

RRRC Land Use & Environment Committee

Green Infrastructure Mapping Update

January 29, 2016



Green Infrastructure Mapping Background

- Baseline data: Virginia Conservation Lands Needs Assessment (VCLNA) developed by Department of Conservation & Recreation – Natural Heritage Division
- RRRC completed updates to VCLNA models in three phases over several years
- Purpose: Account for development between initial model release, incorporate new data where applicable and possible

Phase I & II Updates

- Phase I: VCLNA Ecological Integrity model
 - Removed areas based on buffer of locality building structures layers
 - Prioritized high-priority statewide cores and other ecological cores adjacent to streams
- Phase II: VCLNA Forest Economics model, VCLNA Cultural Assets model, Protected Lands layer
 - Removed areas based on buffer of locality building structures layers
 - Forest Economics model: Utilized Department of Forestry Land Cover data to remove non-forested areas from model
 - Cultural Assets model: Incorporated updated easement data, National Register of Historic Places data, local parks; Compiled viewshed analyses for NRHP and selected locations

Phase III Overview

- Phase III was funded as part of the Agriculture and Forestry Industries Development planning grant received by RRRC
 - Also included 'Tween Rivers Trail website and marketing development
 - Green Infrastructure fact sheets and Brochure
- Focused on two additional VCLNA models: Agricultural model and Watershed Integrity model
- The ultimate objective of the Green Infrastructure project is to provide local governments and non-profit organizations with maps and spatial data representing critical natural and cultural assets within the region to be used as a tool in planning, zoning and land conservation.

Phase III: Agricultural model

- VCLNA Agricultural Model Report (2007):

The Virginia Agricultural Model was developed in an effort to map important agricultural areas in Virginia based on suitable lands, prime farmland soils and historic farm resources ... Agricultural resources contribute to the economy and to a sustainable way of life ... The potential loss of agriculture to the economy may not be immediately recognizable as prime farmland is considered a merit good. The loss of agricultural land translates into the loss of these future benefits (i.e. air quality, scenery, open space, agricultural product exports).

Phase III: Agricultural model

- DCR-DNH also revised the Agricultural model significantly in late 2015
- Differences in methodologies
- RRRC reviewed both and created initial base maps based on the 2007 and 2015 statewide models (with some changes)
 - Agriculture Working Group reviewed these base layers in December and provided feedback
- Preference was for layer using 2007 methodology

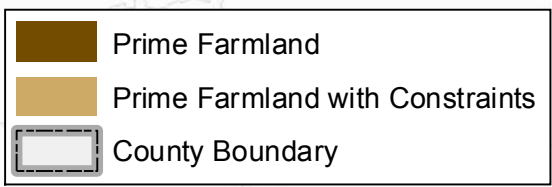
Phase III: Agricultural model

- Prime Agriculture base layer
 - USDA NRCS SSURGO Soils data
 - Prime Farmland
 - Prime Farmland with Constraints (if irrigated; if drained; if protected from flooding, etc.)
 - Did not utilize Farmland of Statewide Importance: Clear issues when comparing across county boundaries.

Phase III: Agricultural model

- Prime Agriculture base layer
 - 2011 National Land Cover Data
 - Removed areas classified as Developed, Barren Land, Woody & Emergent Herbaceous Wetlands, Open Water
 - Regional Slope data
 - Removed areas with >25% slope
 - Developed areas
 - Town boundaries removed

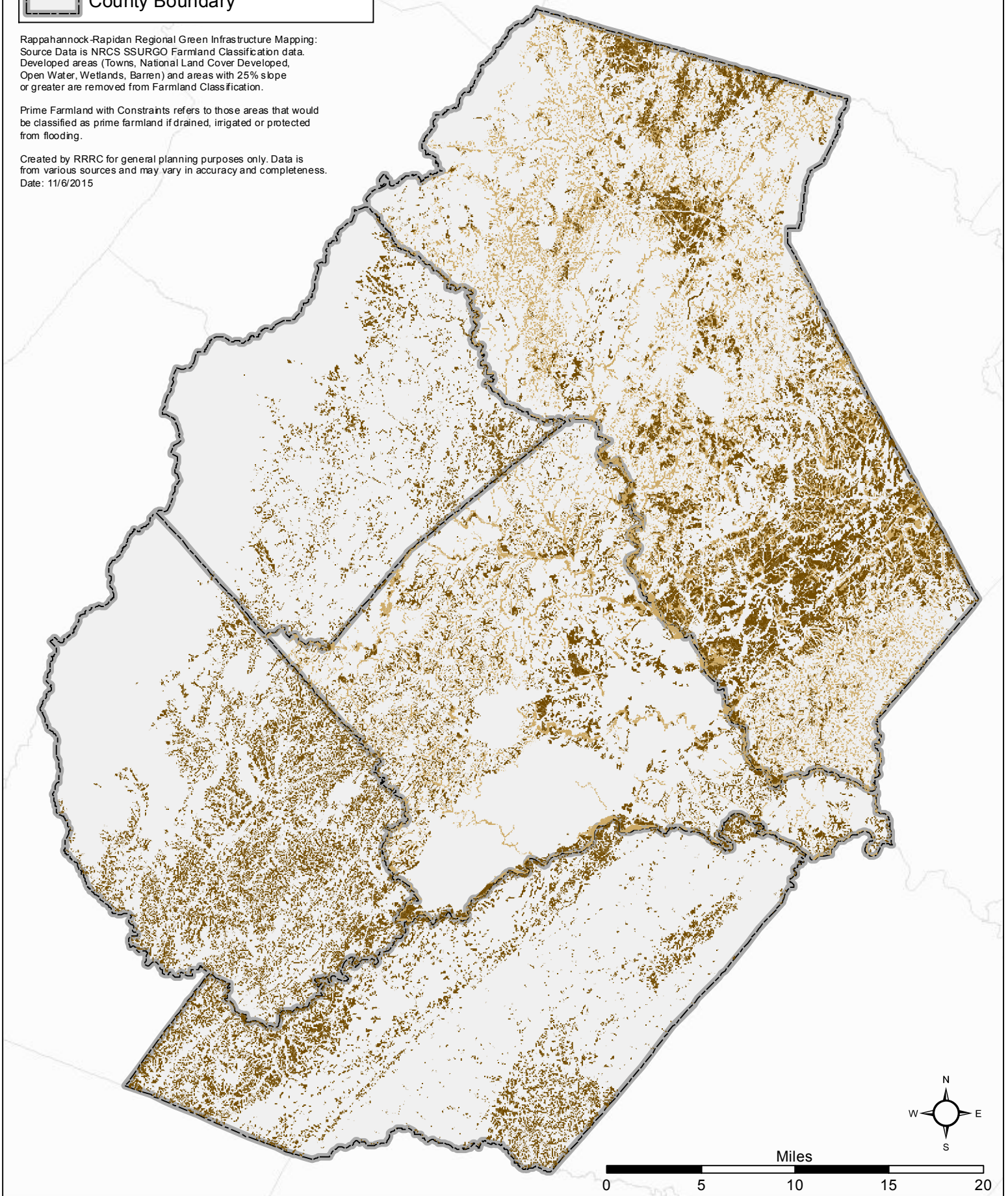
Rappahannock-Rapidan Regional Green Infrastructure Mapping
Regional Prime Agricultural Lands



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.

Created by RRRC for general planning purposes only. Data is
from various sources and may vary in accuracy and completeness.
Date: 11/6/2015



Phase III: Agricultural model

- Layer can be used on its own, but has value as an overlay with other regional data sets
 - Easements & Conserved Lands
 - Future Growth Areas
 - Developed by RRRC based on Future Land Use maps, Comprehensive Plans, etc.
 - DCR Agricultural Land Units:
 - Statewide Possible Agriculture land polygon layer developed using automated feature extraction tools and VBMP aerial photography. Data is not ground truthed and represents potential agricultural land units
 - Generalized County Land Use designations
- Constraints
 - Local data variance
 - Prime Farmland designations

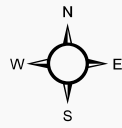
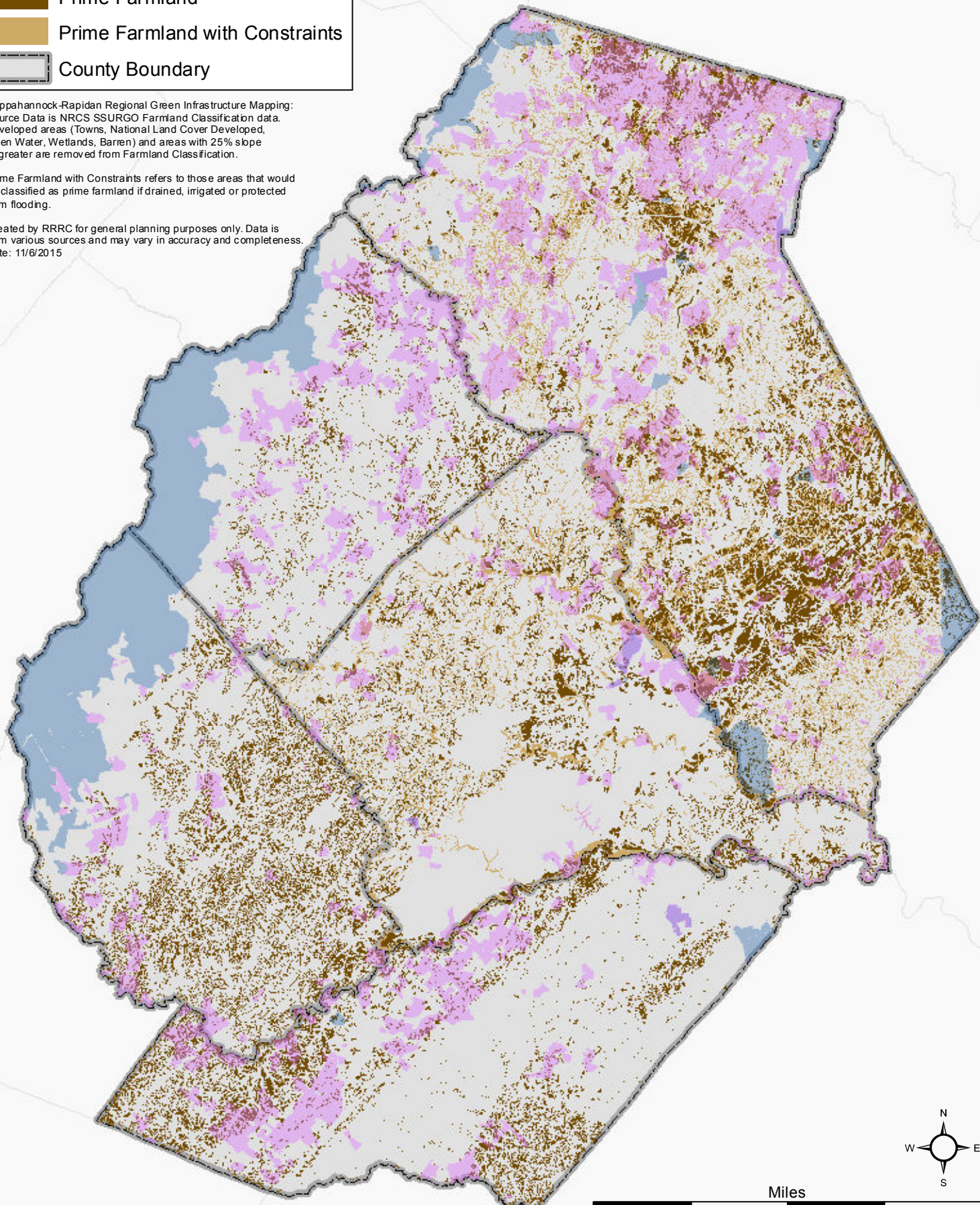
Rappahannock-Rapidan Regional Green Infrastructure Mapping
Regional Prime Agricultural Lands with Easements and Conserved Lands

- Conservation Easements
- Conservation Lands (DCR)
- Prime Farmland
- Prime Farmland with Constraints
- County Boundary

Rappahannock-Rapidan Regional Green Infrastructure Mapping:
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Rappahannock-Rapidan Regional Green Infrastructure Mapping

Regional Prime Agricultural Lands with Future Growth Areas

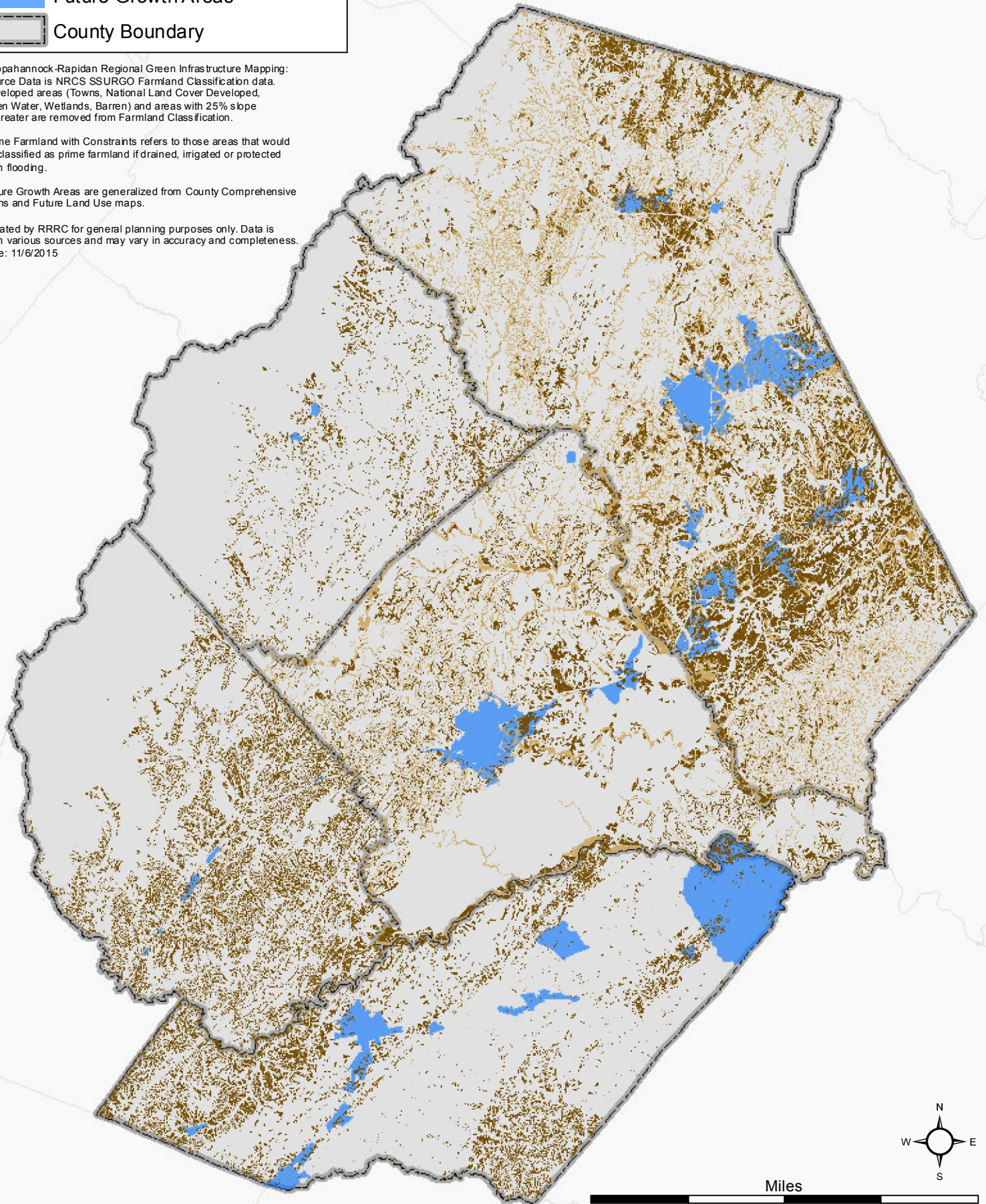


Rappahannock-Rapidan Regional Green Infrastructure Mapping:
Source Data is NRCS SSURGO Farmland Classification data.
Developed areas (Towns, National Land Cover Developed,
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or greater are removed from Farmland Classification.

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

Future Growth Areas are generalized from County Comprehensive
Plans and Future Land Use maps.

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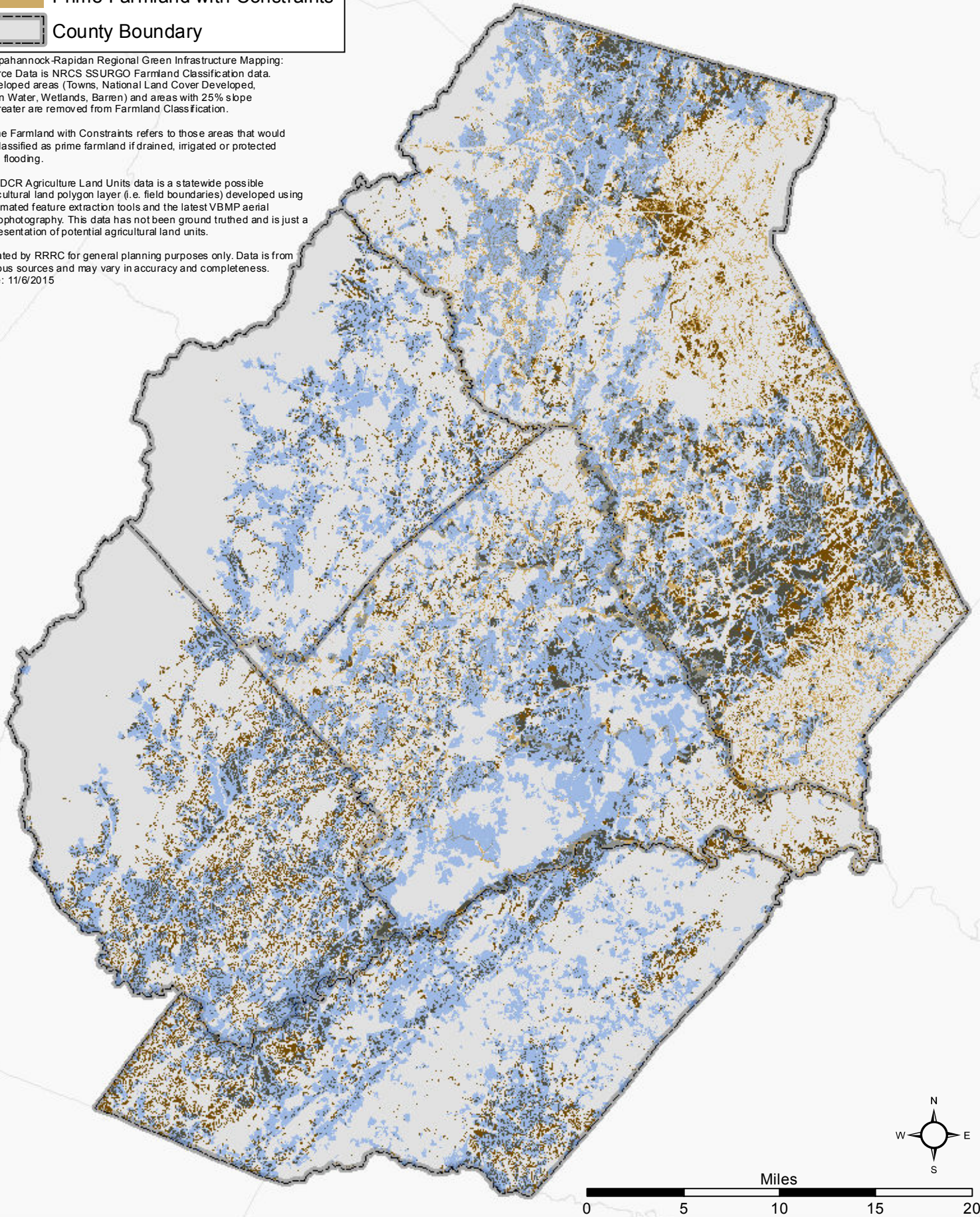
Rappahannock-Rapidan Regional Green Infrastructure Mapping
Regional Prime Agricultural Lands with DCR Agricultural Land Units

Rappahannock-Rapidan Regional Green Infrastructure Mapping:
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Open Water, Wetlands, Barren) and areas with 25% slope
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be classified as prime farmland if drained, irrigated or protected
from flooding.

The DCR Agriculture Land Units data is a statewide possible
agricultural land polygon layer (i.e. field boundaries) developed using
automated feature extraction tools and the latest VBMP aerial
orthophotography. This data has not been ground truthed and is just a
representation of potential agricultural land units.

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- Prime Farmland
- Prime Farmland with Constraints

Land Use (Generalized)

- Agriculture or Undeveloped > 99 acres
- Agriculture or Undeveloped < 99 acres
- Residential, Commercial, Other

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.

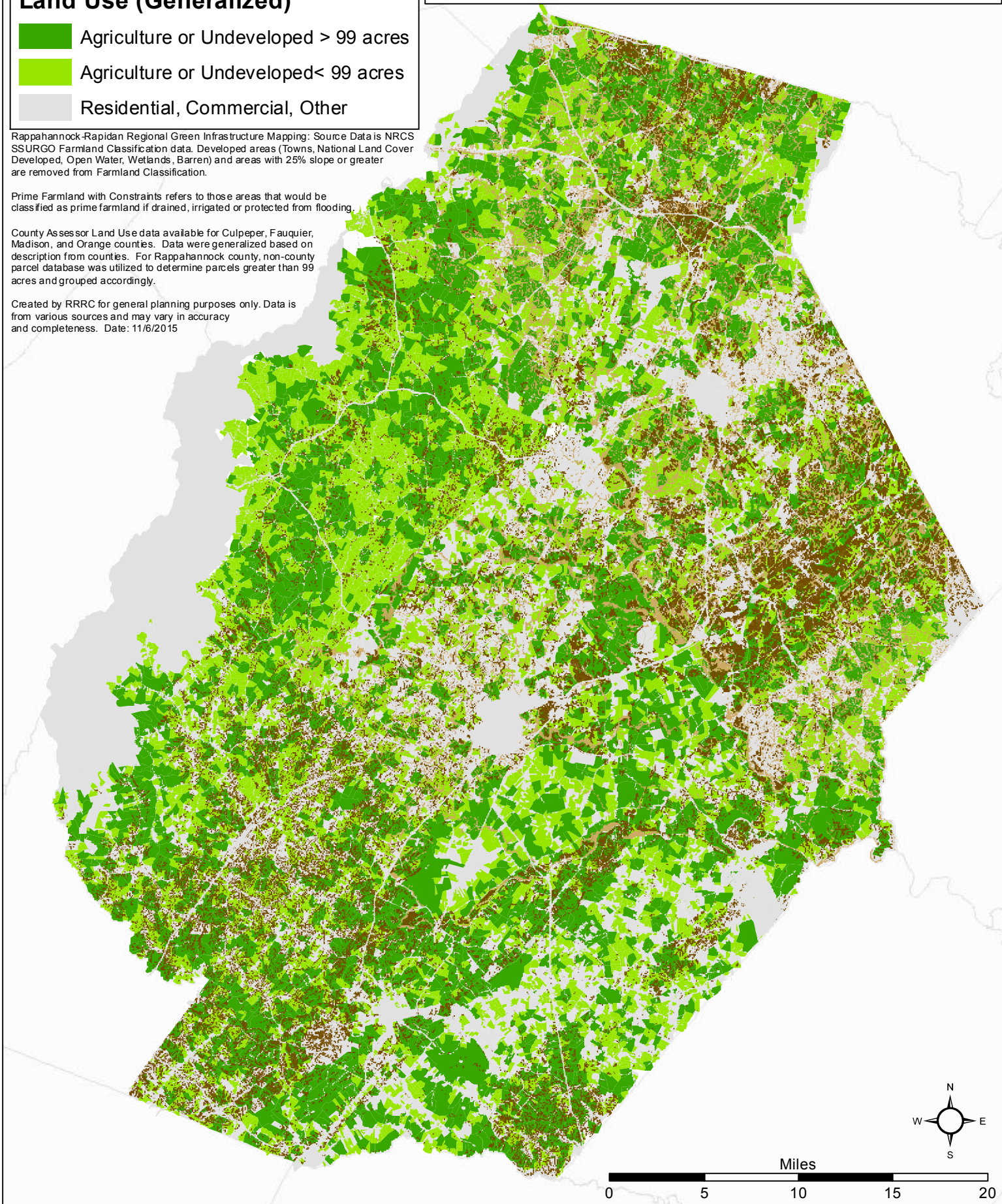
Prime Farmland with Constraints refers to those areas that would be classified as prime farmland if drained, irrigated or protected from flooding.

County Assessor Land Use data available for Culpeper, Fauquier, Madison, and Orange counties. Data were generalized based on description from counties. For Rappahannock county, non-county parcel database was utilized to determine parcels greater than 99 acres and grouped accordingly.

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Rappahannock-Rapidan Regional Green Infrastructure Mapping

Regional Prime Agricultural Lands with County Assessor Land Use Designation



Phase III: Watershed model

- VCLNA Watershed Integrity Model Report (2007):

The Virginia Watershed Integrity Model was developed to show the relative value of land as it contributes to watershed or water quality integrity ... For the Watershed Integrity model, the input parameters focused on identifying important terrestrial features that contribute to water resources, and therefore watershed integrity.

Phase III: Watershed model

- Input data sets for the VCLNA Watershed Integrity model include:
 - Slope data: Greater than average slope (Watershed level)
 - Source Water Protection Zones
 - VCLNA Ecological Cores data
 - Streams, Shorelines, Floodplains
 - DOF Index of Terrestrial Integrity: Natural Cover, River-Stream Corridor Integrity, Habitat Fragmentation, Imperviousness
 - Modified Index of Biotic Integrity: Intolerant species, species richness, non-indigenous species, Critical/Significant species, tolerant species

Phase III: Watershed model

- Based on review of the initial model and input data sets, RRRC staff identified limited opportunities for adjusting the base model scores
 - Wellhead GIS data from Virginia Department of Health (low weighting in model reduces significant change)
 - Fragmentation and imperviousness built into larger Terrestrial Integrity Index (potential for double counting)
- Focus on overlay mapping
 - Consistent with application discussion in initial model report

Watershed Integrity Score (DCR)



Streams and Water Bodies

County Boundary

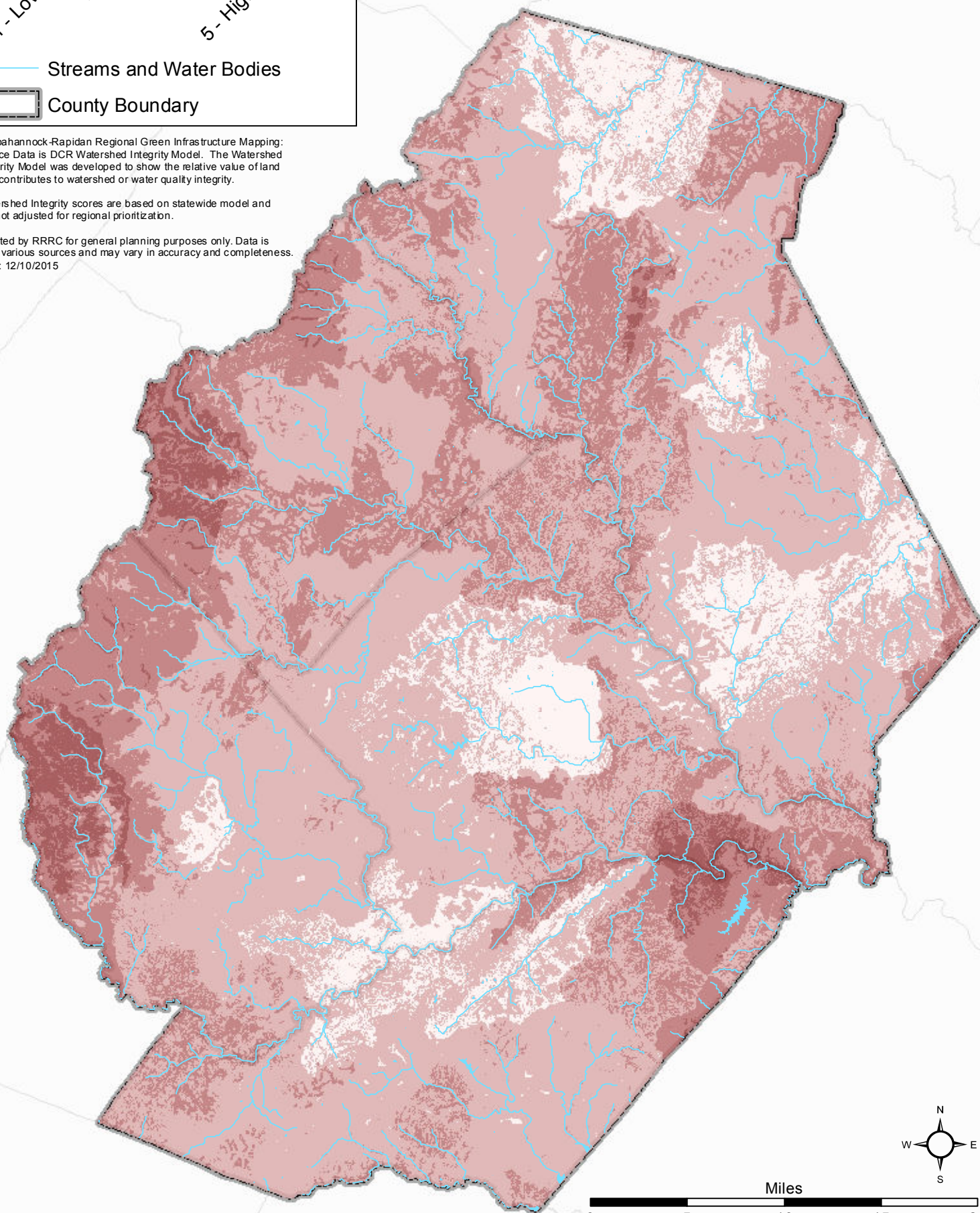
Rappahannock-Rapidan Regional Green Infrastructure Mapping:
Source Data is DCR Watershed Integrity Model. The Watershed Integrity Model was developed to show the relative value of land as it contributes to watershed or water quality integrity.

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

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Rappahannock-Rapidan Regional Green Infrastructure Mapping

Base Watershed Model Layer



Watershed Integrity Score (DCR)



1 2 3 4 5

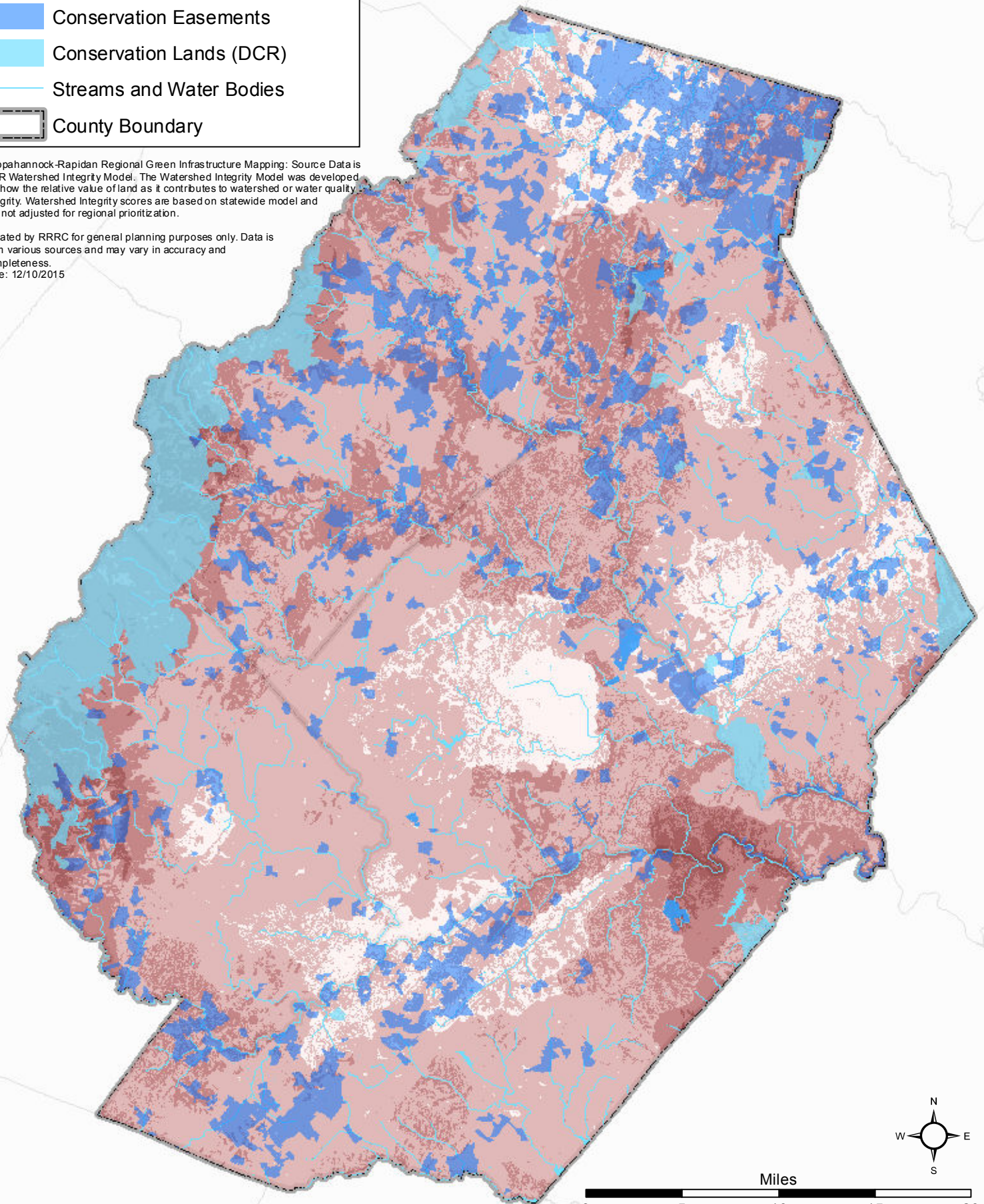
- Conservation Easements
- Conservation Lands (DCR)
- Streams and Water Bodies
- County Boundary

Rappahannock-Rapidan Regional Green Infrastructure Mapping

Base Watershed Model layer
with Easements and Public Lands

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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Watershed Integrity Score (DCR)



1 2 3 4 5

Future Growth Areas

Streams and Water Bodies

County Boundary

Rappahannock-Rapidan Regional Green Infrastructure Mapping

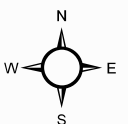
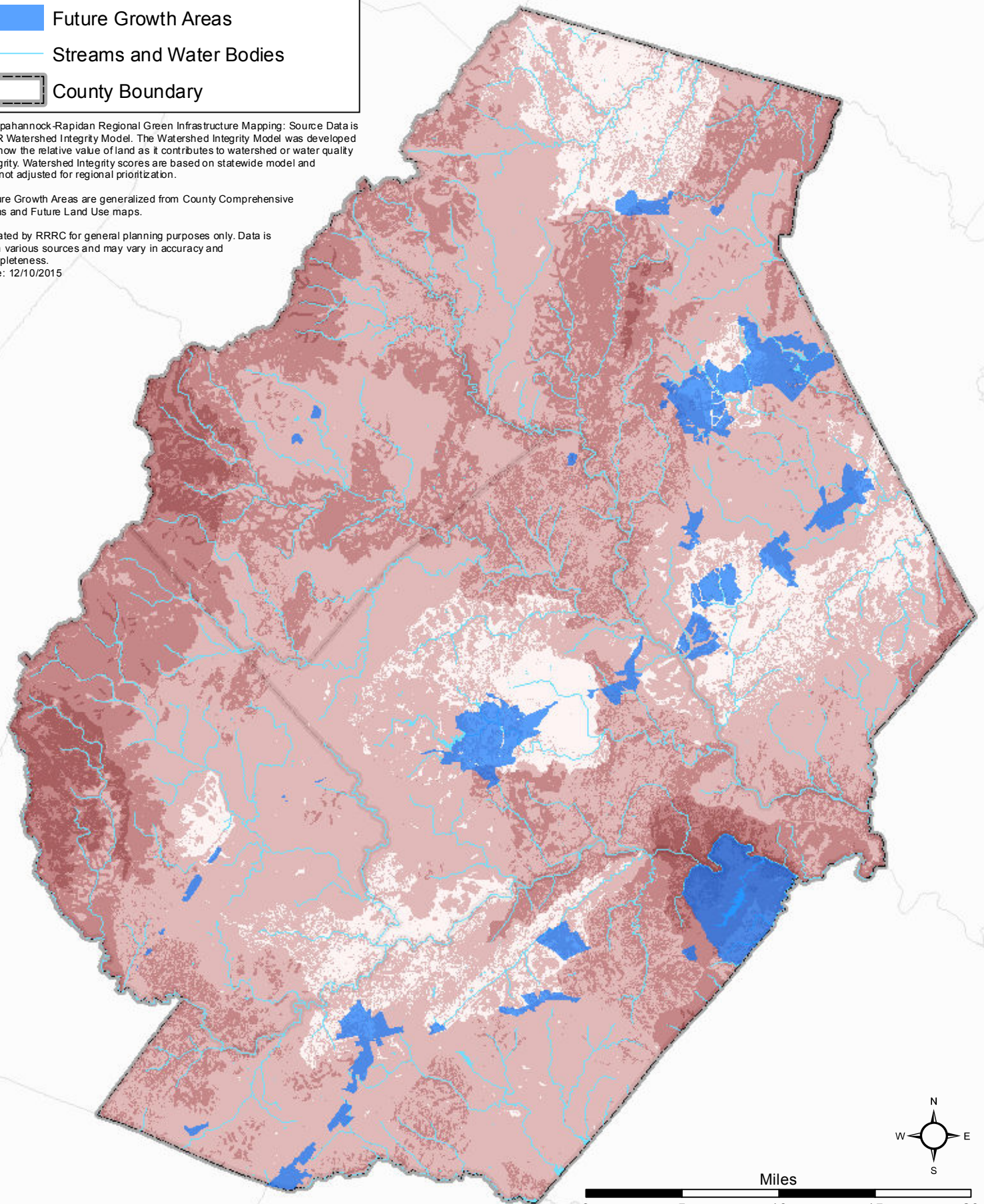
Base Watershed Model layer with Future Growth Areas

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.

Future Growth Areas are generalized from County Comprehensive Plans and Future Land Use maps.

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Watershed Integrity Score (DCR)



1 2 3 4 5

Zone 1

Zone 2

Streams and Water Bodies

County Boundary

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.

Potential Zone 1 Protection Zones for Surface Water were developed by Virginia Department of Health and are 5 mile buffers of surface water withdrawal points. Zone 2 areas include entire contributing watershed.

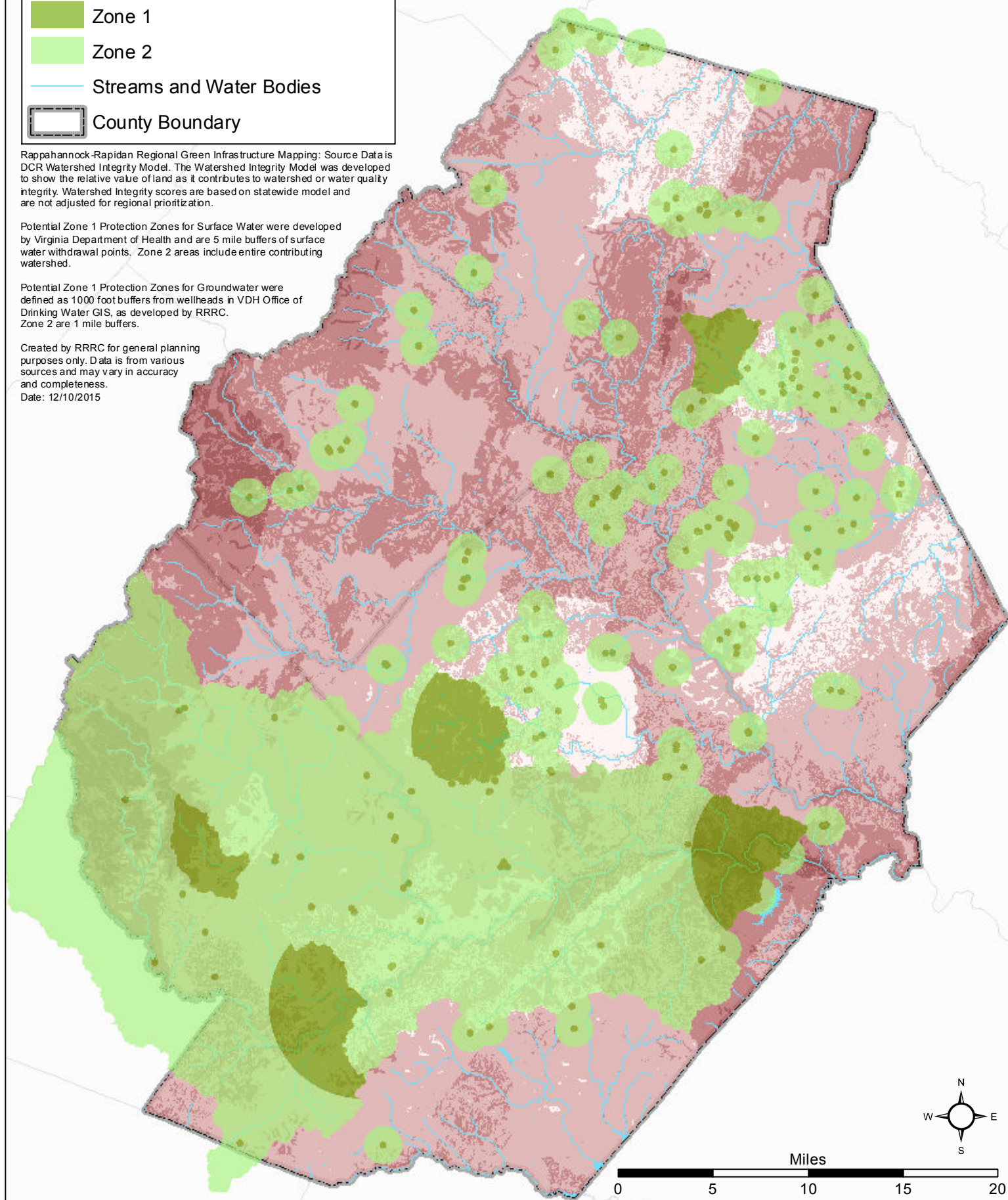
Potential Zone 1 Protection Zones for Groundwater were defined as 1000 foot buffers from wellheads in VDH Office of Drinking Water GIS, as developed by RRRC. Zone 2 are 1 mile buffers.

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Rappahannock-Rapidan Regional Green Infrastructure Mapping

Base Watershed Model layer with Potential
Surface & Ground Water Protection Zones



Rappahannock-Rapidan Regional Green Infrastructure Mapping
Base Watershed Model Layer with Hydrologic Units
with High Non Point Source Unit Area Loads

Streams and Water Bodies

HIGH NPS UAL Score

Watershed Integrity Score (DCR)



1 2 3 4 5



County Boundary

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Non Point Source Unit Area Load Source: Virginia Department
of Environmental Quality.

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