



# 2013 Annual Report

## *Accomack–Northampton Coastal Resources Technical Assistance Program*



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Virginia Coastal Zone  
MANAGEMENT PROGRAM



Virginia Coastal Zone Management Program

Accomack-Northampton Planning District Commission

NOAA Grant: NA13NOS4190135

Grant Year 2013 Task 41

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# **Fiscal Year 2013 Technical Assistance Annual Report**

*March, 2015*

*Prepared For:*

**Virginia Coastal Zone Management Program**

Virginia Department of Environmental Quality

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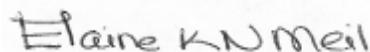
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## *Acknowledgements*

The following persons provided invaluable assistance in A-NPDC's Technical Assistance Projects:

A-NPDC Staff – John Aigner, David Annis, Kat Edwards, Susan Haycox, Brenette Hinmon, Leslie Mason, Melissa Matthews, Elaine Meil, Sue Simon and Curtis Smith

Virginia Coastal Zone Management Program – Laura McKay, Virginia Witmer, Shep Moon, Beth Pollack, April Bahen, and Nick Meade

*On the cover – Photograph of the Mid-Atlantic Regional Spaceport at the NASA Wallops Flight Facility by Gordon Campbell of At Altitude Gallery. The facility is located on Wallops Island, a barrier island in northern Accomack County. The facility is a regional economic driver providing local employment and drawing tourists during launch activities.*



**Virginia Coastal Zone**  
MANAGEMENT PROGRAM



*This project was funded by the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant #NA13NOS4190135 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.*

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## 1.0 Introduction

The Accomack-Northampton Planning District Commission (A-NPDC) was formed in 1970 to provide planning and housing services on the Eastern Shore of Virginia. A-NPDC is a regional commission consisting of Accomack and Northampton Counties and the Town of Chincoteague. Additionally, the A-NPDC assists 19 incorporated towns on the Eastern Shore.

The Eastern Shore of Virginia is a 70-mile long peninsula between the Atlantic Ocean and the Chesapeake Bay that has remained as one of the few remaining rural regions on the Atlantic seaboard. The region is unique for its vast wealth of coastal resources. The threats of development and constant changes to the region’s dynamic coastal environment put the socio-economic, natural, and built environments on the Eastern Shore at risk. As result, A-NPDC has championed several efforts focusing on ensuring a sustainable future for local economies and the environment.

In 2013, the A-NPDC continued to coordinate the Eastern Shore of Virginia Climate Adaptation Working Group (CAWG) to synchronize efforts amongst local, state, and federal representatives of government, aquaculture, agriculture, and community organizations to better plan and mitigate risks associated with climate change and sea level rise. CAWG along with other A-NPDC efforts such as the Eastern Shore of Virginia Ground Water Committee are working to ensure a productive future for Eastern Shore residents and the natural environment.

During the 2013 Fiscal Year (FY2013), A-NPDC coordinated the CAWG, offered coastal management training opportunities for local government staff, and coordinated public education efforts. The A-NPDC also continued to staff the Eastern Shore of Virginia Ground Water Committee, provide GIS services, conduct state and federal environmental reviews, and work with local governments and organizations to address coastal management issues. The A-NPDC’s focal project for FY2013 involved the development of the *Uniform Land Preservation and Policy Report for Northampton County and Accomack County* by working with local governments and land preservation organizations to identify specific policy options regarding how lands protected by conservation easements should be treated, mechanisms to verify conservation protection measures are in place and being maintained on protected property, and also strategies and mechanisms to prevent low conservation value land from being protected permanently. The expected outcome of these activities is expected to improve coastal management on the Eastern Shore of Virginia.

As part of the overall mission, the A-NPDC maintains a coastal program with the assistance and support of the Virginia Coastal Zone Management Program and the National Oceanic and Atmospheric Administration (NOAA).

## 2.0 Executive Summary

The FY2013 program included staff support of the Eastern Shore CAWG, coordination of eight training and outreach programs; technical assistance to local, state, and federal government organizations; staff support of the Eastern Shore Ground Water Committee; and development of the *Uniform Land Preservation and Policy Report for Northampton County and Accomack County*. Over \$2,578,066 in grant funds and staff time were leveraged to aid the completion of multiple projects related to the goals presented in the scope of work for FY2013.

## 3.0 Products

The following sections describe the activities completed during FY2013.

### 3.1 Climate Adaptation Working Group Report

The Climate Adaptation Working Group (CAWG) is comprised of local government staff and officials and met four times during FY2013 to coordinate coastal management efforts, provide information and solicit input from localities on state and federal initiatives, and allow the exchange of information between localities. This task implements Executive Order 23, Goal 8.

#### 3.1.1 Summary of Accomplishments

In FY2013 the CAWG:

- ◆ Engaged over 30 partnering and participating agencies including local, state, and federal government agencies and local NGOs;
- ◆ Published and distributed a quarterly informational newsletter (newsletters included in **Appendices A-D**);
- ◆ Held four quarterly meetings;
- ◆ Engaged local residents during one presentation related to sea level rise adaptation;
- ◆ Coordinated with the NASA Wallops Flight Facility to incorporate local data into local adaptation planning efforts;
- ◆ Coordinated with the Nature Conservancy to develop a regional marsh migration

- model and Coastal Resilience Decision Support Tool;
- ◆ Oversaw the development of and maintained the Eastern Shore Coastal Change Archive, an online mapping project to solicit and preserve local knowledge of experienced changes resulting from sea level rise and climate change; and
- ◆ Reviewed approximately 50 adaption-related projects.

### 3.1.2 Quarterly Meeting Reports

#### November 13, 2013 CAWG Meeting

Meeting Location: VIMS Eastern Shore Lab, Wachapreague, VA

Meeting Time: 1:00 – 3:00 p.m.

Attendees: 12

Agencies Represented: 10

Meeting Outcomes:

- Curt Smith provided an update on the ES Coastal Change Archive
- Curt Smith presented a summary of recent adaptation items and events including the *IPCC's Climate Change 2013: The Physical Science Basis, proceedings of the Recurrent Coastal Flooding Subpanel of the Secure Commonwealth Panel, the North Atlantic Comprehensive Coastal Vulnerability Study, and the ESVA Transportation Infrastructure Inundation Vulnerability Assessment*
- Gwynn Crichton of the Nature Conservancy presented an introduction to a marsh migration model being developed for the Eastern Shore and solicited input from CAWG members
- Tiffany Moissan of NASA presented overviews for the NASA-Wallops Flight Facility's Climate Adaptation Science Investigation Update and the development of the NASA Mid-Atlantic Coastal Resilience Institute
- Jenny Neyland, a consultant for NASA, presented an overview of the NASA-Wallops Flight Facility Joint Land Use Study
- Curt Smith updated the group on the upcoming rewrite of the regional Hazard Mitigation Plan.

The sign-in sheet and agenda from the meeting are included in **Appendix E**.

#### February 2014 CAWG Meeting

Meeting Location: Meeting held remotely via email

Meeting Time: N/A

Attendees: 44

Agencies Represented: 30

Meeting Outcomes:

- A recent report produced by the NASA-Wallops Flight Facility was distributed to the

group: *NASA-WFF Climate Resilience Workshop Summary Report*

- Curt Smith updated the group regarding upcoming events related to adaptation
- The group was updated on the construction of a living shoreline at Camp Occohannock on the Bay by the Nature Conservancy and invited to participate in a kickoff workshop for the event.

The sign-in sheet, agenda, and photographs from the meeting are included in **Appendix F**.

### *May 13, 2014 CAWG Meeting*

Meeting Location: Eastern Shore of Virginia Chamber of Commerce, Melfa, VA

Meeting Time: 1:00 – 3:00 p.m.

Attendees: 15

Agencies Represented: 12

Meeting Outcomes:

- Steve Parker, recently retired director of the Nature Conservancy’s Virginia Coast Reserve, was recognized for his contributions to CAWG
- The group reviewed and discussed recent local, regional, and national adaptation events including a local living shoreline workshop for landowners, local FEMA Preliminary FIRM public meetings, a local ground water summit, and the NOAA Climate Prediction Applications Science Workshop
- Curt Smith presented updates on eight local, regional, and national adaptation items and resources
- Curt Smith led a discussion on the development of a public workshop for 2014. The group reached consensus that two workshops were needed:
  - A workshop for local government staff and elected officials to provide an overview of the FEMA Community Rating System and the benefits of participating in the program; and
  - A public workshop to follow-up on CAWG’s Coastal Flooding Workshop
- Curt Smith reported on 11 adaptation planning and regulatory items

The sign-in sheet and agenda from the meeting are included in **Appendix G**.

### *August 12, 2014 CAWG Meeting*

Meeting Location: VIMS Eastern Shore Lab, Wachapreague, VA

Meeting Time: 1:00 – 3:00 p.m.

Attendees: 18

Agencies Represented: 13

Meeting Outcomes:

- Curt Smith reviewed the CAWG Strategies set forth during the August 2010 Adapting to Climate Change Workshop and described in the Nature Conservancy’s May 2011 report, the *Eastern Shore of Virginia: Strategies for Adapting to Climate*

*Change.* Curt presented a draft 2014 Progress Report for CAWG and the group provided input on progress accomplished regarding specific strategies to be incorporated into the final draft. The final progress report is included in **Appendix H**.

- Curt Smith presented an overview of the Hampton Roads Climate Adaptation for Coastal Communities conducted by NOAA and the group indicated great interest in holding this for the Eastern Shore
- The group reviewed and discussed recent local, regional, and national adaptation events including the VA Climate Change and Resiliency Update Commission, the Secure Commonwealth Panel Recurrent Flooding Subpanel, the VA Joint Commission on Sea Level Rise and Recurrent Flooding, and the USACE North Atlantic Coastal Comprehensive Study
- Curt Smith presented updates on ongoing CAWG projects including the ESVA Transportation Infrastructure Inundation Vulnerability Assessment, Hazard Mitigation Plan, and eight other initiatives
- Gwynn Crichton of the Nature Conservancy introduced and provided an overview of a two-year NFWF-funded project entitled Coastal Resilience in Accomack and Northampton Counties
- Kristin Raub of the University of Connecticut consulted the group on the development of community surveys related to climate adaptation on the Eastern Shore

The sign-in sheet and agenda from the meeting are included in **Appendix I**.

## 3.2 Coastal Management Training Report

The A-NPDC coordinated nine training and outreach events during FY2013. The events are summarized in the following sections. This task implements Executive Order 23, Goal 10.

### *3.2.1 Chesapeake Bay Foundation VOICES Presentation on Sea-Level Rise Adaptation*

A-NPDC staff gave a presentation to 15 local residents enrolled in the Chesapeake Bay Foundation’s VOICES course on November 16, 2013 at the Eastern Shore Community College in Melfa. The course is designed to educate local residents on the environmental, ecological, and socio-economical impacts of the Chesapeake Bay. The presentation was followed by a Q&A session and lasted over one hour. Participants were educated on historic, current, and future sea-level rise, its implications for the Chesapeake Bay and communities on the Eastern Shore, and measures being taken to adapt to expected changes.

Photographs and the presentation are included in **Appendix J**.

### *3.2.2 Shore Big Trees Program Development Meeting*

The A-NPDC hosted a coordination event with representatives from the VCZMP, VA Department of Conservation and Recreation, and the Eastern Shore Soil and Water Conservation District on November 21, 2013 at the Eastern Shore of Virginia National Wildlife Refuge. The meeting's objective was to develop a new program celebrating and promoting the plantings of native trees as part of the successful Plant ES Natives: They're Shore Beautiful native plant campaign. Specifically, the group explored various ideas to include in the program ranging from demonstration planting sites, various program partner roles, various funding options, and selection of the program name.

It was determined that the program would initially focus on planting native trees in public places with signage installed to educate the public on benefits of native trees and to raise awareness and appreciation for existing native trees. The program eventually could be expanded to include the development of a local catalog of the region's largest and oldest native trees and an awards program recognizing these trees in the region.

The meeting sign-in sheet and agenda are included in **Appendix K**.

### *3.2.3 Southern Northampton County Public Ground Water Summit*

On February 12, 2014, A-NPDC staff kicked off its Public Ground Water Summit series on behalf of the Ground Water Committee at Kiptopeke Elementary School in Cape Charles. This first summit was focused on the communities within southern Northampton County including the towns of Cape Charles and Cheriton. Curt Smith of A-NPDC and Britt McMillan, Ground Water Consultant to the Committee, gave presentations summarizing specific ground water conditions to 20 persons representing different stakeholder groups including town and county governments and planning commissions, private citizens, and businesses.

The workshop provided information on how the past environments on the Shore have influenced the public ground water supply with specific descriptions concerning the Chesapeake Bay bolide impact, the southward progradation of the Susquehanna River and the Delmarva Peninsula and the influence of Carolina Bays on ground water. Additional explanation of past environments and how they affect water quality, resulting in high iron in some areas, sulfur smell in other areas, and hard carbonate waters, all on the Shore. The presentations provided insight into everything that is known and unknown regarding the

region's sole source aquifers. The presentations were followed by lively discussions between the presenters and the audience.

The workshop was advertised in local newspapers, on the radio, and on the internet. County and town government leaders and planning commissioners were personally contacted to encourage their participation. Photos from the workshop and event materials are included in **Appendix L**.

### *3.2.4 Public Meeting to Introduce Draft Chesapeake Bay Milestones and Virginia's Nonpoint Source Plan*

On February 25, 2014 the A-NPDC hosted a webinar being conducted by DEQ regarding Chesapeake Bay TMDL milestones and Virginia's Nonpoint Source Plan. A-NPDC staff worked closely with DEQ to ensure that an additional webinar viewing location was added to accommodate Eastern Shore residents. Originally, the only option for Eastern Shore residents to participate in the webinar was to drive to Norfolk. Nine residents and staff representing seven different agencies attended and participated in the webinar in the A-NPDC Conference Room. The event press release and sign-in sheet are included in **Appendix M**.

### *3.2.5 Accomack County Planning Commission Ground Water Presentation*

On April 22, 2014 Curt Smith of A-NPDC presented an overview of regional ground water conditions and current management systems on behalf of the Ground Water Committee at the request of Accomack County. Only Planning Commissioners and staff members were in attendance. The presentation created a great deal of enthusiasm and led to lengthy discussions about ground water resources and its management within Accomack County. Feedback received from the attendees was overwhelmingly positive with most Commissioners indicating they felt that they had a much more thorough understanding of ground water on the Shore.

The presentation is included in **Appendix N**.

### *3.2.6 Household Hazardous Waste Collection*

On Saturday, May 10, 2014 over 50 Accomack and Northampton residents dropped off nearly 1 ton of household hazardous waste at the 10th Annual Household Hazardous Waste Collection. This year's collection was held concurrently at three locations at

Accomack and Northampton County Convenience Centers in Makemie Park, Fishers Corner, and Birdsnest making it easier for more residents to participate. A variety of hazardous materials were collected for proper disposal and recycling including aerosols, gasoline, kerosene, pesticides, insecticides, acids, fluorescent light bulbs, fertilizers, paint thinners, and asbestos shingles. Residents could dispose of 50 pounds at no cost, which was twice the allowance as previous years.

The Eastern Shore’s landfills are not engineered to handle these hazardous wastes that often illegally enter the landfills or are improperly disposed of by pouring out onto the ground or into a water body. These actions not only increase landfill operating costs putting additional burdens on our local governments, but they also pose a serious health risk to Eastern Shore residents and the environment. All potable water used by Eastern Shore residents comes from the ground and is very susceptible to contamination from these hazardous wastes which tend to accumulate around everyone’s homes over time. Hazardous wastes create unnecessary health and safety risks at home and every quantity brought in through the collection program ensures that that waste will not pollute our water resources on the Eastern Shore and endanger the quality of our water and public health.

Residents are encouraged to plan for participating in the event which will be held annually on the Eastern Shore every spring with the next collection occurring in Spring 2015.

NOAA and VCZM logos were displayed on all promotional and event materials. The agencies were also acknowledged in radio interviews leading up to the event and in media press releases following the event.

Event materials and photographs are included in **Appendix O**.

### *3.2.7 Northern Northampton County Public Ground Water Summit*

On June 11, 2014, A-NPDC staff hosted a community-focused ground water summit, the second summit in its Public Ground Water Summit series sponsored by the Ground Water Committee at the Northampton County Board of Supervisors Chambers in Eastville. This summit focused on the communities within northern Northampton County including the towns of Eastville and Exmore. Curt Smith of A-NPDC and Britt McMillan, Ground Water Consultant to the Committee, gave presentations summarizing specific ground water conditions to 17 persons representing different stakeholder groups including town and county governments and planning commissions, private citizens, and businesses.

The workshop provided information on how the past environments on the Shore have influenced the public ground water supply with specific descriptions concerning the Chesapeake Bay bolide impact, the southward progradation of the Susquehanna River and the Delmarva Peninsula and the influence of Carolina Bays on ground water. Additional explanation of past environments and how they affect water quality, resulting in high iron in some areas, sulfur smell in other areas, and hard carbonate waters, all on the Shore. The presentations provided insight into everything that is known and unknown regarding the region's sole source aquifers. The presentations were followed by lively discussions between the presenters and the audience.

The workshop was advertised in local newspapers, on the radio, and on the internet. County and town government leaders and planning commissioners were personally contacted to encourage their participation. Photos from the workshop and event materials are included in **Appendix P**.

### ***3.2.8 A-NPDC Shore Big Tree Dedication Ceremony***

A-NPDC staff coordinated the planting and dedication of a Shore Big Tree at the A-NPDC office in Accomac on September 12, 2014. A-NPDC staff spoke during a dedication ceremony attended by A-NPDC Board Members and Staff and staff of partnering agencies from VCZMP and the Eastern Shore Soil and Water Conservation District. The tree was planted with the intent that it will serve as a cornerstone of the community by providing shade for park visitors and natural habitat for decades to come and was featured in an article in the *Eastern Shore News*.

Photos from the ceremony and feature article are included in **Appendix Q**.

### ***3.2.9 Town of Wachapreague Shore Big Tree Dedication Ceremony***

A-NPDC staff coordinated the planting and dedication of a Shore Big Tree in the Town of Wachapreague's Seaside Park on September 13, 2014. The tree was dedicated during the Plant ES Natives Fall Celebration. The tree was located adjacent to the existing Plant ES Natives demonstration garden in the park and included a customized stone marker. The Mayor of Wachapreague, Delegate Robert Bloxom, and A-NPDC staff spoke during a dedication ceremony attended by residents of Wachapreague and Accomack and Northampton Counties. The tree was planted with the intent that it will serve as a

cornerstone of the community by providing shade for park visitors and natural habitat for decades to come.

### 3.3 Technical Assistance Report

The A-NPDC provided technical assistance to local, state, and federal organizations on numerous occasions including environmental review, GIS, and information services during FY2013. Technical assistance activities are summarized in the following sections. This task implements Executive Order 23, Goals 1, 4, and 10.

#### 3.3.1 Partnerships

The A-NPDC partnered with over 50 government and NGO organizations during FY2013 to complete projects aimed to complete the Scope of Work. **Table 1** summarizes A-NPDC partnerships for FY2013.

Table 1 FY2013 Partnerships		
ID	Agency/Group	Partnership Activity
1	NASA Wallops Flight Facility, U.S. Fish & Wildlife Service, Chincoteague Bay Field Station, and the Nature Conservancy	A-NPDC staff collaborated to develop a workshop to address climate adaptation strategies for the Wallops Flight Facility.
2	33 Agencies, Governments, and NGOs	A-NPDC staff coordinated the Eastern Shore Climate Adaptation Working Group which brought together 33 partnering groups quarterly to address climate change and sea level rise in the region.
3	VIMS	A-NPDC staff partnered with VIMS research faculty to submit proposals for conducting geologic research on the Atlantic Coast with focus on conducting public outreach and coordination with local governments. The two proposals were submitted to the National Science Foundation but not selected for funding.
4	The Nature Conservancy	A-NPDC staff partnered with TNC to leverage the Enhancing Coastal Resiliency on Virginia’s Eastern Shore project funded through the NFWF Hurricane Sandy Disaster Resilience Fund.
5	VIMS, VCZMP, Middle Peninsula PDC & Northern Neck PDC	A-NPDC served as partnering agency on the Rural Working Waterfronts Coalition and leveraged funding through VCZM to ensure and enhance working waterfronts in the VA coastal zone.

6	VCZMP, Eastern Shore Soil & Water Conservation District, VA Dept. of Conservation and Recreation	A-NPDC staff worked to coordinate the development and implementation of the Shore Big Trees Program.
7	ESVA Resource Conservation & Development Council	A-NPDC staff participated in meetings of the ESRC&D and developed projects of local significance.
8	ESVA Environmental Education Council	A-NPDC staff served on the regional council to further environmental education efforts within the region
9	Eastern Shore Watersheds Network	A-NPDC staff served on the Steering Committee of the ESVA Watersheds Network. The network is a local watershed group that began meeting annually in 2001 to address pollution reduction strategies for ESVA watersheds through public education and outreach, data sharing, and research communication.
10	VA Department of Conservation and Recreation	A-NPDC partnered in the development of the Virginia Outdoors Plan by hosting and coordinating local public input sessions.

### 3.3.2 Leveraged Funds

The A-NPDC used NOAA/VCZM grant funds to leverage services and complete projects aimed at improving coastal management on the Eastern Shore of Virginia. **Table 2** summarizes instances where NOAA/VCZM grant funds were leveraged during FY2013. Over \$2,578,066 was leveraged in FY2013 utilizing NOAA /VCZM grant funds.

<b>Table 2</b>			
<b>FY2013 Leveraged Funds</b>			
<b>ID</b>	<b>Group/ Event</b>	<b>Activity</b>	<b>FY2010 Amount</b>
1	Malcolm Pirnie, Inc.	Eastern Shore Ground Water Committee funds used to support consulting hydrogeologist to the Eastern Shore Ground Water Committee.	\$21,666
2	ESVA Transportation Infrastructure Inundation Vulnerability Assessment	Funds used to leverage VCZM grant to conduct a sea level rise vulnerability assessment of regional transportation infrastructure.	\$25,000
3	Rural Chesapeake Bay/Seaside of VA Working	Funds used to leverage VCZM grant to assess impacts from local regulatory factors for the waterfront village of Willis Wharf.	\$5,000

	Waterfront Coalition		
4	Climate Adaptation Working Group/The Nature Conservancy	NFWF Hurricane Sandy Disaster Resiliency funding leveraged to develop coastal resiliency planning tools for the Eastern Shore utilizing the platform established for the Eastern Shore Climate Adaptation Working Group.	\$2,260,000
5	FEMA/VDEM	Funds used to leverage a rewrite of the Eastern Shore Hazard Mitigation Plan.	\$133,000
6	DEQ	Funds used to leverage the Eastern Shore Septic Pumpout Program for qualifying low-moderate income property owners.	\$20,000
7	Accomack & Northampton Counties	Funds used to leverage an annual Household Hazardous Waste Collection.	\$14,000
8	Accomack County	Funds used to leverage the Eastern Shore GreenWorks Committee to oversee litter reduction strategies.	\$6,000
9	VCZM/DMME/BOEM	Funding to coordinate a local stakeholder engagement process for establishing best management practices to reduce use conflicts with commercial and recreational users within the Virginia Wind Energy Area during construction and operation of offshore wind turbines.	\$22,400
10	VA Seaside Commercial Fishing Mapping Project	Funds used to leverage the completion of grant proposal and attend project development meetings. Leveraged funds resulted in completion of commercial fishing survey to enhance coastal management in the region	\$60,000
11	ESVA Climate Adaptation Working Group	A-NPDC staff coordinated a regional group focused on developing adaptation and outreach strategies for improving the Eastern Shore’s ability to prepare and manage climate change and sea level rise.	\$10,000 in-kind hours
12	ESVA GIS Users Group	A-NPDC staff coordinated a regional group focused on providing a forum for networking and data sharing amongst GIS Users and providing training services.	\$1,000 in-kind hours

**Total Leveraged Funds FY2013: \$2,578,066**

### 3.3.3 Historical Searches

One historical search was performed by A-NPDC staff during FY2013. Historically, the A-NPDC has provided this service to numerous agencies and without local availability of DSS, local agencies on the Eastern Shore would be required to pay \$100 to \$150 per search.

Each environmental review corresponds with a historical search. **Table 3** summarizes the historical searches.

<b>Table 3</b>			
<b>FY2013 Historical Searches</b>			
<b>ID</b>	<b>Agency</b>	<b>Search Description</b>	<b>Outcomes</b>
1	Eastern Shore of Virginia Housing Authority	One search was completed for the Bailey Road Housing Development near the Town of Parksley as part of the environmental review for the construction of 24 residential units. The environmental review resulted in a finding of no significant impact.	Assured water quality in the Hunting Creek and Chesapeake Bay watersheds. Upgraded living conditions in the coastal zone.

### **3.3.4 Information Requests**

The A-NPDC responded to 25 information requests from private, local, state, and federal organizations and private citizens during FY2013. These requests are summarized in **Table 4**.

<b>Table 4</b>				
<b>FY2013 Information Requests</b>				
<b>ID</b>	<b>Date</b>	<b>Agency/Group</b>	<b>Contact</b>	<b>Request Description</b>
1	8/15/2013	Town of Parksley	Denise Bernard	Parksley Water Supply Plan assistance
2	8/15/2013	Accomack Co. Resident	Shuli Tor	Flood vulnerability inquiry
3	9/23/2013	Friends of Burtons Shore	Betsy Pinder	Public access inquiry regarding coastal erosion at Burtons Shore landing in Accomack
4	10/8/2013	USACE	Michelle Hayman	Review and comment of flooding vulnerability assessment
5	10/10/2013	Accomack Co. Resident	Ralph Hampton	Household hazardous waste collection inquiry
6	10/10/2013	Middlesex Co. Resident	Pete Mansfield	Wastewater reuse for groundwater recharge inquiry
7	10/15/2013	Chincoteague Wastewater Advisory Committee	Spiro Papadopoulos	Print maps for public meeting regarding wastewater treatment planning on Chincoteague
8	10/15/2013	Waste Watchers of the Eastern Shore	Jenny O'Neill	Print 50 copies of event flyers for non-profit volunteer litter control advocacy group

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9	10/18/2013	Accomack Co. Resident	Pat Cody	LiDAR data inquiry
10	2/12/2014	Northampton Co. Resident	Lynette Dyer	Bayside private oyster lease inquiry
11	2/14/2014	Cape Charles Wave	Dorie Southern	Northampton groundwater information inquiry
12	2/17/2014	Northampton Co. Resident	Connie Decker	Northampton groundwater information inquiry
13	2/18/2014	Accomack Co. Resident	Will Glime	Working waterfronts inquiry
14	2/19/2014	Waste Watchers of the Eastern Shore	Jenny O'Neill	Print 50 copies of event flyers for non-profit volunteer litter control advocacy group
15	2/19/2014	Northampton Co. Planning Commission	Roberta Kellam	Chesapeake Bay TMDL-WIP inquiry
16	2/19/2014	Eastern Shore Soil & Water Conservation District	JE Lewis	Northampton groundwater information inquiry
17	3/5/2014	Northampton Co. Planning Commission	Martina Coker	Northampton groundwater information inquiry
18	3/5/2014	Accomack Co. Planning Department	Rich Morrison	Transient & Working Waterfront Needs Assessment report request
19	3/5/2014	Accomack Co. Planning Department	Rich Morrison	Northern Neck Timber Barging Economic Feasibility report request
20	3/7/2014	Capital News Service	Brian Compere	Chesapeake Bay Impact Crater and groundwater interview
21	3/10/2014	Town of Cape Charles	Rob Testerman	Town zoning ordinance template request
22	3/10/2014	Chesapeake Bay Journal	Leslie Middleton	ES Public Access Authority and Working Waterfronts interview
23	3/24/2014	Virginia-Pilot	Roger Chesley	Tangier demographics, erosion, and sea level rise interview
24	4/7/2014	Waste Watchers of the Eastern Shore	Jenny O'Neill	Print copies of Keep America Beautiful community survey documents
25	9/3/2014	Accomack Co. Resident	Barry Sharpe	Household hazardous waste collection inquiry

## 3.4 Ground Water Committee Report

The A-NPDC staffed the Eastern Shore of Virginia Ground Water Committee and managed the Ground Water Committee's consulting hydrogeologist during FY2013.

### 3.4.1 Summary of Accomplishments

A-NPDC staff coordinated ground water permit reviews with DEQ and local aspects of the ground water model update developed by USGS. A-NPDC staff also maintained and updated the Ground Water Committee web site and conducted educational programs including two public workshops and presentations to local government boards. During FY2013, the Ground Water Committee held 9 meetings, awarded the 2013 Eastern Shore

Ground Water Award, commented on multiple regulatory actions, reviewed 14 ground water withdrawal permits, completed an update to the *Eastern Shore of Virginia Ground Water Supply Protection and Management Plan*, conducted a Household Hazardous Waste Collection, and reviewed multiple environmental reviews and regulatory items.

Additional specific notable accomplishments of the Ground Water Committee in FY2013 are summarized in Table 5.

Table 5		
FY2013 Ground Water Committee Accomplishments		
Technical Documentation		
ID	Activity	Month
1	Present the complete new Groundwater Resource Protection and Preservation Plan. The plan was developed in a modular format and designed to be treated as a “living document”. As such, relevant portions of the new plan will be routinely updated and will not be used as a “final” document. In this way the Plan will be maintained “current”.	Oct
2	Discuss VDH SHIFT Stakeholder Advisory Committee recommendations for maximizing private sector involvement in the onsite sewage program. Concerns with increasing private sector involvement were predominately on VDH providing adequate oversight to protect human health and the environment.	Nov
3	Present results of groundwater model scenario for hypothetical withdrawal Northampton County in the vicinity of the former KMC facility. Results found that near the center spine the withdrawal was more volume limited than water quality limited, with most of the predicted water quality impacts occurring near the shore on the Seaside and Bayside.	Nov
4	Review new state regulations: Groundwater Withdrawal Regulations (9VAC25-610), Designated Groundwater Management Areas (9VAC25-600), and Repealed the declaration of the Eastern Shore of Virginia as a critical Ground Water Area (9VAC26-620)	Jan
5	Review of two new USGS studies: <i>Land Subsidence and Relative Sea-Level Rise in Southern Chesapeake Bay Region and Sediment Distribution and Hydrologic Conditions of the Potomac Aquifer in Virginia and Parts of Maryland and North Carolina</i>	Jan
6	Reviewed three new USGS studies related to groundwater depletion: <i>Groundwater Depletion in the United States: 1900-2008 (Konikow, USGS SIR 2013-5079)</i> ; <i>Assessing Groundwater Availability in the North Atlantic Coastal Plain Aquifer System (USGS Fact Sheet 2011-3019)</i> ; and <i>Hydrology and Hydrologic Conditions of the Northern Atlantic Coastal Plain Aquifer System from Long Island, New York, to North Carolina (Materson, et.al., USGS SIR 2013-5133)</i>	Mar
7	Reviewed a new USGS model developed for the Barrier Islands to evaluate effects of climate change on groundwater: <i>Development of a Numerical Model to Simulate Groundwater Flow in the Shallow Aquifer System of Assateague Island, Maryland and Virginia (Masterson, et.al., USGS OFR 2013-1111)</i>	Mar
8	Completed review of water quality results from the RMC research. Prepared summaries for the residents of results with remarks on water quality that did not meet EPA Drinking Water MCLs.	Mar
9	Reviewed two new publications by USGS authors in the publication “ <b>Current Perspectives in Contaminant Hydrology and Water Resources Sustainability</b> ”: <i>Occurrence and Mobility of Mercury in Groundwater</i> and <i>Arsenic in Groundwater: A Summary of Sources and the Biogeochemical and Hydrogeologic Factors Affecting Arsenic Occurrence and Mobility</i>	Apr
10	Reviewed a new USGS publication on factors affecting vulnerability of public water supply wells in the United States. The publication provided a wide review of current conditions and steps that can be taken to minimize well vulnerability. Much of the information presented in the report is also applicable to individual domestic wells: <i>Factors Affecting Public Supply Well Vulnerability to Contamination: Understanding Observed Water Quality and Anticipating Future Water Quality (Eberts, Thomas, and Jagucki, USGS Circular 1385)</i>	May

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11	Reviewed the new VDEQ Ambient Groundwater Quality Monitoring Program. Discussed planned scope of the program, benefit to the Eastern Shore, and funding impediments to full implementation.	Aug	
12	Reviewed VDEQ plans to reallocate groundwater withdrawals for permits in the Eastern Virginia Groundwater Management Area with a target to reduce permitted withdrawals by over 50 MGD.	Aug	
13	Presented an overview of groundwater susceptibility to saltwater intrusion on the Eastern Shore of Virginia.	Sep	
Implementation of Work Plan			
ID	Activity	Month	Outcome
1	Complete new Groundwater Resource Protection and Preservation Plan “Living Document”	Oct	Present complete document to Groundwater Committee for approval.
2	Draft letters commending Tipton & Walker Farms for exemplary use of Columbia Aq.	Nov	Highlight benefits of implementing Columbia Aq for agricultural irrigation
3	Review two new USGS studies: <i>Land Subsidence and Relative Sea-Level Rise in Southern Chesapeake Bay Region and Sediment Distribution and Hydrologic Conditions of the Potomac Aquifer in Virginia and Parts of Maryland and North Carolina</i>	Jan	Incorporation of new and relevant local data / information into regional groundwater management plan.
4	Reviewed three new USGS studies related to groundwater depletion (see Technical Documentation above)	Mar	Incorporation of new and relevant local data / information into regional groundwater management plan.
5	Reviewed a new USGS model developed for the Barrier Islands to evaluate effects of climate change on groundwater (see Technical Documentation above)	Mar	Incorporation of new and relevant local data / information into regional groundwater management plan.
6	Completed review of water quality results from the RMC research. Prepared summaries for the residents of results with remarks on water quality that did not meet EPA Drinking Water MCLs.	Mar	Summaries of the results with remarks on water quality that did not meet EPA drinking water MCLs were developed for distribution to the residents the samples were collected. Results were incorporated into the regional groundwater management plan water quality dataset.
7	Reviewed two new publications by USGS authors related to mercury and arsenic in groundwater (see Technical Documentation above)	Apr	Incorporation of new and relevant local data / information into regional groundwater management plan.
8	Reviewed summary Template for 1) Captains Cove Utility Company; 2) Hypothetical Accomack Industrial Withdrawal; and 3) Hypothetical Northampton Industrial Withdrawal	Apr	Summaries to be included in the regional groundwater management plan and available and short summary handouts.
9	Review DEQ Ambient Groundwater Quality Monitoring Strategy. DEQ has developed the first comprehensive groundwater monitoring strategy for Virginia since the 1980’s. The Monitoring Strategy document developed by DEQ describes the basis behind the locations, frequency, and types of data collected.	Aug	Committee request investigating use of NASA laboratory as a potential cost effective method.
10	Review DEQ process to reallocate Groundwater Withdrawal Permits in the Eastern Virginia Groundwater Management Area to address unsustainable over allocation. DEQ has determined that the amount of groundwater currently allocated is approximately 2X greater the sustainable amount available. To address the unsustainable permit amounts, DEQ is in the process of meeting with the 14 largest groundwater users with the goal of reducing	Aug	Will continue to track progress for the planned reductions on the mainland. Requested current Eastern Shore Model from VDEQ to evaluate how close the Eastern Shore is to over allocation.

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	their permitted withdrawal by about 60%.		
11	Presented a review of current conditions and factors that increase vulnerability of the aquifers on the Eastern Shore to saltwater intrusion.	Sep	Continue to make the public aware of the susceptibility of the Yorktown-Eastover aquifer to saltwater intrusion and measures that can help mitigate impacts.
12	Reviewed DEQ’s Ambient Groundwater Quality Monitoring Strategy. The DEQ monitoring program was compared to the USGS geophysical monitoring program.	Sep	Review USGS geophysical monitoring program at the November meeting.

The Ground Water Committee Report implements Executive Order 23, Goals 2 and 10.

The following sections summarize activities related to Committee organization; statutory, regulatory, and permit tracking/review; research and investigation; and implementation of ground water protection.

### Committee Organization

Committee Officers elected for FY 2013 were Mr. Richard Hubbard as Chairman and Ms. Wanda Thornton as Vice Chairman.

The Committee welcomed one new member, Mr. Granville Hogg.

### 3.4.2 Monthly Progress Reports

#### October 15, 2013 Meeting

The meeting minutes are included in **Appendix R**.

#### November 19, 2013 Meeting

The meeting minutes are included in **Appendix S**.

#### December, 2013 Meeting

The Committee elected to not hold a meeting during this month.

#### January 21, 2014 Meeting

The meeting minutes are included in **Appendix T**.

#### February, 2014 Meeting

- ◆ A Public Workshop was held in place of the regular monthly meeting. The workshop is described in greater detail in Section 3.2.3.

#### March 18, 2014 Meeting

The meeting minutes are included in **Appendix U**.

#### April 15, 2014 Meeting

The meeting minutes are included in **Appendix V**.

#### May 20, 2014 Meeting

The meeting minutes are included in **Appendix W**.

#### June, 2014 Meeting

- ◆ A Public Workshop was held in place of the regular monthly meeting. The workshop is described in greater detail in Section 3.2.7.

*July, 2014 Meeting*

- ◆ The Committee elected to not hold a meeting during this month.

*August 19, 2014 Meeting*

The meeting minutes are included in **Appendix X**.

*September 16, 2014 Meeting*

The meeting minutes are included in **Appendix Y**.

### 3.5 Uniform Land Preservation and Policy Report for Northampton County and Accomack County

The *Proceedings of the Eastern Shore Land Protection Working Group* report is included in **Appendix Z**.

## Appendix A

SEPTEMBER/OCTOBER 2013 CLIMATE ADAPTATION WORKING GROUP  
NEWSLETTER

**From:** Curtis Smith [csmith@a-npdc.org]  
**Sent:** Thursday, October 17, 2013 5:42 PM  
**To:** Amber Parker; Anne Armstrong ; Art Schwartzchild; Bill Neville (wneville@chincoteague-va.gov); Bonnie Mahl (bonnie.mahl@esswcd.org); 'Brian Reid - VDOT'; Bundick, Joshua A. ; cvvaughn@dmg.gannett.com; Dan Bilicki; Dave Burden (shorekeeper@gmail.com); 'Dave Harris'; Denard Spady; Denise Drewler - Saxis; 'Ed Parks'; Elaine Meil; Fred Janci; Grayson Chesser; Gwynn Crichton; Hank Badger; 'Jack McCambridge - VDOT'; Jay Ford; Joe Fehrer; John Joeckel; Larry Atkinson; Laura McKay; Louis Hinds; Marcia Berman; Mitchell, Joel T. (WFF-2500); Moisan, Tiffany A. (WFF-610W); Nick Meade; Peter Henderson; Peter Stith; PG Ross; Rob Testerman (robert.testerman@capecharles.org); Robbie Lewis; Ruth Boettcher; Sara Reiter; Shannon Hulst; Skip Stiles; Steve Parker; Stewart Baker; Tatum Ford; tina.jerome@va.usda.gov; Tom Brockenbrough; '2retiredroses@gmail.com'; 'Aileen Joeckel'; Alex Wilke; 'Billy Graham'; Bo Lusk; 'brewell@vt.edu'; Bundick, Joshua A. ; 'burneyh@rcn.com'; carmie.duer@esswcd.org; 'Carol Burnham'; 'Chris Gordon'; 'Clint Sisson'; 'Dave Gillispie'; 'Dave Pezza'; 'David Fauber'; 'David McCaleb'; 'Don Heerd'; 'Donna Fauber'; 'Dottie Beck'; 'ductape40@hotmail.com'; 'Eric Dodge'; 'evp1@gmail.com'; 'iml@verizon.net'; 'Jack Murray'; 'James Ahern'; 'James Noel'; 'Janis Turner'; 'Jay Davenport'; 'Jeremy Tarwater'; Jim McGowan (mcgowan1997@verizon.net); 'k\_miles@mctteliecom.com'; 'Kitty Croke'; 'Lee Ann Fick'; 'Mary Graham'; 'Mary Jane Dodson'; 'nancyrichardswest@verizon.net'; 'Patricia Ahem'; Rich Morrison (rmorrison@co.accomack.va.us); 'Russell Vreeland'; 'sam.negretti@gmail.com'; 'Sandra Schultz'; Sarah Morgan; 'scbelfit@verizon.net'; 'Shana Jones'; 'Shannon Gordon'; 'sjaye@nvcc.edu'; 'Sue Mastyl'; 'Susan Carmody'; 'Vera Leak'; 'Wanda Smith'; 'Zack Mallette'; 'csmith@a-npdc.org'; 'Susan Simon'  
**Subject:** CAWG Sep/Oct 2013 Newsletter  
**Attachments:** es-ins-2013.pdf

## Eastern Shore of Virginia Climate Adaptation Working Group

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### September/October 2013 Newsletter

Welcome to our new newsletter!

The Eastern Shore of Virginia CAWG is a partnership between nearly 30 local, state, and federal government agencies and non-government organizations that meets quarterly to develop informational materials and planning tools to enhance our region's ability to prepare for changes resulting from sea level rise and climate change.

Below is a compilation of recent news, information, resources, and events pertaining to the citizens of the Eastern Shore.

Please feel free to forward this email to anyone who may be interested and have them contact Curt Smith at [csmith@a-npdc.org](mailto:csmith@a-npdc.org) to be added to the distribution list.

#### CAWG "Top 10"

1. [Climate Change 2013: The Physical Science Basis](#) – United Nations International Panel on Climate Change, 9/13
2. [Presentations/Materials from the Adaptive Planning for Flooding & Coastal Change in Virginia Forum](#) – VA Coastal Policy Clinic & VIMS, 9/13
3. [Recurrent Coastal Flooding Subpanel of the Secure Commonwealth Panel Minutes from 9/25/13 Meeting](#)
4. [North Atlantic Comprehensive Coastal Vulnerability Study](#) – US Army Corps of Engineers, 10/13
5. [Shore's resilience, need for planning highlighted](#) – Star Democrat, 10/5/13
6. [Climate Change: See the Dramatic New Data for Yourself \[Slide Show\]](#) – Scientific American, 9/13
7. [Hot spots: Global temperature rise](#) – Washington Post, 10/9/13
8. [Timing a Rise in Sea Level](#) – New York Times, 8/15/13
9. [Time for Virginia to change](#) – Skip Stiles Editorial to Virginian-Pilot, 10/6/13
10. [First-of-Its-Kind Easement from Sea Level Rise Impacts](#) – Southern Maryland News Net, 8/23/13

#### Local/Regional Items

##### A. Upcoming Public Events

1. **October 17** – UVA-LTER Seminar: *Partnering with salt marsh plants to solve sea level rise problems in the uplands. 7:00 pm in*

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Oyster

**B. Resources**

1. [Virginia's Changing Coast Brings Changes to Virginia's Coastal Insurance \(Attached\)](#) – Wetlands Watch, Presentation from 9/25/13 Coastal Insurance Workshop
2. [Presentations/Materials from the Adaptive Planning for Flooding & Coastal Change in Virginia Forum](#) – VA Coastal Policy Clinic & VIMS, 9/13
3. [Recurrent Coastal Flooding Subpanel of the Secure Commonwealth Panel Minutes from 9/25/13 Meeting](#)
4. [North Atlantic Comprehensive Coastal Vulnerability Study](#) – US Army Corps of Engineers, 10/13
5. [VIMS Center for Coastal Resource Management Newsletter – Fall 2013](#)

**C. News**

1. [Norfolk: A Sinking City](#) – Outside Magazine, 7/17/13
1. [First-of-its-Kind Easement from Sea Level Rise Impacts](#) – Southern Maryland News Net, 8/23/13
3. [Higher sea levels mean more flood damage from storms like Isabel, experts say](#) – Richmond Times Dispatch, 9/15/13
4. [Virginia mayors: Time to respond to climate change](#) – Daily Climate, 9/16/13
5. [Coastal Communities in Virginia Lead the Way on Local Climate Action](#) – WRI Insights, 9/17/13
6. [VIMS flooding report makes a splash](#) – VIMS, 9/17/13
7. [Virginia Mayors Plead for Help with Climate Change](#) – Scientific American, 9/17/13
8. [Virginia Town Forced to Adapt to Rising Seas](#) – Voice of America, 9/20/13
9. [Time for Virginia to change](#) – Skip Stiles Editorial to Virginian-Pilot, 10/6/13
10. [Shore's resilience, need for planning highlighted](#) – Star Democrat, 10/5/13
11. [Gov. Martin O'Malley's climate change plans](#) – Baltimore Sun, 8/18/13
12. [Shore's resilience, need for planning highlighted](#) – Star Democrat, 10/5/13

**National/Global Adaptation Information/Planning Resources**

1. [Coastal Resilience Online Decision-Making Support Tool](#) – The Nature Conservancy
2. [2012 State of the Climate: Global Sea Level](#) – NOAA, 7/13
3. [Rising Seas](#) – National Geographic, 9/13
4. [Hurricane Sandy Eroded Half of Fire Island's Beaches and Dunes: New Report Quantifies Coastal Change](#) – USGS, 8/27/13
5. [U.S. and Global Temperature](#) – EPA, 8/13
6. [New World Map for Overcoming Climate Change](#) – Wildlife Conservation Society 9/16/13
7. [Climate Sensitivity of the National Estuarine Research Reserve System](#) – NOAA NERRS, 7/13
8. [Unprecedented Rate and Scale of Ocean Acidification Found in the Arctic](#) – USGS, 9/11/13
9. [Remapping Coastal Areas Damaged by Hurricane Sandy](#) – USGS, 8/13
10. [Arctic sea ice minimum in 2013 is 6th-lowest on record](#) – NASA, 9/23/13
11. [Climate science: Rising tide](#) – Nature, 9/18/13

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12. [Climate Models Show Potential 21st Century Temperature, Precipitation Changes](#) – NASA, 9/27/13
13. [New U.N. report: Humans responsible for climate change](#) – NASA, 9/27/13
14. [IPCC Headline Statements from 2013 Report](#) – IPCC, 9/13
15. [Climate Change 2013: The Physical Science Basis](#) – International Panel on Climate Change, 9/13
16. [UN urges global response to scientific evidence that climate change is human-induced](#) – United Nations, 9/13
17. [Climate Change: See the Dramatic New Data for Yourself \[Slide Show\]](#) – Scientific American, 9/13
18. [Hot spots: Global temperature rise](#) – Washington Post, 10/9/13

**Additional Research/News Items**

**A. Sea Level Items**

1. [Timing a Rise in Sea Level](#) – New York Times, 8/15/13
2. [Leaving Our Descendants A Whopping Rise in Sea Levels](#) – Yale Environment 360, 7/24/13
3. [Rising Seas](#) – National Geographic, 9/13
4. [Climate report urges state to develop proactive sea-level strategy](#) – Delaware Online, 8/16/13
5. [Rising oceans: An economy washed away?](#) – Sea Coast Online, 8/25/13
6. [What Big Questions Remain about Sea Level Rise?](#) – Scientific American, 9/18/13

**B. Climate Items**

1. [Buried in Muck, Clues to Future NYC Drought](#) – The Climate Desk, 8/9/13
2. [Nutria: 'Swamp rats' on the move as winters warm](#) – The Daily Climate, 8/12/13
3. [US Climate Change Study Explores Weather Modification](#) – AccuWeather, 8/15/13
4. [Can Extreme Weather Make Climate Change Worse?](#) – Climate Central, 8/14/13
5. [A sparrow's story: Project looks at signs of climate change in Long Island Sound](#) – CT Mirror, 8/13/13
6. [Changes in store as state warms](#) – Newark Advocate, 8/19/13
7. [As temperatures rise, pests and invasive plants thrive](#) – Newark Advocate, 8/26/13
8. ['Uncertain' Science: Judith Curry's Take On Climate Change](#) – NPR, 8/22/13
9. [Ocean Acidification Will Make Climate Change Worse](#) – Time, 8/26/13
10. [Cooling Pacific has dampened global warming, research shows](#) – The Guardian, 8/28/13
11. [Global warming has increased risk of record heat](#) – Stanford University, 9/5/13
12. [Marine species distribution changes reflect local climate conditions](#) – NOAA Northeast Fisheries Science Center, 9/13/13
13. [Alaska's Resilient Crabs Not Immune to Effects of Rapidly Acidifying Waters](#) – PBS, 9/16/13
14. [Global warming could change strength of El Niño](#) – Australian Research Council, 9/11/13
15. [Marine life spawns sooner as oceans warm](#) – CSIRO, 8/5/13
16. [Scientists Weigh Climate Change Role in 2012 Weather](#) – National Geographic, 9/13
17. [East Antarctic Ice Sheet could be more vulnerable to climate change than previously thought](#) – Durham University, 8/28/13
18. [Movement of marine life follows speed and direction of climate change](#) – Princeton University, 9/12/13
19. [Global warming is likely to increase severe thunderstorm conditions in U.S., research finds](#) – Stanford University, 9/23/13

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20. [Wind and Rain Belts to Shift North as Planet Warms, Says Study](#) – Columbia University, 9/23/13
21. [The science of global warming has changed a lot in 25 years. The basic conclusions haven't.](#) – Washington Post, 9/27/13
22. [Study in nature reveals urgent new time frame for climate change](#) – University of Hawaii, 10/9/13
23. [World ocean systems undermined by climate change by 2100](#) – Huffington Post, University of Hawaii, 10/15/13
24. [Climate change creates complicated consequences for North America's forests](#) – Dartmouth University, 10/14/13
25. [Foliage Season Under Fire from Climate Change](#) – Climate Central, 10/15/13

**C. Hazard Mitigation Items**

1. [Sea Level Rise to Play Bigger Role in NYC Storms: Study](#) – Climate Central, 8/9/13
2. [Islands: Tiny Pacific islands make big plans for climate resilience](#) – E&E Publishing, 8/9/13
3. [State asks insurers: Are you ready for climate change?](#) – Star Tribune, 8/14/13
4. [Gorgeous Glimpses of Calamity](#) – New York Times, 8/16/13
5. [Warmer winters have brought a troublesome pest to New Jersey: Asian tiger mosquitoes](#) – NJ.com, 8/18/13
6. [Coastal cities face \\$1tn floods by 2050](#) - Climate News Network, 8/18/13
7. [Greenwich Stilt Houses Foreshadow Impact of New FEMA Maps](#) – Bloomberg, 8/19/13
8. [Expert brings public health into climate change](#) – SF Gate, 8/20/13
9. [Can Cities Adjust to a Retreating Coastline?](#) – New York Times, 8/22/13
10. [Where Sand Is Gold, the Reserves Are Running Dry](#) – New York Times, 8/24/13
11. [Risk of Sandy-Level Flood in NYC Has Doubled Since 1950](#) – Climate Central, 9/5/13
12. [POLL: Call to remove sea-level rise notices](#) – Newhaven Herald, 8/25/13
13. [How will crops fare under climate change? Depends on how you ask](#) – Princeton University, 7/17/13
14. [Infectious diseases and climate change intersect with no simple answers](#) – National Science Foundation, 8/1/13
15. [Air pollution worsened by climate change set to be more potent killer in the 21st century](#) – Springer, 9/4/13
16. [Climate Change Spells Trouble for Anglers](#) – National Geographic, 9/13
17. [Climate change 'driving spread of crop pests](#) – BBC, 9/1/13
18. [Up to Five Billion Face 'Entirely New Climate' by 2050](#) – Climate Central, 10/9/13
19. [Florida – Blasting dropped from beach restoration plan](#) – Coastal News Today, 10/9/13
20. [Risks of Rising Seas Pondered in Portland, Maine](#) – Coastal Contractor, 10/7/13

Contact

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## Appendix B

SPRING 2014 CLIMATE ADAPTATION WORKING GROUP NEWSLETTER

**From:** Curtis Smith [csmith@a-npdc.org]  
**Sent:** Friday, February 14, 2014 1:38 PM  
**Subject:** CAWG Spring 2014 Newsletter  
**Attachments:** es-ins-2013.pdf; Living shoreline 3.13.14 workshop poster.pdf

## Eastern Shore of Virginia Climate Adaptation Working Group

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### Spring 2014 Newsletter

*The Eastern Shore of Virginia CAWG is a partnership between nearly 30 local, state, and federal government agencies and non-government organizations that meets quarterly to develop informational materials and planning tools to enhance our region's ability to prepare for changes resulting from sea level rise and climate change.*

*Below is a compilation of recent news, information, resources, and events pertaining to the citizens of the Eastern Shore.*

*Please feel free to forward this email to anyone who may be interested and have them contact Curt Smith at [csmith@a-npdc.org](mailto:csmith@a-npdc.org) to be added*

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to the distribution list.

### Local/Regional Items

#### A. Upcoming Public Events

1. February 21, 2014 - Webinar: Climate Information for Managing Risks in Water Resources: Working with Communities, Space is limited, [Register Here](#)
2. February 26, 2014 – Virginia Working Waterfronts Workshop Satellite Location at Eastern Shore Community College. 9am-330pm. Registration required by Feb 19. Register online [here](#)
3. March 13, 2014 – Living Shoreline Workshop for Landowners at Occohannock on the Bay Camp and Retreat Center in Belle Haven. Advanced registration required. Workshop from 10am-1pm and optional volunteer planting 1pm-5pm. More information on flyer (attached).
4. March 20, 2014 – Mid Atlantic Regional Planning Body Public Listening Sessions for the [Draft Mid-Atlantic Regional Ocean Planning Framework](#) in Norfolk, VA 1:30-4:00 and 5:00-7:30. Comments can also be provided in writing to the RPB by April, 15 2014.
5. May 6-8, 2014 – NOAA's 12<sup>th</sup> Annual Climate Prediction Applications Science Workshop in Fairfax, VA. Registration available beginning March 1. More information can be found [here](#).

#### B. Resources

1. Presentation from CAWG Flood Insurance Workshop: Virginia's Changing Coast Brings Changes to Virginia's Coastal Insurance, Wetlands Watch, 9/25/13 (see attached)
2. [Climate of the Southeast United States: Variability, Change, Impacts and Vulnerability, Southeast Climate Consortium, 2013](#)
2. [Land Subsidence and Relative Sea-Level Rise in the Southern Chesapeake Bay Region, USGS Circular 1392 in cooperation with Hampton Roads Planning District Commission, 2013](#)
3. [Maryland's CoastSmart Community Scorecard: A Community Self-Assessment Tool, 9/13](#)
4. [Transatlantic Solutions to Sea Level Rise Adaptation: Moving Beyond the Threat, Climate Change and Sea Level Rise Initiative \(CCSLRI\), Old Dominion University, 10/30-31/13](#)
5. [Climate-Polling-Virginia-2013, Stanford University, Woods Institute for the Environment, 2013](#)
6. [Final Sea Level Rise Adaptation Report in Del., WBOC-TV 16, 12/12/13](#)
7. [Sea-level Change in the Mid-Atlantic, VIMS, 9/1/10](#)
8. [Rising Seas - Interactive: If All The Ice Melted, National Geographic, 1/2014](#)

#### C. News

1. [Marshes in a Changing World: Part 1, Maryland Sea Grant, 10/21/13](#)
2. [Crisfield, Md., beats back a rising Chesapeake Bay, The Washington Post 10/24/13](#)
3. [Camp Occohannock Living Shoreline, Living Shoreline | The Nature Conservancy, 11/5/13](#)
4. [CLEAR aims to minimize environmental disasters, The News Desk, Fredericksburg.com, 1/10/14](#)

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5. [Chesapeake Bay marsh expert joins VIMS faculty](#), *VIMS*, 11/11/13
6. [Living shorelines, oyster reefs helped by grant](#), *The Daily Times*, [delmarvanow.com](#), 11/12/13
7. [Laughing gulls get drowned out on Eastern Shore](#), *HamptonRoads.com PilotOnline.com*, 11/21/13
8. [Laughing gulls no match for rising seas](#), *The Center for Conservation Biology*, 11/18/13
9. [Climate report: New report explores impacts of climate change in the Southeast](#), *dailypress.com*, 11/25/13
10. [Down by the Levee](#), *Chesapeake Quarterly Volume 9, Number 4: 2010*
11. [Humans threaten wetlands ability to keep pace with sea-level rise](#), *VIMS*, 12/4/13
12. [With Climate Change, Md. State Insect Could Be Forced to Move North](#), *Southern Maryland Headline News*, 12/10/13
13. [Bridge Over Buried Rivers](#), *Chesapeake Quarterly*, April 2011
14. [New faculty member studies changing shorelines](#), *VIMS*, 10/29/13
15. [Delmarva fox squirrel faces big threat from sea-level rise](#), *The Daily Times*, 12/13/13
16. [Virginia Coastal Policy Clinic tackles legal issues of rising waters](#), *William and Mary*, 1/20/14
17. [Project helping a living shoreline to emerge on shore VA creek](#), *Bay Journal*, 2/6/14

#### National/Global Adaptation Information/Planning Resources

1. [Climate Models Show Potential 21st Century Temperature, Precipitation Changes](#), *NASA*, 9/13/2013
2. [FACT SHEET: Executive Order on Climate Preparedness](#), *The White House*, 11/1/13
3. [New Tool Helps Planners Steer Clear of Tipping Points](#), *NOAA, Sea Grant Program*, 11/12/13
4. [Rebuild by Design](#), *An Initiative of the President's Hurricane Sandy Rebuilding Task Force In Collaboration With NYU's Institute for Public Knowledge Municipal Art Society Regional Plan Association Van Alen Institute*, 1/14
5. [Abrupt Impacts of Climate Change: Anticipating Surprises](#), *National Academy of Sciences*, 2013
6. [Cost Efficient Climate Change Adaption in the North Atlantic](#), *NOAA Sea Grant and North Atlantic Regional Team*, 2013
7. [Cost-Efficient Climate Adaptation in the North Atlantic](#), *Connecticut Sea Grant*
8. [RealClimate: Sea-level rise: What the experts expect](#), 11/23/13
9. [Video: 2047 is 'tipping point' for climate change, new study says](#), *The Globe and Mail*, 10/09/13
10. [Status and Trends of Wetlands in the Coastal Watersheds of the Conterminous United States 2004 to 2009](#), *US Department of Interior, Fish & Wildlife Services*
11. [Planning for Sea Level Rise Adaptation at the Site Scale in New Jersey](#), *NOAA Coastal Services Center*, 1/14
12. [World temperature records available via Google Earth](#), *Univ. of East Anglia*, 2/4/14
13. [Your Warming World Online Viewer](#), *NewScientist*

#### Additional Research/News Items

##### A. Sea Level Items

1. [Study says U.S. can't keep up with loss of wetlands](#), *The Washington Post*, 12/8/13
2. [How high will sea levels rise? Let's ask the experts](#), *WashingtonPost.com*, 11/26/13
3. [Sea Level Rise and Shoreline Changes are Leading Influences on Flooding from Tropical Cyclones](#), *UMass Amherst*, 12/4/13

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4. [Sea-level rise threatens hundreds of U.S. animal species](#), 12/11/13
5. [The flood next time](#), *New York Times*, 1/13/14
6. [Sea level variations escalating along eastern Gulf of Mexico coast](#), *American Geophysical Union*, 1/29/14

##### B. Climate Items

1. [CU-Boulder-led study shows unprecedented warmth in Arctic](#), *University of Colorado Boulder*, 10/23/13
2. [Acidification of oceans threatens to change entire marine ecosystem](#), *Vancouver Sun*, 10/25/13
3. [Humble Clumps of Moss Yield Sobering Climate Surprises](#), *DiscoverMagazine.com*, 10/24/13
4. [How Climate Change Impacts Indigenous Communities](#), *University of Arizona News*, 10/28/13
5. [Warm winters let trees sleep longer](#), *TUM - TU München*, 10/30/13
6. [Climate Change and Extreme Weather](#), *Coastal Heritage*, Spring/Summer 2013
7. [Warming report sees violent, sicker, poorer future](#), *US News and World Report*, 11/2/13
8. [Environmental Mercury Cycling and Global Change](#), *USGS Toxic Substances Hydrology Program*, 12/19/13
9. [At climate-change summit in Warsaw, countries look to lay foundation for global pact](#), *The Washington Post*, 11/13/13
10. [LLNL scientists find precipitation, global warming link](#), *Lawrence Livermore Laboratory*, 11/11/13
11. [UEA research reveals why timing of bird migration is changing](#), *University of East Anglia (UEA)*, 11/13/13
12. [Westerly Winds Could Counteract Nearly Half of Antarctic Sea-level Rise Expected By 2100](#), *Scientific American*, 11/15/13
13. [Changing winds dampen Antarctic sea-level rise](#), *Nature News & Comment*, 11/15/13
14. [Climate change may disrupt flight season of Canadian butterflies](#), *University of British Columbia*, 11/19/13
15. [Rising Ocean Acidification Leads to Anxiety in Fish](#), *Scripps Institution of Oceanography, UC San Diego*, 12/4/13
16. [In New Jersey Pines, Trouble Arrives on Six Legs](#), *NYTimes.com*, 12/1/13
17. [Living on Earth: Messed Up Migrations](#), *PRI's Environmental News Magazine*, 12/6/13
18. [Lost Freshwater May Double Climate Change Effects on Agriculture](#), *Computation Institute*, 12/16/13
19. [Kerry Quietly Makes Priority of Climate Pact](#), *NYTimes.com*, 1/2/14
20. [Ocean acidification: A climate change issue](#), *Voxxi*, 12/21/13
21. [Still Uncertain: Climate Change's Role in Drought](#), *Climate Central*, 12/20/13
22. [In U.S., Winters Warming but Precipitation More Nuanced](#), *Climate Central*, 12/19/13
23. [Walden Trees Leafing Out Far Earlier Than in Thoreau's Time](#), *Boston University*, 1/13/14
24. [Extreme Weather Wreaking Havoc on Food as Farmers Suffer](#), *Bloomberg*, 1/17/14
25. [Seafloor Marine Life Face Major Threat from Climate](#), *Climate Central*, 1/18/14
26. [The water cycle amplifies abrupt climate change](#), *German Research Centre for Geosciences*, 1/19/14
27. [Research Shows Warmer Winters May Be Pushing Raptors Northward](#), *Boise State University*, 1/27/14
28. [Climate Study Projects Major Changes in Vegetation Distribution by 2100](#), *Univ. of Arkansas*, 1/30/14
29. [Americans' Mental Health is Latest Victim of Changing Climate](#), *LifeScience*, 1/31/14
30. [Salt-Water Fish Extinction Seen By 2048](#), *CBS News*, 11/2/06
31. [Biggest climate warmers](#), *Science News*, 2/9/14

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32. [Pacific trade winds stall global surface warming -- for now](#), *Univ. of New South Wales*, 2/9/14

**C. Hazard Mitigation Items**

1. [Is Rebuilding Storm-Struck Coastlines Worth The Cost?](#), *NPR*, 10/27/13
2. [New Obama order aims to prepare communities for severe weather](#), *Reuters* 11/1/13
3. [Rising sea levels, falling real estate values](#), *MiamiHerald.com*, 11/9/13
4. [Scientists Develop New Method to Help Global Coasts Adapt to Sea-Level Rise](#), *University of Southampton*, 10/25/13
5. [Steep hike in flood insurance rates strikes rural areas](#), *Environment*, *Sacramento Bee*, 11/16/13
6. [Federal Flood Insurance Program Drowning In Debt. Who Will Pay?](#), *NPR*, 1/1/14
7. [FEMA Knew Flood Maps Left NYC Unprepared for Sandy](#), *Climate Central*, 12/26/13
8. [Food for millions at risk | Sea Change: Ocean acidification](#), *Seattle Times* (no date)
9. [Study finds sea levels rising fast; concerns grow about Shore](#), *Philly.com*, 1/08/14
14. [Iowa scientists: Climate change affecting farming](#), *Yahoo Finance*, 10/18/13
15. [Could Sandy Happen Again? Maybe, Says Tufts Geologist](#), *Tufts University* 10/18/13
16. [GSA Annual Meeting talk on the Lessons of Hurricane Sandy](#), *Geological Society of America*, 10/27/13
17. [Photos: Hurricane Sandy then and now](#), *CNN.com*
18. [Secretary Jewell Announces \\$162 Million for 45 Projects to Protect Atlantic Coast Communities from Future Storms](#), *US Department of Interior*, 10/24/13
19. [Heeding Lessons from Sandy: Planning Wisely for the Future with Smart Decisions Today](#), *Planet Change | The Nature Conservancy*, 10/26/13
20. [One year after Hurricane Sandy, New Jersey's forgotten western shore struggles to rebuild](#), *NJ.com* 10/26/13
21. [Aerial Photos: Post-Sandy and After Restoration: National Geodetic Survey imagery shows restored areas in New Jersey](#), *NOAA*, 10/29/13
22. [Major Expansion of Surging Seas Launched on Sandy One-Year Anniversary](#), *Surging Seas: Sea level rise analysis by Climate Central*
23. [Hurricane Sandy Hasn't Shifted Climate Narrative](#), *Climate Central*, 10/29/13
24. [The Myriad Impacts of Sandy Along the East Coast](#), *Climate Central*, 10/29/13
25. [Warming report sees violent, sicker, poorer future](#), *US News and World Report*, 11/1/13
26. [A Year After Sandy, The Wrong Policy on Rebuilding the Coast by Rob Young](#), *Yale Environment 360*, 10/31/13
27. [POLITICS: New homes rise on hazard-prone beach as officials lobby for more federal protection](#), *Monday, December 2, 2013*
28. [Climate clues as dengue fever spreads in US](#), *BBC News US & Canada* 11/15/13
29. [Climate change described visually](#), *Flowing Data*, 12/4/13
30. [Flood Grant Program To Let Communities Consider Rising Seas Due To Climate Change](#), 12/23/13
31. [Spending bill delays flood insurance rate increases](#), *The Hill*, 1/14/14
32. [Climate Proofing of Farms Seen Too Slow as Industry Faces Havoc](#), *Bloomberg*, 1/20/14
33. [5 Radical Ideas To Protect Coastal Cities From the Next Big Storm](#), *Gizmodo India*, 1/2/14

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34. [Climate change threatens to cause trillions in damage to world's coastal regions if they do not adapt to sea-level rise](#), *Univ. of Southampton*, 2/4/14
35. [Sea level threat to force retreat of communities in Wales](#), *BBC News*, 2/11/14
36. [Hurricane Preparedness: Community Vulnerability and Medically Fragile Populations](#), *The Virginia News*, 2/14

Contact

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## Appendix C

SUMMER 2014 CLIMATE ADAPTATION WORKING GROUP NEWSLETTER

**From:** Curtis Smith [csmith@a-npdc.org]  
**Sent:** Thursday, June 05, 2014 4:44 PM  
**Subject:** CAWG Summer 2014 Newsletter

## Eastern Shore of Virginia Climate Adaptation Working Group

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### Summer 2014 Newsletter

*The Eastern Shore of Virginia CAWG is a partnership between nearly 30 local, state, and federal government agencies and non-government organizations that meets quarterly to develop informational materials and planning tools to enhance our region's ability to prepare for changes resulting from sea level rise and climate change.*

*Below is a compilation of recent news, information, resources, and events pertaining to the citizens of the Eastern Shore.*

*Please feel free to forward this email to anyone who may be interested and have them contact Curt Smith at [csmith@a-npdc.org](mailto:csmith@a-npdc.org) to be added to the distribution list.*

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#### **CAWG "Top 10"** – Top stories & resources handpicked by Curt Smith. These links can also be found in the lists below.

1. [Eastern Shore of Virginia Coastal Change Archive](#), A-NPDC – The Archive can be accessed on the VA Coastal Zone Management Program's online data portal, Coastal GEMS. The Archive is located under the "Coastal Land" group.  
*NOTE: THE ARCHIVE MAY NOT BE ACTIVE UNTIL THE WEEK OF JUNE 9. SO PLEASE KEEP CHECKING BACK.*
  2. [Chincoteague and Wallops Island NWRs Draft Comprehensive Conservation Plan/Environmental Impact Statement](#), *US Fish & Wildlife Service, May 2014*
  3. [3rd National Climate Assessment](#) – *US Global Change Research Program, May 2014*
  4. Intergovernmental Panel on Climate Change Fifth Assessment Report –  
[Climate Change 2014: Impacts, Adaptation, and Vulnerability](#)  
[Climate Change 2014: Mitigation of Climate Change](#)
  5. Tangier Features in the News –  
[Pieces of Tangier](#) – *Video Documentary by Jenny Roberts, 2014*  
[Treasured Island: The people of Tangier Island fear their life, land, and heritage could wash away](#), *Al Jazeera America, 5/14*
  6. [Gov. Terry McAuliffe puts state climate panel back in action](#), *Roanoke Times, 4/7/14*
  7. [VIMS model now capable of street-level storm-tide predictions](#), *VIMS, 3/19/14*
  8. [RODANTHE: While the seas rise in the Outer Banks and elsewhere in NC, science treads water](#), *News and Observer, 3/15/14* –  
*\*\*This is an excellent article and video summarizing the politically-charged nature of sea level rise planning in North Carolina*
  9. [Summer Flounder Stirs North-South Climate Change Battle](#), *Climate Central, 6/3/14*  
*\*\*Interesting article on how a warming Atlantic has shifted flounder northward resulting in issues for local economies and marine fishery regulations*
  10. [Drowning in Place: Local Government Costs and Liabilities for Flooding Due to Sea-level Rise](#), *The Florida Bar Journal November 2013*
- (I couldn't keep it to a Top 10, I guess. Sorry!)*
11. Antarctic Ice Sheet Collapse and Corresponding Sea Level Rise Articles –  
[Melting East Antarctica Ice Could Mean Thousands Of Years Of Unstoppable Sea Level Rise](#), *Science 2.0, 5/5/14*  
[Scientists Warn of Rising Oceans as Antarctic Ice Melts](#), *New York Times, 5/12/14*  
[10-Foot Sea Level Rise Now Unstoppable Due To Glacier Collapse](#), *Popular Science, 5/12/14*
  12. [Cities hope for state guidance on sea rise](#), *Virginian-Pilot, 3/3/14*

#### **Upcoming Public Events**

1. **June 23, 2014** – Chincoteague NWR CCP Open House, Bateman Center, Chincoteague NWR, 5-8pm
2. **June 24, 2014** – Chincoteague NWR CCP Open House, Delmarva Discovery Center, Pocomoke, 4-7pm

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3. **June 25, 2014** – Chincoteague NWR CCP Open House, Eastern Shore Community College, Melfa, 4-7pm
4. **June 26, 2014** – Chincoteague NWR CCP Open House, Bateman Center, Chincoteague NWR, 1-4pm
5. **June 26, 2014** – Chincoteague NWR CCP Public Hearing, Chincoteague Center, Chincoteague, 6-9pm

### Adaptation Resources & Planning Tools

#### A. Local Items

1. [Eastern Shore of Virginia Coastal Change Archive](#), A-NPDC – The Archive can be accessed on the VA Coastal Zone Management Program's online data portal, Coastal GEMS. The Archive is located under the "Coastal Land" group.  
*NOTE: THE ARCHIVE MAY NOT BE ACTIVE UNTIL THE WEEK OF JUNE 9, SO PLEASE KEEP CHECKING BACK.*
2. [Chincoteague and Wallops Island NWRs Draft Comprehensive Conservation Plan/Environmental Impact Statement](#), *US Fish & Wildlife Service, May 2014*  
[Newsletter/Summary](#)
3. [Pieces of Tangier](#) – *Video Documentary by Jenny Roberts, 2014*
4. [County flood zone shifts](#), *Eastern Shore News, 4/21/14*
3. [Treasured Island: The people of Tangier Island fear their life, land, and heritage could wash away](#), *Al Jazeera America, 5/14*

#### B. State/Regional Items

1. [Old Dominion University Mitigation & Adaptation Research Institute \(MARI\)](#) – MARI newly established institute is focused on researching mitigation and adaptation to provide knowledge needed by coastal communities to handle the challenges and utilize the opportunities of climate change and sea level rise
2. [VIMS model now capable of street-level storm-tide predictions](#), *VIMS, 3/19/14*
3. [Virginia shorebird count falls 36 percent in 20 years](#), *Virginian-Pilot, 4/7/14*
3. [Gov. Terry McAuliffe puts state climate panel back in action](#), *Roanoke Times, 4/7/14*
5. [North Atlantic Coast Comprehensive Study](#), *US Army Corps of Engineers – Updated with most recent documents*
4. [Virginia Center for Coastal Resources Management Spring 2014 Newsletter](#)
5. [In Norfolk, evidence of climate change is in the streets at high tide](#), *Washington Post, 5/31/14*
6. [Hampton Roads Targeted for National Sea Level Project](#), *Virginian-Pilot, 6/4/14*

#### C. National Items

1. [3rd National Climate Assessment](#) – *US Global Change Research Program, May 2014*  
[White House Press Release](#)  
[Climate change is clear and present danger, says landmark US report](#), *The Guardian, 5/4/14*  
[Federal report gauges U.S. impacts of global warming](#), *USA Today, 5/6/14*  
[Climate Change Study Finds U.S. Is Already Widely Affected](#), *New York Times, 5/6/14*  
[Federal report: Warming disrupts Americans' lives](#), *USA Today, 5/7/14*  
[U.S. Climate Change Report Warns of Regional Impacts](#), *Climate Central, 5/6/14*

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1. [America's Changed Climate](#), *Chemical & Engineering News, 5/12/14*  
[National Climate Assessment: 15 arresting images of climate change now and in the pipeline](#), *Washington Post, 5/6/14*
2. [Climate Change Indicators in the United States, 2014 \(3rd Edition\)](#), *US EPA*  
[EPA grows its climate change trends list](#), *The Hill, 5/28/14*
3. [USGS National Climate Change Viewer](#) – updated 5/5/14
4. [USDA Emergency Watershed Protection Program – Floodplain Easement Option](#)
5. [USDA Regional Climate Hubs](#) – Regional networks to help agriculture and forestry mitigate climate change impacts  
[Press Release](#), *USDA 2/5/14*
6. [2014 Quadrennial Defense Review](#) – addresses national security issues resulting from climate change, *US Dept. of Defense 3/4/14*  
[Summary Article](#), *The Center for Climate and Security, 3/5/14*  
[Pentagon Warns of Climate Change 'Threat Multipliers'](#), *Washington Examiner, 3/4/14*  
[Four-Star Warning: Generals Dub Climate Change a Security Risk](#), *NBC News, 5/7/14*
7. [Climate Change and Infrastructure, Urban Systems, and Vulnerabilities: Technical Report for the US Department of Energy in Support of the National Climate Assessment, 2014](#)  
[Adaptation: Infrastructure threatened by climate change poses a 'national crisis'](#) – *E&E Publishing, 3/6/14*
8. [Surging Seas](#) – sea level rise analysis tool by Climate Central. Recently updated.  
[Press release for recent updates](#)
9. [Climate Change: Key Indicators](#), *NASA*
10. [What We Know: The Reality, Risks and Response to Climate Change](#), *American Association for the Advancement of Science, March 2014*  
[Interactive Website](#)  
[Scientists Sound Alarm on Climate](#), *New York Times, 3/18/14*
11. [The Economic Case for Restoring Coastal Ecosystems](#), *Center for American Progress, April 2014*
12. [Tybee Island Sea Level Rise Adaptation Plan](#), *City of Tybee Island, GA, June 2013*
13. [South Carolina Businesses Acting on Rising Seas](#)
14. [Map: How climate change will affect you](#), *MSNBC, 4/22/14*
15. [The emergent patterns of climate change](#), *Gavin Schmidt TED Talk, March 2014*

#### D. Global Items

1. Intergovernmental Panel on Climate Change Fifth Assessment Report (3 separate reports)  
[IPCC Press Release](#)  
[Climate Change Impacts in Pictures: 8 Stark IPCC Images](#), *Climate Central, 3/31/14*  
[Climate Change 2013: The Physical Science Basis](#) –  
[Full Report](#)  
[Summary for Policymakers](#)  
[Climate Change 2014: Impacts, Adaptation, and Vulnerability](#)

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[Full Report](#)

[Summary for Policymakers](#)

[Global warming to hit Asia hardest, warns new report on climate change](#), *The Guardian*, 3/22/14

[UN science report: Warming worsens security woes](#), *US News*, 3/30/14

[Climate impacts 'overwhelming' - UN](#), *BBC News*, 3/31/14

[Earth Will Cross the Climate Danger Threshold by 2036](#), *Scientific American*, 3/19/14

Climate Change 2014: Mitigation of Climate Change

[Full Report](#)

[Summary for Policymakers](#)

[IPCC explores the ethics and economics of fighting climate change](#), *E&E News*, 4/9/14

[Climate Efforts Falling Short, U.N. Panel Says](#), *NY Times*, 4/13/14

[UN urges huge increase in green energy to avert climate disaster](#), *The Observer*, 4/12/14

[IPCC: Mitigating climate change more challenging than ever](#), *Science*, 4/13/14

**Adaptation Research Articles & News Items**

**A. Sea Level Items**

1. [Cities hope for state guidance on sea rise](#), *Virginian-Pilot*, 3/3/14
2. [New Greenland Ice Melt Fuels Sea Level Rise Concerns](#), *Kitsap Sun*, 3/16/14
3. [Rising Seas](#), *New York Times*, 3/20/14
4. [Long-term predictions for Miami sea level rise could be available relatively soon](#), *National Science Foundation*, 4/14/14
5. [Melting East Antarctica Ice Could Mean Thousands Of Years Of Unstoppable Sea Level Rise](#), *Science 2.0*, 5/5/14
6. [Back to the future to determine if sea level rise is accelerating](#), *University of Southampton*, 5/9/14
7. [Scientists Warn of Rising Oceans as Antarctic Ice Melts](#), *New York Times*, 5/12/14
8. [10-Foot Sea Level Rise Now Unstoppable Due To Glacier Collapse](#), *Popular Science*, 5/12/14

**B. Climate Items**

1. [Extreme weather decides distribution of insects](#), *Aarhus University*, 4/11/14
2. [Unstable Atlantic deep ocean circulation under future climate conditions](#), *University of Bergen*, 2/20/14
3. [Global warming felt to deepest reaches of ocean](#), *McGill University*, 3/2/14
4. [New data confirms Arctic ice trends: sea ice being lost at a rate of five days per decade](#), *University College of London*, 3/4/14
5. [URI Oceanographer Refutes Claim that Climate Change is Slowing Gulf Stream](#), *University of Rhode Island*, 3/3/14
6. [Extreme-temperature days rising, say weather experts](#), *The Star Phoenix*, 2/26/14
7. [Scientists: Global Warming Likely to Surpass 2°C Target](#), *National Geographic*, 2/27/14
8. [Warming Temperatures Are Pushing Two Chickadee Species and Their Hybrids Northward](#), *Newswise*, 3/6/14
9. [Study: Eastern chickadee populations moving fast in response to global warming](#), *Summit County Voice*, 3/8/14

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10. [Congress ignores an insurance mess](#), *Virginian-Pilot*, 3/10/14
11. [Long-term warming likely to be significant despite recent slowdown](#), *NASA*, 3/11/14
12. [UCLA study yields more accurate data on thousands of years of climate change](#), *UCLA*, 3/13/14
13. [Number of Days Without Rain to Dramatically Increase in Some World Regions](#), *UC San Diego*, 3/13/14
14. [Climate change will reduce crop yields sooner than we thought](#), *University of Leeds*, 3/16/14
15. [Researchers: Northeast Greenland Ice Loss Accelerating](#), *Ohio State*, 3/16/14
16. [Acidic waters killing off millions of scallops along the West Coast](#), *CTV News*, 3/16/14
17. [The day before yesterday: when abrupt climate change came to the Chesapeake Bay](#), *Chesapeake Quarterly*, 12/2013
18. [Rocky Mountain Wildflower Season Lengthens by More Than a Month](#), *Univ. of Maryland*, 3/12/14
19. [Deep Ocean Current May Slow Due to Climate Change, Penn Research Finds](#), *University of Pennsylvania*, 3/20/14
20. [On track to climate prediction](#), *Bjerknes Centre for Climate Research*, 3/20/14
21. [How climate change will acidify the oceans](#), *BBC News*, 3/26/14
22. [Climate change influences landowner's tree choices](#), *The Washington Times*, 3/29/14
23. [Warming Climate May Spread Drying to a Third of Earth, Says Study](#), *Columbia University*, 3/31/14
24. [WMO: "No standstill in global warming"](#), *Nature*, 3/24/14
25. [NSIDC, NASA Say Arctic Melt Season Lengthening, Ocean Rapidly Warming](#), *NASA*, 3/31/14
26. [Earth Will Cross the Climate Danger Threshold by 2036](#), *Scientific American*, 3/19/14
27. [Asheville researchers connect dots of climate change](#), *Asheville Citizen Times*, 4/6/14
28. [Endangered butterfly defies climate change with new diet and habitat](#), *The Guardian*, 4/7/14
29. [Field study shows why food quality will suffer with rising CO<sub>2</sub>](#), *UC Davis*, 4/6/14
30. [Permafrost thawing could accelerate global warming](#), *Florida State University*, 4/7/14
31. [Slowdown of global warming fleeting](#), *Penn State*, 4/7/14
32. [Lost in an acid sea: A fish's sense of smell](#), *Daily Climate*, 4/14/14
33. [Turtles Change Migration Routes Due to Climate Change](#), *Inter Press Service*, 4/14/14
34. [Migrants enjoy a warm welcome](#), *Daily and Sunday Express*, 4/6/14
35. [Hot West, Cold East May be the Norm as World Warms](#), *Climate Central*, 4/21/14
36. [Wildlife response to climate change is likely underestimated, experts warn](#), *Univ. of Massachusetts at Amherst*, 4/22/14
37. [CO<sub>2</sub> makes growing seasons longer](#), *Nature*, 4/23/14
38. [Climate change: Pacific Ocean acidity dissolving shells of key species](#), *San Jose Mercury News*, 4/30/14
39. [Climate change study reveals unappreciated impacts on biodiversity](#), *University of Copenhagen*, 5/1/14
40. [New study sheds light on global warming trends](#), *Florida State University*, 5/4/14
41. [Climate change threatens to worsen U.S. ozone pollution](#), *University Corporation for Atmospheric Research*, 5/5/14

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42. [Climate change making food crops less nutritious, research finds](#), *The Guardian*, 5/7/14
43. [Gardening for Climate Change](#), *Living On Earth*, 5/9/14
44. [Climate Change: A Boon for Pests, A Bane for Us](#), *International Science Times*, 5/10/14
45. [Climate Change Accelerates Hybridization between Native and Invasive Species of Trout](#), *USGS*, 5/25/14
46. [Study shows iron from melting ice sheets may help buffer global warming](#), *European Association of Geochemistry*, 5/21/14
47. [Stanford research shows European farmers must adapt to climate change](#), *Stanford University*, 5/20/14
48. [Antarctic Ice Sheet unstable at end of last ice age](#), *Oregon State University*, 5/28/14
49. [Examining How Marine Life Might Adapt to Acidified Oceans](#), *Yale University*, 5/14/14
50. [Summer Flounder Stirs North-South Climate Change Battle](#), *Climate Central*, 6/3/14

**C. Hazard Mitigation/Policy Items** – information on impacts to economies & the built environment

1. [Climate change brings more crime](#), *Los Angeles Times*, 2/19/14
2. [House Passes Flood Insurance Bill; Key Senators Sign On](#), *Insurance Journal*, 3/4/14
3. [NY State Expects All Utilities to Prep for Climate Change](#), *Climate Central*, 2/25/14
4. [Mystery surrounds massive die-off of oysters and scallops off B.C. coast](#), *The Globe and Mail*, 2/27/14
5. [What if the Shore goes under? Experts urge tourism shift away from waterfront](#), *Asbury Park Press*, 3/6/14
6. [Flood insurance: Waves of problems](#), *The Economist*, 3/8/14
7. [An ecosystem feels the human touch](#), *NASA*, 3/4/14
8. [Climate Study: Rising Seas Could Wipe Out Many Cultural Landmarks](#), *Live Science*, 3/4/14
13. [RODANTHE: While the seas rise in the Outer Banks and elsewhere in NC, science treads water](#), *News and Observer*, 3/15/14
16. [Coastal homeowners debate whether to rebuild or retreat](#), *Press of Atlantic City*, 3/15/14
17. [Proposed flood-insurance law just a life raft](#), *Philadelphia Inquirer*, 3/17/14
18. [State's highest court upholds Scituate Planning Board decision](#), *The Scituate Mariner*, 3/23/14
19. [Flood insurance rates are on the rise in Virginia](#), *Virginian-Pilot*, 3/10/14
20. [New Outer Banks flood maps could mean insurance savings](#), *Virginian-Pilot*, 4/1/14
21. [South Florida considers investment against rising seas](#), *PBS*, 3/19/14
22. [Drowning in Place: Local Government Costs and Liabilities for Flooding Due to Sea-level Rise](#), *The Florida Bar Journal November 2013*
23. [The City and the Sea: Lessons on resilience from America's most crowded coast](#), *Orion*, March/April 2014
24. [Our Year of Extremes: Did Climate Change Just Hit Home?](#), *NBC News*, 4/6/14
25. [Oceans of trouble for U.S. taxpayers](#), *New England Center for Investigative Reporting* 3/9/14
26. [Reasons to protect Tangier's intangibles](#), *Virginian-Pilot*, 4/6/14
27. [The unfrozen north, circa 2067](#), *Globe and Mail*, 4/1/14
28. [Why are more Americans being diagnosed with allergies?](#), *Killeen Daily Herald*, 4/14/14

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29. [Doing flood risk science differently?](#), *Geography Directions*, 2014
30. [South Bethany rejects sea level rise code change](#), *Delaware Online*, 4/26/14
31. [Climate change: Don't wait until you can feel it](#), *Carnegie Institution*, 4/25/14
32. [Lloyd's calls on insurers to take into account climate-change risk](#), *The Guardian*, 5/7/14
33. [Alabama Avoids Preparing for Rising Seas Menacing Mobile](#), *Bloomberg*, 5/12/14
34. [Hurricanes May Threaten Cities Like Never Before as Tropics Expand, Study Finds](#), *Mashable*, 5/14/14
35. [NC's next sea-level forecast will look only 30 years ahead](#), *Raleigh News & Observer*, 5/15/14
36. [Annapolis' Harriet Tubman monument among historic sites facing climate change threats](#), *The Baltimore Sun*, 5/20/14
37. [Should we try to fight rising sea levels — or abandon the coasts?](#), *Vox*, 6/5/14

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## Appendix D

AUGUST 2014 CLIMATE ADAPTATION WORKING GROUP NEWSLETTER

**From:** Curtis Smith [csmith@a-npdc.org]  
**Sent:** Friday, August 08, 2014 11:42 AM  
**Subject:** CAWG August 2014 Newsletter

## Eastern Shore of Virginia Climate Adaptation Working Group

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### August 2014 Newsletter

*The Eastern Shore of Virginia CAWG is a partnership between over 30 local, state, and federal government agencies and non-government organizations that meets quarterly to develop informational materials and planning tools to enhance our region's ability to prepare for changes resulting from sea level rise and climate change.*

*Below is a compilation of recent news, information, resources, and events pertaining to the citizens of the Eastern Shore.*

*Please feel free to forward this email to anyone who may be interested and have them contact Curt Smith at [csmith@a-npdc.org](mailto:csmith@a-npdc.org) to be added to the distribution list.*

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**CAWG "Top 10"** – Top stories & resources handpicked by Curt Smith. These links can also be found in the lists below.

1. **Tangier Features:**  
[Pieces of Tangier – Video Documentary by Jenny Roberts, 2014](#)  
[Saving Tangier Island: A Chesapeake Bay Island Could Be Running Out of Time](#), *Chesapeake Bay Journal*, 6/23/14
2. [Partnership to research mid-Atlantic climate change](#), *Eastern Shore News*, 6/11/14
3. [Virginia Climate Change & Resiliency Update Commission](#)  
[Governor McAuliffe announcement, 7/1/14](#)  
[McAuliffe reinstates climate commission, Richmond Times Dispatch 7/1/14](#)  
[Gov. Terry McAuliffe puts state climate panel back in action, Roanoke Times, 4/8/14](#)
4. Virginia Joint Commission on Sea Level Rise and Recurrent Flooding  
[Fighting Va. flooding linked to rising seas will be complicated, costly](#), *Richmond Times Dispatch*, 7/22/14  
[Bipartisan group discusses threat of rising sea levels in Hampton Roads](#), *Richmond Times Dispatch*, 6/30/14
5. [Summer Fun: How Much Hotter Will Your City Be?](#), *Climate Central*, 8/1/14
6. [USGS Coastal Change Hazards Portal](#)
7. [Safe Coast Virginia: Climate Change Threats and Practical Solutions for Coastal Virginia](#), *Chesapeake Climate Action Network, 2014*
8. [Climate experts estimate risk of rapid crop slowdown](#), *National Center for Atmospheric Research*, 7/25/14
9. [Sea-level rise and its impact on Virginia](#), *World Resources Institute*, June 2014
10. [Study investigates Chesapeake Bay storm-surge wall](#), *Virginian-Pilot*, 7/17/14

#### **Upcoming Public Events**

1. **August 15, 2014** – Chincoteague NWR CCP Public Comment Deadline

#### **Adaptation Resources & Planning Tools**

##### **A. Local Resources/Tools**

1. [Wallops Flight Facility Mid-Atlantic Coastal Research Institute:](#)  
[Partnership to research mid-Atlantic climate change](#), *Eastern Shore News*, 6/11/14
2. [Chincoteague and Wallops Island NWRs Draft Comprehensive Conservation Plan/Environmental Impact Statement](#), *US Fish & Wildlife Service*
3. [Pieces of Tangier – Video Documentary by Jenny Roberts, 2014](#)

##### **B. State & Regional Resources/Tools**

11. [Virginia Climate Change & Resiliency Update Commission](#)  
[Governor McAuliffe announcement, 7/1/14](#)

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- [McAuliffe reinstates climate commission, Richmond Times Dispatch 7/1/14](#)  
[Gov. Terry McAuliffe puts state climate panel back in action, Roanoke Times, 4/8/14](#)
12. Virginia Joint Commission on Sea Level Rise and Recurrent Flooding  
[Fighting Va. flooding linked to rising seas will be complicated, costly, Richmond Times Dispatch, 7/22/14](#)  
[Bipartisan group discusses threat of rising sea levels in Hampton Roads, Richmond Times Dispatch, 6/30/14](#)
  13. [Rising To the Challenge: Bi-partisan conference addressing sea level rise in Virginia](#)  
[Sea level rise takes center stage at forum, Virginian-Pilot, 7/1/14](#)  
[Sea Level Rise Cuts Across Political Divide in Norfolk, World Resources Institute, 7/2/14](#)
  14. [Safe Coast Virginia: Climate Change Threats and Practical Solutions for Coastal Virginia, Chesapeake Climate Action Network, 2014](#)  
[Safe Coast Virginia: Report outlines the climate change threat to the coast, and 10 achievable solutions, Daily Press, 7/10/14](#)
  15. [Sea-level rise and its impact on Virginia, World Resources Institute, June 2014](#)
- C. National Resources/Tools**
1. [Risky Business Project: The Economic Risks of Climate Change in the United States – June, 2014](#)  
[Report: Climate change a huge economic risk, USA Today, 6/24/14](#)  
[Bipartisan Report Tallies High Toll on Economy From Global Warming, New York Times, 6/24/14](#)  
[Report Details Economic Impacts Of Climate Change, New Republic, 6/23/14](#)  
[US climate report suggests \\$500bn of property below sea level by 2100, The Guardian, 7/3/14](#)
  2. [Sea Level Rise and Nuisance Flood Frequency Changes around the United States, NOAA, 6/14](#)  
[Annoying Minor Floods Are Increasing on US Coasts, ABC News, 7/28/14](#)
  3. [USGS Coastal Change Hazards Portal](#)  
[Science Brings Clarity to Shifting Shores, USGS, 7/16/14](#)  
[Coastal Change Hazards Rodanthe Tutorial Video, USGS](#)
  4. [Planning for Climate Change on the National Wildlife Refuge System, US Fish & Wildlife Service, 2008 \(updated 2014\)](#)
  5. [Considering Multiple Futures: Scenario Planning to Address Uncertainty in Natural Resources Conservation, US Fish & Wildlife Service, 2014](#)
  6. [Summertime Blues? U.S. Seeing Red as Temps Rise – Climate Central, 6/19/14](#)
  7. [Summer Fun: How Much Hotter Will Your City Be?, Climate Central, 8/1/14](#)
  8. [This new mapping technology will show whether global warming could drown your town, Washington Post, 6/27/14](#)
  9. [USDA Regional Climate Hubs – Regional networks to help agriculture and forestry mitigate climate change impacts](#)  
[Press Release, USDA 2/5/14](#)  
[Seasons of change: USDA climate hubs to help farmers with weather patterns, Jamestown Sun, 6/21/14](#)
  10. [Climate-Smart Conservation: Putting Adaptation Principles into Practice, National Wildlife Federation, 5/8/14](#)
  11. [Assessing Health Vulnerability to Climate Change: A Guide for Health Departments, Centers for Disease Control and Prevention, 2014](#)

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12. [The Cost of Delaying Action to Stem Climate Change, White House Council of Economic Advisers, 2014](#)  
[White House says delays in curbing greenhouse gas emissions may cost billions, Washington Post, 7/29/14](#)
- D. Global Resources/Tools**
1. [Atlas of Mortality and Economic Losses from Weather, Climate, and Water Extremes, World Meteorological Organization, 6/14](#)
  2. [Shifting ocean surface saltness from 2004-2013, NOAA, 7/28/14](#)
  3. [Global Analysis – June 2014: State of the Climate, NOAA, 6/14](#)

#### Adaptation Research Articles & News Items

- A. Sea Level Research Articles & News Items**
1. [Georgia marsh experiment catalogs threats from sea level rise, Savannah Morning News, 6/9/14](#)
  2. [Study links Greenland ice sheet collapse, sea level rise 400,000 years ago, Oregon State University, 6/25/14](#)
  3. [Exclusive: Coastal flooding has surged in U.S., Reuters finds, Reuters, 7/10/14](#)
  4. [Assessing Seagrass Vulnerability along Florida's Gulf Coast, NOAA, 7/14](#)
  5. [Rising Seas: Will the Outer Banks Survive?, National Geographic, 7/25/14](#)
  6. [Sea-level spikes can harm beaches worse than hurricane, American Geophysical Union, 8/5/14](#)
  7. [Reading between the tides: 200 years of measuring global sea level, NOAA, 8/4/14](#)
- B. Climate Change Research Articles & News Items**
- Atmospheric Warming*
1. [Climate not to blame for the disappearance of large mammals, Aarhus University, 5/28/14](#)
  2. [10 Living Things That Are Loving Global Warming, Weather.com, 6/6/14](#)
  3. [Discovery of a bud-break gene could lead to trees adapted for a changing climate, Oregon State University, 6/16/14](#)
  4. [Research Could Lead to a New Breed of Superchicken, Bloomberg, 6/26/14](#)
  5. [How species will, or won't, manage in a warming world, Science News, 7/11/14](#)
  6. [Climate experts estimate risk of rapid crop slowdown, National Center for Atmospheric Research, 7/25/14](#)
  7. [Conservation scientists asking the wrong questions when considering the impacts of climate change on wildlife, Wildlife Conservation Society, 7/30/14](#)
  8. [New Study Confirms Water Vapor as Global Warming Amplifier, University of Miami, 7/28/14](#)
  9. [Tornado Outbreaks Could Have a Climate Change Assist, Climate Central, 8/5/14](#)
  10. [More severe tornado outbreaks may be linked to climate change, CBS News, 8/8/14](#)
  11. [NASA selects instruments to track climate impact on vegetation, NASA, 7/30/14](#)
  12. ['Second punch' of ocean acidification threatens Lowcountry, Post & Courier, 6/22/14](#)
  13. [Underwater Meadows Might Serve As Antacid For Acid Seas, NPR, 7/15/14](#)
  14. [Tropical Fish Cause Trouble as Climate Change Drives Them Toward the Poles, National Geographic, 7/25/14](#)

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15. [In Chesapeake Bay waters warmed by summer sun, a deadly pathogen lies in wait](#), *Washington Post*, 7/26/14
16. [Southeast, southwest Alaska communities at highest risk from ocean acidification, study says](#), *Alaska Dispatch*, 7/29/14

**C. Hazard Mitigation & Climate Adaptation Planning & Policy Items**  
(information on impacts to economies & the built environment)

1. [Interior chief: Jamestown at risk from rising seas](#), *Virginian-Pilot*, 6/5/14
2. [Tybee Island Leaders Prepare For Sea Level Rise](#), *WSAV*, 5/8/14
3. [Louisiana is world's biggest loser](#), *Australian Broadcasting Corp.*, 6/17/14
4. [On N.C.'s Outer Banks, scary climate-change predictions prompt a change of forecast](#), *Washington Post*, 6/24/14
5. [Saving Tangier Island: A Chesapeake Bay Island Could Be Running Out of Time](#), *Chesapeake Bay Journal*, 6/23/14
6. [US mayors unanimously pass climate change ideas](#), *US News & World Report*, 6/23/14
7. [For N.J. Mayor, The Time To Adapt To Rising Sea Levels Is Now](#), *NPR*, 5/21/14
8. [Putting a Price Tag on Nature's Defenses](#), *New York Times*, 6/5/14
9. [White House Unveils Climate Change Initiatives](#), *New York Times*, 7/16/14
10. [Study investigates Chesapeake Bay storm-surge wall](#), *Virginian-Pilot*, 7/17/14
11. [Old maps show why Norfolk's often waterlogged](#), *Virginian-Pilot*, 7/27/14
12. [Learning to Take the Heat: Declines in U.S. Heat-Related Mortality](#), *Environmental Health Perspectives*, 8/14
16. [USGS Release: Virginia Storm-Tide Sensor Network Strengthened](#), *USGS*, 8/1/14
14. [FEMA threatened by record legal fees that eclipse cost of Katrina](#), *E&E Publishing*, 8/6/14

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## Appendix E

November 13, 2013 Climate Adaptation Working Group  
Meeting Sign-In Sheet and Agenda





## Eastern Shore of Virginia Climate Adaptation Working Group

### AGENDA

**Date: November  
13, 2013**

**Time: 1:00 - 3:00  
PM**

**Place: VIMS  
Eastern Shore  
Laboratory,  
Wachapreague**

#### 1:00 Welcome, Introductions, & Meeting Objectives

- CAWG Strategic Plan Discussion
- Review of recent adaptation items/events
  - Climate Change 2013: The Physical Science Basis – IPCC
  - Adaptive Planning for Flooding & Coastal Change in Virginia Forum
  - Recurrent Coastal Flooding Subpanel of the Secure Commonwealth Panel Minutes
  - North Atlantic Comprehensive Coastal Vulnerability Study – USACE
  - European Union Sea Level Rise Conference Recap (Oct. 30, 2013)

#### 1:25 Ongoing Educational & Outreach Items (Smith, A-NPDC)

- Flood Insurance Workshop Recap
- ESVA Science Symposium Update
- ESVA Coastal Change Archive Project Update
- CAWG Website Discussion

#### 1:30 Adaptation Planning & Regulatory Items

- ESVA Transportation Infrastructure Inundation Vulnerability Assessment (Smith, A-NPDC)
- NASA Mid-Atlantic Coastal Resilience Institute/Climate Adaptation Science Investigation Update (Tiffany Moissan, NASA-WFF)
- ESVA Marsh Migration Modeling Presentation (Gwynn Crichton, TNC)
- Wallops Flight Facility Joint Land Use Study Briefing (Jenny Neyland)

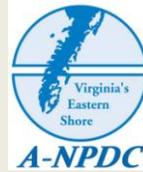
#### 2:30 Roundtable Updates from Working Group

#### 2:55 Next Steps for Working Group

#### 3:00 Adjournment

## Appendix F

February 2014 Climate Adaptation Working Group Meeting  
Emails



# Eastern Shore of Virginia Climate Adaptation Working Group



*Hello Everyone,*

*Due to the fact that many people, including myself, have indicated that their current schedules have remained extremely busy, I am proposing a change to our regularly scheduled quarterly meeting for February. CAWG was scheduled to meet on February 11 but I am now proposing that the group meet remotely via email instead.*

*I am asking that anyone who would like to share any updates or news, new planning or informational resources, or upcoming events please send me the information and I will compile and distribute a meeting packet.*

**Please submit anything you would like to share with the group to me no later than this Friday, Feb. 7 by COB.**

*In addition to sending out the CAWG meeting packet next week, I also have compiled the latest edition of our CAWG Newsletter and will be distributing that as well.*

*Please mark your calendars for future CAWG meetings in 2014 noted in the “Upcoming Events” section of this letter in the column to the right.*

## Partnering Agencies

Accomack County  
 Accomack-Northampton Planning District Commission  
 Chesapeake Bay Foundation  
 Chincoteague Bay Field Station  
 Citizens for a Better Eastern Shore  
 Eastern Shore Resource Conservation & Development Council  
 Eastern Shore Soil & Water Conservation District  
 Eastern Shore of VA Land Trust  
 NASA Wallops Flight Facility  
 Northampton County  
 The Nature Conservancy  
 Town of Cape Charles  
 Town of Chincoteague  
 Town of Exmore  
 Town of Saxis  
 Town of Tangier  
 Town of Wachapreague  
 US Fish & Wildlife Service  
 USDA Natural Resource Conservation Service  
 UVA Long Term Ecological Research Project  
 VA Coastal Zone Mgmt. Program  
 VA Dept. of Conservation & Recreation  
 VA Dept. of Emergency Management  
 VA Dept. of Forestry  
 VA Dept. of Game & Inland Fisheries  
 VA Institute of Marine Science  
 VA Marine Resources Commission  
 VA Dept. of Transportation  
 Wetlands Watch

## Upcoming Events

- **CAWG Meeting** – February, 2014 (to be held via email)

*Cheers,*

*Curt*

- [CAWG Meeting](#) – May 13, 2014
- [CAWG Meeting](#) – August 12, 2014
- [CAWG Meeting](#) – November 11, 2014

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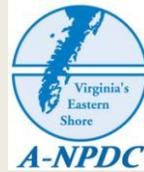
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# Eastern Shore of Virginia Climate Adaptation Working Group



*Hello Everyone,*

*In addition to the information included within the Spring 2014 CAWG Newsletter, the following items were provided to me by CAWG members:*

[NASA-WFF Climate Resilience Workshop Summary Report \(Cover Letter & Report Attached\)](#)

The Wallops Flight Facility (WFF) Climate Adaptation Science Investigator (CASI) working group created this year completed its first report. This document (attached, with cover letter) summarizes the proceedings of the 2012 Resilience and Adaptation to Climate Risks Workshop for the Eastern Shore of Virginia held at WFF.

[Camp Occohannock Living Shoreline Workshops \(Flyer Attached\)](#)

The Eastern Shore Resource Conservation and Development Council (ES RC&D) and The Nature Conservancy are in the final stages of installing a 1000-ft living shoreline project at Occohannock on the Bay Camp and Retreat Center (Camp Occohannock) in Belle Haven to protect property from coastal erosion. The purpose of this project is to demonstrate how marsh plants, sand, and limited rock can both effectively protect shorelines from erosion while also creating critical coastal habitats that support clean water and wildlife. This

## Partnering Agencies

Accomack County  
Accomack-Northampton Planning District Commission  
Chesapeake Bay Foundation  
Chincoteague Bay Field Station  
Citizens for a Better Eastern Shore  
Eastern Shore Resource Conservation & Development Council  
Eastern Shore Soil & Water Conservation District  
Eastern Shore of VA Land Trust  
NASA Wallops Flight Facility  
Northampton County  
The Nature Conservancy  
Town of Cape Charles  
Town of Chincoteague  
Town of Exmore  
Town of Saxis  
Town of Tangier  
Town of Wachapreague  
US Fish & Wildlife Service  
USDA Natural Resource Conservation Service  
UVA Long Term Ecological Research Project  
VA Coastal Zone Mgmt. Program  
VA Dept. of Conservation & Recreation  
VA Dept. of Emergency Management  
VA Dept. of Forestry  
VA Dept. of Game & Inland Fisheries  
VA Institute of Marine Science  
VA Marine Resources Commission  
VA Dept. of Transportation  
Wetlands Watch

## Upcoming Events

- [CAWG Meeting](#) – February, 2014 (to be held via email)

project is possible through the generous support of the Eastern Shore of Virginia Community Development Foundation, the Wildlife Conservation Society’s Climate Adaptation Fund, the Chesapeake Bay Trust, and the National Fish and Wildlife Foundation.

We’d like to share our experience on this project with local landowners and interested citizens by inviting you to a workshop and optional volunteer work day at camp, which is located near Belle Haven. We are offering the workshop and volunteer work days on both **March 13, 2014** and on **May 1, 2014**. The objective of these workshops will be to give landowners, community members, resource managers, and other interested persons the opportunity to see and hear about the camp’s living shoreline project and learn more about what is involved in planning, permitting, and implementing living shoreline projects on private property.

**On March 13th, the agenda will be as follows:**

10 a.m. – Noon: Workshop on living shorelines with Scott Hardaway, project designer and Director of the Shoreline Studies Program at the Virginia Institute of Marine Science. Topics will cover:

- Shoreline design, permitting process & timeline
- What/when to plant, where to get materials, and how to install
- Costs and contractors

Noon – 1 p.m. Lunch provided to all registered workshop participants

1 p.m. – 5 p.m. (Optional) Chesapeake Bay Foundation volunteer work day to plant shrubs, grasses, and trees in unland riparian buffer

- **[Webinar: Climate Information for Managing Risks in Water Resources: Working with Communities](#)** - February 21, 2014 - Space is limited, [Register Here](#)
- **[VA Working Waterfronts Workshop](#)** – February 26 at ESCC (registration required by 2/19)
- **[Living Shoreline Workshop for Landowners](#)** – March 13 at COOTB (registration required)
- **[Mid Atlantic Regional Planning Body Public Listening Sessions](#)**- March 20 in Norfolk, VA 1:30-4:00 and 5:00-7:30. For the [Draft Mid-Atlantic Regional Ocean Planning Framework](#) Comments can also be provided in writing to the RPB by April, 15 2014.
- **[Living Shoreline Workshop for Landowners](#)** – May 1 at COOTB (registration required)
- **[NOAA’s 12th Annual Climate Prediction Applications Science Workshop](#)** – May 6-8, 2014 in Fairfax, VA. Registration available beginning March 1. More information can be found [here](#)
- **[CAWG Meeting](#)** – May 13, 2014
- **[CAWG Meeting](#)** – August 12, 2014
- **[CAWG Meeting](#)** – November, 2014

along living shoreline (to be continued on March 14th for those interested)

**On May 1st, the agenda will be as follows:**

11:30 a.m. – 2 p.m. Workshop on living shorelines with Scott Hardaway, project designer and Director of the Shoreline Studies Program at the Virginia Institute of Marine Science. Topics will cover:

- Shoreline design, permitting process & timeline
- What/when to plant, where to get materials, and how to install
- Costs and contractors

Lunch provided during workshop!

2:30 p.m.-5:30 p.m. (Optional) The Nature Conservancy and RC&D's volunteer work day to plant marsh grass planting (to be continued on May 2nd from 2:30 p.m. until 5:30 p.m.)

Participants are welcome to come for the workshop and lunch only, and while encouraged, is not obligated to stay for the planting on either dates.

Please note that we are requesting advanced registration for the workshops and volunteer days! Please contact Gwynn Crichton ([gcrichon@tnc.org](mailto:gcrichon@tnc.org) or (434) 951-0571) or Sara Reiter ([esrcd.sara@gmail.com](mailto:esrcd.sara@gmail.com) or (757) 757-710-7266) to register for one of the workshop dates.

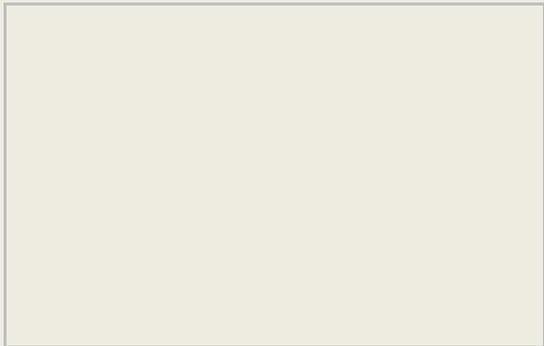
To learn more about the living shoreline project at Camp Occohannock, please visit [The Nature Conservancy's Virginia Program website on nature.org](http://www.nature.org).

***Finally, please note that the previous email had November 11, 2014 as a meeting date. It was brought to my attention that Veteran's Day falls***

*on this date and while we will still meet in November, we will select a date leading up to the meeting. I look forward to seeing everyone on May 13 for our next meeting.*

*Cheers,*

*Curt*



### Contact

Curt Smith  
Director of Planning  
757.787.2936  
[csmith@a-npdc.org](mailto:csmith@a-npdc.org)

### Follow us

[www.a-npdc.org](http://www.a-npdc.org)



A-NPDC on Facebook

If you no longer wish to receive these emails, please reply to this message with "Unsubscribe" in the subject line.

## Appendix G

May 13, 2014 Climate Adaptation Working Group Meeting  
Sign-In Sheet and Agenda





## Eastern Shore of Virginia Climate Adaptation Working Group Meeting Agenda

May 13, 2014

1:00-3:00 p.m.

ES of VA Chamber of Commerce, Melfa, VA

### Welcome, Introductions, & Meeting Objectives

- 1:00 pm > Steve Parker Recognition  
> Welcome ESVA Chamber of Commerce to CAWG

### Ongoing Educational & Outreach Items

- 1:05 pm > Local, Regional, and National Adaptation Events:
- > TNC/RC&D Living Shoreline Workshop for Landowners – May 1
  - > NOAA Climate Prediction Applications Science Workshop – May 6-8
  - > FEMA Preliminary FIRM public meetings in Accomack and Northampton – May 12 & 13
  - > Eastville/Nassawadox/Exmore Ground Water Summit – June 11
- > Local, Regional, and National Adaptation Items/Resources:
- > 2014 VA General Assembly Update:
    - > Recurrent Flooding Joint Subcommittee ([HJ16, SJ3](#)) and [press release](#)
    - > [Eastern Shore Public Access Authority \(HB844\)](#)
  - > Secure Commonwealth Panel Recurrent Flooding Subpanel Update
    - > [Recurrent Flooding Presentation to SCP](#)
  - > [2014 FEMA Pre-Disaster Mitigation & Flood Mitigation Assistance Grant](#) – due by July 25
  - > [USACE North Atlantic Coastal Comprehensive Study](#)
  - > [USDA Regional Climate Hubs](#)
    - > [Press release](#)
  - > White House Climate Data Initiative
    - > [Press release for launch](#) and [Fact Sheet](#)
  - > [National Climate Assessment](#)
    - > [Third NCA Report](#)
    - > [Article and video](#)



## Eastern Shore of Virginia Climate Adaptation Working Group Meeting Agenda

May 13, 2014

1:00-3:00 p.m.

ES of VA Chamber of Commerce, Melfa, VA

- IPCC [Climate Change 2014 Report](#)
  - [Press release](#) and [news article](#)
- CAWG Education & Outreach Initiatives:
  - 2014 CAWG Public Workshop development
  - ESVA Coastal Change Archive Presentation – Curt Smith, A-NPDC

### Adaptation Planning & Regulatory Items

- 2:15 pm
- ESVA Transportation Infrastructure Inundation Vulnerability Assessment (Smith, A-NPDC)
  - ESVA Hazard Mitigation Plan Rewrite Discussion (Smith, A-NPDC)
  - Community of Practice on Climate Adaptation for Eastern Shore Tidal Marshes and Coast introduction
  - TNC Marsh Advancement/Migration Mapping Project (Crichton, TNC)
  - Forecasting Change in the Delmarva Coastal Lagoons Update (Smith, A-NPDC)
  - Chincoteague NWR Comprehensive Conservation Plan Update
  - NASA Climate Adaptation Science Initiative (CASI) & Mid-Atlantic Coastal Resilience Institute (MACRI) Updates
  - Accomack Co. Joint Land Use Study/NASA Programmatic Environmental Impact Statement Update
  - NFWF Hurricane Sandy Coastal Resiliency Proposal Updates
  - USGS/NWS Local Tide Gauge Development Update (Smith, A-NPDC)
  - UConn Eastern Shore Environmental Survey

### CAWG Member Roundtable Updates

- 2:40 pm Roundtable Updates
- 2:55 pm Next Steps and Adjourn

## Appendix H

### 2014 Climate Adaptation Working Group Progress Report



## Eastern Shore of Virginia Climate Adaptation Working Group 2014 Progress Report

Actions were developed during August 2010 Adapting to Climate Change Workshop and included in the Nature Conservancy's May, 2011 report, *The Eastern Shore of Virginia: Strategies for Adapting to Climate Change*

### Adaptation Action #1 – Local Adaptation Planning

*Review county comprehensive plans and hazard mitigation plans to incorporate the current and predicted effects of sea-level rise and coastal flooding using vulnerability assessment derived from LiDAR and best available scientific data.*

Step	Status	Explanation
1-A. Convene Eastern Shore LiDAR Working Group to ensure the coordinated and efficient distribution, storage, and analysis of the LiDAR data in evaluating vulnerability of coastal areas to sea-level rise.	Complete	TNC & A-NPDC produced LiDAR Plan, presented data to Counties, and hosted workshop in 2011
1-B. Incorporate sea-level rise data and vulnerability analysis in revision of Eastern Shore Hazard Mitigation Plan and Northampton and Accomack County Comprehensive Plans and amend plans to better protect vulnerable areas and promote adaptation.	HMP – scheduled for 2014-16 Comp Plans - Complete and Ongoing	Additional vulnerability assessments needed for HMP, County Plans, and Town Plans
1-C. Hold series of public outreach forums to educate community about vulnerable areas and introduce alternative scenarios for adaptation as part of the Eastern Shore hazard mitigation planning and county comprehensive plan review process.	Complete and Ongoing	2012 Coastal Flooding Workshop, 2013 Coastal Insurance Workshop, 2014 Coastal Change Archive

### Adaptation Action #2 – Shoreline Management Plans

*Develop shoreline management plans for all Eastern Shore stream reaches in consultation with VIMS that are incorporated into county comprehensive plans per the new statewide statutory requirement, and promote new general permit for living shorelines with land owners through education and demonstration projects.*

Step	Status	Explanation
2-A. Promote and implement new legislation passed by the General Assembly that requires localities to incorporate coastal resource management guidance (aka plans) into scheduled revision of comp plans.	Incomplete and Ongoing	Scheduled to be incorporated into Accomack and Northampton Co. comprehensive plans
2-B. Promote new general permit for "living shorelines" as the preferred alternative for stabilizing shorelines in Virginia by continuing to build on past public outreach and education programs regarding alternative shoreline management through workshops and demonstration projects such as Ocohanock Creek.	Complete and Ongoing	2013-14 COOTB construction and workshop; 2013-14 CBFS Greenbackville construction and workshop 2014-16 NFWF living shorelines (3)

### Adaptation Action #3 – Restoration and Protection of Natural Systems

*Work with public and private partners to enhance climate change adaption by species, habitats and ecological systems through expansion and restoration of a resilient, productive and connected network of protected lands that capture habitat gradients and transition zones from sub-tidal coastal bays to upland forests across the Eastern Shore of Virginia landscape.*

Step	Status	Explanation
3-A. Use LiDAR vulnerability assessment to identify and prioritize critical areas for protection and restoration to facilitate adaptation and build resiliency of habitats and ecological systems on the Eastern Shore in response to accelerated sea-level rise and climate change.	Pending	NFWF funding acquired in 2014 by TNC. Completion of tool/website slated for 2016.
3-B. Work with the Southern Tip Partnership to secure funding to acquire high priority adaptation lands.	Ongoing	STEP protection priorities analysis complete considers SLR & marsh retreat. 640-ac Level Ponds Preserve protected in 2012
3-C. Develop easement restrictions that support adaptation to climate change.	Incomplete	New language about living shorelines options for mitigating shoreline erosion added to template.

3-D. Adaptively manage existing and emerging conservation and restoration projects based on ecological monitoring and new research regarding climate change effects to increase the adaptive capacity and resiliency of Eastern Shore ecological systems.	Incomplete	In progress (details TBD)
3-E. Incorporate climate change considerations in developing a coastal and marine spatial plan under CZM-funded Special Area Management Program.	Incomplete	Recent SAMP projects have completed assessments of Seaside uses. Future marine spatial planning should incorporate climate change

### Adaptation Action #4 – Groundwater Management

*Enhance and sustain groundwater resources through incorporating climate change effects in planning for future water resource supply and demand and implementing appropriate management and conservation actions.*

Step	Status	Explanation
4-A. Address and incorporate climate change considerations in county water supply plans and the revision of the Ground Water Supply Protection and Management Plan that includes improved projections of future water supply and demand and more comprehensive assessment of all water uses.	Complete	A-NPDC completed county WSPs in 2011 and GWSPMP in 2013
4-B. Increase and expand financial incentives and cost-share programs to encourage shallow-water aquifer use by the agricultural sector.	Incomplete	GW Committee encourages use of Columbia through communication with individual users & GW Award Program
4-C. Work with dominant non-agricultural users such as the poultry industry and developers to increase water use efficiency and recharge.	Incomplete and ongoing	VA explored recharge for reuse incentivized program but no action to date. GW Committee educates local users.
4-D. Provide tax incentives for developers to use permeable surfaces for parking lots and other paved areas.	Incomplete	No action to date by localities or GW Committee
4-E. Explore alternative technologies such as aquifer storage and recovery (ASR) systems to create a water resources bank.	Complete	GW Committee has explored ASR and understands most feasible options for Shore users

### Adaptation Action #5 – Education and Outreach

*Establish Eastern Shore Climate Adaptation Working Group to promote political will by developing education and outreach programs for the public and helping to facilitate the implementation of key adaptation strategies by the two counties.*

Step	Status	Explanation
No specific steps identified, but CAWG is alive and well!!!	Complete and ongoing	

## Appendix I

August 12, 2014 Climate Adaptation Working Group  
Meeting Sign-In Sheet and Agenda

EASTERN SHORE OF VIRGINIA  
Climate Adaptation Working Group  
August 12, 2014

NAME	ORGANIZATION
Curt Smith	A-MDC
Gregory Cosentino	TNC
Chris Bruce	TNC
JACK Mc CAMBRIDGE	VDOT
Josephine Mooney	ESRC&D
Joe Johnson	TNC
Jill Bieri	TNC
Jim Mc Gowan	TNC
Jane Lassiter	NRCS
Dario Moez	A-MDC
ROB TESTERMAN	Town of Chesapeake
Kevia Holcomb	USFWS
Mary-Carson Stiff	Wetlands Water/Virginia Coastal Plan
Kristin Paulk	University of Connecticut
Kristen Tremblay	Accomack County Planning
Michelle Covi	ODU/Virginia Sea Grant
Sophie Hui	ES Study
Hali Florde Pagan	VEST
Tatum Ford	CBF



## Eastern Shore of Virginia Climate Adaptation Working Group Meeting Agenda

August 12, 2014

1:00-3:00 p.m.

VIMS Eastern Shore Laboratory, Wachapreague, VA

### Welcome, Introductions, & Meeting Objectives

- 1:00 pm > Steve Parker Recognition
- > 2014 CAWG Progress Report (Smith, A-NPDC)

### Adaptation Planning & Regulatory Items

- 1:15 pm > Local, Regional, and National Adaptation Events:
  - > Climate Adaptation for Coastal Communities Training – July 29-31
  - > [Climate Data Initiative: Chesapeake Bay Hackathon](#) – Aug. 2-3
  - > [2014 Rising Seas Summit: Developing Resources to Inform Decision Making and Planning for Resilience](#) – Sep. 24-26
- > Local, Regional, and National Adaptation Items/Resources:
  - > Virginia Climate Change and Resiliency Update Commission
    - > [Convening announcement](#)
    - > [News coverage](#)
  - > Secure Commonwealth Panel Recurrent Flooding Subpanel Update
    - > [Recurrent Flooding Presentation to SCP](#)
  - > Virginia Joint Commission on Sea Level Rise and Recurrent Flooding
    - > [News coverage](#)
  - > [USACE North Atlantic Coastal Comprehensive Study](#)
- > CAWG Projects:
  - > Green Infrastructure in Accomack & Northampton Counties – Introduction and overview presentation (Crichton, TNC)
  - > ESVA Transportation Infrastructure Inundation Vulnerability Assessment – presentation of draft maps (Smith, A-NPDC)
  - > ESVA Hazard Mitigation Plan Rewrite Discussion (Smith, A-NPDC)
  - > Community of Practice on Climate Adaptation for Eastern Shore Tidal



## Eastern Shore of Virginia Climate Adaptation Working Group Meeting Agenda

August 12, 2014

1:00-3:00 p.m.

*VIMS Eastern Shore Laboratory, Wachapreague, VA*

- Marshes and Coast update (Smith, A-NPDC; Fehrer, TNC)
- Forecasting Change in the Delmarva Coastal Lagoons Update (Smith, A-NPDC)
- EPA Region 3 Delmarva Conservation Modeling Project introduction/overview (Meil, A-NPDC)
- [Chincoteague NWR Comprehensive Conservation Plan Update](#) (Holcomb, USFWS)
  - [Comment period extended to August 15](#)
- NASA Climate Adaptation Science Initiative (CASI) & Mid-Atlantic Coastal Resilience Institute (MACRI) Updates
- [Accomack Co. Joint Land Use Study/NASA Programmatic Environmental Impact Statement Update](#)

### Ongoing Educational & Outreach Items

- 2:15 pm ➤ CAWG Education & Outreach Initiatives:
- Fall 2014 CAWG Public Workshop development update (Smith, A-NPDC)
  - UConn ESVA Community Surveys – outcomes of first survey & development of additional survey (Kristin Raub, UConn)

### CAWG Member Roundtable Updates

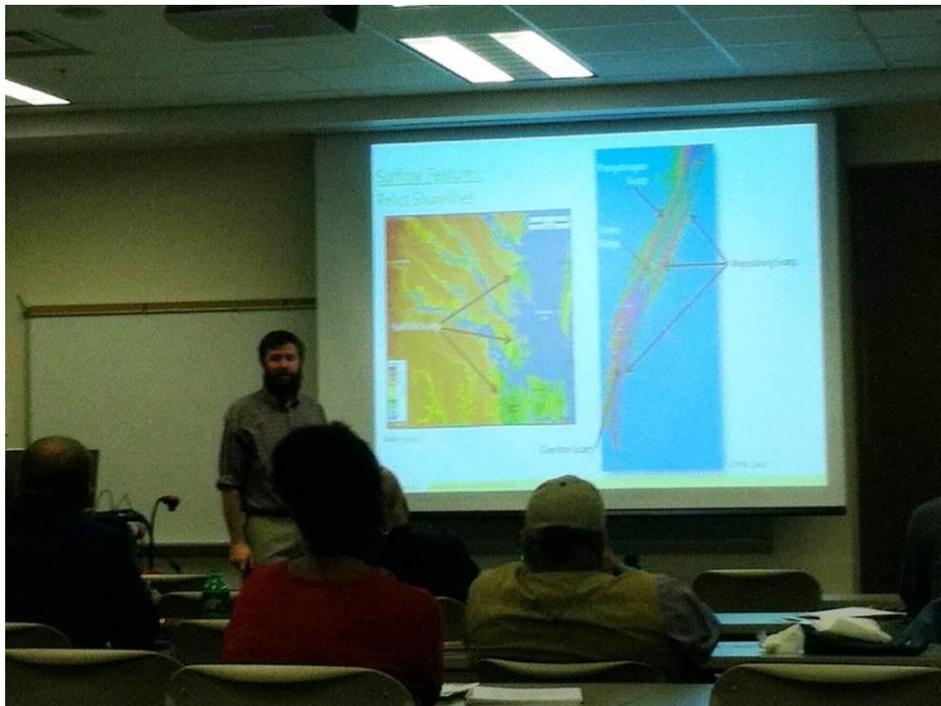
- 2:45 pm Roundtable Updates  
2:55 pm Next Steps and Adjourn

## Appendix J

Chesapeake Bay Foundation VOICES Class Presentation  
Photographs and Presentation



Photograph 1 – Curt Smith addressing the crowd at the VOICES class.



Photograph 2- Curt Smith addressing the crowd at the VOICES class.

**Geologic Evolution of the Chesapeake Bay and Eastern Shore of Virginia**

Curt Smith  
Director of Planning  
Accomack-Northampton Planning District Commission  
November 6, 2013

## A-NPDC Overview and Purpose

- Commonwealth created 21 PDCs in 1970 to address regional issues by fostering cooperation amongst localities and cooperation between state & localities
- Accomack-Northampton District:
  - Members: 2 Counties and Town of Chincoteague
  - Also provides services to 18 other towns
- Affiliate Organizations:
  - A-N Regional Housing Authority → provides privately or authority-owned rental housing
  - ESV Housing Alliance → improving housing for homeowners
  - A-NPDC →
    - Community Development
    - Economic Development
    - Transportation Planning
    - Environmental Planning → Ground Water Committee; Climate Adaptation Working Group

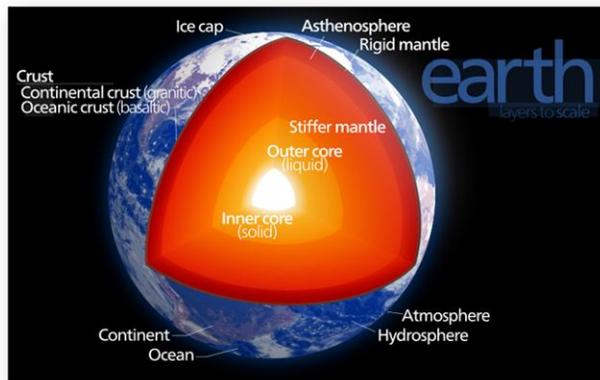
## Presentation Overview

- Causes of Geologic Change:
  - Uniform and gradual land subsidence and fluctuations in sea level working in tandem with punctuated catastrophic events (meteor impact, storms, etc.)
- Timeline:
  - i. Opening of Atlantic Ocean & Salisbury Embayment – **≈180 Million Years Ago (MYA)**
  - ii. Filling of Salisbury Embayment (Potomac Formation) – **≈180 to 35.5 MYA**
  - iii. Bolide impact & removal of pre-impact sediments – **≈35.5 MYA**
  - iv. Deposition of post-impact sediments – **≈35.5 MYA – Present**
  - v. Reworking of surficial sediments & progradation of peninsula – **≈200,000 YA – Present**
  - vi. Sea level reaches elevation of modern Chesapeake Bay transitioning system from riverine to estuarine - **≈8,000 YA**
  - vii. Sea level continues to rise and inundate the Chesapeake Bay watershed and the Chesapeake Bay begins to take its modern appearance we currently recognize - **≈3,000 YA**
    - Around this time the rate of sea level rise slows to  $\approx 1\text{-}2\text{ ft/century}$  and this trend remains through the entire period of colonization, deforestation, and development. This slower rate represents an anomaly for SLR since the last ice age (18,000 YA)
    - Relative SLR has been measured to be  $1.45\text{ ft/century}$  since 1927 at Sewells Point
    - Recent measurements since the 1990s indicate that SLR be accelerating in the region and returning to rates of  $\approx 3\text{-}4\text{ ft/century}$  that were common during much of the time since the last glacial maximum

3 November 6, 2013

Accomack-Norhampton Planning District Commission

## The Earth's Interior

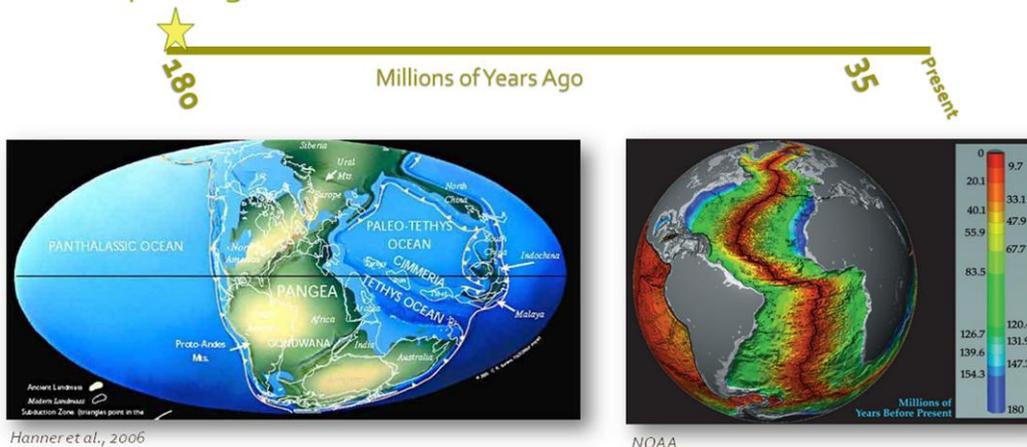


- Universe Age: 13.82 Billion Years
- Earth Age: 4.54 Billion Years
- Depth to Center  $\approx 4,030$  Miles
  - Crust -  $<0.01\%$ 
    - Oceanic Crust ( $\approx 3\text{-}6$  mi. thick)
    - Continental Crust ( $\approx 20\text{-}30$  mi. thick)
  - Mantle ( $\approx 1,800$  mi.) -  $45\%$
  - Outer Core ( $\approx 1,400$  mi.) -  $35\%$
  - Inner Core ( $\approx 800$  mi.) -  $20\%$

4 November 6, 2013

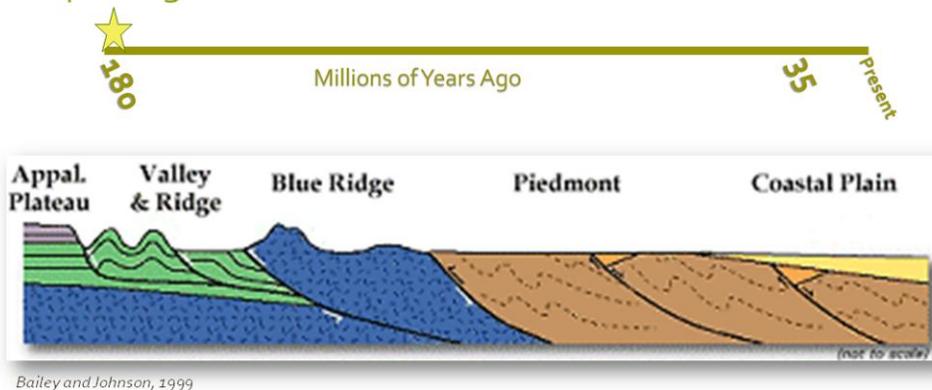
Accomack-Norhampton Planning District Commission

### Opening of Atlantic Ocean



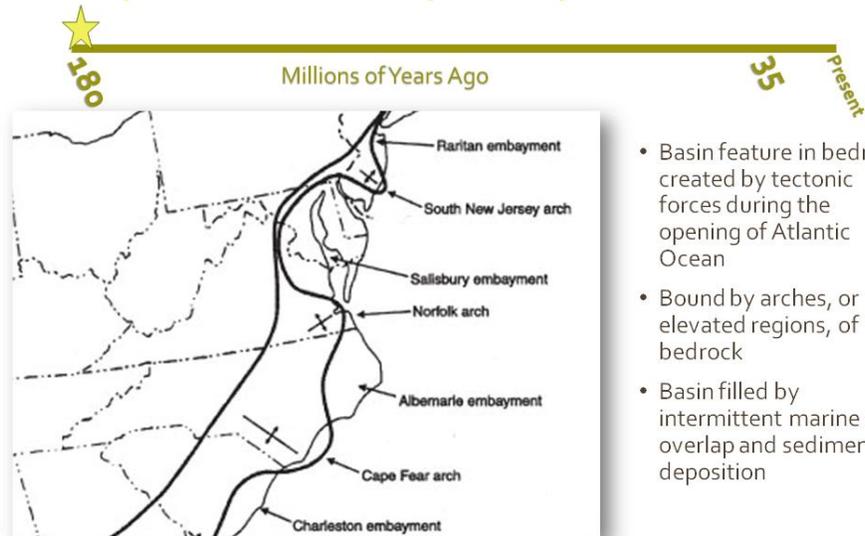
5 November 6, 2013 Accomack-Norhampton Planning District Commission

### Opening of Atlantic Ocean



6 November 6, 2013 Accomack-Norhampton Planning District Commission

## Development of Salisbury Embayment

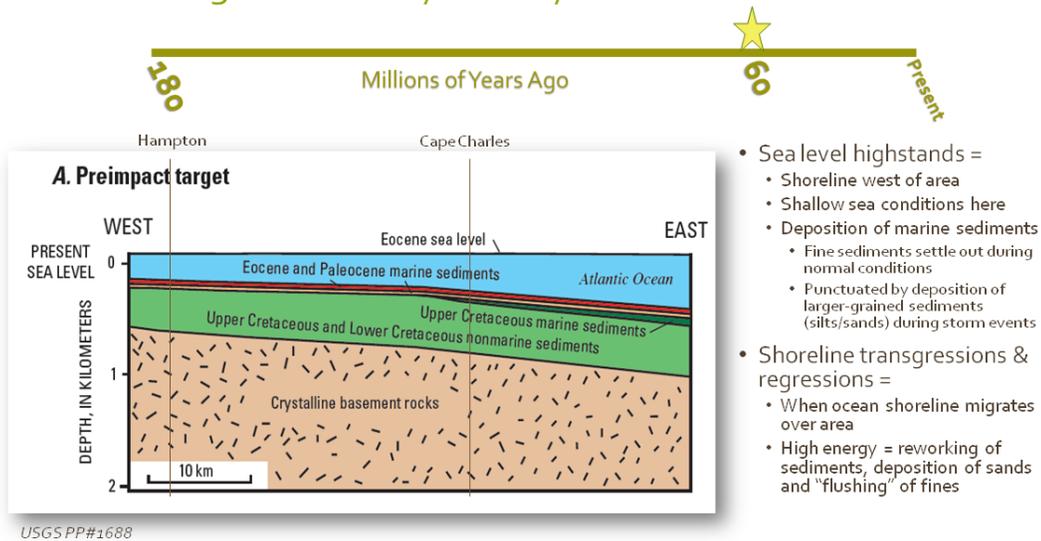


- Basin feature in bedrock created by tectonic forces during the opening of Atlantic Ocean
- Bound by arches, or elevated regions, of bedrock
- Basin filled by intermittent marine overlap and sediment deposition

7 November 6, 2013

Accomack-Norhampton Planning District Commission

## In-Filling of Salisbury Embayment

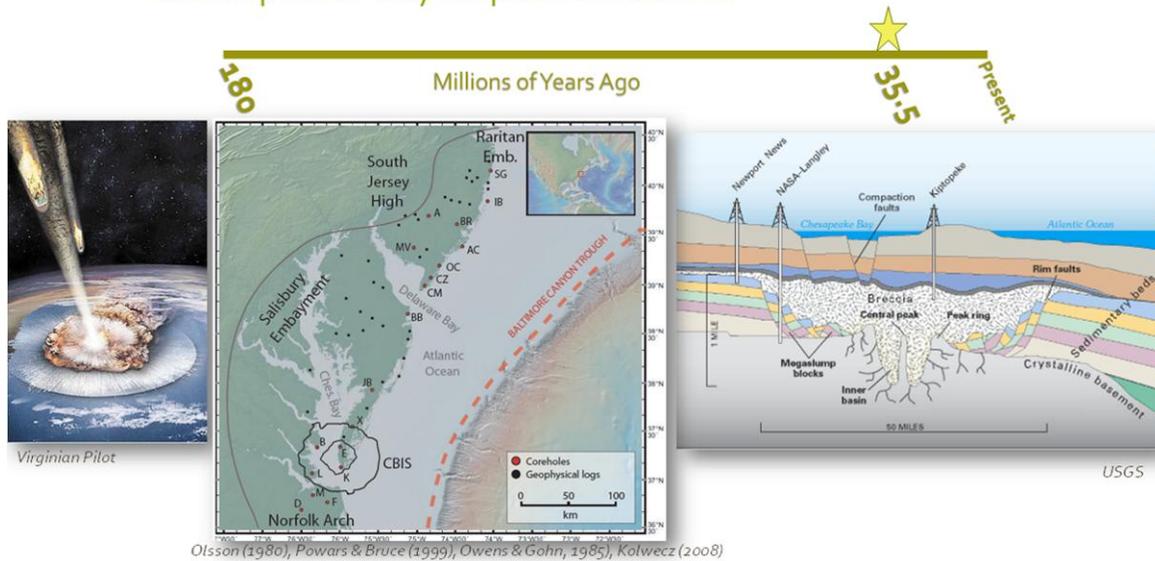


- Sea level highstands =
  - Shoreline west of area
  - Shallow sea conditions here
  - Deposition of marine sediments
    - Fine sediments settle out during normal conditions
    - Punctuated by deposition of larger-grained sediments (silts/sands) during storm events
- Shoreline transgressions & regressions =
  - When ocean shoreline migrates over area
  - High energy = reworking of sediments, deposition of sands and "flushing" of fines

8 November 6, 2013

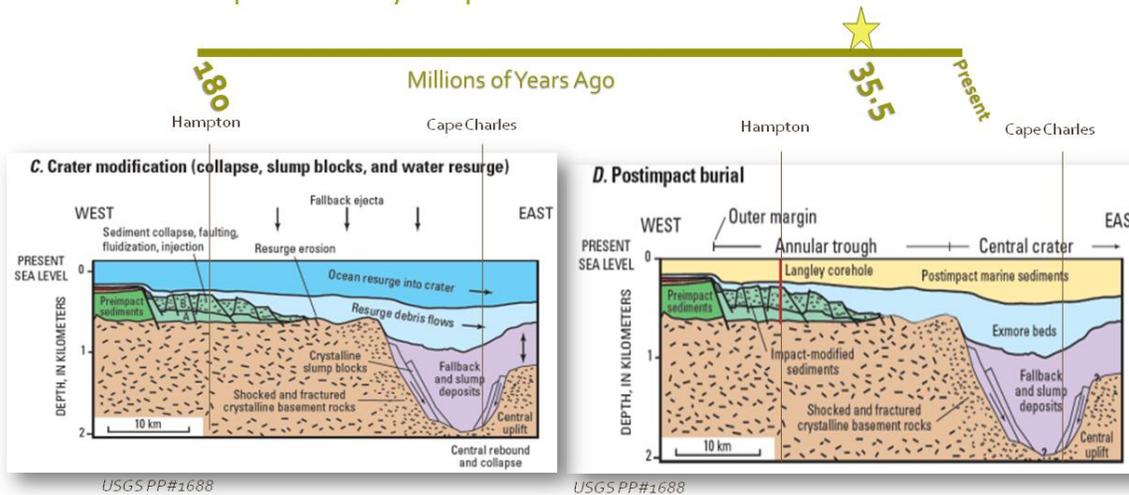
Accomack-Norhampton Planning District Commission

## Chesapeake Bay Impact Structure



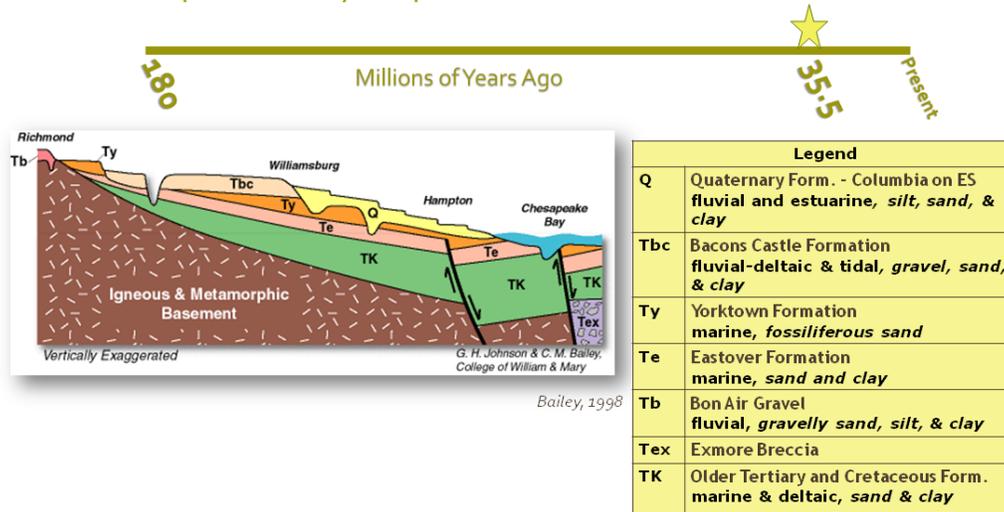
9 November 6, 2013 Accomack-Norhampton Planning District Commission

## Chesapeake Bay Impact Structure



10 November 6, 2013 Accomack-Norhampton Planning District Commission

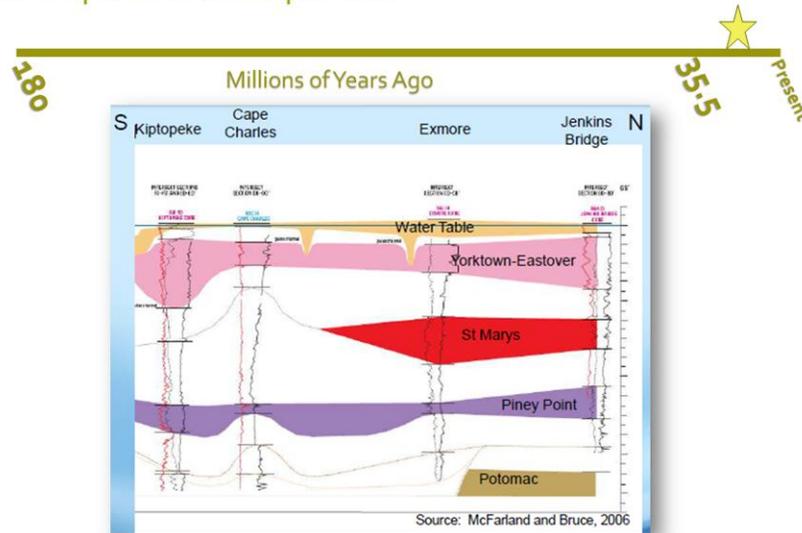
## Chesapeake Bay Impact Structure



11 November 6, 2013

Accomack-Norhampton Planning District Commission

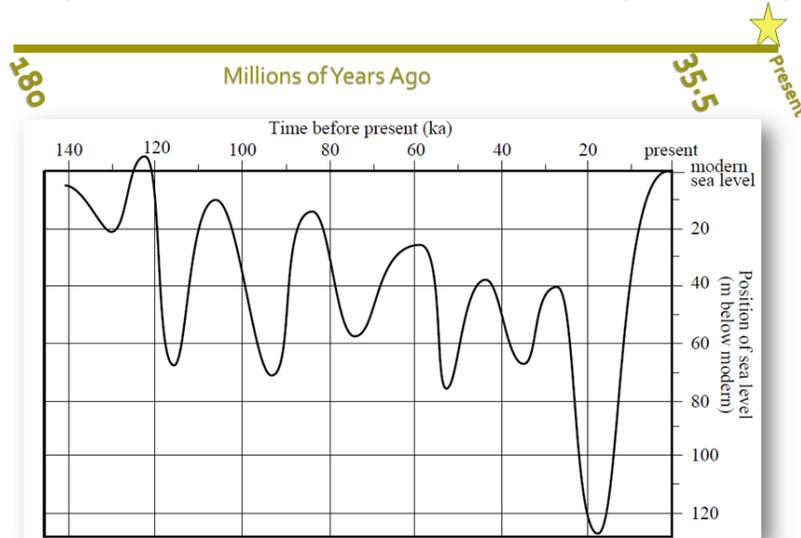
## Post-Impact Development



12 November 6, 2013

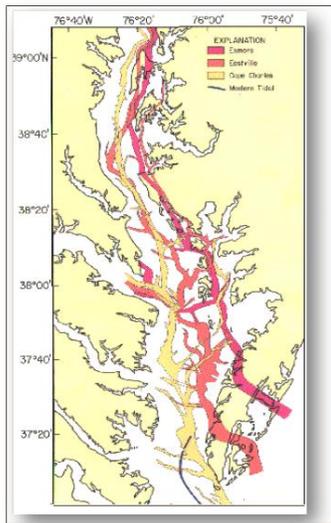
Accomack-Norhampton Planning District Commission

## Development of Eastern Shore & Chesapeake Bay

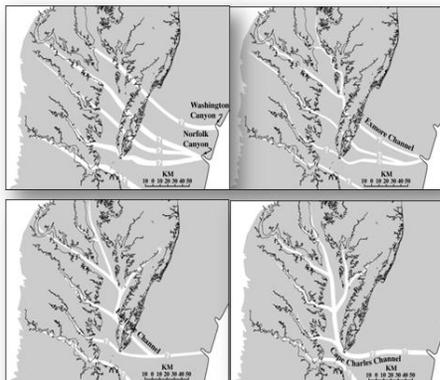


13 November 6, 2013 Accomack-Northampton Planning District Commission

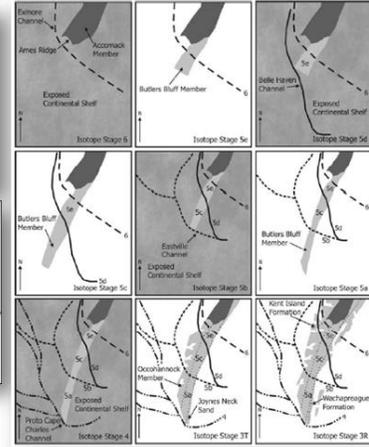
## Development of Eastern Shore & Chesapeake Bay



Colman et al (1990)



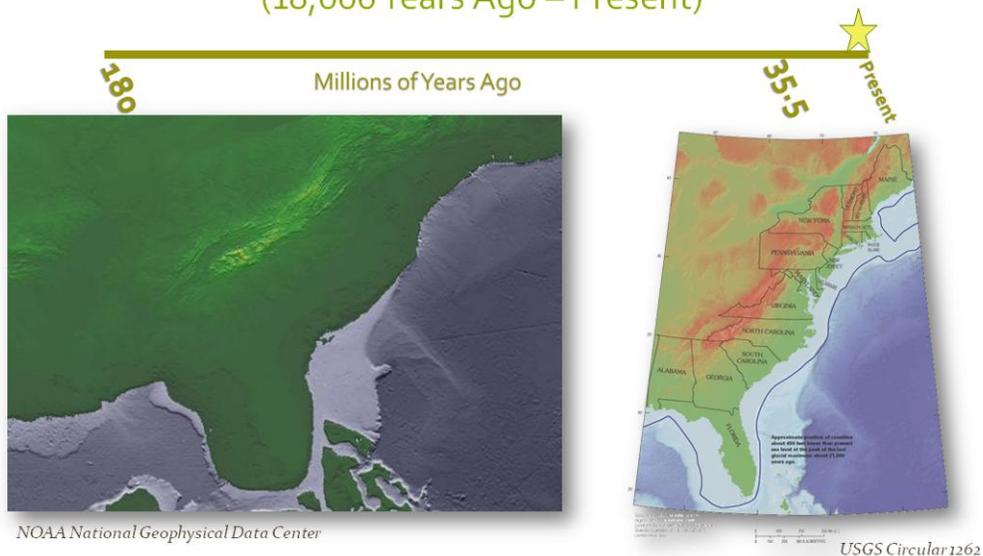
Hobbs (2004)



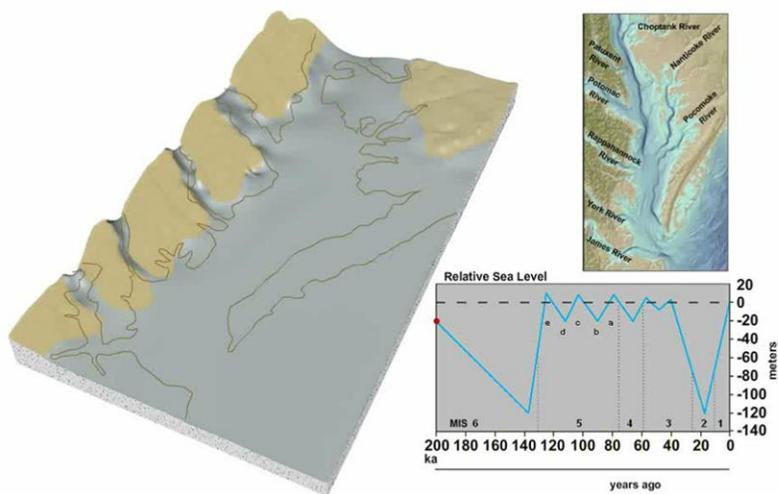
Scott (2006)

14 November 6, 2013 Accomack-Northampton Planning District Commission

### Conditions During and Since Last Glacial Maximum (18,000 Years Ago – Present)



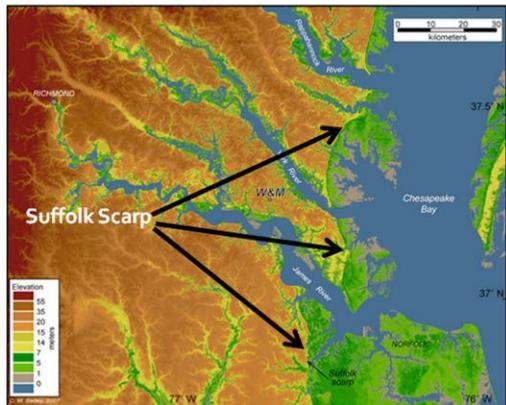
15 November 6, 2013 Accomack-Norhampton Planning District Commission



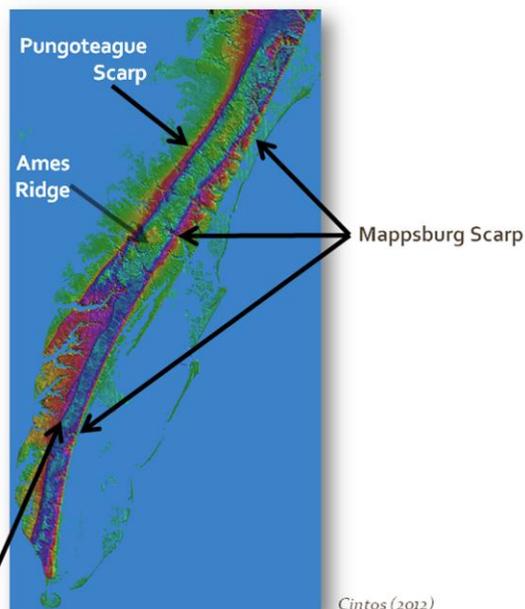
### USGS Chesapeake Bay Evolution Animation

16 November 6, 2013 Accomack-Norhampton Planning District Commission

Surficial Features:  
Relict Shorelines



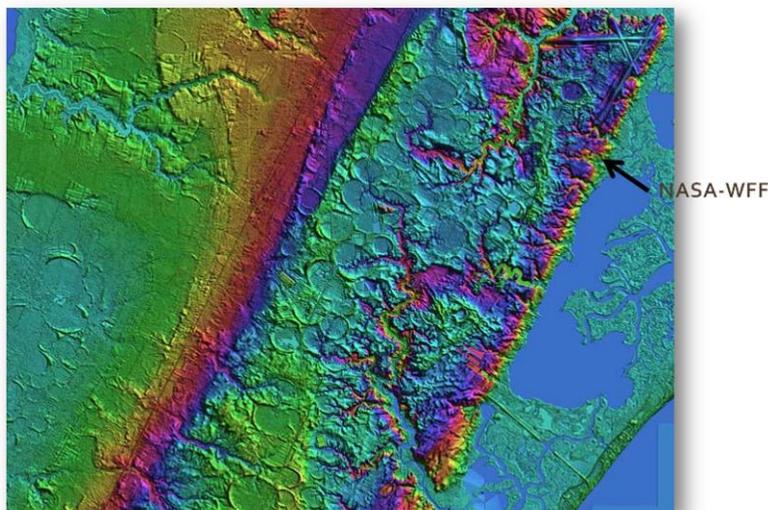
Bailey (2009)



Cintos (2012)

Surficial Features:  
Carolina Bays

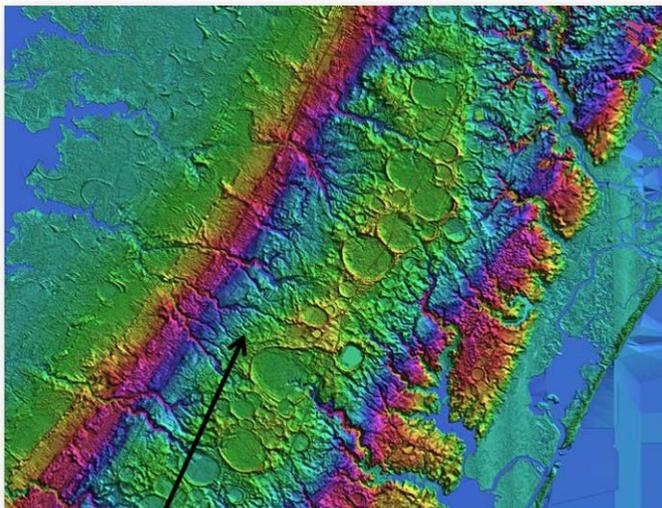
- Over 700 shallow, elliptical depressions
  - Similar orientation (NW-SE)
  - Variable size (1 – 1,000 acres)
  - Some overlapping
  - Coarse-grained rims
  - Fine-grained floors
- Variable ages (100,000- <5,000 years)
- Debated origin
  - Wind & Water
  - Shock wave from bolide explosion



Cintos (2012)

Surficial Features:  
Carolina Bays

- Over 700 shallow, elliptical depressions
  - Similar orientation (NW-SE)
  - Variable size (1 – 1,000 acres)
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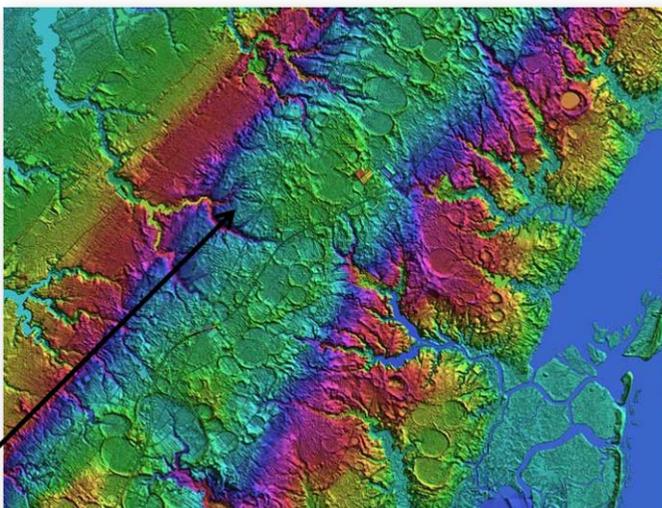


Parksley

Cintos (2012)

Surficial Features:  
Carolina Bays

- Over 700 shallow, elliptical depressions
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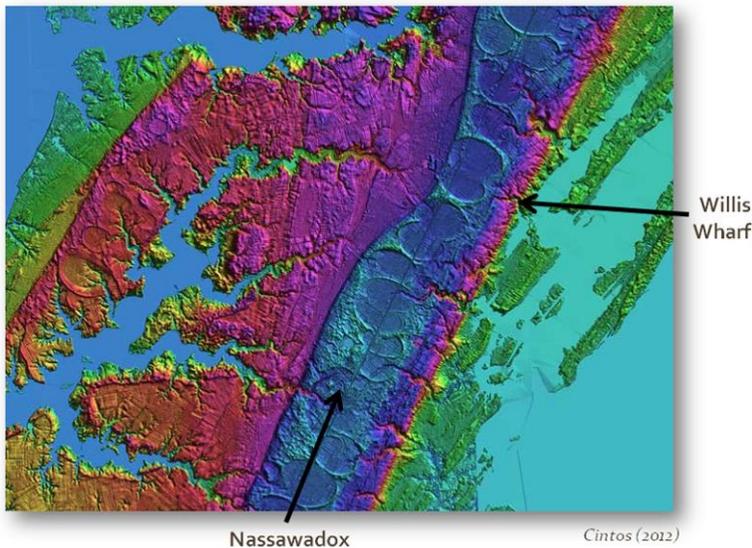


Onancock

Cintos (2012)

### Surficial Features: Carolina Bays

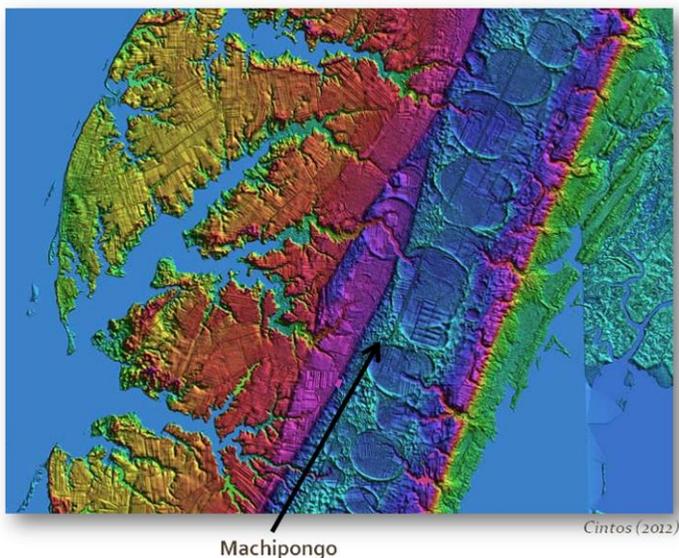
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  - Wind & Water
  - Shock wave from bolide explosion



21 November 6, 2013 Accomack-Norhampton Planning District Commission

### Surficial Features: Carolina Bays

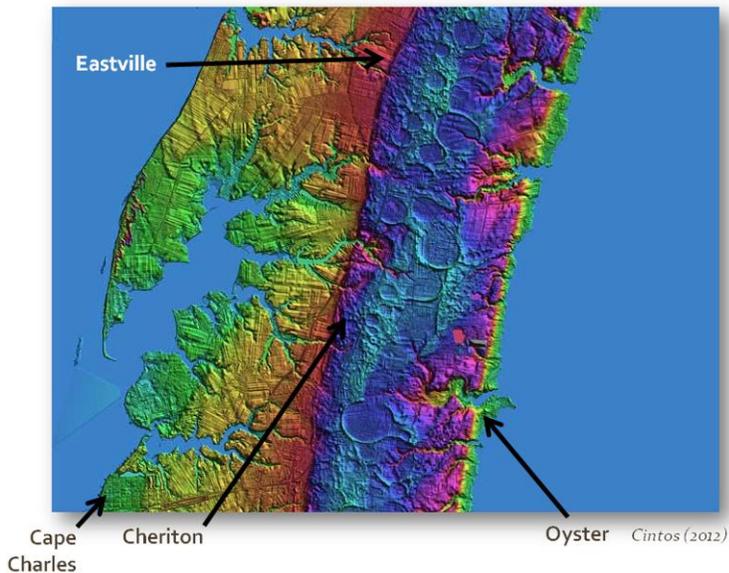
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- Debated origin
  - Wind & Water
  - Shock wave from bolide explosion



22 November 6, 2013 Accomack-Norhampton Planning District Commission

### Surficial Features: Carolina Bays

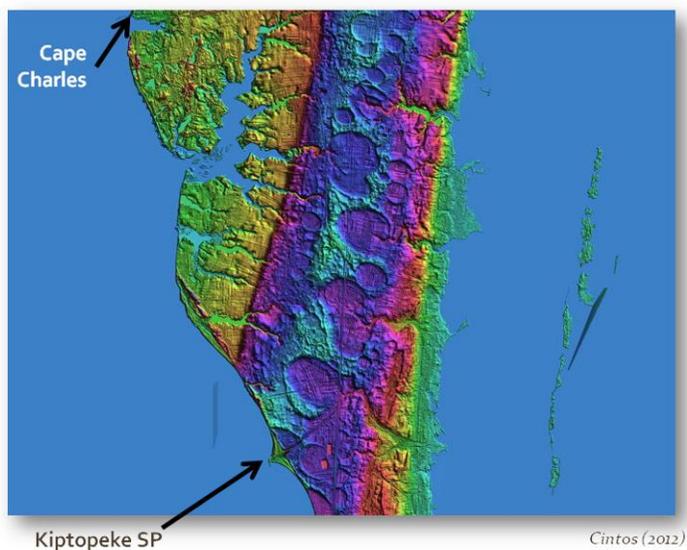
- Over 700 shallow, elliptical depressions
  - Similar orientation (NW-SE)
  - Variable size (1 – 1,000 acres)
  - Some overlapping
  - Coarse-grained rims
  - Fine-grained floors
- Variable ages (100,000- <5,000 years)
- Debated origin
  - Wind & Water
  - Shock wave from bolide explosion



23 November 6, 2013 Accomack-Norhampton Planning District Commission

### Surficial Features: Carolina Bays

- Over 700 shallow, elliptical depressions
  - Similar orientation (NW-SE)
  - Variable size (1 – 1,000 acres)
  - Some overlapping
  - Coarse-grained rims
  - Fine-grained floors
- Variable ages (100,000- <5,000 years)
- Debated origin
  - Wind & Water
  - Shock wave from bolide explosion



24 November 6, 2013 Accomack-Norhampton Planning District Commission

## Long –Term Planning for Eastern Shore & Chesapeake Bay

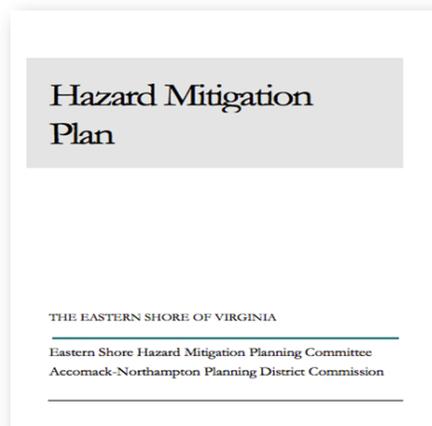
- Accomack & Northampton Counties
  - Neither have policies directly addressing sea level rise
  - Both acknowledge sea level rise in Comp Plans
    - Accomack acknowledges modern rates @ 1.5 to 3 times the historic rate
  - Both mitigate flooding damages via:
    - Enforcing flood-resistant construction practices in Flood Hazard Areas
      - Both require homes constructed in Flood Hazard Areas be at least 1 ft above the FEMA Base Flood Elevation
  - Participating in the FEMA Community Rating System program (Accomack does, North. does not)
  - Elevating houses (approx. 100 in past)
  - Implementing Chesapeake Bay Preservation Act on both bayside and seaside
- State Efforts
  - Governor's Commission on Climate Change (2008) – identified CC impacts and adaptation strategies
  - VIMS – VA Recurrent Flooding Study (2012)
    - Identifies issues facing coastal localities, recommends options for adaptation
    - Forecasts 1.0-2.5' of SLR by 2050 and 1.5-7.5' of SLR by 2100
  - Secure Commonwealth Panel Recurrent Flooding Sub-panel (2013-2014) – Developing implementation strategies for adaptation
- ESVA Ground Water Committee - *Ground Water Supply Protection and Management Plan Update* → 2013; monitoring regional salt water intrusion into aquifers
- NASA Wallops Flight Facility – Adaptation Workshop → Fall 2012; Climate Adaptation Science Initiative; Accomack Co. Joint Land Use Study → 2013
- USFWS ESVA and Chincoteague National Wildlife Refuges

15 November 6, 2013

Accomack-Northampton Planning District Commission

## Long –Term Planning Continued - ESVA Hazard Mitigation Plan

- A-NPDC, 2 Counties, 13 Towns
  - Original 2006, Updated in 2011
1. *Review historical hazards*
  2. *Identify and prioritize natural hazards*
    - Highest Priority Hazards: **Coastal Flooding**, High Wind, Stormwater Flooding, Coastal Erosion
  3. *Conduct risk & vulnerability assessment for high priority hazards*
    - ESVA Coastal Flooding Risk in 2011 → \$470,000,000 Potential Total Loss (with \$300,000,000 Uninsured) from a 100-Year Flood Event
  4. *Define mitigation strategies and develop mitigation projects to mitigate future hazard impacts*

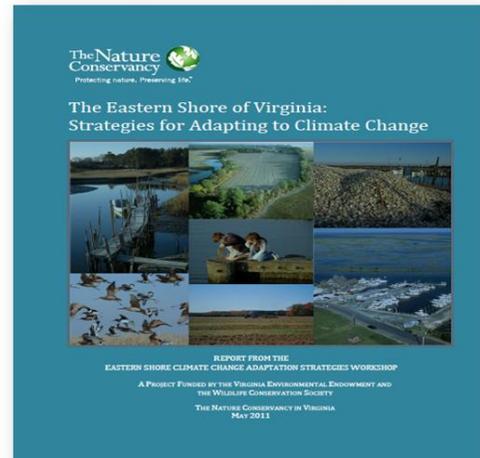


November 6, 2013

Accomack-Northampton Planning District Commission

## Long –Term Planning Continued – The Nature Conservancy’s ESVA Climate Adaptation Project

- **ESVA Climate Adaptation Workshop**
  - August 2010
  - Local and regional participants
  - Industries (agriculture, aquaculture, tourism)
  - Local, state, and federal government agencies
  - Local community organizations
  - Identified impacts to natural and built environment
  - Created Climate Adaptation Working Group
- **ESVA Strategies for Adapting to Climate Change**
  - May 2011
- **High resolution elevation data (LiDAR) for Accomack and Northampton Counties**
  - March 2012



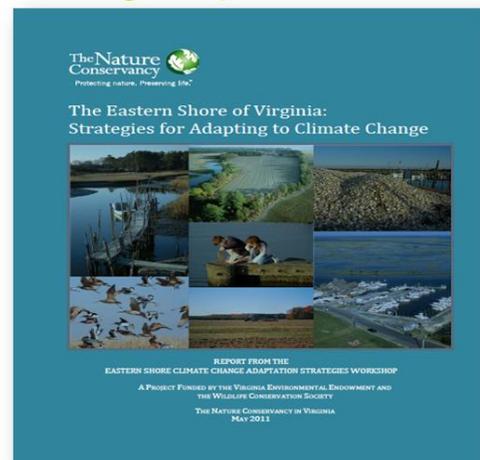
27

July 22, 2012

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## Long –Term Planning Continued – ESVA Strategies for Adapting to Climate Change Report

- **Identifies global climate change impacts on ESVA**
  - Sea level
  - Temperature
  - Precipitation
- **Develops vision for adaptation on ESVA**
- **Prioritizes Adaptation Strategies**
  1. Local Adaptation Planning – County Comp Plans, Hazard Mitigation Plan
  2. Shoreline Management Plans – with VIMS
  3. Restoration & Protection of Natural Systems
  4. Ground Water Management
  5. Education & Outreach



28

July 22, 2012

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## Long –Term Planning Continued – ESVA Climate Adaptation Working Group

- Local, State, & Federal Representatives
  - A-NPDC, ESSWCD
  - ESVA Counties & Towns
  - VDEM, VCZMP, VIMS, UVA-LTER, VDCR, VDOT
  - NASA-WFF, USDA-NRCS, USFWS
  - Eastern Shorekeeper, Nature Conservancy, CBES, ES RC&D Council, VESLT, Wetlands Watch
  - & the list is still growing!

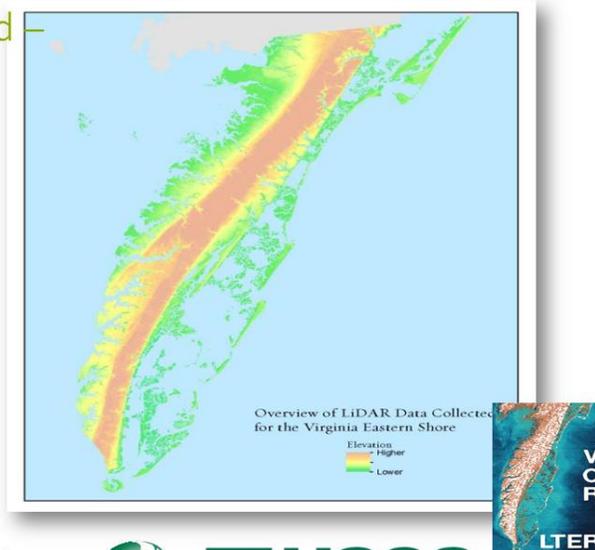


- Facilitate implementation of key adaptation strategies by ESVA localities
- Public Education & Outreach
- Forum for comparison & coordination amongst localities & agencies
- Serve as contact point for state and regional studies
- Explore funding options for adaptation

29 July 22, 2012 Footer text here

## Long –Term Planning Continued – LiDAR Elevation Data

- Many Planning Uses:
  - More safely site development out of harm's way
  - Document shoreline change
  - Hazard mitigation planning
  - Emergency service planning
  - Stormwater management plans
  - FEMA Flood Insurance Rate Maps
  - Document vegetation cover & land-use practices



The Nature Conservancy  
Protecting nature. Preserving life.™

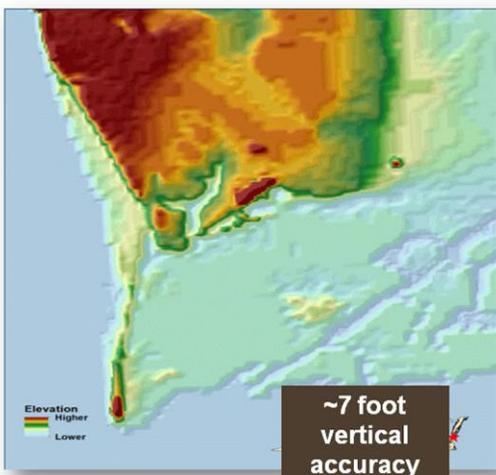
USGS  
science for a changing world

VCR  
LTER  
UNIVERSITY OF VIRGINIA

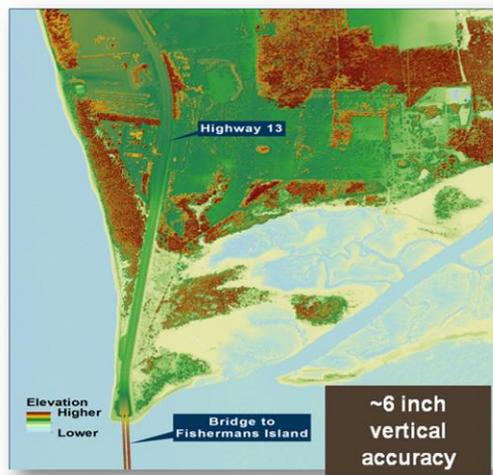
30 July 22, 2012 Footer text here

## LiDAR Elevation Data Example: Southern Tip of Shore

Old Elevation Data



New LiDAR Data



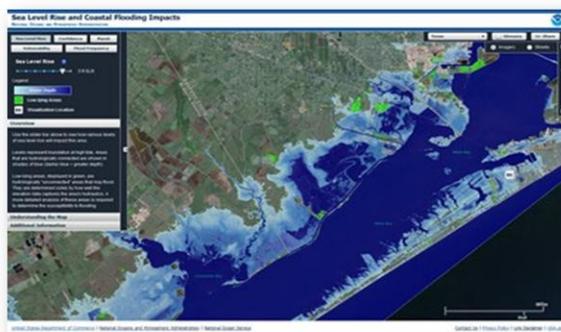
31

July 22, 2012

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## NOAA Sea Level Rise & Coastal Flooding Impacts Viewer

- NOAA Coastal Services Center Digital Coast
- Maps – Now Available
  - Sea Level Rise Inundation
  - Shallow Flooding Frequency & Duration
  - Socioeconomic Vulnerability
  - Marsh Impacts/Migration
  - Mapping Confidence



32

July 22, 2012

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Virginia Coastal Zone  
MANAGEMENT PROGRAM



Curt Smith  
Director of Planning  
Accomack-Northampton  
Planning District Commission  
[csmith@a-npdc.org](mailto:csmith@a-npdc.org)  
757-787-2936



## Appendix K

### Shore Big Trees Development Meeting Sign-In Sheet and Agenda



EASTERN SHORE OF VIRGINIA  
Champion Trees of Tomorrow Planning Meeting  
November 21, 2013

NAME	ORGANIZATION
Curt Smith	A-NPDC
Virginia Wiltner	VA CZM
Don Field	VA DCR
Laura McKay	VA CZM
Bonnie Uzhil	FRANCIS

*\* look up plaque prices  
& stone*

### Champion Trees of Tomorrow Planning Meeting

November 21, 2013

2:15 p.m.

Eastern Shore of VA National Wildlife Refuge, Cape Charles

#### MEETING AGENDA

1. Presentation of program idea
2. Discussion of potential demonstration sites
3. Discussion of program partner roles
  - VCZM
  - ESSWCD
  - VDCR
  - VDOF
  - VA Tech Big Tree Program
  - A-NPDC
4. Discussion of funding options
  - Site design plans
  - Site construction activities
  - Site maintenance
  - Signage - *plaque, educational signage  
upon rocks*
5. Discussion of program name
6. Other Matters
7. Adjournment



## Appendix L

Southern Northampton County Ground Water Summit Sign-In Sheet, Event Flyer, Press Release, Photographs, and Presentations

*The Eastern Shore of Virginia Ground Water Committee Presents a Free, Public Educational Event Summarizing the Specific Ground Water Conditions for Cape Charles, Cheriton, & southern tip of the Eastern Shore:*

# Cape Charles/Cheriton Ground Water Summit



**WEDNESDAY, FEBRUARY 12, 2014**

**6:30 P.M. – 8:00 P.M.**

**KIPTOPEKE ELEMENTARY SCHOOL**

24023 FAIRVIEW ROAD, CAPE CHARLES

**## Where is our ground water? ## How much is there? ##**

**## How is it replenished? ## How safe is my water? ##**

**## Are there ways I can protect it? ## How old is the water? ##**

**## Should I be worried about the quality of my water? ##**

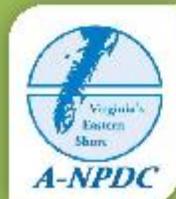
**## What is being done to ensure it is safe? ##**

**## Will my community have sufficient water to sustain itself? ##**

**## Is there enough to support growth for generations to come? ##**

**Learn answers to these & many other questions!!!**

*Also, look for upcoming Ground Water Summits for other Eastern Shore communities!  
Please Contact Curt Smith at 787-2936 or [csmith@anpdc.org](mailto:csmith@anpdc.org) for more information.*



### Eastern Shore of Virginia Ground Water Committee

February 12, 2014

6:30 - 8:00 p.m.

Kiptopeke Elementary School, Cape Charles

### Cape Charles-Cheriton Ground Water Summit

#### AGENDA

- 6:30 p.m. Introduction
- 6:35 p.m. *Geologic Evolution of the Southern Delmarva Peninsula*  
Curt Smith, Director of Planning, Accomack-Northampton Planning District Commission
- 6:50 p.m. *Ground Water Conditions and Issues for Cape Charles, Cheriton, and the Southern End of the Eastern Shore of Virginia*  
Britt McMillan, Hydrogeologic Consultant to the Ground Water Committee, Arcadis-Malcolm Pirnie
- 7:40 p.m. Questions and Discussion
- 8:00 p.m. Adjourn



EASTERN SHORE OF VIRGINIA GROUND WATER COMMITTEE  
Cape Charles-Cheriton Ground Water Summit  
February 12, 2014

NAME	AFFILIATION	EMAIL ADDRESS**
Carl Smith	A-HPAC	
Frank Reinherz	Home Owner	frank@reinherr.com
Charyna Williams	Public Service	charlyna@public.com
Robert Beaker	Home Owner	rbeaker@public.com
George Humphreys	NH Co. GWC Committee	
Robert Kellum	WAC Staff PC	robert.kellum@wac.com
Alan Hubbard	Northampton Co. GWC	
Bill Frouse	Home Owner	bill.frouse@acc.com
Tommy Whittell	CC Environmental Public Service	tommy.whittell@cc.com
Chris Robinson	CC Public Service	chrisherob@public.com
Tom Terrence	Tom's Care Centers	tom@terrence.com
Carol Eden Jaccarino	Homeowner	carol@eden.com
John J. McConick	Homeowner	john@mcconick.com
Louise LeBlond	B.O.S.	louise@bos.com
Christina Hargy	Boys Northampton	christina@bos.com
Bob McFarley	None	bob@mcfarley.com
John Wickman	None	john@wickman.com
A. Phibbs		ap@phibbs.com
Matt Raham	Home Owner	matt@raham.com



*Photograph 1* – Britt McMillan addressing the audience at the event.



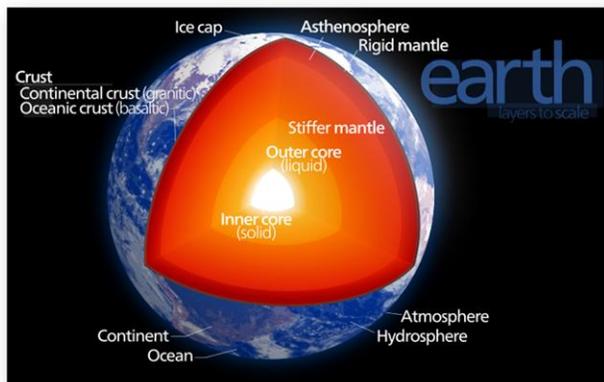
*Photograph 2* – Britt McMillan addressing the audience at the event.



## Presentation Overview

- Causes of Geologic Change:
  - Uniform and gradual land subsidence and fluctuations in sea level working in tandem with punctuated catastrophic events (meteor impact, storms, etc.)
- Timeline:
  - i. Opening of Atlantic Ocean & Salisbury Embayment – **≈180 Million Years Ago (MYA)**
  - ii. Filling of Salisbury Embayment (Potomac Formation) – **≈180 to 35.5 MYA**
  - iii. Bolide impact & removal of pre-impact sediments – **≈35.5 MYA**
  - iv. Deposition of post-impact sediments – **≈35.5 MYA – Present**
  - v. Reworking of surficial sediments & progradation of peninsula – **≈200,000 YA – Present**
  - vi. Sea level reaches elevation of modern Chesapeake Bay transitioning system from riverine to estuarine - **≈8,000 YA**
  - vii. Sea level continues to rise and inundate the Chesapeake Bay watershed and the Chesapeake Bay begins to take its modern appearance we currently recognize - **≈3,000 YA**

## The Earth's Interior



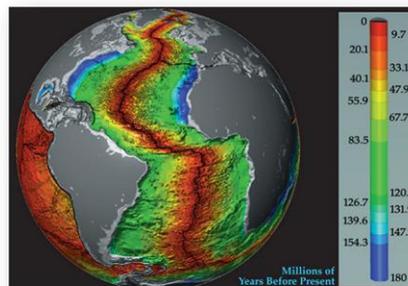
- Universe Age: 13.82 Billion Years
- Earth Age: 4.54 Billion Years
- Depth to Center ≈ 4,030 Miles
- Crust - <0.01%
  - Oceanic Crust (≈3-6 mi. thick)
  - Continental Crust (≈20-30 mi. thick)
- Mantle (≈1,800 mi.) - 45%
- Outer Core (≈1,400 mi.) – 35%
- Inner Core (≈800 mi.) – 20%

Accomack-Norhampton Planning District Commission

## Opening of Atlantic Ocean



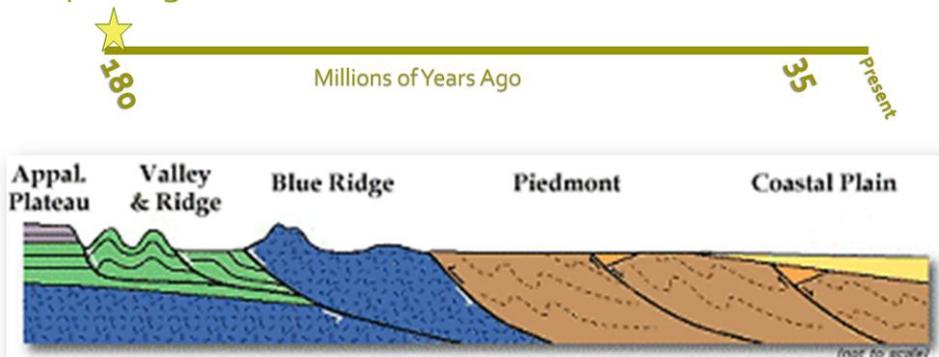
Hanner et al., 2006



NOAA

Accomack-Norhampton Planning District Commission

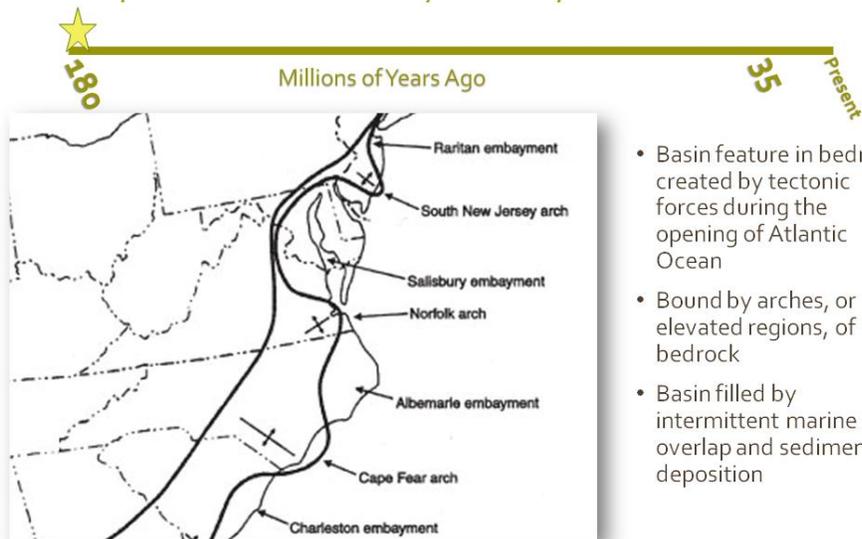
## Opening of Atlantic Ocean



Bailey and Johnson, 1999

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## Development of Salisbury Embayment

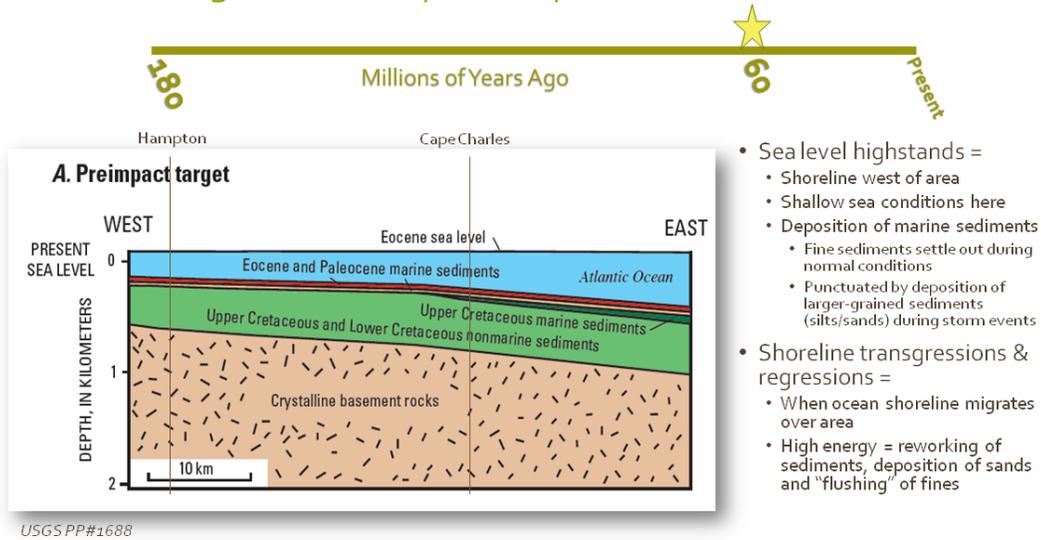


Ward and Powars, 1991

- Basin feature in bedrock created by tectonic forces during the opening of Atlantic Ocean
- Bound by arches, or elevated regions, of bedrock
- Basin filled by intermittent marine overlap and sediment deposition

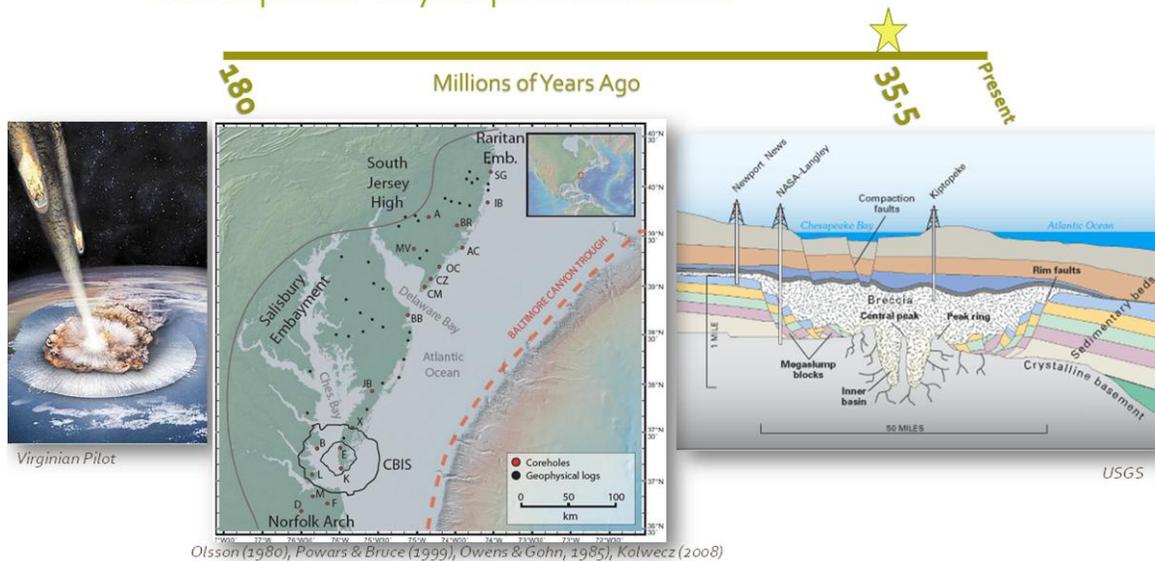
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## In-Filling of Salisbury Embayment



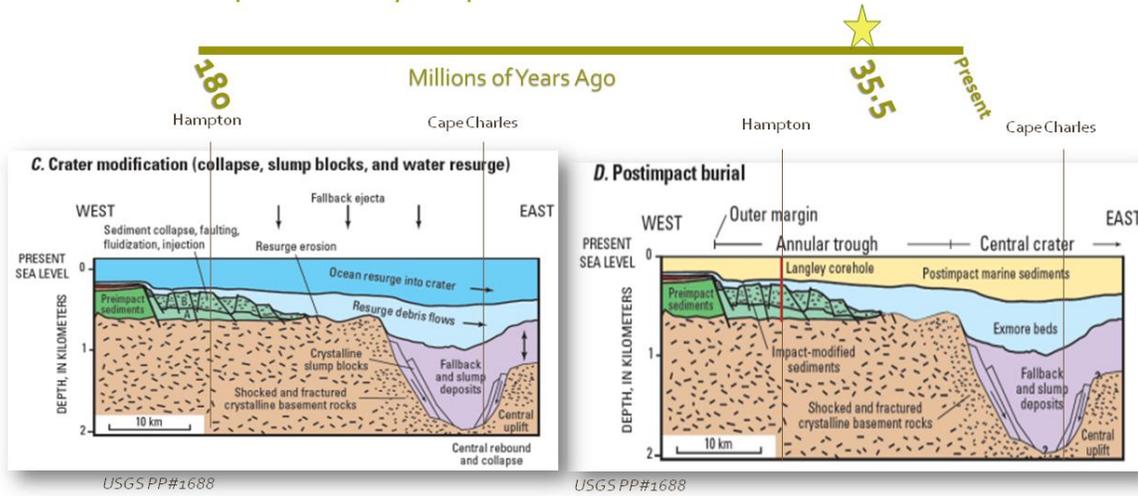
Accomack-Norhampton Planning District Commission

## Chesapeake Bay Impact Structure



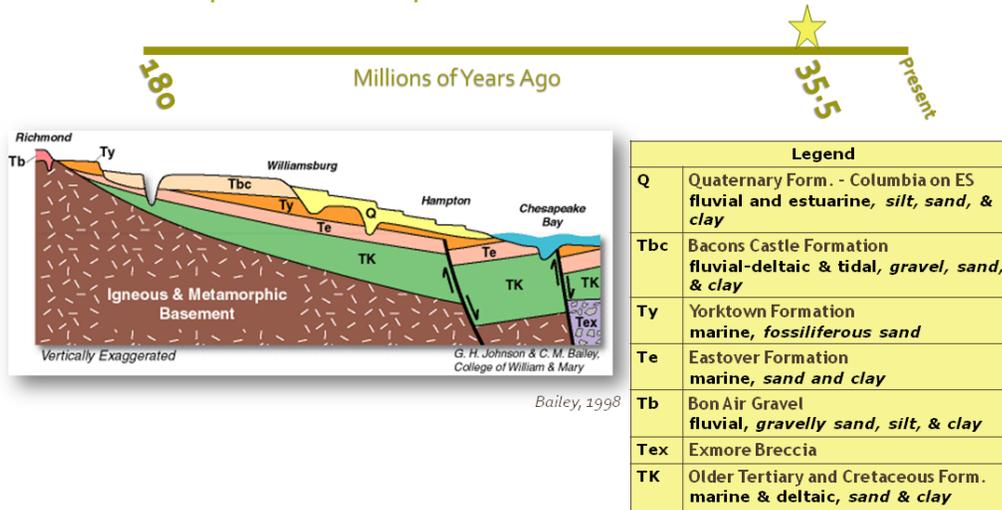
Accomack-Norhampton Planning District Commission

## Chesapeake Bay Impact Structure



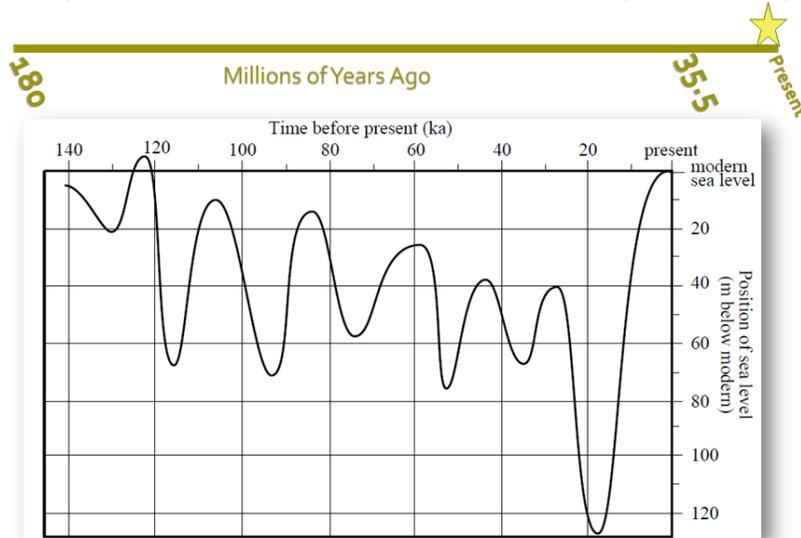
Accomack-Norhampton Planning District Commission

## Post-Impact Development



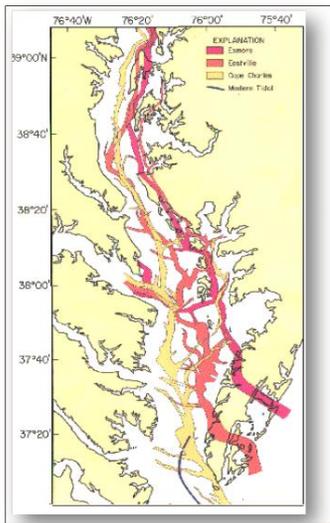
Accomack-Norhampton Planning District Commission

## Development of Eastern Shore & Chesapeake Bay

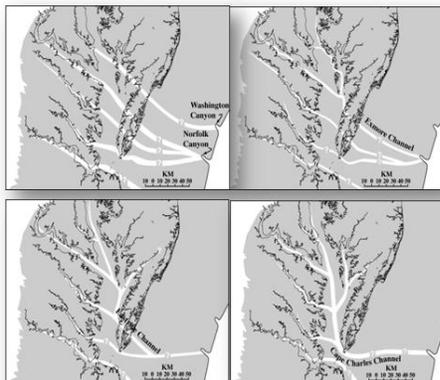


Accomack-Norhampton Planning District Commission

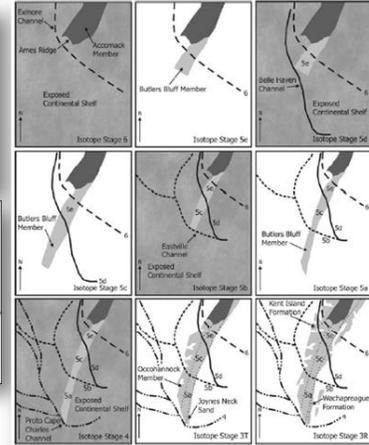
## Development of Eastern Shore & Chesapeake Bay



Colman et al (1990)



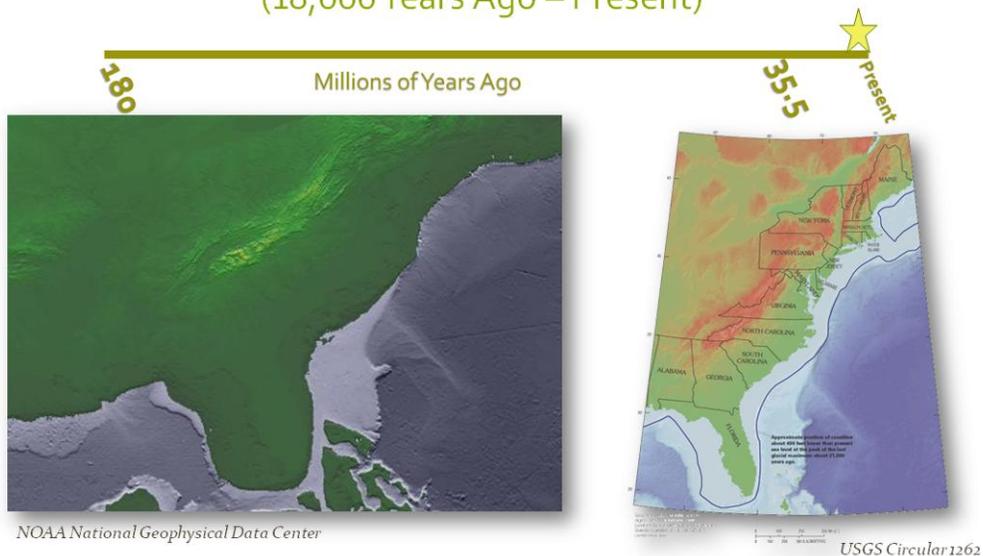
Hobbs (2004)



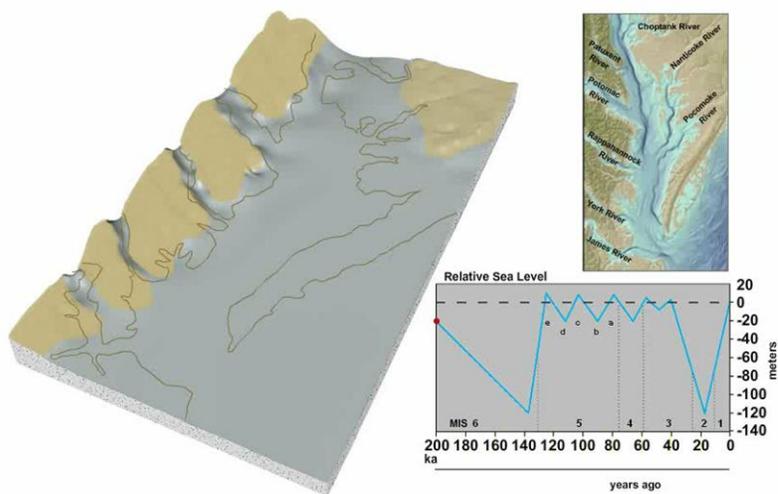
Scott (2006)

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### Conditions During and Since Last Glacial Maximum (18,000 Years Ago – Present)



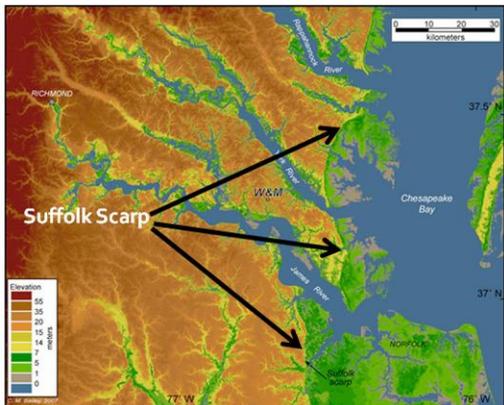
Accomack-Norhampton Planning District Commission



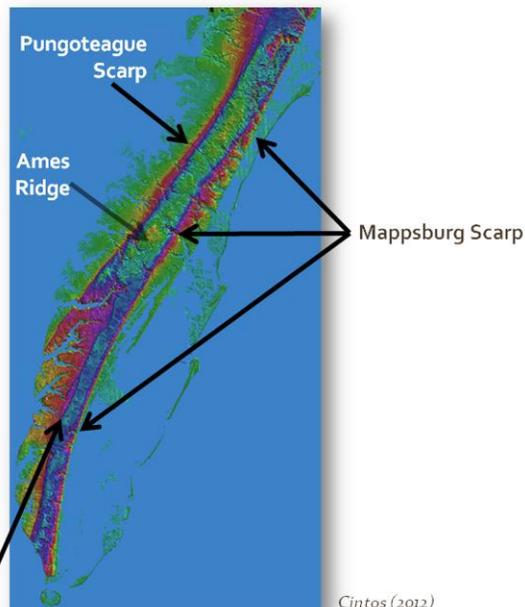
### USGS Chesapeake Bay Evolution Animation

Accomack-Norhampton Planning District Commission

Surficial Features:  
Relict Shorelines



Bailey (2009)

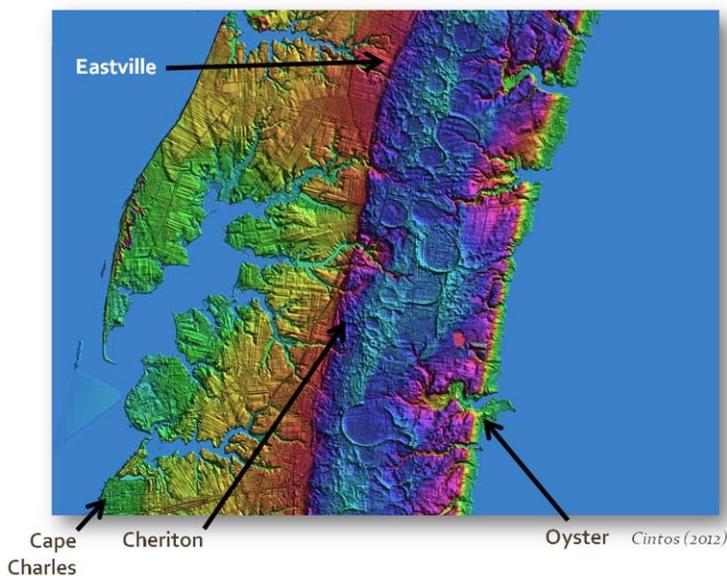


Cintos (2012)

Accomack-Norhampton Planning District Commission

Surficial Features:  
Carolina Bays

- Over 700 shallow, elliptical depressions
  - Similar orientation (NW-SE)
  - Variable size (1 – 1,000 acres)
  - Some overlapping
  - Coarse-grained rims
  - Fine-grained floors
- Variable ages (100,000- <5,000 years)
- Debated origin
  - Wind & Water
  - Shock wave from bolide explosion

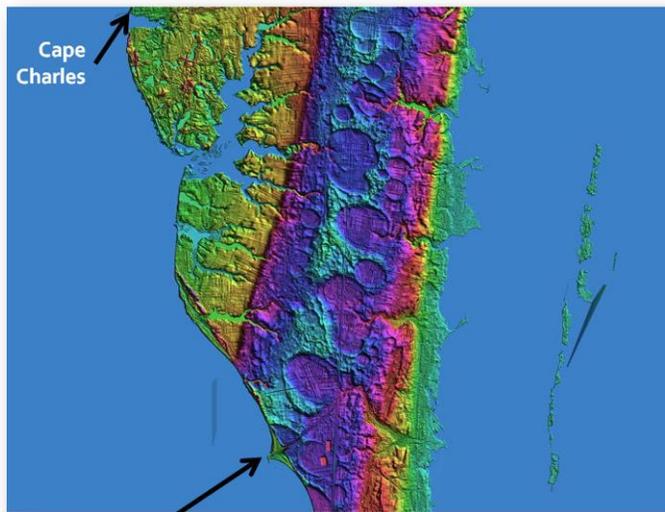


Cintos (2012)

Accomack-Norhampton Planning District Commission

### Surficial Features: Carolina Bays

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- Debated origin
  - Wind & Water
  - Shock wave from bolide explosion



Kiptopeke SP

Cintos (2012)

Accomack-Northampton Planning District Commission



Curt Smith  
Director of Planning  
Accomack-Northampton  
Planning District Commission  
[csmith@a-npdc.org](mailto:csmith@a-npdc.org)  
757-787-2936



## Eastern Shore of Virginia

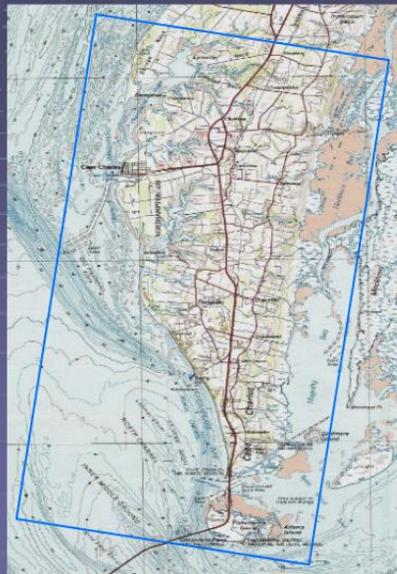
### *Groundwater Resources on the Eastern Shore of Virginia*

From Kiptopeke to Eastville

February 2014

## How do we study the groundwater – something we can't see?

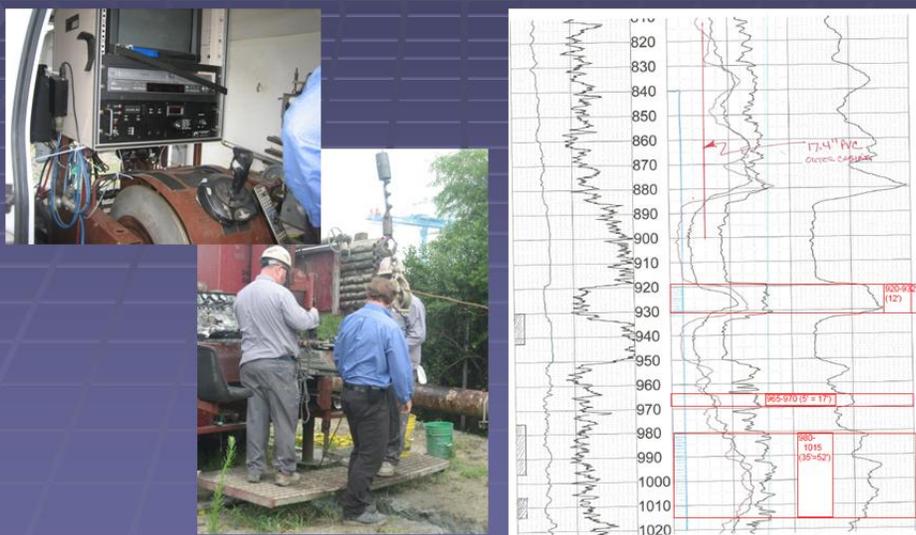
- Empirical data collected through borings and wells
  - Drill cores and lithologic samples
  - Geophysical
  - Hydraulic tests
  - Water quality sampling
  - Long term monitoring: water quality and water levels
- Modeling to estimate characteristics between empirical data points predict changes



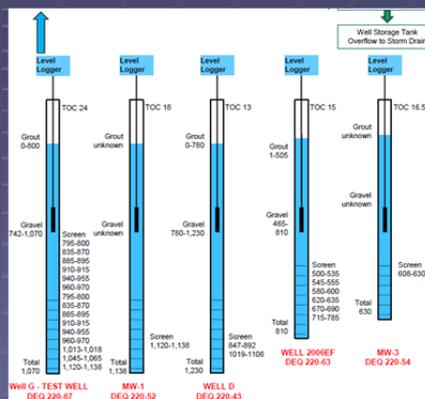
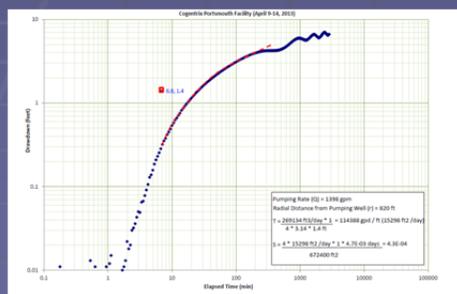
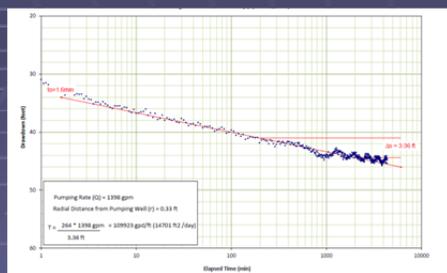
## Drill cuttings and cores provide direct samples of aquifer and confining units



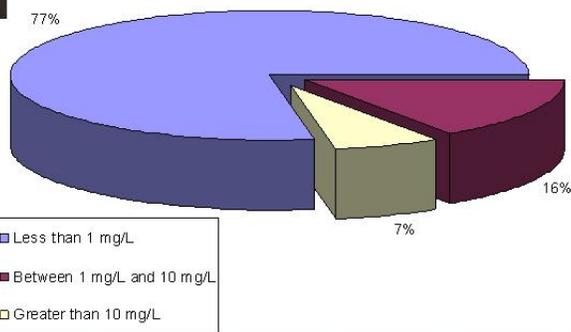
## Geophysical techniques can provide accurate depths for aquifers and confining units



## Aquifer tests provide the most accurate comparable measure of hydraulic properties

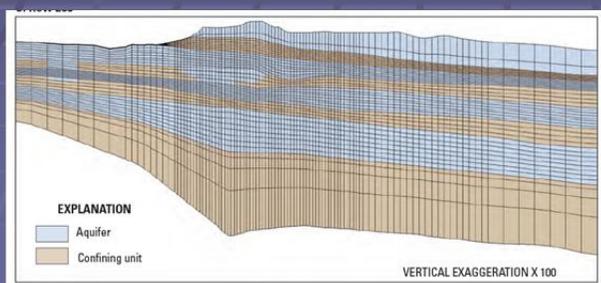


## Water samples collected from wells are most commonly used to assess water quality

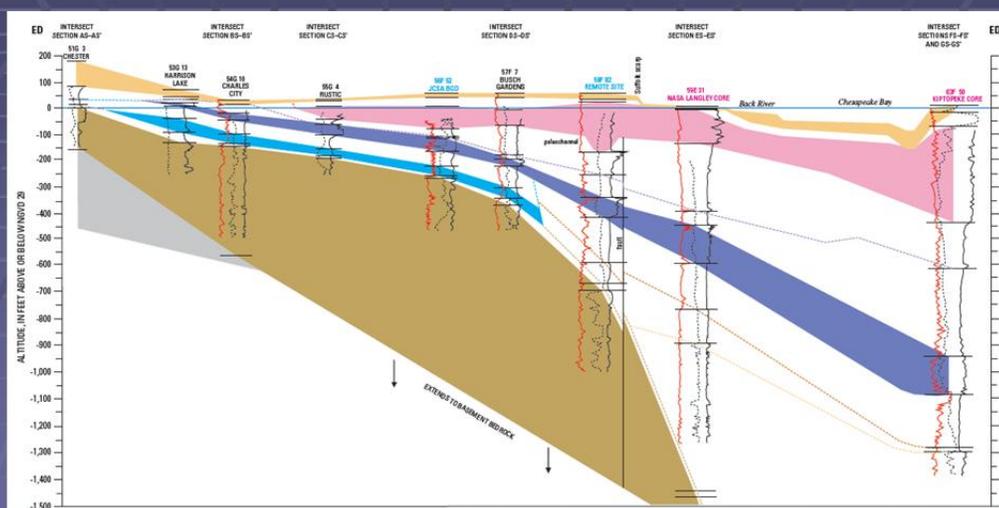


## Groundwater Models – Allow use of empirical data to evaluate behavior of the aquifers

- Richardson “Sharp” model
- Sandford, Pope & Nelms. Eastern Shore Model

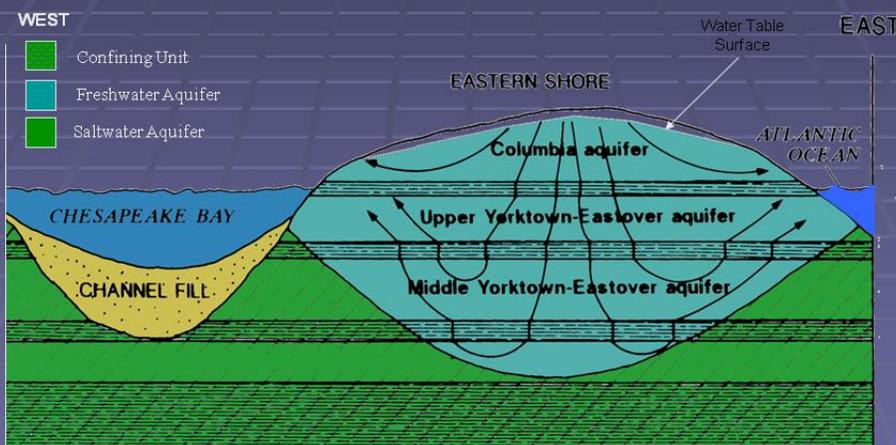


## Hydrogeology of the Eastern Shore: Meteorite destroyed most aquifers deeper than Yorktown-Eastover in Northampton County



# Water Table and Fresh Water Confined Aquifers

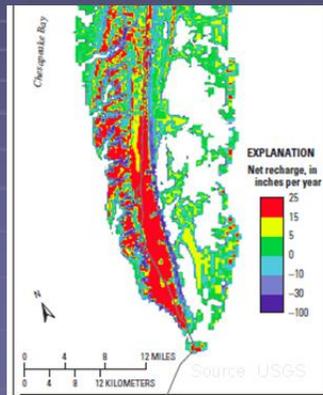
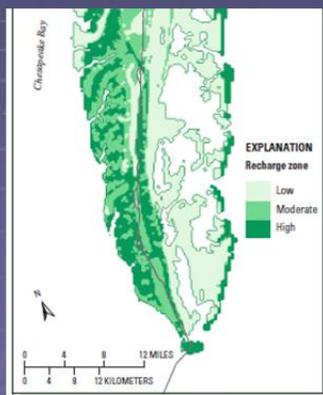
Fresh ground water is restricted to depths less than 350 feet



Recharge to the water table is a function of soil type, slope, and location

Potential Recharge areas (based on soil type and slope)

Estimated Recharge Rates

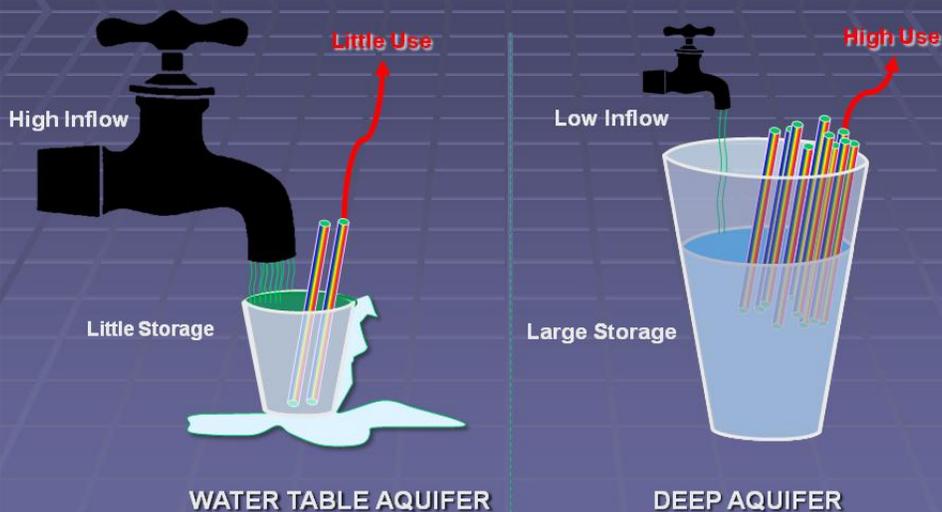


Of the water infiltrating to the water table, only a small amount reaches the Yorktown aquifer

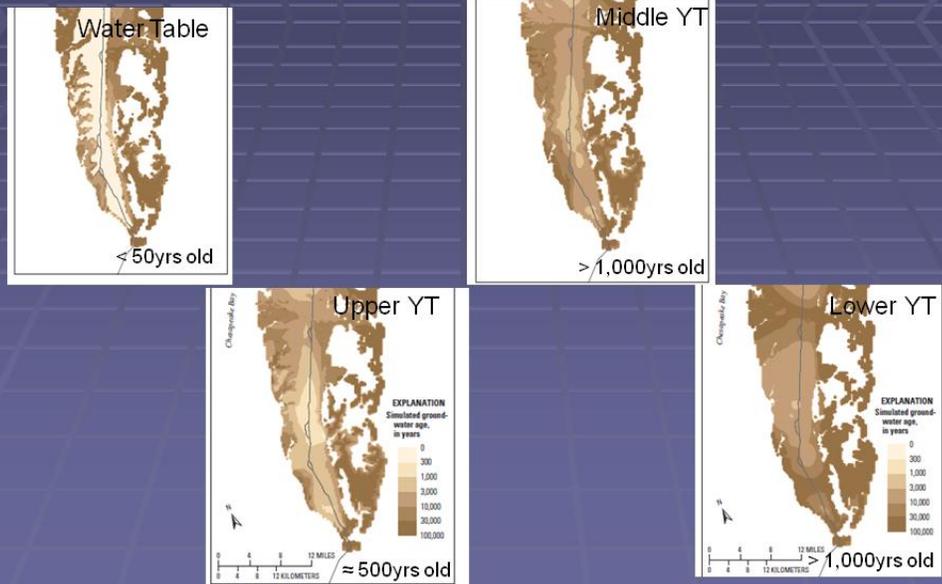
- Limited Recharge:
  - Of the 44-inches of annual precipitation only 5 to 6 inches infiltrate to the water table
  - Most is removed by vegetation
  - And only about 0.05 in/year make it to the confined aquifer ( $\approx 1\%$ )



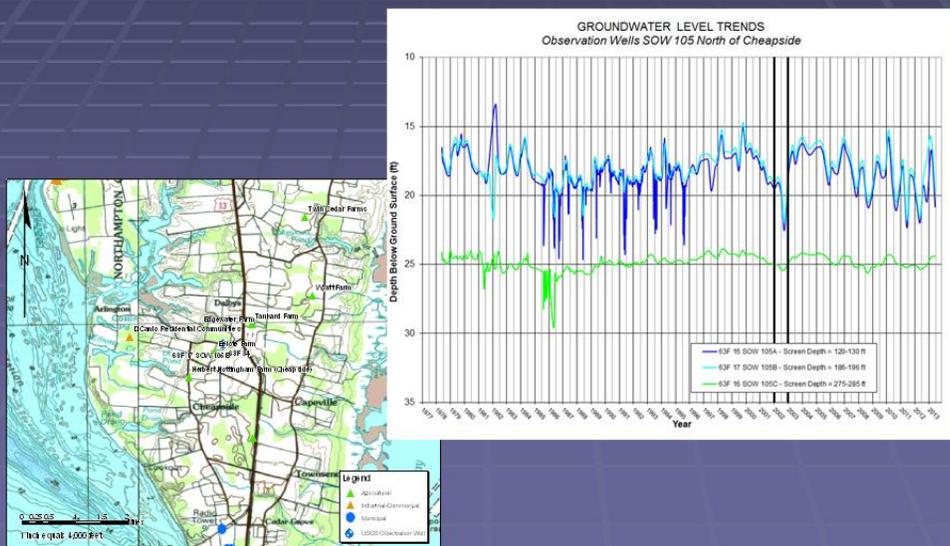
## Water Table / Yorktown Dilemma



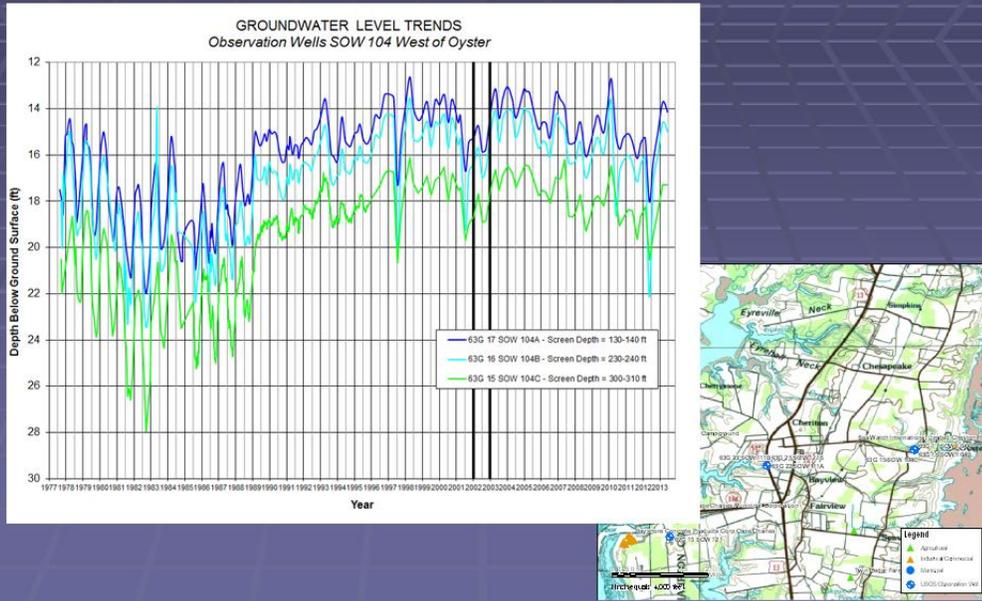
## Age of the water table is recent – Yorktown-Eastover is ancient



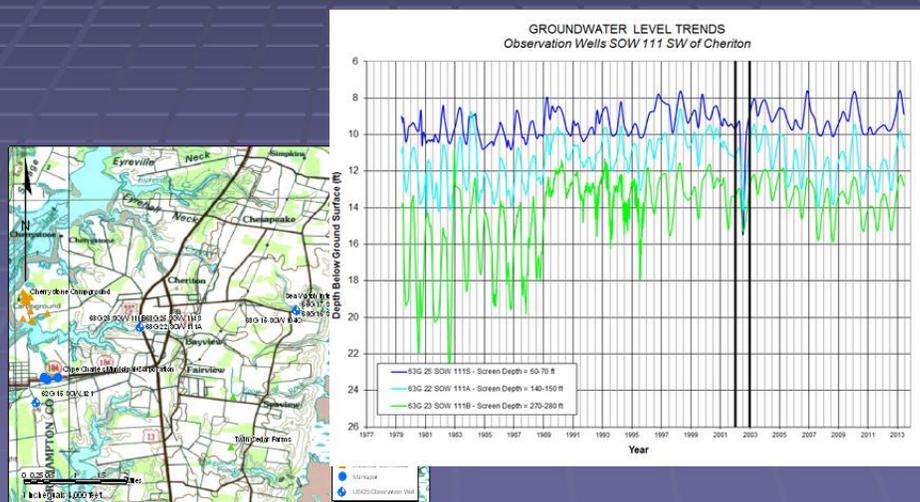
## Observed Water Level Trends



# Observed Water Level Trends



# Observed Water Level Trends

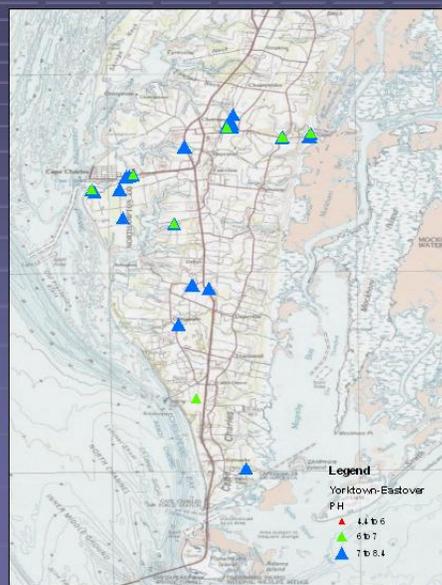
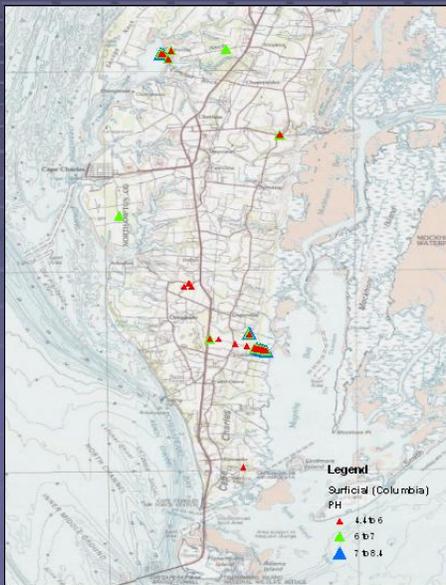


# Groundwater Quality

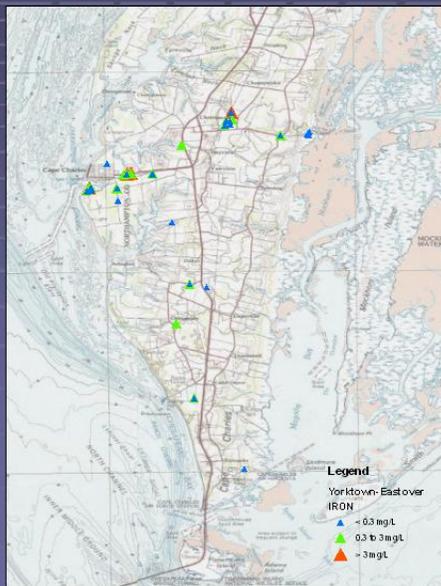
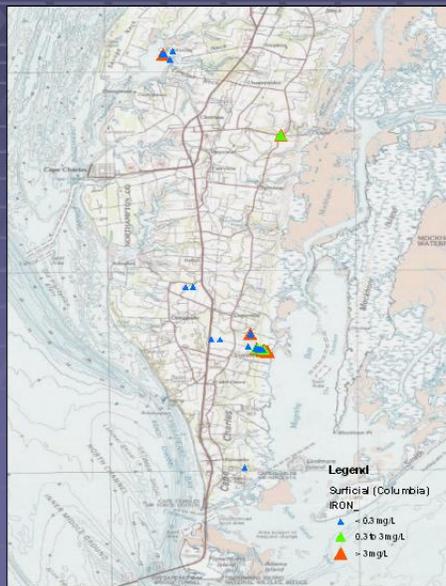
- Multiple sources:
  - USGS – USGS studies and “warehouse” for data
  - DEQ (routine regulatory reporting)
  - Periodic studies: Universities (VPI, RMC, UVA) and ANPDC
  - Health Department



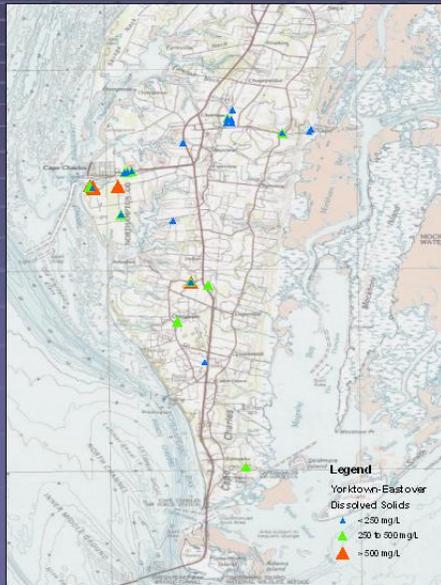
## pH



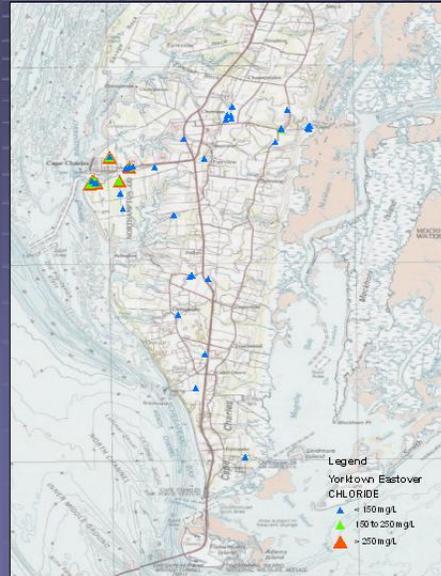
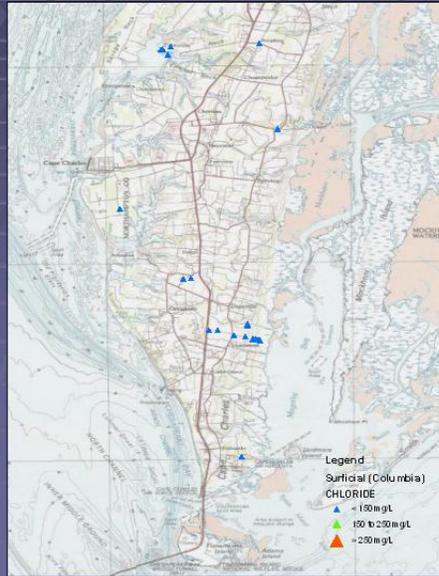
# Iron



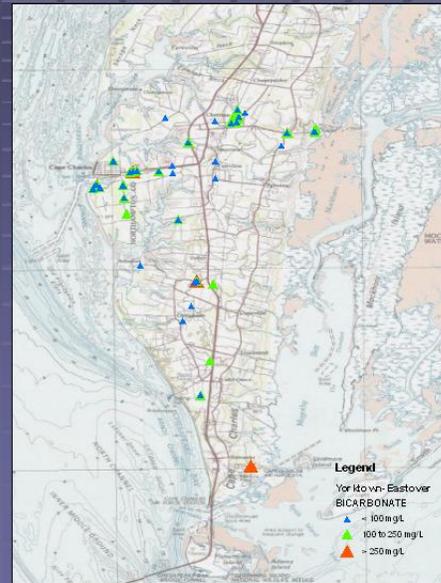
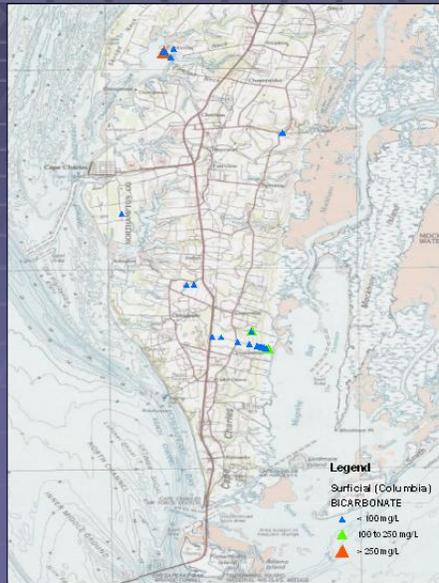
# Total Dissolved Solids



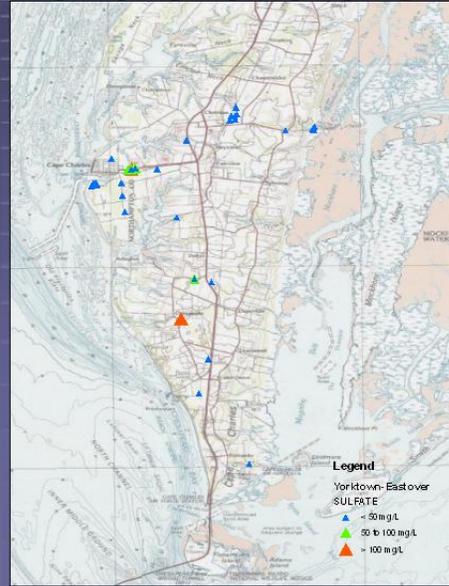
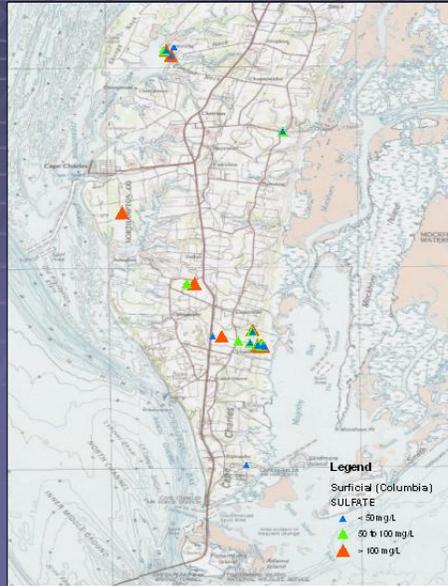
# Chlorides



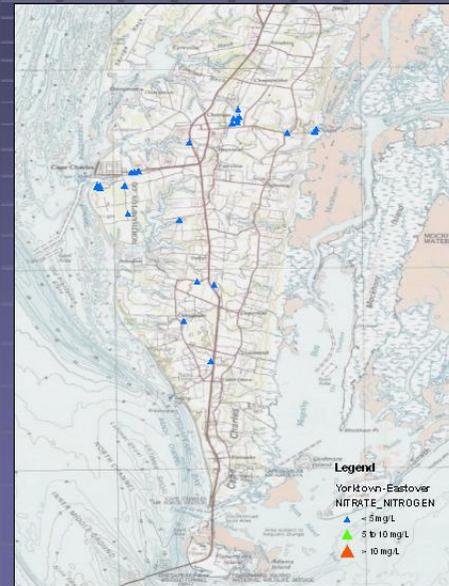
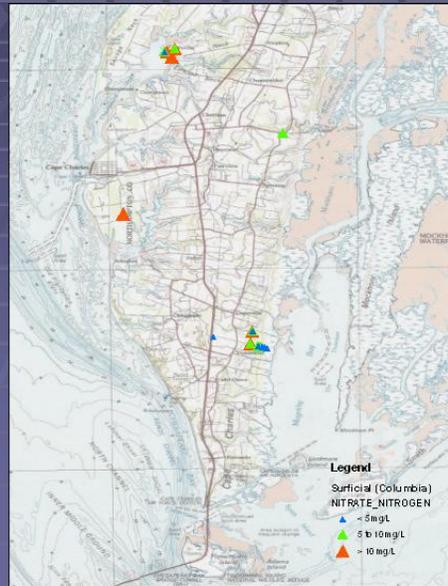
# Bicarbonate Alkalinity



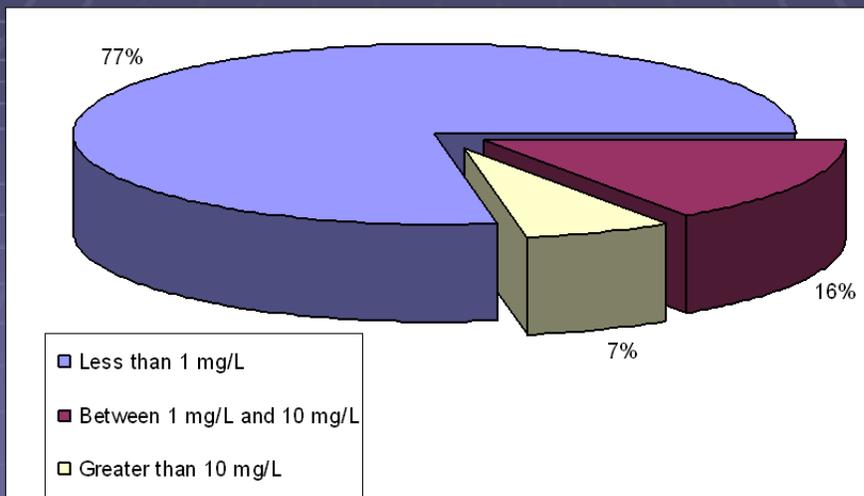
# Sulfate



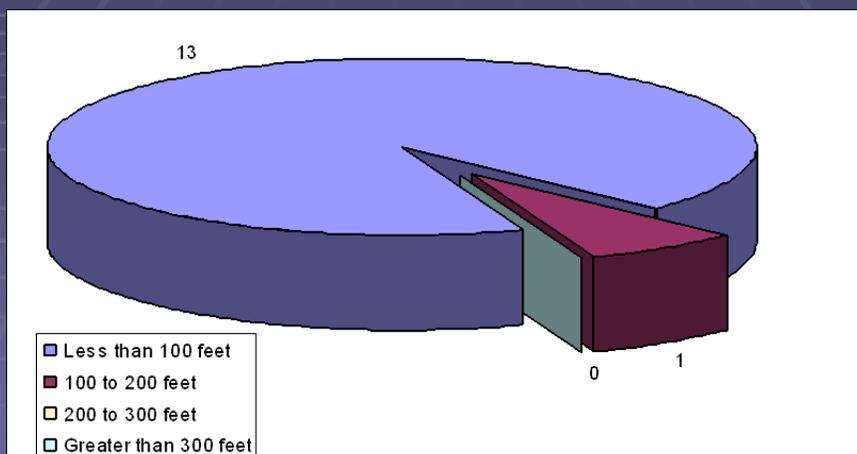
# Nitrate-Nitrogen



## Nitrate From VPI 1993 Study – Percent Exceeding Drinking Water MCL

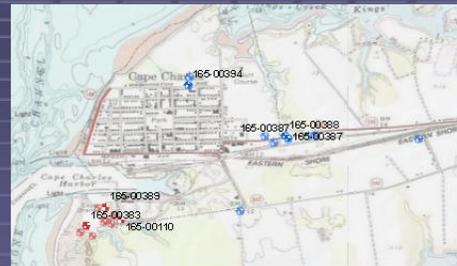
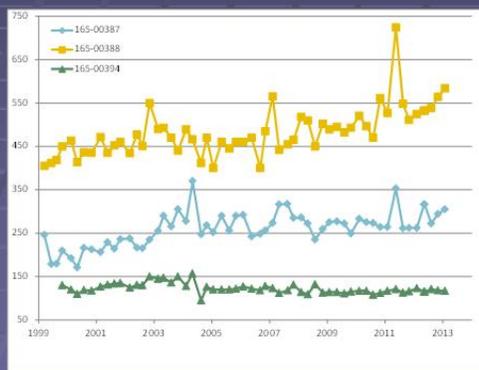


## Nitrate From VPI 1993 Study – Exceeding Drinking Water MCL by Depth

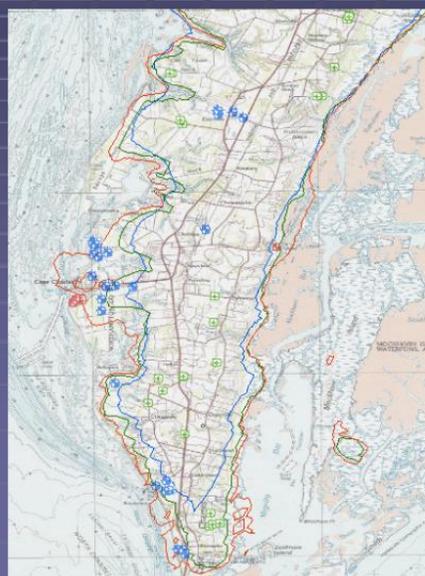


# Potential for Saltwater Intrusion

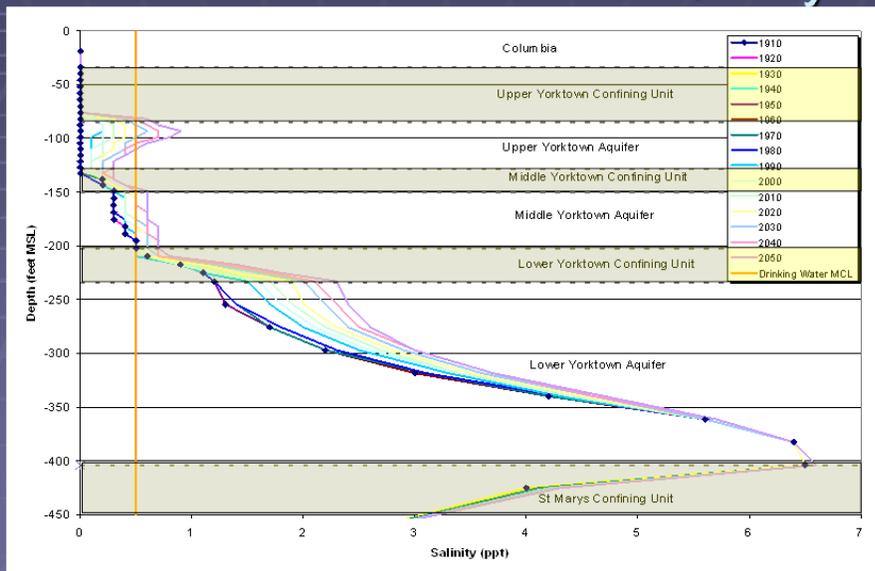
## Measured Saltwater Intrusion



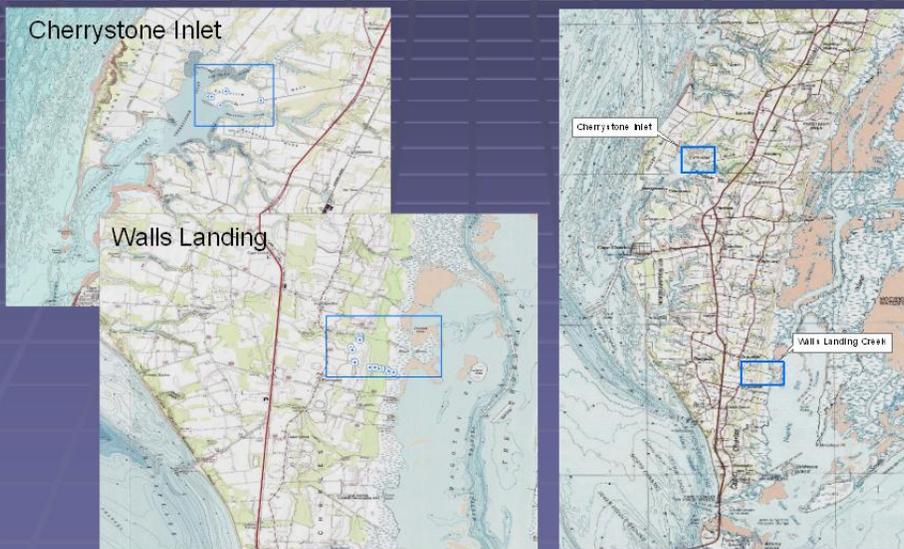
# Saltwater Intrusion in Yorktown- Eastover



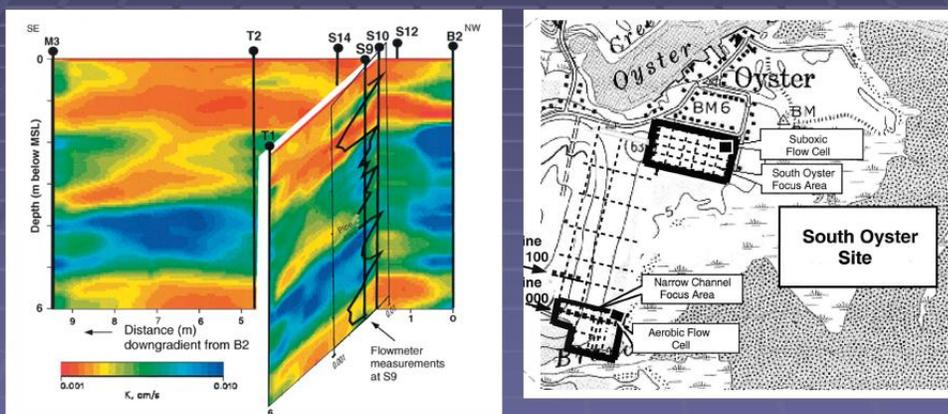
# Town of Cape Charles Model Predicted Water Quality



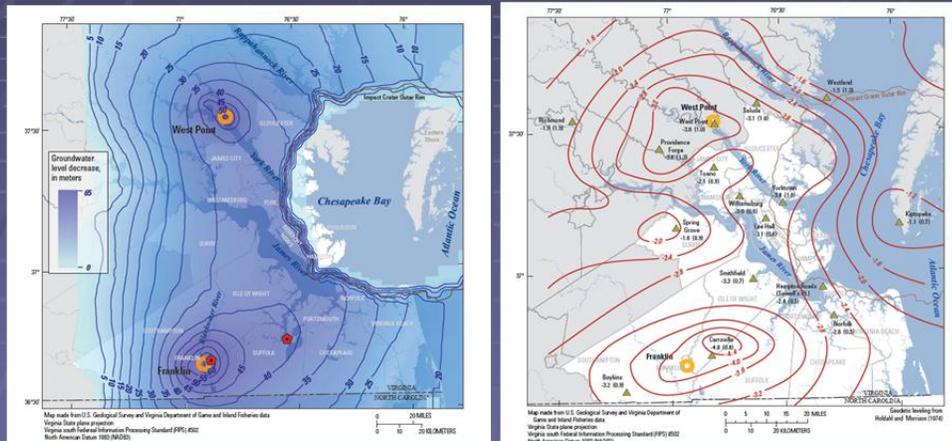
## Other Studies: Shallow Groundwater Discharge to Creeks and Bays



## Other Studies: Microbial transport in Groundwater



## Other Studies: Relative Sea Level Rise – lower than other areas in Virginia thanks to the meteorite impact



## Overall Summary

- Southern end of Northampton County has been one of the more intensely studied areas on the Eastern Shore
- Due to its location at the southern tip of the Shore, available yield is substantially less than areas to the north
- Saltwater intrusion limits withdrawals along the Bay and Seaside
- Lowered water levels limit withdrawals along the central spine (near Rt. 13)

## Overall Summary – Groundwater Availability

- Current use appears to be sustainable.
- As much as 1 MGD of additional groundwater can be sustainably withdrawn from the Yorktown-Eastover if the well field is properly located and developed.
- Columbia (Surficial) aquifer recharges at about 100x faster than Yorktown-Eastover.
- Appropriate storm water management (LIDs) can be used with development to preserve the high recharge to the Columbia.
- Greater than 1 MGD of additional groundwater can be sustainably withdrawn from the Columbia (Surficial) aquifer. Space requirement (low per well yield) is the greatest limiting factor.

## Overall Summary – Water Use and Water Levels

- Peak water use was in the 1980's when KMC and similar industries were in operation.
- Water levels that were lowered from the past operations have recovered and are largely stabilized.
- Influence of irrigation use is apparent in water level measurements.

## Overall Summary – Water Quality

- Groundwater quality in both Water Table (Columbia / Surficial) and Yorktown-Eastover is good.
- Areas near the Bay and Seaside are susceptible to saltwater intrusion. Some saltwater intrusion has been observed in the Cape Charles area.
- Areas affected by saltwater intrusion can be limited and/or treated through membrane treatment systems.
- Yorktown-Eastover is much more susceptible to saltwater intrusion than the Columbia (water table)
- Risk for saltwater intrusion can be greatly reduced by maximizing use of the Columbia where possible.

## Overall Summary – Water Quality

- High iron is a common problem in both the Columbia and Yorktown-Eastover
- Columbia (Surficial / Water Table)
  - Low pH
  - Generally high nitrates (from land use)
  - Localized high sulfates (likely natural sources)
  - More susceptible to land use contamination
- Yorktown-Eastover
  - High hardness (greater with depth)
  - High dissolved solids and salts (greater with depth and closer to coast)

## Overall Summary – Future Research

- Influence of the Eastville (and other) paleochannels on flow and recharge between the Columbia and Yorktown-Eastover.
- Saltwater intrusion along the coastal areas. Saltwater intrusion through upconing.
- Influence of land use on groundwater quality.

## Appendix M

Draft Chesapeake Bay Milestones and Virginia's Draft  
Nonpoint Source Plan Public Meeting Documents

**PRESS RELEASE**

**Contact : Curt Smith, A-NPDC**

**Phone: 787-2936 x 114**

**Email: [csmith@a-npdc.org](mailto:csmith@a-npdc.org)**

**Announcement of a meeting to present and discuss preliminary milestones for  
Chesapeake Bay restoration and the state-wide Nonpoint Source (NPS)  
Management Plan**

The Accomack-Northampton Planning District is hosting a public webcast viewing of a public meeting being held by the Virginia Department of Environmental Quality (DEQ) on February 25, 2014 from 9:30 a.m. to 4:30 p.m. at the A-NPDC office at 23372 Front Street in Accomac. DEQ will be presenting details of a continuing effort to restore water quality in the Chesapeake Bay and offering an opportunity for comments from the public. Specifically, the meeting will present preliminary water quality improvement milestones related to the Chesapeake Bay Total Maximum Daily Load and an update on the state-wide NPS Management Plan. The morning session will focus on Chesapeake Bay milestone development and the afternoon session will focus on NPS Management Plan development and milestones.

The public webcast was only being offered at DEQ Regional Offices around the state, but this viewing opportunity is intended to accommodate Eastern Shore residents who would have needed to incur travel costs to participate in the meeting. Participants at the A-NPDC will be able to watch the presentations and participate by asking questions to the presenters.

The A-NPDC asks that those interested in participating RSVP no later than Wednesday, February 19 if they plan on attending. To RSVP and for further information, please contact Curt Smith, Director of Planning at [csmith@a-npdc.org](mailto:csmith@a-npdc.org) or 787-2936.

Public Meeting to Introduce Draft Chesapeake Bay Milestones and Virginia's Draft Nonpoint Source Plan February 25, 2014 @ 10

Please Print Legibly!! Please provide email so that we may contact you regarding future developments!!

Name	!!Please Print!!	Affiliation: Organization represented or Citizen	Email Address or Telephone # !!Please Print!! Email Preferred!!
1	Curt Smith	A-NPDC	C.smith@ac-npdc.org
2	BILL PROSISE	CITIZEN	PROSISE@AOC.COM
3	Celle Chernock	Eastern Shore Seawater Conservation Dist.	Celle.Chernock@esswsc.org
4	Robert Kuller	Northampton PC	Sophie and Fully Su Media LLC
5	Jon Richardson	VDH	Jon.Richardson@vdot.virginia.gov
6	MARINE COKER	NIC PC	NIC@NISON89@aol.com
7	Mark Taylor	Accomack County	mtaylor@co.accomack.va.us
8	R. Owen Hooks	NRST Env. Office	ROH@NRST.GOV
9	Rich Morrison	Accomack County	Morrison@Co.accomack.va.us
10			
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## Appendix N

# Accomack County Planning Commission Ground Water Presentation



Accomack County Planning Commission

# Overview of Ground Water on the Eastern Shore

Curt Smith  
Director of Planning  
Accomack-Northampton Planning District Commission  
April 22, 2014



## A-NPDC Overview and Purpose



- Commonwealth created 21 PDCs in 1970 to address regional issues by fostering cooperation amongst localities and cooperation between state & localities
- Accomack-Northampton District:
  - Members: 2 Counties and Town of Chincoteague
  - Also provides services to 18 other towns
- Affiliate Organizations:
  - A-N Regional Housing Authority → provides privately or authority-owned rental housing
  - ESV Housing Alliance → improving housing for homeowners
  - A-NPDC →
    - Community Development
    - Economic Development
    - Transportation Planning
    - Environmental Planning → Ground Water Committee; Climate Adaptation Working Group

## Presentation Overview

1. Geologic/Hydrogeologic Framework Evolution
2. Ground Water Conditions
3. Ground Water Use
4. Threats to Ground Water Quality
5. Ground Water Management and Water Supply Planning

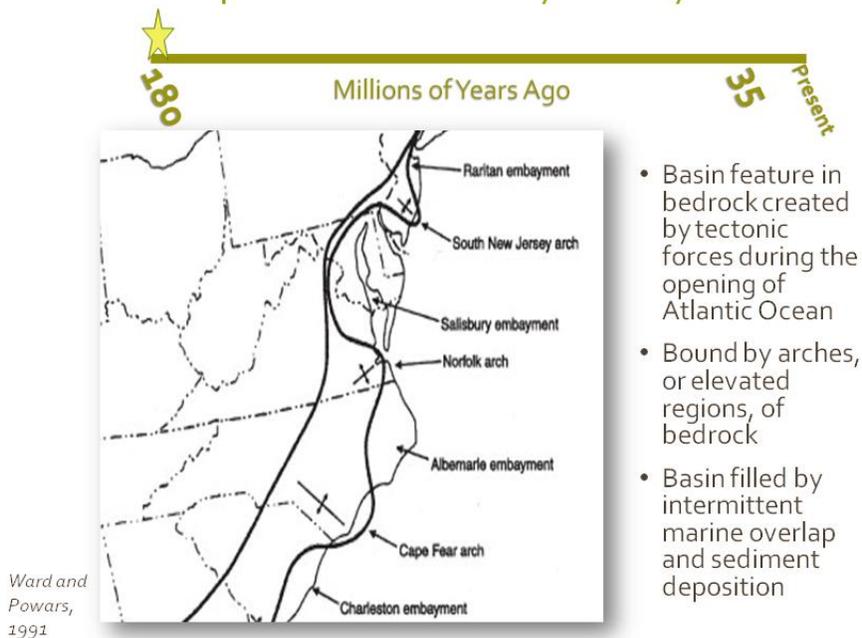
Accomack-Northampton Planning District Commission

## Geologic/Hydrogeologic Framework Evolution

- Timeline:
  - i. Opening of Atlantic Ocean & Salisbury Embayment – **≈180 Million Years Ago (MYA)**
  - ii. Filling of Salisbury Embayment (Potomac Formation) – **≈180 to 35.5 MYA**
  - iii. Bolide impact & removal of pre-impact sediments – **≈35.5 MYA**
  - iv. Deposition of post-impact sediments – **≈35.5 MYA – Present**
  - v. Reworking of surficial sediments & progradation of peninsula – **≈200,000 YA – Present**
  - vi. Sea level reaches elevation of modern Chesapeake Bay transitioning system from riverine to estuarine - **≈8,000 YA**
  - vii. Sea level continues to rise and inundate the Chesapeake Bay watershed and the Chesapeake Bay begins to take its modern appearance we currently recognize - **≈3,000 YA**

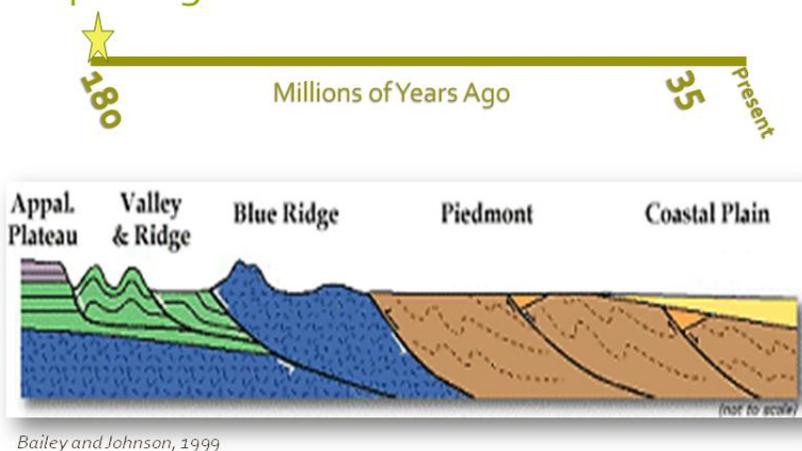
Accomack-Northampton Planning District Commission

## Development of Salisbury Embayment



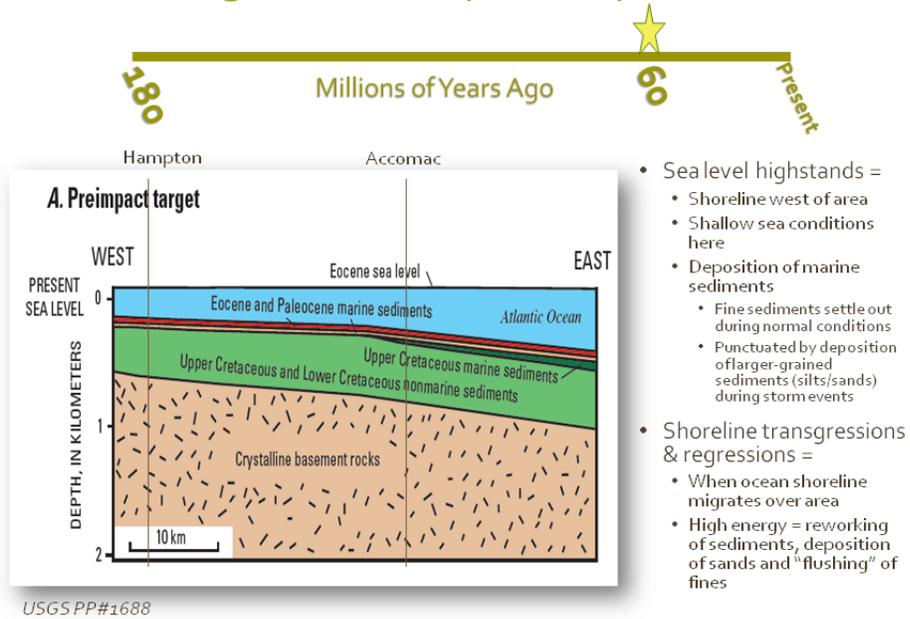
Accomack-Northampton Planning District Commission

## Opening of Atlantic Ocean



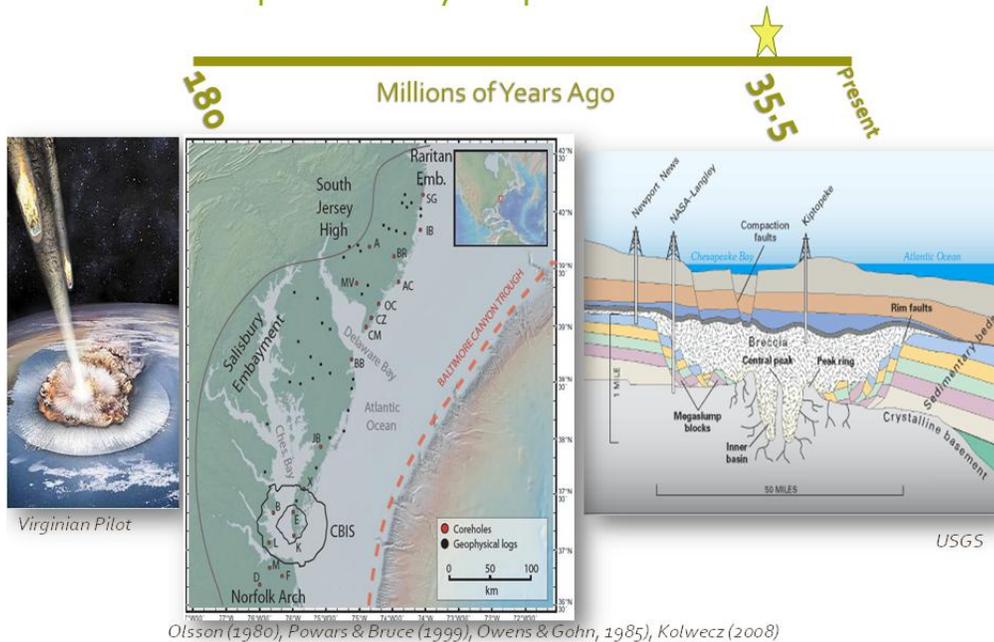
Accomack-Northampton Planning District Commission

## In-Filling of Salisbury Embayment

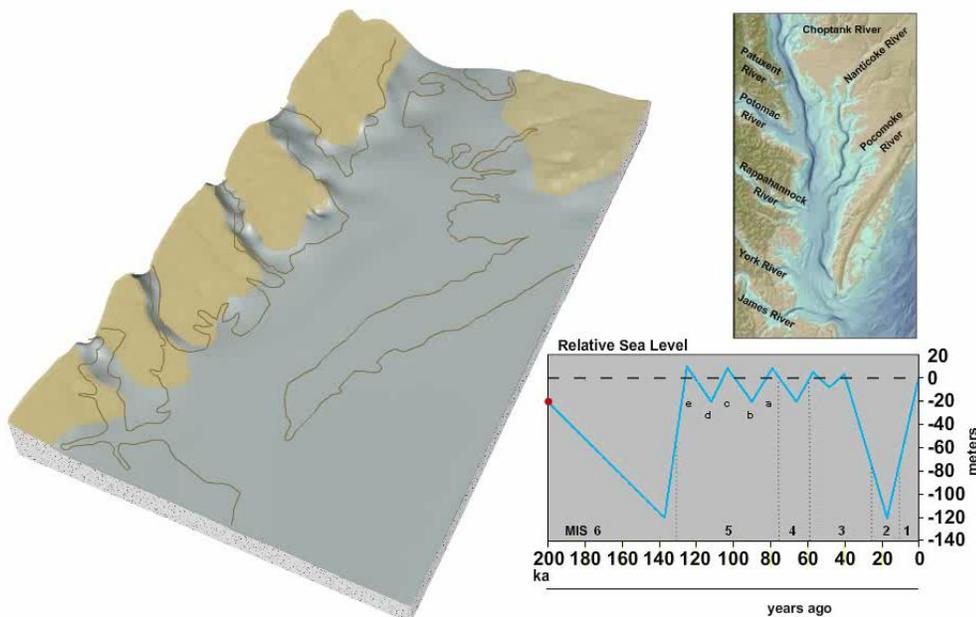


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## Chesapeake Bay Impact Structure



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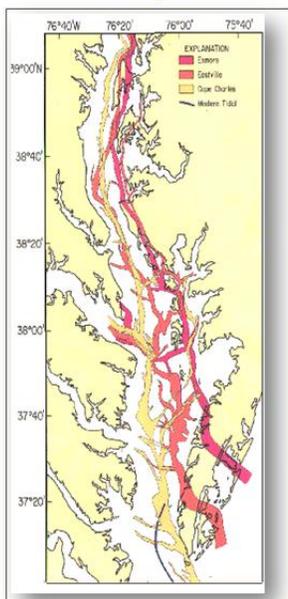


### USGS Chesapeake Bay Evolution Animation

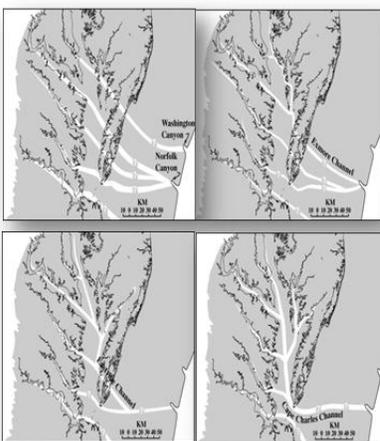
(Bratton et. al, 2009)

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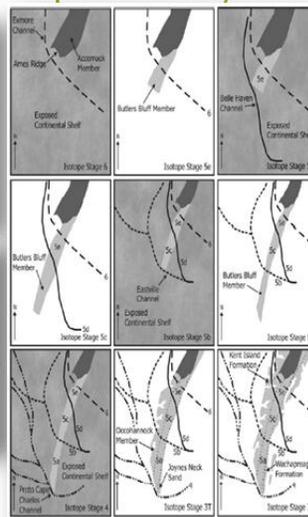
### Development of Eastern Shore & Chesapeake Bay



Colman et al  
(1990)



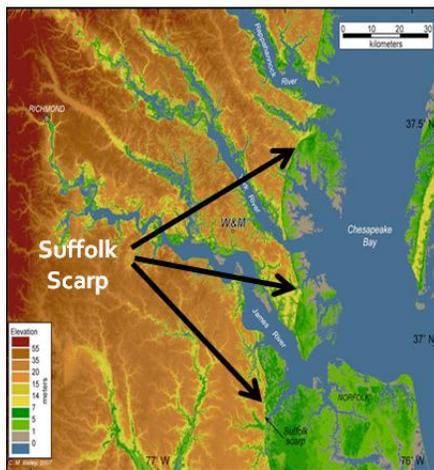
Hobbs (2004)



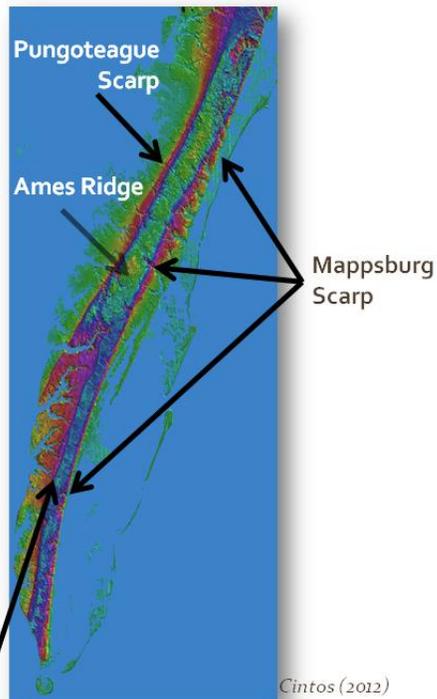
Scott (2006)

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Surficial Features:  
Relict Shorelines



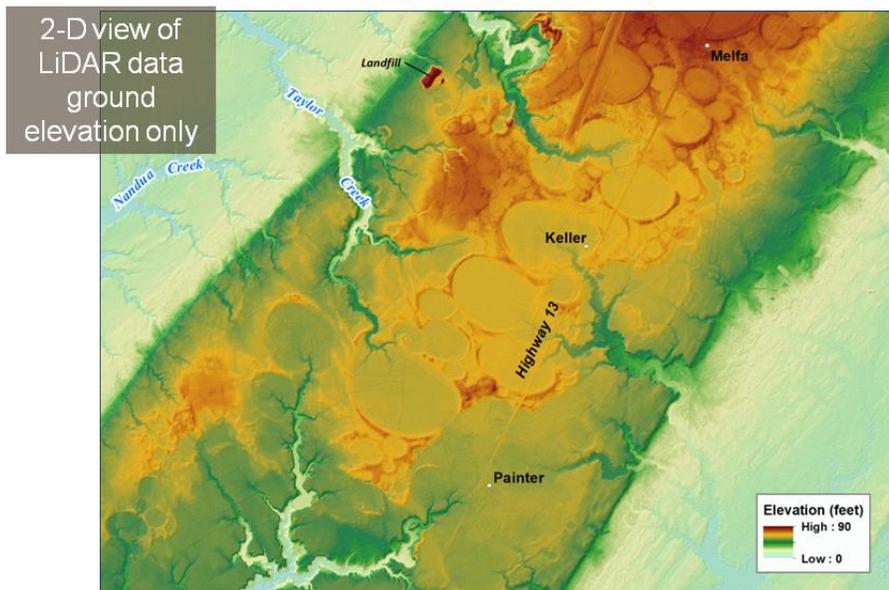
Bailey (2009)



Cintos (2012)

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South-Central Accomack County  
(Melfa, Keller, & Painter)



The Nature Conservancy (2011)

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## Chincoteague



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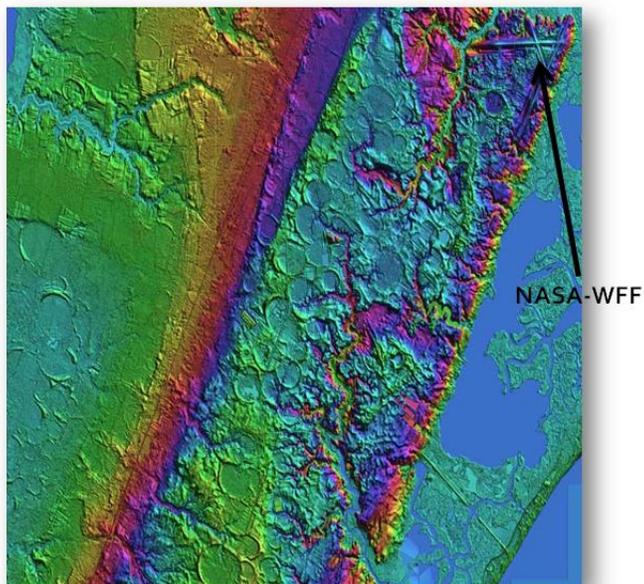
## Saxis/Sanford



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### Surficial Features: Carolina Bays

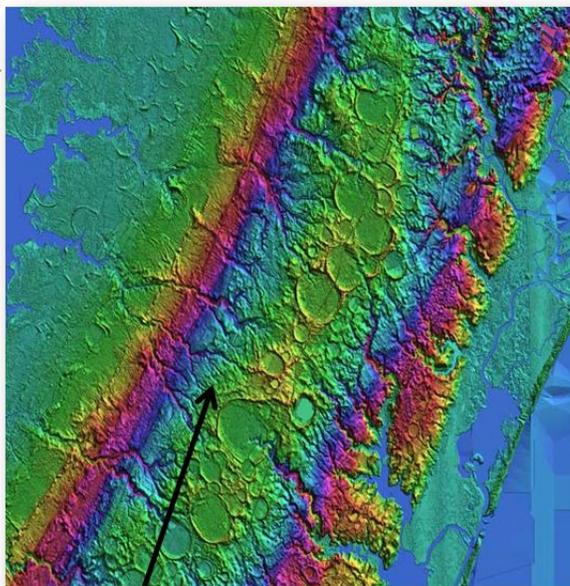
- Over 700 shallow, elliptical depressions
  - Similar orientation (NW-SE)
  - Variable size (1 – 1,000 acres)
  - Some overlapping
  - Coarse-grained rims
  - Fine-grained floors
- Variable ages (100,000-<5,000 years)
- Debated origin
  - Wind & Water
  - Shock wave from bolide explosion



Cintos (2012)

### Surficial Features: Carolina Bays

- Over 700 shallow, elliptical depressions
  - Similar orientation (NW-SE)
  - Variable size (1 – 1,000 acres)
  - Some overlapping
  - Coarse-grained rims
  - Fine-grained floors
- Variable ages (100,000-<5,000 years)
- Debated origin
  - Wind & Water
  - Shock wave from bolide explosion

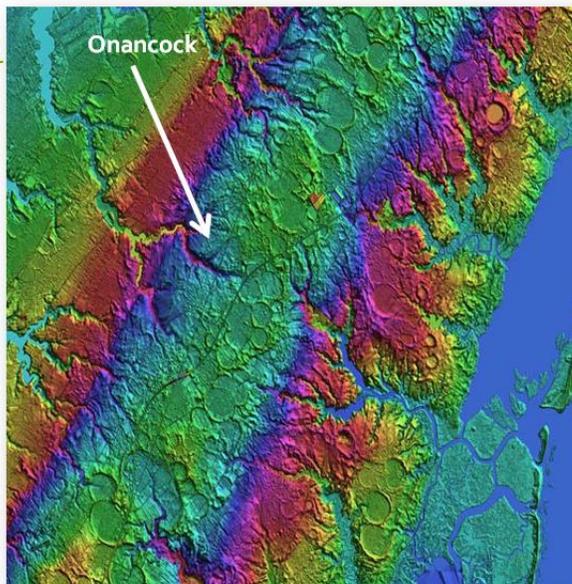


Parksley

Cintos (2012)

## Surficial Features: Carolina Bays

- Over 700 shallow, elliptical depressions
  - Similar orientation (NW-SE)
  - Variable size (1 – 1,000 acres)
  - Some overlapping
  - Coarse-grained rims
  - Fine-grained floors
- Variable ages (100,000-<5,000 years)
- Debated origin
  - Wind & Water
  - Shock wave from bolide explosion

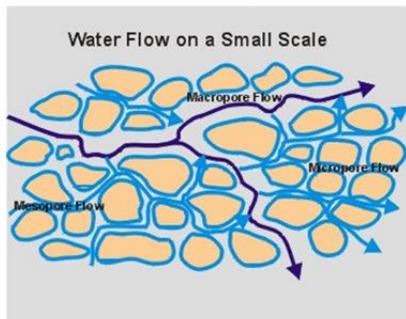


*Cintos (2012)*

## Ground Water Conditions on the Eastern Shore

## Ground Water is not like an underground river!

- Groundwater flows through porous soils and sediment that includes gravels, sands, silts, and clay.



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Soil/Sediment type determines if it can be used as a source of water

### **An Aquifer is a Source for Groundwater and is:**

Any coarse grained material (sand, gravel) that can supply sufficient water for a beneficial use

### **A Confining Unit Impedes Movement of Groundwater and is:**

Any fine grained material (silt, clay) that can significantly restrict vertical movement of groundwater such that the resulting groundwater is under pressure.

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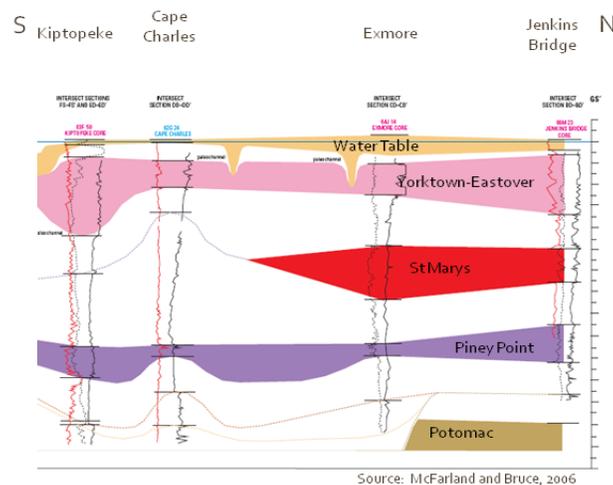
## Aquifers are defined by where they appear relative to a confining layer

- Water Table
  - Water is not “under pressure”
  - Well yield is lower than comparable confined aquifers
  - Replenished (recharged) directly by precipitation
  - More vulnerable to contamination from surface activities
- Confined aquifer
  - Water is under pressure, confined by an overlying layer(s) of silt and clay
  - Replenished from vertical flow through the confining unit (recharge is much lower than a water table aquifer)
  - More vulnerable to saltwater intrusion

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## All Groundwater Aquifers on the Eastern Shore

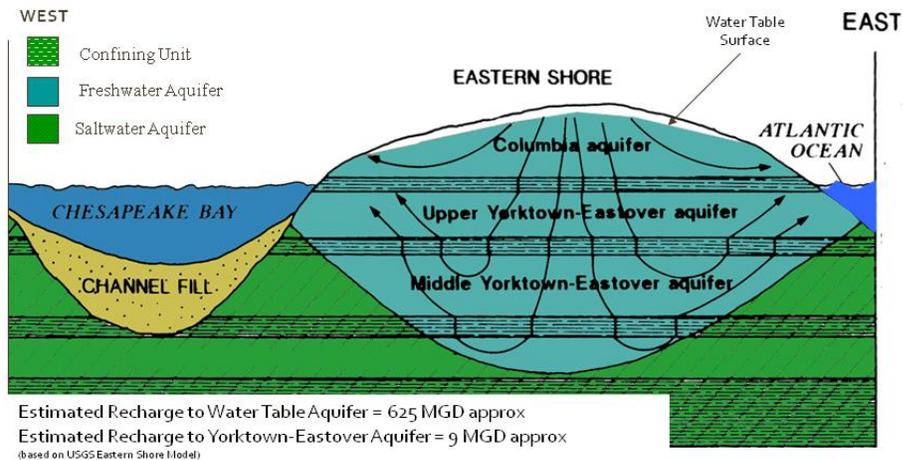
- **Fresh Groundwater is restricted to the Columbia (Water Table) aquifer and significant portions of the Yorktown-Eastover aquifer**
- **Brackish groundwater is found in portions of the Yorktown-Eastover, all of the St. Marys Aquifer, Piney Point, and Potomac aquifers**
- **The Columbia, Yorktown-Eastover, and Piney Point aquifers are found throughout the Eastern Shore**
- **St. Marys and Potomac Aquifers are absent in the southern portion of the Shore**



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## Water Table and Fresh Water Confined Aquifers on the Eastern Shore

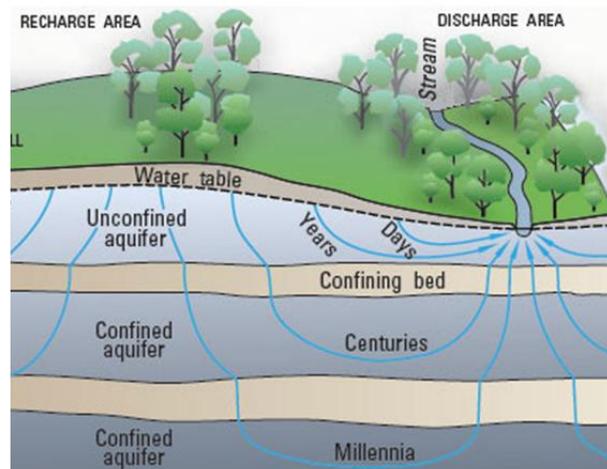
Fresh ground water is restricted to depths less than 350 feet



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## Movement through the Groundwater System

- Horizontal flow typically toward a surface water body. Gradient is often low and the actual flow rate is low
- Vertical flow typically downward and very low



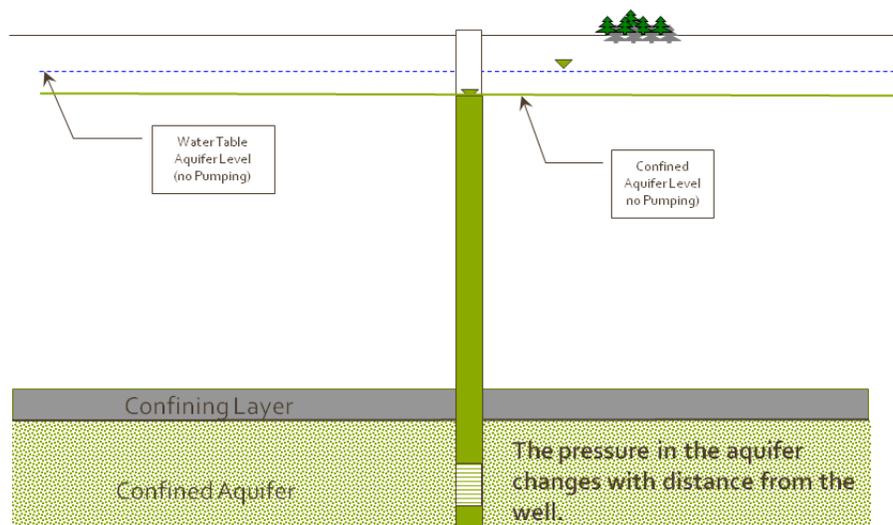
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## Hydraulic Gradient Under Confined Pumping Conditions

- Horizontal flow may be re-oriented toward well. Gradient (flow rate) is often significantly increased
- Vertical flow remains downward but rate often significantly increased

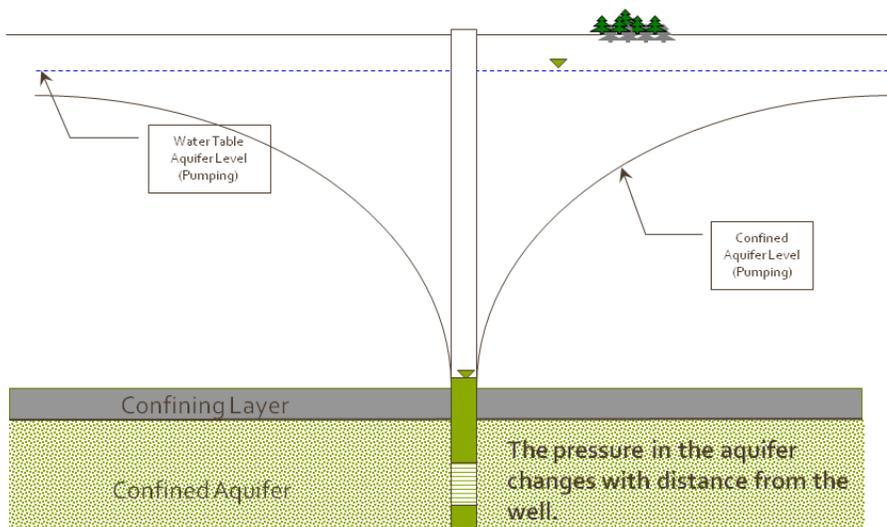
Accomack-Northampton Planning District Commission

## Groundwater Levels under no Pumping



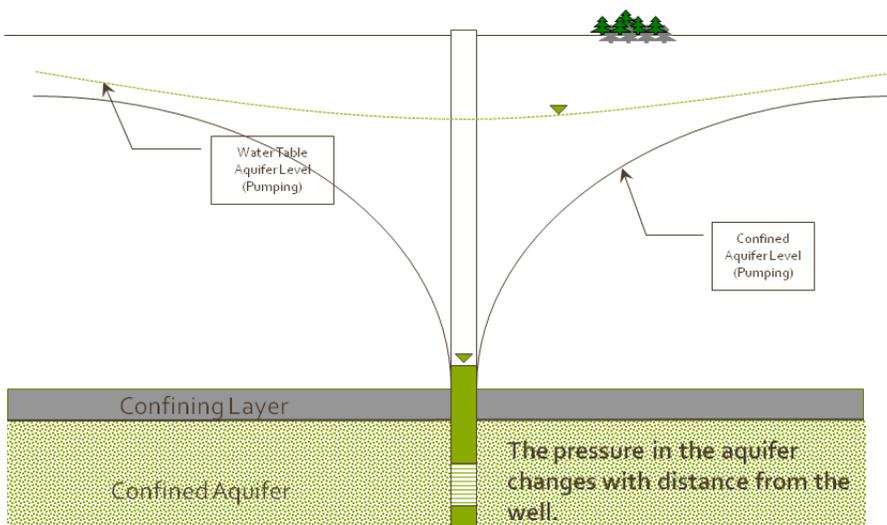
Accomack-Northampton Planning District Commission

### Pumping from a confined aquifer with little leakage through the confining layer

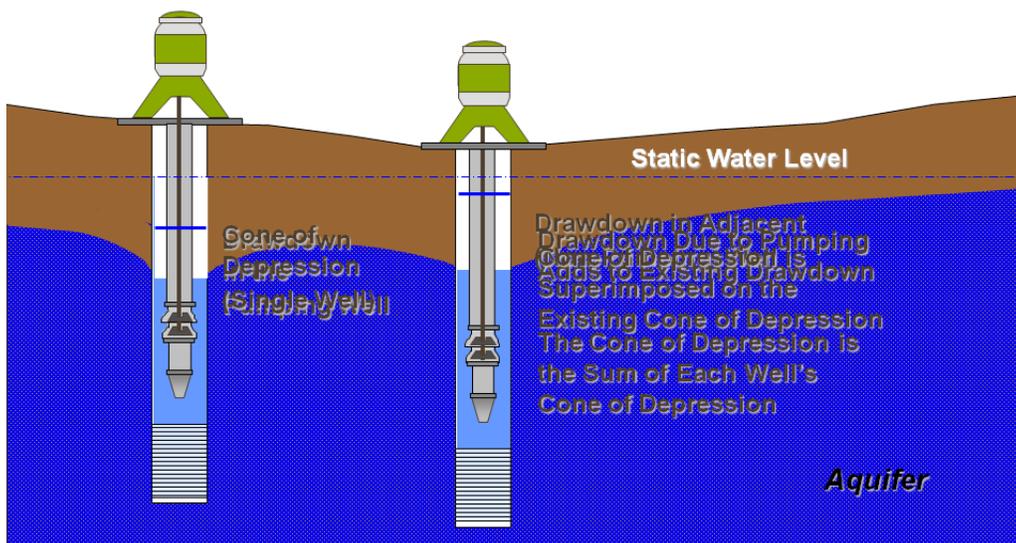


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### Pumping from a confined aquifer with significant leakage through the confining layer

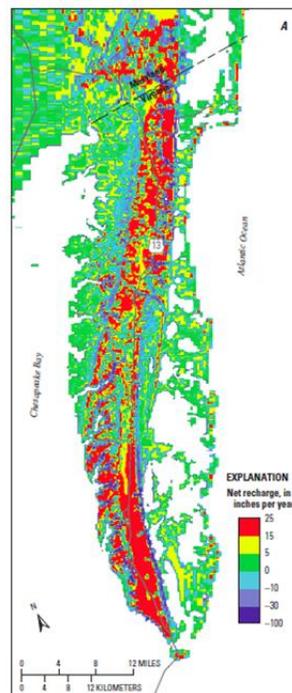
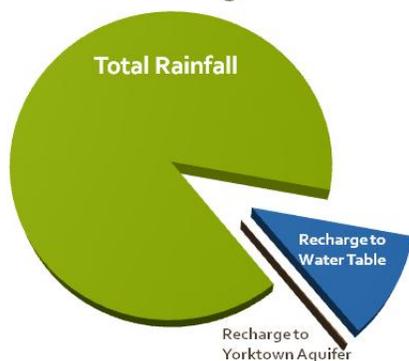


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## How Much Water Recharges the Aquifers?

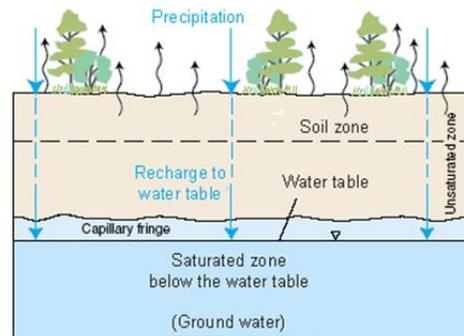
- All fresh water comes from precipitation falling directly on the Shore
- About 88% of the precipitation never infiltrates to the groundwater



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## How Much Water Recharges the Aquifers?

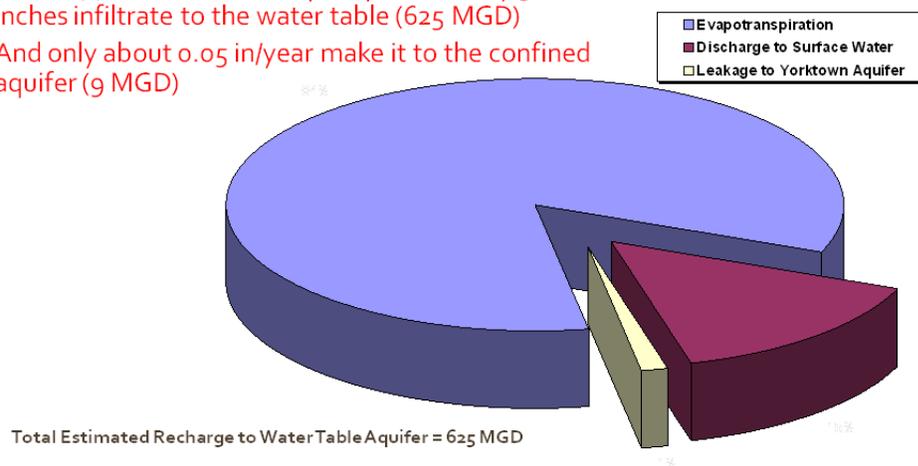
- Most of the rainfall never infiltrates to the groundwater and is lost through:
  - Evaporation
  - Interception (on plants and trees)
  - Direct runoff
  - Evapotranspiration



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## Of the water infiltrating to the water table, only a small amount reaches the Yorktown aquifer

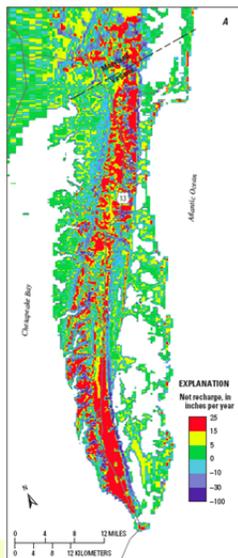
- **Limited Recharge:**
  - Of the 44-inches of annual precipitation only 5 to 6 inches infiltrate to the water table (625 MGD)
  - And only about 0.05 in/year make it to the confined aquifer (9 MGD)



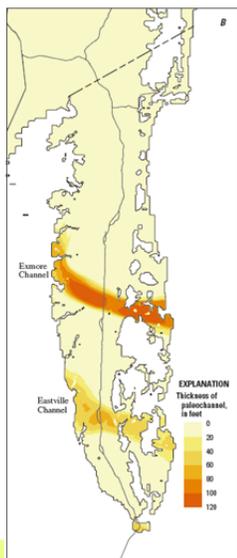
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## Recharge amounts vary across the Shore

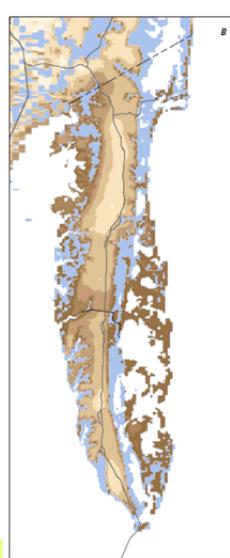
Recharge to Surficial Aq



Location of Paleochannels

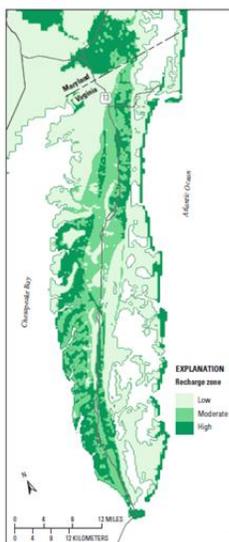


Recharge to Y-E Aq

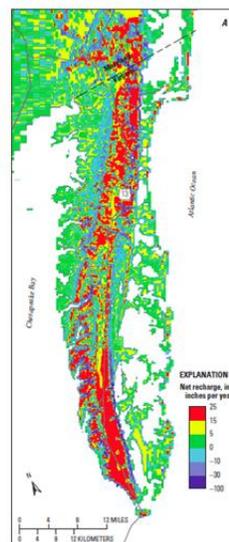


## Recharge to the water table is a function of soil type, slope, and location

Potential Recharge areas (based on soil type and slope)



Estimated Recharge Rates

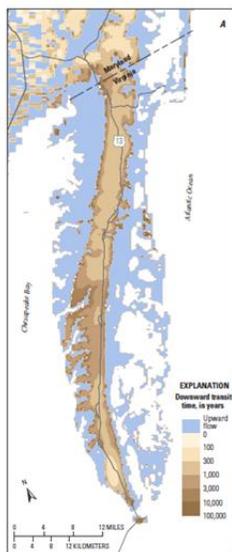


Source: USGS

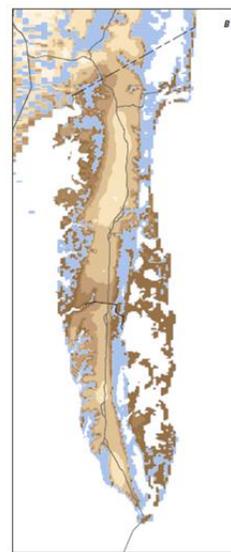
Source: USGS

## Recharge to the Yorktown depends more on where pumping from the aquifer is occurring

Estimated in  
1900  
(pre-pumping)



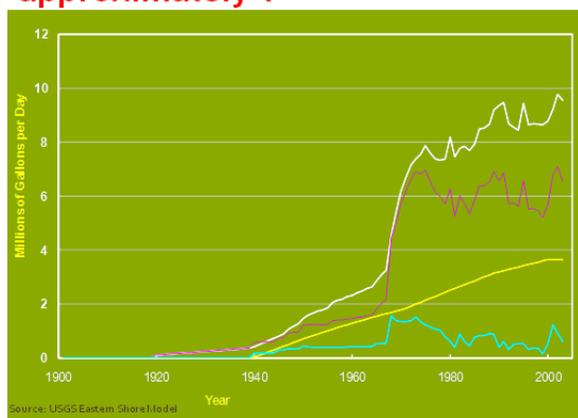
Estimated in  
2003  
(Effects of  
pumping)



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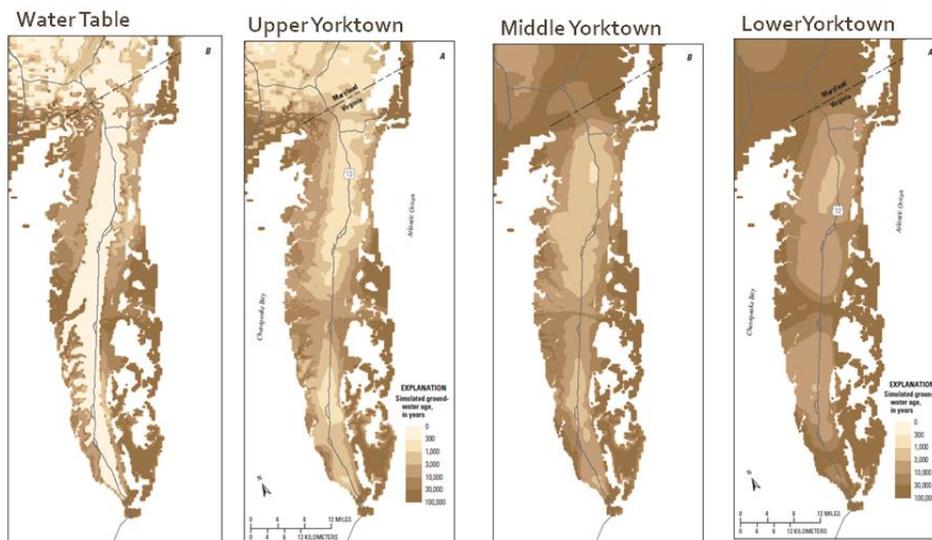
## Recharge rate to the Yorktown has increased over time due to pumping

- **Current Yorktown-Eastover Aquifer use exceeds recharge by approximately 1 MGD**
- **Recharge will increase as use increases – but will NOT keep pace with pumping**



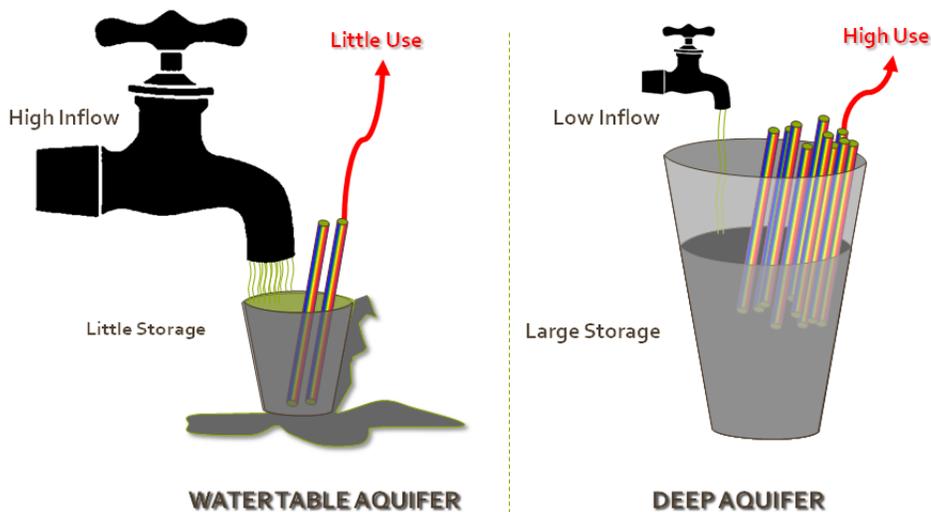
Accomack-Norhampton Planning District Commission

## Estimated Water Ages Reflect Recharge Rates



Accomack-Norhampton Planning District Commission

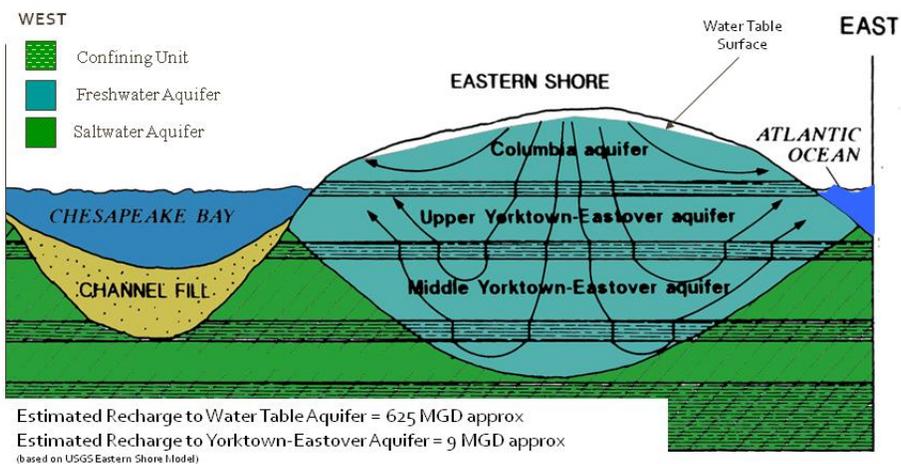
## Water Table /Yorktown Dilemma



Accomack-Norhampton Planning District Commission

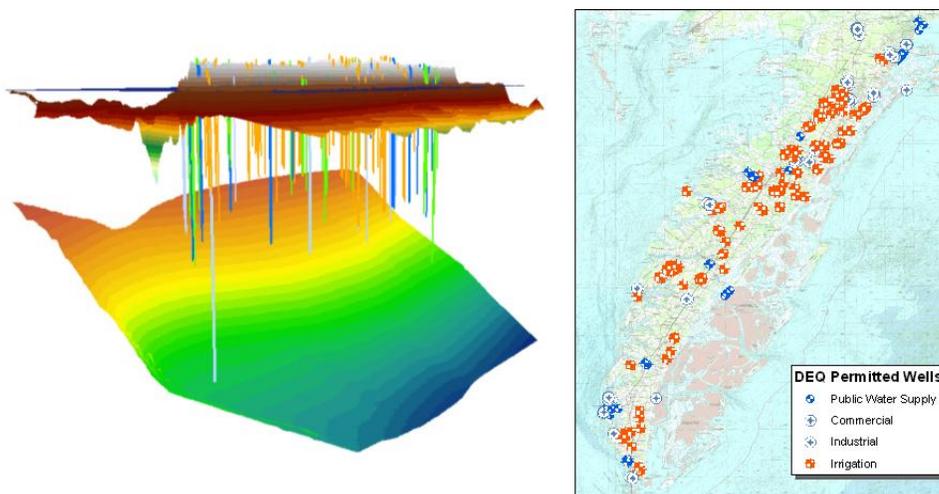
## Ultimately the Balance of Recharge to Use Dictates Stability of the Fresh Water Lens

Fresh ground water is restricted to depths less than 350 feet



Accomack-Norhampton Planning District Commission

## Groundwater Use on the Eastern Shore



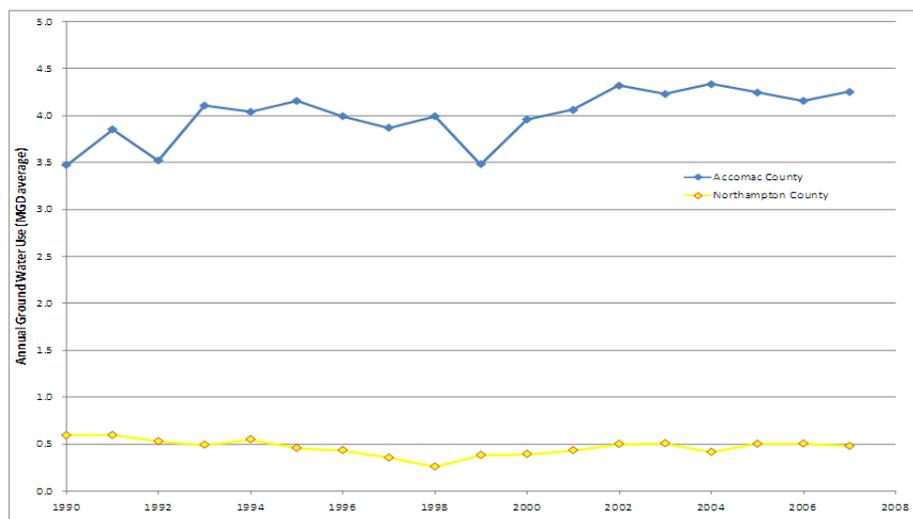
Accomack-Norhampton Planning District Commission

## Ground Water Use and Ground Water Level Measurements

- Ground Water Use for permitted wells (wells pumping greater than 300,000 gallons-per-month) are submitted to VDEQ
- Ground Water Levels are routinely measured in Observation Wells by the USGS

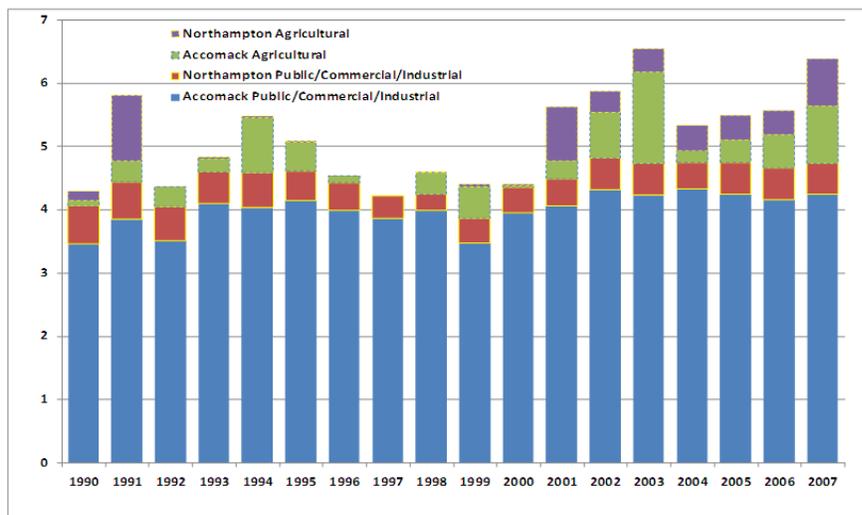
Accomack-Northampton Planning District Commission

## Non-Agricultural Ground Water Use Trends



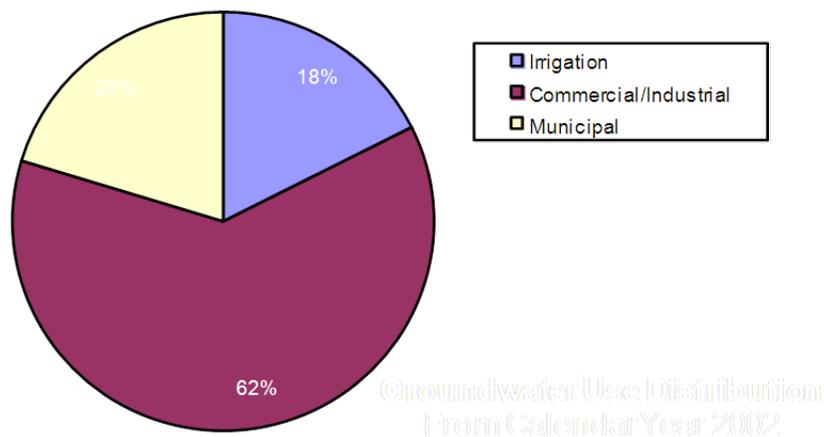
Accomack-Northampton Planning District Commission

## All Permitted Ground Water Use



Accomack-Northampton Planning District Commission

## Types of Groundwater Use



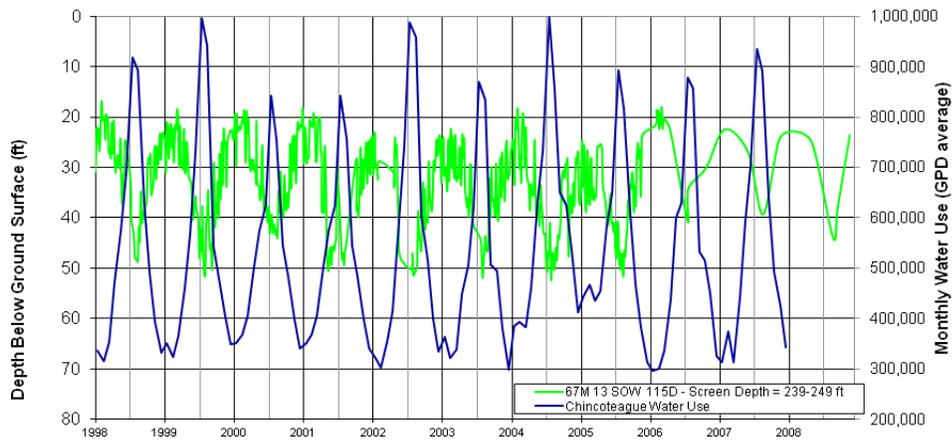
Groundwater Use Distribution  
From Calendar Year 2002.

## Why Measure Ground Water Levels?

- Ground water use:
  - Lowers ground water levels, reducing available water to other ground water users
  - Reduces the size of the freshwater lens
- Impact of ground water use can be evaluated:
  - Indirectly using models
  - Measured directly from pumping wells and observation wells

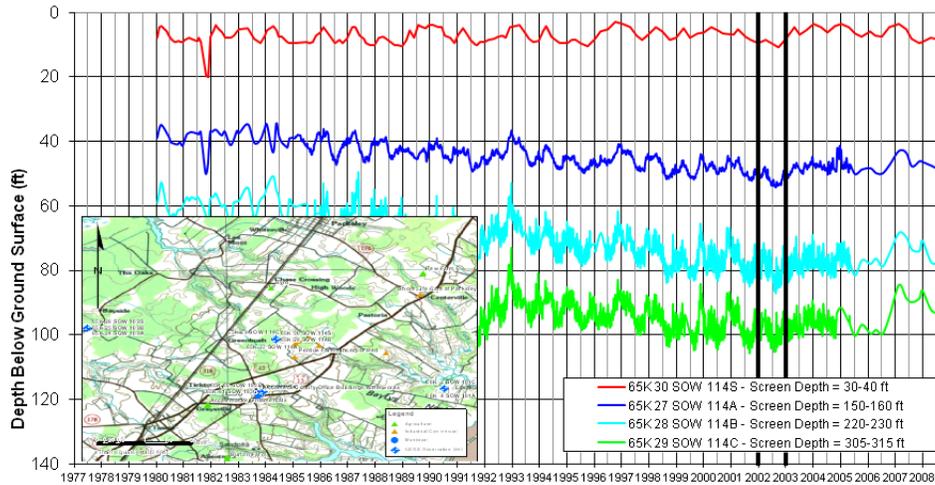
Accomack-Northampton Planning District Commission

## Water Level Change and Monthly Use



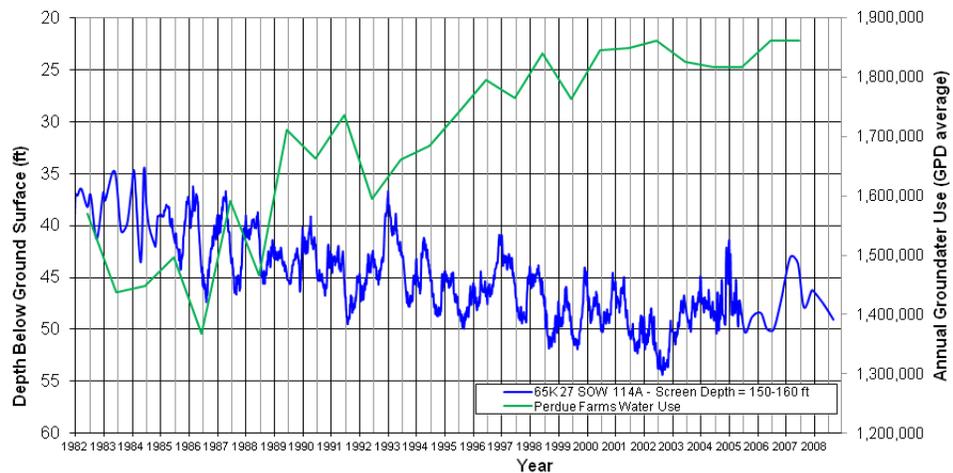
Accomack-Northampton Planning District Commission

## Ground Water Levels Near Perdue Farms



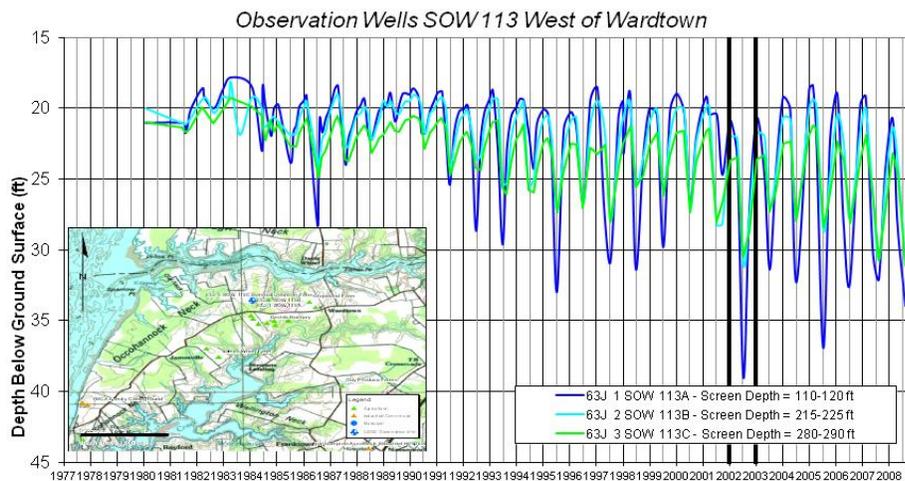
Accomack-Northampton Planning District Commission

## Water Level Change and Annual Use Near Perdue Farms

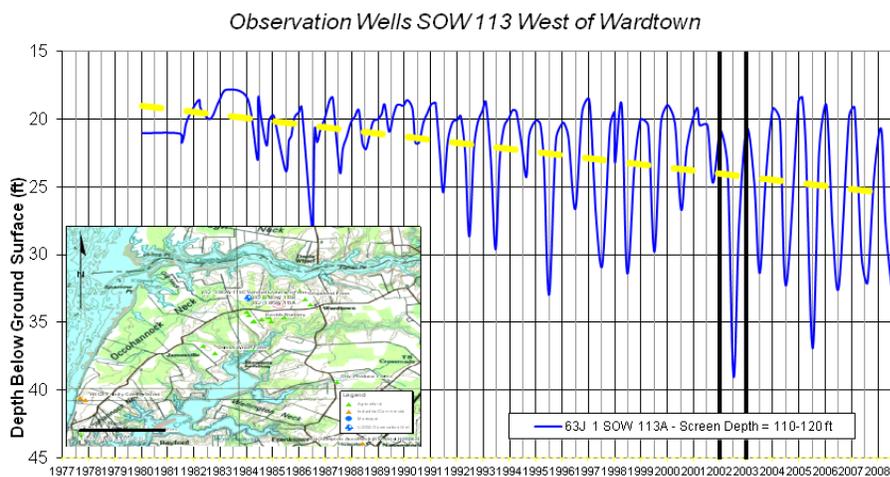


Accomack-Northampton Planning District Commission

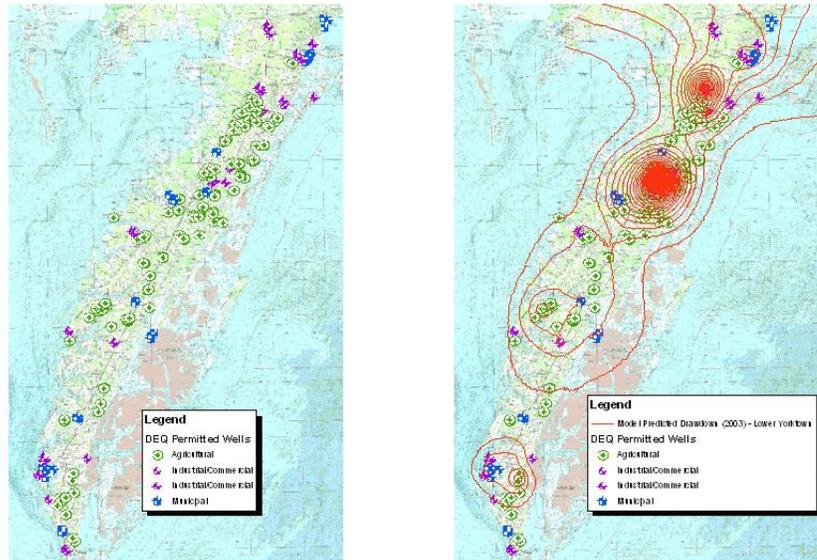
## Effect of Irrigation Use



## Long Term Decline from Irrigation Use



## Amount of water level decline in the Lower Yorktown Aquifer



Accomack-Northampton Planning District Commission

## Threats to Ground Water Quality & Quantity on the Eastern Shore

- Water Table Aq.
  - Quality → Surface Activities
  - Quantity → Drought
- Confined Aq.
  - Quality → Over-pumping
  - Quantity → Over-pumping

Accomack-Northampton Planning District Commission

## Potential Threats To Water Table Water Quality

### Sources:

#### Agriculture / Livestock

- Nutrients (Fertilizers)
- Pesticides / Herbicides
- On-site waste disposal

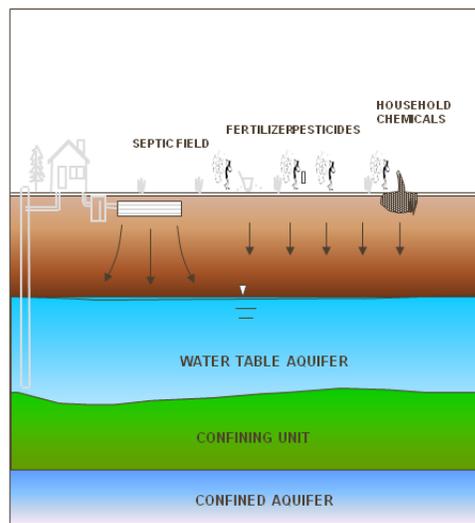
#### Waste Units

- *Septic Systems / Drain Fields*
- Public Sewers
- Underground Storage Tanks (USTs)

#### Residential

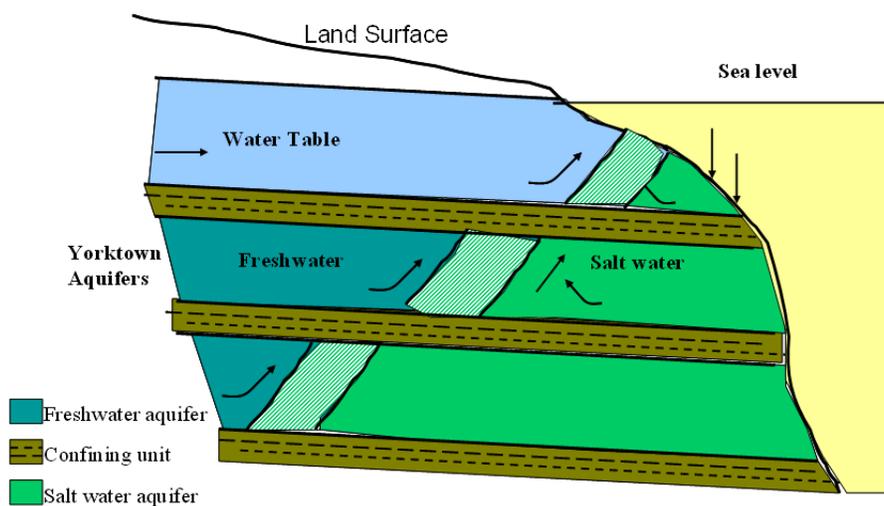
- *Nutrients / Pesticides - Herbicides*
- *Petroleum and solvents*

### Function of amount (loading) and area of application



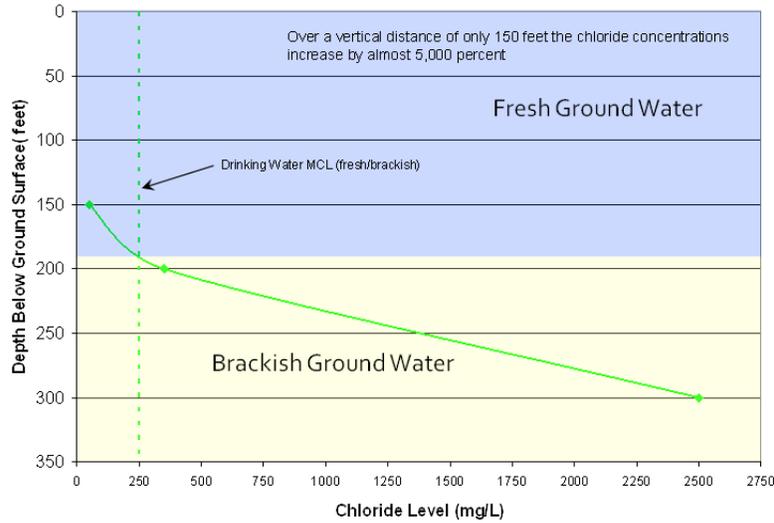
Accomack-Northampton Planning District Commission

## Potential Threats to Yorktown- Eastover Aquifer Water Quality



Accomack-Northampton Planning District Commission

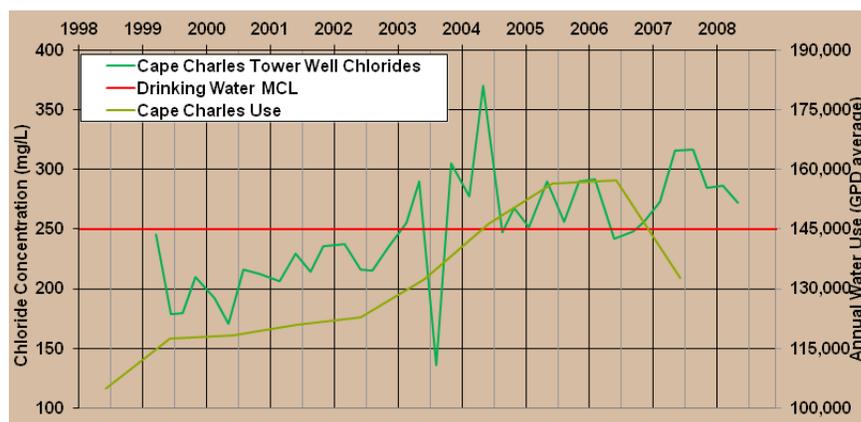
## Chloride Increase With Depth Upshur Neck Seaside Example



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## Why the Eastern Shore of Virginia?

Most likely cause for a loss of fresh ground water is salt water intrusion due to over pumping



Accomack-Northampton Planning District Commission

## Ground Water Management and Water Supply Planning

- ESVA Ground Water Committee
- ESVA Ground Water Resource Protection and Preservation Plan
- Water Supply Plans – Accomack & Northampton Cos.

Accomack-Northampton Planning District Commission

### ESVA Ground Water Committee

- Formed in 1990 by Accomack & Northampton to study and plan for ground water protection and management
- 11-member Committee meets monthly
  - 2 County Administrators, 4 County Supervisors, 4 County-appointed members, A-NPDC Executive Director
- Coordinated by A-NPDC with funding from Counties & VA Coastal Zone Management Program
- Contracts consulting hydrogeologist to advise Committee
- Activities:
  - Develop protection and management plans
  - Ground Water Research: USGS, VA Tech, Randolph-Macon
  - Public Workshops & Educational Materials
  - Review/comment on state withdrawal permit applications and federal environmental assessments
  - Coordinate with state/federal governments on ground water-related regulations
  - ESVA Ground Water Model
  - ESVA Ground Water Award Program
  - Household Hazardous Waste Collection

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## *ESVA Ground Water Resource Protection and Preservation Plan*

- Originally adopted in 1992 and Updated in 2013
- Purpose:
  - Ensure that adequate and safe drinking water is available to all citizens of the commonwealth
  - Encourage, promote, and protect all other beneficial uses
  - Encourage, promote, and develop incentives for alternative water sources, included but not limited to desalinization
- Components of Plan
  - Water Resources: Current understanding of water resources. Will periodically update as new research is available.
  - Land and Water Resource Use: Water use will be updated annually.
  - Resource Vulnerability:
    - Saltwater Intrusion: Water quality trends updated annually. Modeling and other research updated periodically.
    - Water Level Declines: Updated annually.
    - Land Use Activities: Updated periodically based on research.
  - Sustainability Plan

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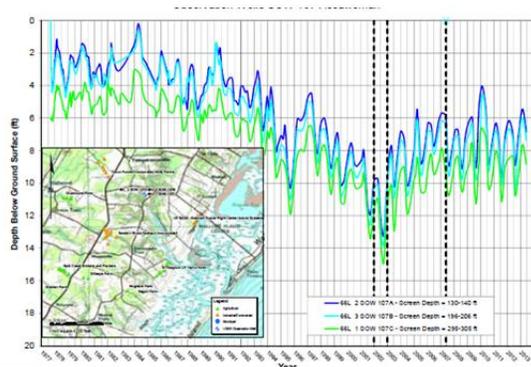
## Component Summary

- Institutional Controls: Federal / State / Local
- Research:
  - Hydraulic Characteristics: Paleochannels; Confining Units; Deeper Aquifers
  - Water Quality: Freshwater/Saltwater Transition; Agricultural Nutrients; On-Site Systems; Emerging Contaminants
  - Climate Change
- Monitoring: Water Use; Groundwater Levels; Water Quality
- Alternate Source Development: Columbia (Water Table); Membrane Treatment; Reuse; ARS
- Conservation and Reduction

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## Highlights

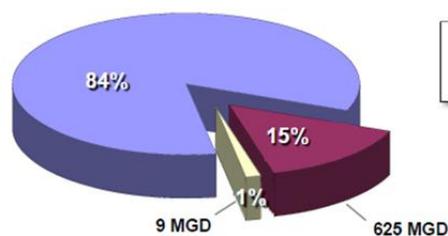
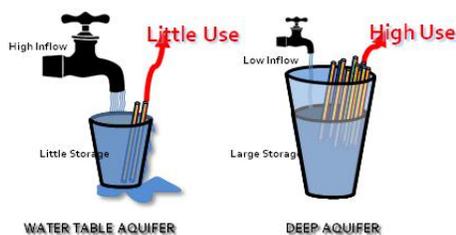
- Relevant components of the 1992 plan have been retained.
- Sections of the plan will be updated, some as frequently as annually to maintain current. Plan and various components such as monitoring data and research publications will be linked on the internet to improve accessibility.



Accomack-Northampton Planning District Commission

## Highlights

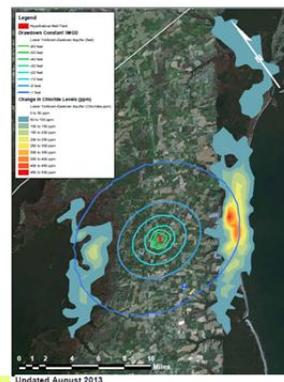
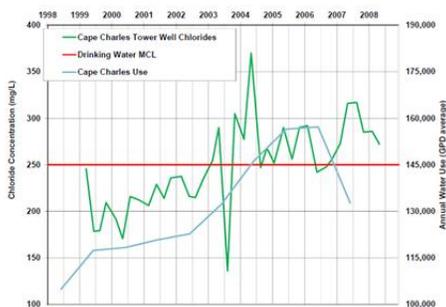
- Better understanding of the groundwater resource: Columbia aquifer is replenished at much higher rates than the Yorktown-Eastover. With lower withdrawals, the Columbia is an underused resource.



Accomack-Northampton Planning District Commission

## Highlights

- Better understating of the vulnerability: Improved models for the Shore provide greater insight on flow dynamics. Yorktown-Eastover more vulnerable near the Bayside and Seaside, less vulnerable near the spine than previously thought.

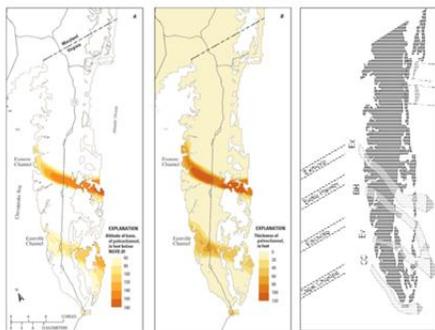


Accomack-Northampton Planning District Commission

Updated August 2013

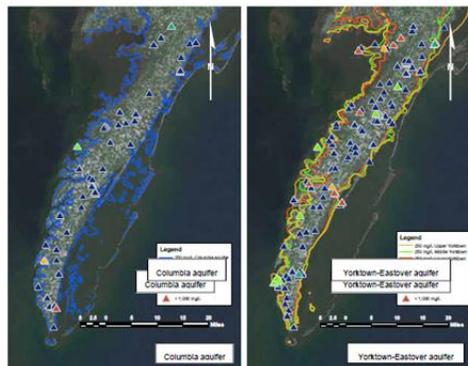
## Highlights

- Research needs are more focused and will be periodically revised.



Source: Sandford, et al, 2009

Source: Hobbs, et al, 2008



Accomack-Northampton Planning District Commission

## Accomack County Water Supply Plan

- Regulations: 9 VAC 25-780
  - Adopted in 2011
  - Required to be reviewed every 5 years and rewritten every 10 years
- Purpose:
  - Ensure that adequate and safe drinking water is available to all citizens of the commonwealth
  - Encourage, promote, and protect all other beneficial uses
  - Encourage, promote, and develop incentives for alternative water sources, included but not limited to desalinization
- Components of Plan
  - Existing Water Sources (*Description of water systems*)
  - Existing Water Use (*Description of current and historical use*)
  - Existing Water Resource Conditions (*Groundwater Resource, Natural Resources*)
  - Projected Water Demand (*Future water use*)
  - Water Demand Management (*Water Conservation and Management*)
  - Drought Response and Contingency Plan
  - Statement of Need and Alternatives (*Use / Resource Constraints; alternate sources / technologies*)

Accomack-Northampton Planning District Commission

# Thank You!



Virginia Coastal Zone  
MANAGEMENT PROGRAM

Curt Smith  
Director of Planning  
Accomack-Northampton  
Planning District Commission

[csmith@a-npdc.org](mailto:csmith@a-npdc.org)

757-787-2936



## Appendix O

### 2014 Household Hazardous Waste Collection Items

# 2014 ESVA Household Hazardous Waste Collection

**THE ONLY LOCAL OPTION FOR ACCOMACK & NORTHAMPTON COUNTY RESIDENTS TO PROPERLY DISPOSE OF THEIR HOUSEHOLD HAZARDOUS WASTE**

**WHY PARTICIPATE?** - Household products containing toxic chemicals like pesticides, solvents, cleaning products, & weed killers can be a threat to people and the environment if improperly discarded. Never throw these materials into the trash as the toxic chemicals may harm sanitation workers, or result in fires in collection vehicles. It is also not safe to pour them into a sink, ditch, or storm drain as they can end up in the environment polluting the air, water, or soil.

**SATURDAY, MAY 10**

**NOW AT 3 LOCATIONS!!!**

**1) IN NORTHERN ACCOMACK:  
MAKEMIE PARK CONVENIENCE CENTER  
9312 NEAL PARKER ROAD, TEMPERANCEVILLE**

**2) IN CENTRAL ACCOMACK:  
FISHERS CORNER CONV. CENTER  
26213 PARKSLEY ROAD, PARKSLEY**

**3) IN NORTHAMPTON:  
BIRDSNEST CONVENIENCE CENTER  
9005 BIRDSNEST DRIVE, BIRDSNEST**

**COLLECTIONS BEGIN AT 10:00 AM &  
CLOSE PROMPTLY AT 2:00 PM &  
WILL TAKE PLACE RAIN OR SHINE**

**\*\*\*COLLECTIONS FOR ACCOMACK &  
NORTHAMPTON RESIDENTS ONLY.  
RESIDENTS CAN PARTICIPATE AT ANY OF  
THE 3 SITES\*\*\***

**UP TO 50 POUNDS FOR FREE!!!  
ADDITIONAL WASTE WILL COST \$1.00/LB**

**DISPOSAL OF THE FIRST 50 POUNDS FOR FREE  
WILL BE AVAILABLE ONLY AS FUNDS ALLOW.**

**Arrive early to ensure your spot!!!**

## **What to Bring**

- ✓ Garden chemicals
- ✓ Poisons
- ✓ Repellants
- ✓ Degreasers
- ✓ Fuel: gas, kerosene
- ✓ Fungicides
- ✓ Wood preservatives
- ✓ Other hazardous waste
- ✓ Wood stain
- ✓ Paint thinner
- ✓ Paint remover
- ✓ Driveway sealers
- ✓ Epoxy
- ✓ Rodent poison
- ✓ Asbestos

Hazardous items will have cautionary words on the label. For example: *Danger, Warning, or Caution. Other words or phrases that can signal hazardous products include: poisonous, hazardous, combustible, flammable, corrosive, volatile, caustic, irritant, explosive, toxic, use with adequate ventilation, or avoid inhaling.*

If there are no words indicating it is a hazardous product, it likely isn't. Dispose of it in your regular trash!

## **Do Not Bring**

- ✗ PAINT WILL NOT BE ACCEPTED (LATEX OR OIL-BASED)!!! \*\*\*Paint can be discarded by removing lid to allow to air dry or mix with absorbent (e.g. kitty litter, wood chips) until no longer a liquid & discarded in plastic bag\*\*\*
- ✗ Commercial waste
- ✗ Industrial waste
- ✗ Car batteries
- ✗ Tires
- ✗ Motor oil
- ✗ Ammunition
- ✗ Flares
- ✗ Explosives
- ✗ Empty containers of any kind
- ✗ Radioactive waste
- ✗ Medicines
- ✗ PCBs
- ✗ Smoke detectors
- ✗ Freon
- ✗ Propane tanks
- ✗ Medical waste
- ✗ Biological waste

For additional information, please contact the Accomack-Northampton Planning District Commission at 787-2936 or [www.a-npdc.org](http://www.a-npdc.org)



*This event is a community service sponsored by the ESVA Ground Water Committee. It is made possible by funding from Accomack & Northampton Counties, A-NPDC, VA Coastal Zone Management Program, & NOAA & volunteer work from Waste Watchers of the Eastern Shore. This event is not open to business, industry, or institutions.*

## **PRESS RELEASE**

**Contact : Curt Smith, A-NPDC**  
**Phone: 787-2936 x 114**  
**Email: csmith@a-npdc.org**

### **Household Hazardous Waste Collections Scheduled for Three Locations on May 10**

The Eastern Shore of Virginia Ground Water Committee is pleased to announce that the 10th Annual Household Hazardous Waste Collection will be held on Saturday, May 10 from 10:00 a.m. – 2:00 p.m. The collection is available for residents of Accomack and Northampton and will be offered concurrently at Convenience Centers in Makemie Park (Temperanceville), Fishers Corner (Parksley), and Birdsnest.

The Eastern Shore's landfills are not engineered to handle these materials and hazardous wastes illegally entering the landfill threaten the health of Eastern Shore residents and the environment. Hazardous wastes also tend to accumulate around everyone's homes over time creating unnecessary health and safety risks at home. Every quantity of hazardous waste brought in ensures that that waste will not pollute our water resources on the Eastern Shore and endanger the quality of our water and our health.

Participants can dispose of up to 50 pounds of hazardous waste for free. Additional waste will cost \$1.00 per pound for every pound in excess of 50 pounds. Disposal of the first 50 pounds for free will be available only as funds allow. Interested parties are encouraged to arrive early to ensure a spot. Collections will begin at 10:00 a.m. and end promptly at 2:00 p.m. and will take place rain or shine.

Accepted household wastes include garden chemicals, poisons, repellants, degreasers, fuels including gasoline and kerosene, fungicides, wood preservatives, wood stain, paint thinner and remover, driveway sealers, epoxy, rodent poison, and asbestos. Items not accepted include commercial and industrial wastes, car batteries, tires, motor oil, ammunition, flares, explosives, medical and biological wastes, radioactive waste, medicines, PCBs, smoke detectors, Freon or propane tanks, and empty containers of any kind.

Paint will not be accepted. Oil and latex paints may be disposed of by removing the container lid to allow the paint to air dry or mixing the paint with an absorbent such as kitty litter or wood chips. Once the paint has solidified, place the paint container in a plastic bag and dispose of the container with the regular trash.

If you have questions about the Household Hazardous Waste Collection, please contact Curt Smith of the Accomack-Northampton Planning District Commission at 787-2936.

This event is the only local option for proper disposal of household hazardous waste and is only held once each year. Residents are encouraged to plan for this event each year by storing hazardous wastes in a safe, secure location until the event occurs during the spring of each year.

The event is made possible with funding from Accomack and Northampton Counties, the Accomack-Northampton Planning District Commission, NOAA, and the Virginia Coastal Zone Management Program and with volunteer assistance from Waste Watchers of the Eastern Shore.

## **PRESS RELEASE**

**Contact : Curt Smith, A-NPDC**  
**Phone: 787-2936 x 114**  
**Email: [csmith@a-npdc.org](mailto:csmith@a-npdc.org)**

### **10<sup>th</sup> Annual Household Hazardous Waste Collection Keeps Nearly 1 Ton of Hazardous Materials from Polluting Local Environment and Water Supply**

On Saturday, May 10, over 50 Accomack and Northampton residents dropped off nearly 1 ton of household hazardous waste at the 10<sup>th</sup> Annual Household Hazardous Waste Collection. This year's collection was held concurrently at three locations at Accomack and Northampton County Convenience Centers in Makemie Park, Fishers Corner, and Birdsnest. A variety of hazardous materials were collected for proper disposal and recycling including aerosols, gasoline, kerosene, pesticides, insecticides, acids, fluorescent light bulbs, fertilizers, paint thinners, and asbestos shingles.

The Eastern Shore's landfills are not engineered to handle these hazardous wastes that often illegally enter the landfills or are improperly disposed of by pouring out onto the ground or into a water body. These actions not only increase landfill operating costs putting additional burdens on our local governments, but they also pose a serious health risk to Eastern Shore residents and the environment. All water used by Eastern Shore residents comes from the ground and is very susceptible to contamination from these hazardous wastes which tend to accumulate around everyone's homes over time. Hazardous wastes create unnecessary health and safety risks at home and every quantity brought in through the collection program ensures that that waste will not pollute our water resources on the Eastern Shore and endanger the quality of our water and public health.

Residents are encouraged to plan for participating in the event which will be held annually on the Eastern Shore every spring with the next collection occurring in Spring 2015. For tips on safer use, storage, and disposal of all types of household hazardous waste please contact Curt Smith with the Accomack-Northampton Planning District Commission at 787-2936.

The event is a community service sponsored by the Eastern Shore of Virginia Ground Water Committee and made possible by funding from Accomack and Northampton Counties, Accomack-Northampton Planning District Commission, Virginia Coastal Zone Management Program, and NOAA and volunteer work from Waste Watchers of the Eastern Shore.



*Photograph 1* – 2014 Household Hazardous Waste Collection at Birdsnest site.



*Photograph 2* – Hazardous materials collected during the 2014 Household Hazardous Waste Collection at Fishers Corner Convenience Center.

## Appendix P

Northern Northampton County Ground Water Summit  
Sign-In Sheet, Event Flyer, Press Release, Photographs,  
and Presentations

**EASTERN SHORE OF VIRGINIA GROUND WATER COMMITTEE**  
**Northern Northampton County Ground Water Summit**  
**June 11, 2014**

NAME	AFFILIATION	EMAIL ADDRESS**
		**only necessary if you would like to be included on our distribution list
Curt Smith	A-APPDC	
Brent Waters	Goldier	bwaters@goldier.com
Robert C. Duer	Town of Exmore	rduer@exmore.org
H. Taylor Dukes III	Town of Exmore	tdukes@exmore.org
Dirk Lynch	MSA PC.	edirklynch@gmail.com
William A. Prosis Jr	CITIZEN	PROSIS@AOL.COM
Granville Hogg	CITIZEN/BOB	ghogg@northampton.co.uk
Peter Stith	Northampton County	pstith@co.northampton.va.us
Rick HUBBARD	BOB NORTHAMPTON	
H. B. ARNOLD	CITIZEN	hbnoldsw@verizon.net
Ken DUFFY	"	envivoduf@aol.com
Annie Hess	CITIZEN	ahess@feathertree3.com
Ethan Hess		
Elvin Hess	CITIZEN	ehess@feathertree3.com
Gloria Bradley	CITIZEN/writer	gloria.bradley.consulting@gmail.com
Charles McSwain	NC Dev Office	cmcswin@conncity.com
John Chubb	Citizen/BOB	jchubb@verizon.net



*The Eastern Shore of Virginia Ground Water Committee Presents a Free, Public Educational Event Summarizing the Specific Ground Water Conditions for Eastville, Nassawadox, Exmore, & surrounding areas:*

# **Northern Northampton County Ground Water Summit**



**WEDNESDAY, JUNE 11, 2014**

**6:30 P.M. – 8:00 P.M.**

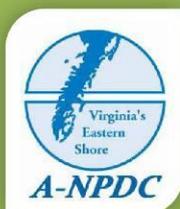
**NORTHAMPTON CO. SUPERVISORS CHAMBERS**

16404 COURTHOUSE ROAD, EASTVILLE

- *Where is our ground water?* ●● *How much is there?* ●●
- *How is it replenished?* ●● *How safe is my water?* ●●
- *Are there ways I can protect it?* ●● *How old is the water?* ●●
- *Should I be worried about the quality of my water?* ●●
- *What is being done to ensure it is safe?* ●●
- *Will my community have sufficient water to sustain itself?* ●●
- *Is there enough to support growth for generations to come?* ●●

**Learn answers to these & many other questions!!!**

*Also, look for upcoming Ground Water Summits for other Eastern Shore communities!  
Please Contact Curt Smith at 787-2936 or [csmith@v-npdc.org](mailto:csmith@v-npdc.org) for more information.*



## **PRESS RELEASE**

**Contact : Curt Smith, A-NPDC**  
**Phone: 787-2936 x 114**  
**Email: csmith@a-npdc.org**

### **Event to Discuss Ground Water Issues and Conditions for Northern Northampton County Scheduled for June 11**

The Eastern Shore of Virginia Ground Water Committee is pleased to invite the public to the Northern Northampton County Ground Water Summit on Wednesday, June 11, from 6:30-8:00 p.m. at the Northampton County Board of Supervisors' Chambers in the County Administration Building at 16404 Courthouse Road in Eastville. This summit will be an educational forum that answers critical questions and concerns related to ground water conditions for Eastville, Nassawadox, Exmore, and surrounding areas.

Ground water is the sole source of drinking water on the Shore and its sustainability and quality are essential for residents and communities. This summit aims to offer participants an opportunity to gain a better understanding of where their water comes from, how and when it got there, what is being done to ensure its quality, and what are its largest threats. Presentations will explore varied topics including the area's geologic evolution, what is and what is not known about the resource, and answer the question: "Is there enough water to support our community for generations to come?".

Britt McMillan, Consulting Hydrogeologist to the Eastern Shore Ground Water Committee, and Curt Smith, Director of Planning for the Accomack-Northampton Planning District Commission, will be presenting and responding to questions from the audience.

This event is the second of a series of community-focused ground water summits presented by the Ground Water Committee. The next summit will be held in October 2014 focusing on southern and central Accomack County communities from Belle Haven to Accomac. Future summits in 2015 will focus on communities from Parksley to Temperanceville and Chincoteague/Saxis/Greenbackville.

For additional information, please see the event flyer here or contact Curt Smith at 787-2936.

## A-NPDC Overview and Purpose



- Commonwealth created 21 PDCs in 1970 to address regional issues by fostering cooperation amongst localities and cooperation between state & localities
- Accomack-Northampton Planning District:
  - Members: 2 Counties and Town of Chincoteague
  - Also provides services to 18 other towns
- Affiliate Organizations:
  - A-N Regional Housing Authority → provides privately or authority-owned rental housing
  - ESV Housing Alliance → improving housing for homeowners
  - A-NPDC →
    - Community Development
    - Economic Development
    - Transportation Planning
    - Environmental Planning → Ground Water Committee; Climate Adaptation Working Group

Accomack-Northampton Planning District Commission

## ESVA Ground Water Committee

### Current Members

<b>Accomack Co.</b>	<b>Northampton Co.</b>
Jim Belote	Gene Hampton
Grayson Chesser	Peter Henderson
J.W. Jeffries	Granville Hogg
Wanda J. Thornton, Vice Chairman	Richard Hubbard, Chairman
<b>Non-Voting Ex-Officio</b>	
Steve Miner	
Katie Nunez	
Elaine Meil, Secretary	

### Created as bi-county committee in 1990 to:

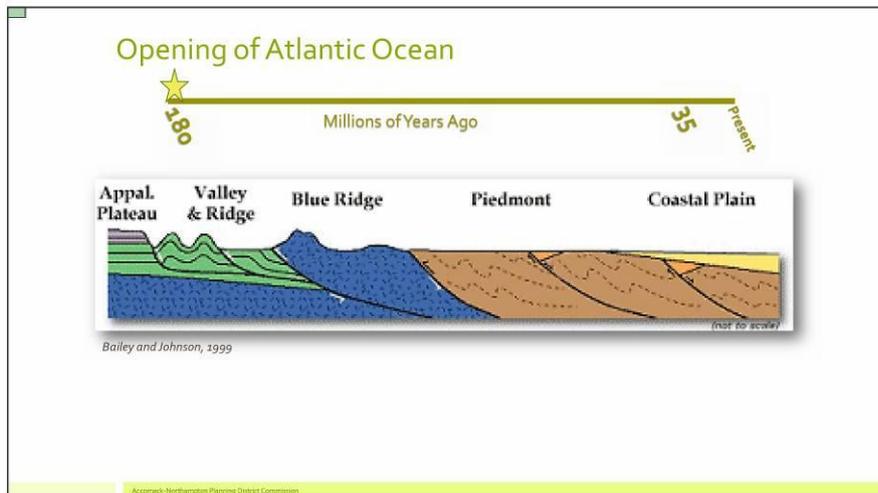
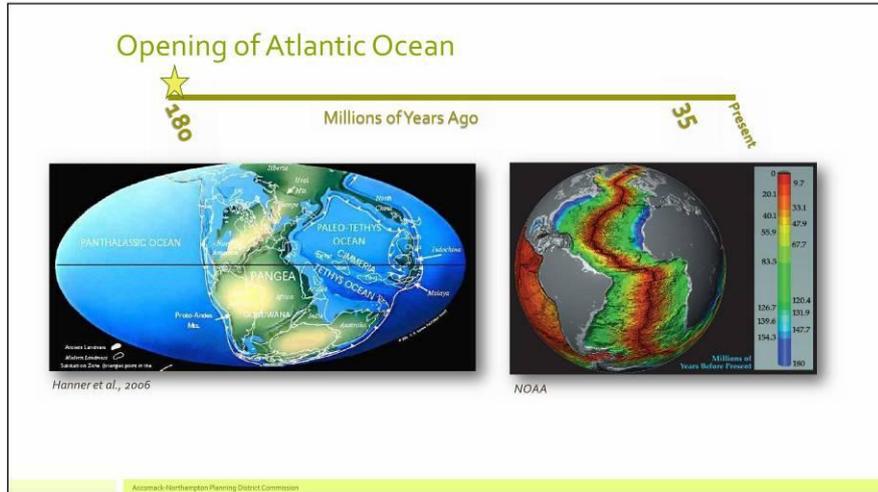
- ❑ Assist local governments & residents in understanding, protecting, & managing GW resources
  - Household Hazardous Waste Collection (2004-2014)
- ❑ Prepare a GW resources protection & management plan (Created 1992, Updated 2013)
  - Water Supply Plans (2011)
- ❑ Serve as an educational & informational resource
  - Public Workshops
  - GW Website
  - ESVA GW Award Program
- ❑ Initiate special studies concerning the protection & management of the GW resource
  - ESVA GW Model
  - Water Quality Studies – 2001, 2013
- ❑ Coordinate & communicate among parties responsible for GW protection, management, & research

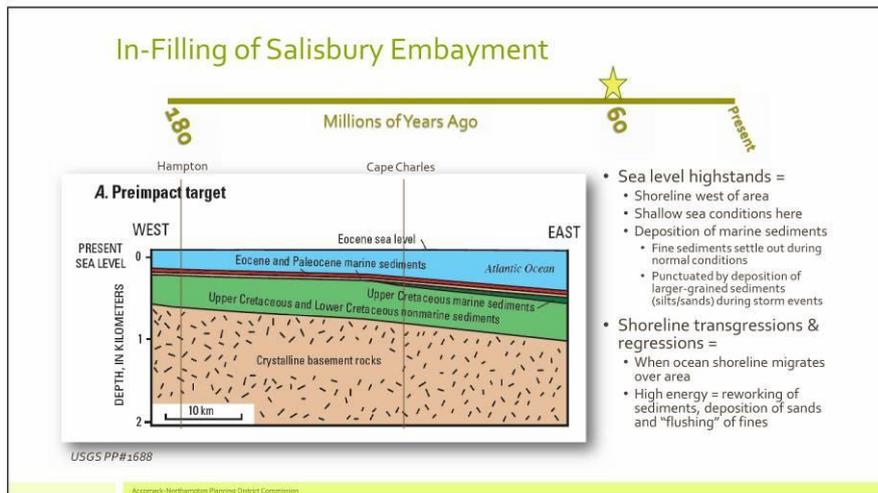
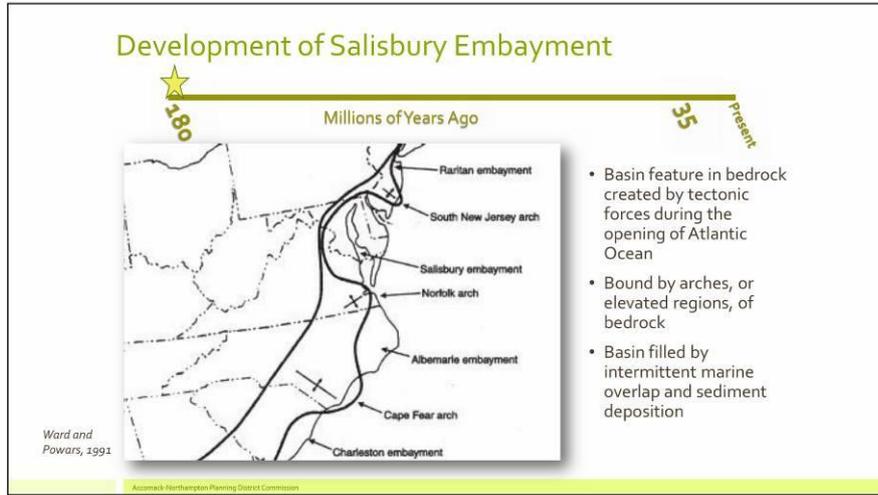
Accomack-Northampton Planning District Commission

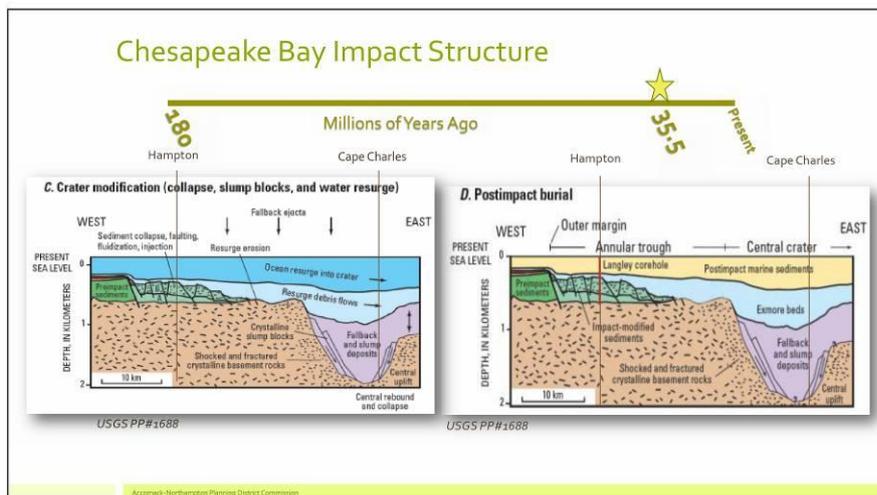
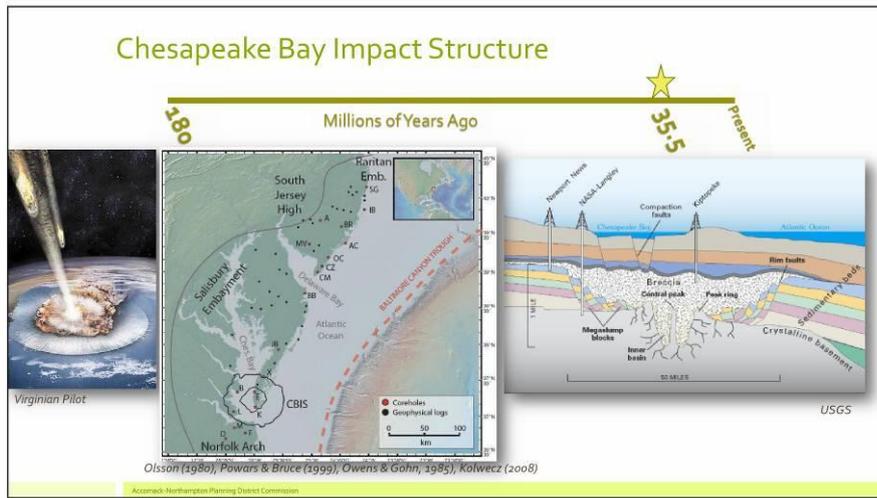
## Presentation Overview

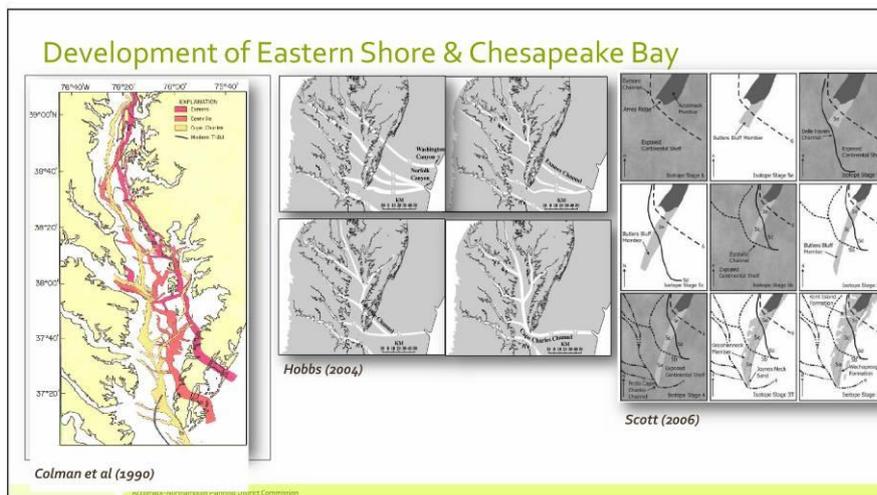
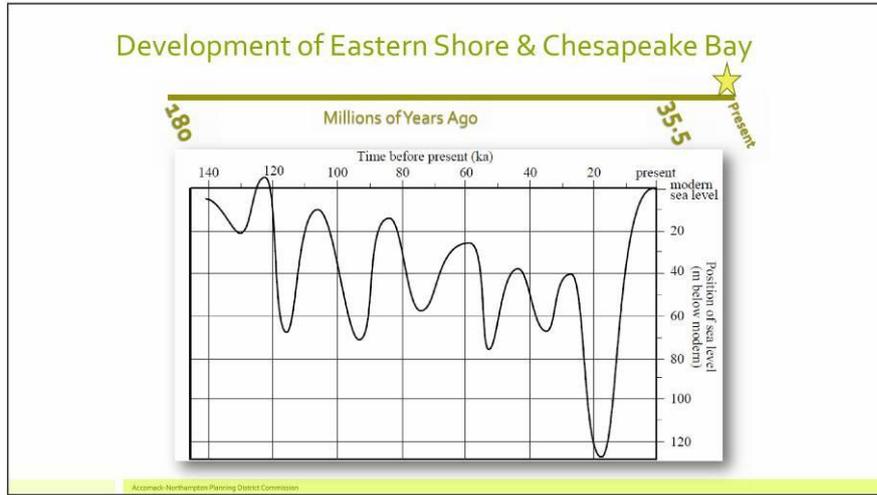
- Causes of Geologic Change:
  - Uniform and gradual land subsidence and fluctuations in sea level working in tandem with punctuated catastrophic events (meteor impact, storms, etc.)
- Timeline:
  - i. Opening of Atlantic Ocean & Salisbury Embayment – **≈180 Million Years Ago (MYA)**
  - ii. Filling of Salisbury Embayment (Potomac Formation) – **≈180 to 35.5 MYA**
  - iii. Bolide impact & removal of pre-impact sediments – **≈35.5 MYA**
  - iv. Deposition of post-impact sediments – **≈35.5 MYA – Present**
  - v. Reworking of surficial sediments & progradation of peninsula – **≈200,000 YA – Present**
  - vi. Sea level reaches elevation of modern Chesapeake Bay transitioning system from riverine to estuarine - **≈8,000 YA**
  - vii. Sea level continues to rise and inundate the Chesapeake Bay watershed and the Chesapeake Bay begins to take its modern appearance we currently recognize - **≈3,000 YA**

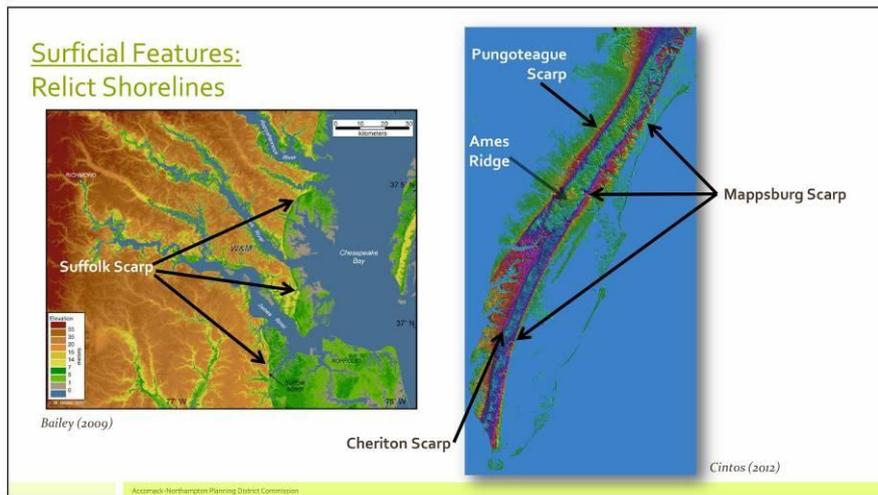
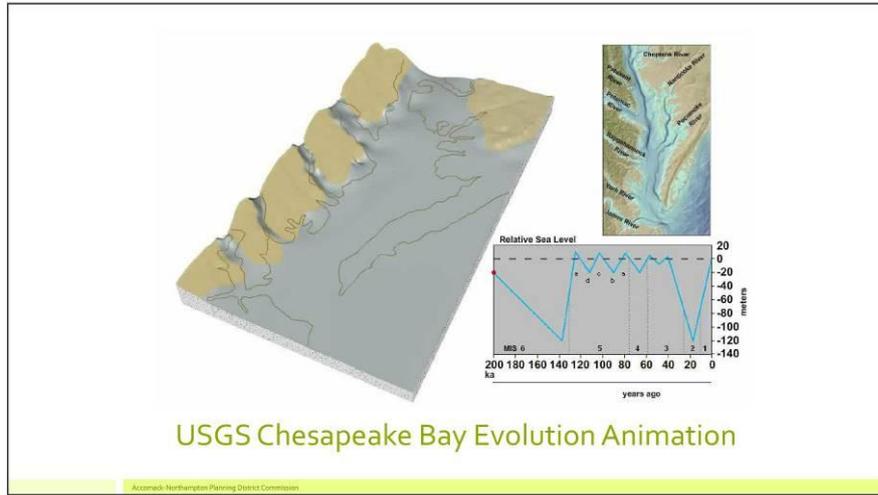
Accomack-Northampton Planning District Commission

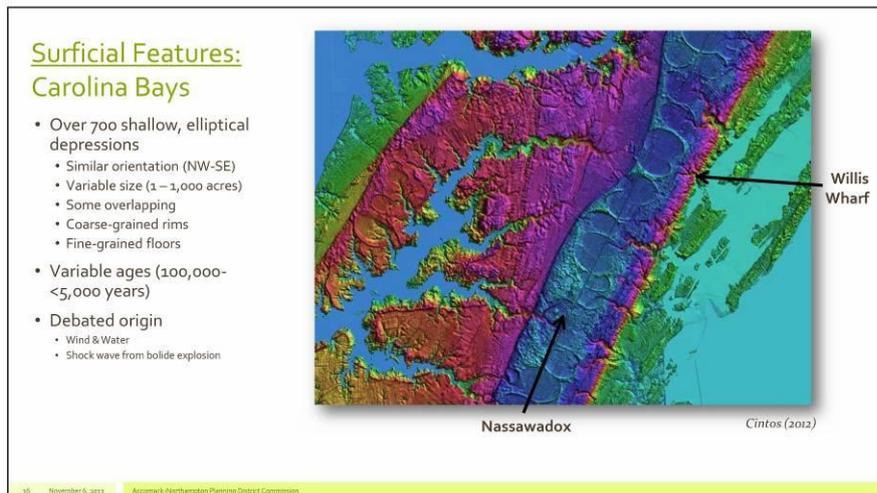
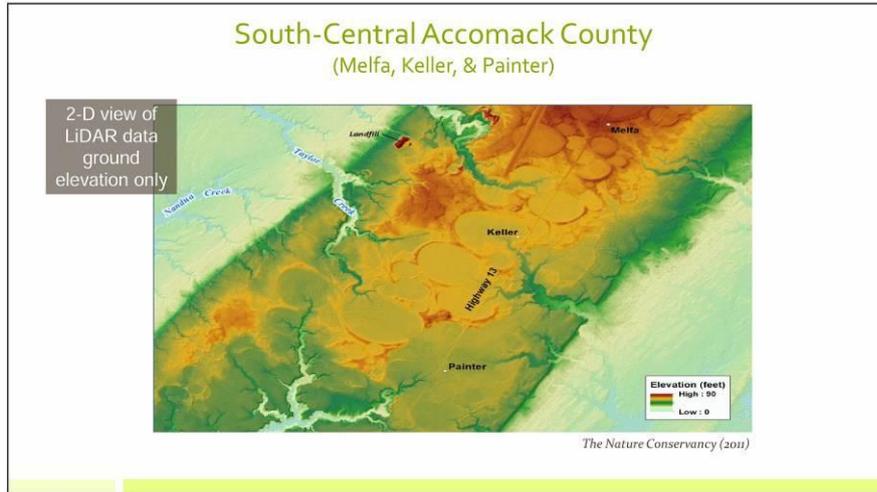






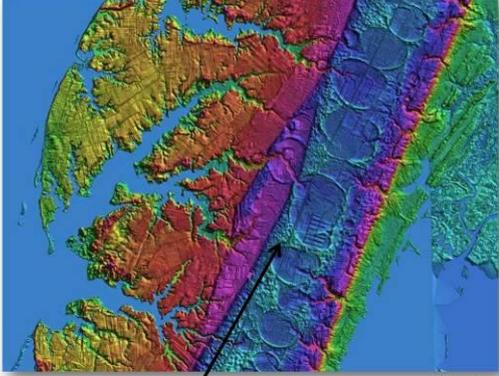






**Surficial Features:  
Carolina Bays**

- Over 700 shallow, elliptical depressions
  - Similar orientation (NW-SE)
  - Variable size (1 – 1,000 acres)
  - Some overlapping
  - Coarse-grained rims
  - Fine-grained floors
- Variable ages (100,000- <5,000 years)
- Debated origin
  - Wind & Water
  - Shock wave from bolide explosion



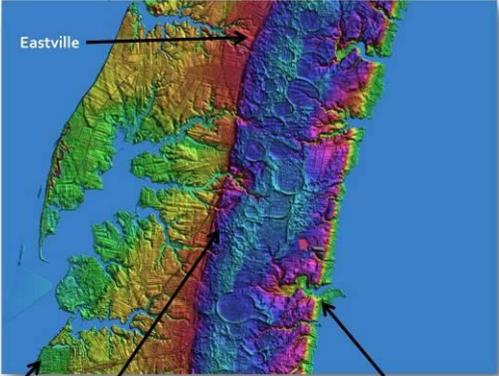
Machipongo

*Cintos (2012)*

17 November 6, 2013 Accomack-Norfolk Planning District Commission

**Surficial Features:  
Carolina Bays**

- Over 700 shallow, elliptical depressions
  - Similar orientation (NW-SE)
  - Variable size (1 – 1,000 acres)
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  - Coarse-grained rims
  - Fine-grained floors
- Variable ages (100,000- <5,000 years)
- Debated origin
  - Wind & Water
  - Shock wave from bolide explosion



Eastville

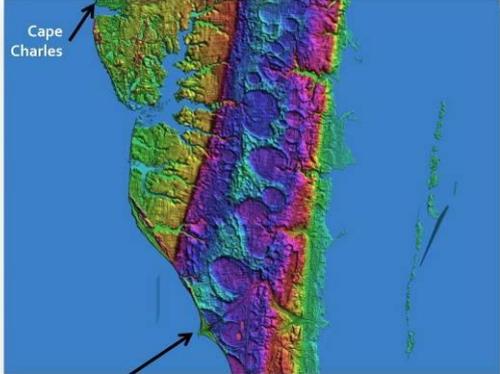
Cape Charles Cheriton Oyster

*Cintos (2012)*

Accomack-Norfolk Planning District Commission

**Surficial Features:  
Carolina Bays**

- Over 700 shallow, elliptical depressions
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Cape Charles

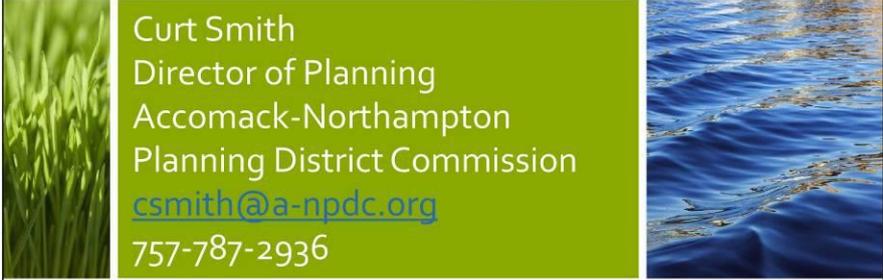
Kiptopeke SP

Cintos (2012)

Accomack-Northampton Planning District Commission



**Curt Smith**  
Director of Planning  
Accomack-Northampton  
Planning District Commission  
[csmith@a-npdc.org](mailto:csmith@a-npdc.org)  
757-787-2936



# Eastern Shore of Virginia

## *Groundwater Resources on the Eastern Shore of Virginia*

From Eastville to Exmore

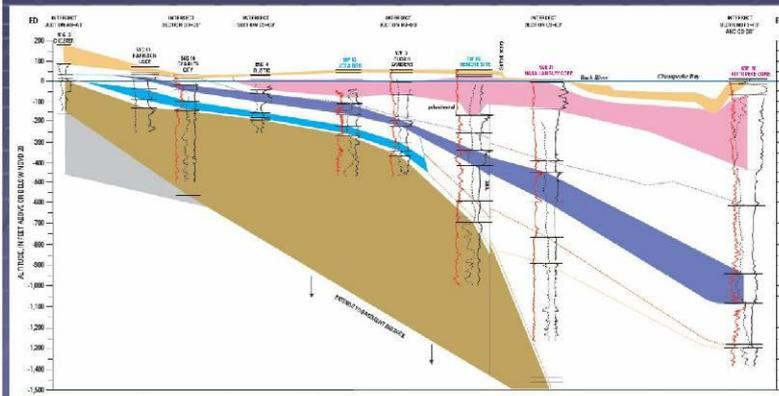
June 2014



## Eastville to Exmore

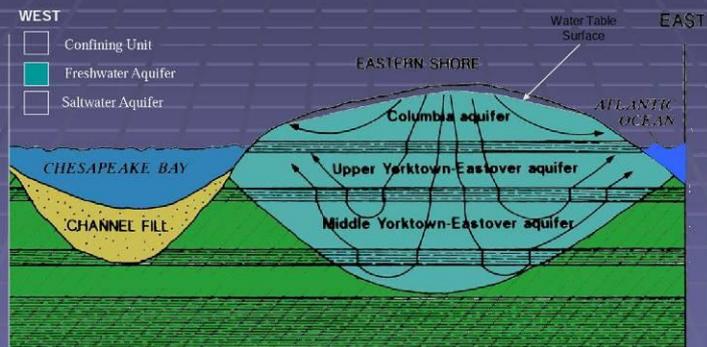


## Hydrogeology of the Eastern Shore: Meteorite destroyed most aquifers deeper than Yorktown-Eastover in Northampton County



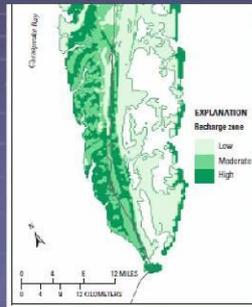
## Water Table and Fresh Water Confined Aquifers

Fresh ground water is restricted to depths less than 350 feet

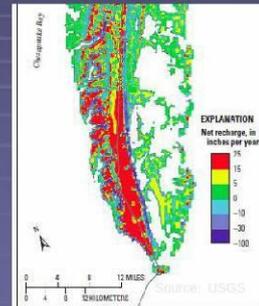


## Recharge to the water table is a function of soil type, slope, and location

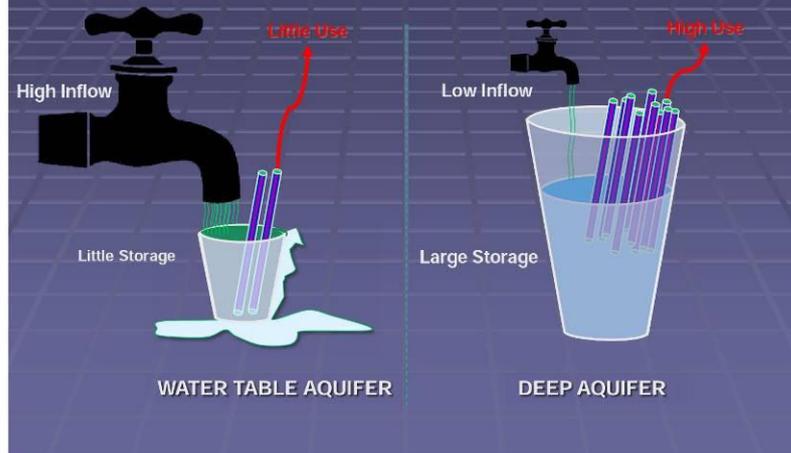
Potential Recharge areas (based on soil type and slope)



Estimated Recharge Rates

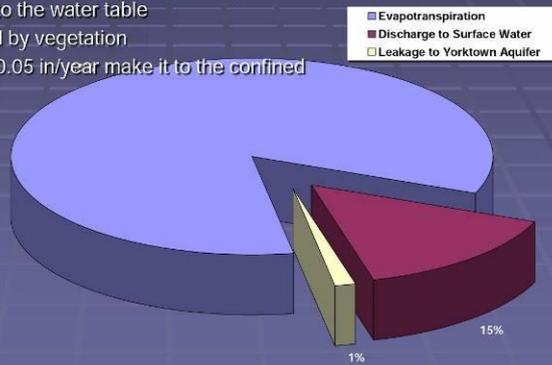


## Water Table / Yorktown Dilemma



Of the water infiltrating to the water table, only a small amount reaches the Yorktown aquifer

- Limited Recharge:
  - Of the 44-inches of annual precipitation only 5 to 6 inches infiltrate to the water table
  - Most is removed by vegetation
  - And only about 0.05 in/year make it to the confined aquifer ( $\approx 1\%$ )

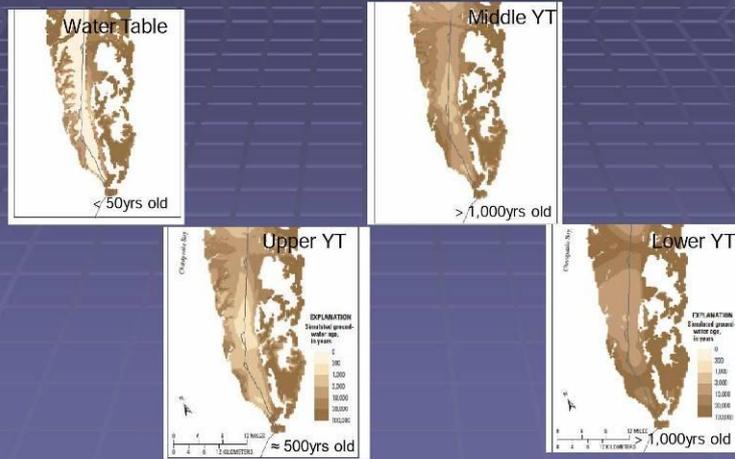


## Irrigation Ponds

- Water table is the sustainable groundwater resource
- Use of ponds that are excavated below groundwater table (not deep enough to reach the Yorktown aquifer) are a good storage option for this water
- Storage in the ponds can offset the lack of storage in the Columbia

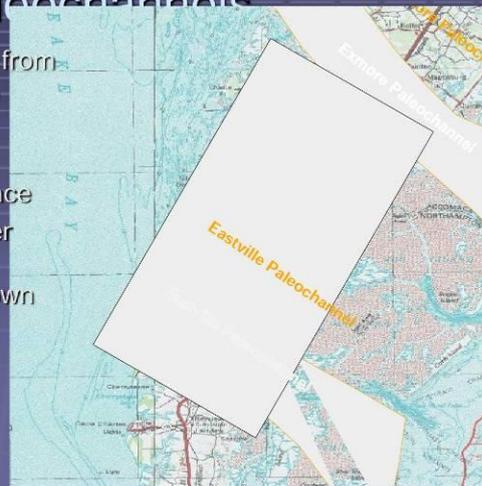


## Age of the water table is recent – Yorktown-Eastover is ancient

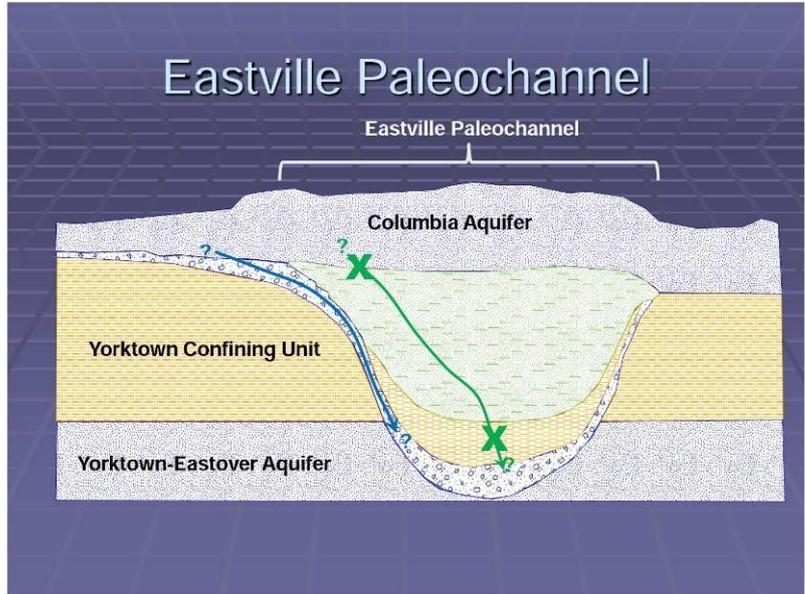


## Eastville and Exmore Paleochannels

- Removed sediments from the original Yorktown Confining Unit
- Deposited other sediments in their place
- Effect on groundwater flow between the Columbia and Yorktown-Eastover aquifers is uncertain



# Eastville Paleochannel

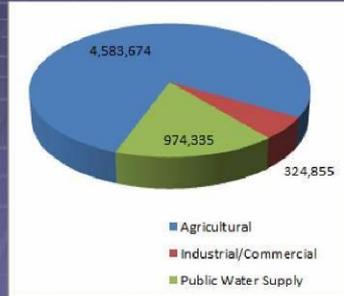


# Permitted Groundwater Withdrawals



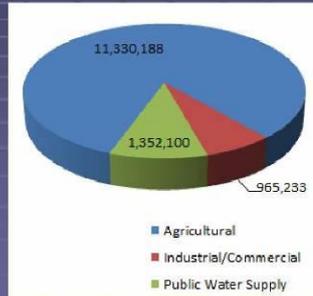
# Permitted Groundwater Withdrawal Amounts

Annual Permit (GPD)



Total ≈ 6 MGD

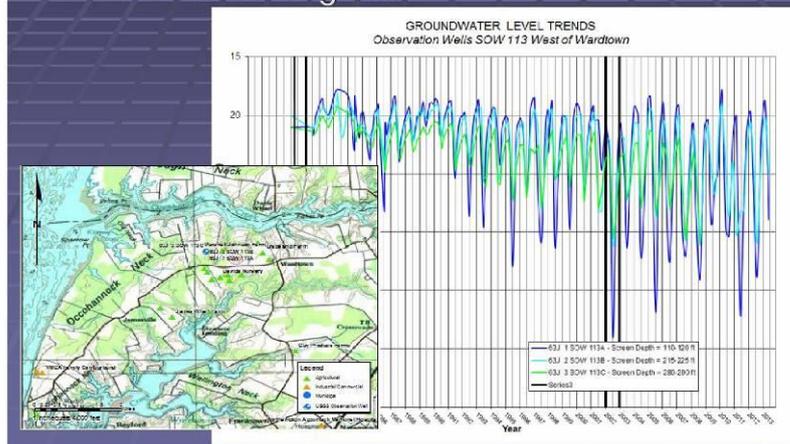
Monthly Maximum Permit (GPD)



Total ≈ 14 MGD

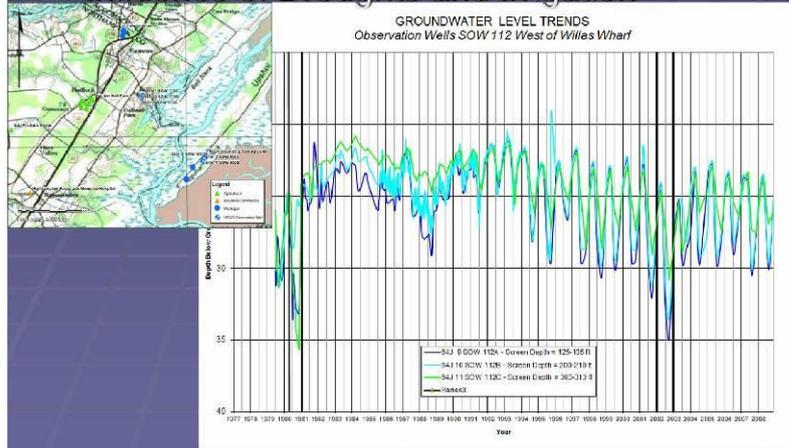
# Observed Water Level Trends

## ■ Influence of Irrigation

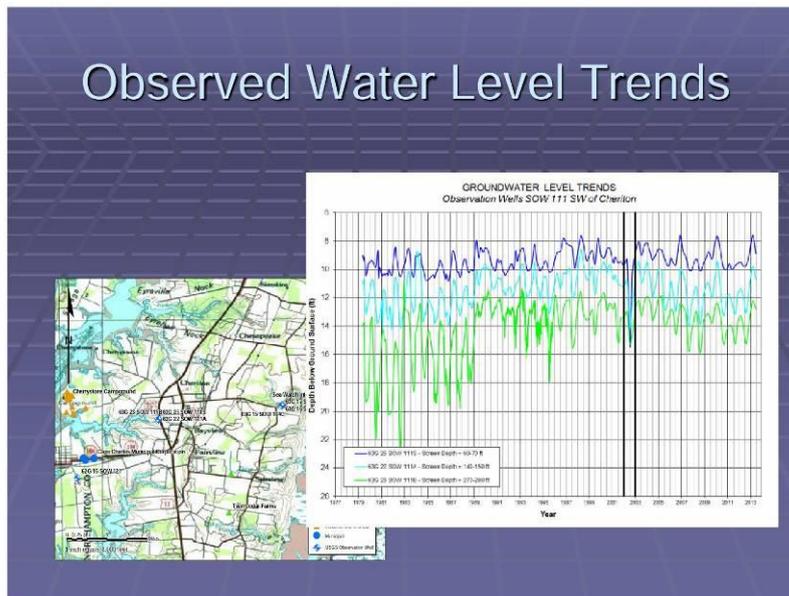


# Observed Water Level Trends

## ■ Influence of Droughts and Irrigation

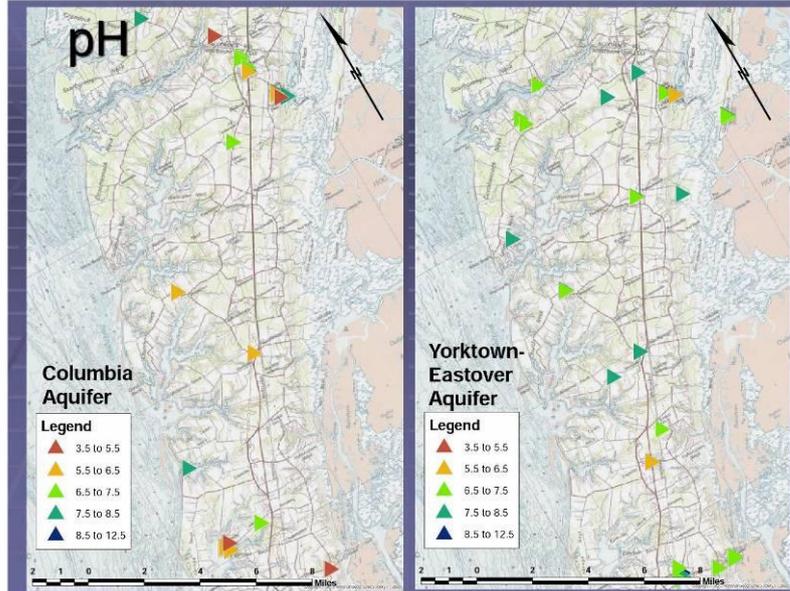


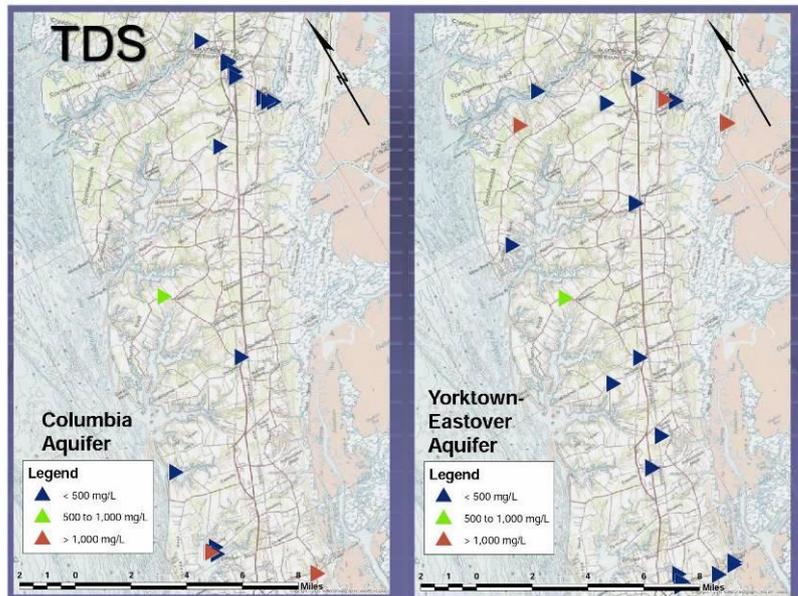
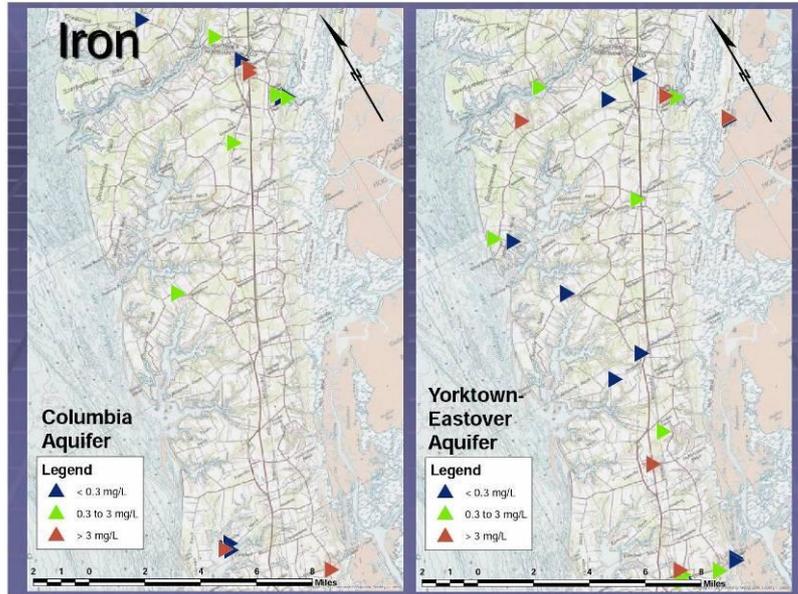
# Observed Water Level Trends

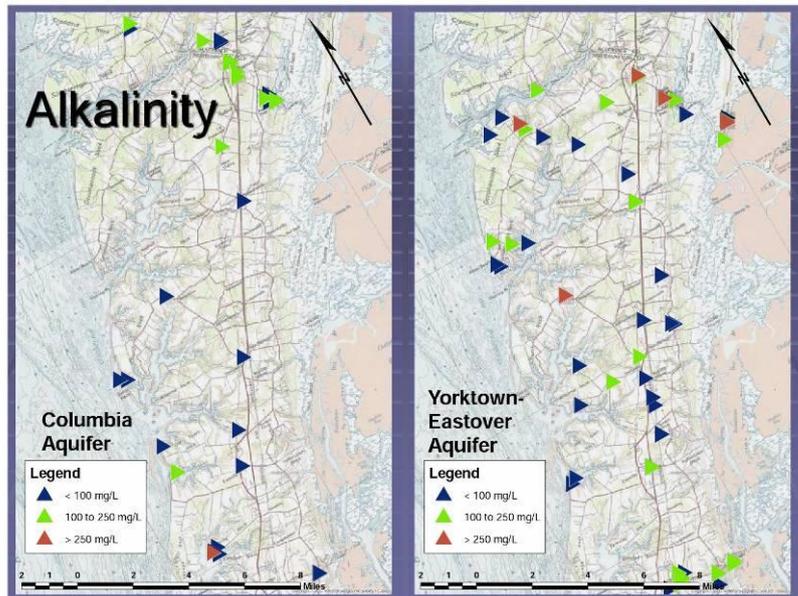
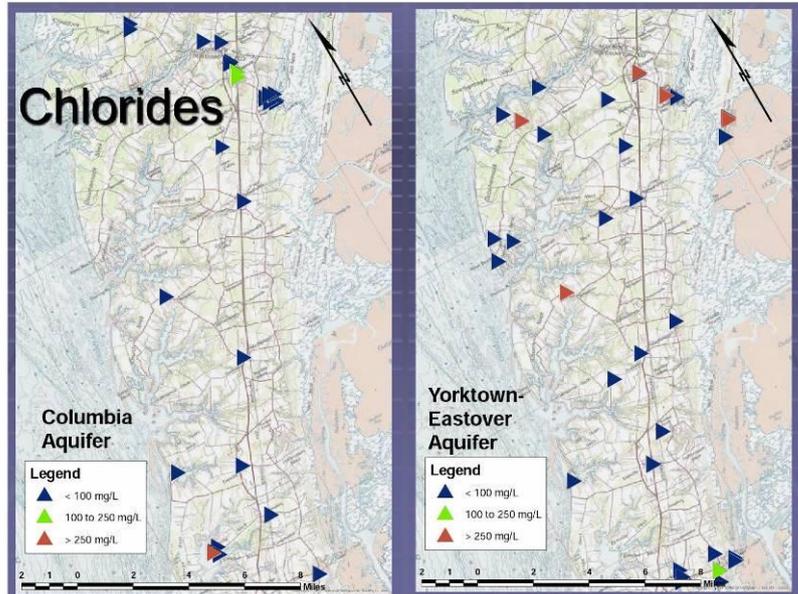


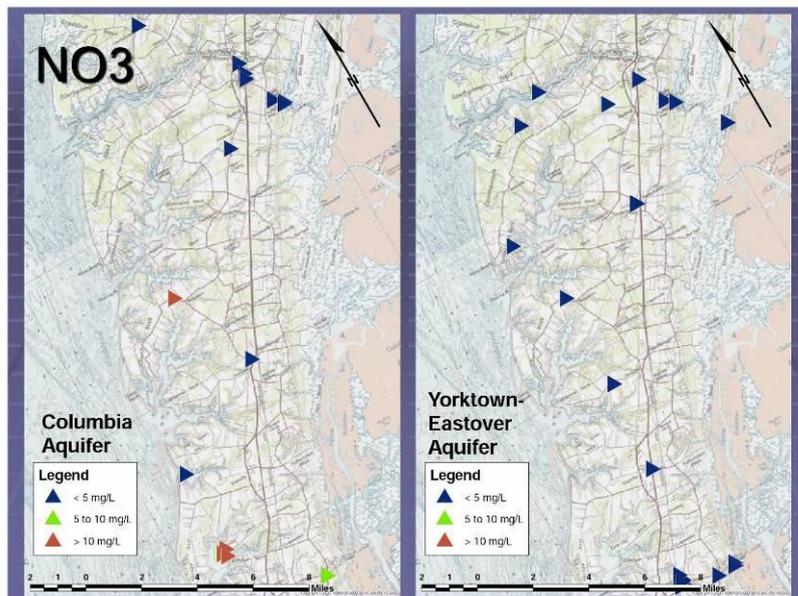
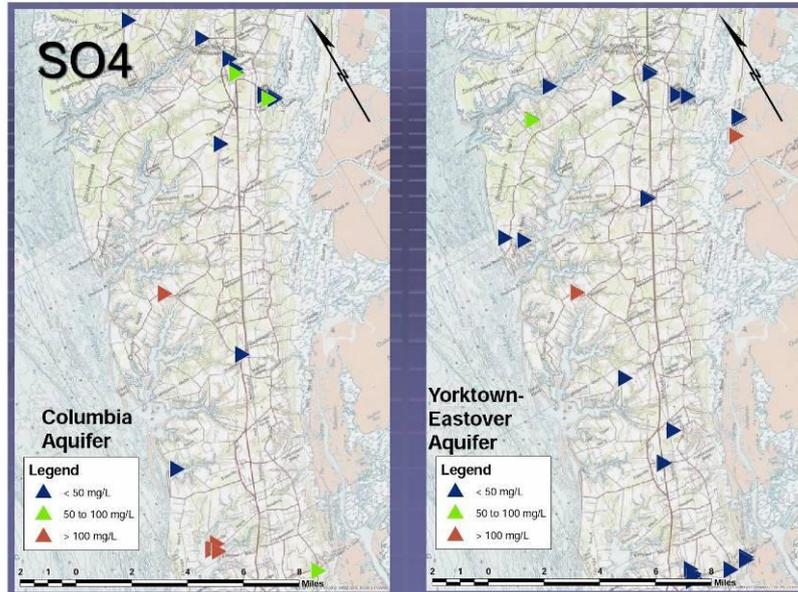
# Groundwater Quality

- Multiple sources:
  - USGS – USGS studies and “warehouse” for data
  - DEQ (routine regulatory reporting)
  - Periodic studies: Universities (VPI, RMC, UVA) and ANPDC
  - Health Department

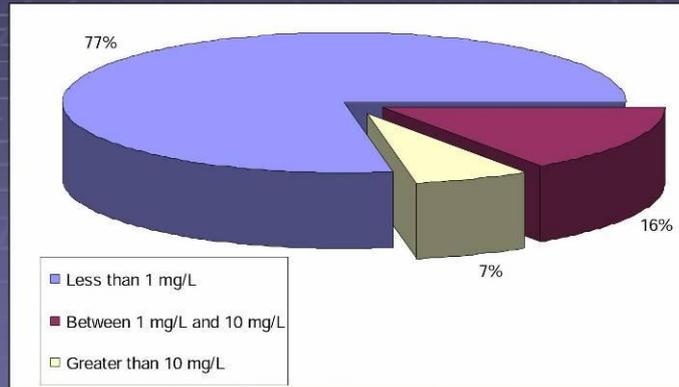




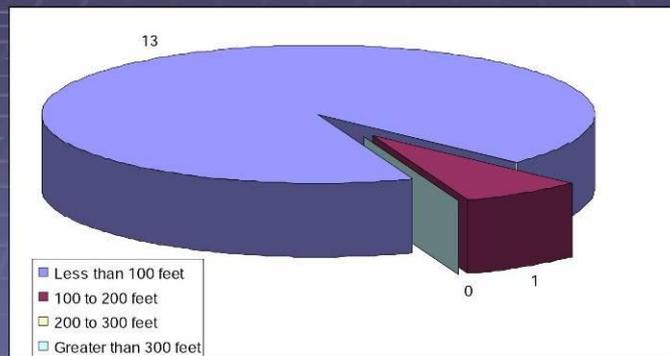




### Nitrate From VPI 1993 Study – Percent Exceeding Drinking Water MCL

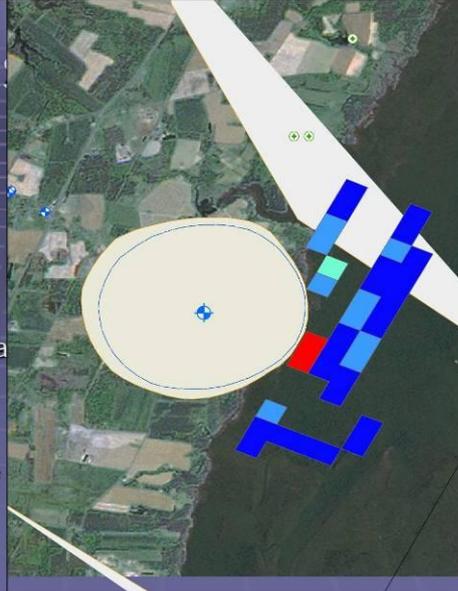


### Nitrate From VPI 1993 Study – Exceeding Drinking Water MCL by Depth

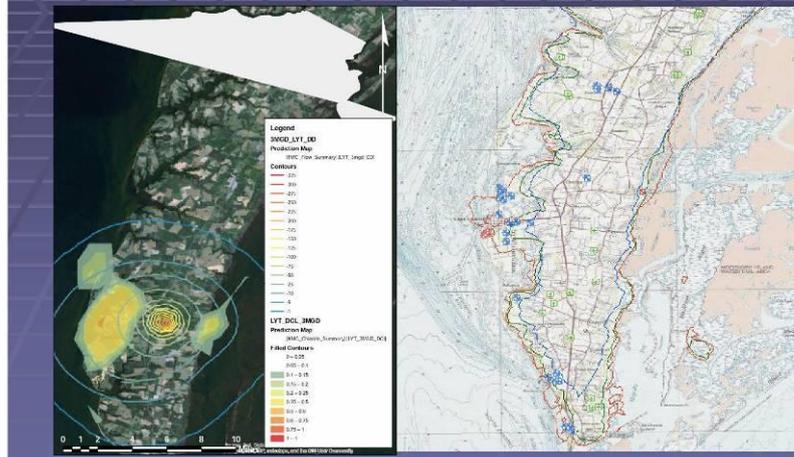


## Potential for

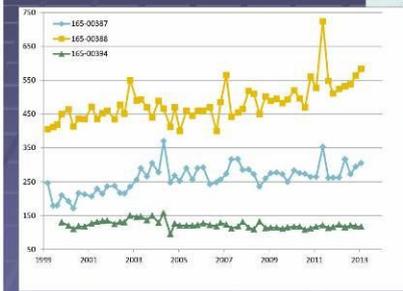
- Seaford Farm
- Annual  $\approx 83,000$  gpd
- Maximum Month  $\approx 358,000$  gpd
- Analysis completed by DEQ
- Expect an increase in salt water resulting from the withdrawal
- Impacts most likely restricted to the edge of the freshwater lens, offshore



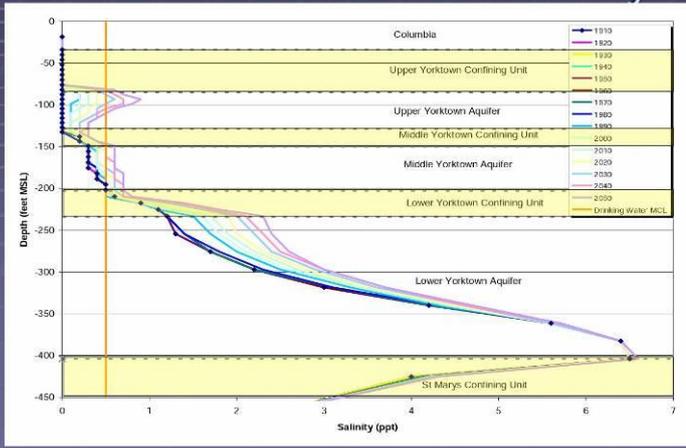
## Saltwater Intrusion in Yorktown-Eastover



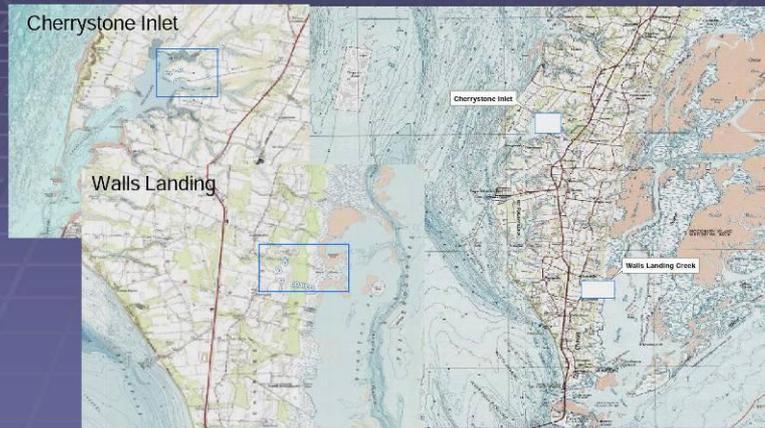
# Measured Salinity



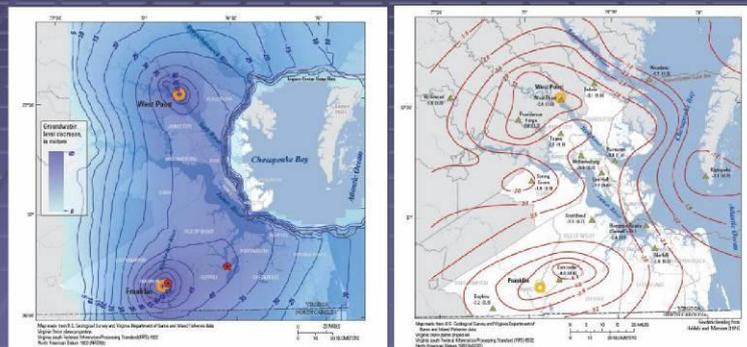
# Town of Cape Charles Model Predicted Water Quality



## Other Studies: Shallow Groundwater Discharge to Creeks and Bays



## Other Studies: Relative Sea Level Rise – lower than other areas in Virginia thanks to the meteorite impact



## Overall Summary

- Northern end of Northampton County is one of the lesser studied areas on the Eastern Shore
- Due to it's location near the southern tip of the Delmarva Peninsula, available yield is substantially less than areas to the north
- Saltwater intrusion limits withdrawals along the Bay and Seaside
- Lowered water levels limit withdrawals along the central spine (near Rt. 13)

## Overall Summary – Groundwater Availability

- Current use appears to be sustainable.
- As much as 1 MGD of additional groundwater can be sustainably withdrawn from the Yorktown-Eastover if the well field is properly located and developed.
- Columbia (Surficial) aquifer recharges at about 100x faster than Yorktown-Eastover.
- Appropriate storm water management (LIDs) can be used with development to preserve the high recharge to the Columbia.
- Greater than 1 MGD of additional groundwater can be sustainably withdrawn from the Columbia (Surficial) aquifer. Space requirement (low per well yield) is the greatest limiting factor.

## Overall Summary – Water Use and Water Levels

- Peak water use was in the 1980's when KMC and similar industries were in operation.
- Water levels that were lowered from the past operations have recovered and are largely stabilized.
- Influence of irrigation use is apparent in water level measurements.

## Overall Summary – Water Quality

- Groundwater quality in both Water Table (Columbia / Surficial) and Yorktown-Eastover is good.
- Areas near the Bay and Seaside are susceptible to saltwater intrusion. Some saltwater intrusion has been observed to the south in the Cape Charles area.
- Areas affected by saltwater intrusion can be limited and/or treated through membrane treatment systems.
- Yorktown-Eastover is much more susceptible to saltwater intrusion than the Columbia (water table)
- Risk for saltwater intrusion can be greatly reduced by maximizing use of the Columbia where possible.

## Overall Summary – Water Quality

- High iron is a common problem in both the Columbia and Yorktown-Eastover
- Columbia (Surficial / Water Table)
  - Low pH
  - Generally high nitrates (from land use)
  - Localized high sulfates (likely natural sources)
  - More susceptible to land use contamination
- Yorktown-Eastover
  - High hardness (greater with depth)
  - High dissolved solids and salts (greater with depth and closer to coast)

## Overall Summary – Future Research

- Influence of the Eastville and Exmore paleochannels on flow and recharge between the Columbia and Yorktown-Eastover.
- Saltwater intrusion along the coastal areas. Saltwater intrusion through upconing.
- Influence of land use on groundwater quality.

## Appendix Q

Shore Big Tree Dedication Ceremony Photographs and  
News Articles



Photograph 1 – Curt Smith addressing the crowd at the A-NPDC Shore Big Tree dedication ceremony



Photograph 2 – Curt Smith discussing the A-NPDC Shore Big Tree with Accomack County Supervisor, Laura Belle Gordy.



Photograph 3 – A-NPDC staff and Shore Big Tree partners from VCZMP, ES Soil and Water Conservation District and Accomack County standing with the A-NPDC Shore Big Tree.

## Appendix R

Minutes of the October 15, 2013 Eastern Shore of  
Virginia Ground Water Committee

Minutes of the  
Eastern Shore of Virginia Ground Water Committee

The meeting of the Eastern Shore of Virginia Ground Water Committee was held at 10:00 AM on Tuesday, October 15, 2013 in the Conference Room of the Enterprise Building in Accomac, Virginia.

Members Present:

Richard Hubbard, Chairman  
Wanda Thornton, Vice Chairman  
Elaine Meil, Secretary  
Jim Belote  
Larry Trala  
J. W. Jeffries  
Grayson Chesser  
Peter Henderson

Members Absent:

Steve Miner  
Katherine Nunez  
Eugene R. Hampton

Others Present:

Britt McMillan, Malcolm Pirnie  
Harvey Spurlock, Town of Chincoteague  
Cole Charnock, ESSWCD  
Jon Richardson, ES Health District  
Spiro Papadopoulos, Chincoteague Wastewater Advisory Committee  
Deborah Christie, Congressman Scott Rigell's Office

1. Call to Order

Chairman Hubbard called the meeting to order at 10:01 a.m.

2. Minutes of the September 17, 2013 Meeting

The September 17, 2013 minutes were presented.

**Committee Member Trala moved to approve the Minutes of August 20, 2013 meeting as presented. Seconded by Committee Member Jeffries, the motion carried unanimously.**

3. Financial Status Report

The FY 2014 Financial Status Report was presented.

Bills Payable

No bills payable

*Total Bills Payable: \$0.00*

**Vice Chairman Thornton moved to approve the FY 2014 Financial Status Report as presented. The motion was seconded by Committee Member Jeffries and carried by unanimous vote.**

4. Staff Update

The following Staff Updates were presented:

Committee Attendance Record

The FY2014 Committee Attendance Record was presented.

Environmental Reviews

None.

VPDES Permits

None.

Ground Water Permit Comment Letters

Comment letters submitted to DEQ were included for review:

- Accomack Co. Office Building (October 8)

Informational Items

Staff presented two articles related Exmore's enforcement of water restrictions and a management issues facing local governments including stormwater management, the Chesapeake Bay TMDL/WIP, water supply, and sea level rise/recurrent flooding.

Other Items

*Letter to DEQ regarding Centralization of Groundwater Withdrawal Staff and Support for the Groundwater Committee*

The letter was presented for review and approval for submission was granted.

*Letter to VDH regarding Safety and Health in Facilitating a Transition (SHIFT) Stakeholder Advisory Committee*

Staff presented the letter and indicated its submission on September 23.

*R-MC Study Outreach*

Staff presented a press release published in the *Eastern Shore News*. Staff indicated that edits to the participant report template were complete and that staff will compile reports for each participant and distribute in the coming weeks.

*Virginia Water Laws and Regulations Workshop*

Staff presented information about the November 21 workshop and the Committee requested that workshop items be ordered and made available to Accomack and Northampton Counties.

*Virginia Master Well Owner Network Training*

Staff reported that Erin Ling is planning to give a presentation to the Committee during the November meeting.

*ESVA Hazard Mitigation Plan*

Staff reported that A-NPDC submitted an application for VDEM funding to completely rewrite the plan during the next two years in order to complete the project prior to the required 5-year update timeframe.

5. Ground Water Consultant Report

Technical/Regulatory/Educational Items

1. *Draft Groundwater Protection and Preservation Plan* –

The Committee had very minor edits to the final draft of the plan and reached a consensus approval of the updated plan pending completion of suggested minor edits.

2. DEQ Review and Comments on the Draft Water Supply Plans for Accomack County and Northampton County

Britt reviewed the DEQ comments for each county's plan including three items required for immediate compliance. Curt and Britt reported that the compliance issues would be completed and reported to DEQ in a timely manner.

3. Agriculture and Green Communities Update

Britt reported that contacts for the effort had been researched and initial contact with the VA Nursery and Landscape Assoc. had been made.

4. Tipton & Walker Farms Letters of Commendation

Britt did not address this due to time constraints.

Ground Water Permits

1. Permit Applications –

- Newman North Farm - Information was included in the packet but no discussion occurred during the meeting. No comments were presented.
- Captains Cove – No information was included in the packet but Britt presented a review of the draft permit application indicating that approximately half of the volume previously permitted was being requested in the current application. The use occurs from 6 wells in the Yorktown for a public water supply. Britt indicated that saltwater intrusion was a concern in the area of the wells and recommended that monitoring be implemented. It was revealed that additional data and analysis of NASA-WFF use data could make changes to the forecasted impact to saltwater intrusion. The Committee reached consensus to submit a letter of support as long as saltwater intrusion monitoring is implemented if no significant changes are expected following DEQ's further analysis.

2. Issued Permits –

- Jones 3 Farm - Information was included in the packet but no discussion occurred during the meeting. No comments were presented.
- Custis Farm - Information was included in the packet but no discussion occurred during the meeting. No comments were presented.
- Shelley Farm - Information was included in the packet but no discussion occurred during the meeting. No comments were presented.

Committee Work Plan-Related Items

None.

Community Presentations

1. Public Workshops:

It was reported that the first in the new series of public workshops summarizing groundwater conditions in and around communities of the Shore would be in the Cape Charles/Cheriton area and occur in February 2014.

Britt indicated that the presentation would specifically focus on groundwater quality, aquifer yield characteristics, and factors influencing sustainability for that specific region.

Other Items

None.

6. Other Matters

None.

7. Public Participation

Jon Richardson reported that no new updates were available regarding the privatization of AOSEs and the SHIFT Committee, although meetings had been scheduled to address the issue.

8. Schedule Next Meeting

The next Committee meeting was scheduled for 10:00 AM on November 19, 2013 in the A-NPDC Conference Room in Accomac.

9. Adjournment

**There being no further business brought before the Committee, Vice Chairman Thornton moved to adjourn the meeting. The motion was seconded by Committee Member Trala and carried by unanimous vote.**

**Chairman Hubbard adjourned the meeting at 12:04 p.m.**

\_\_\_\_\_  
Richard Hubbard, Chairman

Copy test:

\_\_\_\_\_  
Elaine K. N. Meil, Secretary

## Appendix S

Minutes of the November 19, 2013 Eastern Shore of  
Virginia Ground Water Committee

Minutes of the  
Eastern Shore of Virginia Ground Water Committee

The meeting of the Eastern Shore of Virginia Ground Water Committee was held at 10:00 AM on Tuesday, November 19, 2013 in the A-NPDC Conference Room of the Enterprise Building in Accomac, Virginia.

Members Present:

Richard Hubbard, Chairman  
Wanda Thornton, Vice Chairman  
Elaine Meil, Secretary  
Jim Belote  
Eugene R. Hampton  
J. W. Jeffries  
Peter Henderson

Members Absent:

Steve Miner  
Katherine Nunez  
Larry Trala  
Grayson Chesser

Others Present:

Britt McMillan, Malcolm Pirnie  
Harvey Spurlock, Town of Chincoteague  
Carmie Duer, ESSWCD  
Cole Charnock, ESSWCD  
Owen Hooks, NASA-WFF  
Spiro Papadopoulos, Chincoteague Wastewater Advisory Committee

1. Call to Order

Chairman Hubbard called the meeting to order at 10:04 a.m.

2. Other Matters

Chairman Hubbard proposed moving the VAMWON presentation forward on the agenda to accommodate teleconferencing.

*VA Master Well Owner Network Training Opportunity Presentation – Erin Ling, VA Household Water Quality Program/VA Master Well Owner Network*

Ms. Ling presented information on the VHWQP and VAMWON programs and requested input from the Committee concerning the development of a VAMWON training on the Shore in April or May of 2014.

3. Minutes of the October 15, 2013 Meeting

The October 15, 2013 minutes were presented.

**Vice Chairman Thornton moved to approve the Minutes of October 15, 2013 meeting as presented. Seconded by Committee Member Henderson, the motion carried unanimously.**

4. Financial Status Report

The FY 2014 Financial Status Report was presented.

Bills Payable

Arcadis-Malcolm Pirnie – partial completion of GW Mgmt. Plan contract - \$7,260

Arcadis-Malcolm Pirnie – 1<sup>st</sup> Qtr. FY14 assistance - \$5,250

*Total Bills Payable: \$12,510.00*

**Vice Chairman Thornton moved to approve the FY 2014 Financial Status Report as presented. The motion was seconded by Committee Member Belote and carried by unanimous vote.**

Accomack Co. FY15 Budget Request

Staff requested the Committee's consent for submission of the FY15 work plan. Level funding of \$19,721 for the same scope of work as FY14 was proposed.

**Committee Member Belote moved to approve the submittal of the FY 2015 Accomack County Budget Request as presented. The motion was seconded by Committee Member Hampton and carried by unanimous vote.**

Northampton Co. FY15 Budget Request

Staff requested the Committee's consent for submission of the FY15 work plan. Level funding of \$17,885 for the same scope of work as FY14 was proposed.

**Committee Member Henderson moved to approve the submittal of the FY 2015 Northampton County Budget Request as presented. The motion was seconded by Vice Chairman Thornton and carried by unanimous vote.**

5. Public Nomination for 2013 Ground Water Award

Staff requested nominations for the 2013 Award. Discussion regarding potential nominees ensued.

**Vice Chairman Thornton nominated the Eastern Shore Rural Health Onley Community Health Center and moved to present them with the 2013 Eastern Shore of Virginia Ground Water Award for exemplary protection and conservation of water resources during the construction of their facility. The motion was seconded by Committee Member Hampton and carried by unanimous vote.**

6. Staff Update

The following Staff Updates were presented:

Committee Attendance Record

The FY2014 Committee Attendance Record was presented.

Environmental Reviews

None.

VPDES Permits

None.

Ground Water Permit Comment Letters

None.

Informational Items

*Slow-moving Eastern Shore groundwater could delay full impact of nitrogen reductions for decades – Bay Journal, 11/11/13*

Staff presented the article highlighting USGS research showing how nutrients currently entering the Chesapeake Bay are typically 10-50 years old explaining how modern nutrient reduction strategies and regulations are being offset by this slow natural process.

Other Items

Ground Water Supply Management & Protection Plan Presentations

Staff indicated Britt is scheduled to present the plan to the Northampton Supervisors on December 10 and the Accomack Supervisors on January 15.

Letter to DEQ regarding Centralization of Groundwater Withdrawal Staff and Support for the Groundwater Committee

Staff indicated that no response had been received.

Safety and Health in Facilitating a Transition (SHIFT) Advisory Committee

Staff presented a letter submitted to the Committee from Jon Richardson of the ESHD.

R-MC Study Outreach

Staff reported that participant reports were being prepared using a QA/QC process for accuracy and the reports would be distributed in December.

7. Ground Water Consultant Report

Technical/Regulatory/Educational Items

1. New Regulations –

Britt reported on 2 new regulations as follows:

a. Groundwater Withdrawal Regulations (9VAC25-610): Britt indicated the principal changes are to the application process which now takes into account different types of uses (public water supplies, industrial and commercial, and agricultural use). Additionally, evaluation of impacts to groundwater now evaluates twice as great of an area of impact as the previous requirements.

b. Designated Groundwater Management Areas (9VAC25-600): Britt reported that the Eastern VA Groundwater Management Area was expanded to include the entire Coastal Plain and cited concerns for potential additional delays to the permit application review process due to additional burdens to the already limited DEQ staff.

2. DEQ Review and Comments on the Draft Water Supply Plans for Accomack County and Northampton County

Britt reviewed the DEQ comments for each county's plan including three items required for immediate compliance. Curt and Britt reported that the compliance issues would be completed and reported to DEQ in a timely manner.

3. VDH SHIFT Advisory Committee: No updates.

4. Groundwater Withdrawal Model Scenarios-

a. Northampton Withdrawal from former KMC area: Britt presented information and outcomes for the model scenario evaluating relative vulnerability of a hypothetical large withdrawal and compared results to similar simulations completed for Accomack County for a hypothetical large withdrawal between the existing Tyson and Perdue withdrawals. Britt ran pumping scenarios for 0.5 MGD, 1 MGD, and 3 MGD and distributed the hypothetical wells screened in the Upper,

Middle, and Lower Yorktown across the KMC site. It was noted that the former operation at the site operated under approximately 0.5 MGD. It was interpreted from the scenario outcomes that the 3 MGD scenario would likely not be permitted due to excessive drawdown and salt water intrusion induced in the Upper and Lower Yorktown in adjacent coastal areas. Additionally, it was interpreted that the 1 MGD and 0.5 MGD scenarios would be permitted, although it was inferred that a 2 MGD withdrawal likely would not be permitted. For comparison, Perdue is currently permitted at approximately 2MGD in Accomac.

- b. NASA Withdrawal: Britt indicated that he was not able to run this scenario using the updated data but plans to do so in the future.
- 5. Water Table Aquifer Stakeholder Participation: No new updates.
- 6. Tipton & Walker Farms Letters of Commendation  
Britt did not address this due to time constraints.

#### Ground Water Permits

- 1. Permit Applications –
  - Jones 2 Farm - Information was included in the packet but no discussion occurred during the meeting. No comments were presented.
  - Highway Farm – Information was included in the packet but no discussion occurred during the meeting. No comments were presented.
- 2. Issued Permits –
  - Virginia Landing – Britt presented information from the permit in. Discussion ensued regarding potential impacts

**Committee Member Belote moved to submit a letter to DEQ not objecting to the Virginia Landing withdrawal. The motion was seconded by Committee Member Henderson and carried by unanimous vote.**

- Seybolt Farm - Britt presented information from the permit in. Discussion ensued regarding potential impacts.

**Committee Member Belote moved to submit a letter to DEQ not objecting to the Seybolt Farm withdrawal. The motion was seconded by Committee Member Hampton and carried by unanimous vote.**

#### Committee Work Plan-Related Items

None.

#### Community Presentations

- 1. Public Workshops:  
No new updates were presented.

#### Other Items

None.

- 8. Public Participation  
None.
- 9. Schedule Next Meeting

The Committee reached consensus for cancelling the December 2013 Committee meeting. The next Committee meeting was scheduled for 10:00 AM on January 21, 2013 in the A-NPDC Conference Room in Accomac.

10. Adjournment

**There being no further business brought before the Committee, Committee Member Belote moved to adjourn the meeting. The motion was seconded by Committee Member Hampton and carried by unanimous vote.**

**Chairman Hubbard adjourned the meeting at 12:00 p.m.**

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Richard Hubbard, Chairman

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Elaine K. N. Meil, Secretary

## Appendix T

Minutes of the January 21, 2014 Eastern Shore of  
Virginia Ground Water Committee

Minutes of the  
Eastern Shore of Virginia Ground Water Committee

The meeting of the Eastern Shore of Virginia Ground Water Committee was held at 10:00 AM on Tuesday, January 21, 2014 in the A-NPDC Conference Room of the Enterprise Building in Accomac, Virginia.

Members Present:

Richard Hubbard, Chairman  
Elaine Meil, Secretary  
Jim Belote  
Eugene R. Hampton  
J. W. Jeffries

Members Absent:

Wanda Thornton, Vice Chairman  
Peter Henderson  
Steve Miner  
Katherine Nunez  
Granville Hogg  
Grayson Chesser

Others Present:

Curt Smith, A-NPDC  
Britt McMillan, Malcolm Pirnie  
Hank Ghittino, VDEQ  
Harvey Spurlock, Town of Chincoteague  
Carmie Duer, ESSWCD  
Jon Richardson, ESHD  
Owen Hooks, NASA-WFF  
Spiro Papadopoulos, Chincoteague Wastewater Advisory Committee  
Steve Paeglow, All Pure Inc.

1. Call to Order  
Chairman Hubbard called the meeting to order at 10:05 a.m.
2. Welcome New Committee Member: Granville Hogg  
Committee Member Hogg was unable to attend and will be welcomed during the March meeting.
3. Minutes of the November 19, 2013 Meeting  
The November 19, 2013 minutes were presented.

**Committee Member Jeffries moved to approve the Minutes of November 19, 2013 meeting as presented. Seconded by Committee Member Belote, the motion carried unanimously.**

4. Financial Status Report  
The FY 2014 Financial Status Report was presented.

Bills Payable

Arcadis-Malcolm Pirnie – Final GW Mgmt. Plan contract - \$3,025  
*Total Bills Payable: \$3,025.00*

**Committee Member Hampton moved to approve the FY 2014 Financial Status Report as presented. The motion was seconded by Committee Member Belote and carried by unanimous vote.**

5. Staff Update

The following Staff Updates were presented:

Committee Attendance Record

The FY2014 Committee Attendance Record was presented.

Environmental Reviews

None.

VPDES Permits

None.

Ground Water Withdrawal Permit Comment Letters

Staff presented the following letters to DEQ per the Committee's motions during previous meetings:

- Virginia Landing
- Seybolt Farm

Informational Items

Exmore Finances Improving – Eastern Shore Post, 1/10/14

Staff presented the article describing the Town's recent adoption of an ordinance allowing constituents to install shallow wells to relieve both the Town and residents of water expenses. The ordinance allows wells up to 50-feet deep for exterior use. Wells must be marked with warning, "Water unsafe for drinking" and will require a permit prior to construction.

Ancient Seawater Entombed Beneath Chesapeake Bay Crater – Nature World News, 11/13/13

Staff presented the article highlighting groundwater conditions resulting from the Chesapeake Bay bolide impact.

Seawater discovered near the Chesapeake Bay is up to 150 million years old – Washington Post, 11/17/13

Staff presented a second article highlighting groundwater research on groundwater associated with the Chesapeake Bay bolide impact.

Flow Rates for Typical Fixtures Then & Now – Hampton Roads Planning District Commission Newsletter, 12/10/13

Staff presented the article summarizing reductions to household water use resulting from the US Energy Policy Act of 1994 and the Energy Independence and Security Act of 2007. A house built in 2011 uses 35% less indoor water on average than homes built before 1994.

While fixture improvements have resulted in greater conservation, they also have lessened local demand for local water utilities raising costs for treatment and transport.

*HRPDC Releases 2013 Summary of Permitted Groundwater Withdrawals in the Eastern Virginia Groundwater Management Area – Hampton Roads Planning District Commission Newsletter, 12/10/13*

Staff presented the annual summary of withdrawal permit data. The Committee requested that Britt use the summary as a template for Eastern Shore withdrawals.

*Vast freshwater reserves found beneath the oceans – Flinders University, 12/6/13*

Extensive freshwater reserves were recently discovered beneath the oceans kilometers off the coasts of Australia, China, North America, and South Africa. The aquifers could potentially be used to stave off a looming global water crisis.

#### Other Items

*Cape Charles/Cheriton Ground Water Summit*

Staff presented the event flyer and discussed logistics for the summit. The Committee discussed the schedule for the community-based groundwater summit series and reached consensus on the following schedule:

June 2014 – Eastville to Exmore

October 2014 – Belle Haven to Accomac

June 2015 – Accomac to Temperanceville

October 2015 – Temperanceville to New Church

*Ground Water Supply Management & Protection Plan Presentations*

Staff indicated that Britt and Curt presented the plan to the Northampton Supervisors on December 10 and the Accomack Supervisors on January 15 with each County passing resolutions approving the Plan. Staff presented the resolutions.

*Letter to DEQ regarding Centralization of Groundwater Withdrawal Staff and Support for the Groundwater Committee*

Staff indicated that no response had been received.

*Safety and Health in Facilitating a Transition (SHIFT) Advisory Committee*

Staff reported that the final SHIFT report was released and included 7 consensus recommendations including that VDH remains in an oversight role and produces an equal work product to the private sector as well as encourages applicants to seek out the private sector. Staff reported that comments submitted by Secretary Meil on behalf of the Committee were originally omitted from the report but were added once notified by Committee staff.

*Household Hazardous Waste Collection Update*

Staff reported that the collection has been scheduled for Saturday, May 10 from 10:00am-2:00pm. The collection will again be held simultaneously at three locations across the Shore with one collection in Northampton at the Birdsnest Convenience Center and two convenience center locations to be determined in Accomack. CARE Environmental, Inc. of

New Jersey will again be contracted to handle disposal of all waste. Advertising of the event will begin in February and updates will be provided at the next meetings.

*Accomack and Northampton Water Supply Plans*

Staff presented the Committee's response to DEQ for required revisions for each County plan. The plans were approved by DEQ on December 13. Accomack is required to reach compliance on numerous outstanding items by November 8, 2018 and Northampton by December 13, 2018 in time for the mandated five-year review. The Committee discussed a plan for attaining compliance by the mandated deadline and reached a consensus that the Committee would take the lead on this effort on behalf of the Counties.

*VAMWON Training Update*

Staff reported that the training is tentatively scheduled for April or May 2014 at the VTAREC Field Station in Painter.

*2013 ESVA Ground Water Award Update*

Staff reported that ES Rural Health officials were notified and invited to the March meeting.

*R-MC Study Outreach*

Staff reported that participant reports were being prepared using a QA/QC process for accuracy and the reports were sent to Britt for review prior to being distributed.

*Accomack & Northampton Stormwater Program Development Update*

Staff reported that each County is incorporating additional measures for considering ground water conditions during BMP development that previously had not been required.

6. Ground Water Consultant Report

Technical/Regulatory/Educational Items

1. New Regulations –

Britt reported on 3 new regulations as follows:

- a. Groundwater Withdrawal Regulations (9VAC25-610): No new updates provided.
- b. Designated Groundwater Management Areas (9VAC25-600): No new updates provided.
- c. Repealed the declaration of the Eastern Shore of Virginia as a critical Ground Water Area (9VAC25-620): Britt reported that the declaration was moved to 9VAC25-600 as a ground water management area.

2. Water Table Aquifer Stakeholder Participation: No new updates.

3. USGS Research: Britt presented a summary review of the following research publications:

- a. *Land Subsidence and Relative Sea-Level Rise in Southern Chesapeake Bay Region*. Eggleston and Pope (2013) USGS Circular 1392
- b. *Sediment Distribution and Hydrologic Conditions of the Potomac Aquifer in Virginia and Parts of Maryland and North Carolina*. McFarland (2013) USGS SIR 2013-5116: Britt reported that Potomac Aquifer is a good potential source of water for northern Accomack County.

4. Tipton & Walker Farms Letters of Commendation: Britt presented a draft letter to be submitted to the owner of Tipton & Walker Farms for exemplary use of the Columbia Aquifer as a source of irrigation water for their farms. The Committee reached consensus that Curt submit the letter on behalf of the Committee.

#### Ground Water Permits

1. Captains Cove - Britt reported that the proposed withdrawal averages 220,000 gallons per day and only 10% of withdrawals in the region are greater. The withdrawal would be from the upper Yorktown Aquifer and would have an area of impact of approximately 1 mile. DEQ is requiring monitoring to mitigate potential impacts from saltwater intrusion that were forecasted by the withdrawal model indicating the potential for saltwater intrusion east of the site and upconing at the site. Discussion ensued regarding potential impacts.

**Committee Member Jeffries moved to submit a letter to DEQ not objecting to the Captains Cove withdrawal permit application with qualifying language highlighting the importance of saltwater intrusion monitoring. The motion was seconded by Committee Member Hampton and carried by unanimous vote.**

#### Committee Work Plan-Related Items

Britt indicated that he intends to compare the results of the groundwater model scenario for a hypothetical large withdrawal in Cheriton to similar situations completed for Accomack County for a hypothetical large withdrawal; between the existing Tyson and Perdue withdrawals.

#### Community Presentations

1. Public Workshops:

Britt indicated that his presentation for the Cape Charles-Cheriton Ground Water Summit would include groundwater quality, aquifer yield characteristics, and factors influencing sustainability.

#### Other Items

None.

7. Other Matters

Secretary Meil reported that the Committee will be tasked with an EPA Sole Source Aquifer Review for an upcoming construction project at the Accomac Manor property.

8. Public Participation

Owen Hooks of NASA-WFF indicated that NASA is very interested and concerned about ground water impacts in northern Accomack County as NASA needs clean ground water for labs and firefighting.

9. Schedule Next Meeting

The Committee reached consensus to hold a public workshop on February 12, 2014 in place of their regular monthly meeting. The next Committee meeting was scheduled for 10:00 AM on March 18, 2014 in the A-NPDC Conference Room in Accomac.

10. Adjournment

**There being no further business brought before the Committee, Committee Member Jeffries moved to adjourn the meeting. The motion was seconded by Committee Member Hampton and carried by unanimous vote.**

**Chairman Hubbard adjourned the meeting at 11:40 a.m.**

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Richard Hubbard, Chairman

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Elaine K. N. Meil, Secretary

## Appendix U

Minutes of the March 18, 2014 Eastern Shore of  
Virginia Ground Water Committee

Minutes of the  
Eastern Shore of Virginia Ground Water Committee

The meeting of the Eastern Shore of Virginia Ground Water Committee was held at 10:00 AM on Tuesday, March 18, 2014 in the A-NPDC Conference Room of the Enterprise Building in Accomac, Virginia.

Members Present:

Richard Hubbard, Chairman  
Wanda Thornton, Vice Chairman  
Elaine Meil, Secretary  
Jim Belote  
J. W. Jeffries  
Granville Hogg  
Grayson Chesser

Members Absent:

Peter Henderson  
Steve Miner  
Katherine Nunez  
Eugene R. Hampton

Others Present:

Curt Smith, A-NPDC  
Britt McMillan, Malcolm Pirnie  
Hank Ghittino, VDEQ  
Cole Charnock, ESSWCD  
Owen Hooks, NASA-WFF  
Nancy Stern, ES Rural Health

1. Call to Order  
Chairman Hubbard called the meeting to order at 10:07 a.m.
2. Welcome New Committee Member: Granville Hogg  
Committee Member Hogg was welcomed to the Committee.
3. Presentation of the 2013 ES Ground Water Award  
Chairman Hubbard presented Nancy Stern of the ES Rural Health Onley Community Health Center the 2013 award.
4. Minutes of the January 21, 2014 Meeting  
The January 21, 2014 minutes were presented.  
**Committee Member Jeffries moved to approve the Minutes of January 21, 2014 meeting as presented. Seconded by Committee Member Hogg, the motion carried unanimously.**
5. Financial Status Report  
The FY 2014 Financial Status Report was presented.  
Bills Payable

Arcadis-Malcolm Pirnie –GW Comm. quarterly billing - \$5,250  
Arcadis-Malcolm Pirnie – Final GW Mgmt. Plan contract - \$1,815  
Arcadis-Malcolm Pirnie – Additional Services (KMC, Wallops) - \$4,150  
A-NPDC – Quarterly Staff Support - \$1,985  
*Total Bills Payable: \$13,200.00*

**Vice Chairman Thornton moved to approve the FY 2014 Financial Status Report as presented. The motion was seconded by Committee Member Jeffries and carried by unanimous vote.**

6. Staff Update

The following Staff Updates were presented:

Committee Attendance Record

The FY2014 Committee Attendance Record was presented.

Environmental Reviews

None.

VPDES Permits

None.

Ground Water Withdrawal Permit Comment Letters

Staff presented the following letters to DEQ per the Committee’s motions during previous meetings:

- Captains Cove – letter not objecting with qualifying text submitted to DEQ Feb. 7

Informational Items

None.

Other Items

Cape Charles/Cheriton Ground Water Summit

Staff reported an attendance of 21 people that was largely restricted due to inclement weather. Britt suggested hosting an event at some point in the future that would serve as an open house for well owners to hold discussions with consultants directly. The Committee discussed a revised plan for the workshop series that resulted in the following:

- June 2014 – Eastville to Exmore (Northern Northampton with additional info for Cape Charles/Cheriton available for those who couldn’t attend Feb. 2014 summit)
- October 2014 – Belle Haven to Accomac (Southern Accomack)
- June 2015 – Accomac to Temperanceville (Central Accomack)
- October 2015 – Temperanceville to New Church (Northern Accomack)

Household Hazardous Waste Collection Update

Staff reported that the collection has been scheduled for Saturday, May 10 from 10:00am-2:00pm. The collection will again be held simultaneously at three locations across the Shore with one collection in Northampton at the Birdsnest Convenience Center and two collections in Accomack at the Makemie Park and Fishers Corner Convenience Centers. CARE Environmental, Inc. of New Jersey will again be contracted to handle disposal of all waste.

VAMWON Training and Residential Water Sampling Update

Staff reported that the training will be scheduled for a Friday in July or August 2014 at the VTAREC Field Station in Painter and will be held over the course of an entire day. The

training will cover groundwater basics, well construction and maintenance, water testing, water treatment, and info about how VAMWON programs work. Drinking water clinics that will provide residential well sampling are scheduled for the week of October 8 in both counties. The sample costs will be \$10/sample and will include a suite of 14 parameters.

#### *R-MC Study Outreach*

Staff reported that the participant reports are finalized and will be distributed in the coming days.

#### *Accomack County Planning Commission*

Curt will be giving an overview presentation of the regional hydrogeologic framework to the Accomack PC per their request to supplement their current effort to update the Comprehensive Plan on April 22.

### 7. Ground Water Consultant Report

#### Technical/Regulatory/Educational Items

1. USGS Research: Britt presented a summary review of the following research publications:
  - a. *Development of a Numerical Model to Simulate Groundwater Flow in the Shallow Aquifer System of Assateague Island, Maryland and Virginia*. Masterson et al., 2013, USGS OFR 2013-1111. The Committee requested staff contact USGS to request a copy of their model so that it could be incorporated into the ES groundwater model.
  - b. *Groundwater Depletion in the United States: 1900-2008*. Konikow, 2013; USGS SIR 2013-5079.
  - c. *Hydrology and Hydrologic Conditions of the Northern Atlantic Coastal Plain Aquifer System from Long Island, New York, to North Carolina*. Materson et al., 2013; USGS SIR 2013-5133.
2. Draft Report Format for Groundwater Impact Analysis: Britt presented a one-page/two-sided summary template that will be used to summarize results of groundwater model impact analyses. The summaries plan to be distributed to the public and incorporated in the Groundwater Management Plan. The Committee gave consensus approval for the template as presented. Britt will complete summaries for the following existing and hypothetical withdrawals and present at upcoming Committee meetings:
  - Cape Charles area
  - Captains Cove
  - Hypothetical industrial withdrawal in Accomack County
  - Hypothetical industrial withdrawal in lower Northampton County
3. Water Table Aquifer Stakeholder Participation: No progress reported during March.

#### Ground Water Permits

1. C&H Farms - Britt reported that the proposed withdrawal averages 20,000 gallons per day and 65% of withdrawals in the region are greater. The withdrawal would be from the lower-middle-upper Yorktown Aquifer and would have an area of impact of <1 mile. Britt indicated that the withdrawal would be from the middle of the Eastville Paleochannel for which there is currently a lack of information regarding influence on the hydrologic system in its entirety. A question arose about potential impacts to

nearby irrigation ponds and Britt responded that there should be no expected impacts to the ponds resulting from the withdrawal. No potential salt water intrusion is expected as result of the withdrawal.

**Vice Chairman Thornton moved to submit a letter to DEQ not objecting to the Captains Cove withdrawal permit application with qualifying language stating that if additional supply is requested then those withdrawals should occur from the shallow Columbia Aquifer. The motion was seconded by Committee Member Belote and carried by unanimous vote.**

Committee Work Plan-Related Items

Groundwater Model Impact Analyses summary template included above.

Community Presentations

1. Public Workshops:  
Discussed during Staff Report.

Other Items

None.

7. Other Matters

Committee Member Hogg requested details for groundwater use at the NASA-WFF and Hank Ghittino reported that the facility's use is now regularly reported.

Committee Member Hogg raised a question concerning conservation estimates for Hampton Roads included in the Staff report.

Committee Member Hogg raised the question of what plans were in place for when increasingly significant saltwater intrusion is found for Cape Charles and Hank Ghittino reported that DEQ did not include any caveat covering this in the Town's permit.

Committee Member Hogg stated that he was concerned with irrigation ponds tapping into the Yorktown. Discussion ensued regarding current and historic Committee efforts concerning this matter.

Vice Chairman Thornton reported that MD Congressman Harris will encourage our neighboring MD jurisdictions to participate and cooperate with the Committee's efforts concerning management and conservation of the regional groundwater resource.

8. Public Participation

None.

9. Schedule Next Meeting

The next Committee meeting was scheduled for 10:00 AM on April 15, 2014 in the A-NPDC Conference Room in Accomac.

10. Adjournment

**There being no further business brought before the Committee, Committee Member Hogg moved to adjourn the meeting. The motion was seconded by Committee Member Jeffries and carried by unanimous vote.**

**Chairman Hubbard adjourned the meeting at 11:55 a.m.**

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Richard Hubbard, Chairman

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Elaine K. N. Meil, Secretary

## Appendix V

Minutes of the April 15, 2014 Eastern Shore of  
Virginia Ground Water Committee

Minutes of the  
Eastern Shore of Virginia Ground Water Committee

The meeting of the Eastern Shore of Virginia Ground Water Committee was held at 10:00 AM on Tuesday, April 15, 2014 in the A-NPDC Conference Room of the Enterprise Building in Accomac, Virginia.

Members Present:

Wanda Thornton, Vice Chairman  
Elaine Meil, Secretary  
Jim Belote  
Eugene R. Hampton  
Granville Hogg

Members Absent:

Richard Hubbard, Chairman  
Grayson Chesser  
J. W. Jeffries  
Peter Henderson  
Steve Miner  
Katherine Nunez

Others Present:

Curt Smith, A-NPDC  
Britt McMillan, Malcolm Pirnie  
Hank Ghittino, VDEQ  
Cole Charnock, ESSWCD  
Owen Hooks, NASA-WFF  
Taylor Dukes, Town of Exmore  
Robert Duer, Town of Exmore  
Spiro Papadopoulos, Accomack County Planning Commission  
Jon Richardson, Virginia Department of Health

1. Call to Order  
Vice Chairman Thornton called the meeting to order at 10:07 a.m.
2. Minutes of the March 18, 2014 Meeting  
The March 18, 2014 minutes were presented.

**Committee Member Belote moved to approve the Minutes of March 18, 2014 meeting as presented. Seconded by Committee Member Hogg, the motion carried unanimously.**

3. Financial Status Report  
The FY 2014 Financial Status Report was presented.

Bills Payable

A-NPDC – 3<sup>rd</sup> Quarter Staff Support - \$1,985  
*Total Bills Payable: \$1,985.00*

**Committee Member Belote moved to approve the FY 2014 Financial Status Report as presented. The motion was seconded by Vice Chairman Thornton and carried by unanimous vote.**

4. Staff Update

The following Staff Updates were presented:

Committee Attendance Record

The FY2014 Committee Attendance Record was presented.

Environmental Reviews

None.

VPDES Permits

None.

Ground Water Withdrawal Permit Comment Letters

Staff presented the following letters to DEQ per the Committee's motions during previous meetings:

- C&H Farm Permit – letter not objecting with qualifying text submitted to DEQ Apr. 9

Informational Items

2012 Virginia Toxics Release Inventory Report – DEQ 3/2014

Staff presented a summary of relevant local findings from the report including releases from Perdue, Tyson, KMX Chemical, and NASA Wallops Flight Facility.

Other Items

Northern Northampton County Ground Water Summit

Staff reported the summit has been scheduled for Wednesday, June 11 from 6:30-8:00 pm in the County BOS Chambers in Eastville. The summit will cover areas from Exmore to Eastville and will include some additional materials for Cape Charles/Cheriton. Staff will promote the event during May.

The schedule for the upcoming workshop series was reported as follows:

- June 11, 2014 – Eastville to Exmore (Northern Northampton)
- October 2014 – Belle Haven to Accomac (Southern Accomack)
- June 2015 – Accomac to Temperanceville (Central Accomack)
- October 2015 – Temperanceville to New Church (Northern Accomack)

Household Hazardous Waste Collection Update

No new updates were reported.

VAMWON Training and Residential Water Sampling Update

Staff reported that coordination with VAMWON to develop sampling protocol that will provide supplemental information for the ES groundwater model has taken place.

R-MC Study Outreach

Staff reported that the final reports were distributed to all participants.

Accomack County Planning Commission Presentation

Staff reported that they are scheduled to give an overview presentation of the regional hydrogeologic framework on April 22 to the Accomack PC to supplement their current effort to update the Comprehensive Plan.

*DEQ Water Supply Plan Public Comment Opportunity*

Staff presented a DEQ request for public comment for a periodic review and small business impact review of the WSP regulation to determine whether the regulation should be repealed, amended or retained in its current form. Specifically, comment is being sought for whether the regulation is:

- i. Necessary for the protection of public health, safety, and welfare or for the economical performance of important governmental functions;
- ii. Minimizes the economic impact on small businesses in a manner consistent with the stated objectives of applicable law; and
- iii. Is clearly written and easily understandable.

The Committee had no comments.

*Online Groundwater Withdrawal Permit Viewer Update*

Staff attended a meeting of the VA Coastal Policy Team and presented the suggestion of using Coastal GEMS as a state-wide permit repository. The group acknowledged the need for such a resource, but the VCZMP did not feel their site was the most appropriate. The group suggested that DEQ investigate the potential for developing a separate site for the permit viewer. Discussion ensued on various ways to publicly display this information.

*Assateague Island Ground Water Model*

Per a request during the March 2014 Committee meeting, staff contacted USGS staff and were able to receive a copy of the model. The Assateague model has been turned over to Britt who will work on incorporating the model into the ES groundwater model. Additionally, the USGS indicated that additional development and refinement of the model is planned during 2014-2015 and will be available to the Committee once complete.

5. Ground Water Consultant Report

Technical/Regulatory/Educational Items

1. USGS Research: Britt presented a summary review of the following research publications:
  - a. Current Perspectives in Contaminant Hydrology and Water Resources Sustainability:
    - i. Occurrence and Mobility of Mercury in Groundwater
2. Groundwater Impact Analysis Summaries:  
Britt presented one-page/two-sided summaries for the following ES Ground Water Model Scenarios:
  - Cape Charles area
  - Captains Cove
  - Hypothetical industrial withdrawal in Accomack County
  - Hypothetical industrial withdrawal in lower Northampton CountyThe summary results will be incorporated into the regional groundwater management plan.
3. Water Table Aquifer Stakeholder Participation: No progress reported during March.

Ground Water Permits

1. Kuzzens Mappsville North - Britt and Hank reported that Kuzzens decided to withdrawal the permit application.

Committee Work Plan-Related Items

Groundwater Model Impact Analyses summary template included above.

Community Presentations

1. Public Workshops:  
Discussed during Staff Report.

Other Items

None.

6. Other Matters

Committee Member Hogg asked if the Committee can look into hypothetical ground water withdrawals related to additional development along the Route 13 corridor between Cape Charles and Cheriton. Britt explained previous work that has been accomplished and may be relevant to his concerns. Vice Chairman Thornton commented that the Committee can provide a summary of Northampton County permitted ground water users and suggested that this be made available at the June 2014 public workshop.

Committee Member Hampton expressed concerns about proposed changes to the Northampton County Zoning Ordinance which would allow for by-right usage in Agricultural Zones for manure lagoons, dredge spoil disposal sites, and other techniques that could potentially compromise ground and surface water quality. Discussion ensued regarding the issue and the role the Committee should serve on that matter. No consensus was reached for developing comment or becoming involved in the matter.

7. Public Participation

None.

8. Schedule Next Meeting

The next Committee meeting was scheduled for 10:00 AM on May 20, 2014 in the A-NPDC Conference Room in Accomac.

9. Adjournment

**There being no further business brought before the Committee, Committee Member Belote moved to adjourn the meeting. The motion was seconded by Vice Chairman Thornton and carried by unanimous vote.**

**Vice Chairman Thornton adjourned the meeting at 12:05 p.m.**

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Richard Hubbard, Chairman

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Elaine K. N. Meil, Secretary

## Appendix W

Minutes of the May 20, 2014 Eastern Shore of Virginia  
Ground Water Committee

Minutes of the  
Eastern Shore of Virginia Ground Water Committee

The meeting of the Eastern Shore of Virginia Ground Water Committee was held at 10:00 AM on Tuesday, May 20, 2014 in the A-NPDC Conference Room of the Enterprise Building in Accomac, Virginia.

Members Present:

Richard Hubbard, Chairman  
Wanda Thornton, Vice Chairman  
Elaine Meil, Secretary  
Jim Belote  
Eugene R. Hampton  
Granville Hogg  
J. W. Jeffries  
Grayson Chesser  
Peter Henderson

Members Absent:

Steve Miner  
Katherine Nunez

Others Present:

Britt McMillan, Malcolm Pirnie  
Hank Ghittino, VDEQ  
Cole Charnock, ESSWCD  
Spiro Papadopoulos, Accomack County & Chincoteague Planning Commissions

1. Call to Order

Chairman Hubbard called the meeting to order at 10:00 a.m.

2. Minutes of the April 15, 2014 Meeting

The April 15, 2014 minutes were presented.

**Committee Member Hogg moved to approve the Minutes of April 15, 2014 meeting as presented. Seconded by Committee Member Hampton, the motion carried unanimously.**

3. Financial Status Report

The FY 2014 Financial Status Report was presented.

Bills Payable

A-NPDC – 4th Quarter Staff Support - \$1,985

Arcadis – Consultant Support - \$5,250

*Total Bills Payable: \$7,235.00*

**Vice Chairman Thornton moved to approve the FY 2014 Financial Status Report as presented. The motion was seconded by Committee Member Jeffries and carried by unanimous vote.**

4. Staff Update

The following Staff Updates were presented:

Committee Attendance Record

The FY2014 Committee Attendance Record was presented.

Environmental Reviews

None.

VPDES Permits

None.

Ground Water Withdrawal Permit Comment Letters

None.

Informational Items

None.

Other Items

Household Hazardous Waste Collection Update

Staff reported another successful collection was held May 10 at the Birdsnest, Fishers Corner, and Makemie Park Convenience Centers. Fifty one residents brought in 1,762 lbs. (0.8 tons) of hazardous waste.

VAMWON Training and Residential Water Sampling

The Committee requested additional information be presented at the next Committee meeting.

5. Ground Water Consultant Report

Technical/Regulatory/Educational Items

1. USGS Research: Britt reported that the following USGS research publications have been recently published:
  - a. Factors Affecting Public Supply Well Vulnerability to Contamination: Understanding Water Quality and Anticipating Future Water Quality (Eberts, et.al., USGS Circular 1385)
  - b. Effects of Climate Variability and Change on Groundwater Resources of the United States (USGS Fact Sheet 2009-3074)
2. Mission H2O Virginia Annual Meeting: Britt reported that he attended the meeting on May 15.
3. Water Table Aquifer Stakeholder Participation: No additional progress reported.
4. Template for Presenting Regional Groundwater Withdrawal Summary: Britt reviewed a web based application supported by HRPDC, the DEQ Public Notice and Groundwater Withdrawal Permit web links.

Britt established a presentation form and information to present for the ES Groundwater Management Area. The Committee requested that Curt, Elaine, and Britt investigate the feasibility for hosting a web-based viewer on the A-NPDC's Committee website.

Ground Water Permits

1. Edgewater Farm – Britt presented a review of the proposed withdrawal for agricultural irrigation.

**Committee Member Belote moved to submit a letter to DEQ for the Edgewater Farm Draft Permit Application that does not object to the proposed withdrawal with qualifying text recommending that the water table be utilized should additional supply be needed. Seconded by Vice Chairman Thornton, the motion carried unanimously.**

**Committee Member Hampton moved to submit a letter to the owner of Edgewater Farm regarding the benefits of utilizing the water table aquifer for necessary irrigation supply. Seconded by Committee Member Jeffries, the motion carried unanimously.**

2. Seaford Farm –

Britt presented a review of the proposed withdrawal for agricultural irrigation.

**Committee Member Belote moved to submit a letter to DEQ for the Seaford Farm Draft Permit Application that does not object to the proposed withdrawal with qualifying text commending the use of irrigation ponds and recommending that the water table be utilized should additional supply be needed. Seconded by Vice Chairman Thornton, the motion carried unanimously.**

Committee Work Plan-Related Items

None.

Community Presentations

1. Public Workshops:

Britt reported that the Northern Northampton County Ground Water Summit was scheduled for June 11 at the Northampton Supervisors' Chamber in Eastville. The Committee requested that Britt's presentation include additional focus on ways that residents can protect the regional groundwater supply and that irrigation ponds be addressed. It was also requested that the summary table showing all permitted withdrawals be provided as a handout during the workshop.

Other Items

None.

6. Other Matters

None.

7. Public Participation

Hank Ghittino reported that his program is being consolidated and a new program manager would be coming to the Committee meeting in August.

8. Schedule Next Meeting

The Committee reached consensus that the Northern Northampton Groundwater Summit would be held in place of the regular monthly meeting in June and that no meeting would be held during July.

The next Committee meeting was scheduled for 10:00 AM on August 19, 2014 in the A-NPDC Conference Room in Accomac.

9. Adjournment

**There being no further business brought before the Committee, Committee Member Jeffries moved to adjourn the meeting. The motion was seconded by Vice Chairman Thornton and carried by unanimous vote.**

**Chairman Hubbard adjourned the meeting at 12:00 p.m.**

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Richard Hubbard, Chairman

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Elaine K. N. Meil, Secretary

## Appendix X

Minutes of the August 19, 2014 Eastern Shore of  
Virginia Ground Water Committee

Minutes of the  
Eastern Shore of Virginia Ground Water Committee

The meeting of the Eastern Shore of Virginia Ground Water Committee was held at 10:00 AM on Tuesday, August 19, 2014 in the A-NPDC Conference Room of the Enterprise Building in Accomac, Virginia.

Members Present:

Richard Hubbard, Chairman  
Wanda Thornton, Vice Chairman  
Jim Belote  
Eugene R. Hampton  
Granville Hogg  
J. W. Jeffries  
Grayson Chesser

Members Absent:

Peter Henderson  
Steve Miner  
Katherine Nunez  
Elaine Meil, Secretary

Others Present:

Curt Smith, A-NPDC  
Britt McMillan, Malcolm Pirnie  
Susan Simon, A-NPDC  
Robert Duer, Town of Exmore  
Taylor Dukes, Town of Exmore  
Hank Ghittino, VDEQ  
Jon Richardson, ESHD  
Bill Prorise, Citizen  
Owen Hooks, NASA  
Michael Ward, Northampton Co. Planning Commission

1. Call to Order

Chairman Hubbard called the meeting to order at 10:03 a.m.

2. Elections of FY2015 Committee Officers

Staff requested nominations for FY2015 Committee Officers from the floor.

**Committee Member Belote moved to nominate Wanda Thornton for Chairman and Committee Member Jeffries seconded the nomination. The motion carried unanimously with Committee Member Thornton abstaining.**

**Vice Chairman Thornton nominated Richard Hubbard to be Vice Chairman, and Committee Member Jeffries seconded the nomination. The motion carried by unanimous vote with Chairman Hubbard abstaining.**

**Vice Chairman Thornton was elected as Chairman by acclamation. Chairman Hubbard was elected as Vice Chairman by acclamation.**

3. Minutes of the April 15, 2014 Meeting

The April 15, 2014 minutes were presented.

**Committee Member Jeffries moved to approve the Minutes of the May 20, 2014 meeting as presented and Committee Member Hampton seconded. The motion carried unanimously.**

4. Financial Status Report

The FY 2015 Financial Status Report was presented.

Bills Payable

A-NPDC – 4th Quarter Staff Support:	\$1,985
A_NPDC – HHW Disposal Costs:	\$8225.40
Arcadis – Consultant Support Services through 3/31	\$5,250
<i>Total Bills Payable:</i>	<i>\$15,460.40</i>

**Committee Member Jeffries moved to approve the FY 2015 Financial Status Report as presented. The motion, seconded by Committee Member Belote carried unanimously.**

Ground Water Consultant Contract Renewal

Staff requested the Committee approve an extension of the Ground Water Consultant Contract with Arcadis through 2015 once contract language is updated to include a clause to allow the contract to be renewed annually for up to four years.

**Committee Member Hampton moved to approve an extension of the Ground Water Consultant Contract with Arcadis through 2015 once contract language is updated to include a clause allowing the contract to be renewed annually for up to four years. Committee Member Belote seconded the motion and it carried unanimously.**

Proposed FY2015 Annual Budget

The proposed FY 2015 Annual Budget was presented with a request to approve. Discussion included a suggestion to determine whether the Department of Environmental Quality's monitoring program would suffice as ground water model, with the benefit that it would be free and would not need the USGS budget line item of \$5,950. The Committee decided to revisit this idea in September.

**Vice Chairman Hubbard moved to approve the proposed FY2015 budget as presented, and Committee Member Belote seconded. The motion carried unanimously.**

5. Staff Update

The following Staff Updates were presented:

Committee Attendance Record

The FY2014 and FY2015 Committee Attendance Records were presented.

Environmental Reviews

*VA Water Protection Draft Individual Permit 14-0307 for ODEC Tasley to Exmore Aerial Transmission Line Replacement Project*

Staff presented A-NPDC's letter to DEQ noting compensation for acreage of wetlands impacted in Accomack and Northampton do not benefit directly by ODEC's offer to preserve wetlands in Virginia Beach. Discussion ensued concerning the economic impacts of the

transmission line permit and the costs to do the preferred option. The Committee requested a report back concerning information on how to create a wetland mitigation bank on the Shore.

VPDES Permits

None.

Ground Water Withdrawal Permit Comment Letters

None.

Informational Items

*Hydrologists find Mississippi River network's buffering system for nitrates is overwhelmed – University of Texas at Austin 5/11/2014*

Staff presented a research article that measures the amount of natural filtration of nitrates in groundwater prior to discharge to the Mississippi River as an example of research that would benefit Chesapeake Bay and local watersheds restoration. The research showed excess nitrates levels in groundwater overwhelm the natural filtration capacity and result in excess nitrates to receiving waters.

*Cape Charles Articles Regarding Groundwater – Cape Charles Wave 7/21/2014*

The Committee discussed two articles about efforts to address groundwater in the Town of Cape Charles Plan Update, and information from the recent Ground Water Summits in Northampton. Committee Member Hogg requested a presentation at the September meeting clarifying Northampton County's groundwater conditions.

Other Items

Public Workshops

Staff reported on the lively discussion concerning groundwater management in Northampton among the 17 attendees to the Northern Northampton Groundwater Summit in Eastville on June 11. The Southern Accomack Co. Groundwater Summit (Accomac to Belle Haven) is scheduled for October 2014; Central Accomack Co. (Accomac to Temperanceville) in June 2015; and Northern Accomack Co (Temperanceville to New Church) in October 2015.

Household Hazardous Waste Collection Update

Staff reported that a meeting will take place in the Fall to discuss the Household Hazardous Waste Program's future options, including the potential for year-round collecting. The 2015 collection will follow the past setup with 3 concurrent collections: Chincoteague and Tasley convenience centers in Accomack, and a site still to be determined in Northampton.

VAMWON Training and Residential Water Sampling

As requested at the previous meeting, staff informed the Committee that in October, two-hundred residents will have an opportunity to sample their well water for \$10, and additional residents could sample their well water for \$50 and advised the Committee of the logistics and follow-up interpretation plans. To enhance the ground water model, a form was created for participants to allow the use of the sampling data as supplemental information for the Eastern Shore groundwater model. The Committee discussed concerns regarding confidentiality and reached consensus on the minimum geographic scale to be utilized.

Pesticide Collection Announced

Staff informed the Committee that VDACS will hold free pesticide collections for pre-registered local participants in Northampton on August 25 from 9am-1pm at Crop Production

Services in Eastville and in Accomack, on September 8 from 9am-1pm at Crop Production Services in Melfa.

*Accomack County Planning Commission Presentation*

Staff reported on a regional hydrogeologic framework overview presentation to the Accomack PC to supplement their Comprehensive Plan update efforts. The presentation generated many discussions and feedback from the Commissioners who indicated that it was extremely beneficial towards enhancing their understanding of groundwater conditions.

*Indoor Plumbing Survey*

To enhance management of A-NPDC's community development and indoor plumbing rehabilitation programs, staff informed the Committee of A-NPDC's survey of properties on the Shore that lack indoor plumbing. The Shore is one of very few areas where this issue remains a significant problem in Virginia. A comprehensive survey to identify properties lacking indoor plumbing has not been performed for the region. Although historic estimates of the number of properties lacking indoor plumbing cited more than 1,300 in 1990, 782 in 1998, and nearly 150 most recently in 2002; none of these efforts covered the entire region.

NFWF awarded Skeo Solutions of Charlottesville a Technical Assistance Grant to conduct a windshield survey of the entire Bayside, scheduled to occur during the week of September 8. A-NPDC applied for additional funding from the VA Coastal Zone Management Program to fund Skeo for a complete survey of the entire Seaside later in 2014.

Upon the survey's completion, Skeo and A-NPDC will hold a strategic planning workshop with local governments to identify specific strategies to eradicate these conditions in the region.

*Shore Big Tree Program Kickoff*

Staff in partnership with the VA Coastal Zone Management Program and VA Dept. of Conservation & Recreation developed a new program as part of the Plant ES Natives campaign. The program promotes the importance of planting native trees with respect to habitat and water conservation and will celebrate with demonstration sites of "Shore Big Trees" to be planted in public places. The program kicks off multi-day events on September 11 with a Shore Big Tree dedicated at A-NPDC's office on September 12, a dedication at the Wachapreague Seaside Park at 11:00am on September 13, and at the Onancock School in October or November.

*A-NPDC and Waste Watchers form ESVA GreenWorks Committee*

Staff informed the Committee of a joint memorandum of understanding signed by A-NPDC and Waste Watchers to establish the new GreenWorks Committee. The Committee will work to curb and manage litter in the region through a scientific, data-driven process while also increasing recycling rates and conducting education and outreach activities.

6. Ground Water Consultant's Report

Technical/Regulatory/Educational Items

1. *DEQ Ambient Groundwater Quality Monitoring Strategy*: Britt noted the map showed good distribution of water sampling along the Shore, and indicated that he may need to employ USGS to fill any gaps for spot sampling.

Committee Member Hogg requested clarification and a presentation from Britt at the September meeting on salt water intrusion and its impact on Northampton County.

Ensuing discussion touched on tier levels, historical changes, and proposed budgets and costs to achieve what DEQ seeks to accomplish. A suggested cost-saving option was to possibly use NASA-WFF's state-approved lab to do the sampling.

**Vice Chairman Hubbard made a motion, seconded by Committee Member Hogg, and approved by acclamation for Staff to write a letter to NASA requesting permission to conduct the DEQ Groundwater Monitoring Program sampling at their WFF laboratory.**

2. DEQ Initiating Adjustments to Groundwater Withdrawal Permits to Address Unsustainable Over Allocation on the Mainland: There has been consideration, but no action yet on reallocating permitted uses in the area. DEQ has a proposed solution to a long-standing issue concerning allowing withdrawals at non-sustainable levels (over-allocation). Allocated groundwater permits need to be reduced by ~ 50%. Current use is ~70 MGD; permitted use is ~140 MGD. Sustainable use is estimated to be near the current use amount.

Hank Ghittino reported that work is underway with users on establishing reduction targets and identifying potential reduction options.

Britt noted that the reduction process must be in place by the end of 2015, then permits will be adapted and reductions implemented after that. He also informed the Committee that DEQ is closing the loophole problems with regard to large subdivisions not requiring a permit and well registration to address the lack of well construction reporting for individual, non-permitted (mostly domestic) wells.

3. Draft FY2014 Annual Summary Report: Britt reported that the Annual Report is not complete. Britt needs updated data from DEQ and will present a summary in September of ground-water conditions on the Shore that shows actual use is greater than permitted use.

Ground Water Permits

None.

Committee Work Plan-Related Items

Eastern Shore of Virginia Groundwater Model: Britt reported that the most recent version of the Eastern Shore Model used by DEQ has been requested and it is anticipated that the revised model will include more recent actual use as well as Permitted Withdrawal amounts. Once received, the model will be used to further evaluate groundwater resource sustainability under current actual use and projected use conditions.

Community Presentations

Covered during the Staff Update

Other Items

None.

7. Other Matters

None.

8. Public Participation

None

9. Schedule Next Meeting & Adjournment

The next Committee meeting was scheduled for on September 16, 2014 at 10:00 AM in the A-NPDC Conference Room in Accomac.

**There being no further business brought before the Committee, Committee Member Jeffries moved to adjourn the meeting. The motion was seconded by Committee Member Hampton and carried by unanimous vote.**

**Chairman Thornton adjourned the meeting at 12:04 p.m.**

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Wanda Thornton, Chairman

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Elaine K. N. Meil, Secretary

## Appendix Y

Minutes of the September 16, 2014 Eastern Shore of  
Virginia Ground Water Committee

Minutes of the  
Eastern Shore of Virginia Ground Water Committee

The meeting of the Eastern Shore of Virginia Ground Water Committee was held at 10:00 AM on Tuesday, September 16, 2014 in the A-NPDC Conference Room of the Enterprise Building in Accomac, Virginia.

Members Present:

Wanda Thornton, Chairman

Jim Belote

Eugene R. Hampton

Granville Hogg

J. W. Jeffries

Elaine Meil, Secretary

Members Absent:

Grayson Chesser

Richard Hubbard, Vice Chairman

Peter Henderson

Steve Miner

Katherine Nunez

Others Present:

Curt Smith, A-NPDC

Britt McMillan, Arcadis-Malcolm Pirnie

Hank Ghittino, VDEQ

Bob Meyers, Northampton County Citizen

Michael Ward, Northampton Co. Planning Commission

Latonya Justice, ESSWCD

David Liu, NASA

1. Call to Order

Chairman Thornton called the meeting to order at 10:04 AM

2. Minutes of the August 18, 2014 Meeting

The August 18, 2014 minutes were presented.

**Committee Member Jeffries moved to approve the Minutes of the November 18, 2014 meeting as presented and Committee Member Belote seconded the motion. The motion carried unanimously.**

3. Financial Status Report

The FY 2015 Financial Status Report was presented.

Bills Payable

*Total Bills Payable:* *\$0.00*

**Committee Member Jeffries moved to approve the FY 2015 Financial Status Report as presented. The motion, seconded by Committee Member Belote carried unanimously.**

4. Staff Update

The following Staff Updates were presented:

Committee Attendance Record

The FY2015 Committee Attendance Record was presented.

Environmental Reviews

Wetlands Mitigation Bank Issue

Staff provided an update regarding using mitigation banks on the Eastern Shore to offset impact to wetlands. ANPDC does not know the status of mitigation banks on the Eastern Shore, and whether all the credits have been used. DEQ uses a website called RIBITS as a federal repository for wetlands banks. The Chairman posited that we don't know enough about the criteria used, the decision-making process, and who makes the decisions, then suggested the two counties do individual investigations in order to know how much money is leaving the Eastern Shore, and how best to pursue mitigation bank options. The Committee expressed concern that under the current mitigation decision-making method, the Eastern Shore exports its wealth across the Bay at tax-payers' expense.

Discussion ensued. The Committee requested a report back concerning information on how to create a wetland mitigation bank on the Shore.

VPDES Permits

None

Ground Water Withdrawal Permit Comment Letters

None

Informational Items

None

Other Items

Public Workshops

Staff reported the Southern Accomack Co. Groundwater Summit (Accomack to Belle Haven) is scheduled for 6:30-8:00 PM, October 30 at the Eastern Shore Community College. The summit will focus on ground water conditions from Belle Haven to Accomack and will follow the outline of previous community-based ground water summits. Staff handed out flyers and asked Committee members to help spread the word about the event to supplement A-NPDC's media notices. Additional workshops in the series are scheduled for Central Accomack Co. (Accomack to Temperanceville) in June 2015, and Northern Accomack Co (Temperanceville to New Church) in October 2015.

Household Hazardous Waste Collection Update

Staff reported no new updates. A-NPDC staff and the counties will meet in the fall to discuss future options for the program.

VAMWON Training and Residential Water Sampling

Staff informed the Committee that in October, 200 residents have an opportunity to sample their well water for \$10, and additional residents can sample their well water for \$50. Participants pick up their sample kits and receive directions on sample collection at the VT AREC in Painter on October 2 from 5-7 PM, then drop off their samples at VT AREC or either Health Department office in Nassawadox or Accomack on October 7 between 12-8 PM.

An interpretation meeting scheduled for November 13 from 6-8 PM at ESCC includes a presentation by A-NPDC's staff on regional groundwater conditions.

Indoor Plumbing Survey

The windshield survey of the Bayside was postponed and rescheduled for the week of October 6. A-NPDC applied, but was not selected, for additional funding from the VA Coastal Zone Management Program for an entire Seaside survey. Staff is pursuing additional options to ensure that the entire peninsula is surveyed and expects to know within the next few weeks if reprogrammed VCZM funds are available for the Seaside survey.

5. Ground Water Consultant's Report

Technical/Regulatory/Educational Items

1. Susceptibility of the Eastern Shore of Virginia Groundwater Aquifers to Saltwater Intrusion: Britt presented an overview of the factors that most influence saltwater intrusion on the Eastern Shore, trends, and measures that can be taken to reduce the impacts from saltwater intrusion.
2. DEQ Ambient Groundwater Quality Monitoring Strategy: DEQ's first comprehensive groundwater monitoring strategy for Virginia since the 1980's was finalized in November 2013. The DEQ strategy identified eight Tier I and II wells on the Eastern Shore coast for sampling. However, the FY14 budget was not sufficient to carry out the approved plan. Britt will inquire about DEQ funding for FY15. The current \$12,000 budget allocation covers sampling of only one well and would give only a snapshot, not enough to track trends.

Britt also compared the DEQ and USGS sampling methods. DEQ measures actual water quality. The USGS sampling method requires PVC casing to measure conductivity, but does not actually measure water quality. USGS monitoring could only be done once, although there was USGS sampling in 2007 and A-NPDC can retrieve the 2007 data for comparison. NASA has agreed to allow VDEQ to use their labs to help reduce sampling costs. The Committee will decide in November on which mechanism to use: DEQ's or USGS's.

3. Draft FY2014 Annual Summary Report: Britt presented a one-page (double sided) summary of the Annual Groundwater Use Report. Discussion ensued regarding the map, table, and pie charts. The Committee discussed the summary findings and the permits for agricultural, commercial/industrial, and public water supply. The Committee requested a larger map; revisions to the table and a pie chart; and a statement that the 5.3 million gallons used is sustainable (and significantly less than the 9 MGD that is needed to recharge the Yorktown Aquifer).

Ground Water Permits

The Bayview application review was pushed to the November meeting due to time constraints.

Committee Work Plan-Related Items

Eastern Shore of Virginia Groundwater Model: Britt has requested DEQ's most recently used version of the Eastern Shore Model. The revised model is expected to include recent actual use as well as permitted withdrawal amounts. Once received, the model will evaluate groundwater resource sustainability under current actual use and projected use conditions.

Community Presentations  
Covered during the Staff Update.

Other Items  
None.

6. Other Matters

Committee Member Hogg asked whether the Committee needs to amend its charge to include storm water infiltration as recharge and other issues related to water and natural resources.

**Committee Member Belote moved to request that at the November meeting, A-NPDC staff and the two officers recommend options on amending the Groundwater Committee charter to include other water-related issues. The motion was seconded by Committee Member Jeffries, and approved unanimously.**

7. Public Participation

The Committee discussed the possibility of including NASA data in the annual summary, but decided to avoid confusion and keep it as is. The Committee asked Britt to add a line item for non-permitted groundwater use, based on USGS estimates.

8. Schedule Next Meeting & Adjournment

**The Committee will conduct a public workshop at the Eastern Shore Community College on Oct 30. The next Committee meeting was scheduled for November 18, 2014 at 10:00 AM in the A-NPDC Conference Room in Accomac.**

**There being no further business brought before the Committee, Committee Member Jeffries moved to adjourn the meeting. The motion was seconded by Committee Member Belote and carried by unanimous vote.**

**Chairman Thornton adjourned the meeting at 12:05 p.m.**

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Wanda Thornton, Chairman

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Elaine K. N. Meil, Secretary

## Appendix Z

Proceedings of the Eastern Shore Land Protection  
Working Group

# Proceedings of the Eastern Shore Land Protection Working Group

Accomack-Northampton Planning District Commission, February 2015

Proceedings of the Eastern Shore Land Protection Working Group



*This project, Task #41 was funded, in part, by the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant FY2013 #NA13NOS4190135 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended. The views expressed herein are those of the authors and do not necessarily reflect the views of the U.S. Department of Commerce, NOAA, or any of its subagencies.*

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### Appendices:

Sign In Sheets

Land Preservation & Policy Working Group Comments

## Introduction

The Accomack-Northampton Planning District Commission held a series of stakeholder meetings including local government officials, agency representatives of land preservation organizations and the interested public to review the varying methods of land preservation. The meetings would serve as a forum to discuss the varying land preservation tools and coordinate the use of these tools for long planning horizons. The original scope of work envisioned that the outcome would be a report with “specific policy recommendations for local governments and land preservation organizations regarding how to protect land by conservation easements in the context of other protection measures such as zoning, mechanisms to verify conservation protection measures are in place and being maintained on protected property, and also strategies and mechanisms to protect permanently the land with the highest conservation value.” The report would be shared with existing preservation partnerships (Southern Tip Partnership) and local officials.

## Land Preservation Working Group

A working group was assembled by the Accomack-Northampton Planning District Commission staff made up stakeholders. A-NPDC staff sought to create a working group with representation from entities that had significant conservation holdings on the Eastern Shore and the localities that have conservation holdings within their jurisdiction. Representatives were requested from the following organizations. At the July 11, 2014 meeting, the group recognized that a major land conservation group, the Virginia Department of Game and Inland Fisheries, was not represented and a representative was added.

### Working Group Organizations

- Accomack County
- Chincoteague Wildlife Refuge
- Eastern Shore of Virginia Wildlife Refuge
- Northampton County
- The Nature Conservancy
- Town of Chincoteague
- Virginia Eastern Shore Land Trust
- Virginia Department of Conservation & Recreation – Natural Heritage
- Virginia Department of Conservation & Recreation – Kiptopeke State Park
- Virginia Department of Game and Inland Fisheries

### Summary of the Meetings

Three stakeholder meetings were held on July 11, 2014, November 5, 2014 and January 8, 2015. A-NPDC also presented the draft report to the Southern Tip Partnership meeting on February 11, 2015. Attendance records of the working group meetings are attached as an appendix.

Initial topics were identified at the July 11, 2014 meeting. In September 2014, the first draft of the report was circulated to the working group. This draft included a toolkit of legislative authorities and six draft recommendations from numerous sources, including the 2012 Joint Legislative Audit and Review Commission, the Working Group identified local needs and one additional recommendation requested by the Eastern Shore of Virginia Ground Water Committee. Comments were received and presented to the group at the November 5, 2014 meeting and several topics and major data gaps were identified for further review. It was evident at this meeting that some topics had conflicting views. Significant edits were made, many of the gaps related to economic information remained, and the draft report was re-presented at the January 8, 2015 meeting. A few edits were discussed and made, as a result of this meeting, and the report was sent out to the Southern Tip Partnership. It became apparent at the February 11, 2015 meeting of the Partnership that more economic data needed to be collected and analyzed before consensus conclusions and recommendations could be reached.

After discussion with the Coastal Zone Management (CZM) staff, it was determined that the way forward was to provide a description of the Working Group activities, outline the contents of the draft report, and remove the recommendations of the report. The previous report is withdrawn and replaced with this description of the proceedings.

## Descriptions of Meetings and Presentations

### July 11, 2014 Working Group Meeting

The first meeting was held July 11, 2014 and had nine attendees. The following topics were discussed.

- Conservation Easement Transfers
- Revenue from the Extinguishment of Conservation Easements
- Wetlands Mitigation Bank
- Purchase of Development Rights
- Agricultural and Forestal District
- National Wildlife Refuge System Landscape Conservation Planning
- National Wildlife System Land Protection Planning
- Accomack County/Wallops Island Joint Land Use Study
- Delmarva 3vs Model
- DCR Natural Heritage – Exemplary Species Priority
- Need to Address County Concerns Over Loss of Tax Revenue
- Federal Emergency Management Agency Hazard Mitigation Program
- Request DGIF Comment
- Need for Establishing the Economic Case for Conservation

A-NPDC staff requested a meeting time and the group determined they would prefer to conduct the review of the report by email.

**September 19, 2014 Distribution of the First Draft of the Report**

The draft report was sent to all the attendees, DGIF representative, the planning directors of Accomack and Northampton Counties, and the Eastern Shore of Virginia Soil & Water Conservation District for comments. Staff requested comments by October 14, 2014.

The draft report had 52 citations, a length of 23 pages and 4 figures and maps. It included the following outline of topics.

- Introduction
- Stakeholders
- Conservation Tools
  - Local Land Use Tools
    - Comprehensive Plan
    - Zoning
    - Agricultural and Forestal Districts Act
  - Taxation
    - Use Value Assessment (Land Use Assessment)
    - Certain Property Exempt from Taxation by Classification or Designation
    - Virginia Land Conservation Incentive Act
    - Virginia Recordation Tax Act
  - Legislative Authorities
    - Open-Space Land Act
      - Purchase of Development Rights Program
    - Transfer of Development Rights Program
    - Virginia Conservation Easement Act
      - Easement Holder Requirements
      - Enforcement of Conservation Easements
    - State Water Control Law (Wetlands Mitigation Banks)
  - Fee Simple Ownership for Conservation
    - Property Owned by State Agencies
      - Virginia Natural Areas Preserves System
      - Virginia State Parks
      - Wildlife Management Areas
    - Property Owned by Federal Agencies
      - National Wildlife Refuge System
        - Chincoteague National Wildlife Refuge & Wallops Island National Refuge
        - Eastern Shore of Virginia National Wildlife Refuge & Fisherman Island National Wildlife Refuge
        - North Atlantic Landscape Conservation Cooperative
    - Property Owned by Non-Government Organizations
      - Virginia Coast Reserve
      - Port Isobel & Fox Island
- Guiding Jurisdictional Policies
  - Accomack County

Northampton County  
 Comprehensive Plan Update – Draft Section 6 Environment

- Recommendations
- Recommendation #1
  - Recommendation #2
  - Recommendation #3
  - Recommendation #4
  - Recommendation #5
  - Recommendation #6

Within three days, several comments were received that requested an additional meeting for discussion. Other comments were also received.

**November 5, 2014 Working Group Meeting**

As requested, an additional meeting was scheduled for November 5, 2014. Staff incorporated the comments received into the report. Prior to the meeting, staff sent a review draft marked with changes, as well as the text of all the comments received.

The second meeting was held November 5, 2014 and had nine attendees. The following topics were discussed.

- Inclusion of the Virginia Ecological Value Assessment
- Joint Legislative Audit and Review Commission – Dedicated Revenue Sources for Land Conservation in Virginia
- Clarify Intent of the Report
- Add a General Description of Impacts with Summary
- Include a Land Conservation Definition
- Include in report a summary of tools based on level of protectiveness
- Clarify that land conservation is done for specific purposes such as: Habitat, Species, Water Quality, Hazard Mitigation, Recreational Access, Agricultural Base, Open Space, Wildlife, Quality of Life, Aesthetics and Corridors and Linkages
- Add Blue-green Infrastructure Study
- Add Southern Tip Partnership
- Include 2013 Virginia Outdoors Plan information on economic benefits and cost of services information

Additional clarifying language was added in the meeting.

**January 8, 2015 Working Group Meeting**

The third meeting was held on January 8, 2015 and included six attendees. The following topics were discussed.

- 2013 Virginia Outdoors Plan Discussion – Chapter 5 (Land Conservation) & Region 22 (Accomack-Northampton Recreational Planning Region) Chapter

Counting the Costs and Benefits of Growth, A Fiscal Impact Analysis of Growth in the City of Charlottesville and Albemarle County, Virginia (December 2012)  
 Discussion of the Eastern Shore Land Protection Report

Additional edits were requested and included from this meeting. Additional comments were also received after this meeting.

**February 11, 2015 Southern Tip Partnership Presentation**

The draft report was sent to the Southern Tip Partnership and it was at this meeting that discussion indicated there was a need for additional economic analysis before recommendations could be developed. A-NPDC staff and CZM staff discussed possible options. It was agreed that A-NPDC would write a new summary of the meetings and submit a general description that would replace the draft Eastern Shore Land Protection Report.

**Virginia Coastal Zone Management Information Request**

The Coastal Zone Management Program has requested more detail and documentation of sources reviewed and gaps found regarding additional economic analysis. The sources do not include all sources reviewed but is limited to studies, budgets and reports that have economic impact and fiscal information.

**Sources Examined**

*Virginia Department of Conservation and Recreation's Land Preservation Tax Credit Conservation Value Summary* (years available 2007-2012) – This report provides the value of tax credits requested by locality in that year, if the number of total requests is large enough (in 2012 five or more). Acreage is included.

*2013 Virginia Outdoors Plan, Chapter 5* – Has two sections on economic benefits and costs of not conserving open-space land.

*Trust for Public Land's Conservation: An Investment That Pays* (2009) – Has good verbal descriptions of types of benefits.

*Counting the Costs and Benefits of Growth, A Fiscal Impact Analysis of Growth in the City of Charlottesville and Albemarle County, Virginia* (December 2012) – Describes fiscal cost-benefit ratios for local land uses including agriculture and recreation.

*US Fish and Wildlife Service Division of Economics, Public Review Draft for Chincoteague National Wildlife Refuge Economic Analysis in Support of Comprehensive Conservation Plan* (DRAFT January 2013) – Provides estimations of total spending by refuge visitors.

*American Farmland Trust's Cost of Community Services in Northampton County, Virginia* (June 1999) – Describes fiscal costs for local land uses including agriculture.

*Virginia Department of Conservation and Recreation's Virginia State Parks 2013 Attendance and Economic Impact* – Provides economic impact based on attendance by overnight and day use.

*Virginia Institute of Marine Science's Economic Activity Associated with Commercial Fisheries and Shellfish Aquaculture in Northampton County, Virginia* (October 2014) – Economic Impact of Aquaculture and Commercial Fisheries Landings including an estimate of business taxes.

*Middle Peninsula Planning District Commission's Conservation Easements: Fiscal Impacts to Localities in the Middle Peninsula* (2010) – Addresses conservation easements' fiscal impacts in the context of the Composite Index of a Locality's Ability to Pay.

*Virginia Department of Education's Composite Index of a Locality's Ability to Pay* – Provides the calculation of every locality's portion of school funding.

*US Travel Association's Economic Impact of Domestic Travel on Virginia Localities* (2012) – Provides economic impacts of domestic travel by Virginia county and includes a local tax category.

*Virginia Department of Taxation Annual Report, Table 6.3* (2013) – Provides comparison of tax exempt value to total fair market value of real estate by county for all counties of Virginia.

*County of Accomack, Virginia Annual Fiscal Plan* (FY 2015) – Provides the previous year actuals and adopted budgeted balance sheet broken down in various categories.

*County of Northampton, Virginia Annual Operating Budget* (2013-2014) – Provides the previous year actuals and adopted budgeted balance sheet broken down in various categories.

*Joint Legislative Audit and Review Commission Dedicated Revenue Sources for Land Conservation in Virginia* (September 2012) – Provides historic information on Virginia's land conservation funding as well as amount of acreage conserved by county.

#### **Data Needs**

Throughout the process there was continued focus on seeking information to answer questions regarding economic factors and the working group identified an economic analysis need in the first meeting. While certain economic effects are expected, limited data is available to provide estimates of the revenues and expenditures.

On the revenue side, data needs include the specific effects on property values in proximity to conserved lands, the effect of land conservation on certain industries such as aquaculture and agriculture, the portion of tourism revenue attributable to conservation. Additional work is needed to quantify the reduction in revenue from the tax exemption by classification attributable to conservation.

On the expenditure side, very little specific data is available. These include gaps in data on service cost avoidance related to forgoing increased demands for fire protection, schools and other government services, cost increases in local government staffing to comply with state and federal requirements attributable to agricultural conservation and costs associated with oversight of land conservation tools, and local government service costs associated with tourism development.

Specific data needs were also requested from the Working Group and The Nature Conservancy provided several included below and also listed in the Working Group Comment Appendix.

- a. Request the county assessors to provide detailed information on all tax exempt land by category so the impact of conservation land can be accurately discussed.
- b. Request the American Farmland Trust to conduct Cost of Services studies for Accomack and Northampton counties.
- c. Engage an independent organization, such as UVA's Weldon Cooper Center, to conduct a study on the economic impacts of conservation in Accomack and Northampton counties.
- d. Conduct a current zoning buildout analysis of Accomack and Northampton counties and use the analysis to determine the future revenue needed to fund additional services required by new development.
- e. Develop strategies to leverage Eastern Shore conservation efforts for economic development, as is being done in Southwest Virginia.

### Appendix: Sign In Sheets for Land Preservation & Policy Working Group

Land Preservation & Policy for the Eastern Shore of Virginia  
 Friday, July 11, 2014  
 10:00am  
 Mill Run Apartments Community Room  
 35489 Mill Run Lane  
 Belle Haven, Virginia

Name	Organization	Mailing Address	Phone Number & Fax	Email Address
Dot Fice	Del. Dept. of Rec. & Parks	P.O. Box 712 P.O. Box 23810	757-657-5777	dot.fice@delaware.gov
Forrest Haveler	Del. Dept. of Parks & Recreation	3540 K. J. J. Rd, Dr Camp Charles, VA 20010	757-331-3402 Fax 757/331-4340	Forrest.haveler@delaware.gov
Kevin Holcomb	USFWS - Chesapeake NWR	P.O. Box 62 Chincoteague, VA 23036	757-336-6143 x2319	Kevin.Holcomb@fws.gov
Get Smith	ANPDC			csmith@anpdc.org
Jim Madson	TNC	P.O. Box 158 Westonville, VA 23413	757-942-3447 X 22	JimMadson@tnc.org

Land Preservation & Policy for the Eastern Shore of Virginia  
 Friday, July 11, 2014  
 10:00am  
 Mill Run Apartments Community Room  
 35489 Mill Run Lane  
 Belle Haven, Virginia

Name	Organization	Mailing Address	Phone Number & Fax	Email Address
Kristen Trembley	Accomack County Planning Department	<del>Accomack County Planning Department</del>	757-787-5711	Kristen@acc.comack.va.us
Bob Ladd	USFWS - Chesapeake NWR	5003 Atlantic Ave Camp Charles, VA 20010	757-331-2720 x118	Bob.Ladd@fws.gov
Peter Handman	VE-S Land Trust	P.O. Box 114 Farmingdale, VA 23352	757-59985	Handman@ve-s.org
Zane May	ANPDC			

Land Preservation and Policy for the Eastern Shores of Virginia  
 Wednesday, November 05, 2014  
 10:00am  
 A-N Planning District Commission  
 23372 Front Street  
 Accomac, VA 23001

*Fane  
Cowan*

Name	Organization	Mailing Address	Phone Number & Fax	Email Address
<i>Bob Lefke</i>	<i>USFWS</i>	<i>5005 Bullock Creek Cape Charles, VA 23510</i>	<i>0750 331-2710 x112 0750 331-3428</i>	<i>bob.l@fws.gov</i>
<i>Carmie Swartz</i>	<i>Eastern Shore SWCA</i>	<i>22915 Center Parkway Accomac, VA 23001</i>	<i>757-462-0910 x119</i>	<i>Carmie.Swartz@eswca.org</i>
<i>Jane Cowan-Lessner</i>	<i>USDA - NRCS</i>	<i>22545 Ctr. Parkway Accomac</i>	<i>757-767-0918 x110</i>	<i>jane.lessner@va.usda.gov</i>
<i>Neil Poulos Engel Peter Henderson</i>	<i>VEP Land Trust</i>	<i>Po Box 114 Eymore</i>	<i>757-462-5885</i>	<i>neil@vep.org peter@vep.org</i>



*Rob Ritter attended and did not sign in.*



Land Preservation and Policy for the Eastern Shores of Virginia  
 Wednesday, November 05, 2014  
 10:00am  
 A-N Planning District Commission  
 23372 Front Street  
 Accomac, VA 23001

Name	Organization	Mailing Address	Phone Number & Fax	Email Address
<i>John Medina</i>	<i>TWC</i>			





Land Preservation & Policy for the Eastern Shore of Virginia  
 Thursday, January 8, 2015  
 10:00am  
 Accomack-Norhampton Planning District Offices  
 Accomac, Virginia

Name	Organization	Mailing Address	Phone Number & Fax	Email Address
Robert Ritter	Solo of Change	101 Herchbachway GISD Community Dr. Accomack VA	757-336-6179	
Curt Swick	A-NPDC			
Peter Stahl	Norhampton County	1644 Commerce Rd. Eastville VA 23047	757-678-2140	pstahl@norhamptonva.gov
Jim McCombs	TNC			

Flannery K. Neal DNR  
 Dot Field  
 PO Box 712  
 Norfolk, VA 23510  
 757-714-5100  
 dotfield@dnr.state.va.us

## Appendix: Land Preservation & Policy Working Group Comments

**Elaine K. N. Meil**

**Subject:** FW: TNC Comments on A-NPDC Proceedings of the Eastern Shore Land Protection Group

**From:** James McGowan  
**Sent:** Wednesday, March 18, 2015 12:47 PM  
**To:** Elaine Meil  
**Cc:** Jill Bieri  
**Subject:** TNC Comments on A-NPDC Proceedings of the Eastern Shore Land Protection Group

Hi Elaine,

Here are TNC's comments on the A-NPDC's Proceedings of the Eastern Shore Land Protection Group. Please let us know if you have any questions or need any additional information:

TNC Comments on A-NPDC Proceedings of the Eastern Shore Land Protection Group

1. Page 4: It would be worth mentioning here what the "conflicting views" are. The draft report was never intended to discuss economic data. However, when it was suggested that land conservation was responsible for reducing county tax revenue, it became necessary to look at the whole economic picture.

The second paragraph on page 4 states that the "toolkit" would be summarized, but the list of items on page 5 is really an outline. Perhaps the second paragraph on page 4 should say, "outline the contents of the draft report".

2. Page 8-9: We suggest making the discussion on data needs more concise, and end with a summary paragraph that lists specific goals for the next report. Here are some suggestions:
  - a. Request the county assessors to provide detailed information on all tax exempt land by category so the impact of conservation land can be accurately discussed.
  - b. Request the American Farmland Trust to conduct Cost of Services studies for Accomack and Northampton counties.
  - c. Engage an independent organization, such as UVA's Weldon Cooper Center, to conduct a study on the economic impacts of conservation in Accomack and Northampton counties.
  - d. Conduct a current zoning buildout analysis of Accomack and Northampton counties and use the analysis to determine the future revenue needed to fund additional services required by new development.
  - e. Develop strategies to leverage Eastern Shore conservation efforts for economic development, as is being done in Southwest Virginia.
3. We suggest adding a final statement that the Working Group and the A-NPDC are working together to find an independent agent to prepare a comprehensive report for the Eastern Shore that addresses the economic issues raised during this process.
4. How will this final grant report be approved and distributed?

Thanks for the opportunity to comment on this draft proceedings report. TNC will look forward to working with the A-NPDC and other partners on the next steps.  
 Regards,  
 Jim

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A-NPDC Response: A-NPDC staff has changed the language to outline noted in Comment 1. The data needs section has been made more concise and the suggestions added. The comment letter is now incorporated into the record of the proceedings. On March 16, 2015, A-NPDC staff gave a status report to the Commission on the project, noted that the work found that additional

information is needed, noted it was time to close the grant out and offered a draft of the report to interested persons. Only one person, a member of the audience, requested a copy. With no objection from the Commission and the incorporation of final working group comments, the report will now be submitted as a component piece of the annual report of FY2013 grant #NA13NOS4190135 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration. Upon their acceptance, a copy will be made and kept at the A-NPDC offices and may also be included in the annual reports available on the Virginia Coastal Zone Management website and also the A-NPDC website.