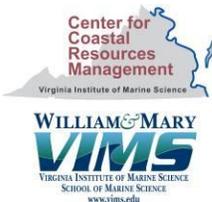

The Coastal Virginia Ecological Value Assessment: a collaborative integration of conservation datasets and priorities in Virginia



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This project was funded in part by the Virginia Coastal Zone Management Program at the Department of Environmental Quality through grant number NA10NOS4190205 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management act of 1972, as amended.

Prepared by:

Virginia Coastal Zone Management Program
Virginia Commonwealth University- Center for Environmental Studies
Virginia Department of Conservation and Recreation- Division of Natural Heritage
Virginia Department of Game and Inland Fisheries
Virginia Institute of Marine Science- Center for Coastal Resource Management

Coastal Zone Management Program
Virginia Department of Environmental Quality
Division of Environmental Enhancement
629 East Main Street
Richmond, Virginia 23219
Fax: (804) 698-4319

Cover images courtesy of Irvine Wilson (Magothy Bay Natural Area Preserve- top, Dendron Swamp Natural Area Preserve-bottom) and Gary Fleming (Crow's Nest Natural Area Preserve-right), Virginia Department of Conservation and Recreation- Division of Natural Heritage.

This document may be cited as:

Virginia Coastal Zone Management Program. 2013. The Coastal Virginia Ecological Value Assessment: a collaborative integration of conservation datasets and priorities in Virginia. Richmond, Virginia.

Executive Summary

The Coastal Virginia Ecological Value Assessment (VEVA) was developed to be a comprehensive, GIS-based tool to guide the land use planning and conservation planning of local governments and planning districts in the Coastal Zone of Virginia. Funded primarily by the Coastal Zone Management Program (CZM) at the Virginia Department of Environmental Quality (NOAA grant FY10 NA10NOS4192025, Task 11), the Coastal VEVA improves upon, and replaces, the former Priority Conservation Areas (PCA) data layer. The PCA was developed in 2008 by Virginia's Department of Conservation and Recreation-Division of Natural Heritage, Department of Game and Inland Fisheries, and Virginia Commonwealth University-Center for Environmental Studies (NOAA grant FY08 NAO8NOS4190466, Task 11.02). These partners integrated datasets identifying priority lands based on wildlife habitat and biodiversity values, landscape level Green Infrastructure networks and healthy waters in the Coastal Zone. In 2010, these same state partners were joined by DCR-Division of Soil and Water and Virginia Institute of Marine Science-Center for Coastal Resources Management to develop an update and enhancement of the PCA. This consisted of updates to datasets previously included in the PCA, as appropriate, the inclusion of coastal and estuarine priority conservation areas (VIMS), and the inclusion of Virginia's Healthy Watersheds, as identified by VCU-Center for Environmental Studies. *Three deliverables were produced in accordance with the project grant requirements and are provided within this report:* 1) A final Coastal VEVA Map displaying the revised dataset (page 21). 2) An updated NOAA Coastal and Estuarine Land Conservation Program (CELCP) Land Acquisition Priorities Map (page 22), and 3) Outreach activities involving the creation and delivery of educational materials, outlined in the last section of this report (page 24).

Coastal VEVA synthesizes important natural resource information in one geospatial layer for guiding conservation planning, natural resource management, land use management and public awareness of the general ecological values of areas throughout the Coastal Zone. VEVA combines scientific data and best professional judgment to rank terrestrial and aquatic areas on a 1-to-5 scale of ecological value. This dataset is not intended to replace on the ground surveys or consultations with biologists as appropriate, but is intended to be a thorough first step to enable efficient consideration of natural resources and ecosystem function early in any planning process. This report provides a description of the datasets that provided the inputs to the Coastal VEVA, as well as methods for its development using ArcGIS. Furthermore, examples are provided as to how the output GIS layers can be used in a local context, and how local data can be incorporated with the Coastal VEVA, for making decisions around land use and conservation.

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Introduction and Background

Habitat loss, fragmentation, and degradation represent the most significant threats to the effective conservation of wildlife species and natural communities. At the same time, however, the capacity to purchase, conserve, and manage lands has diminished significantly due to declining budgets. This problem is compounded by the rapid conversion of lands from traditional rural and agricultural uses, which may support a broad diversity of wildlife, to industrial or residential uses, which create landscapes inhospitable to many species and aquatic systems. This condition is especially clear in Virginia where—by one estimate—current land conversion rates will develop more land over the next 40 years than has been developed in the past 400 years (Benedict *et al.* 2004). Undoubtedly, habitat loss and fragmentation cannot be stopped. Rather, the impacts must be managed proactively via well-informed, comprehensive planning that recognizes the critical importance of conserving and managing terrestrial and aquatic species habitats and the ecosystem functions they help constitute. This is the foundation for healthy “Green and Blue” Infrastructure.

Since most land use decisions are made at the local government level, conservation of lands is frequently made at the local level. Considering that funding for conservation is typically very limited at the local level, having tools to identify conservation opportunities that maximize our ability to conserve and manage the most important areas in the most financially sound ways is key. Understanding that all lands/resources are not equal in their contribution to a healthy functioning environment can aid planners and citizens in deciding where to maximize their conservation potential.

Virginia natural resources agencies have independently identified important conservation opportunities relative to their legislative missions. Specific conservation tools used for this purpose include the Virginia Conservation Lands Needs Assessment (VCLNA) which was developed by the Virginia Department of Conservation and Recreation – Division of Natural Heritage (DCR-DNH) and the Virginia Wildlife Action Plan, developed by the Virginia Department of Game and Inland Fisheries (DGIF). Both the Ecological Model (the Virginia Natural Landscape Assessment or VaNLA) of the VCLNA and the mapped tiered-species habitats from the Wildlife Action Plan identified conservation priorities spatially. However, each of these efforts were formed with different objectives and assumptions and therefore, presented different results. Concurrently, Virginia Commonwealth University’s Center for Environmental Studies (VCU-CES) has developed methods to rate aquatic resource integrity based on fish and macro-invertebrate community sampling and watershed health assessment modeling. The Virginia Institute of Marine Science’s Center for Coastal Resource Management (CCRM) has developed an Aquatic Priority Conservation Areas (APCA) data layer showing where important coastal and estuarine resources exist. These data provide another way to identify conservation priorities. With several tools for mapping conservation priorities, local planners need to fully evaluate all available options at the risk of under-representing a specific conservation perspective. Synthesis is needed to present a unified method of prioritizing conservation opportunities.

In 2008, the Virginia Coastal Zone Management Program (through NOAA Grant # NA 08NOS4190466; FY08; Task#11.02) funded Virginia’s DCR-DNH, DGIF, and VCU-CES to collaboratively develop the Priority Conservation Areas (PCA) data layer and map. The PCA was an integration of DGIF’s Priority Wildlife Diversity Conservation Areas dataset, VCU’s Aquatic Resources Integrity Layer, and DCR-DNH’s Natural Landscape Network (a derivation of the VaNLA) and Conservation Sites layers. The PCA is a comprehensive tool to help guide land conservation along with land use planning in Virginia’s Coastal Zone.

Virginia CZM brought the same state entities that partnered for the PCA together again in 2010, along with DCR- Division of Soil and Water and VIMS’ Center for Coastal Resources Management to create a

more comprehensive synthesis of information for conservation planning - the Coastal Virginia Ecological Value Assessment (Coastal VEVA) (NOAA grant FY10 NA10NOS4192025, Task 11). Coastal VEVA *is a more comprehensive tool that captures and considers current conditions in coastal and estuarine areas as well as free flowing fresh water habitat.*

The Coastal VEVA delineates several GIS conservation priority datasets including the VA Dept. of Game and Inland Fisheries' Priority Wildlife Diversity Conservation Areas; VA Dept. of Conservation and Recreation Division of Natural Heritage Conservation Sites Layer (CSL) and Natural Lands Network (NLN); VCU Center for Environmental Studies aquatic resource integrity layer; VA Dept. of Conservation and Recreation Division of Soil and Water Healthy Waters data; and VIMS' CCRM Aquatic Priority Conservation Areas (APCA). These ecological resources are defined as lands, aquatic resources and surface waters indentified as important for conservation of Virginia's wildlife, plants, aquatic communities and resources and natural communities. The data are ranked on a scale of 1 to 5, with a 5 representing the highest conservation priority. Thus, the VEVA synthesizes important natural resource information in one geospatial layer for guiding conservation planning, natural resource management, land use management and awareness. This dataset is not intended to replace on the ground surveys or consultations with biologists as appropriate, but is intended to be a thorough first step to enable efficient consideration of natural resources and ecosystem function early in any planning process.

The Coastal VEVA is available online through the Virginia CZM Program's Coastal Geospatial Educational Mapping System (GEMS) at <http://deq.virginia.gov/coastalgems>. The VEVA data layer can be viewed with many other data layers (such as "conserved lands," "county boundaries," "public access sites") in order to conduct additional spatial analyses.

VEVA Data Inputs

The following text and figures summarize the data inputs to the VEVA. In many cases, data from the former Priority Conservation Areas analyses were used (e.g. terrestrial components from DCR-Natural Heritage and DGIF). For the Aquatic Component, data were enhanced, and for the Estuarine component, data were slightly modified from VIMS' former Aquatic Priority Conservation Areas analysis. The following diagram illustrates the general composition of the VEVA:

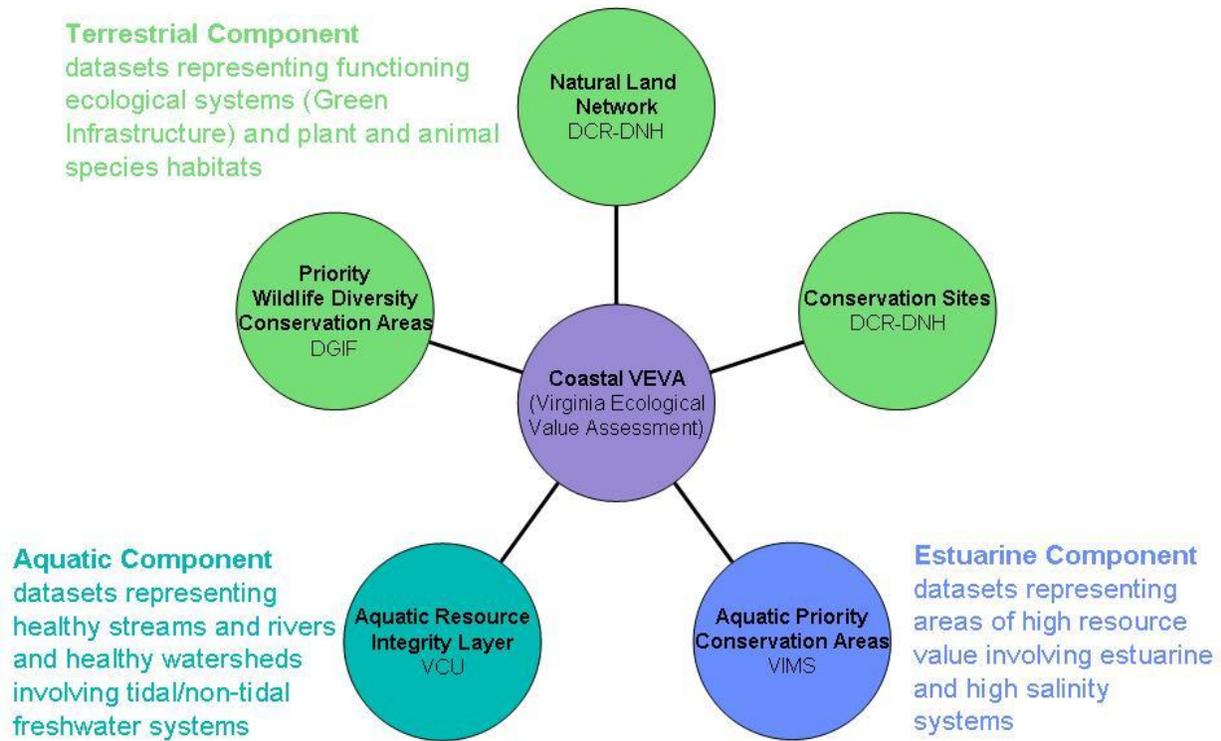


Figure 1. Coastal VEVA Component Overview. This diagram illustrates the terrestrial, aquatic and estuarine components of the VEVA, the datasets that comprised them, and the sources of those datasets.

Terrestrial Component – Biodiversity and Green Infrastructure

Virginia DCR-DNH prepared two data layers from the Natural Heritage Plan, both of which were also included in the original PCA. These two inputs were selected to provide both a fine filter and a coarse filter for identifying conservation priorities in Virginia. In short, coarse filter tools are designed to conserve high percentages of species by conserving adequate diversity, distribution, and abundance of ecological communities, ecological land units (e.g., alliances of ecological communities, physical environments and landscape-level ecological phenomena). Coarse filter tools are complemented by fine filter approaches, which focus on specific habitats of individual rare species, or species that specialize on a small and/or unique habitat type.

Virginia's Natural Heritage Conservation Sites provided the fine filter to capture lands valuable for conservation of high biodiversity. The coarse filter consisted of the Natural Land Network, a subset of interconnected landscape cores and corridors from the Virginia Natural Landscape Assessment (VaNLA). The following text briefly describes these two PCA inputs.

DCR - Virginia Natural Heritage Conservation Sites (Fine Filter)

The DCR-DNH maintains a GIS layer and database of Virginia's Conservation Sites, a central component of the Natural Heritage Plan. A conservation site is a planning boundary delineating the Virginia Natural Heritage Program's best determination of the land and water area occupied by one or more natural heritage resources (exemplary natural communities and rare species) and required to support their long-term survival. The size and dimensions of a conservation site are based on the habitat requirements of the natural heritage resources present and the physical features of the surrounding landscape. Features taken into consideration include underground and surface hydrology, slope, aspect, vegetation structure, current land uses, and potential threats from invasive species. Conservation sites do not necessarily preclude human activities, but the site's viability may be greatly influenced by human activities. Conservation sites may require ecological management, such as invasive species control or water management, in order to maintain or enhance their viability. Each conservation site is given a biodiversity significance ranking (B-rank) based on rarity, quality, and number of natural heritage resources it contains.

Biodiversity Ranks calculated for all DCR-DNH Conservation Sites in the Virginia Coastal Zone as of January 2009 and classified from 1 (low) to 5 (high). A map of Conservation Sites used in the VEVA is not displayed here due to sensitive nature of the data. The Virginia DCR- Division Natural Heritage can be contacted for more information about, or for access to, the Conservation Sites database/map layer.

DCR - Virginia Natural Land Network (Coarse Filter)

The Virginia Natural Land Network is a focused subset of lands identified in the Virginia Natural Landscape Assessment (VaNLA), a landscape-scale GIS analysis for identifying, prioritizing, and linking natural habitats in Virginia, which was developed by the DCR-DNH with funding from the Virginia Coastal Zone Management Program (NOAA Grant # NA05NOS4191180, Task 92.05 and NOAA Grant # NA03NO54190104, Task 95.01). Using land cover data derived from satellite imagery, the VaNLA identifies un-fragmented natural habitats called Ecological Cores, or large patches of natural land cover with at least 100 acres of interior conditions. Cores consist mainly of upland forests and forested wetlands statewide, but also marshes, beaches, and dunes in the coastal plain. Large, medium, and small Ecological Cores are identified, along with smaller Habitat Fragments that may be important in more urban localities. Ecological Cores provide habitat for a wide range of species, from those dependent upon interior forests to habitat generalists, as well as species that utilize marsh, dune, and beach habitats.

Cores also provide benefits in terms of open space, recreation, water quality (including drinking water protection), and carbon sequestration, along with the associated economic benefits of these functions.

All VaNLA cores are given an ecological integrity score. This score is derived from a ranking method resulting from the calculation of several attributes from all cores that assess a core's relative contribution to ecosystem functions (e.g. rare terrestrial and aquatic species locations from the State Wildlife Action Plan (SWAP) and Natural Heritage Plan, locations of rare community types, total core area, length of core interior streams, variety of unmodified wetlands, etc.). Via this process, each ecological core was assigned an ecological integrity score of C1 – Outstanding to C5 – General.

In the interest of identifying an entire ecological network upon which to base conservation decisions, landscape corridors were also identified using GIS to identify the most suitable linkages between the two highest ranks of cores (C1 and C2). Suitable corridors that link cores allow animal movement between cores and help to facilitate seed and pollen transfer between cores. In addition to identifying links between C1 and C2 cores, corridors also integrated all landscape cores that they intersected (C3, C4 and C5 cores) as habitat nodes. These nodes provide stepping stones for plant and animal populations over time and help to assure that lands identified as important to core linkages also contribute to the available habitats for some species within the ecological network. More detailed methods and background for the VaNLA can be found on the DCR-DNH website at http://www.dcr.virginia.gov/natural_heritage/vclnavnla.shtml

Portions of the VaNLA were selected to provide the coarse filter contribution to the greater PCA. Referred to as the Virginia Natural Land Network (NLN), this subset of lands consists of a GIS layer of:

- all the highest ranked cores (C1 and C2) in the Coastal Zone, each ranked by ecological integrity,
- all landscape corridors providing linkages between these cores, and
- all cores (ranks C3 – C5) that intersect landscape corridors.

The NLN was provided with rankings of ecological integrity from low (1) to high (5) for incorporation into the PCA. All cores included in the NLN maintain their same VaNLA Ecological Integrity scores for the VEVA weighting, and all corridors were given a rank of 1 where they did not intersect a VaNLA core. The NLN is shown in Figure 2.

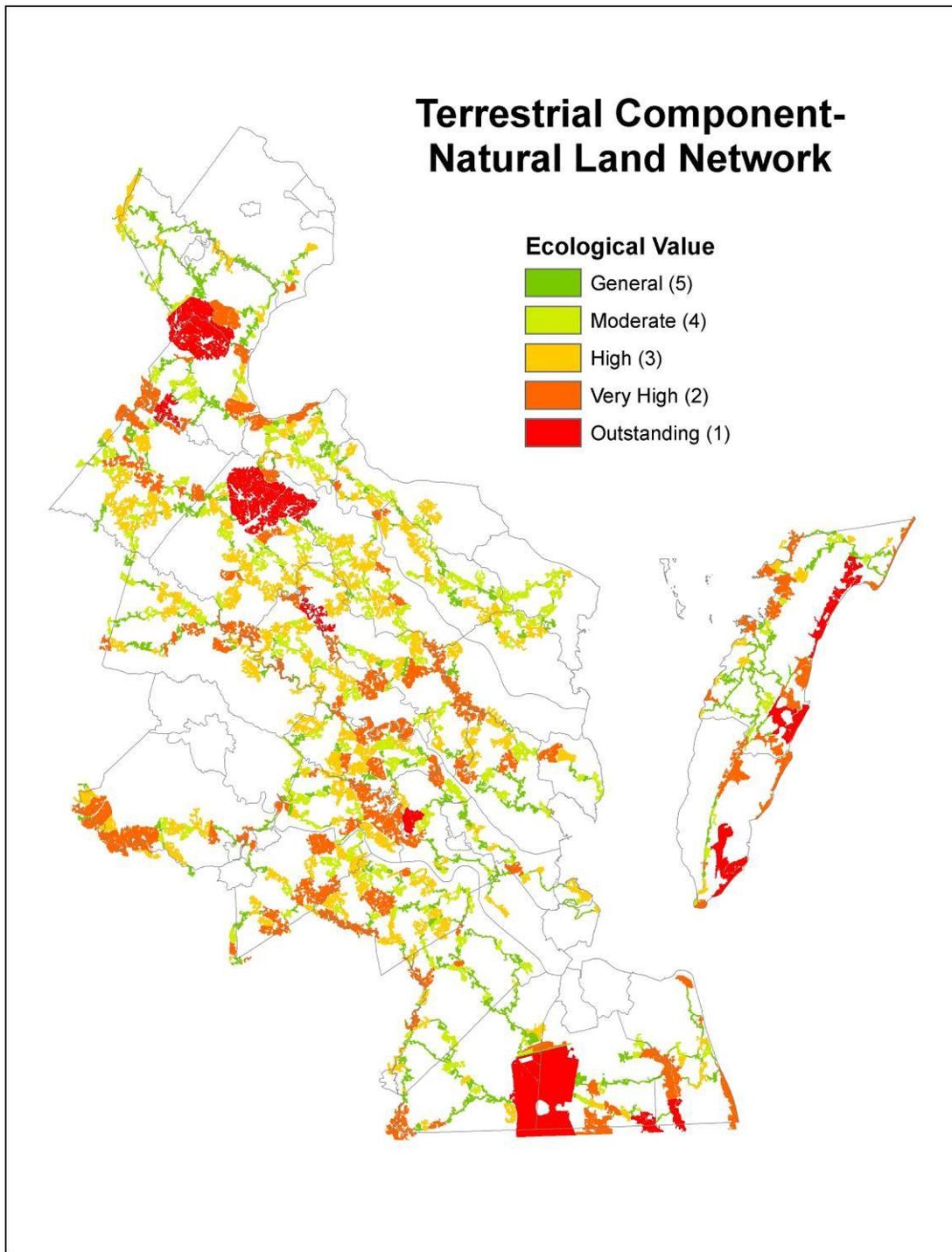


Figure 2. Natural Land Network for the Virginia Coastal Zone. The Natural Land Network consists of habitat cores in the Virginia Natural Landscape Assessment (VaNLA) with Ecological Integrity values of 1- Outstanding, or 2-Very High, as well as the corridors and nodes that provide connectivity for these highest ranking cores. Cores are symbolized here in terms of Ecological Value, from 1- General, to 5- Outstanding. These rankings are synonymous with the Ecological Integrity rankings in the VaNLA.

Terrestrial Component – Wildlife Diversity

Wildlife Diversity was included in the VEVA via the Priority Wildlife Diversity Conservation Areas (PWDCA) GIS layer. The PWDCA also provided the wildlife diversity input in the former PCA.

Priority Wildlife Diversity Conservation Areas

The DGIF maintains several GIS datasets showing the location of important wildlife features. However, DGIF has never produced a map showing how these features should be prioritized and conserved. As part of the Wildlife Action Plan, DGIF mapped habitats of over 250 species of greatest conservation need (Tiered Habitat); these do not include any protective buffer around habitats. Furthermore, there are general conservation actions included in the Wildlife Action Plan that benefit multiple species that had not been mapped. Therefore, it was necessary to create a new GIS dataset to compile wildlife conservation areas. This dataset was called Priority Wildlife Diversity Conservation Areas or PWDCA. The term *diversity* was included to reinforce the wildlife diversity or nongame wildlife conservation focus.

The first step was to determine appropriate existing GIS datasets that represent conservation opportunities. These datasets included: Anadromous Fish Use Waters, Colonial Waterbird Database, and Audubon Important Bird Areas. The DGIF's Coldwater Stream Survey dataset was also considered, but is primarily outside of the Coastal Zone.

The next step was to gather “mappable” conservation actions outlined in the Wildlife Action Plan. There were four explicit conservation actions that could be mapped:

1. *Acquire or protect needed habitats.* The DGIF mapped the habitats of over 250 species of greatest conservation need within the top two tiers of imperilment, plus any state or federally listed species in a lower tier. These are called DGIF's Tiered Species Habitat. While this doesn't include the habitats needed to conserve all species of greatest conservation need, it does include a major portion of the most critically imperiled species.
2. *Protect large blocks of contiguous habitat.* The DCR-DNH identified cores of natural land cover within the Ecological Model of their VCLNA. These cores and related features represent contiguous or unfragmented habitat. These are also referred to as the VaNLA cores.
3. *Create forest or upland buffers around marshes and protect wooded wetlands.* Wetlands are identified in the U.S. Fish and Wildlife Service's (USFWS) National Wetlands Inventory. Buffers can be created in GIS to identify buffers around these features.
4. *Protect and establish riparian buffers.* GIS data on streams can be buffered to delineate appropriate stream buffers. The best available stream data are the National Hydrography Dataset from U.S. Geological Survey (USGS).

Details on the existing GIS datasets, as well as datasets used to map conservation actions, are listed below:

Anadromous Fish Use Waters: This dataset maintained by DGIF and updated in 2006 identifies reaches that are confirmed or potential migration pathways, spawning grounds, or nursery areas for anadromous fish. The base layer hydrography for this dataset is the USGS National Hydrography Dataset, High (1:24,000) and Medium (1:100,000) resolution.

Colonial Waterbird Database: This dataset contains known occurrences of colony nesting waterbirds in Virginia (for example, Least Tern (*Sternula antillarum*), and Royal Tern (*Thalasseus maximus*). It

includes data from the 2003 Colonial Waterbird survey conducted by the College of William and Mary's Center for Conservation Biology (CCB), data from the DGIF's Species Observations database and data from Cornell University.

Audubon Important Bird Areas (IBA): This IBA dataset consists of 20 IBAs in the Coastal Zone. It was created by the Center for Conservation Biology with funding from the Virginia CZM Program and is maintained by the Audubon Society as part of a global effort to conserve bird biodiversity. They are created to encompass habitat important to one or more species and are based on nominations from experts in the avian community.

DGIF's Tiered Species Habitat: Aquatic and terrestrial tiered confirmed and potential habitat layers were created as part of the Virginia Wildlife Action Plan. There are four tiers, representing levels of imperilment with I being the highest. All maps and information were reviewed by biologists. For more information, visit: <http://bewild.virginia.org>.

- **Terrestrial confirmed habitat:** This layer includes confirmed locations from DGIF's Species Observations database as well as data from DCR-DNH's Biotics Data System.
- **Terrestrial potential habitat:** This layer represents areas with potential for supporting species. It is based on species distribution, species habitat requirements, existing spatial data and biologists' knowledge.
- **Aquatic habitat:** The aquatic layers are based on a Stream Reach Classification System using the 1:100,000 National Hydrography Dataset (NHD). Reaches in this dataset were assigned additional attributes useful for habitat evaluation such as size, gradient and elevation.
 - **Confirmed habitat:** Confirmed reaches have documented species occurrences.
 - **Potential habitat:** Potential reaches are assigned based on species distribution and the characteristics of confirmed reaches.

Note that the DGIF's Threatened and Endangered Species Waters dataset is essentially a subset of the aquatic habitat portion of the Tiered Species Habitat, for those individual listed species. Therefore this dataset was not included on its own.

National Wetlands Inventory: This dataset is maintained and downloaded from the USFWS. It was digitized from 1:24,000 topographic quads and attributed using the Cowardin Wetland Classification System.

National Hydrography Dataset: This dataset is maintained and downloaded from the U.S. Geologic Survey. The layer used to extract riparian areas was at the 1:100,000 scale.

VaNLA Cores: Layer created and distributed by the DCR-DNH for the Virginia Conservation Lands Needs Assessment, as part of the Virginia Natural Lands Network. It was published in 2006 and represents areas of un-fragmented natural habitat ranging in size and corresponding conservation value.

Unique terrestrial and aquatic areas: This layer includes areas that represent particularly important habitats for ten species that merited additional priority. The species included Canebrake rattlesnake, Bog turtle, Shortnose sturgeon, American oystercatcher, Wood turtle, Mabee's salamander, Eastern Tiger salamander, Bald eagle, Peregrine falcon and the Barking treefrog.

Once the initial GIS input layers were gathered, it was necessary to determine how they should be processed and prioritized. The list of relevant layers and habitat features was sent to 13 DGIF Wildlife Diversity biologists and broad questions were posed including: *What areas in Virginia should be*

preserved?; What are the priorities that should be managed in a specific way?; What areas should localities protect through local zoning or planning?; How should the Wildlife Diversity section prioritize land for acquisition? The biologists reviewed the list of mapped wildlife features, suggesting priorities for features, buffer distances and buffer priorities where appropriate. Priorities were on a scale of 1 to 10, with 10 being the highest. In addition, biologists identified any other features that should be included in the model. Specific areas were identified as having additional value as being unique terrestrial or aquatic features.

Input was received from all 13 biologists. The results of this survey were averaged. However, input from those biologists with specific taxonomic expertise was considered more appropriate than similar input from non-experts for individual taxa features. For example, avian biologists determined the priority rankings of Important Bird Areas and tiered bird species habitats while aquatic biologists had more input on riparian buffer rankings. Initial input was compiled and draft buffer distances and priorities were determined. A second round of input on these draft results followed. After feedback on the draft values was received and incorporated, final values were determined (Table 1).

Table 1. Prioritization Scheme for Confirmed and Potential DGIF Resources

Aquatic Tiered Habitat ¹			
Confirmed (DGIF)	Tier I spp reach	Priority	10
		Buffer	300
		Buffer priority	10
	Tier II spp reach	Priority	9
		Buffer	300
		Buffer priority	9
	Tier III spp reach	Priority	7
		Buffer	300
		Buffer priority	7
	Tier IV spp reach	Priority	5
		Buffer	300
		Buffer priority	5
Potential (DGIF)	Tier I spp reach	Priority	7
		Buffer	150
		Buffer priority	7
	Tier II spp reach	Priority	6
		Buffer	150
		Buffer priority	6
	Tier III spp reach	Priority	4
		Buffer	150
		Buffer priority	4
	Tier IV spp reach	Priority	3
		Buffer	150
		Buffer priority	3
Terrestrial Tiered Habitat ¹			
Confirmed (DGIF includes data from DCR- DNH)	Tier I spp location	Priority ²	10
		Buffer	200
		Buffer priority	10
	Tier II spp location	Priority ²	9
		Buffer	200
		Buffer priority	9
	Tier III spp location	Priority ²	7
		Buffer	200

		Buffer priority	7
	Tier IV spp location	Priority ²	5
		Buffer	200
		Buffer priority	5
Potential (DGIF)	Tier I spp habitat	Priority	8
		Buffer	100
		Buffer priority	8
	Tier II spp habitat	Priority	6
		Buffer	100
		Buffer priority	6
	Tier III spp habitat	Priority	4
		Buffer	100
		Buffer priority	4
	Tier IV spp habitat	Priority	3
		Buffer	100
		Buffer priority	3
Important Bird Areas (National Audubon Society)	Important Bird Areas	Priority ³	10, 5
		Buffer Distance	0
		Buffer Priority	0
CWB (DGIF, W&M's Center for Cons. Biology)	Colonial Waterbirds	Priority	8
		Buffer Distance	300
		Buffer Priority	8
VaNLA Cores (DCR-DNH)	Large	Priority	5
	Medium	Priority	4
	Small	Priority	4
	Fragments	Priority	3
National Wetlands Inventory (USFWS)	Wooded Wetlands	Priority	8
		Buffer Distance	200
		Buffer Priority	6
	Non-wooded Wetlands	Priority	5
		Buffer Distance	150
		Buffer Priority	4
Anadromous Fish Use Areas (DGIF)	Confirmed	Priority	4
		Buffer	100
		Buffer priority	4
	Potential	Priority	2
		Buffer	100
		Buffer priority	2
Streams (USGS, 1:100,000 NHD)	Riparian Buffers	Priority	3
		Buffer	100
		Buffer priority	3
Unique Terrestrial Areas ⁴		Priority	0.5, 1
Unique Aquatic Areas ⁵		Priority	1

¹Tier III and IV data is only included for Threatened and Endangered Species

²Birds were assigned priority of 1.

³Upper Blue Ridge IBA was assigned priority of 5, all others were 10.

⁴Maple Flats, Cat Ponds, Grafton Ponds, Breaks Interstate Park, Lower Bernard Island, Halfmoon Island, Webb Island, Parkers Island, Scarsborough Island, Finney's, Watts Island, Tangier Island, Goose Island, Clump Island, Great Fox Island South and Northeast Naval Annex were assigned a value of 1. An area on the Lower Peninsula with Canebrake habitat was assigned 0.5.

⁵Indian Creek, Paddy Run, Johns Creek/Mill Creek, Craig Creek, and Nottoway River

The features, buffer distances, and priority ranks were used to combine the GIS datasets into Priority Wildlife Diversity Conservation Areas. All geoprocessing was done using ESRI ArcGIS ArcInfo version 9.2.

First, the riparian areas were identified using line and polygon features from the NHD. The NHD identifies several waterbody types, including rivers, lakes, ponds, seas/oceans, as well as pipelines. To focus this analysis on actual lakes, rivers and ponds, data for sea/ocean and pipelines were removed prior to analysis. Remaining features were buffered by 100m and assigned weights. Wetland areas were selected from the USFWS National Wetlands Inventory Data for wooded (types EFO, PFO) and non-wooded (types E2EM, E2SS, PSS, PEM and PUB) areas. Wetland polygons were buffered appropriately. Riparian and wooded polygons were joined and dissolved resulting on the maximum value for each polygon.

Important Bird Areas were not altered from original dataset; weights were assigned accordingly.

Anadromous fish areas were buffered (according to the distances in the above table) for both confirmed and potential. Data were joined and dissolved on maximum value where areas overlapped.

VaNLA Cores from DCR-DNH were not altered, only assigned weights.

Unique terrestrial areas were selected from DCR-DNH's Conservation Lands layer, and from DCR's Jurisdictions layer. Unique terrestrial areas also include areas delineated by DGIF Biologists to denote remaining potential habitat for certain wildlife species (e.g. inclusion of areas on the Lower James representing suitable Canebrake rattlesnake habitat). Unique aquatic layers were selected from the NHD.

For terrestrial and aquatic tiered data, confirmed and potential locations were buffered and assigned weights according to tier. Layers were joined to identify areas of overlap. Data were imported into MS Access where duplicate species were removed and final weights were calculated for each polygon. Final weight was calculated as the highest weight, plus half the total of the additional weights in each polygon. Because Tiered Species Habitats had such a high priority, there was a danger of these data overshadowing other wildlife features. The use of highest species weight plus half the weights of additional species occurring at the same location reduced the overall influence of sites where several tiered species co-occur.

All layers were compiled and converted from vector polygons to a raster dataset according to final weight. The raster layers were summed to get a total score for all locations. Using the Standard Deviations classification method, the combined raster was broken into 5 categories, with 1 being lower priority and 5 being the highest conservation priority.

The input layers and draft PWDCA with the 1-5 categories were posted in an intranet map site, providing an opportunity for final review by DGIF biologists. The final PWDCA is shown in Figure 3.

Terrestrial Component- Priority Wildlife Diversity Conservation Areas

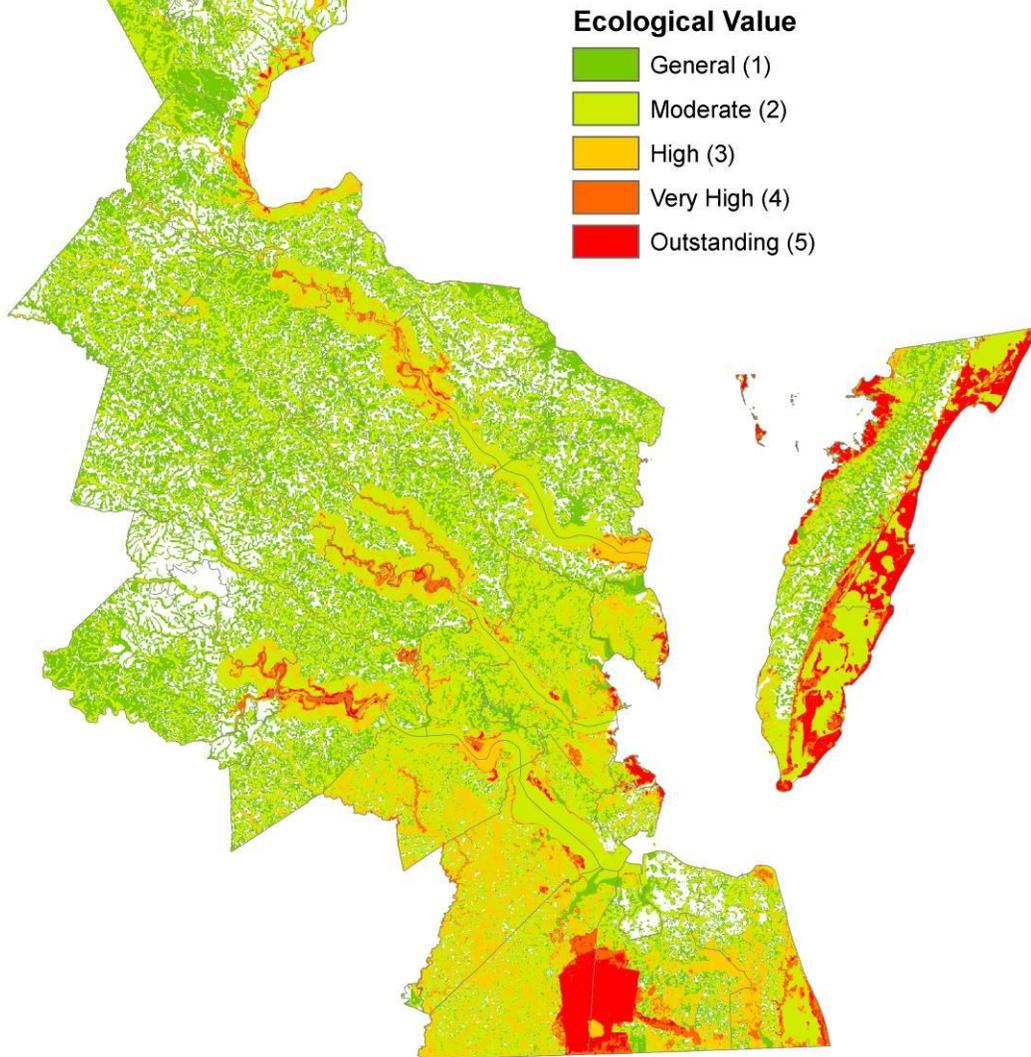


Figure 3. The DGIF Priority Wildlife Diversity Conservation Areas provides the Wildlife Diversity input for the Terrestrial Component of the VEVA.. This layer was also used in the PCA. Here the PWDCA is symbolized from 1-General to 5-Outstanding Ecological Value.

Aquatic Component

The stream reach assessment used for the PCA was updated for use in the VEVA. For the VEVA an additional Healthy Waters watershed analysis was conducted. These two analyses provided the aquatic component of the VEVA, where “aquatic” can be defined as tidal and non-tidal freshwater streams and rivers throughout the Coastal Zone.

VCU – Aquatic Resource Integrity Layer

This layer was created by Virginia Commonwealth University Center for Environmental Studies (VCU-CES) to aid in the characterization of stream health in the Commonwealth. This layer is a combination of both a local scale assessment and a watershed based approach to stream health. The assessment was aided by the Interactive Stream Assessment Resource (INSTAR).

Stream Reach Assessment:

Within each geo-referenced stream reach (150-200m, depending on stream width), fishes, macroinvertebrates, and stream habitat data were collected. Data were compiled into databases and application macros calculated over 50 separate ecological metrics, including those typically generated for Index of Biotic Integrity (IBI) and Rapid Bioassessment Protocol (RBP) assessments. INSTAR evaluates the ecological health of stream reaches based on percent comparability of empirical data to the appropriate (e.g., basin, stream order) reference model. A Virtual Stream Assessment (VSA) score representing stream health is calculated and placed in one of four categories: Exceptional, Healthy, Restoration Potential, and Compromised.

In addition to extensive stream community data collected by VCU biologists for INSTAR, appropriate data from other sources (e.g., agencies, universities) were screened for inclusion in the database, based on stringent criteria.

Modified Index of Biotic Integrity Watershed Assessment:

Watershed assessments included a broader range of validated qualitative (e.g., species lists) biotic data from various sources, including state and federal agencies. These data were used to generate watershed health scores using six metrics or variables for the Commonwealth’s 1275 6th order watersheds. Watershed integrity was calculated for each hydrologic unit and ranked in one of four categories: Exceptional, Healthy, Restoration Potential, and Compromised.

Healthy Waters Watershed:

Virginia’s Healthy Waters initiative is an effort to broaden conservation efforts to protect streams, creeks and other waters before they become impaired. Healthy waters are identified using the INSTAR database. Healthy INSTAR sites are sites that have a Virtual Stream Assessment Score greater than 70 (More information on Healthy Waters is available online at <http://instar.vcu.edu/>). At each healthy waters site, a watershed was generated using the Hydrologic Tools in Spatial Analyst. Each watershed was attributed with the stream health score of the INSTAR site for which the watershed was generated.

Layer creation:

All 1:24,000 hydrology lines in the Commonwealth were rasterized to 30m pixels and the watershed health score was attributed on each pixel that was inside a watershed. The stream reaches were buffered and rasterized.

The buffered NHD data were attributed with the Healthy Waters watershed rank of 5 for Exceptional or 4 for Healthy where data exist.

The Aquatic Resource Integrity Layer was then created by merging the Healthy Waters watershed assessment with the MIBI watershed assessment layer. A Mosaic operation using the last option was used to combine the two layers. The Aquatic Resource Integrity Layer with health categories is shown in Figure 4.

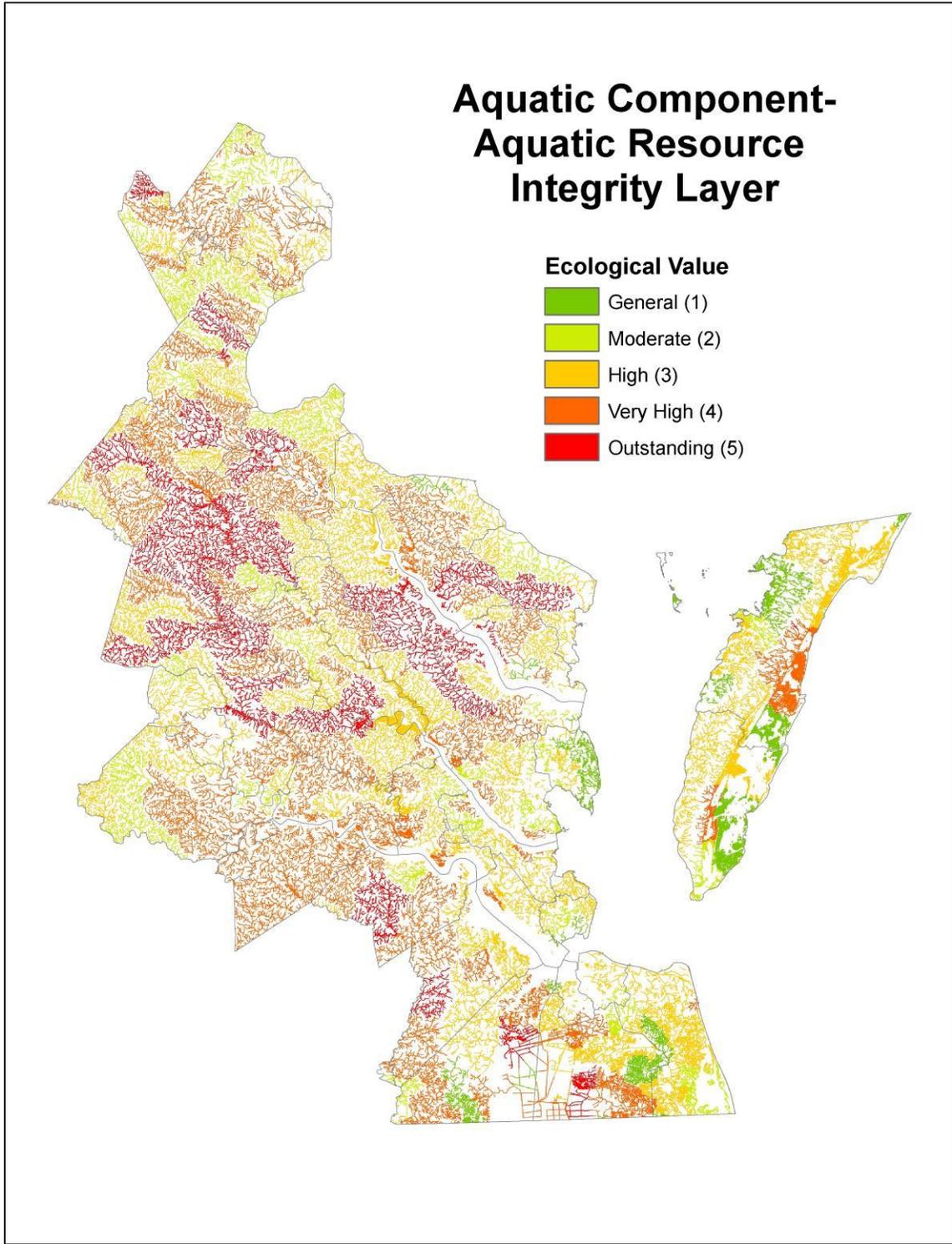


Figure 4. Aquatic Resource Integrity Layer. This Aquatic Component to the VEVA was developed from a stream reach – and watershed- level GIS analyses. This component includes tidal and nontidal freshwater streams and rivers, where stream reaches are ranked 1-General to 5-Outstanding in Ecological Value.

Estuarine Component- Blue Infrastructure

The VEVA goes beyond the aquatic extent of the PCA, and includes estuarine resources as well. Where the Aquatic Component provided by VCU focuses on the freshwater tidal and non-tidal systems, the Estuarine Component includes additional ecologically valuable areas in systems of higher salinity. This Estuarine Component was provided by a modification to the Aquatic Priority Conservation Areas GIS layer, developed by VIMS and funded by the Virginia CZM Program. The Virginia CZM Program funded the first work to map Virginia's Blue Infrastructure (NA03NOS4190104 Task 95.02 as well as three follow-on efforts to prioritize those resources, leading up to the APCA (NA07NOS4190178 Task 93.04; NA07NOS4190178 Task 96.01; and NA08NOS4190466 Task 11.03).

VIMS - Aquatic Priority Conservation Areas (APCA)

The Aquatic Priority Conservation Areas (APCA) assessment developed by VIMS was accomplished in two steps. First, an Aquatic Cumulative Resource Assessment (ACRA) was performed to determine resource richness. The ACRA was developed using 17 different layers from various agencies. These included several already discussed above (see Table 2 below), as well as nine unique datasets found only in the estuarine portion of the coastal zone.

Table 2. Data layers and sources used to develop the APCA

Dataset	Originator
Colonial Waterbird Database	Center for Conservation Biology, William and Mary
Audubon Important Bird Areas	VA Department of Game and Inland Fisheries
Shellfish Suitability	VIMS CCRM
Reef Restoration Sites	Virginia Marine Resources Commission (VMRC)/VIMS CCRM
Oyster Reefs	VMRC/VIMS Eastern Shore Lab/ CCRM
Artificial Fishing Reef	VMRC
Wetlands (2009)	National Wetlands Inventory, US Fish and Wildlife
Sand/Mud Flats (2009)	National Wetlands Inventory, US Fish and Wildlife
Seed Areas	VMRC/VIMS CCRM
Aquaculture Sites	VMRC/VIMS CCRM
Turtle Nest	NOAA Environmental Sensitivity Index Atlas
SAV (1999 – 2008)	VIMS Submerged Aquatic Vegetation Program
Aquatic Confirmed Habitat	VA Department of Game and Inland Fisheries
Aquatic Resource Integrity Layer	Center for Environmental Studies/VCU
Stream Conservation Areas	VA Department of Conservation and Recreation
Threatened & Endangered Waters	VA Department of Game and Inland Fisheries
Regulated Areas	VMRC/VIMS CCRM

Corresponding shapefiles associated with each data layer were converted to raster with a cell size of 30m. Most data sets contained large areas of no data values. To standardize the extent of each layer the "no data" values were set to "0," and each raster was merged with the study area boundary specifying the resulting raster would retain the maximum cell value on each overlapping cell.

Since this was a study directed at identifying resource rich areas, datasets which included density values, numerical counts, or valuations were reviewed and selective attributes were used in the ACRA. The outcome of this process eliminated resource poor areas defined by the independent datasets. Therefore low density areas or regions void of a specific resource were eliminated from the analysis.

The second phase of the project ranked the various resources for their ecological value. This ranking, or valuation analysis, coded each data raster with a value based on best professional judgment and scientific knowledge. The classes assigned to the APCA and their corresponding values are: exceptional habitat value =3; very high habitat value=2; good habitat value=1. The protocols established for the first part of the analysis (ACRA) already removed those areas of lower ecological value. Table 3 summarizes the rankings for all the resources considered.

Table 3. Summary of ecological value scores for APCA input datasets:

LAYER	SCORE
1) ColonialWaterbirdDatabase	3
2) AudubonImportantBirdAreas	2
3) ShellfishSuitability	2
4) ReefRestorationSites	3
5) OysterReefs	3
6) ArtificialFishingReef	1
7) Wetlands(2009NWI)	3
8) Sand/MudFlats(from2009NWI)	2
9) SeedAreas	1
10) Aquaculturesites	2
11) TurtleNest	3
12) SAV(1999–2008)	3
13) AquaticConfirmedHabitat	3
14) VCUAquaticResourceIntegrity	3
15) StreamConservationAreas	2
16) Threatened&EndangeredWaters	3
17) RegulatedAreas	1

Using the ArcMap® tool set “Mosaic to New Raster Tool (Mosaic Method: Maximum),” rasters were superimposed and combined by cell (30m cell size). Using this technique, the output raster retains the maximum cell value on each overlapping cell. Therefore a cell with only one resource that has a score value of 3 is not outweighed by a cell with 4 resources with values of 1 each. Finally, this raster set was divided into 3 categories (excluding 0) to reflect the proposed classification.

Integration of Estuarine Component into Original PCA

To integrate the APCA into the original PCA the above classification was re-viewed and re-assessed to comply with the 5-level priority classification used in Priority Conservation Areas model. Nine unique aquatic layers were introduced through the VIMS assessment not previously considered in the state’s PCA model. These nine layers were re-classified and integrated into the new VEVA model as summarized in Table 4 and mapped in Figure 5.

Table 4. Subset of 9 coastal and estuarine resources selected for inclusion in the Coastal VEVA.

Data sets to be integrated	SCORES Original/Integrated
3) Shellfish Suitability	2/4
4) Reef Restoration Sites	3/5
5) Oyster Reefs	3/5
6) Artificial Fishing Reef	1/3
9) Seed Areas	1/3
10) Aquaculture sites	2/4
11) Turtle Nest	3/5
12) SAV (1999 – 2008)	3/5
17) Regulated Areas	1/3

Since the VIMS assessment eliminates regions which are “resource poor” the lower end of the DGIF classification is not represented. At this time, no attempt will be made to re-introduce these areas into the APCA as sites for future conservation.

For the final integration, these 9 rasters were resampled (100m cell size), and combined using the ArcMap® tool set “Mosaic to New Raster Tool” (Mosaic Method: Maximum).

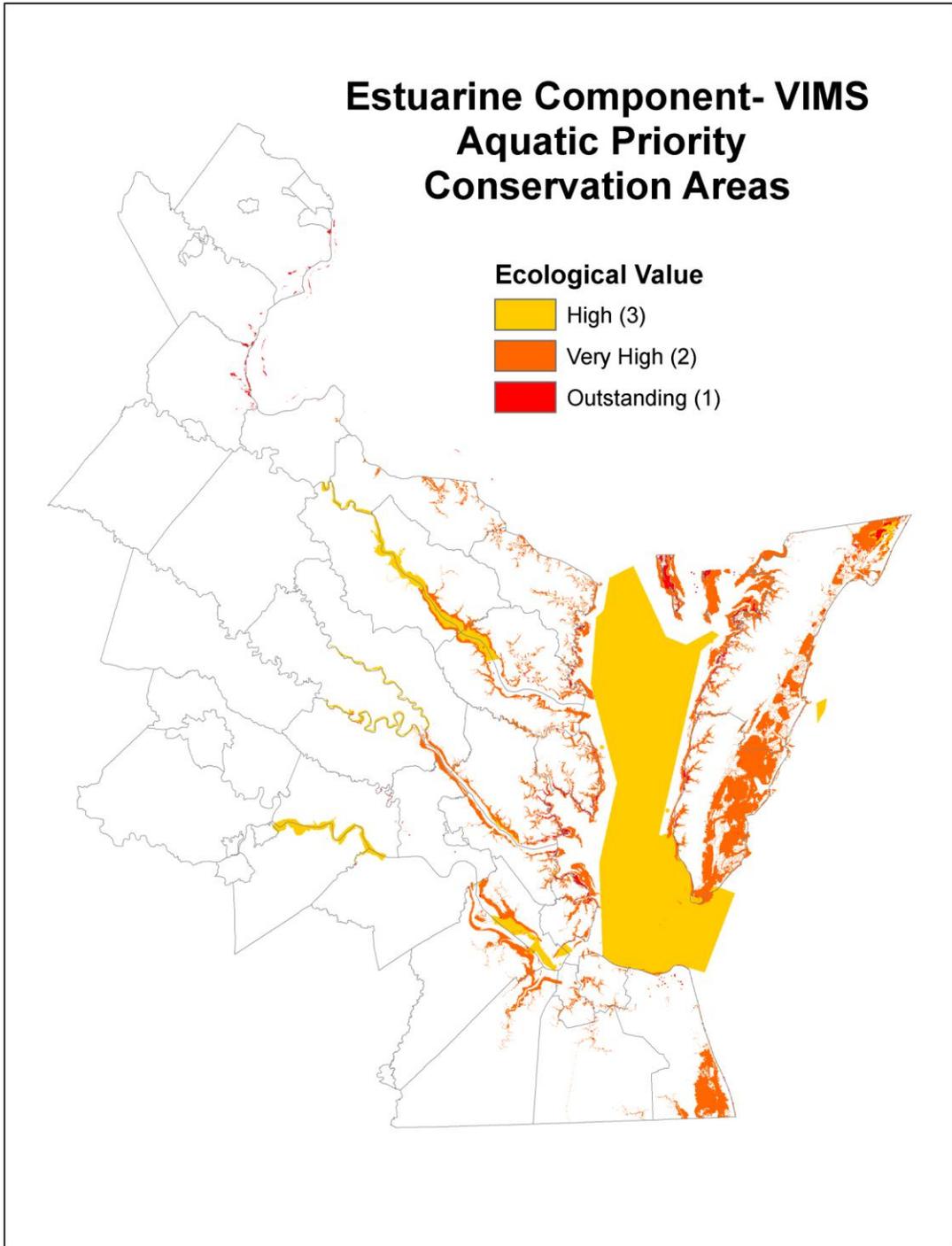


Figure 5. Estuarine Component. Relative to the VEVA Aquatic Component, this component includes waters that are, or are associated with, estuarine and/or high salinity systems. The estuarine component was developed from a re-analysis of VIMS' Aquatic Priority Conservation Areas. This analysis focused only on estuarine resources of at least a "high" ranking of ecological value, and sought to minimize overlap with other VEVA input datasets. Areas included in the estuarine component are ranked 3-High to 5-Outstanding in Ecological Value.

Combining Input Data Layers to Create the Coastal Virginia Ecological Value Assessment (VEVA)

VEVA Data Layer

All data were resampled to 100 meter cell size, where 1 cell represents a 100 meter by 100 meter area on the ground. The DGIF PWDCA layer, DNH natural land network and conservation sites, and VCU-CES aquatic resource integrity layer were combined using cell statistics, where the maximum value cell is output to a new data layer. A majority filter (majority, 4 neighbors) was run on the new PCA data layer to smooth the data and remove noise in the dataset. See Figure 6 for a finalized Coastal VEVA map (project deliverable #1).

Adaptation of Coastal VEVA into CELCP Land Acquisition Priorities Map

Administered by NOAA's Office of Coastal Resource Management, the Coastal and Estuarine Land Conservation Program (CELCP) provides funding for the acquisition, conservation and management of coastal and estuarine lands with significant ecological value,. A separate Coastal VEVA map was generated to be a tool for the CELCP to strategically identify the most ecologically significant resource areas in coastal Virginia. Figure 7 displays the CELCP Land Acquisition Priorities Map (project deliverable #2),

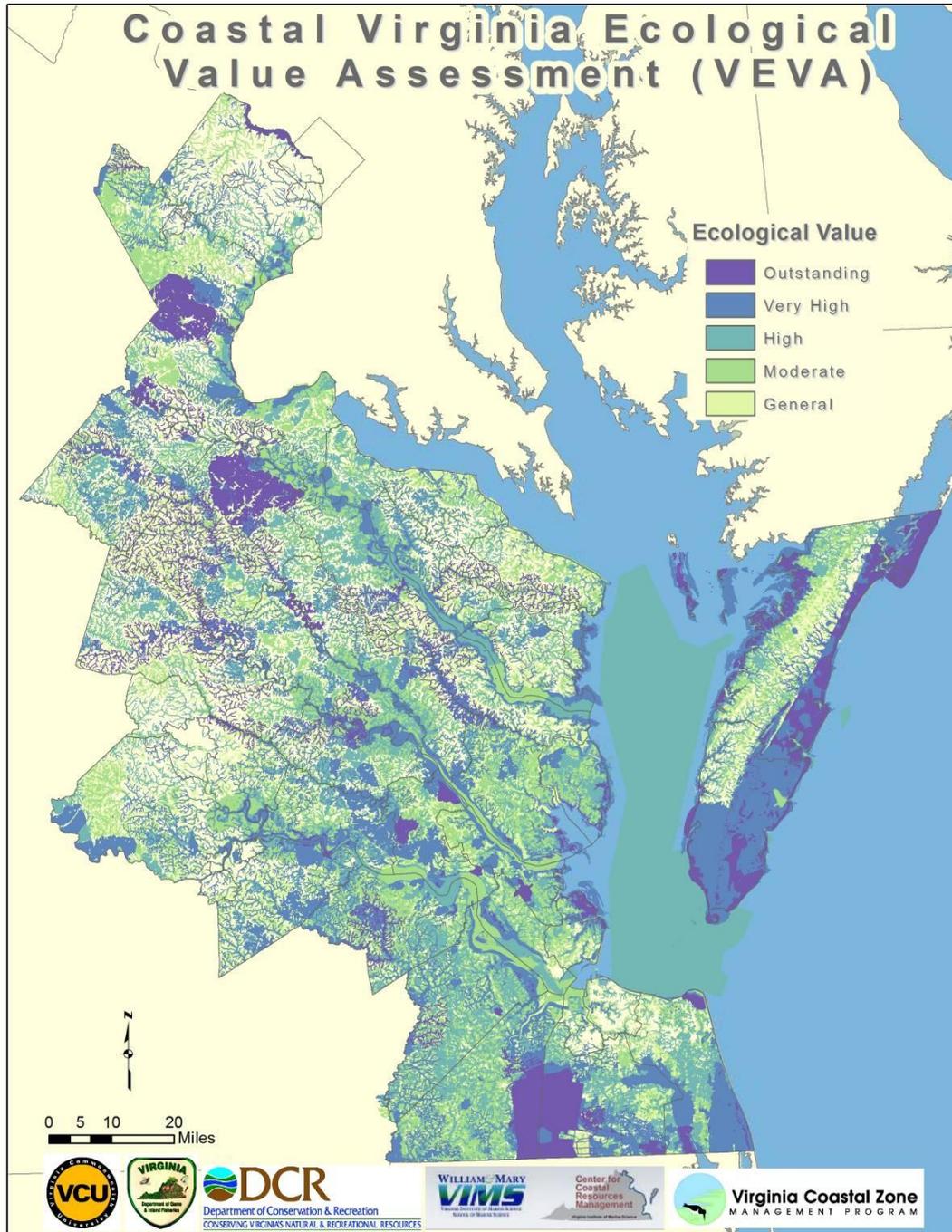


Figure 6. Coastal Virginia Ecological Value Assessment. This map (project deliverable #1) was developed from the integration of terrestrial (datasets from DGIF and DCR), aquatic (datasets from VCU), and estuarine components (VIMS dataset). In all cases, input datasets entered the VEVA analysis with pre-existing weights applied to lands and/or waters by the partner that developed the data input. In cases of overlap, the highest value given to any particular land/water was retained for the final map. Thus, all lands and waters in the VEVA display their highest ranking as per input datasets and partner expertise. All lands and waters are ranked from an Ecological Value of 1 – General to 5 – Outstanding.

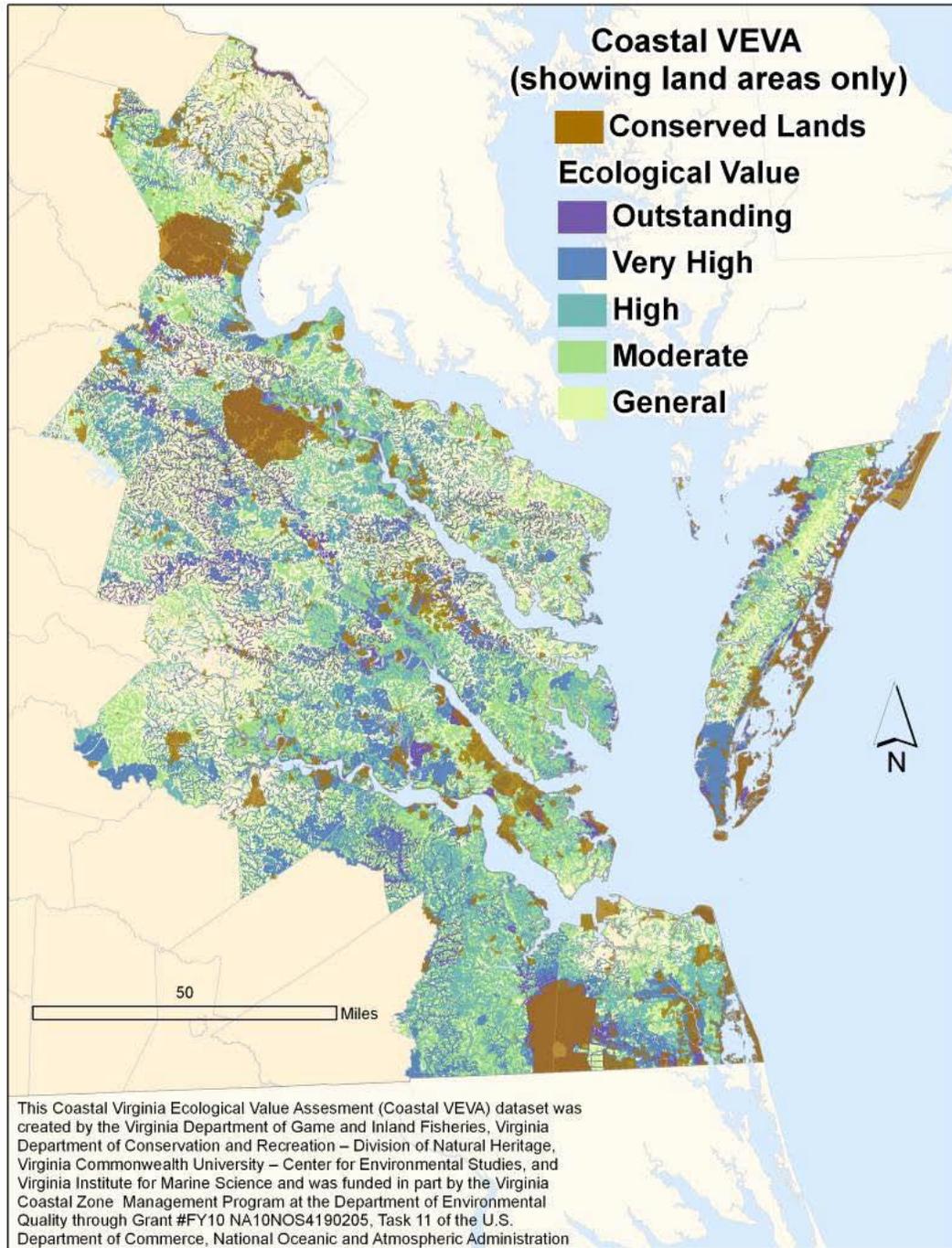


Figure 7. NOAA CELCP Land Acquisition Priorities Map (with conserved lands). The Coastal VEVA identifies the ecological value (i.e. Green and Blue Infrastructure) of Virginia’s terrestrial and aquatic areas to guide conservation planning. As such, the VEVA was used to derive a separate CELCP Land Conservation Priorities Map (project deliverable #2) which highlights unconserved land area to further refine acquisition prioritization. CELCP conservation opportunities lands are ranked from 1- General Opportunity to 5- Outstanding Opportunity.

VEVA Input Layer Attribute Table

The VEVA data layer is attributed with an ID field, a Rank field and a TableID field. The end user is not readily able to see which input layers are represented by the VEVA polygon entity. A table was generated by unioning all the input data layers in GIS then attributing the table to show for each VEVA polygon, what input layer is present at that particular polygon. The table generated is called VEVA_InputLayer_Presence and is available in DBF format (dbase IV), xls format (97 Excel) and xlsx format (2007 Excel). The table contains the following fields:

- TableID: Unique ID used to join or relate back to the VEVA.shp attribute table (a TableID field is present in the VEVA.shp)
- AQUATIC: A field attributed with a Y or NA. A Y indicates an entity from VCU-CES's Aquatic Resource Integrity layer is present within the VEVA polygon. An NA indicates that at the time of model development, no aquatic elements had been identified at that particular location. An NA does not necessarily mean there are no important aquatic elements. An NA means the area may not have an aquatic element if a survey has been conducted in the area, or, that the area may not have been surveyed for important aquatic elements.
- APCA: A field attributed with a Y or NA. A Y indicates an entity from VIMS' CRA layer is present within the VEVA polygon. An NA indicates that at the time of model development, no CRA elements had been identified at that particular location. An NA does not necessarily mean there are no important CRA elements. An NA means the area may not have a CRA element if a survey has been conducted in the area, or, that the area may not have been surveyed for elements.
- CSL: A field attributed with a Y or NA. A Y indicates an entity from DCR-Natural Heritage's CS Layer is present within the VEVA polygon. An NA indicates that at the time of model development, no conservation sites had been delineated at that particular location. An NA does not necessarily mean there are no important conservation sites, or rare species elements upon which conservation sites are built. An NA means the area may not have an element if a survey has been conducted in the area, or, that the area may not have been surveyed for Natural Heritage rare species and community elements.
- NLN: A field attributed with a Y or NA. A Y indicates an entity from DCR-Natural Heritage's NLN layer is present within the VEVA polygon. An NA indicates that at the time of model development, no NLN cores and corridors had been identified at that particular location. An NA does not necessarily mean there are no NLN components.
- PWDCA: A field attributed with a Y or NA. A Y indicates an entity from the PWDCA layer is present within the VEVA polygon. An NA indicates that at the time of model development, no elements had been identified at that particular location. An NA does not necessarily mean there are no elements. An NA means the area may not have an element if a survey has been conducted in the area, or, that the area may not have been surveyed for important elements.

To work with the table and the VEVA data layer, join the table to the VEVA data layer using the TableID field.

Outreach

The final component of the Coastal VEVA project (project deliverable #3) was the development and delivery of outreach materials aimed at educating local planners and Boards of Supervisors on the update of the original PCA (NOAA Grant # NA 08NOS4190466; FY08; Task#11.02) to the more comprehensive and updated Coastal VEVA (NOAA grant FY10 NA10NOS4192025, Task 11). The first step of the Outreach task took place as the Coastal VEVA analysis and mapping were still underway. This consisted of a survey of local planners throughout the Coastal Zone, to gauge the awareness and use of the PCA and other state conservation and land use planning tools and datasets. Results from this survey would help direct the most effective communication of the distinctions between the VEVA and PCA, so that outreach efforts would effectively promote and support local use of the Coastal VEVA.

Survey results were summarized and analyzed to focus outreach activities and materials development on the most relevant current interests and needs of local governments and planning staff. To address issues raised in survey responses, outreach focus was placed on relaying an understanding of the meaning of Coastal VEVA data inputs; the importance of these inputs to local planning; and how the VEVA outputs can be used to guide local land use decisions and land conservation. Survey questions and results are summarized in Appendix A.

Educational materials are described below, followed by a summary of meetings, conferences, and workshops at which Coastal VEVA has been presented. Corresponding materials for each outreach event are cited and included in Appendices, as well.

Educational Materials

Coastal VEVA Maps

The final Coastal VEVA map (see Figure 6, page 21) is a key element used in outreach efforts, including presentations, posters, handouts, etc. The consistent use of this standardized map gives Coastal VEVA a distinctive, easily recognizable identity among current and potential users; benefits from straightforward symbology and descriptors of ecological values (i.e. General, Moderate, etc.); and logos to represent partner involvement and data inputs.

CELCP Map

The CELCP map refines the Coastal VEVA output map by focusing on the prioritized ecological values of *lands* that may be targeted for conservation and management. This map uses symbology and format consistent with the Coastal VEVA. Descriptors of lands (e.g. General, Moderate, etc.) can be interpreted as rankings of opportunity, instead of overall ecological value. Moreover, the CELCP map includes succinct details on data sources, as this map is likely to be used outside the context of the Coastal VEVA project, and along other land conservation prioritization tools.

Handout

A handout consisting of the map, background information, and references of input data providers and Coastal VEVA partners was also developed. This handout, or “leave-behind,” serves as a concise reference to distribute at workshops and meetings (see Appendix B).

Data Availability

Readily available data is an integral piece of outreach; Coastal VEVA data must be accessible for users to easily obtain and integrate into their own mapping analysis and decision-making processes. Coastal VEVA is available for public download and also for general viewing on the following websites:

Download: DGIF GIS Data Website (<http://www.dgif.virginia.gov/gis/gis-data.asp>)

Viewing:

-DEQ Coastal GEMS (discussed in more detail in example below)(<http://www.deq.virginia.gov/Programs/CoastalZoneManagement/CoastalGEMSGeospatialData.aspx>)

A factsheet was also developed for use on Coastal GEMS

LandScope Virginia Map Viewer (<http://www.landscape.org/map/?maxLong=-74.0842&title=Coastal%20Virginia%20Ecological%20Values%20Assessment&transparency=20&baseMap=ST%20BSH&minLat=36.6966&themes=cus&maxLat=38.9483&customLayerGroups=390&minLong=-79.2588&dataLayers=>)

-LandScope Chesapeake Map Viewer
(<http://www.landscape.org/map/?baseMap=HYB&transparency=20&dataLayers=808&maxLat=44%2E0519&title=Chesapeake%20Bay%20Watershed&minLat=35%2E2947&maxLong=-71%2E6064&themes=cus&customLayerGroups=147%2C808&minLong=-83%2E977>)

Succinct Factsheets and User Friendly Metadata were also developed for Coastal GEMS and LandScope, respectively. These factsheets serve as the initial source of background information for many users who are introduced to the Coastal VEVA via these mapping websites. The Coastal GEMS factsheet can be viewed on Coastal GEMS (<http://128.172.160.131/gems2/>) and in Appendix C. The LandScope User Friendly Metadata can be found in Appendix D, and at http://www.landscape.org/virginia/map_layers/priorities/coastal_veva/24922/.

Use Case Examples for Integrating VEVA into Local Land Use Planning

Outreach efforts were conducted not only to inform and promote the use of the Coastal VEVA but also to support its use. In addition to the educational materials developed and presentations given, some use case examples were created to help users envision how the Coastal VEVA can fit into existing land use decisions and conservation planning efforts. The following summarizes Use Constraints and provides examples of how Coastal VEVA can be applied to map-based local land use and conservation planning situations.

Use Constraints

There are certain inherent use constraints with this geospatial model. The VEVA data layer was developed with a specific objective to guide conservation planning at the landscape level, as well as at the local level. To achieve a tool that is this versatile, existing statewide datasets- built from a combination of state level and locally-pertinent data - had to be used. It is difficult to handle case by case situations (i.e. locally specific data) when working with statewide datasets simply because the integration of one specific case or rule for one specific area may skew the model for the remainder of the study area. For example, optimally, it would be beneficial to remove all new development from the model; however, data on new development does not exist in GIS format for the entire state. To use data representative of new development in select areas would skew the final model results, because newly developed areas that have not been digitized will not get the same treatment in the model as developed areas that have been digitized. Thus the final model would be skewed and the output VEVA model would display different levels of accuracy in mapping development across the Coastal Zone. Altogether, if data were not representative of the entire study and if datasets were not complete, they were not included in the model.

It is important to remember this dataset is intended to guide conservation planning and efforts. This dataset is not intended to replace on the ground surveys or consultations with biologists as appropriate.

This dataset serves as a complement to existing local data that may not already be a part of the VEVA data layer.

The following section provides some basic tips for use of the VEVA at local scales and with additional local data.

Scale

The VEVA data layer was derived for the Coastal Zone of Virginia. Input datasets include locally developed, finer resolution data that were resampled to a 100 meter cell size. This resample has made the product a coarser, smaller scale analysis. With minimal work, the VEVA layer can be refined to meet local planning needs.

Land Use Layer Development Date

Another constraint to the VEVA data layer is the date of the land use data used for some component development. In general, land use data used to develop the component inputs of the VEVA were either the National Landcover Dataset (circa 2000), or the NOAA Coastal Change Analysis Program's (CCAP) update to the NLCD, (circa 2005). Use of local land use data more recent than this is greatly encouraged, wherever possible, when using the VEVA for local planning efforts. Such information can be readily incorporated into the VEVA data layer.

Local Data

The relatively coarse 100-meter resolution of the output VEVA layer was necessary for integrating several state level datasets. Thus, the incorporation of specific local data will instantly reveal that local information is more informative at a finer scale. Unfortunately, since each locality identifies unique priorities in their specific area(s), there is no standard that can be applied at a statewide level to readily identify, process and incorporate the many, varied local datasets into a state level product like the VEVA. Typically, local data may exist for specific areas, but may not exist at the statewide level. Nonetheless, local data can be incorporated into the VEVA layer and, VEVA can be used as an accompaniment to local planning processes.

Use Case Examples for Integrating Coastal VEVA into Local Land Use Planning

Working with the VEVA Data Available via the Web

To aid in the planning process, the VEVA data layer may be used as a guide to identify where important ecological areas exist. By itself, the VEVA data layer represents a valid data layer to aid local, comprehensive, state-level and conservation planning. If one wishes to integrate additional data layers into their use of the VEVA, the user should be aware of the input datasets used to develop VEVA. Some local datasets might be redundant with some of the finer level data that went into the separate VEVA components. For example, if a local government planner typically uses Anadromous Fish Use Area data from the DGIF for their planning, using the VEVA as well would "doublecount" these data, because they were a component of the PWDCA (DGIF's contribution to the VEVA). Thus one may have to cull some data from a local analysis to avoid inappropriate redundancy of inputs.

One way of screening for this doublecounting potential would be to access the VEVA layer through Coastal GEMS website available at <http://www.deq.virginia.gov/coastal/coastalgems.html>.

A basemap is available in Coastal GEMS which will help the planner locate areas of interest. The VEVA and additional natural resource datasets can be viewed and queried. The end user can use Coastal GEMS to identify priority conservation areas and see how those areas relate to the current planning practice. The user can then print maps for use in presentations or reports.

Working with the VEVA data in the ArcGIS Environment

The methods discussed below may be applied to incorporate more recent land use and local data with VEVA using GIS methods. The ArcGIS environment is equipped with various tools that provide the end user with a vast analytical working environment. There are many ways to incorporate local data into GIS datasets and planning processes, each method unique to the specific end user.

Using VEVA to Identify Areas of Importance

As an example, with minimal effort, the end user can use the VEVA data layer to identify areas of outstanding ecological significance for a specific area by selecting a particular VEVA rank(s). The first step of the process would entail visually assessing high ranked VEVA areas in relation to the existing land use to see what type of impact existing or future land use may have on the outstanding ecological areas.

For example, in the graphic below, parcels symbolized to show zoning are displayed along with the “Outstanding” ecological rank from the VEVA layer overlaid (in purple):



The data can be used as part of the planning process to:

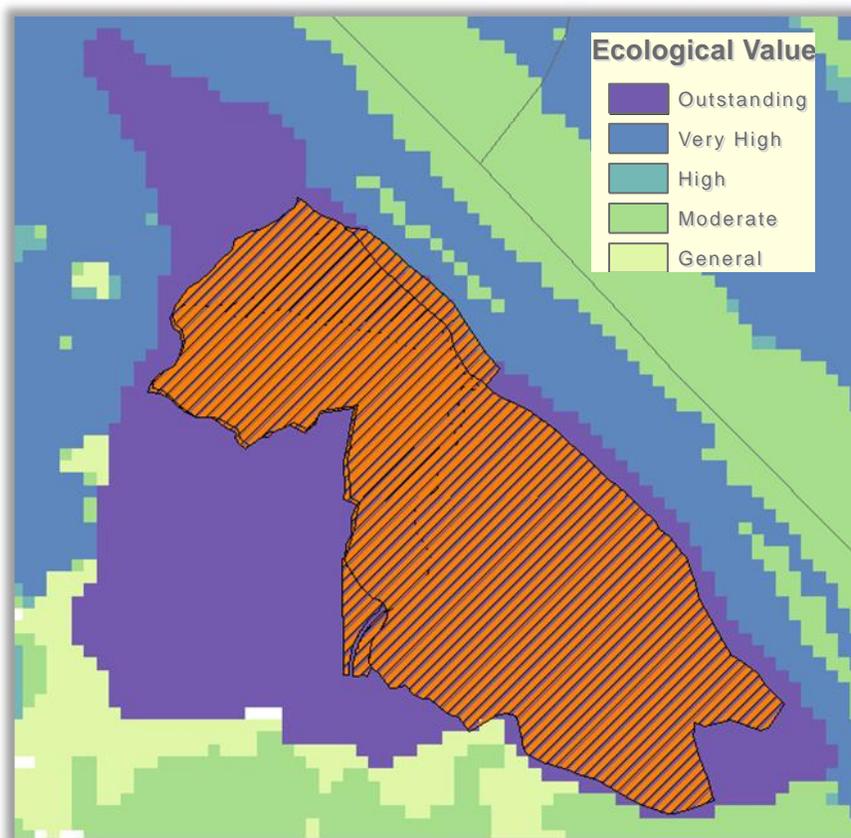
- Identify areas that could be considered for open natural space value
- Identify parcels that may be zoned for conservation
- Identify areas for potential easements
- Identify areas that would benefit most from low impact development measures
- Identify areas where additional development can be focused, so that areas that can be conserved or zoned in a compatible use to preserve ecological integrity can be zoned strategically

Integrating Local Data

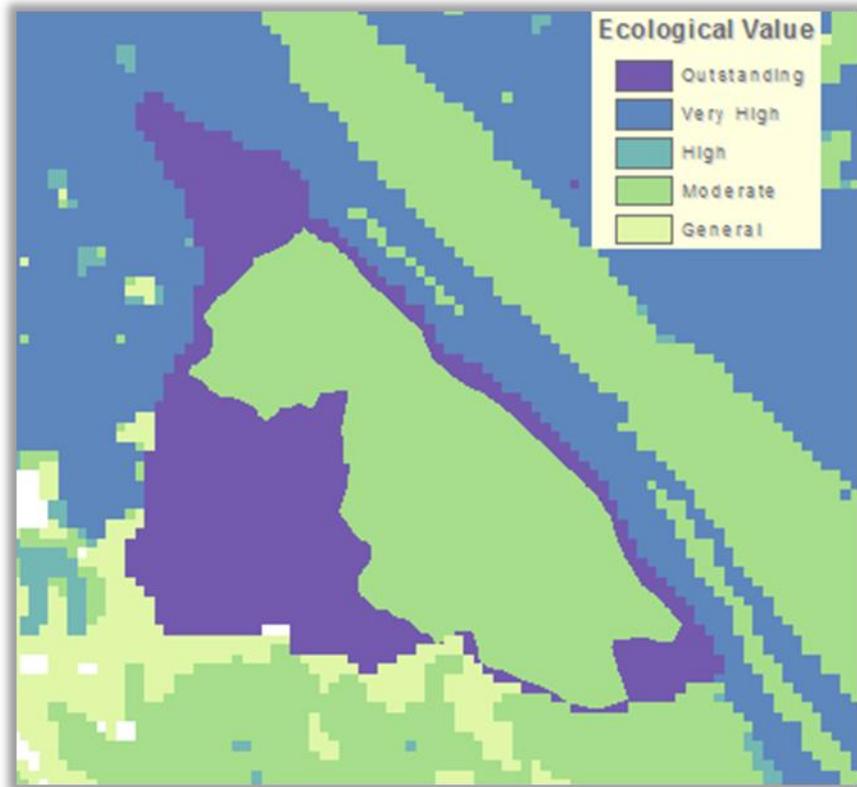
Local data not included in the VEVA data layer can be added and used to adjust the value of specific entities' interests. The Analysis Toolset in ArcGIS provides a variety of overlay tools that can be used to add data to the VEVA data layer and then use those local data to refine the rankings of lands and waters in the VEVA layer.

In the following example, the VEVA polygon is considered of Outstanding ecological value. This area may be considered outstanding based on a variety of criteria (area, contiguous forested area, wildlife habitat, important bird migratory path, etc.). The local data (orange hatching) may indicate the Outstanding area contains parcels slated for new development and thus should not be considered outstanding. Perhaps this polygon rank should be lowered to Moderate, based on the expected results of this development on the natural resource value(s) of the polygon.

The graphic below shows the VEVA data layer symbolized based on rank with the new development overlaid in orange hatching:



The orange area can be integrated into the VEVA using an overlay (dependent on the end user needs). In the following scenario, a union was used to combine the developed polygon with the VEVA polygon. Once combined, the part of the VEVA that is fragmented, and no longer considered Outstanding can be re-ranked to a Moderate rank, rather than Outstanding:



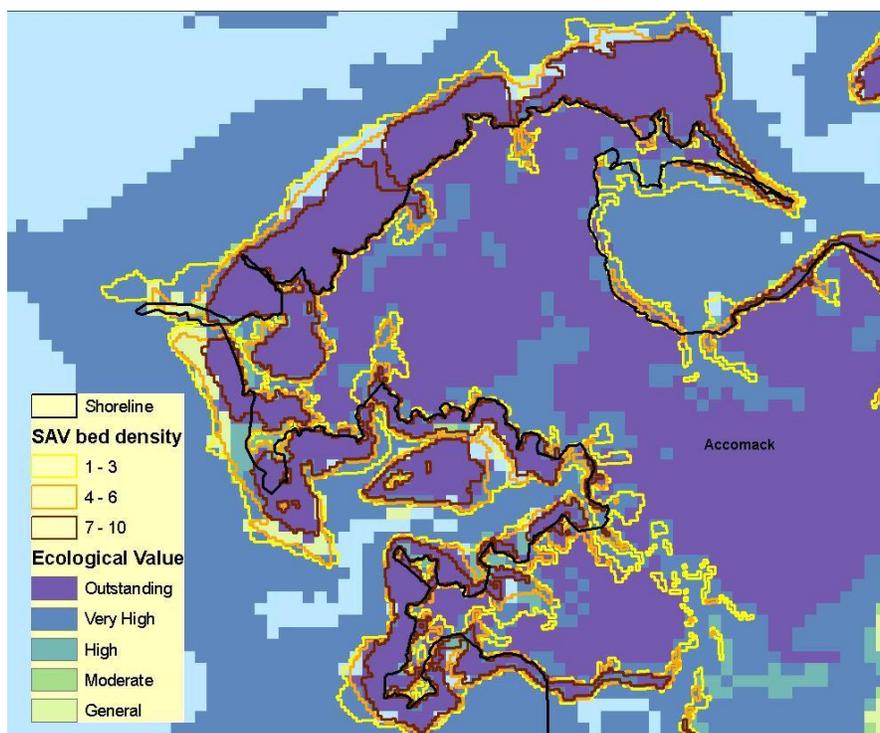
This same process could be used to increase the value of a VEVA polygon by simply integrating the data that justifies such change, and editing the rank value in ArcGIS. Data can also be removed from VEVA: local data can be overlain to identify the boundary of the pertinent area, VEVA data removed from inside that boundary, and then local data can replace these data on the map layer.

Using the VEVA Layer to Derive a Local Model

The VEVA data layer can be used as a first step in deriving local models. Individual components of the VEVA model can be obtained from the respective data developers (i.e. DCR-Natural Heritage, DGIF, VIMS or VCU-CES). Once in hand locally, these data layers can be edited to include localized data, to remove particular data, and can be ranked according to local interests. The data can then be combined and assigned weights according to local priorities to model local ecological values, just as the VEVA was developed to address priorities within the boundaries of the Coastal Zone.

Using the VEVA to Identify Opportunities for Green and Blue Infrastructure Conservation

Since the VEVA includes both green infrastructure (e.g. terrestrial biodiversity, wildlife diversity) and blue infrastructure values (e.g. Healthy Watersheds, ecologically valuable estuarine resource areas), the VEVA output map allows one to begin to visualize the benefits of comprehensive conservation planning in one place. This is evident when viewing component VEVA datasets over the summarized VEVA output map. For instance, the following figure includes the VEVA output map with a black shoreline, overlain with outlines of Submerged Aquatic Vegetation (SAV) beds (a component of the VIMS APCA (see Table 3)).



The SAV bed density areas ranks have been classified into three categories here, where the brown outline indicates those areas of highest density SAV beds. Areas of submerged aquatic vegetation are known to provide a foundation for ecological function in the Bay: SAV beds provide refuge, habitat and food for the fish and invertebrates that are critical players in the larger Bay food web. Since the presence and health of SAV beds and their values as habitat are influenced by water quality, land uses and land management, the VEVA map can be used to display general linkages between high value blue infrastructure resource areas and the lands just inland from them. Based on the adjacency of these high density SAV waters and the Outstanding-ranked lands just inland, one can begin to explore land use and management decisions on these lands. Conservation and/or more ecologically sound management practices on those lands could promote the expansion of those highest ranking SAV beds to surrounding areas (i.e. deeper brown areas might expand into areas currently symbolized with orange and yellow shades) thereby benefitting water quality and ecological value in those areas.

Delivery

Coastal VEVA was presented at the following events in 2011 and 2012.

Coastal Planning District Commissions Meeting (March 28, 2011)

As the Coastal VEVA analysis was being finalized, staff from the Virginia Department of Conservation and Recreation – Division of Natural Heritage, spoke to planners from Planning Districts throughout the Coastal Zone, at the Richmond Regional Planning District Commission offices, in Richmond, Virginia. This talk provided an overview of the Coastal VEVA and focused on how it would provide a more comprehensive and up-to-date replacement for the Priority Conservation Areas product. This, the first of presentations on the VEVA, was short but valuable as it garnered the first reactions of local partners and users of the Coastal VEVA. Slides developed for this presentation were further developed and became part of a much larger presentation to be used in other venues (Appendix E).

Environment Virginia Symposium (April 6, 2011)

"The Coastal Virginia Ecological Value Assessment (VEVA)" was presented by DCR-Natural Heritage staff at the 2011 Environment Virginia Symposium to a mixed audience of planners, environmental scientists and state and federal natural resource representatives. Slides used in this presentation are included in the comprehensive presentation in Appendix E.

York River Research Symposium (April 20, 2011)

An oral presentation entitled "Coastal Virginia Ecological Value Assessment (VEVA): a conservation planning tool for Virginia's coastal zone" and poster were presented to a varied audience of scientists, planners, resource and land managers and outreach specialists. This workshop was hosted by the Chesapeake Bay National Estuarine Research Reserve in Virginia at Waterman's Hall on the VIMS campus in Gloucester, Virginia. Marcia Berman, the Program Manager for the Comprehensive Coastal Inventory at the Virginia Institute of Marine Sciences, was a key partner in the Coastal VEVA project, and made this presentation.. Appendix F provides relevant materials from this symposium.

Virginia GIS Conference (September 19, 2011)

An oral presentation entitled "Coastal Virginia Ecological Value Assessment (VEVA): A conservation planning tool for Virginia's Coastal Zone" was presented by DCR-Natural Heritage staff, at the 2011 Virginia GIS Conference, at the Cultural Arts Center, Glen Allen, Virginia. The audience included GIS professionals from local and state governments, as well as private organizations and consulting companies from throughout the Virginia. Appendix G includes the presentation abstract and slides presented.

Discussion with National Park Service (February 14, 2012)

The Virginia DCR-Natural Heritage Information Manager and Virginia CZMP Director met with John Davy, Outdoor Recreation Planner for the National Park Service, Chesapeake Bay Program and Chair of Public Access Planning Action Team. Discussions focused on how the Coastal VEVA can be used as guidance in land conservation decisions pertaining to national trails planning, and specifically, the John Smith Chesapeake National Historic Trail. Appendix H includes a map produced for the NPS-Chesapeake Bay Program, as a follow-up to this discussion.

Blue - Green Infrastructure Workshops (February 2, 2012 and September 27, 2012)

Virginia DCR-Natural Heritage staff presented "The Coastal Virginia Ecological Value Assessment" at a workshop for "Introducing Green Infrastructure for Coastal Resilience". This workshop was hosted by the Chesapeake Bay Estuarine Research Reserve, on the VIMS campus in Gloucester, Virginia. This presentation and others shared the VEVA and other Green and Blue Infrastructure planning tools to state and local government agency staff. The agenda, attendees list and VEVA presentation slides are provided in Appendix I.

This February, 2012, workshop provided high level overview of the Coastal VEVA, and was very well received. It was decided then, that a follow-up workshop would be valuable 1) to concentrate on an audience of planners and local government staff from the Coastal Zone, 2) to provide a more in-depth presentation of the VEVA and its component datasets, and 3) to allow all partners in the Coastal VEVA project to answer questions via an interactive panel discussion.

This follow-up workshop, "Blue and Green Infrastructure in Coastal Virginia: tools and implementation" was also hosted by CBNERRS at VIMS in Gloucester, on September 27, 2012. Representatives from all Coastal VEVA partner agencies participated by presentations and on the panel. Appendix J provides the agenda, an attendees list, and the presentations presented at this follow-up workshop.

7th Annual Chesapeake Watershed Forum

On September 29th, 2012, DCR staff conducted a 90-minute workshop at the 7th Annual Chesapeake Watershed Forum, at the National Conservation Training Center in Shepherdstown, West Virginia. This workshop used the Coastal VEVA dataset and map layer as an exemplary regional conservation planning tool, in a hands-on workshop to familiarize participants with LandScope Chesapeake, an interactive website developed to guide conservation efforts throughout the Chesapeake Bay watershed. Participants included staff and volunteers from state and federal natural resource agencies, local governments and conservation non-profits, from Virginia and Bay states.

References

Benedict M. A., W. Allen, E. McMahon. 2004. Advancing Strategic Conservation in the Commonwealth of Virginia. Using a Green Infrastructure Approach to Conserving and Managing the Commonwealth's Natural Areas, Working Landscapes, Open Space, and Other Critical Resources, The Conservation Fund, Center for Conservation and Development, Arlington.

Bulluck, J.F., J.M. Ciminelli, and J.T. Weber, 2007. Natural Landscape Assessment and Green Infrastructure – Completion and Distribution: Final Report. Natural Heritage Technical Report #07-17. Virginia Department of Conservation and Recreation, Division of Natural Heritage. Richmond, Virginia.

Appendix A. Survey Summary

Locality Survey of Conservation Planning Needs

Question 1

Please identify your locality:	
Answer Options	Response Count
	49
<i>answered question</i>	49
<i>skipped question</i>	1

Number	Response Date	Response Text	Categories
1	May 19, 2011 4:07 PM	Town of West Point	5, 10
2	May 19, 2011 12:37 PM	Prince William County, VA	3, 9
3	May 17, 2011 10:13 PM	Prince William SWCD	3, 13
4	May 17, 2011 12:14 PM	Loudoun County	3, 9
5	May 16, 2011 7:42 PM	King George County	2, 9
6	May 16, 2011 12:32 PM	Fairfax County	3, 9
7	May 13, 2011 2:22 PM	Mathews County	5, 9
8	May 13, 2011 1:24 PM	Vienna, VA	3, 10
9	May 12, 2011 7:31 PM	Fairfax and Arlington	3, 9
10	May 12, 2011 6:52 PM	City of Fredericksburg	2, 11
11	May 12, 2011 4:42 PM	Town of Port Royal	2, 10
12	May 12, 2011 4:42 PM	Northern Virginia	3, 12
13	May 12, 2011 4:10 PM	County of Stafford	2, 9
14	May 12, 2011 4:10 PM	County of Stafford	2, 9
15	May 12, 2011 1:20 PM	northern va	3, 12
16	May 12, 2011 1:19 PM	mason neck, fairfax county	3, 9
17	May 12, 2011 12:33 PM	Stafford County	2, 9
18	May 12, 2011 12:04 PM	Northumberland County	7, 9
19	May 12, 2011 11:57 AM	Fredericksburg	2, 11
20	May 12, 2011 11:31 AM	PD 16	2, 12
21	May 11, 2011 7:50 PM	King and Queen County	5, 9
22	May 11, 2011 7:48 PM	Westmoreland Co.	7, 9
23	May 11, 2011 6:22 PM	Northumberland County	7, 9
24	May 11, 2011 6:13 PM	Gloucester County	5, 9
25	May 11, 2011 5:16 PM	Gloucester	5, 9
26	May 11, 2011 5:03 PM	Middle Peninsula	5, 12
27	May 11, 2011 4:25 PM	King William County	5, 9
28	Apr 18, 2011 6:08 PM	City of Hampton	4, 11
29	Apr 13, 2011 7:22 PM	Northampton County	1, 9
30	Apr 13, 2011 7:05 PM	Northern Virginia	3, 12
31	Apr 12, 2011 7:44 PM	Gloucester County	5, 9
32	Apr 12, 2011 11:39 AM	City of Chesapeake	4, 11
33	Apr 11, 2011 9:02 PM	Portsmouth VA	4, 11

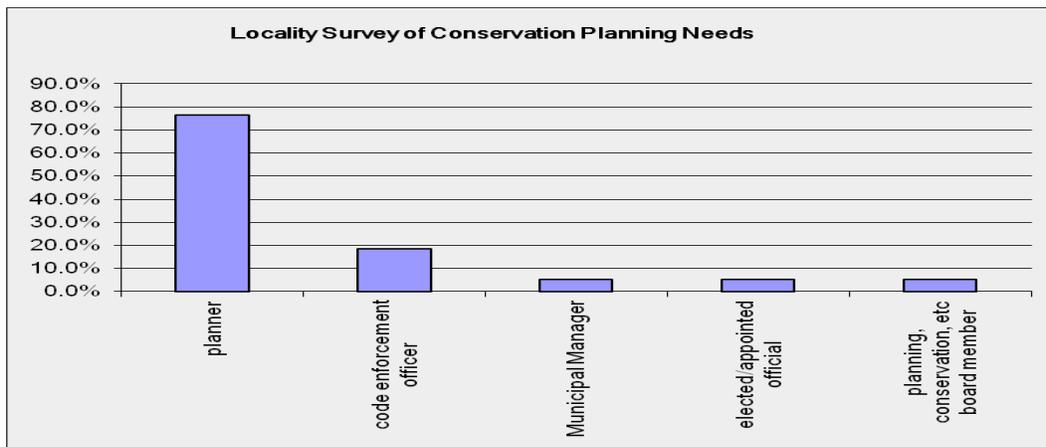
34	Apr 11, 2011 8:15 PM	Gloucester County	5, 9
35	Apr 11, 2011 7:46 PM	Isle of Wight County	4, 9
36	Apr 11, 2011 6:55 PM	Virginia Beach	4, 11
37	Apr 11, 2011 12:56 PM	Town of Chincoteague	1, 10
38	Mar 28, 2011 4:47 PM	Richmond County	7, 9
39	Mar 28, 2011 3:29 PM	Northern Neck of Virginia	7, 12
40	Mar 24, 2011 12:36 PM	Crater PDC	6, 12
41	Mar 23, 2011 2:57 PM	Eastern Shore of Virginia (Accomack & Northampton)	1, 12
42	Mar 22, 2011 8:17 PM	Richmond Regional PDC	8, 12
43	Mar 15, 2011 2:04 PM	Chesterfield	8, 9
44	Mar 14, 2011 2:48 PM	New Kent County	8, 9
45	Mar 14, 2011 1:18 PM	Charles City	8, 9
46	Mar 11, 2011 8:41 PM	Chesterfield County	8, 9
47	Mar 11, 2011 8:38 PM	New Kent County	8, 9
48	Mar 9, 2011 9:58 PM	Northampton County	1, 9
49	Mar 9, 2011 9:35 PM	Accomack County	1, 9

Question 2

Please identify your role (choose all that apply):

Answer Options	Response Percent	Response Count
planner	76.3%	29
code enforcement officer	18.4%	7
Municipal Manager	5.3%	2
elected/appointed official	5.3%	2
planning, conservation, etc board member	5.3%	2
Other (please specify)		15
<i>answered question</i>		38
<i>skipped question</i>		12

Number	Response Date	Other (please specify)	Categories
1	May 19, 2011 4:07 PM	GIS	1
2	May 17, 2011 12:14 PM	Water resources	2
3	May 16, 2011 7:42 PM	GIS Coordination	1
4	May 16, 2011 12:32 PM	ecology	4
5	May 13, 2011 1:24 PM	Planning & Zoning Director	6
6	May 12, 2011 7:31 PM	Service Forester	2
7	May 12, 2011 4:42 PM	Staff member of land trust	3
8	May 12, 2011 12:33 PM	Stormwater Manager/Erosion Control	7
9	May 12, 2011 11:57 AM	university faculty, geography	4
10	May 11, 2011 6:13 PM	GIS Analyst	1
11	May 11, 2011 5:16 PM	Env Programs	4
		Field Director Northern Neck Land	
12	Mar 28, 2011 3:29 PM	Conservancy	3
13	Mar 24, 2011 12:36 PM	Technology Director	1
14	Mar 23, 2011 2:57 PM	Regional Government Manager	5
15	Mar 9, 2011 9:35 PM	GIS Coordinator	1

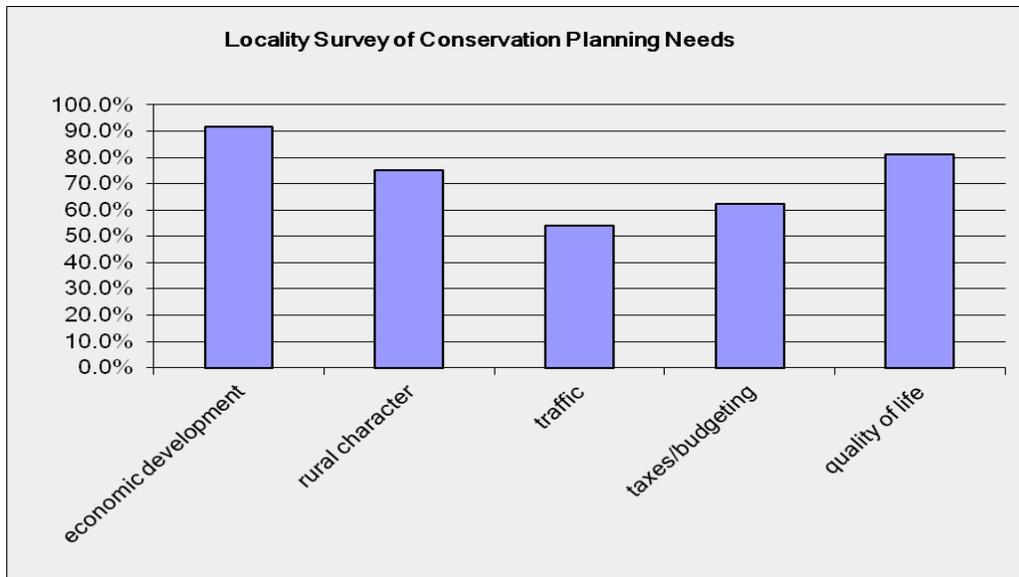


Question 3

What are the important issues to your community? (Choose as many as applicable)

Answer Options	Response Percent	Response Count
economic development	91.7%	44
rural character	75.0%	36
traffic	54.2%	26
taxes/budgeting	62.5%	30
quality of life	81.3%	39
Other (please specify)		7
<i>answered question</i>		48
<i>skipped question</i>		2

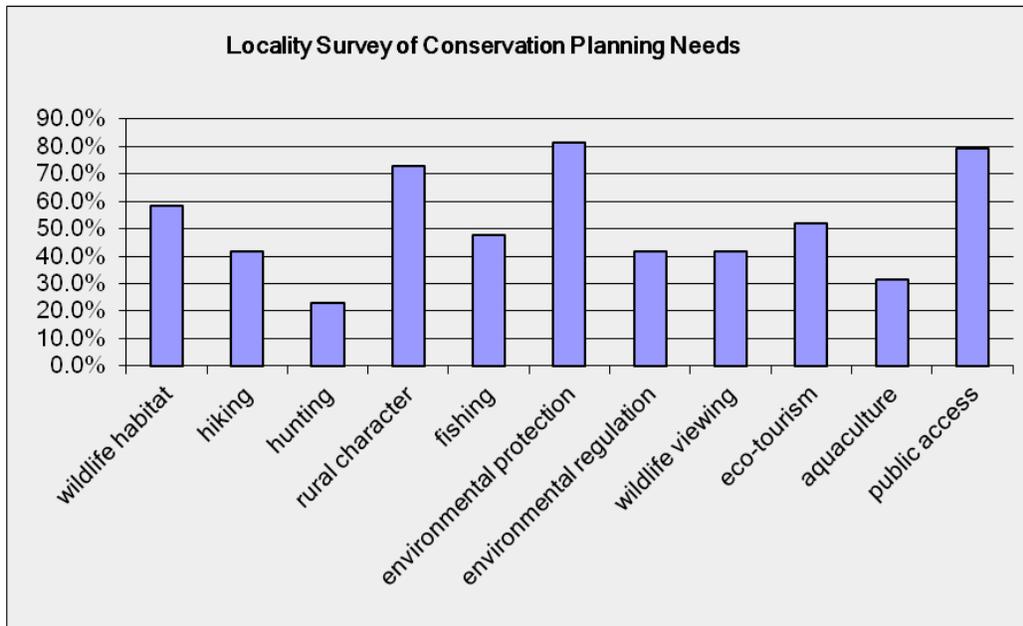
Number	Response Date	Other (please specify)
1	May 17, 2011 10:13 PM	farmer/suburbanite interface; lack of citizen understanding of environmental issues
2	May 12, 2011 7:31 PM	Open Space Preservation
3	May 12, 2011 4:42 PM	impact of nearby military training: explosions that vibrate houses
4	May 12, 2011 1:19 PM	recreation, conservation
5	May 11, 2011 4:25 PM	Broadband Internet
6	Apr 11, 2011 8:15 PM	coastal
7	Mar 28, 2011 4:47 PM	private property rights



Question 4

What are some long term goals for your community, as they relate to areas conserved or managed for natural resources? (Choose as many as applicable)

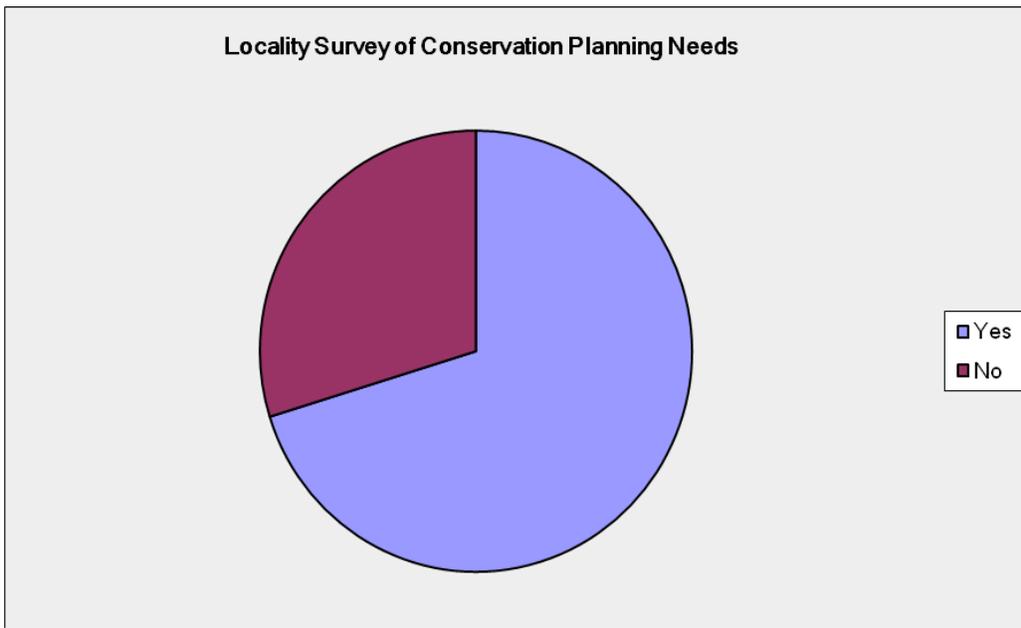
Answer Options	Response Percent	Response Count
wildlife habitat	58.3%	28
hiking	41.7%	20
hunting	22.9%	11
rural character	72.9%	35
fishing	47.9%	23
environmental protection	81.3%	39
environmental regulation	41.7%	20
wildlife viewing	41.7%	20
eco-tourism	52.1%	25
aquaculture	31.3%	15
public access	79.2%	38
<i>answered question</i>		48
<i>skipped question</i>		2



Question 5

Are you currently involved in any natural resource conservation planning efforts?

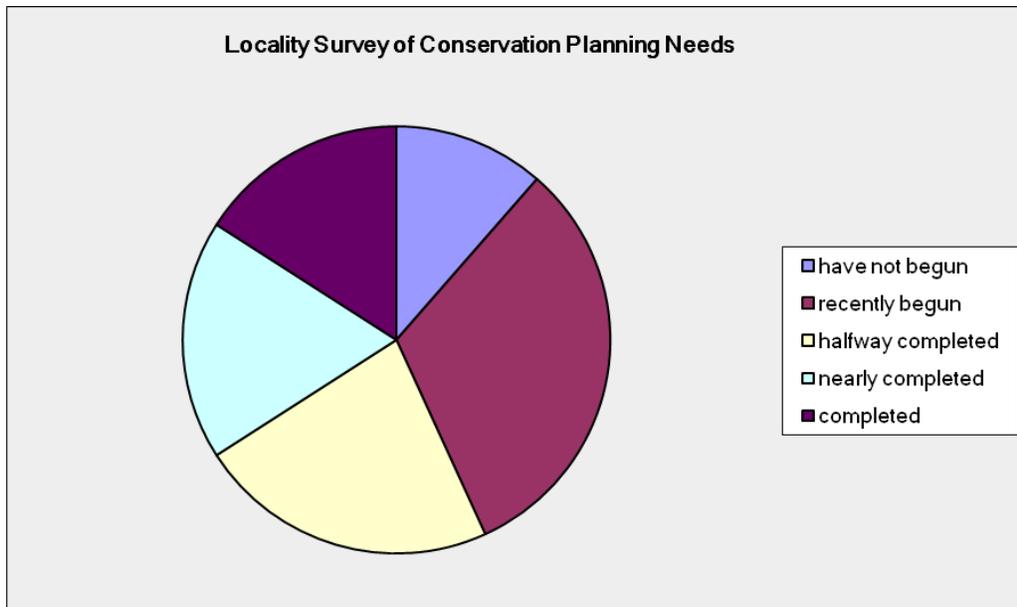
Answer Options	Response Percent	Response Count
Yes	70.2%	33
No	29.8%	14
<i>answered question</i>		47
<i>skipped question</i>		3



Question 6

At what stage is your community involved in identifying natural resources?

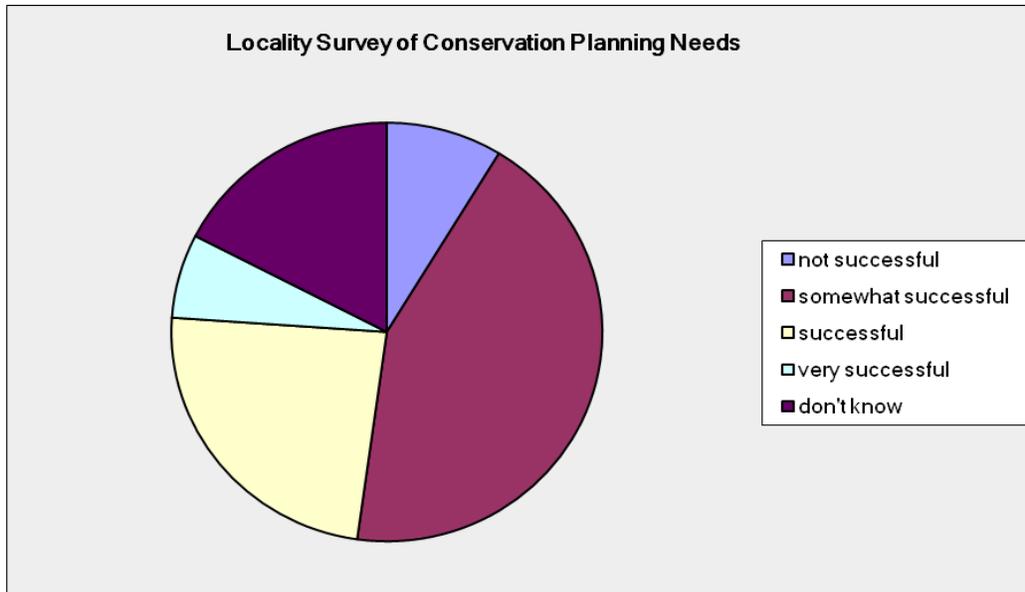
Answer Options	Response Percent	Response Count
have not begun	11.4%	5
recently begun	31.8%	14
halfway completed	22.7%	10
nearly completed	18.2%	8
completed	15.9%	7
<i>answered question</i>		44
<i>skipped question</i>		6



Question 7

How would you describe your natural resource area protection efforts?

Answer Options	Response Percent	Response Count
not successful	8.7%	4
somewhat successful	43.5%	20
successful	23.9%	11
very successful	6.5%	3
don't know	17.4%	8
<i>answered question</i>		46
<i>skipped question</i>		4

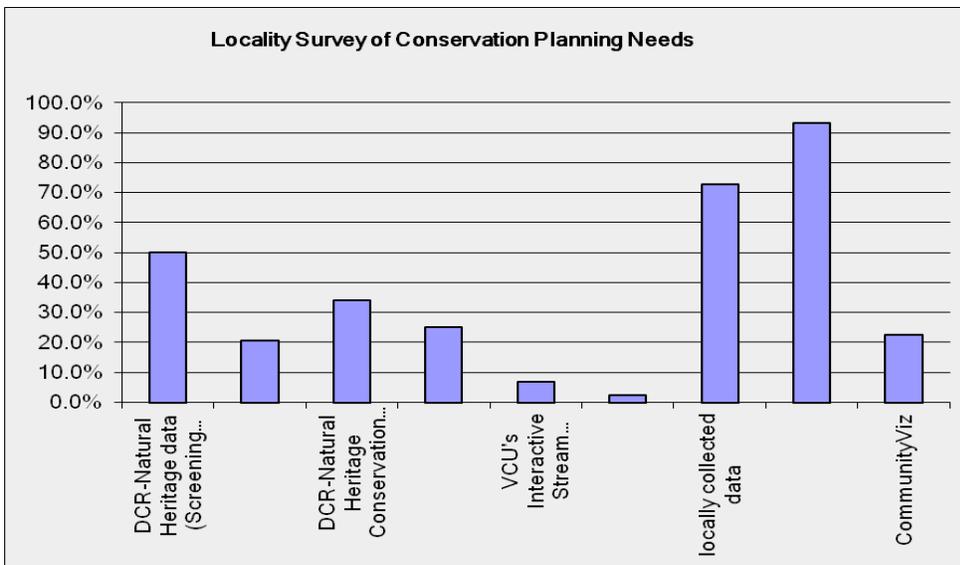


Question 8

What data or tools are you using to create your local natural resource maps? (Choose as many as applicable)

Answer Options	Response Percent	Response Count
DCR-Natural Heritage data (Screening Coverage and/or Conservation Sites datasets, Natural Heritage Data Explorer, Land Conservation Data Explorer)	50.0%	22
DGIF Priority Wildlife Diversity Conservation Areas	20.5%	9
DCR-Natural Heritage Conservation Planning Tools (VaNLA, other VCLNA models)	34.1%	15
Coastal Gems	25.0%	11
VCU's Interactive Stream Assessment Resource (INSTAR)	6.8%	3
VIMS' Aquatic Resource Integrity Layer dataset	2.3%	1
locally collected data	72.7%	32
GIS	93.2%	41
CommunityViz	22.7%	10
Other (please specify)		4
<i>answered question</i>		44
<i>skipped question</i>		6

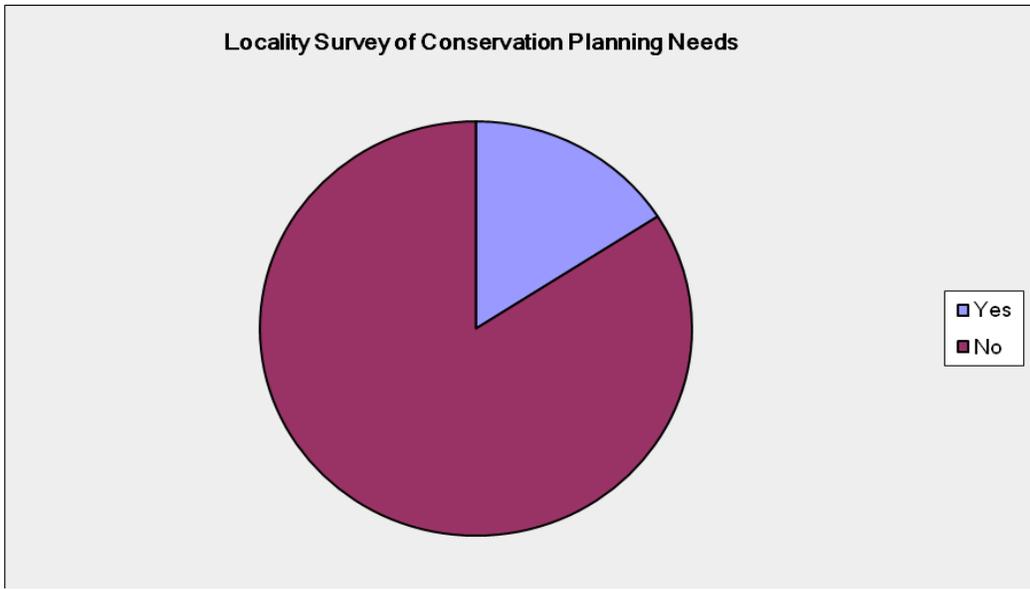
Number	Response Date	Other (please specify)
1	May 17, 2011 10:13 PM	DGIF wetlands inventory, FSA maps, PWC County Mapper, NRCS web soil survey, NRCS threatened and endangered species maps
2	May 12, 2011 12:33 PM	Unknown
3	Apr 11, 2011 7:46 PM	VA Dept. of Mines, Minerals, and Energy
4	Mar 11, 2011 8:38 PM	Green Infrastructure Mapping



Question 9

Do you use CommunityViz in your planning efforts?

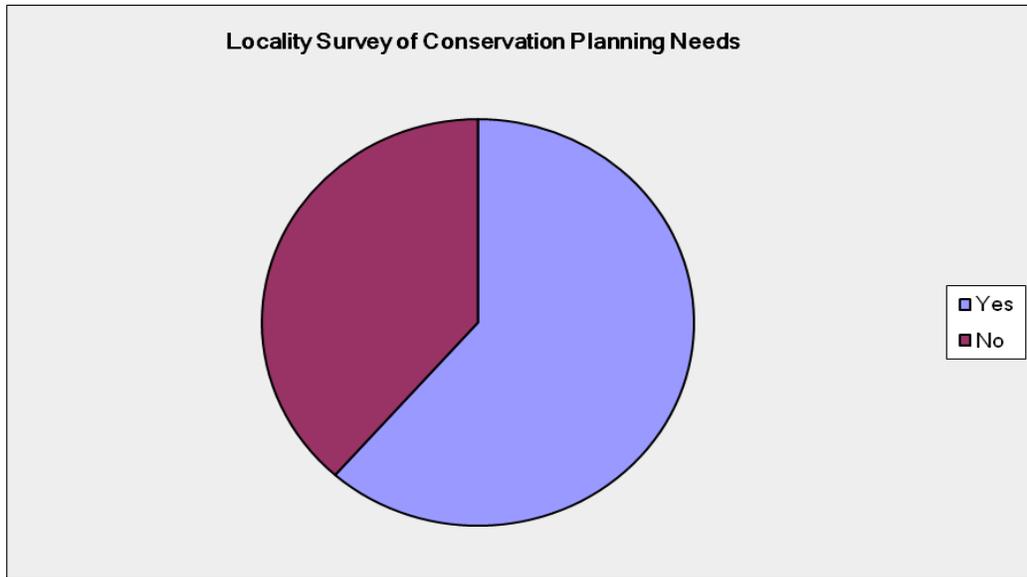
Answer Options	Response Percent	Response Count
Yes	15.9%	7
No	84.1%	37
<i>answered question</i>		44
<i>skipped question</i>		6



Question 10

Would you like to know more about CommunityViz?

Answer Options	Response Percent	Response Count
Yes	61.5%	24
No	38.5%	15
<i>answered question</i>		39
<i>skipped question</i>		11



Question 11

If so, please leave your contact information below.

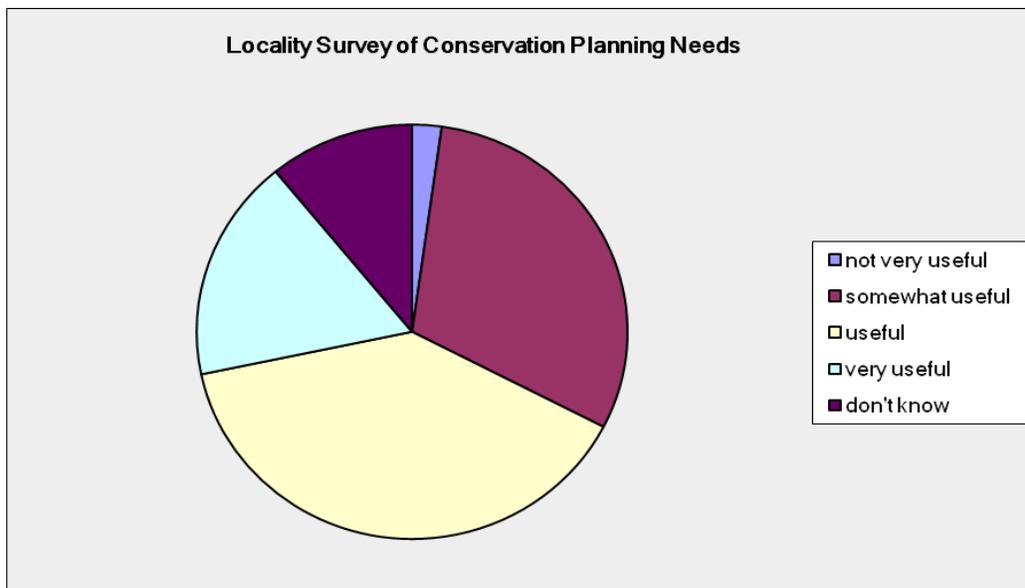
Answer Options	Response Count
	20
<i>answered question</i>	20
<i>skipped question</i>	30

Number	Response Date	Response Text
1	May 19, 2011 4:07 PM	hmcgowan@west-point.va.us
2	May 17, 2011 10:13 PM	katenorris@pwsxcd.org John Shaw, Mathews County Director of Planning & Zoning P. O. Box 839 Mathews, VA 23109
3	May 13, 2011 2:22 PM	Mathews, VA 23109
4	May 12, 2011 6:52 PM	kwutt@fredericksburgva.gov I have no idea what it even is, so...sure.
5	May 12, 2011 4:42 PM	wbailey@nvct.org john_reffit@blm.gov, david_lyster@blm.gov,
6	May 12, 2011 1:19 PM	douglas_vinson@blm.gov Rita Taylor
7	May 11, 2011 6:13 PM	rtaylor@gloucesterva.info
8	May 11, 2011 5:16 PM	srae@gloucesterva.info
9	May 11, 2011 4:25 PM	slucchesi@kingwilliamcounty.us David Imburgia 757-727-5221 or
10	Apr 18, 2011 6:08 PM	dimburgia@hampton.gov
11	Apr 13, 2011 7:22 PM	sbenson@co.northampton.va.us Laura Grape, Senior Environmental Planner lgrape@novaregion.org3060 Williams Drive, Suite 510 Fairfax, VA 22031
12	Apr 13, 2011 7:05 PM	Fairfax, VA 22031
13	Apr 12, 2011 7:44 PM	egibson@gloucesterva.info
14	Apr 11, 2011 9:02 PM	brussof@portsmouthva.gov Anne Ducey-Ortiz aducey@gloucesterva.info
15	Apr 11, 2011 8:15 PM	PO Box 329, Gloucester VA 32061 Kim Hummel, Environmental Planner Isle of Wight County Dept. of Planning and Zoning P.O. Box 80
16	Apr 11, 2011 7:46 PM	Isle of Wight, VA 23397
17	Apr 11, 2011 6:55 PM	cmckenna@vbgov.com William Neville, Town of Chincoteague 6150 Community Drive Chincoteague Island, VA 23336
18	Apr 11, 2011 12:56 PM	wneville@chincoteague-va.gov Mark Bittner, mbittner@craterpdc.org
19	Mar 24, 2011 12:36 PM	(804) 861-1666 x237 Heather Barrar
20	Mar 15, 2011 2:04 PM	barrarh@chesterfield.gov

Question 12

How would you rank the usefulness of the data provided by the State?

Answer Options	Response Percent	Response Count
not very useful	2.2%	1
somewhat useful	30.4%	14
useful	39.1%	18
very useful	17.4%	8
don't know	10.9%	5
<i>answered question</i>		46
<i>skipped question</i>		4



Question 13

Please provide details for the previous reply, along with your (optional) contact information:

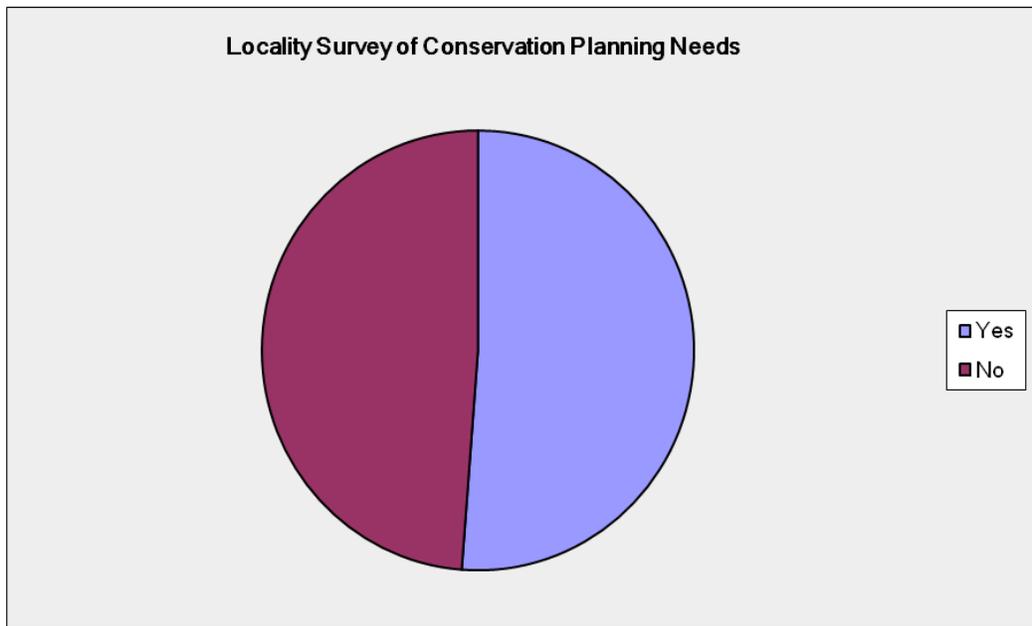
Answer Options		Response Percent	Response Count	
Details		77.3%	17	
Contact info		45.5%	10	
<i>answered question</i>			22	
<i>skipped question</i>			28	
Number	Response Date	Details	Cat eg ori es	Contact info
1	May 19, 2011 4:07 PM		7	hmcgowan@west-point.va.us
2	May 17, 2011 10:13 PM	we pull maps and data from variety of state and other sources	4	
3	May 12, 2011 4:42 PM		7	Alex Long; along@infionline.net
4	May 12, 2011 4:42 PM	It helps us identify where to target protection efforts, and what sort of protections we should consider for a given property.	3	
5	May 12, 2011 1:19 PM	our contract archaeologists use state cultural data	4	
6	May 12, 2011 11:57 AM	state provides good centerline data and image data	4	
7	May 12, 2011 11:31 AM	it's somewhat useful	6	
8	May 11, 2011 7:50 PM	Guidance in the Ches. Bay Pres. Act	3	pthompson@kingandqueenco.net
9	May 11, 2011 6:13 PM	Aerial imagery from state (VGIN/VITA) has been extremely beneficial	4	
10	May 11, 2011 5:16 PM	instar	4	
11	May 11, 2011 4:25 PM	DCR Natural Heritage	4	769-4969
		I don't work with the GIS data or CommunityViz but my staff planner does. We haven't taken full advantage of all the data sources, so don't feel I can comment more definitively.		
12	Apr 13, 2011 7:22 PM		6	
13	Apr 13, 2011	State data is very useful,	1	

	7:05 PM	particularly when conducting analyses at a regional scale. That said, local knowledge is extremely helpful in fine-tuning state data.	
14	Apr 12, 2011 7:44 PM	would like to see more centralized information	2 egibson@glo ucesterva.inf o brussof@port smouthva.go v (757) 393-8836 x 6 4212
15	Apr 11, 2011 9:02 PM	Fred Brusso, Planning Administrator No enforcement or regulatory tools to be able to protect resources even if they are discovered	6
16	Apr 11, 2011 8:15 PM	to protect resources even if they are discovered natural resource data and tools need to be integrated with other planning tools to be useful	5
17	Apr 11, 2011 12:56 PM		2 wneville@chi ncoteague- va.gov northernneckj oe@gmail.co m
18	Mar 28, 2011 3:29 PM		7
19	Mar 22, 2011 8:17 PM	it is useful, sometimes it is outdated or not appropriate for a small scale at which we are working	1
20	Mar 14, 2011 2:48 PM		7 George M Homewood, PO Box 50, New Kent, VA 23124; 804-966- 9603
21	Mar 11, 2011 8:38 PM	for site plan reviews need more site specific information and more pertinent information to help us address upcoming regulations	1, 5
22	Mar 9, 2011 9:35 PM		7 tbrockenbrou gh@co.acco mack.va.us

Question 14

Are you aware of Priority Conservation Areas data and maps?

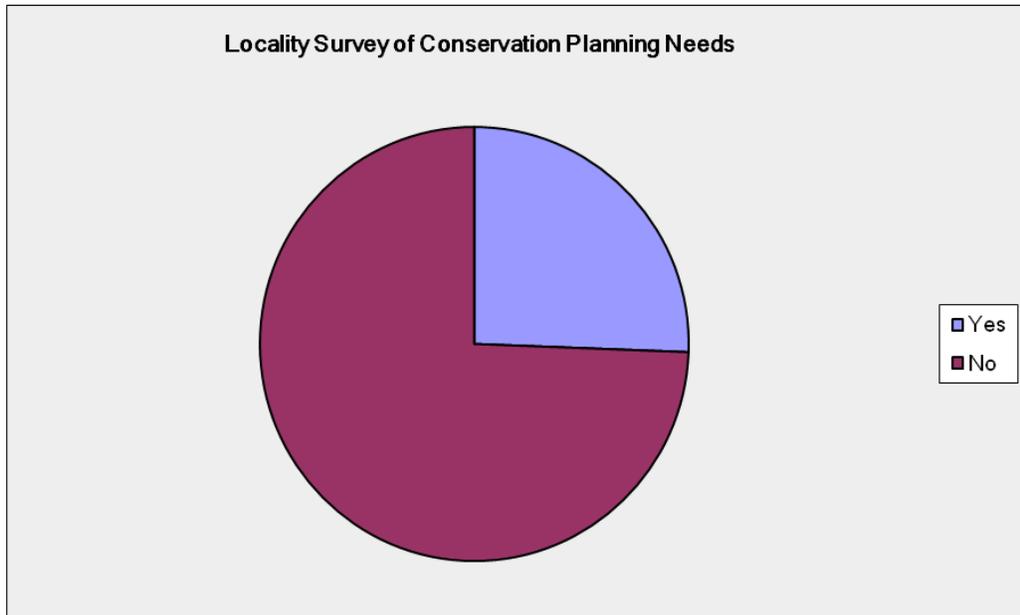
Answer Options	Response Percent	Response Count
Yes	51.2%	22
No	48.8%	21
<i>answered question</i>		43
<i>skipped question</i>		7



Question 15

Have you used the Priority Conservation Areas data and/or maps for natural area planning?

Answer Options	Response Percent	Response Count
Yes	25.6%	11
No	74.4%	32
<i>answered question</i>		43
<i>skipped question</i>		7



Question 16

If so, can you please provide examples of how the Priority Conservation Areas data have been used?

Answer Options		Response Count
		15
<i>answered question</i>		15
<i>skipped question</i>		35

Number	Response Date	Response Text	Cate gorie s
		Don't know what they are?	
1	May 17, 2011 10:15 PM	Are these RPA maps?	8
2	May 12, 2011 4:48 PM	the above answers are based on the GWRC participation in creating habitat priority maps	3
3	May 12, 2011 4:47 PM	N/A	8
4	May 12, 2011 1:22 PM	as a layer with recreational/scenic trail planning	4
5	May 11, 2011 6:25 PM	Protection of reservoir areas.	1
6	May 11, 2011 6:16 PM	n/a	8
7	May 11, 2011 5:07 PM	Mapping green infrastructure	2
8	Apr 13, 2011 7:26 PM	We haven't yet used the PCA data, but we are now embarking on a comp plan review and expect to use that information.	5
9	Apr 13, 2011 7:14 PM	My response to 15 is actually "kind of". We took a look at the PCA in NoVA and found that it was a bit overwhelming to explain the results.	7
10	Apr 11, 2011 7:50 PM	Cannot answer. I am not familiar with this data. PCA maps were consulted to determine the applicability of grant funds for land purchase/protection	8
11	Apr 11, 2011 1:02 PM	To select a watershed for a Special Project area as a joint venture w/VOF for concentrated out reach efforts.	1
12	Mar 28, 2011 4:09 PM	green infrastructure asset mapping and opportunity identification	6
13	Mar 22, 2011 8:22 PM	CZMA grant support for local blue green infrastructure planning ; CELCP applications	2
14	Mar 22, 2011 8:04 PM	Part of the Green Infrastructure Maps created for the County	2
15	Mar 11, 2011 8:40 PM		2

Question 17

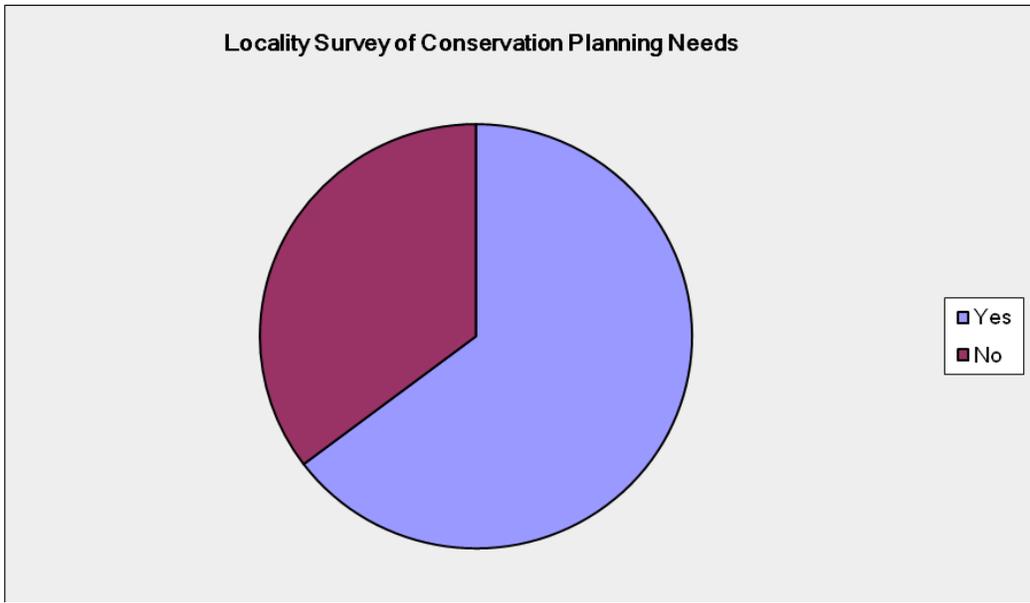
Did the information in the Priority Conservation Areas data reflect your local knowledge of conditions?

Answer Options		Response Count
		15
<i>answered question</i>		15
<i>skipped question</i>		35

Number	Response Date	Response Text	Categories
1	May 17, 2011 12:15 PM	Seems rather incomplete somewhat; there are areas that were left out that should have been included and areas included	4
2	May 12, 2011 4:48 PM	I was perplexed as to why	2
3	May 12, 2011 4:47 PM	N/A	5
4	May 12, 2011 1:22 PM	yes,	1
5	May 11, 2011 6:25 PM	Yes	1
6	May 11, 2011 6:16 PM	n/a	5
7	May 11, 2011 5:07 PM	in most cases There were some inconsistencies with the results from the PCA and local knowledge, particularly when we explored some of the datasets used in the analysis	3
8	Apr 13, 2011 7:14 PM	(Aquatic Resources Integrity/Healthy Waters).	4
9	Apr 11, 2011 7:50 PM	Cannot answer.	5
10	Apr 11, 2011 1:02 PM	generally	3
11	Mar 28, 2011 4:09 PM	Yes	1
12	Mar 22, 2011 8:22 PM	somewhat	2
13	Mar 22, 2011 8:04 PM	most of the time yes.	3
14	Mar 15, 2011 2:05 PM	Yes	1
15	Mar 11, 2011 8:40 PM	yes	1

Question 18

Do you plan on using Priority Conservation Areas data for your future planning needs?		
Answer Options	Response Percent	Response Count
Yes	64.7%	22
No	35.3%	12
<i>answered question</i>		34
<i>skipped question</i>		16



Question 19

If so, what are the characteristics of the Priority Conservation Areas that made you decide to use it?

Answer Options		Response Count
		15
<i>answered question</i>		15
<i>skipped question</i>		35

Number	Response Date	Response Text	Categories
1	May 17, 2011 12:15 PM	As an additional basis for environmental review	3
2	May 16, 2011 8:40 PM	Comprehensive plan map Town is considering annexation;	2
3	May 12, 2011 4:48 PM	Town is very active in land-use matters of Caroline County since that impacts our citizens Re: #18, I might use PCAs depending what they offer, once I look into it. If they offer more detailed or different information than Natural Heritage Resource Screening, or represent additional state policies re: conservation priorities, then I'll use them.	1
4	May 12, 2011 4:47 PM	since we manage 1 800 acre site in virginia, it would just be to find out what our classification is	5, 6
5	May 12, 2011 1:20 PM	GIS based current information readily available	1
6	May 11, 2011 8:07 PM	Not sure.	5
7	May 11, 2011 6:25 PM	I need to familiarize myself with this data.	6
8	May 11, 2011 6:16 PM	We were involved in developing the project for the county.	6
9	Apr 13, 2011 7:26 PM	Not sure	6
10	Apr 11, 2011 8:16 PM	Cannot answer.	6
11	Apr 11, 2011 7:50 PM	Large blocks of undeveloped lands w/ valuable wildlife habitat.	1
12	Mar 28, 2011 4:09 PM	all the different datasets involved in its creation	5
13	Mar 22, 2011 8:22 PM	Depends on the project need.	6
14	Mar 22, 2011 8:04 PM	can help guide development	6
15	Mar 11, 2011 8:40 PM		4

Question 20

If not, why not?			
Answer Options			Response Count
			14
		<i>answered question</i>	14
		<i>skipped question</i>	36
Number	Response Date	Response Text	Categories
1	May 13, 2011 1:25 PM	We have relatively good knowledge of the available convservations areas within the Town.	3
2	May 12, 2011 4:47 PM	N/A	1
3	May 12, 2011 11:59 AM	cannot answer the question because of lack of knowledge about PCA	1
4	May 11, 2011 7:52 PM	Did not know about them	1
5	May 11, 2011 6:16 PM	n/a	1
6	May 11, 2011 5:17 PM	not familiar with what it has to offer	1
7	Apr 18, 2011 6:10 PM	No personal knowledge	1
8	Apr 13, 2011 7:14 PM	The inconsistencies as mentioned in question 17 resulted in a loss of confidence in the data.	4
9	Apr 11, 2011 8:16 PM	Not familiar with them yet	1
10	Apr 11, 2011 7:50 PM	Cannot answer.	1
11	Apr 11, 2011 1:02 PM	As a developed TOWN, we are already surrounded by Conservation Areas. efforts to identify valuable green infrastructure have been met with opposition from public; conservation designated areas	2
12	Mar 28, 2011 4:52 PM	have been removed from Comprehensive Plan and future land use map	5
13	Mar 22, 2011 8:04 PM	na	1
14	Mar 11, 2011 8:40 PM	However, large intact cores already developed	2

Question 21

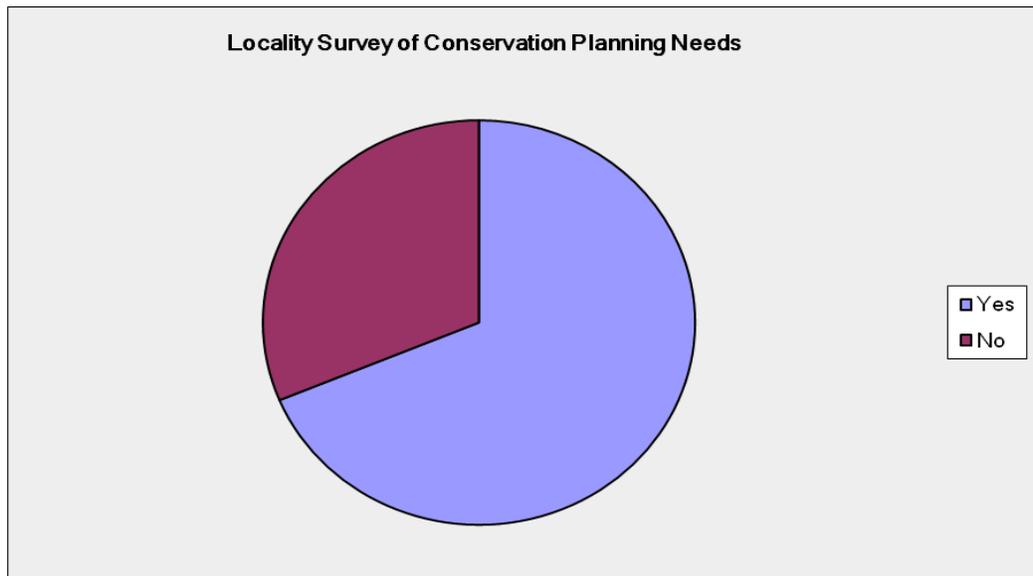
How could the Priority Conservation Areas data be improved?

Answer Options	Response Count
	12
<i>answered question</i>	12
<i>skipped question</i>	38

Number	Response Date	Response Text	Categories
1	May 13, 2011 1:25 PM	N/A	1
2	May 12, 2011 4:48 PM	greater access; it is my understanding that the DCR data canNOT be used unless we seek permission to use it; therefore, why bother?	5
3	May 12, 2011 4:47 PM	N/A	1
4	May 11, 2011 8:07 PM	Do not know.	1
5	May 11, 2011 6:16 PM	n/a	1
6	Apr 13, 2011 7:14 PM	Ground truth will local data and knowledge.	3
7	Apr 11, 2011 9:04 PM	Provide information on what it is.	4
8	Apr 11, 2011 7:50 PM	Cannot answer.	1
9	Apr 11, 2011 1:02 PM	Update mapping to coordinate with Blue Green Infrastructure Plan adopted in Accomack County	2
10	Mar 22, 2011 8:22 PM	data can always be improved... I suppose the more available optional nuances, the better. The more insight it can give me into assets on the ground the better.	3, 4
11	Mar 22, 2011 8:04 PM	na	1
12	Mar 11, 2011 8:40 PM	update it	2

Question 22

Was the Priority Conservation Areas data documentation adequate?		
Answer Options	Response Percent	Response Count
Yes	68.8%	11
No	31.3%	5
<i>answered question</i>		16
<i>skipped question</i>		34



Question 23

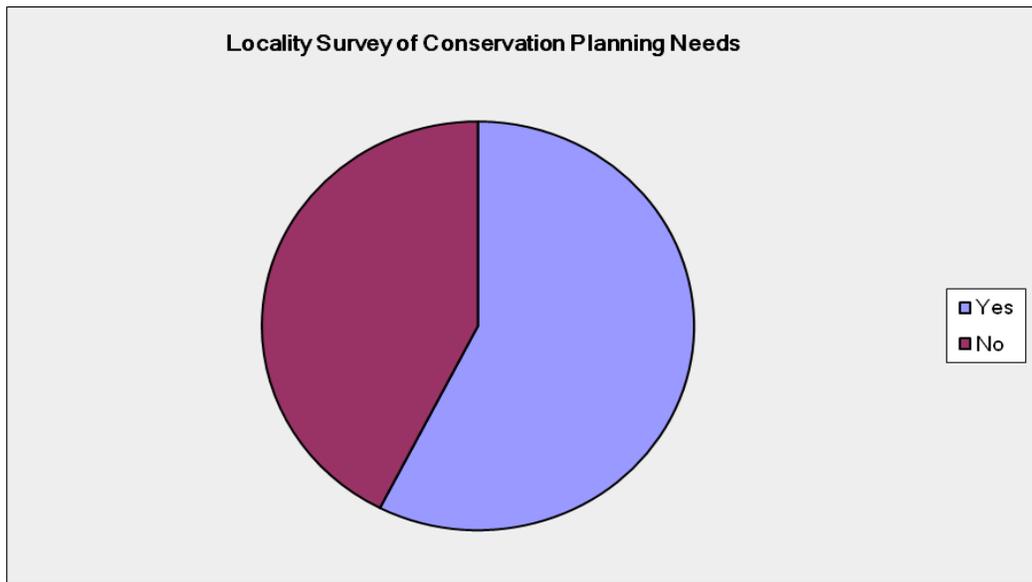
How could the documentation be improved?	
Answer Options	Response Count
	7
<i>answered question</i>	7
<i>skipped question</i>	43

Number	Response Date	Response Text
1	May 12, 2011 4:48 PM	Greater detail and input from the general public and then full access and use by public
2	May 12, 2011 4:47 PM	N/A
3	May 12, 2011 11:59 AM	cannot answer #22. see above
4	May 11, 2011 8:07 PM	Do not know.
5	Apr 11, 2011 7:50 PM	Cannot answer.
6	Mar 24, 2011 12:38 PM	Make date of data creation apparent; list a contact name; improve metadata generally
7	Mar 22, 2011 8:04 PM	na-- concerning question 24 and 25: Who is the "state". Not sure how to answer these questions

Question 24

Are you aware that the State can provide direct technical assistance with your planning efforts?

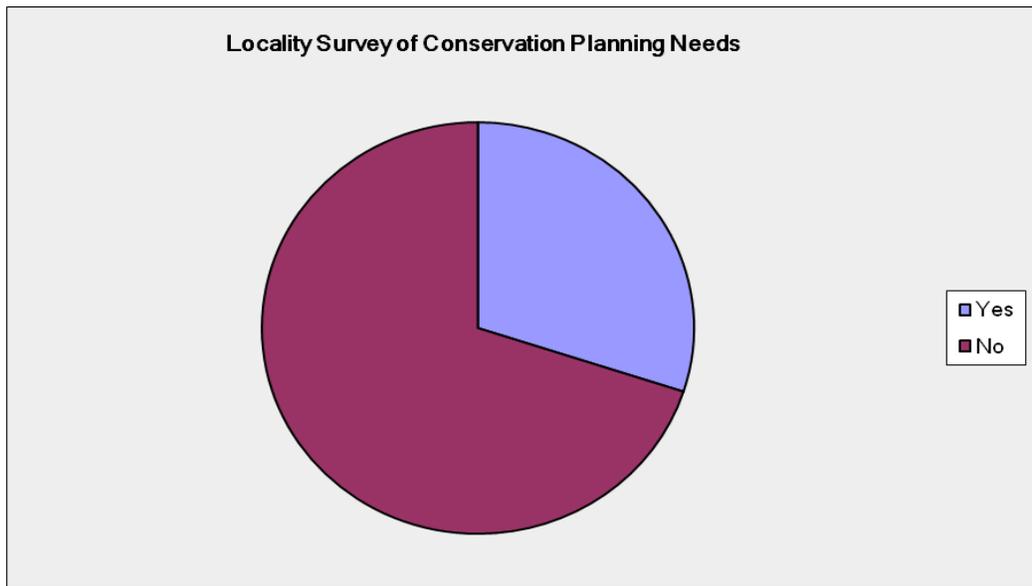
Answer Options	Response Percent	Response Count
Yes	57.5%	23
No	42.5%	17
<i>answered question</i>		40
<i>skipped question</i>		10



Question 25

Have you accessed the State for assistance with your planning efforts?

Answer Options	Response Percent	Response Count
Yes	30.0%	12
No	70.0%	28
<i>answered question</i>		40
<i>skipped question</i>		10

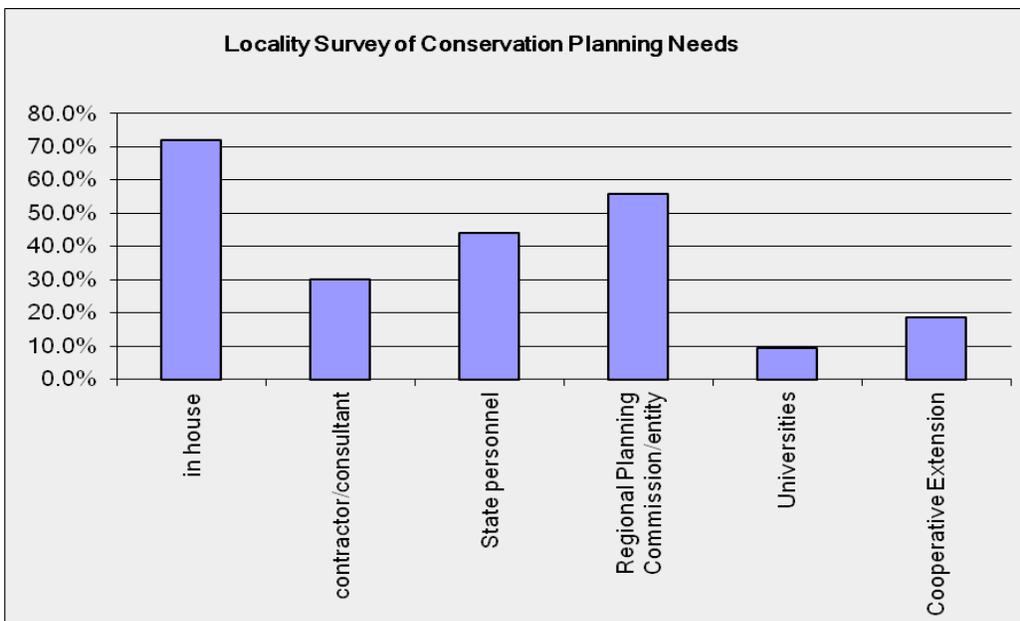


Question 26

Who provides you assistance with your natural resource planning efforts? (select all that apply)

Answer Options	Response Percent	Response Count
in house	72.1%	31
contractor/consultant	30.2%	13
State personnel	44.2%	19
Regional Planning Commission/entity	55.8%	24
Universities	9.3%	4
Cooperative Extension	18.6%	8
Other (please specify)		4
<i>answered question</i>		43
<i>skipped question</i>		7

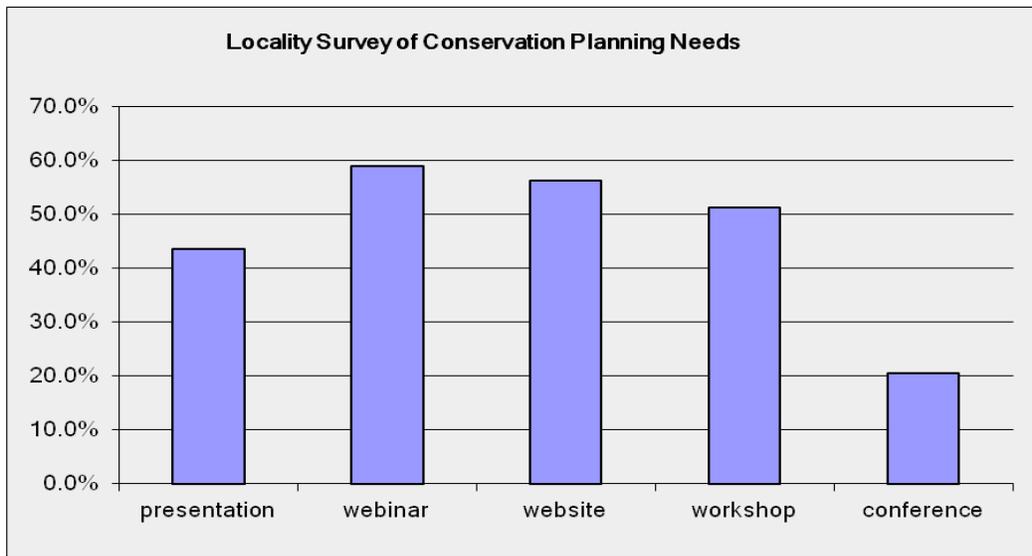
Number	Response Date	Other (please specify)
1	May 12, 2011 4:48 PM	Port Royal is very small and cannot afford outside help
2	May 12, 2011 4:47 PM	County planners for the most part
3	Apr 13, 2011 7:14 PM	Our contractor/consultant has been in direct contact with state staff, even though we have not.
4	Mar 14, 2011 2:51 PM	Colonial SWCD, Green Infrastructure Center



Question 27

How would you like to learn more about the technical assistance for natural resource planning? (select all that apply)

Answer Options	Response Percent	Response Count
presentation	43.6%	17
webinar	59.0%	23
website	56.4%	22
workshop	51.3%	20
conference	20.5%	8
Other (please specify)		0
<i>answered question</i>		39
<i>skipped question</i>		11



Appendix B. Handout

The following handout was developed and distributed at workshops, meetings, and conferences to serve as a quick, concise reference for Coastal VEVA. This handout will continue to serve as a key “leave-behind” for the Coastal VEVA.

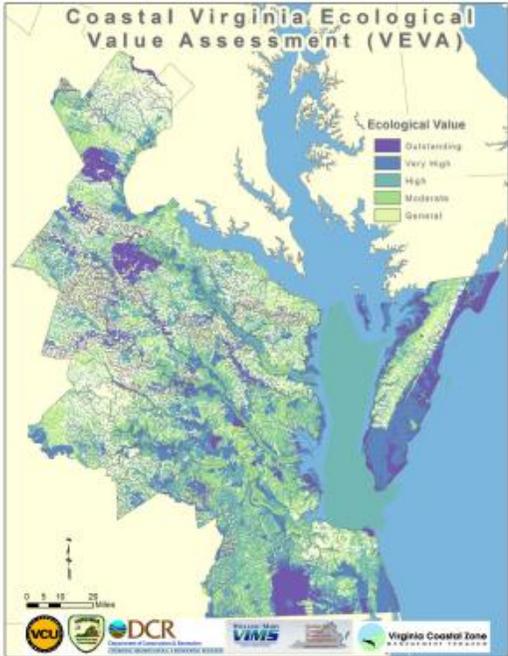
Coastal Virginia Ecological Value Assessment (VEVA)

The Coastal Virginia Ecological Value Assessment (VEVA) was developed to integrate the Priority Conservation Areas data layer (VA-DGIF, VA-DCR DNH and VCU CES) with Virginia Healthy Waters data and with the Cumulative Resource Assessment (VIMS College of William and Mary Center for Coastal Resource Management). The effort was undertaken to synthesize important natural resource information in one geospatial layer for natural resource management, land use management and awareness. This dataset is intended to guide conservation planning and efforts. This dataset is not intended to replace on the ground surveys or consultations with biologists as appropriate.

The VEVA project was made possible through the collaboration of the following agencies:

- Virginia Coastal Zone Management Program
- Virginia Commonwealth University Center for Environmental Studies
- Virginia Department of Conservation and Recreation Divisions of Natural Heritage and Soil and Water
- Virginia Department of Game and Inland Fisheries
- Virginia Institute of Marine Sciences College

For more information on VEVA, including where to download data, visit the Coastal GEMS website at : <http://www.deq.state.va.us/coastal/coastalgems.html>



The Coastal Virginia Ecological Value Assessment (VEVA) dataset delineates priority conservation areas ranked by level of importance based on VA Dept. of Game and Inland Fisheries' Priority Wildlife Diversity Conservation Areas, VA Dept of Conservation and Recreation Division of Natural Heritage Conservation Sites Layer (CSL) and Natural Lands Network (NLN), VCU Center for Environmental Studies aquatic resource integrity data layer, and VIMS College of William and Mary Center for Coastal Resource Management Cumulative Resource Assessment layer. Ecological Resource Areas are defined as lands, aquatic resources and surface waters identified as important for conservation of Virginia's wildlife, plants, aquatic communities and resources and natural communities. The data are ranked on a scale of 1 to 5, with a 5 representing the highest conservation priority. The identified lands/waters can be used alone or with additional local data to prioritize areas for preservation, protection or specific management action.



Appendix C. Coastal VEVA Factsheet, developed to accompany the Coastal VEVA data layer on the Virginia CZMP's Coastal GEMS interactive Mapping website

Virginia Ecological Value Assessment (VEVA)

The Virginia Ecological Value Assessment (VEVA) integrates elements of the Priority Conservation Areas dataset, Healthy Waters data and VIMS Center for Coastal Resource Management Cumulative Resource Inventory. VEVA delineates priority conservation areas ranked by level of importance based on VA Dept. of Game and Inland Fisheries' Priority Wildlife Diversity Conservation Areas, VA Dept of Conservation and Recreation Division of Natural Heritage Conservation Sites Layer (CSL) and Natural Lands Network (NLN), VCU Center for Environmental Studies aquatic resource integrity layer and VIMS College of William and Mary Center for Coastal Resource Management Cumulative Resource Assessment. The Virginia Ecological Value Assessment builds on the definition of the Priority Conservation Areas and are defined as lands, aquatic resources and surface waters identified as important for conservation of Virginia's wildlife, plants, and aquatic and natural communities. The identified lands, aquatic resources and waters can be used to prioritize areas for preservation, protection or specific management action. This dataset was developed to synthesize important natural resource information in one geospatial layer for natural resource management, land use management and awareness.

Status of the data
Completed, February 2011

Data Source
Virginia Coastal Zone Management Program, 2011. Coastal Virg.

To access this data layer/tool directly, please visit:
<http://www.dgif.virginia.gov/gis/gis-data.asp>



For original datasets, please contact:
Jason Bulluck
217 Governor Street
Richmond, VA 23219
Phone: (804)786-8377
Fax:
Email: jason.bulluck@dcr.virginia.gov

Why should we care?

Two major ideas have become clearer alongside our understanding of the impacts of habitat loss and fragmentation. First, most land conservation happens locally. This is due in part to the fact that specific decisions about how parcels of land will be used are made locally, and at this level, public input and funding possibilities are most closely linked with the conservation of a specific place. Second, all lands/resources are not equal in their contribution to a healthy functioning ecological network. Each conservation opportunity displays a unique set of conservation values that can be used to weigh the benefits of conserving one parcel over another. Considering the reality that funding for conservation is typically very limited at the local level, having tools to identify conservation opportunities that maximize our ability to conserve and manage the most important areas in the most financially sound ways is key. With several tools for mapping conservation priorities, local planners needed to fully evaluate all available options at the risk of under representing a specific conservation perspective. VEVA synthesizes multiple conservation, wildlife and aquatic data layers presenting a unified method of prioritizing conservation opportunities.

Links to find more information:

[Virginia Ecological Value Assessment](#)
[Virginia Healthy Waters](#)

How is this resource managed?

There are multiple resources which are integrated into VEVA. Each of these resources are managed by different entities and through different measures. The DGIF Priority Wildlife Conservation Areas contain wildlife habitat information of species in the Virginia Wildlife Action Plan. VA DGIF enforces the laws, regulations, and guidelines governing the collection, holding, exhibiting, and release of wildlife by issuing permits and guidelines for these activities. Specific laws and regulations are found in the Code of Virginia and the Virginia Administrative Code. For answers to specific questions about wildlife, fisheries, or boating laws and regulations, please contact the Virginia Department of Game and Inland Fisheries. The DCR-DNH conservation sites are based upon data pertaining to the location of, viability of, quality of and threats to populations of rare plant species and rare animal species, as well as natural communities. Conservation Sites data (spatial and tabular) are managed by the DCR-DNH and are continually updated.

based on new and revised data from field biologists and from data sharing partners. The DCR-DNH Natural Land Network is derived from the Virginia Natural Landscape Assessment (VaNLA). The VaNLA is a conservation planning tool managed by the DCR-DNH and updated upon the availability of revised input datasets and reference layers. Healthy waters are protected through the anti-degradation clause of the Clean Water Act.

Links to find more information about how this resource is managed:

[Clean Water Act](#)
[U.S. Fish and Wildlife Endangered Species Program](#)
[Virginia Wildlife Laws and Regulations](#)

Why was the GIS data created?

Virginia natural resources agencies have independently quantified important conservation opportunities. Specific conservation tools used for this purpose include the Virginia Conservation Lands Need Assessment (VCLNA) which was developed by the Virginia Department of Conservation and Recreation – Division of Natural Heritage (DCR-DNH) and the Virginia Wildlife Action Plan, developed by the Virginia Department of Game and Inland Fisheries (DGIF). Both the Ecological Model (the Virginia Natural Landscape Assessment or VaNLA) of the VCLNA and the mapped tiered-species habitats from the Wildlife Action Plan identified conservation priorities spatially. However, each of these efforts were formed with different perspectives and assumptions and therefore, presented very different results. Concurrently, Virginia Commonwealth University's Center for Environmental Studies (VCU-CES) has developed methods to rate aquatic resource integrity based on fish and macro-invertebrate community sampling and VIMS Center for Coastal Resource Management has identified important Coastal Resources through their Cumulative Resource Assessment. These data provided another way to identify conservation priorities. With several tools for mapping conservation priorities, local planners needed to fully evaluate all available options at the risk of under representing a specific conservation perspective. Synthesis was needed to present a unified method of prioritizing conservation opportunities. This project is the result of a partnership between VCU-CES, DCR-DNH, DCR Soil and Water, VIMS Center for Coastal Resources Management and DGIF to fulfill the need to provide a single collaborative approach to mapping conservation opportunities.

Links to projects that funded this data acquisition:

How was the GIS data created?

Priority Wildlife Diversity Conservation Areas were developed by the VA Department of Game and Inland Fisheries. Data from habitat maps, Colonial Waterbird surveys, DCR-DNH's VCLNA, USGS National Hydrography Dataset, USFWS National Wetlands Inventory, Audubon's Important Bird Areas, and other datasets were compiled using input from DGIF biologists and guidance from the Wildlife Action Plan. Data was created in GRID format and ranks were associated with the data from a scale of 1 (low priority) to 5 (high priority). Virginia DCR-DNH prepared two data layers from data in the Natural Heritage Plan to contribute to the PCA compilation. These layers were selected because together they provide a fine filter and a coarse filter conservation planning tool. In short, coarse filter tools are designed to conserve high percentages of species by conserving adequate diversity, distribution, and abundance of ecological communities, ecological land units (e.g., alliances of ecological communities, physical environments and landscape-level ecological phenomena). Coarse filter tools are complimented by fine filter approaches, which focus on specific habitats of individual rare species, or species that specialize on a small and/or unique habitat type. For the PCA, DCR-DNH prepared data layers derived from DCR-DNH Conservation Sites (Conservation Sites ranked by biodiversity rank; fine filter) and the Virginia Natural Landscape Assessment (VaNLA) (Virginia Natural Land Network; coarse filter). The aquatic resource integrity layer was developed by VCU Center for Environmental Studies using stream based ecological data, the INSTAR stream reaches (<http://instar.vcu.edu>), and watershed based health data (<http://instar.vcu.edu>). The watershed based health data are the Healthy Waters watershed layer, which are watersheds generated for each healthy water in Virginia. The National Hydrography Dataset (high resolution) was assigned a watershed health value based on the Healthy Waters watershed rank. The datasets were mosaiced together to create a blue infrastructure layer with ranks of 2 (low integrity) - 5 (high integrity). The PCA input datasets were combined using the majority tool. A majority filter was run on the final dataset to smooth the data. The final Priority Conservation Areas dataset shows entities ranked by conservation priority from a high of 5 to a low of 1. The Cumulative Resource Assessment (CRA) was derived by VIMS Center for Coastal Resources Management and is a subset of the Aquatic Priority Conservation Areas dataset developed by CCRM. The CRA includes shellfish suitability data, reef restoration sites, oyster reef data, artificial fishing reef data, seed areas, aquaculture sites, turtle nest sites, submerged aquatic vegetation data and regulated area data. Ecological value was assigned to each data layer based on best professional judgment.

Future Directions?

This project produced a synthesized dataset to guide conservation planning, assessed these areas for risk to development, demonstrated use of this tool within planning and visualization software, and transferred the knowledge to regional planning groups. It is anticipated that Planning District Commissions will use VEVA and other results of this project within their development of green infrastructure initiatives and to assist counties with comprehensive planning.

Frequently Asked Questions:

Are there any access constraints to using the data?

No. The data are available to the public.

Can I access the individual components that were used in the creation of VEVA?

Yes. Contact the specific originator for details on how to access the individual data components. Use the link on the website and refer to the metadata for the individual component contact information.

Are there any disclaimers to using this data?

This dataset is intended to guide conservation planning and efforts. This dataset is not intended to replace on the ground surveys or

Appendix D. User Friendly Metadata developed to accompany the Coastal VEVA data layer on LandScope Virginia and LandScope Chesapeake interactive mapping websites



© Bruce McNitt/Panoramic Images (Virginia)

[Home](#) > [Explore Places and Topics](#) > [Find Your State](#) > [Virginia](#) >

Coastal Virginia Ecological Value Assessment (VEVA)

Overview

The Coastal Virginia Ecological Value Assessment (VEVA) dataset combines scientific data and best professional judgment to rank terrestrial and aquatic areas on a 1-to-5 scale of ecological value, with 5 representing the highest conservation priority. These values can be used to prioritize areas for preservation, develop strategies for special area management actions, or to build awareness about Virginia's ecological integrity throughout the Coastal Zone.

Data Layer Description

Source

Virginia Department of Environmental Quality- Coastal Zone Management Program

Virginia Commonwealth University- Center for Environmental Studies

Virginia Department of Conservation and Recreation Divisions of Natural Heritage and Stormwater Management

Virginia Department of Game and Inland Fisheries

Virginia Institute of Marine Science Center for Coastal Resources Management

What this data layer represents

Location

Coastal Zone counties of the Commonwealth of Virginia

Scale: 1:100,000

Description

The Coastal Virginia Ecological Value Assessment (VEVA) was developed to be a comprehensive, GIS-based tool to guide the land use and conservation planning of local governments and planning districts in the Coastal Zone of Virginia. Coastal VEVA improves upon and replaces the former Priority Conservation Areas (PCA) data layer. The PCA was developed in 2008 to combine several existing GIS conservation priority datasets, including the VA Dept. of Game and Inland Fisheries' Priority Wildlife Diversity Conservation Areas; VA Dept. of Conservation and Recreation Division of Natural Heritage Conservation Sites Layer (CSL) and Natural Lands Network (NLN); and VCU Center for Environmental Studies Aquatic Resource Integrity Layer (NOAA grant FY08 NAO8NOS4190466, Task 11.02). In 2010, these same state partners were joined by DCR-Division of Soil and Water and Virginia Institute of Marine Science-Center for

Coastal Resources Management to update and enhance the PCA. This consisted of updates to datasets previously included in the PCA, the inclusion of VIMS' Aquatic Priority Conservation Areas layer, and the inclusion of Virginia's Healthy Watersheds data, as identified by VCU-Center for Environmental Studies.

Coastal VEVA synthesizes important natural resource information in one geospatial layer for guiding conservation planning, natural resource management, land use management and public awareness of the general ecological values of areas throughout the Coastal Zone. This dataset is not intended to replace on the ground surveys or consultation with biologists as appropriate, but is intended to be a thorough first step to enable efficient consideration of natural resources and ecosystem function early in any planning process. These data do not constitute official legal or technical advice.

This project was funded in part by the Virginia Coastal Zone Management Program at the Department of Environmental Quality through grant number NA10NOS4190205 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management act of 1972, as amended.

How to get the data layer

[Download](#) it at VA DGIF's GIS site.

Or view it at [Virginia DEQ Coastal GEMS](#).

How you might make use of this data layer

Coastal VEVA is a generalized geospatial dataset intended to guide initial conservation planning or blue-green infrastructure efforts. All areas within the VEVA are important; the 1-5 values are subjective rankings based on expert opinions and the best available information. It is recommended that priority be given to sites with the highest ecological value in consultation with a biologist. The data can be used in the planning process to identify areas that could be considered for open natural space value, recognize parcels that may be zoned for conservation, find areas for potential easements, distinguish areas that would benefit most from low impact development measures, or pinpoint areas where additional development can be focused, so that areas that can be conserved or strategically zoned in a compatible use to preserve ecological integrity. Users should also consider protection and management of entire watersheds, as impacts to headwaters areas have cumulative effects on downstream priority features such as rivers and wetlands.

Local data not included in the VEVA data layer can be added and used to adjust the value of specific entities' interests where appropriate. The Analysis Toolset in ArcGIS provides a variety of overlay tools that can be used to add data to the VEVA data layer and then use those local data to refine the rankings of lands and waters in the VEVA layer. Since the VEVA includes both green infrastructure (e.g. terrestrial biodiversity, wildlife diversity) and blue infrastructure values (e.g. Healthy Watersheds, ecologically valuable estuarine resource areas), the VEVA output map allows one to begin to visualize the benefits of comprehensive conservation planning in one place.

How to get more information

Visit the Virginia CZM [Blue Green Infrastructure Mapping and Planning Efforts](#) site.

Or view the layer's [formal metadata](#).

Sample Map



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Appendix F. Poster Presentation Materials for the York River Symposium

Abstract

Name of corresponding author	Marcia R. Berman* (1) Jason F. Bulluck (2)
Affiliation	VIMS Center for Coastal Resources Management (1) VA Dept. of Conservation and Recreation Division of Natural Heritage (2)
Email address Telephone number	marcia@vims.edu (1) Jason.Bulluck@dcr.virginia.gov (2) (804) 684-7188 (1) (804) 786-8377 (2)

Mailing address:

- (1) P.O Box 1346 Gloucester Point, VA 23062
- (2) 217 Governor Street
Richmond, Virginia 23219

Coastal Virginia Ecological Value Assessment (VEVA): A conservation planning tool for Virginia’s Coastal Zone.

Marcia R. Berman* (1) and Jason F. Bulluck (2)

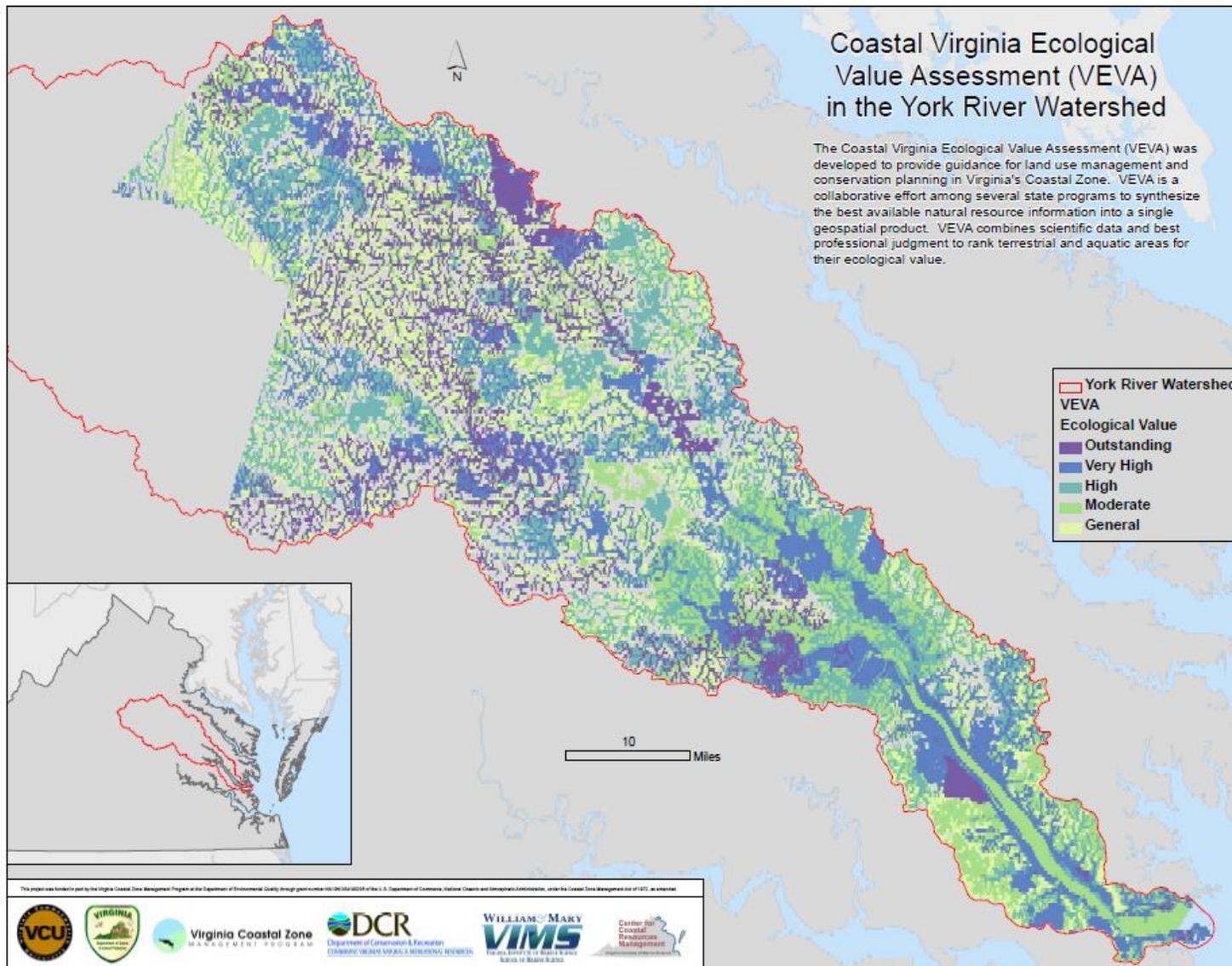
Habitat loss and fragmentation pose threats to long term conservation of wildlife species and natural communities. Conservation planning at the local level offers a proactive approach to managing current and future stressors. However, tools available to local governments in support of this process are limited. The Coastal Virginia Ecological Value Assessment (VEVA) synthesizes best available resource information into one geospatial product to provide guidance to localities engaged in conservation and land use planning. VEVA is a multi-agency collaborative effort funded by Virginia’s Coastal Zone Management Program.

In 2009, Virginia’s Departments of Game and Inland Fisheries, Conservation and Recreation-Division of Natural Heritage, and Virginia Commonwealth University’s Center of Environmental Studies (VCU) combined conservation databases to create Virginia’s Priority Conservation Areas (PCA) dataset. In 2010, the Virginia Institute of Marine Sciences’ Center for Coastal Resources Management engaged in a similar activity; focused on estuarine and coastal bay areas. In 2011, the two initiatives were integrated to create Coastal VEVA.

Coastal VEVA takes an integrated approach to blue-green infrastructure as a regional and local level planning tool. VEVA combines scientific data and best professional judgment to rank terrestrial and aquatic areas for ecological value. A qualitative ecological value is assigned to an area based on habitat and resources present. A 5-tier classification scheme ranks areas from “general” to “outstanding”. These data can be applied to conservation planning efforts to maximize conservation objectives while also meeting local development needs.

The presentation will discuss project details, highlighting examples from the York River Watershed.

Poster



Presentation

Coastal Virginia Ecological Value Assessment (VEVA): A conservation planning tool for Virginia's Coastal Zone

York River Watershed

Marcia R. Berman
Karinna Nunn
Jason F. Bulluck

York River Synopsium, LLC



Coastal Virginia Ecological Value Assessment (VEVA)

- VEVA is a classification that uses science-based best professional judgment to assess natural systems found on the coastal landscape;
- Collaborative effort among several state programs to synthesize the best available natural resource information into a single geospatial product;
- Developed to provide guidance to local governments engaged in land use management and conservation planning;

Coastal Virginia Ecological Value Assessment (VEVA)

Data Sources:

- Priority Wildlife Diversity Conservation Areas (VA DGIIF)
- Natural Lands Network (VA DCR - Nat. Heritage)
- Natural Heritage Conservation Sites Layer (Nat. Heritage)
- Aquatic Resource Integrity Layer (VCU-CES)
- Aquatic Priority Conservation Areas (VIMS-CCRM)
- Virginia's Healthy Waters (VA DEQ)

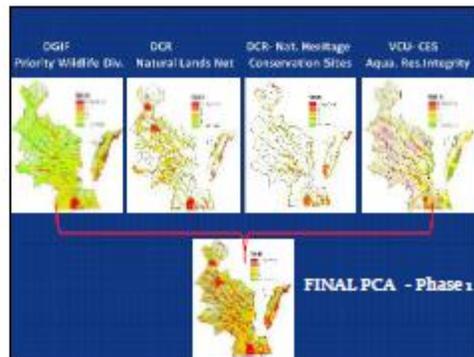
Phase 1. Priority Conservation Areas

Focus: Terrestrial/Free Flowing Streams

Coastal Virginia Ecological Value Assessment (VEVA)

Data Sources:

- Priority Wildlife Diversity Conservation Areas (VA DGIIF)
- Natural Lands Network (VA DCR - Nat. Heritage)
- Natural Heritage Conservation Sites Layer (Nat. Heritage)
- Aquatic Resource Integrity Layer (VCU-CES)
- Aquatic Priority Conservation Areas (VIMS-CCRM)
- Virginia's Healthy Waters (VA DEQ)



Phase 2. Aquatic Priority Conservation Areas

Focus: Estuarine

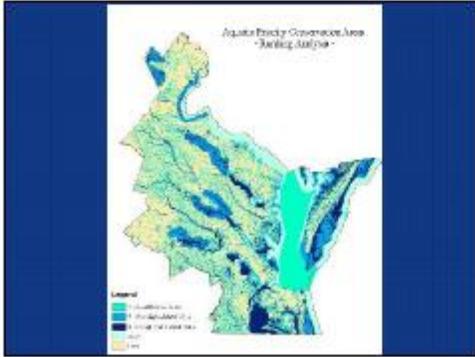
- ### Coastal Virginia Ecological Value Assessment (VEVA)
- Data Sources:
- Priority Wildlife Diversity Conservation Areas (VA DGI)
 - Natural Lands Network (VA DCR - Nat. Heritage)
 - Natural Heritage Conservation Sites Layer (Nat. Heritage)
 - Aquatic Resource Integrity Layer (VCU-CES)
 - **Aquatic Priority Conservation Areas (VIMS-CCRA)**
 - Virginia's Healthy Waters (VA DEQ)

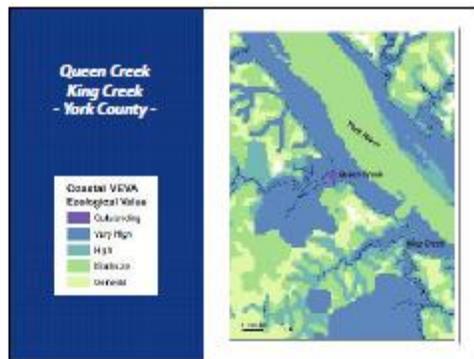
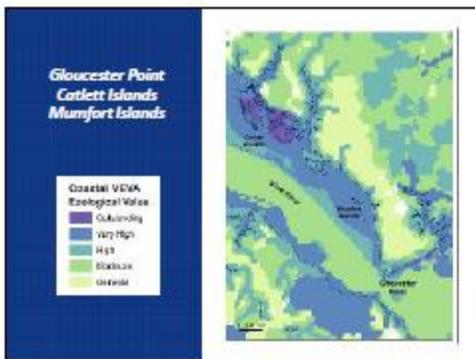
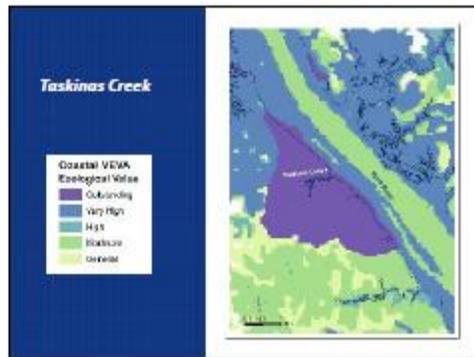
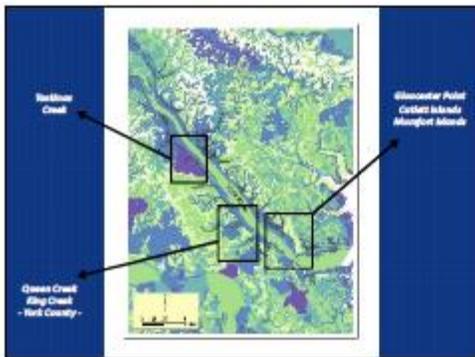
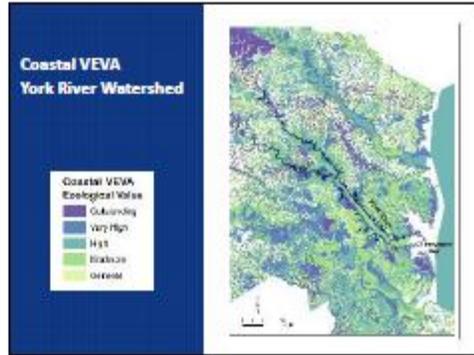
- ### Data Layers used to establish Aquatic Priority Conservation Areas
- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Colonial Waterbird Database 2. Audubon Important Bird Areas 3. Shellfish Suitability 4. Reef Restoration Sites 5. Oyster Reefs 6. Artificial Fishing Reef 7. Wetlands (2009 NWI) 8. Sand/Mud Flats 9. Seagrass Areas | <ol style="list-style-type: none"> 10. Aquaculture sites 11. Turtle Nesting Sites 12. SAV (1999 - 2008) 13. Aquatic Confirmed Habitat 14. VCU Aquatic Resource Integrity 15. Stream Conservation Areas 16. Threatened & Endangered Waters 17. Regulated Areas |
|---|---|

APCA Ranking of Individual Attributes

LAYER	SCORE
1) Colonial Waterbird Database	3
2) Audubon Important Bird Areas	3
3) Shellfish Suitability	3
4) Reef Restoration Sites	3
5) Oyster Reefs	3
6) Artificial Fishing Reef	3
7) Wetlands (2009 NWI)	3
8) Sand/Mud Flats (2009 NWI)	3
9) Seagrass Areas	3
10) Aquaculture sites	3
11) Turtle Nest	3
12) SAV (1999 - 2008)	3
13) Aquatic Confirmed Habitat	3
14) VCU Aquatic Resource Integrity	3
15) Stream Conservation Areas	3
16) Threatened & Endangered Waters	3
17) Regulated Areas	3

1 = good
 2+ = very high
 3+ = exceptional





Next Steps for VEVA

- Outreach
 - regional conferences
 - planning district commission meeting
 - online guides
- Expansion west of the coastal zone

Coastal VEVA

<http://www.deq.state.va.us/coastal/coastalgems.html>

http://ccrm.vims.edu/resources/conservation_planning/index.html

<http://www.dgif.virginia.gov/gis/gis-data.asp>



Appendix G. Materials for Virginia GIS Conference

Abstract

Jason Bulluck

Information Manager

Virginia Department of Conservation and Recreation- Division of Natural Heritage

Jason.bulluck@dcr.virginia.gov

(804) 786-8377

Coastal Virginia Ecological Value Assessment (VEVA): A conservation planning tool for Virginia's Coastal Zone.

Habitat loss, degradation, and fragmentation pose significant threats to the long term conservation of Virginia's wildlife species and natural communities. Comprehensive conservation planning at the local level offers a proactive and effective approach to managing current and future resources. However, locally applicable tools are limited. The Coastal Virginia Ecological Value Assessment (VEVA) synthesizes best available state level resource information into one geospatial product to provide guidance to localities engaged in conservation and land use planning. Funded by Virginia's Coastal Zone Management Program, VEVA is a multi-agency collaborative effort. In 2009, Virginia's Departments of Game and Inland Fisheries, Conservation and Recreation- Division of Natural Heritage, and Virginia Commonwealth University's Center of Environmental Studies integrated selected conservation data to create the coastal Priority Conservation Areas (PCA) dataset. In 2010, the Virginia Institute of Marine Sciences' Center for Coastal Resources Management engaged in a similar activity, focused on estuarine and coastal bay areas. The two initiatives were combined in 2011 to create the coastal VEVA. Coastal VEVA incorporates scientific data and best professional judgment to rank terrestrial and aquatic areas for ecological value. A 1-to-5, "general" to "outstanding" rank is assigned to terrestrial and aquatic areas based on wildlife habitat, as well as blue and green infrastructure assets. These data, as maps and GIS layers, can be applied to conservation planning efforts, as well as land use decisions, to help assure minimal impacts to conservation values, while meeting local development needs.

The "how to" presentation will discuss project details and GIS applications.

Presentation

The Coastal Virginia Ecological Value Assessment







Jason Bulluck
 Natural Heritage Information Manager
 VA Dept. of Conservation and Recreation

VaGIS Conference
 September 19, 2011

Priority Conservation Areas (PCAs)

— An initial step toward identifying areas for protection and conservation of Virginia's wildlife plants and natural resources. The "Hot Spot" lands are not the most important or the most diverse, but they are the most vulnerable.



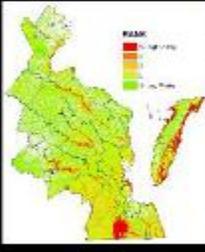
Legend

- Highly Vulnerable
- Vulnerable
- Least Vulnerable
- Not Vulnerable



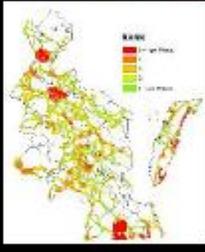


DGIF- Priority Wildlife Diversity Conservation Areas



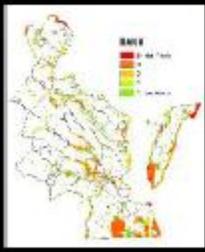
- Input from wildlife diversity biologists
- Based on Virginia's Wildlife Action Plan
- Other wildlife resource spatial data
 - Important bird areas
 - Colonial waterbird sites
 - Coldwater streams
 - Anadromous fish use areas
 - Etc.
- Datasets ranked based on conservation value for wildlife

DCR-DNH- Natural Landscape Network



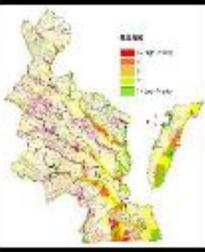
- Virginia Natural Landscape Assessment
 - Prioritizes natural lands
 - Identifies natural land networks
- C1 and C2 cores and corridors/nodes
- Ranked by ecological integrity, 1-5 (5 highest)

DCR-DNH- Conservation Sites

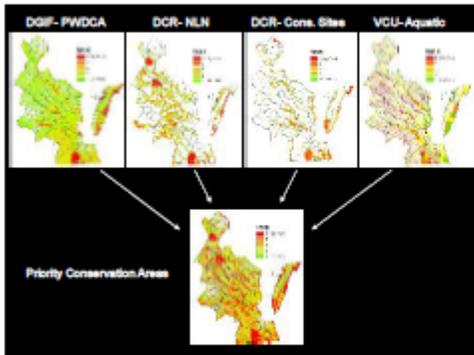


- Delineate known occurrences of rare species, plus required habitat and buffer
- Biodiversity significance ranked
- Represent land that should be conserved for protection of natural heritage resources, NOT protected lands

VCU- Aquatic Resource Integrity Layer



- Stream reach approach
 - Individual reaches
 - INSTAR
 - Aquatic community assessment
 - Fish, habitat, macroinvertebrates
- Watershed approach
 - Coarse scale analysis to characterize whole watershed
 - Incorporates various data



VIMS-Aquatic Priority Conservation Areas

- 17 different layers from various agencies
- Assigned a score (1-3) for each resource
- Assessed weighted sum, boosted weighted sum, and maximum value approaches
- Maximum value approach chosen to create the final product

LAYER	SCORE
1) Cultural/Statutory Database	3
2) Audubon Impaired Bird Areas	2
3) Wildlife Suitability	2
4) Reef Restoration Sites	3
5) Outer Reefs	3
6) Artificial/Existing Reef	3
7) Wetlands (2009 NPS)	3
8) Sand/Shell Beds (Post-2003 NPS)	2
9) Seed Areas	1
10) Aquaculture sites	2
11) Turtle Nest	3
12) MVA (2008-2008)	3
13) Aquatic Confined/Isolated	3
14) VCU Aquatic Resource Integrity	3
15) Stream Conservation Areas	2
16) Threatened & Endangered Animals	3
17) Regulated Areas	3

Healthy Waters

- "A new ecological approach to identifying and protecting healthy waters in Virginia"
- Virginia's Healthy Waters Initiative
 - Raise awareness about importance of protecting streams, creeks, and other waters
 - Effort to include these critical healthy resources before they are compromised
- Sections of healthy streams identified and ranked through use of INSTAR
 - Ranks of exceptionally healthy, healthy, or restoration candidate
 - Identified using information about fish communities, bugs, in-stream habitat and riparian borders

What defines Healthy Waters?

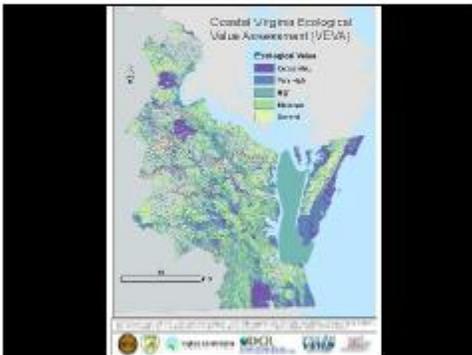
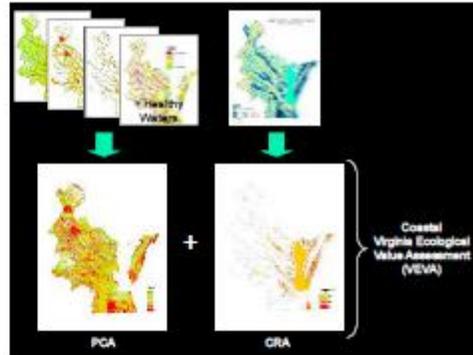
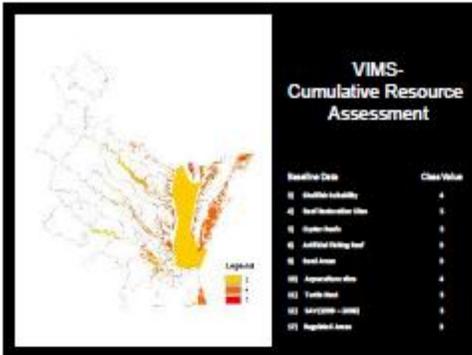
- High number of native species, broad diversity of species
- Few or no non-native species
- Few generalist species that are tolerant of degraded water quality
- High number of native predators
- Migratory species whose presence indicates dams or other impediments are not creating blockages
- Low incidence of disease or parasites
- Intact buffers of vegetation in the riparian zone

Examples of Healthy Waters in the Coastal Zone

- Fredericksburg: Galbarne Run
- Hanover and Henrico counties: Chickahominy River
- King and Queen County: Little River and Bull Run
- Prince William County: South Fork Quantico Creek
- Richmond County: Tobacco Creek and North Fork Richardson Creek
- Stafford County: White Oak Run
- Suffolk County: Jones Swamp Tributary

Bringing it all together

- Healthy Watersheds Integration
 - Delineated to supplement the healthy waters stream reaches that were used in the PCA
 - Where Healthy Waters data was unavailable, VCU's Modified Index of Biotic Integrity (MIBI) was used
- PCA re-run
 - Inclusion of Healthy Waters ranks in VCU-CES Aquatic Resource Integrity layer
 - Data resampled to 100m cells and combined using cell statistics
 - Majority filter to smooth data and remove noise
- APCA Integration
 - Boiled down to a Cumulative Resource Assessment (CRA) to avoid overlapping resources and double-counting
 - CRA waters given class values (1-3) and combined with Mosaic to New Raster Tool
 - Combined with re-run PCA using cell statistics



Coastal VEVA

- A classification that uses science-based best professional judgment to assess natural systems found on the coastal landscape
- A collaborative effort among several state programs to synthesize the best available natural resource information into a single geospatial product
- Was developed to provide guidance to local governments engaged in land use management and conservation planning

Utilization of Coastal VEVA

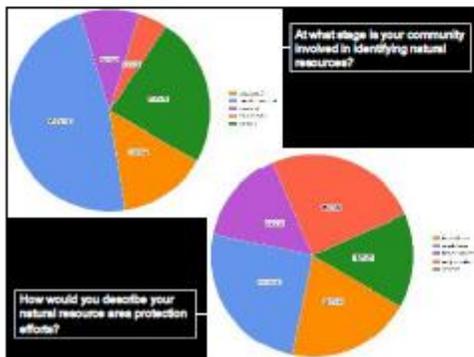
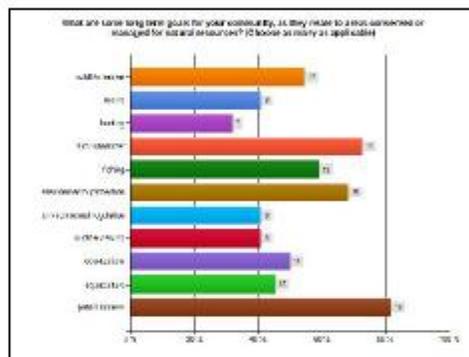
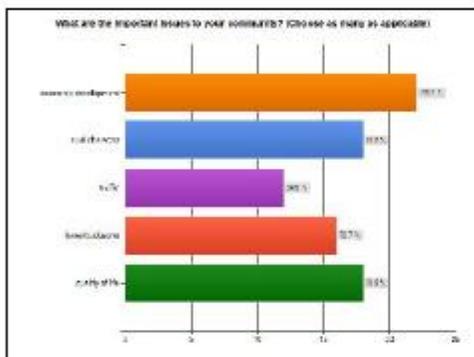
- Guiding development
- TMQL Implementation planning
- Comprehensive plans
- Land preservation and protection (e.g. CELCP map)
- Policy Implementation:
 - Flood plain management planning
 - Natural hazard planning
 - Subdivision and zoning ordinances
 - Building codes

Caveats and Limitations

- Includes areas of known disturbance such as Interstates, large developments, and military installations
- "Datedness" of data
- Inherent overlap of data
- Downsampling to meet standardized 100m cell size creates a coarser, smaller scale analysis
- Coastal VEVA is intended to guide conservation planning and efforts, and is not intended to replace on the ground surveys or consultation with biologists
- This data serves as a compliment to existing local data

Locality Survey of Conservation Planning Needs

- Survey to guide tool usage and development to help in locally practical ways
- 23 respondents, 94.7% planners
- 66.7% currently involved in natural resource conservation planning efforts
- 50% already aware of PCA data and maps
- 35% have used PCA data and/or maps for natural area planning:
 - To determine applicability of grant funds for land purchase/protection
 - For green infrastructure: asset mapping and opportunity identification, planning, CELOP applications
 - To select a watershed for a special outreach area for concentrated outreach efforts with VOF
- 64.3% plan on using PCA data for future planning needs



Next Steps

- Outreach
 - Regional Conferences
 - Planning District Commission meetings
 - Online guides
- Expansion west of the Coastal Zone
- Data input updates



Data download

- DGIF's GIS site
<http://www.dgif.virginia.gov/data.asp>
- VIMS' GIS site
http://com.vims.edu/resources/conservation_planning/index.html

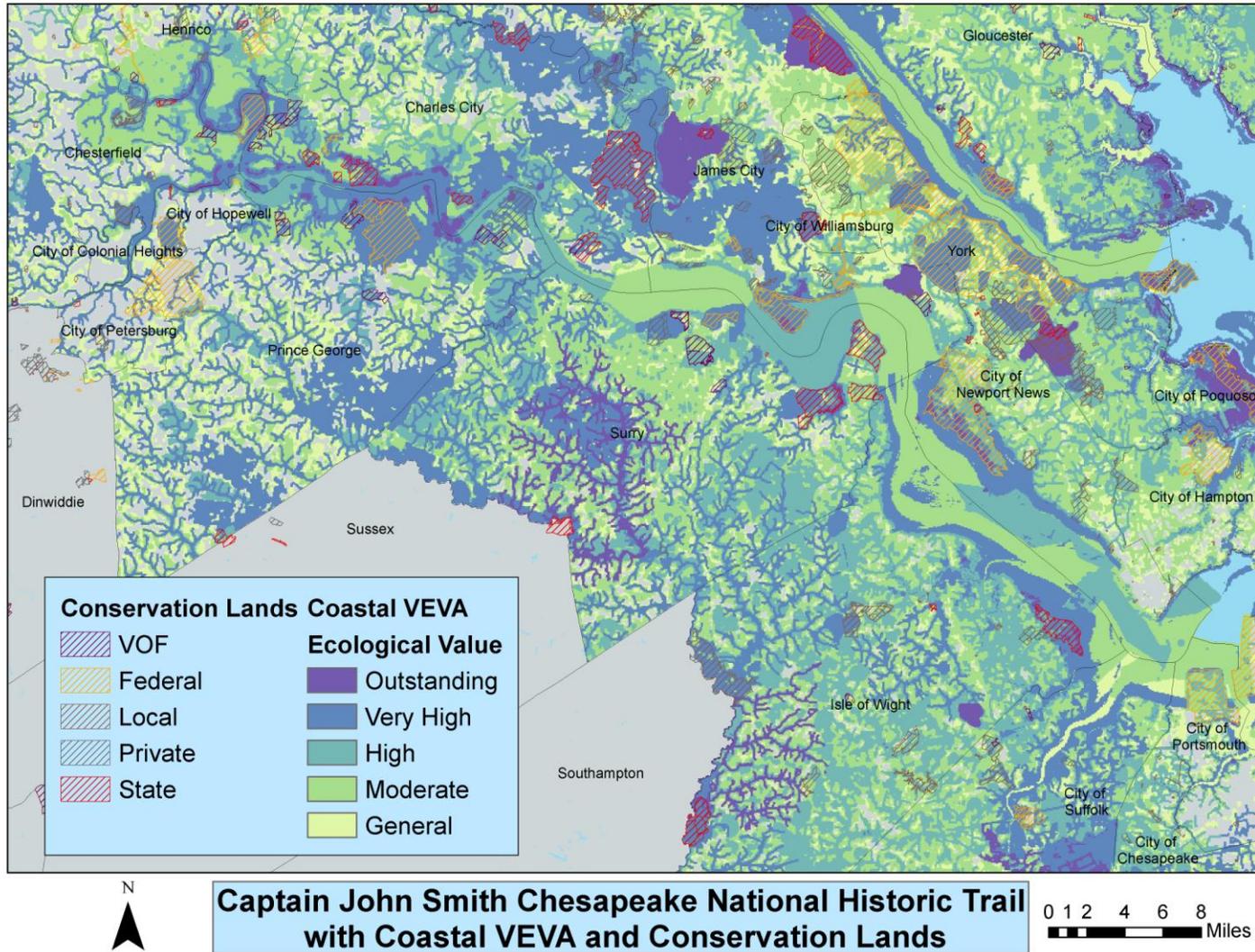
Data viewing

- Virginia DEQ Coastal GEMS
<http://www.deq.state.va.us/coastal/coastalgems.html>

This project was funded in part by the Virginia Coastal Zone Management Program at the Department of Environmental Quality through grant number NA09NO04190205 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.

Questions?

Appendix H. Map produced for National Park Service John Smith Trail Discussion



Agenda

Introducing Green Infrastructure for Coastal Resilience

February 2, 2012

Virginia Institute of Marine Science

8:30 - 9:00 AM - Coffee and sign-in

9:00 AM - Welcome - Sandra Erdle - Coordinator, Coastal Training Program, Chesapeake Bay National Estuarine Research Reserve in VA

9:05 AM - Green Infrastructure Concepts and Principles: What is it? - Lindsay Goodwin, NOAA Coastal Services Center

An Introduction to Green Infrastructure Planning Processes - Lindsay Goodwin

10:15 AM - Break

Getting On-the-Ground: Green Infrastructure Network Design - Lindsay Goodwin

12:30 PM Lunch

1:15 PM - Blue and Green Infrastructure Planning Initiatives of the Virginia Coastal Zone Management Program - a brief introduction to the VA CZM Program, and to the primary B/G initiatives: Coastal VEVA, and the Regional PDC projects. Shep Moon and Beth Polack, VA Coastal Zone Management Program.

1:30 PM - Local Perspective - VEVA as a Resource - Jason Bulluck, VA Division of Natural Heritage

2:00 PM - Incorporating Blue and Green Infrastructure into Local Plans and Ordinances in Coastal Virginia - Shep Moon and Beth Polack

2:30 - Local Perspective - the process - results - projects, examples! - Alisa Hefner, Skeo Solutions and Green Infrastructure Center

3:15 PM - What's Next? Resources for Moving Forward - Lindsay Goodwin

3:30 PM - Feedback and Evaluation



Chesapeake Bay
National Estuarine
Research Reserve
in Virginia



VIMS | WILLIAM
& MARY
VIRGINIA INSTITUTE OF MARINE SCIENCE

Attendees (via sign-in sheet)

Michael	Anaya	manaya@hampton.gov	City of Hampton
Faye	Andrashko	Faye.Andrashko@nnsxcd.org	Northern Neck Soil and Water Conservation District
Heather	Barrar	Barrarh@chesterfield.gov	Chesterfield County
Laura	Barry	BarryL@chesterfield.gov	Chesterfield County
Bronco	Bayless	fishinbronco@earthlink.net	Gloucester County Wetlands Board
Pam	Boatwright	pboatwright@elizabethriver.org	Elizabeth River Project
Carrie	Bookholt	cbookhol@vbgov.com	City of Virginia Beach
Louis	Bott	lbott@nngov.com	City of Newport News
Bobbie	Burton	burtonbs@longwood.edu	Hull Springs Farm of Longwood College
Ed	Carr	Ed.Carr@dgif.virginia.gov	VA Dept of Game and Inland Fisheries
Kevin	Dubois	kevin.dubois@norfolk.gov	City of Norfolk
Gayle	Hicks	ghicks@hampton.gov	City of Hampton
Shereen	Hughes	shereen.hughes@wetlandswatch.org	Wetlands Watch
Patty	Hunt	phunt@jlab.org	Jefferson Laboratory-Dept of Energy
David	Imburgia	dimburgia@hampton.gov	City of Hampton
John	Kirk	John.Kirk@dgif.virginia.gov	VA Dept of Game and Inland Fisheries
Danielle	Kulas	Danielle.Kulas@dcr.virginia.gov	DCR's Division of Natural Heritage
Jacob	Lacy	jlacy@nngov.com	City of Newport News
Alex	Long	along@infionline.net	Weichert Realtors
Robert	MacPherson	RMacPher@vbgov.com	City of Virginia Beach
Geralyn	Mireles	Geralyn_Mireles@fws.gov	US Fish and Wildlife Service
David	Norris	david.norris@dgif.virginia.gov	VA Dept of Game and Inland Fisheries
David	Nunnally	dnunnally@co.caroline.va.us	Caroline County
Stacy	Porter	porters@portsmouth.va.gov	City of Portsmouth
Marshall	Sebra	msebra@kilmarnockva.com	Town of Kilmarnock
Justin	Shafer	Justin.Shafer@norfolk.gov	City of Norfolk
James	Staranowicz	jstaranowicz@staffordcountyva.gov	Stafford County
Peter	Stith	pstith@co.northampton.va.us	Northampton County
Roxanne	Stonecypher	rstonecypher@CityofChesapeake.Net	City of Chesapeake
Brian	Swets	bswets@CityofChesapeake.Net	City of Chesapeake
Judy	Tucker	Coastalsoc@aol.com	The Coastal Society
Christina	Uperti	Cuperti@vbgov.com	City of Virginia Beach
Jim	White	james.d.white@norfolk.gov	City of Norfolk
Wayne	Wilcox	Wwilcox@vbgov.com	City of Virginia Beach
Sandra	Erdle	syerdle@vims.edu	Chesapeake Bay National Estuarine Research Reserve in VA
Alisa	Hefner	ahefner@skeo.com	Green Infrastructure Center
Lindsay	Goodwin	lindsay.goodwin@noaa.gov	NOAA Coastal Services Center
Shep	Moon	hsmoon@deq.virginia.gov	VA Coastal Zone Management Program
Beth	Polack	Beth.Polak@deq.virginia.gov	VA Coastal Zone Management Program
Jason	Bulluck	Jason.Bulluck@dcr.virginia.gov	DCR's Division of Natural Heritage

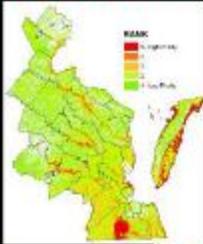
DGIF Components

- Tier III+ Species Habitats
- DCR- VCLNA Cores
- NWI Wetlands
- USGS – Hydrography 1:100k
- Audubon Important Bird Areas
- Anadromous fish use
- Coldwater streams
- Colonial waterbird colonies

Priority Wildlife Diversity Conservation Areas (PWDCA) Scoring

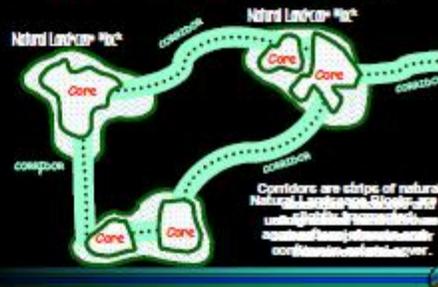
Category	Sub-category	Count	Value	Weight	Score	
Confirmed	Tier I egg nests	10	200	2000	2000	
	Tier II egg nests	8	100	800	800	
	Tier III egg nests	2	50	100	100	
	Tier IV egg nests	5	200	1000	1000	
	Tier I egg habitat	1	100	100	100	
	Tier II egg habitat	3	100	300	300	
Potential	Tier I egg nests	7	150	1050	1050	
	Tier II egg nests	6	100	600	600	
	Tier III egg nests	1	50	50	50	
	Tier IV egg nests	3	200	600	600	
	Tier I egg habitat	1	100	100	100	
	Tier II egg habitat	3	100	300	300	
Unconfirmed	Tier I egg locations	10	200	2000	2000	
	Tier II egg locations	8	100	800	800	
	Tier III egg locations	2	50	100	100	
	Tier IV egg locations	5	200	1000	1000	
	Tier I egg habitat	1	100	100	100	
	Tier II egg habitat	3	100	300	300	
	Wetlands	Wetlands	60	200	12000	12000
	Wetlands	Wetlands	45	150	6750	6750
	CRIS	Wild landowners	1	200	200	200
	CRIS	Wild landowners	2	100	200	200
	Land Use	Confirmed	1	100	100	100
	Land Use	Potential	3	100	300	300
Streams	Highly sensitive	5	100	500	500	
Streams	Highly sensitive	1	100	100	100	
Streams	Highly sensitive	1	100	100	100	

DGIF- Priority Wildlife Diversity Conservation Areas



- Input from wildlife diversity biologists
- Based on Virginia's Wildlife Action Plan
- Other wildlife resource spatial data
 - Important bird areas
 - Colonial waterbird sites
 - Coldwater streams
 - Anadromous fish use areas
 - Etc.
- Datasets ranked based on conservation value for wildlife

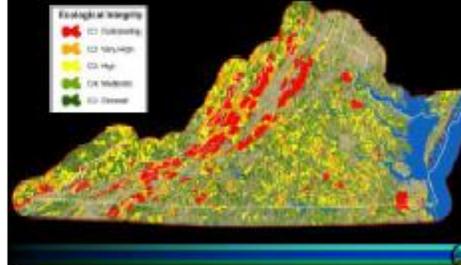
DCR-Natural Heritage Component Virginia Natural Landscape Assessment (VaNLA)



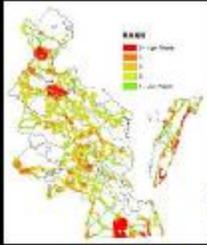
Ecological Integrity Model



Cores and Habitat Fragments by Ecological Integrity



DCR-DNH- Natural Landscape Network

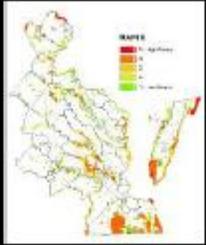


- Virginia Natural Landscape Assessment
 - Prioritizes natural lands
 - Identifies natural land networks
- C1 and C2 cores and corridors/nodes
- Ranked by ecological integrity, 1-5 (5 highest)

DCR
Department of Conservation & Forestry
Division of Natural Heritage

Virginia Coastal Zone
MARINE COASTAL ZONE

DCR-DNH- Conservation Sites



- Delineate known occurrences of rare species, plus required habitat and buffer
- Biodiversity significance ranked
- Represent land that should be conserved for protection of natural heritage resources, NOT protected lands

VCU Aquatic Component

- Stream reach based approach
 - Local scale assessment for individual stream segment integrity
 - Aquatic Community analysis
 - 50+ variables possible
- Watershed based approach
 - Coarse scale analysis to characterize whole watershed
 - Incorporates various data
 - 6 variables/metrics

Virginia Coastal Zone
MARINE COASTAL ZONE

VCU

VCU Stream Reach Component

- Individual stream reach
- INSTAR
- Aquatic community assessment
 - Fish, Habitat, Macroinvertebrates
- ~1000 locations
- 4 Health categories



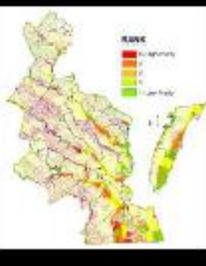
VCU Watershed Component




All valid biological data:

- Species lists
- Individual occurrences
- Surveys
- VA DGIF, DNH, VCU, US Army, Local Governments

VCU - Aquatic Resource Integrity Layer



- Stream reach approach
 - Individual reaches
 - INSTAR
 - Aquatic community assessment
 - Fish, habitat, macroinvertebrates
- Watershed approach
 - Coarse scale analysis to characterize whole watershed
 - Incorporates various data

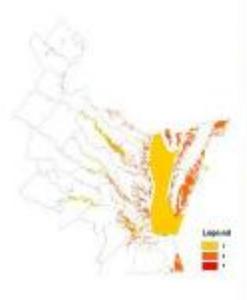
VIMS – Estuarine Component Aquatic Priority Conservation Areas



- 17 different layers from various agencies
- Assigned a score (1-3) for each resource
- Assessed weighted sum, boosted weighted sum, and maximum value approaches
- Maximum value approach chosen to create the final product

DATA	SCORE
1) General National Wetlands	3
2) Aquatic Invertebrate Benthos	2
3) Wetland Suitability	2
4) Reef/Underwater Sites	3
5) Hydro-Soils	3
6) Artificial/Polishing Reef	3
7) Wetlands (2000 WPA)	3
8) Wetland Maps from 2000 WPA	3
9) Sand Areas	2
10) Aquaculture Sites	2
11) Turbidity	3
12) Silt (1980-2000)	3
13) Aquatic Confined/Impaired	3
14) VCI Aquatic Resource Integrity	3
15) Stream Conservation Areas	2
16) Threatened & Endangered Species	3
17) Regulated Areas	3

VIMS-Cumulative Resource Assessment



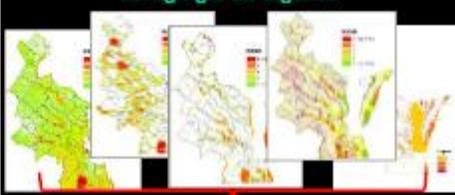
Raw Data

- 1) Wetland Suitability
- 2) Reef/Underwater Sites
- 3) Hydro-Soils
- 4) Artificial/Polishing Reef
- 5) Sand Areas
- 6) Aquaculture Sites
- 7) Turbidity
- 8) Silt (1980-2000)
- 9) Regulated Areas

Class Value

Legend: 1, 2, 3

Bringing it all together



Maximum Value Operation

1 (0) 2 (1) 3 (2) 4 (3) 5 (4)

Central Virginia Ecological Value Assessment (VEVA)



Ecological Value

- Very High
- High
- Moderate
- General



Coastal VEVA

- A classification that uses science-based best professional judgment to assess natural systems found on the coastal landscape
- A collaborative effort among several state programs to synthesize the best available natural resource information into a single geospatial product
- Was developed to provide guidance to local governments engaged in land use management and conservation planning

Utilization of Coastal VEVA

- Guiding development
- TMDL implementation planning
- Comprehensive plans
- Land preservation and protection (e.g. CELCP map)
- Policy implementation:
 - Flood plain management planning
 - Natural hazard planning
 - Subdivision and zoning ordinances
 - Building codes

Caveats and Limitations

- Includes areas of known disturbance such as Interstates, large developments, and military installations
- "Datedness" of data
- Inherent overlap of data
- Downsampling to meet standardized 100m cell size creates a coarser, smaller scale analysis
- Coastal VEVA is intended to guide conservation planning and efforts, and is not intended to replace on the ground surveys or consultation with biologists
- This data serves as a compliment to existing local data

Next Steps

- Outreach
 - Regional Conferences, Planning Commission meetings, online guides, recreation planning efforts
- Expansion west of the Coastal Zone
- Data input updates



Data download

- DGIF's GIS site
<http://www.dgif.virginia.gov/gis/>
- VIMS' GIS site
http://ccrm.vims.edu/resources/conservation_standards/index.html

Data viewing

- Virginia DEQ Coastal GEMS
<http://www.deq.state.va.us/coastal/coastalgems.html>

This project was funded in part by the Virginia Coastal Zone Management Program at the Department of Environmental Quality through grant number NA10N054190205 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.



Jason Bulluck
Natural Heritage Information Manager
VA Dept. of Conservation and Recreation
jason.bulluck@dcr.virginia.gov
804-786-8377

Appendix J. Materials for the September CBNERRVA Blue-Green Infrastructure Workshop

Agenda



Blue and Green Infrastructure in Coastal Virginia: Tools and Implementation

A workshop on local options for protecting important land and water resources

September 27, 2012

Virginia Institute of Marine Science

Waterman's Hall

8:30 – 8:45 Coffee and sign-in

8:45 – 9:10 Welcome and Introduction

Sandra Erdle – Chesapeake Bay National Estuarine Research Reserve

Shep Moon – Virginia Coastal Zone Management Program

9:10 – 10:20 Coastal Virginia Ecological Value Assessment (Coastal VEVA)

An overview of this collaborative effort among state programs to synthesize the best available natural resource information into a single geospatial product.

Jason Bulluck: VA Dept. of Cons. and Rec. - Natural Heritage Division

Lenée Pennington: VA Department of Game and Inland Fisheries

Todd Janeski: VCU Center for Environmental Studies

Marcia Berman: VIMS Center for Coastal Resources Management

Beth Polak: Virginia CZM Program

10:20 – 10:40 Break (drinks and snacks provided)

10:40 – 12:00 Regional & Local Blue & Green Infrastructure Planning

A panel discussion of lessons learned from Virginia CZM-funded projects to promote Coastal VEVA and protect Blue and Green Infrastructure.

Sara Kidd: Hampton Roads Planning District Commission

Kevin Byrnes: George Washington Regional Commission

Sarah Stewart: Richmond Regional Planning District Commission

Laura Grape: Northern Virginia Regional Commission

Stuart McKenzie: Northern Neck Planning District Commission

Lewie Lawrence: Middle Peninsula Planning District Commission

Tom Brockenbrough: Accomack County

12:00 – 12:45 Lunch (please bring a lunch, drinks and dessert will be provided)

12:45 – 2:00 New Tools: The Green Infrastructure Center Practitioners Guide and the Virginia Department of Forestry’s InFOREST Tool

A review of the practices promoted in the GIC’s new publication on how to protect blue and green infrastructure, and a demonstration of the Virginia Department of Forestry’s new tool for analyzing the benefits of green infrastructure and enhancing environmental decision-making at the local level.

Karen Firehock: Green Infrastructure Center

2:00 – 2:15 Break (drinks and snacks provided)

2:15 – 3:30 Land Conservation

A panel discussion of traditional land conservation efforts and their implications for local government initiatives to protect blue and green infrastructure.

Sarah Richardson: VA DCR Office of Land Conservation

Lewie Lawrence: Middle Peninsula Planning District Commission

Martha Little: Virginia Outdoors Foundation Stewardship Program

3:30 – 4:00 Wrap Up and What’s next?



Attendees (via sign-in sheet)

Rogard	Ross	rogard@yahoo.com	Friends of Indian River
Aguilar	Leah	Leah.Aguilar@yorkcounty.gov	York County
Aleshire	Emily	Emily.Aleshire@va.usda.gov	USDA, NRCS
Anaya	Michael	manaya@hampton.gov	City of Hampton
Anderson	Al		Lancaster County Wetlands Board
Ausink	Chris	causink@hampton.gov	City of Hampton
Bahringer	Nils	nils5@verizon.net	VA Beach Wetlands Brd
Barry	Laura	BarryL@chesterfield.gov	Chesterfield County
Berman	Marcia	marcia@vims.edu	CCRM, VIMS
Bilkovic	Donna	donnab@vims.edu	CCRM, VIMS
Bott	Louis	lbott@nngov.com	City of Newport News
Britt	Kristie	Kristie.Britt@deq.virginia.gov	VA DEQ
Brockenbrough	Tom	tbrockenbrough@co.accomack.va.us	Accomack County
Brumbaugh	Barbara	bbrumba@cityofchesapeake.net	City of Chesapeake
Bulluck	Jason	jason.bulluck@dcr.virginia.gov	DCR DNH
Byrnes	Kevin	byrnes@gwregion.org	George Wash Reg Commission
Carver	Craig	craig.carver@aecom.com	AECOM Env. Planner
Chasse	Matt	Matt.Chasse@noaa.gov	NOAA Estuarine Reserves Division
Creed	Jordon	Jordon.Creed@norfolk.gov	City of Norfolk
Dubois	Kevin	kevin.dubois@norfolk.gov	City of Norfolk
Ducey-Ortiz	Anne	aducey@gloucesterva.info	Gloucester County
Duhring	Karen	karend@vims.edu	CCRM, VIMS
Egginton	Emily	Emily@vims.edu	VIMS
Emslie	Margaret	margaret.emslie@deq.virginia.gov	VA DEQ
Erdle	Sandra	syerdle@vims.edu	CBNERRVA/VIMS
Evans	Jimmy	jrevans@vb.gov	City of Virginia Beach
Firehock	Karen	firehock@gcinc.org	Green Infrastructure Center
Fletcher	Ryan	rfletcher@kingwilliamcounty.us	King William County
Gallegos	John	John_Gallegos@fws.gov	Back Bay NWR
Grape	Laura	lgrape@novaregion.org	Northern VA Reg Council
Green	Amy	Amy.Green@yorkcounty.gov	York County
Harbin	John	jharbin@staffordcountyva.gov	Stafford County
Hardaway	Scott	hardaway@vims.edu	Shoreline Studies Prog/VIMS
Harr	Richard	rharr@nngov.com	City of Newport News
Harvey	Jeffrey	jharvey@co.stafford.va.us	Stafford County
Holloway	Karen	Karen.Holloway@poquoson-va.gov	City of Poquoson

Howell	Jennifer	Jennifer.Howell@deq.virginia.gov	VA DEQ
Hughes	Shereen	Shereen.Hughes@wetlandswatch.org	Wetlands Watch
Hummel	Kim	khummel@isleofwightus.net	Isle of Wight County
Imburgia	David	dimburgia@hampton.gov	City of Hampton
Janeski	Todd	Todd.Janeski@dcr.virginia.gov	VCU Ctr for Env. Studies
Janeski	Robert	rjaneski@verizon.net	Lancaster Co. Wetlands Board
Johnson	Greg	Gjohnson@vbgov.com	City of Virginia Beach
Kidd	Sara	skidd@hrpdcva.gov	Hampton Roads PDC
Komenda	Sharon	shkomenda@yahoo.com	Friends of Indian River
Lacatell	Andy	alacatell@TNC.ORG	TNC
Lane	Mike	lanewmike@aol.com	environmental consulting
Lawrence	Lewie	Llawrence@mppdc.com	Middle Peninsula PDC
Lerberg	Scott	lerbergs@vims.edu	CBNERRVA/VIMS
Lewis	Beth	blewis@southamptoncounty.org	Southampton County
Little	Cecil	littlebay@yahoo.com	Middlesex Wetlands Board
Mason	Charles	ccmason@vbgov.com	City of Virginia Beach
Mason	Pam	mason@vims.edu	CCRM/VIMS
McFarlane	Ben	bmcfarlane@hrpdcva.gov	Hampton Roads PDC
McIntyre	Nancy	NMclntyre@vbgov.com	City of Virginia Beach
McKenzie	Stuart	smckenzie@nnpdc17.state.va.us	Northern Neck PDC
Meehan	Alison	alison.meehan@dcr.virginia.gov	VA DCR
Minnick	Bill	benabill@yahoo.com	Gloucester Wetlands Board
Mitchell	Molly	molly@vims.edu	CCRM, VIMS
Moon	Shep	Shep.Moon@deq.virginia.gov	VA CZMP
Nunnally	David	dnunnally@co.caroline.va.us	Caroline County
Oliver	Dinah	Dinah.Oliver@deq.virginia.gov	VA DEQ
Owen	Randy	Randy.Owen@mrc.virginia.gov	VA MRC
Owens	Ronald	rowens@gloucesterva.info	Gloucester County
Parker	Amy	aparker@yorkcounty.gov	York County
Pennington	Lenee	Lenee.Pennington@dgif.virginia.gov	VA DGIF
Peterson-Lambert	Kathryn	triplam747@aol.com	master naturalist
Polak	Beth	Beth.Polak@deq.virginia.gov	VA CZMP
Revere	Edna		Lancaster Co. Wetlands Board
Richardson	Sarah	sarah.richardson@dcr.virginia.gov	DCR Office of Land Cons
Rudnicki	Richard	rrudnicki@isleofwightus.net	Isle of Wight County
Scully	Paul	Pscully@vbgov.com	City of Virginia Beach
Shearer	Patrick	Pshearer@kerrenv.com	Kerr Environmental
Simmons	Maurice		Middlesex Wetlands Board

Smith	Anne	annesmith@vims.edu	VA Clean Marina Program
Smolnik	Matthew	mamolnik@isleofwightus.net	Isle of Wight County
Stephenson	Peter	Pstephenson@smithfieldva.gov	Town of Smithfield
Stewart	Sarah	ssewart@richmondregional.org	Richmond Regional PDC
Swets	Brian	bswets@CityofChesapeake.Net	City of Chesapeake
Swords	Janet	jmswords@cox.net	
Thompson	Denise	Denise.Thompson@norfolk.gov	City of Norfolk
Vest	Deborah	Deborah.Vest@poquoson-va.gov	City of Poquoson
Walker	William	benabill@yahoo.com	wetlands board
Wyne	Kevin	Kevin.Wyne@poquoson-va.gov	City of Poquoson

Presentations

The following presentation was given by Jason Bulluck, Virginia Department of Conservation and Recreation, Division of Natural Heritage.

The Coastal Virginia Ecological Value Assessment



Blue and Green Infrastructure in Coastal Virginia: Tools and Implementation
September 27, 2012
Virginia Institute of Marine Science, Waterman's Hall

Coastal VEVA

- A classification that uses science-based best professional judgment to assess natural systems found on the coastal Virginia landscape
- A collaborative effort among several state programs to synthesize the best available natural resource information into a single geospatial product
- Was developed to provide guidance to local governments engaged in land use management and conservation planning

Priority Conservation Areas (PCAs)

PCAs consist of areas which harbor an appreciable concentration of riparian habitat, plant and animal resources, "bluebird" lands, and/or other natural resources for protection, protection or management purposes.

- PCA completed in 2008
- revised and enhanced:
 - updated inputs
 - added Healthy Watershed input
 - added component for estuarine areas



WDCR, VCU, and other logos are present at the bottom.



DCR-Natural Heritage Conservation Sites

- Boundaries that enclose:
 - at least one natural heritage resource, and
 - the surrounding habitat or buffer necessary for protection
- Biodiversity significance is ranked
- Represent land that should be conserved for protection of natural heritage resources, NOT protected lands



Stream Conservation Units

- Flag presence of aquatic natural heritage resources
- Signify that protection of these aquatic elements should be considered
- 2 miles upstream and 1 mile downstream of documented aquatic natural heritage resources, and all tributaries within this reach



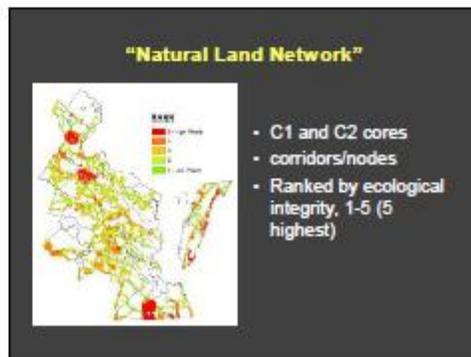
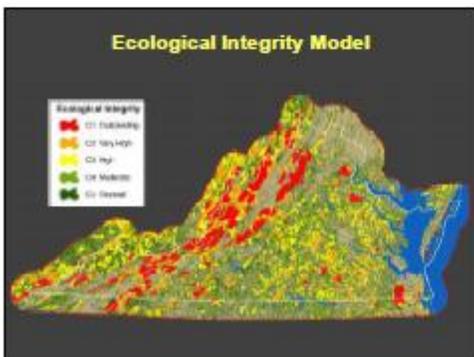
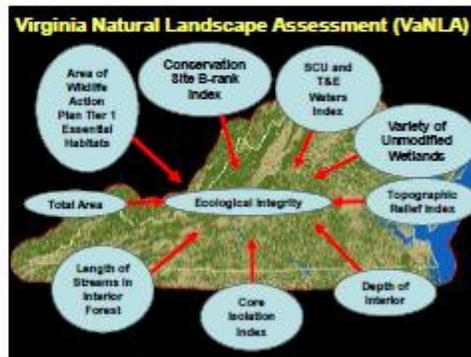
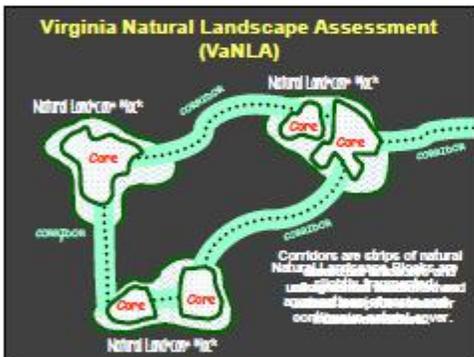
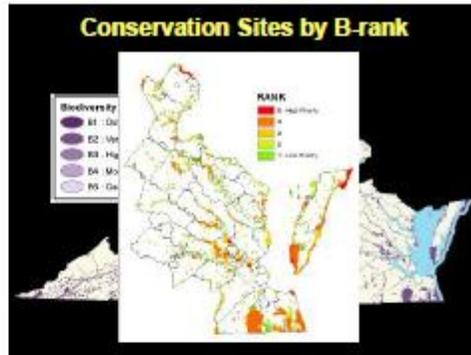
Biodiversity Significance Ranks

Rate the significance of conservation sites based on:

- > Number of natural heritage resources contained
- > Global rarity of the species or natural communities contained
- > Viability of the populations or natural communities contained

B-ranks

B1 – Outstanding
 B2 – Very High
 B3 – High
 B4 – Moderate
 B5 – General

Jason Bulluck
Natural Heritage Information Manager
VA Dept. of Conservation and Recreation
jason.bulluck@dcr.virginia.gov
804-786-8377



Caveats and Limitations

- Includes areas of known disturbance such as Interstates, large developments, and military installations
- "Datedness" of data
- Inherent overlap of data
- Downsampling to meet standardized 100m cell size creates a coarser, smaller scale analysis
- Coastal VEVA is intended to guide conservation planning and efforts, and is not intended to replace on the ground surveys or consultation with biologists
- This data serves as a compliment to existing local data

The following presentation was given by Lenée Pennington, Virginia Department of Game and Inland Fisheries.

Priority Conservation Areas: Priority Wildlife Diversity Conservation Areas

Dave Morton
Kendell Ryan



VA Dept. of Game & Inland Fisheries

- Regulatory/Project Review – T&E Species
- Conservation Planning: Wildlife Action Plan

Mission Statement

- To manage Virginia's wildlife and inland fish to maintain optimum populations of all species to serve the needs of the Commonwealth;
- To provide opportunity for all to enjoy wildlife, inland fish, boating and related outdoor recreation and to work diligently to safeguard the rights of the people to hunt, fish and harvest game as provided for in the Constitution of Virginia;
- To promote safety for persons and property in connection with boating, hunting and fishing;
- To provide educational outreach programs and materials that foster an awareness of and appreciation for Virginia's fish and wildlife resources, their habitats, and hunting, fishing, and boating opportunities.



VDGIF - background

- Wildlife Diversity Division – within Bureau of Wildlife Resources
- Several focused GIS datasets of wildlife resources
- Assembled - Priority Wildlife Diversity Conservation Areas dataset



Priority Wildlife Diversity Conservation Areas

- What areas should be preserved?
- What are the priority areas that should be managed in a specific way?
- What areas should localities to protect through zoning or planning?
- How should DGIF-WDD prioritize lands for acquisition based on existing spatial data?



Priority Wildlife Diversity Conservation Areas

- Input from wildlife diversity biologists
- Based on Virginia's Wildlife Action Plan
 - mapped Tier III+ habitat
 - recommended conservation actions
- Other wildlife resource spatial data:
 - Important Bird Areas
 - Colonial waterbird sites
 - Coldwater streams
 - Anadromous fish use areas




Virginia's Wildlife Action Plan

- Completed – Fall of 2005
- Plan for conserving *Species of Greatest Conservation Need* and their habitats
- 924 Species ranked in Tiers (I – IV)
- Tier I, II + species habitat maps
- Conservation Actions – variety of sources

<http://bewildvirginia.org/>



Conservation Actions – Wildlife Action Plan

Mappable Actions:

- acquire or protect needed habitats
- protect large blocks of contiguous habitat
- create forest/upland buffers around marshes and protect wooded wetlands
- protect/establish riparian buffers

Wildlife Resource Spatial Data

- Tier I/II+ species' habitats
- Audubon Important Bird Areas
- Anadromous fish use areas
- Colonial waterbird colonies
- DCR - VCLNA Cores
- NWI Wetlands
- USGS – Hydrography 1:100k

Tiered habitat

- Habitat Assessment for Species of Greatest Conservation Need (SGCN)
 - Mapped as part of the Wildlife Action Plan
 - Created detailed maps of Tier I, II and T&E species' habitats
 - Modeled from best available information
 - Biologist input and existing spatial data
 - Habitat mapped for 247 species - terrestrial and aquatic

Terrestrial species distribution map Shenandoah salamander

Aquatic species distribution map Littlewing pearl mussel

Audubon IBAs

- Global effort to conserve areas vital to birds
- 19 Important Bird Areas in Virginia
- IBA's in Coastal Zone:
 - Delmarva Peninsula Bayside Marshes
 - Lower Delmarva Peninsula
 - Barrier Island and Lagoon System
 - Chesapeake Bay Islands and Western Shore Marshes
 - Lower James, Lower Rappahannock and Lower Potomac Rivers
 - Pamunkey and Mattaponi Rivers
 - Great Dismal Swamp
 - Back Bay
 - Cupeper Basin

Anadromous Fish Use Areas

- Dataset created by DGIF
- Includes confirmed and potential migration pathways, spawning grounds or nursery areas for anadromous fish
- Based on species observations and biologist input
- 1:100K and 1:24K NHD



Colonial Waterbirds

- Known occurrences of Colonial nesting waterbirds in Virginia
- Data are from several sources
 - 2003 Colonial Waterbird Survey by the Center for Conservation Biology
 - Cornell University
 - DGIF

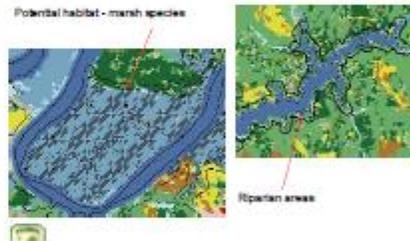


Final PWDCA Component Values

Scale	Confirmed	Potential	Value	Weight	Final Value
Aquatic	Terrestrial wetland	10	200	2000	2000
	Terrestrial wetland	5	200	1000	1000
	Terrestrial wetland	7	200	1400	1400
Riparian	Terrestrial wetland	5	100	500	500
	Terrestrial wetland	7	100	700	700
	Terrestrial wetland	4	100	400	400
Terrestrial	Terrestrial wetland	10	200	2000	2000
	Terrestrial wetland	5	200	1000	1000
	Terrestrial wetland	7	200	1400	1400
Riparian	Terrestrial wetland	5	100	500	500
	Terrestrial wetland	7	100	700	700
	Terrestrial wetland	4	100	400	400
Terrestrial	Terrestrial wetland	5	100	500	500
	Terrestrial wetland	7	100	700	700
	Terrestrial wetland	4	100	400	400
Riparian	Terrestrial wetland	5	100	500	500
	Terrestrial wetland	7	100	700	700
	Terrestrial wetland	4	100	400	400
Terrestrial	Terrestrial wetland	5	100	500	500
	Terrestrial wetland	7	100	700	700
	Terrestrial wetland	4	100	400	400
Riparian	Terrestrial wetland	5	100	500	500
	Terrestrial wetland	7	100	700	700
	Terrestrial wetland	4	100	400	400



Buffering features



Terrestrial tiered species habitat



Priority Wildlife Diversity Conservation Areas



**Priority Wildlife Diversity
Conservation Areas - conclusions**

- Are subjective rankings based on current data and expert opinion
- Can be used independently to prioritize wildlife conservation areas
- Used as a component in developing the Priority Conservation Areas
- Will be available for download from:
<http://www.dgif.virginia.gov/gis/>



Marcia Berman, Program Manager for the Comprehensive Coastal Inventory at the Virginia Institute of Marine Sciences also presented, using the same slides that are in Appendix F.