

Northern Neck Planning District Commission FY09-10 Focal Area Grant, Task 12.06 Northern Neck Blue Green Infrastructure Protection



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Virginia Coastal Zone
MANAGEMENT PROGRAM



**Northern Neck Planning District Commission
FY09-10 Focal Area Grant, Task 12.06
Northern Neck Blue Green Infrastructure Protection**

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Blue Green Infrastructure Protection Planning In the Northern Neck Region: Planning Commission Education/Consensus Building Report

I. Northumberland County

Northern Neck Planning District Commission (NNPDC) staff used the Virginia Coastal Management Program's Virginia Conservation Lands Needs Assessment (VCLNA) and Priority Conservation Areas (PCA) (in cooperation with the Virginia Department of Conservation and Recreation) for guidance in the Blue Green Infrastructure Protection Planning process. The statewide GIS datasets were clipped to the Northumberland County boundary, and maps were made showing the Recreation, Forest, Cultural, Agricultural as well as Ecological Models that are components of the VCLNA, in addition to a PCA map. After the maps were completed, NNPDC staff created a presentation that contained the VCLNA and PCA mapping model data to introduce the Northumberland Planning Commission to the new state data that values natural areas in their county which has not been available before now.

NNPDC staff presented the first introduction to the VCLNA data and the Blue Green Infrastructure Protection Planning process on May 20, 2010 to the Northumberland County Planning Commission. The emphasis of the presentation was that this new VCLNA data would help the county identify valuable natural areas, as some areas have more values for water quality, habitat, and forestry than other areas.

A planning commission member noted that the maps presented were missing a map of places appropriate for economic development within the county. NNPDC staff explained that these were maps to highlight the value of natural areas in the county, and that land use decisions on where economic development would occur is a local decision not a state decision. The planning commission member further elaborated that he wondered how the areas that are slated in the County Comprehensive Plan for future growth meshed with the natural area data maps shown. NNPDC staff explained that the basis of the Virginia Conservation Land Needs Assessment were natural area cores, which were comprised of areas of natural vegetation larger than 100 acres, and that the county growth areas were in the white spaces (either not forested, or forest areas less than 100 acres) between the cores. NNPDC staff had previously overlaid the future growth areas with the VCLNA and found that the growth areas were outside the VCLNA cores.

With this type of natural area valuation data, NNPDC staff recommended that the county consider setting aside higher value natural areas in the county for protection from development. The rationale, NNPDC staff explained was that if no natural area protection planning was considered, then the development community would develop most all of the county lands, which would fragment natural areas and decrease the ecosystem services that the natural areas provide to the citizens of Northumberland County. What would be left would be small fragments of natural areas that would be scattered throughout the county, providing little to no ecological, habitat, water or air quality benefits. NNPDC

staff explained that many of the benefits of these natural areas are attributed to the larger expanses of natural areas which support a variety of wildlife species and provide natural functions like groundwater recharge. Smaller natural areas, even if numerous, do not provide the same benefits as larger natural areas. NNPDC staff related that other areas in the state, most notably Northern Virginia has been almost fully developed and the only natural areas left are small slivers that form the streambeds that convey stormwater runoff.

Planning commission members stated that the Northumberland County will never be like Northern Virginia, as Northumberland is too isolated, at the end of the road, so to speak, and that amount of development would never occur here. NNPDC staff related that long term development patterns (longer than 50 years) cannot be predicted reliably now. No one knows for sure what future development will occur in Northumberland County over such an extended time period.

Another planning commission member questioned if the Blue Green Infrastructure Planning would restrict how individuals could develop their property. NNPDC staff noted that it is up to the county how they would like to implement the plan, and what, if any, restrictions would be placed on landowners in the chosen areas.

Finally a planning commission member asked what is the current state of conservation in the county and where the currently conserved lands are located in the county. NNPDC staff said that issue would be addressed at the next presentation to the planning commission.

NNPDC staff obtained GIS data on the lands that are currently conserved in the Northern Neck Region from Virginia Department of Conservation and Recreation. NNPDC staff clipped that data to the Northumberland County boundary and created maps showing the acreages and percent of county land area conserved as a region and in Northumberland County. These maps were incorporated into a presentation that was given at the July 15, 2010 Northumberland Planning Commission Meeting.

According to July 2009 data, the four county Northern Neck Region has 7.0% of the land conserved (4.4% conserved [mostly public] lands and 2.6% private conservation easements), while Northumberland County has 2.5% of its land conserved (0.6% conserved [mostly public] and 1.9% in private conservation easements). When presenting the data, NNPDC staff showed that the properties conserved were all over the map, in a haphazard fashion. NNPDC staff mentioned that such isolated pockets of conserved areas are not as productive as larger concentrations of natural areas and are dysfunctional in that regard. NNPDC staff noted that if Northumberland had a Blue Green Infrastructure Plan, then the geographic pattern could be more compact and contiguous, instead of spread throughout the county.

NNPDC staff again presented the VCLNA maps and PCA maps of Northumberland County to remind the members of the data available for use in delineating natural areas to protect. NNPDC staff noted that the next steps could be utilizing the GIS on the portable

computer to delineate areas for inclusion into the Blue Green Infrastructure Plan, or possibly working with county staff to identify some areas to be reviewed at the next Planning Commission Meeting. The Northumberland Planning Commission declined the actions suggested and stated they would like to have more information before going further.

A planning commission member asked what type of tools were available to protect any areas they might choose to delineate. The member stated that if all we can do is recommend not to develop these areas, then the plan would be of little worth. NNPDC staff responded by saying that language encouraging conservation easements in the Comprehensive Plan would be the least intrusive way of protecting any areas delineated, but on the other end of the spectrum, a county zoning overlay ordinance could restrict building in these delineated natural areas slated for protection. NNPDC staff mentioned also that next grant year the NNPDC would be compiling a document that would outline the full range of options to help implement natural area protection initiatives funded by the Virginia Coastal Management Program.

NNPDC staff mentioned that if the planning commission was reluctant to create new areas in the county to protect thus impacting landowners property rights, they might consider protecting areas that are already shown on the Future Land Use Plan in the county's Comprehensive Plan, namely the future potential reservoir sites. NNPDC staff had assisted the county with the last revision of the Comprehensive Plan and asked the planning commission members if they would be interested in investigating how the VLCNA natural area cores lined up with the future potential reservoir sites. Planning Commission members said that that would be useful information to pursue.

NNPDC staff coordinated with neighboring Planning District Commission (PDC) counterparts to compare how other PDC's were faring with their blue green infrastructure planning efforts, since it seemed as if not much progress was being made in the Northern Neck. Staff from the George Washington Regional Commission (GWRC) remarked that they were using the CityGreen software package to estimate the ecosystem services of natural areas in their urbanized region and had gotten positive feedback from city and county staff involved with storm water management. GWRC staff mentioned that the CityGreen analysis opened up the discussion and helped show the real value of natural areas for storm water control and infiltration. GWRC staff offered to do an analysis for the four Northern Neck counties, since they had all the data needed to do the analysis. NNPDC staff accepted the generous offer.

NNPDC used the CityGreen analysis in a blue green infrastructure planning presentation at the November 18, 2010, Northumberland Planning Commission meeting. The CityGreen analysis was used to answer the question of how will blue green infrastructure planning help the citizens of Northumberland County. The CityGreen analysis was conducted by GWRC staff for the years 1996, 2001 and 2006. The input of the software program analysis is land cover data interpreted from satellite imagery, and the years that data were available for the Northern Neck determined the year of the analysis. A basic assumption of the program is the scenario of removal of ALL natural vegetation from the

unit of analysis, in this case the lands within the county. The software then calculates the amount of air pollution removal, the amount of carbon sequestration and the value of storm water management treatment the vegetation would have given if left in place. Planning commission members noted that the water acreage differed in each year measured. NNPDC staff explained that the area of water within the county boundary varies depending on what time of day the satellite data was captured. Depending on the time of day, the tide could be low, high, or somewhere in between. Although the actual acreages differed throughout the years, the percentage of water stayed the same, that is 2.2% of the county area. Another anomaly that a planning commission member noticed was an increase in tree cover from 1996 to 2001. NNPDC staff posited that the difference could be due to re-forestry operations, of smaller trees reaching maturity within the four year span between the analysis. Although most of the planning commissioners thought the analysis was informative, some members thought it was not very appropriate because 1) all of the vegetation in the county would never be removed, and 2) since the county does not operate any storm water systems, the storm water valuation was not applicable. All in all, though NNPDC staff believe that the analysis did highlight the fact that although natural areas are not thought of as providing benefits to the citizens of the county, that in fact they do, and the services are not economically valued by the community, since there is no way to sell or make money off the services.

NNPDC staff then presented the potential reservoir sites from the county's comprehensive plan displayed over top of the Virginia Conservation Lands Need Assessment (VCLNA) ecological cores as well as the Priority Conservation Areas (PCA). NNPDC staff noted that the reservoirs lined up with the natural areas cores of the VCLNA and PCA rather well. NNPDC staff pointed out that three out of the ten potential reservoir sites were inside high value ecologically ranked natural areas cores in the VCLNA and that five of the ten potential reservoir sites were located within the highest ranked class of the PCA, which is rated as an imperative conservation opportunity. NNPDC staff mentioned that if the planning commission was interested in creating a blue green infrastructure plan for the county, the three reservoirs that were in the high value natural area cores might be a good start. NNPDC staff explained that while the reservoirs might not be built as long as the regions groundwater supply is adequate, the NNPDC Regional Water Supply Plan indicated that in one hundred years from now the groundwater supply might not be adequate to supply the needs of the projected population. NNPDC staff also noted that if development occurs in the reservoir inundation footprint, it is likely the reservoir would never be built, even if needed. NNPDC staff implored the planning commission to take steps now to protect natural lands that might be needed to provide potable water supply for future generations. The planning commission decided they were not ready to create a Blue Green Infrastructure Plan at this juncture but were open to NNPDC staff presenting at a future meeting in 2011, with data showing the results of a previous analysis done by the NNPDC analyzing buildings near the footprint of the future potential reservoir sites.

On February 24, 2011, NNPDC staff presented on blue green infrastructure planning which would turn out to be the final presentation to the Northumberland County Planning Commission. NNPDC staff continue to focus on the future potential reservoir sites

already present in the county Comprehensive Plan since the commission had expressed its reluctance to draw new boundaries that could affect the property rights of landowners with respect to the future use of their land. NNPDC staff reasoned that building off previously vetted future land use decisions would be the path of least resistance in the hopes of building support for a Blue Green Infrastructure Plan.

NNPDC staff, back in 2006, conducted an analysis by digitizing the flood pool of each future potential reservoir site to show the largest amount of inundation that would occur and using the county's E911 building structure outlines, overlaid them using GIS to see if any buildings would be impacted by any of the reservoirs. The study found that as of that date no structures were impacted, though one structure was within 50 feet of one of the reservoirs. NNPDC staff included these maps in the presentation and went through each one of the reservoir analysis maps, displaying the results of the study for planning commission members.

There was much discussion about the suitability of the proposed reservoir sites to economically supply water to citizens of the county, about de-salinization, and about other topics related to water supply planning. NNPDC staff tried to steer the discussion back to protection of high value natural areas, stating that whether or not the county chooses to build reservoirs in the future or not, the areas outlined by several of the reservoirs were high value natural areas and worthy of protection.

NNPDC staff then displayed a map of steep slopes in the county, using soil type (which incorporates a slope factor in the classification) as a proxy for a digital elevation model. NNPDC staff pointed out that the dendritic pattern of the steep slopes follows the drainage pattern of streams in the county. NNPDC staff also noted that this soil type is named Steep Sandy Soils (Symbol StE) Land by the USDA in the Soil Survey, occurs on 15% to 45% slope and that these soils are "only suited for trees and the most hardy-drought resistant grasses". NNPDC staff further elaborated that these soils are sandy, and lack organic matter, meaning the only thing holding them in place is the natural vegetation's root system, and if that is removed, then the soils would wash away in the next rain event. NNPDC staff noted that these soils are very fragile and that development should be avoided on them. NNPDC staff then displayed maps showing the relation of these steep slopes with the VCNLA natural area cores and there was high correspondence between the two features. NNPDC staff also created a map that showed the relation of the steep slopes with the PCA polygons, and again there was a high degree of correspondence. NNPDC staff noted that while engineered solutions to building on these soils was possible, it was more expensive to do so, and if the construction was not managed properly, the soils could erode rapidly, affecting riverine aquatic resources not to mention the structural integrity of the building itself.

NNPDC staff once again asked if the Northumberland Planning Commission would consider creating a Blue Green Infrastructure Plan to protect natural areas in the county, and suggested that the three reservoirs in the headwaters of the Great Wicomico River that coincided with high value natural area cores in the VCLNA would be a great beginning. The commission chose to take no action on the matter.

For additional information, including presentations given, and related newspaper articles, regarding Blue Green Infrastructure Planning in Northumberland County, please see Appendix A.

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II. Lancaster County

NNPDC staff introduced the concept of blue green infrastructure planning at the June 17, 2010 Lancaster County Planning Commission meeting. NNPDC staff first defined blue green infrastructure and then linked the benefits of blue green infrastructure planning to other functions that local governments are mandated to provide. NNPDC staff explained that local governments are charged with protection of water quality within their jurisdictions as a result of the Chesapeake Bay Preservation Act while at the same time, they must have a comprehensive plan in place to help steer development to appropriate places (future growth areas). NNPDC staff then extrapolated that if the county has the authority to define which areas are best for future development, then they should have the authority to determine where development should not occur. The best places to develop (as defined by the future growth areas in the Comprehensive Plan Future Land Use Plan Map) have been determined to have characteristics that limit negative consequences from development (e.g. mostly level, well drained land, sewage treatment available) and maximize the positive consequences (e.g. jobs, convenience, tax revenue, proximity to population).

Conversely, there most likely are areas within the county where development would increase the negative consequences (e.g. poorly drained soils, steep slopes, highly erodible soils) and would cost much more to develop since engineered solutions must be designed to compensate for poor site characteristics. If these costly engineered solutions fail, then the negative consequences from this development can contaminate nearby groundwater, and possibly lead to siltation of creeks or smothering of wetlands and/or oyster beds by erosive deposits from upland areas. In these areas, where the cost to develop is high, along with the possibility of environmental damage if development is not constructed properly and maintained judiciously, perhaps these areas might be best to be left in a natural state. The highest and best use might be to leave these areas in a natural state with native vegetation holding fragile soils in place, sequestering carbon, absorbing carbon dioxide, emitting oxygen and promoting groundwater infiltration into underground aquifers for the benefit of Lancaster County future citizens.

NNPDC staff likened the future growth areas defined by the locality in the Comprehensive Plan as analogous to prime farmland. Prime farmland is defined as the land best suited for crop production, with the minimum amount of inputs needed to assure high crop yield. Thus marginal farmland can produce a moderate crop yield; however, there are more inputs needed (fertilizers, herbicides and pesticides) in order to get a decent harvest (and return on investment). Economically speaking, perhaps farmers should reduce the amount of marginal farmland farmed and maximize the use the prime farmland, letting the marginal farmland revert to a natural state. NNPDC staff suggested that local government can follow this example, develop on the lands that are best suited for it, and protect areas that could pose problems if developed improperly (or at too large a scale).

NNPDC staff expounded that if no natural area planning is undertaken by the county (as is the case now) then the developers will continue to develop parcels throughout the

county, thereby fragmenting valuable natural habitat. Developers will develop where they can make the most profit, and once the county is built-out (all lands are subdivided and developed to the maximum extent allowed by zoning law), then the only areas left will be small pockets of non-functional natural areas, too small and fragmented to provide any wildlife habitat and too small to effectively filter the large amounts of storm-water runoff generated by surrounding development. NNPDC staff indicated that by beginning natural area planning now, the benefits of these functioning natural areas will be preserved for future generations of Lancaster County citizens. The county will still have plenty of land left for developing, while protecting high value natural areas from future fragmentation.

NNPDC staff wanted to introduce the overall concept of blue green infrastructure protection planning and focus on the concepts and the benefits of the concept without showing local natural area value maps that might complicate the issue to the planning commission; therefore, for this introductory presentation, no local natural area value maps were created.

After the presentation, a planning commission member related that a lot of planning comes up against private landowners property rights and wondered what type of encouragement or incentives they would have to consider to implement blue green infrastructure planning. NNPDC staff stated how blue green infrastructure protection planning would be implemented is up to the individual county and that is a decision that county leaders would have to make. Encouraging landowners in these areas to consider voluntary conservation easements is certainly one way to implement blue green infrastructure protection planning. Another planning commission member asked how the landowners in the blue green infrastructure protection designated areas would be compensated for the reduced value of their land. He further stated that a lot of landowners, especially farmers, do not have retirement investments, and plan on selling their land for development to generate cash to fund their retirement. He stated there would need to be some kind of fund to pay landowners for the loss of the best use of their land. NNPDC staff mentioned the Chesapeake Bay Total Maximum Daily Load (TMDL) enforcement action instituted by EPA will be in effect by the end of the year (2010). NNPDC staff further explained that the state has decided to greatly expand the Nutrient Credit Exchange Program, and that there might be instances where payments to landowners could be used to offset nutrient credits to sewage treatment plants that are more expensive to upgrade. The planning commission chair related that although blue green infrastructure planning sounds like a good idea, a few years ago, the planning commission bought into another good idea, the highway corridor overlay district, and it was rapidly shot down by the citizens of Lancaster County due to perceived property rights intrusion. He mentioned he did not want to repeat that scenario with blue green infrastructure protection planning, if citizens packed the meeting room to protest the project. NNPDC staff explained that they were informing the county what the state has done with natural area value mapping, that these natural area datasets have never before been available to counties, and that there is an opportunity to help protect local valuable coastal resources (now that we know where they are) to the future benefit of the citizens of the county of Lancaster. Whether or not the county decides to implement blue green

infrastructure protection planning is a decision that is entirely up to the county with the NNPDC available for assistance regardless of the decision.

The next Lancaster County Planning Commission meeting the NNPDC presented on blue green infrastructure planning was on August 9, 2010. To further elaborate the fragmented nature of current natural area protection and to have a baseline to reference, NNPDC staff obtained the most up to date (7-9-10) conserved land database from the Department of Conservation and Recreation and clipped the data to the Lancaster County boundary. Maps were produced for the county and the region, the conserved lands were divided into two categories, conserved (mostly public) lands and private conservation easements. Lancaster County had a total of 4.6% of land in the county conserved, with 1.7% conserved (mostly public) lands which includes Belle Isle State Park and Chilton Woods State Forest, and 2.8% in private conservation easements. The conserved lands map shows properties dispersed throughout the county, with no clear concentration in any area of the county. To compare Lancaster County to the region as a whole, the four county region of the Northern Neck had a total of 7% of the land conserved, with 4.4% conserved (mostly public) lands and 2.6% of the land in private conservation easements.

After discussing the current state of natural area protection in Lancaster County, NNPDC staff presented maps of the Virginia Conservation Land Needs Assessment (VCLNA) ecological model and the Priority Conservation Areas (PCA). NNPDC staff explained that the VCLNA uses natural areas (mostly forested) of 100 acres or larger, called cores, as its basis and has a bit of an upland terrestrial bias. NNPDC staff, when displaying the PCA data, described the data as having more of a balance between water resources as land resources. Planning commission members commented that the PCA map makes it look like the whole county should be protected, which of course, is not realistic nor desirable. NNPDC staff concurred that the map looked somewhat busy but added that the reason is because the water has been classified as well as the land.

NNPDC staff asked the planning commission members to look twenty, fifty or one hundred years in the future and ask themselves what could they have done now to help protect the rural and natural resource heritage that Lancaster County was built upon. NNPDC staff explained that once natural areas are developed, they are lost forever. The effect of development on watershed water quality was also discussed. Development creates impervious surfaces, such as roofs and parking lots, which cause more storm water to run off the land at a quicker rate and at a higher volume and temperature than a watershed with a majority of natural cover. The rain in a watershed with mostly natural cover soaks into leaves, branches and the bark of trees, and what does fall to the ground is dissipated by the understory vegetation and the leaf cover on the forest floor to be eventually absorbed by the soil. There is very little storm water runoff in these watersheds, and when it does occur, they tend to be from the larger storm events.

In watersheds with developed lands, rain hits roofs, sidewalks, and parking lots, and is heated up by the thermal inertia of the roof or pavement. Since these materials are impervious, almost all of the rain water runs off quickly, filling up curbs and gutters and flowing rapidly to the nearest culvert and stream. As a result of the fast moving nature of

the storm water, there is little attenuation of the temperature or volume before this water hits a stream with aquatic life in it. The temperature variation and the accumulated toxins that are picked up when the storm water moves across the impervious landscape stress aquatic life and can impact benthic organisms. Research has shown that watersheds with as little as 11% of impervious cover can impact stream health and the organisms that live in streams. NNPDC staff related that development usually adversely affects the water quality of surrounding streams and waterways. If a locality truly wants to protect and maintain high water quality then there should be considerable thought into the amount of development that should be allowed in the watershed. If there was an area or a waterway in the county that they wanted to protect from the negative environmental impacts of development, then a blue green infrastructure plan could help them accomplish this goal.

The planning commission chair stated that while the concept for planning for protection of natural areas makes sense, the average landowner in Lancaster County would probably not understand why their land was delineated for protection. He mentioned that education of the benefits of conservation would be helpful. He also mentioned that blue green infrastructure planning would be easier to sell to the public if there were measurable benefits to the citizens of Lancaster County.

NNPDC staff stated that he understood the chairman and that at the next presentation to the Planning Commission would attempt to answer that question.

NNPDC staff, with help from the George Washington Regional Commission (GWRC) staff, conducted an analysis of the ecosystems services that natural areas in Lancaster County produce. The software program (called CityGreen) calculates the value of air pollution removal, carbon sequestration and storm water management that natural areas provide, using satellite land cover data as its main input. Satellite land cover data was available for Lancaster County for the years 1996, 2001 and 2006, therefore analyses were run by GWRC staff for the four NNPDC counties those calendar years. The basic assumption of the CityGreen software is modeling the effects if all natural area in a county was removed, and that engineered solutions would have to be created to filter the air, store the carbon and filter storm water runoff. The graphs and charts created by the City Green software was incorporated into a presentation with the subtitle "How does blue green infrastructure planning benefit the average citizen of Lancaster County?"

NNPDC staff presented at the October 21, 2010 Lancaster County Planning Commission meeting, opening with the introduction to the CityGreen software analysis in an attempt to answer the question above. There was some discussion over the value of the computer model analysis, most notable that the presumption of all vegetated areas being removed as being unrealistic. Planning commission members seemed to understand that vegetated areas of the county do provide benefits to citizens of the county, and that if those areas were to disappear, there would be negative environmental consequences. NNPDC staff also noted that the forest land cover data in Lancaster County is declining throughout the time period of 1996 through 2006. NNPDC staff surmised that forest land is being converted to agricultural fields, as well as residential use.

In addition to the quantitative benefits of blue green infrastructure planning illustrated by the CityGreen software, NNPDC staff wanted to emphasize that such planning, in addition to helping wildlife habitat and water quality, can also help the county accomplish other goals that it has already committed to achieve. Throughout the last comprehensive planning process, residents stated that they wanted to protect the rural character of the county and the cultural heritage of the past. NNPDC staff mentioned that the forests were the first resource of the new world, and helped provide material to build watercraft to harvest the local seafood, as well as build the structures to house the early settlers, as well as providing habitat for the vast amount of wild game present. Today, forestry is still a significant economic sector in Lancaster County (along with agriculture). NNPDC staff stated that most forests in the Northern Neck are located on marginal soils or soils with steep slopes because if the land was productive and flat, it would be in agricultural production.

Near the end of the presentation, NNPDC staff inquired on the best approach that the planning commission would like to use to identify high value natural areas in the county for inclusion in the blue green infrastructure plan. The chairman of the planning commission noted that identifying natural areas is important, but they need to find a way to go about it so as to not infringe on property owner's rights. A planning commission member stated that only a small portion of the county is publically owned and that the blue green infrastructure planning project would rely on the voluntary participation of private landowners. He also stated that he liked the idea of identifying reservoir sites in the county. Another planning commission member agreed but explained that he is interested in the planning tool, not necessarily restricting landowner's rights at this time. The chair agreed, but noted that when the commission has tried to identify areas in the county for other things, the owners of those properties did not want their property singled out. He stated that it has been his experience in the past that the property owners didn't want their properties listed in the Comprehensive Plan as being a good place for reservoirs or other conservation areas. The Lancaster County Planning and Land Use Director stated that the Comprehensive Plan identified seven potential reservoir sites and if NNPDC staff could do an overlay to show how many homes would be affected for each, that would be helpful information to identify possible conservation areas for the next revision of the Comprehensive Plan. NNPDC staff agreed to do the analysis in the hopes that one or more of the areas for potential future reservoir sites could be included in a blue green infrastructure plan. After further discussion with the Lancaster County Planning and Land Use Director, the decision was made to not examine any potential future reservoir sites that were present in the future growth area designated in the Lancaster County Comprehensive Plan, since this area was slated for growth, not conservation.

At the county's request, NNPDC staff digitized the outlines of the flood pool elevation of the reservoirs from the 1969 Northern Neck Economic Development Commission' Comprehensive Plan for Water And Sewerage Facilities from which the reservoirs in the Lancaster County Comprehensive Plan were derived. NNPDC staff then used GIS to overlay the reservoirs with the Lancaster County E911 building outlines to determine if any buildings would be impacted if the reservoirs were constructed. The series of maps

depicting the results were included in the presentation given to the Lancaster County Planning Commission on January 20, 2011. NNPDC staff related that the potential future reservoirs cited in the Comprehensive Plan when at flood pool elevation (the highest level of reservoir, when the spillway starts to siphon off water) there were four structures impacted and they were located on the McMahon Swamp Reservoir located near the intersection of Route 600 and Route 201. Two of the structures were residential buildings and two were commercial buildings owned by the same company. NNPDC staff also offered that the two Little Branch Corrotoman Reservoirs in between Route 354 and Route 3 has the least amount of development surrounding them.

To further the case for inclusion of some of the potential future reservoir areas into a blue green infrastructure plan, NNPDC staff overlaid the 800 foot waterfront residential overlay district buffers around the potential future reservoir sites from the Lancaster County Comprehensive Plan, over the VCLNA ecological model cores. The reservoir buffer polygons lined up well with natural area cores, and three of the reservoirs were located on high ecological value natural area cores according to the VCLNA model.

In order to further the case for inclusion of the future potential reservoir sites, which follow the streambeds of the county, NNPDC staff wanted to illustrate the amount and distribution of steep slopes around the streams in Lancaster County. Since the only elevation model the NNPDC has does not have a fine enough resolution to show the narrow steep slopes along the streambeds, NNPDC used USDA soil classes as a proxy. USDA soil classes have a slope range built into their description, and NNPDC staff created a map with the steepest soil class (E) which has a slope of 15 to 45 percent. This soil class, named Steep Sandy Land (StE), is described in the use and management section of the Lancaster Soil Survey as nearly all of the soil type is wooded. The soils are only suited for trees or the most hardy, drought resistant varieties of grasses. NNPDC staff decided to further illustrate the steep slope issue by including the "D" soil classes, which have slopes that range from 10 to 15%, noting that these soils are usually adjacent to the "E" soils. NNPDC explained that these soils are also too steep to farm sustainably, so that most often these are left in a natural vegetative state. NNPDC staff then overlaid the steep slopes over the VCLNA ecological model natural area cores, and there was much overlap, although the steep slopes did not exactly following the outlines of the natural area cores. These maps seemed to resonate well with the planning commission, since it was clear that there are steep slopes in the county, that these slopes have soils with little organic matter and are comprised mostly of sand, and as such are highly erodible if the vegetation is removed. A planning commission member noted that this was an excellent presentation and he thought tying the reservoir issue with the sloping of the land, with its limited use, into the blue green infrastructure planning adds a new dimension to the issue. The planning commission chair noted that it would be beneficial to know how many tax parcels would be affected around each potential reservoir site and the tax numbers of such parcels.

NNPDC staff at the request of the Planning Commission, overlaid the future potential reservoir flood pool elevations previously digitized with Lancaster County digital tax maps to determine the number of property owners affected by the potential future

reservoir foot print. NNPDC staff had to group properties, as some landowners owned multiple adjacent properties. NNPDC staff, cognizant of the Planning Commission's desire to reduce impacts to county citizen's property rights, decided to create additional maps to show the 100 foot Chesapeake Bay Resource Protection Area over the reservoir inundation areas. Since the 100 foot Chesapeake Bay Resource Protection Area is already a local ordinance affecting local property owner's rights, NNPDC staff hoped it would illustrate that the land use in these areas are already restricted and adding another layer of protection would not be very burdensome to property owners. NNPDC staff compiled the unique property owners and the 100 foot Chesapeake Bay Resource Protection Area maps for each of the five reservoirs, incorporating them into what would be the final presentation to the Lancaster County Planning Commission on blue green infrastructure planning on March 17, 2011.

NNPDC staff presented the series of maps that he created to help the Planning Commission determine which reservoirs had the least amount of property owners impacted. NNPDC staff noted that the reservoir with the least number of unique property owners (10) was Camps Millpond. NNPDC staff also showed that most of the reservoir footprints are already covered by the 100 foot Chesapeake Bay Resource Protection Area, and that this land already has restrictions on what landowners can build there. NNPDC staff hoped that showing that these lands are already subject to building restrictions would encourage the Planning Commission to move forward in creating a blue green infrastructure plan. However, that was not the case. A planning commission member asked that if the reservoirs were built, then wouldn't the 100 foot Chesapeake Bay Resource Protection Area move inland of the reservoir and represent a taking. After a long discussion between county staff and Planning Commission members the answer was determined to be yes. The chair of the Planning Commission then thanked NNPDC staff for their work and interest in Lancaster County planning, but took no further action in regards to blue green infrastructure planning.

Additional supporting information in the form of presentations given to the Lancaster Planning Commission and newspaper articles written about the Blue Green Infrastructure Protection Planning Project in Lancaster County are found in Appendix B.

Richmond and Westmoreland Counties Blue Green Infrastructure Planning - Continuing Efforts

III. Richmond County

NNPDC staff in the previous grant year worked with the Richmond County Comprehensive Plan Committee to try to incorporate blue green infrastructure protection planning into the Comprehensive Plan Revision process which was underway at that time. NNPDC staff commended the Richmond County Comprehensive Plan Committee on the previous Comprehensive Plan that already had conservation areas identified in their Future Land Use Plan Map. NNPDC staff overlaid the existing conservation areas from Richmond County's 1999 Comprehensive Plan over top of the Virginia Department of Conservation and Recreation's (DCR) Virginia Conservation Land Needs Assessment Ecological Cores using GIS and found that the state VCLNA data corroborated the work the county did back in 1999 in designating those areas as conservation in the Future Land Use Plan Map. The work done back in the late 1990's from local knowledge of county officials was validated by the Virginia Department of Conservation's natural area modeling work with the VCLNA model data fifteen years later. This news generated excitement from both Virginia DCR and Richmond County staff.

Through the GIS analysis of overlaying the conservation areas with the VCLNA, NNPDC staff identified one area in the county that was a high value natural core, but was not shown as a conservation area on the Future Land Use Map, the Cat Point Creek Watershed. NNPDC staff recommended to the Richmond County Comprehensive Plan Committee to add this conservation area to the other conservation areas present in the Future Land Use Map for the new Comprehensive Plan in development.

Richmond County Comprehensive Plan Committee members expressed concern that the conservation areas in the existing Comprehensive Plan were too large, covered too much of the county and would limit future development of the county. At the December 28th, 2010 meeting of the Committee, members asked NNPDC staff to help them better understand the conservation areas by 1) requesting the area and percent of land already conserved, 2) area and percent of existing Comprehensive Plan conservation areas, 3) area and percent of the recommended addition to the conservation area (Cat Point Creek), and 4) total area and percent of the existing conservation areas and recommended conservation areas, and 5) the total area and percent of the existing conservation areas, recommended conservation areas and currently conserved areas. NNPDC staff, using GIS, performed analyses to answer these questions for the Richmond County Planning Commission. In addition NNPDC staff thought it would be beneficial to calculate the area within the conserved areas that were already protected by existing law that prohibits development in these areas. Wetland law and Virginia's Chesapeake Bay Preservation Act 100 foot Resource Protection Area do not allow development in those areas already so the thought would be to subtract the area of these features from the total. Subtracting the lands already protect from development would give a true and accurate representation of the area and percent of land that could be developed within the conservation areas, instead of the total area.

NNPDC staff presented the results of the GIS analysis at the Richmond County Comprehensive Plan Committee on April 26, 2010. The total land area of the existing Comprehensive Plan Conservation Areas are 22.08 square miles, and that makes up 11.5% of the land areas. The total land area of the existing Comprehensive Plan Conservation Areas minus the wetlands and Chesapeake Bay Resource Protection Areas (RPA) is 16.86 square miles which equates to 8.8% of the land area. The NNPDC recommended addition to the existing Comprehensive Plan Conservation Areas (Cat Point Creek) land area was 11.05 square miles, or 5.8% of the land area. The NNPDC recommended addition to the existing Comprehensive Plan Conservation Areas (Cat Point Creek) land area minus the wetlands and RPA is 7.91 square miles or 4.1% of the county land area. Therefore, the total area of the existing and recommended conservation areas was 33.2 square miles or 17.2% of the county's land area. Additionally, the total area of the existing and recommended conservation areas minus the wetlands and RPA was 24.8 square miles, or 12.9% of the land area in the county. The total area of the existing and recommended comprehensive plan conservation areas and currently conserved lands (subtracting any currently conserved land from any of the comprehensive plan conservation areas- to eliminate double counting) are 46.08 square miles or 24.0% of the county land area. Subtracting the wetlands and RPA's from the existing and recommended comprehensive plan conservation areas and currently conserved lands yields 37.78 square miles or 19.7% of the county land area.

In subsequent meetings, the Richmond County Comprehensive Plan Committee chose not to include any new conservation areas, in fact, they removed all of the existing conservation areas from the Future Land Use Map. So currently there are no conservation areas designated on any of the maps in the Richmond County Comprehensive Plan.

Richmond County staff indicated that the newly revised Comprehensive Plan (without any mention of conservation areas) will have public hearings in July or August 2011, and then after any revisions, be up for adoption by the Richmond County Board of Supervisors soon after that.

Additional information in the form of the April 26, 2010 presentation to the Richmond County Comprehensive Plan Committee can be found at the end of this report in Appendix C.

IV. Westmoreland County

NNPDC staff in the previous grant year worked with the Westmoreland County Planning Commission in an attempt to create a blue green infrastructure plan for inclusion into the Westmoreland Comprehensive Plan. NNPDC staff encouraged the Planning Commission to customize the natural area data that was produced by DCR in cooperation with the Virginia Coastal Program. Planning Commission members stated that they did not want to lose any information contained in the state developed data, so they did not modify any of the VCLNA maps. The chairman of the Planning Commission stated that the Planning Commission would use the Green Infrastructure maps as guidance whenever zoning changes came to the Commission for a recommendation. NNPDC staff helped Westmoreland County revise their Comprehensive Plan, and followed the plan through to adoption by the Westmoreland County Board of Supervisors on December 13, 2010. The Westmoreland County Comprehensive Plan is available on the Westmoreland County website, <http://www.westmoreland-county.org/assets/docs/2010-Westmoreland-Comp-Plan-ADOPTED-2010-12-13.pdf>. However, the maps are separated from the text of the Comprehensive Plan to reduce download times due to file size. Therefore, the link for the Westmoreland County Comprehensive Plan Maps is: <http://www.westmoreland-county.org/assets/docs/All-Westmoreland2030-Maps-2009-12-07-WEB.pdf>. The comprehensive plan maps pertaining to Blue Green Infrastructure Protection Planning start with map 8.22a, Westmoreland County Green Infrastructure: Conserved Lands as of 2008, which depicts lands currently protected from development, both public and private. Next is map 8.22b, Westmoreland County Green Infrastructure: Virginia Conservation Land Needs Assessment: Known Conservation Sites which illustrates confirmed sites of natural resource assets, either plant, animal or habitat. Map 8.22c, Westmoreland County Green Infrastructure: Virginia Conservation Land Needs Assessment: Natural Area Cores, shows the rankings of the natural area cores from the VCLNA Ecological Model. Map 8.22d, Westmoreland County Green Infrastructure: Virginia Conservation Land Needs Assessment: Natural Area Corridors are corridors proposed in the VCLNA to link higher value cores together to provide for animal movement, as well as seed transport. The final blue green infrastructure map is Map 8.22e, Westmoreland County Green Infrastructure: Virginia Conservation Land Needs Assessment: Cultural Needs Assessment which ranks modeled cultural significance on a scale from high to low.

Westmoreland County is currently the only Northern Neck county that the NNPDC has had success in getting blue green infrastructure maps into their county comprehensive plan.

Appendix A

Northumberland County Blue Green Infrastructure
Protection Planning:
Additional Information

Northumberland County Blue-Green Infrastructure Planning



May 20th, 2010

Northumberland Planning Commission Meeting

What is Blue-Green Infrastructure Planning?

Blue - Green Infrastructure is “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”.

Why Blue-Green Infrastructure Planning Important

- County government is responsible for water quality protection (Comp Plan, Chesapeake Bay Act)
- County government is also charged with steering development to appropriate areas (Comprehensive Plan)
- It follows that County government should plan for areas in the county that should remain in a natural state, to benefit all present as well as future citizens

Why Blue-Green Infrastructure Planning Important (cont'd)

- Instead of waiting until a majority of the lands in the county are developed, perhaps we should PLAN which parts of Northumberland County should remain in a natural state
- With the EPA Chesapeake Bay TMDL process ongoing, there will be a Bay-wide TMDL in place for nutrients and sediment by December 2010, retaining natural open space will help filter nutrients before they reach the Bay

Northern Neck Regional Blue-Green Infrastructure Planning

- A focal area of the Virginia Coastal Zone Management Program, DEQ, NOAA and executed by the local Planning District Commissions
- Currently, the Richmond, Fredericksburg, and the Northern Neck Planning District Commissions are currently working on Blue - Green Infrastructure Plans for their member counties
- The NNPDC is working primarily with Westmoreland and Richmond County last year, since they are in the process of revising their Comprehensive Plans. This year, the NNPDC is working with Northumberland and Lancaster Counties on Blue - Green Infrastructure Plans

New Data Layers to Support Blue Green Infrastructure Planning in Virginia

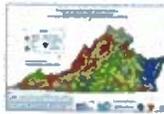
- Department of Conservation and Recreation's Virginia Conservation Needs Land Assessment (VCLNA) GIS Model and Maps
- Department Conservation and Recreation, Department of Game and Inland Fisheries Priority Conservation Area Maps

Virginia Conservation Needs Land Assessment (VCLNA)

- Statewide effort to identify high value natural lands
- Contains several GIS models: Ecological, Cultural Asset, Vulnerability, Forest Economics, Recreation Model, Watershed Integrity, and Agricultural Model
- Focus mainly on Upland Terrestrial Habitat

SYNOPSIS OF THE VIRGINIA CONSERVATION LANDS NEEDS ASSESSMENT

The VCLNA is a flexible, widely applicable tool for integrating and coordinating the needs and strategies of different conservation interests, using GIS (Geographic Information System) to model and map land conservation priorities and actions in Virginia. The VCLNA consists of seven complex models:



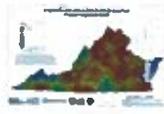
ECOLOGICAL MODEL

The *Ecological Model* is a collection of models and products including the Virginia Natural Landscape Assessment (VaNLA), DGIF's Wildlife Action Plan, and a biodiversity assessment using species and natural community information from DCR's Natural Heritage Program. The VaNLA is a landscape-scale GIS analysis for identifying, prioritizing, and linking natural habitats in Virginia. It identifies and connects the most important natural, unfragmented lands based on considerations of biological and ecological value and integrity.



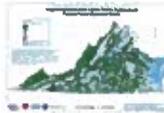
CULTURAL ASSET MODEL

The *Virginia Cultural Asset Model* is a statewide model showing the cultural value of lands in Virginia. The Division of Natural Heritage worked closely with the Virginia Department of Historic Resources to identify and prioritize important cultural assets in Virginia, including archaeological and architectural sites, and American Indian Areas.



VULNERABILITY MODEL

The *Virginia Vulnerability Model* (or growth prediction model) are four statewide and one composite model showing predicted growth patterns across the landscape. The model uses GIS and statistical methods to analyze housing allocation, lot size estimation, growth hotspot, residential land conversion hotspots and travel time proximity in an effort to model urban, suburban (urban fringe) and rural (outside the urban fringe) growth patterns.



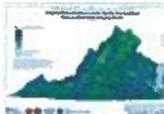
FOREST ECONOMICS MODEL

The *Forest Economics Model* is a GIS effort to map viable forestland with economic value. The Division worked closely with the Virginia Department of Forestry to analyze biophysical parameters, management constraints and socioeconomic influences.



RECREATION MODEL

The *Virginia Recreation Model* is a GIS effort to map the value of lands as they contribute to recreational opportunity. The Division worked closely with the Virginia Department of Game and Inland Fisheries as well as DCR's Division of Planning and Recreation and numerous collaborators and data contributors to analyze a variety of recreational datasets (including but not limited to hunting, fishing, wildlife watching, parks, trails, population density influences and public access) in an effort to model recreational value across the landscape.



WATERSHED INTEGRITY MODEL

The *Virginia Watershed Integrity Model* is a GIS effort to map the relative value of land as it contributes to water quality and watershed integrity. The Division worked closely with the Virginia Department of Forestry and Virginia Commonwealth University Center for Environmental Studies to analyze a variety of parameters focused on identifying important terrestrial features that contribute to water resources, and, therefore watershed integrity.



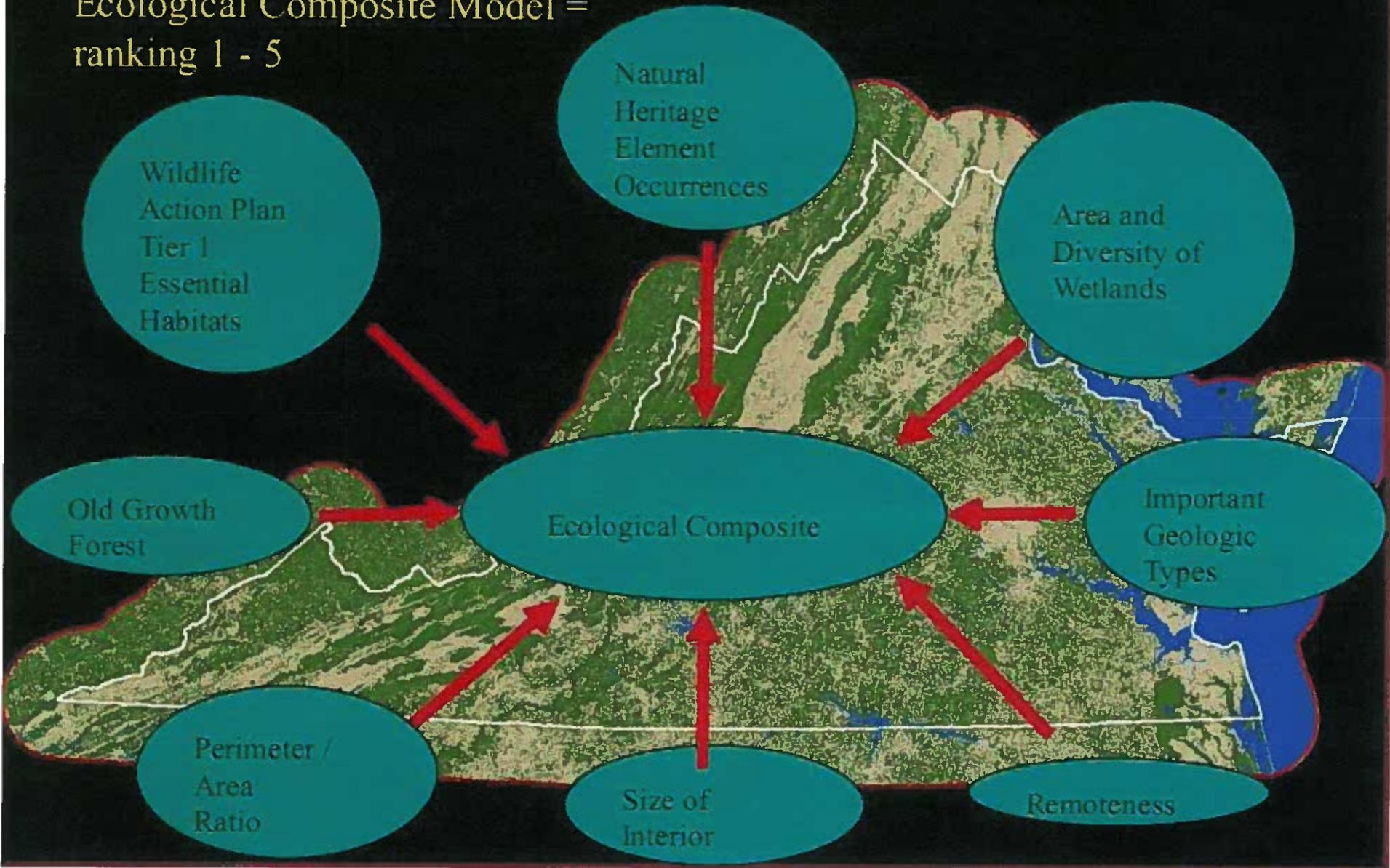
AGRICULTURAL MODEL

The *Virginia Agricultural Model* is a GIS effort to map important agricultural lands in Virginia, developed in cooperation with the Department of Agriculture and Consumer Services and the Virginia Department of Historic Resources. This model analyzed parameters such as soils, slope, land use and historic farms.



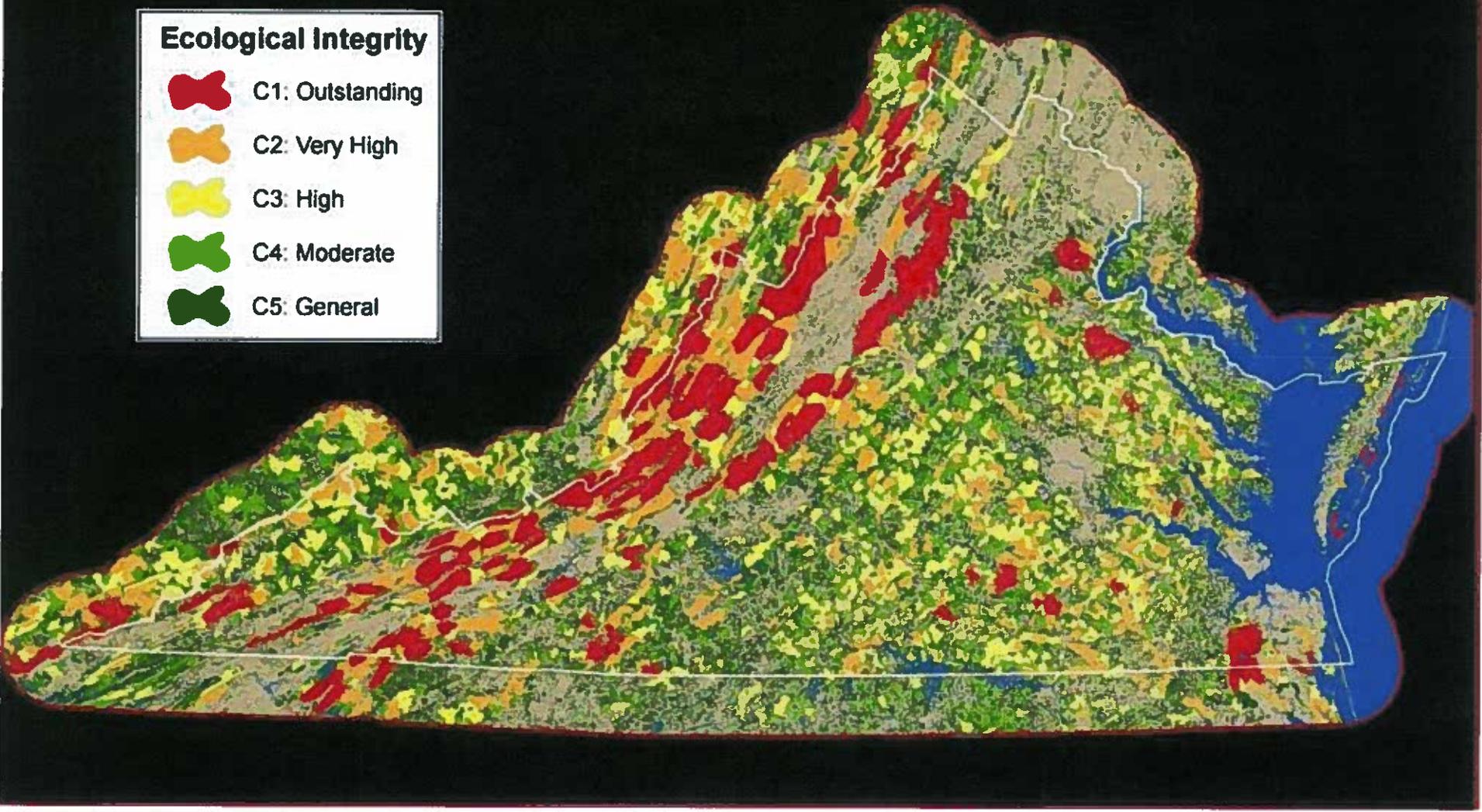
http://www.dcr.virginia.gov/natural_heritage/vclna.shtml

Ecological Composite Model =
ranking 1 - 5



Ecological Integrity

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

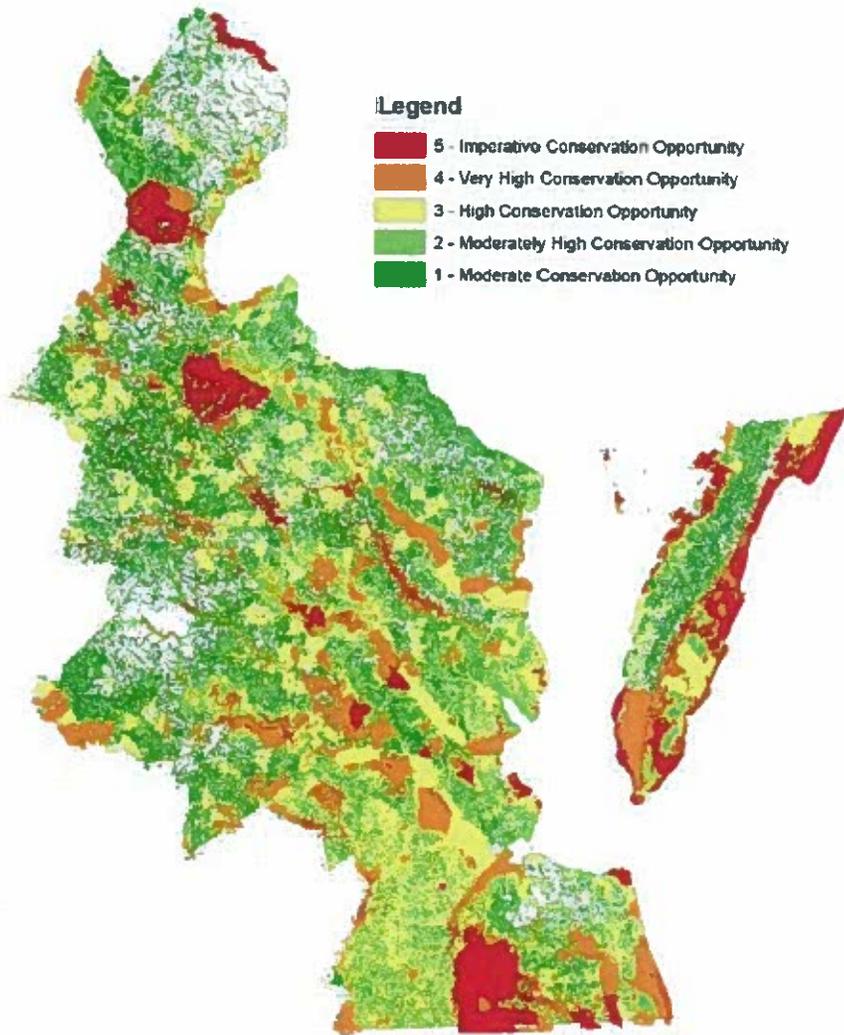


Virginia Priority Conservation Areas

- Combines the VCLNA with VDGIF's Priority Wildlife Diversity Conservation Areas from the Wildlife Action Plan and Virginia Commonwealth University's Aquatic Resources Integrity Layer
- Eliminates the upland terrestrial bias present in the VCLNA
- Helps visually understand the link between land use and near-shore water quality

Priority Conservation Areas

Priority Conservation Areas: lands and surface waters identified as important for conservation of Virginia's wildlife, plants, and natural communities. The identified lands/waters can be used to prioritize areas for preservation, protection or specific management action.



Components in the Priority Conservation Areas (PCA) dataset

DGIF

Priority Wildlife Diversity Conservation Areas (PWDCAs)
A layer created for this project guided by Virginia's Wildlife Action Plan, incorporating mapped species' habitats and recommended conservation actions to conserve riparian buffers, large blocks of habitat and forest and wetland buffers. DGIF biologists provided input to the layer which also includes other wildlife resource spatial data such as Important Bird Areas, Colonial waterbird sites, Coldwater streams and Anadromous fish use waters. See Figure 4.

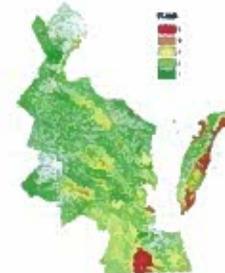


Figure 4. DGIF Priority Wildlife Diversity Conservation Areas

DCR-DNH

Natural Heritage Plan Conservation Sites and Stream Conservation Units
A fine filter approach with polygons that delineate known occurrences of rare species plus required habitat and buffer (Fig. 1). The sites are ranked by biodiversity significance.

Virginia Natural Land Network

A coarse filter approach that prioritizes based on ecological integrity unfragmented cores of natural habitat and the corridors that connect them. For this project they included the highest 2 ranks of cores (C1 and C2) and associated corridors/nodes (Fig. 2).

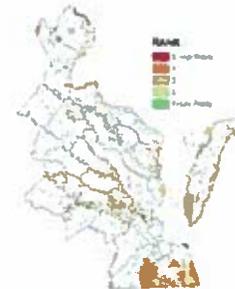


Figure 1. DCR-DNH Conservation Sites and Stream Conservation Units

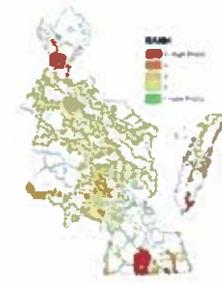


Figure 2. DCR-DNH Natural Land Network

VCU-CES

Aquatic Resources Integrity Layer

A stream reach and watershed based approach. Stream based approach includes an aquatic community assessment based on fish, habitat and macro invertebrates. Streams are assigned one of 4 health categories. Watershed approach incorporates 6 metrics using living resource databases. See Figure 3.

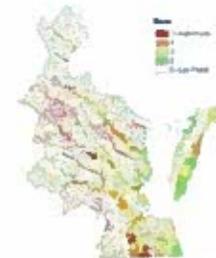


Figure 3. VCU-CES Aquatic Resources Integrity Layer

Next Steps

- Examine the Blue – Green Infrastructure data layers for Northumberland County
- Explore which areas might be considered for inclusion in the Blue – Green Infrastructure Plan
- Draft the Northumberland Blue – Green Infrastructure Plan, with the hope that it could be incorporated into the County Comprehensive Plan during the next revision



Questions?



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Virginia Coastal Zone
MANAGEMENT PROGRAM



Northumberland Blue – Green Infrastructure Planning Map Data



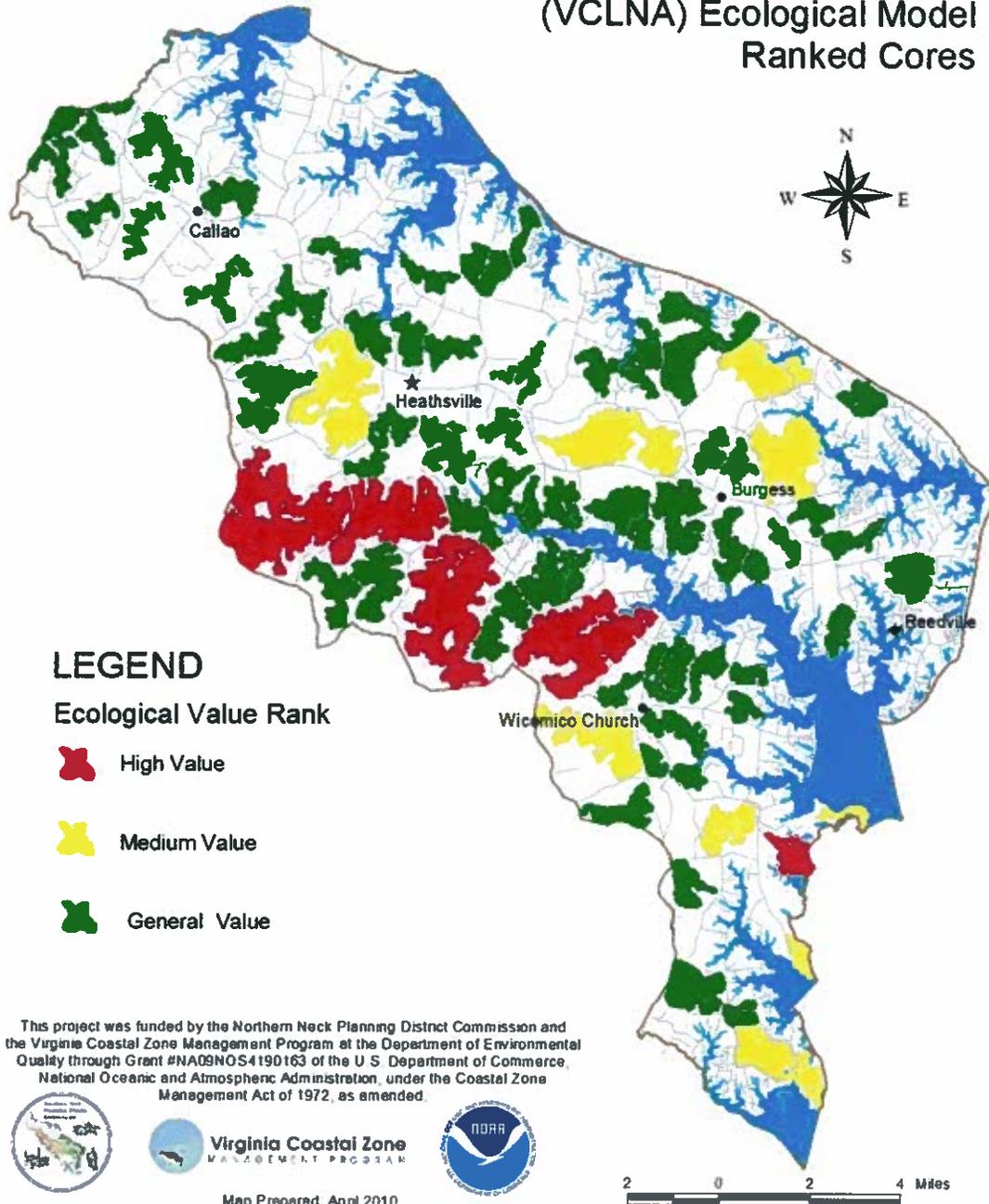
May 20th, 2010

Northumberland County Planning Commission

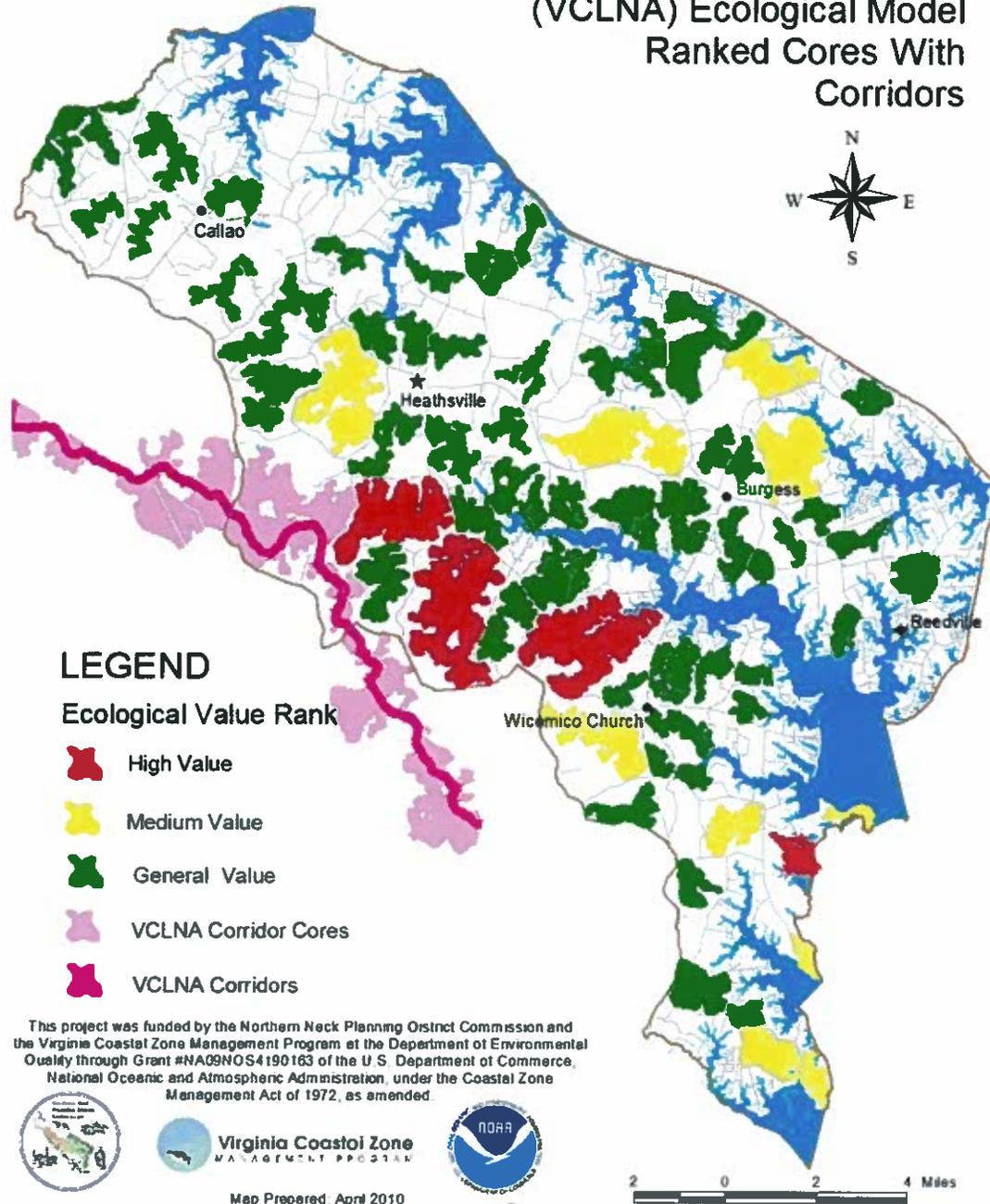
Virginia Conservation Needs Land Assessment

- Basis are “Cores” of natural areas (forests)
- Must be at least 100 acres in size
- Ecologically ranked using model
- Cores were connected to create Natural Corridors
- Has somewhat of an upland terrestrial bias
- Regionwide planning initiative to hopefully link natural areas together

Northumberland County: Virginia Conservation Needs Land Assessment (VCLNA) Ecological Model Ranked Cores



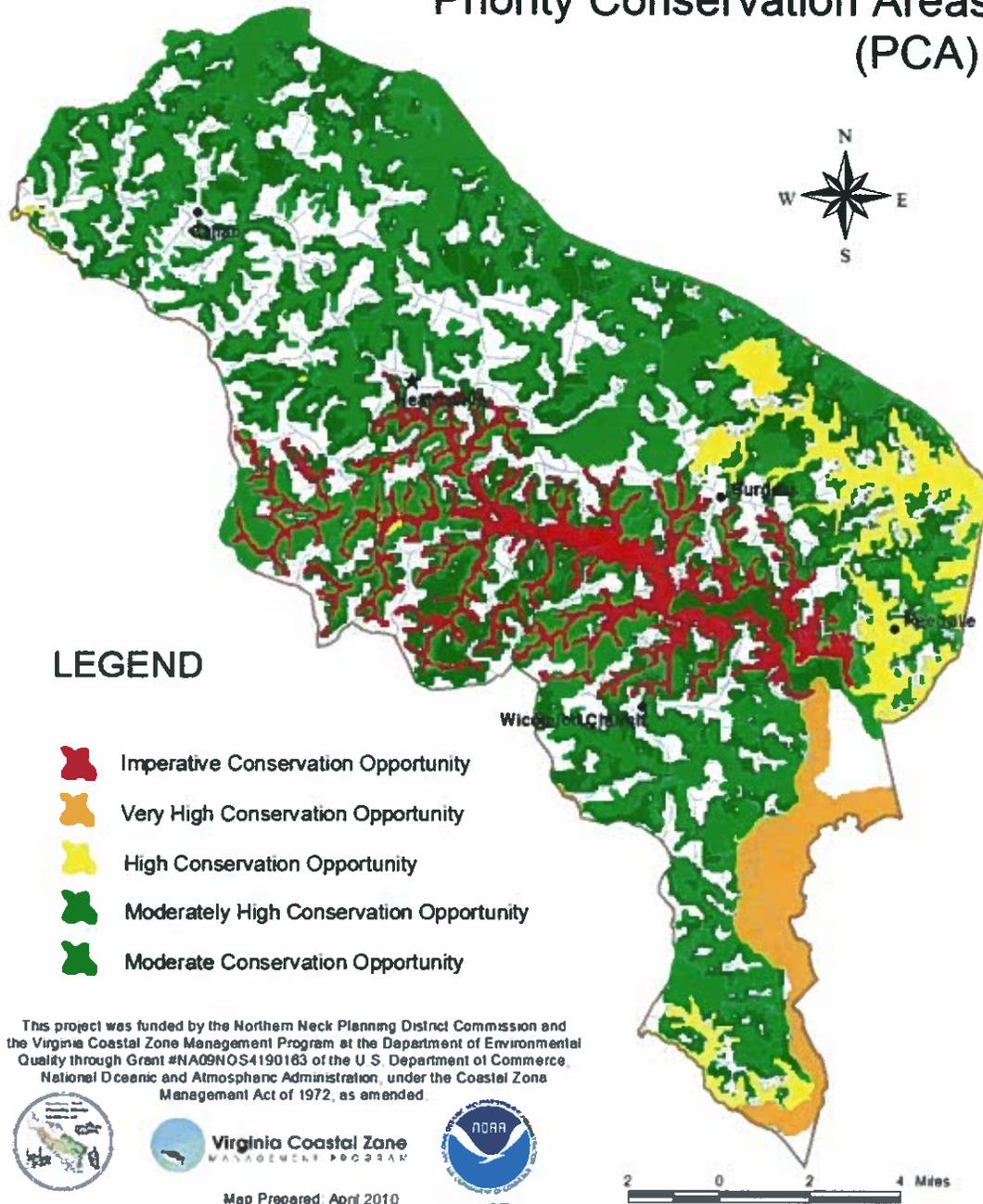
Northumberland County: Virginia Conservation Needs Land Assessment (VCLNA) Ecological Model Ranked Cores With Corridors



Virginia Priority Conservation Areas

- A conglomeration of the VCLNA, VDGIF's Wildlife Action Plan, and VCU Aquatic Resources Integrity Layer
- Focuses more on areas where the water meets the land
- Shows the linkage between good land stewardship and high water quality

Northumberland County: Priority Conservation Areas (PCA)



LEGEND

-  Imperative Conservation Opportunity
-  Very High Conservation Opportunity
-  High Conservation Opportunity
-  Moderately High Conservation Opportunity
-  Moderate Conservation Opportunity

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Map Prepared: April 2010

Questions, Thoughts?

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Virginia Coastal Zone
MANAGEMENT PROGRAM



Environmental planner outlines 'Blue-Green Infrastructure'

by Starke Jett

HEATHSVILLE—Stuart McKenzie last week discussed “Blue-Green Infrastructure” with the Northumberland Planning Commission.

McKenzie described it as the “inter-connected 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.”

An environmental planner with the Northern Neck Planning District Commission, McKenzie said there are new mapping tools available to determine the county’s environmental resources. He suggested these tools could be used in the planning process to preserve the most important ecological and historical sites and steer development toward more appropriate areas.

“Why is it important?” he asked. “Because there are better lands for development and better lands for preservation. This is a guiding tool.”

“Would this restrict what people could do with their property?” asked commission member Bill Kling.

“That depends on what you do,” said McKenzie. “It’s up to you and how you want to do it.”

He explained the mapping tools could be used merely as reference data, or as the basis for county ordinances designed to protect sensitive areas. His suggested goal is to “draft the Northumberland plan, with the hope that it could be incorporated into the county comprehensive plan during the next revision.”

No action was taken on the ideas presented by McKenzie, who will make similar presentations to all the counties in the Northern Neck.

The commission decided to continue its review of the zoning ordinances at its June 17 meeting. Members decided against forming a subcommittee to review the regulations.

The commission has reviewed about half of the zoning ordinance sections and hopes to finish the job by the end of the year. A review of the comprehensive plan is scheduled to start next year.

The commission also heard a report from Ida Hall, the Northumberland representative to the Tidewater Resource Conservation and Development Council (TRCDC). She urged the commission members to fill out a survey the council will use to develop a five-year plan for achieving its vision of “prosperous communities in harmony with their environments.”

The public also is welcome to complete the survey, which can be found online at surveymonkey.com, or by calling the TRCDC in Tappahannock at 443-1118.

Northumberland Blue – Green Infrastructure Planning Map Data



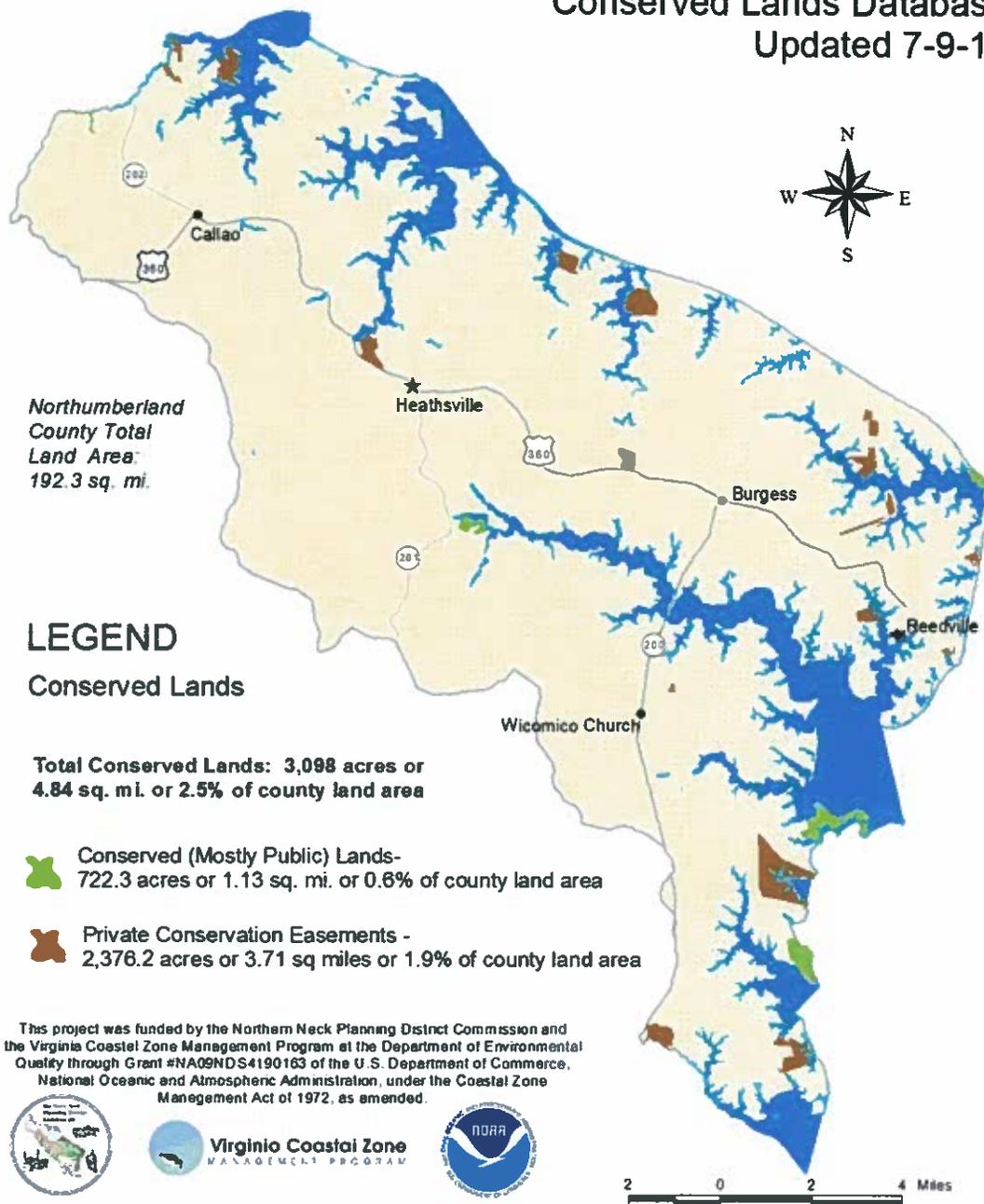
July 15, 2010

Northumberland County Planning Commission

Amount of Land Already Conserved in Northumberland County

- Currently (as of 7-9-10) there are 3,098 acres or 4.84 sq. mi. (2.5%) of the county that are permanently conserved
- Conserved (mostly Public) Lands make up 722.3 acres or 1.13 sq. mi. (0.6%) of the county land area
- Private Conservation Easements make up 2,376.2 acres, or 3.71 sq. mi. (1.9%) of the county land area

Northumberland County:
 Department of Conservation and Recreation
 Conserved Lands Database
 Updated 7-9-10



Northumberland
 County Total
 Land Area:
 192.3 sq. mi.

LEGEND

Conserved Lands

Total Conserved Lands: 3,098 acres or
 4.84 sq. mi. or 2.5% of county land area

 Conserved (Mostly Public) Lands-
 722.3 acres or 1.13 sq. mi. or 0.6% of county land area

 Private Conservation Easements -
 2,376.2 acres or 3.71 sq miles or 1.9% of county land area

This project was funded by the Northern Neck Planning District Commission and the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant #NA09NDS4190163 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.



Comparison of Two Virginia Counties: Conserved Land Percentages

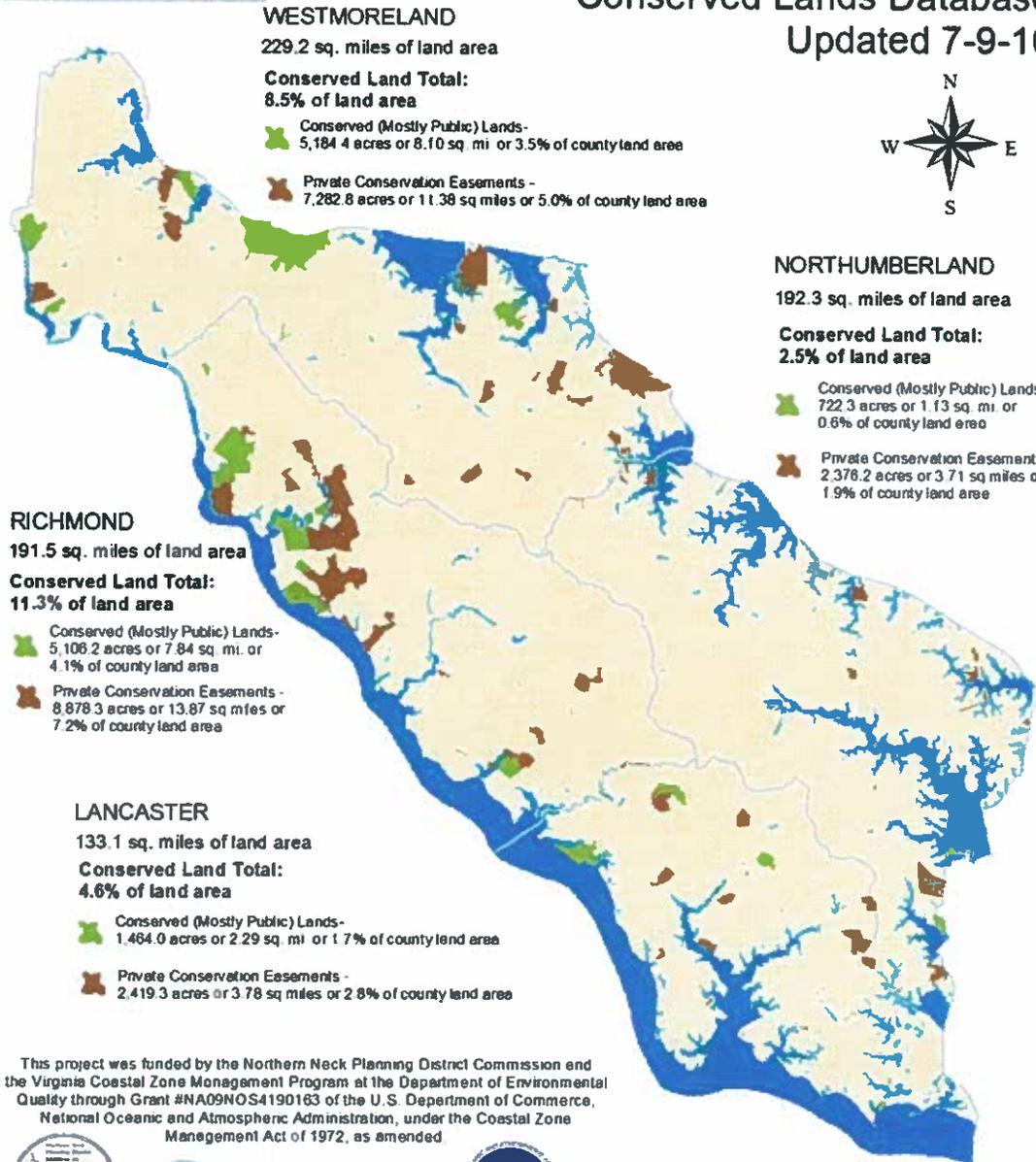
- Northumberland County in Virginia's Northern Neck has 4.84 sq. mi or 2.5% of its land conserved
- Albemarle County in Virginia's Piedmont Region has 165.54 sq. miles or 22.9% of its land conserved

What About the Other Northern Neck Counties?

- The Northern Neck, as a region, has 51.89 sq. mi. or 7% of its land area conserved
- LC has 4.6% of its land area conserved
- RC has 11.3% of its land area conserved
- WC has 8.5% of its land area conserved
- NC has 2.5% of its land area conserved

NNK Regionwide
 Conserved Land 4.4%
 Private Easement 2.6%
 Total Conserved 7.0%

Northern Neck Region Department of Conservation and Recreation Conserved Lands Database Updated 7-9-10



WESTMORELAND
 229.2 sq. miles of land area
Conserved Land Total:
 8.5% of land area

Conserved (Mostly Public) Lands -
 5,184.4 acres or 8.10 sq. mi. or 3.5% of county land area
 Private Conservation Easements -
 7,282.8 acres or 11.38 sq. miles or 5.0% of county land area

NORTHUMBERLAND
 192.3 sq. miles of land area
Conserved Land Total:
 2.5% of land area

Conserved (Mostly Public) Lands -
 722.3 acres or 1.13 sq. mi. or 0.6% of county land area
 Private Conservation Easements -
 2,376.2 acres or 3.71 sq. miles or 1.9% of county land area

RICHMOND
 191.5 sq. miles of land area
Conserved Land Total:
 11.3% of land area

Conserved (Mostly Public) Lands -
 5,106.2 acres or 7.84 sq. mi. or 4.1% of county land area
 Private Conservation Easements -
 8,878.3 acres or 13.87 sq. miles or 7.2% of county land area

LANCASTER
 133.1 sq. miles of land area
Conserved Land Total:
 4.6% of land area

Conserved (Mostly Public) Lands -
 1,464.0 acres or 2.29 sq. mi. or 1.7% of county land area
 Private Conservation Easements -
 2,419.3 acres or 3.78 sq. miles or 2.8% of county land area

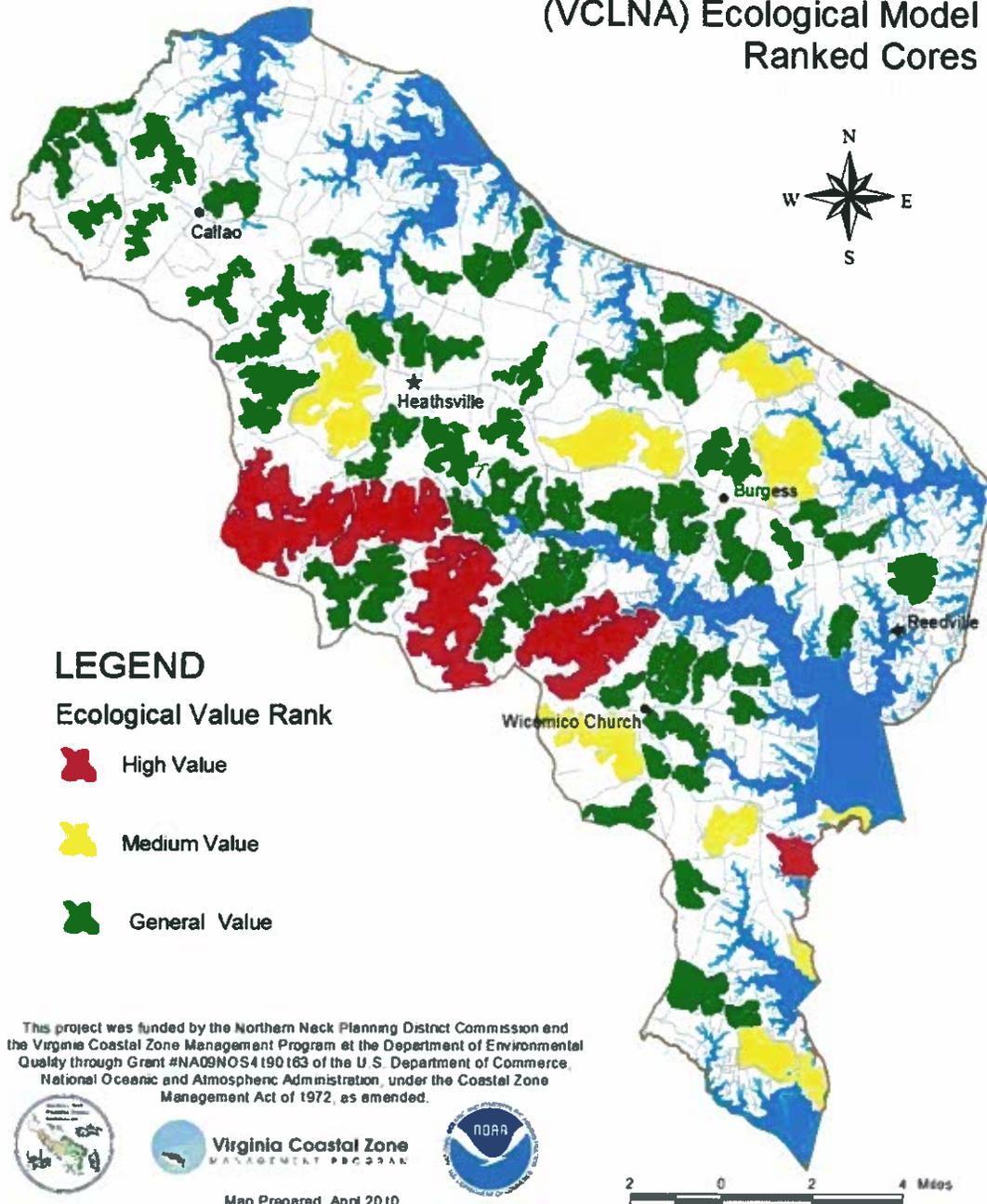
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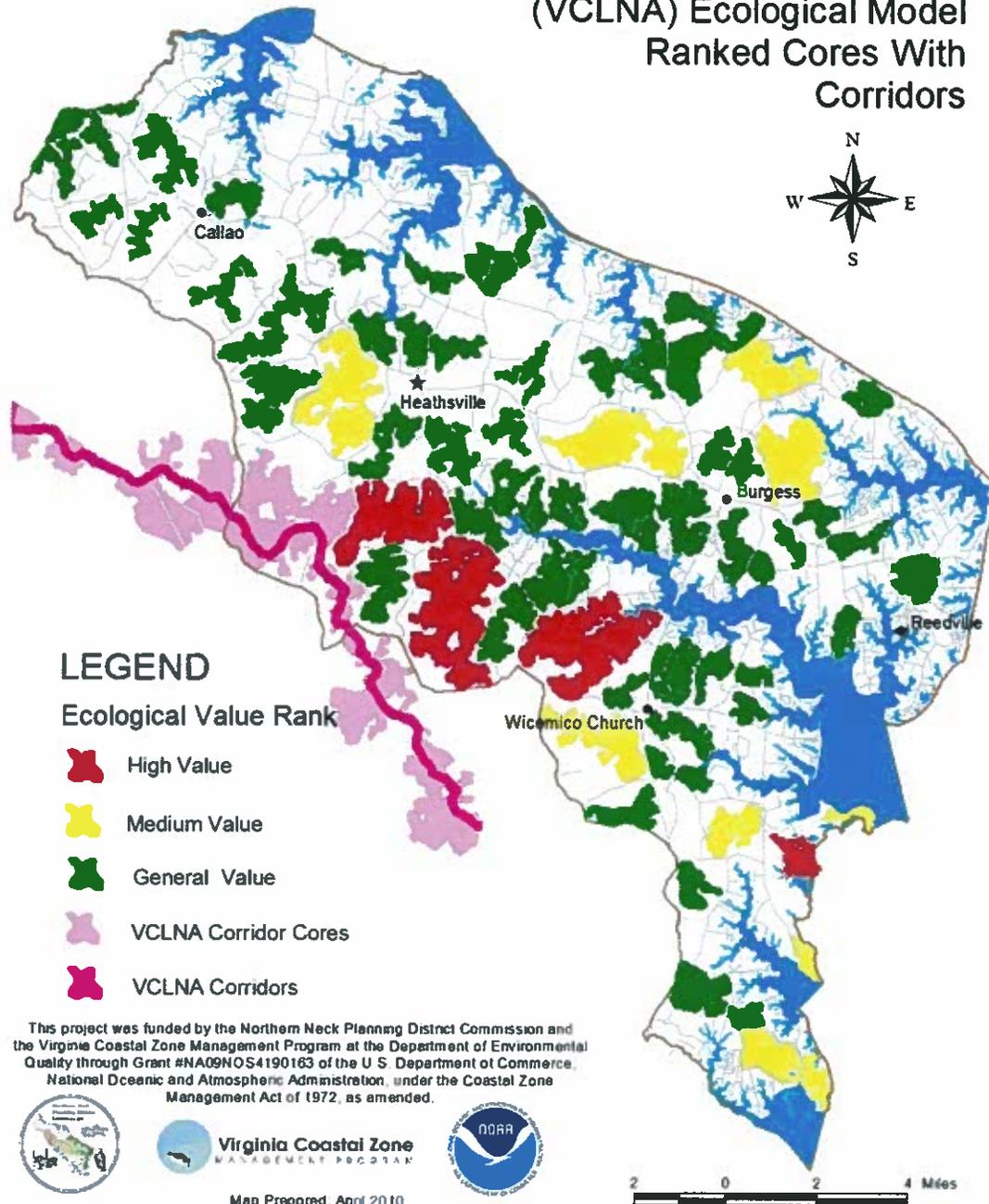
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Northumberland County: Virginia Conservation Needs Land Assessment (VCLNA) Ecological Model Ranked Cores



Northumberland County: Virginia Conservation Needs Land Assessment (VCLNA) Ecological Model Ranked Cores With Corridors



LEGEND

Ecological Value Rank

- High Value
- Medium Value
- General Value
- VCLNA Corridor Cores
- VCLNA Corridors

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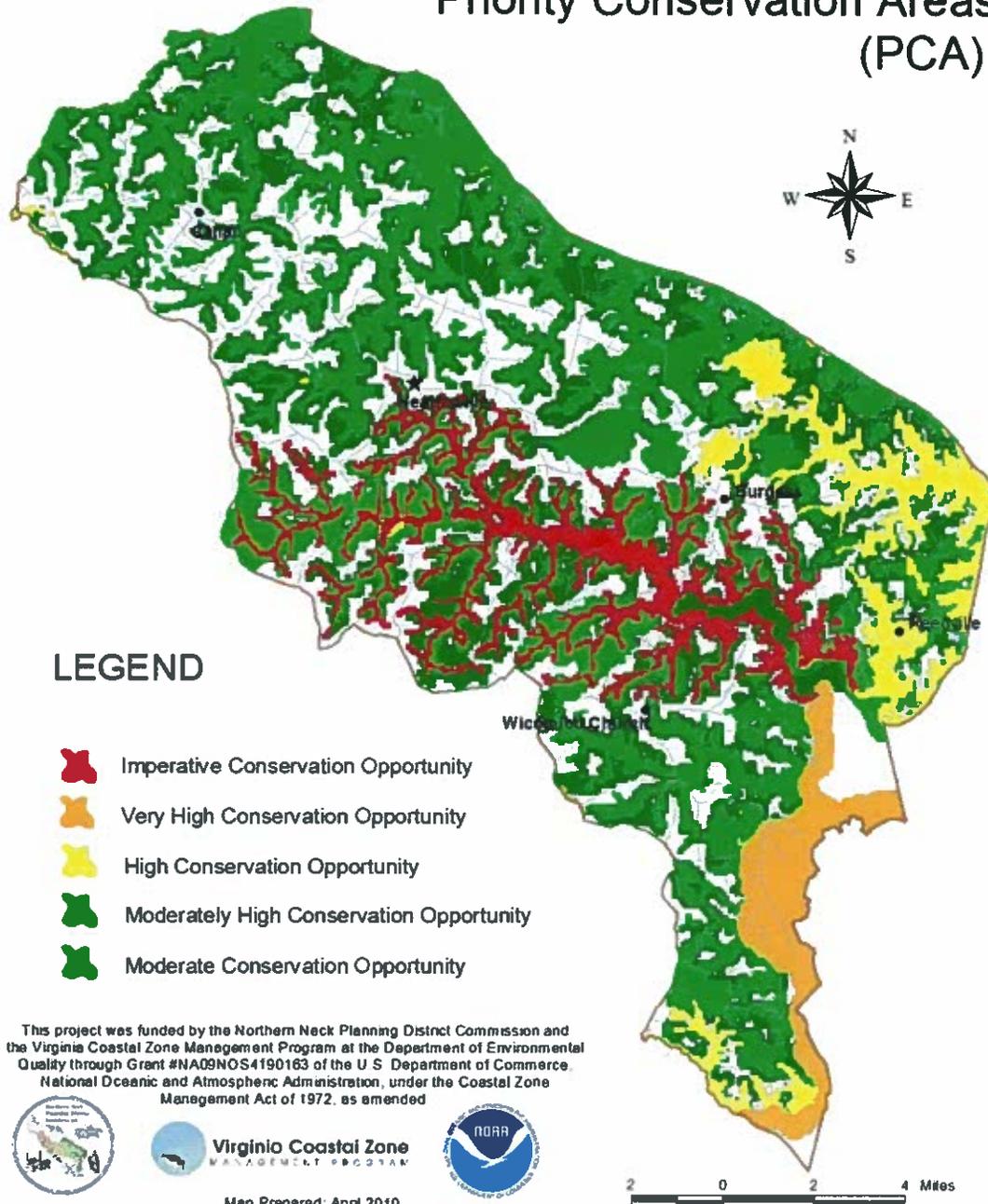
Map Prepared: April 20 10

2 0 2 4 Miles

Virginia Priority Conservation Areas

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Northumberland County: Priority Conservation Areas (PCA)



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Map Prepared: April 2010

What are some possible next steps?

- Use the GIS mapping program on this computer tonight to preliminarily identify areas that might be in the county's best interest to designate as an area that would be desirable to stay in a natural state
- Request that county staff work with NNPDC staff to help delineate areas to bring back to the Planning Commission to consider at a later date

Questions, Thoughts?

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Environmental Planner

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Virginia Coastal Zone
MANAGEMENT PROGRAM



Rappahannock Record, Thursday, July 22, 2010

Northumberland planners hear more on conservation initiative

Hearing is slated August 19 on PUD zoning district

by Starke Jett

HEATHSVILLE — Although the Northumberland planning commission didn't have enough members present July 15 to achieve a quorum, the four present heard more about the Blue Green Infrastructure from Northern Neck Planning District Commission environmental planner Stuart McKenzie.

"I'm here to give you the tools and data and guide you if you want to do this," said McKenzie. "We have never had this data before. It's up to you how you use it."

The goal is to create a "stand-alone document" specifying valuable environmental resources and areas in the county that need to be preserved, he said. The document could be incorporated into the comprehensive plan when it is updated.

"It is better to do it sooner rather than later," said McKenzie. "Once development comes in, you can't go back to the natural."

The tools and data he referred to are new mapping surveys prepared by the Department of Conservation and Recreation (DCR) and the Virginia Coastal Program (VCP) that became available about five years ago.

DCR has compiled what is called the Virginia Conservation Needs Land Assessment (VCNLA) and the VCP has designated Priority Conservation Areas (PCA).

The highly detailed maps, created largely with satellite

imagery, pinpoint dwindling natural areas and clarify how they could be linked together to create environmental conservation zones.

The question is whether county leaders will decide to implement the data at their fingertips. McKenzie repeatedly stressed it is up to them to use the information or not, and he lobbied for working with county staff to prepare a preliminary document. Without a quorum, no action was taken on the issue.

After McKenzie's presentation, the commissioners briefly reviewed a new planned unit development (PUD) zoning ordinance compiled by staff.

As described in the ordinance, the new R-5 PUD zoning district would "provide for the orderly development of larger parcels wherein a mixture of residential, commercial and recreational uses are permitted in a planned development that would be compatible with the local (or immediate) area. Additional purposes are to protect the agricultural areas, natural resources, water and shorelines of the county and to manage the building density in order to maintain the rural character of the county."

Again the lack of a quorum precluded any action by the commission.

However, assistant county administrator Lutrell Tadlock was directed by commission chairman Albert Fisher to schedule a public hearing on the new PUD ordinance on August 19.

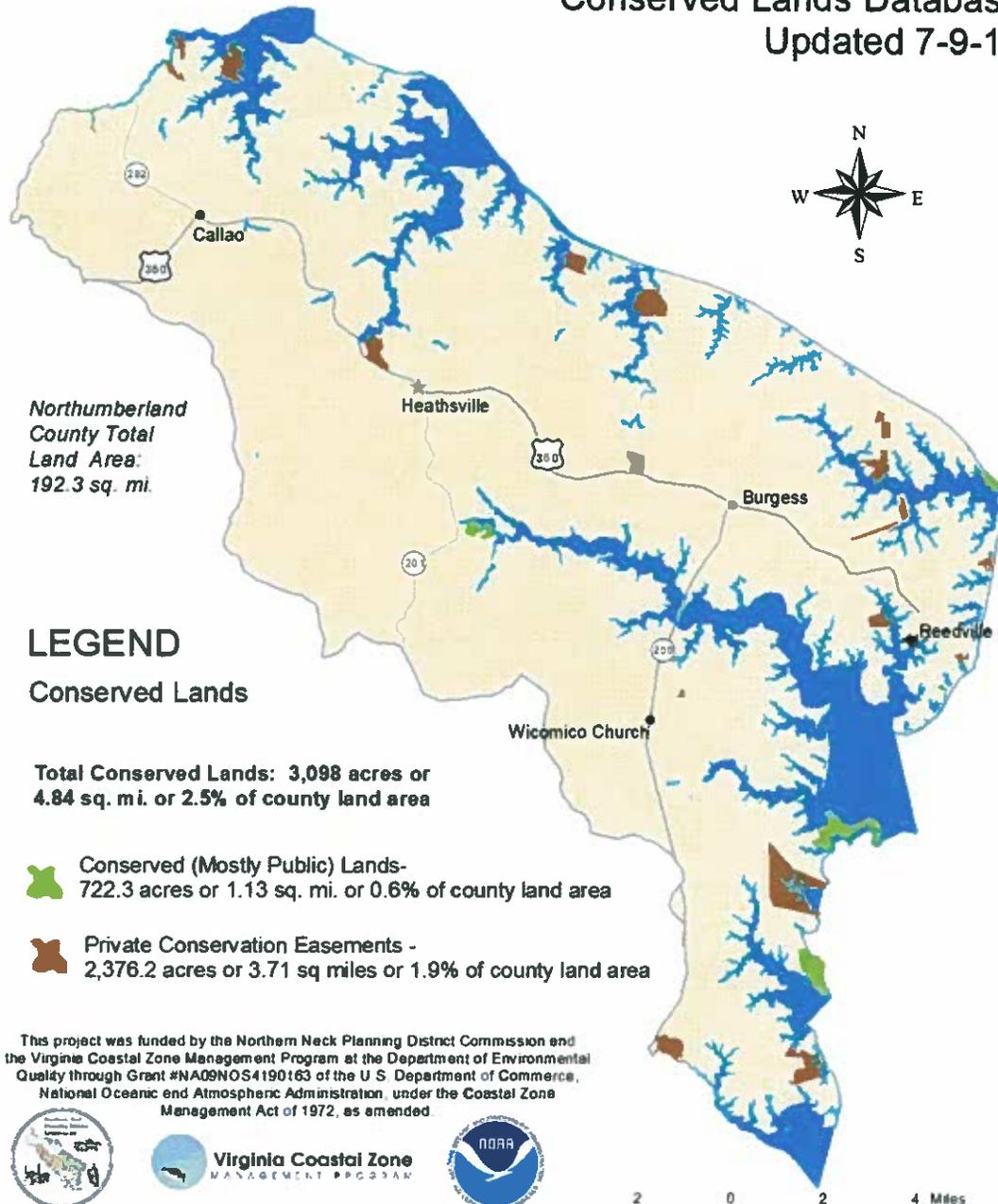
The possible adoption of the new ordinance would not have any effect on the Bluff Point PUD already being considered by county leaders.

Northumberland County Blue Green Infrastructure Planning

*How does Blue Green Infrastructure
Planning benefit the average citizen
of Northumberland County?*

November 18, 2010

Northumberland County:
 Department of Conservation and Recreation
 Conserved Lands Database
 Updated 7-9-10



Northumberland
 County Total
 Land Area:
 192.3 sq. mi.

LEGEND

Conserved Lands

**Total Conserved Lands: 3,098 acres or
 4.84 sq. mi. or 2.5% of county land area**

 **Conserved (Mostly Public) Lands-**
 722.3 acres or 1.13 sq. mi. or 0.6% of county land area

 **Private Conservation Easements -**
 2,376.2 acres or 3.71 sq miles or 1.9% of county land area

This project was funded by the Northern Neck Planning District Commission and the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant #NA09NOS4190163 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.



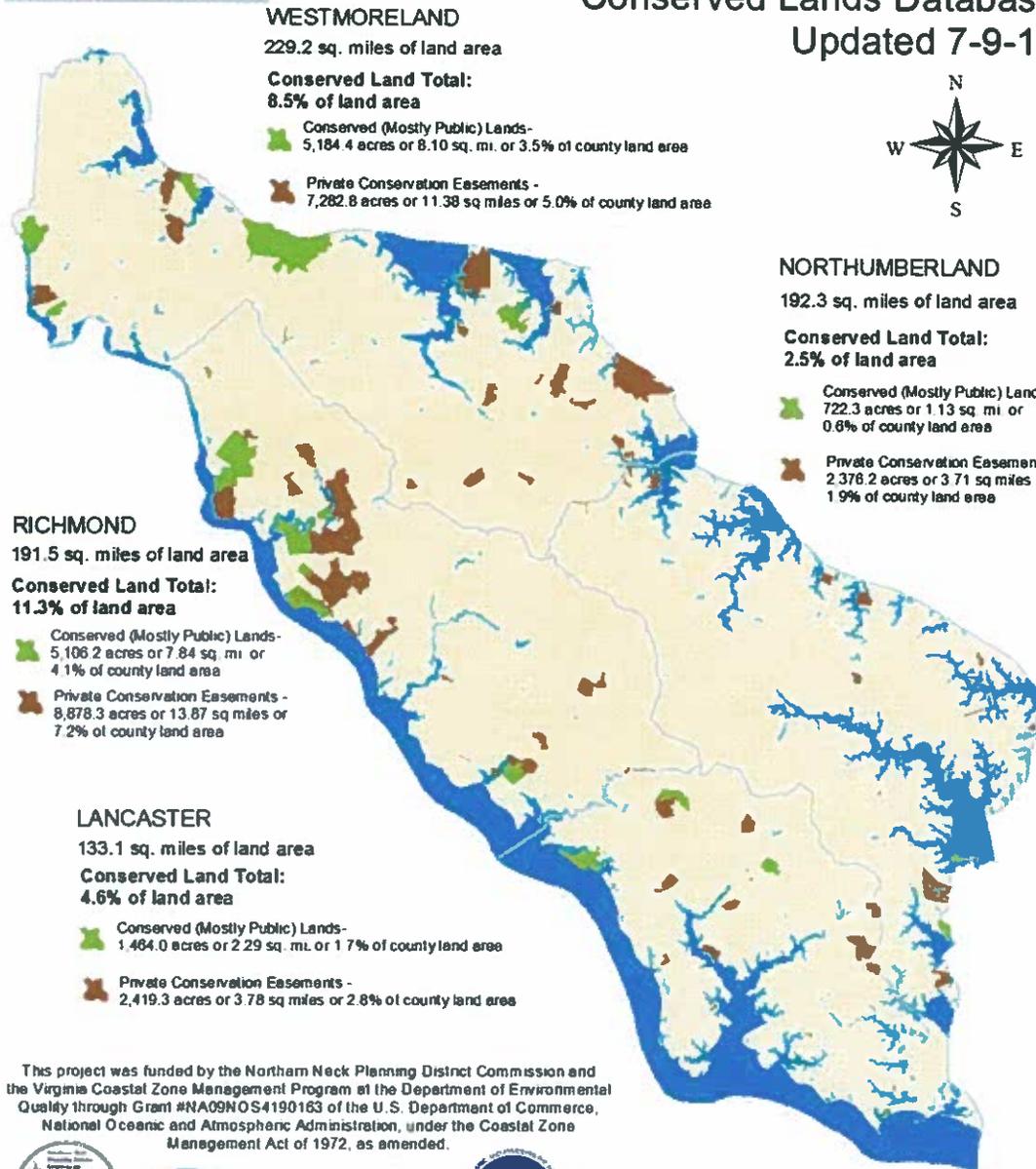
NNK Regionwide
 Conserved Land 4.4%
 Private Easement 2.8%
 Total Conserved 7.0%

Northern Neck Region

Department of Conservation and Recreation

Conserved Lands Database

Updated 7-9-10



WESTMORELAND
 229.2 sq. miles of land area
Conserved Land Total:
 8.5% of land area

Conserved (Mostly Public) Lands -
 5,184.4 acres or 8.10 sq. mi. or 3.5% of county land area
 Private Conservation Easements -
 7,282.8 acres or 11.38 sq miles or 5.0% of county land area

NORTHUMBERLAND
 192.3 sq. miles of land area
Conserved Land Total:
 2.5% of land area

Conserved (Mostly Public) Lands -
 722.3 acres or 1.13 sq mi or 0.6% of county land area
 Private Conservation Easements -
 2,376.2 acres or 3.71 sq miles or 1.9% of county land area

RICHMOND
 191.5 sq. miles of land area
Conserved Land Total:
 11.3% of land area

Conserved (Mostly Public) Lands -
 5,106.2 acres or 7.84 sq mi or 4.1% of county land area
 Private Conservation Easements -
 8,878.3 acres or 13.87 sq miles or 7.2% of county land area

LANCASTER
 133.1 sq. miles of land area
Conserved Land Total:
 4.6% of land area

Conserved (Mostly Public) Lands -
 1,464.0 acres or 2.29 sq. mi. or 1.7% of county land area
 Private Conservation Easements -
 2,419.3 acres or 3.78 sq miles or 2.8% of county land area

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Virginia Coastal Zone
 MANAGEMENT PROGRAM



Retain History and Culture

- Historically, forests were used to build the ships that plied the local waters under sail
- Forests provide habitat, wild game for hunting, lumber, they hold the soil in place, and generate local revenue, not to mention they are aesthetically pleasing to most citizens
- In the Northern Neck, most forests are on marginal soils; either low production soils or soils with steep slopes

Blue Green Infrastructure Planning

Benefits

- By identifying areas in the county whose “highest and best use” would be to stay in natural land cover would keep forestry and hunting as viable economic engines to continue to generate local revenue
- Positive Externalities would accrue to landowners adjacent to Blue Green Infrastructure areas, and landowners in BGI areas could receive economic benefits if they chose to enter into a conservation agreements

Blue Green Infrastructure Planning Benefits

- Forests act to filter the air; they filter carbon monoxide, carbon dioxide, as well as nitrogen dioxide
- Forests also “sequester” carbon (keeping it in a neutral state)
- Forest filter stormwater runoff, cleaning the water that runs off before it reaches the local creeks

Blue Green Infrastructure Planning

Benefits

- The Virginia Department of Forestry, and others are trying to quantify the ecological services (benefits) of forest lands
- A computer program developed by American Forests, call CityGreen can estimate the value of forests in removing air pollutants, sequestering carbon and the value of forests for stormwater runoff, all based on satellite imagery of land cover

Benefits of Blue Green Infrastructure

- Our neighboring PDC, George Washington Regional Commission (Fredericksburg Region) graciously ran three scenarios for Northumberland County from 1996, 2001 and 2006 Satellite Imagery
- The results of that CityGreen modeling software analysis follows:

Analysis Report
for
1996 Northumberland



Land cover in acres and percentages

Impervious Surfaces	1,117.5	0.9%
Open Space - Grass/Scattered Trees	43,343.2	34.7%
Trees	77,443.4	62.0%
Urban: Bare	148.1	0.1%
Water Area	2,773.2	2.2%
Total:	124,825.4	100.0%

Tree Canopy: 77,443.4 acres (62.0%)

Air Pollution Removal

Nearest air quality reference city: *Washington DC*

	<u>Lbs. Removed/yr</u>	<u>Dollar Value/yr</u>
Carbon Monoxide:	345,169	\$169,400
Ozone:	2,892,317	\$9,512,092
Nitrogen Dioxide:	1,380,675	\$4,877,996
Particulate Matter:	2,278,114	\$5,373,725
Sulfur Dioxide:	1,104,540	\$953,253
Totals:	7,800,816	\$20,886,466

Dollar values are based on 2009 dollars

Carbon Storage and Sequestration

Tons Stored (Total):	3,332,503
Tons Sequestered (Annually):	25,944

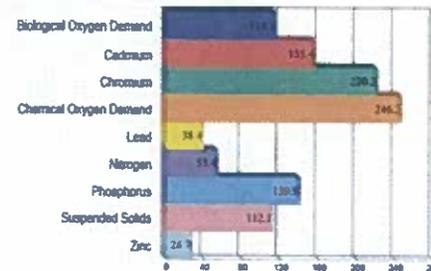
Stormwater Management

Water Quantity (Runoff Volume)	
2-yr, 24-hr Rainfall in inches:	3.25
Curve Number reflecting existing conditions:	72
Curve Number of replacement land cover:	90
Dominant Soil Type: B	
Replacement land cover type: (existing condition)	
Impervious Surfaces, Buildings/ structures	
Additional cu. ft. storage needed:	554,627,238
Construction cost per cu. ft.:	\$2.00
Total Stormwater Value:	\$1,109,254,475
Annual Stormwater Value:	\$96,709,860

(based on 20-year financing at 6% interest)

Water Quality (Contaminant Loading)

Percent change in contaminant loadings



Analysis Report for 2001 Northumberland



Land cover in acres and percentages

Category	Acres	Percentage
Impervious Surfaces	1,164.4	0.9%
Open Space - Grass/Scattered Trees	43,307.0	34.7%
Trees	77,450.9	62.0%
Urban: Bare	146.8	0.1%
Water Area	2,756.3	2.2%
Total:	124,825.4	100.0%

Tree Canopy: 77,450.9 acres (62.0%)

Air Pollution Removal

Nearest air quality reference city: Washington DC

	Lbs. Removed/yr	Dollar Value/yr.
Carbon Monoxide:	345,203	\$169,416
Ozone:	2,692,580	\$9,513,021
Nitrogen Dioxide:	1,380,810	\$4,878,472
Particulate Matter:	2,278,337	\$5,374,250
Sulfur Dioxide:	1,104,648	\$953,346
Totals:	7,801,577	\$20,888,505

Dollar values are based on 2009 dollars

Carbon Storage and Sequestration

Tons Stored (Total):	3,332,828
Tons Sequestered (Annually):	25,847

Stormwater Management

Water Quantity (Runoff Volume)

2-yr, 24-hr Rainfall in inches:	3.25
Curve Number reflecting existing conditions:	72
Curve Number of replacement land cover:	90

Dominant Soil Type: B

Replacement land cover type (existing condition)

Impervious Surfaces: Buildings/ structures

Additional cu. ft. storage needed:	584,893,043
Construction cost per cu. ft.:	\$2.00

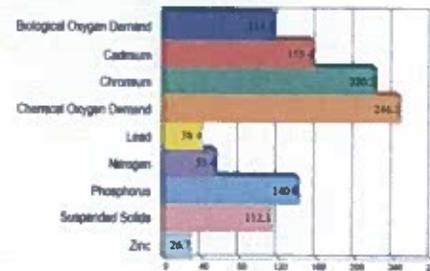
Total Stormwater Value: \$1,169,786,066

Annual Stormwater Value: \$96,768,208

(Based on 20-year financing at 6% interest)

Water Quality (Contaminant Loading)

Percent change in contaminant loadings



**Analysis Report
for
2006 Northumberland**



Land cover in acres and percentages

Category	Acres	Percentage
Impervious Surfaces	1,204.4	1.0%
Open Space - Grass/Scattered Trees	44,846.2	35.8%
Trees	76,056.6	60.9%
Urban: Bare	152.8	0.1%
Water Area	2,765.4	2.2%
Total:	124,825.4	100.0%

Tree Canopy: 76,056.6 acres (60.9%)

Air Pollution Removal

Nearest air quality reference city: *Washington DC*

	<u>Lbs. Removed/yr</u>	<u>Dollar Value/yr.</u>
Carbon Monoxide:	338,988	\$188,368
Ozone:	2,644,105	\$9,341,756
Nitrogen Dioxide:	1,355,851	\$4,790,644
Particulate Matter:	2,237,319	\$5,277,496
Sulfur Dioxide:	1,084,761	\$938,183
Totals:	7,661,124	\$20,512,444

Dollar values are based on 2009 dollars

Carbon Storage and Sequestration

Tons Stored (Total):	3,272,627
Tons Sequestered (Annually):	25,480

Stormwater Management

Water Quantity (Runoff Volume)

2-yr, 24-hr Rainfall in inches:	3.25
Curve Number reflecting existing conditions:	72
Curve Number of replacement land cover:	89

Dominant Soil Type: **B**

Replacement land cover type: (existing condition)

Impervious Surfaces: Buildings/ structures

Additional cu. ft. storage needed: **542,073,097**

Construction cost per cu. ft.: **\$2.00**

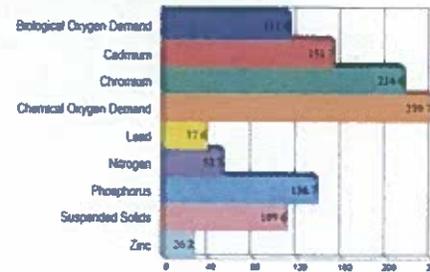
Total Stormwater Value: \$1,084,146,195

Annual Stormwater Value: \$94,520,806

(based on 20-year financing at 6% interest)

Water Quality (Contaminant Loading)

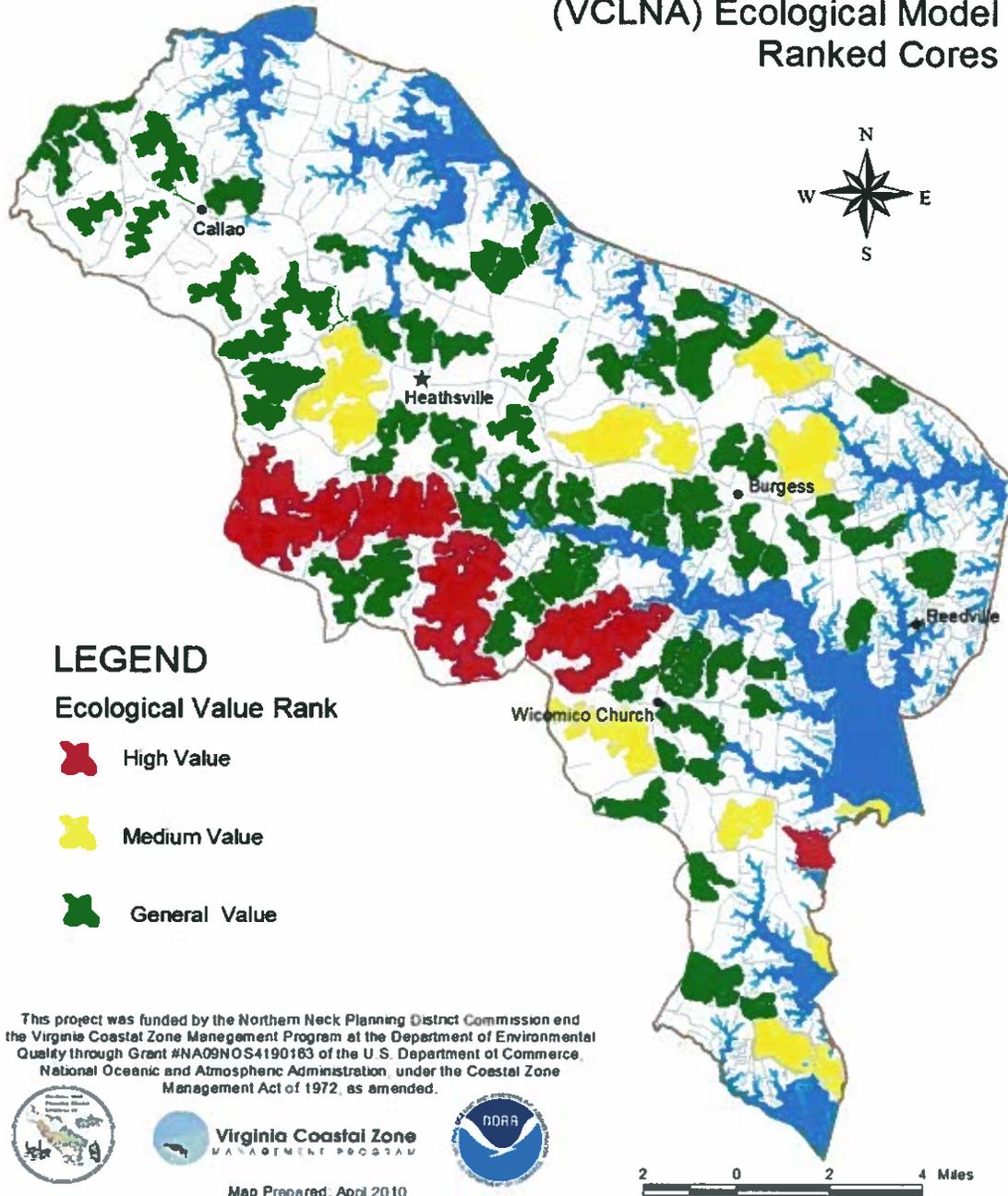
Percent change in contaminant loadings



Summary

- Natural Areas in Northumberland County benefit all citizens by filtering air and water, and keeping soil in place
- Some Natural Areas have a higher value for filtration, wildlife habitat and as corridors for wildlife movement
- Recent efforts by the Commonwealth have given us maps that value natural areas within Northumberland County that have not been available before now – the VCLNA and PCA

Northumberland County: Virginia Conservation Needs Land Assessment (VCLNA) Ecological Model Ranked Cores



LEGEND

Ecological Value Rank

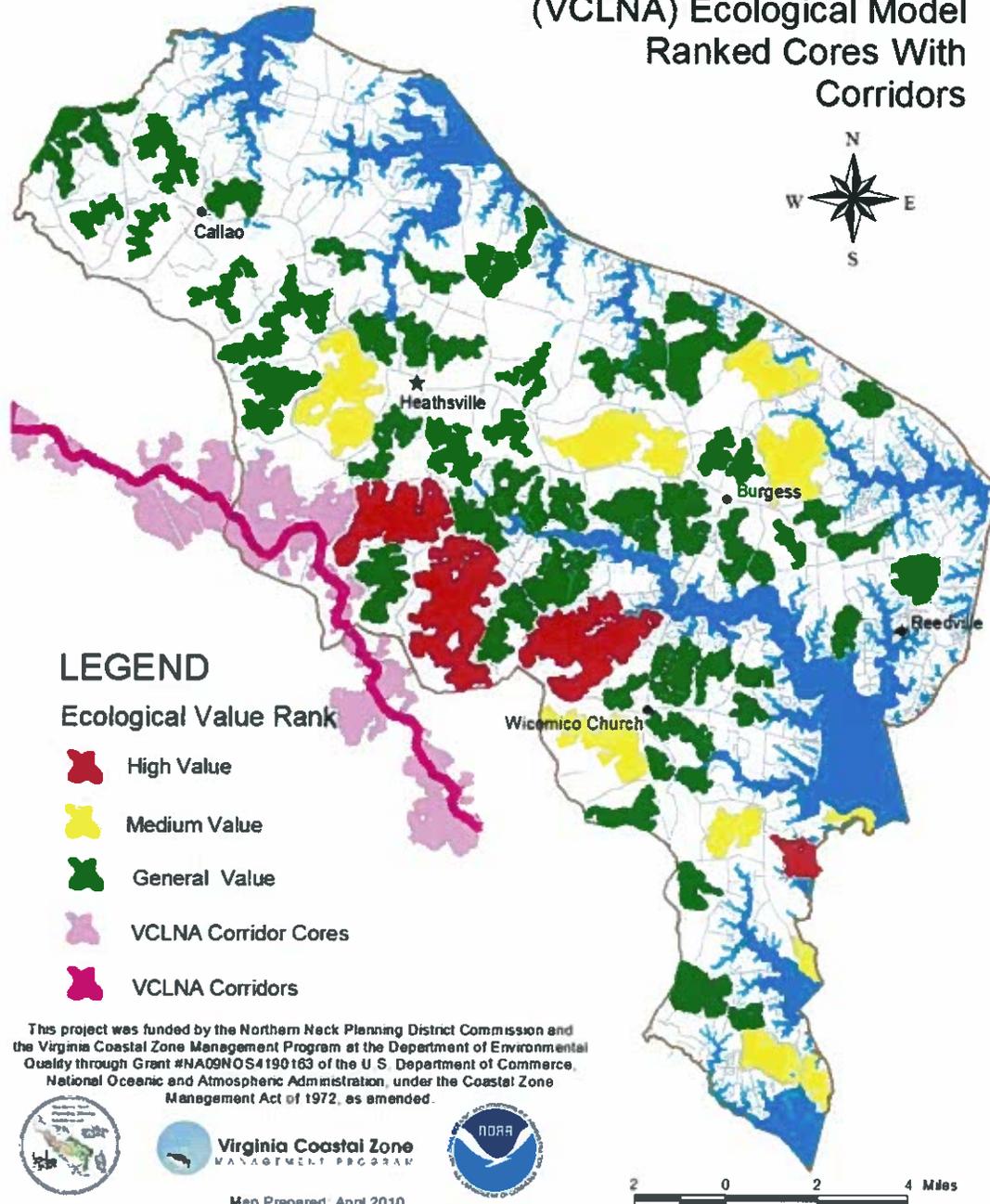
-  High Value
-  Medium Value
-  General Value

This project was funded by the Northern Neck Planning District Commission and the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant #NA09NOS4190163 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.

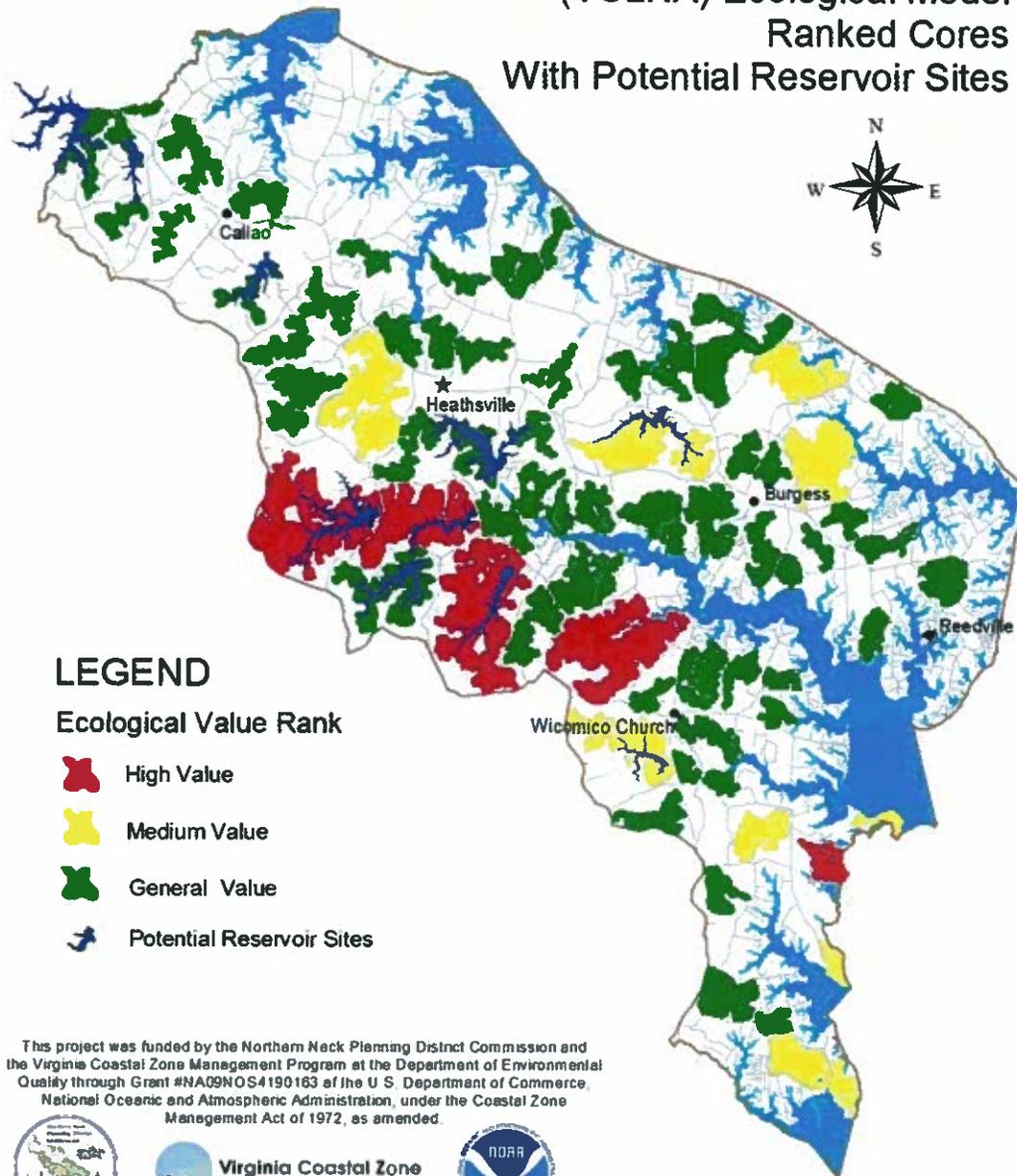


Map Prepared: April 2010

Northumberland County: Virginia Conservation Needs Land Assessment (VCLNA) Ecological Model Ranked Cores With Corridors



Northumberland County: Virginia Conservation Needs Land Assessment (VCLNA) Ecological Model Ranked Cores With Potential Reservoir Sites



LEGEND

Ecological Value Rank

-  High Value
-  Medium Value
-  General Value
-  Potential Reservoir Sites

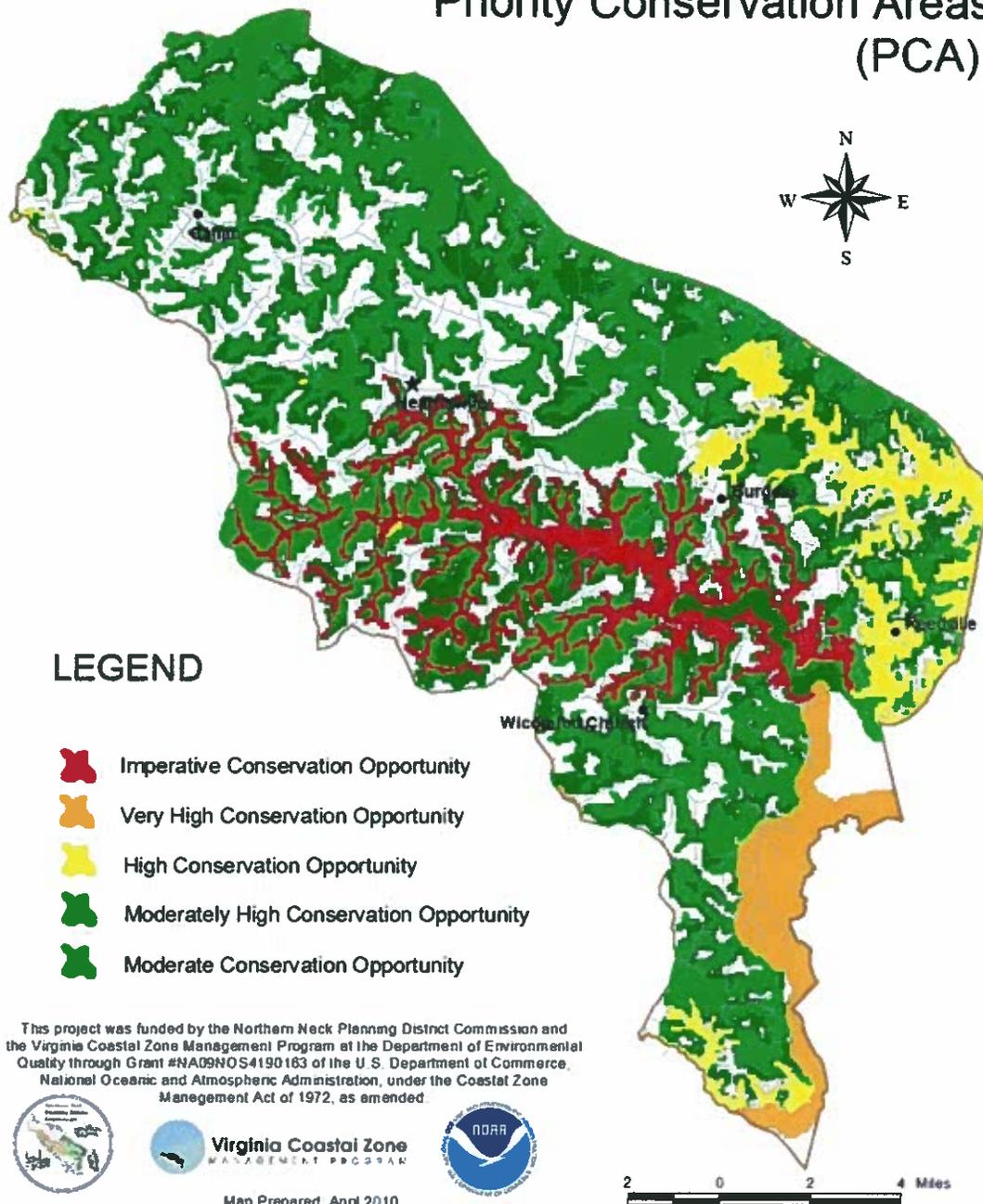
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Map Prepared November 2010

2 0 2 4 Miles

Northumberland County: Priority Conservation Areas (PCA)



LEGEND

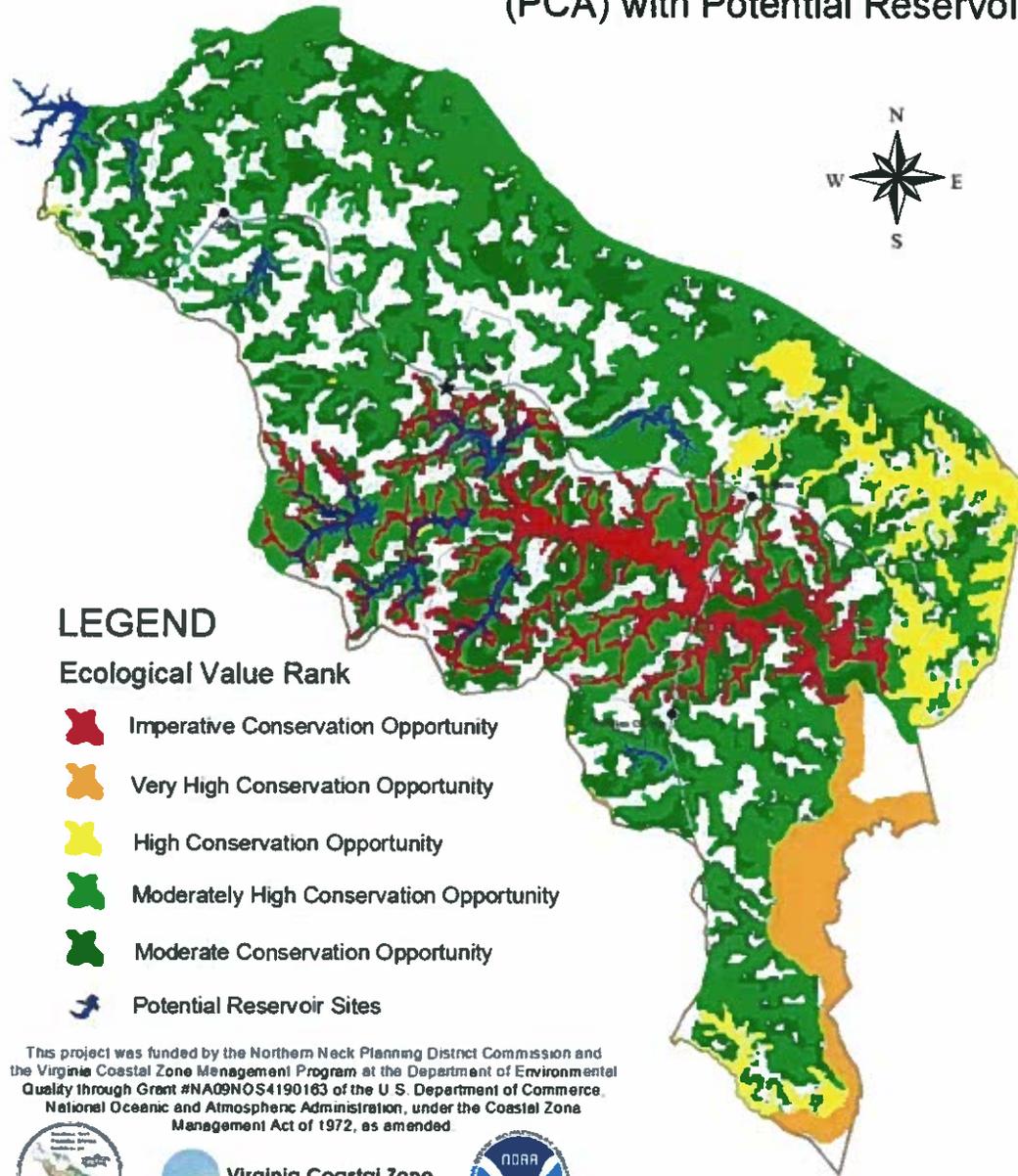
-  Imperative Conservation Opportunity
-  Very High Conservation Opportunity
-  High Conservation Opportunity
-  Moderately High Conservation Opportunity
-  Moderate Conservation Opportunity

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Map Prepared: April 2010

Northumberland County: Priority Conservation Areas (PCA) with Potential Reservoirs



LEGEND

Ecological Value Rank

-  Imperative Conservation Opportunity
-  Very High Conservation Opportunity
-  High Conservation Opportunity
-  Moderately High Conservation Opportunity
-  Moderate Conservation Opportunity
-  Potential Reservoir Sites

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Map Prepared November 2010

2 0 2 4 Miles

Questions?

Stuart McKenzie

Environmental Planner

Northern Neck Planning District Commission

804.333.1900, ext. 25



Virginia Coastal Zone
MANAGEMENT PROGRAM



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Northumberland County Blue Green Infrastructure Planning

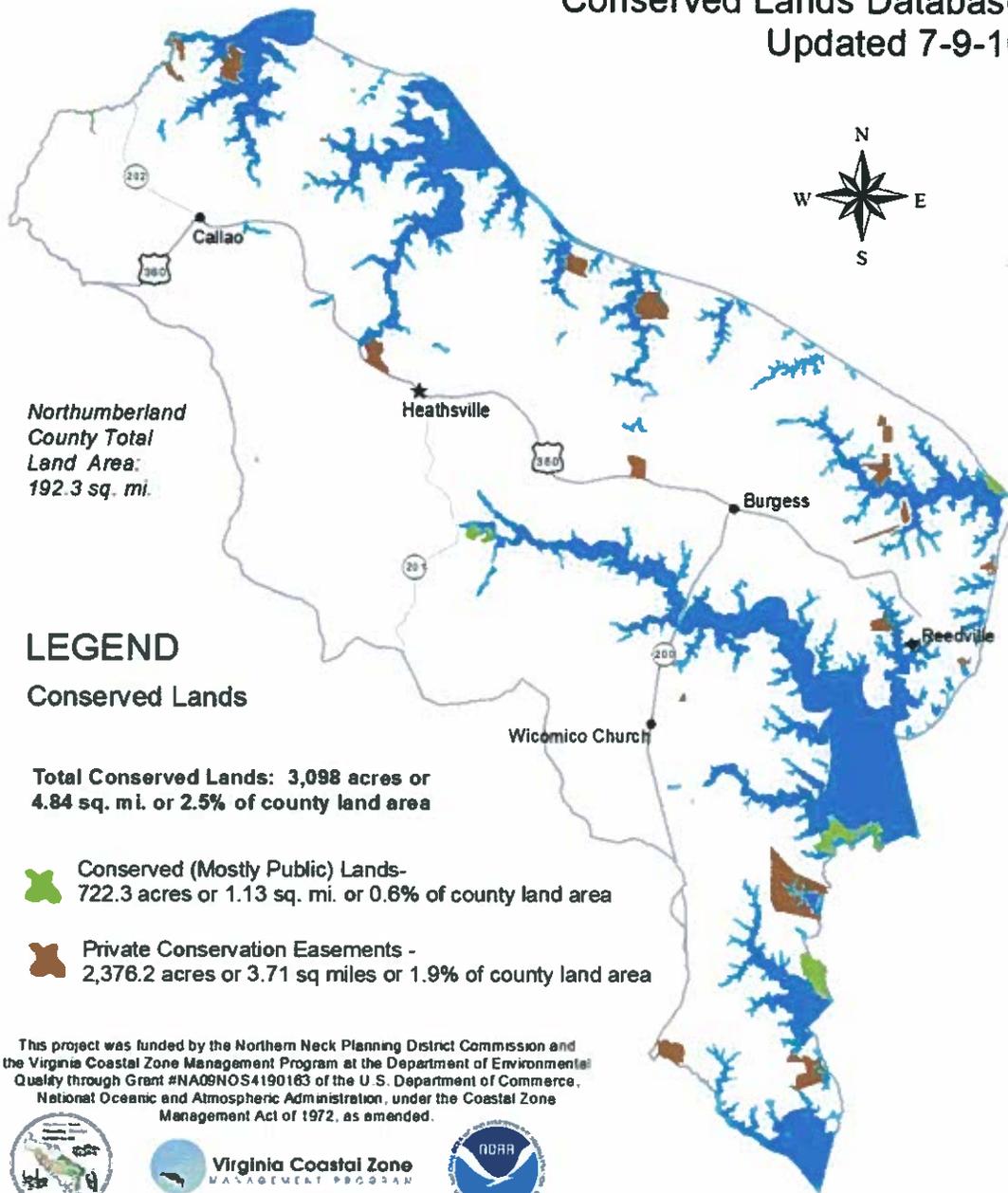


Northumberland Planning
Commission Meeting
February 24, 2011

What is Blue Green Infrastructure Planning

- Examining Natural Areas in your county that have high values for Northumberland County citizens in their natural state
- Taking measures that will help protect these natural areas so that the benefits that accrue from them are not lost to future generations
- Trying to coordinate the efforts into a plan that can help consolidate larger functional natural areas (as opposed to fragmented natural areas)

Northumberland County:
 Department of Conservation and Recreation
 Conserved Lands Database
 Updated 7-9-10



Northumberland
 County Total
 Land Area:
 192.3 sq. mi.

LEGEND

Conserved Lands

**Total Conserved Lands: 3,098 acres or
 4.84 sq. mi. or 2.5% of county land area**

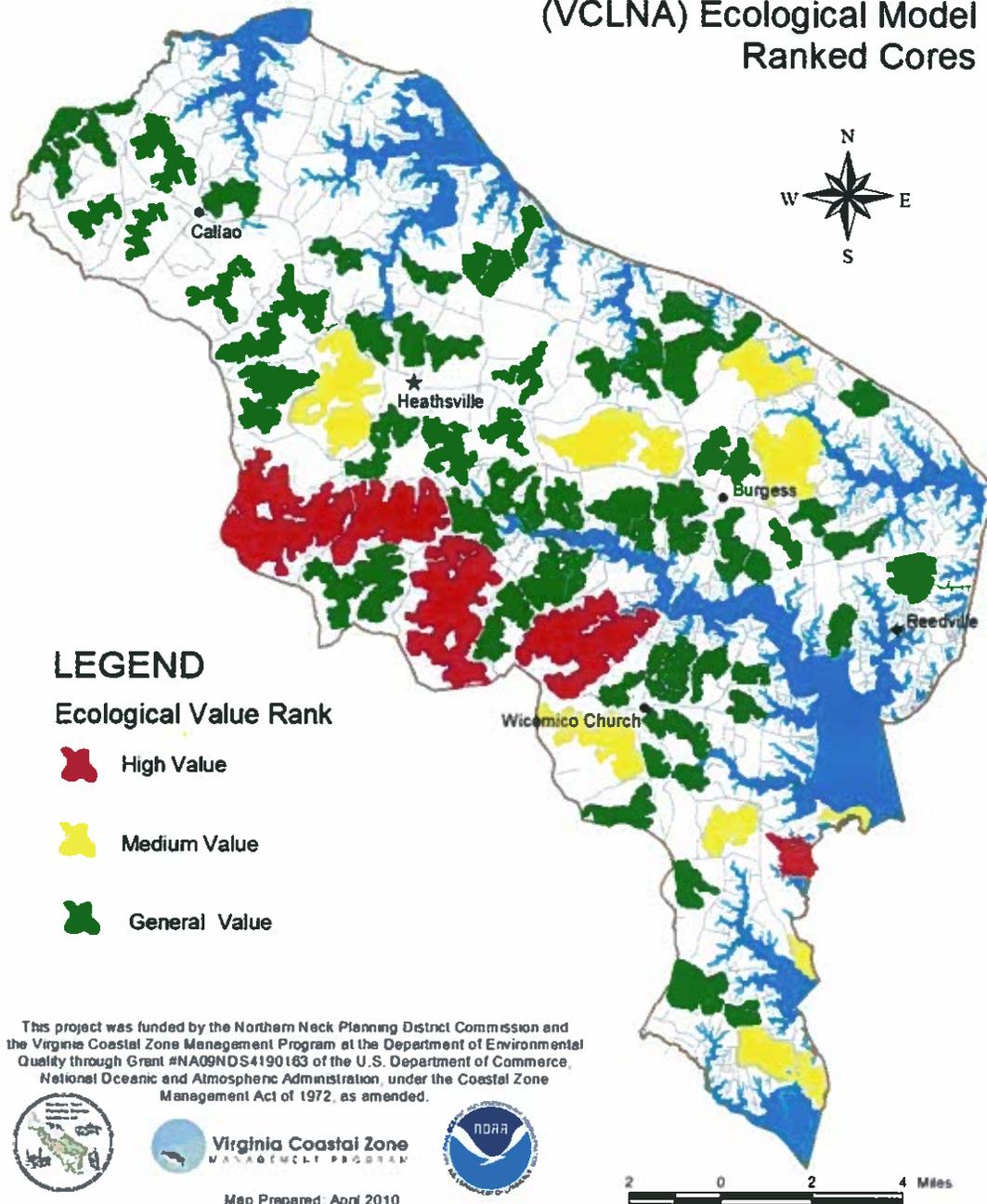
 **Conserved (Mostly Public) Lands-**
 722.3 acres or 1.13 sq. mi. or 0.6% of county land area

 **Private Conservation Easements -**
 2,376.2 acres or 3.71 sq miles or 1.9% of county land area

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Northumberland County: Virginia Conservation Needs Land Assessment (VCLNA) Ecological Model Ranked Cores



LEGEND

Ecological Value Rank

-  High Value
-  Medium Value
-  General Value

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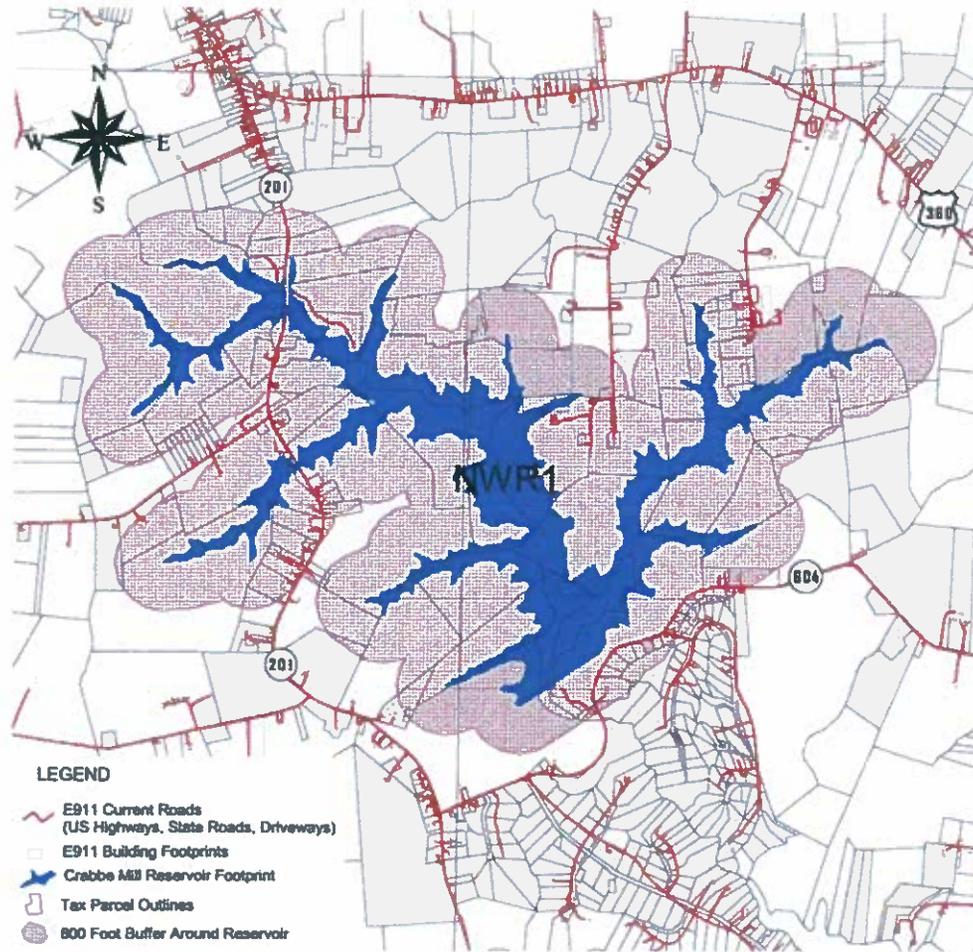
Map Prepared: April 2010

Future Reservoir Analysis - 2006

- Digitized potential reservoir sites from the NEDCO Comprehensive Water and Sewer Plan for the Northern Neck (1969)
- Used the reservoir flood pool elevation and digitized along the elevation contour of the USGS 1:24,000 Topographic Map
- Overlaid with the 2006 E911 Addressable Structures from the County E911 System

Figure 0.02

*Crabbe Mill Reservoir with
800 Foot Buffer, Tax Parcels
and Existing Building Footprints*



LEGEND

-  E911 Current Roads
(US Highways, State Roads, Driveways)
-  E911 Building Footprints
-  Crabbe Mill Reservoir Footprint
-  Tax Parcel Outlines
-  800 Foot Buffer Around Reservoir

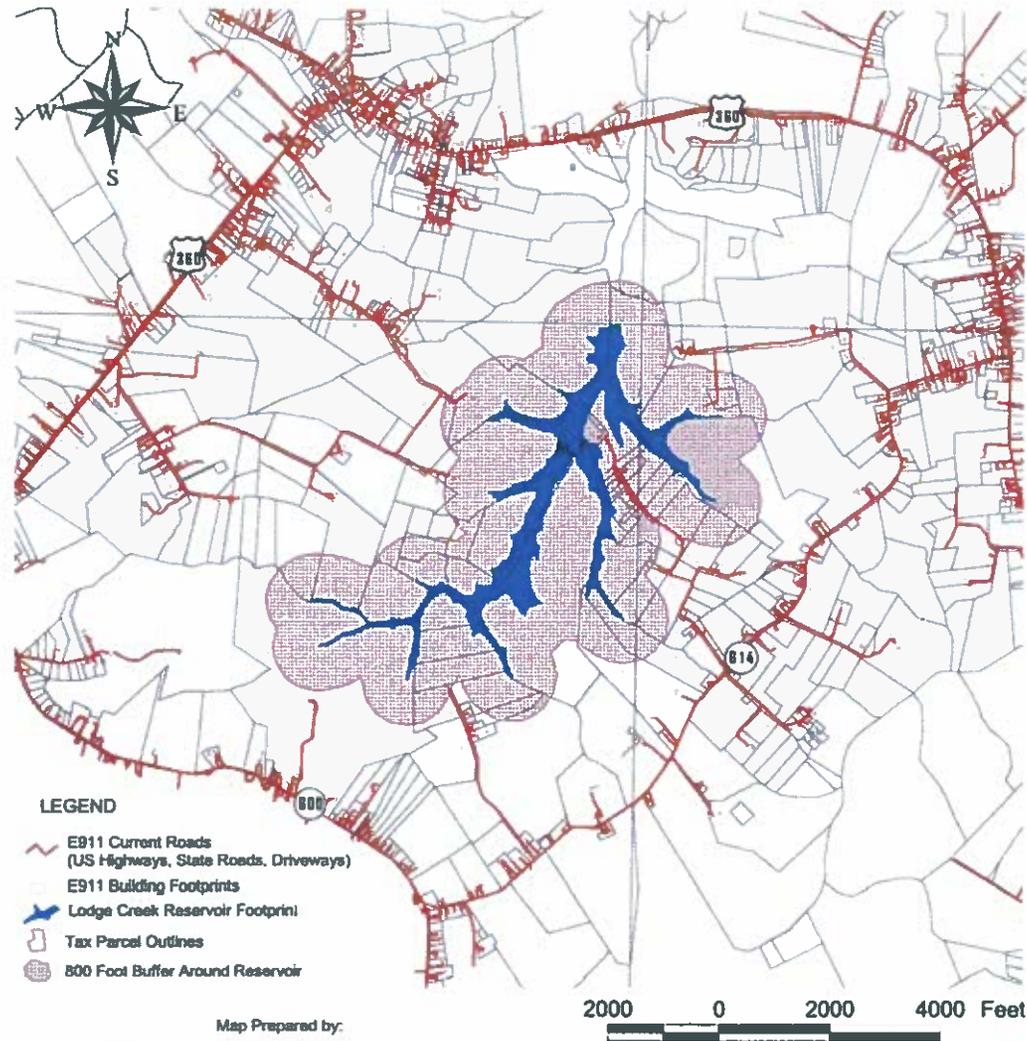
Map Prepared by:



May 2006

Figure 0.01

*Lodge Creek Reservoir with
800 Foot Buffer, Tax Parcels
and Existing Building Footprints*



Map Prepared by:



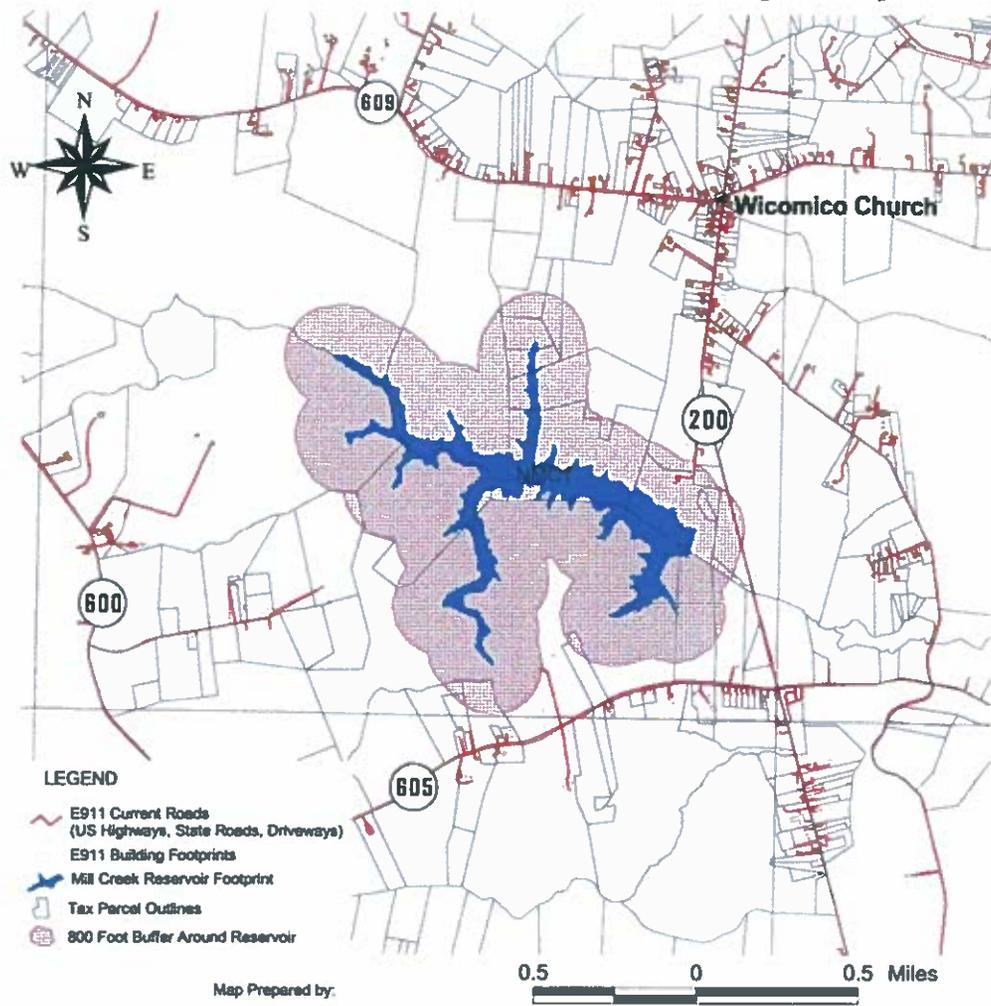
Virginia Coastal Zone
MANAGEMENT PROGRAM



May 2006

Figure 0.03

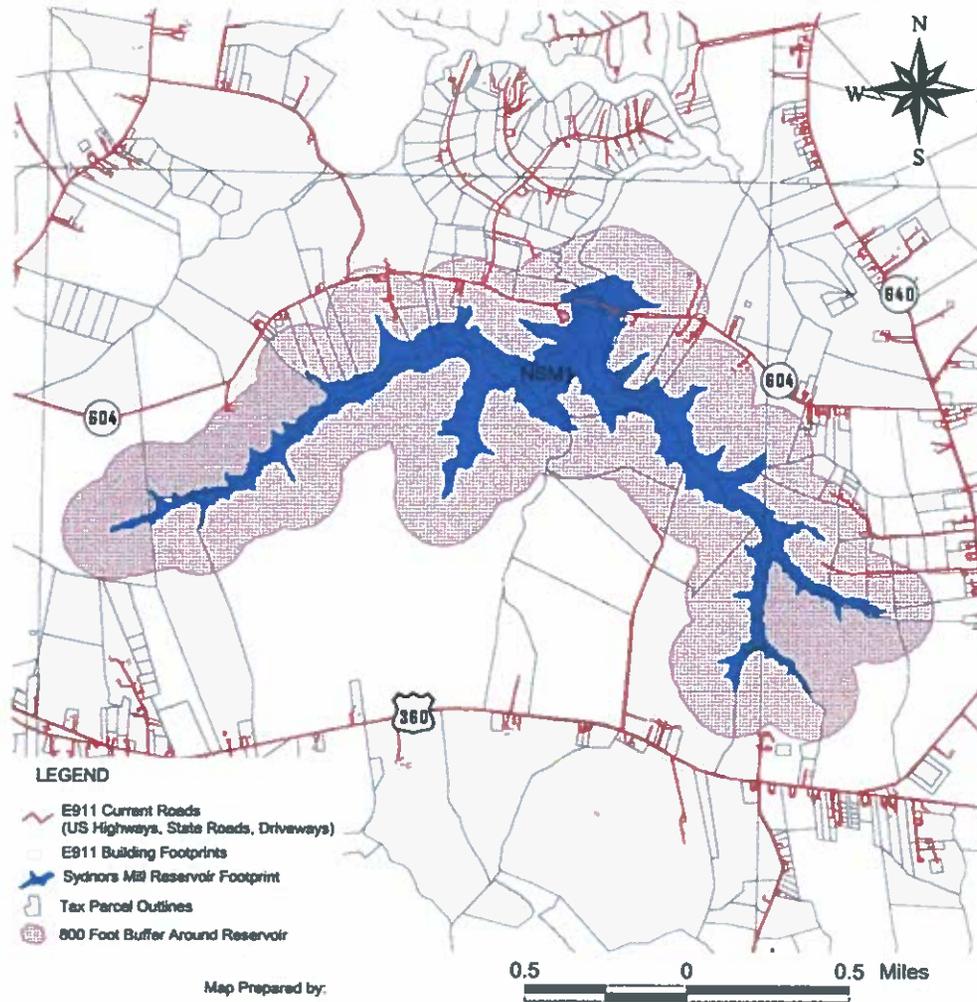
*Mill Creek Reservoir with
800 Foot Buffer, Tax Parcels
and Existing Building Footprints*



May 2006

Figure 0.04

*Sydnors Mill Reservoir with
800 Foot Buffer, Tax Parcels
and Existing Building Footprints*



Map Prepared by:



Virginia Coastal Zone
MANAGEMENT PROGRAM



May 2006

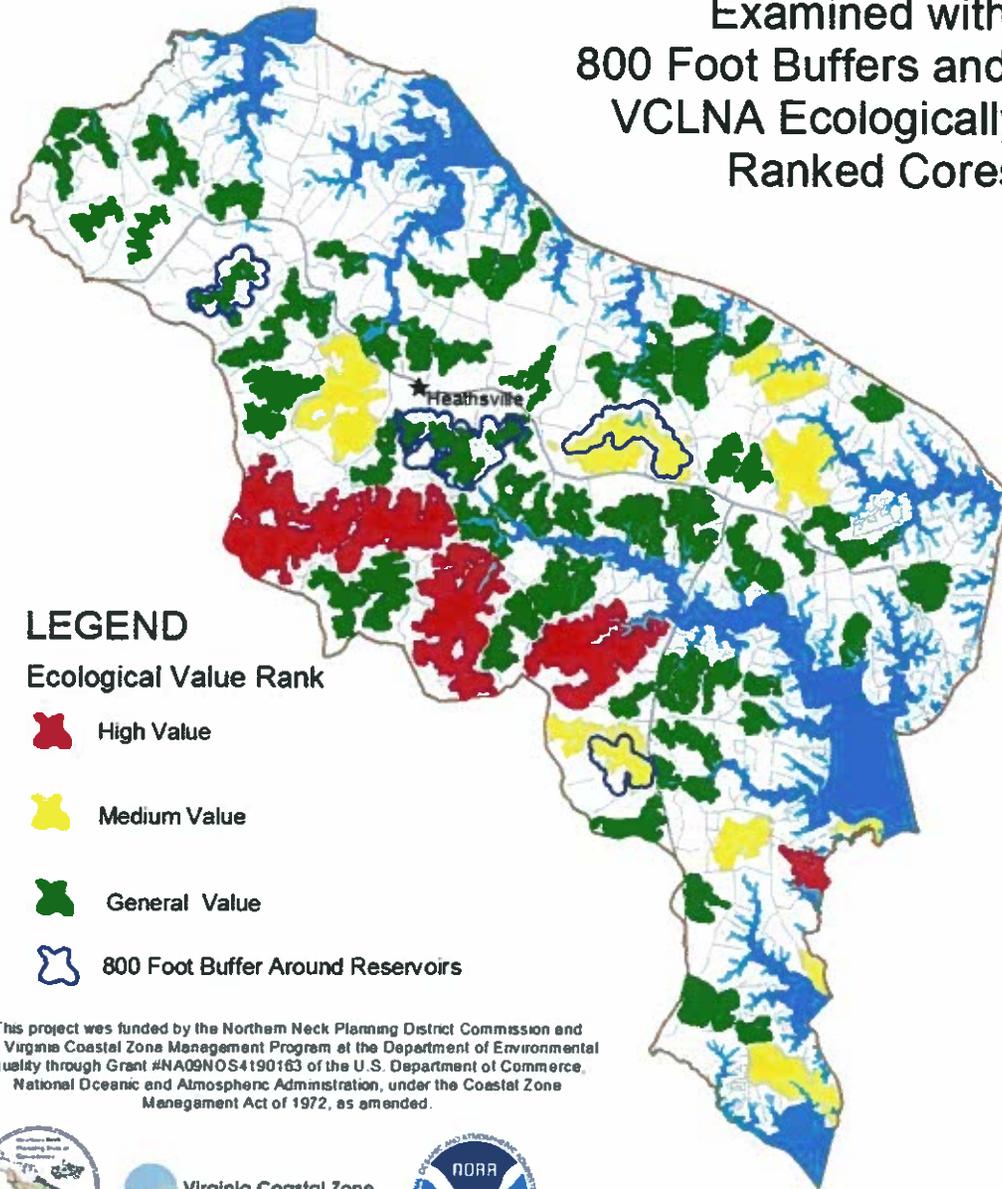
Future Reservoir Analysis Results

- No structures were within the four reservoir flood inundation footprints
- One residential structure was within 50 feet of Crabbe Mill Reservoir (NWR1)
- Mill Creek and Lodge Creek Reservoirs have the least amount of development surrounding them

Future Reservoirs and Green Infrastructure

- Areas around streams in the Northern Neck are usually steep and highly erodible
- Areas in the Northern Neck that are steep are covered in forest, as the flat land is farmed
- These steep areas have the soil held in place by tree roots and development on these slopes (removing the natural vegetation) is fraught with difficulties
- Keeping sediment and nutrients out of drinking water impoundments is very important

Northumberland County: Four Potential Reservoirs Examined with 800 Foot Buffers and VCLNA Ecologically Ranked Cores



LEGEND

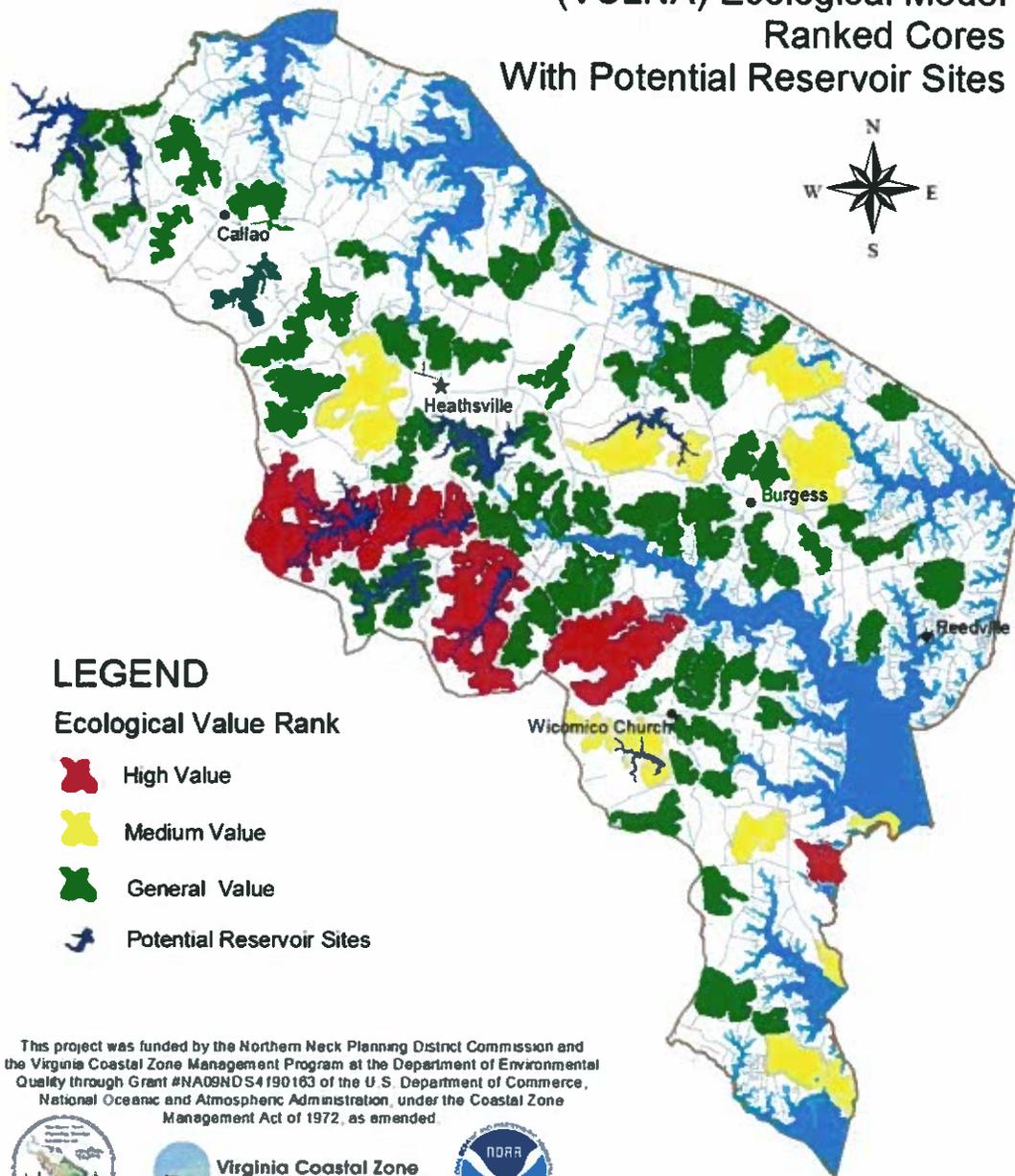
Ecological Value Rank

-  High Value
-  Medium Value
-  General Value
-  800 Foot Buffer Around Reservoirs

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Northumberland County: Virginia Conservation Needs Land Assessment (VCLNA) Ecological Model Ranked Cores With Potential Reservoir Sites



LEGEND

Ecological Value Rank

-  High Value
-  Medium Value
-  General Value
-  Potential Reservoir Sites

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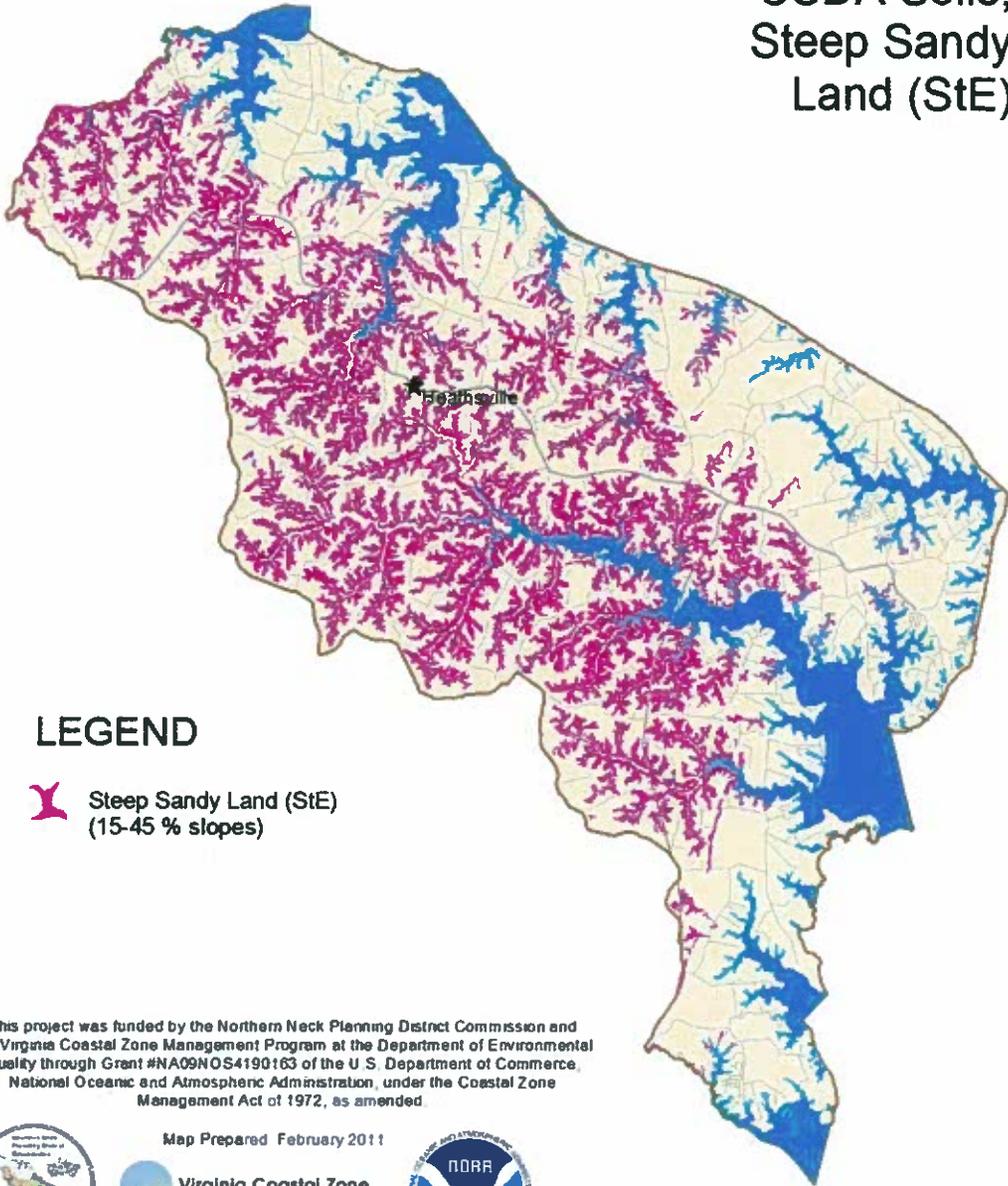
Map Prepared November 2010.



Identification of Steep Slopes

- Since many streams erode channels into the soil, our steep slopes are often gullies with narrow widths
- Traditional elevation models cannot show these steep gullies, because the sample grid is too coarse
- A proximate way to identify these steep slopes without elevation models is soil slope classes

Northumberland County:
 USDA Soils,
 Steep Sandy
 Land (StE)



LEGEND

 Steep Sandy Land (StE)
 (15-45 % slopes)

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Map Prepared February 2011



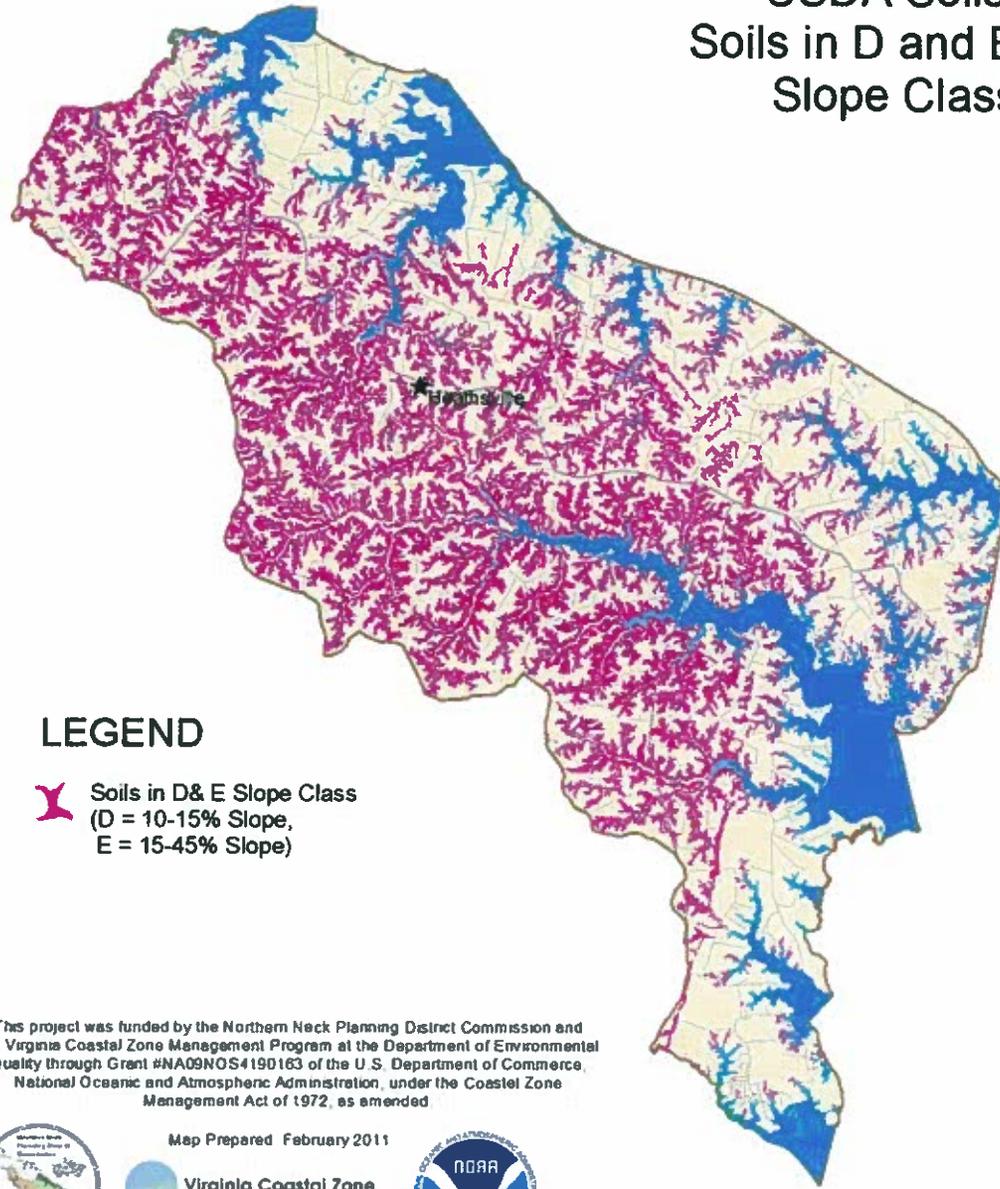
Steep Sandy Land Soils (StE)

- These soils have slopes that are 15 to 45%
- The USDA Soil Survey for Northumberland and Lancaster Counties states in the Use and Management section for the StE soils that “Nearly all the acreage is wooded. The soils is suited only for trees or the most hardy, drought –resistant varieties of grasses.”

Soils with 10-45% Slope

- These are “D” (10 to 15% slope) and “E” (15 to 45% slope) soils that are shown in the Soil Survey
- Normally these are adjacent to the Steep Sandy Soils mentioned before
- These soils are have too much slope to farm sustainably, so are most often in a natural vegetative state

Northumberland County: USDA Soils, Soils in D and E Slope Class



LEGEND

-  Soils in D& E Slope Class
(D = 10-15% Slope,
E = 15-45% Slope)

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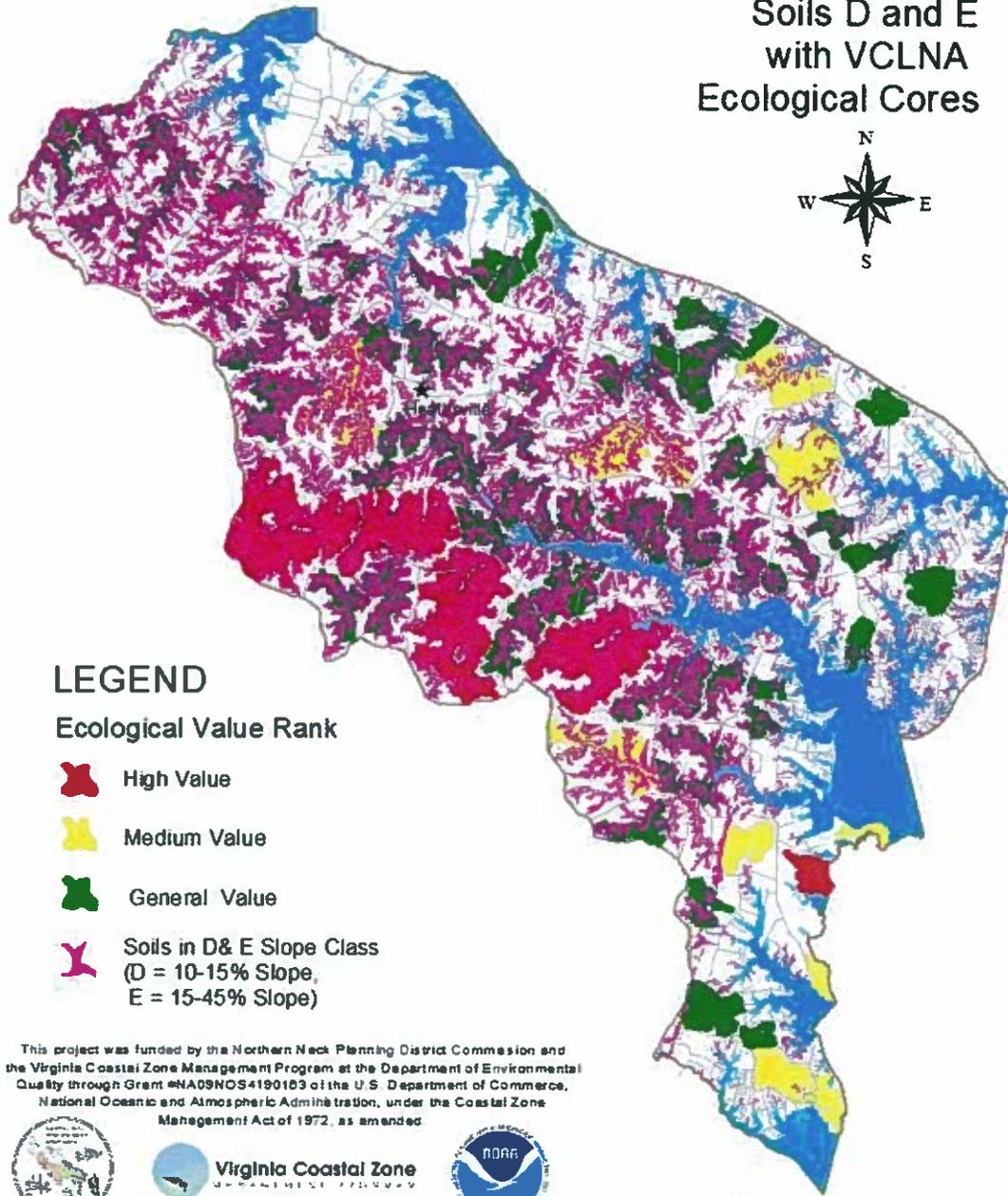


Map Prepared February 2011

2 0 2 4 Miles

**How do these soils compare to the
Virginia Conservation Needs Land
Assessment Core Areas?**

Northumberland County:
 USDA Soils
 Soils D and E
 with VCLNA
 Ecological Cores



LEGEND

Ecological Value Rank

-  High Value
-  Medium Value
-  General Value
-  Soils in D & E Slope Class
 (D = 10-15% Slope,
 E = 15-45% Slope)

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Map Prepared February 2011



Summary

- The County's Comprehensive Plan Future Land Use Map shows potential future reservoir sites
- These areas have steep slopes and are mostly covered in natural vegetation
- The county would benefit if a Blue Green Infrastructure Plan identified some of these future reservoir sites to be kept in a natural state for the benefit of future generations

Questions?

Stuart McKenzie

Environmental Planner

Northern Neck Planning District Commission

P.O. Box 1600

Warsaw, VA 22572

Phone : 804.333.1900 extension 25



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Environmental planner notes potential reservoir sites in Northumberland

by Starke Jett

HEATHSVILLE—Northern Neck Planning District Commission environmental planner Stuart McKenzie last Thursday outlined four potential reservoir sites in Northumberland for the county planning commission.

The sites include Crabbe Mill off Courthouse Road near Heathsville, Lodge Creek near Callao, Mill Creek near Wicomico Church and Sydnors Mill near Horsehead.

There are no structures within any of the reservoir inundation footprints and only one dwelling within 50 feet of one, the Crabbe Mill site, said McKenzie. The least amount of development exists around the Mill Creek and Lodge Creek sites.

As with most creek beds in the county, each site is surrounded by steep topography unsuitable for development or farming and would benefit the county by being protected for possible future water needs, he said.

The depletion of the aquifer used by the county by heavily populated southern Maryland and the West Point paper mill is beyond local control, said McKenzie.

"I know our job is to plan for the future," said commission member Alfred Fisher. "But has anyone sat down and given any numbers on what this would cost? I think it will be astronomical."

"This is all very preliminary stuff," said McKenzie. "Why am I talking about reservoirs? They are tied together with important natural areas. You may want to protect them all at the same time. We are trying to get you comfortable with this idea, but it is up to you."

"Say we need the reservoirs," said commission member Charles Williams. "Who is going to pay for it? What about compensating the landowners?"

"We think it might make good sense to set aside this land for sometime in the future," said audience member and comprehensive plan technical advisor Gregory Haugan of Heathsville. "It is way too early

to discuss any costs. There may not be a need for any reservoirs for another 50 years. But it would be better to designate the sites as important now instead of after it is too late."

An overlay could be used to designate the reservoir sites, suggested chairman

George Kramda.

Although the commission took no direct action on the issue, Kramda thanked McKenzie for the presentation and said it is valuable information that will be considered during the upcoming comprehensive plan review and update.

Appendix B
Lancaster County Blue Green Infrastructure
Protection Planning:
Additional Information

Lancaster County Blue-Green Infrastructure Planning



June 17th, 2010

Lancaster County Planning Commission Meeting

What is Blue-Green Infrastructure Planning?

Blue - Green Infrastructure is “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”.

Why Blue-Green Infrastructure Planning Important

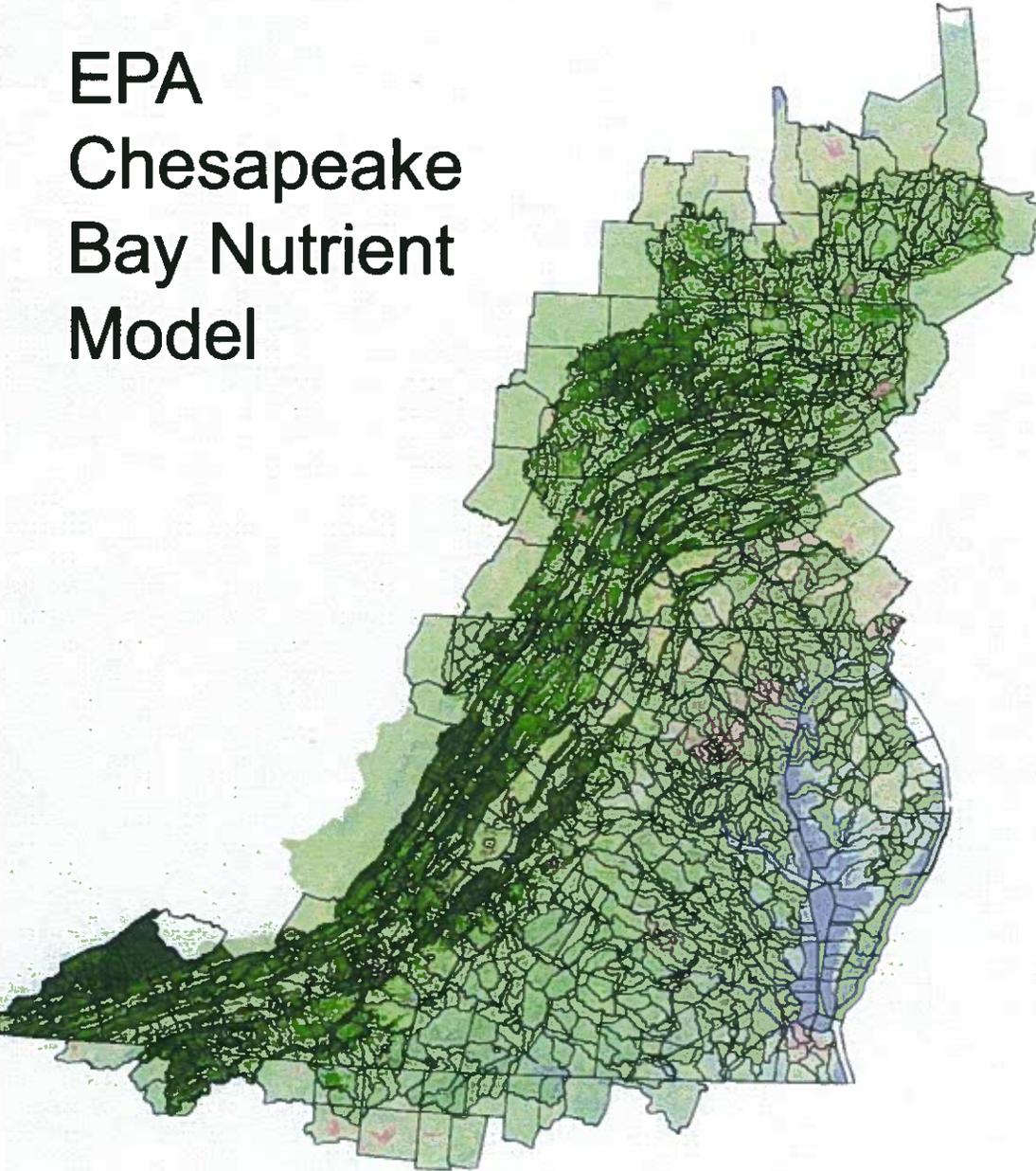
- County government is responsible for water quality protection (Comp Plan, Chesapeake Bay Act)
- County government is also charged with steering development to appropriate areas (Comprehensive Plan)
- It follows that County government should plan for areas in the county that should remain in a natural state, to benefit all present as well as future citizens

Why Blue-Green Infrastructure Planning Important (cont'd)

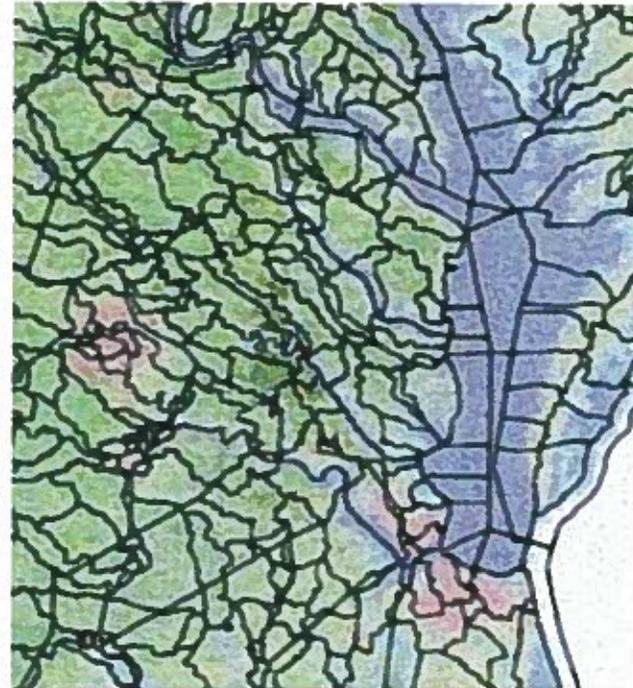
- Instead of waiting until a majority of the lands in the county are developed, perhaps we should PLAN which parts of Lancaster County should remain in a natural state
- With the EPA Chesapeake Bay TMDL process ongoing, there will be a Bay-wide TMDL in place for nutrients and sediment by December 2010, retaining natural open space will help filter nutrients from upstream before they have a chance to reach the River or Bay

Phase 5 Land-River Segments

EPA
Chesapeake
Bay Nutrient
Model



Close-up View



Northern Neck Regional Blue-Green Infrastructure Planning

- A focal area of the Virginia Coastal Zone Management Program, DEQ, NOAA and executed by the local Planning District Commissions
- Currently, the Richmond, Fredericksburg, and the Northern Neck Planning District Commissions are currently working on Blue - Green Infrastructure Plans for their member counties
- The NNPDC worked with Westmoreland and Richmond County last year, since they are in the process of revising their Comprehensive Plans. This year, the NNPDC is working with Lancaster and Northumberland Counties on Blue - Green Infrastructure Plans

New Data Layers to Support Blue Green Infrastructure Planning in Virginia

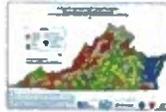
- Department of Conservation and Recreation's Virginia Conservation Needs Land Assessment (VCLNA) GIS Model and Maps
- Department Conservation and Recreation, Department of Game and Inland Fisheries Priority Conservation Area Maps

Virginia Conservation Needs Land Assessment (VCLNA)

- Statewide effort to identify high value natural lands
- Contains several GIS models: Ecological, Cultural Asset, Vulnerability, Forest Economics, Recreation Model, Watershed Integrity, and Agricultural Model
- Focus mainly on Upland Terrestrial Habitat

SYNOPSIS OF THE VIRGINIA CONSERVATION LANDS NEEDS ASSESSMENT

The VCLNA is a flexible, widely applicable tool for integrating and coordinating the needs and strategies of different conservation interests, using GIS (Geographic Information System) to model and map land conservation priorities and actions in Virginia. The VCLNA consists of seven complex models:



ECOLOGICAL MODEL

The *Ecological Model* is a collection of models and products including the Virginia Natural Landscape Assessment (VaNLA), DGIF's Wildlife Action Plan, and a biodiversity assessment using species and natural community information from DCR's Natural Heritage Program. The VaNLA is a landscape-scale GIS analysis for identifying, prioritizing, and linking natural habitats in Virginia. It identifies and connects the most important natural, unfragmented lands based on considerations of biological and ecological value and integrity.



CULTURAL ASSET MODEL

The *Virginia Cultural Asset Model* is a statewide model showing the cultural value of lands in Virginia. The Division of Natural Heritage worked closely with the Virginia Department of Historic Resources to identify and prioritize important cultural assets in Virginia, including archaeological and architectural sites, and American Indian Areas.



VULNERABILITY MODEL

The *Virginia Vulnerability Model* (or growth prediction model) are four statewide and one composite model showing predicted growth patterns across the landscape. The model uses GIS and statistical methods to analyze housing allocation, lot size estimation, growth hotspot, residential land conversion hotspots and travel time proximity in an effort to model urban, suburban (urban fringe) and rural (outside the urban fringe) growth patterns.



FOREST ECONOMICS MODEL

The *Forest Economics Model* is a GIS effort to map viable forestland with economic value. The Division worked closely with the Virginia Department of Forestry to analyze biophysical parameters, management constraints and socioeconomic influences.



RECREATION MODEL

The *Virginia Recreation Model* is a GIS effort to map the value of lands as they contribute to recreational opportunity. The Division worked closely with the Virginia Department of Game and Inland Fisheries as well as DCR's Division of Planning and Recreation and numerous collaborators and data contributors to analyze a variety of recreational datasets (including but not limited to hunting, fishing, wildlife watching, parks, trails, population density influences and public access) in an effort to model recreational value across the landscape.



WATERSHED INTEGRITY MODEL

The *Virginia Watershed Integrity Model* is a GIS effort to map the relative value of land as it contributes to water quality and watershed integrity. The Division worked closely with the Virginia Department of Forestry and Virginia Commonwealth University Center for Environmental Studies to analyze a variety of parameters focused on identifying important terrestrial features that contribute to water resources, and, therefore watershed integrity.



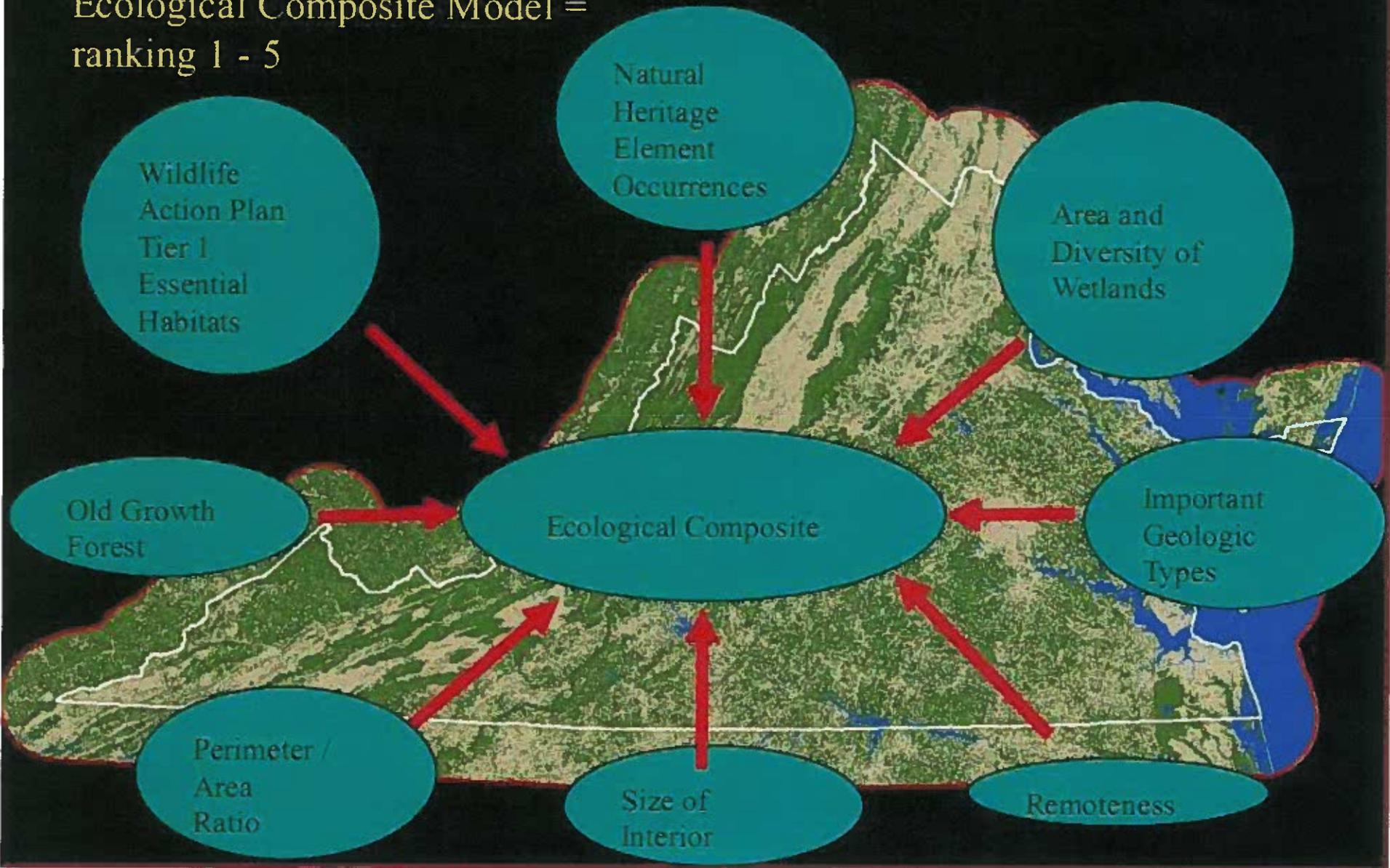
AGRICULTURAL MODEL

The *Virginia Agricultural Model* is a GIS effort to map important agricultural lands in Virginia, developed in cooperation with the Department of Agriculture and Consumer Services and the Virginia Department of Historic Resources. This model analyzed parameters such as soils, slope, land use and historic farms.



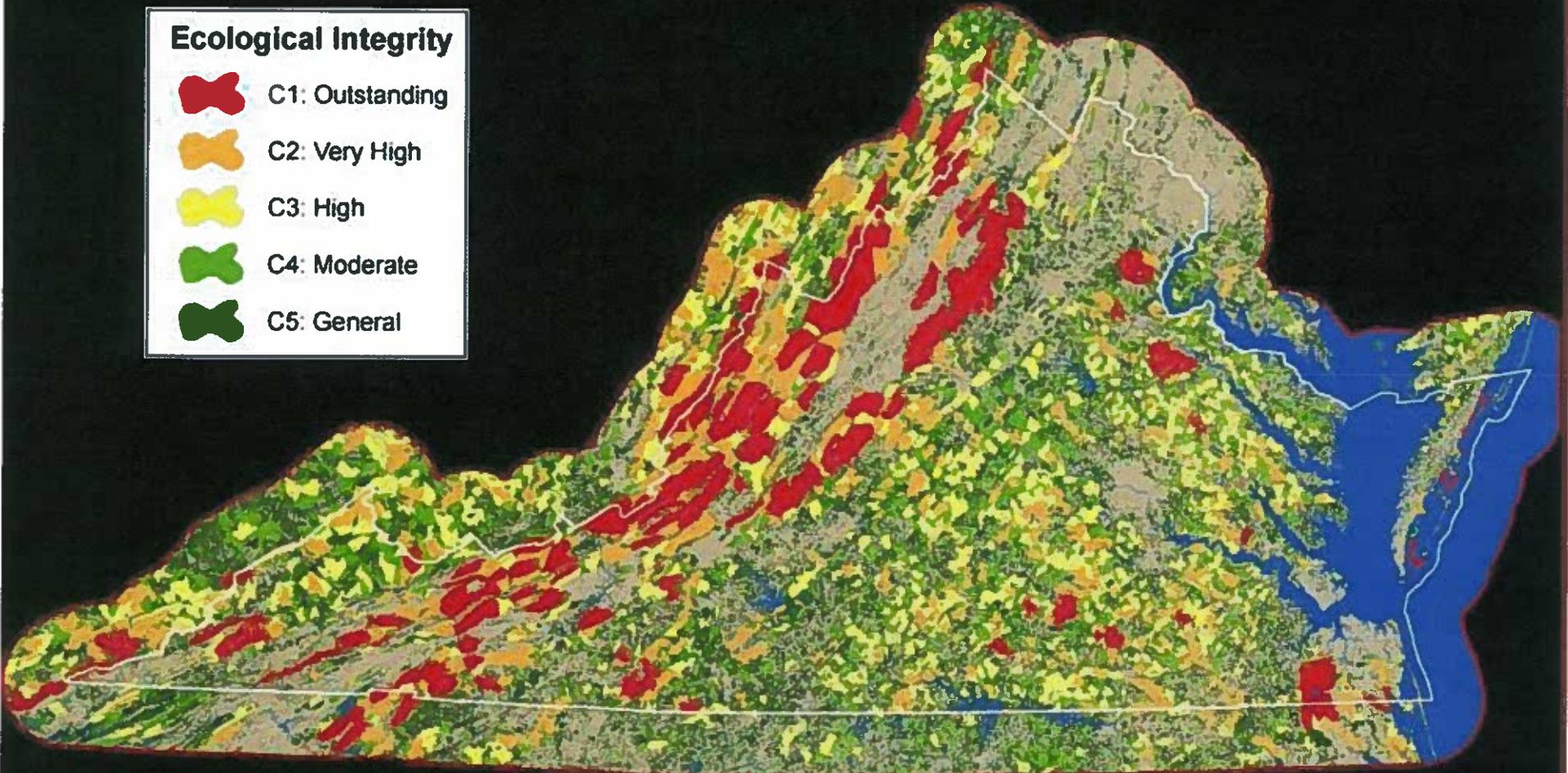
http://www.dcr.virginia.gov/natural_heritage/vclna.shtml

Ecological Composite Model =
ranking 1 - 5



Ecological Integrity

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

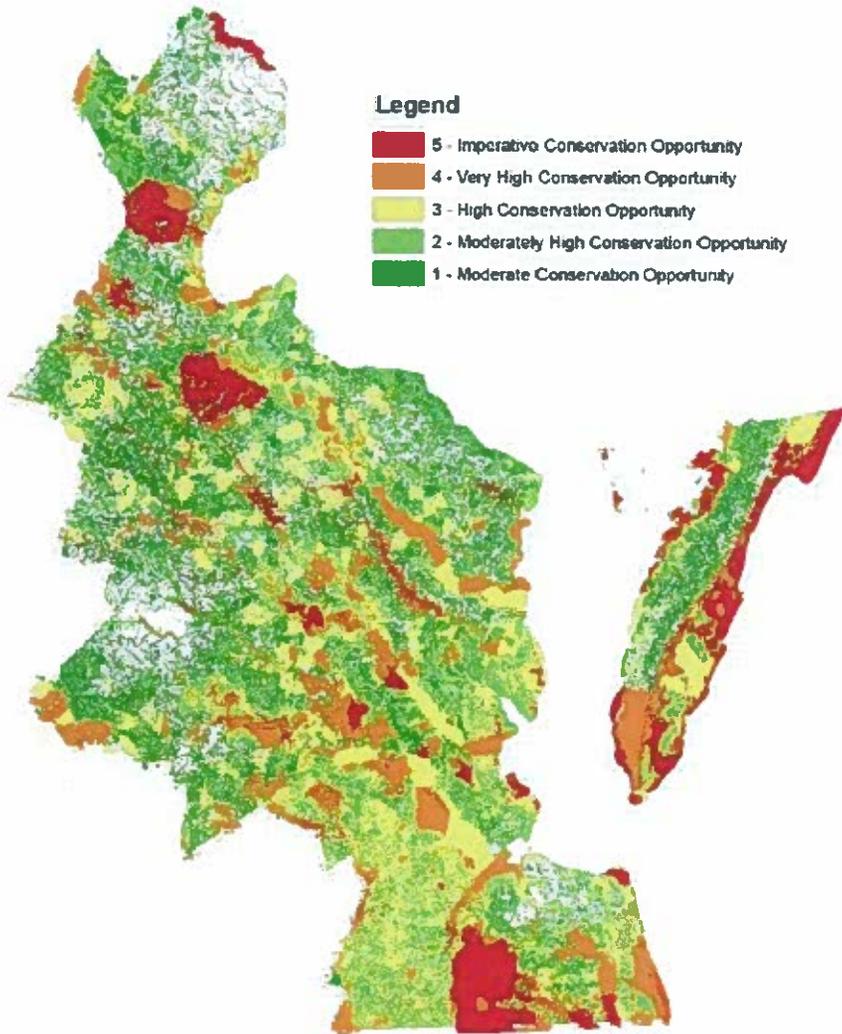


Virginia Priority Conservation Areas

- Combines the VCLNA with VDGIF's Priority Wildlife Diversity Conservation Areas from the Wildlife Action Plan and Virginia Commonwealth University's Aquatic Resources Integrity Layer
- Eliminates the upland terrestrial bias present in the VCLNA
- Helps visually understand the link between land use and near-shore water quality (the "blue" part of Blue-Green Infrastructure Planning)

Priority Conservation Areas

Priority Conservation Areas: lands and surface waters identified as important for conservation of Virginia's wildlife, plants, and natural communities. The identified lands/waters can be used to prioritize areas for preservation, protection or specific management action.



Components in the Priority Conservation Areas (PCA) dataset

DGIF

Priority Wildlife Diversity Conservation Areas (PW/DCA)
 A layer created for this project guided by Virginia's Wildlife Action Plan, incorporating mapped species' habitats and recommended conservation actions to conserve riparian buffers, large blocks of habitat and forest and wetland buffers. DGIF biologists provided input to the layer which also includes other wildlife resource spatial data such as Important Bird Areas, Colonial waterbird sites, Coldwater streams and Anadromous fish use waters. See Figure 4.

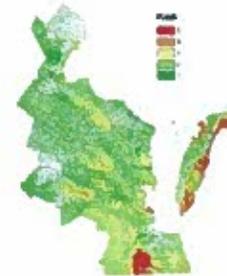


Figure 4. DGIF Priority Wildlife Diversity Conservation Areas

DCR-DNH

Natural Heritage Plan Conservation Sites and Stream Conservation Units
 A fine filter approach with polygons that delineate known occurrences of rare species plus required habitat and buffer (Fig. 1). The sites are ranked by biodiversity significance.

Virginia Natural Land Network
 A course filter approach that prioritizes based on ecological integrity unfragmented cores of natural habitat and the corridors that connect them. For this project they included the highest 2 ranks of cores (C1 and C2) and associated corridors/nodes (Fig. 2).

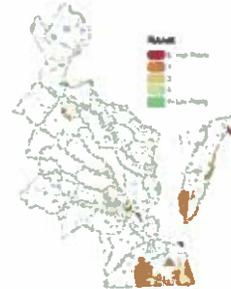


Figure 1. DCR-DNH Conservation Sites and Stream Conservation Units

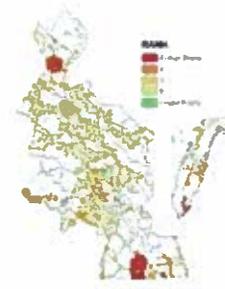


Figure 2. DCR-DNH Natural Land Network

VCU-CES

Aquatic Resources Integrity Layer
 A stream reach and watershed based approach. Stream based approach includes aquatic community assessment based on fish, habitat and macro invertebrates. Streams are assigned one of 4 health categories. Watershed approach incorporates 6 metrics using living resource databases. See Figure 3.

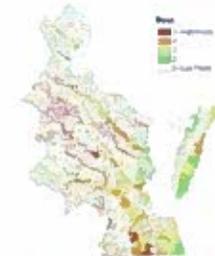


Figure 3. VCU-CES Aquatic Resources Integrity Layer

Next Steps

- Examine the Blue – Green Infrastructure data layers for Lancaster County
- Explore which areas might be considered for inclusion in the Blue – Green Infrastructure Plan
- Draft the Lancaster Blue – Green Infrastructure Plan, with the hope that it could be incorporated into the County Comprehensive Plan during the next revision



Questions?



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This project was funded by the Northern Neck Planning District Commission and the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant #NA09NOS4190163 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.



Virginia Coastal Zone
MANAGEMENT PROGRAM



Lancaster Blue – Green Infrastructure Planning Map Data



August 19, 2010

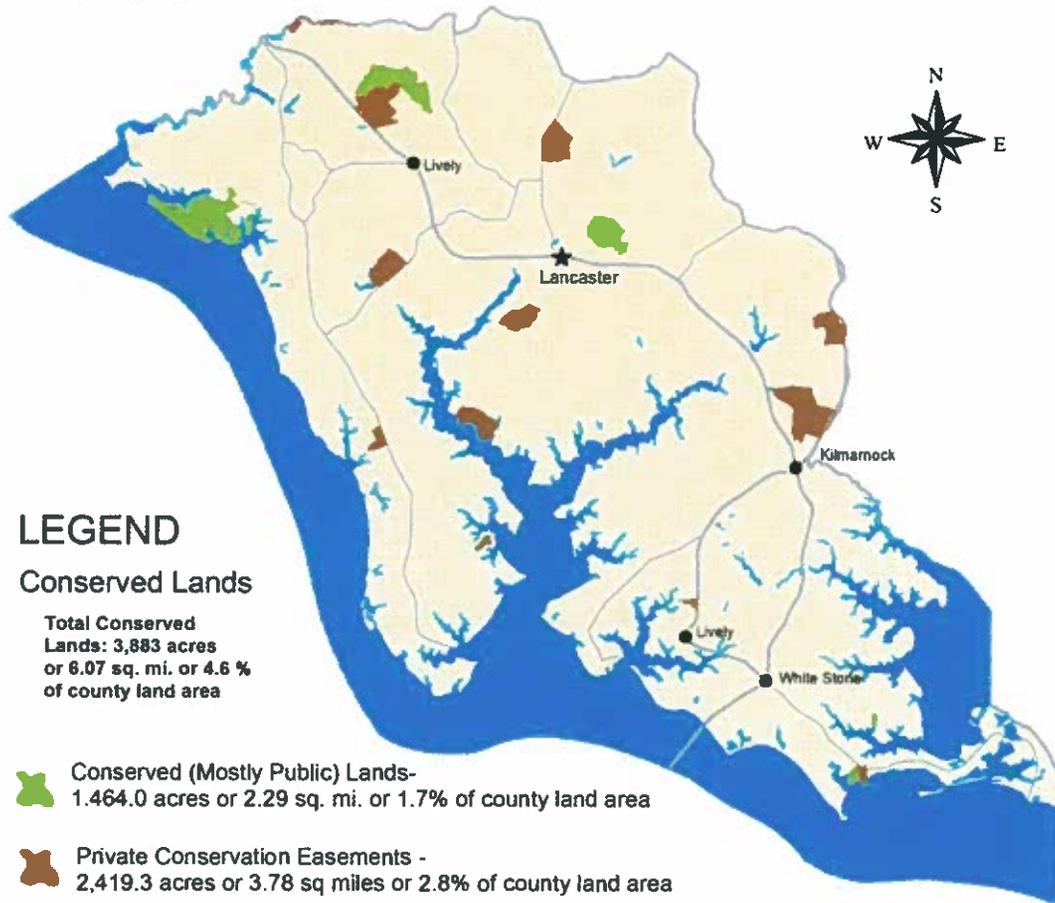
Lancaster County Planning Commission

Amount of Land Already Conserved in Lancaster County

- Currently (as of 7-9-10) there are 3,883 acres or 6.07 sq. mi. (4.6%) of the county that are permanently conserved
- Conserved (mostly Public) Lands make up 1,463.9 acres or 2.29 sq. mi. (1.7%) of the county land area
- Private Conservation Easements make up 2,419.3 acres, or 3.78 sq. mi. (2.8%) of the county land area

Lancaster County:
 Department of Conservation and Recreation
 Conserved Lands Database
 Updated 7-9-10

Lancaster
 County Total
 Land Area:
 133.1 sq. mi.



LEGEND

Conserved Lands

Total Conserved
 Lands: 3,883 acres
 or 6.07 sq. mi. or 4.6 %
 of county land area

 Conserved (Mostly Public) Lands-
 1,464.0 acres or 2.29 sq. mi. or 1.7% of county land area

 Private Conservation Easements -
 2,419.3 acres or 3.78 sq miles or 2.8% of county land area

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Comparison of Two Virginia Counties: Conserved Land Percentages

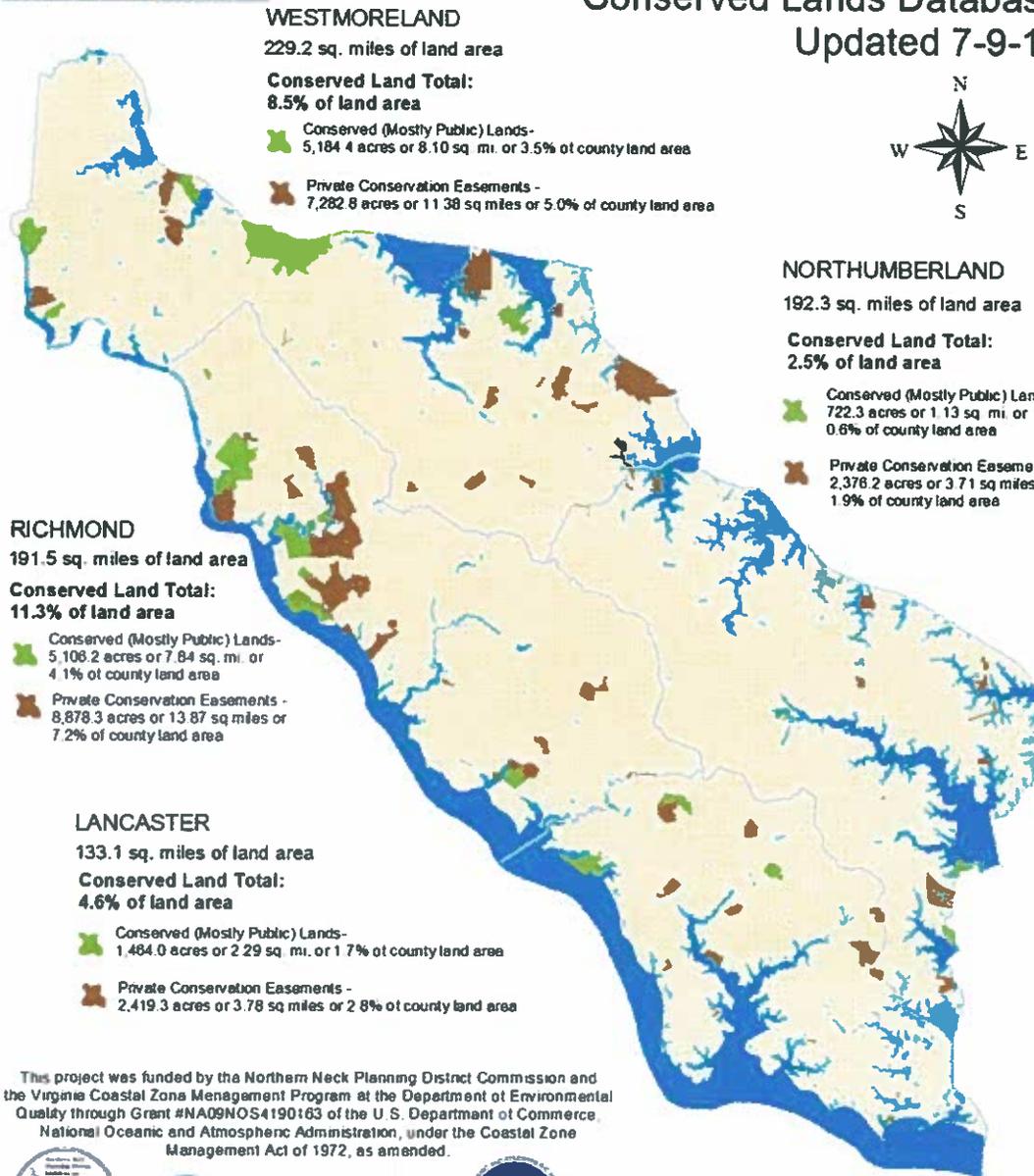
- Lancaster County in Virginia's Northern Neck has 6.07 sq. mi or 4.6% of its land conserved
- Albemarle County in Virginia's Piedmont Region has 165.54 sq. miles or 22.9% of its land conserved

What About the Other Northern Neck Counties?

- The Northern Neck, as a region, has 51.89 sq. mi. or 7% of its land area conserved
- LC has 4.6% of its land area conserved
- RC has 11.3% of its land area conserved
- WC has 8.5% of its land area conserved
- NC has 2.5% of its land area conserved

NNK Regionwide	
Conserved Land	4.4%
Private Easement	2.6%
Total Conserved	7.0%

Northern Neck Region Department of Conservation and Recreation Conserved Lands Database Updated 7-9-10



WESTMORELAND
229.2 sq. miles of land area
Conserved Land Total:
8.5% of land area

- Conserved (Mostly Public) Lands -
5,184.4 acres or 8.10 sq. mi. or 3.5% of county land area
- Private Conservation Easements -
7,282.8 acres or 11.38 sq. miles or 5.0% of county land area

NORTHUMBERLAND
192.3 sq. miles of land area
Conserved Land Total:
2.5% of land area

- Conserved (Mostly Public) Lands -
722.3 acres or 1.13 sq. mi. or
0.6% of county land area
- Private Conservation Easements -
2,376.2 acres or 3.71 sq. miles or
1.9% of county land area

RICHMOND
191.5 sq. miles of land area
Conserved Land Total:
11.3% of land area

- Conserved (Mostly Public) Lands -
5,106.2 acres or 7.84 sq. mi. or
4.1% of county land area
- Private Conservation Easements -
8,878.3 acres or 13.87 sq. miles or
7.2% of county land area

LANCASTER
133.1 sq. miles of land area
Conserved Land Total:
4.6% of land area

- Conserved (Mostly Public) Lands -
1,464.0 acres or 2.29 sq. mi. or 1.7% of county land area
- Private Conservation Easements -
2,419.3 acres or 3.78 sq. miles or 2.8% of county land area

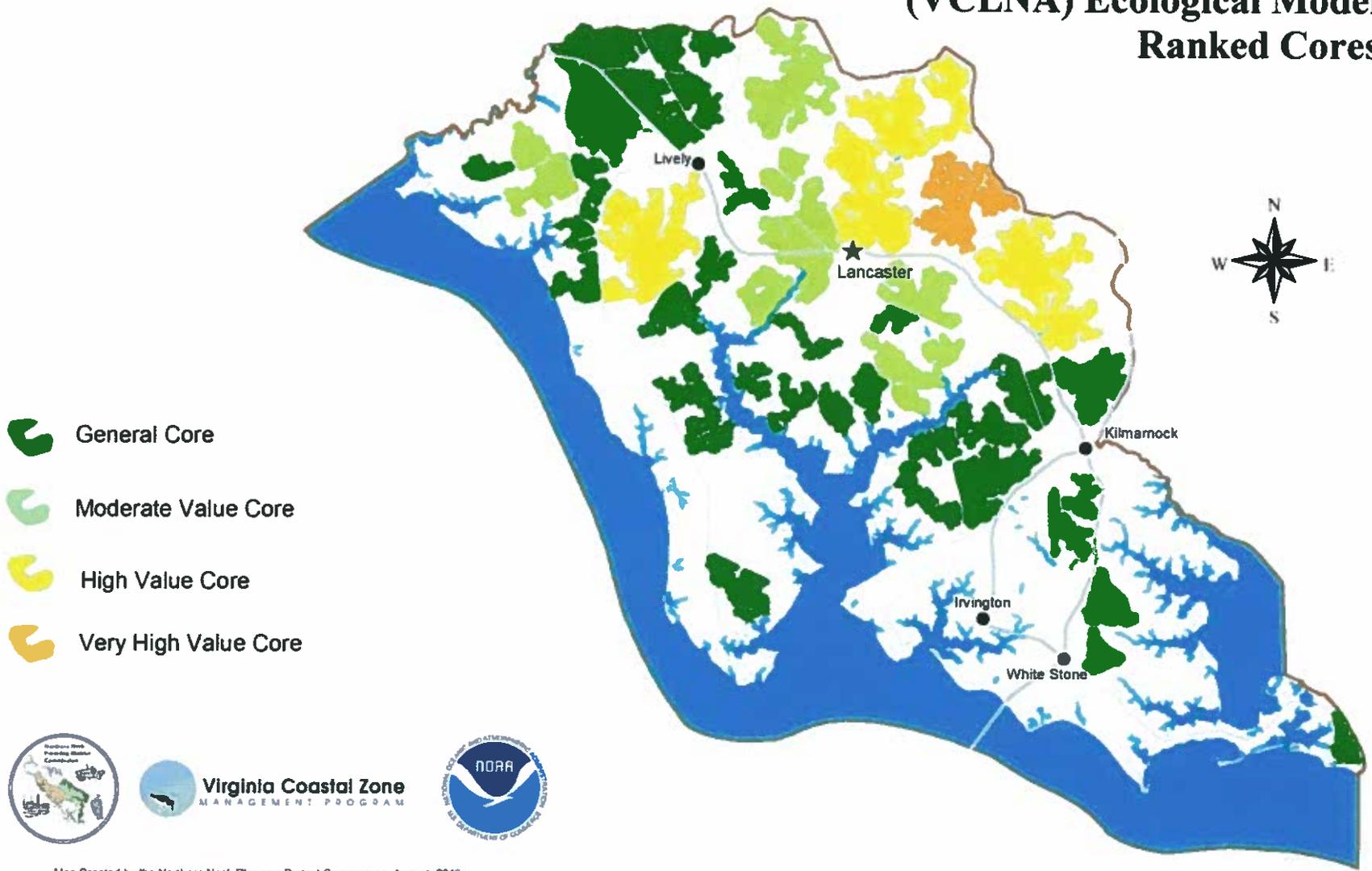
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Virginia Conservation Needs Land Assessment

- Basis is “cores” of natural areas (forests)
- Must be at least 100 acres in size
- Ecologically ranked using model
- Cores were connected to create natural corridors
- Has somewhat of an upland terrestrial bias
- Regionwide planning initiative to potentially link natural areas together

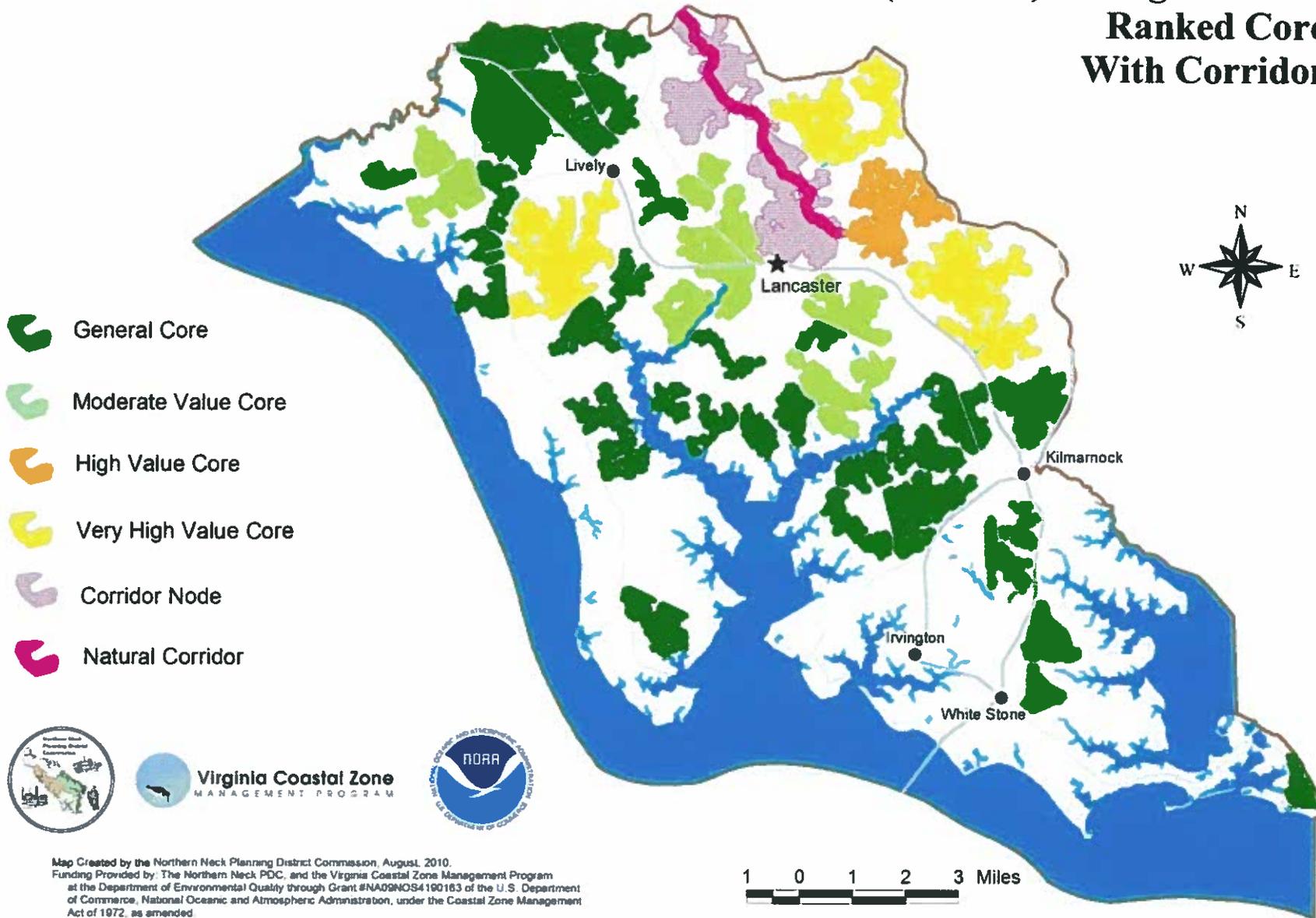
Lancaster County: Virginia Conservation Needs Land Assessment (VCLNA) Ecological Model Ranked Cores



Map Created by the Northern Neck Planning District Commission, August, 2010.
 Funding Provided by: The Northern Neck PDC, and the Virginia Coastal Zone Management Program
 at the Department of Environmental Quality through Grant #NA09NOS4190163 of the U.S. Department
 of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management
 Act of 1972, as amended



Lancaster County: Virginia Conservation Needs Land Assessment (VCLNA) Ecological Model Ranked Cores With Corridors

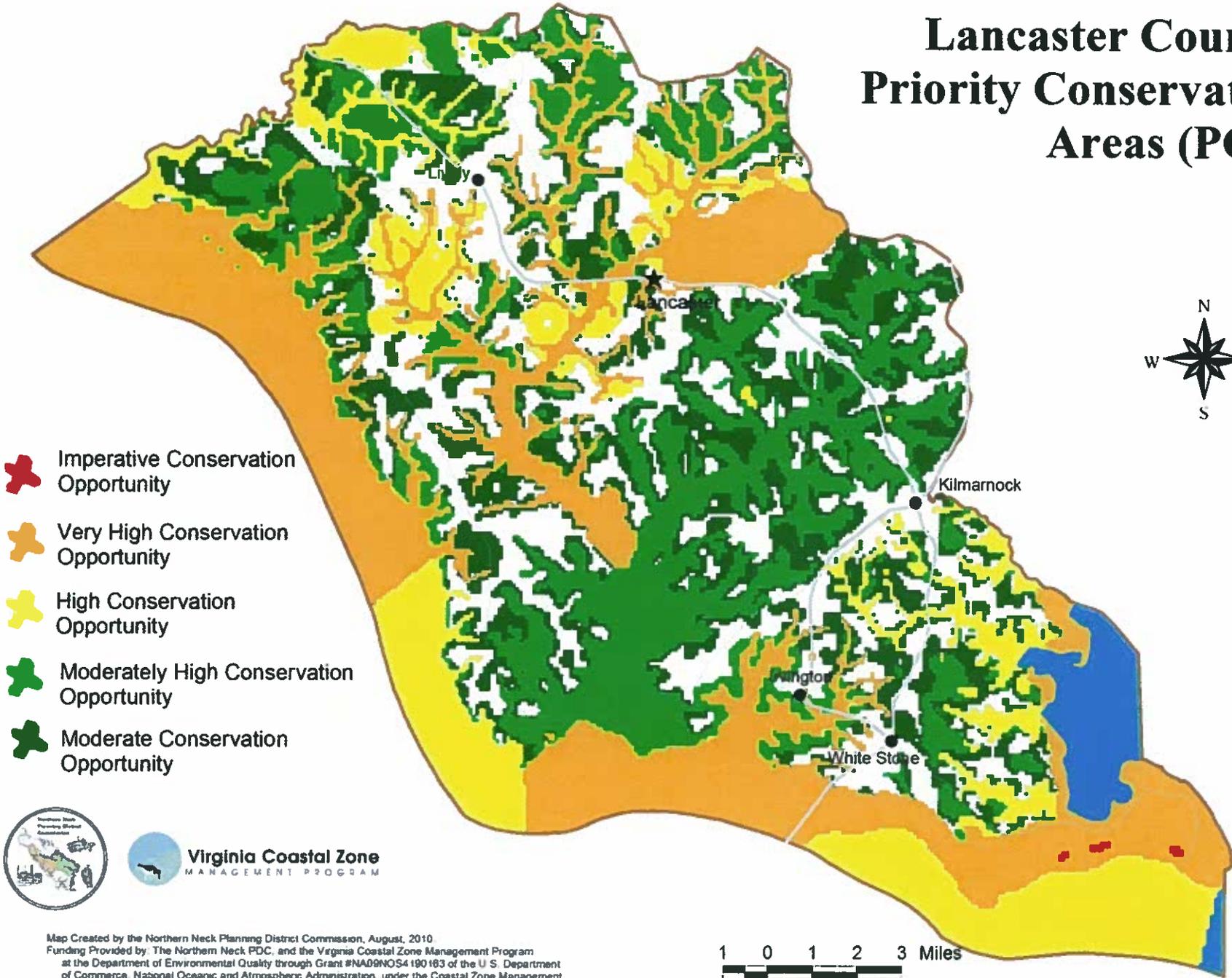


Map Created by the Northern Neck Planning District Commission, August, 2010.
Funding Provided by: The Northern Neck PDC, and the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant #NA09NOS4190163 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.

Virginia Priority Conservation Areas

- A conglomeration of the VCLNA, VDGIF's Wildlife Action Plan, and VCU Aquatic Resources Integrity Layer
- Focuses more on areas where the water meets the land
- Shows the linkage between good land stewardship and high water quality

Lancaster County: Priority Conservation Areas (PCA)



Map Created by the Northern Neck Planning District Commission, August, 2010
 Funding Provided by: The Northern Neck PDC, and the Virginia Coastal Zone Management Program
 at the Department of Environmental Quality through Grant #NA09NOS4190163 of the U.S. Department
 of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management
 Act of 1972, as amended

1 0 1 2 3 Miles

What are some possible next steps?

- Use the GIS mapping program on this computer in a future meeting or worksession to preliminarily identify areas that might be in the county's best interest to designate as an area that would be desirable to stay in a natural state
- Request that county staff work with NNPDC staff to help delineate areas to bring back to the Planning Commission to consider at a later date

Questions, Thoughts?

Stuart McKenzie

Environmental Planner

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Virginia Coastal Zone
MANAGEMENT PROGRAM



Lancaster County Blue Green Infrastructure Planning

*How does Blue Green Infrastructure
Planning benefit the average citizen
of Lancaster County?*

October 21, 2010

Retain History and Culture

- Historically, forests were used to build the ships that plied the local waters under sail
- Forests provide habitat, wild game for hunting, lumber, they hold the soil in place, and generate local revenue, not to mention they are aesthetically pleasing to most citizens
- In the Northern Neck, most forests are on marginal soils; either low production soils or soils with steep slopes

Blue Green Infrastructure Planning

Benefits

- By identifying areas in the county whose “highest and best use” would be to stay in natural land cover would keep forestry and hunting as viable economic engines to continue to generate local revenue
- Positive Externalities would accrue to landowners adjacent to Blue Green Infrastructure areas, and landowners in BGI areas could receive economic benefits if they chose to enter into a conservation agreements

Blue Green Infrastructure Planning

Benefits

- Forests act to filter the air; they filter carbon monoxide, carbon dioxide, as well as nitrogen dioxide
- Forests also “sequester” carbon (keeping it in a neutral state)
- Forest filter stormwater runoff, cleaning the water that runs off before it reaches the local creeks

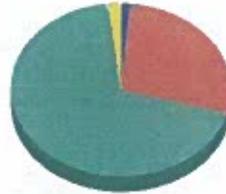
Blue Green Infrastructure Planning

Benefits

- The Virginia Department of Forestry, and others are trying to quantify the ecological services (benefits) of forest lands
- A computer program developed by American Forests, call CityGreen can estimate the value of forests in removing air pollutants, sequestering carbon and the value of forests for stormwater runoff, all based on satellite imagery of land cover

Benefits of Blue Green Infrastructure

- Our neighboring PDC, George Washington Regional Commission (Fredericksburg Region) graciously ran three scenarios for Lancaster County from 1996, 2001 and 2006 Satellite Imagery
- The results of that CityGreen modeling software analysis follows:



Land cover in acres and percentages

Category	Acres	Percentage
Impervious Surfaces	1,098.8	1.3%
Open Space - Grass/Scattered Trees	23,932.2	27.8%
Trees	59,206.3	68.8%
Urban: Bare	96.1	0.1%
Water Area	1,732.8	2.0%
Total	86,066.2	100.0%

Tree Canopy: 59,206.3 acres (68.8%)

Air Pollution Removal

Nearest air quality reference city: Washington DC

	<u>Lbs. Removed/yr</u>	<u>Dollar Value/yr</u>
Carbon Monoxide:	263,885	\$129,508
Ozone:	2,058,306	\$7,272,099
Nitrogen Dioxide:	1,055,541	\$3,729,281
Particulate Matter:	1,741,643	\$4,108,272
Sulfur Dioxide:	844,433	\$728,772
Totals:	5,963,809	\$15,967,932

Dollar values are based on 2009 dollars

Carbon Storage and Sequestration

Tons Stored (Total):	2,547,735
Tons Sequestered (Annually):	19,835

Stormwater Management

Water Quantity (Runoff Volume)

2-yr, 24-hr Rainfall in inches:	3.25
Curve Number reflecting existing conditions:	71
Curve Number of replacement land cover:	91

Dominant Soil Type: B

Replacement land cover type: (existing condition)

Impervious Surfaces, Buildings/ structures

Additional cu. ft. storage needed:	441,303,510
Construction cost per cu. ft.:	\$2.00

Total Stormwater Value: \$882,607,020

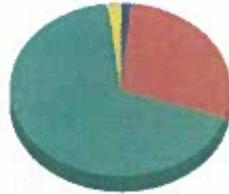
Annual Stormwater Value: \$78,949,702

(based on 20-year financing at 6% interest)

Water Quality (Contaminant Loading)

Percent change in contaminant loadings





Land cover in acres and percentages

Category	Acres	Percentage
Impervious Surfaces	1,160.9	1.3%
Open Space - Grass/Scattered Trees	24,658.7	28.7%
Trees	58,442.2	67.9%
Urban: Bare	113.2	0.1%
Water Area	1,691.3	2.0%
Total	86,086.2	100.0%

Tree Canopy: 58,442.2 acres (67.9%)

Air Pollution Removal

Nearest air quality reference city: Washington DC

	Lbs. Removed/yr	Dollar Value/yr
Carbon Monoxide:	260,480	\$127,637
Ozone:	2,031,741	\$7,179,244
Nitrogen Dioxide:	1,041,919	\$3,681,151
Particulate Matter:	1,719,166	\$4,055,250
Sulfur Dioxide:	833,535	\$719,367
Totals:	5,886,840	\$15,761,848

Dollar values are based on 2008 dollars.

Carbon Storage and Sequestration

Tons Stored (Total):	2,514,854
Tons Sequestered (Annually):	19,579

Stormwater Management

Water Quantity (Runoff Volume)

2-yr, 24-hr Rainfall in inches:	3.25
Curve Number reflecting existing conditions:	71
Curve Number of replacement land cover:	91

Dominant Soil Type: B

Replacement land cover type: (existing condition)

Impervious Surfaces: Buildings/ structures

Additional cu. ft. storage needed: 433,633,028

Construction cost per cu. ft.: \$2.00

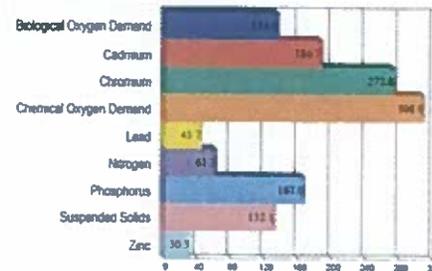
Total Stormwater Value: \$867,266,056

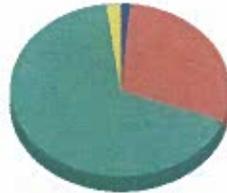
Annual Stormwater Value: \$76,612,207

(based on 20-year financing at 6% interest)

Water Quality (Contaminant Loading)

Percent change in contaminant loadings





Land cover in acres and percentages

Category	Acres	Percentage
Impervious Surfaces	1,194.4	1.4%
Open Space - Grass/Scattered Trees	25,191.5	29.3%
Trees	57,798.6	67.2%
Urban: Bare	137.4	0.2%
Water Area	1,744.2	2.0%
Total	86,066.2	100.0%

Tree Canopy: 57,798.6 acres (67.2%)

Air Pollution Removal

Nearest air quality reference city: *Washington DC*

	<u>Lbs. Removed/yr</u>	<u>Dollar Value/yr.</u>
Carbon Monoxide:	257,611	\$126,429
Ozone:	2,009,367	\$7,099,195
Nitrogen Dioxide:	1,030,444	\$3,640,613
Particulate Matter:	1,700,233	\$4,010,592
Sulfur Dioxide:	824,356	\$711,445
Totals:	5,822,011	\$19,588,273

Dollar values are based on 2009 dollars

Carbon Storage and Sequestration

Tons Stored (Total):	2,487,159
Tons Sequestered (Annually):	19,363

Stormwater Management

Water Quantity (Runoff Volume)

2-yr, 24-hr Rainfall in inches:	3.25
Curve Number reflecting existing conditions:	71
Curve Number of replacement land cover:	91

Dominant Soil Type: **B**

Replacement land cover type: (existing condition)

Impervious Surfaces: Buildings/ structures

Additional cu. ft. storage needed:	428,190,378
Construction cost per cu. ft.:	\$2.00

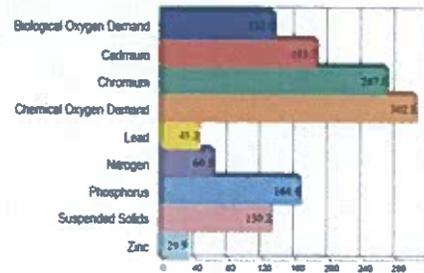
Total Stormwater Value: \$856,380,756

Annual Stormwater Value: \$74,663,177

(based on 20-year financing at 6% interest)

Water Quality (Contaminant Loading)

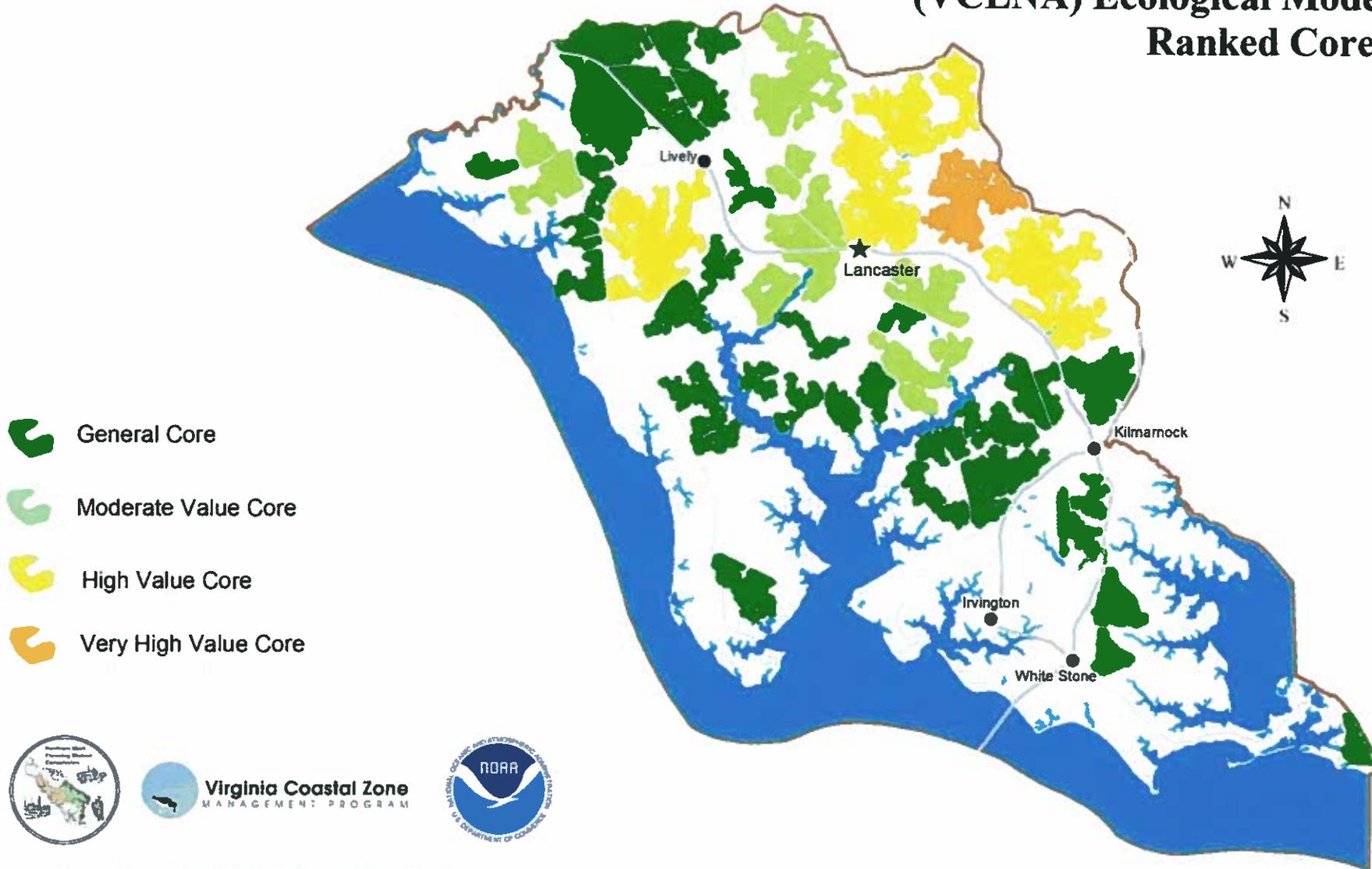
Percent change in contaminant loadings



Summary

- Natural Areas in Lancaster County benefit all citizens by filtering air and water, and keeping soil in place
- Some Natural Areas have a higher value for filtration, wildlife habitat and as corridors for wildlife movement
- Recent efforts by the Commonwealth have given us maps that value natural areas within Lancaster County that have not been available before now – the VCLNA and PCA

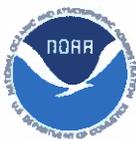
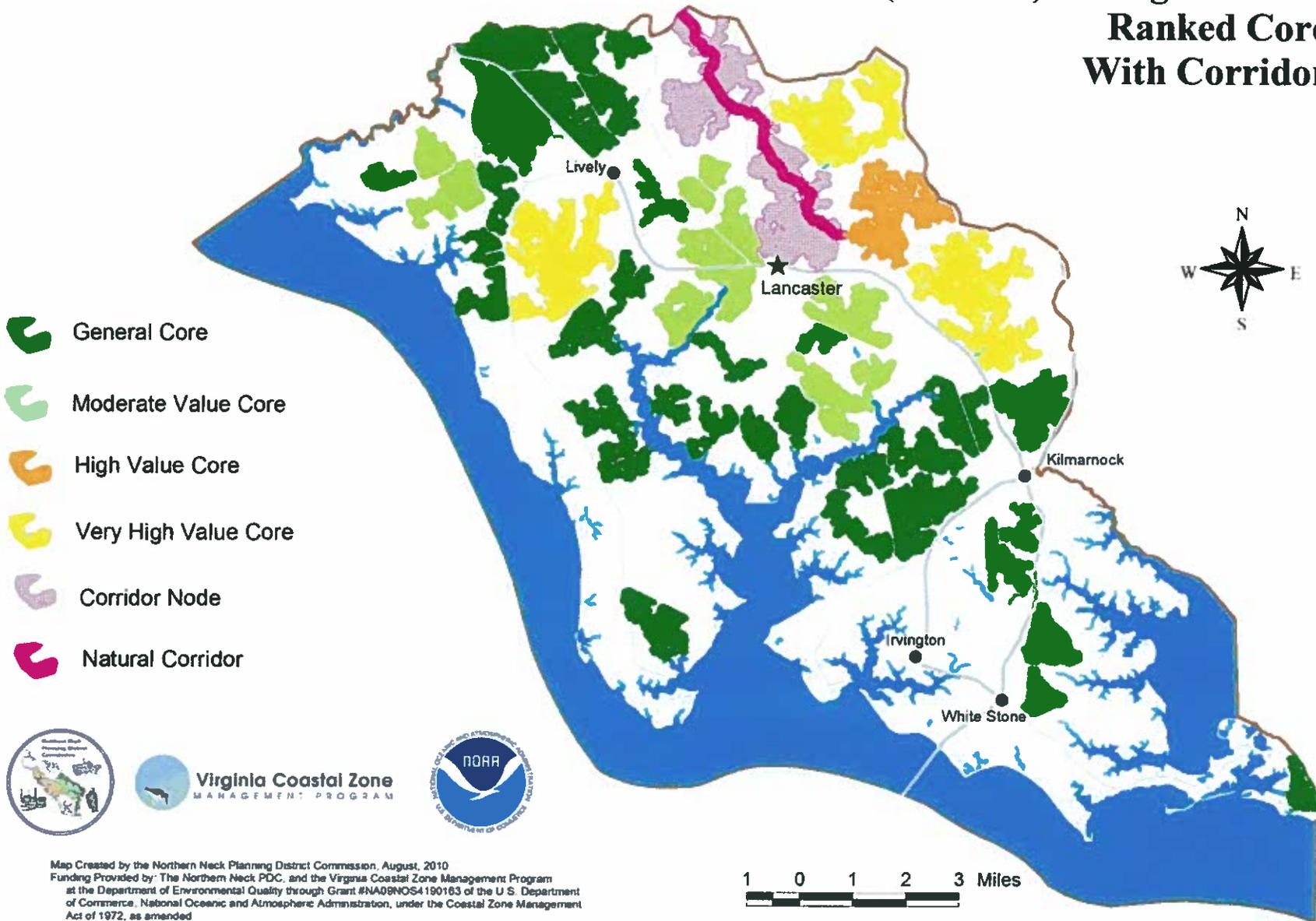
Lancaster County: Virginia Conservation Needs Land Assessment (VCLNA) Ecological Model Ranked Cores



Map Created by the Northern Neck Planning District Commission, August, 2010
 Funding Provided by: The Northern Neck PDC, and the Virginia Coastal Zone Management Program
 at the Department of Environmental Quality through Grant #NA09NOS4190183 of the U.S. Department
 of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management
 Act of 1972, as amended.

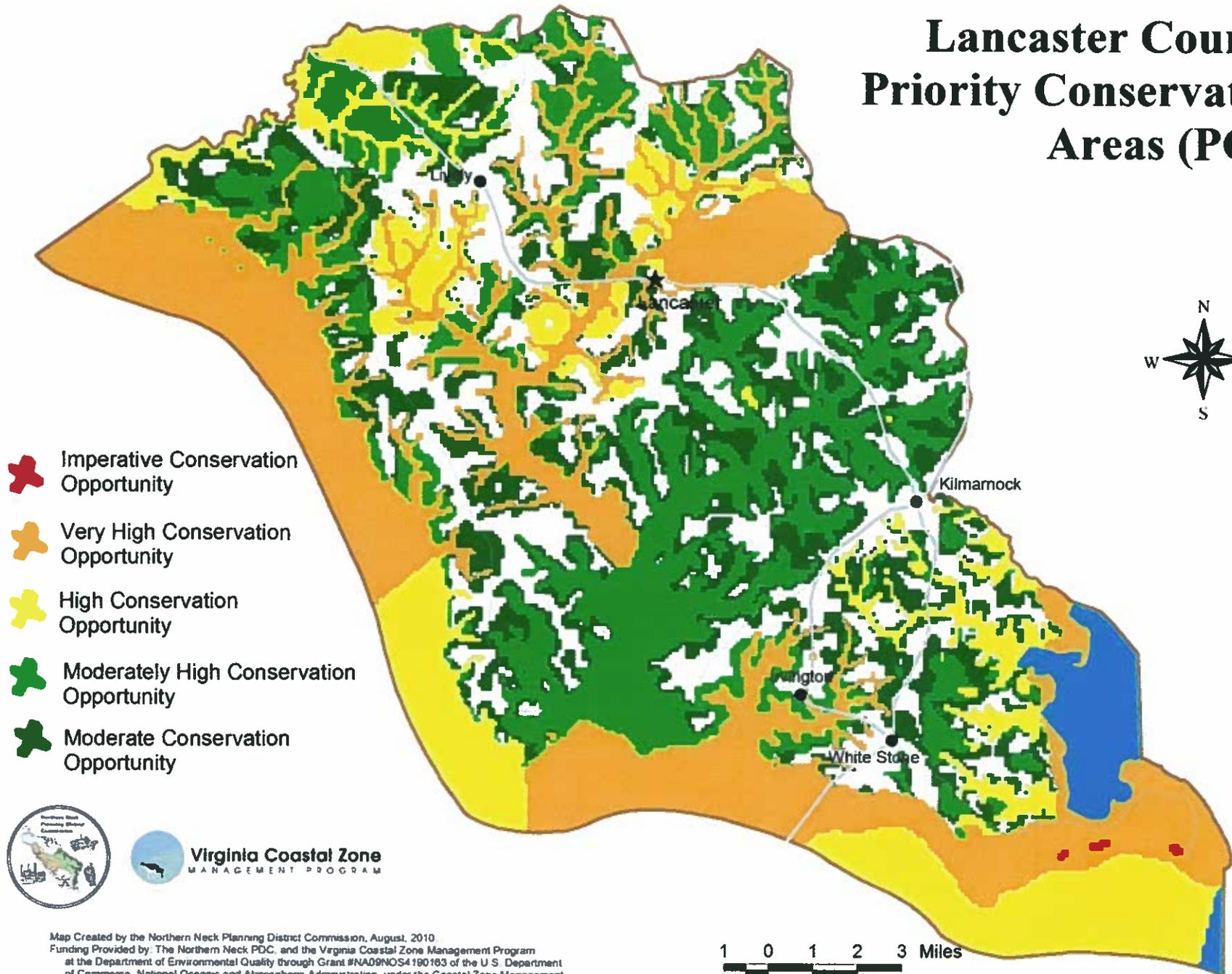
1 0 1 2 3 Miles

Lancaster County: Virginia Conservation Needs Land Assessment (VCLNA) Ecological Model Ranked Cores With Corridors



Map Created by the Northern Neck Planning District Commission, August, 2010
 Funding Provided by: The Northern Neck PDC, and the Virginia Coastal Zone Management Program
 at the Department of Environmental Quality through Grant #NA09NOS4190163 of the U.S. Department
 of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management
 Act of 1972, as amended

Lancaster County: Priority Conservation Areas (PCA)



Map Created by the Northern Neck Planning District Commission, August, 2010
 Funding Provided by: The Northern Neck PDC, and the Virginia Coastal Zone Management Program
 at the Department of Environmental Quality through Grant #NA09NOS4190163 of the U.S. Department
 of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management
 Act of 1972 as amended

Questions?

Stuart McKenzie

Environmental Planner

Northern Neck Planning District Commission

804.333.1900, ext. 25



Virginia Coastal Zone
MANAGEMENT PROGRAM



This project was funded by the Northern Neck Planning District Commission and the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant #NA09NOS4190163 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.

Lancaster planning commission is tiptoeing through 'greenways'

by Audrey Thomasson

LANCASTER—Planners are stepping softly as they approach the issue of delineating areas for "greenways," also known as conservation areas, because they call for reduced or no development.

In the past, property owners objected when county officials considered increasing set-backs along the three major county roads and again during discussions on open-space planning.

"We got pounded on for telling property owners what they can do with their property," said chair David

Jones. "We need a better way to sell it."

Over the past few months, Northern Neck Planning District Commission environmental planner Stuart McKenzie has been pitching the concept to Lancaster, Northumberland, Richmond and Westmoreland counties.

According to McKenzie, the idea is to create "greenways" across the Northern Neck to link with "greenways" in adjoining counties. "If you know where you want to put development, you might want to consider where not to put it," he said.

He showed maps of the county that identified areas which would qualify,

noting they had to be over 100 acres of contiguous land without such things as power line easements or roads.

He suggested identifying areas best suited in a natural state. "In the Northern Neck, most forests are on marginal soils; either low production soils or soils with steep slopes," said McKenzie. "Natural areas in Lancaster County benefit all citizens by filtering air and water and keeping soil in place. They would have a higher value for filtration, as a wildlife habitat and as corridors for wild-

'Greenways', continued on page A2

'Greenways'

continued from page A1

life movement."

Such areas would be ideal for hunt clubs while other places could have better soil for farming or development, he said.

McKenzie noted the state could now supply maps "that value natural areas within Lancaster County."

However, the issue facing planners is how to create incentives for landowners to keep land in its natural state.

Although land conservation is part of the comprehensive plan, said planner Robert Smart, there is a small percentage of publicly owned land in the county, "...most is privately owned. We have no mechanism

to get people to conserve." He suggested creating a reservoir of properties—going to owners and giving them some financial incentive to place property in a "greenway."

Jones asked McKenzie to identify natural areas for a future meeting, but reminded him, "when we picked areas before, everyone wanted it placed somewhere else."

According to county planning and land use director Don Gill, "greenway" planning would not become an issue until work begins on the next county comprehensive plan in 2012.

Lancaster County Blue Green Infrastructure Planning



Lancaster Planning Commission
Meeting

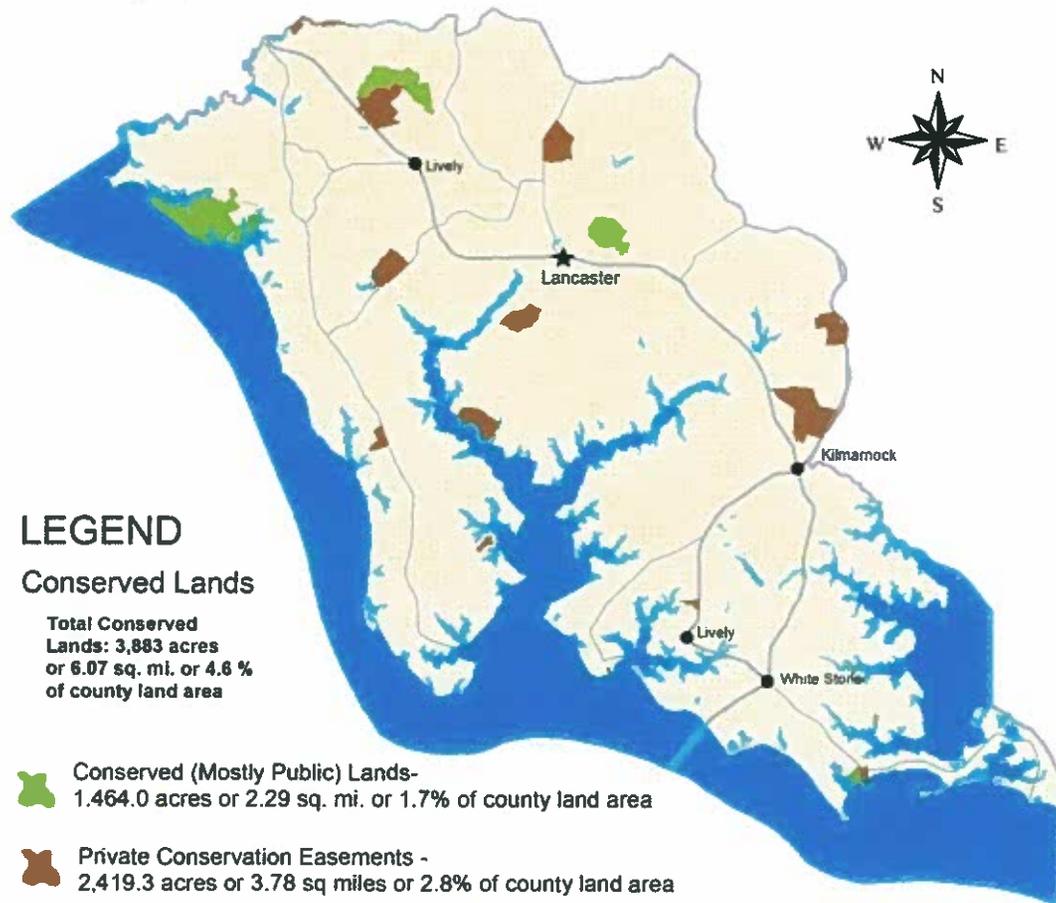
January 20, 2011

What is Blue Green Infrastructure Planning

- Examining Natural Areas in your county that have high values for Lancaster citizens in their natural state
- Taking measures that will help protect these natural areas so that the benefits that accrue from them are not lost to future generations
- Trying to coordinate the efforts into a plan that can help consolidate larger functional natural areas (as opposed to fragmented natural areas)

Lancaster County:
 Department of Conservation and Recreation
 Conserved Lands Database
 Updated 7-9-10

Lancaster
 County Total
 Land Area:
 133.1 sq. mi.



LEGEND

Conserved Lands

Total Conserved
 Lands: 3,883 acres
 or 6.07 sq. mi. or 4.6 %
 of county land area

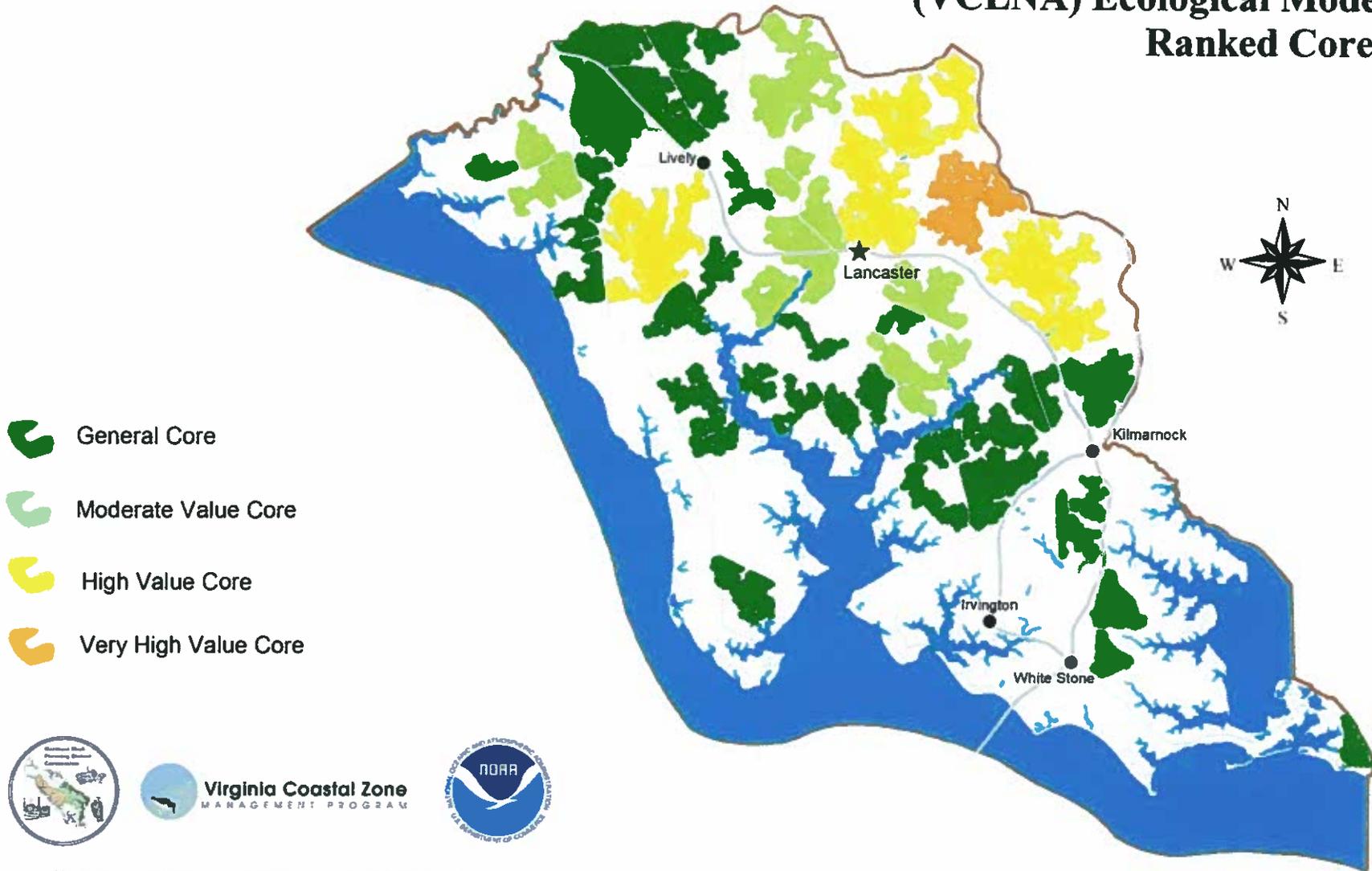
 Conserved (Mostly Public) Lands-
 1,464.0 acres or 2.29 sq. mi. or 1.7% of county land area

 Private Conservation Easements -
 2,419.3 acres or 3.78 sq miles or 2.8% of county land area

This project was funded by the Northern Neck Planning District Commission and the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant #NA09NOS4190163 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.



Lancaster County: Virginia Conservation Needs Land Assessment (VCLNA) Ecological Model Ranked Cores



-  General Core
-  Moderate Value Core
-  High Value Core
-  Very High Value Core



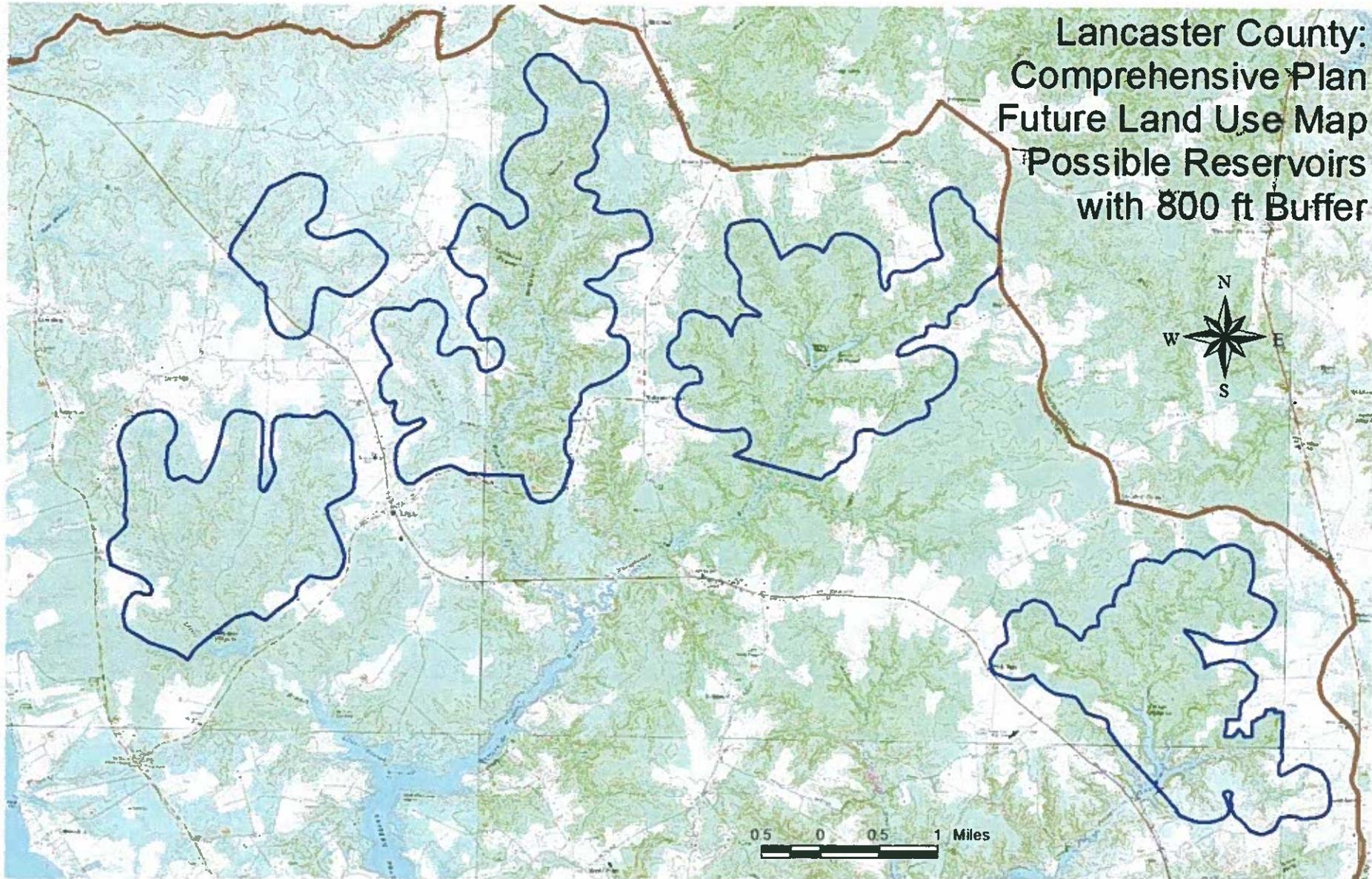
Map Created by the Northern Neck Planning District Commission, August, 2010
 Funding Provided by: The Northern Neck PDC, and the Virginia Coastal Zone Management Program
 at the Department of Environmental Quality through Grant #NA09NOS4190163 of the U.S. Department
 of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management
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1 0 1 2 3 Miles

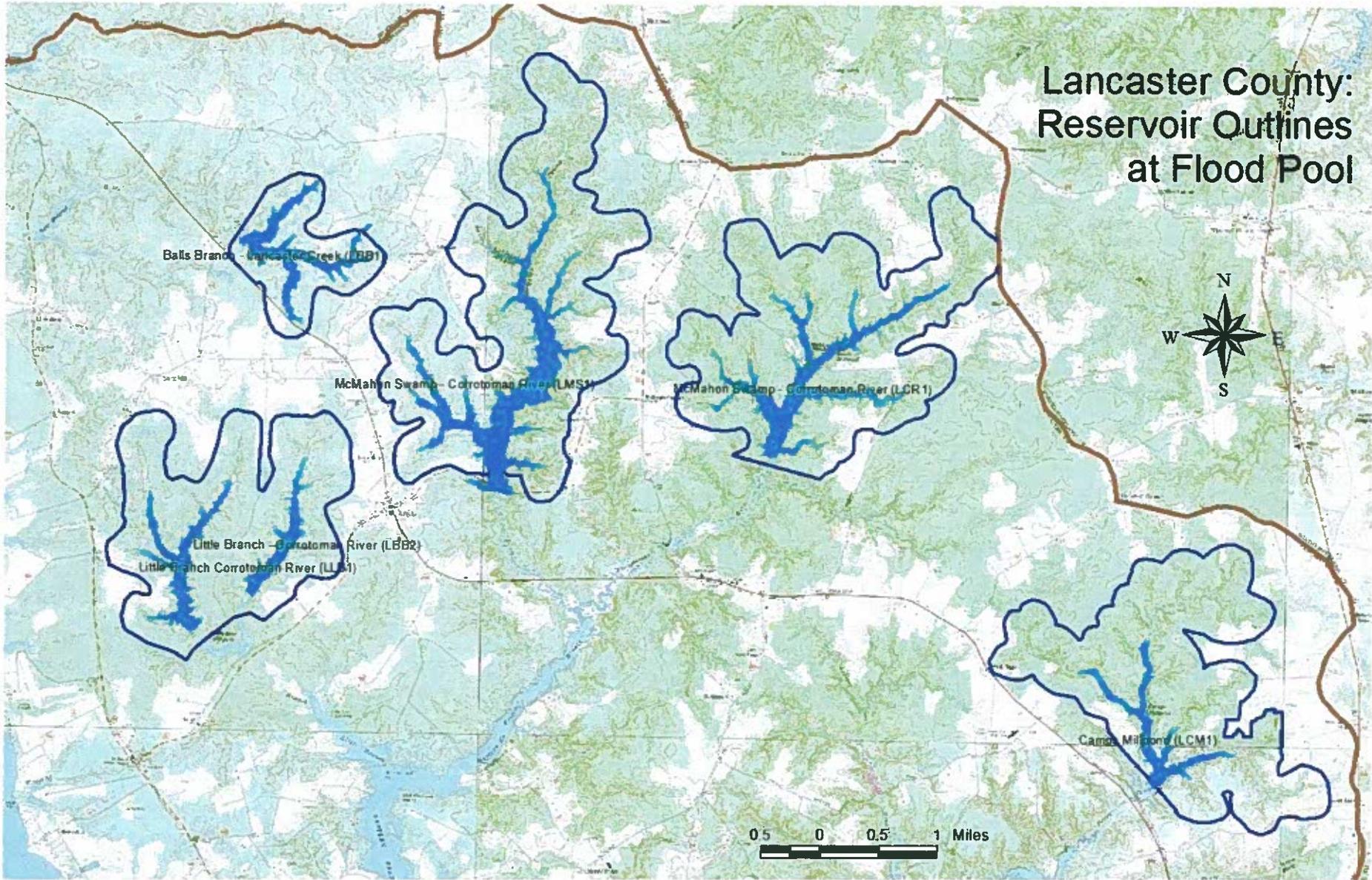
Future Reservoir Analysis

- Digitized potential reservoir sites from the NEDCO Comprehensive Water and Sewer Plan for the Northern Neck (1969)
- Used the reservoir flood pool elevation
- Overlaid with the February 2010 E911 Addressable Structures from the County E911 System
- Extracted any buildings within the reservoir footprint

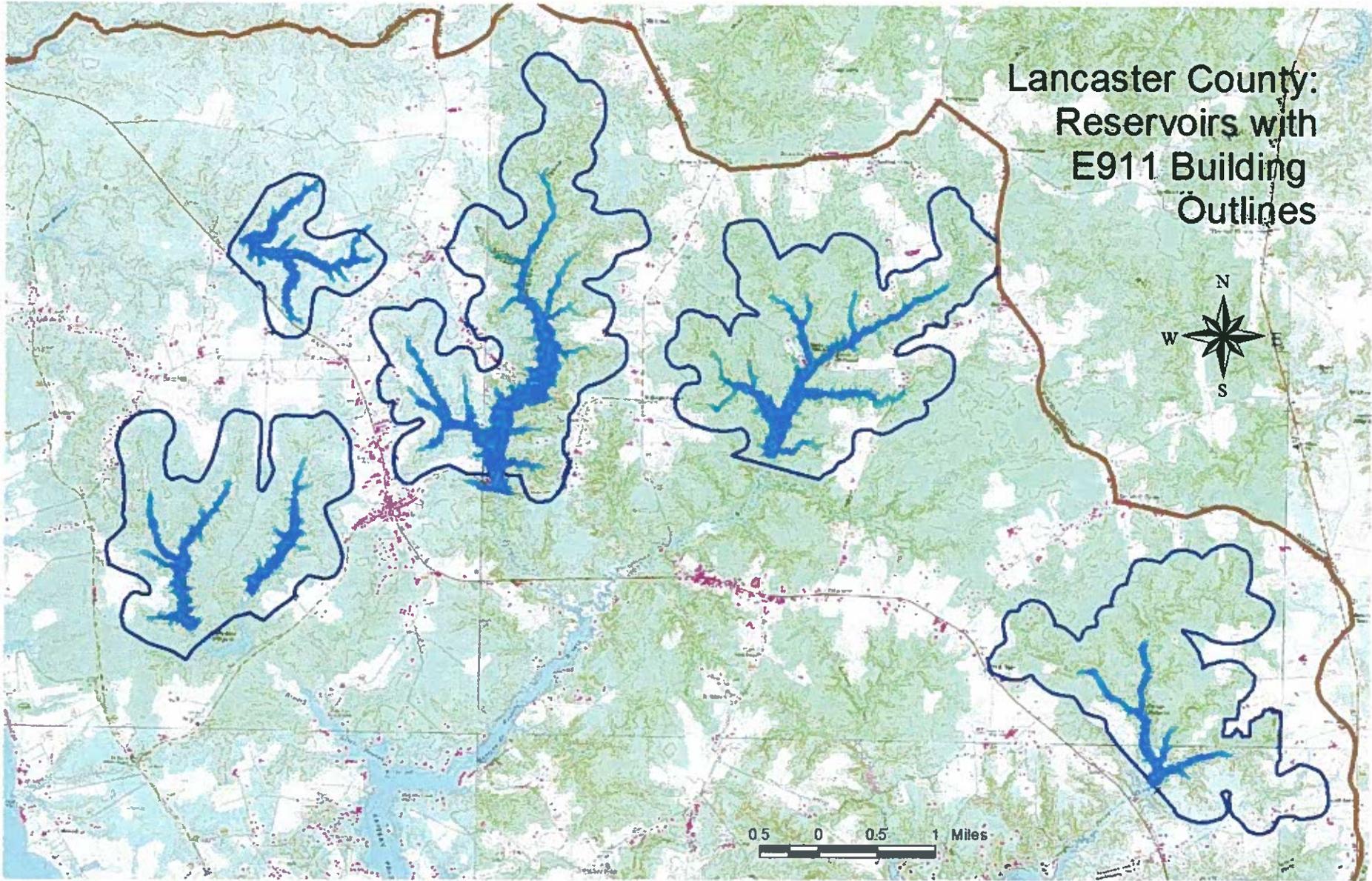
**Lancaster County:
Comprehensive Plan
Future Land Use Map
Possible Reservoirs
with 800 ft Buffer**



This project was funded by the Northern Neck Planning District Commission and the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant NA09NOS4190163 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.



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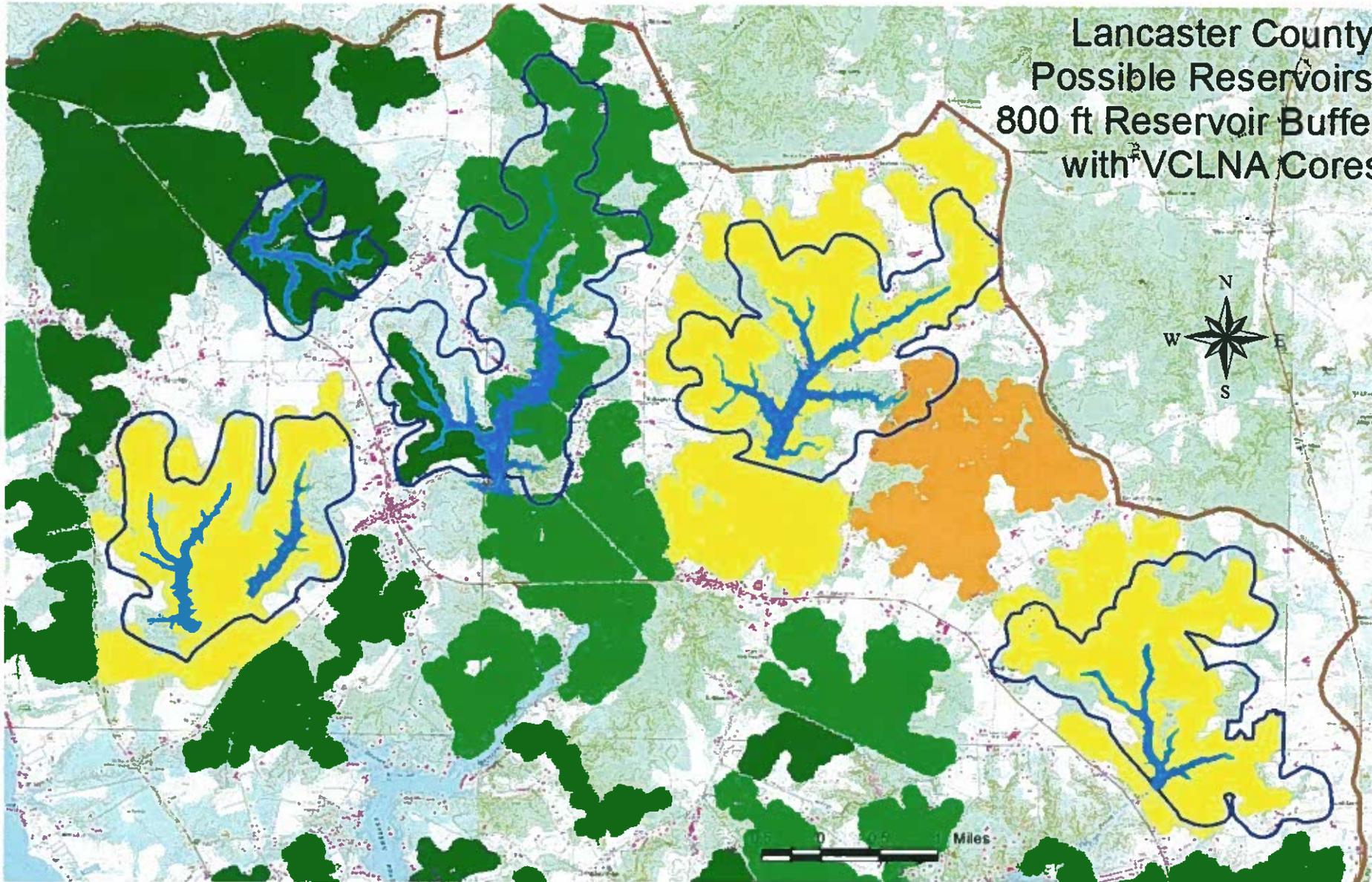
Future Reservoir Analysis Results

- Four structures impacted, all on McMahan Swamp Reservoir (LMS1) on Route 201 and 600
- Two residential structures and two commercial buildings (part of same company)
- The two Little Branch Corrotoman Reservoirs (LLB1 and LLB2) have the least development surrounding them

Future Reservoirs and Green Infrastructure

- Areas around streams in the Northern Neck are usually steep and highly erodible
- Areas in the Northern Neck that are steep are covered in forest, as the flat land is farmed
- These steep areas have the soil held in place by tree roots and development on these slopes (removing the natural vegetation) is fraught with difficulties

Lancaster County: Possible Reservoirs, 800 ft Reservoir Buffer with VCLNA Cores



This project was funded by the Northern Neck Planning District Commission and the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant NA09NOS4190163 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.

Identification of Steep Slopes

- Since many streams erode channels into the soil, our steep slopes are often gullies with narrow widths
- Traditional elevation models cannot show these steep gullies, because the sample grid is too coarse
- A proximate way to identify these steep slopes without elevation models is soil slope classes

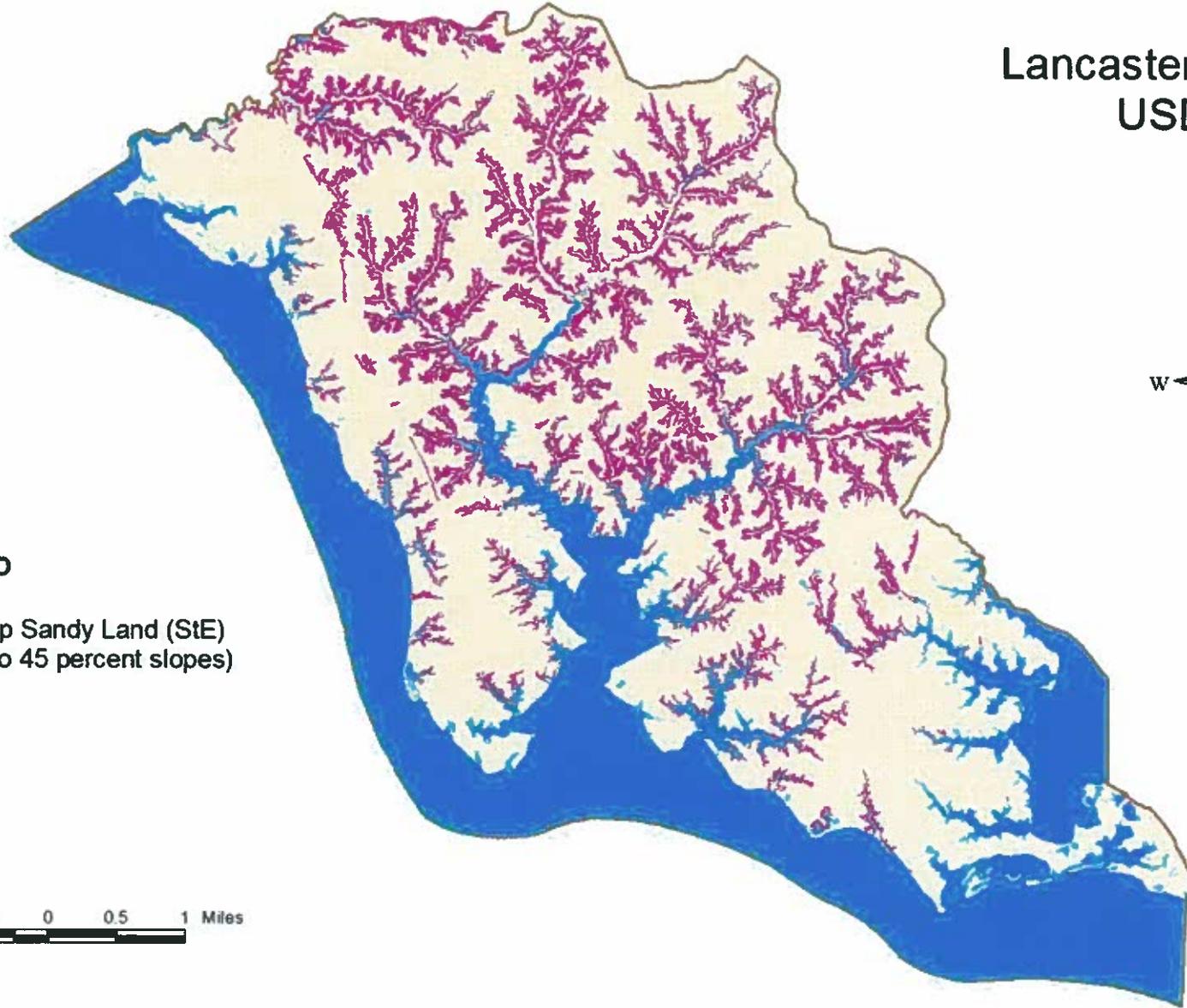
Lancaster County: USDA Soils, Steep Sandy Land



LEGEND

-  Steep Sandy Land (StE)
(15 to 45 percent slopes)

0.5 0 0.5 1 Miles



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Steep Sandy Land Soils (StE)

- These soils have slopes that are 15 to 45%
- The USDA Soil Survey for Northumberland and Lancaster Counties states in the Use and Management section for the StE soils that “Nearly all the acreage is wooded. The soils is suited only for trees or the most hardy, drought –resistant varieties of grasses.”

Soils with 10-45% Slope

- These are “D” (10 to 15% slope) and “E” (15 to 45% slope) soils that are shown in the Soil Survey
- Normally these are adjacent to the Steep Sandy Soils mentioned before
- These soils are have too much slope to farm sustainably, so are most often in a natural vegetative state

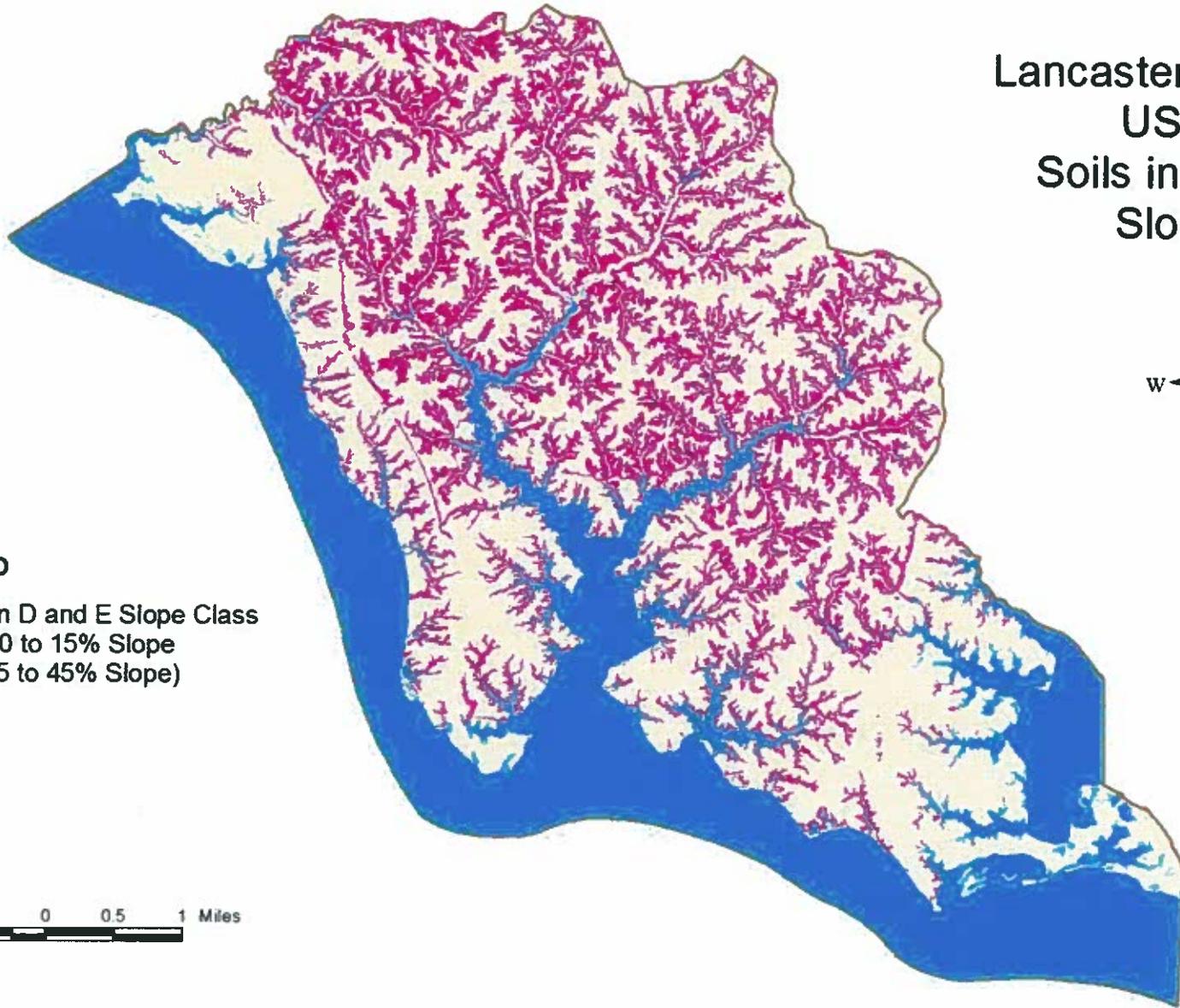
Lancaster County: USDA Soils Soils in D and E Slope Class



LEGEND

-  Soils in D and E Slope Class
(D = 10 to 15% Slope
E = 15 to 45% Slope)

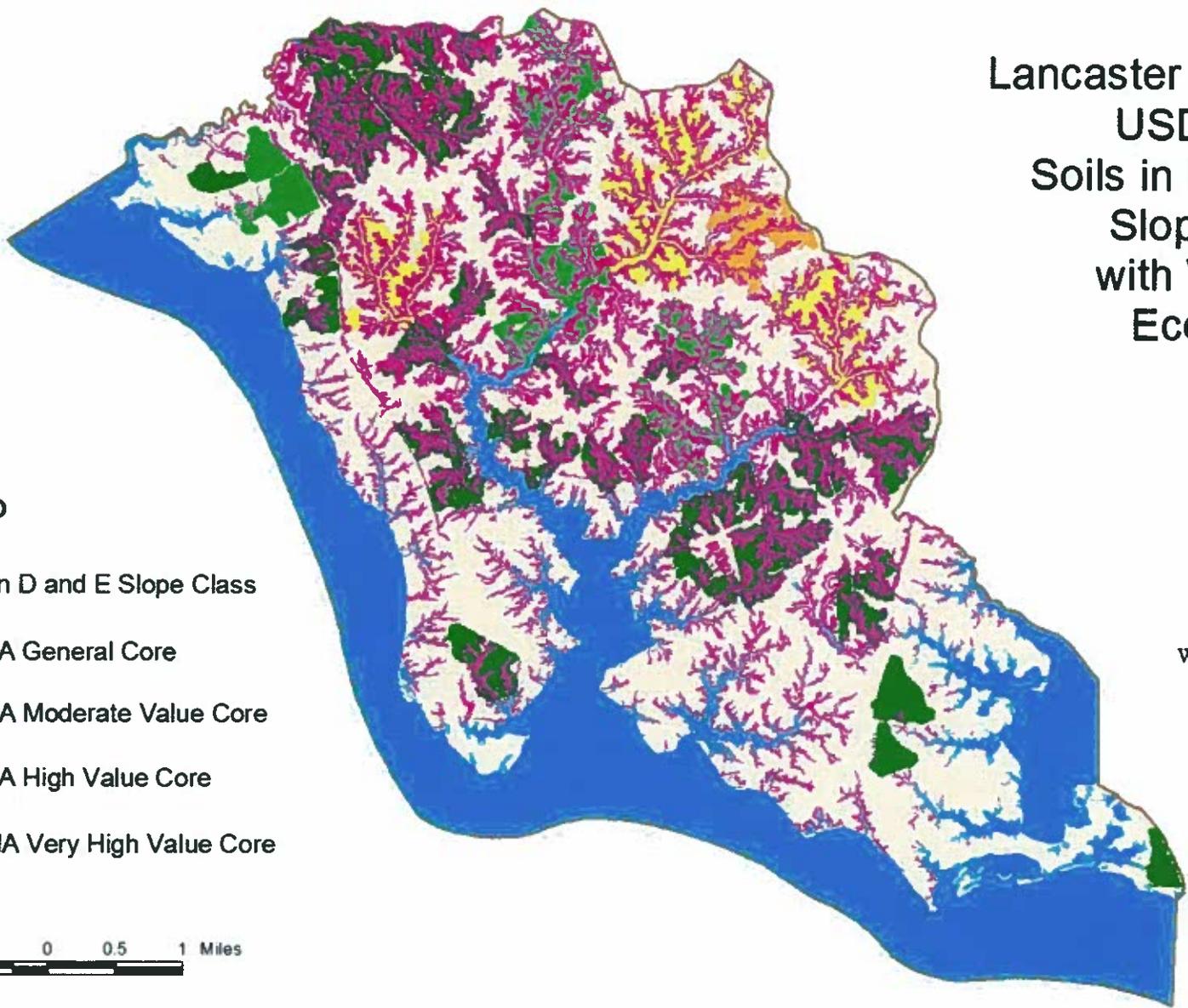
0.5 0 0.5 1 Miles



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**How do these soils compare to the
Virginia Conservation Needs Land
Assessment Core Areas?**

Lancaster County: USDA Soils Soils in D and E Slope Class with VCLNA Ecological Cores



LEGEND

-  Soils in D and E Slope Class
-  VCLNA General Core
-  VCLNA Moderate Value Core
-  VCLNA High Value Core
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Summary

- The County's Comprehensive Plan Future Land Use Map shows potential future reservoir sites with an 800 foot buffer around them
- These areas have steep slopes and are mostly covered in natural vegetation
- The county would benefit if a Blue Green Infrastructure Plan identified some of these future reservoir sites to be kept in a natural state for the benefit of future generations

Questions?

Stuart McKenzie

Environmental Planner

Northern Neck Planning District Commission

P.O. Box 1600

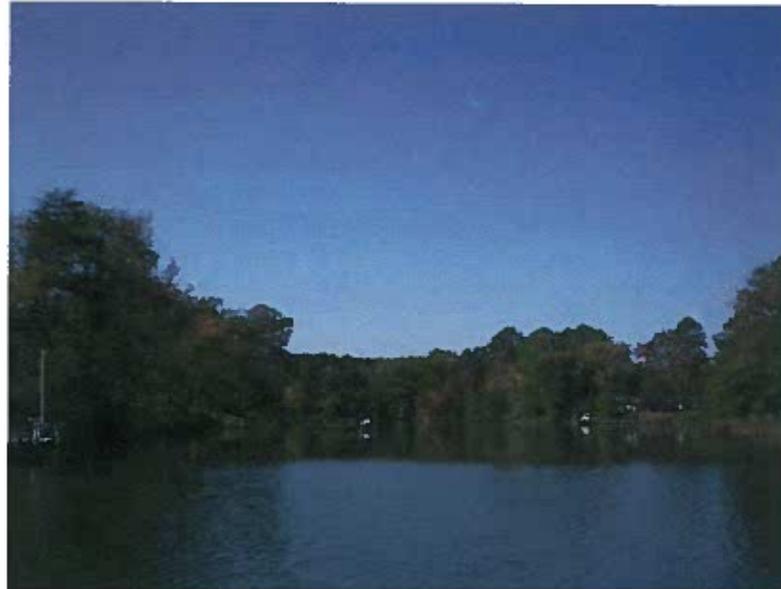
Warsaw, VA 22572

Phone : 804.333.1900 extension 25



This project was funded by the Northern Neck Planning District Commission and the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant #NA09NOS4190163 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.

Lancaster County Blue Green Infrastructure Planning



Lancaster Planning Commission
Meeting

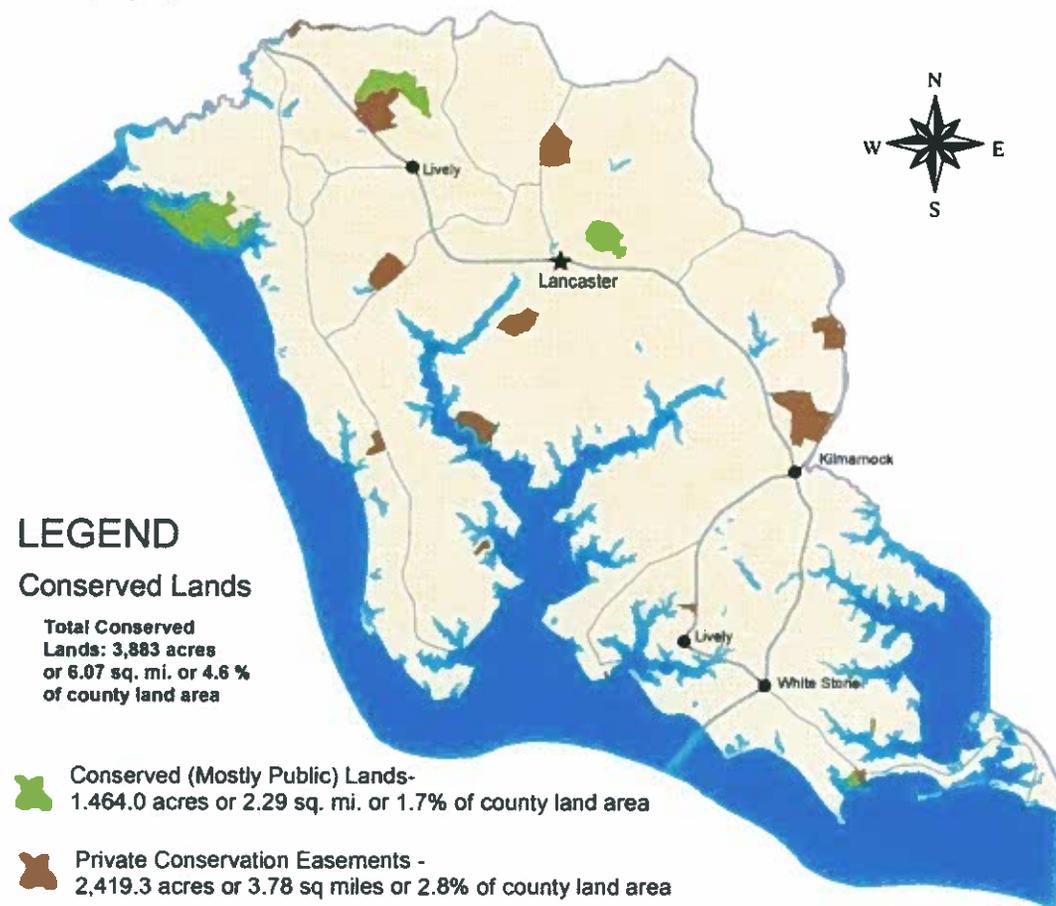
March 17, 2011

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 Updated 7-9-10

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LEGEND

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**Total Conserved
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 or 6.07 sq. mi. or 4.6 %
 of county land area**

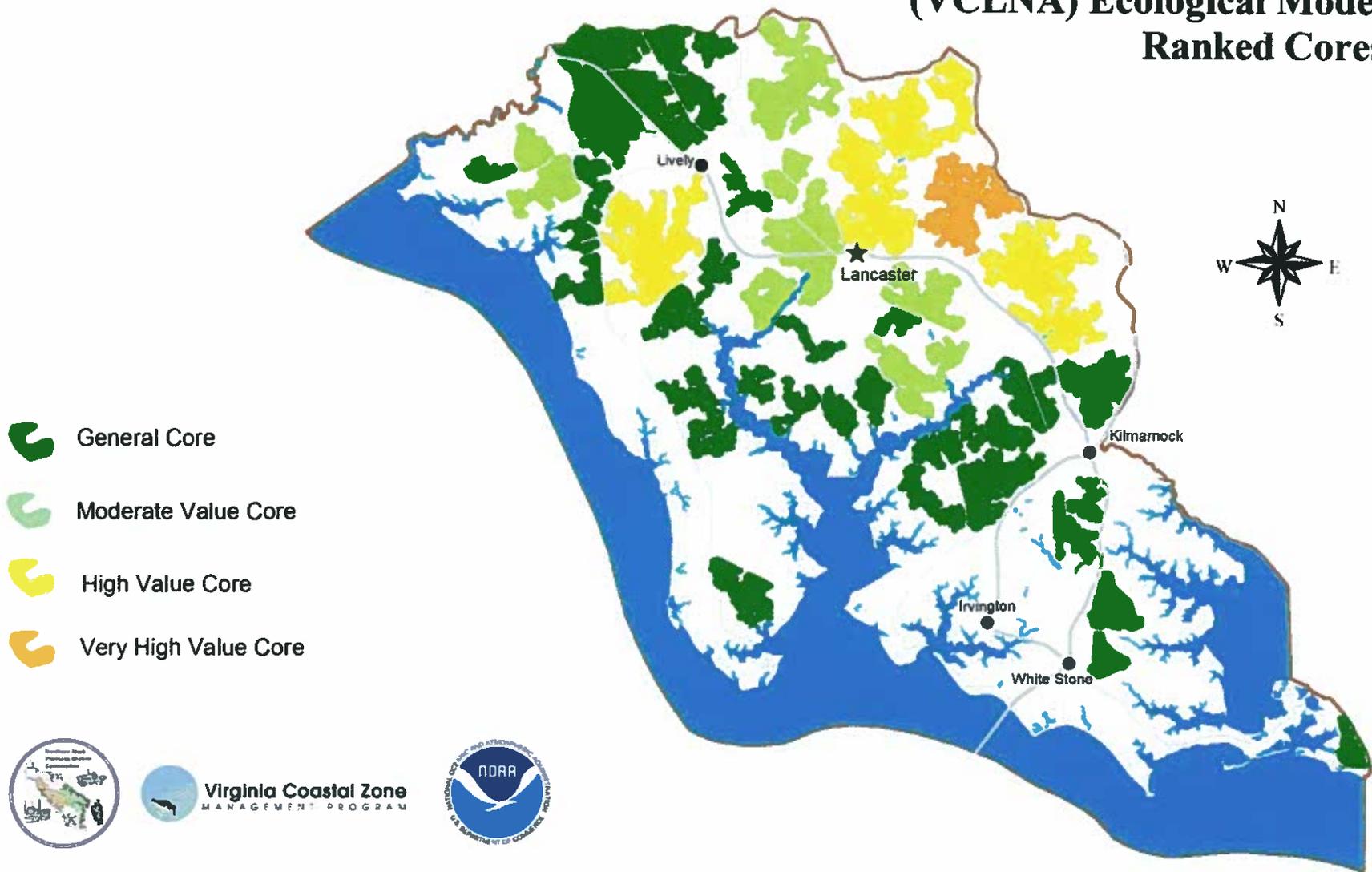
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Lancaster County: Virginia Conservation Needs Land Assessment (VCLNA) Ecological Model Ranked Cores



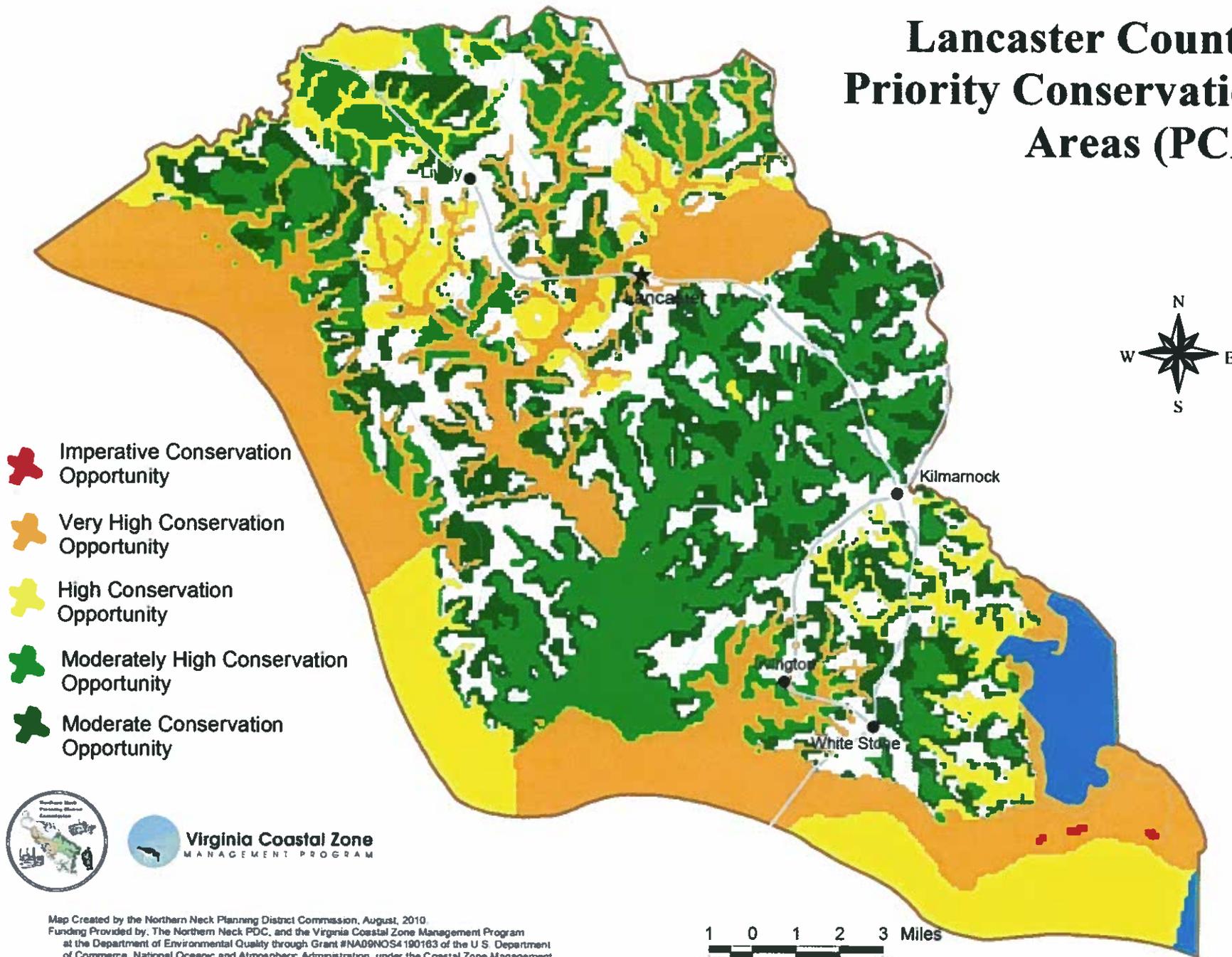
-  General Core
-  Moderate Value Core
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-  Very High Value Core



Map Created by the Northern Neck Planning District Commission, August, 2010
 Funding Provided by: The Northern Neck PDC, and the Virginia Coastal Zone Management Program
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 of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management
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Lancaster County: Priority Conservation Areas (PCA)



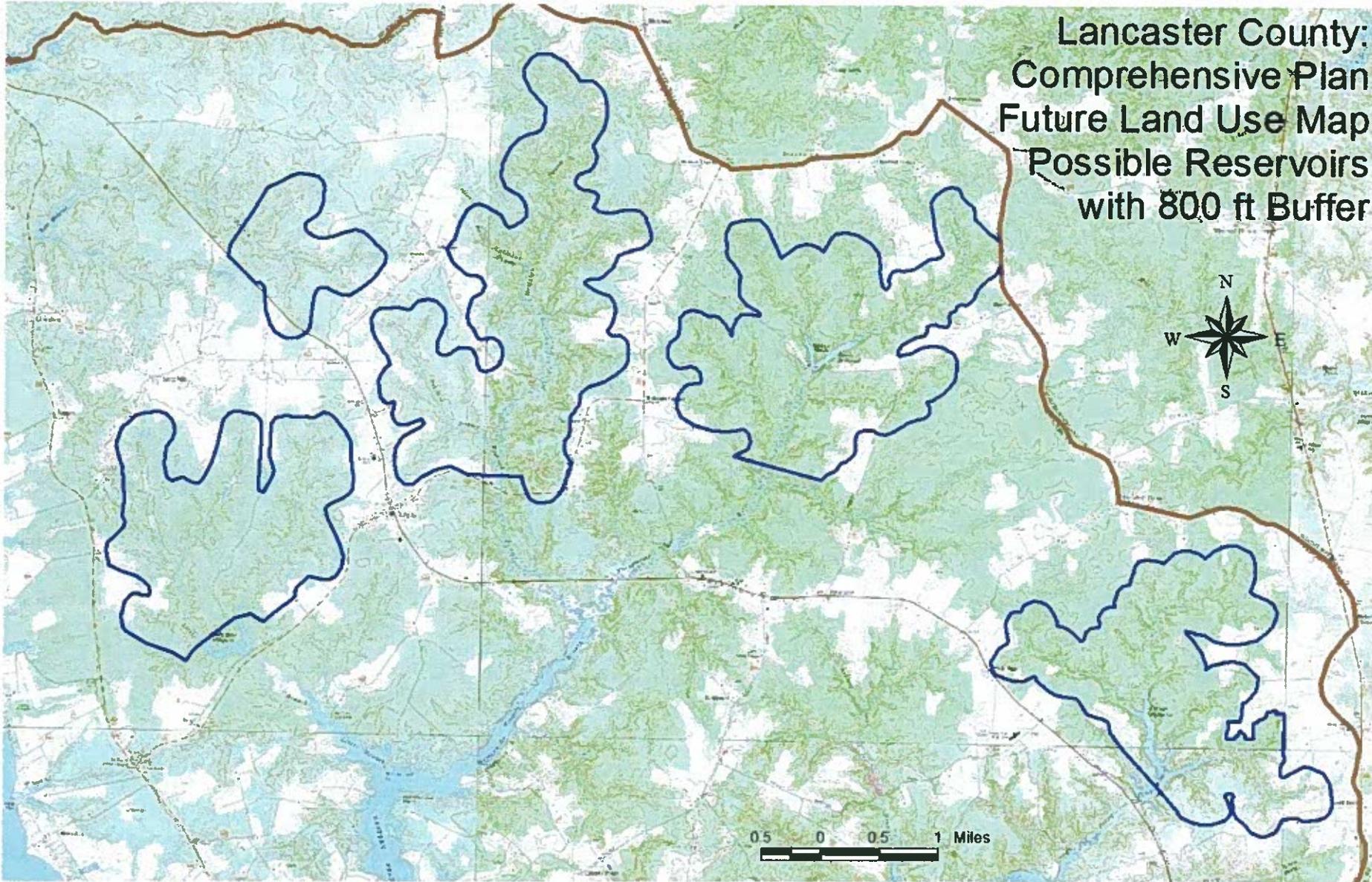
-  Imperative Conservation Opportunity
-  Very High Conservation Opportunity
-  High Conservation Opportunity
-  Moderately High Conservation Opportunity
-  Moderate Conservation Opportunity



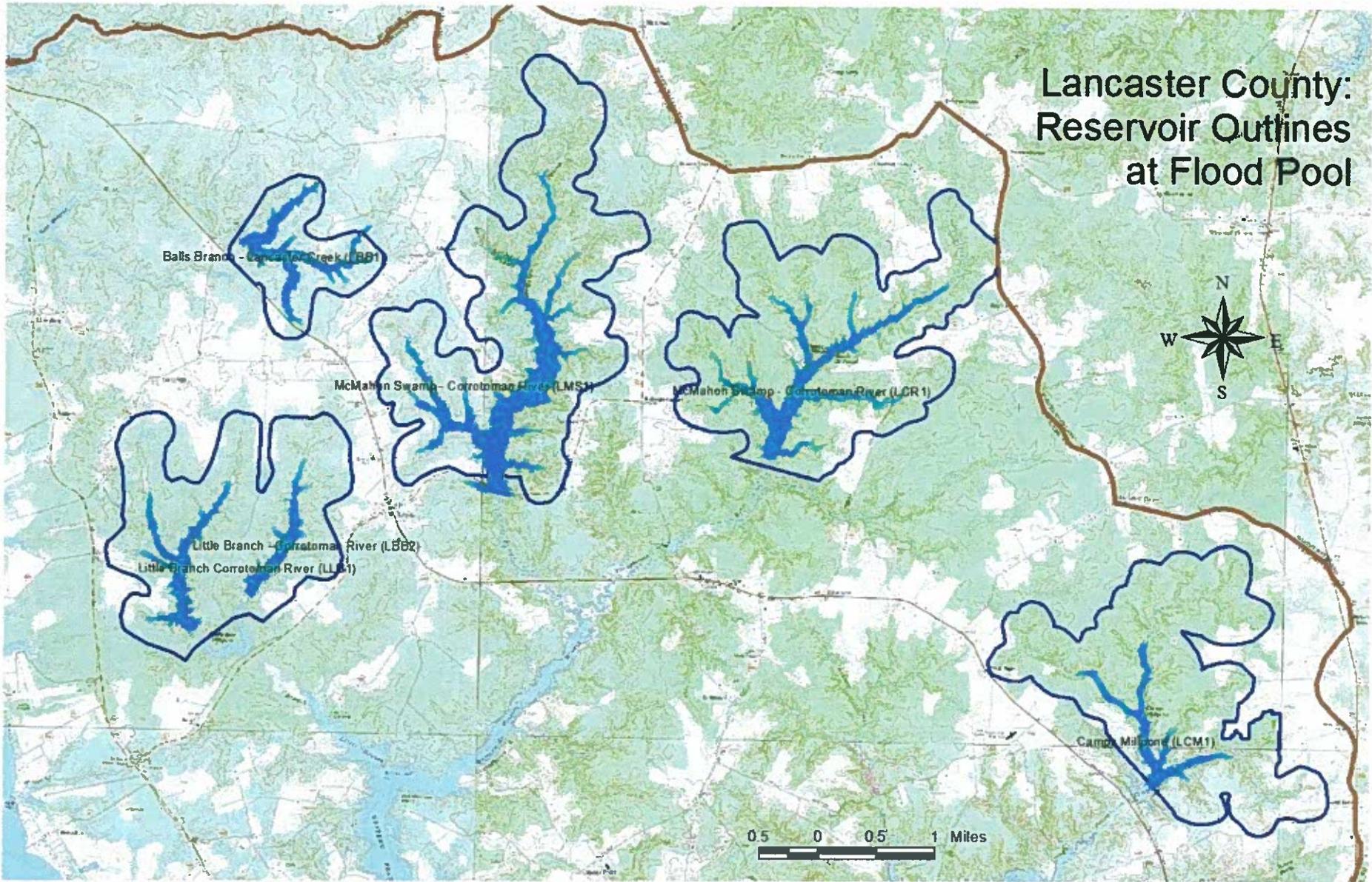
Map Created by the Northern Neck Planning District Commission, August, 2010.
 Funding Provided by: The Northern Neck PDC, and the Virginia Coastal Zone Management Program
 at the Department of Environmental Quality through Grant #NA09N054190163 of the U.S. Department
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**Lancaster County:
Comprehensive Plan
Future Land Use Map
Possible Reservoirs
with 800 ft Buffer**

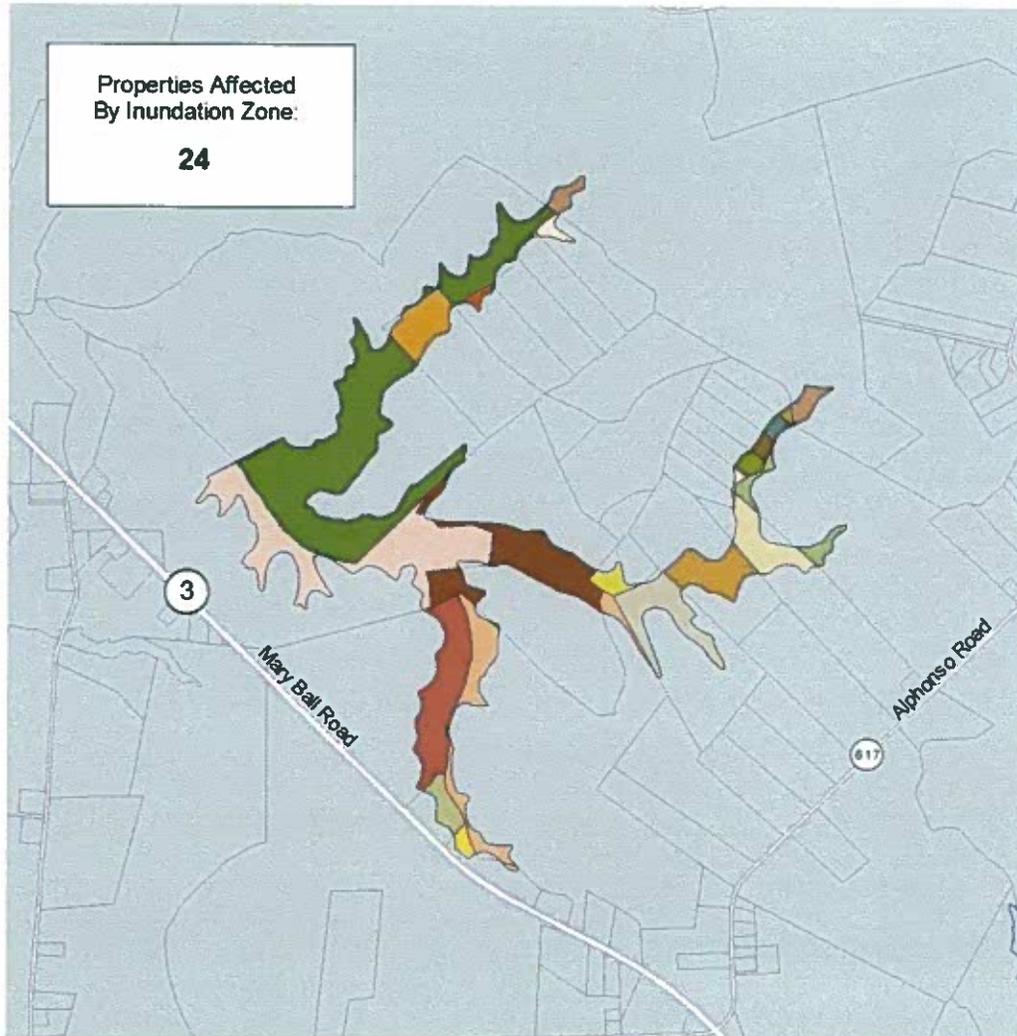


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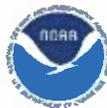


This project was funded by the Northern Neck Planning District Commission and the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant NA09NOS4 t90 t63 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.

Balls Branch - Lancaster Creek - LBB1 Reservoir Properties within Inundation Area

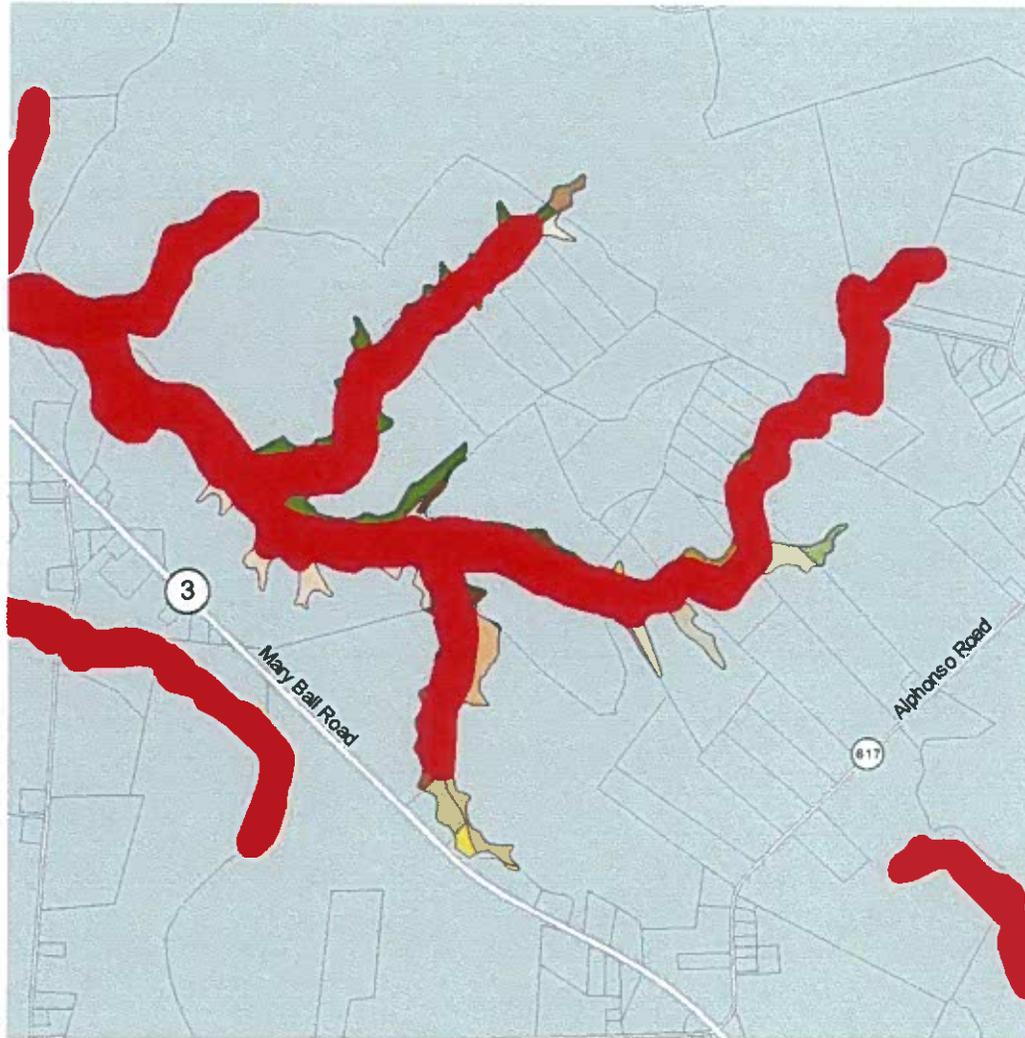


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Balls Branch - Lancaster Creek - LBB1 Reservoir 100 foot Resource Protection Area

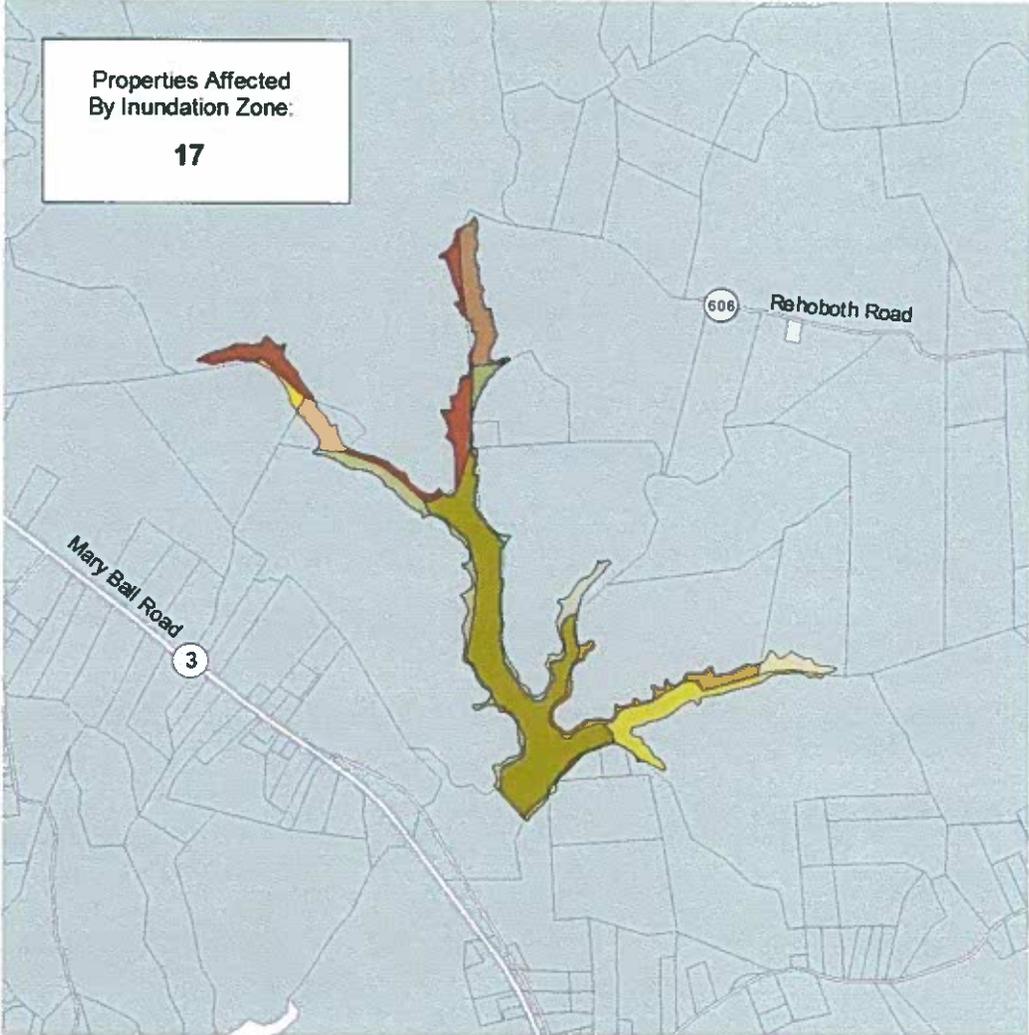


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Camps Millpond - LCM1 Reservoir Properties within Inundation Area

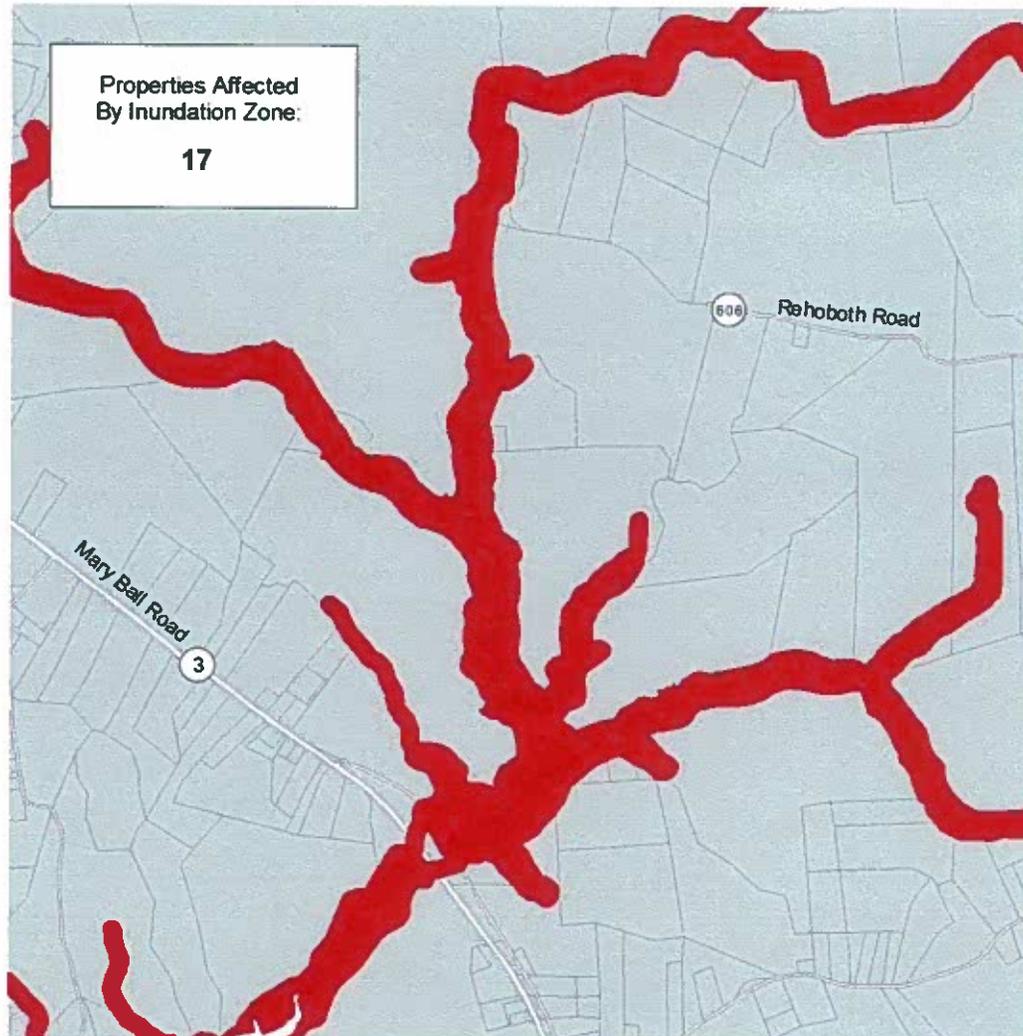


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Camps Millpond - LCM1 Reservoir 100 foot Resource Protection Area

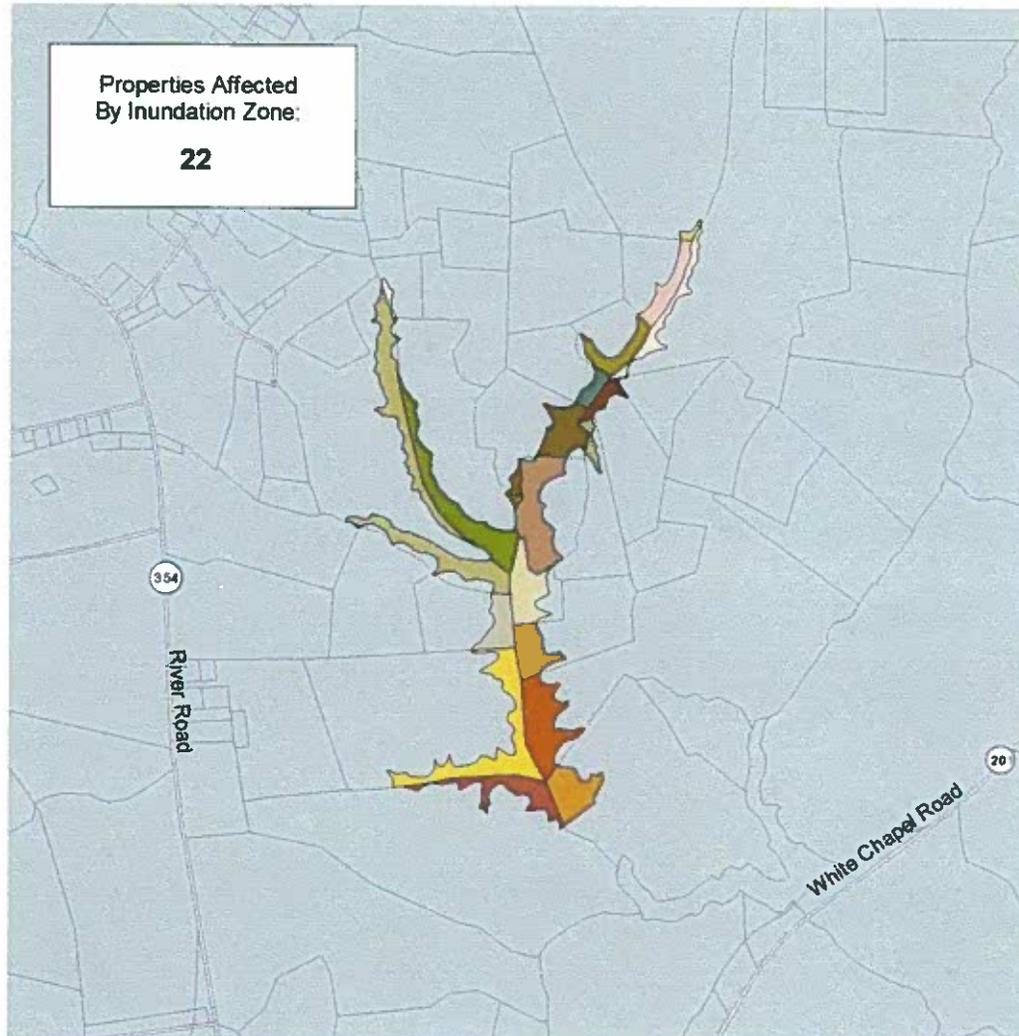


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Little Branch - Corrotoman River - LLB1 Reservoir Properties within Inundation Area

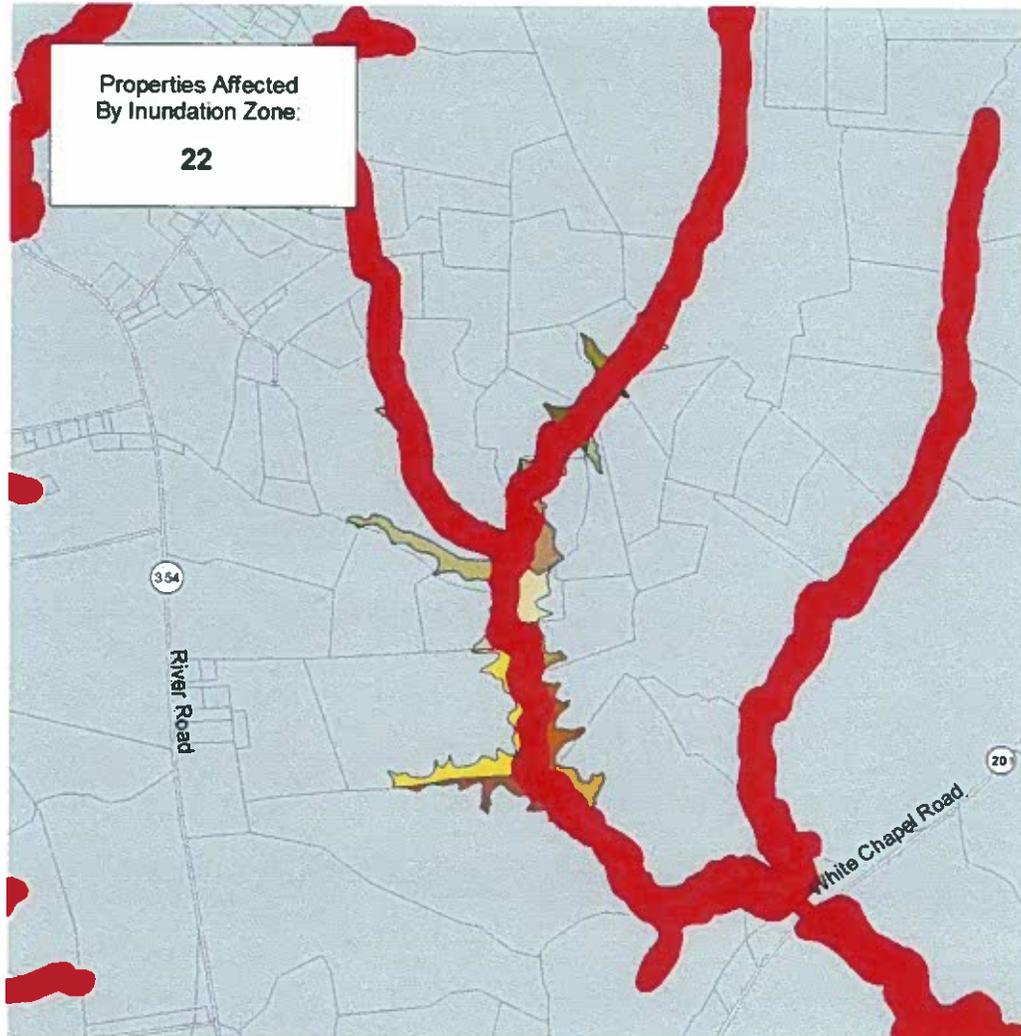


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Little Branch - Corrotoman River - LLB1 Reservoir 100 Foot Resource Protection Area

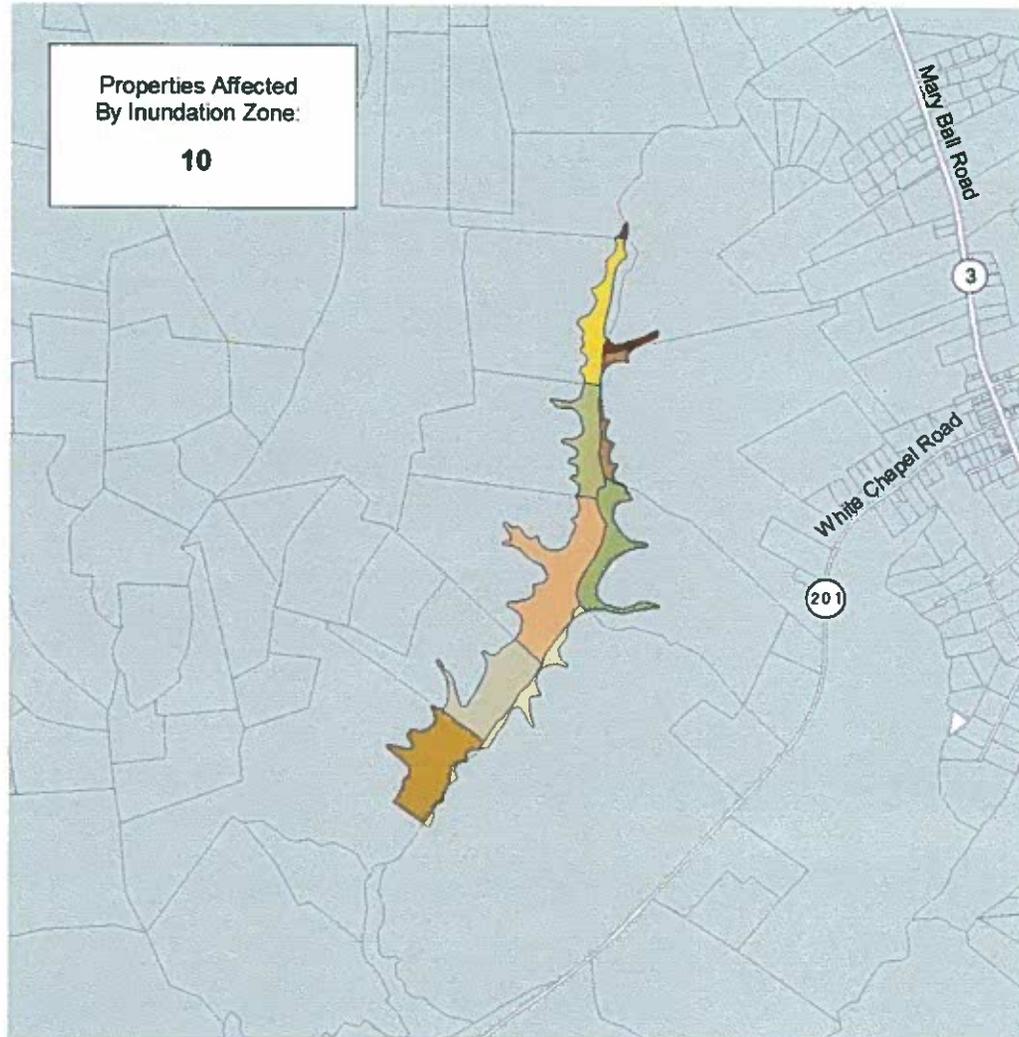


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Little Branch- Corrotoman River - LLB2 Reservoir Properties within Inundation Areas

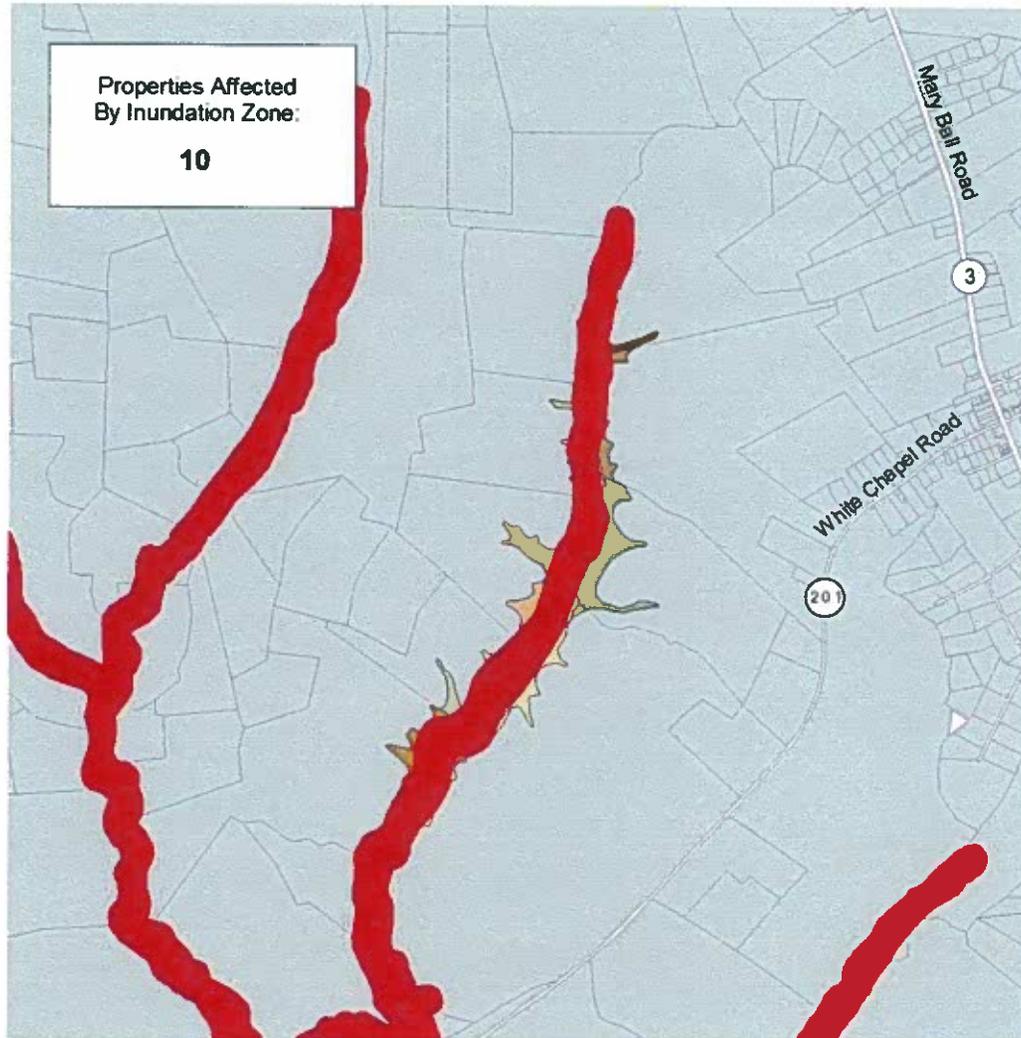


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Little Branch- Corrotoman River - LLB2 Reservoir 100 foot Resource Protection Area

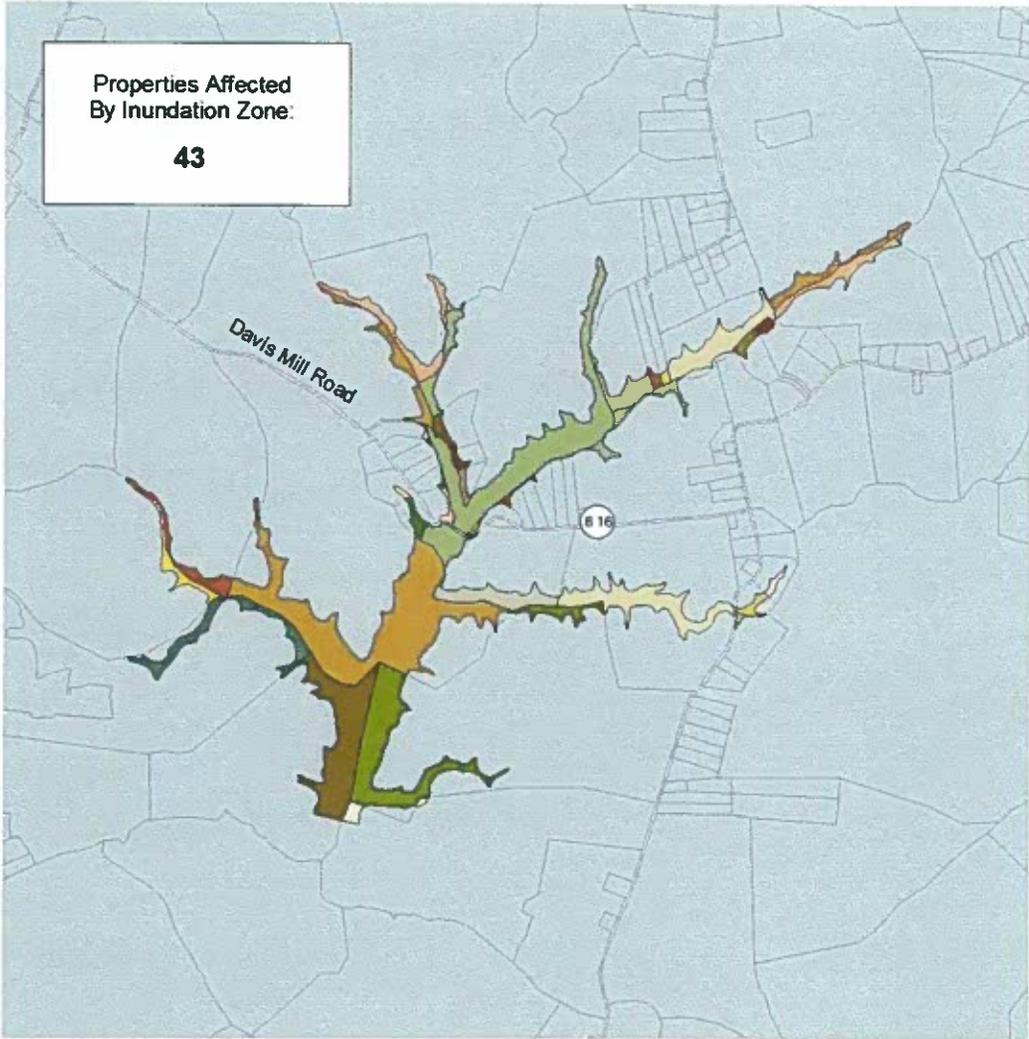


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McMahon Swamp - LCR1 Reservoir Properties within Inundation Area

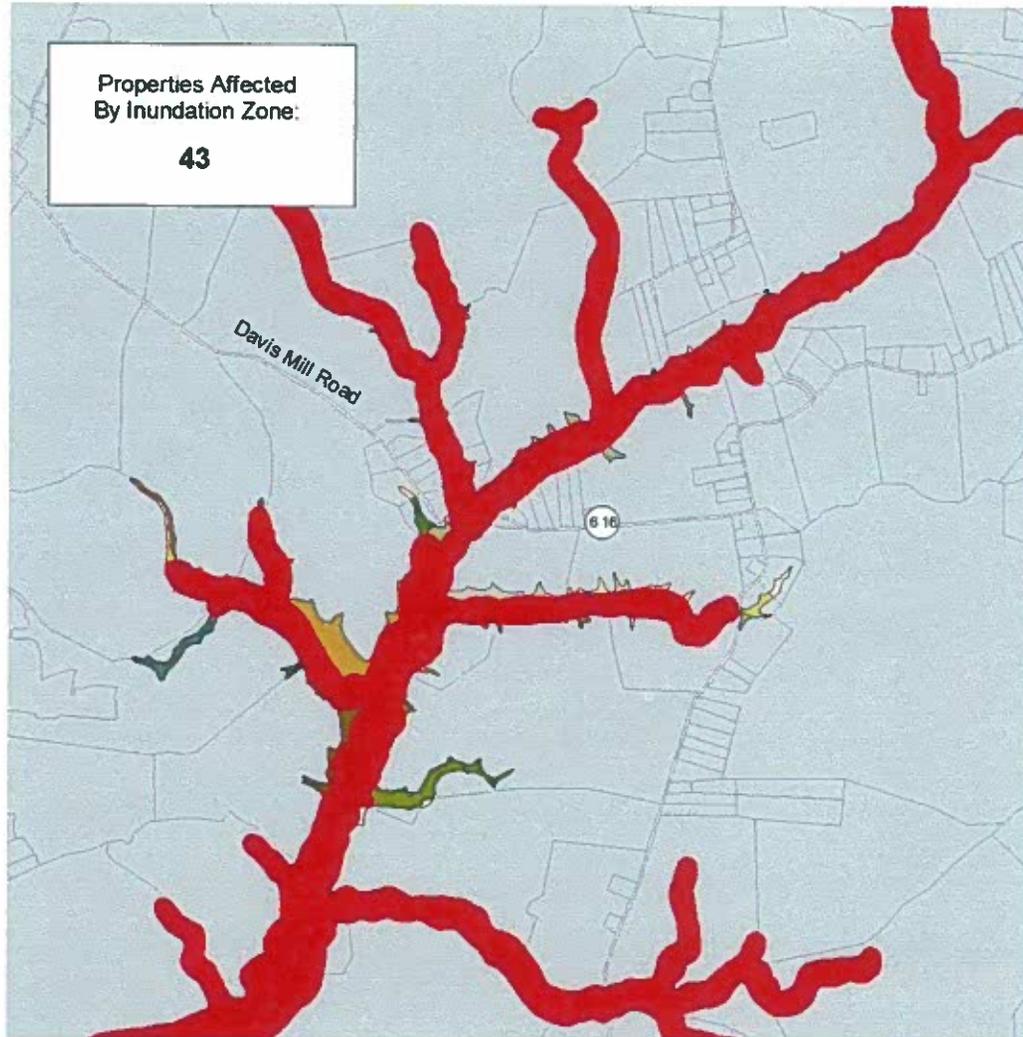


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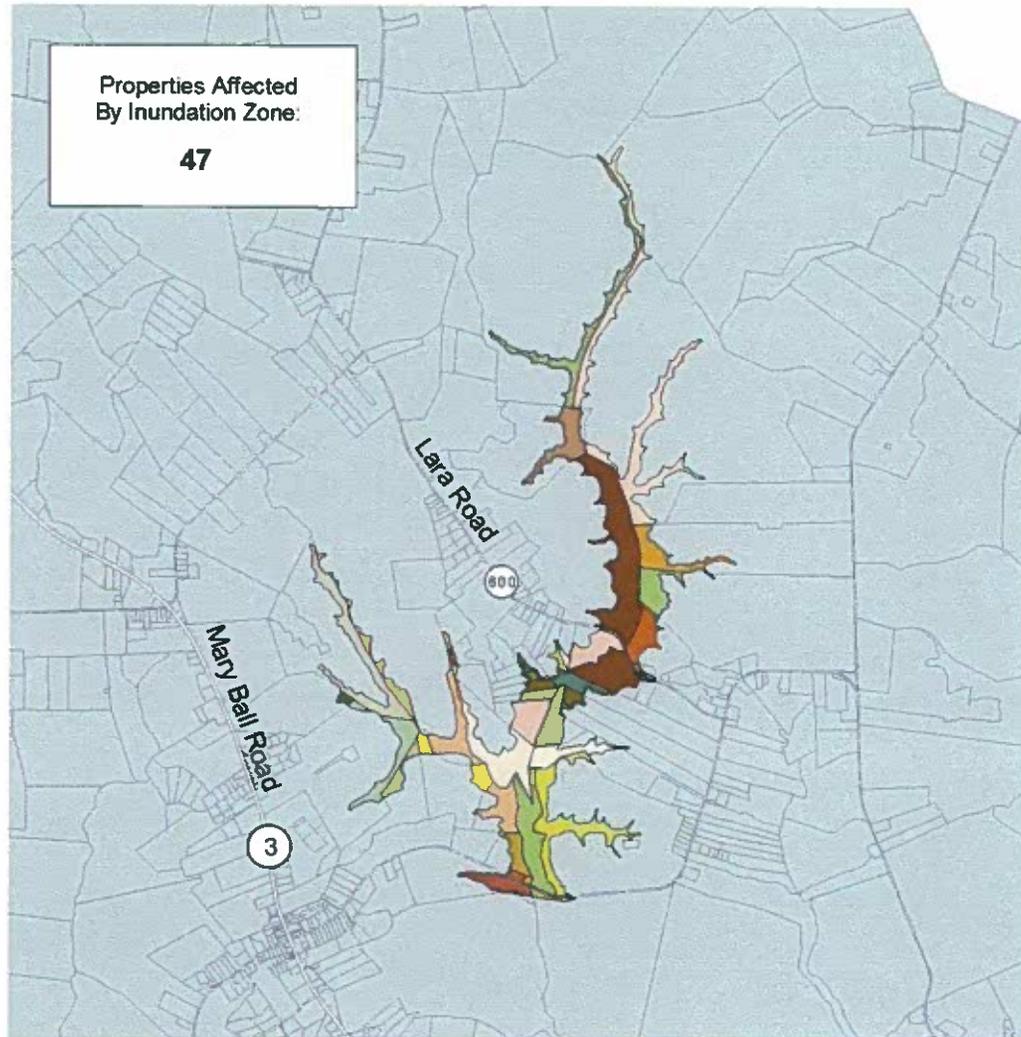


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McMahon Swamp - LMS1 Reservoir Properties within Inundation Area

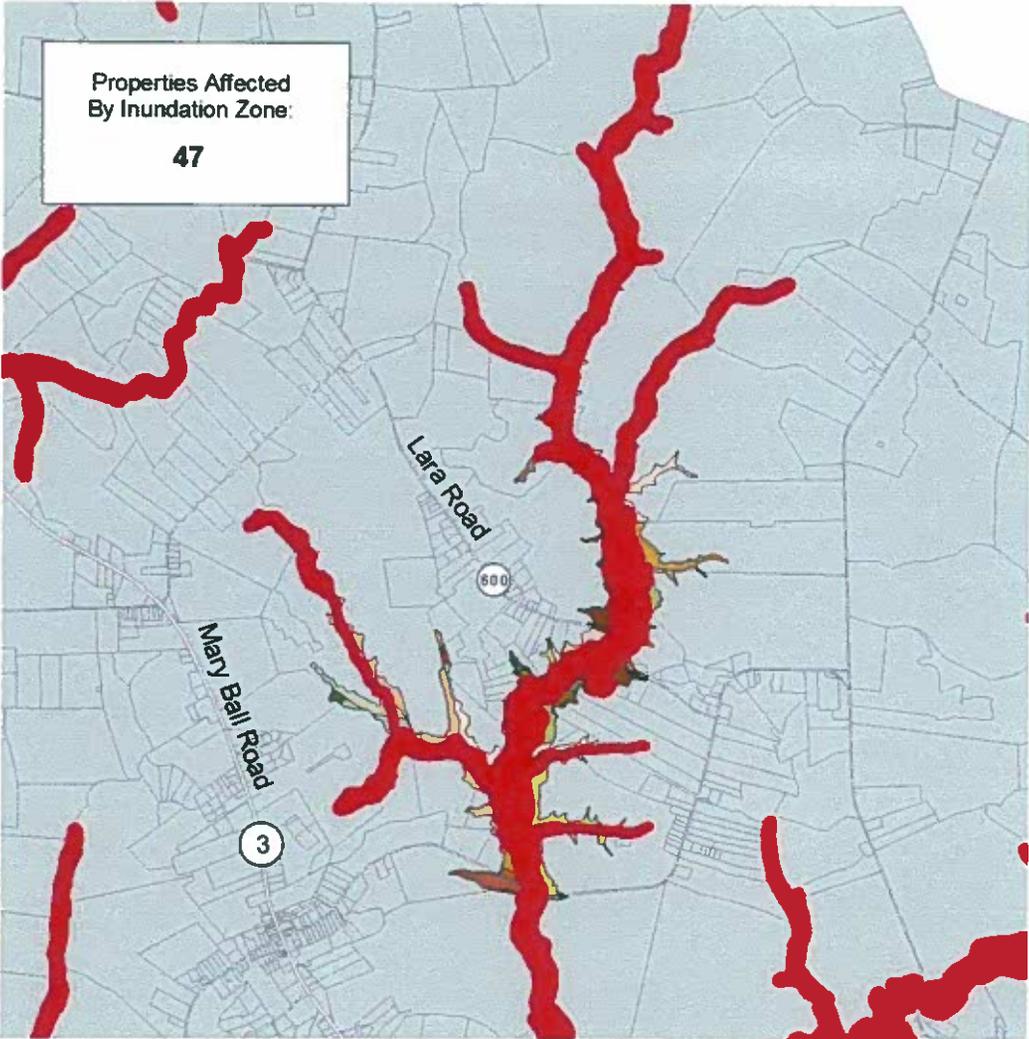


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McMahon Swamp - LMS1 Reservoir 100 foot Resource Protection Area

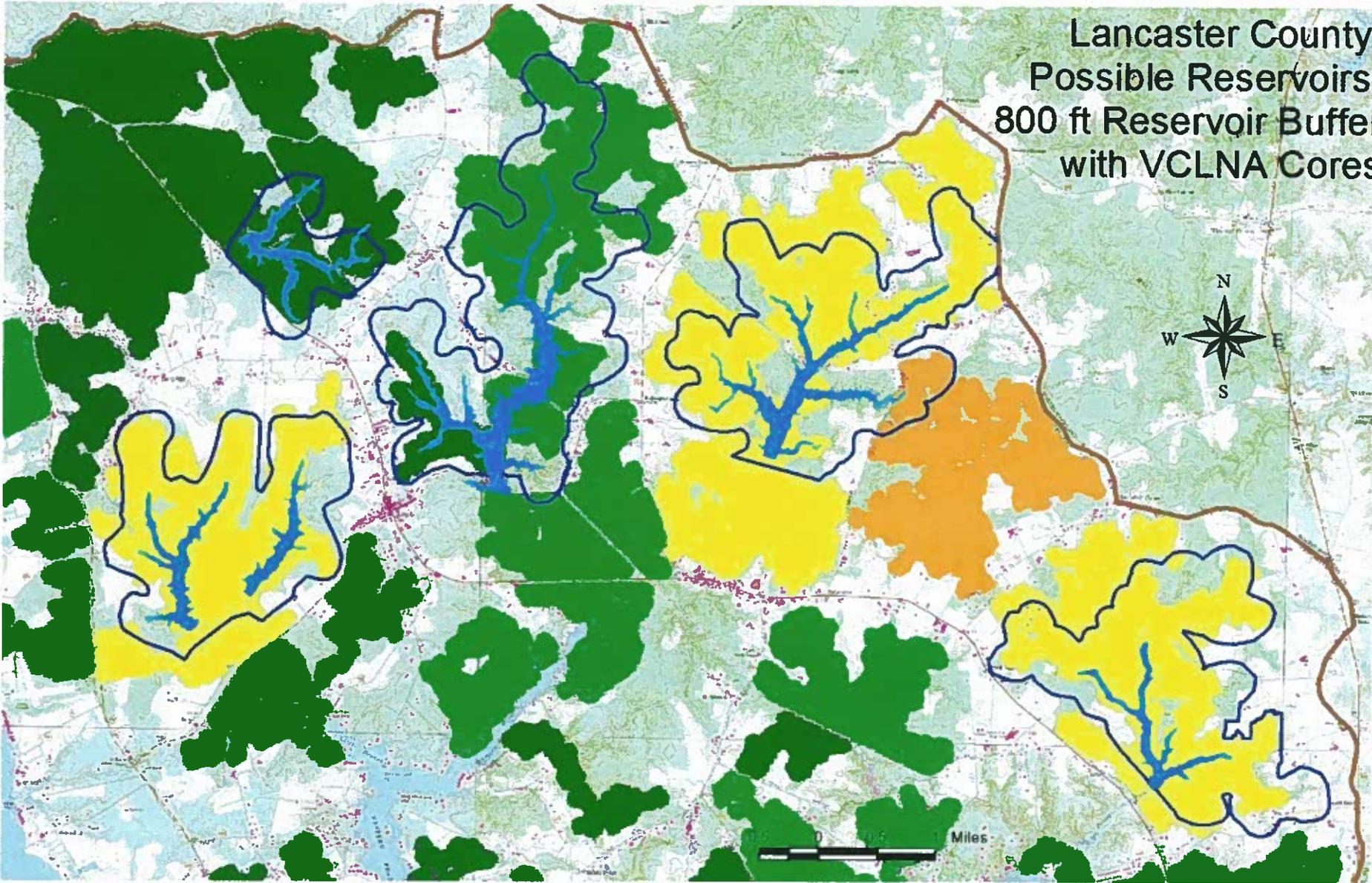


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Lancaster County: Possible Reservoirs, 800 ft Reservoir Buffer with VCLNA Cores



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Summary

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Questions?

Stuart McKenzie

Environmental Planner

Northern Neck Planning District Commission

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Warsaw, VA 22572

Phone : 804.333.1900 extension 25



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Appendix C
Richmond County Blue Green Infrastructure
Protection Planning:
Additional Information

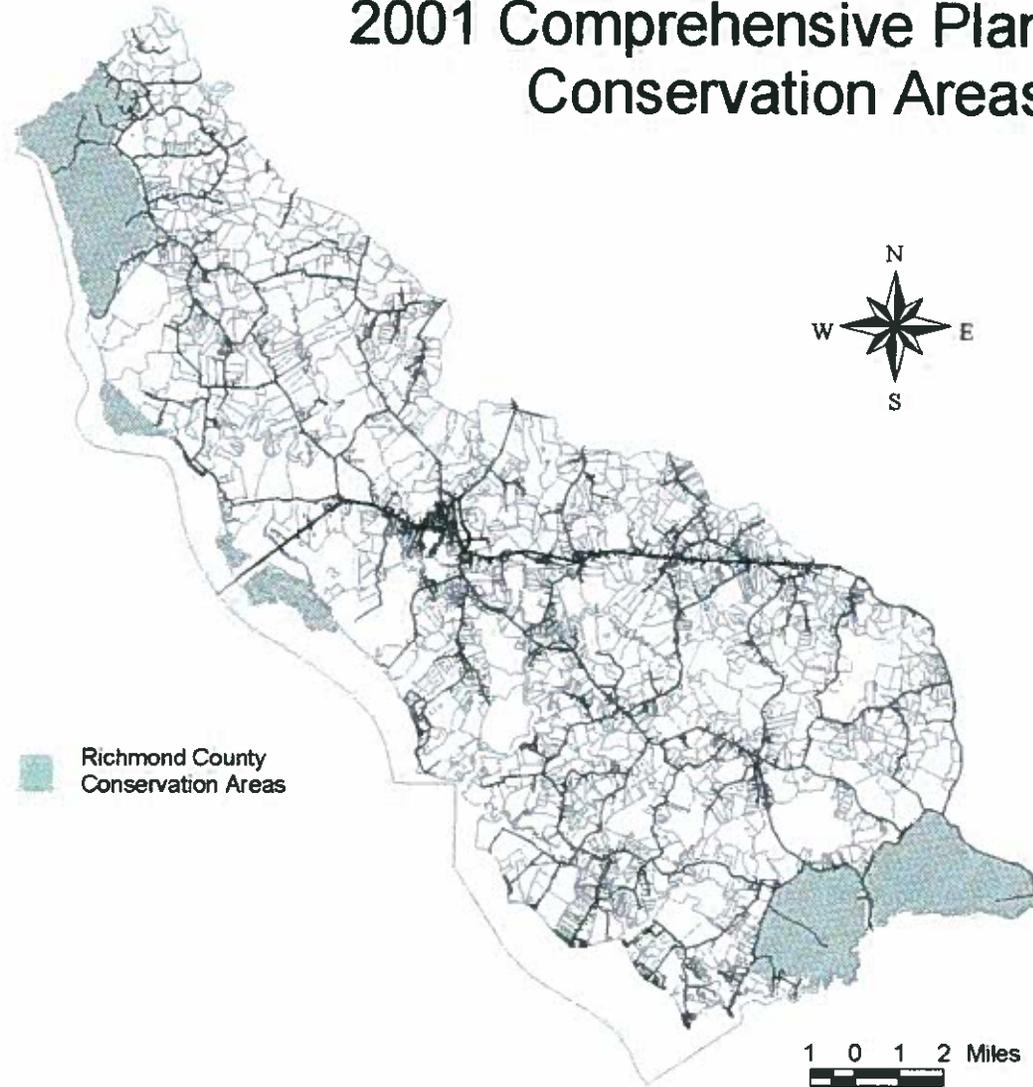
Richmond County Comprehensive Plan

Green Infrastructure Planning (Or Conservation Areas)

2001 Richmond Comprehensive Plan

- Conservation areas were chosen because of the large amount of natural vegetation and habitat
- Conservation areas were large parcels with water quality filtering benefits accrued from the forested areas
- Conservation areas allow other areas of the county to be developed while retaining wild areas for wildlife and natural processes

Richmond County 2001 Comprehensive Plan Conservation Areas

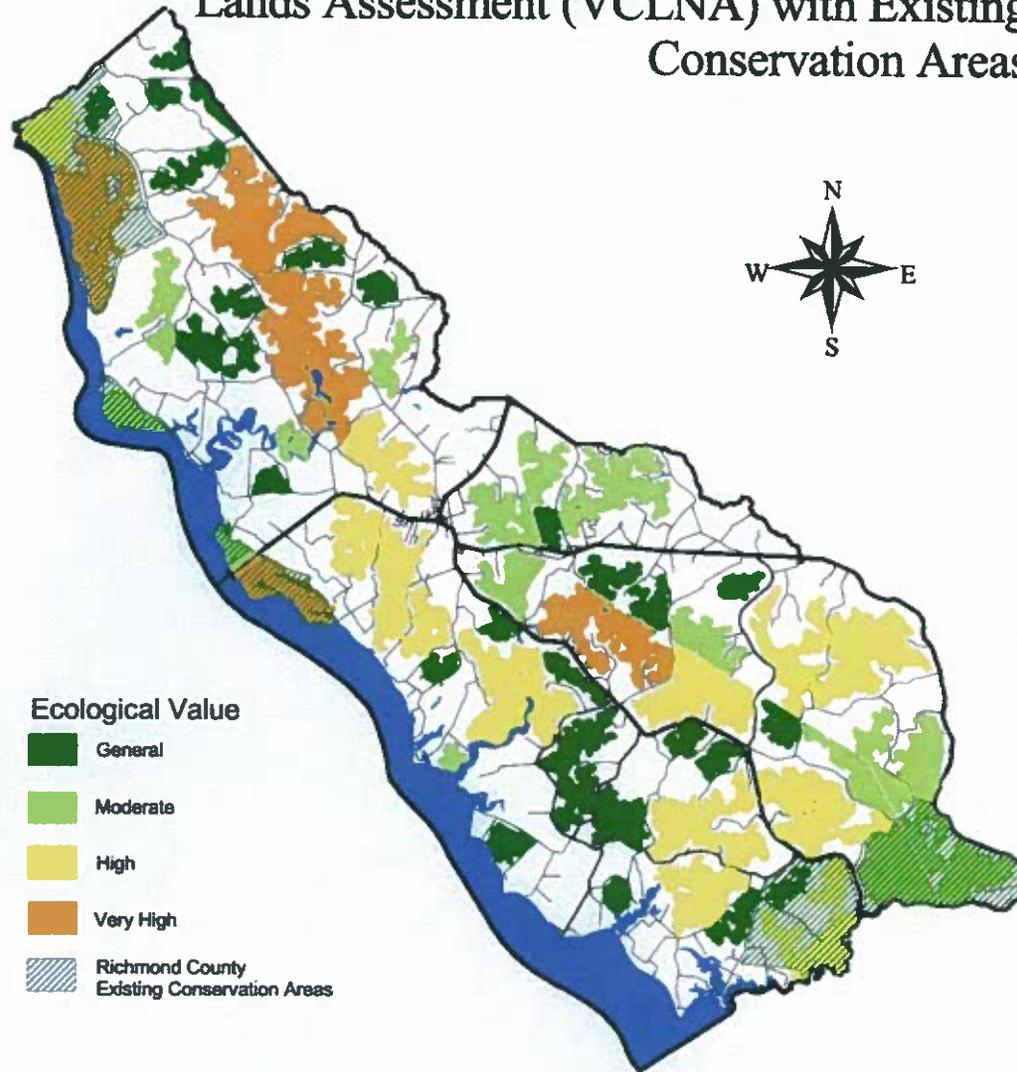


This project was funded by the Northern Neck Planning District Commission, and the Virginia Coastal Zone Management Program at the Virginia Department of Environmental Quality through Grant #NA08NOS4190466 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.

2001 Richmond County Comprehensive Plan

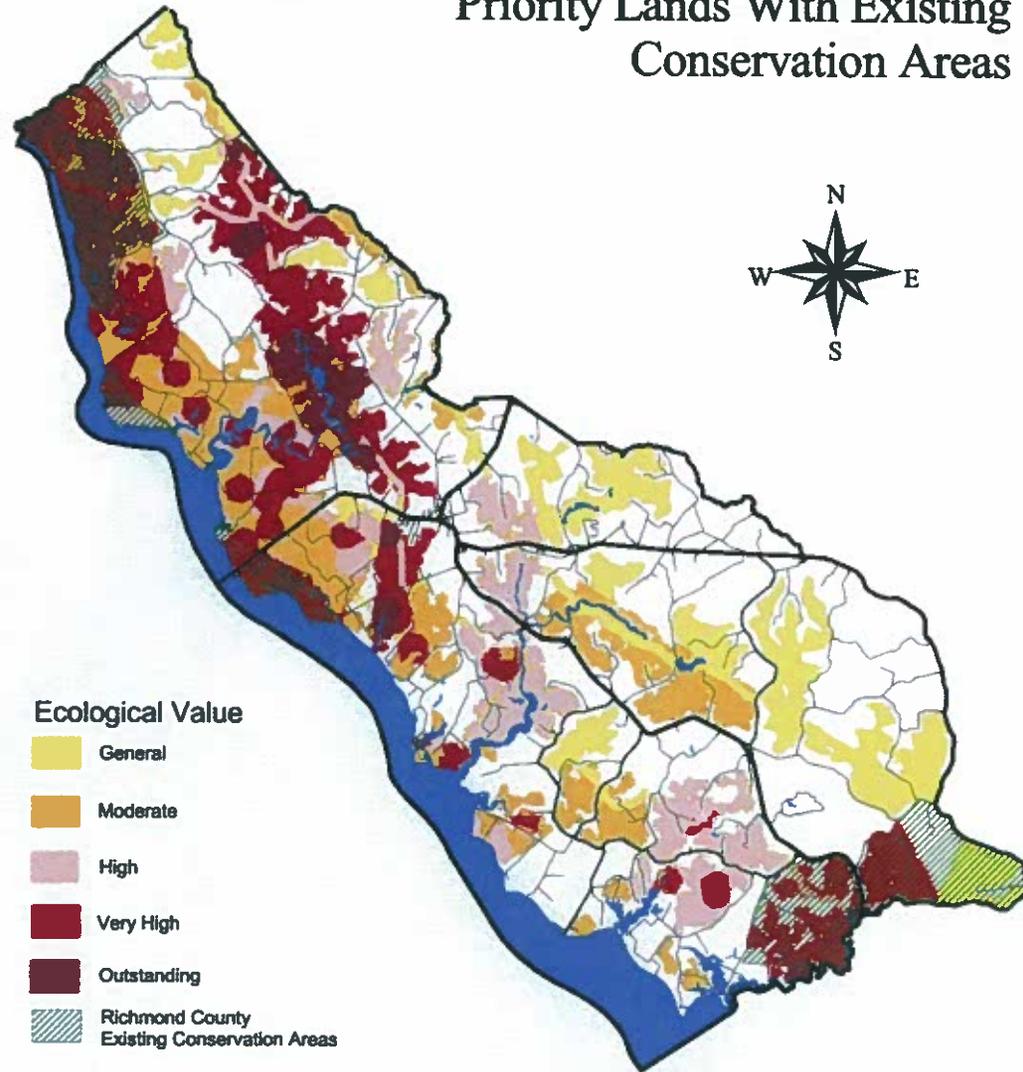
- Local knowledge was to identify areas of conservation
- Today, the State (The Department of Conservation and Recreation) has improved data on natural areas, and ranks those areas based on ecological diversity
- Up to date data on natural areas coincide nicely with the conservation areas chosen more than a decade ago!

Virginia Department of Conservation and Recreation Virginia Conservation Needs Lands Assessment (VCLNA) with Existing Conservation Areas



This project was funded by the Northern Neck Planning District Commission and the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant #NAO8NOS4190183 of the U.S. Department of Commerce National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.

Virginia Coastal Program Coastal Estuarine Land Program (CELP) Priority Lands With Existing Conservation Areas

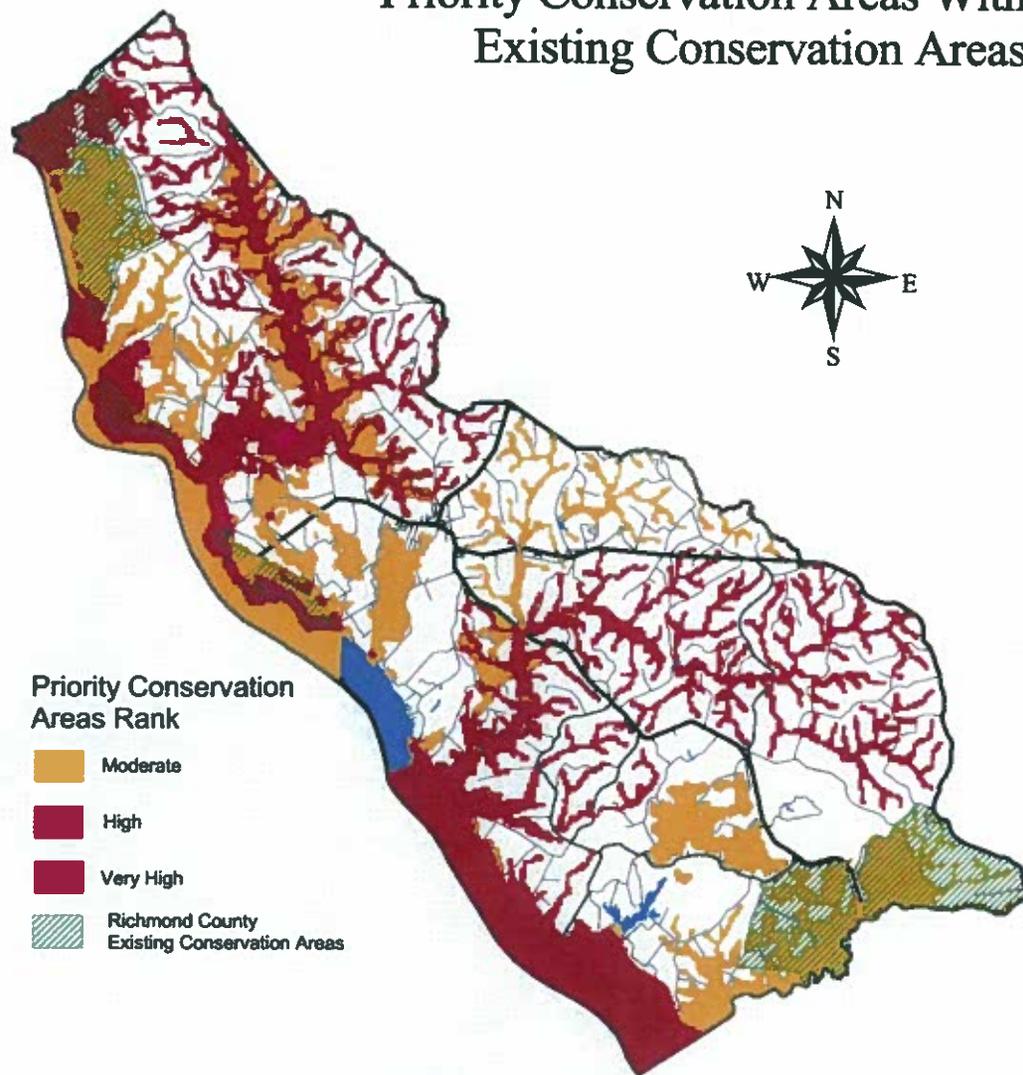


Virginia Coastal Zone



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Virginia Department of Conservation and Recreation Priority Conservation Areas With Existing Conservation Areas



Virginia Coastal Zone
MANAGEMENT PROGRAM

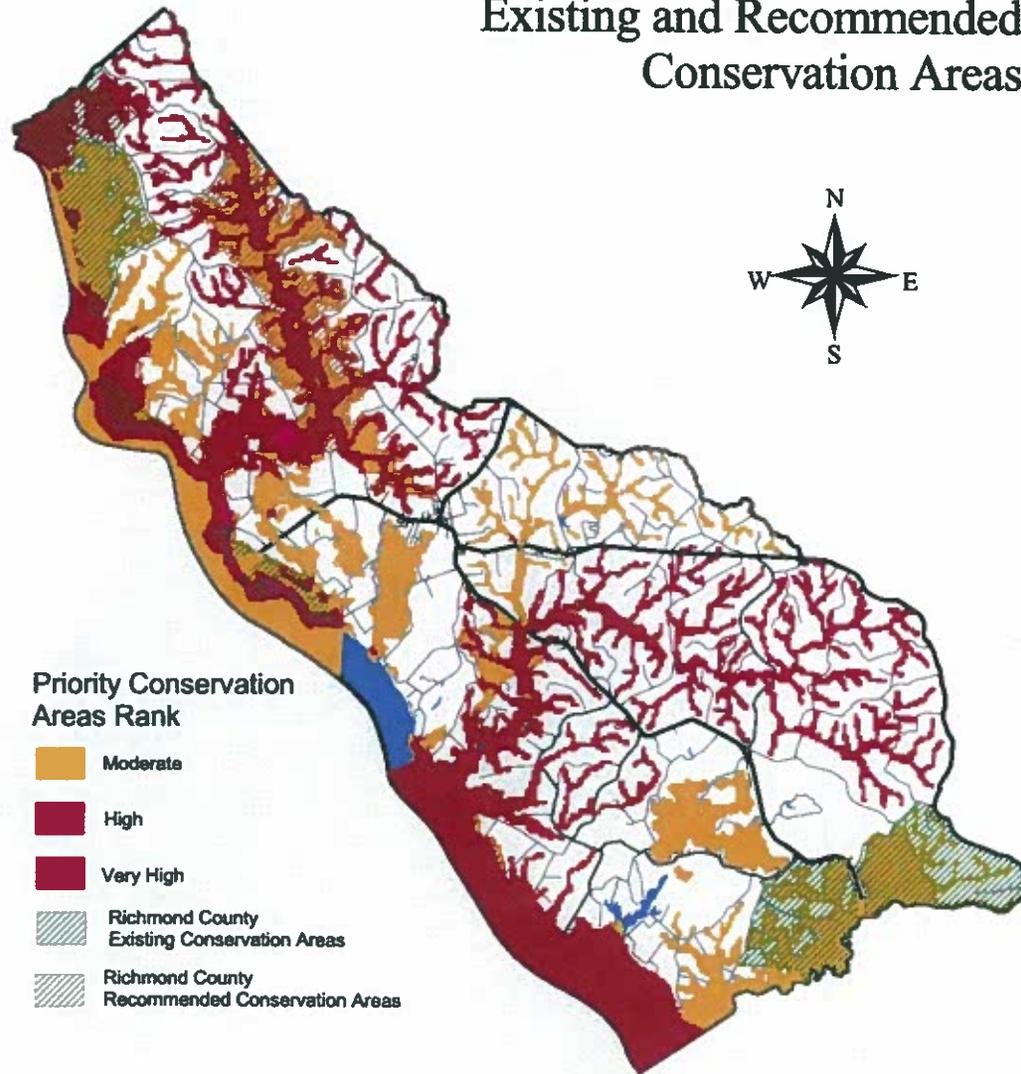


This project was funded by the Northern Neck Planning District Commission and the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant #NA06N054190163 of the U.S. Department of Commerce National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended

2010 Richmond County Comprehensive Plan

- Better data from state agencies allow the County to better assess natural areas in the County this time around
- Several data sources from DCR, DGIF and the Virginia Coastal Program all indicate the same areas as high value areas
- One area in Richmond County is shown to be high value, but not in a conservation area, that is Cat Point Creek

Virginia Department of Conservation and Recreation Priority Conservation Areas With Existing and Recommended Conservation Areas

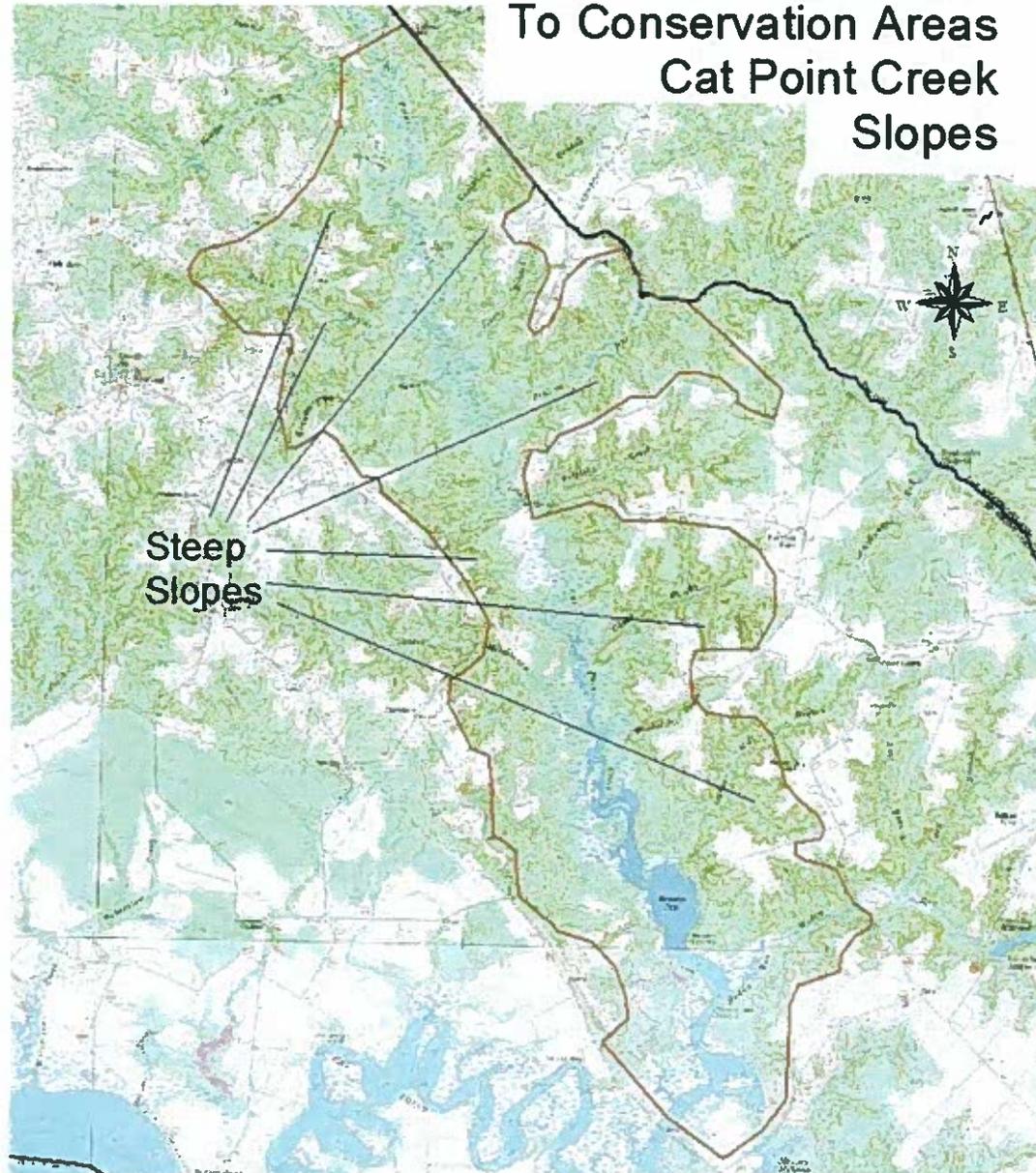


Virginia Coastal Zone



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Richmond County: Recommended Addition To Conservation Areas Cat Point Creek Slopes



This project was funded by the Northern Neck Planning District Commission and the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant # NA09NO541901d3 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.

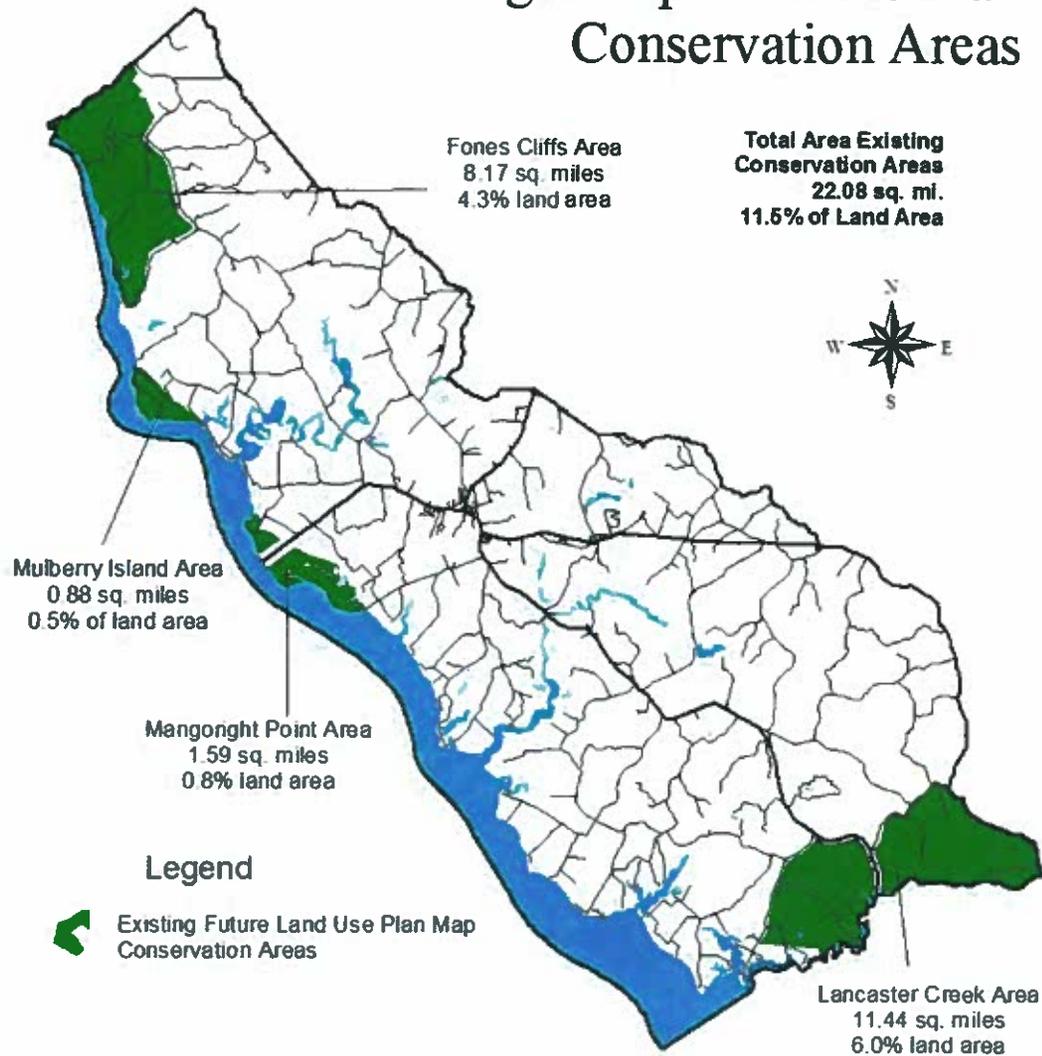
2010 Richmond County Comprehensive Plan

- State agency data has verified the importance of conservation lands within the county for natural habitat from the existing Comprehensive Plan
- State agency data has identified another area of the county with high value to a multitude of wildlife species and environmental benefits (Cat Point Creek)
- Richmond County should build on previous efforts to conserve important parts of the County for future generations, for future water quality and to help ensure the rural character of the County

December 28th RC Comp. Plan Committee Meeting Request

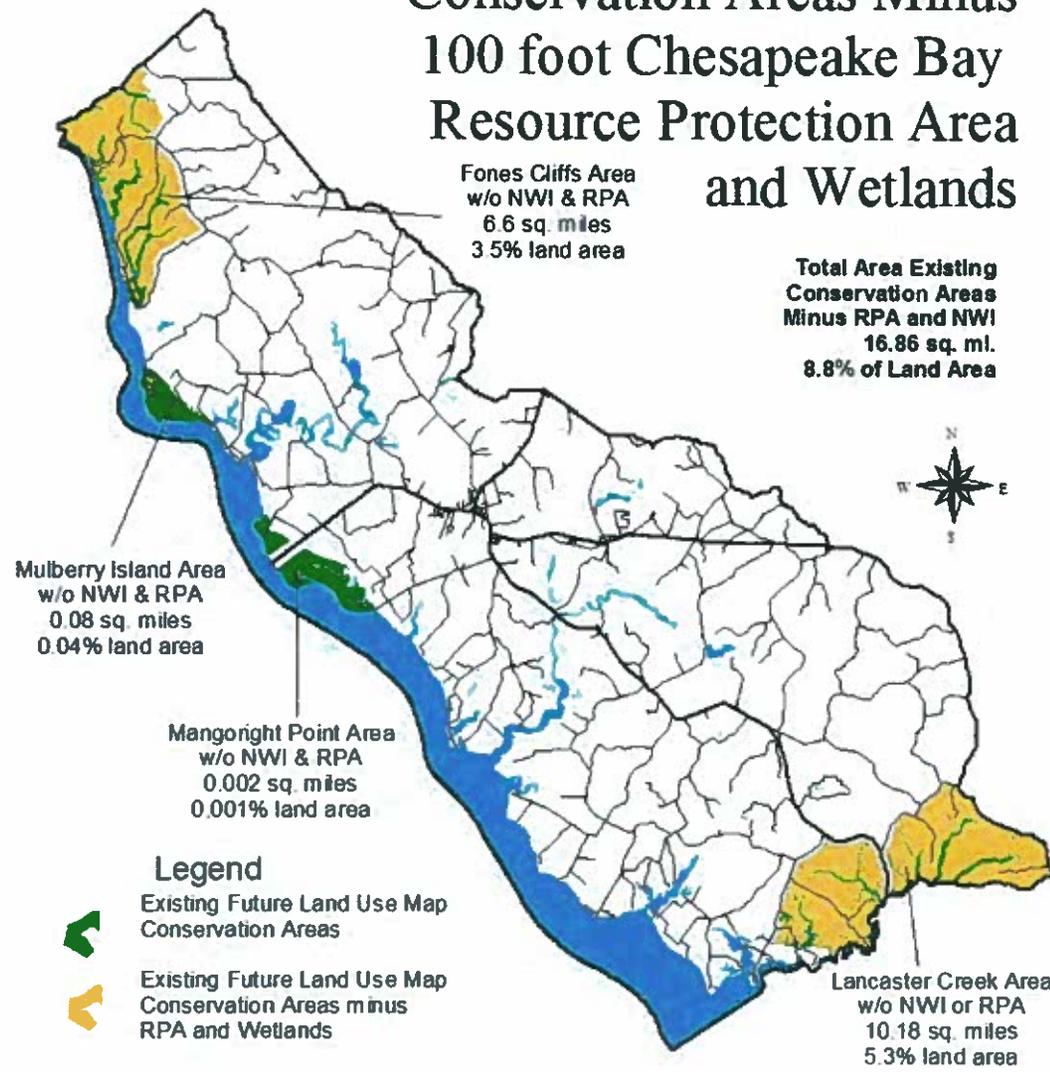
- Area and Percent Lands Already Conserved
- Area and Percent of Existing Conservation Areas
- Areas and Percent of Existing Conservation Areas minus RPA and Wetlands
- Area and Percent of Recommended Conservation Area
- Area and Percent of Recommended Conservation Area minus RPA and Wetlands
- Total Area of Existing and Recommended Conservation Areas and Conserved Lands
- Total Area of Existing and Recommended Conservation Areas and Conserved Lands minus RPA and Wetlands

Richmond County Existing Comprehensive Plan Conservation Areas



This project was funded by the Northern Neck Planning District Commission and the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant #NA08NO54190400 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.

Richmond County Existing Comprehensive Plan Conservation Areas Minus 100 foot Chesapeake Bay Resource Protection Area and Wetlands



Virginia Coastal Zone
ESTUARINE PROGRAM



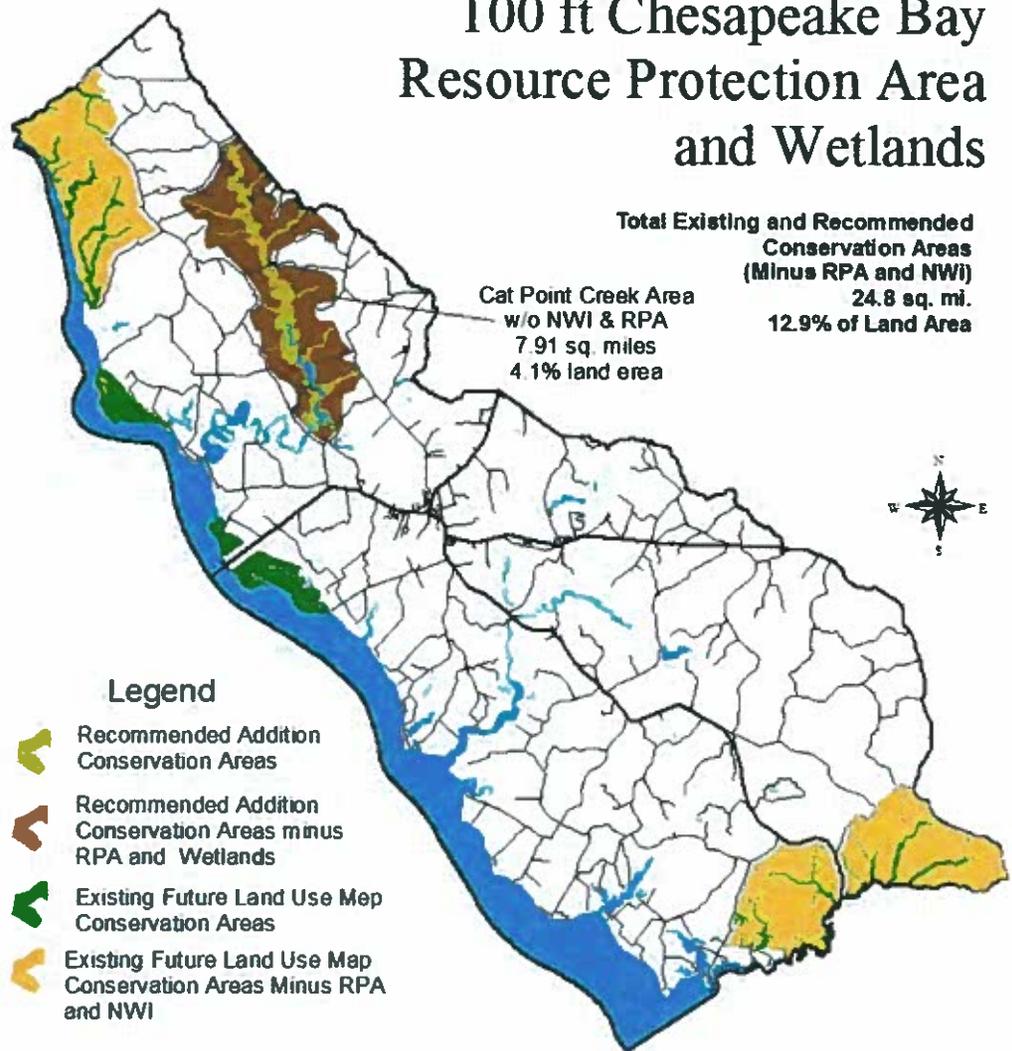
This project was funded by the Northern Neck Planning District Commission and the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant #NA08NO54193489 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.

Richmond County Recommended Addition to Comprehensive Plan Conservation Areas



This project was funded by the Northern Neck Planning District Commission and the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant #NA08NOS4190456 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.

Richmond County: Recommended Conservation Areas Minus 100 ft Chesapeake Bay Resource Protection Area and Wetlands



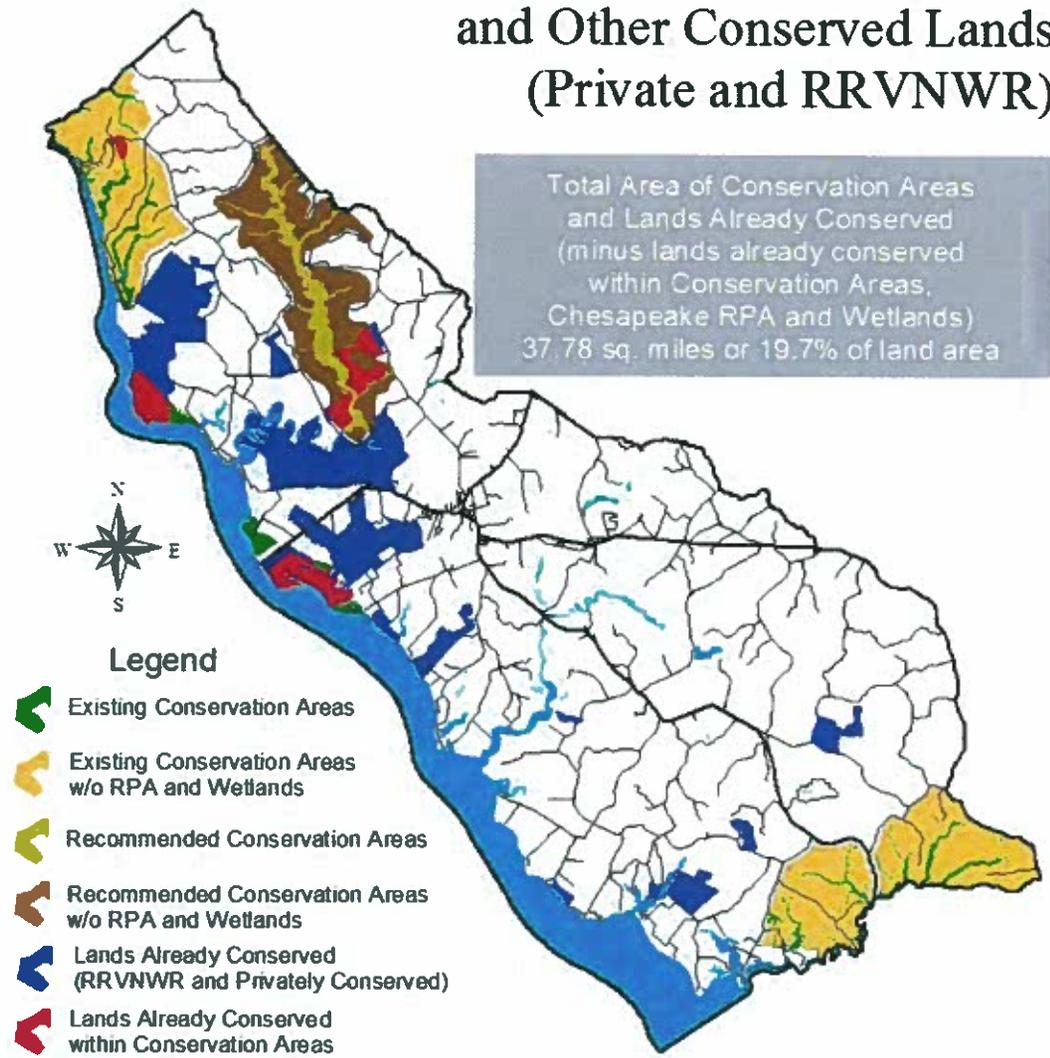
This project was funded by the Northern Neck Planning District Commission and the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant #NA08ND04190488 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.

Richmond County: Existing and Recommended Comprehensive Plan Conservation Areas, Conserved Lands and Overlapping Lands That Are Already Conserved



This project was funded by the Northern Neck Planning District Commission and the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant #NA08NO54190468 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.

Richmond County: Existing and Recommended Comprehensive Plan Conservation Areas (minus RPA and Wetlands), and Other Conserved Lands (Private and RRVNWR)



The project was funded by the Northern Neck Planning District Commission and the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant #NA08NO54190468 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.

Questions?

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