Building Consensus for a Regional Green Infrastructure Plan

A Presentation for 2010 Virginia Coastal Partners Workshop

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GWRC

Virginia Coastal Zone MANAGEMENT PROGRAM

GEORGE WASHINGTON REGIONAL COMMISSION

What is Green Infrastructure?

- An interconnected network of natural lands and other open spaces that conserves ecosystem values and functions and provides associated benefits to human populations

Two Guiding Concepts

- Protecting and linking parks and other green spaces for the benefit of people
- Preserving and linking natural areas to benefit bio-diversity and counteract a trend of habitat fragmentation

3 Phases to Plan Development

- **2008-2009: Work with VCLNA data and inform local governments and stakeholder organizations about green infrastructure planning effort and VCLNA data**

- **2009-2010: Develop analytical capacity to measure tree canopy and impervious surface area, assess the value of tree canopy and determine how land cover patterns have changed over time**

- **2010-2011: Create regional "green footprint" development scenario for public consideration & comparison with other regional growth options, Develop draft GI plan, solicit local planning commission feedback & support, present to GWRC for adoption.**

Phase 1: 2008 Program Scope

- Review data gaps of VCLNA and other data sets & select critical VCLNA datasets
- Met with local planning staff, and local GIS staff to assess existing comprehensive plans' use of VCLNA (if any) and other State natural resource data
- Produce an initial draft regional conservation corridor map (eco-cores & corridors)
  - Blue-green infrastructure map for each locality
  - Composite regional map illustrating continuity of identified conservation corridors

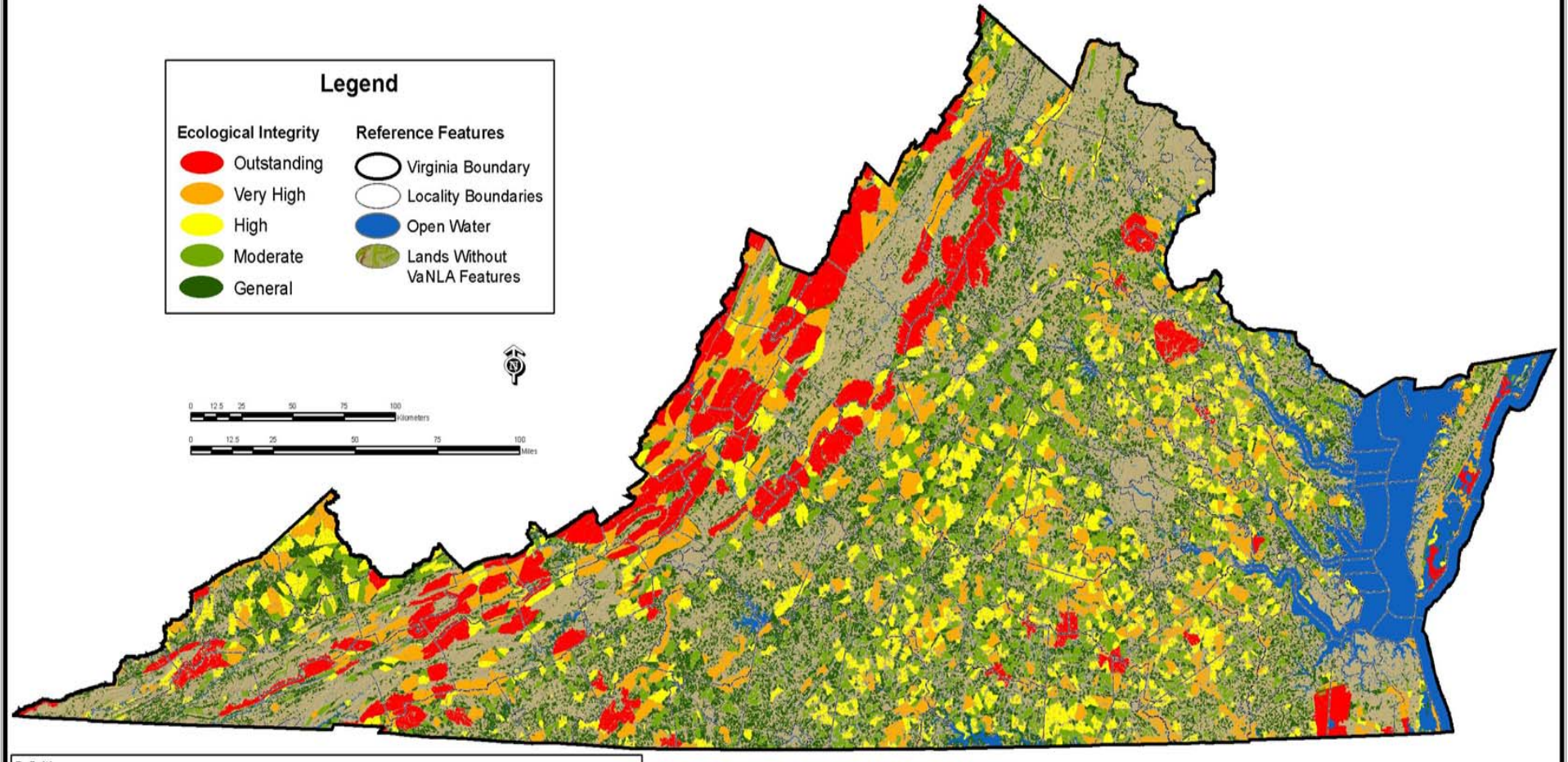
Ecological Model of VCLNA

- **Data includes:**
  - Virginia Natural Landscape Assessment (VaNLA)
  - Products from the Wildlife Action Plan
  - Virginia Biodiversity Assessment
  - Other Natural Heritage data
- **VaNLA is a landscape-scale GIS analysis for identifying, prioritizing, and linking natural habitats in Virginia.**
- **Prioritized Outstanding-General**

DEPARTMENT OF CONSERVATION AND RECREATION

Virginia Conservation Lands Needs Assessment
Virginia Natural Landscape Assessment
Cores and Habitat Fragments Prioritized by Ecological Integrity

June 2007



Definitions

Core: A patch of natural land with at least 100 acres of interior cover. Interior cover begins 100 meters inward from the patch edge.

Habitat Fragment: A patch of natural land with 10 to 99 acres of interior cover. Interior cover begins 100 meters inward from the patch edge.

Ecological Integrity: Maintaining vital natural landscapes is essential for basic ecosystem services such as cleaning our air and filtering our water. Natural lands also harbor thousands of species of animals and plants and contain libraries of genetic information from which we derive new foods, materials, and medicinal compounds. These parts of the landscape also provide us with recreational opportunities and open space resources. But these qualities are represented differently across the cores and habitat fragments that constitute the natural landscape. To assess their unique values, we are assigning each core and habitat fragment an ECOLOGICAL INTEGRITY score that rates the relative contribution of that area to the values above. In general, larger, more biologically diverse areas are given higher scores. Scores are enhanced if the core or habitat fragment is part of a larger complex of natural lands. Areas that may contribute to water quality enhancement score higher, as well, while other factors have yet to be analyzed in this work in progress.

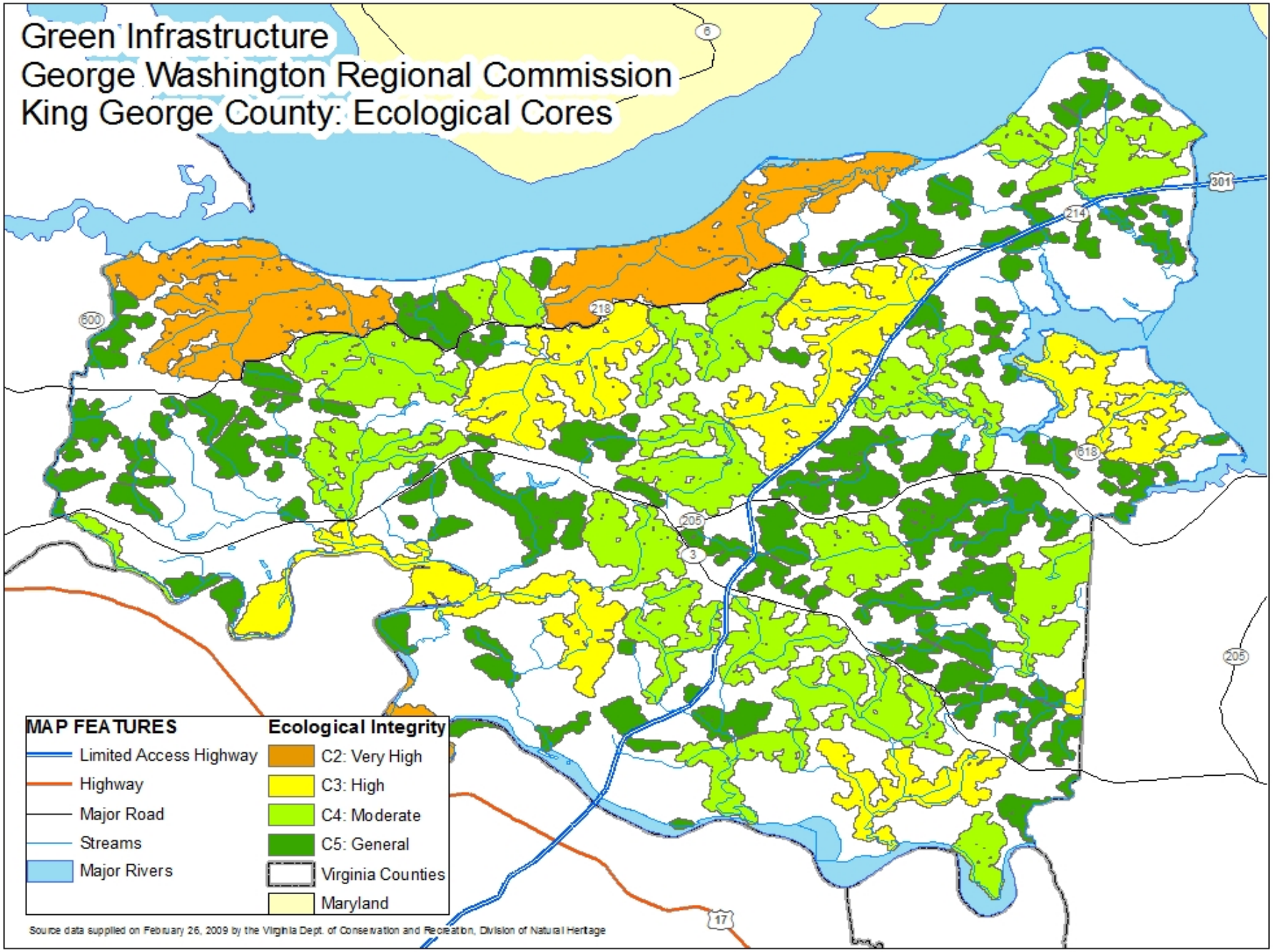
For more information about the VaNLA and other components of the VCLNA, visit DCR's website at http://www.dcr.virginia.gov/.

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

VLCF Virginia Land Conservation Foundation

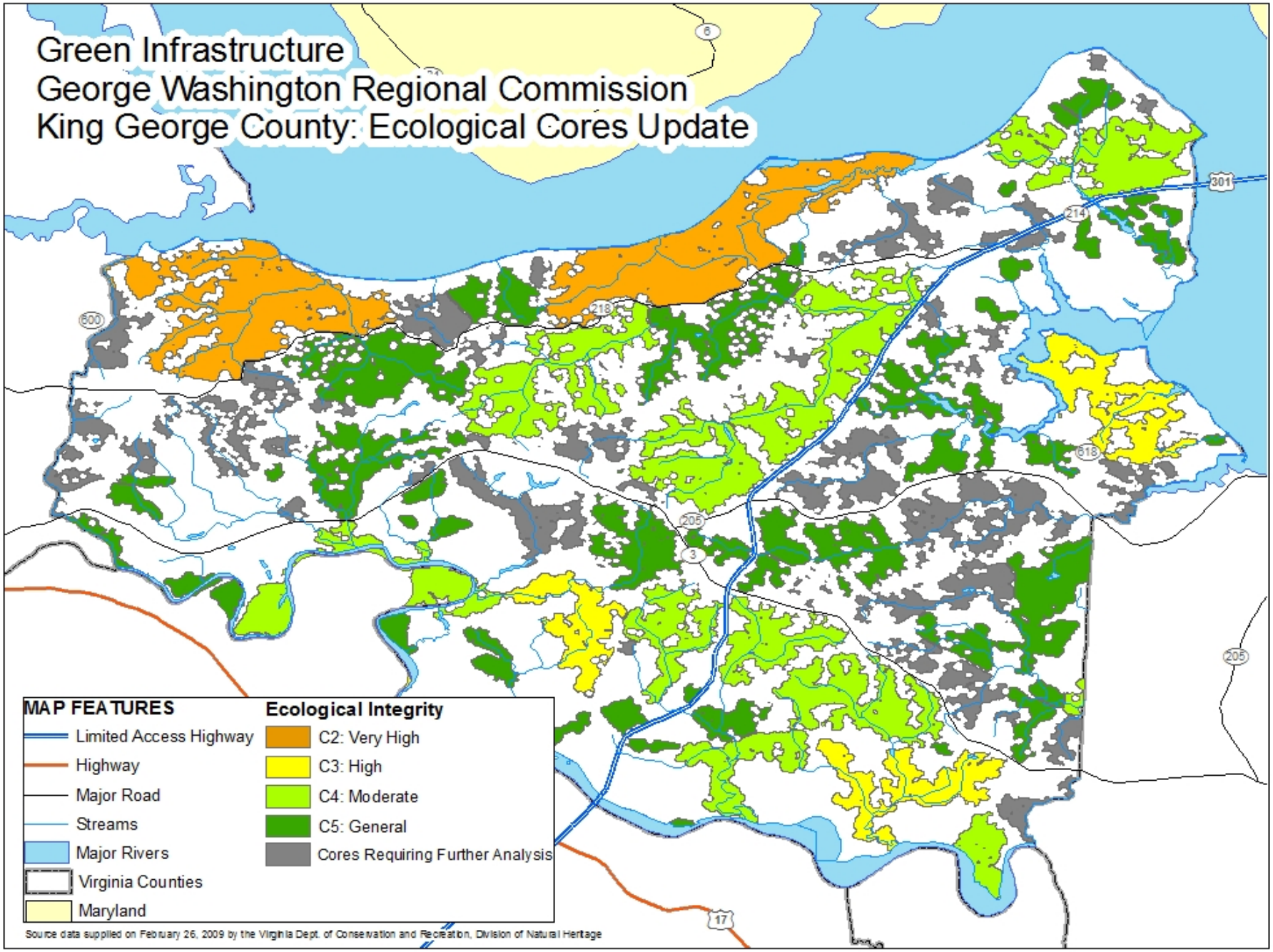
Virginia Coastal Zone MANAGEMENT PROGRAM

Chesapeake Bay Program
A Watershed Partnership


Green Infrastructure
George Washington Regional Commission
King George County: Ecological Cores
MAP FEATURES
Limited Access Highway
Highway
Major Road
Streams
Major Rivers
Ecological Integrity
C2: Very High
C3: High
C4: Moderate
C5: General
Virginia Counties
Maryland
Source data supplied on February 26, 2009 by the Virginia Dept. of Conservation and Recreation, Division of Natural Heritage
6
301
214
218
600
618
205
3
17

Update Process:

- Followed RRPDC model update methodology for continuity across Virginia coastal zone
- Original model used 2000 satellite imagery
- Created 100 meter buffer around existing buildings
- Removed the buffer from ecological cores
- Recalculated core area
- Re-categorized if percent change in area was 20% or greater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King George County: Ecological Cores Update
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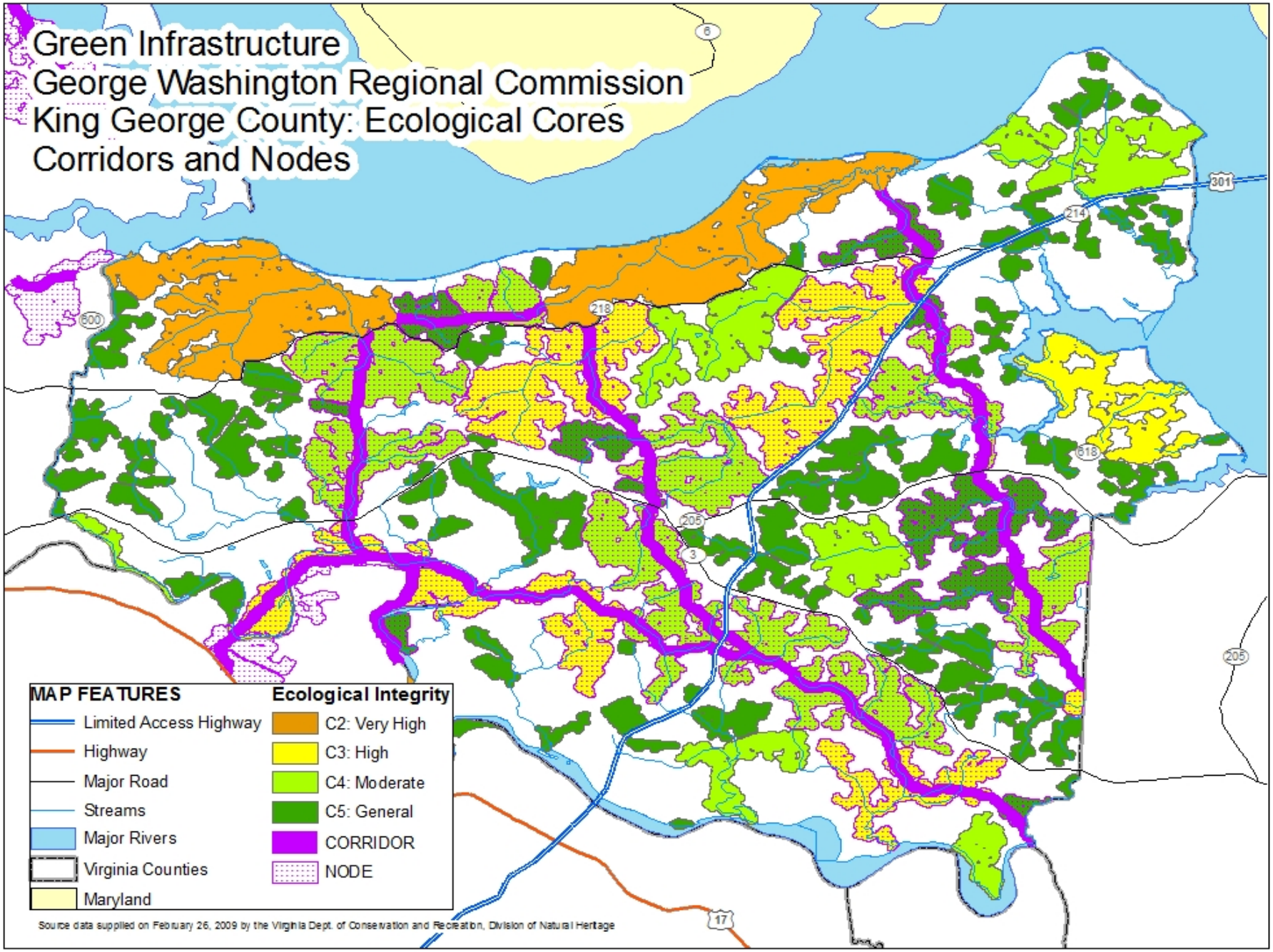
Cores Requiring Further Analysis
Source data supplied on February 26, 2009 by the Virginia Dept. of Conservation and Recreation, Division of Natural Heritage

Nodes and Corridors

- All ecological cores in the 2 highest categories (C1 and C2) were connected by landscape corridors and nodes to create a statewide network of natural lands.
- Corridors maintain 100 meters of interior cover and 100 meters of buffer on each side
- The corridors were guided through lower-ranked ecological cores (C3, C4, and C5) when possible creating a statewide network of natural lands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Phase 2: 2009 Program Scope

1. Conduct "Urban Ecosystem Analysis" study
   - 1996-2001-2006-2009 imagery & use of CITYgreen to analyze imagery:
     - Determine the 13 year trend in tree canopy & impervious surface area land coverage
     - Identify the value of defined eco-cores & corridors, relative to total regional tree canopy
2. Evaluate estimation methods for impervious area to choose best, most practical to get better impervious surface area estimates
3. Provide local training opportunity on the tools to be used to "tell the story"

2009 Program Scope: (continued)

4. Develop regional greenway model to define desireable/feasible trail connectivity for human interaction

5. Integrate green infrastructure data into regional land use scenario planning process to model build-out and development suitability scenarios for all localities & region as a whole

Urban Ecosystem Analysis: Objectives

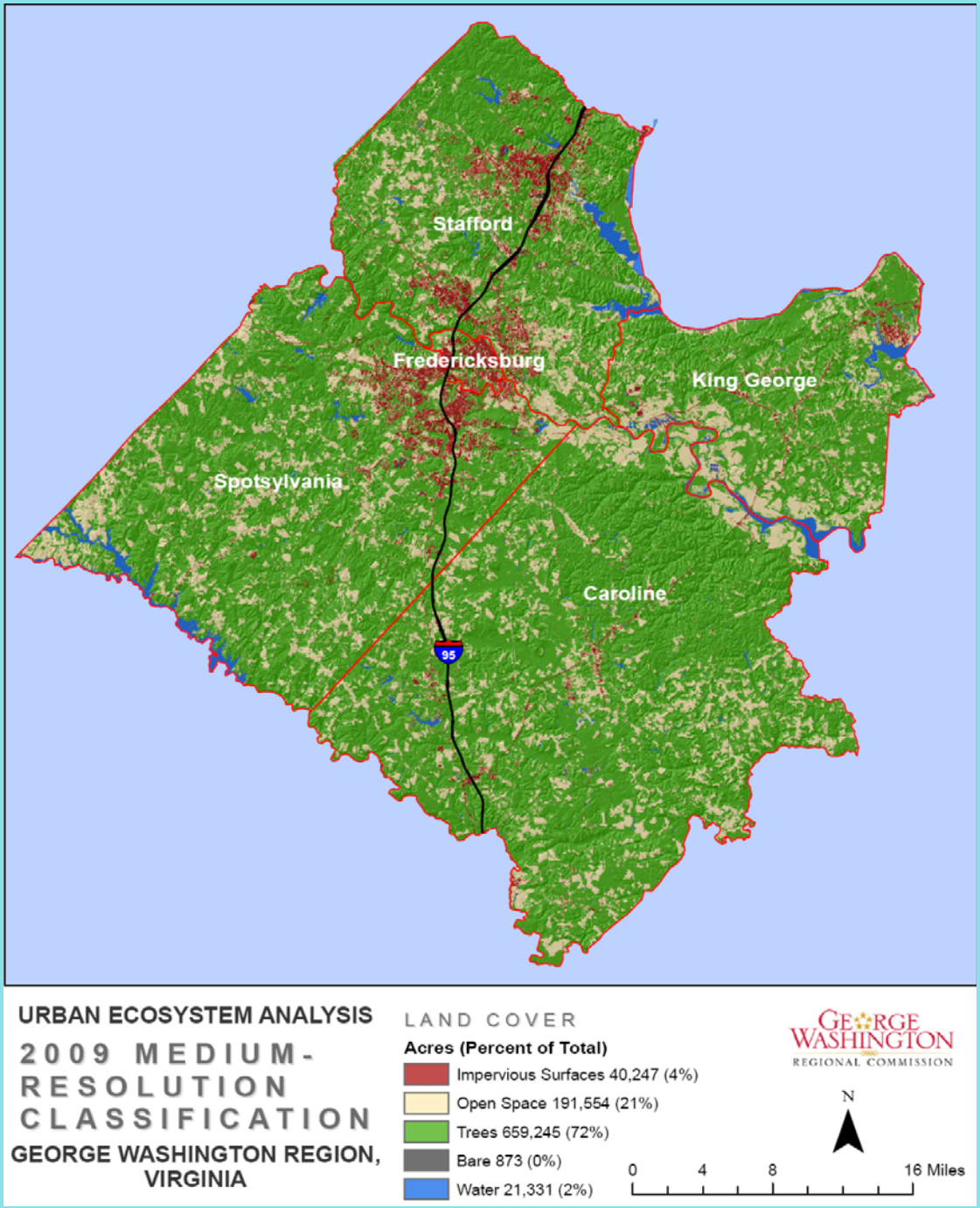
- To define land cover trends and their ecological implications for the region and localities,

- To introduce local govt staff to current data sources and analytical tools that can support better environmental management and policy formulation for:
    1. Preservation of tree canopy,
    2. Target tree planting and reforestation efforts, and
    3. Enhance riparian vegetation corridors

- To provide tools to enable local decision makers to more effectively plan for and manage growth throughout the Region.

Levels of Analysis with CITYgreen:

- Regional Area
- Regional Eco-Cores & Corridors
- 3 sub-regional watersheds
  - Potomac, Rappahannock, and York Rivers
- Five local governments
- 29 local magisterial districts



UEA Report

2009:

- 4% impervious
- 21% open space
- **72% trees**
- 2% water
- <1% bare

1996:

- **76% trees**

Study Findings:

- **Between 1996 and 2009, the GW Region**:
  - **Experienced 48.6% population growth,**
  - **Lost 4.17% of its tree canopy**,
  - **Gained 43.46% of impervious surface area,** 2.80% of urban bare area, and 8.68% of open space.
- **Several other findings related to the value of remaining tree canopy to:**
  - Sequester & store atmospheric carbon
  - Remove air-borne pollutants from atmosphere
  - Retain storm water that would otherwise run-off
  - Absorb water-borne pollutants

Assessment of Eco-Cores & Corridors

- **The Region's ecological core areas and potential conservation corridors that inter-connect these prime natural habitat areas represented 52.82% of the Region's land area.**

- **The identified areas had an estimated 92.60% tree canopy that provided 3.58 billion cubic feet of storm water detention services, valued at $17.00 billion.**

- **This "green infrastructure" system removed 44.99 million lbs. of air pollutants at a value of $120.47 million per year, stored 19.22 million tons of carbon in trees' wood & sequestered 149,645 tons of carbon annually.**

Building Regional Greenway Model

- **Technical assistance grant ($4K) from Million Mile Greenway** to create & provide a regional greenway model (application of ESRI Spatial Analyst)

- Worked with regional committee to select data layers, data features and relative importance for defining greenway corridor alignment

- Upon receipt of model from consultants, follow-up interaction with committee to calibrate the weights of factors in the model to reach “feasible” scenario

- **Outputs supplied to localities and used to inform and support local greenway planning effort (e.g. Spotsylvania Co.)**

Training Local Staff on Modeling Tools

- **American Forests' CITYgreen training for regional and local govt. planning staff**
- **NOAA's Remote Sensing for Spatial Analysts (1-day), focusing on land cover change analysis techniques.**

Estimating Impervious Areas

- UEA study, based on 30-meter resolution imagery, detected 43.5% increase in impervious area over 13 years (1996 – 2009)
- Chesapeake Bay land use change model based on 30-meter imagery
- NOAA's Impervious Surface Analysis Tool (ISAT) applied to analysis of C-CAP satellite imagery for 1996 – 2006.
- 30-meter and 1-meter 2009 imagery compared for the Fredericksburg to assess estimation error with 30-meter imagery.

Comparative Summary of Results:

City of Fredericksburg Case Study Area	2009 CITYgreen Estimate				2006 ISAT Estimate		
	30-meter C-CAP Imagery	1-meter NAIP Imagery	Difference	Percent Difference	Low -Intensity Coefficient	Medium-Intensity Coefficient	High-Intensity Coefficient
Total City Area (acres)	6,727.90	6,727.90	0	0%			
Total Impervious Area	3,203.70	**2,112.40**	-1,091.30	-34.1%	991.78	1,462.54	**1,930.96**
Pct Impervious	47.62%	31.40%	-16.22		14.69%	21.67%	28.61%
Total Tree Canopy	2,113.60	2,960.70	847.10	40.1%	Not applicable		
Pct Tree Canopy	31.42%	44.01%	12.59		Not applicable		

- **30-meter imagery over-estimates impervious area by 34% compared to 1-meter**
- **30 meter imagery under-estimates tree canopy by 40% compared to 1-meter**
- **For Fredericksburg, high-intensity coefficients in NOAA's ISAT best approximated the more-accurate 1-meter estimate of impervious area (allowing for differences between 2006 & 2009)**

Integrating Eco-Cores/Corridors with Regional Scenario Planning

- **Regional GIS parcel-level database combined with assorted environmental layers to assess development suitability for regional/local build-out analysis:**
  - **Eco-cores & corridors**
  - **Chesapeake Bay resource protection areas & 100 yr flood plain**
  - **Regional soils and slope data**
  - **National historic parks and historic sites**
  - **Military installations**

Phase 3: 2010 Program Scope

- Develop "green footprint" scenario for regional build-out analysis
- Develop regional green infrastructure plan, working through GWRC Green Government Commission & Green Earth sub-committee
- Take the draft Plan to local Planning Commissions, Soil & Water Conservation Districts and environmental stakeholder organizations
- Present the GI Plan to GWRC Board for adoption consideration

Green Conservation Scenario

- Using Community Viz model
- Allocate future growth to areas based on:
  - Existing comp plans & existing zoning
  - Planned urban water & sewer service area
  - Defined urban development areas
  - Defined eco-cores & corridors
  - Identified historic landmark properties
- Compare results with results of 3 other scenarios:
  - #1: “business as usual”…managed sprawl
  - #2: Scenario #1 + local Urban Development Areas
  - #3: Balanced Employment + Housing Scenario

Benefits of Green Infrastructure:

- Protects and enhances critical water resources
- Provides recreation, health, and educational benefits
- Enhances community appearance and provides a connection to nature
- Increases property value, provides positive fiscal impact and provides free/low cost natural services
- Valuable tool in local Chesapeake Bay TMDL WIP response

Next Steps:

- Monthly meetings with project committee
- Defining Plan's Goals, Objectives
- Local govt. policy review for support in Comp Plans
- Incorporate findings of "green footprint" scenario
- Define planning tools and mechanisms to support voluntary implementation