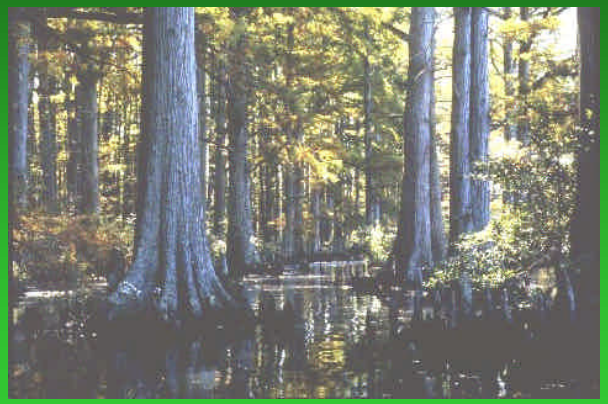
Virginia Conservation Lands Needs Assessment

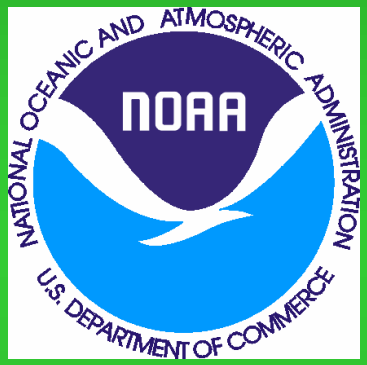




Setting Priorities for Land Conservation



DCR
Department of Conservation & Recreation
CONSERVING VIRGINIA'S NATURAL & RECREATIONAL RESOURCES
Virginia Natural Heritage Program

The Department of Conservation and Recreation acknowledges:



What is Green Infrastructure?

"Green Infrastructure is our nation's natural life support system – an interconnected network of waterways, wetlands, woodlands, wildlife habitats, and other natural areas; greenways, parks and other conservation lands; working farms, ranches and forests; and wilderness and other open spaces that support native species, maintain natural ecological processes, sustain air and water resources and contribute to the health and quality of life for America's communities and people."

Green Infrastructure definition developed by the Green Infrastructure Work Group

Green Infrastructure Principles

- **Green infrastructure should be the framework for conservation and development**
- **Design and plan green infrastructure before development**
- **Linkage is key**
- **Green infrastructure functions across multiple jurisdictions and at different scales**
- **Green infrastructure is grounded in sound science and land use planning theories and practices**
- **Green infrastructure is a critical public investment**
- **Green infrastructure involves diverse stakeholders**

Principles from ***Green Infrastructure: Smart conservation for the 21st Century,*** Benedict and McMahon

Ecosystem services include:

- Atmospheric gas and climate regulation
- Protecting areas against storm and flood damage
- Maintaining flows and storages of water
- Conserving and generating soils
- Storing and cycling nutrients
- Filtering and cooling water
- Pollinating crops and other plants
- Habitat for resident and transient wildlife
- Maintaining a vast genetic library
- Providing forest products, fish and game for human consumption
- Opportunities for recreation, scenery, etc.

Virginia Land Conservation Foundation

- A state Board with representatives from key conservation agencies and organizations
- Receives technical support from DCR
- Designed to lead land conservation activities statewide
- Four priority areas:
    1. Natural Area Protection
    2. Open Space and Parks
    3. Historic Area Preservation
    4. Farmlands and Forest Preservation
- Permanent funding is being pursued

The Virginia Conservation Lands Needs Assessment

- **A tool for integrating and coordinating the needs and strategies of different conservation interests**
- **A flexible, widely applicable tool for identifying and prioritizing land conservation**
- **A top priority of DCR's strategic planning**

Virginia Natural Landscape Assessment (VA-NLA)

- **One component of the more comprehensive VCLNA**
- **A landscape-scale GIS analysis for identifying, prioritizing, and linking natural habitats in Virginia**
- **An analysis that generates ecological data layers that complement other conservation interests and needs**

The VCLNA Natural Landscape Assessment is NOT:

- **A tool for identifying small patches of habitat that may be important**
- **A tool for identifying natural grasslands**
- **A tool for prioritizing natural heritage resource protection lands**
- **A tool for fine-scale analyses and prioritizations**

Central Stafford County - 1981

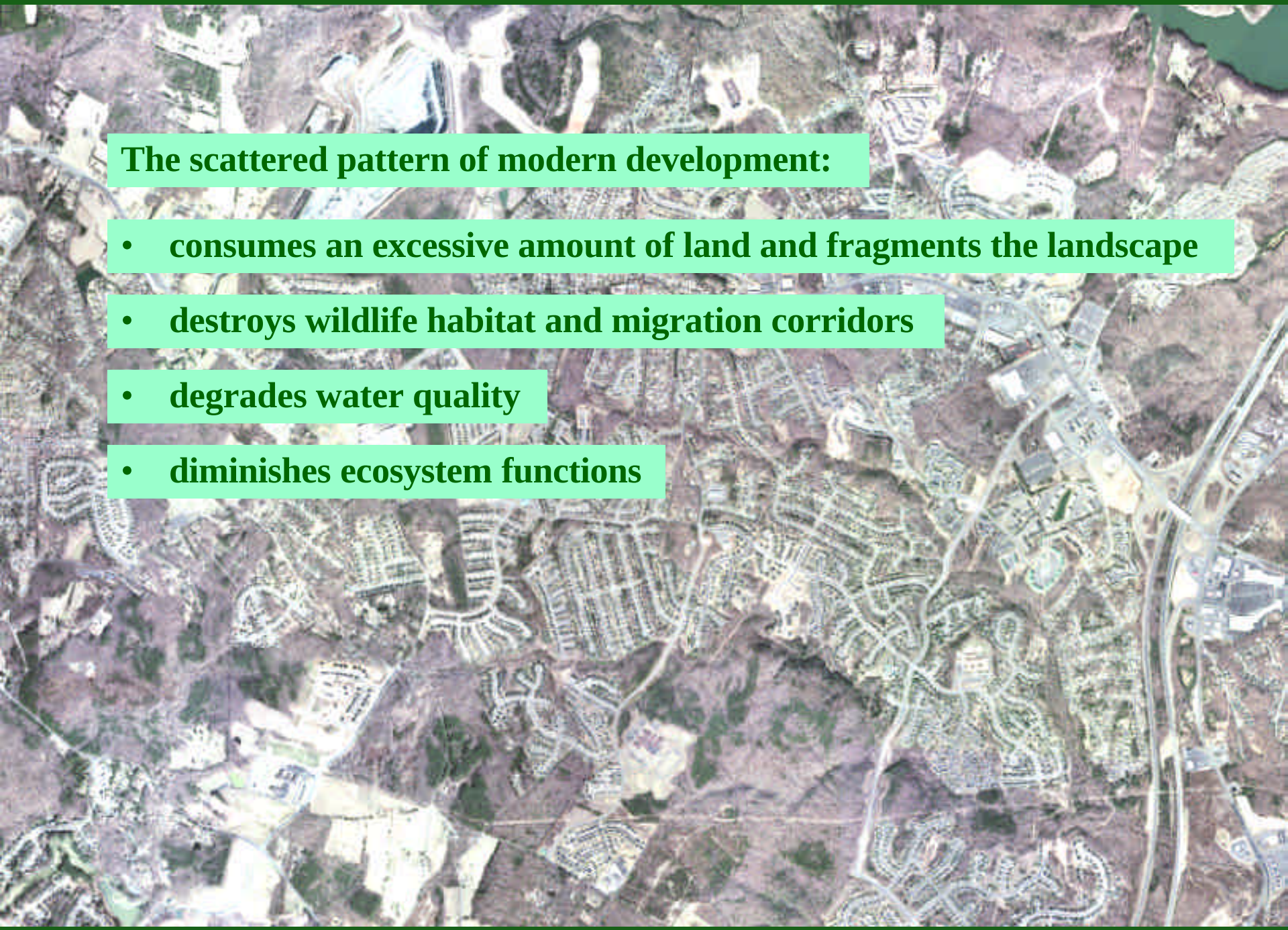
National High Altitude Photography

Central Stafford County - 2002

“Between 1992 and 1997, Virginia lost 343,500 acres to development.”

“If current trends continue, Virginia will develop more land in the next 40 years than it has in the past 400 years.”

Source: **The Virginia Conservation Network**
Smart Growth (white paper)
http://www.vcnva.org/white_papers/2003/smart_growth.php



The scattered pattern of modern development:

- **consumes an excessive amount of land and fragments the landscape**
- **destroys wildlife habitat and migration corridors**
- **degrades water quality**
- **diminishes ecosystem functions**

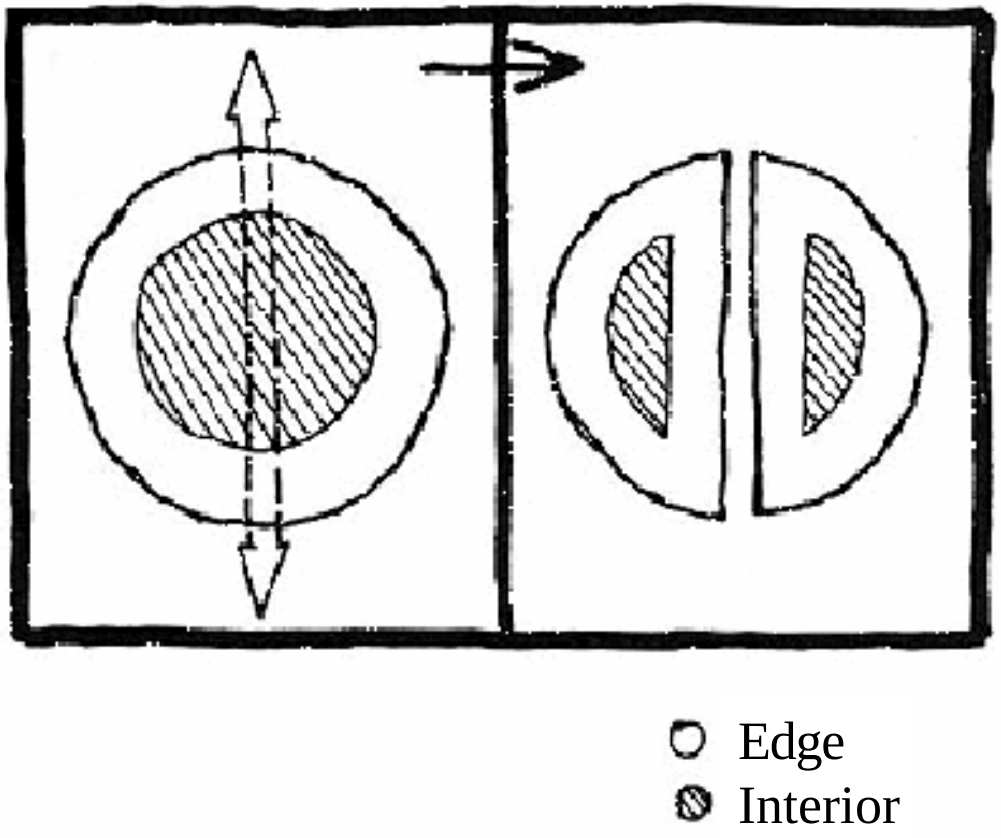
As forests are divided and isolated:

- **interior habitat decreases**
- **human disturbance increases**
- **opportunistic edge species replace interior species**
- **genetic exchange decreases**
- **populations of many species become too small to persist**

Fragmentation

Dividing a large patch into two smaller patches:

- **removes interior habitat**
- **reduces interior species population sizes**
- **reduces diversity of interior species**

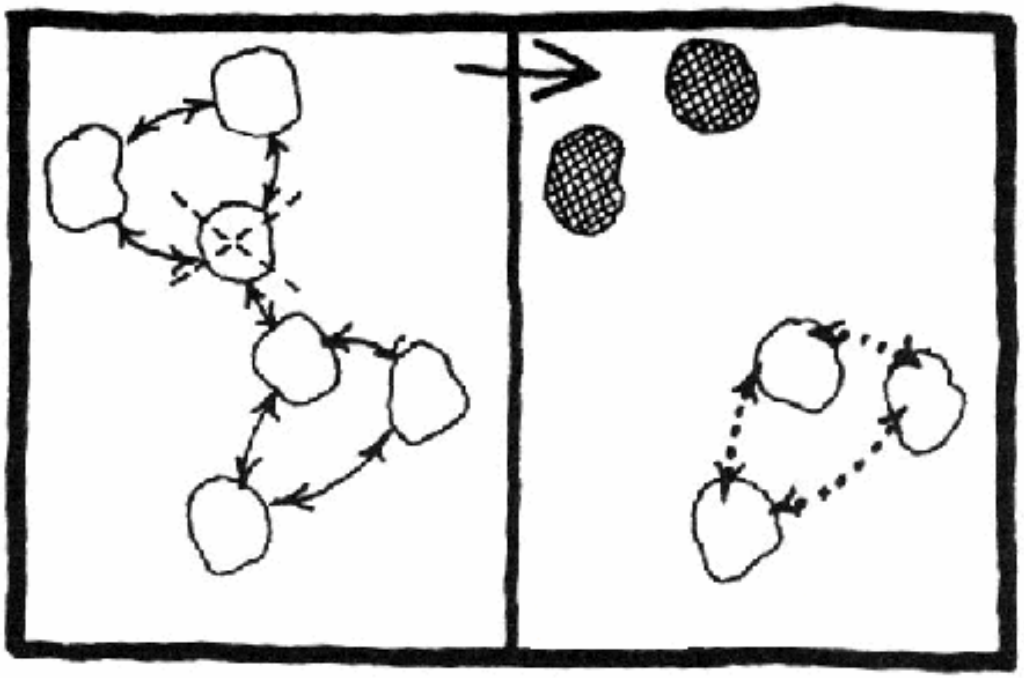


Metapopulation Dynamics

A metapopulation is an interacting population subdivided among different patches.

Removal of a patch:

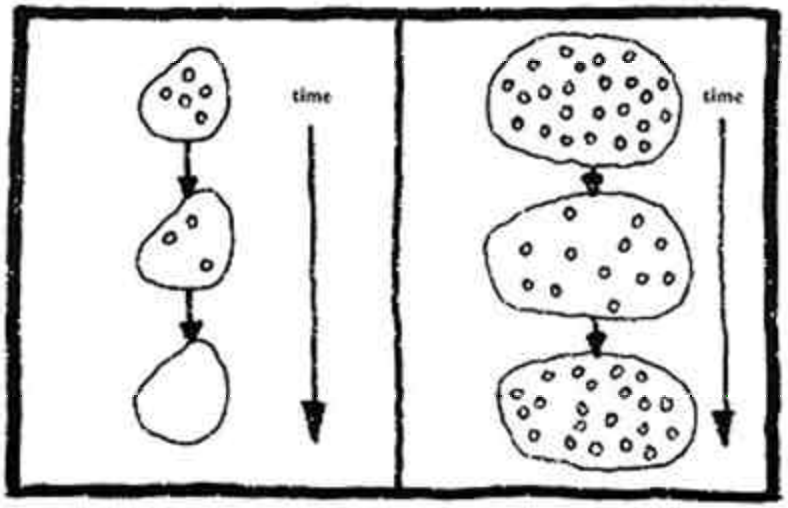
- **reduces the metapopulation size**
- **increases probability of local extinctions**
- **slows the re-colonization process**
- **reduces stability of the metapopulation**



Local Extinction

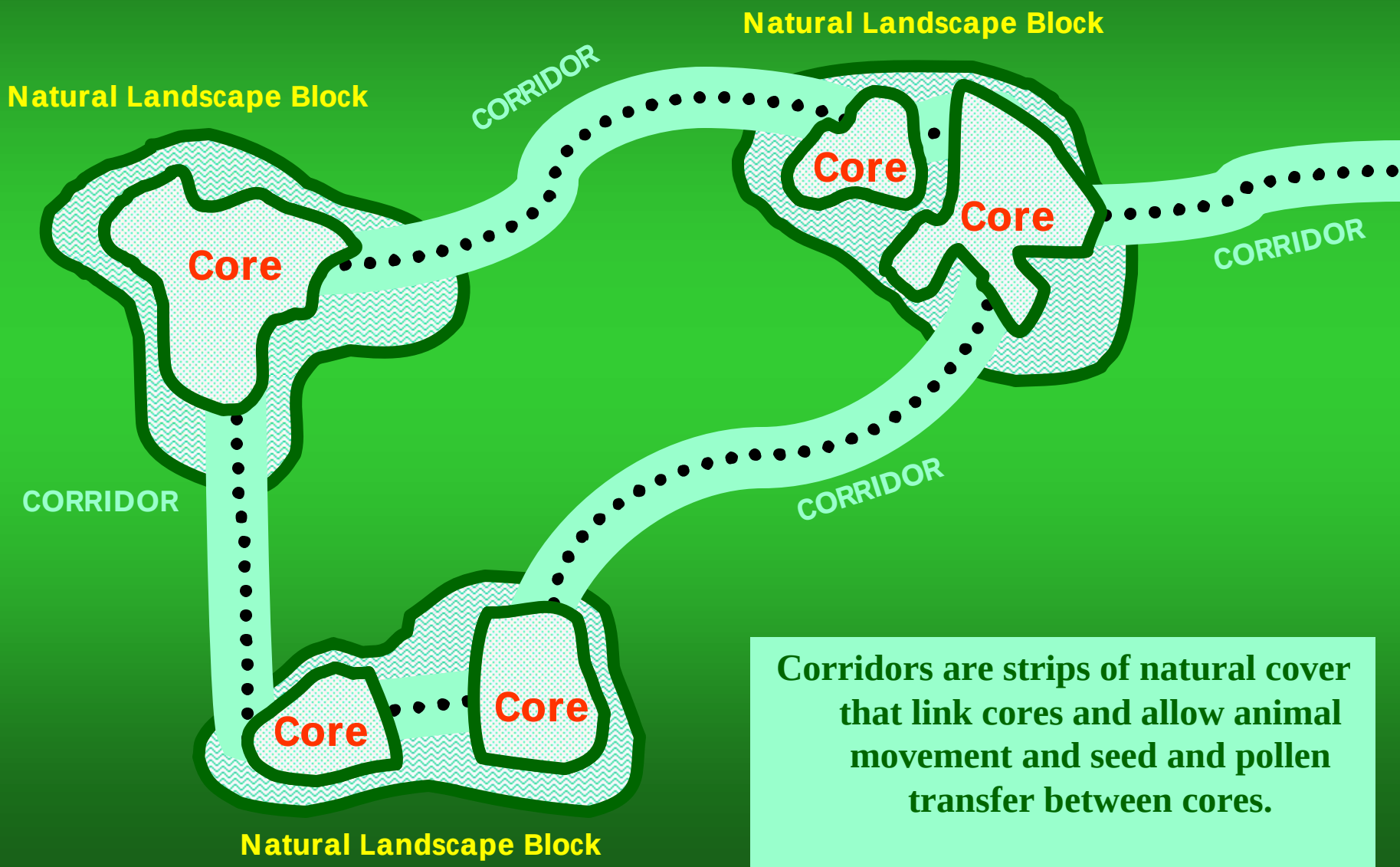
Large patches of natural vegetation:

- protect aquifers and streams
- act as carbon sinks
- sustain viable populations of interior species
- provide core habitat and escape cover
- permit natural disturbance regimes
- reduce extirpation probabilities



Larger patches normally have larger population sizes, thus species are less likely to go extinct during population fluctuations.

Conceptual Model of VCLNA Natural Landscape Assessment



Corridors are strips of natural cover that link cores and allow animal movement and seed and pollen transfer between cores.

Cores are:

- natural areas containing at least 100 acres of interior cover
- bounded by anthropogenic land cover, roads, railroads, power line corridors, and pipeline corridors

Natural Landscape Blocks are:

- natural areas containing one or more core areas
- bounded by major roads and unsuitable land cover greater than 100 meters across
- lands that buffer and support the cores

Corridors are:

- linear natural areas that connect large blocks of natural cover
- embedded in dissimilar matrices (unnatural land covers)
- continuous
- sufficiently wide

Cores and Natural Landscape Blocks contain:

♦Large blocks of interior forest

♦ Large wetland complexes

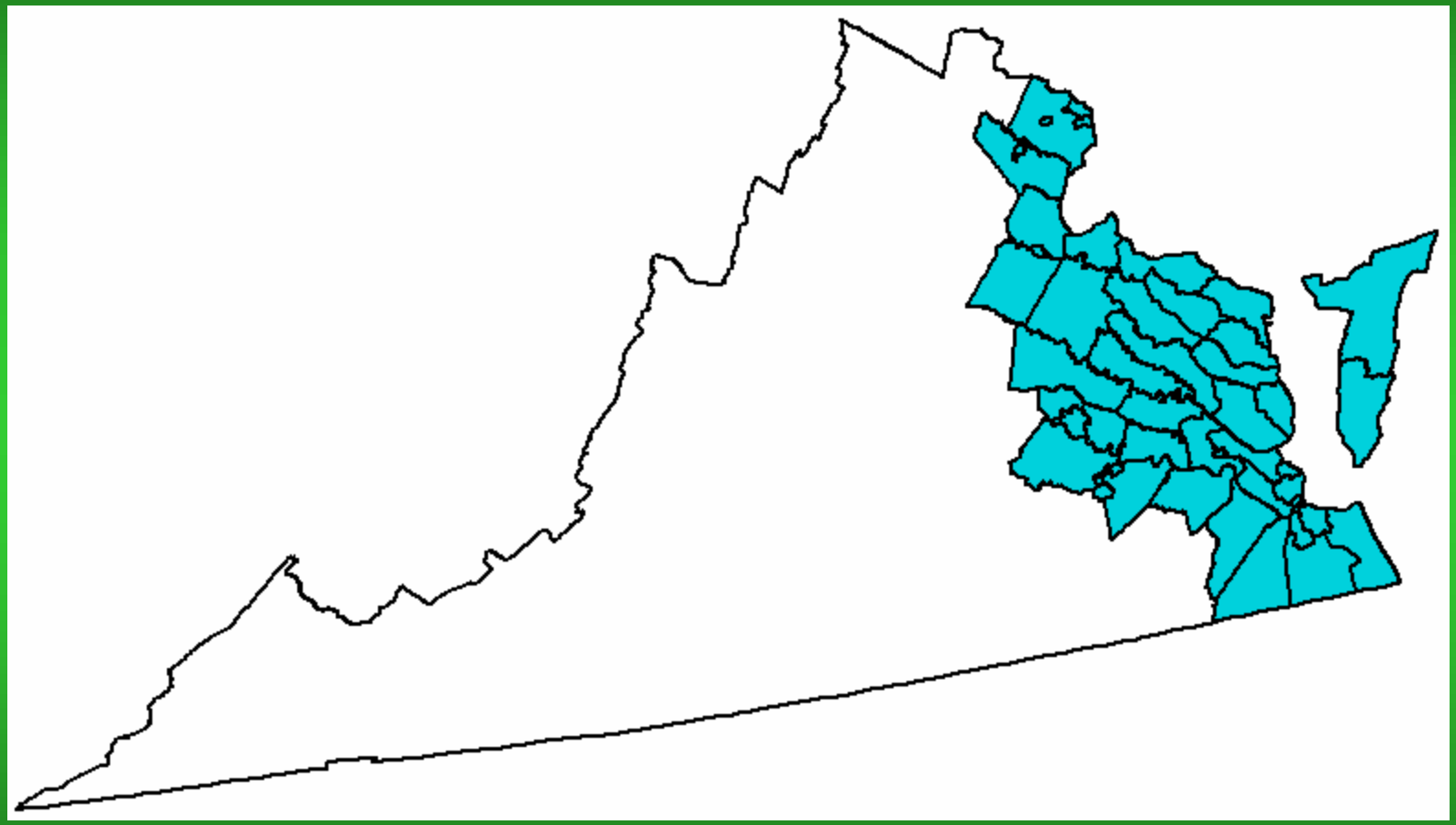
♦Relatively pristine rivers and streams

Cores and Natural Landscape Blocks contain:

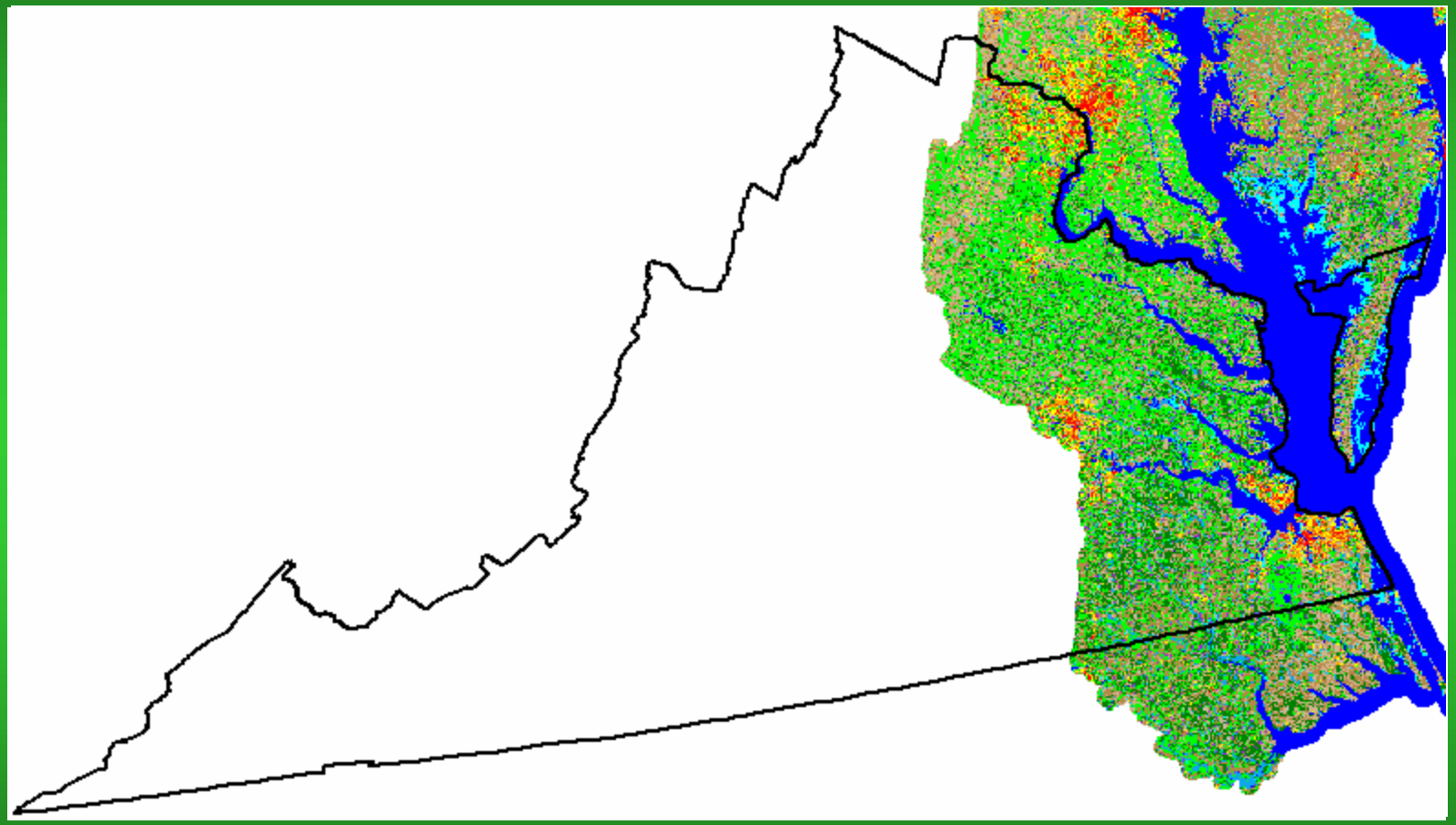
- Sensitive species habitat

- Existing parks and conservation lands

Phase I: The Coastal Zone



National Land Cover Data 2001
Zone 60

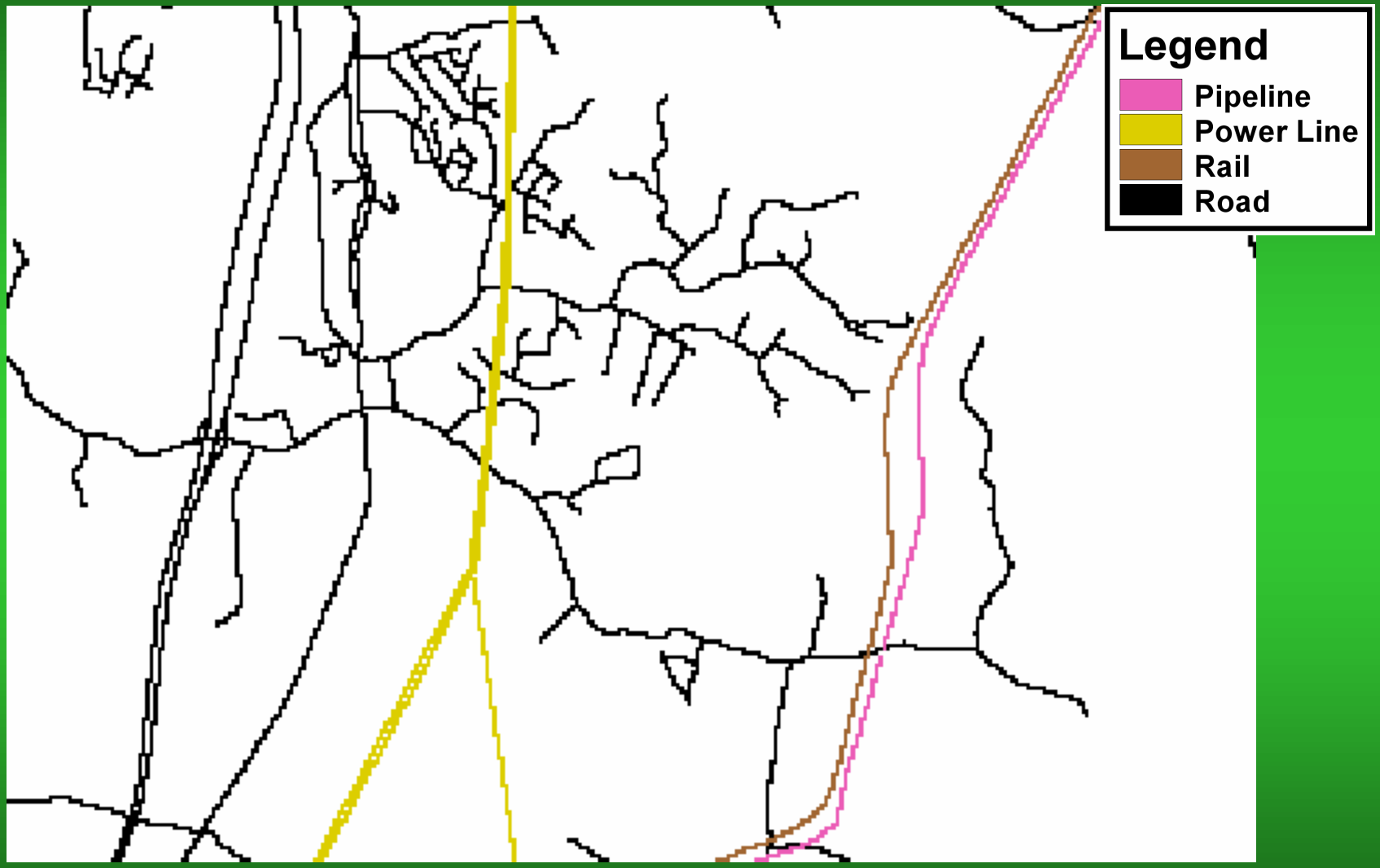


Cores Development

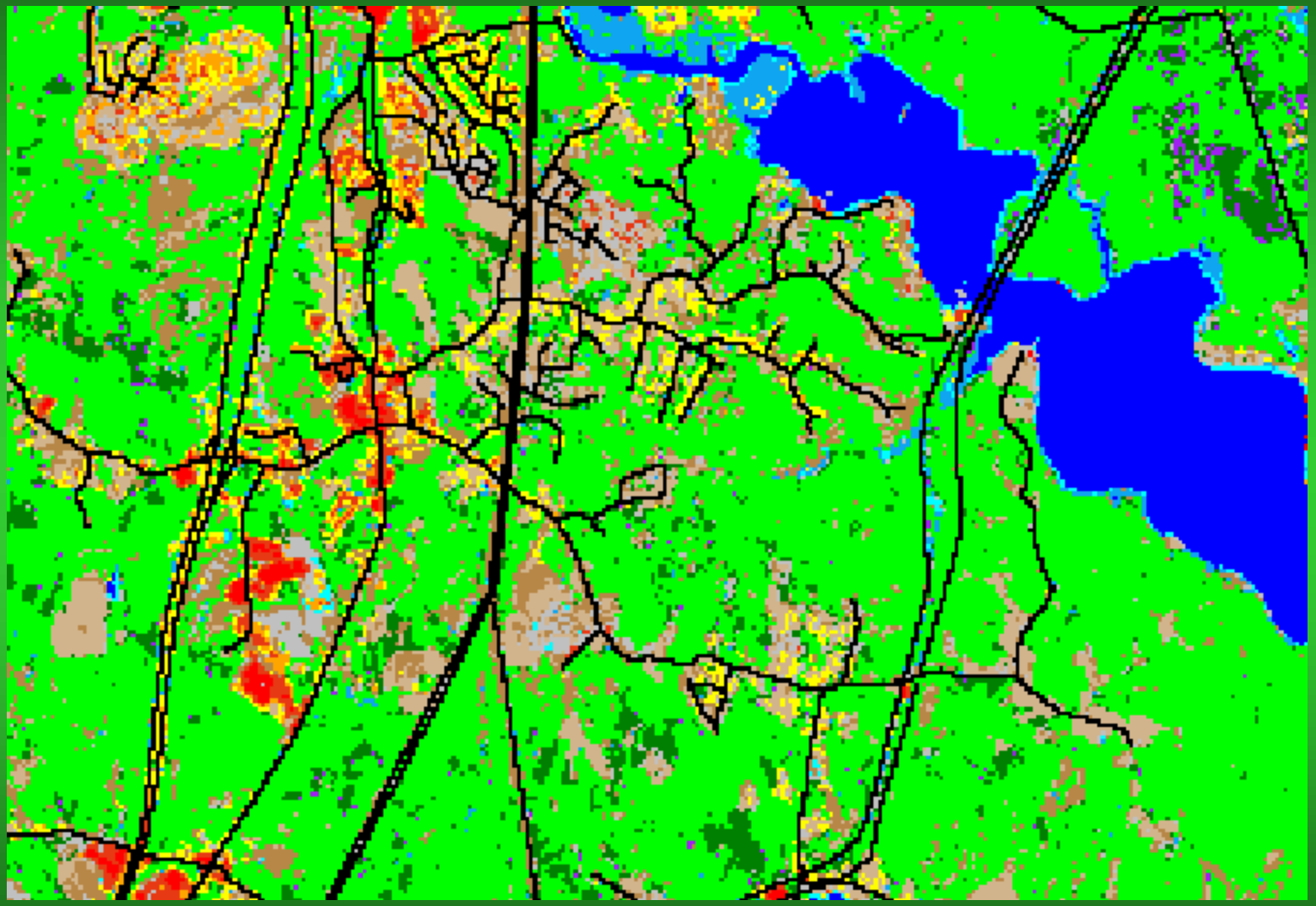
Cores are areas of unfragmented natural cover with at least 100 acres of interior conditions.

Due to the 30-meter resolution of the NLCD, some types of fragmentation were not visible in the imagery.

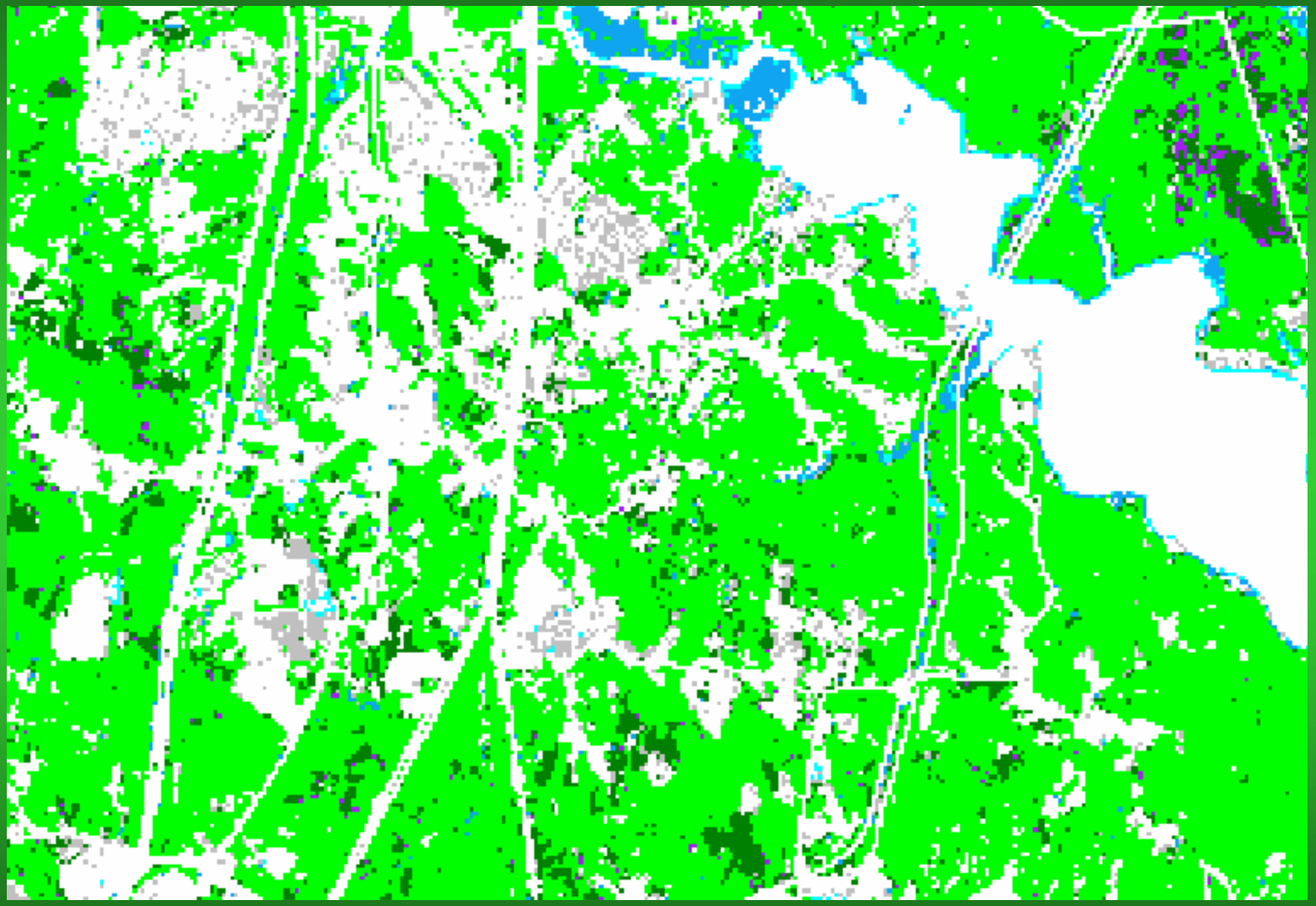
Fragmentation Layer



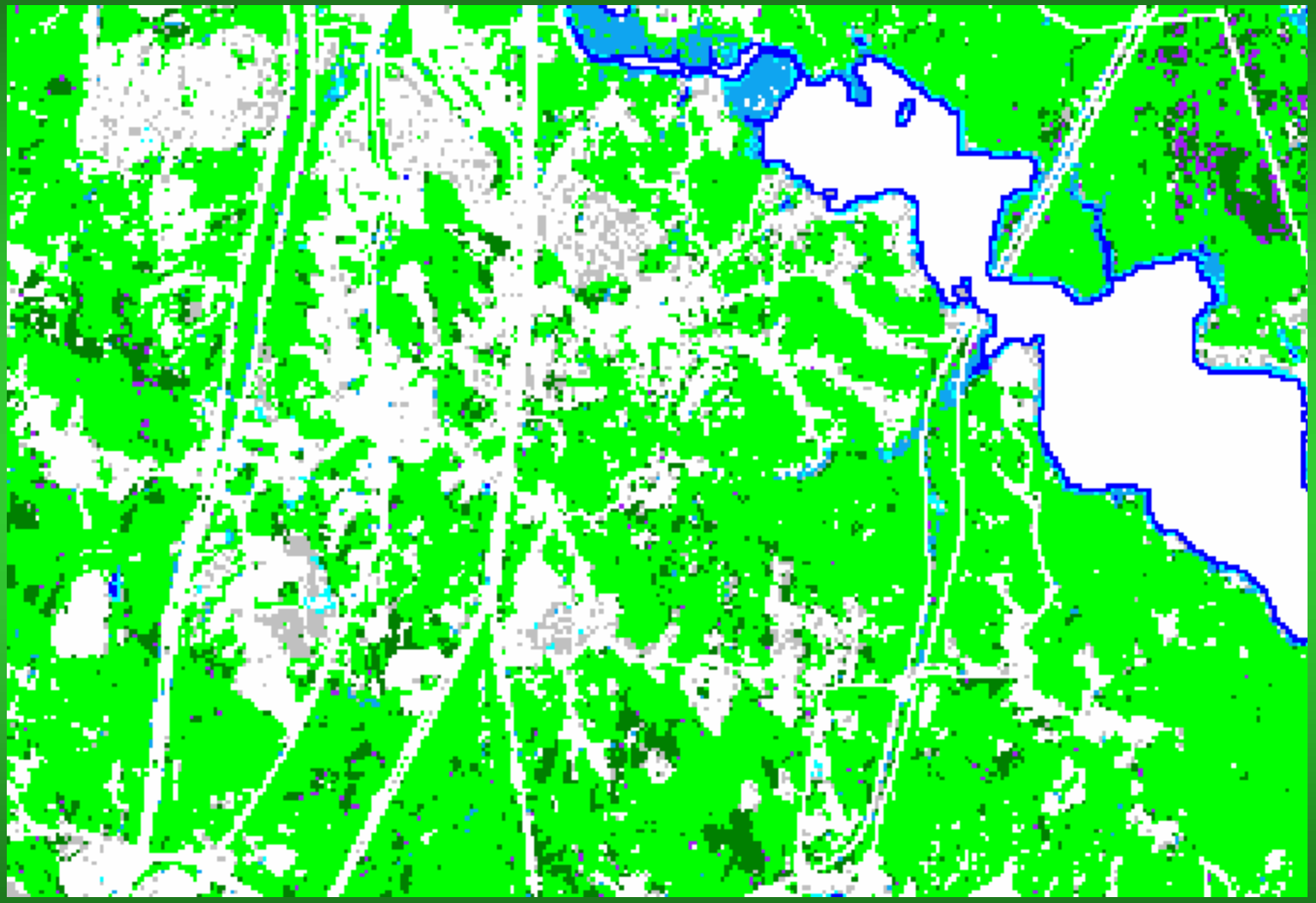
Fragmented NLCD



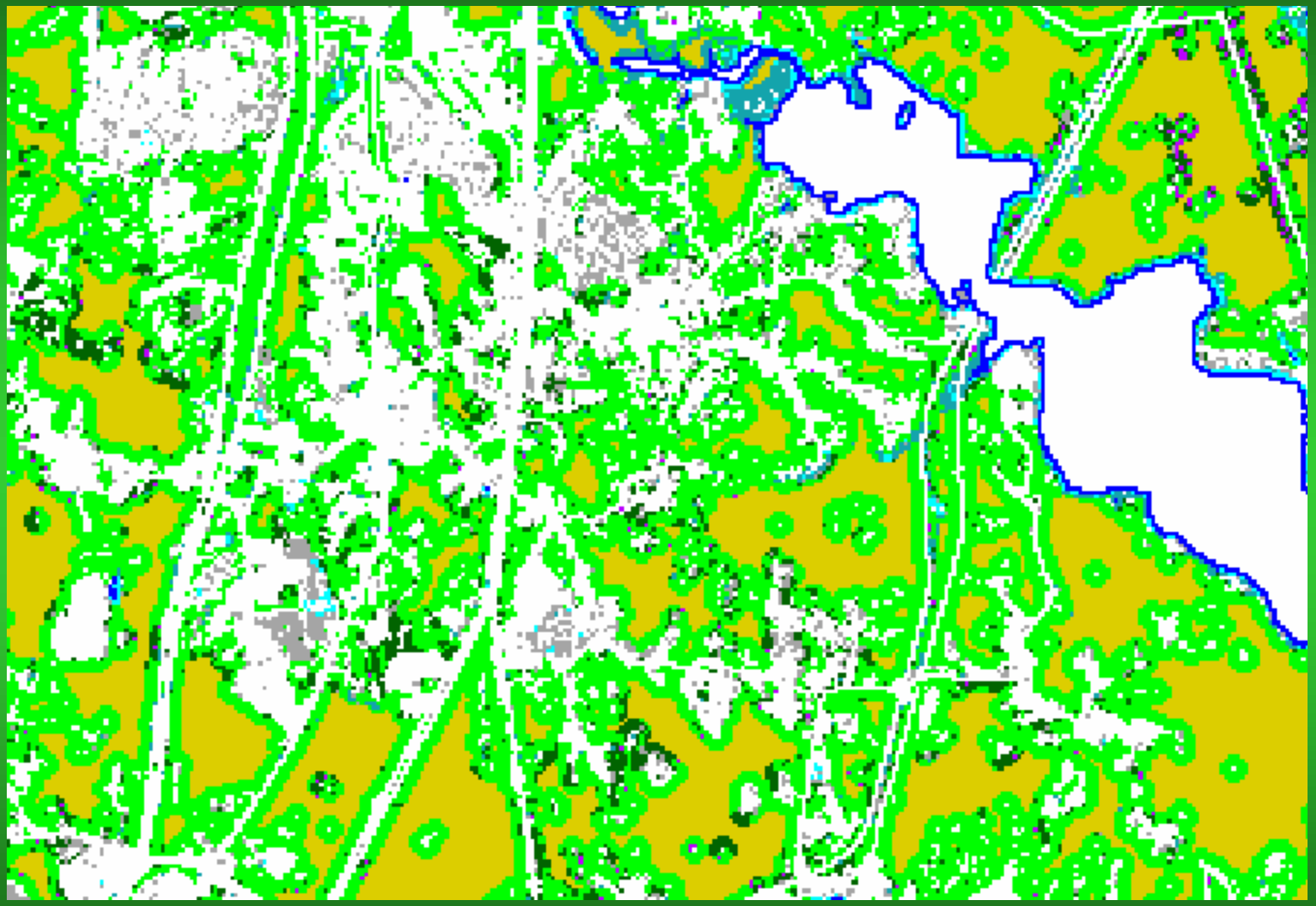
Natural Land Cover



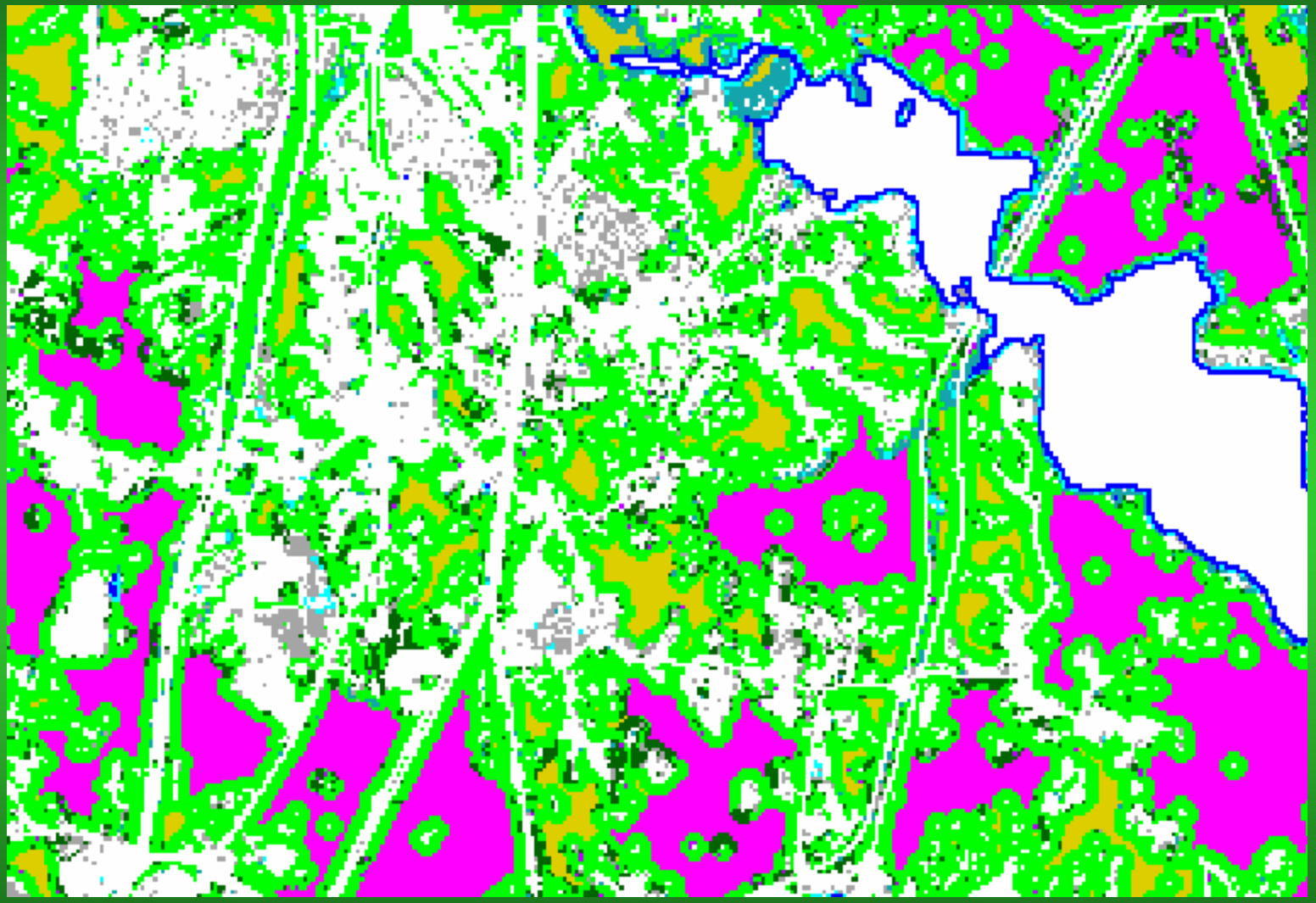
Natural Land Cover Plus Near-Shore Water



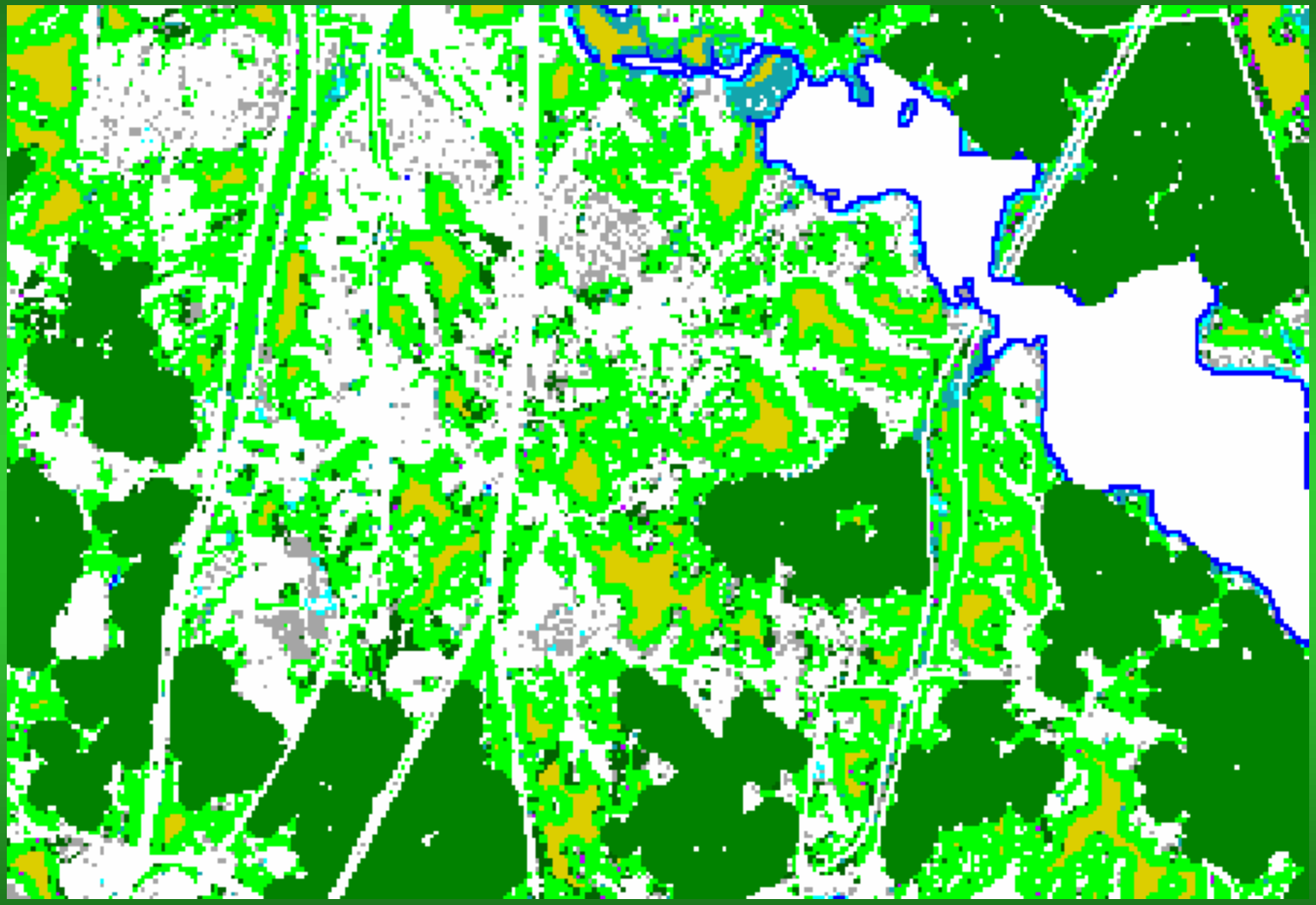
Interior Natural Area



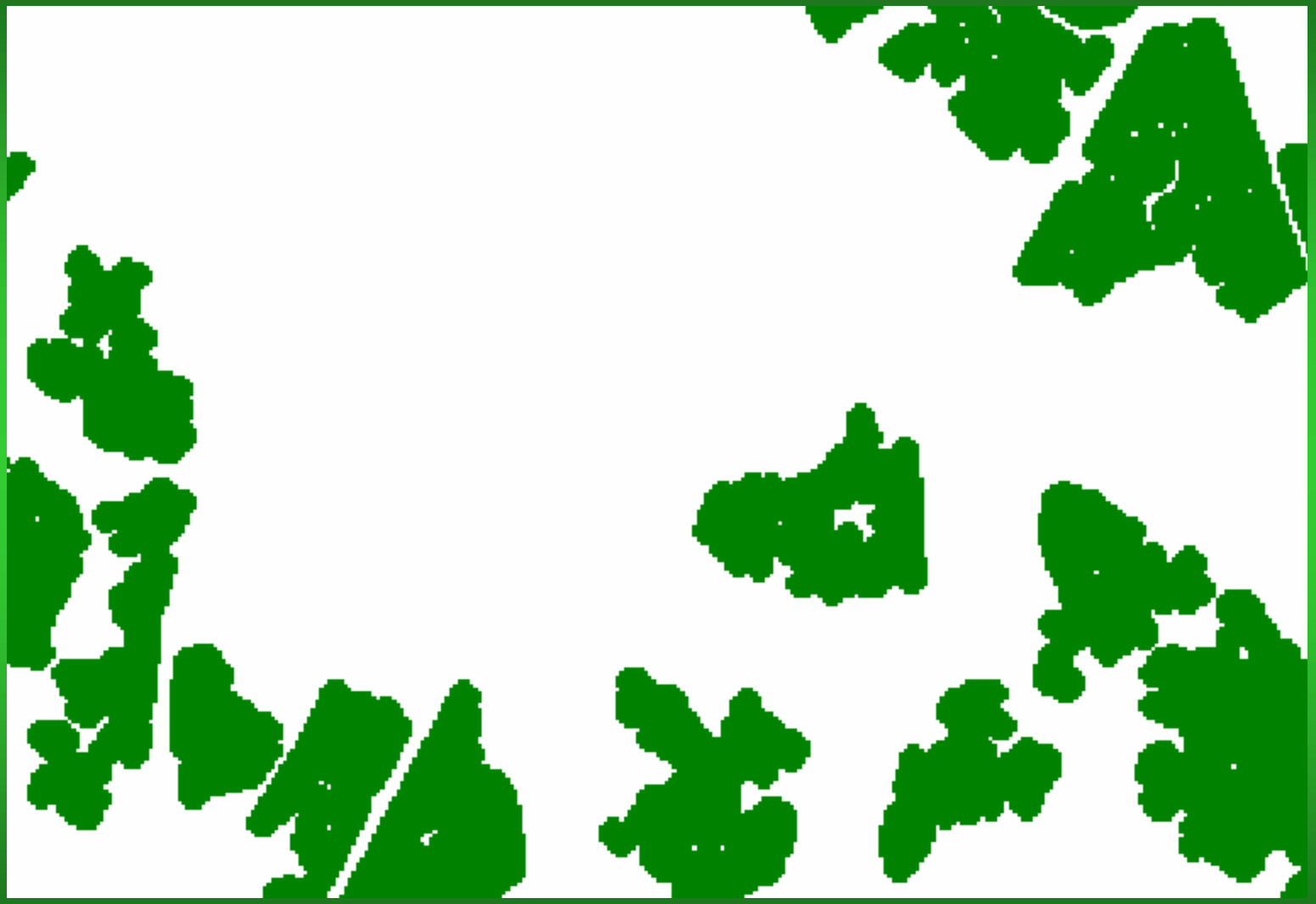
Interior Natural Area >100 Acres



Cores



Cores



Core Prioritization

- **Compared and ranked cores for ecological significance based upon multiple criteria**
- **It was a coarse-scale analysis dependent upon statewide datasets**
- **It used a core-prioritization model with assigned weights**

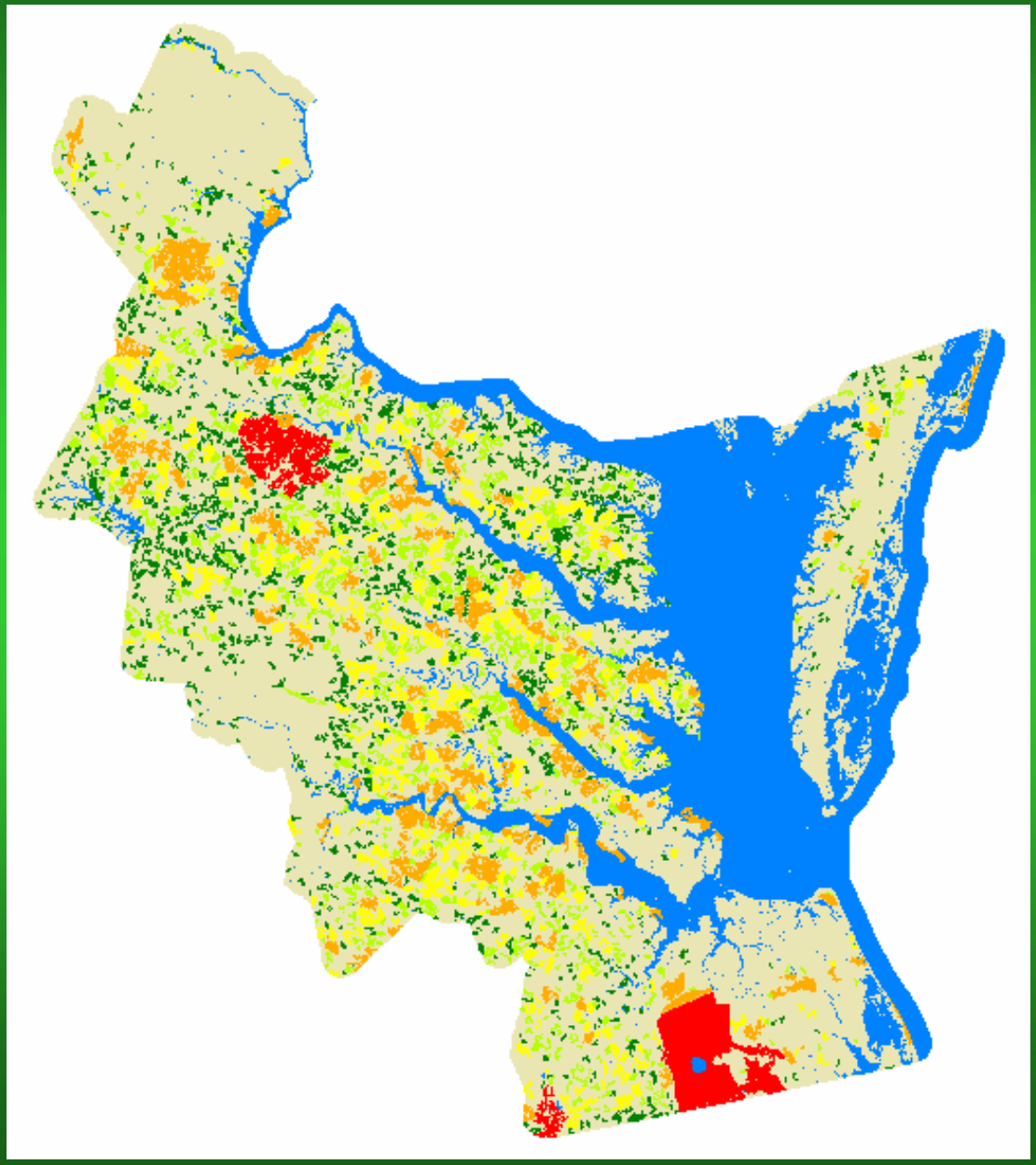
VCLNA Core Prioritization Model

Parameter	Weight	% of Total	Category % of Total
Rare Species and Habitats			50.5
Number of element occurrences in core (excluding low-precision & outdated EOs)§	15	5.9	
Area of B1 & B2-ranked terrestrial Conservation Sites in core	45	17.8	
Area of B3-ranked terrestrial Conservation Sites in core	15	5.9	
Area of B4-ranked terrestrial Conservation Sites in core	10	4.0	
Area of B5-ranked terrestrial Cons		2.0	
Length of B1 & B2-ranked Stream		8.9	
Length of B3-ranked Stream Conservation Units and T&E Waters in core		3.0	
Length of B4-ranked Stream Conservation Units and T&E Waters in core	5	2.0	
Length of B5-ranked Stream Conservation Units and T&E Waters in core	2.5	1.0	
Size of Interior			10.7
Interior of core greater than or equal to 10,000 acres	15	5.9	
Interior of core from 5,000 to 9,999 acres	9	3.6	
Interior of core from 1,000 to 4,999 acres	3	1.2	
Wetlands			3.2
Area of NWI unm		.2	
Diversity			9.1
VAGap Species R		.9	
Variety of NWI un		.6	
Topographic relief index (standard deviation of elevations in core)	4	1.6	
Stream Quality			13.1
Aquatic Gap Species Richness in core*	15	5.9	
Modified Index of Biotic Integrity (Mini MIBI, includes only fish and mussels)**	6	2.4	
Length of streams within interior forest in core	6	2.4	
Length of confirmed anadromous fish reaches in core	3	1.2	
Length of potential anadromous fish reaches in core	2	0.8	
Length of streams containing natural brook trout populations in core	1	0.4	
Core Context			11.9
Area of core proximity zone divided by core area (measure of core isolation) ***	10	4.0	
Mean distance from core to nearest roads	6	2.4	
Proportion of core proximity zone made up of hub	6	2.4	
Area of proximity to focus wetland core	4	1.6	
Nearest neighboring core distance ***	2	0.8	
Surrounding 100 meter buffer suitability index	2	0.8	
Fine Scale Habitats			1.6
Number of 1° & 2° dune occurrences in core	1	0.4	
Area of Critical or Special Neotropical Migratory Bird Habitat in core	1	0.4	
Area of karst geology in core	1	0.4	
Area of diabase geology in core	1	0.4	
Total:	252.5	100.0	100.0

This model has been peer-reviewed.

Parameters were added and weights were adjusted based upon reviewer's comments.

Prioritized VCLNA Cores



VCLNA Core Significance

- C1 - Outstanding
- C2 - Very High
- C3 - High
- C4 - Moderate
- C5 - General

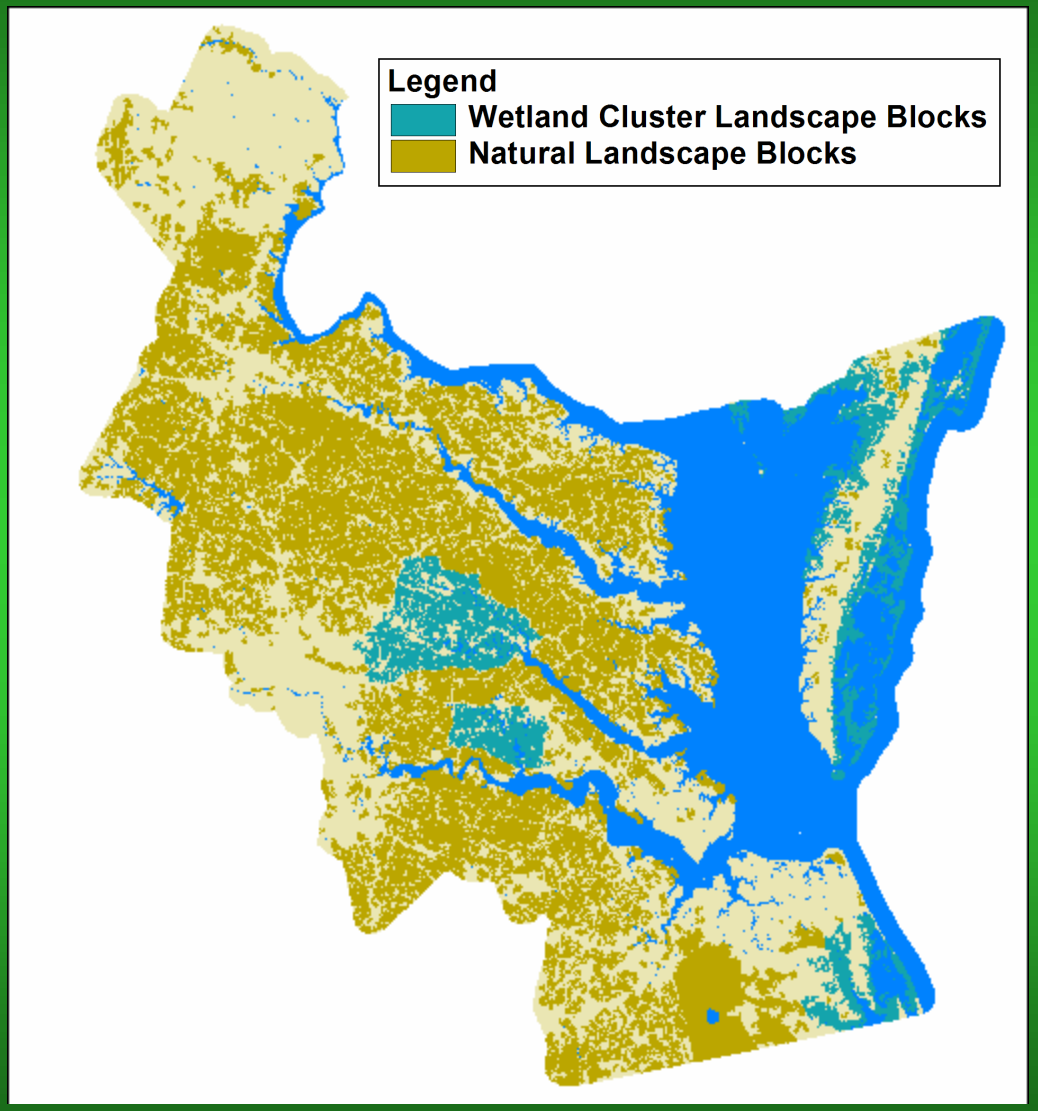
Natural Landscape Block Development

Natural Landscape Blocks

- **slightly fragmented aggregations of cores, plus contiguous natural cover.**
- **bounded by major roads and unsuitable land cover gaps greater than 100 meters across.**
- **natural lands that support and buffer cores.**

Natural Landscape Blocks were developed using natural land covers from the base imagery and eliminating areas of detected and estimated human disturbance (e.g. roads, residential areas, and other developed lands).

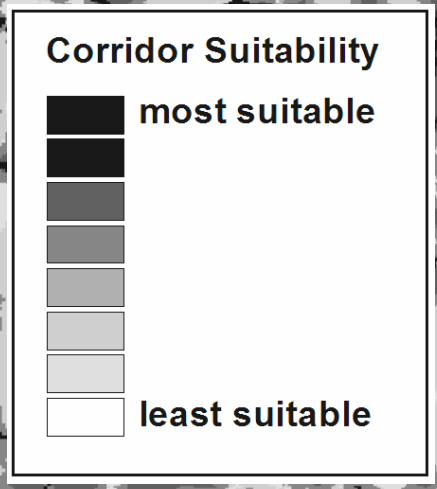
Natural Landscape Blocks



Corridor Analysis

- **Used least-cost-path analysis to identify the best corridor routes to link the highest-priority (C1 & C2) cores**
  - **this is not monetary cost!**
  - **rather, it is the shortest distance through the most suitable habitats**
- **This analysis required development of a corridor suitability layer.**

Corridor Analysis

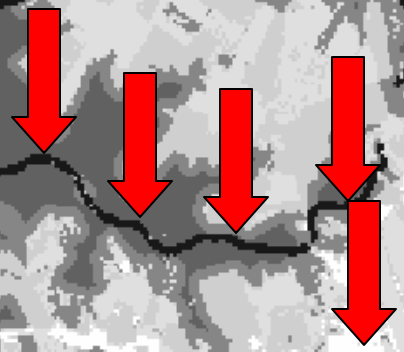


The corridor suitability layer represents impedances to animal and seed movement based upon many landscape parameters, including:

- land cover
- riparian forest
- slope
- interior forest
- offshore water
- roads
- core rank
- urban proximity

Corridor Analysis

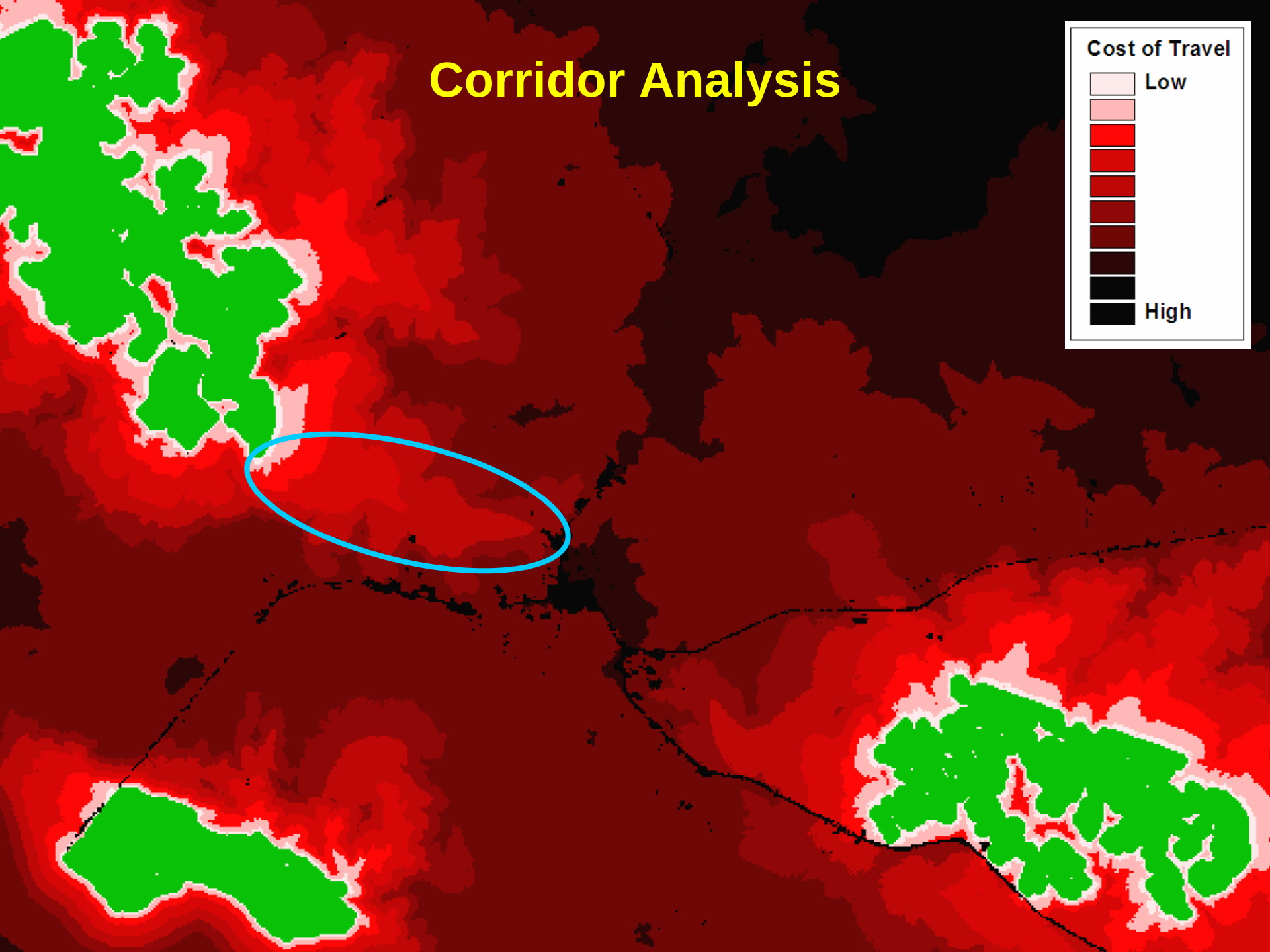
The landscape between cores was assessed for its linkage potential, identifying conduits and barriers to movement.



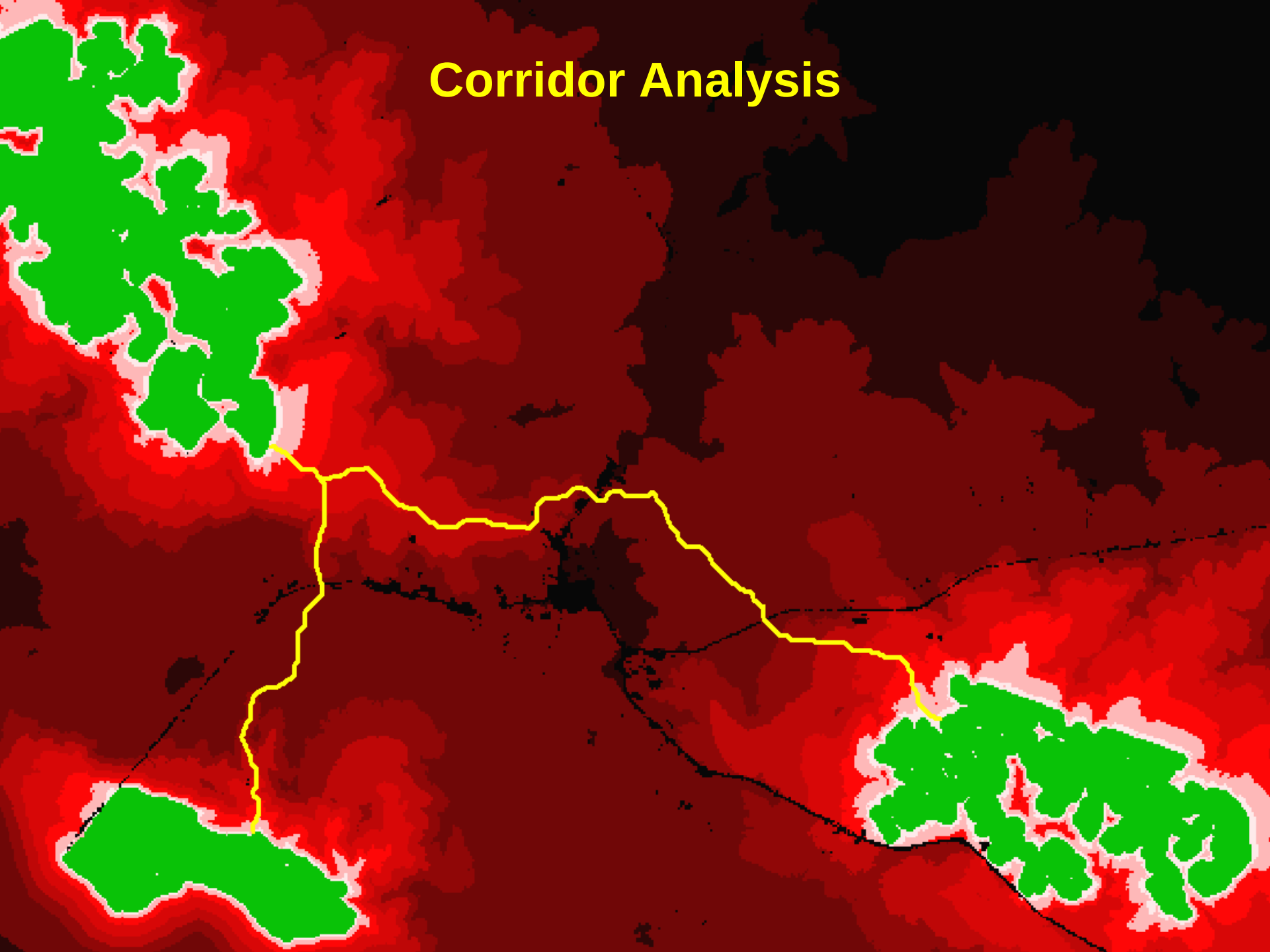
Features like forested streams and ridge lines were considered relatively suitable for corridors.

Urban areas and roads were avoided.

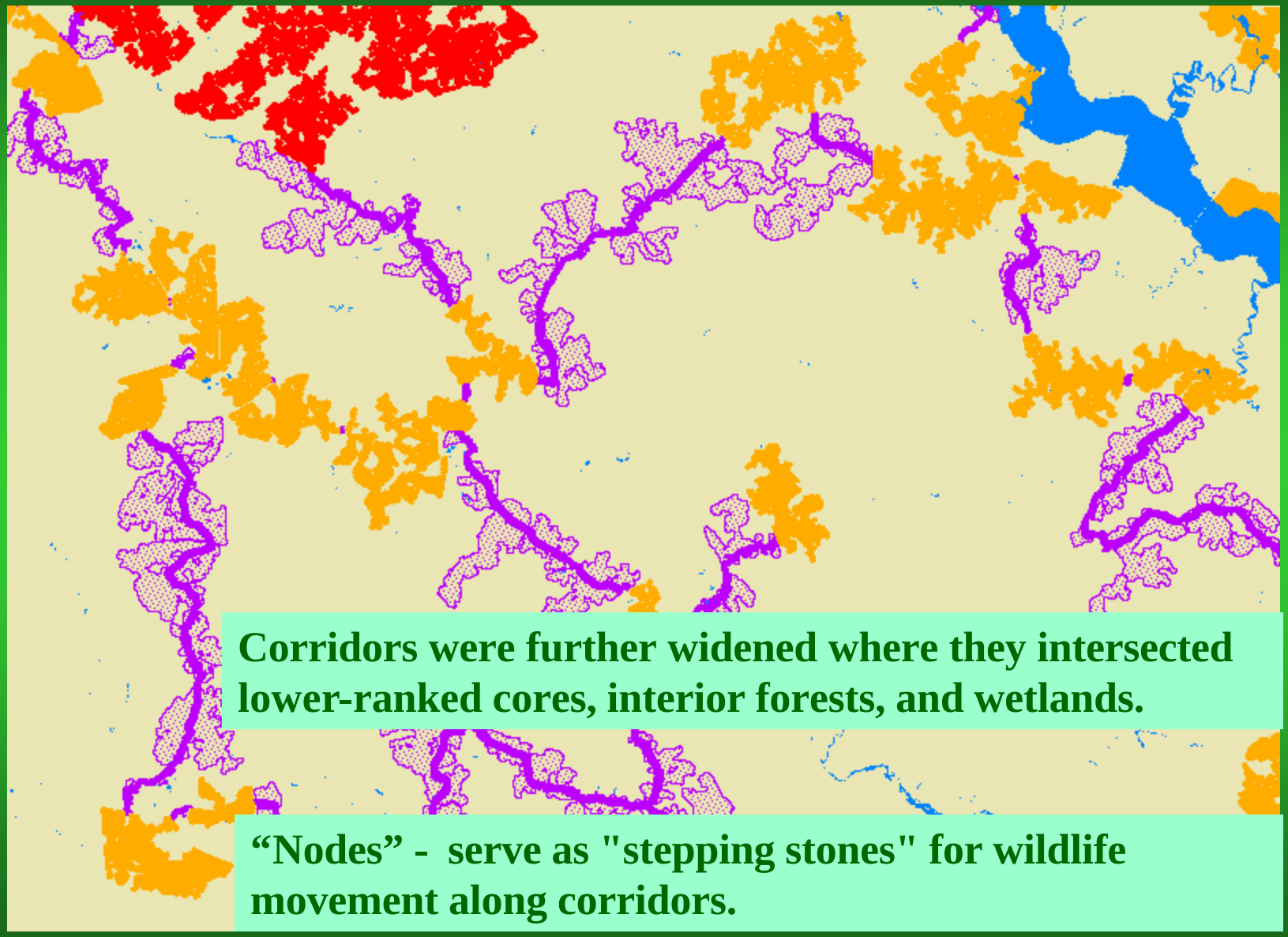
Corridor Analysis



Corridor Analysis



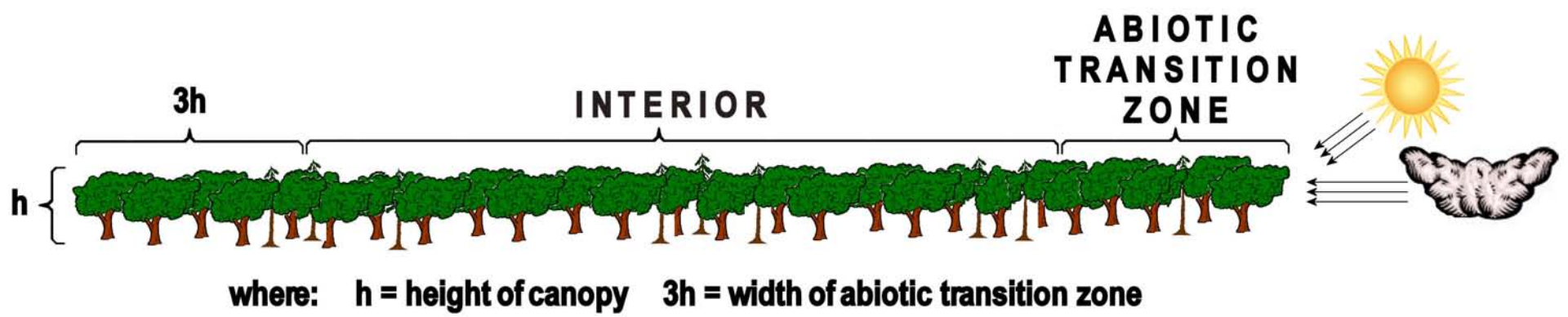
Corridor Results



Corridors were further widened where they intersected lower-ranked cores, interior forests, and wetlands.

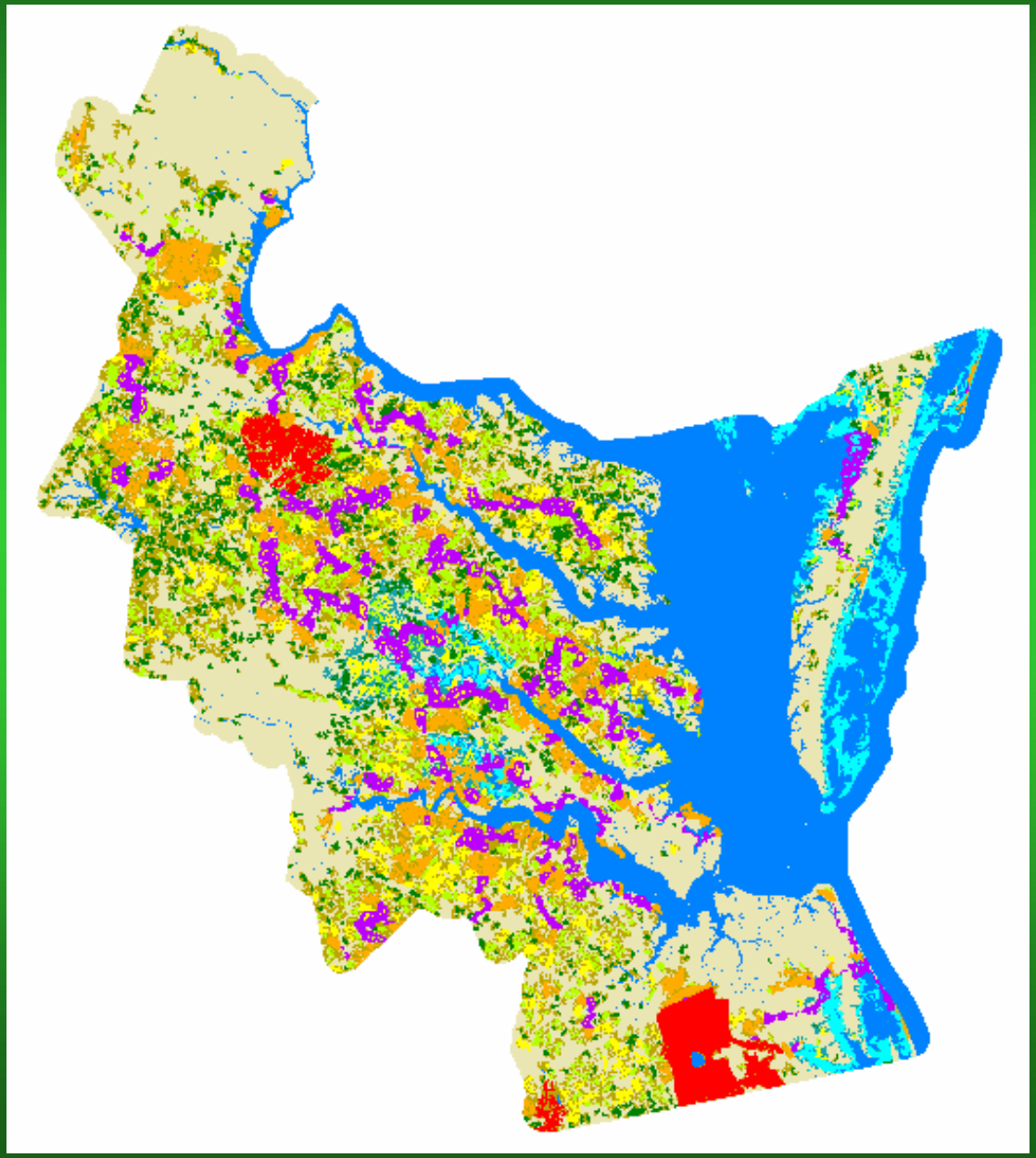
“Nodes” - serve as "stepping stones" for wildlife movement along corridors.

Corridor Width



- **100 meters is the abiotic transition zone for NLA corridors**
- **we recommend that all corridors be a minimum of 300 meters wide, which allows for a swath of interior area 100 meters wide.**
- **we recommend that nodes be included to make corridors more functional**

Prioritized Cores and Other VCLNA Features



LEGEND

VCLNA Core Significance

- C1 - Outstanding
- C2 - Very High
- C3 - High
- C4 - Moderate
- C5 - General

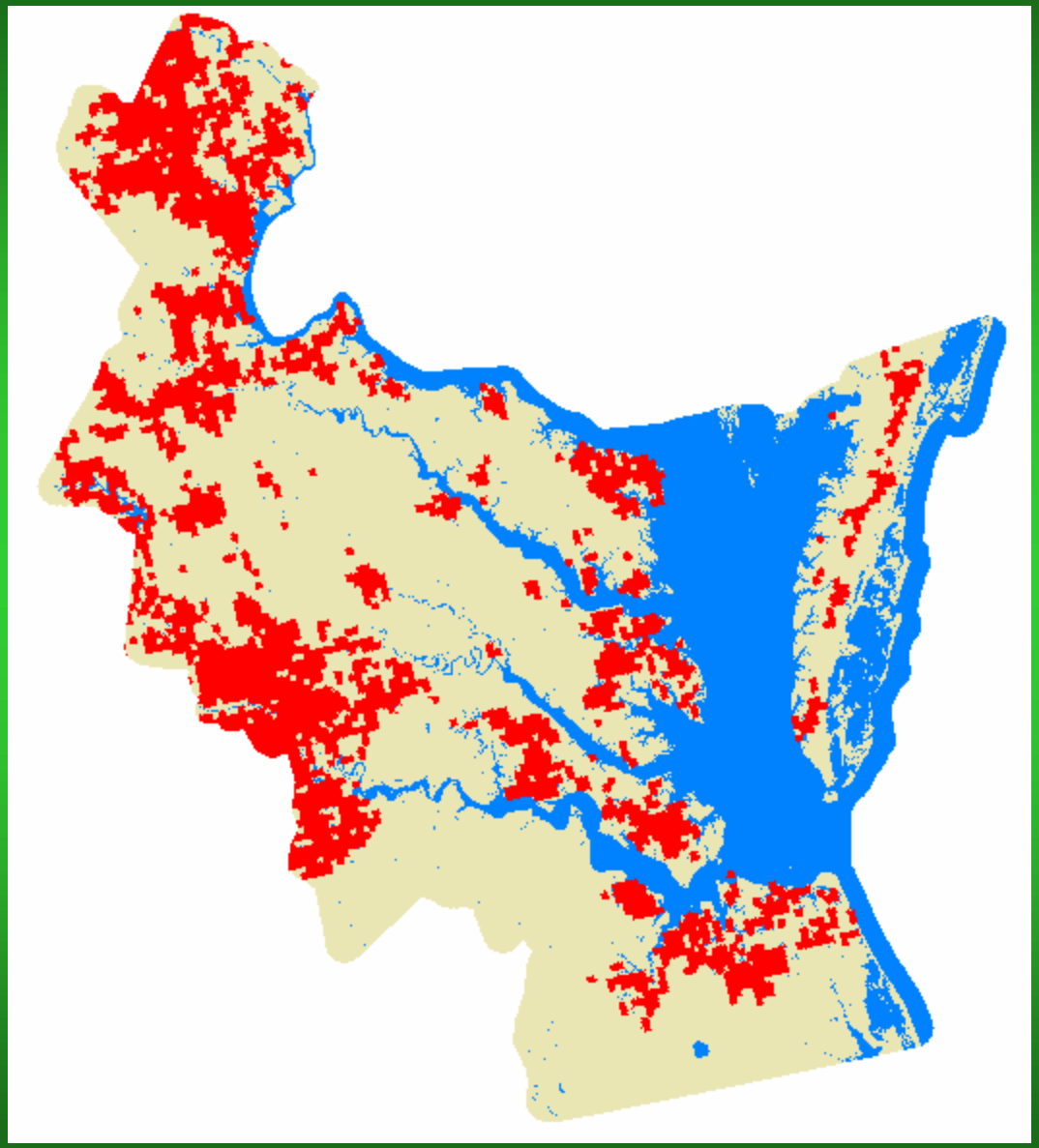
Other VCLNA Features

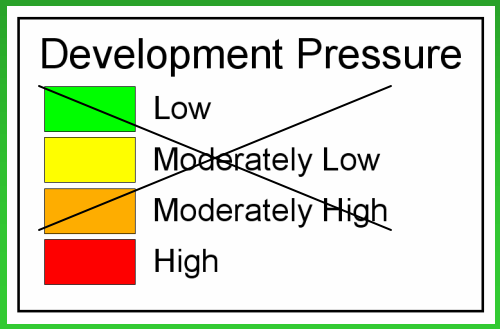
- Corridors for C1 and C2 Cores
- Corridor Nodes
- Wetland Core Clusters
- Wetland Cluster Landscape Blocks
- Natural Landscape Blocks

VCLNA Natural Landscape Assessment Vulnerability Analysis

- **Identified cores at greatest risk of loss to development**
- **Help focus conservation efforts on the highest priority cores that are at greatest risk of being developed.**
- **For the coastal zone product, VCLNA Cores were intersected with a vulnerability layer obtained from the Chesapeake Bay Resource Lands Assessment.**
- **Future iterations of the vulnerability analysis may require creation of a vulnerability model using parameters such as:**
  - **ownership, easement, and regulatory restrictions on development**
  - **land management**
  - **incentives for development**
  - **population growth**
  - **number of parcels in core**
  - **commuting time to urban centers**
  - **mean distance to nearest major road**

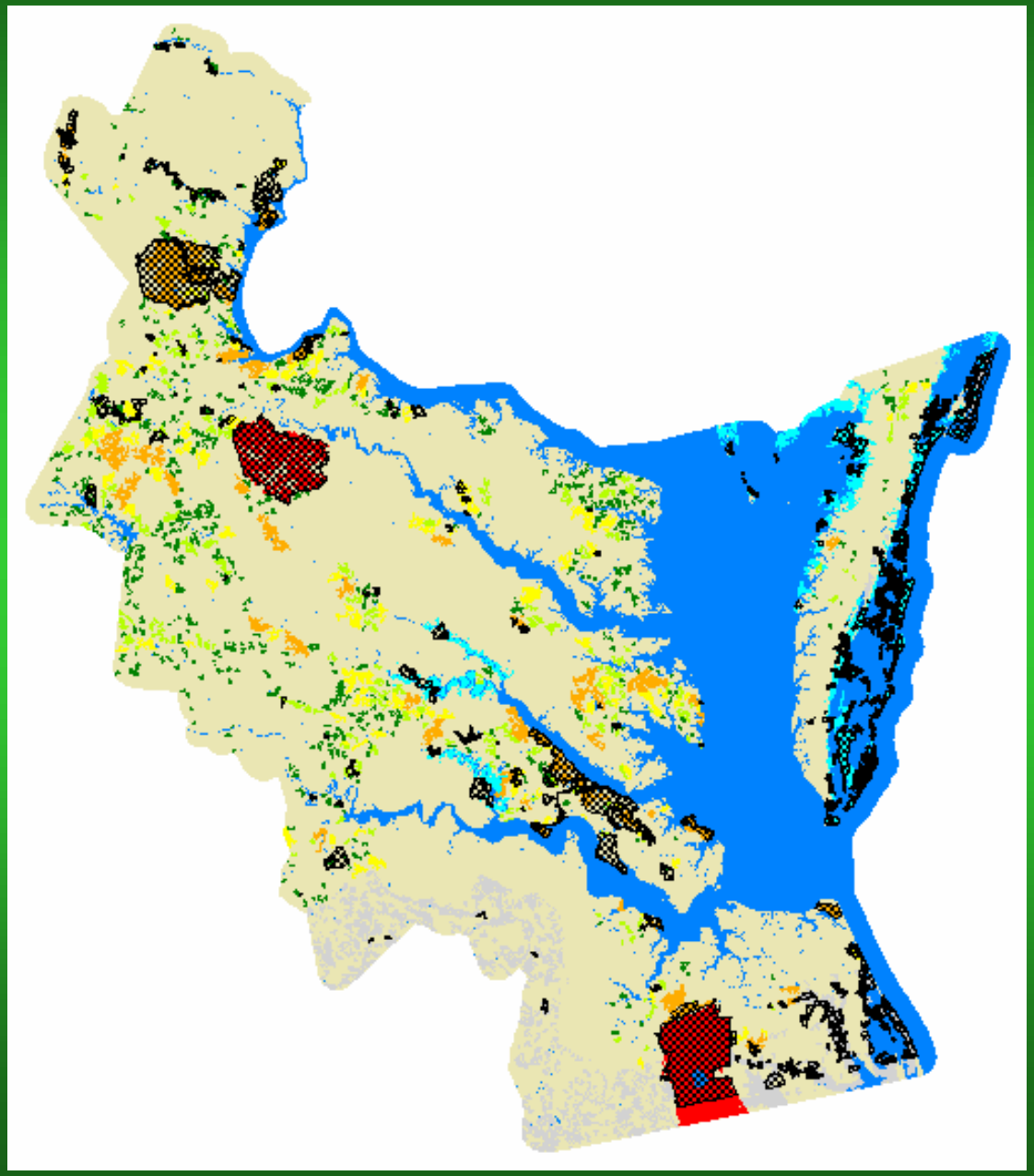
Proximity to Growth Hot Spots





Source: Chesapeake Bay Resource Lands Assessment

Vulnerable Cores



LEGEND

Vulnerable VCLNA Core Significance

- C1 - Outstanding
- C2 - Very High
- C3 - High
- C4 - Moderate
- C5 - General

Other Features

- Vulnerable Wetland Core Clusters
- Cores and Wetland Core Clusters for which vulnerability could not be assessed
- Conservation Lands that intersect Vulnerable Cores

Coastal Zone Products

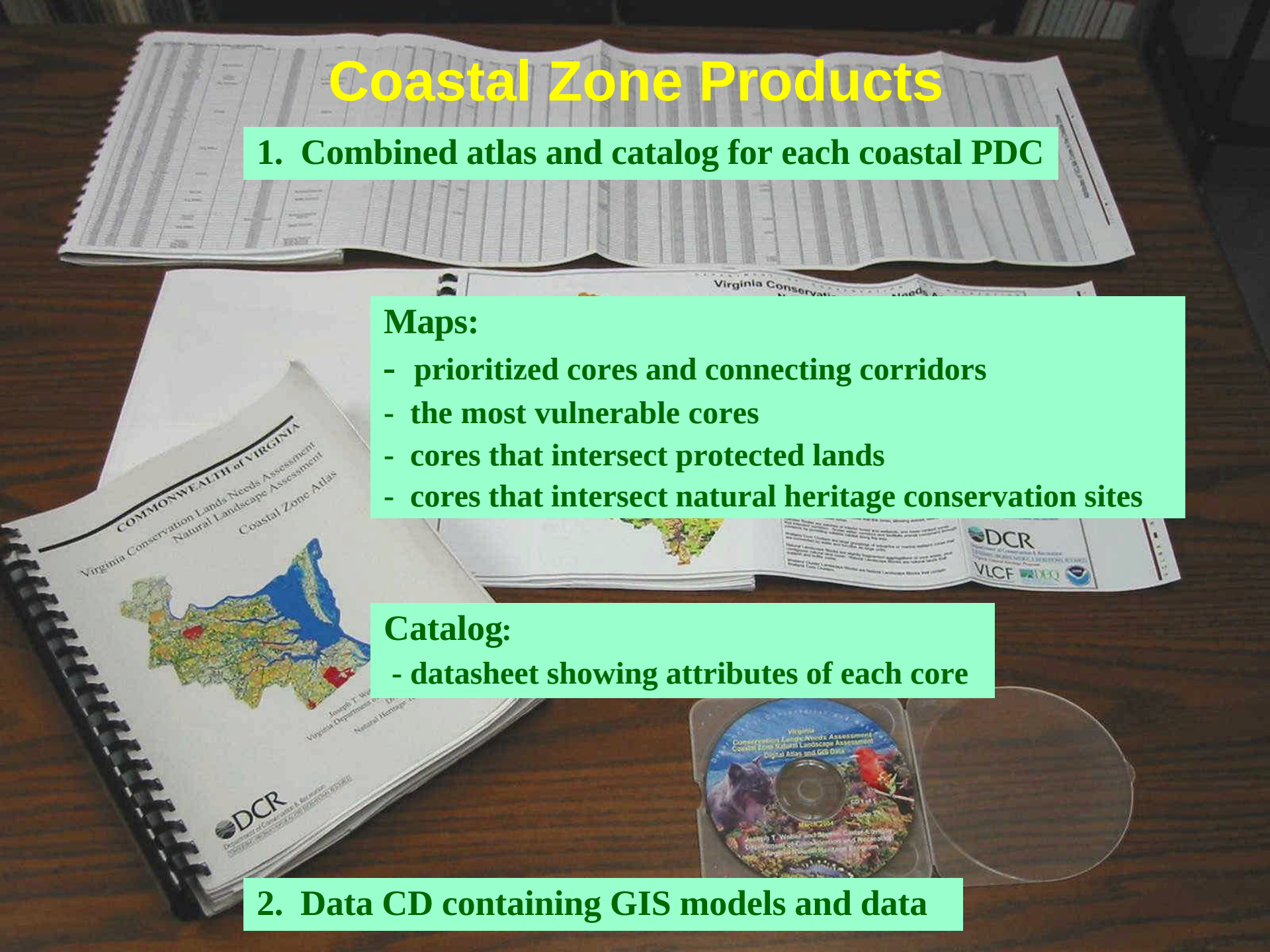
1. Combined atlas and catalog for each coastal PDC

Maps:

- prioritized cores and connecting corridors
- the most vulnerable cores
- cores that intersect protected lands
- cores that intersect natural heritage conservation sites

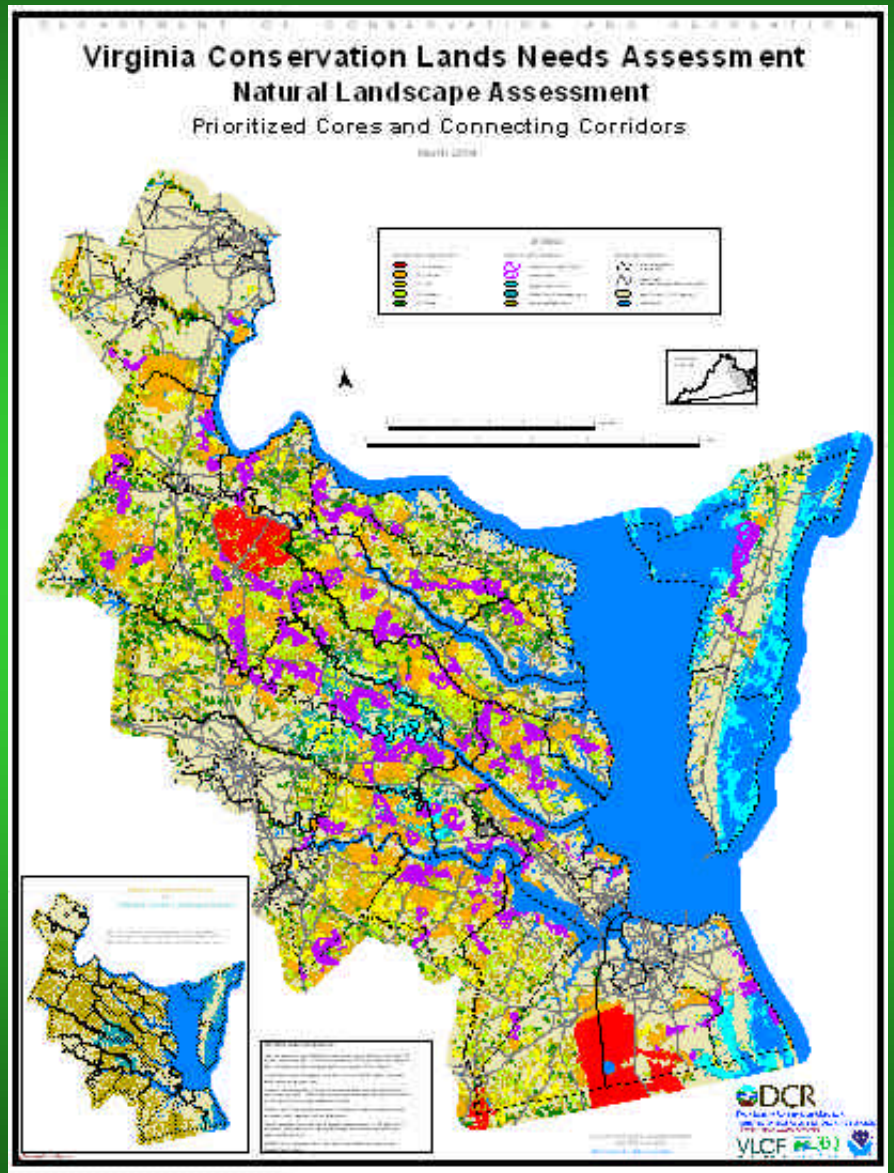
Catalog:

- datasheet showing attributes of each core

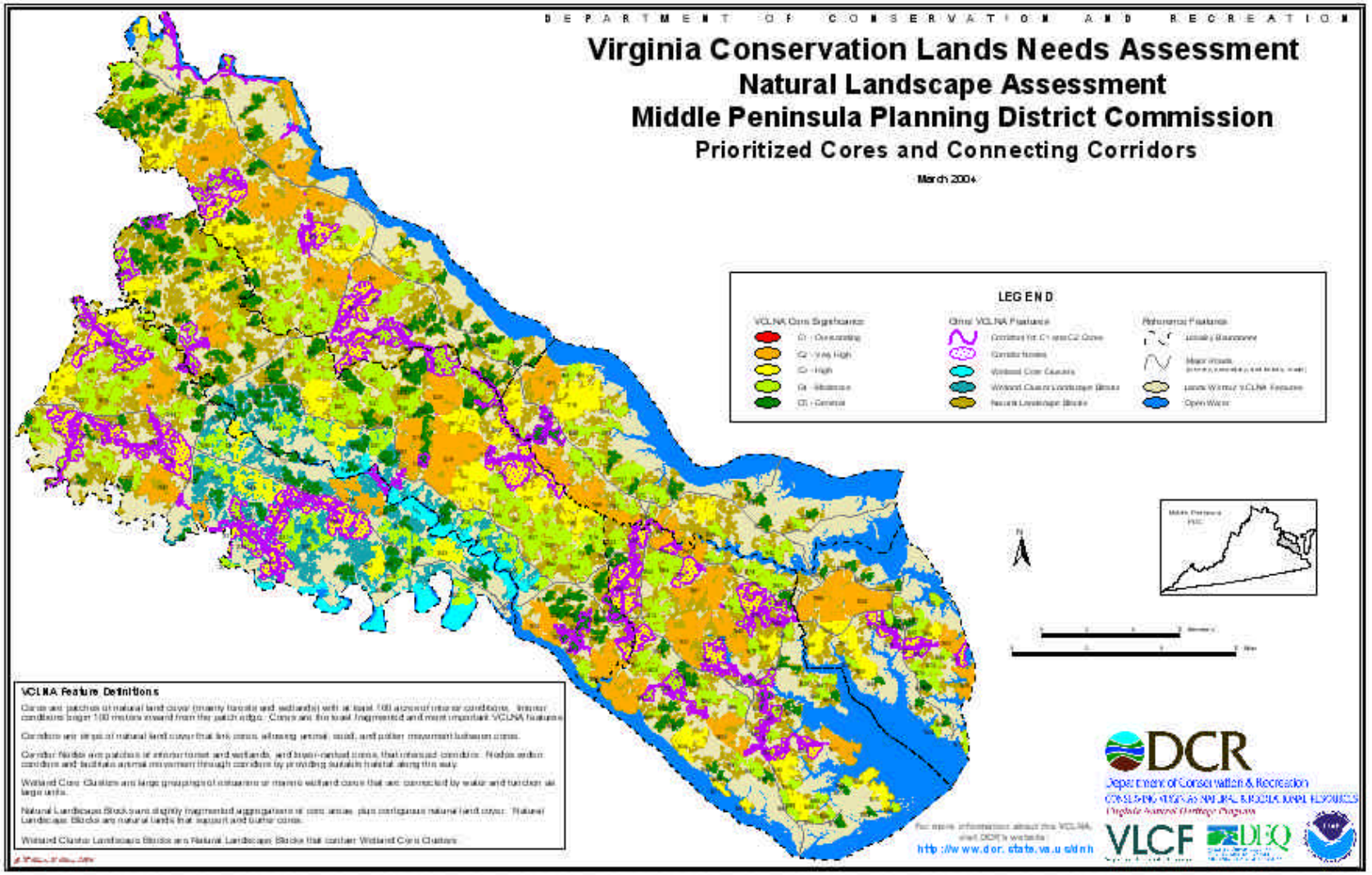


2. Data CD containing GIS models and data

Coastal Zone Atlas Maps



Coastal Zone Atlas Maps

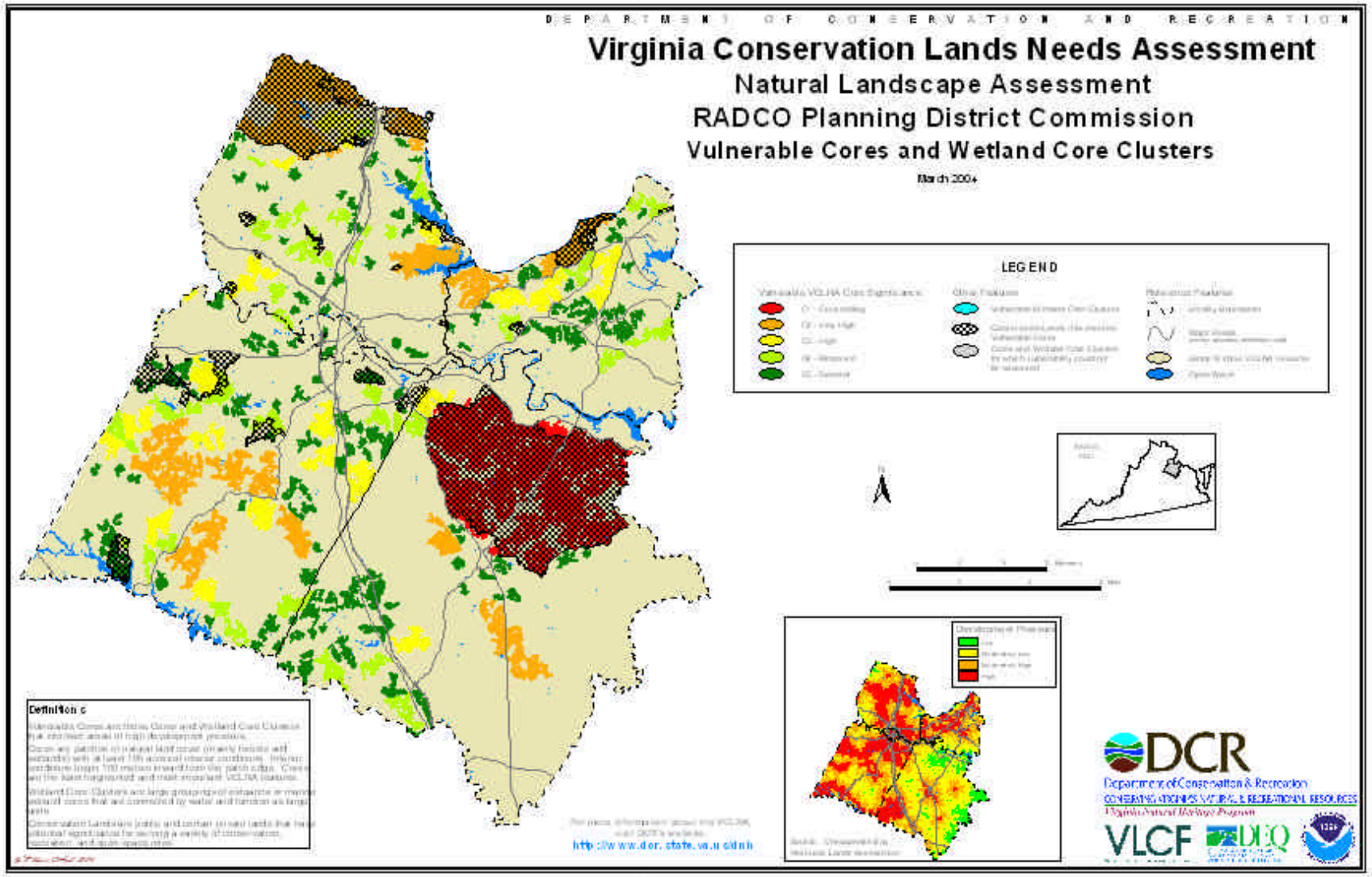


Middle Peninsula PDC

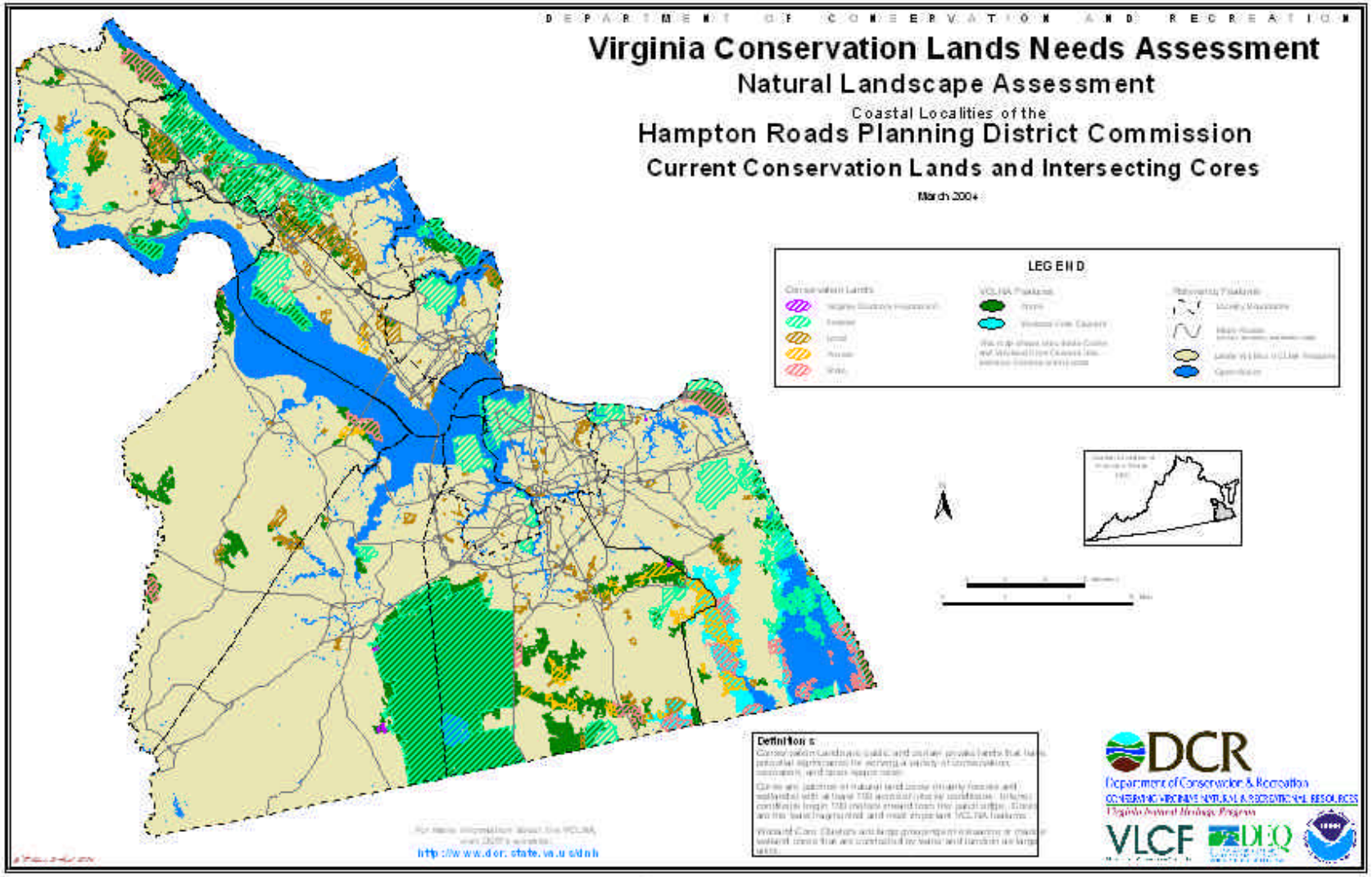
Prioritized Cores and Connecting Corridors

VCLNA – NATURAL LANDSCAPE ASSESSMENT – MARCH 2004

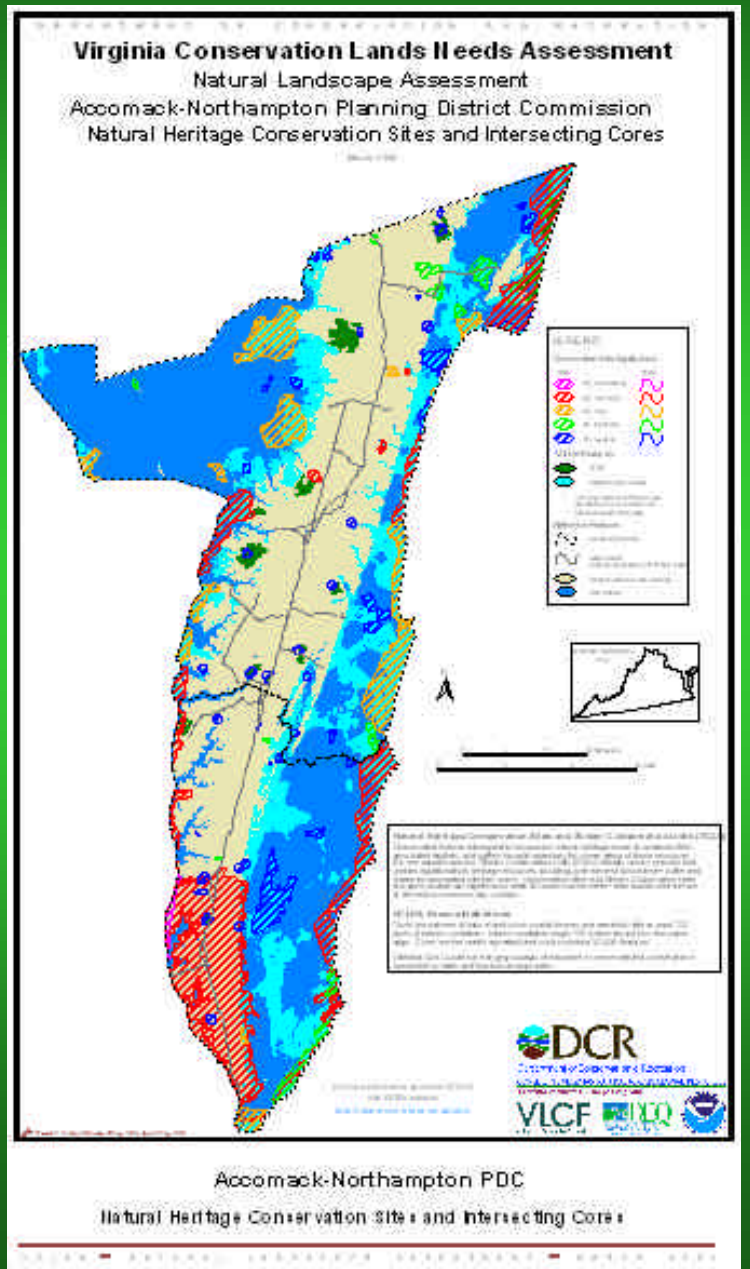
Coastal Zone Atlas Maps



Coastal Zone Atlas Maps



Coastal Zone Atlas Maps



Now underway for the VCLNA

- **Revise the VCLNA Natural Landscape Assessment and extend it to the entire state**

- **Prepare a Green Infrastructure plan for the Virginia Coastal Zone**
  - **Work with Green Infrastructure Advisory Workgroup to identify and develop issue-specific data sets to integrate with the Natural Landscape Assessment, e.g.**

- natural heritage resources

- prime agricultural soils

- cultural and historic resources

- outdoor recreation

- sustainable forestry

- water quality improvement

- drinking water protection

Working with partners to extend utility of VCLNA

- **Assist local and regional partners with implementation:**
  - **focus on conservation lands in specific areas**
    - **counties, watersheds**
  - **incorporate local data, including**
    - **aerial photography**
    - **zoning overlays**
    - **land ownership**
    - **land prices**
  - **re-rank priorities based on local concerns and opportunities**

***e.g.*, Middle Peninsula Green Infrastructure Forum October 19**

Assistance to the Virginia Land Conservation Foundation

Use VCLNA products to assist with:

- **development of the Virginia Land Conservation Foundation Strategic Plan**

- **use of a Decision Support System to identify and prioritize VLCF's conservation targets**

VISTA

- **Decision-support software designed to help planners, conservation groups, and local communities better integrate conservation information into their land-use and conservation planning processes.**
- **A custom desktop GIS application that is an extension of ESRI's ArcMap platform with Spatial Analyst.**
- **VISTA will serve as the decision support system to prepare a Green Infrastructure plan for the Virginia Coastal Zone.**
- **VISTA will work with NatureServe and other partners to facilitate use of VISTA with VCLNA data by localities, local land trusts, and other conservation agents in Virginia.**


The VCLNA will be a key state resource for targeting Virginia lands for conservation.

Questions?

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