

Estuarine Blue Infrastructure: Priority Conservation Areas for the Seaside of Virginia's Eastern Shore

5/27/2010

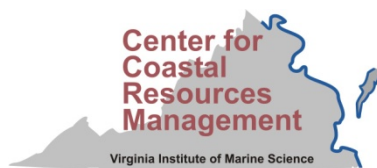
Virginia Institute of Marine Science
Center for Coastal Resources Management

Final Project Report Submitted to

Virginia Coastal Zone Management Program

Virginia Department of Environmental Quality

NOAA Grant # NA07NOS4190178



This project was funded in part by the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant # NA07NOS4190178, FY07 Task 96.01 of the United States Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.

TABLE OF CONTENTS

Executive Summary i

Introduction 1

Objective 1

Project Scope 2

Method and Approach – Cumulative Resource Assessment 3

Method and Approach – Aquatic Priority Conservation Areas 9

Summary Remarks 13

Acknowledgments 16

References 16

Metadata: Virginia Aquatic Priority Conservation Areas – Cumulative Analysis 17

Metadata: Virginia Aquatic Priority Conservation Areas – Ranking Analysis 44

Metadata: Virginia Aquatic Priority Conservation Areas – Spatial Connectivity..... 71

Executive Summary

This project is an extension of earlier efforts within the coastal zone of Virginia to build a platform for enhanced Blue and Green Infrastructure planning. This project is motivated by an interest in extending statewide conservation efforts into estuarine systems and recognition that land use decisions on the upland effect water quality and habitat health in the receiving waters.

The project in its entirety has been accomplished in distinct parts. Part one develops a Cumulative Resource Assessment to evaluate the distribution of aquatic natural resources within waters of Virginia's Chesapeake Bay waters, Back Bay of Virginia Beach, Virginia, and the seaside of the Eastern Shore of Virginia. This task mined data resources at all levels of government to bring together a comprehensive representation of information available for the study areas. The outcome of the CRA would indicate where the maximum number of resources co-exists, but not necessarily where the most important resources exist.

The second part of the project develops a process to prioritize the most ecologically valuable regions within Virginia tidal waters. Using the data output from the CRA, an Aquatic Priority Conservation Area (APCA) analysis was developed which ranks individual resources based on potential to provide important ecosystem services. A weighting function was applied and zones of good, very high, and exceptional habitat value were designated.

Phase three of the project reviewed priority conservation areas (PCAs) designated on the upland and modeled spatial relationships between terrestrial PCAs and Aquatic PCAs. Linkages established between the two could potentially elevate areas on the upland for conservation due to the geo-spatial relationship to important aquatic areas. The analysis only focused on the highest valued conservation areas within both datasets.

Finally where data was available and could support an analysis of climate change impacts, the APCA output was assessed for areas vulnerable to sea level rise impacts. The results of the analysis, which focused only within the Chesapeake Bay portion of Virginia, could indicate where APCA were unlikely to be sustained as a result of long-term impacts of rising water levels. The analysis used climate change vulnerability data derived for wetlands and beach environments as the indicator and identified APCAs adjacent to or coincident with these locations.

Introduction

This project is an outgrowth of an ongoing management effort on the seaside of Virginia's Eastern Shore. The Seaside Special Area Management Plan (SAMP) addresses the complex interaction of multi-interest stakeholders with concerns ranging from expansion of aquaculture, recreational uses, and protection of essential habitat. The SAMP committee, representing these stakeholders, has identified a number of focused projects that provide data to guide the formulation of effective policy to manage the complex nature of this region.

The committee recommended we continue and expand earlier efforts within the coastal zone of Virginia to build a platform for enhanced Blue and Green Infrastructure planning Infrastructure (begun as FY 2003 Task 95.02 to VIMS). There is a need to develop tools to assist local governments with aquatic conservation planning, and begin developing links between aquatic conservation and terrestrial conservation priorities where possible. CZM grants to other state agencies have resulted in the identification of priority terrestrial areas that should be conserved. So combined with the results of the VIMS Aquatic Priority Conservation Areas, local governments and other planning entities will begin to have a seamless view of both land and water resources by downloading these layers into their own GIS or by simply viewing them through tools such as Coastal GEMS.

In June of 2009 the Obama Administration created an Interagency Ocean Policy Task Force to formulate national policy that would ensure protection of ocean, coastal and Great Lakes ecosystems. In the announcement, the White House ordered that a framework be established for effective coastal and marine spatial planning. To that end, this project focuses on defining areas within the Virginia portion of the Chesapeake Bay where we find an abundance of aquatic living resources and essential habitat to support living resources. The effort is important because it paves the way for prioritizing tributaries that are considered highly valuable, potentially vulnerable to upland land use practices, and therefore targets for conservation.

Objective

This project had several objectives. The first was to integrate various data sources to develop a cumulative assessment of aquatic living resources and habitat as a measure of

estuarine resource sensitivity along the seaside of the Eastern Shore of Virginia. An Aquatic Cumulative Resource Assessment (CRA) defines where clusters of aquatic natural resources exist. The basis for a CRA is to collect and geographically juxtapose living resource data to identify resource rich areas.

The second project object was to employ a valuation system to determine if one aquatic region within the study boundary is potentially more ecologically valuable than another. Building on the CRA and the data collected as part of that activity, resources will be ranked as a function of their ability to provide ecological services. This goal will identify regions of high aquatic habitat value that should be the focus of any aquatic conservation management plan.

Recognizing that land use decisions on the upland affect the quality of the adjacent waters, a comprehensive conservation targeting plan would be remiss if it did not consider connectivity between the two landscapes. Another objective of this project was to attempt to develop linkages between the aquatic areas of importance and terrestrial areas previously identified as priority conservation areas under a separate study (DGIF, 2009). This is a holistic approach to prioritizing conservation areas; particularly on the upland.

The project is motivated by an interest in extending statewide conservation efforts into estuarine systems and recognition that land use decisions on the upland effect water quality and habitat health in the receiving waters. Local planners benefit from tools that can point to areas where resources are highly valued and potentially at risk. These techniques are useful for local governments who deal with limited resources, competition for uses, and economic pressures.

Project Scope

Under this grant, a Cumulative Resources Assessment (CRA) and Aquatic Priority Conservation Areas (APCA) were developed for the seaside of the Eastern Shore of Virginia. In separate activities (Task 93.04, FY 07, and Task 11.03 FY 08) the assessment was expanded to include the tidal waters of the Virginia portion of the Chesapeake Bay as well as the Back Bay region located in Virginia Beach, Virginia 1). Tasks undertaken to develop the two products were:

Cumulative Resource Assessment

1. Collect and review all relevant data sources. Specifically this includes a review of data within the current Coastal GEMS application, NOAA's 2004 Environmental Sensitivity Index Atlas for Virginia, products developed by the Virginia Department of Conservation and Recreation, the Virginia Department of Game and Inland Fisheries (DGIF), the Virginia Marine Resources Commission (VMRC), Virginia Commonwealth University (VCU), The Nature Conservancy, and others. Estuarine data found in the Center for Coastal Resources Management's (CCRM) Blue Infrastructure tool was also reviewed for currency and inclusion.
- 2) Use Geographic Information Systems (GIS) and available data to create estuarine overlay districts of high sensitivity along the seaside of the Eastern Shore. These regions will represent a varying degree of sensitivity based on the number of estuarine living resources identified within a given place.
- 3) Generate maps to illustrate the outcome of the CRA and prepare data and metadata for Coastal GEMS.

Aquatic Priority Conservation Areas

1. Using the output of the Cumulative Resource Assessment (CRA) apply a valuation system to rank ecological value of the aquatic areas within the study boundaries and generate Aquatic Priority Conservation Areas (APCA) for future conservation targeting;
2. Review recent terrestrial conservation models developed within Virginia (DGIF, 2009) and assess where spatial connectivity exists between aquatic and terrestrial areas of importance;
3. Generate maps to illustrate the outcome and prepare data and metadata for Coastal GEMS.

Method and Approach - Cumulative Resource Assessment

The first task to developing the CRA was to review available data sources. We began with Blue Infrastructure, an archive representing aquatic resource information for Virginia's tidal waters. The datasets comprising Blue Infrastructure were reviewed for currency and updated if deemed appropriate for inclusion in the CRA. Since the CRA would extend into intertidal habitat regions not included in Blue Infrastructure, additional data sources such as the National Wetlands Inventory and the Environmental Sensitivity Index Atlas were consulted.

While most of these data were focused within the Chesapeake Bay region, they were still reviewed for consistency with other comparable projects. In addition, there have been a number of recent activities that support strategic conservation planning in Virginia which utilized some unique attributes.

In 2009, the Virginia Department of Game and Inland Fisheries released, *"Sustainable Communities: Assessment of Priority Conservation Areas and their Vulnerability to Development"* (DGIF, 2009). This project combined extensive statewide data sets and several spatial models to define priority conservation areas (PCAs) on the upland and within waters of Virginia. These data would be valuable for the anticipated aquatic CRA. After extensive review, a combination of baseline and modeled output data were acquired from the partners involved in the PCA project for use in the CRA.

In all steps following, extreme care was used to insure duplication of data was not occurring. Table 1 lists the final suite of datasets used in the CRA.

Table 1. Baseline data for the Cumulative Resource Assessment

Dataset	Originator
1) Colonial Waterbird Database	Center for Conservation Biology, William and Mary
2) Audubon Important Bird Areas	VA Department of Game and Inland Fisheries
3) Shellfish Suitability	VIMS CCRM
4) Reef Restoration Sites	VMRC/VIMS CCRM
5) Oyster Reefs	VMRC/VIMS Eastern Shore Lab/ CCRM
6) Artificial Fishing Reef	VMRC
7) Wetlands (2009)	National Wetlands Inventory, US Fish and Wildlife
8) Sand/Mud Flats (2009)	National Wetlands Inventory, US Fish and Wildlife
9) Seed Areas	VMRC/VIMS CCRM
10) Aquaculture sites	VMRC/VIMS CCRM
11) Turtle Nest	NOAA Environmental Sensitivity Index Atlas
12) SAV (1999 – 2008)	VIMS Submerged Aquatic Vegetation Program
13) Aquatic Confirmed Habitat	VA Department of Game and Inland Fisheries
14) Aquatic Resource Integrity	Center for Environmental Studies/VCU
15) Stream Conservation Areas	VA Department of Conservation and Recreation
16) Threatened & Endangered Waters	VA Department of Game and Inland Fisheries
17) Regulated Areas	VMRC/VIMS CCRM

The next task focused on integrating the data to perform the CRA. Corresponding shapefiles associated with each data layer were converted to a raster with a cell size of 30m. Most data sets contained large areas of no data values. To standardize the extent of each layer we set the nodata values 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 CRA. The outcome of this process eliminated resource poor areas defined by the independent datasets. For example, the data set "Shellfish Suitability" includes polygons classified as "unsuitable" or "moderately suitable" for shellfish aquaculture. For this study, only those polygons classified as "suitable" or "optimal" for shellfish aquaculture were used in this analysis. The dataset "patch reefs" classified the density of oysters ranging from none to areas that support more than 1000 oysters/m². This study used only those reefs with densities greater than 10 oysters/m². From the Aquatic Resource Integrity layer developed by the Center for Environmental Studies at Virginia Commonwealth University we used only areas classified as "healthy" or "exceptional" and eliminated areas classified as "restoration potential" or "compromised". We included only Stream Conservation Areas (Va Department of Conservation and Recreation-Division of Natural Heritage) with biodiversity rankings of "high" to "outstanding", and only tier I and tier II ranked habitat from the Aquatic Confirmed Habitat layer developed by the Department of Game and Inland Fisheries. Each dataset was reviewed very carefully to understand the full extent of the classification before determinations were made. In some cases, data originators were consulted for clarification. Polygons eliminated from the CRA were coded "0" and those retained for the analysis were given a value of "1".

Other data manipulation also occurred. This study considered only vegetated wetlands, mudflats, or sand flats from the National Wetlands Inventory (NWI) coverage. We combined 10 individual years of Submerged Aquatic Vegetation (SAV) mapping data produced by the SAV Mapping Program at VIMS and used only those SAV patches that persisted for 6-10 years as an indicator of sustainability. All other polygons were eliminated from the study (assigned a value of "0").

Buffers were also established around specific resources to represent areas within which the resource migrates (e.g. bird areas), or areas within which a resource could be affected by

some impact (e.g. rare or threatened waters). Buffers were placed around points (e.g. artificial reefs) or around lines to give them a spatial platform for the analysis. In general point datasets were buffered 200m (Reef Restoration Sites, Aquaculture Sites, Turtle Nesting Locations) or 300m (Colonial Waterbird Dataset) to provide an area for analysis. Linear datasets were generally buffered as follows; Aquatic Confirmed Habitat (300m - following criteria established by the originator), Threatened and Endangered Waters (200m), and Stream Conservation Areas (25m).

The 17 raster layers were superimposed using the Weighted Sum Tool. All layers received the same weight; overlapping cells were summed to produce the Cumulative Resource Assessment. In all cases, the analysis was performed using ESRI’s ArcMAP-ArcInfo®.

The results of the CRA are illustrated in Figure 1. The cumulative analysis used 17 different layers. Within the entire coastal region of Virginia (including the Seaside of the Eastern Shore) the maximum number of resources that were geographically co-located was equal to 7. Table 2 presents the pixel counts for each cumulative level.

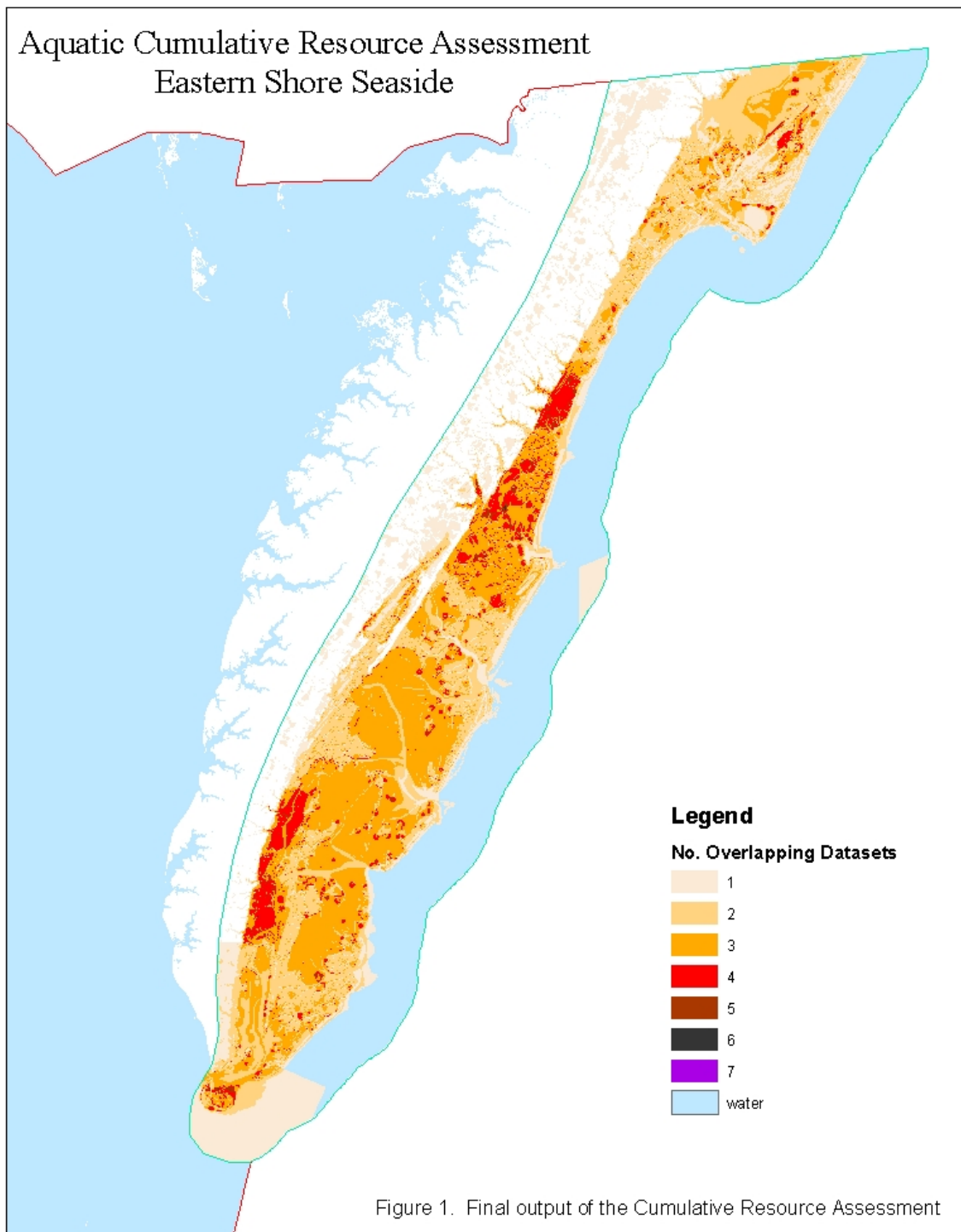
Table 2. Cumulative Resource Assessment for Virginia’s Coastal Zone and Eastern Shore

Total Number of Resources	Pixel Count
0	22,971,550
1	8,549,878
2	2,324,309
3	1,005,944
4	117,835
5	8,211
6	268
7	5

While the map indicates the location of areas that support the maximum number of resources, this analysis does not measure the collective or independent contribution to the ecosystem as a whole. The analysis loosely indicates where there is some diversity in habitat

type. However, areas that support a relatively low number of different resources (only 1 or 2) may include a resource type which performs a vast number of ecosystem services (e.g. a wetland).

The results do indicate potential hot spots for review and consideration for conservation measures. The next project steps will be undertaken to provide true direction toward an ecosystem approach for targeting aquatic conservation areas.



Method and Approach – Aquatic Priority Conservation Areas

The initial steps to develop the Aquatic Priority Conservation Areas (APCA) required a review of all data within Cumulative Resource Assessment (CRA). These data and the original CRA analysis would be the building blocks for the APCA (Figure 1). Table 1. lists all the data used in the CRA and the data originators. The data review included consultation with data developers, as well as detailed metadata reviews to address a few specific issues.

First, it was critical to insure there was no duplication or double counting of resources. Since several of the datasets were derived from analytical interpretation (e.g. Aquatic Resource Integrity Layer) it was conceivable that baseline data may have already been considered. This was the case in several original products considered. For these, we turned to the baseline data inputs.

Second, it was important to have a complete understanding of the resource, as mapped, in order to assign a value which would ultimately represent its ecological value or ability to perform ecological services. We used best professional judgment when ultimately assigning values to each data layer; however, we did so only following a robust review of the dataset for clarity.

Since the CRA output already eliminated resource starved areas from the analysis (CCRM, 2010), the classification for the APCA reflects a relatively healthy spectrum of each attribute. In other words low density or regions void of a specific resource have already been eliminated from the analysis and therefore the classification does not need to be expanded to low end conditions. In the ranking or valuation analysis, each data raster was coded with a value based on best professional judgment (Table 2). The classes assigned to the APCA and their corresponding values are as followed:

- Exceptional Habitat Value: 3
- Very High Habitat Value: 2
- Good Habitat Value: 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 an area with only two resources that score a value of 3 each are not outweighed by an areas with 4 resources with values of 1 each. Finally, this raster set was divided into 3 categories (excluding 0) to reflect the proposed classification. The results of this analysis are illustrated in Figure 2.

Linking Aquatic Priority Conservation Areas to Terrestrial Priority Conservation Areas

We understand that conservation of important aquatic systems may begin with upland based management practices. We also understand that conservation of “isolated” areas; whether they are aquatic or terrestrial systems, does not necessarily meet conservation goals of reducing habitat fragmentation and loss. The next task in this analysis begins the process of establishing connection between terrestrial areas identified for conservation and highly valued aquatic systems prioritized for conservation.

Since the interaction between terrestrial and aquatic based ecosystems is complex and a full study is beyond the scope of this project, the analysis here focuses strictly on geospatial relationships between the two only. Why might this be useful? First, and generally speaking, a healthy aquatic system is most likely found adjacent to a well managed, natural terrestrial landscape. Given this, sustainability of a highly valued aquatic system may be more attainable if geographically connected to an upland area set aside for conservation purposes. Our analysis therefore seeks to identify those areas where this may occur.

Using the terrestrial based component of the Priority Conservation Areas (PCAs) identified by DGIF (2009) and output of the APCA conducted here and described above, areas of spatial adjacency or geographic juxtaposition have been identified. In other words the spatial connectivity between the terrestrial component of the PCA and the APCA is based on where both data sets overlap or touch. For this demonstration we have decided to use only those areas classified in the APCA as “exceptional” and only the top two highest ranked upland priority areas in from the PCA (“imperative opportunity” and “very high opportunity”).

Overlap between the terrestrial PCA and the APCA occurs primarily within analytical buffers conducted in the independent analyses originating from the CRA. These buffers, which varied depending up the resource (25m-300m), represent areas within which a resource logically migrate or within which the resource can be affected by external measures.

Table 2. Summary of ecological value scores

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

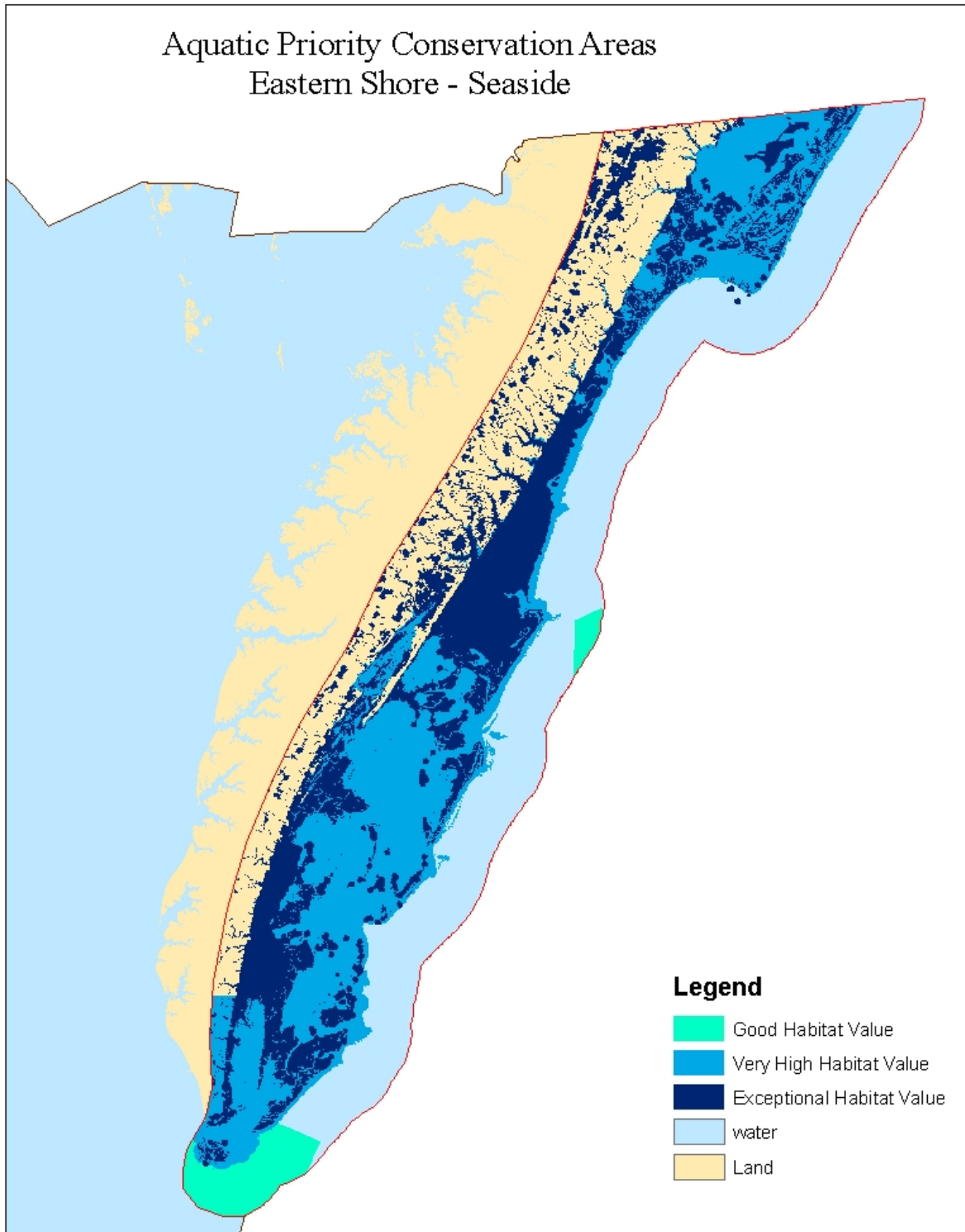


Figure 2. Aquatic Priority Conservation Area designations based on habitat value

Some buffers were used merely to create polygons from features originally mapped as points or lines (e.g. artificial reef locations or nontidal wetland areas). In only one instance was the overlap generated as a function of duplication between datasets. Both the Terrestrial PCA and the APCA use non-tidal wetlands from NWI. While the occurrence of this was more prevalent within the Chesapeake Bay analysis, nontidal wetlands still make up a component of the stream conservation units used in the APCA.

PCA upland areas defined as “imperative opportunity” and/or “very high opportunity” that were not coincident with, but adjacent to an aquatic region valued as “exceptional”, were also highlighted. Figure 3 illustrates both the overlap and the adjacency for a simplistic comprehensive overview of spatial connectivity between the two.

The areas highlighted in Figure 3 may assist local governments in filtering out the absolute best areas to target for conservation. Ideally these areas would reflect upland areas identified for conservation that are coincident with or adjacent to important aquatic systems. The analysis does not consider constraints that may arise due to land ownership, regulatory restrictions, or limitations on the capacity of local governments to implement conservation policy. This would be a valuable piece for further study.

Summary Remarks

This study reflects a local and regional need to address the quality of Blue Infrastructure on the seaside of the Eastern Shore of Virginia. It revitalizes prior efforts to develop Blue Infrastructure as well as special areas management planning. The project has developed tools to assist local governments identify and prioritize essential aquatic habitat for conservation consideration. The respective analyses comprising this study have been undertaken using best available data, science, and management practices. While better data and more data will improve on results, the effort responds to a growing consensus that waiting is no longer an option.

Issues such as open space, use conflict, public access, and preservation of the public trust confront local governments daily. They are complicated by economic development, population growth, dwindling resources, and natural pressures. Conservation has been in the forefront for many years. Aquatic conservation is getting more attention as alternative energy

exploration such as wind farms, and traditional energy exploration such as offshore drilling call for environmental reviews to assess potential impacts.

Marine Spatial Planning will play a significant role in this process. The tasks accomplished under this study exemplify the utility of Marine Spatial Planning at the local and state level. The products developed will serve as a baseline resource for local governments, non-government organizations (NGOs), and state natural resource managers engaged in or considering implementation of a conservation management plan.

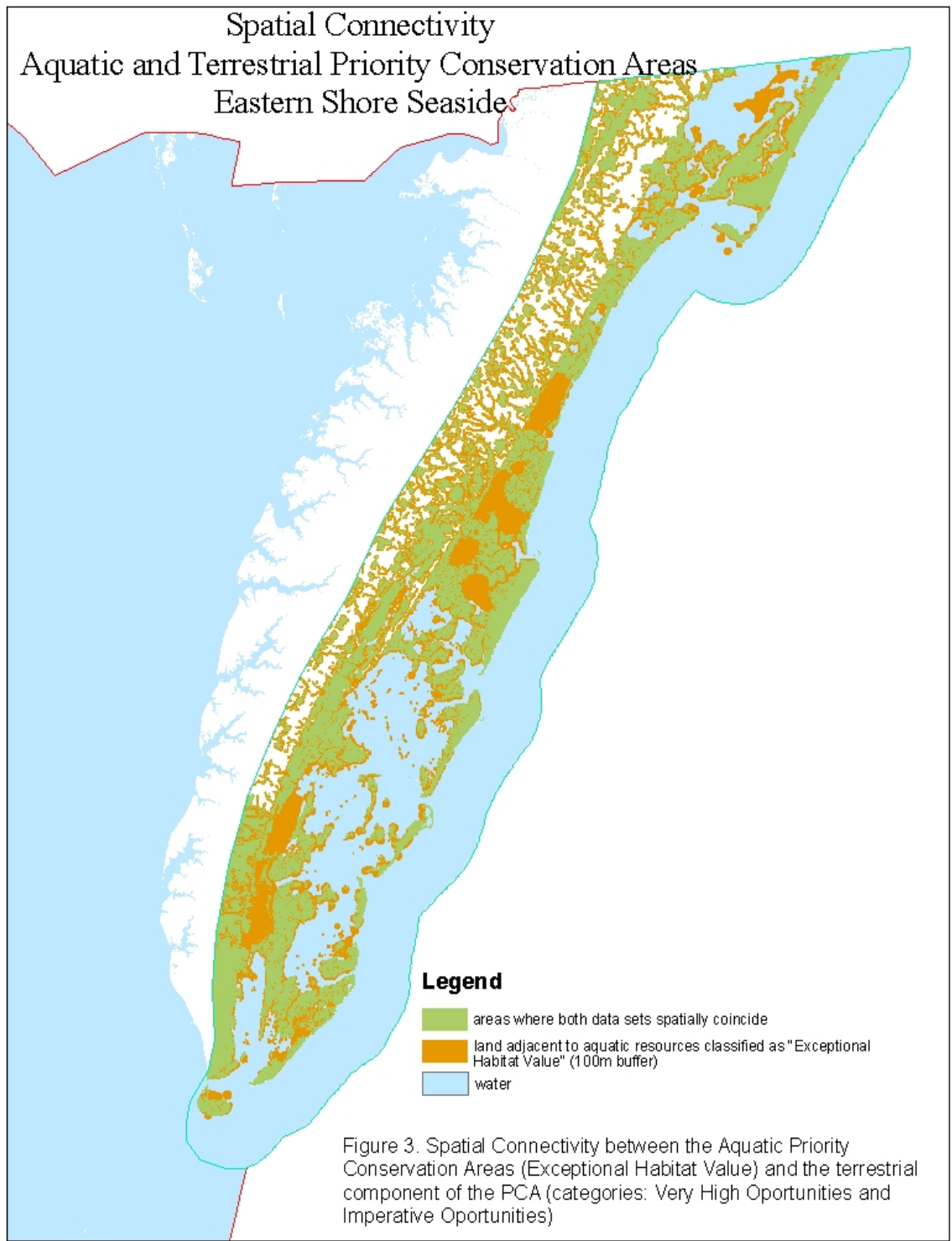


Figure 3. Observed linkages between highly ranked terrestrial conservation areas and aquatic zones of exceptional value

Acknowledgements

This project was funded in part by the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant #NA07NOS4190178, Task 96.01 of the United States Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.

The principal investigator would like to thank CCRM GIS analysts Karinna Nunez and Tamia Rudnicky for their contributions to this project. The project elements were critiqued by the Special Area Management Committee for the Seaside of the Eastern Shore and their suggestions were greatly appreciated. Special thanks to Nick Meade and Laura McKay.

Special thanks to external partners who shared data in this study: Dave Morton of the VA Department of Game and Inland Fisheries; Jason Bulluck and Joe Weber of the VA Department of Conservation and Recreation, Division of Natural Heritage; Will Shuart, Jennifer Ciminelli, and Greg Garmen of the VCU Center for Environmental Studies; Brian Watts of the William and Mary Center for Conservation Biology; and P.G. Ross and Mark Luckenbach from the Virginia Institute of Marine Science's Wachapreague Lab.

References

Center for Coastal Resources Management, 2010. Estuarine Blue Infrastructure: Draft Priority Conservation Areas for Chesapeake Bay and its Tidal Tributaries and Back Bay – A Cumulative Resource Assessment, Final Project Report to the Virginia Coastal Zone Management Program, NOAA Grant # NA07NOS4190178, Virginia Institute of Marine Science, College of William and Mary, Gloucester Point, Virginia.

Department of Game and Inland Fisheries, 2009. Sustainable Communities: Assessment of Priority Conservation Areas and their Vulnerability to Development, Final Project Report, Virginia Coastal Zone Management Program, NOAA Grant # 08NOS4190466

Virginia Aquatic Priority Conservation Areas - Cumulative Analysis

Metadata:

- [Identification Information](#)
- [Data Quality Information](#)
- [Spatial Data Organization Information](#)
- [Spatial Reference Information](#)
- [Entity and Attribute Information](#)
- [Distribution Information](#)
- [Metadata Reference Information](#)

Identification_Information:

Citation:

Citation_Information:

Originator: Comprehensive Coastal Inventory, Virginia Institute of Marine Science

Publication_Date: 2010

Title:

Virginia Aquatic Priority Conservation Areas - Cumulative Analysis

Geospatial_Data_Presentation_Form: vector digital data

Publication_Information:

Publication_Place: Gloucester Point, Virginia

Publisher: Virginia Institute of Marine Science

Online_Linkage: [not available](#)

Description:

Abstract:

This data set is the result of overlaying 17 datasets representing the natural resource component of the Virginia portion of the Chesapeake Bay, the seaside lagoons on the Eastern Shore, and Back Bay in the City of Virginia Beach. The cumulative sensitivity analysis shows the areas of highest concentration of living resource features. Datasets included are Colonial Waterbirds, Audubon Important Bird Areas, Shellfish Suitability, Reef Restoration Sites, Oyster Reefs, Artificial Fishing Reefs, Wetlands, Sand/Mud Flats, Seed Areas, Aquaculture Sites, Turtle Nesting Locations, Submerged Aquatic Vegetation, Aquatic Confirmed Habitat, VCU Aquatic Resource Intergrity, Stream Conservation Areas, Threatened and Endangered Waters, and Regulated Areas.

Purpose:

To locate areas of high ecological importance in the Chesapeake Bay and its tidal tributaries, Back Bay, and the seaside of the Eastern Shore, by overlaying living resource datasets.

Time_Period_of_Content:

Time_Period_Information:

Range_of_Dates/Times:

Beginning_Date: 2002

Ending_Date: present

Currentness_Reference:

data of data sets used

Status:

Progress: Complete

Maintenance_and_Update_Frequency: None planned

Spatial_Domain:

Bounding_Coordinates:

West_Bounding_Coordinate: -77.992689

East_Bounding_Coordinate: -75.172544

North_Bounding_Coordinate: 39.080789

South_Bounding_Coordinate: 36.518449

Keywords:

Theme:

Theme_Keyword_Thesaurus: none

Theme_Keyword: blue infrastructure

Theme_Keyword: cumulative sensitivity analysis

Place:

Place_Keyword_Thesaurus: none

Place_Keyword: Virginia

Place_Keyword: Eastern Shore

Place_Keyword: Chesapeake Bay

Place_Keyword: Back Bay

Access_Constraints: none

Use_Constraints:

This analysis does not measure the collective or independent contribution that each dataset contributes to the ecosystem as a whole. The analysis loosely indicates where there is some diversity in habitat type. However, areas that support a relatively low number of different resources (only 1 or 2) may include a resource type which performs a vast number of ecosystem services (e.g. a wetland) and therefore is a more important area ecologically than an area that reveals 4, 5, or 6 different layers in one location. The results do indicate potential hot spots for review and consideration for conservation measures. A clear review of the content of data within each area is necessary. However, additional analyses underway will rank areas based on the content and type of resources present for a more valuable tool for targeting of aquatic conservation areas.

Point_of_Contact:

Contact_Information:

Contact_Person_Primary:

Contact_Person: Marcia Berman

Contact_Organization: Virginia Institute of Marine Science (VIMS)

Contact_Position: Director Comprehensive Coastal Inventory Program

Contact_Address:

Address_Type: mailing address

Address:

P.O. Box 1346

City: Gloucester Point

State_or_Province: Virginia

Postal_Code: 23062

Country: USA

Contact_Voice_Telephone: (804) 684-7188

Contact_Facsimile_Telephone: (804) 684-7179

Contact_Electronic_Mail_Address: marcia@vims.edu

Native_Data_Set_Environment:

Microsoft Windows XP Version 5.1 (Build 2600) Service Pack 3; ESRI ArcCatalog 9.3.1.3000

[Back to Top](#)

Data_Quality_Information:

Lineage:

Source_Information:

Source_Citation:

Citation_Information:

Originator: Comprehensive Coastal Inventory, Virginia Institute of Marine Science

Publication_Date: 2003

Title:

Hard Clam and Oyster Suitability Models

Geospatial_Data_Presentation_Form: digital data

Publication_Information:

Publication_Place: Gloucester Point, Virginia

Publisher: Virginia Institute of Marine Science

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Single_Date/Time:

Calendar_Date: 2000

Source_Currentness_Reference:

dates of base data

Source_Citation_Abbreviation:

shellfish_suit

Source_Contribution:

shows suitable shallow water habitat for hard clam and oyster aquaculture (used optimal and suitable habitat rankings).

Source_Information:

Source_Citation:

Citation_Information:

Originator: Virginia Marine Resources Commission

Publication_Date: 2005/2006

Title:

Regulated Areas

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Single_Date/Time:

Calendar_Date: 2005/2006

Source_Citation_Abbreviation:

regareas

Source_Contribution:

Regulated areas: broodstock management area, oyster management area, SAV sanctuary, shellfish management area, Striped Bass spawning sanctuary, harvest area, Black Drum management area, Blue Crab sanctuary.

Source_Information:

Source_Citation:

Citation_Information:

Originator: Virginia Marine Resources Commission

Publication_Date: 2009

Title:

Oyster Reef Restoration Sites

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Single_Date/Time:

Calendar_Date: ongoing

Source_Citation_Abbreviation:

reefs09

Source_Contribution:

oyster reef restoration locations.

Source_Information:

Source_Citation:

Citation_Information:

Originator: U.S. Fish and Wildlife Service

Publication_Date: 20090925

Title:

National Wetlands Inventory

Publication_Information:

Publication_Place: Washington, D.C.

Publisher: U.S. Fish and Wildlife Service

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Range_of_Dates/Times:

Beginning_Date: 1977

Ending_Date: present

Source_Citation_Abbreviation:

NWI

Source_Contribution:

wetlands data including mud/sand flats.

Source_Information:

Source_Citation:

Citation_Information:

Originator: Watts, B.D. and B. J. Paxton, The Center for Conservation Biology

Publication_Date: 2009

Title:

Colonial Waterbirds

Publication_Information:

Publication_Place: Williamsburg, Virginia

Publisher: The Center for Conservation Biology, College of William and Mary

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Range_of_Dates/Times:

Beginning_Date: 5/8/2008

Ending_Date: 7/16/2008

Source_Citation_Abbreviation:

colwtrbird

Source_Contribution:

location of waterbird nesting colonies

Source_Information:

Source_Citation:

Citation_Information:

Originator: Aimee Weldon - Virginia Audubon Society

Publication_Date: 2007

Title:

Virginia Important Bird Areas

Publication_Information:

Publication_Place: Richmond, Virginia

Publisher: Virginia Dept. of Game and Inland Fisheries

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Single_Date/Time:

Calendar_Date: 1/24/2008

Source_Citation_Abbreviation:

iba

Source_Contribution:

geographic boundaries of important bird areas.

Source_Information:

Source_Citation:

Citation_Information:

Originator: Virginia Marine Resources Commission

Publication_Date: 2005/2006

Title:

Artificial Fishing Reefs

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Single_Date/Time:

Calendar_Date: 2005/2006

Source_Citation_Abbreviation:

fish_reefs

Source_Contribution:

location of fishing reefs.

Source_Information:

Source_Citation:

Citation_Information:

Originator: Virginia Marine Resources Commission

Publication_Date: 2005/2006

Title:

Seed Areas

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Single_Date/Time:

Calendar_Date: 2005/2006

Source_Citation_Abbreviation:

seed

Source_Contribution:

location of oyster seed areas.

Source_Information:

Source_Citation:

Citation_Information:

Originator: Ross, P.G. and Luckenbach, M.L., College of William and Mary, Virginia Institute of Marine Science, Eastern Shore Laboratory

Publication_Date: 12/31/2008

Title:

Seaside Oyster Mapping Patch Reefs

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Range_of_Dates/Times:

Beginning_Date: 3/1/2007

Ending_Date: 7/1/2008

Source_Citation_Abbreviation:

patch reefs

Source_Contribution:

location of isolated patch and fringe reefs on the seaside of Virginia's Eastern Shore.

Source_Information:

Source_Citation:

Citation_Information:

Originator: Virginia Marine Resources Commission

Publication_Date: 2002

Title:

Aquaculture Sites

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Single_Date/Time:

Calendar_Date: 2002

Source_Contribution:

location of aquaculture sites.

Source_Information:

Source_Citation:

Citation_Information:

Originator: Center for Environmental Studies at VCU

Publication_Date: October 2009

Title:

Aquatic Resource Layer

Publication_Information:

Publication_Place: Richmond, Virginia

Publisher: Center for Environmental Studies at VCU

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Single_Date/Time:

Calendar_Date: October 2009

Source_Citation_Abbreviation:

arl

Source_Contribution:

aquatic resource integrity: location of exceptional and healthy areas.

Source_Information:

Source_Citation:

Citation_Information:

Originator: Virginia Dept. of Game and Inland Fisheries

Publication_Date: 2008

Title:

Aquatic Confirmed Habitat

Publication_Information:

Publication_Place: Richmond, Virginia

Publisher: Virginia Dept. of Game and Inland Fisheries

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Single_Date/Time:

Calendar_Date: 2008

Source_Citation_Abbreviation:

aquaTier

Source_Contribution:

tiers 1 and 2 aquatic confirmed habitat.

Source_Information:

Source_Citation:

Citation_Information:

Originator: Division of Natural Heritage, VA DCR

Publication_Date: 2008

Title:

Stream Conservation Units

Publication_Information:

Publication_Place: Richmond, Virginia

Publisher: Division of Natural Heritage, VA DCR

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Single_Date/Time:

Calendar_Date: 2008

Source_Citation_Abbreviation:

SCU

Source_Contribution:

location of stream conservation areas.

Source_Information:

Source_Citation:

Citation_Information:

Originator: National Oceanic and Atmospheric Administration (NOAA), National Ocean Service, Office of Response and Restoration, Hazardous Materials Response Division, Seattle, Washington and NOAA Chesapeake Bay Office, Gloucester Point, Virginia.

Publication_Date: 2005

Title:

Virginia ESI: Reptile Points

Publication_Information:

Publication_Place: Seattle, Washington

Publisher: National Oceanic and Atmospheric Administration (NOAA), National Ocean Service, Office of Response and Restoration, Hazardous Materials Response Division, Seattle, Washington

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Range_of_Dates/Times:

Beginning_Date: 2002

Ending_Date: 2004

Source_Citation_Abbreviation:

ESI

Source_Contribution:

Sea turtle nesting locations.

Source_Information:

Source_Citation:

Citation_Information:

Originator: Virginia Institute of Marine Science

Publication_Date: 2009

Title:

Chesapeake Bay SAV Coverage

Publication_Information:

Publication_Place: Gloucester Point, Virginia

Publisher: Virginia Institute of Marine Science

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Range_of_Dates/Times:

Beginning_Date: 1999

Ending_Date: 2008

Source_Citation_Abbreviation:

SAV

Source_Contribution:

location of SAV

Source_Information:

Source_Citation:

Citation_Information:

Originator: Virginia Department of Game and Inland Fisheries, Wildlife Diversity Division, Fish and Wildlife Information Services

Publication_Date: 2002

Title:

Threatened and Endangered Waters

Publication_Information:

Publication_Place: Richmond, Virginia

Publisher: Virginia Department of Game and Inland Fisheries

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Single_Date/Time:

Calendar_Date: 2002

Source_Citation_Abbreviation:

TE waters

Source_Contribution:

location of threatened and endangered waters.

Process_Step:

Process_Description:

Point datasets (reef restoration sites, colonial waterbird survey points, and turtle nesting locations) were converted to polygon shapefiles by buffering each point 200 meters.

Process_Date: 2010

Process_Step:

Process_Description:

SAV shapefiles corresponding to the past 10 surveys (1999 – 2008) are included in the Cumulative Sensitivity Analysis. For each shapefile, SAV bed density equal to dense, moderate,

or sparse was extracted and reclassified with a score value of 1 (to weight all the layers in the same manner). Each shapefile was converted to a raster with a cell size of 30m and combined (using the Mosaic Tool) with the raster of the study area. Each output displays the maximum cell value on each overlapping cell. Finally, all the rasters (10) were overlapped using the Weighted Sum Tool. Overlapping cells were summed and then the output grid was divided into 10 classes (excluding 0) using the Equal Interval classification method. For the purpose of this analysis, only classes corresponding from 6 to 10 were used in the final Cumulative Sensitivity Analysis. These classes represent those beds that have been more consistently present through the time period considered here.

Process_Date: 2010

Process_Step:

Process_Description:

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

Process_Date: 2010

Process_Step:

Process_Description:

Each of the 17 raster datasets was reclassified such that data to be counted was given a value of "1", while data not to be counted was valued at "0". The following datasets and selected attributes received a value of "1": Shellfish suitability (ranking of optimal or suitable); NWI (only used vegetated wetlands and mud/sand flats); Patch reefs (areas with >10 oysters/sq m); Aquatic resource integrity layer (ranking of healthy or exceptional); Aquatic confirmed habitat (tier I and II only); Stream conservation areas (biodiversity rankings of high to outstanding); SAV 10 year cumulative grid (only areas with 6 to 10 years of overlap).

Process_Date: 2010

Process_Step:

Process_Description:

The seventeen rasters were overlaid using the Weighted Sum Tool. All layers received the same weight, overlapping cells were summed to produce the Cumulative Sensitivity Analysis.

Process_Date: 2010

Process_Step:

Process_Description:

Metadata imported.

Source_Used_Citation_Abbreviation:

C:\DOCUME~1\tamia\LOCALS~1\Temp\xml1226.tmp

Process_Date: 20100525

Process_Time: 15532800

[Back to Top](#)

Spatial_Data_Organization_Information:

Direct_Spatial_Reference_Method: Vector

Point_and_Vector_Object_Information:

SDTS_Terms_Description:

SDTS_Point_and_Vector_Object_Type: G-polygon

Point_and_Vector_Object_Count: 433731

[Back to Top](#)

Spatial_Reference_Information:

Horizontal_Coordinate_System_Definition:

Planar:

Grid_Coordinate_System:

Grid_Coordinate_System_Name: Universal Transverse Mercator

Universal_Transverse_Mercator:

UTM_Zone_Number: 18

Transverse_Mercator:

Scale_Factor_at_Central_Meridian: 0.999600

Longitude_of_Central_Meridian: -75.000000

Latitude_of_Projection_Origin: 0.000000

False_Easting: 500000.000000

False_Northing: 0.000000

Planar_Coordinate_Information:

Planar_Coordinate_Encoding_Method: coordinate pair

Coordinate_Representation:

Abcissa_Resolution: 0.000000

Ordinate_Resolution: 0.000000

Planar_Distance_Units: meters

Geodetic_Model:

Horizontal_Datum_Name: North American Datum of 1983

Ellipsoid_Name: Geodetic Reference System 80

Semi-major_Axis: 6378137.000000

Denominator_of_Flattening_Ratio: 298.257222

[Back to Top](#)

Entity_and_Attribute_Information:

Detailed_Description:

Entity_Type:

Entity_Type_Label: va_aquatic_pca_cumulative

Attribute:

Attribute_Label: FID

Attribute_Definition:

Internal feature number.

Attribute_Definition_Source:

ESRI

Attribute_Domain_Values:

Unrepresentable_Domain:

Sequential unique whole numbers that are automatically generated.

Attribute:

Attribute_Label: Shape

Attribute_Definition:

Feature geometry.

Attribute_Definition_Source:

ESRI

Attribute_Domain_Values:

Unrepresentable_Domain:

Coordinates defining the features.

Attribute:

Attribute_Label: FID_va_aqu

Attribute:

Attribute_Label: GRIDCODE

Attribute_Definition:

Number of overlapping resources.

Attribute:

Attribute_Label: No_Layers

Attribute_Definition:

Number of overlapping resources. Areas with no datasets have been coded as land or water.

[Back to Top](#)

Distribution_Information:

Distributor:

Contact_Information:

Contact_Organization_Primary:

Contact_Organization: Virginia Institute of Marine Science (VIMS)

Contact_Position: Director Comprehensive Coastal Inventory Program

Contact_Address:

Address_Type: mailing address

Address:

P.O. Box 1346

City: Gloucester Point

State_or_Province: Virginia

Postal_Code: 23062

Country: USA

Contact_Voice_Telephone: (804) 684-7188

Contact_Electronic_Mail_Address: marcia@vims.edu

Contact_Instructions:

Contact via email

Resource_Description: Downloadable Data

Distribution_Liability:

The Comprehensive Coastal Inventory Program (CCI) at VIMS performs a service by distributing data generated by either CCI or public agencies which offer data without restriction or charge. CCI assumes no responsibility for data accuracy or precision, metadata completeness or correctness for digital information. CCI assumes no liability for misuse of any data which may arise as a result of any alteration, conversion, or combination with other data sources. As well,

the timeliness and scale of these products must be considered when evaluating appropriate use.

Standard_Order_Process:

Digital_Form:

Digital_Transfer_Information:

Transfer_Size: 144.129

[Back to Top](#)

Metadata_Reference_Information:

Metadata_Date: 20100526

Metadata_Contact:

Contact_Information:

Contact_Organization_Primary:

Contact_Organization: Virginia Institute of Marine Science (VIMS)

Contact_Person: Tamia Rudnicki

Contact_Position: GIS Programmer/Analyst

Contact_Address:

Address_Type: mailing address

Address:

P.O. Box 1346

City: Gloucester Point

State_or_Province: Virginia

Postal_Code: 23062

Country: USA

Contact_Voice_Telephone: (804) 684-7181

Contact_Facsimile_Telephone: (804) 684-7179

Contact_Electronic_Mail_Address: tamia@vims.edu

Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata

Metadata_Standard_Version: FGDC-STD-001-1998

Metadata_Time_Convention: local time

Metadata_Extensions:

Online_Linkage: <http://www.esri.com/metadata/esriprof80.html>

Profile_Name: ESRI Metadata Profile

[Back to Top](#)

Virginia Aquatic Priority Conservation Areas Ranking Analysis

Metadata:

- [Identification Information](#)
- [Data Quality Information](#)
- [Spatial Data Organization Information](#)
- [Spatial Reference Information](#)
- [Entity and Attribute Information](#)
- [Distribution Information](#)
- [Metadata Reference Information](#)

Identification_Information:

Citation:

Citation_Information:

Originator: Comprehensive Coastal Inventory, Virginia Institute of Marine Science

Publication_Date: 2010

Title:

Virginia Aquatic Priority Conservation Areas Ranking Analysis

Geospatial_Data_Presentation_Form: vector digital data

Publication_Information:

Publication_Place: Gloucester Point, Virginia

Publisher: Virginia Institute of Marine Science

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

Online_Linkage: http://ccrm.vims.edu/publications/completed_projects/index.html

Description:

Abstract:

This data set is the result of overlaying 17 datasets that reflect high ecosystem service potential and living resource areas within the Virginia portion of the Chesapeake Bay, the seaside lagoons on the Eastern Shore, and Back Bay in the City of Virginia Beach. The cumulative sensitivity analysis shows the areas of highest concentration of living resource features. Datasets included are Colonial Waterbirds, Audubon Important Bird Areas, Shellfish Suitability, Reef Restoration Sites, Oyster Reefs, Artificial Fishing Reefs, Wetlands, Sand/Mud Flats, Seed Areas, Aquaculture Sites, Turtle Nesting Locations, Submerged Aquatic Vegetation, Aquatic Confirmed Habitat, VCU Aquatic Resource Integrity, Stream Conservation Areas, Threatened and Endangered Waters, and Regulated Areas.

Purpose:

To rank areas of high ecological importance in the Chesapeake Bay and its tidal tributaries, Back Bay, and the seaside of the Eastern Shore, by overlaying living resource datasets.

Time_Period_of_Content:

Time_Period_Information:

Range_of_Dates/Times:

Beginning_Date: 2002

Ending_Date: present

Currentness_Reference:

data of data sets used

Status:

Progress: Complete

Maintenance_and_Update_Frequency: None planned

Spatial_Domain:

Bounding_Coordinates:

West_Bounding_Coordinate: -77.993088

East_Bounding_Coordinate: -75.172070

North_Bounding_Coordinate: 39.085431

South_Bounding_Coordinate: 36.518365

Keywords:

Theme:

Theme_Keyword_Thesaurus: none

Theme_Keyword: blue infrastructure

Theme_Keyword: ranking analysis

Place:

Place_Keyword_Thesaurus: none

Place_Keyword: Virginia

Place_Keyword: Eastern Shore

Place_Keyword: Chesapeake Bay

Place_Keyword: Back Bay

Access_Constraints: none

Use_Constraints:

This analysis uses best available data to make the determinations. These data have not been verified as part of this study. The outcome of the analysis does not consider local, state, or federal regulations for maintaining, establishing or enforcing conservation areas. The outcome does not include property ownership and whether conservation measures at the local or state level conflict with private property owner use. The study is merely conducted and presented as a guide for local governments seeking direction on where ecologically important areas may benefit from managed conservation practices.

Point_of_Contact:

Contact_Information:

Contact_Person_Primary:

Contact_Person: Marcia Berman

Contact_Organization: Virginia Institute of Marine Science (VIMS)

Contact_Position: Director Comprehensive Coastal Inventory Program

Contact_Address:

Address_Type: mailing address

Address:

P.O. Box 1346

City: Gloucester Point

State_or_Province: Virginia

Postal_Code: 23062

Country: USA

Contact_Voice_Telephone: (804) 684-7188

Contact_Facsimile_Telephone: (804) 684-7179

Contact_Electronic_Mail_Address: marcia@vims.edu

Native_Data_Set_Environment:

Microsoft Windows XP Version 5.1 (Build 2600) Service Pack 3; ESRI ArcCatalog 9.3.1.3000

[Back to Top](#)

Data_Quality_Information:

Lineage:

Source_Information:

Source_Citation:

Citation_Information:

Originator: Comprehensive Coastal Inventory, Virginia Institute of Marine Science

Publication_Date: 2003

Title:

Hard Clam and Oyster Suitability Models

Geospatial_Data_Presentation_Form: digital data

Publication_Information:

Publication_Place: Gloucester Point, Virginia

Publisher: Virginia Institute of Marine Science

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Single_Date/Time:

Calendar_Date: 2000

Source_Currentness_Reference:

dates of base data

Source_Citation_Abbreviation:

shellfish_suit

Source_Contribution:

shows suitable shallow water habitat for hard clam and oyster aquaculture (used optimal and suitable habitat rankings).

Source_Information:

Source_Citation:

Citation_Information:

Originator: Virginia Marine Resources Commission

Publication_Date: 2005/2006

Title:

Regulated Areas

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Single_Date/Time:

Calendar_Date: 2005/2006

Source_Citation_Abbreviation:

regareas

Source_Contribution:

Regulated areas: broodstock management area, oyster management area, SAV sanctuary, shellfish management area, Striped Bass spawning sanctuary, harvest area, Black Drum management area, Blue Crab sanctuary.

Source_Information:

Source_Citation:

Citation_Information:

Originator: Virginia Marine Resources Commission

Publication_Date: 2009

Title:

Oyster Reef Restoration Sites

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Single_Date/Time:

Calendar_Date: ongoing

Source_Citation_Abbreviation:

reefs09

Source_Contribution:

oyster reef restoration locations.

Source_Information:

Source_Citation:

Citation_Information:

Originator: U.S. Fish and Wildlife Service

Publication_Date: 20090925

Title:

National Wetlands Inventory

Publication_Information:

Publication_Place: Washington, D.C.

Publisher: U.S. Fish and Wildlife Service

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Range_of_Dates/Times:

Beginning_Date: 1977

Ending_Date: present

Source_Citation_Abbreviation:

NWI

Source_Contribution:

wetlands data including mud/sand flats.

Source_Information:

Source_Citation:

Citation_Information:

Originator: Watts, B.D. and B. J. Paxton, The Center for Conservation Biology

Publication_Date: 2009

Title:

Colonial Waterbirds

Publication_Information:

Publication_Place: Williamsburg, Virginia

Publisher: The Center for Conservation Biology, College of William and Mary

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Range_of_Dates/Times:

Beginning_Date: 5/8/2008

Ending_Date: 7/16/2008

Source_Citation_Abbreviation:

colwtrbird

Source_Contribution:

location of waterbird nesting colonies

Source_Information:

Source_Citation:

Citation_Information:

Originator: Aimee Weldon - Virginia Audubon Society

Publication_Date: 2007

Title:

Virginia Important Bird Areas

Publication_Information:

Publication_Place: Richmond, Virginia

Publisher: Virginia Dept. of Game and Inland Fisheries

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Single_Date/Time:

Calendar_Date: 1/24/2008

Source_Citation_Abbreviation:

iba

Source_Contribution:

geographic boundaries of important bird areas.

Source_Information:

Source_Citation:

Citation_Information:

Originator: Virginia Marine Resources Commission

Publication_Date: 2005/2006

Title:

Artificial Fishing Reefs

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Single_Date/Time:

Calendar_Date: 2005/2006

Source_Citation_Abbreviation:

fish_reefs

Source_Contribution:

location of fishing reefs.

Source_Information:

Source_Citation:

Citation_Information:

Originator: Virginia Marine Resources Commission

Publication_Date: 2005/2006

Title:

Seed Areas

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Single_Date/Time:

Calendar_Date: 2005/2006

Source_Citation_Abbreviation:

seed

Source_Contribution:

location of oyster seed areas.

Source_Information:

Source_Citation:

Citation_Information:

Originator: Ross, P.G. and Luckenbach, M.L., College of William and Mary, Virginia Institute of Marine Science, Eastern Shore Laboratory

Publication_Date: 12/31/2008

Title:

Seaside Oyster Mapping Patch Reefs

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Range_of_Dates/Times:

Beginning_Date: 3/1/2007

Ending_Date: 7/1/2008

Source_Citation_Abbreviation:

patch reefs

Source_Contribution:

location of isolated patch and fringe reefs on the seaside of Virginia's Eastern Shore.

Source_Information:

Source_Citation:

Citation_Information:

Originator: Virginia Marine Resources Commission

Publication_Date: 2002

Title:

Aquaculture Sites

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Single_Date/Time:

Calendar_Date: 2002

Source_Contribution:

location of aquaculture sites.

Source_Information:

Source_Citation:

Citation_Information:

Originator: Center for Environmental Studies at VCU

Publication_Date: October 2009

Title:

Aquatic Resource Layer

Publication_Information:

Publication_Place: Richmond, Virginia

Publisher: Center for Environmental Studies at VCU

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Single_Date/Time:

Calendar_Date: October 2009

Source_Citation_Abbreviation:

arl

Source_Contribution:

aquatic resource integrity: location of exceptional and healthy areas.

Source_Information:

Source_Citation:

Citation_Information:

Originator: Virginia Dept. of Game and Inland Fisheries

Publication_Date: 2008

Title:

Aquatic Confirmed Habitat

Publication_Information:

Publication_Place: Richmond, Virginia

Publisher: Virginia Dept. of Game and Inland Fisheries

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Single_Date/Time:

Calendar_Date: 2008

Source_Citation_Abbreviation:

aquaTier

Source_Contribution:

tiers 1 and 2 aquatic confirmed habitat.

Source_Information:

Source_Citation:

Citation_Information:

Originator: Division of Natural Heritage, VA DCR

Publication_Date: 2008

Title:

Stream Conservation Units

Publication_Information:

Publication_Place: Richmond, Virginia

Publisher: Division of Natural Heritage, VA DCR

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Single_Date/Time:

Calendar_Date: 2008

Source_Citation_Abbreviation:

SCU

Source_Contribution:

location of stream conservation areas.

Source_Information:

Source_Citation:

Citation_Information:

Originator: National Oceanic and Atmospheric Administration (NOAA), National Ocean Service, Office of Response and Restoration, Hazardous Materials Response Division, Seattle, Washington and NOAA Chesapeake Bay Office, Gloucester Point, Virginia.

Publication_Date: 2005

Title:

Virginia ESI: Reptile Points

Publication_Information:

Publication_Place: Seattle, Washington

Publisher: National Oceanic and Atmospheric Administration (NOAA), National Ocean Service, Office of Response and Restoration, Hazardous Materials Response Division, Seattle, Washington

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Range_of_Dates/Times:

Beginning_Date: 2002

Ending_Date: 2004

Source_Citation_Abbreviation:

ESI

Source_Contribution:

Sea turtle nesting locations.

Source_Information:

Source_Citation:

Citation_Information:

Originator: Virginia Institute of Marine Science

Publication_Date: 2009

Title:

Chesapeake Bay SAV Coverage

Publication_Information:

Publication_Place: Gloucester Point, Virginia

Publisher: Virginia Institute of Marine Science

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Range_of_Dates/Times:

Beginning_Date: 1999

Ending_Date: 2008

Source_Citation_Abbreviation:

SAV

Source_Contribution:

location of SAV

Source_Information:

Source_Citation:

Citation_Information:

Originator: Virginia Department of Game and Inland Fisheries, Wildlife Diversity Division, Fish and Wildlife Information Services

Publication_Date: 2002

Title:

Threatened and Endangered Waters

Publication_Information:

Publication_Place: Richmond, Virginia

Publisher: Virginia Department of Game and Inland Fisheries

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Single_Date/Time:

Calendar_Date: 2002

Source_Citation_Abbreviation:

TE waters

Source_Contribution:

location of threatened and endangered waters.

Process_Step:

Process_Description:

Point datasets were converted to polygon shapefiles by buffering each point 200 meters (reef restoration sites, aquaculture sites, and turtle nesting locations), or 300m (colonial waterbird survey points).

Linear datasets were also buffered as follows; Aquatic Confirmed Habitat (300m), Threatened and Endangered Waters (200m), and Stream Conservation Areas (25m).

Process_Date: 2010

Process_Step:

Process_Description:

SAV shapefiles corresponding to the past 10 surveys (1999 through 2008) are included in the Cumulative Sensitivity Analysis. For each shapefile, SAV bed density equal to dense, moderate,

or sparse was extracted and reclassified with a score value of 1 (to weight all the layers in the same manner). Each shapefile was converted to a raster with a cell size of 30m and combined (using the Mosaic Tool) with the raster of the study area. Each output displays the maximum cell value on each overlapping cell. Finally, all the rasters (10) were overlapped using the Weighted Sum Tool. Overlapping cells were summed and then the output grid was divided into 10 classes (excluding 0) using the Equal Interval classification method. For the purpose of this analysis, only classes corresponding from 6 to 10 were used in the final Cumulative Sensitivity Analysis. These classes represent those beds that have been more consistently present through the time period considered here.

Process_Date: 2010

Process_Step:

Process_Description:

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

Process_Date: 2010

Process_Step:

Process_Description:

Each of the 17 raster datasets was reclassified such that data to be counted was given a value of "1", while data not to be counted was valued at "0". The following datasets and selected attributes received a value of "1": Shellfish suitability (ranking of optimal or suitable); NWI (only used vegetated wetlands and mud/sand flats); Patch reefs (areas with >10 oysters/sq m); Aquatic resource integrity layer (ranking of healthy or exceptional); Aquatic confirmed habitat (tier I and II only); Stream conservation areas (biodiversity rankings of high to outstanding); SAV 10 year cumulative grid (only areas with 6 to 10 years of overlap).

Process_Date: 2010

Process_Step:

Process_Description:

The datasets described above were reclassified for the ranking analysis based on best professional judgement. The classification categories and corresponding values are Exceptional Habitat Value (3); Very High Habitat Value (2); and Good Habitat Value (1). A value of 0 indicates no data and can be either land or water. Datasets classified as Good Habitat Value (1) are Artificial Fishing Reefs, Seed Areas and Regulated Areas. Datasets classified as Very High Habitat Value (2) are Audubon Important Bird Areas, Shellfish Suitability, Sand/Mud Flats, Aquaculture Sites, and Stream Conservation Areas. Datasets classified as Exceptional Habitat Value (3) are Colonial Waterbird Database, Reef Restoration Sites, Oyster Reefs, Wetlands, Turtle Nesting Sites, Submerged Aquatic Vegetation, Aquatic Confirmed Habitat, VCU Aquatic Resource Integrity, and Threatened and Endangered Waters.

Process_Date: 2010

Process_Step:

Process_Description:

All rasters were combined by cell (30m cell size) using the Mosaic To New Raster Tool (Mosaic Method: Maximum). The resulting output raster retains the maximum cell value on each overlapping cell. This raster was divided into 3 categories (excluding 0) to reflect the classification scheme.

Process_Date: 2010

Process_Step:

Process_Description:

Metadata imported.

Source_Used_Citation_Abbreviation:

C:\DOCUME~1\tamia\LOCALS~1\Temp\xml1287.tmp

Process_Date: 20100526

Process_Time: 13573100

[Back to Top](#)

Spatial_Data_Organization_Information:

Direct_Spatial_Reference_Method: Vector

Point_and_Vector_Object_Information:

SDTS_Terms_Description:

SDTS_Point_and_Vector_Object_Type: G-polygon

Point_and_Vector_Object_Count: 126272

[Back to Top](#)

Spatial_Reference_Information:

Horizontal_Coordinate_System_Definition:

Planar:

Grid_Coordinate_System:

Grid_Coordinate_System_Name: Universal Transverse Mercator

Universal_Transverse_Mercator:

UTM_Zone_Number: 18

Transverse_Mercator:

Scale_Factor_at_Central_Meridian: 0.999600

Longitude_of_Central_Meridian: -75.000000

Latitude_of_Projection_Origin: 0.000000

False_Easting: 500000.000000

False_Northing: 0.000000

Planar_Coordinate_Information:

Planar_Coordinate_Encoding_Method: coordinate pair

Coordinate_Representation:

Abscissa_Resolution: 0.000000

Ordinate_Resolution: 0.000000

Planar_Distance_Units: meters

Geodetic_Model:

Horizontal_Datum_Name: North American Datum of 1983

Ellipsoid_Name: Geodetic Reference System 80

Semi-major_Axis: 6378137.000000

Denominator_of_Flattening_Ratio: 298.257222

[Back to Top](#)

Entity_and_Attribute_Information:

Detailed_Description:

Entity_Type:

Entity_Type_Label: va_aquatic_pca_ranking

Attribute:

Attribute_Label: FID

Attribute_Definition:

Internal feature number.

Attribute_Definition_Source:

ESRI

Attribute_Domain_Values:

Unrepresentable_Domain:

Sequential unique whole numbers that are automatically generated.

Attribute:

Attribute_Label: Shape

Attribute_Definition:

Feature geometry.

Attribute_Definition_Source:

ESRI

Attribute_Domain_Values:

Unrepresentable_Domain:

Coordinates defining the features.

Attribute:

Attribute_Label: ID

Attribute:

Attribute_Label: GRIDCODE

Attribute:

Attribute_Label: Ranking

Attribute:

Attribute_Label: RankDefin

[Back to Top](#)

Distribution_Information:

Distributor:

Contact_Information:

Contact_Organization_Primary:

Contact_Organization: Virginia Institute of Marine Science (VIMS)

Contact_Position: Director Comprehensive Coastal Inventory Program

Contact_Address:

Address_Type: mailing address

Address:

P.O. Box 1346

City: Gloucester Point

State_or_Province: Virginia

Postal_Code: 23062

Country: USA

Contact_Voice_Telephone: (804) 684-7188

Contact_Electronic_Mail_Address: marcia@vims.edu

Contact Instructions:

Contact via email

Resource_Description: Downloadable Data

Distribution_Liability:

The Comprehensive Coastal Inventory Program (CCI) at VIMS performs a service by distributing data generated by either CCI or public agencies which offer data without restriction or charge. CCI assumes no responsibility for data accuracy or precision, metadata completeness or correctness for digital information. CCI assumes no liability for misuse of any data which may arise as a result of any alteration, conversion, or combination with other data sources. As well, the timeliness and scale of these products must be considered when evaluating appropriate use.

Standard_Order_Process:

Digital_Form:

Digital_Transfer_Information:

Transfer_Size: 4.670

[Back to Top](#)

Metadata_Reference_Information:

Metadata_Date: 20100526

Metadata_Contact:

Contact_Information:

Contact_Organization_Primary:

Contact_Organization: Virginia Institute of Marine Science (VIMS)

Contact_Person: Tamia Rudnicky

Contact_Position: GIS Programmer/Analyst

Contact_Address:

Address_Type: mailing address

Address:

P.O. Box 1346

City: Gloucester Point

State_or_Province: Virginia

Postal_Code: 23062

Country: USA

Contact_Voice_Telephone: (804) 684-7181

Contact_Facsimile_Telephone: (804) 684-7179

Contact_Electronic_Mail_Address: tamia@vims.edu

Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata

Metadata_Standard_Version: FGDC-STD-001-1998

Metadata_Time_Convention: local time

Metadata_Extensions:

Online_Linkage: <http://www.esri.com/metadata/esriprof80.html>

Profile_Name: ESRI Metadata Profile

[Back to Top](#)

Virginia Seaside Spatial Connectivity between Aquatic Priority Conservation Areas and Terrestrial Priority Conservation Areas

Metadata:

- [Identification Information](#)
- [Data Quality Information](#)
- [Spatial Data Organization Information](#)
- [Spatial Reference Information](#)
- [Entity and Attribute Information](#)
- [Distribution Information](#)
- [Metadata Reference Information](#)

Identification_Information:

Citation:

Citation_Information:

Originator: Comprehensive Coastal Inventory, Virginia Institute of Marine Science

Publication_Date: 2010

Title:

Virginia Seaside Spatial Connectivity between Aquatic Priority Conservation Areas and Terrestrial Priority Conservation Areas

Geospatial_Data_Presentation_Form: vector digital data

Publication_Information:

Publication_Place: Gloucester Point, Virginia

Publisher: Virginia Institute of Marine Science

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

Online_Linkage: http://ccrm.vims.edu/publications/completed_projects/index.html

Description:

Abstract:

This data set explores the spatial connectivity of the highest values within the terrestrial portion of the Priority Conservation Areas (PCA) and the Aquatic Priority Conservation Areas (APCA). The targeted areas are where both data sets overlap and the adjacent land to those areas classified as "Exceptional Habitat Value" in the Aquatic Priority Conservation Areas.

Purpose:

To look for spatial connectivity between the highly valued waterbodies (Aquatic Priority Conservation Areas) and the Priority Land Conservation Areas (PCA) on the seaside of the Eastern Shore.

Time_Period_of_Content:

Time_Period_Information:

Range_of_Dates/Times:

Beginning_Date: 2002

Ending_Date: present

Currentness_Reference:

data of data sets used

Status:

Progress: Complete

Maintenance_and_Update_Frequency: None planned

Spatial_Domain:

Bounding_Coordinates:

West_Bounding_Coordinate: -75.993383

East_Bounding_Coordinate: -75.238683

North_Bounding_Coordinate: 38.027391

South_Bounding_Coordinate: 37.081272

Keywords:

Theme:

Theme_Keyword_Thesaurus: none

Theme_Keyword: blue infrastructure

Theme_Keyword: Spatial Connectivity

Place:

Place_Keyword_Thesaurus: none

Place_Keyword: Virginia

Place_Keyword: Eastern Shore

Access_Constraints: none

Use_Constraints:

This analysis uses best available data to make the determinations. These data have not been verified as part of this study. The outcome of the analysis does not consider local, state, or federal regulations for maintaining, establishing or enforcing conservation areas. The outcome does not include property ownership and whether conservation measures at the local or state level conflict with private property owner use. The study is merely conducted and presented as a guide for local governments seeking direction on where ecologically important areas may benefit from managed conservation practices.

Point_of_Contact:

Contact_Information:

Contact_Person_Primary:

Contact_Person: Marcia Berman

Contact_Organization: Virginia Institute of Marine Science (VIMS)

Contact_Position: Director Comprehensive Coastal Inventory Program

Contact_Address:

Address_Type: mailing address

Address:

P.O. Box 1346

City: Gloucester Point

State_or_Province: Virginia

Postal_Code: 23062

Country: USA

Contact_Voice_Telephone: (804) 684-7188

Contact_Facsimile_Telephone: (804) 684-7179

Contact_Electronic_Mail_Address: marcia@vims.edu

Native_Data_Set_Environment:

Microsoft Windows XP Version 5.1 (Build 2600) Service Pack 3; ESRI ArcCatalog
9.3.1.3000

[Back to Top](#)

Data_Quality_Information:

Lineage:

Source_Information:

Source_Citation:

Citation_Information:

Originator: Comprehensive Coastal Inventory, Virginia Institute of Marine Science

Publication_Date: 2010

Title:

Virginia Aquatic Priority Conservation Areas Ranking Analysis

Geospatial_Data_Presentation_Form: digital data

Publication_Information:

Publication_Place: Gloucester Point, Virginia

Publisher: Virginia Institute of Marine Science

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Range_of_Dates/Times:

Beginning_Date: 2002

Ending_Date: 2009

Source_Currentness_Reference:

dates of base data

Source_Citation_Abbreviation:

APCA

Source_Contribution:

location of Aquatic Priority Conservation Areas. Used only those areas of 'Exceptional Habitat Value'.

Source_Information:

Source_Citation:

Citation_Information:

Originator: VA Department of Game and Inland Fisheries

Originator: VA Department of Conservation and Recreation Division of Natural Heritage

Originator: Virginia Commonwealth University Center for Environmental Studies

Publication_Date: 2009

Title:

Priority Conservation Areas

Geospatial_Data_Presentation_Form: digital data

Publication_Information:

Publication_Place: Richmond, Virginia

Publisher: VA Department of Game and Inland Fisheries

Type_of_Source_Media: digital data

Source_Time_Period_of_Content:

Time_Period_Information:

Range_of_Dates/Times:

Beginning_Date: 2001

Ending_Date: 2009

Source_Currentness_Reference:

dates of base data

Source_Citation_Abbreviation:

PCA

Source_Contribution:

Terrestrial component of the Priority Conservation Areas.

Process_Step:

Process_Description:

The PCA and the APCA rasters were converted into polygon shapefiles.

Process_Date: 2010

Process_Step:

Process_Description:

The terrestrial component of the PCA was selected and the highest categories (Very High Opportunity and Imperative Opportunity) were extracted from the dataset.

Process_Date: 2010

Process_Step:

Process_Description:

The category Exceptional Habitat Value was extracted from the Aquatic Priority Conservation Areas and combined (Union Tool) with the data extracted from the PCA.

Process_Date: 2010

Process_Step:

Process_Description:

A 100m buffer was generated using the combined output from the PCA and the APCA. This buffer reflects the adjacent land to those aquatic resources classified as Exceptional Habitat Value.

Process_Date: 2010

Process_Step:

Process_Description:

The buffer was then merged with the areas where the Aquatic Priority Conservation Areas and the terrestrial component of the Priority Conservation Areas overlap.

Process_Date: 2010

Process_Step:

Process_Description:

Metadata imported.

Source_Used_Citation_Abbreviation:

C:\DOCUME~1\tamia\LOCALS~1\Temp\xml17B5.tmp

Process_Date: 20100527

Process_Time: 13525500

[Back to Top](#)

Spatial_Data_Organization_Information:

Direct_Spatial_Reference_Method: Vector

Point_and_Vector_Object_Information:

SDTS_Terms_Description:

SDTS_Point_and_Vector_Object_Type: G-polygon

Point_and_Vector_Object_Count: 2685

[Back to Top](#)

Spatial_Reference_Information:

Horizontal_Coordinate_System_Definition:

Planar:

Grid_Coordinate_System:

Grid_Coordinate_System_Name: Universal Transverse Mercator

Universal_Transverse_Mercator:

UTM_Zone_Number: 18

Transverse_Mercator:

Scale_Factor_at_Central_Meridian: 0.999600

Longitude_of_Central_Meridian: -75.000000

Latitude_of_Projection_Origin: 0.000000

False_Easting: 500000.000000

False_Northing: 0.000000

Planar_Coordinate_Information:

Planar_Coordinate_Encoding_Method: coordinate pair

Coordinate_Representation:

Abscissa_Resolution: 0.000000

Ordinate_Resolution: 0.000000

Planar_Distance_Units: meters

Geodetic_Model:

Horizontal_Datum_Name: North American Datum of 1983

Ellipsoid_Name: Geodetic Reference System 80

Semi-major_Axis: 6378137.000000

Denominator_of_Flattening_Ratio: 298.257222

[Back to Top](#)

Entity_and_Attribute_Information:

Detailed_Description:

Entity_Type:

Entity_Type_Label: va_seaside_spatial_connectiv

Attribute:

Attribute_Label: FID

Attribute_Definition:

Internal feature number.

Attribute_Definition_Source:

ESRI

Attribute_Domain_Values:

Unrepresentable_Domain:

Sequential unique whole numbers that are automatically generated.

Attribute:

Attribute_Label: Shape

Attribute_Definition:

Feature geometry.

Attribute_Definition_Source:

ESRI

Attribute_Domain_Values:

Unrepresentable_Domain:

Coordinates defining the features.

Attribute:

Attribute_Label: SpatialCon

Attribute_Definition:

Spatial Connectivity

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: coincide

Enumerated_Domain_Value_Definition:

high valued areas of the PCA and the APCA overlap

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: adjacent

Enumerated_Domain_Value_Definition:

land adjacent to aquatic resources classified as "Exceptional Habitat Value"

[Back to Top](#)

Distribution_Information:

Distributor:

Contact_Information:

Contact_Organization_Primary:

Contact_Organization: Virginia Institute of Marine Science (VIMS)

Contact_Position: Director Comprehensive Coastal Inventory Program

Contact_Address:

Address_Type: mailing address

Address:

P.O. Box 1346

City: Gloucester Point

State_or_Province: Virginia

Postal_Code: 23062

Country: USA

Contact_Voice_Telephone: (804) 684-7188

Contact_Electronic_Mail_Address: marcia@vims.edu

Contact Instructions:

Contact via email

Resource_Description: Downloadable Data

Distribution_Liability:

The Comprehensive Coastal Inventory Program (CCI) at VIMS performs a service by distributing data generated by either CCI or public agencies which offer data without restriction or charge. CCI assumes no responsibility for data accuracy or precision, metadata completeness or correctness for digital information. CCI assumes no liability for misuse of any data which may arise as a result of any alteration, conversion, or combination with other data sources. As well, the timeliness and scale of these products must be considered when evaluating appropriate use.

Standard_Order_Process:

Digital_Form:

Digital_Transfer_Information:

Transfer_Size: 6.657

[Back to Top](#)

Metadata_Reference_Information:

Metadata_Date: 20100527

Metadata_Contact:

Contact_Information:

Contact_Organization_Primary:

Contact_Organization: Virginia Institute of Marine Science (VIMS)

Contact_Person: Tamia Rudnicki

Contact_Position: GIS Programmer/Analyst

Contact_Address:

Address_Type: mailing address

Address:

P.O. Box 1346

City: Gloucester Point

State_or_Province: Virginia

Postal_Code: 23062

Country: USA

Contact_Voice_Telephone: (804) 684-7181

Contact_Facsimile_Telephone: (804) 684-7179

Contact_Electronic_Mail_Address: tamia@vims.edu

Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata

Metadata_Standard_Version: FGDC-STD-001-1998

Metadata_Time_Convention: local time

Metadata_Extensions:

Online_Linkage: <http://www.esri.com/metadata/esriprof80.html>

Profile_Name: ESRI Metadata Profile

[Back to Top](#)