

Virginia Commonwealth University, Center for Environmental Studies
Coastal Management GIS Support & Coastal GEMS
Maintenance: FY13 Annual Report

October 1st 2013 – September 30th 2014

NOAA Grant # NA13NOS4190168

Grant Year FY2013, Task #1.02



Virginia Coastal Zone
MANAGEMENT PROGRAM



Acknowledgements

This report was prepared by the Virginia Coastal Zone Management Program's Coastal GIS Coordinator. The Coastal GIS Coordinator position is provided through a contract with Virginia Commonwealth University's Center for Environmental Studies and is funded by the Virginia Coastal Zone Management Program at the Virginia Department of Environmental Quality through Grant # NA13NOS4190168 from the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.

Introduction

This report outlines tasks performed and products created under task #1.02 by the Virginia Coastal Zone Management Program's Coastal GIS Coordinator and by staff of Virginia Commonwealth University's Center for Environmental Studies during the grant year FY2013 (October 1st 2013 – September 30th 2014).

This report does not include an image of every map product created for task #1.02 during FY2013. Instead, the images in this report are a sample of the map products created selected to best illustrate each product description.

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Coastal GEMS Mapping Application

Maintenance

Virginia Commonwealth University's Center for Environmental Studies (VCU CES) continued to host the Coastal GEMS online mapping application through the FY13 grant period and VCU CES staff performed routine maintenance and updates on Coastal GEMS during this time.

Tasks included refreshing map services, updating data and cartography in the map file as per CZM staff request, and installing software and security upgrades. Coastal GEMS remained operational throughout the FY13 grant period and was only offline to install software/security updates or to refresh map services.

During the FY13 grant period, at CZM staff request, VCU CES staff updated the data and symbology on eight currently in production GEMS layers and added two new data layers and one new map service. The Coastal GIS Coordinator processed GIS data layers for effective display on Coastal GEMS and uploaded layers to VCU to be added to Coastal GEMS. GEMS fact sheets were added/updated where applicable.

Layers updated: conservation lands, public access lands, private oyster leases, anadromous fish use, public access sites, scenic rivers, oyster gardening, and important bird areas

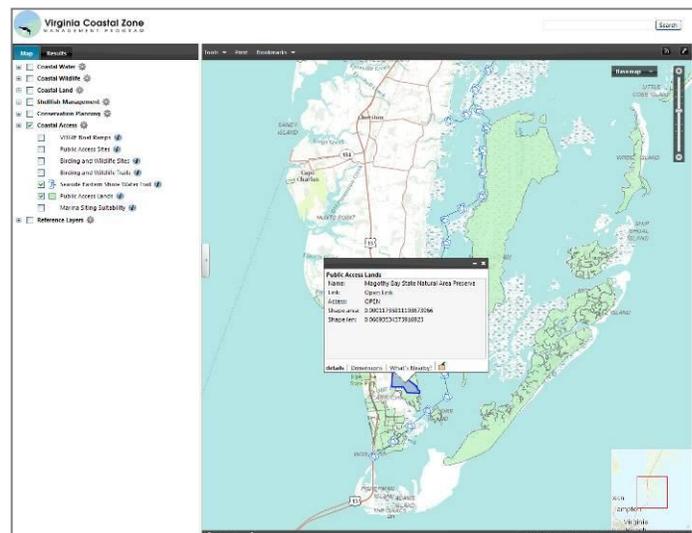
Layers added: Eastern Shore Coastal Change Archive and Coastal Planning District Commission Boundaries

Map services added in this reporting period: NOAA sea level rise data with layers in 1 ft increments from MHHW through 6 feet of projected sea level rise.

Google Analytics services for Coastal GEMS set up by VCU CES staff remained operational throughout the FY13 grant period. VCU CES staff created Google Analytics reports at CZM staff request by querying specific date ranges. From October 1, 2013 to September 30, 2014, Coastal GEMS received 1,171 visits from 606 unique visitors resulting in 1,514 pageviews and an average site visit time of 2 minutes and 22 seconds. The full Google Analytics report for the Coastal GEMS mapping application during the FY13 grant period can be found in the appendix of this report.



Left: A screenshot from Coastal GEMS showing selected layers from the shellfish management map service.



Right: A screenshot from Coastal GEMS showing selected layers from the coastal access map service.

Coastal GEMS can be accessed at:
www.coastalgems.org

Coastal GEMS Data Management

The Coastal GIS Coordinator requested and obtained available data updates for current Coastal GEMS layers from data providers, processed data for display on GEMS, and updated the Coastal GEMS factsheets and website as necessary. In addition two new data layers and one new map service were added to the Coastal GEMS mapping portal during the FY13 grant period. See below for details.

Coastal Planning District Commission Boundaries

Coastal PDC Boundaries

This layer shows the boundaries of the eight planning district commissions (PDCs) within Virginia's Coastal Zone. They include Accomack-Norfolk PDC, Crater PDC, Harorton-Roads PDC, Middle Peninsula PDC, Northern Neck PDC, Northern Virginia Regional Commission, George Washington Regional Commission, and Rappahannock Regional PDC.

Status of the data
Updated July 2014

Data Source
Coastal PDC Boundaries, Virginia Coastal Zone Management Program

To access this data layer/tool directly, please visit:

Why should we care?
Virginia's eight coastal planning district commissions (PDCs) play an integral role in the Virginia Coastal Zone Management (CZM) Program and all eight coastal PDC meet quarterly with Virginia CZM staff. In addition, each PDC holds quarterly meetings for its local coastal resource managers. Coastal PDCs provide an important link between the state agencies and 87 localities that comprise Virginia's network of coastal resource managers. A representative from each PDC serves on the Virginia CZM Program's Coastal Policy Team and all eight coastal PDCs meet quarterly with Virginia CZM staff. In addition, each PDC holds quarterly meetings for its local coastal resource managers.

Links to find more information:
[Virginia Association of Planning District Commissions](#)
[Virginia Coastal Planning District Commissions](#)
[Virginia CZM Program's Coastal Policy Team](#)

How is this resource managed?
The Virginia CZM Program supports each coastal PDC with an annual technical assistance grant and has provided assistance for a variety of regional and local coastal resource management projects sponsored by the PDCs. With this funding support, Virginia's coastal PDCs have been instrumental in the planning and implementation of many key environmental programs.

Links to find more information about how this resource is managed:
[Virginia CZM Program Funding To PDCs](#)

For original datasets please contact:
Nick Meade
609 East Main Street
Richmond, VA 23220-000000
Phone: 804-696-4297
Fax: 804-696-4318
Email: Nick.Meade@vcm.virginia.gov

As requested by the VA CZM Coastal Policy Team, a data layer displaying the boundaries of VA's eight coastal Planning District Commissions (and accompanying fact sheet) is now included under the reference layers category in Coastal GEMS.

Eastern Shore Coastal Change Archive Data

The Eastern Shore Coastal Change Archive data and fact sheet on Coastal GEMS. See the appendix of this report for the full fact sheet text.

Permanent Inundation of Low-Lying Areas

The Eastern Shore of Virginia Coastal Change Archive is a compilation of accounts solicited from local residents of observations made regarding changes to the natural environment related to sea level rise and climate change.

Status of the data
The data was created and first populated during a series of workshops with Accomack and Northampton County residents in May 2014.

Data Source
2014, Eastern Shore Coastal Change Archive, Accomack-Norfolk Planning District Commission.

To access this data layer/tool directly, please visit:
Sorry, this data is not directly accessible.

Why should we care?
Sea level has risen nearly 420 feet in the past 18,000 years and nearly 1.5 feet since the 1930s. The Eastern Shore's coastlines are constantly responding to these changing conditions. Additionally, water temperatures are on the rise and the Eastern Shore's climate has warmed bringing a variety of changes to the types and abundances of wildlife and aquatic life. The times that certain species migrate through the region and the growing seasons of our vegetable species. Eastern Shore residents share a unique connection to the natural environment and are well aware of the changes that occur to it. The Accomack-Norfolk Planning District Commission is engaging residents to compile their stories, observations, and historical documents to create the Coastal Change Archive which will serve as a historical resource for current and future generations to better understand how seasons, landscapes, and organisms are responding to changes in the natural environment. The Archive will also serve as a baseline for evaluating the impacts of future changes to our climate and water levels. Examples of stories in the Archive include: "I've lived in this house my entire life and the flood waters never came in the yard when I was younger. It seems like ever storm brings the

Permanent Inundation of Low-Lying Areas
CATEGORY: Permanent inundation of low-lying areas
FIRST_OBSE: early 1900's
LAST_OBSE: 2014
DESCRIPTION: In order to hold back rising water levels, dikes were constructed along the woods here in the early 20th century in order to protect the area so that strawberries could be grown. The dikes now define the marsh, and the woods are dying

details | Dimensions | What's Nearby

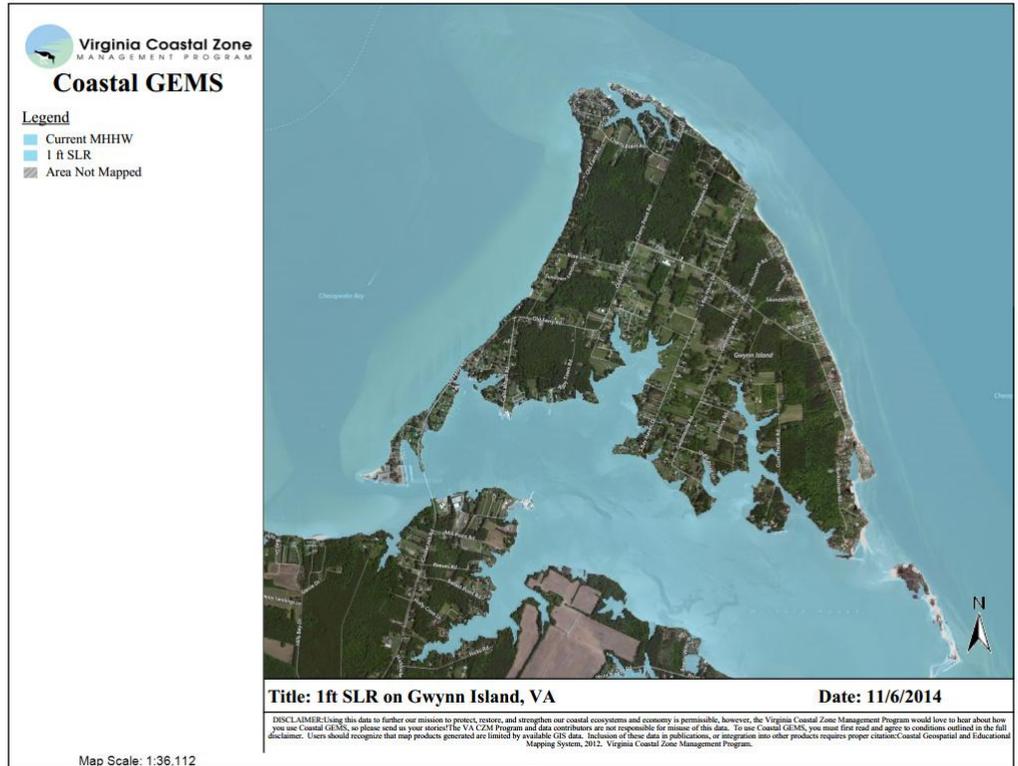
For original datasets, please contact:
Curt Smith, Director of Planning
P.O. Box 427
Accomack, VA 23301-00000000
Phone: 757-787-2936
Fax: 757-787-4211
Email: csmith@e-nppdc.org

Sea Level Rise Map Service

The Coastal GIS Coordinator obtained sea level rise data from NOAA Office for Coastal Management's Sea Level Rise and Coastal Flooding Impacts Viewer so that it could be incorporated into Coastal GEMS and considered in conjunction with other data hosted on GEMS. The Coastal GIS Coordinator processed the data to allow fast, simple display on the Coastal GEMS application and provided VCU CES GIS staff with a symbolized ArcGIS map package used to create a new sea level rise map service available through Coastal GEMS. The Coastal GIS Coordinator also created a fact sheet incorporating information and links about the data, sea level rise in general, its specific impacts in Virginia, and the additional features and functions of the Sea Level Rise and Coastal Flooding Impacts Viewer available through Digital Coast.

Right: A map created using Coastal GEMS showing the potential inundation of Gwynn Island, VA after a projected 1 foot of sea level rise.

Below: A screenshot of factsheet for the sea level rise data on Coastal GEMS.



Coastal GEMS Factsheet

How is this resource managed?
Modeling future sea level rise allows us to reduce vulnerability and increase resilience further into the future by incorporating sea level rise information into planning decisions to help state and local officials, community planners, and infrastructure managers understand possible future risks.

Links to find more information about how this resource is managed:
[NOAA Digital Coast: Conserving Coastal Wetlands for Sea Level Rise Adaptation](#)
[NOAA Digital Coast: Incorporating Sea Level Change Scenarios at the Local Level](#)
[Virginia CZM Program: Climate Change Adaptation Efforts](#)

Why was the GIS data created?
These data were created as part of the National Oceanic and Atmospheric Administration Coastal Services Center's efforts to create an online mapping viewer depicting potential sea level rise and its associated impacts on the nation's coastal areas. The purpose of the mapping viewer is to provide coastal managers and scientists with a preliminary look at sea level rise (slr) and coastal flooding impacts. The viewer is a screening-level tool that uses nationally consistent data sets and analyses. Data and maps provided can be used at several scales to help gauge trends and prioritize actions for different scenarios. The Sea Level Rise and Coastal Flooding Impacts Viewer may be accessed at: <http://www.csc.noaa.gov/slr>

Links to projects that funded this data acquisition:
[NOAA Office for Coastal Management, Digital Coast](#)

How was the GIS data created?
These data depict the potential inundation of coastal areas resulting from a projected 1 to 6 feet rise in sea level above current Mean Higher High Water (MHHW) conditions. The process used to produce the data can be described as a modified bathtub approach that attempts to account for both local/regional tidal variability as well as hydrological connectivity. The process uses two source datasets to derive the final inundation rasters and polygons and accompanying low-lying polygons for each iteration of sea level rise: the Digital Elevation Model (DEM) of the area and a tidal surface model that represents spatial tidal variability. The tidal model is created using the NOAA National Geodetic Survey's VDATUM datum transformation software (<http://vdatum.noaa.gov>) in conjunction with spatial interpolation/extrapolation methods and represents the MHHW tidal datum in orthometric values (North American Vertical Datum of 1988).

Future Directions?
New elevation data are being collected all the time by various federal, state, and local entities so it is possible that newer data have been collected since the mapping areas were originally populated. NOAA has now completed mapping most of the nation's coastal areas for Sea Level Rise and Coastal Flooding Impacts Viewer and has begun to develop an update strategy. This strategy will include examination of new elevation data sets as they become available to determine if a mapping update is warranted.

Frequently Asked Questions

See the appendix of this report for the full fact sheet text as well as more screenshots of the sea level rise data on Coastal GEMS, including layers in 1 ft increments from MHHW through 6 feet of projected sea level rise.

Coastal GIS Coordination

Eastern Shore Coastal Change Archive

The Coastal GIS Coordinator worked with Accomack-Northampton Planning District Commission (ANPDC) staff on the Coastal Change Archive project including helping design and run participatory GIS sessions with long term residents of the Eastern Shore to map climate change witnessed over their lifetimes, processing data to create the final geodatabase, and symbolizing data for inclusion under the Coastal GEMS 'Coastal Land' category.



Eastern Shore of Virginia Coastal Change Archive Project

Project Background:
Sea level has risen nearly 420 feet in the past 18,000 years and nearly 1.5 feet since the 1930s. The Shore's coastlines are constantly responding to these changing conditions. Additionally, water temperatures are on the rise and the Shore's climate has warmed bringing a variety of changes to the types and abundances of wildlife and aquatic life, the times that certain species migrate through the region, and the growing seasons of our vegetative species.

We are working with Eastern Shore residents to compile their stories, observations, and historical documents to create the Coastal Change Archive.

As someone who has extensive experience observing the natural environment on the Eastern Shore, your input is extremely valuable to building the new Coastal Change Archive.

How You Will Be Interviewed:
Participants will tell stories to A-NPDC staff & the stories will be documented using a computer & "e-beam" technology to produce a map of the observed changes. But don't worry! No computer experience is necessary and A-NPDC staff will help you every step along the way. Participants will draw on digital maps projected onto a wall using a stylus that emits signals to an adjacent reader which immediately adds the shape they draw to the map. This innovative method quickly & efficiently allows users to share their thoughts, compare notes & learn from others in the group.

You will be asked to share your story, the location where you made your observations, and the timeframe over which you made the observations. Participants are encouraged to bring photos or any other documentation they have to help illustrate the changes they have observed.

Why Participate?
Your stories will become the baseline for evaluating the impacts of future changes to our climate and water levels. The Archive will be made available on the VCZM & A-NPDC websites as a historic and cultural public resource.

What is Being Mapped:
Sea Level Rise/Recurrent Flooding-Related Changes:
1. Areas That Have Become Permanently Inundated – Places that used to be dry land and are now underwater the majority of the time. Example: a field that once was farmed and has converted to marsh over the decades.
2. Areas That Have Become More Consistently Inundated – Places that at one time rarely or never flooded, but now are commonly underwater. Example: "My yard was rarely underwater during storms but now it happens with almost every little storm or full moon tide."
3. Changes to Types of Vegetation – Observed changes in the types of vegetation in an area including loss of upland forests (ghost forests), emergent wetland grasses/shrubs, loss of wetland grasses/shrubs, emergent tidal salt marsh grasses, or loss of tidal salt marsh grasses. (Example: "The woods along my creek were once full of healthy trees and now there are only a few unhealthy remaining trees and many new types of shrubs that didn't used to be there.")

Climate Change-Related Changes:
1. Changes in Timing of Arrival of Migratory Wildlife Species – Example: "I've noticed that the butterflies arrive to my house a week or two earlier each year than they used to when I was a child."
2. Changes in Timing of Arrival of Migratory Aquatic Species – Example: "I can catch strippers off of my dock a lot earlier in the season than I used to."
3. Vegetative Species Growing Season Changes – Example: "We never used to be able to plant our garden here as early as we are able to do nowadays."

What:
We are interviewing Accomack & Northampton County residents to create an archive of stories of changes to the natural environment.

When:
Thursday, April 3, 2014
10:00 am – 12:00 pm

Where –
A-NPDC Conference Room,
23372 Front Street,
Accomac

For More Info:
Contact Curt Smith,
Director of Planning at
csmith@anpdc.org or
757.787.2936 x114



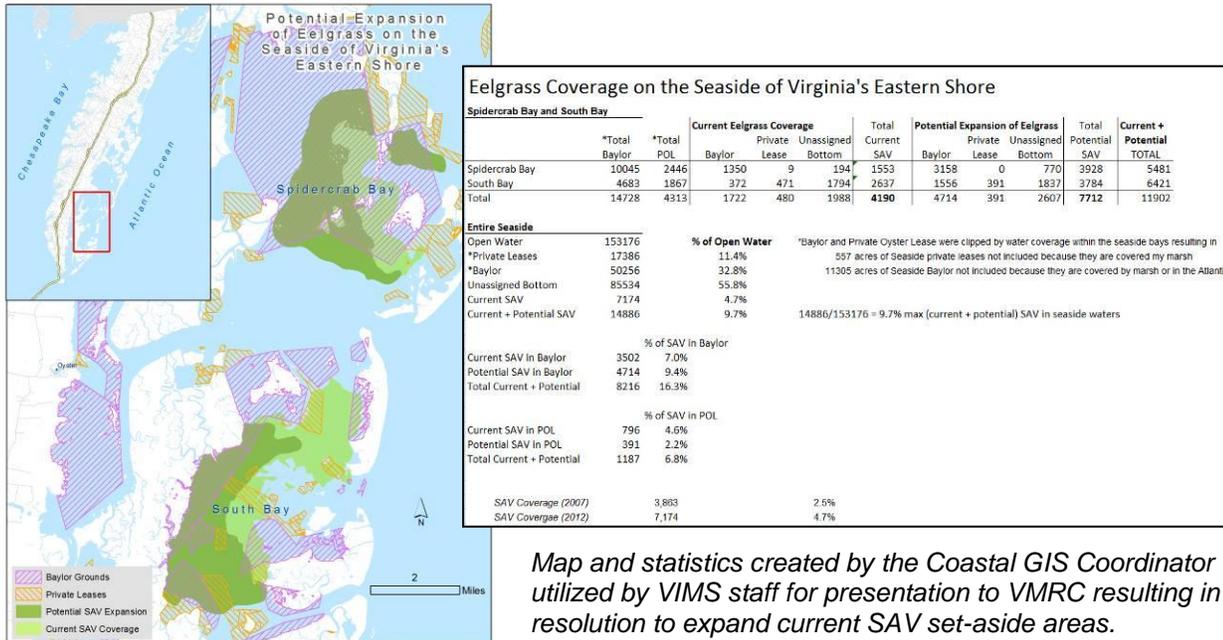
Left: The Eastern Shore Coastal Change Archive Project flyer shared with potential participants for each mapping session.

Below: A picture from the second participatory mapping session on April 24, 2014 at the Barrier Island Center in Machipongo, VA.

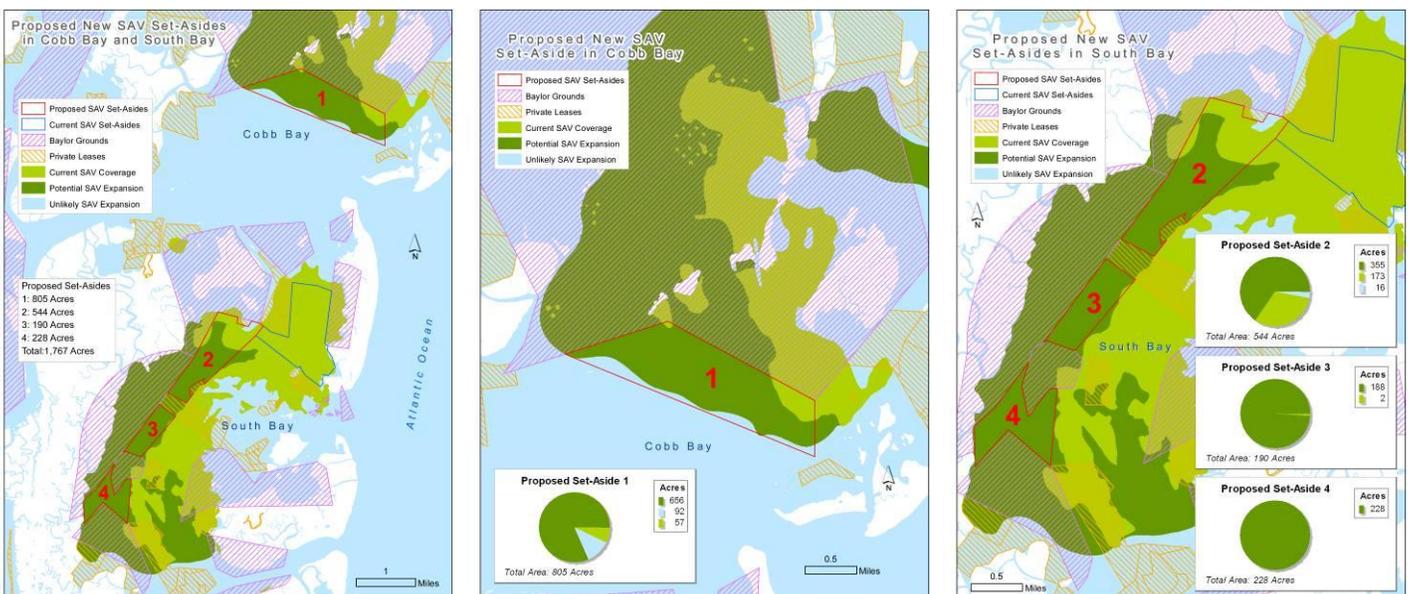


Eastern Shore Seaside Eelgrass Planning

The Coastal GIS Coordinator continued to work with the Seaside Special Area Management Plan (SAMP) group. During the FY13 grant period that work focused on planning for future eelgrass expansion on the Seaside of VA's Eastern Shore. During a meeting with VMRC regulatory staff, VIMS scientists, and local planners, the Coastal GIS Coordinator utilized participatory GIS to map potential eelgrass expansion areas on the seaside of VA's Eastern Shore. The Coastal GIS Coordinator then made calculations comparing potential expansion to current SAV coverage, public and private shellfish grounds, and open water, and provided maps and tables of the data to VIMS staff for use in a presentation to the VMRC Board. This presentation resulted in a resolution by the commission to expand current SAV set-aside areas.



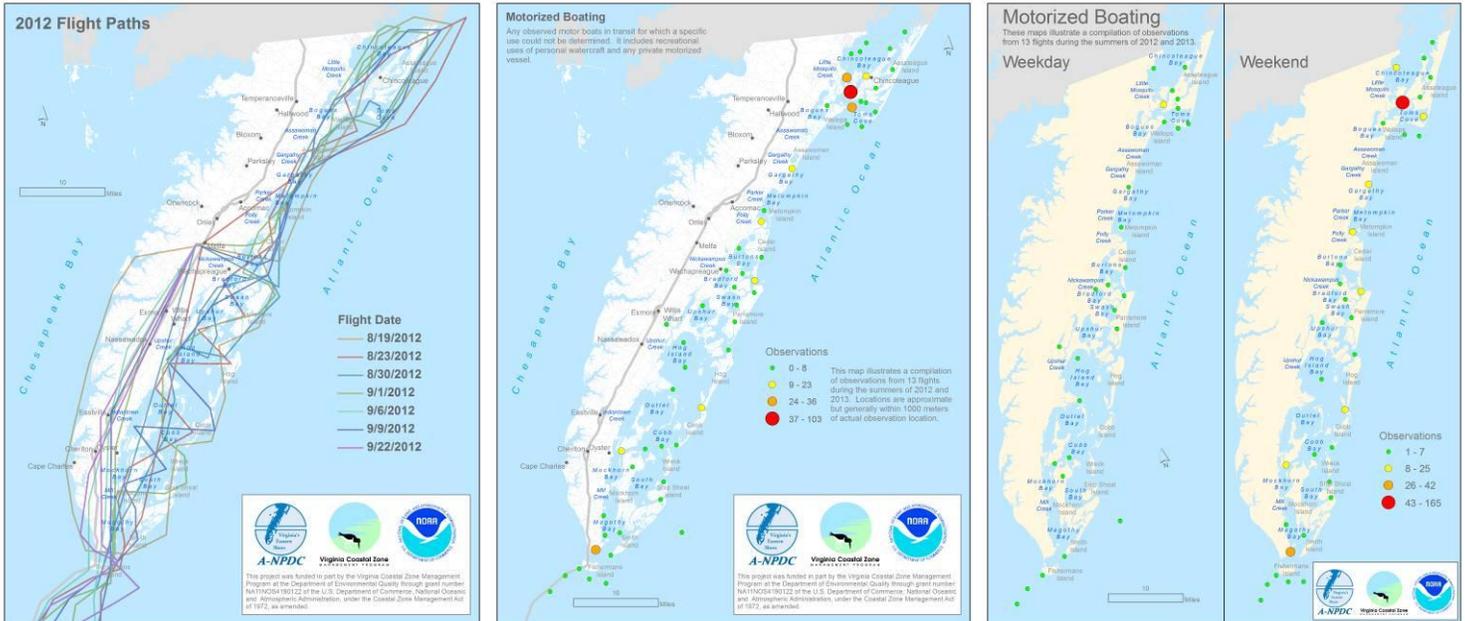
When VMRC resolved to expand current SAV set-aside areas they asked VIMS staff to create boundaries for new potential SAV set-asides, based on the future potential expansion of eelgrass on the seaside, to bring back before the board. The Coastal GIS Coordinator organized a call and subsequent participatory GIS webinar with VMRC regulatory staff, VIMS scientists, and local planners to successfully design and digitize four new proposed SAV set-aside area boundaries on the Seaside of the Eastern Shore. The Coastal GIS Coordinator created maps of the new proposed SAV set-aside areas that will be presented to the VMRC Board at their January 2015 meeting.



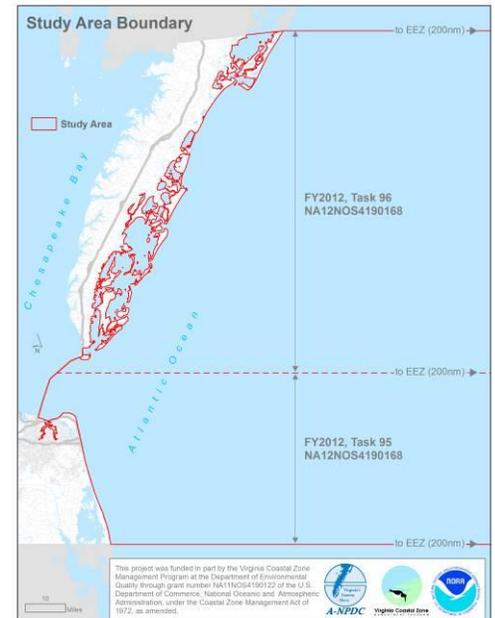
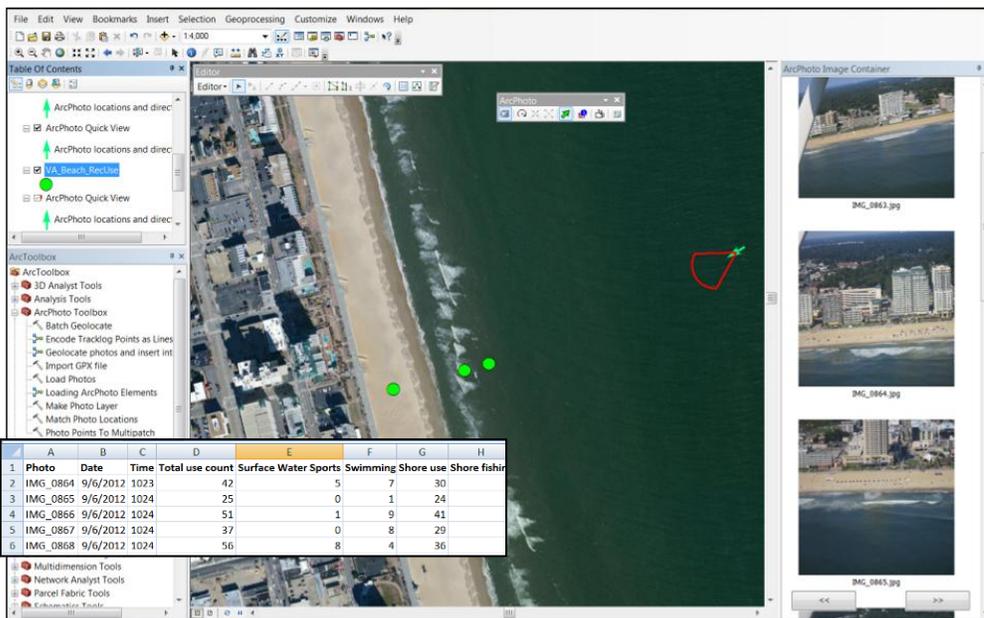
New proposed SAV set-aside area maps with acreage breakdowns created by the Coastal GIS Coordinator to be presented to the VMRC Board.

Virginia Atlantic Coast Aerial Recreational Use Survey

In FY11 the Coastal GIS Coordinator worked with ANPDC staff to design a methodology for recreational use survey flights utilizing VMRC enforcement aircraft and pilots, and ANPDC staff equipped with GPS enabled digital cameras. This methodology was used to collect recreational use data along VA's Atlantic coast during a series of flights in 2012 and 2013. Building on that work during the FY13 grant period, the Coastal GIS Coordinator worked with ANPDC staff to compile and process data from 13 aerial recreational use survey flights covering the seaside of Virginia's Eastern Shore and created a series of maps summarizing the data and maps comparing weekday and weekend use for nine distinct recreational uses as well as maps of survey flight lines. The full methodology for data collection and map creation, as well as the rest of the maps, can be found in the final report for FY12 Task 96, NA12NOS4190168.



The Coastal GIS Coordinator also set up GIS data input process for the VA CZM Ocean Planning Stakeholder Engagement Coordinator, facilitating creation of recreational use spatial data from geotagged aerial photos of Virginia Beach consistent to data created for the Eastern Shore portion of the project and created a map showing the study area boundaries for each portion of the project for each grantee to use in their respective reports.



New Jersey Participatory Recreational Use Mapping Workshop

The Coastal GIS Coordinator remained a regional resource on participatory GIS in FY13, helping to setup and run participatory GIS mapping sessions at recreational use mapping workshops in Southern New Jersey November 13th-15th and in Northern New Jersey November 19th-21st. The Coastal GIS Coordinator was the only GIS staff person to participate in these workshops for all of the Mid Atlantic Regional Council on the Ocean (MARCO) states, beginning with VA's workshop in 2012 and including subsequent workshops in MD, DE, and NJ.

Mapping Recreational Uses off of New Jersey's Coast

How do you recreate on New Jersey's Ocean and Bay?

We need your help to better understand how, where, and when you and others use New Jersey's waters for recreational activities. With traditional coastal and ocean uses expanding, new uses emerging, and New Jersey's coastal population increasing, the pressure is mounting to ensure the sustainable growth of both current and future activities.



Rutgers University is working with New Jersey's Coastal Management Program, a member of the Mid-Atlantic Regional Council on the Ocean (MARCO), in initiating an ocean and bay planning effort to collect and make available information on the many ways in which our waters are used (e.g., fishing, shipping, sand mining, wildlife habitat). This spatial information will help planners to reduce use conflicts in our coastal waters, maximize efficiency, and enhance environmental and economic productivity.

YOUR INPUT IS NEEDED!

What: Mapping recreational uses in New Jersey's Atlantic coast and bays.

When & Where: Participants are invited to attend one day, 8:30am-4:00pm and can choose which day they prefer. Lunch provided.

Thursday and Friday, November 14 and 15, Rutgers campus at Atlantic Cape Community College, Mays Landing

Wednesday and Thursday, November 20 and 21, Monmouth University, West Long Branch

Who: Recreational and for-hire fishers, boaters, paddlers, life guards, surfers, divers, wildlife enthusiasts, ecotourism business owners, local, state, and federal government representatives, non-profits, local citizens.

Why: To compile recreational use information for ocean planning efforts with the goal of reducing marine-use conflicts, maximizing use efficiency, and enhancing environmental and economic productivity.



Participants are invited to attend for one full day to discuss and share their knowledge of recreational uses, such as charter fishing, kayaking, boating, and surfing, wildlife viewing and hunting.

Some mapped human use data exists, but New Jersey has limited data about recreational uses of the Atlantic Ocean and bays. The information you provide will be mapped and basic data will be added to an online data portal that lets you view ocean resources and human uses of the Mid-Atlantic Ocean. (<http://portal.midatlanticocean.org/portal/>).




Participatory GIS Workshop

Participants will use computers and "e-beam" technology to map recreational activities in New Jersey's ocean and bay. No computer experience necessary! Participants will draw on digital maps projected onto a wall using a stylus that emits signals to an adjacent reader that immediately adds the shape they draw on the map. This innovative method efficiently allows users to share their thoughts, compare notes, and learn from others in the group. The maps created will be shared with participants for their confirmation and approval before being shared publicly.

Recreational uses to be mapped:

- For-hire boating:** Charter trips for fishing, diving and snorkeling, party cruises, wildlife and scenic viewing, transport, etc.
- Recreational Fishing:** From motorized and non-motorized vessels, kayaks, dive fishing, shore fishing, etc.
- General Recreation:** Motorized boating, packrafting, sailing, scuba diving, snorkeling, shore use, water sports, swimming, etc.



Why Participate? New Jersey's waters are getting busier every day!

New Jersey currently possesses:

- Access to numerous ports along the Atlantic Coast including the port of New York and New Jersey that is the largest port on the East Coast and then 3rd largest in the nation
- A nascent offshore wind energy industry that is beginning to make big investments as they prepare to develop offshore wind farms
- A valuable tourism industry largely attributed to its 130 miles of beaches
- A seafood industry that provides thousands of jobs
- A coast and ocean that support diverse wildlife including whales, dolphins, seabirds, cold water corals, and offshore canyons



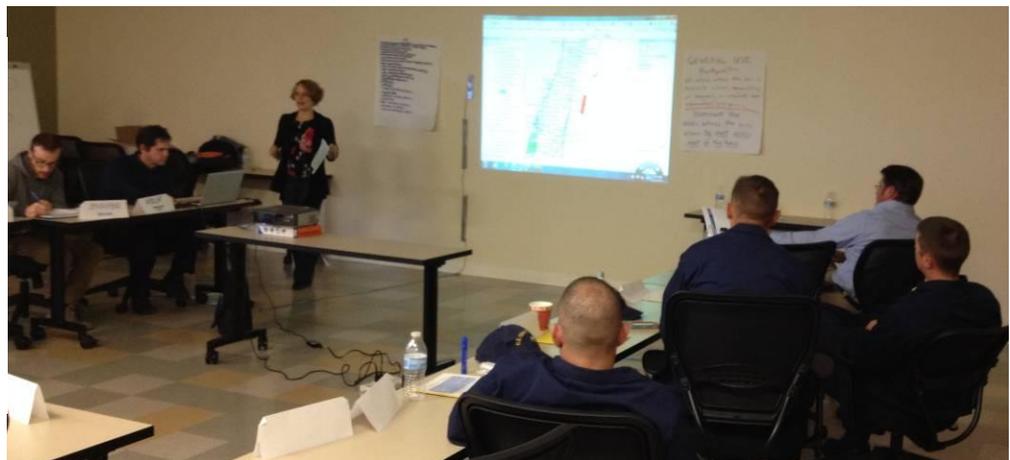
This recreational use mapping workshop provides an opportunity for you to share your knowledge about how people recreate in New Jersey's ocean and bay waters. This will ensure that the most accurate and comprehensive recreational use information is considered as ocean planning efforts take place.

Reserve your spot today!

RSVP to:
Jeanne Herb, Associate Director
Environmental Analysis and Communications (EAC) Group
njcoastusesworkshop@ejb.rutgers.edu or 848-932-2725

Above: The New Jersey Atlantic Coast Recreational Use Mapping Project flyer shared with potential participants.

Right: Participants in a breakout group mapping recreational uses at the Southern New Jersey workshop in Mays Landing.



Left: Participants in a breakout group mapping recreational uses at the Northern New Jersey workshop in West Long Branch.

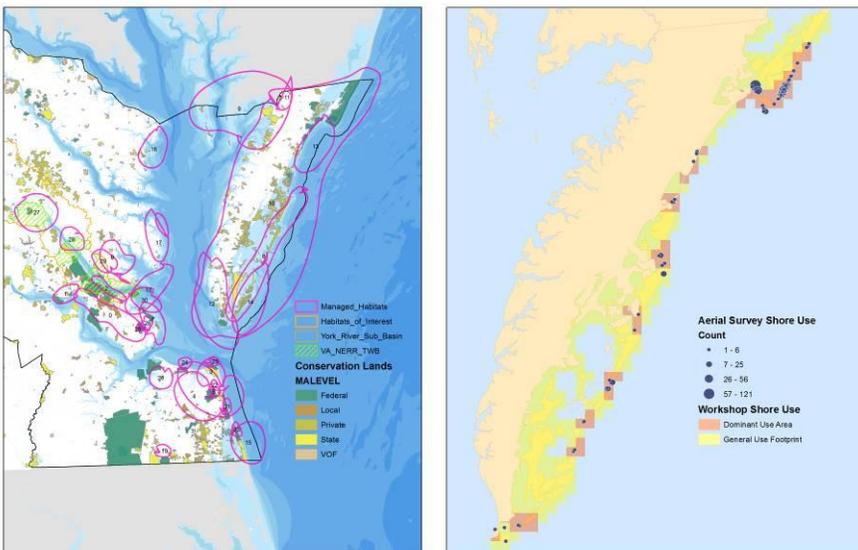
Training and Outreach

The Coastal GIS Coordinator helped to plan, prepare for, and staff a VA CZM Coastal and Ocean Mapping exhibit during the week of January 20th-24th, 2014. The exhibit included a Coastal GEMS display with updated display panels, factsheets, and a computer set up for live demos of the application that displayed screenshots of GEMS v3 features when not in use.

Right: Updated Coastal GEMS fact sheet

The Coastal GIS Coordinator presented on VA CZM's experience utilizing participatory GIS to map recreational uses of the ocean to over 60 participants on a NOAA Office for Coastal Management Ocean Uses webinar on May 1, 2014.

Above: Selected slides from the NOAA Office for Coastal Management Participatory GIS webinar



The Coastal GIS Coordinator ran a participatory GIS session to help introduce the Chesapeake Bay NERR Pilot Project of the Climate Change Vulnerability Assessment Tool for Coastal Habitats and participated in a workshop to discuss three recreation surveys (PGIS, Boater, and Surfrider) happening in the Mid-Atlantic.

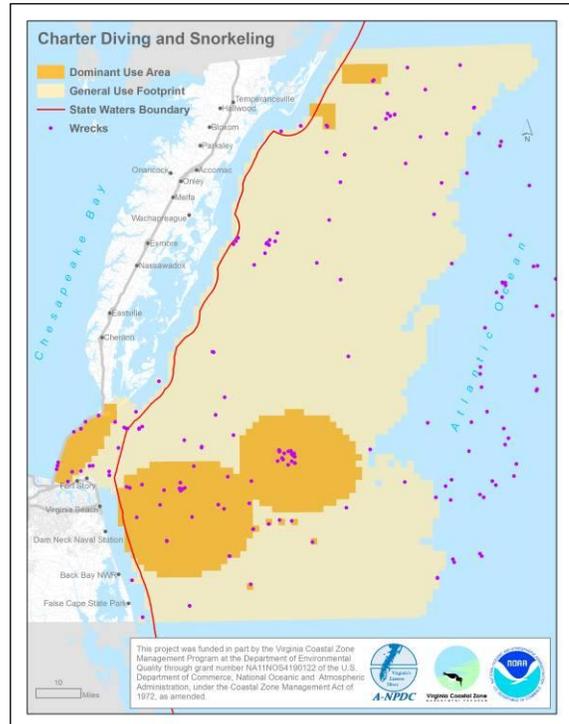
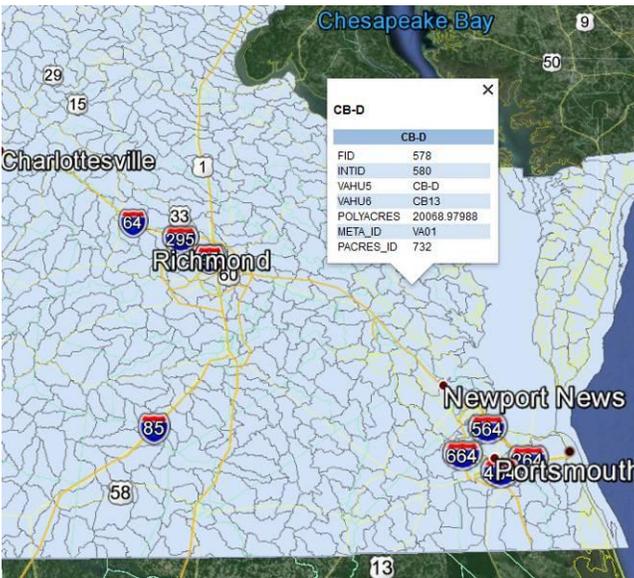
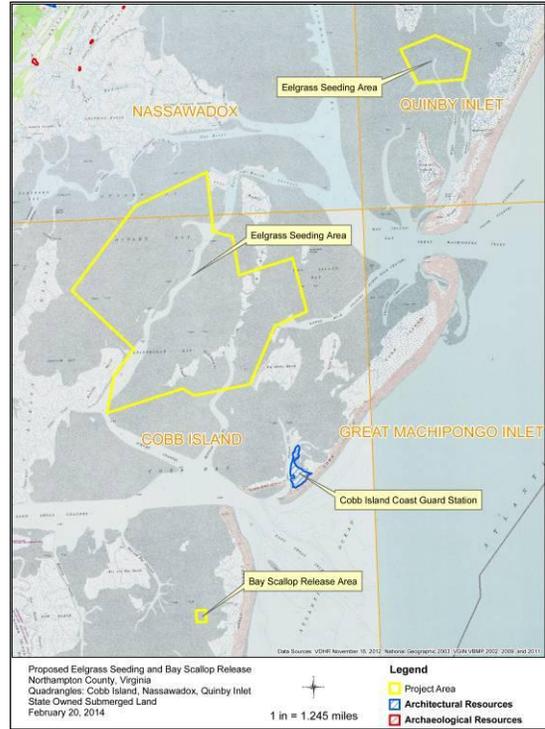
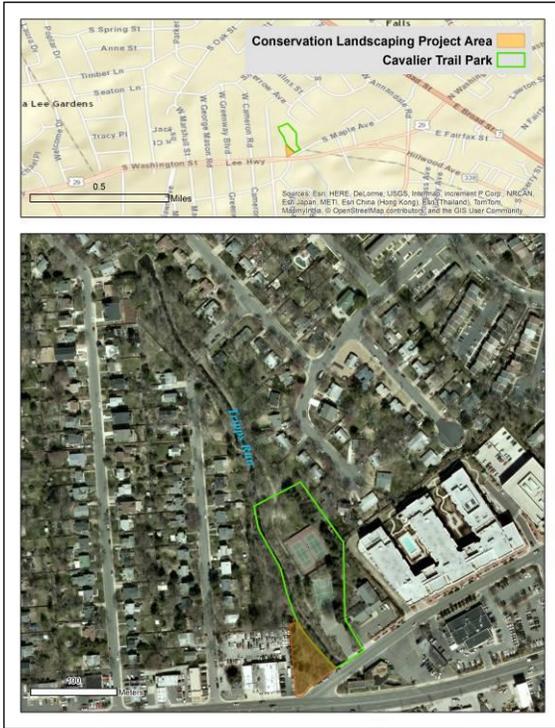
Left: A screenshot from the participatory GIS session to help introduce the Climate Change Vulnerability Assessment Tool.

Center: A map comparing recreational use data mapped by VA CZM through aerial survey and through participatory GIS.

GIS Map Products and Services

CZM Partner Request

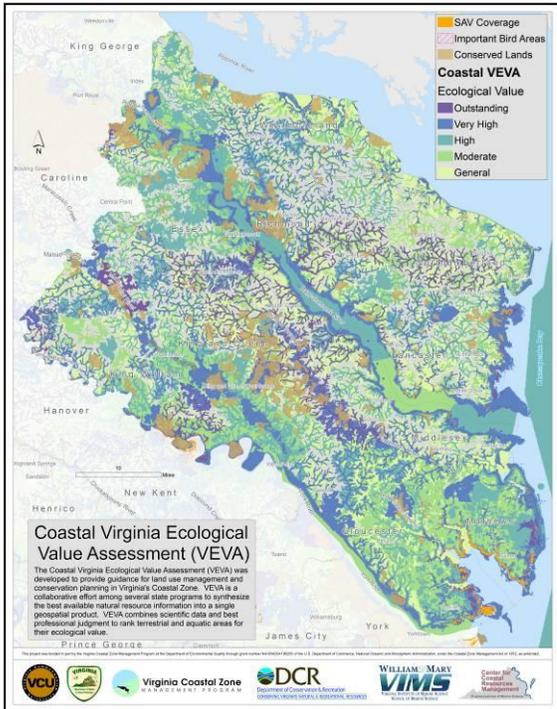
The Coastal GIS Coordinator completed 306A SHPO clearance required DHR archive searches (and project area maps where applicable) for CZM funded projects including a VIMS seaside restoration project, a Northern Virginia Regional Commission conservation landscaping project, and a town of Cape Charles signage project. The Coastal GIS Coordinator also converted GIS data to KMZ files for Middle Peninsula Planning District Commission staff to view in Google Earth and created maps of each use from the VA Atlantic Coast Recreational Use Mapping Project for ANPDC staff to use in their final report (FY 2011, Task 96, NA11NOS4190122).



Clockwise from top left: Project area map for NVRC landscaping project, DHR archive search for VIMS seaside restoration project, one of 22 use maps created from Atlantic Coast Recreational Use Mapping Project data, Virginia 5th order NWBD HUC code data converted to Google Earth .kmz format.

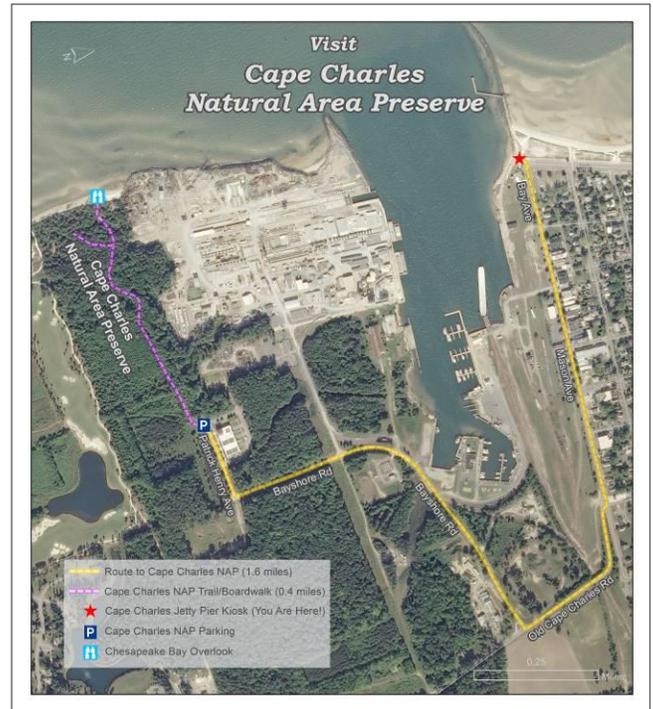
CZM Staff Request

The Coastal GIS Coordinator produced a large scale Coastal VEVA map of Middle Peninsula and Northern Neck, created a regional map for the NOVA native plant guide, created location maps for use in VA CZM magazine articles highlighting CZM funded public access projects, and worked with VA CZM Outreach Coordinator to create aerial imagery panels and a route map to the Cape Charles Natural Area Preserve for an interpretive signage kiosk in Cape Charles, VA.



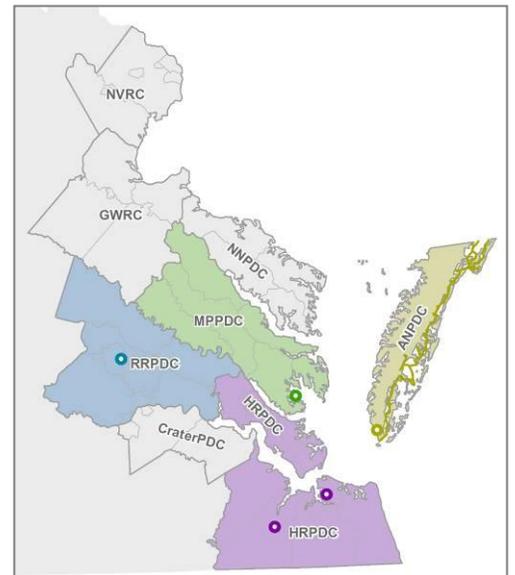
Left: Coastal VEVA and other resources on VA's Middle Peninsula and Northern Neck.

Right and Below: Natural Area Preserve route map and aerial imagery panels for an interpretive signage kiosk in Cape Charles.



Left: Map created for NOVA native plant guide including digitized fall line.

Right: CZM funded public access project site locator map created for CZM fall 2014 magazine.



Appendix

Google Analytics



coastalgems v 3 - <http://gis.vcu.edu/ge...> [Go to this report](#)
All Web Site Data

My Dashboard

Oct 1, 2013 - Sep 30, 2014

All Sessions
100.00%

+ Add Segment

Sessions

Sessions



Sessions and % New Sessions by User Type

User Type	Sessions	% New Sessions
New Visitor	606	100.00%
Returning Visitor	565	0.00%

Users

Users



New Users

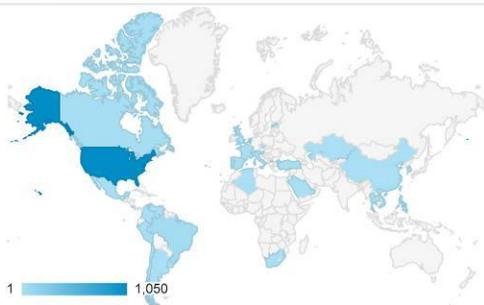
New Users



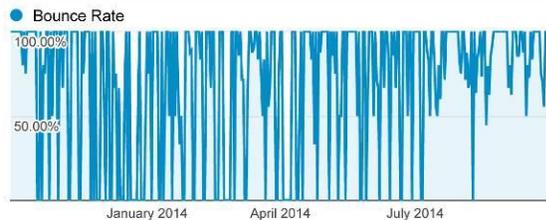
Sessions by Browser

Browser	Sessions
Chrome	837
Firefox	227
Internet Explorer	62
Safari	34
Android Browser	4
Amazon Silk	3

Sessions



Bounce Rate



Avg. Session Duration and Pages / Session

Avg. Session Duration

Pages / Session



Audience Overview

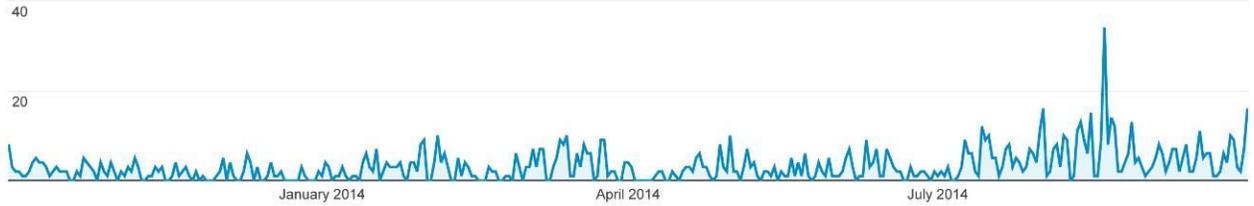
Oct 1, 2013 - Sep 30, 2014


All Sessions
 100.00%

 + Add Segment

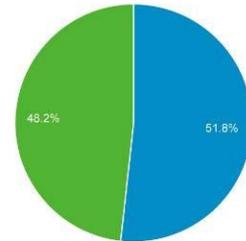
Overview

Sessions



Sessions 1,171	Users 615	Pageviews 1,514
Pages / Session 1.29	Avg. Session Duration 00:02:22	Bounce Rate 84.63%
% New Sessions 51.75%		

■ New Visitor ■ Returning Visitor



Language	Sessions	% Sessions
1. en-us	1,074	91.72%
2. pt-br	43	3.67%
3. es-es	8	0.68%
4. es-mx	7	0.60%
5. (not set)	4	0.34%
6. en-gb	4	0.34%
7. vi	4	0.34%
8. it-it	3	0.26%
9. c	2	0.17%
10. fr-fr	2	0.17%

Eastern Shore Coastal Change Archive Fact Sheet

Permanent Inundation of Low-Lying Areas

The Eastern Shore of Virginia Coastal Change Archive is a compilation of accounts solicited from local residents of observations made regarding changes to the natural environment related to sea level rise and climate change.

Status of the data

The data was created and first populated during a series of workshops with Accomack and Northampton County residents in May 2014.

Data Source

2014. Eastern Shore Coastal Change Archive.. Accomack-Northampton Planning District Commission.

To access this data layer/tool directly, please visit:

[Sorry, this data is not directly accessible.](#)



These homes on the South end of Cedar Island eventually succumbed to the ocean in the winter of 2011-2012. Much of the island itself at that spot disappeared during Hurricane Sandy. Photo by Curt Smith.

For original datasets, please contact:

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Why should we care?

Sea level has risen nearly 420 feet in the past 18,000 years and nearly 1.5 feet since the 1930s. The Eastern Shore's coastlines are constantly responding to these changing conditions. Additionally, water temperatures are on the rise and the Eastern Shore's climate has warmed bringing a variety of changes to the types and abundances of wildlife and aquatic life, the times that certain species migrate through the region, and the growing seasons of our vegetative species. Eastern Shore residents share a unique connection to the natural environment and are well aware of the changes that occur to it. The Accomack-Northampton Planning District Commission is engaging residents to compile their stories, observations, and historical documents to create the Coastal Change Archive which will serve as a historical resource for current and future generations to better understand how seascapes, landscapes, and organisms are responding to changes in the natural environment. The Archive will also serve as a baseline for evaluating the impacts of future changes to our climate and water levels. Examples of stories in the Archive include: "I've lived in this house my entire life and the flood waters never came in the yard when I was younger. It seems like every storm brings the water here now." "My family had been working this farm for generations until my grandparents moved away in 1926. The fields became too wet for the tractors. There weren't any crops that could grow there with that much saltwater flooding. There are tidal marsh grasses in the fields now where my family once tilled that land." "My friends and I used to camp and play games in that pine forest when I was a child. Only a few dead trunks remain today." "I'm finding that my garden is active later in the Fall by several weeks than back in the 1960s."

Links to find more information:

[Accomack-Northampton Planning District Commission](#)
[ESVA Climate Adaptation Working Group](#)

How is this resource managed?

The Coastal Change Archive will continue to be populated using participatory GIS at public workshops hosted by the Accomack-Northampton Planning District Commission where people can continue to share their observations and experiences.

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

Why was the GIS data created?

The Coastal Change Archive was created to establish a baseline dataset for evaluating the impacts of future changes to local climate and sea level. The Archive is intended to serve as both a cultural and historical resource that can raise awareness and generate interest in the issues of climate change and sea level rise and their expected impacts on Eastern Shore communities.

Links to projects that funded this data acquisition:

How was the GIS data created?

The data was created by interviewing Eastern Shore residents using participatory GIS methods. Staff from the Accomack-Northampton Planning District Commission were responsible for facilitating the process and taking notes. VCZM Staff were responsible for overseeing the GIS programming. Participants shared stories which will be documented using a computer & "e-beam" technology to produce a map of the observed changes. Participants will draw on digital maps projected onto a wall using a stylus that emits signals to an adjacent reader which immediately adds the shape they draw to the map. This innovative method quickly & efficiently allows users to share their thoughts, compare notes & learn from others in the group. Participants were asked to share their story, the location where the observation was made, and the timeframe over which the observation was made. Participants were encouraged to share photos or any other documentation they have to help with illustrating the story.

Future Directions?

The Eastern Shore of Virginia Climate Adaptation Working Group, under the direction of the Accomack-Northampton Planning District Commission, will continue to oversee and maintain the Archive. The Archive will be populated at future public workshops where residents will have the opportunity to share their stories using participatory GIS.

Frequently Asked Questions

Do I need any experience working with GIS to participate and share my stories for the project?
No computer experience is necessary and A-NPDC staff will help you every step along the way.

Sea Level Rise Fact Sheet

Sea Level Rise

Description

These data, which depict the potential inundation of coastal areas resulting from a projected 1 to 6 feet rise in sea level above current Mean Higher High Water (MHHW) conditions, allow the visualization of potential impacts from sea level rise to coastal communities in Virginia. They were created as part of the NOAA Office for Coastal Management's Sea Level Rise and Coastal Flooding Impacts Viewer (see link below).

The Sea Level Rise and Coastal Flooding Impacts Viewer is a powerful tool that provides citizens, coastal managers, and scientists with a preliminary look at sea level rise and coastal flooding impacts to coastal communities around the nation. In addition to displaying potential future sea levels, the tool also communicates the spatial uncertainty of mapped sea levels, models potential marsh migration due to sea level rise, overlays social and economic data onto potential sea level rise, examines how tidal flooding will become more frequent with sea level rise, and includes simulations of sea level rise at local landmarks.

Status of the data

These data were created in 2012 and an update strategy is being developed that will include examination of new elevation data sets as they become available to determine if a mapping update is warranted.

Data Source

NOAA Office for Coastal Management Sea Level Rise Data. 2012. Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), Coastal Services Center (CSC)

To access this data layer/tool directly, please visit:

<http://www.coast.noaa.gov/digitalcoast/tools/slrviewer>

Why should we care?

Current sea level rise is about 3 mm/year worldwide. According to NOAA, "this is a significantly larger rate than sea-level rise averaged over the last several thousand years", and the rate may be increasing. Sea level rises can considerably influence human populations in coastal regions, making them more vulnerable to storm surge and flooding, and can negatively affect natural environments and ecosystems. The oceans will continue their rise in the coming century. The International Panel on Climate Change's best estimates range from a few inches to a few feet of sea level rise by 2100. If the rise is 2 feet, the US could lose 10,000 square miles of land. Sea-level rise also increases coastal erosion and the loss of coastal wetlands, and saltwater spoils freshwater drinking supplies. Considering that half of the world's population lives near coasts, sea-level rise is a serious concern.

While most coastal areas are affected by sea level rise due to an increasing volume of water in the ocean, sea level in Virginia is also affected by subsiding shoreline elevation and changing ocean currents. The rate of subsidence in some parts of the state, due to multiple causes including a meteor impact millions of years ago, glacial retreat thousands of years ago, and groundwater withdrawal over the last century, is particularly alarming, almost doubling the effect of increasing ocean volume. Add to that a slowing Gulf Stream, which means less pressure to move water away from the coast, and you get a present rate of sea level rise in southeastern Virginia of greater than 1.5 feet per century, and these rates appear to be accelerating. It's reasonable to anticipate that sea level in Virginia will rise 1.5 feet in the next 20 to 50 years, making consideration of potential impacts not just relevant but vital.

Links to find more information:

[NOAA Digital Coast, Understanding Coastal Inundation](#)
[NOAA National Ocean Service, Is sea level rising?](#)
[VIMS Recurrent Flooding Study, Sea Level Rise in Virginia](#)

How is this resource managed?

Modeling future sea level rise allows us to reduce vulnerability and increase resilience further into the future by incorporating sea level rise information into planning decisions to help state and local officials, community planners, and infrastructure managers understand possible future risks.

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

[NOAA Digital Coast, Conserving Coastal Wetlands for Sea Level Rise Adaptation](#)
[NOAA Digital Coast, Incorporating Sea Level Change Scenarios at the Local Level](#)
[Virginia CZM Program, Climate Change Adaptation Efforts](#)

Why was the GIS data created?

These data were created as part of the National Oceanic and Atmospheric Administration Coastal Services Center's efforts to create an online mapping viewer depicting potential sea level rise and its associated impacts on the nation's coastal areas. The purpose of the mapping viewer is to provide coastal managers and scientists with a preliminary look at sea level rise (slr) and coastal flooding impacts. The viewer is a screening-level tool that uses nationally consistent data sets and analyses. Data and maps provided can be used at several scales to help gauge trends and prioritize actions for different scenarios. The Sea Level Rise and Coastal Flooding Impacts Viewer may be accessed at:
<http://www.csc.noaa.gov/slr>

Links to projects that funded this data acquisition:

[NOAA Office for Coastal Management, Digital Coast](#)

How was the GIS data created?

These data depict the potential inundation of coastal areas resulting from a projected 1 to 6 feet rise in sea level above current Mean Higher High Water (MHHW) conditions. The process used to produce the data can be described as a modified bathtub approach that attempts to account for both local/regional tidal variability as well as hydrological connectivity. The process uses two source datasets to derive the final inundation rasters and polygons and accompanying low-lying polygons for each iteration of sea level rise: the Digital Elevation Model (DEM) of the area and a tidal surface model that represents spatial tidal variability. The tidal model is created using the NOAA National Geodetic Survey's VDATUM datum transformation software (<http://vdatum.noaa.gov>) in conjunction with spatial interpolation/extrapolation methods and represents the MHHW tidal datum in orthometric values (North American Vertical Datum of 1988).



Flooding in Norfolk, VA. Image courtesy of Skip Stiles/Wetlands Watch.

For original datasets, please contact:

Doug Marcy
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Charleston, SC 29405.00000000
Phone: 843-740-1334
Fax: 843-740-1224
Email: doug.marcy@noaa.gov

The model used to produce these data does not account for erosion, subsidence, or any future changes in an area's hydrodynamics. It is simply a method to derive data in order to visualize the potential scale, not exact location, of inundation from sea level rise.

Future Directions?

New elevation data are being collected all the time by various federal, state, and local entities so it is possible that newer data have been collected since the mapping areas were originally populated. NOAA has now completed mapping most of the nation's coastal areas for Sea Level Rise and Coastal Flooding Impacts Viewer and has begun to develop an update strategy. This strategy will include examination of new elevation data sets as they become available to determine if a mapping update is warranted.

Frequently Asked Questions

Do the maps shown in this viewer take into account levees and/or hydraulic features (culverts, pipes, levees, bridges)?

The digital elevation models used to map sea level rise for these data do not incorporate a detailed pipe network analysis or engineering-grade hydrologic analysis (for example, culverts and ditches may not be incorporated, resulting in incorrectly mapped areas).

Why does the data show inundation starting at mean higher high water (MHHW)?

For inundation studies for which increased water level scenarios are required to determine the amount of land affected by sea level inundation, the elevation of a tidal datum (such as mean high water, or MHHW, in areas with diurnal tides) is often used as the base elevation. This is because the high water datum represents the elevation of the normal daily excursion of the tide where the land area is normally inundated. Taking this normal extent of inundation into account is important when trying to delineate land areas inundated by abnormal events such as storm surge or sea level change.

What is the accuracy of these data?

These data are derived from source elevation data that meet or exceed the Federal Emergency Management Agency (FEMA) mapping specifications for the National Flood Insurance Program. Areas that do not have elevation data that meet these criteria are shown as "Areas not mapped".

