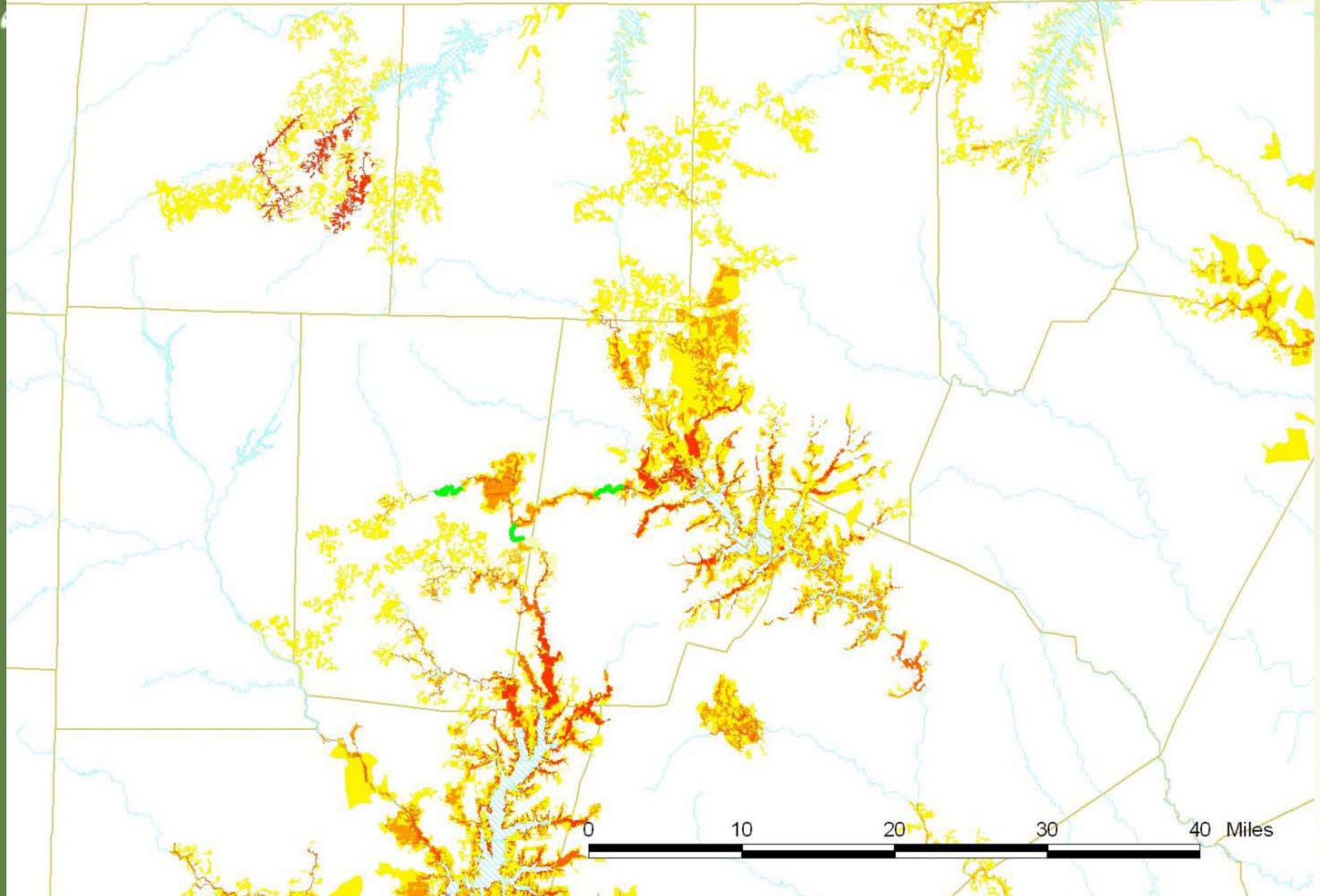
The CPT and Infrastructure Projects



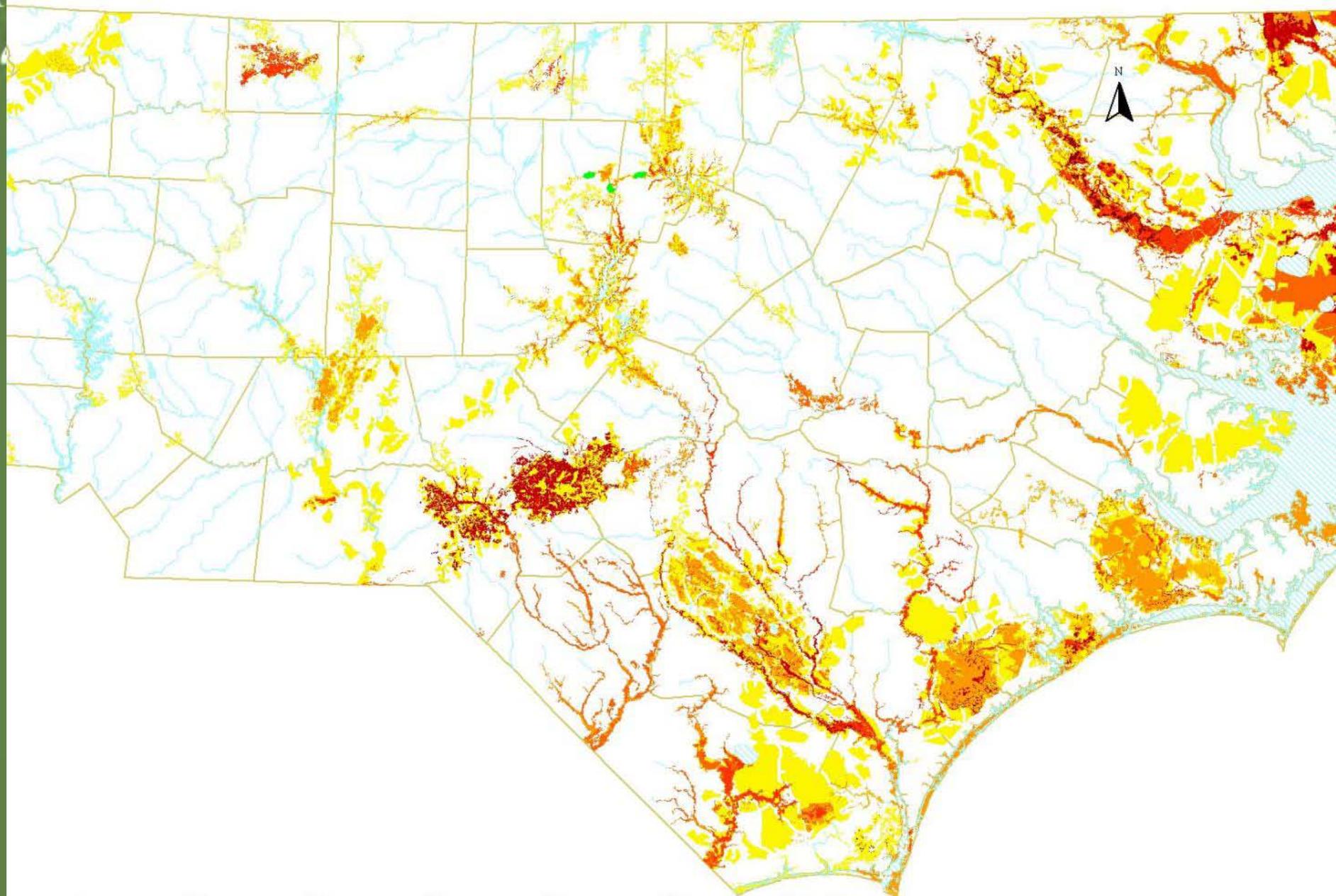
- Map layers identify and prioritize important resources statewide.
- Multiple layers can be used together or independently.
- Maps and assessments support land use, conservation, mitigation and transportation planning and decision-making at various scales.







0 10 20 30 40 Miles



0 25 50 75 100 125 150 Miles

Some examples of the application and use of the CPT

Local land use and conservation plans (Towns of Benson, Boone, and Wilkesboro; City of Morganton; Anson, Chatham, and Pender counties, Centralina and Land of Sky Councils of Government)

Transportation plans (NCDOT - underway)

Identification of preservation and restoration sites for mitigation (NC Ecosystem Enhancement Program)

Grant applications (NC Department of Parks and Recreation, Natural Heritage and Clean Water Management Trust Funds)

Greenway and park planning (Jackson County)

Land acquisition (The Nature Conservancy, local land trusts)

Continuing implementation, updates and outreach

- Update data and mapping every 6 months
- Continue to improve mapping tool
- Outreach to planning, resource and regulatory agencies, local governments, land trusts, and others



Contact Information



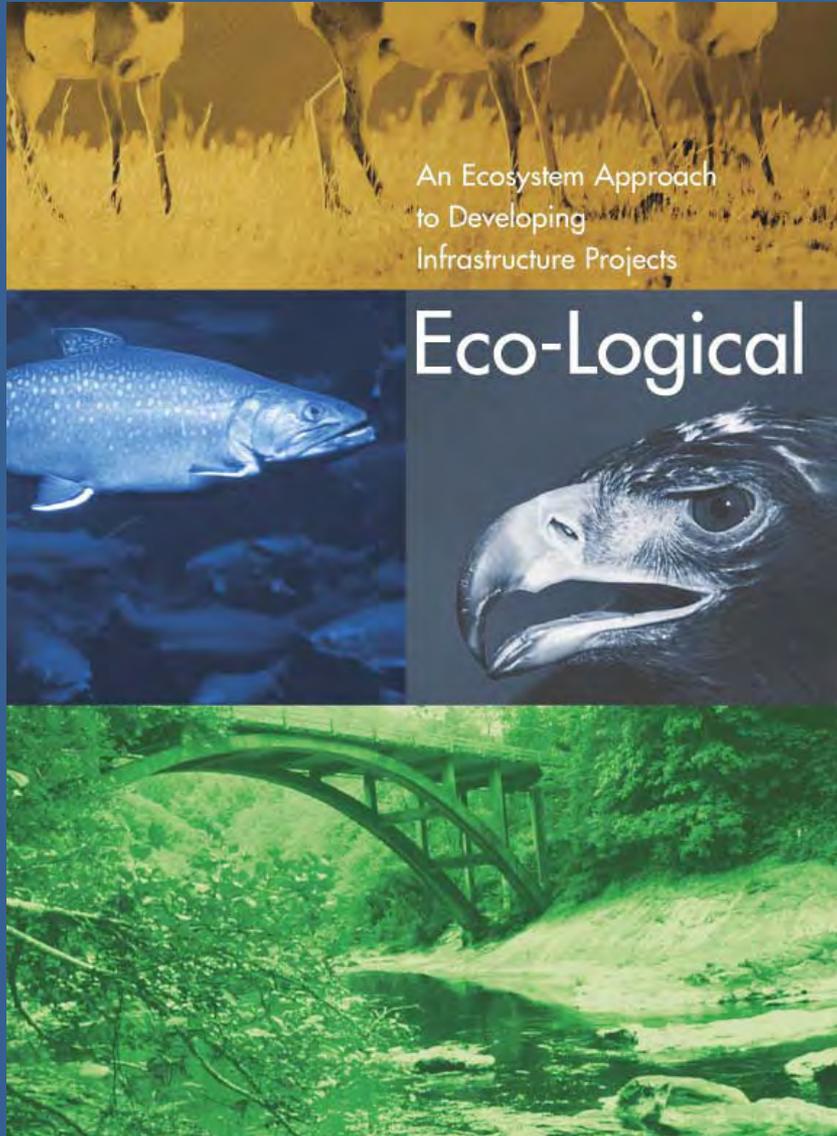
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www.onencnaturally.org



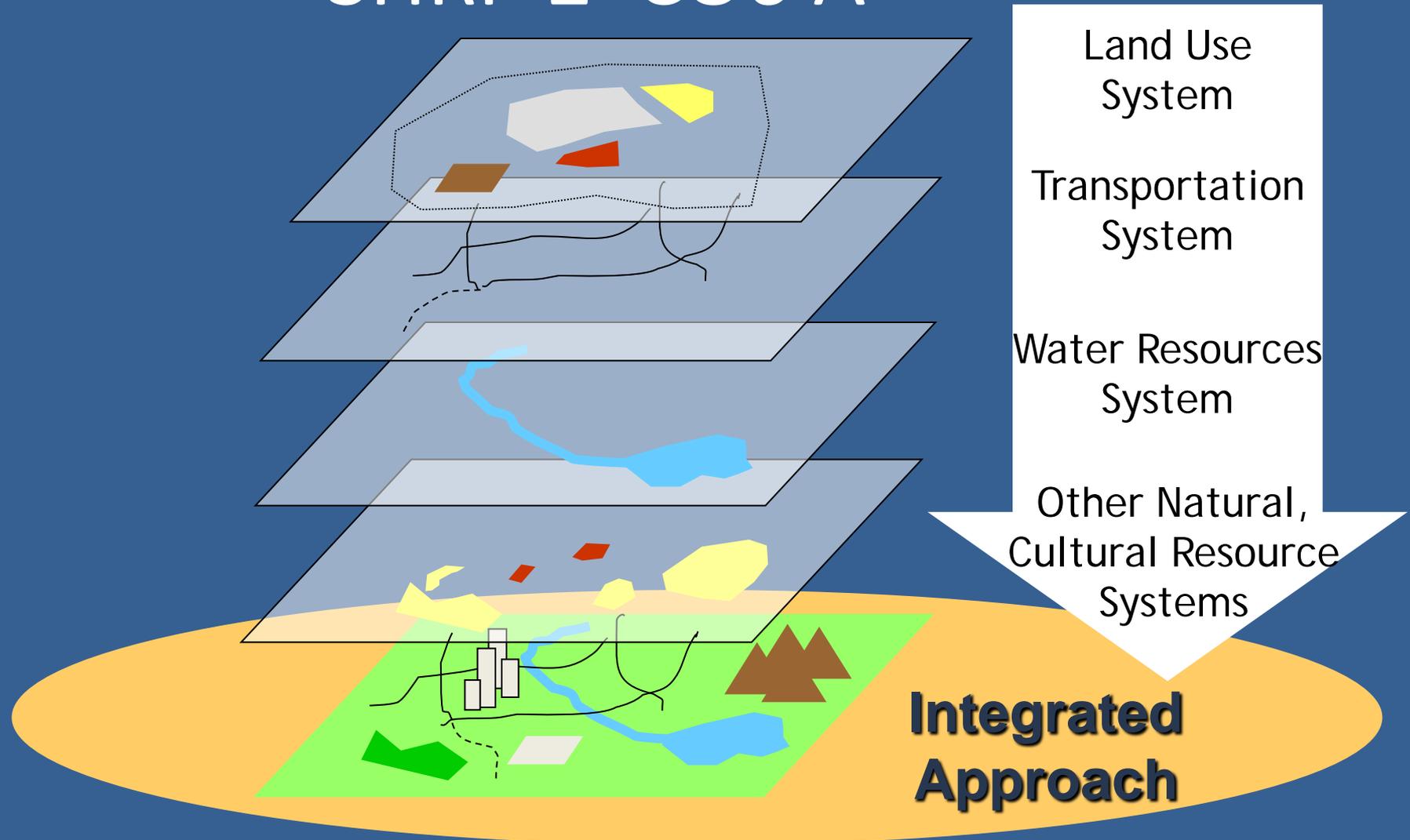


SHRP 2 CO 6 A&B

Integration of
Conservation, Highway
Planning and
Environmental
Permitting Through
Development of an
Outcome-based
Ecosystem Scale
Approach and
Corresponding Credit
System

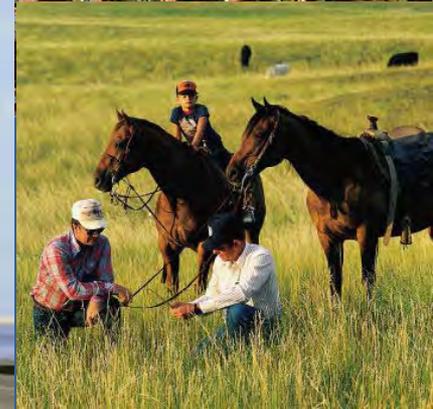
Integration of
Conservation,
Highway Planning,
and
Environmental
Permitting Using
an Outcome-based
Ecosystem
Approach

SHRP 2 CO6 A



Opportunities to support multiple community goals and improve quality of life

SHRP 2 C06 B



The 2011 International Conference on Ecology & Transportation



Questions and Answers

- Collecting and updating data
- Prioritizing resources with partner agencies
- Implementation
- Examples of mitigation and transportation projects



Eco-Logical website:

http://www.environment.fhwa.dot.gov/ecological/eco_entry.asp