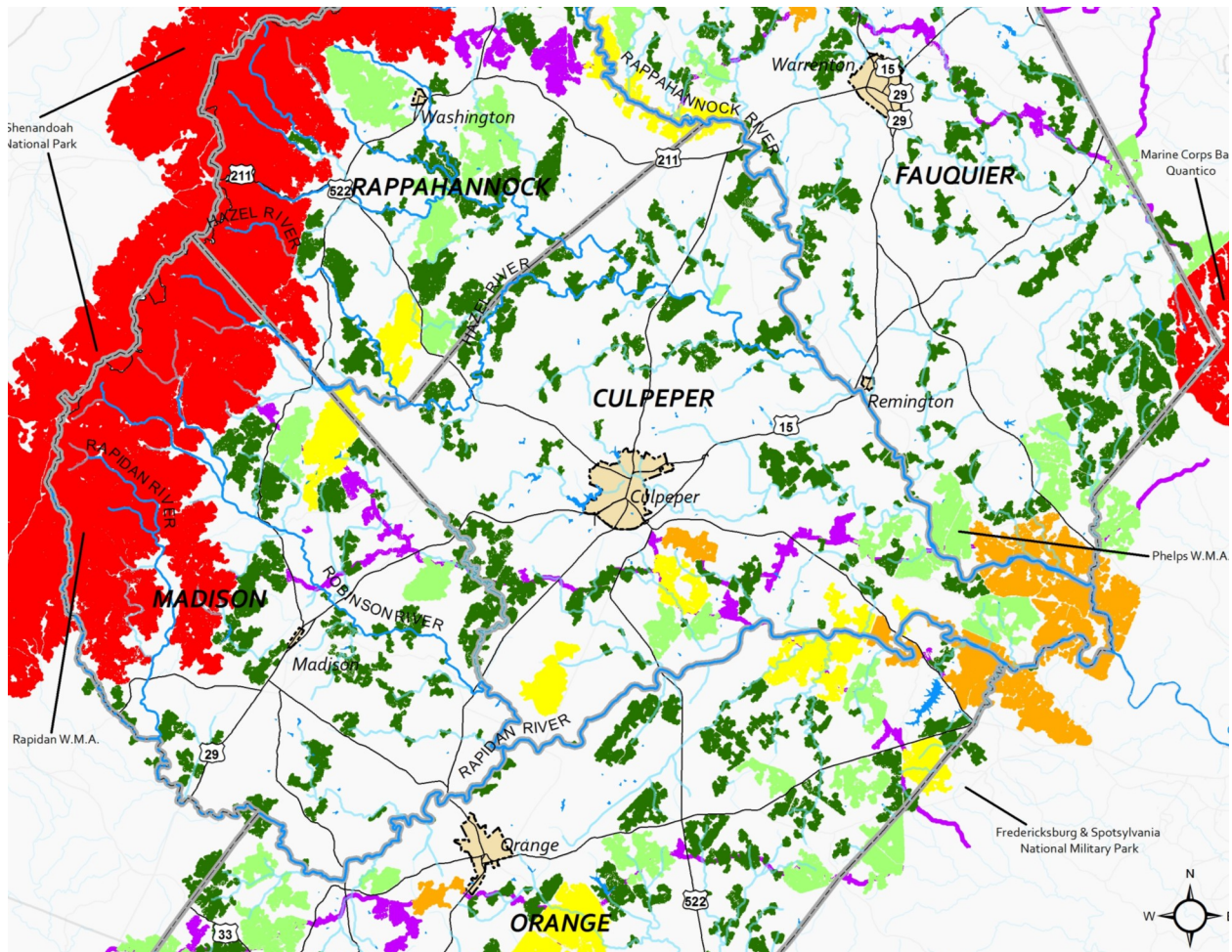
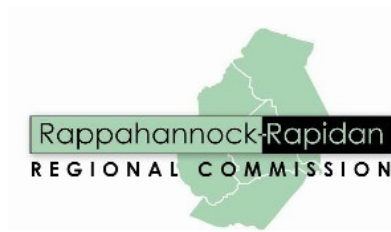


Green Infrastructure: A Guide to Asset Mapping in the Rappahannock-Rapidan Region

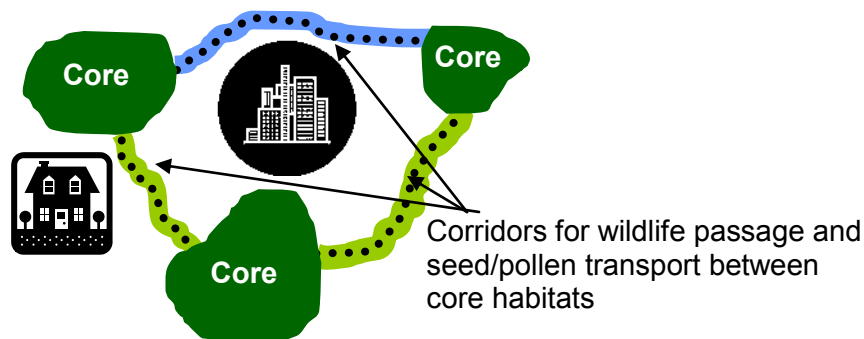
Rappahannock-Rapidan Regional Commission
December 2015



What Is Green Infrastructure?

Green infrastructure is an interconnected network of land and water that sustains air and water resources, maintains natural ecological processes, supports native species, and contributes to the health and quality of life of the people in our communities. Traditionally, the development process has focused primarily on the construction of gray infrastructure, such as roads and utilities. By identifying the existing green infrastructure, communities can assist decision-makers in making more informed land-use and development decisions.

The Virginia Department of Conservation and Recreation (DCR) released the Virginia Conservation Lands Needs Assessment (VCLNA) in 2007 to assist with green infrastructure planning. This GIS tool allows the manipulation of issue-specific data sets that can be weighted and overlaid with local land use and zoning data to assist with local planning and land conservation efforts. Development was guided by an advisory group of technical experts from federal, state, local, private and academic sectors. While DCR has begun updating the VCLNA suite of green infrastructure models, currently only the Agricultural Model has been completed. Updates to the other models are anticipated in the coming years as funding allows.



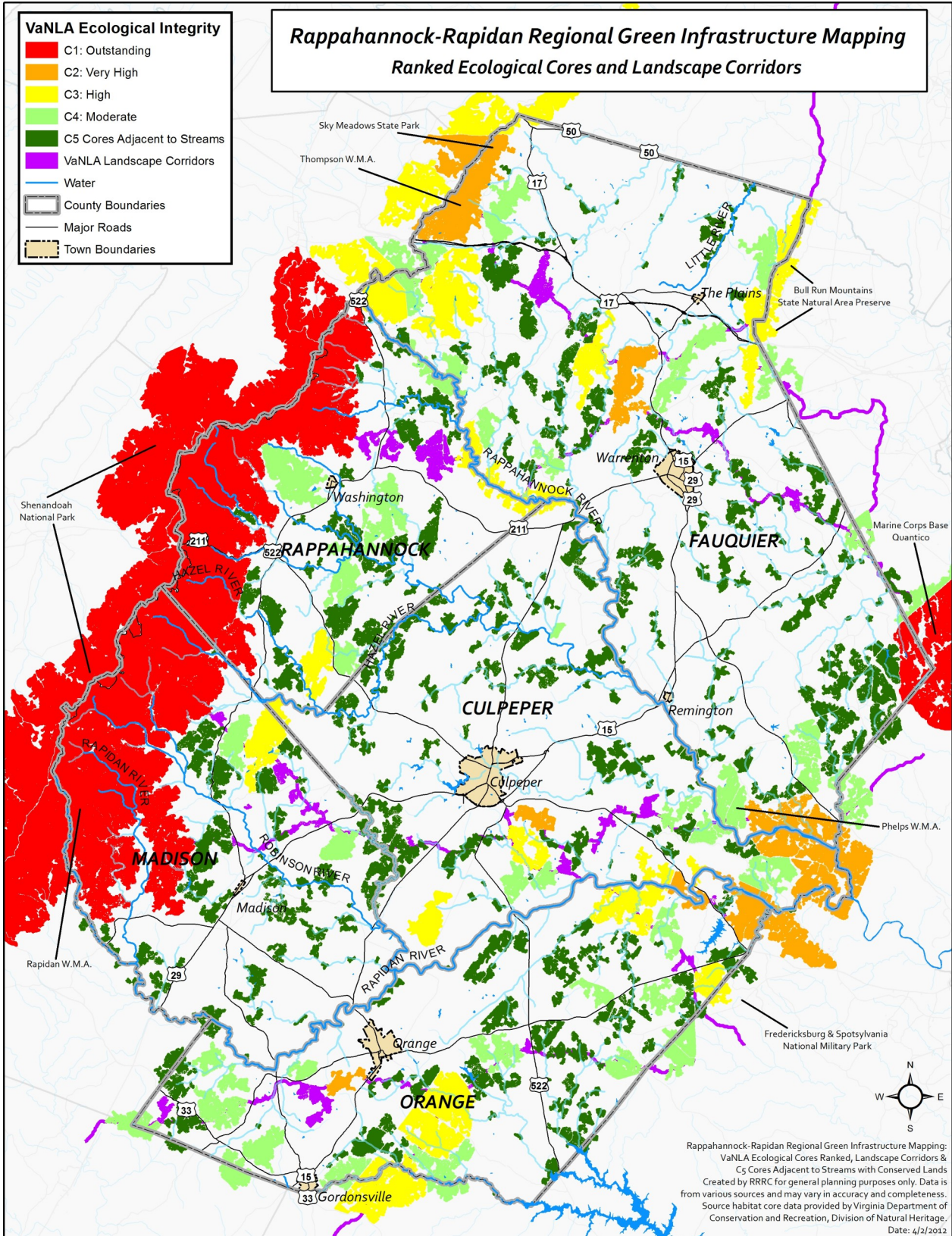
Ecological Base Model

The Virginia Natural Landscape Assessment (VaNLA) is one component of the more comprehensive VCLNA and is the basis for the regional Ecological Base Model. The VaNLA is a landscape-scale GIS analysis for identifying, prioritizing and linking natural habitats in Virginia to reduce habitat fragmentation, while complementing other conservation interests and needs.

For the regional Ecological Base Model, the Commission updated the ecological cores in the VaNLA with current local development data based on E911 points. Ecological cores with outstanding, very high, high or moderate ecological integrity scores, as well as ecological cores with a general score that were adjacent to streams and water bodies in the region were then selected. The resulting data sets, along with the VaNLA Landscape Corridors, make up the Regional Commission's base green infrastructure layer.

The Region's Ecological Base Model incorporates the following components:

- Local development data (E911 points)
- Rare, threatened and endangered species
- Essential wildlife habitats
- Core characteristics (e.g. depth of interior, area, isolation)
- Streams in interior forests
- Wetland area and diversity
- Topographic Relief Index



Protected Lands Model

The Rappahannock-Rapidan Region of Virginia is known for its scenic beauty, agricultural and cultural resources, and recreational opportunities. Tourism and agricultural products are key components of the region's economy. To preserve these resources for local citizens and tourists alike, valuable and/or vulnerable parcels have been protected via conservation easements or designated as parks. Land under conservation easement does not necessarily sit inactive, but in many cases may be used for agricultural, forestry or recreational purposes.

In 1999, DCR was designated as the lead agency in developing the Commonwealth's state-wide Conservation Lands Database. The database has since grown to include state, federal, private, and locally managed lands and conservation easements.

To develop the Regional Protected Lands Layer, the Commission reviewed easement and conserved lands data obtained from DCR. These data sets were then compared with local jurisdiction data, including parcel database, land use and zoning data, as available. Overall, there were minor changes to the existing protected lands layers, primarily consisting of publicly-owned lands identified as recreational or other open space land use being incorporated into the layer for Regional Commission use with this and other planning projects.

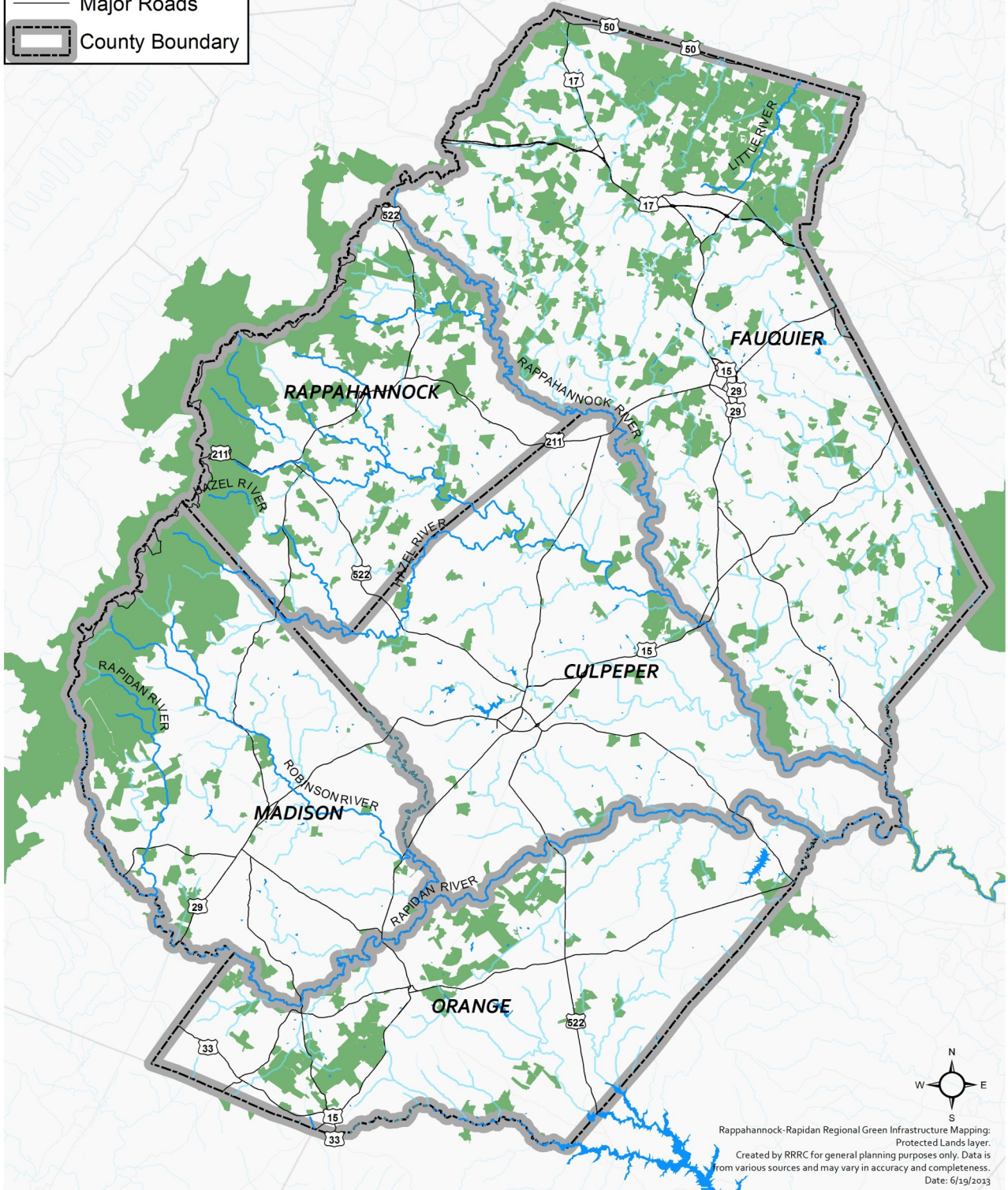
The Region's Protected Lands Layer incorporates the following components:

- National Park holdings
- State Parks
- Local Parks
- National and State Forest lands
- State Wildlife Management Areas
- Publicly and Privately-held Conservation Easements
- Virginia Outdoors Foundation holdings
- The Nature Conservancy Preserved lands



- Protected Lands
- Water
- Major Roads
- County Boundary

Rappahannock-Rapidan Regional Green Infrastructure Mapping
Protected Lands layer



Rappahannock-Rapidan Regional Green Infrastructure Mapping:
Protected Lands layer.
Created by RRRC for general planning purposes only. Data is
from various sources and may vary in accuracy and completeness.
Date: 6/19/2013

Forest Economics Model

Forest products contribute 144,000 jobs and \$27.5 billion to Virginia's economy. However, 82% of Virginia's forests are privately owned, and approximately 16,000 acres are lost annually. (VDOF 2012 State of the Forest P00129, December 2012) Within the Rappahannock-Rapidan Region, 55% of the land cover is forested, and forest products are a key component of the region's economy. Forest lands also provide benefits to the community by providing water and air quality protection, climate moderation, wildlife and plant habitat, recreational opportunities, and aesthetic value.

The objective of the Forest Economic Model is to identify the region's forested lands with the highest economic value. DCR developed the original model in 2007, working with the Virginia Department of Forestry to analyze biophysical parameters, management constraints and socioeconomic influences. The Regional Commission then updated the state model using DOF land cover data and local development data to reflect changes in land cover.

The Region's Forest Economics Model incorporates the following components:

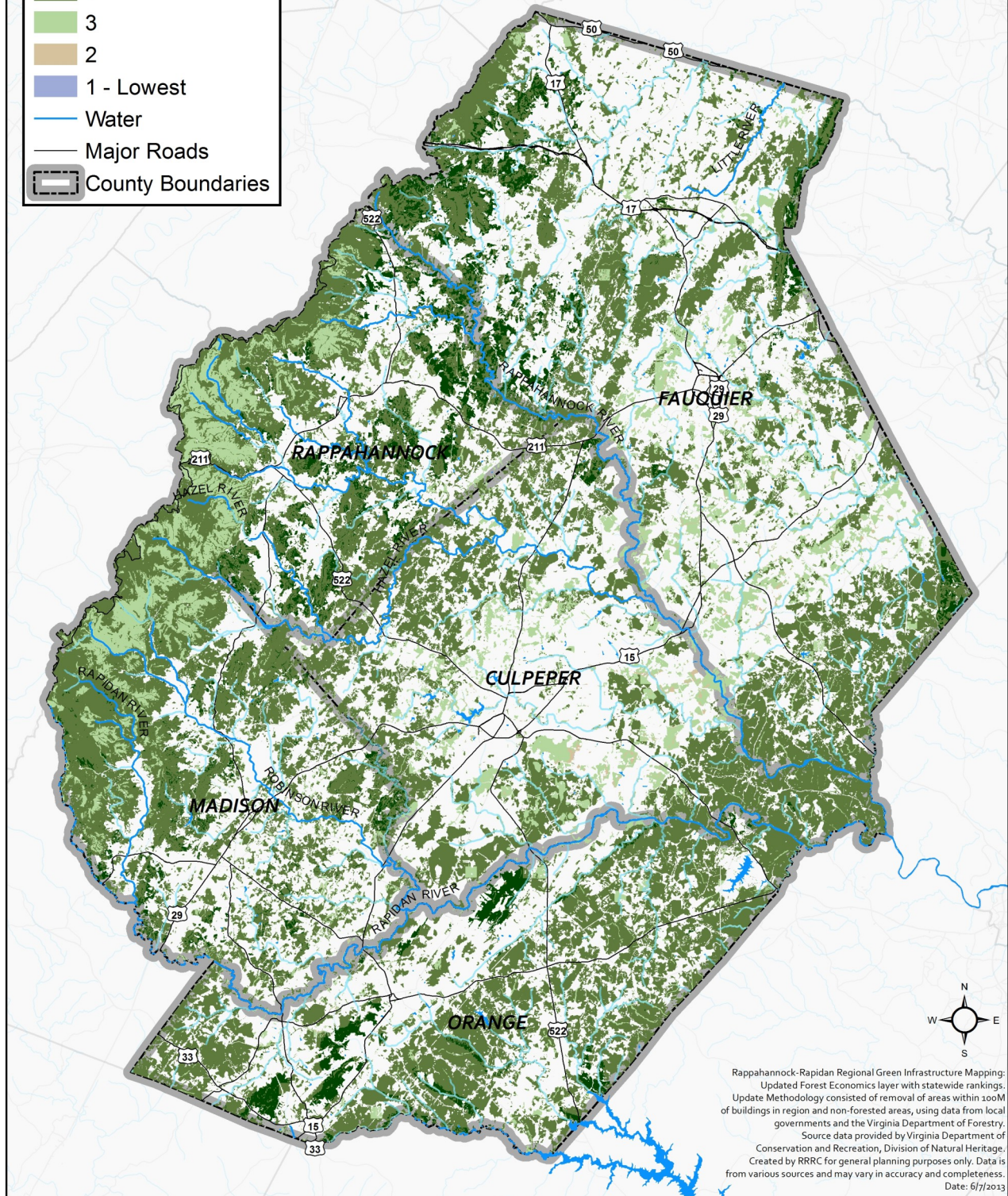
- Soil productivity
- Forest land fragmentation
- Riparian and wetland features
- Steep slopes
- Rare, threatened and endangered species
- US census data
- Forest land use taxation values, including stumpage value and forest productivity values
- Local development data



Forest Economics

- 5 - Highest
- 4
- 3
- 2
- 1 - Lowest
- Water
- Major Roads
- County Boundaries

Rappahannock-Rapidan Regional Green Infrastructure Mapping Updated Forest Economics layer with Statewide Ranking





Prime Agriculture Model

Agriculture contributes 311,000 jobs and \$52 billion annually to Virginia's economy; however, over five million acres of farmland were lost in the state between 1960 and 2012 (VAgriculture Facts and Figures, VDACS, 2015). Within the Rappahannock-Rapidan Region, 37% of the land cover is farmland, and the sale of agricultural products is a key component of the region's economy with \$225 million of crops and livestock sold in 2012 (Census of Agriculture, USDA, 2012). Farmland also provides benefits to the community such as agri-tourism, wildlife habitat, recreational opportunities, and aesthetic value. While Purchase of Development Rights and other easement programs have protected 14.84% of the region's Prime Farmland, the remainder is vulnerable to development pressure as a result of high land prices and an aging population of farm operators.

The objective of the Prime Agriculture Lands Model is to quantify the relative suitability of lands for agricultural activity within the region and identify those likely to be most productive. In partnership with the Virginia Department of Agriculture and Consumer Services, the Natural Resources Conservation Service (NRCS) and Virginia Tech, DCR developed the original statewide model in 2007 and an updated version in 2015. The Regional Commission's Agriculture Working Group determined the 2007 methodology better met regional needs. Therefore, the Commission updated the 2007 state model using local development data and the most recent soils and land cover data.

The Region's Agriculture Lands Model incorporates the following components:

- Farmland Classification/ Soil productivity (NRCS SSURGO Data)
- 2011 National Land Cover Database (NLCD)
- Steep Slopes (USGS Digital Elevation Model)
- 2010 US census data
- Local development data (E911 points)

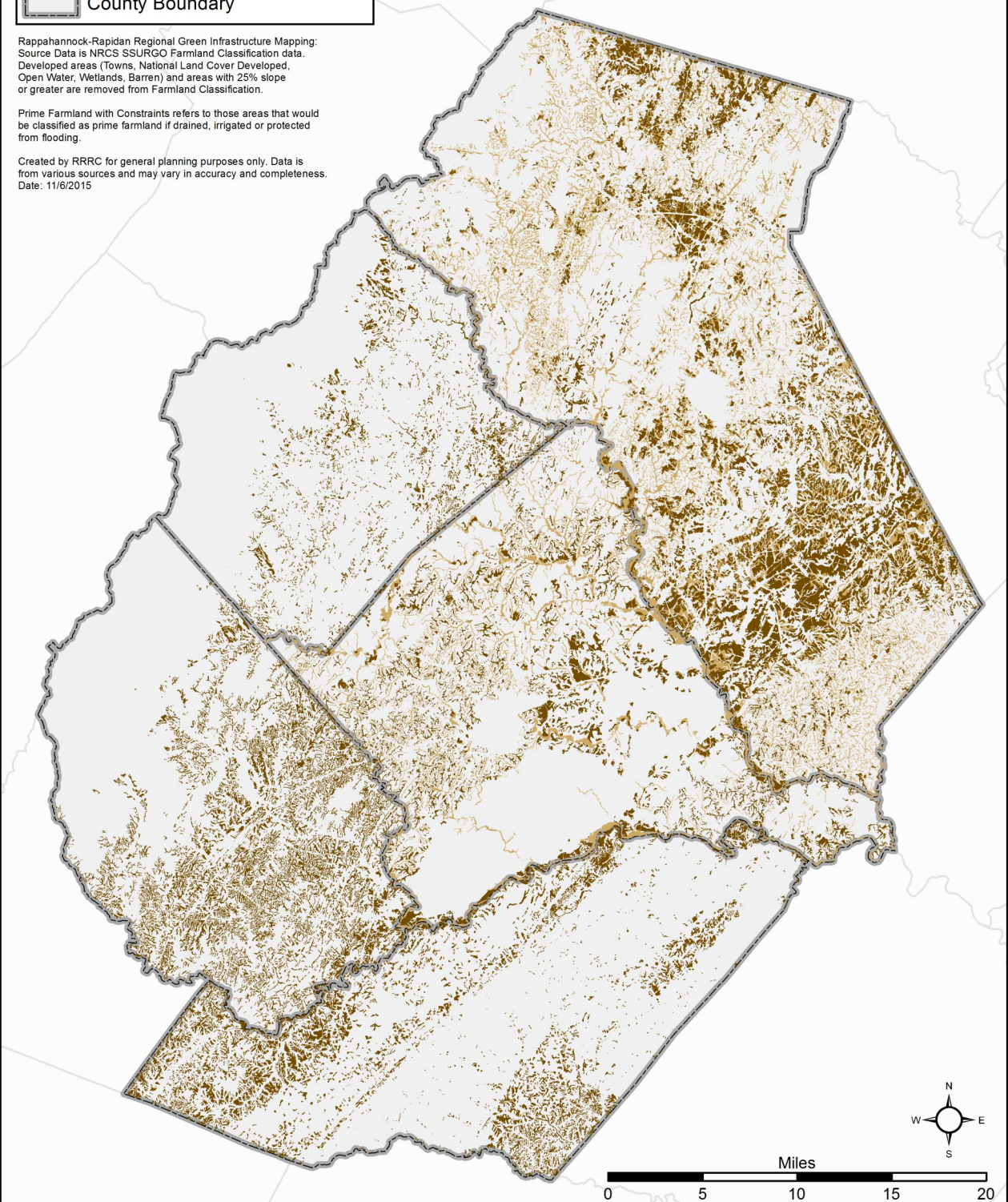
-  Prime Farmland
-  Prime Farmland with Constraints
-  County Boundary

Rappahannock-Rapidan Regional Green Infrastructure Mapping
Regional Prime Agricultural Lands

Rappahannock-Rapidan Regional Green Infrastructure Mapping:
 Source Data is NRCS SSURGO Farmland Classification data.
 Developed areas (Towns, National Land Cover Developed,
 Open Water, Wetlands, Barren) and areas with 25% slope
 or greater are removed from Farmland Classification.

Prime Farmland with Constraints refers to those areas that would
 be classified as prime farmland if drained, irrigated or protected
 from flooding.

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 Date: 11/6/2015



Cultural Assets Model

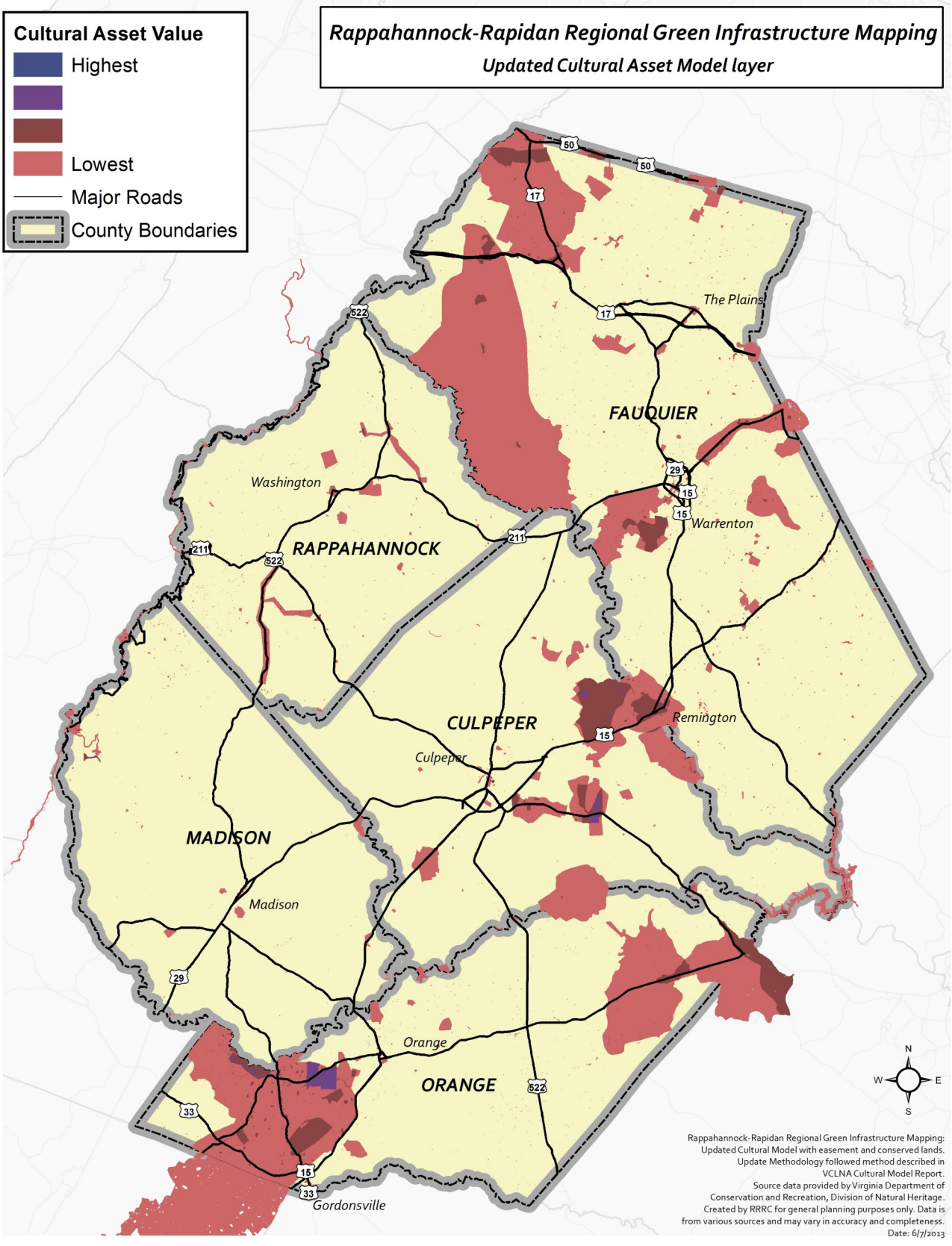
From James Madison's Montpelier, to Civil War battlefields and trails, the Rappahannock-Rapidan Region has a wealth of cultural and historic assets. Tourism is an important source of economic development for counties and towns across the region, attracting increasing numbers of visitors to the area each year.

The objective of the Regional Cultural Assets Model is to identify the Rappahannock-Rapidan region's lands with the highest relative historic and cultural value. The Virginia Department of Conservation and Recreation partnered with the Virginia Department of Historic Resources to develop the state-wide Cultural Asset Model in 2006. The Commission then updated the state model by incorporating new easement data, local parks data and updated listings from the National Register of Historic Places. Parcels in the region that are owned under easement by historic preservation groups such as the Virginia Department of Historic Resources and Civil War Trust were included in this update and assigned cultural values based on the methodology set forth in the VCLNA Cultural Assets Model Report.

The Region's Cultural Assets Model incorporates the following components:

- Archaeological Sites & Architectural Sites
 - National Historic Districts
 - National Historic Landmarks
 - National Historic Register Sites
 - State Inventoried Sites (Eligible for possible National Register and Easements)
- American Indian Areas





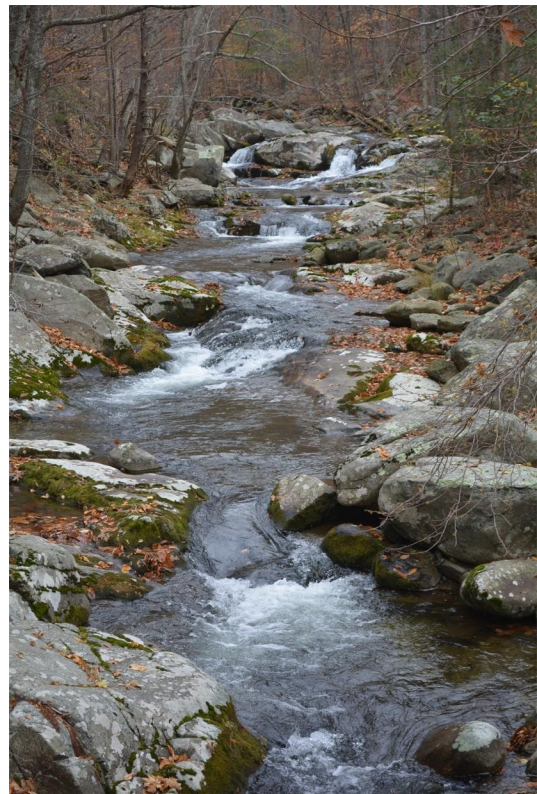
Watershed Model

Clean water is a necessity for life and an asset to our communities, providing recreation, wildlife habitat and aesthetic value. However, activities on land draining to our local water bodies can impact their health as well as communities' enjoyment of this valuable resource. Construction, agriculture and sewage treatment plants have caused oxygen depleting algal blooms from the Rappahannock-River to the Chesapeake Bay. Within the Rappahannock-Rapidan Region, 141 stream segments covering approximately 500 miles are impaired due to *e. coli* bacteria, meaning the pollutant load is above the allowable levels for fishing and swimming (2012 Impaired Rivers GIS, VDEQ).

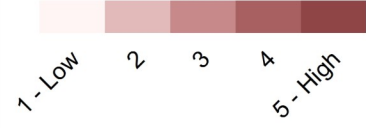
The objective of the Watershed Model is to show the relative value of land as it contributes to the health of the watershed or water quality. The Virginia Department of Conservation and Recreation developed the original model in 2007. The Regional Commission determined that updating this model would be problematic and not produce significant improvements, so instead chose to develop a set of overlays to enhance the usefulness of this model. RRRC obtained updated Source Water Protection zones and wellhead point GIS data from the Virginia Department of Health, Nonpoint Source Assessment Rankings from the Virginia Department of Environmental Quality, and Easement and Conserved Land data from the Virginia Department of Conservation and Recreation.

The Region's Watershed Model incorporates the following components:

- Proximity to Water Bodies and Wetlands
- Slope
- Stream Habitat (VCU Modified Index of Biotic Integrity)
- Rare, threatened and endangered species (VCLNA Ecological Cores)
- Forest Fragmentation and Impervious Surfaces (DOF Terrestrial Integrity data)
- Municipal Water Supplies (VDH Source Water Protection Zones)
- Local development data (E911 points)



Watershed Integrity Score (DCR)



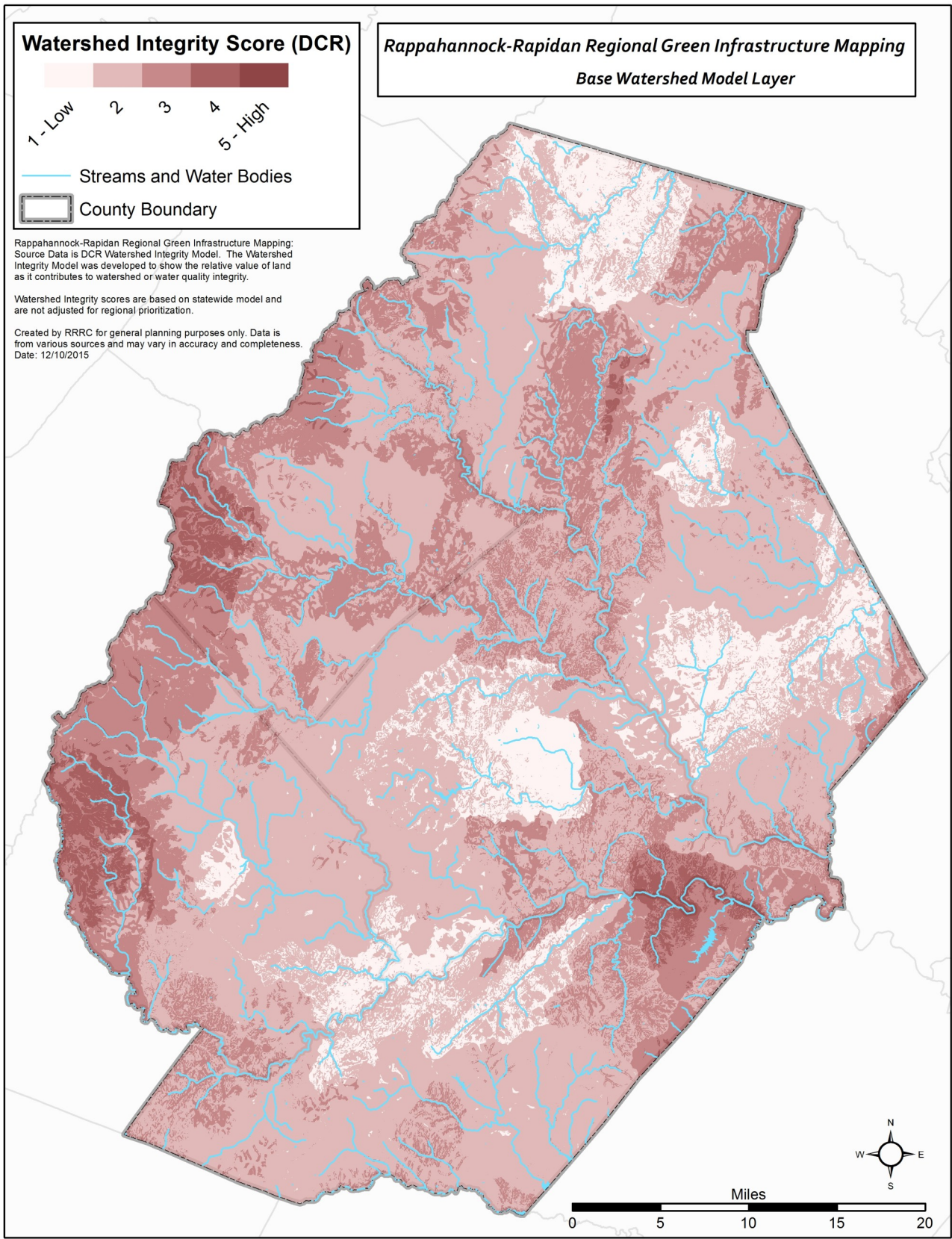
- Streams and Water Bodies
- County Boundary

Rappahannock-Rapidan Regional Green Infrastructure Mapping
Base Watershed Model Layer

Rappahannock-Rapidan Regional Green Infrastructure Mapping: Source Data is DCR Watershed Integrity Model. The Watershed Integrity Model was developed to show the relative value of land as it contributes to watershed or water quality integrity.

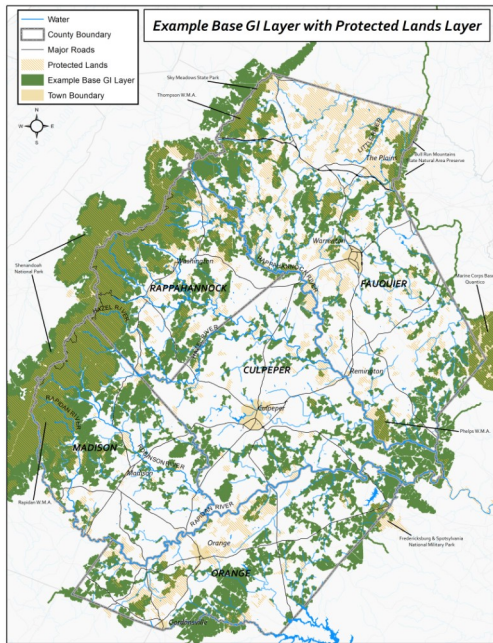
Watershed Integrity scores are based on statewide model and are not adjusted for regional prioritization.

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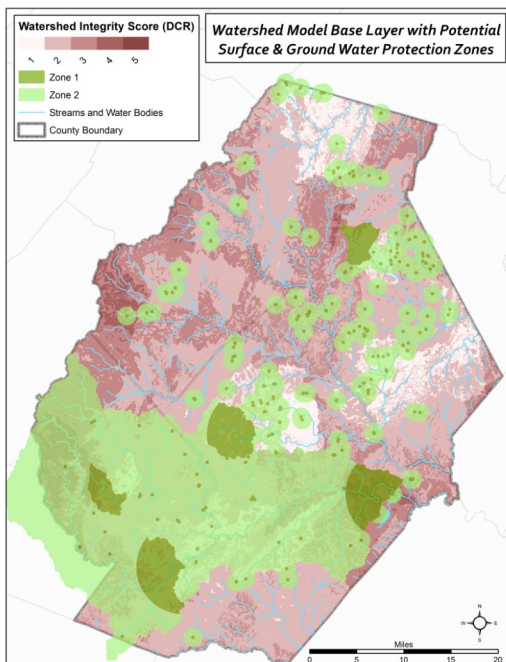
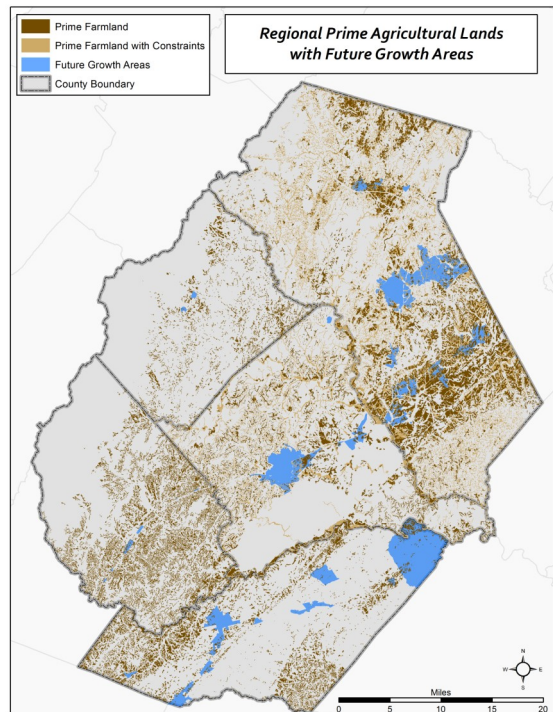
Using the Models

The regional green infrastructure models have many applications for local governments, land trusts, regional and community organizations, and state partners. The data can be used in land-use planning, reviewing development projects, prioritizing land for conservation, targeting land for habitat restoration, making land management decisions, and public education.



For example, by overlaying the Protected Lands Model layer and/or local zoning data with one of the other model layers, users can identify local assets with a high vulnerability. The ecological base layer can also be overlaid with other regional green infrastructure data layers such as the Forest Economics or Watershed Models in developing local, regional or organizational priorities. The Regional Cultural Assets Model can be used together with the other regional green infrastructure GIS layers and/or local and regional data to further inform historic preservation efforts with spatial information about cultural lands. Additionally, by overlaying the Source Water Protection and wellhead point layer with the Watershed Model layer users can get a fuller picture of the region's sensitive watershed assets.

The region's rich forest, agricultural, ecological, cultural and water resources are assets to the community. The regional green infrastructure models provide decision makers and land owners with a tool to continue to best utilize these valuable resources.





Further Information

For additional information concerning the Rappahannock-Rapidan Region Green Infrastructure Mapping, please visit RRRC's website at www.rrregion.org/greeninfrastructure.html, or contact Michelle Edwards at medwards@rrregion.org or 540-829-7450.

To request the GIS versions of the regional maps contained within this document and additional overlays created for this project, please contact Patrick Mauney at plmauney@rrregion.org or 540-829-7450.

For information on the state suite of green infrastructure models, ConservationVision, please visit DCR's website at www.dcr.virginia.gov/natural-heritage/vaconvisgrn.

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