



**Virginia Coastal Zone**  
MANAGEMENT PROGRAM



# FINAL REPORT: LEVERAGING ECONOMIC BENEFITS OF THE NATURAL RESOURCES OF THE LOWER CHICKAHOMINY

Federal Fiscal Year 2017

**Grant Number NA17NOS4190152 Task Number 93.01**

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## Executive Summary

### Mapping and Data Gathering of Conservation and Economic Resources

RRPDC staff updated GIS data and maps for the study area of various themes including land conservation, water quality, recreation, etc. As part of the update process, RRPDC staff created a conserved land and point of interest database for the study area.

### Facilitation of Steering Committee and Economic Study Contractor

RRPDC staff hosted a meeting of the Economic Study contractor team and the project steering committee on January 29, 2018. As a follow-up to this January meeting, RRPDC staff facilitated the committee in the creation of a conserved land dependent business list for the study area.

RRPDC staff maintained communication with the project steering committee and the study contractor team throughout the year. Other work tasks associated with this product included a tour of the study area for the Economic Study contractor team, coordination with local staff on data and information needs, and GIS analysis necessary for the Economic Study.

### Research and Development of Educational Resources for Future Policy Discussion

RRPDC staff developed thorough listings of plans and studies related to this project. Each listing entry includes a summary of the report or study identified and key points relevant to the Lower Chickahominy Study. RRPDC staff have also completed background research for policy options discussed with the project Steering Committee. Information summarized as part of the research includes: policy history, examples of success and/or failure for each policy, studies or plans completed related to each policy, etc.

## Mapping and Data Gathering of Conservation and Economic Resources

RRPDC staff worked with resource agencies of the Commonwealth of Virginia to ensure accurate and updated data in base maps of the study area. RRPDC staff also coordinated with local government staff and other stakeholders to ensure accurate data and information. Current base maps of the study area illustrate this work and will be posted on a project webpage on the RRPDC website during FFY18.

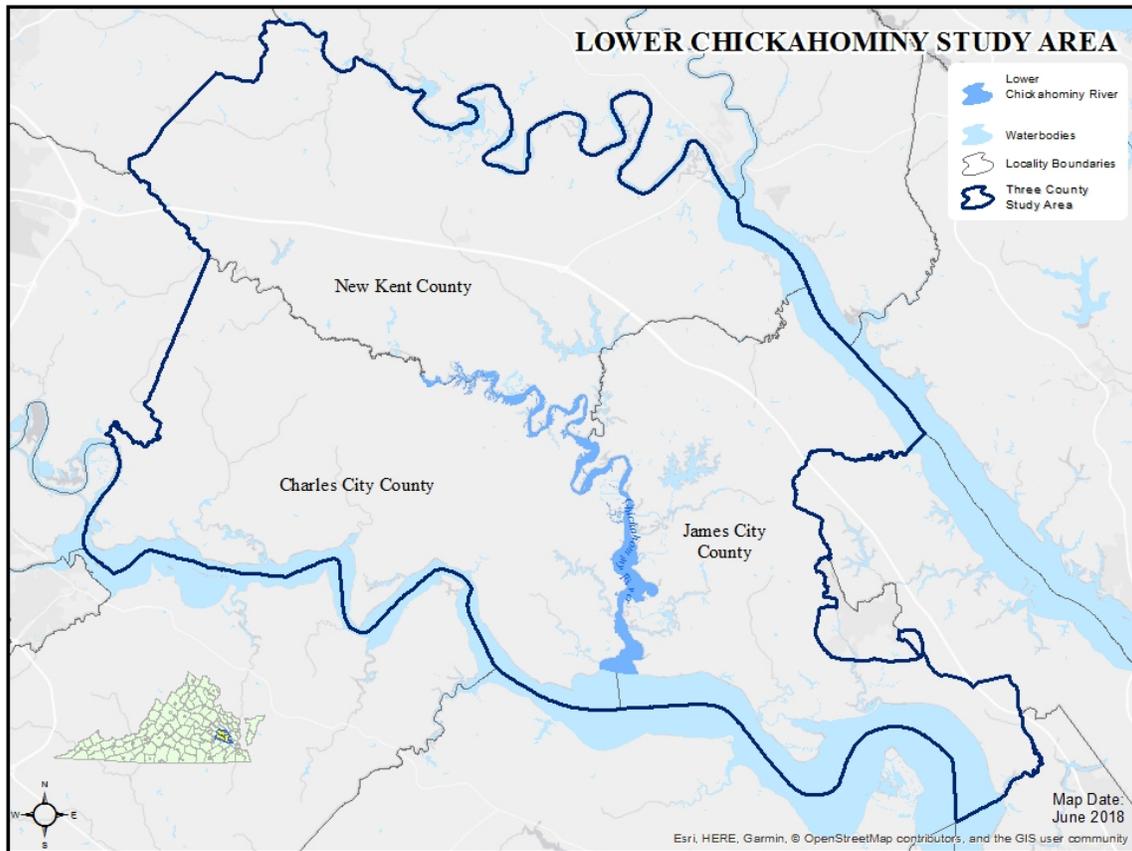
As part of the data update process, RRPDC used a previously created conserved lands database for the RRPDC region to create a recreation and conservation lands database for the Lower Chickahominy study area. General points of interest are also included in the database. This database allows RRPDC staff and other stakeholders to share and reference one set of data as the project continues.

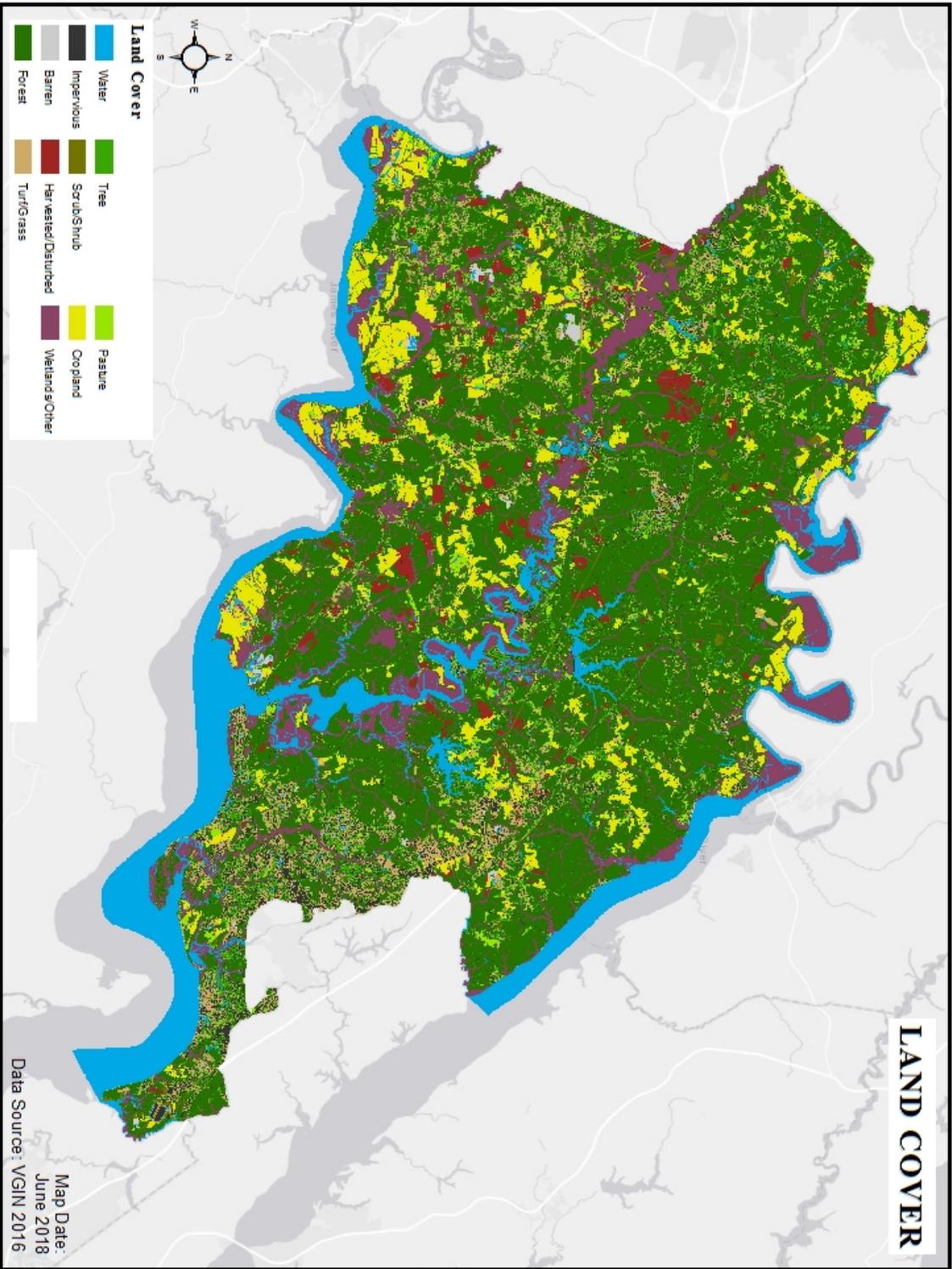
### **Process Outcome:**

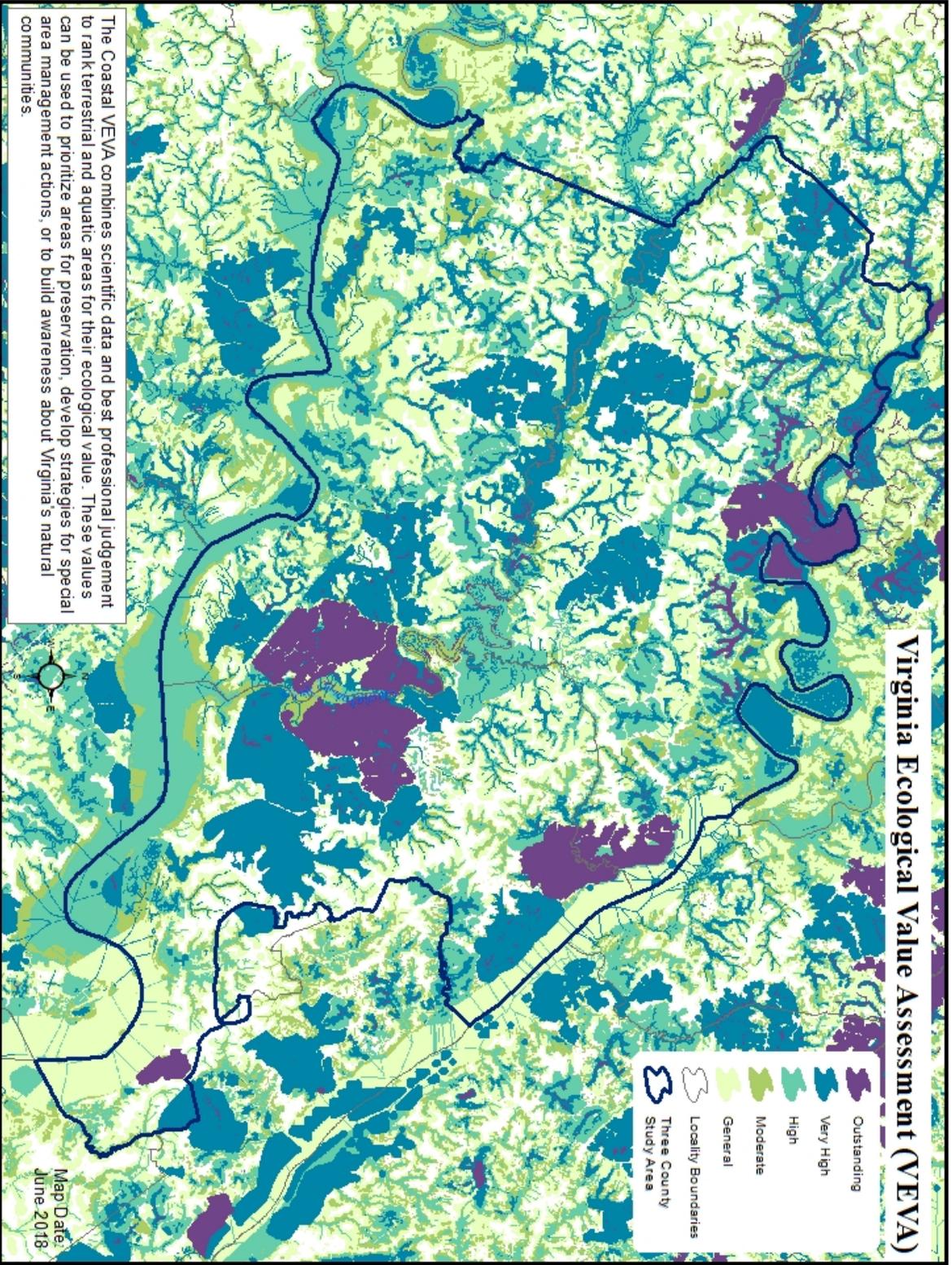
The creation of a comprehensive conserved lands database for the Lower Chickahominy study area localities is an asset that cannot be understated. It allows stakeholders to discuss and analyze data and policy options in a truly comprehensive manner; it enables honest, informed discussion by stakeholders that forms common ground when considering policies. No other single conserved lands GIS data set is similarly comprehensive.

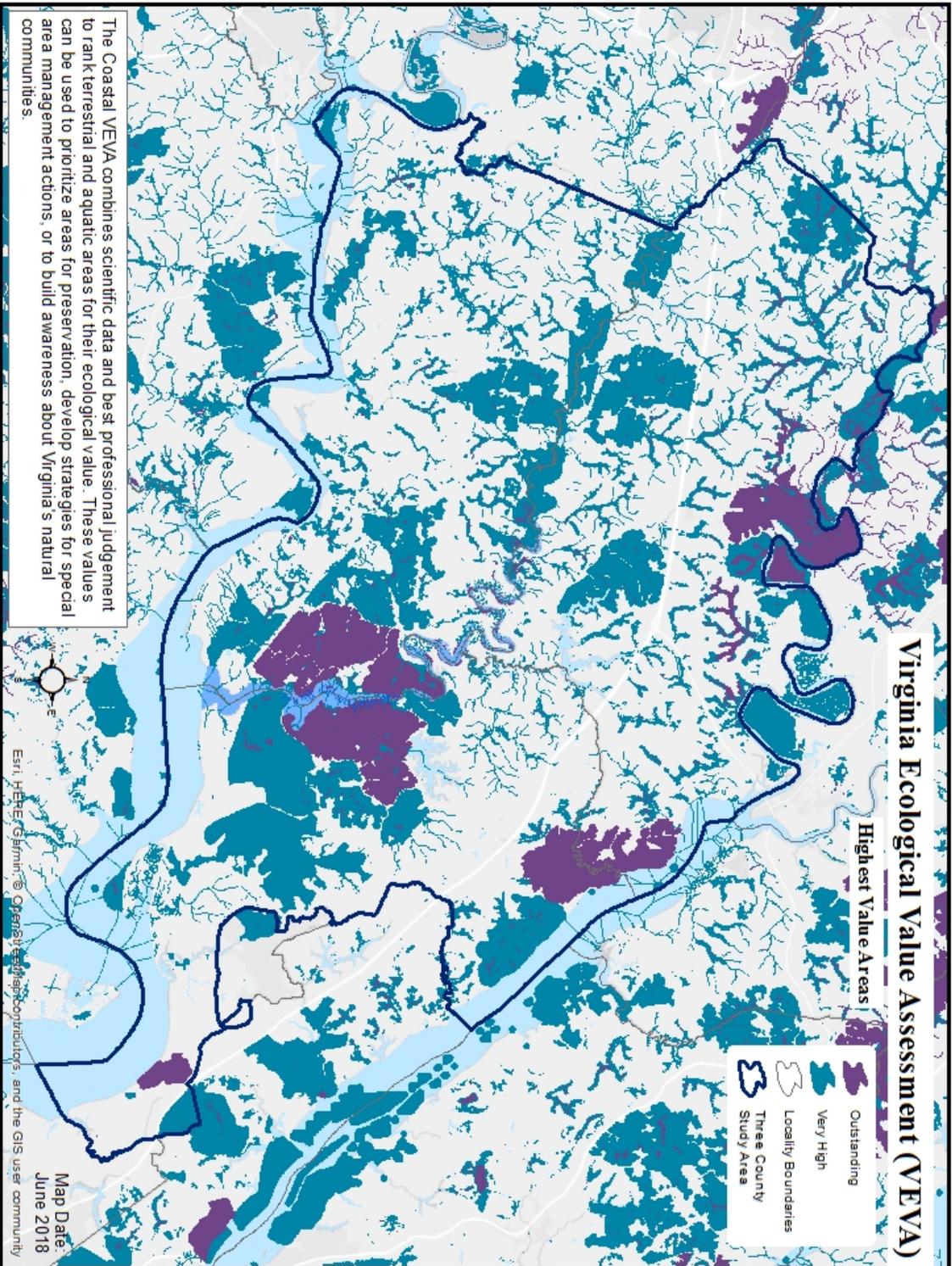
What follow are some of the updated maps for the Study Area.

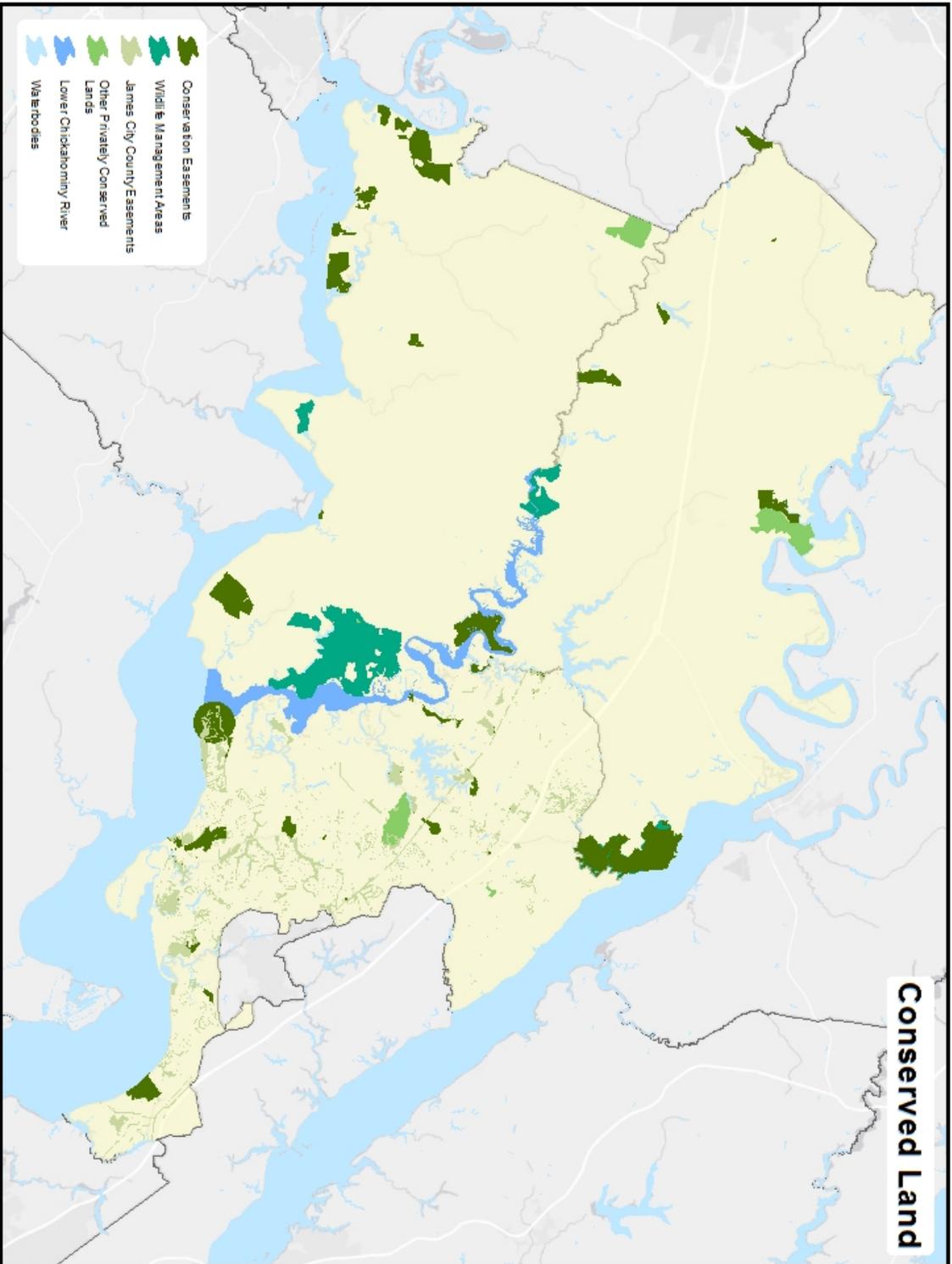
\*Note: not all maps are included here due to file size concerns. All maps will be posted to the project webpage on the RRPDC website mentioned above.



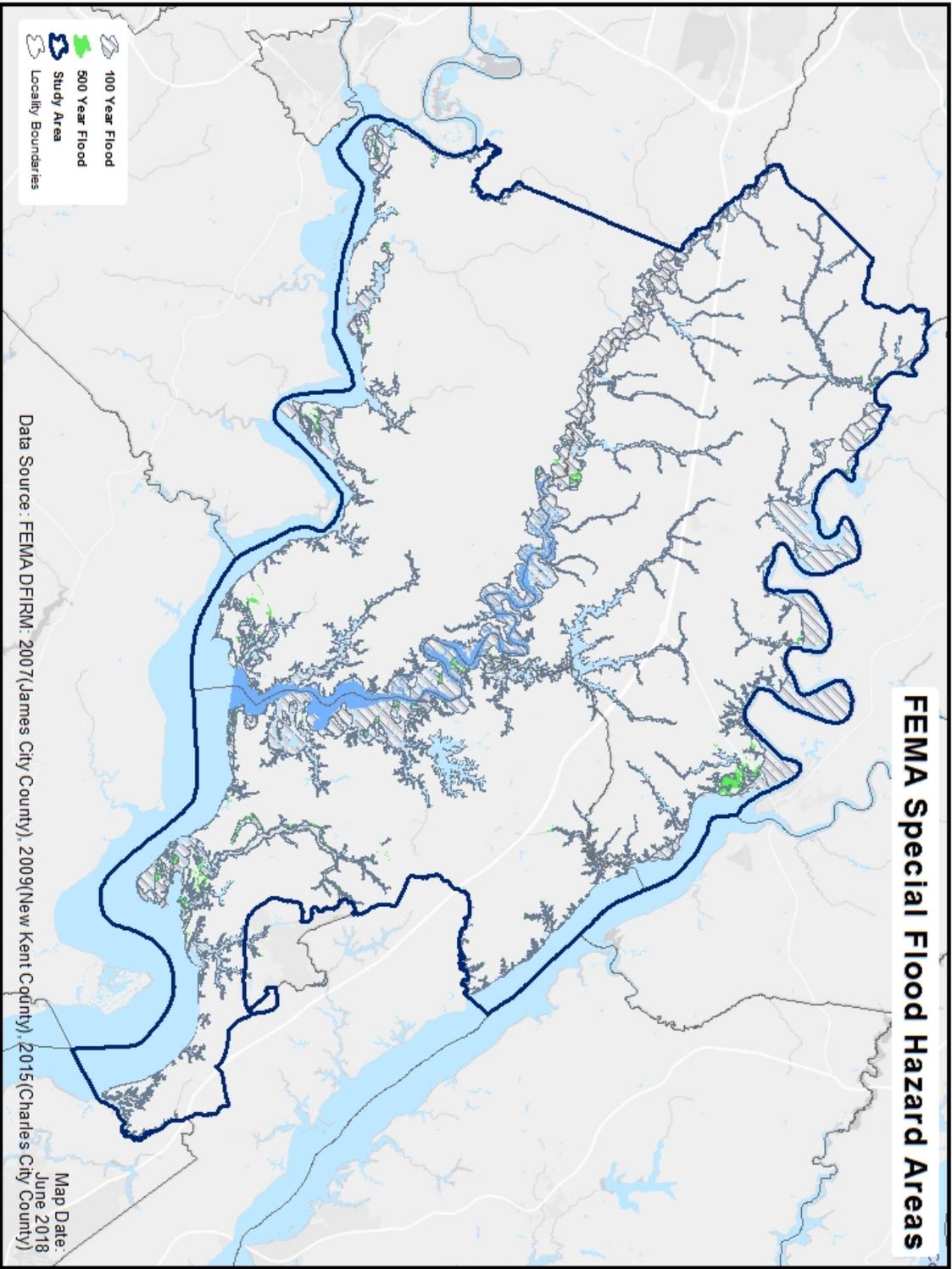








# FEMA Special Flood Hazard Areas



Data Source : FEMA DFIRM: 2007 (James City County), 2009 (New Kent County), 2015 (Charles City County)

Map Date:

June 2018

(Charles City County)

## Facilitation of Steering Committee and Economic Study Contractor

On January 29, 2018, RRPDC staff hosted a meeting of the project steering committee with the selected Economic Study contractor: a team from George Mason University and Urban Analytics, Inc. (GMU/UAI). The contractor team reviewed the goals, process, and data needs of the study. An immediate need of the study team from the project committee was a list of businesses that were either (a) directly dependent on conserved land, meaning they could not and would not exist but for the presence of conserved land in the study area, or (b) indirectly dependent on conserved land, meaning conserved land enhances and contributes to their ability to exist and operate. To accomplish this request, RRPDC staff created a Google Document spreadsheet for all stakeholders on the project committee to edit. At the close of the comment timeframe, RRPDC staff reviewed the list, corrected any errors and supplied the list to the GMU/UAI team.

### **Process Outcome:**

The business list Google sheet accomplished several things:

- A list that can be geocoded and mapped for future project analysis if necessary,
- A roster of businesses to inquire with as policy related to the project is developed and vetted,
- A resource for the Economic Study contractor to use when completing its work.

Throughout the grant year RRPDC emailed the project committee and hosted conference calls to discuss study progress with stakeholders, plan work tasks for the FFY18 grant year, and solicit feedback about policy ideas for later consideration in the project.

### **Process Outcome:**

The project committee was kept informed and offered the opportunity to ask questions about the project as work was underway.

As the study process continued, RRPDC staff guided a tour of the study area for the GMU/UAI team and Virginia Coastal Zone Management Program staff. The driving tour included all three localities in the study area stopping at parks, trails, local businesses, and tourism welcome centers. Included with the tour of the study area for the consultant team was a meeting with the newly recognized native tribes of the study area: the Chickahominy Tribe and the Eastern Chickahominy Tribe.

### **Process Outcome:**

The Economic Study contractor had a set of real-life reference people and places to rely on while conducting the study. This helped ensure the study would be grounded in reality instead of abstractly considered from behind desks far away.

RRPDC staff worked with locality staff in all three study area localities, Charles City County, James City County, and New Kent County, to share with the study contractor team necessary real estate assessor data and conservation easement data. In some instances, RRPDC provided analysis in GIS of parcel data and conservation easement data as a check or clarification of local records. All results from analysis performed by RRPDC staff was provided to the study team and locality staff.

### **Process Outcome:**

The Economic Study contractor was able to use accurate local data for the analysis, thereby making the study findings real and relevant to each local government.

At the conclusion of the study, RRPDC staff facilitated solicitation of comments and questions from project stakeholder committee participants for submission to the GMU/UAI team. RRPDC staff worked with the GMU/UAI team to address all comments and questions as best as possible.

**Process Outcome:**

The project study committee is able to inquire about and receive clarification or edits so that all understand and are pleased with the final product.

## Research and Development of Educational Resources for Future Policy Discussion

RRPDC staff developed a compendium of plans and studies relevant to the Lower Chickahominy project. Each listing includes a summary of the document and key points relevant to the Lower Chickahominy project. This information will be posted on the project webpage in FY2018 for reference and general education purposes. The compendium follows in Appendix A.

**Process Outcome:**

Compiling and reviewing all these plans and studies is important to achieving stakeholder trust and buy-in in the planning process. Doing so also reduces the risk of redundancy in time-consuming research or analysis as we now know what has been done.

RRPDC staff have also compiled research on policy considerations in the study area. This will be a starting base for focus stakeholder conversations during FFY18 and beyond about ultimate policy solutions for consideration at the conclusion of this project.

Policy Considerations include:

- Virginia Scenic River designation
- Creation of a Public Access Authority
- Explore a commercial fee for use of DGIF boat ramp
- How to help localities work with increased interest from utility-scale solar power generation facilities
- A recurring annual forum where emerging issues, accomplishments, policy, conservation, etc could be discussed
- Pop-up or entrepreneurship business support
- An Alliance, similar to that found on the Eastern Shore of Virginia working to conserve land
- Adjusting the high school curriculum to add an entrepreneurial element to MWEE requirements
- Promote eco-tourism
- Better harness and support business associated with the Virginia Capital Trail and other trails in the study area

**Process Outcome:**

Future years of this project will have a good starting place when developing policy options for stakeholders to consider. This list also illustrates that all stakeholders' voices are heard, recorded, and valued in the process.

## Appendix A

### Studies Relevant to the Lower Chickahominy Project

#### ***How Much Is an Ecosystem Worth? – Assessing the Economic Value of Conservation***

STEFANO PAGIOLA, KONRAD VON RITTER, JOSHUA BISHOP

This report details the 4 main ways to assess the economic value of conserving land. The first method of economic assessment is the Total Economic Value approach (TEV) that is most often used at a national level, but can be used at a global, regional, or local level. This calculation incorporates the direct use value, indirect use value, option value, and non-use value of the natural resources in question. The second method involves finding the net benefit of interventions that alter ecosystems and differs from the TEV approach in that it asks about changes in costs and benefits caused by intervention, rather than the total value of the ecosystem's benefits. The third method examines how the costs and benefits of an ecosystem are distributed among stakeholders and how conservation efforts affect them individually. The fourth and final method focuses on finding the beneficiaries of conservation, quantifying the magnitude of the benefits they receive, then designing mechanisms to capture the benefits and their financial contributions.

The Report can be downloaded at [Research Gate](#).

#### ***Bacteria TMDL Development for Lower Chickahominy River Watershed Located in Charles City, James City, and New Kent Counties, VA***

PREPARED FOR: VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

SUBMITTED BY: VIRGINIA INSTITUTE OF MARINE SCIENCE

This report details eight different bacteria-impaired waters, specifically waters impaired by Enterococci and E. coli bacteria, in the Lower Chickahominy River Watershed and the Total Maximum Daily Loads (TMDLs) they were assigned. The study describes the TMDL determination process for the waters, the point and non-point source pollution assessments, plus implementation of the plan and public participation in the process. There are 16 permitted point sources that discharge into the watershed, including Hideaway Sewage Treatment Plant, an MS-4 area located in James City, and single family homes under a general permit. The non-point sources of bacteria include residential sewage disposal systems, sanitary sewer overflows (SSOs), biosolids, pets, wildlife, livestock, recreational boating, and straight pipes. A reduction of 79% in New Kent, 97% in Charles City, and 79% in James City is required in the daily and annual loads of E. coli bacteria, while a reduction of 25% in New Kent, 39% in Charles City, and 68% in James City is required in the daily and annual loads of Enterococci bacteria. The implementation of the TMDLs will be an iterative process that first addresses sources that have the largest impact on water quality and will include continuous water quality monitoring by the DEQ as well as public participation.

#### ***Virginia's Return on Investment in Land Conservation***

THE TRUST FOR PUBLIC LAND

This report details the economic study conducted by The Trust for Public Land through which they found that every public \$1 invested in land conservation in Virginia returned \$4 in natural goods and services

to the commonwealth. The conservation of land in Virginia provides natural goods and services, such as air pollution removal, carbon sequestration, and water quality protection, while also bolstering the tourism industry as well as the agriculture, forestry, and commercial fishing industries. For example, outdoor recreation in Virginia generates \$13.6 billion in annual consumer spending, and this spending directly supports 138,000 jobs and \$3.9 billion in wages and salaries. Not only does land conservation lead to economic development, it also increases Virginia's fiscal health through avoided costs on expensive infrastructure and other municipal services as well as improves human health as availability of parks and proximity to open spaces increases physical activity of both adults and children, reducing healthcare costs in relation to obesity.

The Report can be downloaded at [The Trust for Public Land website](#).

### ***The Economic Benefits of Land Conservation***

THE TRUST FOR PUBLIC LAND

This study provides information about the effect that tree/forest stands have in urban areas and the economic value of preserving them. Some of the benefits that having trees and forest stands in urban areas provide are reduced air temperature, pollution removal, decreased volatile organic compound (VOC) emissions, energy conservation, reduced runoff, and improved water quality. The study argues that according to the proximate principle, homeowners are willing to pay more for a home closer to a park, especially in urban areas, and therefore pay higher property taxes which not only cover the cost of preservation but make the city more money. The study also delineates the economic and infrastructural benefits of agricultural land preservation as well as forest and rural land preservation.

The Report can be downloaded at [The Trust for Public Land website](#).

### ***Simulated Changes in Salinity in the York and Chickahominy Rivers from Projected Sea-Level Rise in Chesapeake Bay***

KAREN C. RICE, MARK R. BENNETT, AND JIAN SHEN

This study evaluates the effects of three possible sea-level rise scenarios on the salinity front in two tributaries to Chesapeake Bay, the York River, and the Chickahominy/James River estuaries. The three sea-level rise scenarios showed an increase of 30, 50, and 100 centimeters. The study found that significant changes in the salinity gradients for the York River and Chickahominy/James River estuaries could be expected for each of the three sea-level rise scenarios. In particular, salinity is predicted to more than double for all three scenarios during a dry year near a drinking-water supply intake for the City of Newport News on the Chickahominy River.

The Report can be found on the [USGS website](#).

### ***Economic Impacts of Protecting Rivers, Trails, and Greenway Corridors: A Resource Book***

PREPARED BY: RIVERS AND TRAILS CONSERVATION ASSISTANCE (RTCA) OF THE NATIONAL PARK SERVICE

This resource book aims to help local-level planners, park and recreation administrators, citizen activists, and non-profit groups understand and communicate the potential economic impacts of a proposed or existing corridor or conservation project. The book is broken up into 8 sections: Real Property Values, Expenditures by Residents, Commercial Uses, Tourism, Agency Expenditures, Corporate Relocation, Public Cost Reduction, and Benefit Estimation. The first 7 sections describe economic benefits that come

from environmental conservation, while the last presents ways to estimate and quantify those benefits in monetary values. While the book focuses on the economics of conservation, the RTCA does recognize the intrinsic value of the natural environment as well. Sections of particular relevance to the LCRW Project are Expenditures by Residents, Commercial Uses, Tourism, and Public Cost Reduction.

This Report can be found on the [Rails To Trails website](#).

***The Economic Benefits of Cleaning Up the Chesapeake Bay: A Valuation of the Natural Benefits Gained by Implementing the Chesapeake Clean Water Blueprint***

CHESAPEAKE BAY FOUNDATION

This economic study sheds light on what states within the Chesapeake Bay Watershed stand to financially gain from the implementation of the Chesapeake Clean Water Blueprint, its central goal being to restore the Bay's ecological health. The study focuses on 8 natural benefits that the Bay provides to the states: climate stability, air pollution treatment, food production, waste treatment, water flow regulation, recreation, water supply, and aesthetic value. The report found that the watershed currently provides \$107 billion annually to the state and local economies, which will increase by \$22 billion annually if the Blueprint is fully implemented or decrease by \$5.6 billion annually if it isn't. The CBF estimates that the full implementation of the plan will cost \$5 billion annually. Furthermore, Virginia has the greatest natural assets in the watershed and stands to realize benefits of over \$8.3 billion annually if the plan is implemented but stands to lose the most (percentage-wise) out of all the states if the plan is not (-8% change from baseline benefit value).

The Report can be found on the [Chesapeake Bay Foundation website](#).

***Improved Use and Understanding of NNBF in the Mid-Atlantic***

SCHRASS, K. AND A.V. MEHTA

This study explains what Natural and Nature-Based Features (NNBFs) are, evaluates barriers that stand between them being a viable alternative to normal gray infrastructure (i.e. rip rap and seawalls) for coastal issues in the Mid-Atlantic region, and recommends various solutions to the barriers. NNBFs are solutions that either evolved through natural processes (i.e. marshes and dunes) or have been engineered by humans to mimic natural functioning (i.e. living shorelines). The National Wildlife Federation collected feedback from stakeholders in New York, New Jersey, Delaware, Maryland and Virginia to identify key challenges preventing wider implementation of NNBF projects in the region. They grouped these key challenges into the following categories: building the case for NNBF, initial site assessment, project design, permitting, and post-construction performance monitoring. Two in-person workshops were held where attendees and stakeholders were broken into small groups to discuss each challenge in depth and to develop solutions, all of which is included in this study.

The Report can be found on the [MARCO website](#).

***Virginia State Parks: Economic Impact Report 2016***

VINCENT P. MAGNINI, PH.D. AND MUZAFFER UYSAL, PH.D.

This brief, data-heavy document outlines the economic activity and impact that the State Park system provided the economy of Virginia in 2016 to illuminate their importance to the state. According to the study's conclusion, the economic activity produced by the parks ranged between \$292.2 million and

\$301.2 million in 2016, whereas the economic impact was between \$219.9 million and \$259.1 million. Park visitation accounted for approximately 3,548 jobs, \$116.5 million in wage and salary income, and \$176 million in value-added effects, while the economic activity generated by the parks generated approximately \$19.6 million in tax revenue, meaning \$0.99 in taxes were generated for every dollar of tax money spent in the park system. The authors do recognize that some societal benefits of the parks system cannot be quantified, such their rest, relaxation, and recreational opportunities, but their focus for this study is very clearly on those benefits that can be quantified.

The Report can be found on the [Virginia Department of Conservation and Recreation website](#).

### ***2015 Special Report on Paddlesports***

THE OUTDOOR FOUNDATION IN PARTNERSHIP WITH COLEMAN, SEVYLOR AND STEARNS

This study summarizes the popularity of paddlesports, including kayaking, canoeing, rafting, and stand-up paddling in the United States in 2014. The study first began in 2010, and the document often refers to historical statistics to give context to present day popularity statistics. In total, 21.7 million Americans, 7.4 percent of the population, enjoyed paddling of some sort in 2014, equating to 215.8 million annual paddling outings in 2014. Kayaking is the most popular form of paddling with 4.4 percent of Americans, mostly between the ages of 18 and 24, making 105.2 million annual outings in 2014. Canoeing was the second most popular paddlesport, followed by rafting and stand-up paddling. The study details the demographics of each sport, relaying information about the average age and ethnicity as well as the most common gender and geographic location for each sport. It also gives information regarding the motivation behind each paddler's participation and how engaged they truly are with the sport.

The Report can be found on the [Outdoor Industry Association website](#).

### ***The Economic Impact of Virginia's Agriculture and Forest Industries***

TERRANCE J. REPHANN, PH. D.

This economic study measures the economic impact that the agriculture and forestry industries have on Virginia's economy. Their results show that agriculture and forestry-related industries had a total economic impact of \$91 billion in 2015, a total value-added impact of \$45.5 billion, and a total employment impact of 442,260 employees. While these impacts are concentrated on the directly affected agriculture, forestry, and manufacturing industries, the two industries also stimulate activity elsewhere in the Virginia economy. According to the study, total employment impacts for the agriculture and forestry industries exceed 1,000 jobs for sixty-two localities and the total economic impact of the industries' exports is approximately 47,000 jobs, \$4.6 billion in value-added, and \$9 billion in total output. While the study breaks down the specific economic impacts that the agriculture industry as well as the forestry industry have on the economy, it also recognizes the substantial environmental and societal benefits that forests provide including air and water quality improvement, flood vulnerability mitigation, provision of wildlife habitat, and much more.

The Report can be found on the [Virginia Department of Agriculture and Consumer Services website](#).

### ***Conservation Easements: Fiscal Impacts to Localities in the Middle Peninsula***

MIDDLE PENINSULA PLANNING DISTRICT COMMISSION

This study focuses on land entered into conservation easement agreements within the Middle Peninsula region, their social, environmental, and economic value, as well as the best practices for capturing that value. Localities within the region that have adopted a land use program, a program that supports the assessment and taxation of agriculture, horticulture, forest and/or open-space lands based on its use value instead of its market value, include Gloucester, Middlesex, King William and Essex Counties; non-land use counties within the region include Mathews and King & Queen Counties and have less guidance regarding the assessment of eased lands. Overall, the study found that the tax revenue impact of conservation easements is less than 0.54% of any given Middle Peninsula locality's budget and easements lower land value and help the composite index (explained in study) which in turn means local schools receive more state aid funding. The study not only recognizes the benefits conservation easements provide in the region, it also gives recommendations to the locality's on how to best utilize easements.

The Report can be found on the [Middle Peninsula Planning District Commission website](#).

### Plans Relevant to the Lower Chickahominy Area

#### ***Charles City County, VA Economic Development Strategic Plan***

PREPARED BY: MORAN, STAHL & BOYER, E.M. PEMRICK AND COMPANY

This document is a comprehensive plan for the economic development of Charles City, VA. The report offers insight into the local economy, currently dominated by agriculture, and recognizes potential areas of economic growth including manufacturing, energy generation, and tourism. Before diving into any action plan, the paper offers a SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis for the Charles City area, identifying its attractive natural environment and access to water as strengths and diversification of tourism, particularly with active activities, as opportunities. After defining the shared vision for Charles City and listing the considerations that factored into its formation, the report dives into the action plan as follows:

- Develop the Courthouse Area;
- Expand and attract selected manufacturing and energy production opportunities;
- Enhance the agriculture and forestry sectors;
- Diversify and expand tourism and related economic opportunities; and
- Enable/support functions that enhance resources and help promote the County to prospective companies and tourists.

The plan places a large emphasis on the Virginia Capital Trail, a biking trail from Richmond to Williamsburg with the Charles City Courthouse at its midpoint. The plan recognizes it as a potentially major driver of nature-based tourism, retail, restaurant, and accommodation visitation and spending for the County.

The Plan can be found on the [Charles City County website](#).

#### ***Management Plan for Chickahominy Wildlife Management Area, Charles City County, Virginia 2016-2026***

PREPARED BY: DAVID GARST AND AARON PROCTOR

This is a management plan for the Chickahominy Wildlife Management Area (CWMA), a 5,217-acre area made up of mixed oak/beechn forest with some mixed pine that is in eastern Charles City County and falls into the Lower Chickahominy River HUC12 class. The area is unique in that it's a large tract of contiguous forest surrounded by a broken landscape of agriculture and residential development, providing habitat for 137 species (not including rare and sensitive species) and many recreational opportunities for the public to fish and hunt. The proposed management actions in this plan are geared toward improvement and creation of habitats as well as improving those recreational opportunities and include increasing the available early successional habitat on the CWMA to promote a larger and more diverse bird population. All the proposed habitat management actions will also promote healthy white-tailed deer and wild turkey populations. This document contains introductory information about the CWMA, goals, objectives, and strategies for habitat management, species management, and recreation, as well as information about the administration of the area.

### ***Richmond Regional Planning Region Local Action Plan Summary***

This document summarizes the Wildlife Action Plan and Local Action Plans for the Richmond Regional Planning Region consisting of 1,410,062 acres including the counties of Charles City, Chesterfield, Goochland, Hanover, Henrico, New Kent, and Powhatan, the town of Ashland, and the city of Richmond. The Local Action Plan summaries included in this document identify species that are local priorities, habitats required to conserve those species, regional threats impacting species and habitats, and priority conservation actions that can be taken to address those threats. Within Richmond Regional Planning Region, priority conservation opportunities include:

- Maintaining existing vegetated wetland and restoring vegetated wetland habitats where possible;
- Improving the quality and quantity of water in creeks and rivers through best management practices and water quality improvement mechanisms;
- Conserving tracts of mature hardwood forests; and
- Maintaining existing open and young forest habitats and pursuing opportunities to restore native open lands and young forests.

For each of these opportunities, the plan recognizes the threats each natural resource faces, conservation management actions to be taken, and climate-smart management actions to be taken. The plan also specifies that preservation of healthy ecosystems will hold priority over restoration of those that are damaged, and that insufficient data exists to fully describe the economic and social benefits and drawbacks of lands held in conservation within the region.

This regional summary can be found on the [Virginia Wildlife Action Plan website](#).

### ***Hampton Roads Planning Region Local Action Plan Summary***

This document summarizes the Wildlife Action Plan and Local Action Plans for the Hampton Roads Planning Region consisting of 2,394,400 acres including the counties of Isle of Wight, James City, Southampton, and York as well as the cities of Chesapeake, Franklin, Hampton, Newport News, Norfolk, Poquoson, Portsmouth, Suffolk, Virginia Beach, and Williamsburg. The Local Action Plan summaries included in this document identify species that are local priorities, habitats required to conserve those

species, regional threats impacting species and habitats, and priority conservation actions that can be taken to address those threats. Within the Hampton Roads Planning Region, priority conservation opportunities include:

- Protecting beaches, dunes, and mud flats;
- Protecting and restoring tidal and non-tidal wetlands;
- Improving the quantity and quality of water in creeks and rivers through best management practices and water quality improvement mechanisms; and
- Conserving tracts of mature hardwood forests and pine savannas.

For each of these opportunities, the plan recognizes the threats each natural resource faces, conservation management actions to be taken, and climate-smart management actions to be taken. The plan also specifies the large impact that climate change and sea level rise will have on the region and that insufficient data exists to fully describe the economic and social benefits and drawbacks of lands held in conservation within the region.

This Plan can be found on the [Be Wild, Virginia website](#).