



Crisfield Resilience Academy

*Supporting the Crisfield community
through research and education*

EPA Office of Research and Development

TOC

Intro

Resilience

Drainage

Flood
warning

NBS

Capacity

Careers

Action
Planning

Comms

Closing

Table of Contents

- 1 About Crisfield & the Academy
- 2 Introduction to Coastal Resilience
- 3 Crisfield's Ditch Drainage System
- 4 Flood Warning Systems
- 5 Nature Based Solutions for Coastal Protection
- 6 Community Capacity Building
- 7 Economics and Careers in Coastal Tourism
- 8 Resilience Action Planning
- 9 Communications & Correspondence
- 10 Evaluation and Closing Sessions

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1. Introduction to the Resilience Academy & Crisfield Projects

Since Crisfield's founding on the Chesapeake Bay, the environment has been an important part of community life, economy, and culture. As part of its efforts to deal with current environmental challenges such as flooding, Crisfield partnered with the U.S. EPA and others to explore [coastal resilience solutions](#) with an educational training opportunity called the **Crisfield Resilience Academy**.



1.0 [Impact/Purpose Statement](#)

1.1 [Acknowledgements](#)

1.2 [Introduction to Crisfield Research](#)

1.3 [Resilience Academy Cohorts](#)
Fall 2024
Spring 2025

1.4 [How to Use This Binder](#)

TOC

Intro

Resilience

Drainage

Flood
warning

NBS

Capacity

Careers

Action
Planning

Comms

Closing

1.0. Impact/ Purpose Statement

The Crisfield Resilience Academy was initiated in response to a need for more education about coastal resilience issues and solutions, which was expressed and requested directly by the city and community members of Crisfield.

The goals of the Crisfield Resilience Academy were to 1) increase the knowledge of Crisfield community members about nature-based solutions, benefits and capabilities relevant for Crisfield, 2) support and increase community capacity to address local flooding issues, and 3) provide feedback on ongoing EPA research to ensure that it was responsive to community needs. EPA evaluated the effectiveness of the program to improve its own capacity to engage community members in research and education. Analyzed data to-date (April 10, 2025) can be found in the back of this binder ([Evaluation](#)).

The larger goal for these materials was to make them useful for other communities with similar flooding issues across the country, but unfortunately, time was not available to complete that final step. We encourage those who might be interested in adapting these materials or exploring the preliminary results to use the materials in this binder, especially those in communities across the country that face consistent and/or nuisance flooding, the EPA's Office of Water, or other partners with an interest in flooding and community capacity. If you do end up adapting these materials for use in your own community, [please let us know – we'd love to hear from you](#) and support your community however we can.

1.1. Acknowledgments

The Crisfield Resilience Academy is the result of hard work by many incredible people. [See the full acknowledgements](#). In particular, we would like to recognize BEACON (Business Economic & Community Outreach Network) of Salisbury University as a key partner and contributor to the project. BEACON assisted with refinement of all associated Academy materials and facilitation of the 12 Academy workshops.

Speakers for workshop sessions were recruited from local organizations and universities in the Eastern Shore of Maryland to help build the community's network of connections with nearby experts. The EPA research team employed co-production strategies with BEACON, city representatives and officials, and local Academy participants to ensure that the Academy succeeded in addressing the community's needs while also supporting community capacity to implement identified solutions in the future.

Recommended citation: Hartley, J., J. Daniel, E. Eisenhauer, R. Leek, M. Chapman, and K. Gootman. *Crisfield Resilience Academy: a Digital Binder of all Academy materials*. To be presented at the Crisfield Resilience Academy - Final Celebration and Graduation Session, Crisfield, MD, 04/26/2025.

1.2. Introduction to Crisfield Research

Crisfield Resilience Academy

Academy participants were asked to commit to attend six in-person training sessions at the Crisfield Public Library. Participants had opportunities to engage with local researchers and experts. Participants were eligible to receive a stipend of up to \$300 for full participation in the program activities (\$50 per session attended). Upon completion of the Academy, participants received a [final certificate](#) of completion and presented their findings at a public session to which their local officials were invited. U.S. EPA and BEACON hosted two cohorts of the Academy.

Coastal Community Resilience Research Projects

The Academy was part of a larger research effort from the U.S. EPA called the Chesapeake Solutions-Driven Research (Chesapeake SDR) project. The Chesapeake SDR was an interdisciplinary effort comprised of scientists, engineers, geospatial researchers, and communications specialists to support the Crisfield community with understanding resiliency and nature-based solutions in Crisfield. Other projects within the Chesapeake SDR included:

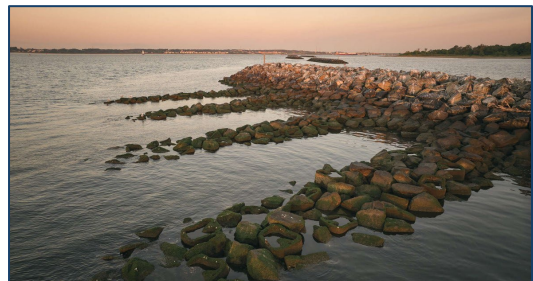
- Assessing Nature Based Strategies
- Assessing Blue Carbon Potential
- Public Learning Sessions
- Research Co-Production
 - Technical Working Group
 - Public Input Sessions
 - Partner Meetings

Assessing Nature-Based Strategies

Throughout the project, EPA supported community decision making around the trade-offs of different nature-based strategies to ensure that they aligned with the values and desired future of the community. This work included investigating natural infrastructure strategies like saltmarshes, living shorelines, and living breakwaters for addressing coastal resilience issues in and around Crisfield. Along with the community, EPA worked to explore the potential co-benefits of these strategies to the natural spaces around Crisfield and protect and develop the community's culture, history, and seafood industry, tourism, and recreation opportunities.



Living shorelines (above) and breakwaters (below).



Research Co-Production

Research co-production is an approach in which researchers, stakeholders, and public participants work together in a partnership to identify areas of concerns and information gaps, share scientific and local knowledge, and plan research efforts.

The goals of this research process were to:

- co-develop research with the Crisfield community and surrounding area to address their needs and goals;
- keep the community and key stakeholders updated with research designs and results; and
- develop products such as presentations, reports, and tools that are useful and accessible for the community and other stakeholders.

This co-production approach involved regular check-ins with key stakeholders, data collection for use in report development and decision-making, meetings and workshops to collect input and feedback on research plans and products, and updates for the community members.

- **Public Input Sessions & Technical Working Group:** The Technical Working Group was designed to provide interim feedback on EPA's data collection, analysis and modeling of nature-based solutions and social and economic co-benefits. The group included subject matter experts to provide review and input on the nature-based solutions research to improve Crisfield's coastal resilience. Members were experienced in salt marsh ecosystems, coastal engineering, and related fields with knowledge of the Crisfield area. The group met quarterly during 2024 and 2025.
 - Public input sessions were held to inform the Crisfield community about EPA's research and to solicit input from the public to be considered in the EPA's research efforts (roughly quarterly and in response to community needs).
- **Partner Meetings:** Multiple federal agencies and organizations supported the Crisfield community. These partners met regularly to discuss their work.
- **History, Coordination, and Partnerships**
 - The Nature Conservancy (TNC), GMU, and UMD worked with the community on addressing tidal flooding issues
 - EPA Creating Resilient Water Utilities (CRWU) team conducted an assessment focused on Crisfield's ditch system and drainage management under climate projections
 - FEMA is providing direct technical assistance to the City to design hard infrastructure flood reduction strategies
 - TNC is funding potential wetland restoration for water storage
 - EPA Office of Research & Development (ORD) is exploring nature-based solutions for storm surge and wave reduction with Crisfield
 - EPA Region 3 and Chesapeake Bay Program Office (CBPO) are identifying nature-based strategy implementation processes
 - Audubon is working on marsh restoration opportunities for salt marsh sparrow habitat

1.3. Resilience Academy Cohorts

Fall 2024 Cohort

The Crisfield Resilience Academy kicked off its first cohort in Fall of 2024. The cohort had 9 regular attendees. The Fall 2024 topics included:

- Session 1: Case Studies of Successful Coastal Resilience Projects - Saturday, September 28 (Crisfield Public Library)
- Session 2: Crisfield's Ditch Drainage System - Saturday, September 28th (Crisfield Public Library)
- Session 3: Flood Warning Systems - Saturday, October 5th (Crisfield Public Library)
- Session 4: Nature-Based Solutions for Coastal Protection - Saturday, October 19th (Crisfield Public Library)
- Session 5: Sustainable Coastal Tourism and Recreation - Saturday, November 2nd (Crisfield Public Library)
- Session 6: Celebration & Graduation – Saturday, November 16th (Crisfield Public Library)

Spring 2025 Cohort

Following revisions in response to feedback from cohort 1 participants, the Crisfield Resilience Academy launched its second cohort in the Spring of 2025. The cohort had 25 regular attendees. The Spring 2025 topics included:

- Session 1: Resilience - Saturday, February 1st (Crisfield Public Library)
- Session 2: Economics & Careers in Coastal Resilience - Saturday, March 1st (Crisfield Public Library)
- Session 3: Ditches & Flood Warning Systems - Saturday, March 22nd (Crisfield Public Library)
- Sessions 4 & 5: Nature Based Solutions (NBS) and Community Capacity Building- Saturday, April 5th (Crisfield Public Library)
- Session 6: Celebration - Saturday, April 26th (Crisfield Public Library)

1.4. How to use this Binder

This binder contains all of the materials for the Crisfield Resilience Academy and is organized by topics. Communications materials, as well as participant evaluation and feedback are also provided. Some of the activities were modified between the first and second cohort, so there may be multiple activity options by topic. Where able, guest presentations are provided for reference. There is a companion PDF document that includes an archive of all materials by session.

2. Introduction to Coastal Resilience

2.0

Introduction to Coastal Resilience – Agenda

2.1

Resilient Cities – Background Information

2.2

Case Studies

1. Adaptation in Norfolk, Virginia
2. Sea Grass Meadows in Spain
3. Oyster Reefs in the Netherlands
4. Marsh Restoration in Pensacola, Florida

2.3

Activity: Resilient Cities

1. Handout Option 1
2. Handout Option 2

2.4

After Session Handouts



2.0. Introduction to Coastal Resilience – Agenda



Crisfield Resilience Academy

Session 1: Introduction to Coastal Resilience

February 1, 2025

Today's Objectives

Participants will learn about coastal resilience projects completed in other locations that share some similarities to Crisfield and will examine their impacts and potential applicability to Crisfield. Active participation is encouraged for the co-creation of community-centered resilience strategies.

Agenda

- 10:00 AM - 10:25 AM:** Welcome! Get-to-know-you; Logistics; and Introductions
Jenna Hartley, U.S. EPA & John Hickman, BEACON
- 10:25 AM - 10:50 AM:** "What does Resilience mean for Crisfield?"
Kyle Buck, Human Geographer, U.S. EPA - Gulf Breeze, FL
- 10:50 AM - 11:15 AM:** Coastal Resilience Activity, Part 1: Case Studies
- 11:15 AM - 11:25 AM:** Break
- 11:25 AM - 11:50 AM:** Coastal Resilience Activity, Part 2: Crisfield Discussion
- 11:50 AM - 12:00 PM:** Moving Forward: Community-Building & Confidence/Competence
- 12:00 PM - 12:15 PM** Conclusion & Session Evaluation

Link to Session Evaluation: <https://bit.ly/CRA-Session-Eval>



Upcoming Academy Dates

- Session 2** Sat., Feb. 22: Ditches & Flood Warning Systems
- Session 3** Sat., March 1: Economics & Careers in Coastal Resilience
- Session 4** Sat. March 22: Nature-Based Solutions
- Session 5** Sat., April 5: Community Capacity Building
- Session 6** Sat., April 26: Academy Celebration & Graduation!*
- *please invite friends, family, and other community members!*



TOC

Intro

Resilience

Drainage

Flood
warning

NBS

Capacity

Careers

Action
Planning

Comms

Closing

2.1. Resilient Cities – Background Information



2.1.1 Background Information

OBJECTIVES

In this activity, participants will analyze real-life examples of successful resilience projects to:

- a) understand their key elements and impacts and
- b) examine lessons learned and best practices from these case studies applicable to various contexts and communities.

BACKGROUND

Coasts experience various threats that can cause disruptions to daily life, such as high winds or flooding. **Coastal resilience** is the ongoing ability for coastal communities to prepare for, adapt to, withstand, and recover from coastal threats, hazards, and disruptions. A coastal community that is more knowledgeable, informed, and prepared for hazardous events has a stronger capacity to respond to weather and climate-related events, including sea level rise¹.



Community resilience goes beyond one-time weather events. It includes ongoing access to safe and affordable housing; flourishing natural ecosystems; equitable health care; a nutritious, affordable, and sufficient food supply; clean water; robust education and workforce opportunities; secure and clean sources of energy; and the capacity to thrive¹. Understanding that those are long-term goals, the process of building resilience succeeds most with strong community input and leadership. The City of Crisfield and the surrounding Crisfield community is already displaying such leadership by working to increase their level of resilience².

Driven by the belief that “building resilience against climate change requires a collaborative effort between government, businesses, and residents,” Crisfield and the surrounding community are collaborating to “help everyone work towards a more resilient future”². **The Crisfield community has defined and is already working on six community resilience goals:** 1) resilient infrastructure, 2) safe and affordable housing, 3) business and job opportunities, 4) recreation and tourism investments, 5) youth development, and 6) enhanced community spaces³.

Other cities across the country and globe have also established successful coastal resilience projects and, in turn, **community resilience**. Today, we’ll investigate and explore the transferability of other communities’ successful resilience projects to potential projects in Crisfield and the surrounding area.

¹ <https://www.whitehouse.gov/wp-content/uploads/2023/09/National-Climate-Resilience-Framework-FINAL.pdf>

² <https://www.crisfieldfloodmitigation.com/>

³ The Nature Conservancy, George Mason University, and University of Maryland (2024, June). Flood Adaptation Assessment for Enhanced Community Resilience. NOAA AdSci Report.Text.

2.1.2 What Does Resilience Mean for Crisfield?

"What does Resilience mean for Crisfield?"

Kyle Buck, Human Geographer, U.S. EPA - Gulf Breeze, FL

Link to Session Evaluation: <https://bit.ly/CRA-Session-Eval>



Notes

What does Resilience Mean for Crisfield?

Crisfield Resilience Academy
September 2024



Multiple Meanings

Withstand:

Limit losses from exposure

Bounce back:

Ability to return to prior state
after losses.

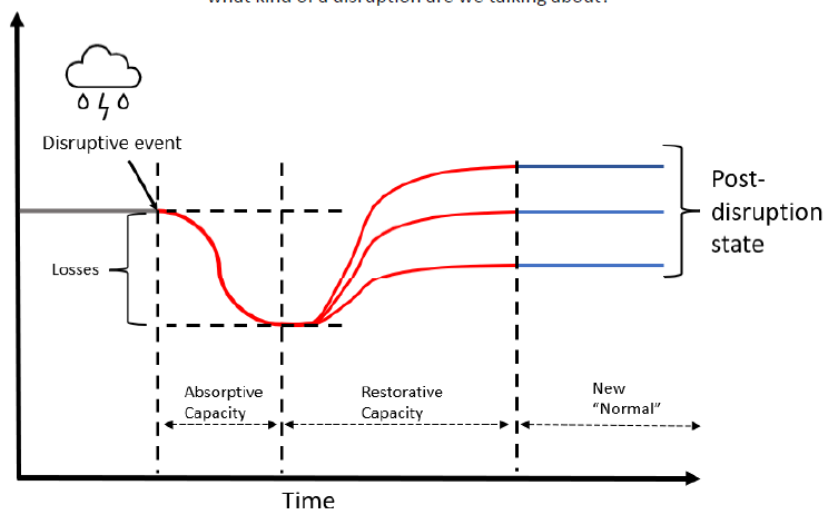
Disruptions:

- Natural Hazards
 - Short-term – hurricanes, tornados, fires
 - Long-term – drought
 - Floods – both short term and long term
- Economic – loss of industry (jobs, resources)
- Social – education, emigration, crime

In general, it is the ability to prepare, adapt to, withstand and/or bounce back after a disruption.

Breaking down components:

- what does it mean "to withstand"?
- what does it mean to "bounce back"?
- what kind of a disruption are we talking about?





Example: (short-term hazard)

- Hurricane
 - Human injury or death
 - Damage to structures
 - Damage to roadways/infrastructure
 - Disruption of business, schools, social routines
- What does resilience look like?
 - Withstand – evacuation plan in place and enacted quickly/efficiently, buildings elevated, hurricane rated windows and roofs.
 - Bounce back – system for getting supplies in, power and water restoration quickly if lost, insurance coverage, access to support networks within and outside of impacted areas.
- Resilient community – has plans in place and sufficient infrastructure to withstand known hazards - will limit loss and quickly return to operational state.
- Non-resilient community – will experience higher initial losses. Losses to infrastructure and/or lack of planning will result in slower response and influx of resources to recover quickly.



Storms affecting Maryland by period

Period	Number of storms
1950s	9
1960s	14
1970s	11
1980s	13
1990s	20
2000s	29
2010s	33
2020s	14



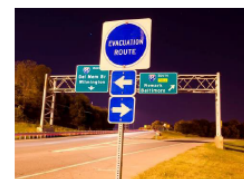
So how do we measure resilience?

- It depends...
- Set goals for the community
- Generally, responses are broad:
 - Reduce damage to property,
 - keep people safe,
 - improve speed of recovery

Elevated buildings, storm shutters/windows, newer roof systems

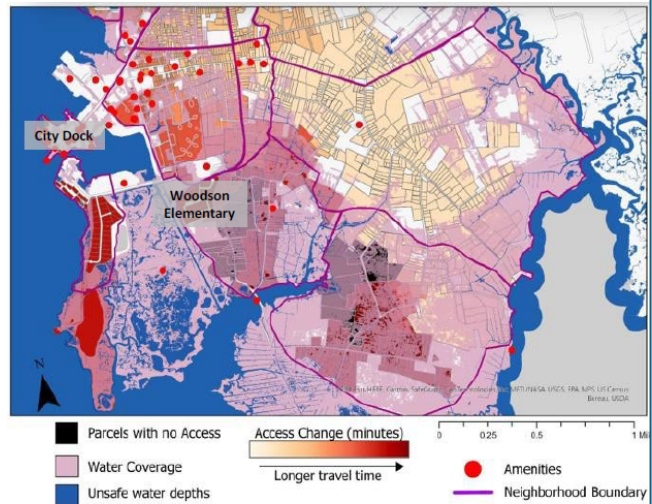
Warning systems and evacuation plans, identification of vulnerable populations, presence of nearby shelters, EMS capacity

Robust infrastructure, supply chains, job supply



Resilience in Crisfield

- Hazards:
 - Flooding
 - Hurricane/storm surge
- Challenges:
 - Location (low elevation, access limited)
- Resources:
 - Active community engagement and interest in improving outcomes
 - Resources targeting the challenges are increasing
- Measuring it all...
 - Six components:
 - Social – vulnerable people and resources to help
 - Economic – income and job stability measures
 - Community – strength of social networks
 - Institutional – planning, insurance, and govt. involvement
 - Housing/Infrastructure – quality and accessibility
 - Environmental – quality and benefits
 - We use 49 individual measures to gauge strengths and vulnerabilities within community.
 - Goal is to identify vulnerabilities that can be addressed/improved.



2.2. Case Studies

2.2.1 Adaptation in Norfolk, Virginia



Team 1

Case Study:

USING LOW IMPACT DEVELOPMENT CONCEPTS TO REDUCE FLOODING, NORFOLK, VA

Challenge:

Over the last century, the Chesterfield Heights neighborhood of Norfolk, Virginia has experienced more than 14 inches of sea level rise. The community, a registrant in the National Registry of Historic Places, has relied largely on stormwater drains to manage any excessive precipitation. However, higher sea levels have rendered the stormwater drainage system ineffective, resulting in regular flooding during storm events. Some homes face flooding problems during normal high tide cycles.

Overview/History

Chesterfield Heights is predominantly an African-American, middle class community consisting of about 900 people living in single-family homes on the Elizabeth River. The first homes were built in 1915 along the riverfront, and subsequent expansion of the community has happened on higher ground.

In recent years the Norfolk area has experienced significant increases in sea level rise and Chesterfield Heights is beginning to feel the impact. The community's riverfront shoreline is constantly eroding because of wave action and the wakes of passing boats. It also has two inlets that carry water deep into the heart of the neighborhood. These factors combined mean the community is particularly vulnerable to flooding and erosion during storm events. In addition to hurricanes, nor'easters cause significant flood damage.

In 2015, Wetland Watch, in collaboration with Virginia Sea Grant, Old Dominion University and Hampton University, wanted to develop a proactive plan to minimize future flooding in a vulnerable coastal community and identified Chesterfield Heights as a candidate. However, many of the community oriented tools available to combat sea level rise and flooding are applied retroactively after a flood and are "hard" tools that do not maintain the ecosystem, and may disrupt the feel of a community.



Credit: Google Earth

Project Details

- **Location:** Norfolk, VA
- **Population:** 246,000
- **Strategies:** Bioswales, Rain Gardens, Floodwater Detention, Green Streets, Coastal Restoration
- **Cost:** \$115 million
- **Benefits:** Flooding reduced by 90%

Learn more at [NRCsolutions.org](https://nrcsolutions.org)

For information, contact info@NRCsolutions.org

Permission to use these case studies was acquired from The Nature Conservancy (Nathan Woiwode - Climate Adaptation Strategy Lead, Northeast Division) and are available here <https://nrcsolutions.org/>

TOC

Intro

Resilience

Drainage

Flood
warning

NBS

Capacity

Careers

Action
Planning

Comms

Closing

Case Study:

USING LOW IMPACT DEVELOPMENT CONCEPTS TO REDUCE FLOODING, NORFOLK, VA

Solution

A cadre of partners worked collaboratively with the residents of Chesterfield Hills to develop a plan to address the increased flooding. The partners included Wetland Watch, Virginia Sea Grant, Hampton Roads Green Building Council, Hampton University's Architecture Department, Old Dominion University's Civil and Environmental Engineering Department, the Virginia Institute of Marine Science, and an advisory group of 30 design, engineering, and development professionals.



Overflowing stormwater system in Chesterfield Heights. Credit: EPA

The goal was to conduct an adaption design process in a shoreline community – at the street level – with full community involvement that focused on adaptation before significant storm and flooding damage occurred. A second goal was to maintain or expand ecosystem services. The work involved identifying community needs and desires; the solutions had to fit the neighborhood culture to be effective.

The group determined there needed to be a way to safely hold more rainwater during storm events to prevent it from further overwhelming the stormwater drainage system. ODU engineering students developed a "water budget" for the neighborhood using the Environmental Protection Agency's Storm Water Management Model (SWMM). From this they determined the volume of peak storm water flow they needed to remove to minimize flooding impacts and allow the existing compromised stormwater system to handle the runoff. They found that a distributed approach that included downspout disconnects, on-ground interlocking cistern systems, rain gardens, bioswales, and permeable pavers with under-street cisterns would be most effective at addressing stormwater flooding. In addition, they concluded that installing a living shoreline along the riverfront would help protect the shoreline from erosion while maintaining its natural feel.

Funding/Financing

Initial funding for the study, \$50,000 in total, was provided by Virginia Sea Grant for project planning. The project was later included in the state of Virginia's submission to the HUD-run, post-Sandy, Natural Disaster Resilience Competition. Virginia was selected as one of the winners of the competition and received \$120 million to implement these and other coastal adaptation strategies.

Benefits

Results indicate that these new design elements will allow the community's stormwater system to effectively handle stormwater now and into the future. Implementing these nature-based solutions should significantly reduce stormwater peak flows, reduce stormwater pollution run-off and expand wetland and natural shoreline areas.

Additional Resource

Stiles, William A. et. al. "[Tidewater Rising Resiliency Design Challenge](#)." Wetlands Watch. P.23-24. January 2016. Web. 09 Nov. 2016.

Learn more at NRCsolutions.org

Naturally Resilient Communities is a partnership of the American Planning Association, the American Society of Civil Engineers, the Association of State Floodplain Managers, the National Association of Counties and The Nature Conservancy and made possible with support from the Kresge Foundation.

2.2.2 Case Study: Sea Grass Meadows in Spain



Team 2

Andalusian Mediterranean Sea, Spain

Conservation of *Posidonia oceanica* meadows

Challenge: Seagrass meadows are a key underwater ecosystem that provides a multitude of ecosystem services including support to fisheries, coastal protection, and climate change mitigation. However, the extent of seagrass meadows is dramatically decreasing as a result of increasing sea temperatures, sea level rise, alteration of ocean pH, more frequent storms, and anthropogenic activities. It has been estimated that one-third of the European seagrass meadows have been lost between 1869

27,022 ha of seagrass meadows were mapped and received protective measures to secure its habitat conservation status

and 2016, especially during the 1970s and 1980s. With this loss of this habitat, there is also a loss of the valuable ecosystem services these seagrass meadows provide.

Overview/History: *Posidonia oceanica* are of particular interest in Europe as it is an endemic species predominantly located in the Mediterranean Sea. Since the 1960s, the extent of this species in the Mediterranean has declined by up to 50%. Some of the threats affecting this ecosystem include bottom trawling, water pollution, competition with invasive species, and sand extraction from seabeds. The EU LIFE+ *Posidonia* Andalusia project was implemented in order to secure the conservation status of *Posidonia oceanica* meadows, defined as a priority conservation habitat in the Annex 1 of the EU Habitats Directive, in the Andalusia region (Southern Spain). Preserving the conservation status guarantees the survival of habitats and species in the medium to long-term by securing enough space and quality of habitats, and by preserving species population size. The project is focused on seagrass meadows located within Sites of Community Interest (SCIs), defined as sites that substantially support the maintenance or restoration of the conservation status of habitats listed in Annex I and/or species listed in Annex II of the EU Habitats Directive.

Solution: Several conservation measures were implemented to secure the conservation status of seagrass meadows in Andalusia. The first step towards this goal was to map the habitat extent, which included 27,022 ha of *Posidonia* meadows. Furthermore, a comprehensive monitoring network was created with standard methodologies to facilitate the assessment of relevant features in seagrass meadows. Such monitoring highlighted the diversity of species present in the seagrass meadows and the importance of protecting them.

PROJECT DETAILS

- **Location:** Andalusian Mediterranean Sea, Spain
- **Population:** more than 1 million inhabitants
- **Strategy:** ecosystem conservation and restoration
- **Cost:** 3,562,125 €
- **Benefits:** biodiversity conservation and restoration, coastal protection

TOC

Intro

Resilience

Drainage

Flood
warning

NBS

Capacity

Careers

Action
Planning

Comms

Closing

After an initial assessment, the project implemented actions to reduce possible degradation sources such as anchoring, trawling and the presence of other non-native species (i.e., alien species) as well as impacting the ability of this habitat to reduce risks to shorelines. In order to address free anchoring, ecological mooring buoys were installed, and awareness campaigns informed about the negative impacts on seagrass meadows of irresponsible anchoring. Furthermore, artificial reefs were deployed in two SCIs aiming at reducing the impact of trawling. Although these measures were very effective, the actions to eliminate alien species were not because their populations had already expanded beyond control at that stage. This example also demonstrates the importance of early action to control invasive species.

In order to secure the maintenance of the conservation status, long-term management plans were also developed for each section of the project. Other actions included dissemination of materials to increase awareness about seagrass conservation and stakeholder engagement through meetings with local communities to support management plans that reflected the local socio-economic context. The emphasis on community outreach and education amongst key user groups of areas providing NbS is a critical component of successful efforts like this case study.

Funding/Financing: The total cost of the project was 3,562,125 €. Around 70% of the cost was funded by the EU LIFE+ program.

Benefits: The main benefit associated with the EU LIFE+ Posidonia Andalusia project is the conservation and restoration of ecosystem services related to seagrass meadows, including carbon sequestration and fish biodiversity enhancement. This project also resulted in benefits related to greater awareness and education amongst user groups and the general public about the benefits of seagrass meadows including their ability to reduce risk to shoreline communities. Although monitoring results were not identified, research indicates that seagrass meadows are likely to offer coastal protection features as well. Such protection is not uniformly distributed amongst meadows, and key physical and biological aspects affecting it include plant stiffness, standing biomass and plant density¹.



Posidonia Oceanica meadows in Andalusia coast. Source: <https://www.iucn.org/regions/mediterranean/projects/completed-projects/conservation-posidonia-oceanica-meadows-andalusia-coast>

¹ Ondiviela, B., Losada, I., Lara, J., Maza, M., Galván, C., Bouma, T. and van Belzen, J., 2014. The role of seagrasses in coastal protection in a changing climate. *Coastal Engineering*, 87, pp.158-168.

2.2.3 Case Study: Oyster Reefs in the Netherlands



Team 3

Eastern Scheldt, Netherlands

Oyster Reefs Eastern Scheldt Pilot Project

Challenge: Climate change impacts in coastal areas such as sea level rise and increasingly severe storm surge events are gradually demanding greater coastal protection to ensure coastlines become more resilient. Several areas in the Netherlands are built upon reclaimed land (i.e., land reclaimed from the sea), including the Southwest region, which experiences increased risks of flooding and elevated vulnerability to tidal amplitude and ranges.

6,000m² of oyster reef substrates provided coastal protection through sediment trapping and wave attenuation.

Overview/History: The tidal basin of the Eastern Scheldt has suffered from severe erosion due to the construction of storm-surge barriers and dams. Taking advantage of the intensive shellfish cultivation culture in the Eastern Scheldt, a pilot project has boosted overall coastal resilience and restore the natural ecosystem through implementing a nature-based solution. The pilot project in the Eastern Scheldt demonstrated the potential of oyster reefs to provide coastal protection against further erosion.

Solution: The project constructed artificial reefs in the intertidal zone of the Eastern Scheldt in front of mudflats, sandy shoals, and salt marshes. The project aimed at verifying the ecosystem as a sustainable solution to address erosion and protect the adjacent ecosystems. The project explored the ability of shellfish and oysters to act as adaptive and responsive structures to keep pace with sea level rise through vertical reef growth. These reef structures can affect sediment deposition patterns, thereby consolidating sediments, assisting with limiting coastal erosion due to wave attenuation, and stabilizing the shoreline.

In 2008, oyster shells were confined within gabions and deployed on the Eastern Scheldt's tidal flat, forming a substrate of oyster shells. Initially, the pilot project placed a small patch of oyster reefs (40m²). Later on, in 2010, three additional reefs were built with 1,600 – 2,000m² coverage in total. The results indicated a successful growth of the reef through the attaching of new oyster larvae to the existing reefs. Each reef presented slightly different results, but general local sedimentation and wave attenuation were observed. However, further research is required to understand the longevity of oyster reefs in medium to high-energy environments. In order to determine the economic benefits arising from

PROJECT DETAILS

- *Location:* Eastern Scheldt, Netherlands
- *Population:*
- *Strategy:* ecosystem creation (oyster reefs)
- *Cost:* Not informed
- *Benefits:* reduce erosion, biodiversity increase

TOC

Intro

Resilience

Drainage

Flood
warning

NBS

Capacity

Careers

Action
Planning

Comms

Closing

Case Study: Oyster Reefs in the Netherlands

such nature-based approach to the coastal communities, it is necessary to sort out its uncertainties regarding upscaling.

Funding/Financing: The main stakeholders involved in the project included EcoShape, IMARES, NIOZ (former NIOO-CEME), Deltares, Rijkswaterstaat (WINN, Zeeland), Van Oord, and TUD. The cost of the project was not disclosed.

Benefits: The project delivered benefits such as reduction of erosion and shoreline stabilization through sediment trapping and wave attenuation; and enhancing biodiversity by providing a hard substrate habitat in a sandy area. Furthermore, it was a valuable project to gather knowledge on the usage of oyster reefs for coastal protection against erosion, becoming a reference of a nature-based approach.



Gabions to be filled with oyster shells. Sources: <https://www.ecoshape.org/en/cases/shellfish-reefs-as-shoreline-protection-eastern-scheldt-nl/construction-phase/>



Small-scale pilot on a salt marsh area. Source: <https://www.ecoshape.org/en/cases/shellfish-reefs-as-shoreline-protection-eastern-scheldt-nl/construction-phase/>



Link to more information:
<https://bit.ly/netherlandsresilience>

2.2.4. Marsh Restoration in Pensacola, Florida



Team 4

Case Study: PENSACOLA, FLORIDA

Challenge:

Pensacola's location in the western Panhandle of Florida combined with its low, flat elevation means that intense wave action, rising water levels and storm surges associated with hurricanes and tropical storms pose significant threats to city. In addition to the threat of loss of life, storm surges can damage property and public infrastructure, force businesses to close, delay emergency responses and erode coastlines. Pensacola has dealt with these impacts since its founding.

History

Pensacola's first hurricane was recorded in 1559—the year Spanish colonists established the first settlement here. Since 1975, Pensacola has been directly hit by eight hurricanes and even more tropical storms. Today, the city ranks 8th on Sperling's list of the "worst places for hurricanes" in the United States.

Solution

In 2000, the City of Pensacola began a project to re-establish lost marsh habitat along its downtown shoreline. While the primary objective of "Project Greenshores" was not to protect its residents from storms, the unintended benefits from the project included increased protection from storm-related surges and rising sea levels, making Project Greenshores an accidental example of natural infrastructure improving a community's resiliency.

The first phase of Project Greenshores at Site 1 was the construction of a breakwater. The structure sits on the bay's floor and extends above the surface, creating a wall that reduces the height and force of waves. The breakwaters were constructed using 14,000 tons of limestone, 6,000 tons of recycled concrete, and 40 preformed concrete blocks. Next, workers formed 35,000 cubic yards of sand into a series of five islands just offshore. Some 41,000 *Spartina Alterniflora* plants, a native species of common saltmarsh grass, were then planted to produce eight acres of marsh habitat. With the combination of offshore breakwaters, the site increased protection from storm surge by attenuating the waves, stabilizing sediment and reducing erosion during storms.

In 2007, Project Greenshores began construction at Site 2 that featured a similar, but smaller-scale design. Here, citizens requested the breakwaters be completely submerged underwater to improve the site's aesthetics. The breakwaters were constructed from 25,000 cubic yards of recycled concrete donated after a runway was decommissioned at a nearby Naval air station. Three islands were then created from 16,000 cubic yards of dredge spoil that was removed from the Escambia River during a separate project. Site 2 was completed in 2008 with the



Credit: Google Earth

Project Details

- **Location:** Pensacola, Florida
- **Population:** 450,000+ (Metropolitan area)
- **Cost:** \$6 million
- **Strategies:** living breakwaters, living shorelines, coastal restoration
- **Benefits:** ecological, economic, social, public health

Learn more at NRCsolutions.org

For information, contact info@NRCsolutions.org

TOC

Intro

Resilience

Drainage

Flood
warning

NBS

Capacity

Careers

Action
Planning

Comms

Closing

Case Study: PENSACOLA, FLORIDA

planting of 30,000 plants. However, the submerged breakwaters at Site 2 proved not as effective at attenuating wave action; over time two of the marsh islands have experienced erosion and lost some of their vertical relief.



Credit: Google Earth

Because the project was one of the first attempts to reconstruct a living shoreline in Florida, research had yet to prove what's known today—breakwaters are essential design elements for the reconstruction of living shorelines.

Partners and Funding

The Florida Department of Environmental Protection served as the lead agency in the project, which required almost \$6 million dollars to fund, with \$2,797,000 coming from cash donations and grants and \$2,828,043 coming from in-kind donations and materials. Volunteers—including some 850 Boy Scouts and Girl Scouts—planted the marsh grass at both sites. In all, more than 60 organizations provided donations or funding. Grants for the project were funded by NOAA, the U.S. Fish and Wildlife Service, the U.S. EPA Gulf of Mexico Program, Florida Department of Environmental Protection, the National Fish and Wildlife Foundation, the Northwest Florida Water Management District, and many local community partners.

Involving the community in the early stages undoubtedly created a foundation for the project's success.

Benefits

Project Greenshores is a resounding habitat restoration success and has exceeded expectations in terms of its potential benefits. Bird species are now so abundant at Project Greenshores that the Audubon Society added it as a site along the Great Florida Birding Trail, which has boosted tourism. Oysters have grown on the breakwaters, which enhances habitat for fish. Crab fishermen have benefitted from increased harvests of blue crabs, which were scarce in the bay before the project. The breakwaters have reduced wave action and turbidity, while the marsh habitat better retains nutrients before they wash into bay, which has improved water quality.

Residents along Pensacola Bay will also pay less for damages during future storms. The same year that Site 1 was completed in 2004, Pensacola took a direct hit from Hurricane Ivan, an intense Category 3 hurricane when it made landfall. The storm surge reached 15 feet and washed out most of Bayfront Parkway, a major roadway that runs parallel to the bay's shoreline. The damage closed the majority of the road for months. The section of Bayfront Parkway directly behind Project Greenshores experienced less damage—only the eastbound lanes were closed here. Also, the shoreline at the project sites did not experience heavy erosion.

The following year Pensacola was hit by Hurricane Dennis, also a Category 3 hurricane, and the benefits of the project were again observed, as the breakwaters and marsh islands helped protect the shore from storm surge. The performance of Project Greenshores during two hurricanes proved its utilization in coastal resiliency.

Link to more information:

<https://bit.ly/pensacolareliance>



Learn more at NRCsolutions.org

Naturally Resilient Communities is a partnership of the American Planning Association, the American Society of Civil Engineers, the Association of State Floodplain Managers, the National Association of Counties and The Nature Conservancy and made possible with support from the Kresge Foundation.

2.3. Activities



2.3.1 Resilience Cities Activity Option 1

- With your team, look over your case study location (Norfolk, Spain, Netherlands, or Florida).
- Reflect on the questions in your small teams, complete the handout for your team, and be ready to share your findings with the larger group. Select a speaker to present to the large group.

DIRECTIONS: Look over your team's resilience case study example. Then complete the handout with your small group and prepare to share with the larger group.		
Project Details	Costs / Benefits of this project	How might this strategy be employed in the Crisfield area?
Strategy or strategies employed (check all that apply): ☐ Ecosystem conservation and restoration ☐ Oyster reef ecosystem creation ☐ Bioswales, rain gardens, floodwater detention, green streets, coastal restoration ☐ Living breakwaters, living shorelines, coastal restoration		
Impacted groups	Who is most impacted in this scenario?	What are their needs during a flooding event?



2.3.2 Resilient Cities Activity Option 2

- a) With your team, look over your case study location (Norfolk, Spain, Netherlands, or Florida).
- b) Reflect on the questions in your small teams, complete the handout for your team, and be ready to share your findings with the larger group. Select a speaker to present to the large group.

DIRECTIONS: Look over your team's resilience case study example. For each of the key elements below, see if and how your example included them, and consider how Crisfield might include them in similar strategies.

*For the rating columns, roughly estimate using checkmarks:



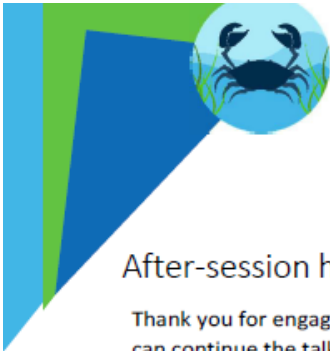
= Community does not have the element



= Community has the element and it is robust

Key Element	*Case Study Rating	How included, if so?	*Current Crisfield Rating	How could Crisfield include or improve this element?
Resilient infrastructure: drainage, water/sewer, emergency services, public health & safety, comms	☐ ☐ ☐		☐ ☐ ☐	
Safe and affordable housing: flood-safe, attract new residents, less reliance on public housing	☐ ☐ ☐		☐ ☐ ☐	
Business and job opportunities: enable residents to stay in local economy, attract new residents	☐ ☐ ☐		☐ ☐ ☐	
Recreation & tourism investments: attract new residents, build business and jobs, support youth recreation	☐ ☐ ☐		☐ ☐ ☐	
Youth development: increase youth-oriented amenities, upward mobility, and skills training	☐ ☐ ☐		☐ ☐ ☐	
Enhanced community spaces: improve existing, build new spaces (ex. hotel/conference center)	☐ ☐ ☐		☐ ☐ ☐	
TOTAL (out of possible 18)		TOTAL (out of possible 18)		
Groups impacted	Who is most impacted in this scenario?		What are their needs during a flooding event?	
Community assets (priority power restoration, disaster relief kits, etc.)	What assets exist to help these populations?		How do these community assets help address the issue?	

2.4. After Session Handout



Crisfield Resilience Academy

Session 1: Introduction to Coastal Resilience

February 1, 2025

After-session handout

Thank you for engaging in the first session of the Crisfield Resilience Academy! We hope you can continue the talks we had today at home. Before the next session on Saturday, February 22nd, talk through the questions below with a **family member or close friend**. Please write some notes so you're ready to share out at the next session.

Name of family member: _____ Date: _____

Part One

Share about your connection to Crisfield. Ask each other:

- How long have you lived in Crisfield or the surrounding area?
- During the time that you have lived in Crisfield or the surrounding area, are there any changes that you have noticed to the natural landscape of Crisfield and/or some of its natural features?
- What is one place you love in Crisfield or the surrounding area?
- Are you always able to access this place? Why or why not?



TOC

Intro

Resilience

Drainage

Flood
warning

NBS

Capacity

Careers

Action
Planning

Comms

Closing

Part Two

Share these images with your family member.



Sunset from City Dock in Crisfield.

*Photo by Josh Kurtz,
Maryland Matters,
September 2023.*



A vehicle moves through a flooded intersection following heavy rains from Ophelia on Sunday [September 24, 2023] in Crisfield, MD. Link to WUNC article here:

<https://www.wunc.org/2023-09-23/post-tropical-cyclone-ophelia-unleashes-heavy-rain-across-northeast>.

Chip Somodevilla/ Getty Images

Ask your family member:

- What, if anything, do each of these images make you think/feel?
- Does one of the images above connect to your experience in Crisfield and to the places you care about, if at all? If so, describe below.

3. Crisfield's Ditch Drainage System

3.1

Agendas

3.2

Background Information

3.2.1 Mapping Crisfield's Ditch Drainage System

3.2.2 Ditch Maintenance in Crisfield

3.2.3 Best Practices for Ditch Maintenance in Somerset County; developed by the Deal Island Peninsula Partnership (DIPP)

3.3

3.3. Activities

3.3.1 Option 1: Stormwater Stroll

3.3.2 Option 2: Stormwater Sets

3.4

3.4. After Session Handouts

3.4.1 Stormwater Stroll Answer Key

3.4.2 After Session



TOC

Intro

Resilience

Drainage

Flood
warning

NBS

Capacity

Careers

Action
Planning

Comms

Closing

3.1. Crisfield's Ditch Drainage System – Agendas

3.1.1 Fall



Crisfield Resilience Academy

Session 2: Crisfield's Ditch Drainage System

September 28, 2024

Today's Objectives

Participants will learn about Crisfield's drainage infrastructure and the role it plays in water management and water quality in the region. We will discuss the complexities of maintenance challenges and how community members can contribute meaningfully to the improvement of the community's drainage infrastructure.

Agenda

- 10:00 AM - 10:15 AM:** Welcome & Reflection on last session
- 10:15 AM - 10:25 AM:** Overview of Crisfield's Ditch Drainage System
Emily Eisenhauer, U.S. Environmental Protection Agency
- 10:25 AM - 10:55 AM:** Speakers Panel
Darlene Taylor, Mayor, City of Crisfield
Dennis Cullison, Director of Public Works, City of Crisfield
- 10:55 AM - 11:05 AM:** Break
- 11:05 AM - 12:00 PM:** Stormwater Stroll
Charles Cavanaugh, Director, Somerset County Solid Waste, Drainage, & Maintenance Departments
- 12:00 PM - 12:15 PM:** Conclusion & Session Evaluation
Link to Session Evaluation: <https://bit.ly/CRA-Session-Eval>



Notes



TOC

Intro

Resilience

Drainage

Flood
warning

NBS

Capacity

Careers

Action
Planning

Comms

Closing

3.1.2 Spring



Crisfield Resilience Academy

Session 3: Crisfield's Ditch Drainage System

March 22, 2025

Today's Objectives

Participants will learn about Crisfield's drainage infrastructure and the role it plays in water management and water quality in the region. We will discuss the complexities of maintenance challenges and how community members can contribute meaningfully to the improvement of the community's drainage infrastructure.

Agenda

10:00 AM - 10:30 AM: Welcome, Stormwater Sets, & Reflection on last session

10:30 AM - 10:45 AM: Crisfield's Ditch Drainage System

Emily Eisenhauer, U.S. Environmental Protection Agency

10:45 AM - 11:30 AM: Community Ditch Discussion

Crisfield Resilience Academy Participants & Alumni

Eric Buehl, Watershed Specialist, Maryland Sea Grant

Emily Eisenhauer, U.S. Environmental Protection Agency

Brian Fowler, Crisfield Public Works Director

11:30 AM - 11:40 AM: Break

11:40 AM - 11:50 AM: Community Solutions to Crisfield's Flooding & Erosion

Examples from Crisfield Resilience Academy Alumni

Presented by Jess Iacona, Salisbury University's BEACON

11:50 AM - 12:00 PM: CodeRED and Flood Warning Systems

John Hickman, Salisbury University's BEACON

12:00 PM - 12:15 PM: Conclusion & Session Evaluation

Link to Session Evaluation: <https://bit.ly/CRA-Session-Eval>

Notes

In the
Flood
Warning
Section



TOC

Intro

Resilience

Drainage

Flood
warning

NBS

Capacity

Careers

Action
Planning

Comms

Closing

3.2. Background Information

3.2.1 Mapping Crisfield's Ditch Drainage System

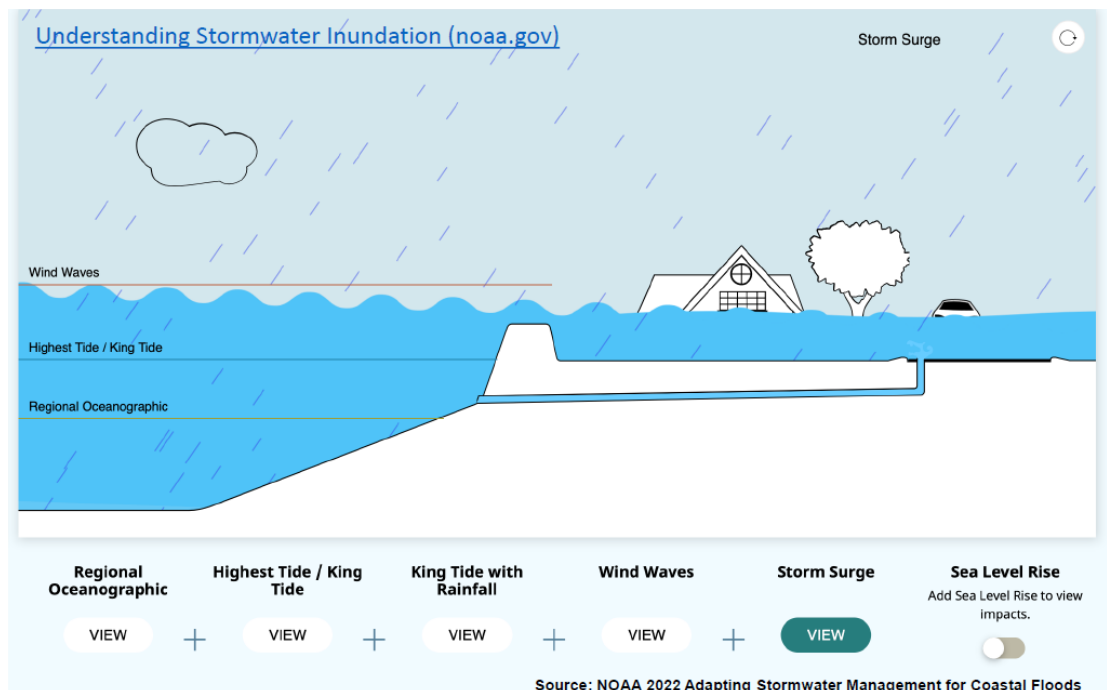


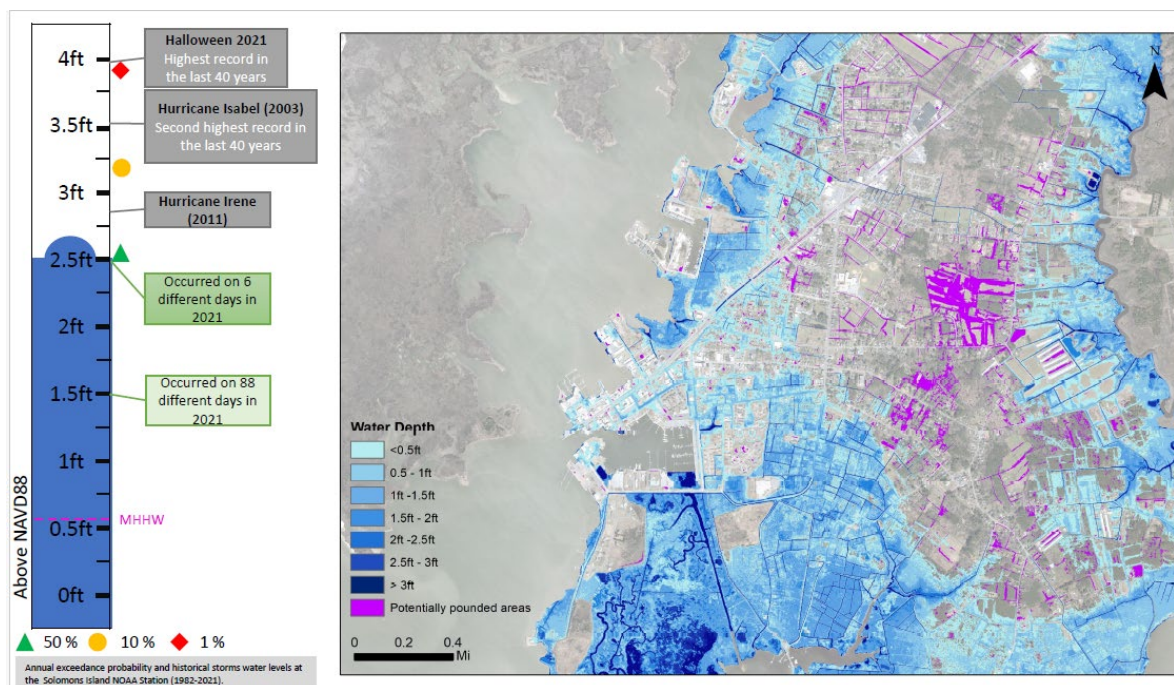
Mapping Crisfield's Ditch Drainage System

Crisfield Resilience Academy Session #2

Emily Eisenhauer, PhD
Office of Research and Development

Disclaimer: This product has been reviewed in accordance with U.S. Environmental Protection Agency (EPA) policy and approved for publication. The views expressed in this presentation are those of the author(s) and do not necessarily represent the views or policies of the EPA. All photos from EPA unless otherwise indicated.





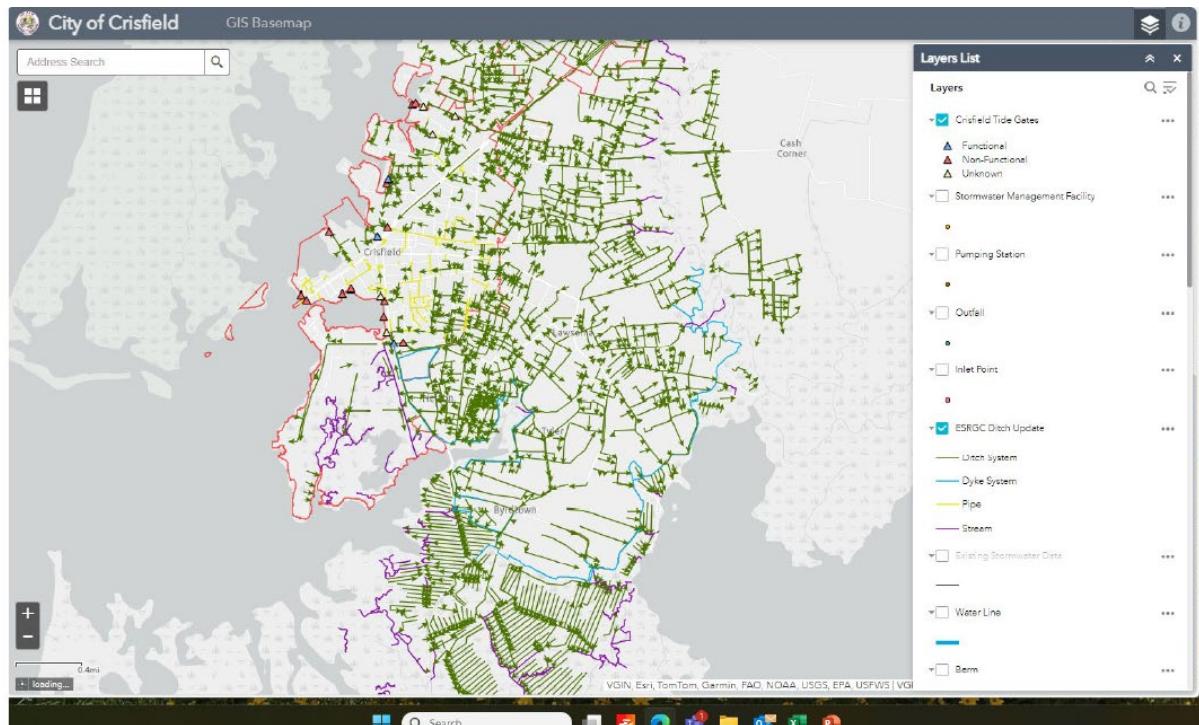
Modeled flood reductions via the *Tide Gate Scenario* vs. *Tide Gate + Three Structure Scenario* during an event with a water level of 2.5ft (above NAVD 88). Toggle the arrow to the left to reveal the flood reduction benefits of the Tide Gate + Three Structure Scenario, which is highlighted in bright green. Source: [Collaborative Adaptation Planning for a Resilient Crisfield \(arcgis.com\)](#) by The Nature Conservancy and George Mason University

Mapping Crisfield's Ditches

- Eastern Shore Regional GIS Collective created map of Crisfield's ditches in 2023 to support City stormwater improvements
 - [City of Crisfield \(arcgis.com\)](https://arcgis.com)
- Used data from George Mason University, aerial imagery and ground survey
- Arrows indicate direction that water flows out of the ditch away from land
- Map shows tide gates, ditches, pipes and other features



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EPA Creating Resilience Water Utilities (CRWU) Flood Adaptation Costs & Benefits Analysis

	Ditch Maintenance Plan	Convert to Closed System
One-Time Costs	Hire consultants for permitting & easements, engineer for grading, and city staff or contractor to create plan Purchase dump truck & excavator	Building 2,000 linear feet of pipe
Annual Costs	City staff time and dredging operations	Annual operation & maintenance costs
Community Benefits	Reduce flood disruption days from 10+ to 5-10 per year	Significantly reduce flood disruption days from 10+ to 2-5 per year
City & Infrastructure Benefits	Reduce rate of ditch degradation and maintain functionality	Significantly reduce infrastructure damage and maintenance costs



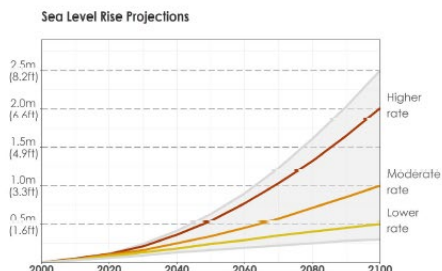
Climate Data & Scenario Planning

Baseline scenario

- **Precipitation:** Crisfield Somers Cove weather station
- **Coastal inundation:** Wachapreague, VA tidal gauge

Projected climate scenario

- 2040 planning horizon
- **Precipitation:**
 - Average of climate projections from CMIP5 models
 - Annual & monthly rainfall : ~5% increase
 - Extreme rainfall intensity: ~10% increase
- **Coastal inundation:**
 - Projections from NOAA report scenarios & Crisfield studies/experience
 - Sea level rise – 1.6 - 2 ft
 - Annual days with tidal flooding – 271 days



Risk Assessment Conclusions

- Ditch maintenance
 - less expensive
 - **cost-effective and helpful NOW as well as in future!**
- Converting to closed system
 - more expensive, not cost-effective now
 - becomes cost-effective and very helpful in future only



3.2.2 Ditch Maintenance in Crisfield

Who maintains Crisfield's ditches?

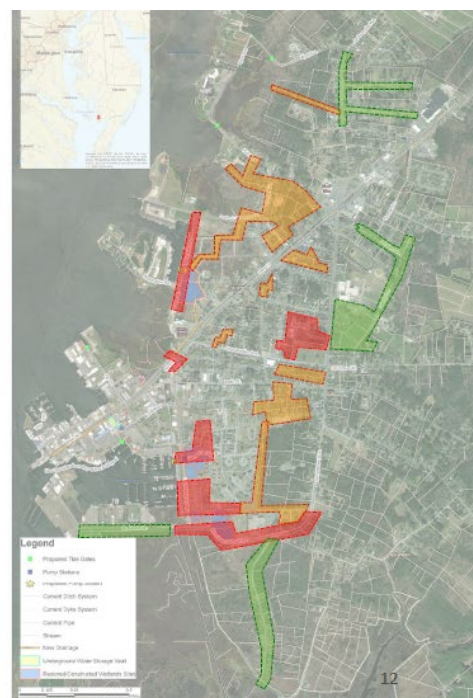
- Somerset County
 - Roadside drainage program – coordinate with DOT and other agencies
 - Off-road drainage program – coordinate with private property owners
- Private property owners
 - Anything beyond 15 ft. from the center of a road is property owner responsibility
 - Property owners must agree to easements for county to conduct maintenance
- City of Crisfield

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8

Priorities for ditch maintenance (FEMA and CDM Smith)

- Priority 1 (Red): Existing access/frequent flooding (e.g., South Somerset by Woodsen, Small Boat Harbor, Myrtle St., Gerald's Ditch, Norris Harbor Drive, Shiloh Church)
- Priority 2 (Green): Other Existing Access
- Priority 3 (Orange): Private property, large drainage area (further assess)
- Priority 4: Private property, small drainage area (no City maintenance at this time)



12

Funding ditch maintenance

(Analysis by FEMA and CDM Smith)

- Estimated \$238,864 per year operational costs + \$93,158 capital costs
- Explored funding options, e.g. general fund (business and property taxes) vs. stormwater utility
- What is a stormwater utility?
 - It charges a fee for a service provided, like a water or wastewater utility
 - The basis of a stormwater fee is the size of impervious area (building, parking lot, pavement) on each property.
 - So the larger the size of the impervious area, the more the property owner pays.
- Next steps: Public input, ordinance, policies and database

What can residents do?

1. Keep ditches clear of trash and debris

- Clean out yearly leaves, pine needles, and other debris
- After a storm or flood event, check for debris that might have accumulated
- Maintain openings under driveways
- Don't fill in the ditch!



What can residents do?

2. Kill or cut down phragmites

- Phragmites is invasive, chokes native plants and blocks drainage
 - [Phragmites Control – Chesapeake Wildlife Heritage](#)
- Pull or mow every 6-8 weeks during the season
- Spray Rodeo in late summer/early fall
 - Wait until it dies then mow or burn (need permit).
 - Or use a certified contractor
- Do not kill other weeds or grass – this causes erosion



Creative Commons: [Phragmites australis 195106851.jpg](#)



Creative Commons:
[Phragmites australis Schilfrohr.jpg](#)5

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What can residents do?

3. Work with Somerset County

- Somerset County Roads and Waterways can sometimes provide assistance to property owners
- Contact Maryland Sea Grant first for help determining work needed
- Then contact [Somerset County](#) to ask about assistance
- Respond to requests for easements for maintenance



3.2.3 Best Practices for Ditch Maintenance in Somerset County

[Somerset County Flyer](#); developed by the Deal Island Peninsula Partnership (DIPP) – Page 1

Best Practices for Ditch Maintenance in Somerset County

Helpful Contact Information:

Roadside Ditches

Woody Barnes:
wbarnes@somersetmd.us
410 651 1930

Off-Road Ditches

Charles Cavanaugh
ccavanaugh@somersetmd.us
410 651 9641

For help with site visits
Maryland Sea Grant Extension
Jennifer Dindinger:
jdinding@umd.edu
410 228 8800



Deal Island
Peninsula
Partnership

The **Roadside Drainage Program** administers all aspects of work on drainage systems (including ditches, pipes, inlets, manholes, and tide gates) within the county's road right-of-way. Often the ditches are constructed by a developer and inspected and maintained by the county. The county has approximately 350 miles of roads, many of which have ditches on both sides. In addition, many of these drainage systems fall within environmentally sensitive areas and are subject to regulations such as critical area, floodplain, stormwater management, sediment control, tidal wetlands and non-tidal wetlands. Maintenance often requires permitting and also partnering with other agencies.

The **Off-road Drainage Program** administers all aspects of work outside of the county road right-of-way. Routine maintenance of these systems is the responsibility of the property owner or resident. For many reasons, routine maintenance is often lacking and these systems fall into disrepair ultimately worsening the flooding challenges. Property owners can request help from the County. The County will then evaluate if they can provide assistance with the ditch based on the number of properties impacted, design needs, easements, and permitting. Work cannot begin until all the necessary easements and permits have been obtained which can be a lengthy process. If just one property owner refuses to sign the easements, then the project cannot go forward.

Things to Consider:

- After a rain, high tides, or a storm it will likely take at least 2-3 tide cycles for the water to be gone and more if you are further inland.
- For Roadside ditches, the County jurisdiction is 15ft from the center of the road. Anything beyond that is the property owner's or resident's responsibility.
- For off-road ditches, the County cannot assist with maintenance unless all of the neighbors grant easements and give permission. If the County cannot obtain all the required easements then they have to move to the next project.
- Property owners/residents are responsible for maintaining the ditches on their property.
- Somerset County can provide technical and limited financial assistance in replacing driveway culverts. Contact Woody Barnes for more information.
- Property owners can conduct small-scale maintenance on their own ditches without a permit. When the county gets involved, the work is often part of a larger drainage network effort, then permits are required. The permitting process can be lengthy.

Suggested Steps to Improving Drainage on your Property

STEP 1: Determine what kind of ditch you have
Maryland Sea Grant Extension can send out a specialist to walk your property and help you determine the work that needs to be done.

Maryland Sea Grant Extension - Jennifer Dindinger:
jdinding@umd.edu 410 228 8800

Is your ditch within 15 feet of the center of the road?

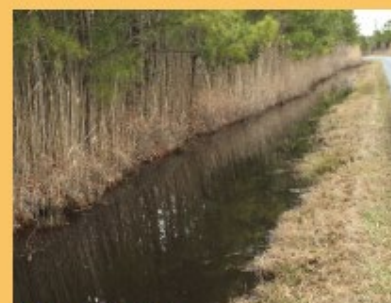
Yes - It's a roadside ditch.

No- It's an off-road ditch.

STEP 2: Reach out to the appropriate county contact to inquire about assistance.

STEP 3: If they are able, the county will take over enacting the necessary maintenance on the ditch.

STEP 4: For off-road ditches, keep up with routine maintenance. (see below for tips and best practices for maintaining your ditch).



Roadside Ditch



Off-road Ditch

Best Practices to Maintain the Ditches on your Property:

1. Keep the ditches free of debris and clean out yearly leaves, pine needles and other debris that may have accumulated.
 - Check your ditch after major rain events to clear out debris that may have accumulated during the storm.
2. Kill/pull/cut down the Phragmites. Somerset County recommends the use of Rodeo for Phragmites management.
 - Physical methods: Pull or mow the Phragmites often (6-8 times per season).
 - Spray in the late summer to early fall (before a killing frost).
 - Follow all guidelines for dilution and surfactant rates to get maximum effectiveness.
 - You can employ a certified applicator if you prefer. Maryland Department of Agriculture maintains a database of Certified Pesticide Applicators: <https://egov.maryland.gov/mda/pesticides>. (You can narrow your search by using Applicant Type "Pest Control Applicator" and Category "6-Right of Way and Weeds").
 - After spraying, wait 6-8 weeks for the plants to die and then they should be burned or mowed.
 - Prior to burning, you should contact the Maryland Department of Natural Resources Forest Service office (410-260-8531) in your county to obtain a burning permit and for information regarding safe burning practices.
 - It may take more than one season to fully kill off the Phragmites.
3. Do not use chemicals to kill grass and weeds on the banks of the ditch. This creates bare spots and contributes to siltation/erosion.
4. Clean out/maintain openings under driveways and private roads.

3.3. Activities

3.3.1 Option 1: Stormwater Stroll

The stormwater stroll took participants on a short walking tour around the Crisfield library. Participants took notes on their handouts.

Stormwater Stroll

For this activity, we will walk through the Crisfield area together to explore how water, and particularly, stormwater, travels in the Crisfield, Maryland area. As we move through the neighborhood, keep an eye out for the following features and take notes as the walking guide describes them to the group.

Name of Crisfield stormwater feature: _____



Description of feature, including purpose in stormwater management:

Names of Crisfield building stormwater features: _____



Description of feature, including purpose in stormwater management:

Names of Crisfield stormwater features: _____



Description of features, including purpose in stormwater management:

Names of Crisfield stormwater features: _____



Description of features, including purpose in stormwater management:

Do you notice any **evidence of flooding** (i.e., erosion, loose soil on road, puddles in low spots) or **features that might cause further issues during a rain event** (i.e., damaged or blocked storm drainage ditch, litter, broken stormwater features)? List any observations below.

Be on the lookout for debris! Do you see any possible debris that could enter or damage stormwater control measures during a flooding event? Or have you seen this happen previously?

3.3.2 Option 2: Stormwater Sets

Instructions: 1) Take a card (either an image or a definition). 2) Move around the room, speak to others, and find the match to your card; 3) With your found partner, discuss the question on the bottom of the definition card and follow up on previous sessions.

Stormwater Sets - Cards for Icebreaker/Interactive Activity



Inlet Pipe

The **inlet pipe** delivers water to a control system such as a ditch or stormwater wetland.

Can you spot this feature near the library, or have you seen one of these features? If so, what have you noticed?



Forebay

The **forebay** is the area of a ditch near the inlet pipe. This area is typically wider than the ditch and allows water to slow down before entering the ditch. This helps prevent erosion and allows pollutants to settle out. Can you spot this feature near the library, or have you seen one of these features? If so, what have you noticed?

Stormwater Sets - Cards for Icebreaker/Interactive Activity



Swale or Ditch

Swales, also commonly called **ditches**, direct water through a channel. These channels are typically vegetated which helps stabilize the soil and remove pollutants from the water. Can you spot this feature near the library, or have you seen one of these features? If so, what have you noticed?



Bioretention Cell

These areas are stormwater control devices that capture water and slowly release it into the soil through **infiltration** and the air and plants through a process called **evapotranspiration**. This helps prevent flooding and removes pollutants. Can you spot this feature near the library?

Stormwater Sets - Cards for Icebreaker/Interactive Activity

**Outlet**

An **outlet** is where water can leave a control device. A trash rack is typically installed over the outlet to reduce debris in the larger stormwater system. *Can you spot this feature near the library, or have you seen one around town?*

**Riprap**

These large rocks help to stabilize the banks of natural and constructed water features. This help prevent erosion and keeps sediment out of the water. *Can you spot this feature near the library, or have you seen one of these around town? If so, what have you noticed?*

Stormwater Sets - Cards for Icebreaker/Interactive Activity

**Stormwater Wetland**

A **stormwater wetland (constructed wetland)** is used to hold and treat water using shallow zones and vegetation. As stormwater flows through the wetland, it removes pollutants through settling and biological uptake. These devices also help prevent flooding by holding and then slowly releasing excessive amounts of water. *Can you spot this feature near the library?*

**Rain Garden**

These small-scale control features can often be found near parking lots and in residential yards. They are also increasingly being added to school campuses. They resemble a normal garden but also offer water treatment, water control, and habitats for local animals. *Can you spot this feature near the library, or have you seen one of these around town? Where might one of these be useful?*



Culvert

These structures allow water to pass under a road and are typically large half circles or boxes.

*Where have you seen these around town?
What have you noticed about them?*



Curb & Gutter

This water control system directs water along a curb and into a gutter. The grating of the gutter helps remove debris from the water before it enters the sewer system. This system allows for the rapid movement of water away from roads.

Have you seen these around town? If so, what have you noticed?



Permeable Pavement

This control measure helps prevent flooding by reducing the amount of impermeable surface in an area. The less water can be absorbed by the ground, the more likely flooding is to occur. These systems, which are typically constructed from gravel in a ridged plastic mesh, allows water to seep into the ground. *Have you seen these around town? If so, what have you noticed?*



Tide Gate

Tide gates, devices used to control tidal water, work almost like a trap. When closed, the hinged door prevents tidal waters from moving upland and therefore controls the flow of water. But sometimes pollutants and trash can block the tide gates, rendering them ineffective. *Have you seen some of these around Crisfield? If so, what have you noticed?*



Stormwater Sets - Cards for Icebreaker/Interactive Activity



Potential site for new Tide Gate

Crisfield was recently awarded funding from FEMA for rehabilitation and/or replacement of up to six tide gates.

This image is of an area on 7th Street where one of the new tide gates might be installed via the partnership with FEMA. *Have you seen this area? If so, what have you noticed?*



3.4. After Session Activities

3.4.1 Stormwater Stroll Answer Key

Stormwater Stroll Facilitator Guide/Answer Key

For this activity, we will walk through the Crisfield area together to explore how water, and particularly, stormwater, travels in the Crisfield, Maryland area. As we move through the neighborhood, keep an eye out for the following features and take notes as the walking guide describes them to the group.

Name of Crisfield stormwater feature: Swale/ditch, inlet pipe and forebay.

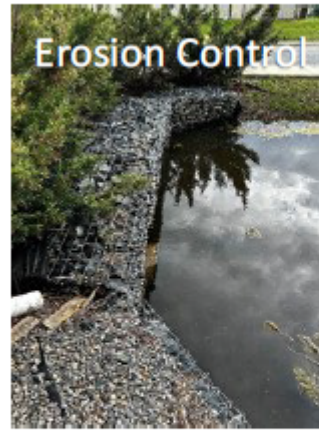


Description of feature, including purpose in stormwater management: The ditch (also called a swale) (red arrow) carries stormwater in a controlled manner. The vegetation in and around the swale helps to prevent soil erosion. The inlet pipe (orange circle) is where stormwater enters the SCM (stormwater control measure). The water initially enters the forebay (white outline), which is an area that helps to slow the stormwater down to allow initial sedimentation to occur. This reduces the amount of sediment that will accumulate further down the SCM and allows for easier cleanout/dredging. This also indicates the need for keeping this area regularly dredged, raked, and mowed, because if the inlet pipe gets clogged, or if the forebay gets filled-in, then water would have nowhere to go. During regular high-tide or surge flooding, the pipe could simply not convey water to the ditch. During a storm event, the pipe may get damaged due to debris.

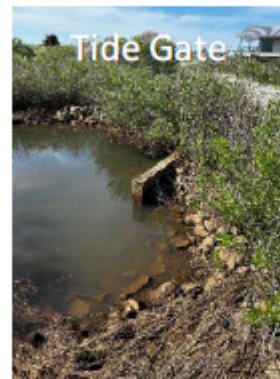
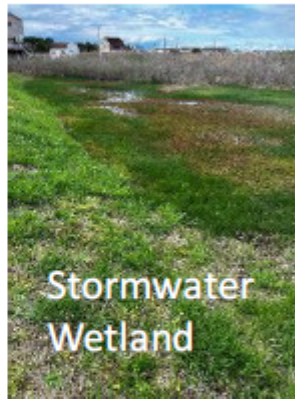
Names of Crisfield building stormwater features: Bioretention cell



Description of feature, including purpose in stormwater management: This stormwater control measure (SCM) is designed to treat stormwater through biological processes. The plants within the bio-cell help to break down and uptake stormwater pollutants. The retained stormwater also allows for the settling of sediment and other suspended solids.

Names of Crisfield stormwater features: Outlet and erosion control device

Description of features, including purpose in stormwater management: The outlet allows the SCM to drain down to its normal pool level. The grating on top, called a trash rack, helps prevent debris from entering the outlet pipe and causing clogs. The erosion control device helps to stabilize the bank and prevent erosion and sedimentation. The pictured erosion control device is made from riprap (large stones) encased in a wire mesh to prevent movement.

Names of Crisfield stormwater features: Stormwater Wetland and a Tide Gate**Description of features, including purpose in stormwater management:**

Stormwater wetlands drastically help improve stormwater quality. The chemical and biological processes inherent to a wetland allow for effective pollutant removal. These features also provide excellent habitat. Tide gates help control the movement of water between two areas provided there is a difference in water levels between the stormwater wetland and the Bay.

3.4.2 After Session Handout



Crisfield Resilience Academy

Session 2: Crisfield's Ditch Drainage System

September 28, 2024

After-session handout

Thank you for engaging in the second session of the Crisfield Resilience Academy! We hope you can continue the talks we had today. Before the next session on October 5, talk through the questions below **with a friend**. **Bonus points if you do this on a walk around the Crisfield area!** Please write some notes so you're ready to share out at the next session.

Name of friend: _____ **Date:** _____

General location of walk with your friend: _____

Part One - Neighborhood Walk

Interview your friend about ditches and ditch maintenance. Take notes on their responses. At some point, **take a photo of the Crisfield area**. **Email the photo to John by Oct. 1:** inhickman@salisbury.edu & BEACON@salisbury.edu. You'll present on the photo next session.

Ask your friend:

- How long have you lived in Crisfield or the surrounding area?
- Tell me about a memory that you have of flooding or high waters in the Crisfield area. If you can recall, roughly how long ago was that memory from?
- Have you noticed the ditches or tide gates in Crisfield before? Where? What have you noticed about them?
- Take a look at the pictures (below), taken near the Crisfield library. *Ask your friend:* What role do you think ditches like these play in Crisfield's water infrastructure?



- Share about the role of ditch maintenance in managing storm water and protecting the community from flooding. *Ask your friend:* Is this new information? Has your opinion changed on ditches in Crisfield?

Part Two - Somerset County Ditch Maintenance Flyer

- Take a look at the 2-page ditch flyer from Somerset County in your Academy folder. Of the "Best Practices to Maintain the Ditches on your Property," which one(s) are actions that you think you might be able to take? Why or why not?

Part Three - Prep for Session 6

To prepare for our final session, we need your input. Please respond to the prompt below and be ready to share at the next session.

Our final session will be a celebration of a resilient Crisfield that is open to the public. This celebration could take many forms, but most importantly, you get to help design it.

To help you think about the celebration, write down one word that describes what you want people to take away from this gathering: _____

Now, take a moment to think about what would be meaningful for your community and help them to achieve the word you wrote above. Write down some ideas for our final session.

We have the opportunity to invite speakers to our final session. Take a moment to think about who would be meaningful for your community to hear from. List any speakers below.

4. Flood Warning Systems

4.1 Agenda

4.2 Background Materials

- 4.2.1 Guest Presentations
- 4.2.2 Code Red Emergency Alerts

4.3 Activities and Handouts

- 4.3.1 After Session Handout - Fall
- 4.3.2 After Session Handout - Spring



4.1. Agenda



Crisfield Resilience Academy Session 3: Flood warning systems

October 5, 2024

Today's Objectives

At the end of this session, Academy participants will be able to compare different options for flood prediction tools and methodologies; and communicate practical strategies to fellow community members.

Agenda

- 10:00 AM - 10:15 AM:** Welcome & Session 2 Reflection
- 10:15 AM - 10:30 AM:** Cohort Leadership Building - Celebration Planning, Pt. 1
- 10:30 AM - 11:00 AM:** CodeRED and other Flood Awareness Tools
John Hickman, BEACON Salisbury University
Jeff Orrock, Meteorologist-In-Charge, National Weather Service
- 11:00 AM - 11:15 AM:** Break
- 11:15 AM - 11:45 AM:** Using sensors to detect flooding and risk across Maryland
Tim Canty and Michael Maddox, University of Maryland
- 11:45 AM - 12:00 PM:** Cohort Leadership Building - Celebration Planning, Pt. 2
- 12:00 PM - 12:15 PM:** Wrap-up & Evaluation

Link to Session Evaluation: <https://bit.ly/CRA-Session-Eval>



Notes



TOC

Intro

Resilience

Drainage

Flood
warning

NBS

Capacity

Careers

Action
Planning

Comms

Closing

4.2. Background Materials

4.2.1 Guest presentations

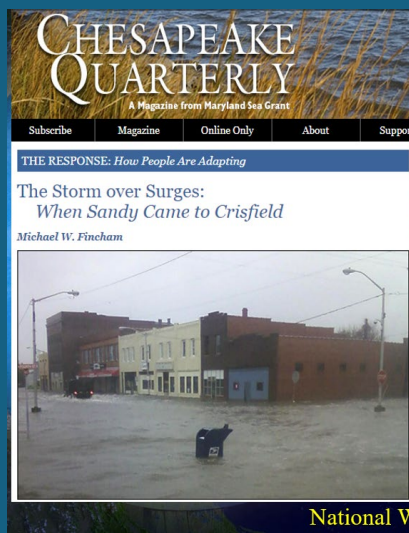
CoderED and other Flood Awareness Tools

John Hickman, BEACON Salisbury University

Jeff Orrock, Meteorologist-In-Charge, National Weather Service

Jeff's presentation covered the tide gage, which was put in place in cooperation between the USGS, NOAA, MD and Town of Crisfield. Jeff talked about tide forecasts, storm tide data (inundation), coastal flooding thresholds and impacts, weather watches, warnings, and advisories; and inundation mapping.

Resource: Weather.gov/akq



Resources:

- climate.umd.edu
- https://tidesandcurrents.noaa.gov/tide_predictions.html

The HydroNet, when fully installed, will be a series of more than 20 sensors along the Chesapeake Bay and its tributaries sending out data to help researchers and local leaders predict when, where, and how much future flooding will occur. John's presentation also covered nuisance flooding, sea level rise, forecasting of sea level rise, weather related flooding, and wind speeds.

Learn more: Crisfield to get its own HydroNet sensors ([video](#), [article](#))

4.1.2 Code Red Emergency Alerts - presentation

CodeRED and Flood Warning Systems

John Hickman, Salisbury University's BEACON

Code Red

What is CodeRED and what is it used for?

- *CodeRED is a emergency notification service provided by OnSolve and developed specifically for local public safety personnel. It's used to alert residents and businesses through a variety of channels of time-sensitive information, emergencies or urgent notifications.*
- *The program delivers messages to participants via telephone, text or email in the event of an emergency such as natural disaster evacuations, missing persons, terrorism threats, escaped felons, water contaminations, and hazardous material incidents.*

SIGN UP for

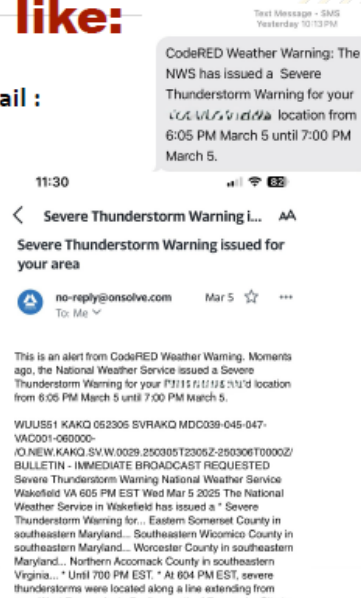
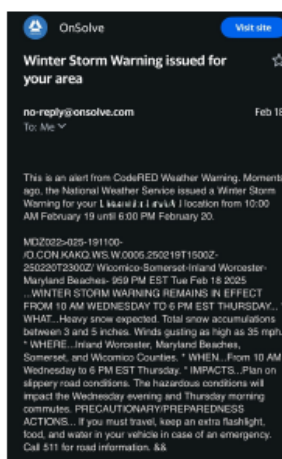
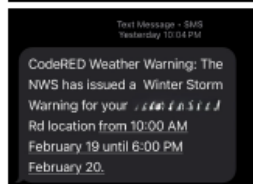
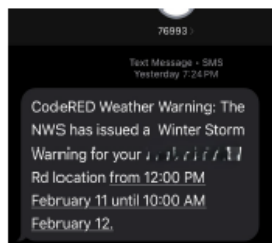
CODE RED
EMERGENCY Alerts!



BEACON
Business Economic and Community Outreach Network
At Salisbury University

What it looks like:

During the past few weeks, I got these via Text, email :



TOC

Intro

Resilience

Drainage

Flood
warning

NBS

Capacity

Careers

Action
Planning

Comms

Closing

How To Sign Up?



SOMERSET COUNTY
WANTS YOU TO
BE ALERT
OF SEVERE WEATHER

SIGN UP for
CODERED
EMERGENCY Alerts!

REGISTER NOW

<https://someset911.org>

EMERGENCY NOTIFICATION ALERTS!

Stay informed and safe!
Register for **CodeRED** Alerts



Sign up for the CodeRED notification system to receive alerts and updates during emergency events.

All citizens and businesses are encouraged to register.

Register online

<https://accountportal.onsolve.net/crisfieldmd>

Register on your smartphone

Text "CRISFIELDRED" to 24639

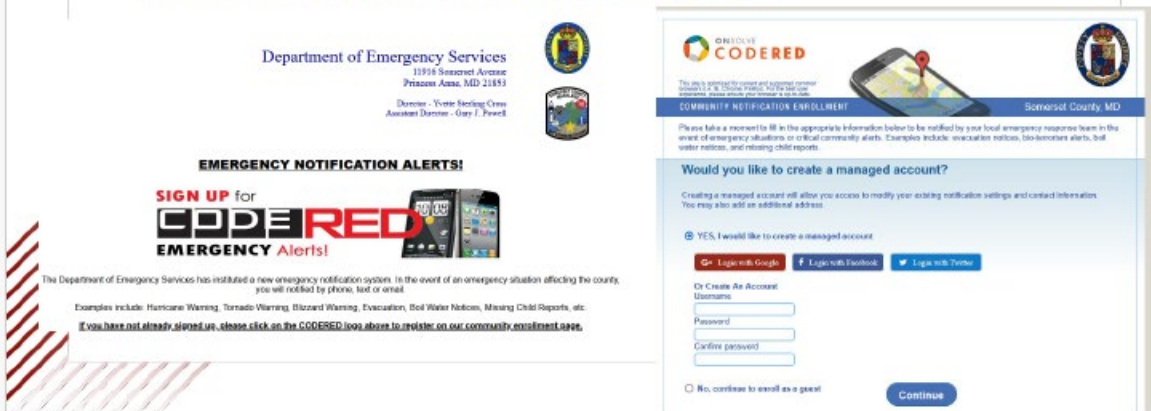
For citizens without internet access

Visit or call the Crisfield City Hall for assistance
410-968-1333

How To Sign Up?

Somerset County:

• <https://www.someset911.org/>



Department of Emergency Services
11916 Somerset Avenue
Prides Cove, MD 21153
Director - Victor Seeling Cross
Assistant Director - Gary J. Powell

EMERGENCY NOTIFICATION ALERTS!

SIGN UP for
CODERED
EMERGENCY Alerts!

The Department of Emergency Services has instituted a new emergency notification system. In the event of an emergency situation affecting the county, you will be notified by phone, text or email.

Examples include: Hurricane Warning, Tornado Warning, Blizzard Warning, Evacuation, Red Water Notices, Missing Child Reports, etc.
If you have not already signed up, please click on the CODERED icon above to register on our community enrollment page.

ONSOLVE CODERED

COMMUNITY NOTIFICATION ENROLLMENT Somerset County, MD

Please take a moment to fill in the appropriate information below to be notified by your local emergency response team in the event of emergency situations or critical community alerts. Examples include: evacuation notices, low-water alerts, red water notices, and missing child reports.

Would you like to create a managed account?

Creating a managed account will allow you access to modify your existing notification settings and contact information. You may also add an additional address.

☒ YES, I would like to create a managed account

☐ No, continue to enroll as a guest

How To Sign Up?

City of Crisfield:

Sign up for the CodeRED notification system to receive alerts and updates during emergency events.

Register on your smartphone
Text "CRISFIELDCODERED" to 24639

Register online
<https://accountportal.onsolve.net/crisfieldmd>

For citizens who need help registering
Visit or call the Crisfield City Hall for assistance
410-968-1333



CodeRED Mobile Alert App Downloads



CITY OF CRISFIELD CODERED



Sign In to your account

Enter your username and password. Passwords are case-sensitive.

Username*

Enter username



Password*

Enter password



☐ Remember Me

[Forgot Username or Password?](#)

SIGN IN

Need an Account?

Let's get your information so you may start receiving notifications from City of Crisfield CodeRED

REGISTER



Create an Account

Complete the fields below to start the registration process with City of Crisfield CodeRED

First Name*

Enter first name

Last Name*

Enter last name

Username*

Enter username

Password*

Enter password

Code
RED
Flyer

Stay informed and safe! Register for CodeRED Alerts

Sign up for the CodeRED notification system to receive alerts and updates during emergency events.

All citizens and businesses are encouraged to register.

Register on your smartphone
Text "CRISFIELDCODERED" to 24639

Register online
<https://accountportal.onsolve.net/crisfieldmd>

For citizens who need help registering
Visit or call the Crisfield City Hall for assistance
410-968-1333

4.3. Handouts

4.3.1 After Session Handout - Fall



Crisfield Resilience Academy Session 3: Flood warning systems

October 5, 2024

After-session handout

Thank you for engaging in the second session of the Crisfield Resilience Academy! We hope you can continue the talks we had today. Before the next session on October 19, talk through the questions below **with a neighbor**. Please write some notes so you're ready to share out at the next session.

Name of neighbor: _____ **Date:** _____

Part One - Flood Warning Resources

Before you talk with a neighbor or a community member about flooding and flood preparedness, bring along your **CodeRED flyer** from your Crisfield Resilience Academy folder.

Please take notes on their responses. Ask:

- How long have you lived in Crisfield? _____
- When you experience flooding in Crisfield, which sources do you rely on for flood awareness and planning?
 - How do you personally prepare for an upcoming flooding event in Crisfield?
 - Is there anything else that would help you better prepare for a flooding event in Crisfield? What might that be?
- Have you heard of CodeRED for flood warnings? Are you signed up?
 - **If yes**, ask what they think about it - is it helpful? Are the warnings accurate for you?
 - **If not**, share a little about the resource, **including giving your neighbor the extra CodeRED flyer** that you received in your Academy folder.

TOC

Intro

Resilience

Drainage

Flood
warning

NBS

Capacity

Careers

Action
Planning

Comms

Closing

4.3.2 After Session Handout - Spring



Crisfield Resilience Academy Session 2: Ditches & Flood Warning Systems

February 22, 2025

After-session handout

Thank you for engaging in the second session of the *Crisfield Resilience Academy*! We hope you can continue the talks that we had today. Before the next session next week on March 1, 2025, talk through the questions below **with a friend**. **Bonus points if you do this on a walk around the Crisfield area!** Please write some notes so you're ready to share out at the next session.

Relationship to friend (e.g., neighbor, spouse, coworker, etc.): _____

Part One - Registering for CodeRED (Flood Warning Resources)

1. Check out the following page(s):
 - a. Crisfield CodeRED page: <https://www.crisfieldfloodmitigation.com/codered>
 - b. Somerset County informational page: <https://www.somerset911.org/>
2. If you aren't already signed up, sign-up for CodeRED alerts.
 - a. Crisfield sign-up link: <https://accountportal.onsolve.net/crisfieldmd>
 - b. Somerset County sign-up link: <https://public.coderedweb.com/CNE/en-US/BE949F78FDDE>
3. Before you talk with a neighbor or a community member about flooding and flood preparedness, **bring along your CodeRED flyer** from your Crisfield Resilience Academy folder to share with them.

Enjoy your coffee, tea, or walk with your friend. Please take notes on their responses. Ask:

- How long have you lived in Crisfield or the surrounding area? _____
- When you experience flooding in Crisfield, which sources do you rely on for flood awareness and planning?
- How do you personally prepare for an upcoming flooding event in Crisfield?
- Is there anything else that would help you better prepare for a flooding event in Crisfield? What might that be?
- Have you heard of CodeRED for flood warnings? Are you signed up? _____
 - If yes, ask what they think about it – is it helpful? Are the warnings accurate for you?
 - If not, share a little about the resource, including giving your neighbor the extra CodeRED flyer that you received in your Academy folder.

TOC

Intro

Resilience

Drainage

Flood
warning

NBS

Capacity

Careers

Action
Planning

Comms

Closing

Part Two - Neighborhood Walk

General location of walk or chat with your friend: _____

If you have time, visit this webpage: <https://www.crisfieldfloodmitigation.com/>

Interview your friend about ditches and ditch maintenance. Take notes on their responses. At some point, **take a photo of the Crisfield area. Email the photo to John by February 27: jnhickman@salisbury.edu & BEACON@salisbury.edu.** You'll discuss your photo in Session 3.

Ask your friend:

- Tell me about a memory that you have of flooding or high waters in the Crisfield area. If you can recall, roughly how long ago was that memory from?

- Have you noticed the ditches or tide gates in Crisfield before? Where? What have you noticed about them?

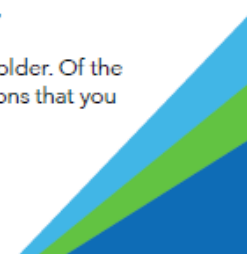
- Take a look at the pictures (here), taken near the Crisfield library. *Ask your friend:* What role do you think ditches like these play in Crisfield's water infrastructure?



- Share about the role of ditch maintenance in managing storm water and protecting the community from flooding. *Ask your friend:* Is this new information? Has your opinion changed on ditches in Crisfield?

BONUS! Part Three - Somerset County Ditch Maintenance Flyer

- Take a look at the 2-page ditch flyer from Somerset County in your Academy folder. Of the "Best Practices to Maintain the Ditches on your Property," which one(s) are actions that you think you might be able to take? Why or why not?



5. Nature Based Solutions

5.0

[Agenda](#)

5.1

[Background Information](#)

5.2

[Activities and Handouts](#)

1. Option 1
2. Option 2
3. NBS Strategies Card
4. Marshes Flyer

5.3

[After Session Handout](#)



TOC

Intro

Resilience

Drainage

Flood
warning

NBS

Capacity

Careers

Action
Planning

Comms

Closing

5.0. Nature-Based Solutions for Coastal Protection– Agenda



Crisfield Resilience Academy Session 4: Nature-Based Solutions for Coastal Protection

October 19, 2024

Today's Objectives

Participants will become familiar with a variety of nature-based solutions (NbS) for improved coastal resilience such as protecting and restoring marshes, living shorelines, and wetlands management. We will examine the potential benefits of these strategies for reducing flooding impacts, improving wildlife habitat, and supporting local economy and culture in Crisfield.

Agenda

- 10:00 AM - 10:25 AM:** Welcome & Reflections – Cohort Leadership Building
- 10:25 AM - 10:50 AM:** Living History: Crisfield's Marshes
Frank Deuter, Lower Shore Land Trust
- 10:50 AM - 11:00 AM:** Break
- 11:00 AM – 11:25 AM:** Knowledge Exchange from Norfolk Neighbors
Skip Stiles, Wetlands Watch
- 11:25 AM – 11:55 AM:** Small Group Activity: *Nature-Based Solutions in Crisfield*
- 11:55 AM – 12:05 PM:** Cohort Leadership Building – Celebration Planning
- 12:05 PM – 12:15 PM:** Conclusion & Session Evaluation
Link to Session Evaluation: <https://bit.ly/CRA-Session-Eval>

Notes



TOC

Intro

Resilience

Drainage

Flood
warning

NBS

Capacity

Careers

Action
Planning

Comms

Closing

5.1. Nature-Based Solutions for Coastal Protection– Background Information

Background: Nature-based solutions (NBS) integrate natural features and processes into disaster risk reduction, creating sustainable and cost-effective ways to protect people and property. From restoring wetlands to planting urban trees, these solutions protect communities from natural hazards while offering co-benefits like cleaner air, cooler cities and healthy ecosystems. Nature-based solutions include varied practices that can be applied at many different scales, for example, to an entire watershed or a specific site. The common thread is that nature-based solutions mimic natural processes and offer diverse benefits.

<https://www.fema.gov/emergency-managers/risk-management/future-conditions/nature-based-solutions>

Crisfield’s coastal location makes it vulnerable to flooding from storms and high tides. Research by the U.S. EPA’s Office of Research & Development is investigating nature-based solutions (such as living breakwaters and oyster reefs, shown right) to protect Crisfield from storms and to support Crisfield’s resilience goals of protecting infrastructure, enhancing recreation, and growing business and jobs.

5.2. Nature-Based Solutions for Coastal Protection

5.2.1 Activity Option 1

Step 1: Handout

For this activity, small groups of 2-3 worked to fill out the handout below to consider which nature-based solutions they heard about or are on the cards given to their group would work in a Crisfield context.

Nature-Based Strategies: marsh restoration, wetland restoration and protection, living shorelines, land conservation, neighborhood practices (permeable pavement, tree trenches, etc.). Additional strategies can be found here:

<https://www.fema.gov/emergency-managers/risk-management/climate-resilience/nature-based-solutions/types>

Instructions: Using the nature-based strategies listed above, the information from today's session, and the notecards at your table, work in a small group to brainstorm how different strategies might help Crisfield adapt to flooding. Complete the chart below. Consider how your strategies could help, what the barriers could be, and, if applicable, where the strategies may be deployed in the Crisfield area. Lastly, write down any remaining questions you may have.

Once you have an idea of where the strategies might work in Crisfield, place a small sticker dot on one of your map handouts.

Name of strategy	How this strategy could help	Potential barriers to implementation	Any remaining questions you have?

LARGE GROUP SHARE-OUT: Using sticky notes, add your proposed strategies and solutions to the large map(s) on the wall. Add any comments or thoughts to the large chart paper also on the wall. Observe others' solutions that are also posted on the large map(s) on the wall. Select one member of your small team and/or large team to present your ideas to the larger group.

Reflection question (if extra time): Pick one of the strategies above:

Who would benefit the most in Crisfield from this strategy? Who would benefit the least? Would anyone be negatively impacted?

Step 2: Cards

Before the session, cut out the cards below. Each group will select three cards to complete the handout in the previous slide. There are blank cards at the end if groups think of other examples of nature-based solutions. Link to the featured NBS: <https://www.fema.gov/emergency-managers/risk-management/climate-resilience/nature-based-solutions/types>

Stormwater Parks

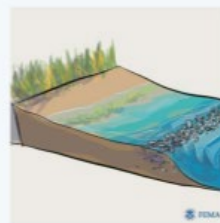


Stormwater parks are recreational spaces that are designed to flood during extreme events and to withstand flooding.

By storing and treating floodwaters, stormwater parks can reduce flooding elsewhere and improve water quality.

<https://www.fema.gov/emergency-managers/risk-management/climate-resilience/nature-based-solutions>

Oyster Reefs

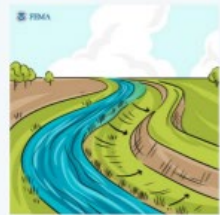


Oysters are often referred to as "ecosystem engineers" because of their tendency to attach to hard surfaces and create large reefs made of thousands of individuals.

In addition to offering shelter and food to coastal species, oyster reefs buffer coasts from waves and filter surrounding waters.

<https://www.fema.gov/emergency-managers/risk-management/climate-resilience/nature-based-solutions>

Setback Levee



Levees provide a vertical barrier against storm surge or river overtopping. A setback moves the levee away from the river or coast. This provides extra space for flood water.

Setback levees provide extra flood protection and reduce erosion. They also support healthier and more dynamic river and coastal systems.

<https://www.fema.gov/emergency-managers/risk-management/climate-resilience/nature-based-solutions>

Land Conservation



Land conservation is one way of preserving interconnected systems of open space that sustain healthy communities.

Land conservation projects begin by prioritizing areas of land for acquisition. Land or conservation easements can be bought or acquired through donation.

<https://www.fema.gov/emergency-managers/risk-management/climate-resilience/nature-based-solutions>



Rainwater Harvesting



Rainwater harvesting systems collect and store rainfall for later use. They slow runoff and can reduce the demand for potable water.

Rainwater systems include rain barrels that store tens of gallons and rainwater cisterns that store hundreds or thousands of gallons.

<https://www.fema.gov/emergency-managers/risk-management/climate-resilience/nature-based-solutions>

Green Streets



Green streets use a suite of green infrastructure practices to manage stormwater runoff and improve water quality.

Adding green infrastructure features to a street corridor can also contribute to a safer and more attractive environment for walking and biking.

<https://www.fema.gov/emergency-managers/risk-management/climate-resilience/nature-based-solutions>

Rain Gardens

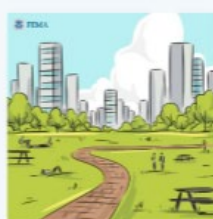


A rain garden is a shallow, vegetated basin that collects and absorbs runoff from rooftops, sidewalks, and streets.

Rain gardens can be added around homes and businesses to reduce and treat stormwater runoff.

<https://www.fema.gov/emergency-managers/risk-management/climate-resilience/nature-based-solutions>

Urban Greenspace



Urban greenspace reduces the urban heat island and improves air quality. They can also absorb flood waters to reduce flooding elsewhere.

Greenspace also provides more recreational opportunities and beautifies a community.

<https://www.fema.gov/emergency-managers/risk-management/climate-resilience/nature-based-solutions>



Permeable Pavement

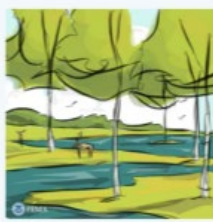


Permeable pavements allow more rainfall to soak into the ground. Common types include pervious concrete, porous asphalt, and interlocking pavers.

Permeable pavements are most commonly used for parking lots and roadway shoulders.

<https://www.fema.gov/emergency-managers/risk-management/climate-resilience/nature-based-solutions>

Wetland Restoration and Protection



Restoring and protecting wetlands can improve water quality and reduce flooding. Healthy wetlands filter, absorb, and slow runoff.

Wetlands also sustain healthy ecosystems by recharging groundwater and providing habitat for fish and wildlife.

<https://www.fema.gov/emergency-managers/risk-management/climate-resilience/nature-based-solutions>

Coastal Wetlands



Coastal wetlands are found along ocean, estuary, or freshwater coastlines.

They are often referred to as "sponges" because of their ability to absorb wave energy during storms or normal tide cycles.

<https://www.fema.gov/emergency-managers/risk-management/climate-resilience/nature-based-solutions>

Sand Trapping



Sand trapping is a method to make and support coastal dunes. Sand trapping fencing helps to build up the front of a dune.

Healthy dunes serve as a natural barrier between the coastline and inland areas. They reduce flooding and provide habitat for coastal animals and plants.

<https://www.fema.gov/emergency-managers/risk-management/climate-resilience/nature-based-solutions>

Living Shorelines



Living shorelines stabilize a shore by combining living components, such as plants, with structural elements, such as rock or sand.

Living shorelines can slow waves, reduce erosion, and protect coastal property.

<https://www.fema.gov/emergency-managers/risk-management/climate-resilience/nature-based-solutions>

Dunes



Dunes are coastal features made of blown sand. Healthy dunes often have dune grasses or other vegetation to keep their shape.

Dunes can serve as a barrier between the water's edge and inland areas, buffering waves as a first line of defense.

<https://www.fema.gov/emergency-managers/risk-management/climate-resilience/nature-based-solutions>

Tree Trenches



A stormwater tree trench is a row of trees planted in an underground infiltration structure made to store and filter stormwater.

Tree trenches can be added to streets and parking lots with limited space to manage stormwater.

<https://www.fema.gov/emergency-managers/risk-management/climate-resilience/nature-based-solutions>

Green Roofs



A green roof is fitted with a planting medium and vegetation. A green roof reduces runoff by soaking up rainfall. It can also reduce energy costs for cooling the building.

Extensive green roofs, which have deeper soil, are more common on commercial buildings. Intensive green roofs, which have shallower soil, are more common on residential buildings.

<https://www.fema.gov/emergency-managers/risk-management/climate-resilience/nature-based-solutions>

Additional Solution: _____
(optional)

Additional Solution: _____
(optional)



Step 3: Maps

Place stickers on locations on the following maps where your solution could work.



TOC

Intro

Resilience

Drainage

Flood
warning

NBS

Capacity

Careers

Action
Planning

Comms

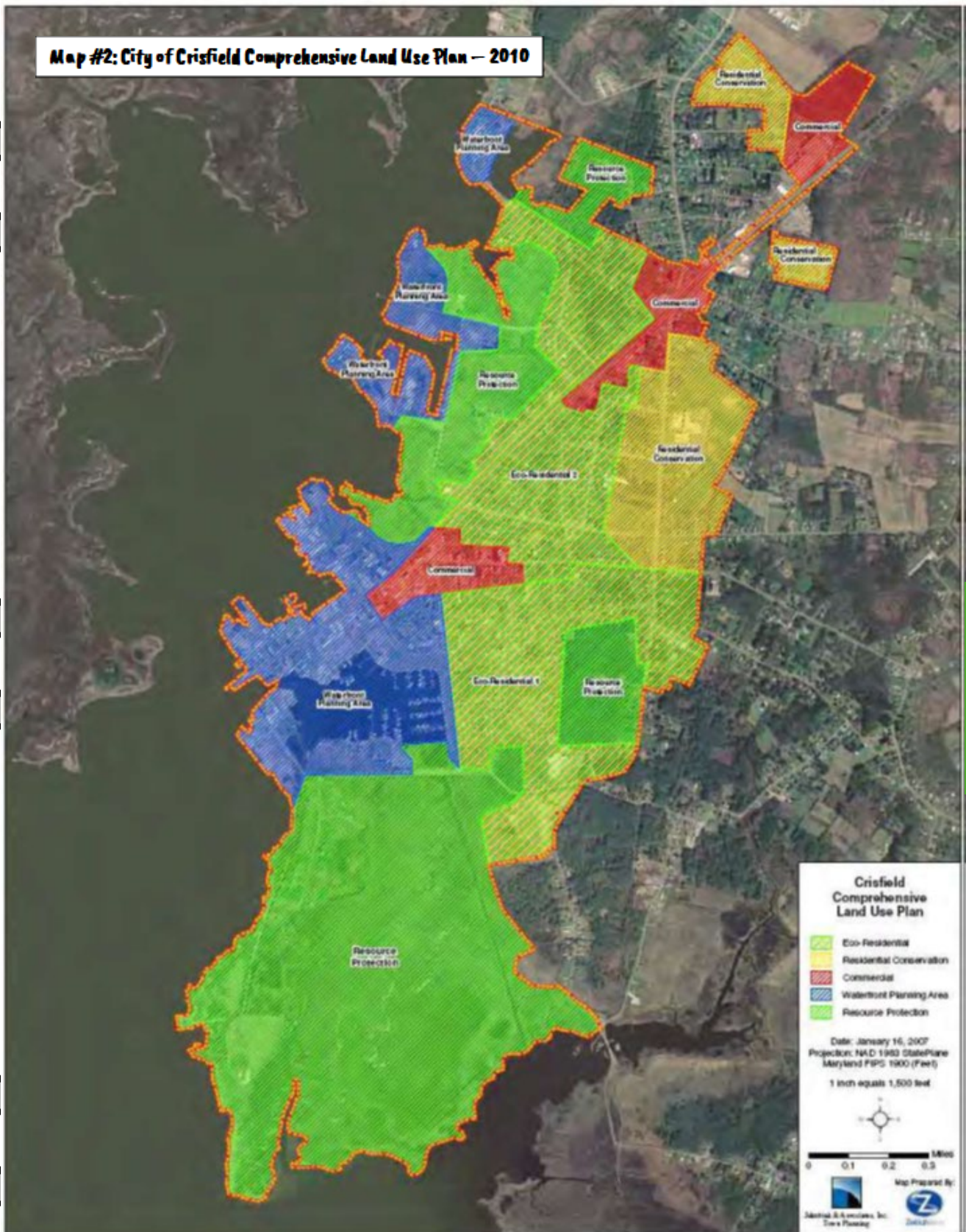
Closing

5.2.1 Handout

5.2.1 Cards

5.2.1 Maps

Map #2: City of Crisfield Comprehensive Land Use Plan — 2010



Map #3: Crisfield Map — Google Image



5.2.2. Handout Option 2

Instructions: Look over the two-page document titled “Nature-Based Strategies for Coastal Resilience: Potential Implementation in Crisfield, Maryland.” Select two strategies to explore. Along with your group, work together to brainstorm how the strategies might help Crisfield adapt to flooding and, more importantly, how the solution might be implemented. Complete the chart on the next page.

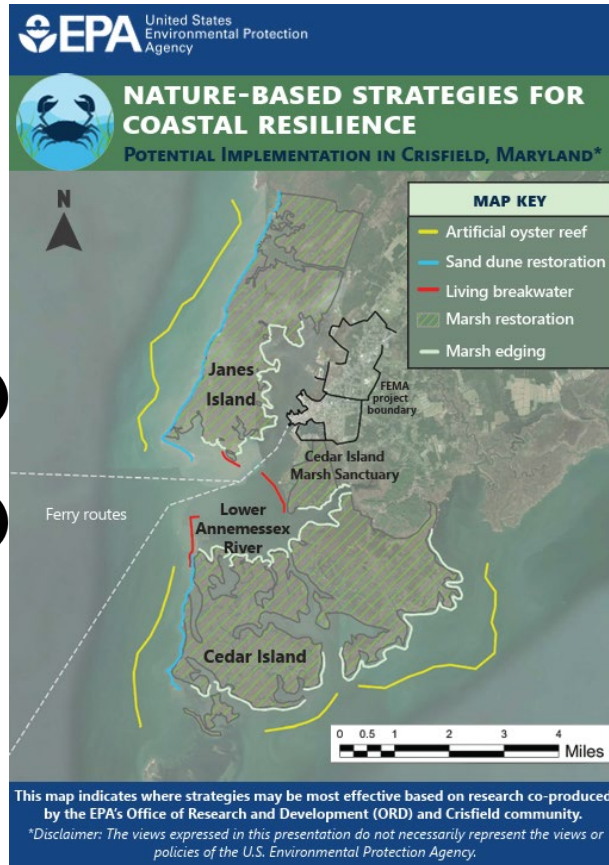


Activity: Nature-Based Solutions in Crisfield

Name of strategy	What kinds of _____ would be helpful to implement the NBS below?		
	Activities	Amenities	Access

LARGE GROUP SHARE-OUT: After you’ve completed the chart above, share your conclusions with the large group. Using post-it notes, add your proposed activities, amenities, and access to the large chart paper(s) on the wall. Add any comments or thoughts to the large chart paper also on the wall. Observe others’ solutions that are also posted on the wall. Select one member of your small team and/or large team to present your ideas to the larger group and lead the discussion.

5.2.3. Nature-Based Strategies for Coastal Resilience - Card



NATURE-BASED STRATEGIES FOR COASTAL RESILIENCE

Crisfield's unique coastal location makes it vulnerable to flooding, storm events, higher tides, sinking land and erosion. To support Crisfield's resilience goals of protecting infrastructure, enhancing recreation, and growing business and jobs, EPA's ORD is co-producing research and offering educational training and leadership opportunities for members of the Crisfield community.



Artificial Oyster Reefs

Rocks or oyster shell bags offshore create artificial reefs that break up incoming wave energy headed towards Crisfield. They can also make new habitat for oysters which support aquaculture and serve as natural filters for cleaner water.

Sand Dune Restoration

Sand dunes act as natural protection against storm surges. Raising and vegetating existing dunes would prevent sand loss and erosion, help decrease water heights of incoming storms before they reach Crisfield's shores and increase habitat for wildlife.



Living Breakwaters

Living breakwaters extend above the water's surface to obstruct waves. Calm areas behind breakwaters also create habitat for fish and crab of importance to Crisfield's seafood industry and recreational fishing.

Marsh Restoration

Salt marshes are central components of healthy and resilient coastal ecosystems. Sediment placement, vegetation plantings and edge protection can help marshes slow wave energy and decrease flooding and erosion, while attracting tourists and Crisfielders looking to hunt, fish and birdwatch in these areas.



5.2.4. Marshes Flyer

The U.S. EPA developed this educational infographic at the request of the community. It was distributed to participants during the nature-based solutions session.



What Can Marshes Do for Crisfield?

Protect Crisfield

- Provide protection from storms - slow waves and decrease wave height.
- Plants secure sediment and protect coastlines from erosion.
- Absorb excess carbon from the atmosphere.
- Filter pollutants and improve water quality.

Provide a Unique Resource

- Fun things to do outdoors.
- Environmental education opportunities.
- Natural beauty.
- Breeding grounds, food sources, and habitat for coastal wildlife:
 - ◊ Crabs and fish
 - ◊ Saltmarsh sparrows, ducks and other waterfowl
 - ◊ Frogs, turtles, and other reptiles

Increase Tourism and Economic Opportunities

- Recreational opportunities:
 - ◊ Birding
 - ◊ Kayaking and canoeing
 - ◊ Camping
 - ◊ Wildlife viewing
 - ◊ Photography
 - ◊ Fishing and crabbing
 - ◊ Duck hunting
- Help ensure the health of commercial and recreational fishing economies.
- Create a connection to the waterfront.
- Have historical significance.

"As some of the most productive ecosystems on earth, salt marshes and their complex, interdependent habitats serve many purposes, only one of which is to delight our senses."

— EPA 'Marshing Forward'

epa.gov/science/matters/marshing-forward-despite-uncertainty-how-epa-researchers-are-reframing-approaches





5.3 Nature Based Solutions– After Session Handout

Thank you for engaging in the fourth session of the Crisfield Resilience Academy! We hope you can continue the talks we had today **with other community members**. Before the next session on November 2, work through the questions below. Please write some notes so you're ready to share out at the next session.

Date: _____

Part One – Nature-Based Solutions

During Session 4, we learned about different nature-based strategies for building coastal resiliency, including marsh restoration, and Frank Deuter spoke with us about the significance of marshes to Crisfield. We also heard from Skip Stiles about wetlands and how nearby coastal towns like Norfolk have made adjustments towards increasing coastal resiliency. Reflect on the session as you respond below.

1) What questions do you still have related to these nature-based strategies? If you speak with a community member during this time, **ask them if they know about nature-based solutions or if they have any questions about nature-based solutions for coastal protection**. If they do, write them below.

2) Pick one question. Circle it above. Where could you go or what resources could you use to begin to answer or address this question? Think about community members, businesses, or other resources. If you have time, see if you can find anything that might help answer the question. Please be ready to share how you found the answers to your question at the next session.

3) What steps, tips, or advice would you share with others on nature-based solutions in Crisfield?

Part Two – Preparing for Session 6 – Crisfield Resilience Academy Celebration!

We're going to build on previous sessions to plan our final celebration. You will have the opportunity to share your stories from your experiences and these sessions at the celebration. Take a moment to think about some of the powerful stories you have encountered about flooding in Crisfield either during the Academy or prior.

- What was the story?
- When did you hear it?
- What format did you hear it (ex. in-person conversation, church sermon, Facebook post, video, other social media source, printed material)?

Take a moment to think about how it would be meaningful for your community to hear about stories from the Crisfield Resilience Academy and resiliency in Crisfield. Write down your top ideas for how to share stories at the celebration.

Now, think about what you want to share about at the final session. It could be something you learned, a story you heard, or a change you want to see for the future. Use the questions below to help with your preparations.

- What do I want people to learn from what I share?
- What do I want people to feel about what I share?
- What action(s) would I want people to take because of what I share?

6. Community Capacity Building

6.0

Agenda

6.1

Activities and Handouts



TOC

Intro

Resilience

Drainage

Flood
warning

NBS

Capacity

Careers

Action
Planning

Comms

Closing

6.0. Community Capacity – Agenda



Crisfield Resilience Academy Sessions 4 & 5: Nature-Based Solutions & Community Capacity Building

April 5, 2025

Today's Objectives

Nature-Based Solutions:

Participants will become familiar with a variety of **nature-based solutions (NBS)** for **improved coastal resilience** that have been modeled for potential use in a Crisfield context, such as protecting and restoring marshes, living shorelines, and wetlands management. Participants will be able to describe potential costs and benefits of these strategies.

Community Capacity Building:

Participants will hear from Maryland Sea Grant representative, Kayle Krieg, to learn more about **community capacity building**. Participants will work in groups on their engagement plans, weighing resources and benefits, and work towards developing strategies to implement their plans at the upcoming community meeting.

Agenda

10:00 AM - 10:20 AM: Welcome & Reflections – Participant Photos

10:20 AM - 11:00 AM: Small Group Activity: *Nature-Based Solutions in Crisfield*

11:00 AM - 11:10 AM: **Break**

11:10 AM - 11:45 AM: Knowledge Exchange from Norfolk Neighbors
Skip Stiles, Wetlands Watch

11:45 AM - 12:15 PM: What is Community Capacity Building?
Kayle Krieg, Maryland Sea Grant

12:15 PM - 1:15 PM: **Working Lunch / Breaks as needed**
"Steps to Resilience" in Crisfield
& Small Group Activity: Developing Engagement Plans
BEACON & Kayle Krieg, Maryland Sea Grant

1:15 PM - 1:30 PM: Conclusion & Session Evaluation



6.1. Community Capacity – Background



Building Community Capacity for Coastal Resilience

Kayle Krieg, PhD Coastal Resilience Specialist
University of Maryland Sea Grant Extension
Crisfield Resilience Academy
April 5, 2025

UNIVERSITY OF
MARYLAND
EXTENSION



Dr. Krieg presented her work and experience as a Coastal Resilience Specialist with Maryland Sea Grant Extension. She described that resilience requires engagement and investment. Krieg described that Crisfield is poised to succeed in their resilience efforts because they have both engagement and investment. There is significant engagement from the Crisfield community and applying for grants and funding. Krieg guided participants through an interactive activity which walked through steps for successful community engagement plan given her experience at Maryland Sea Grant and within other coastal communities in the area.

TOC

Intro

Resilience

Drainage

Flood
warning

NBS

Capacity

Careers

Action
Planning

Comms

Closing

6.1. Community Capacity – Handout

Step 1: Split into Groups / Topics

Group topic	Group members
Oyster reef planting / living breakwaters	
Crisfield Community Concierge program	
Ditch maintenance	
Sand dune restoration	
Marsh restoration & Marsh edging	

Step 2: Get together with your group members. Decide on a few preliminary logistical details.

- Your Group topic: _____
- Your Group members: _____
- Are you splitting into separate sub-groups? Y N
 - ☐ If yes, what are the sub-groups? Who is in them?
- Do you have a willing/designated presenter for Nov. 16th? If yes, write their name here: _____
If you prefer not to present, write "EPA/BEACON." Someone from EPA/BEACON will deliver the message on your behalf.

Step 3: Along with your group members, complete the Community Outreach Plan below, developed by Kayle Krieg of Maryland Sea Grant.

- Goals and Objectives** - What is the driving force? (Awareness/Information/Call to Action)
- Audience** – Identifying target audience (Broad → Specific)
- Create the message** – Based on Audience and to achieve the goal
- Spread the word** – How will the specified audience receive the message?
- Evaluate** – How will you know if the message got to the intended audience?

Step 4: Along with your group members, discuss your ideas for presentation style and length.

- Your estimated presentation time: _____
- Your anticipated presentation style*:
 - ☐ PowerPoint presentation / slides
 - ☐ Informal talking points / discussion
 - ☐ Handout / printout / infographic
 - ☐ Video
 - ☐ Letter / Memo / Article
 - ☐ Other: _____

*Note: you do not need to be able to produce these products yourself between now and Nov. 16th. EPA & BEACON will support you in bringing your ideas to life.

For today, let's just get your ideas started.

Step 5: Along with your group members, begin the preliminary design of your presentation. The BEACON team has multiple templates – ask for one if that would be helpful for you.

Available templates
PowerPoint presentation / slides
Informal talking points / discussion
Handout / Print-out / Infographic
Video
Letter / Memo / Article
Blank page for sketching ideas

The EPA and BEACON teams will work to bring your ideas to life and make sure that everything is ready to go by Session 6. Go team!

7. Economics and Careers in Coastal Tourism

7.0

[Agenda](#)

7.1

[Background Information](#)

7.2

[Activities](#)

7.3

[After Session Handout](#)



TOC

Intro

Resilience

Drainage

Flood
warning

NBS

Capacity

Careers

Action
Planning

Comms

Closing

7.0 Activity: Economics & Careers in Coastal Resilience - Agenda



Crisfield Resilience Academy Session 2: Economics & Careers in Coastal Resilience March 1, 2025

Today's Objectives

At the end of this session, Academy participants will be able to compare different **career and job opportunities in coastal resilience**; navigate the **Somerset County Comprehensive Plan**; and discuss **economic projections for Crisfield over the next two decades**.

Agenda

- 10:00 AM - 10:30 AM: Welcome & Session 1 Reflection: Handout Share-Out**
- 10:30 AM - 10:45 AM: Exploring the Somerset County Comprehensive Plan:**
<https://www.plansomersetmd.org/draft-plan-chapters>
- 10:45 AM - 11:00 AM: Group Discussion - Somerset County Comprehensive Plan**
William Cornish, Assistant Director and Zoning Administrator, Somerset County
- 11:00 AM - 11:10 AM: Break**
- 11:15 AM - 11:45 AM: Roundtable Discussion**
William Cornish, Assistant Director and Zoning Administrator, Somerset County
Shane Hall, Salisbury University, Green Futures Program
Danny Thompson, Somerset County Executive Director, Economic Development
- 11:45 AM - 12:00 PM: Conclusion & Next Steps**
- 12:00 PM - 12:15 PM: Logistics & Session Evaluation**
Link to Session Evaluation: <https://bit.ly/CRA-Session-Eval>



7.1 Economics and Careers in Coastal Resilience – Background Information



Crisfield Resilience Academy – Session 2

Economics & Careers in Coastal Resilience

Background Information

Somerset County has initiated its comprehensive plan update¹, which is a long-range guide to strengthen the community over the next 20 years through land use planning, preservation, and investment.

The plan is an effort to update the *1996 Somerset County Comprehensive Plan*². The Department of Technical and Community Services along with their consultant is drafting the plan update, which is overseen by the Somerset County Planning Commission. Following the plan review and public comment process, the plan will be adopted by the Board of County Commissioners.

The Comprehensive Plan generally guides land use and is an advisory document. **The Zoning Ordinance** is part of the County Code and regulates the type, scale, and intensity of development which may occur in the specific zoning districts.

Explore the Somerset County Comprehensive Plan: <https://www.plansomersetmd.org/about>

Review the Plan

Draft chapters are being posted periodically throughout the plan update process. As chapters are ready, they will be available for review and comment following the presentation to the Somerset County Planning Commission.

View draft chapters online: <https://www.plansomersetmd.org/draft-plan-chapters>

Let's check out an excerpt of Chapter 4: Economic Vitality

Economic vitality is the strength, energy, and continuance of Somerset County's wealth and resources. **Economic development** refers to a program, a group of policies, or activity that seeks to improve the economic well-being and quality of life. The Somerset County Economic Development Commission (SCEDC) was established by the Somerset County Commissioners in 1980, to encourage and promote economic vitality and development for the betterment of all County citizens.

Several promising industries were recommended as focus areas of potential economic opportunity in Chapter 4, including:

- Retirement living and healthcare;
- Aquaculture, agriculture, food processing, and food distribution;
- Skilled trades, including those related to construction and manufacturing;
- Alternative energies; and tourism

¹ <https://www.plansomersetmd.org/about>

² 1996 Somerset County Comprehensive Plan

7.2 Activity: Economics & Careers in Coastal Resilience - Handout

NOTE TO FACILITATOR: CUT THESE CARDS OUT AND SHARE ONE WITH EACH GROUP
(THERE SHOULD BE SIX TOTAL GROUPS)



Crisfield Resilience Academy – Session 2

Economics & Careers in Coastal Resilience

Team 1

Instructions:

1. Read the **Background Information** section of the handout.
2. Look over the Chapter 4 section on **Goals & Strategies**. Highlight sections that are of interest to you and write down questions if you have them for our speakers.
3. In your small group, discuss your assigned Goals and Strategies. Consider the question below as part of your discussions.

SMALL GROUP - GOAL 4.1 - QUESTION TO CONSIDER

What does the quality of life, character and heritage of Somerset County mean to you? Are there any connections to the environment or natural resources?



Crisfield Resilience Academy – Session 2

Economics & Careers in Coastal Resilience

Team 2

Instructions:

7. Read the **Background Information** section of the handout.
8. Look over the Chapter 4 section on **Goals & Strategies**. Highlight sections that are of interest to you and write down questions if you have them for our speakers.
9. In your small group, discuss your assigned Goals and Strategies. Consider the question below as part of your discussions.

SMALL GROUP - GOAL 4.2 - QUESTION TO CONSIDER

What kinds of attributes or access to nature or natural resource amenities would be attractive to older newcomers?



Crisfield Resilience Academy – Session 2

Economics & Careers in Coastal Resilience

Team 3

Instructions:

4. Read the **Background Information** section of the handout.
5. Look over the Chapter 4 section on **Goals & Strategies**. Highlight sections that are of interest to you and write down questions if you have them for our speakers.
6. In your small group, discuss your assigned Goals and Strategies. Consider the question below as part of your discussions.

SMALL GROUP - GOAL 4.3 - QUESTION TO CONSIDER

What types of these businesses could find an opportunity to locate in Crisfield, and why?

NOTE TO FACILITATOR: CUT THESE CARDS OUT AND SHARE ONE WITH EACH GROUP
(THERE SHOULD BE SIX TOTAL GROUPS)



Crisfield Resilience Academy – Session 2

Economics & Careers in Coastal Resilience

Team 4

Instructions:

10. Read the **Background Information** section of the handout.
11. Look over the Chapter 4 section on **Goals & Strategies**. Highlight sections that are of interest to you and write down questions if you have them for our speakers.
12. In your small group, discuss your assigned Goals and Strategies. Consider the question below as part of your discussions.

SMALL GROUP - GOAL 4.4 - QUESTION TO CONSIDER

What would be needed for Crisfield to attract businesses to reuse vacant properties?



Crisfield Resilience Academy – Session 2

Economics & Careers in Coastal Resilience

Team 5

Instructions:

13. Read the **Background Information** section of the handout.
14. Look over the Chapter 4 section on **Goals & Strategies**. Highlight sections that are of interest to you and write down questions if you have them for our speakers.
15. In your small group, discuss your assigned Goals and Strategies. Consider the question below as part of your discussions.

SMALL GROUP - GOAL 4.5 - QUESTION TO CONSIDER

What potential does Crisfield have for renewable energy sources?



Crisfield Resilience Academy – Session 2

Economics & Careers in Coastal Resilience

Team 6

Instructions:

16. Read the **Background Information** section of the handout.
17. Look over the Chapter 4 section on **Goals & Strategies**. Highlight sections that are of interest to you and write down questions if you have them for our speakers.
18. In your small group, discuss your assigned Goals and Strategies. Consider the question below as part of your discussions.

SMALL GROUP - GOAL 4.6 - QUESTION TO CONSIDER

What potential does Crisfield have for more outdoor tourism or agritourism?

7.3 Activity: Economics and Careers in Coastal Resilience – After Session Handout



Thank you for engaging in the third session of the Crisfield Resilience Academy! We hope you can continue the talks that we started today with a local to the area. Bonus points if they have lived in the area for a long time. Please write some notes about your conversation with them so that you're ready to share out at the next session on March 22nd.

Part One – Write down something interesting that you heard from one of the speakers:

William Cornish, Assistant Director and Zoning Administrator, Somerset County

Shane Hall, Salisbury University, Green Futures Program

Danny Thompson, Somerset County Executive Director, Economic Development

Part Two – Discuss the following with someone from the area:

- **Ask:** What, if any, changes have you noticed in the business profile of the Crisfield area? Over how much time have you witnessed that? 2 years, 10 years, 30 years, etc.?
- **Ask:** What are some jobs that you foresee increasing in the area in the next 10-20 years?
- *Share with your contact what you wrote down that was interesting from the session.* **Ask:** What do you think? How does that align with your thoughts or experiences?

Part Three – Conservation Careers for our current high school students!

Check out this website:

https://dnr.maryland.gov/pgc/Documents/Maryland_Conservation_Careers_Guide.pdf

Look at pages 4 & 5. List one agency or organization that you might be interested in working for/learning more about:

On page 7, click on one of the links for Mentorship options. Do any seem interesting to you? Which ones?

On page 8, pick one of the nine fields to explore. Which did you pick? What are some of the degrees/majors used in your selected field? What kind of help or support might you need to pursue this field?

8. Resilience Action Planning

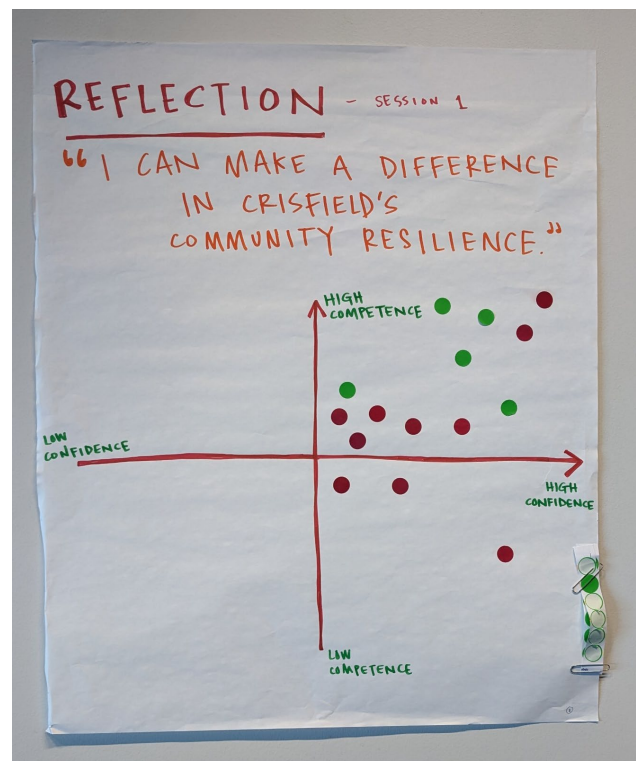
8.0

Agenda

8.1

Activities

1. Resilience Action Planning Booklet
2. Social Media Campaign



8.0 Resilience Action Planning- Agenda



Crisfield Resilience Academy Session 5: Sustainable Coastal Tourism and Recreation

November 2, 2024

Today's Objectives

Participants will hear from locals about existing sustainable coastal tourism in Crisfield and delve into the potential conflicts between economic development and environmental conservation. Participants will work on their realistic plan for the upcoming Crisfield Resilience Academy community meeting (Nov. 16th), weighing resources and benefits, and work towards developing strategies to implement their plans at the upcoming community meeting.

10:00 AM - 10:30 AM: Welcome & Reflections - Cohort Leadership Building
Steps 1 & 2 of the Resilience Action Planning booklet

10:30 AM - 11:00 AM: Crisfield Tourism Panel
Jim Rapp, Delmarva Birding Weekends
Brent Sullivan, MD Park Service, Janes Island State Park

11:00 AM - 11:15 AM: Break

11:15 AM - 12:00 PM: "Steps to Resilience" in Crisfield &
Cohort Leadership Building - Celebration Planning
Steps 3 - 5 of the Resilience Action Planning booklet

12:00 PM - 12:15 PM: Conclusion & Session Evaluation



TOC

Intro

Resilience

Drainage

Flood
warning

NBS

Capacity

Careers

Action
Planning

Comms

Closing

8.1 Activity: Resilience Action Planning

8.1.1 Resilience Action Planning Booklet

The following activity was in a booklet format.

Step 1: Finalize Groups/Topics

Group topic	Group members
Volunteer corps	
Talking Points/face-to-face	
Handout / Print-out / Infographic	
City Sign	
Video	
Letter / Memo / Article	
Other:	

Step 2: Get together with your group members. Decide on a few preliminary logistical details.

- Your Group Topic:
- Your Group Members:
- Are you splitting into separate sub-groups? Y N
 - If yes, what are the sub-groups? Who is in them?
- Do you have a willing/designated presenter for Nov 16th? If yes, write their name here:

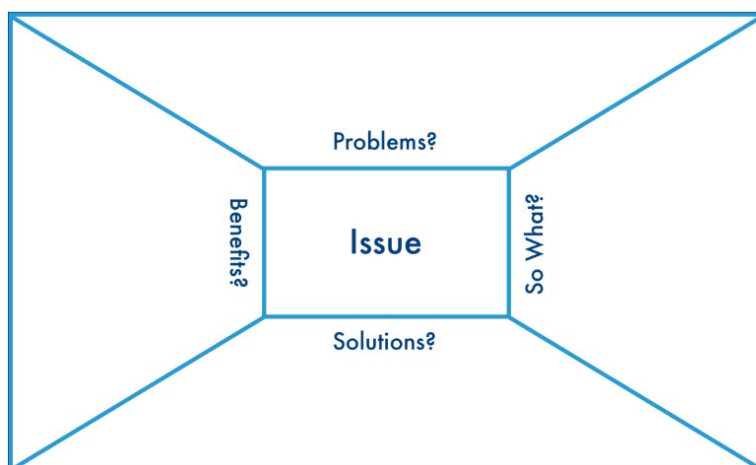
If you prefer not to present, write "EPA/BEACON." We will find someone from EPA/BEACON to partner with you & deliver the message on your behalf.

Step 3: Along with your group members, discuss your ideas for presentation style and length.

- **Your estimated presentation time:** _____
- **Your anticipated presentation style*:**
 - PowerPoint presentation / slides
 - Informal talking points / discussion
 - Handout / printout / infographic
 - Video
 - Letter / Memo / Article
 - Other: _____

*Note: you do not need to be able to produce these products yourself between now and Nov. 16th. EPA & BEACON will support you in bringing your ideas to life. 😊 For today, let's just get your ideas started.

Step 4: Message Box. Individually and with your group members, consider your ideas for messaging and outcome.



We probably won't have time to complete the entire Message Box but keep it in mind as you fill-in your ideas on the pages and templates that follow.

The [Message Box](#) is a tool that helps people communicate science and research findings in a way that resonates with the chosen audience.¹

Step 5: Along with your group members, begin the preliminary design of your presentation. There are multiple templates on the page(s) that follow. Browse through the template options, choose one that you think will work for you and/or your group, and try to fill-in as much as you can in the remaining time.

The EPA and BEACON teams will work to bring your ideas to life and make sure that everything is ready to go by Session 6. Go team!

Presentation Templates

Template style

- PowerPoint presentation / slides
- Informal talking points / discussion
- Handout / Print-out / Infographic
- Video
- Letter / Memo / Article
- Blank page for sketching ideas

PowerPoint presentation/ Slides template

Note: you don't need to follow this guide exactly; it is just to help you get started

Slide 1: Title, image, group names -
photo or image recommendations?

Slide 2: Issue or background story

Slide 3: Additional background info

Slide 4: Proposed actions/solutions

Slide 5: Potential barriers/problems with
proposed actions/solutions

Slide 6: Potential benefits of proposed
actions/solutions

Slide 7: Next steps / Conclusion

Slide 8: Thank you slide, contact
information, website links, resources

TOC

Intro

Resilience

Drainage

Flood
warning

NBS

Capacity

Careers

Action
Planning

Comms

Closing

Informal talking points/ Discussion

Note: you don't need to follow this guide exactly; it is just to help you get started

Writing Effective Talking Points

Talking points are a set of clear, easily remembered phrases that outline a proposal, project, or idea. In most cases, talking points are used to keep a speaker on track when they are giving a presentation at a conference, to a reporter, in a meeting, or even in an elevator. While different talking points may vary greatly depending on the subject matter, length of the presentation, and audience, here are some "best practice principles" to consider:

1. *Keep it short and simple.* Because their purpose is to ease verbal presentation, talking points should be short and contain only the most relevant information.
 - Using bullets can help condense and organize information.
 - Don't have to be complete sentences.
2. *Capture the main point or points.* People won't remember every word they hear in a presentation. So make sure that you clearly articulate and emphasize the main points.
 - Once you've written your talking points, ask yourself if you've missed any important points.
 - Try your talking points out on a friend and see what main points your friend takes away from them.
3. *Think about your audience.* Who is the audience for the presentation? How much do they know about the subject matter? How much background and/or context will you need to give? How do they feel about the argument/ideas/opinions that the presentation will express?
 - **Worst Case Scenario.** What is the best argument that you can think of against the claims or arguments in your presentation? Try to consider some worst case scenarios for how your talking points might be received, and then consider including responses to this potential opposition.

The "Rule of Three"

Many speechwriters have found the so-called "rule of three," whereby talking points are structured around the three most important points, to be a useful framework. If you were limited to three sentences to describe a paper, idea, or project, what are the main ideas that you would highlight?

Example:

1. *Beauty and the Beast* is a great movie.
 - a. Detailed animation
 - b. Classic story
 - c. Appeals to the viewer's emotions
2. *Aladdin* is a great movie.
3. Disney movies made in the early 1990s are really awesome..

Of course, the "rule of three" is merely a framework that some have found useful, not a dogma. Depending on the information you're trying to express, you may need two or five or twelve or any number of points.

What to Avoid in Developing Talking Points:

1. Avoid: Too much information! Why? You don't want to bog down your audience with unnecessary detail/background. They'll just stop listening.
2. Avoid: Many lines of text in a single bullet. Why? Talking points are made to be memorized before a presentation, or quickly glanced at while a presentation is being given. Make them easy to read.
3. Avoid: Hiding the main point. Why? Your audience may only remember one or two key things from the presentation. Make sure that these things they remember are the most important points.

Last updated 10/26/2012

Informal talking points/ Discussion

Note: you don't need to follow this guide exactly; it is just to help you get started

Background Information - three bullet points

-
-
-

Questions that may arise and potential answers

-
-
-
-
-

Conclusions

-
-

Resources and Follow-up items

- For more information on how to join the next cohort of the Crisfield Resilience Academy, please go to <https://www.epa.gov/gcx/crisfield-resilience-academy>
- For more information on the City of Crisfield's flood mitigation efforts, please go to <https://www.crisfieldfloodmitigation.com/>

Handout/ Print-out/ Infographic

Note: you don't need to follow this guide exactly; it is just to help you get started

Infographic Like a Pro!



Visualize

Utilizing geometric shapes, graphs, charts, and diagrams can effectively assist you in visualizing data in a clear and organized manner.

Keep it Simple

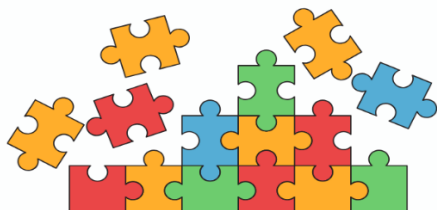
Understanding your target audience is incredibly valuable when creating infographic designs.

Create with Intention

There is ample opportunity for creativity when designing an infographic, so there are no strict design guidelines to follow.

Be Accurate

Incorporate a variety of shapes and sizes, blending them together to create visuals that are both clear and memorable for the user.



Sketch your infographic ideas below.



Embrace Your Creativity

Unleash your creativity! Make sure to incorporate unique typography, illustrations, icons, and various other elements to enhance your expression.

Think Wisely

Create diagrams and outline drafts that include the relevant information on the subject.

Be Transparent and Sincere

Encourage your readers to explore further by offering them access to additional information. Share extra links and resources to enhance their understanding.

Style Matters

When searching for your unique style, be sure to consider how the topic aligns with the appearance of your infographic, including the colors and charts you choose.

Video Storyboard

Letter / Memo / Article

Notes

8.1.2 Community Capacity Building: Social Media Campaign



Introduction

Welcome to the Social Media Crisfield Flooding Project! You will work in groups to create a campaign that addresses flooding in small coastal communities (like Crisfield!). This campaign is meant to be a culmination of the knowledge you have gained from your participation in the Crisfield Resilience Academy. You have learned so much over the last few months and now you are tasked with spreading that knowledge to your community!

Step 1: Topic Selection

1.1 Group Assignment:

You all have expressed interest in **Economic and Business Strategies** or **Nature-Based Strategies**. Divide into two groups of 2-4 each.

Write the group you have chosen to be in (Economic or Nature-Based) in the box below:

Write the members of your group in the box below:

1.2 Gather Information on your Topic

- Review the materials you have from the Crisfield Resilience Academy and online resources. Here are some resources to help you get started:

[Coastal Community Resilience Research | US EPA](#)

[Coastal Community Resilience Research Project Updates | US EPA](#)

[Understanding Stormwater Inundation](#)

- Use the information you have learned, and online resources provided to gather information on your assigned topic.

List the materials, handouts, and websites you may find useful below and add a bibliography of sources at the end of this document.

1.3 Discuss and Choose Key Points

Work with your team to determine what points you want to focus on in your campaign. You want your campaign to be impactful, so try not to focus on too many things.

Brainstorm with your group: What do you want the impact of this campaign to be on your community?

Come up with a sentence or two to describe your campaign and its purpose. Then, determine three points you will use to support your campaign. Remember, these can change later as you get further into forming your campaign! You also want to make sure you keep cohesive language throughout and can clearly define it to your audience. Brainstorm some keywords, phrases and their definitions. Fill out the table below.



Campaign Purpose	
Point 1	
Point 2	
Point 3	
Key Words and Phrases	
Desired Impact	

Step 2: Choosing Social Media Platforms

2.1 Platform Overview:

This campaign should be on at least three different social media platforms. You may choose from Facebook, Instagram (reels and/or photo slides); X; TikTok; a local Press Release, or another social media platform. Using different social media platforms may require you to alter your work for each platform. For example, on TikTok you might create short video content and could tie-in current trends. Fill out the table below with some ideas about the type of content you could produce for each platform.

Social Media Platform	Content Type
Facebook	
Instagram	
X	
TikTok	
Local Press Release	
Other:	

2.2 Platform Selection:

Now that you have brainstormed about content type, you must decide which platforms you want to focus on! Discuss as a group and list your chosen platforms below. You can use more than 3 if you would like!

Optional Extra Activity:

Currently the City of Crisfield is lacking in social media platforms targeted at youth, maybe you could be the solution! Crisfield does not currently have a TikTok account. Are you up for the task of convincing the city that is what you need to reach the younger generations? The final academy meeting on 4/26 will give you the opportunity to present your work to the community, including the Mayor!

You could present pitch a Crisfield TikTok account at the meeting and show TikToks that you made. If any of want to continue your work past the Resilience Academy you could offer to continue running a Crisfield TikTok account in the form of a school club or in a volunteer position with the city. Ideally members from both the Nature-Based Solutions and Business groups would want to be involved with this. Contact Jenna Hartley [hartley.jenna@epa.gov] if you are interested in taking this on!



Step 3: Interviewing Community Members

As a part of this campaign, you will interview two City of Crisfield employees. The product of this interview could be a video recording of the interview, quotes in an article, audio played over another video, or another way you want to incorporate their voices! You can also interview more members of the Crisfield community if you feel that will get your message across!

3.1 Interview Request

You will need to reach out to these employees to request an interview. Craft an email explaining your project and what you would like to interview them about. These interviews can be virtual or in person. Paste the email at the end of this document.

Dominique Parks, City of Crisfield Housing and Community Resource Coordinator

Email: dparks@crisfieldcityhall.com

Phone: 410-968-1333

Brian Fowler, City of Crisfield Public Works Director

Email: bfowler@crisfieldcityhall.com

3.2 Create an Interview Questions Guide

Generate a list of questions you will ask the employees. These questions should be related to the subject of your campaign and their position. Attach your guide at the end of this document.

- Remember to have a question asking them about their background! Just because you know who they are doesn't mean your audience does.
- When generating questions, think about how you will use them in your final product.

3.3 Complete the Interviews

- When completing the interviews, think about how you will use them in your campaign! Will you be using audio, video, text quotes, or all of the above?
- It is smart to have a back up. You might be using someone's phone to record video, and someone else's to record the audio. This allows you to have two recordings of the interview and makes it possible to have higher audio quality.
- If you do not plan on using the clips of the interview where you are asking the questions, make sure to tell your interviewees to restate the question at the beginning of their answer.



Step 4: Create Your Materials

4.1 Plan your Materials

Now is the time to plan the materials you will be using in your campaign.

- These materials could include text, images, videos, hashtags, and infographics. You may want to use the images in this document in your materials!
- Canva has a free version you can use to make infographics!
- You could also create graphics using google slides or power point.
- You can link existing resources in your campaign!
- Don't forget to mention you are doing this as a part of the Crisfield Resilience Academy!

You should create:

- 2 text posts
- 3 infographics
- 3 videos

4.1.1 Planning Table

Fill out the table below with a couple sentences describing each product.

Product	Plan	Source
Text Post 1		
Text Post 2		
Infographic 1		
Infographic 2		
Infographic 3		
Video 1		
Video 2		
Video 3		



Step 4: Create Your Materials

4.2 Create your Materials

Now it is time to put all this planning into action!

Tips for Success

- **Collaborate Effectively:** Work closely with your group members, sharing ideas and responsibilities.
- **Be Creative:** Think outside the box and create engaging content that captures attention.
- **Stay Focused:** Keep your campaign focused on the key strategies/messages you want to convey.
- **Engage Your Audience:** Consider what will resonate with your target audience and how to effectively communicate your message.

Key Information to Include

- What is the issue you are trying to mitigate?
- What are strategies to mitigate that issue?
- Think about where your knowledge of the above subjects started in January. That is where your audience is starting. Make sure to share information they will understand!

4.3 Send your Materials to the City of Crisfield

Email this document to Jenna Hartley [hartley.jenna@epa.gov] and she will get your campaign to the City of Crisfield. Keep an eye out for your posts! You may post your work on your personal social media as well.

Step 5: Reflection

What do you think the impact of your campaign has been, or will be?

What would you do differently in this campaign process if you were to start from the beginning?

What do you hope the impact of this campaign is on your community?

9. Communications

9.0 [Points of Contact](#)

9.1 [One-Pagers](#)

9.2 [Crisfield Stories](#)

9.3 [Promotion](#)

9.4 [Correspondence](#)



9.0. Project Points of Contact



Jenna Hartley | Academy Lead & Facilitator

U.S. Environmental Protection Agency

hartley.jenna@epa.gov



John Hickman | Academy Co-Lead & Facilitator

Director, BEACON at Salisbury University

jnhickman@salisbury.edu and

BEACON@salisbury.edu



Emily Eisenhauer & Roxolana Kashuba

U.S. Environmental Protection Agency

Chesapeake SDR Project Leads

eisenhauer.emily@epa.gov | kashuba.roxolana@epa.gov



Darlene Taylor

Mayor, City of Crisfield

mayordtaylor@crisfieldcityhall.com



Jen Merritt

Grant Administrator, City of Crisfield

jmerritt@crisfieldcityhall.com



9.1. One-Pagers

9.1.1 BINGO

This BINGO card was used as an icebreaker at the beginning of session 1 for the Crisfield Resilience Academy. It allowed participants to talk with one another informally, learn about each other, and connect prior to kicking off the Academy programming.

Instructions: *Welcome to the Crisfield Resilience Academy! As you enter the room, walk around and get to know your fellow participants by filling in their names in squares that match their experiences and hobbies. Use each of your fellow participants only one time. Try to get BINGO with five squares completed either vertically, horizontally, or diagonally. You can also ask facilitators or other folks in the room!*

B	I	N	G	O
Works from home	Plays a musical instrument	Works on water quality	Has gone camping	Has a pet reptile
Has kayaked around Janes Island	Has a birthday this month	Has lived in Crisfield for 10+ years	Born and raised in Crisfield	Runner
Speaks another language	Has traveled outside the U.S.	FREE SPACE!	Knows how to clean a fish	Works on the coast/water
Walked, biked, or scootered here	Is a researcher or scientist	Was born outside the US	Has worked in Crisfield for less than 3 years	Traveled <10 minutes to this meeting
Was born in the old McCready Hospital	Is a vegetarian	Watched a Rocket Launch	Watched the Crab Races	Has visited 5+ States

9.1.2. Invitation to the Celebration

**You'RE INVITED!**

TO THE CRISFIELD RESILIENCE ACADEMY CELEBRATION

FEATURING PRESENTATIONS FROM LOCAL CRISFIELDERS

SATURDAY, APRIL 26

CRISFIELD PUBLIC LIBRARY

10:00AM - 12:15PM



REFRESHMENTS AND COFFEE WILL BE PROVIDED

FOR MORE INFORMATION: [HTTPS://WWW.EPA.GOV/GCX/CRISFIELD-RESILIENCE-ACADEMY](https://www.epa.gov/gcx/crisfield-resilience-academy)



TOC

Intro

Resilience

Drainage

Flood
warning

NBS

Capacity

Careers

Action
Planning

Comms

Closing

9.1.3. Recruitment Flyer



The flyer is a blue and white graphic with a crab icon in a circle on the left. The text is centered and uses various font sizes and weights. A banner at the bottom contains a QR code and a URL. The right side of the flyer features a vertical navigation bar with colored tabs.

THE U.S. ENVIRONMENTAL PROTECTION AGENCY
INVITES YOU TO APPLY FOR THE

CRISFIELD RESILIENCE ACADEMY

APPLICATIONS NOW OPEN FOR CRISFIELD-AREA RESIDENTS INTERESTED IN
THIS ENVIRONMENTAL EDUCATION OPPORTUNITY

ELIGIBILITY & REQUIREMENTS

- »»»» RESIDENT OF CRISFIELD, MARYLAND OR SURROUNDING AREA
- »»»» AGED 15-99+ YEARS OLD
- »»»» HAVE AN INTEREST IN THE ENVIRONMENT
- »»»» CAN BE IN-PERSON FOR TRAINING SESSIONS IN CRISFIELD
 - > SIX SATURDAY SESSIONS IN SPRING 2025
 - > CRISFIELD SESSIONS APPROXIMATELY 2 HOURS EACH
 - > INCLUDING COMPLETION OF SURVEYS

ACADEMY MEMBERS WILL BE ELIGIBLE TO RECEIVE A STIPEND
OF UP TO \$300 FOR PARTICIPATION IN THE ACTIVITIES ABOVE

Questions? Contact Us

hartleyjenna@epa.gov | +1 919-541-2154 beacon@salisbury.edu | +1 410-546-6001



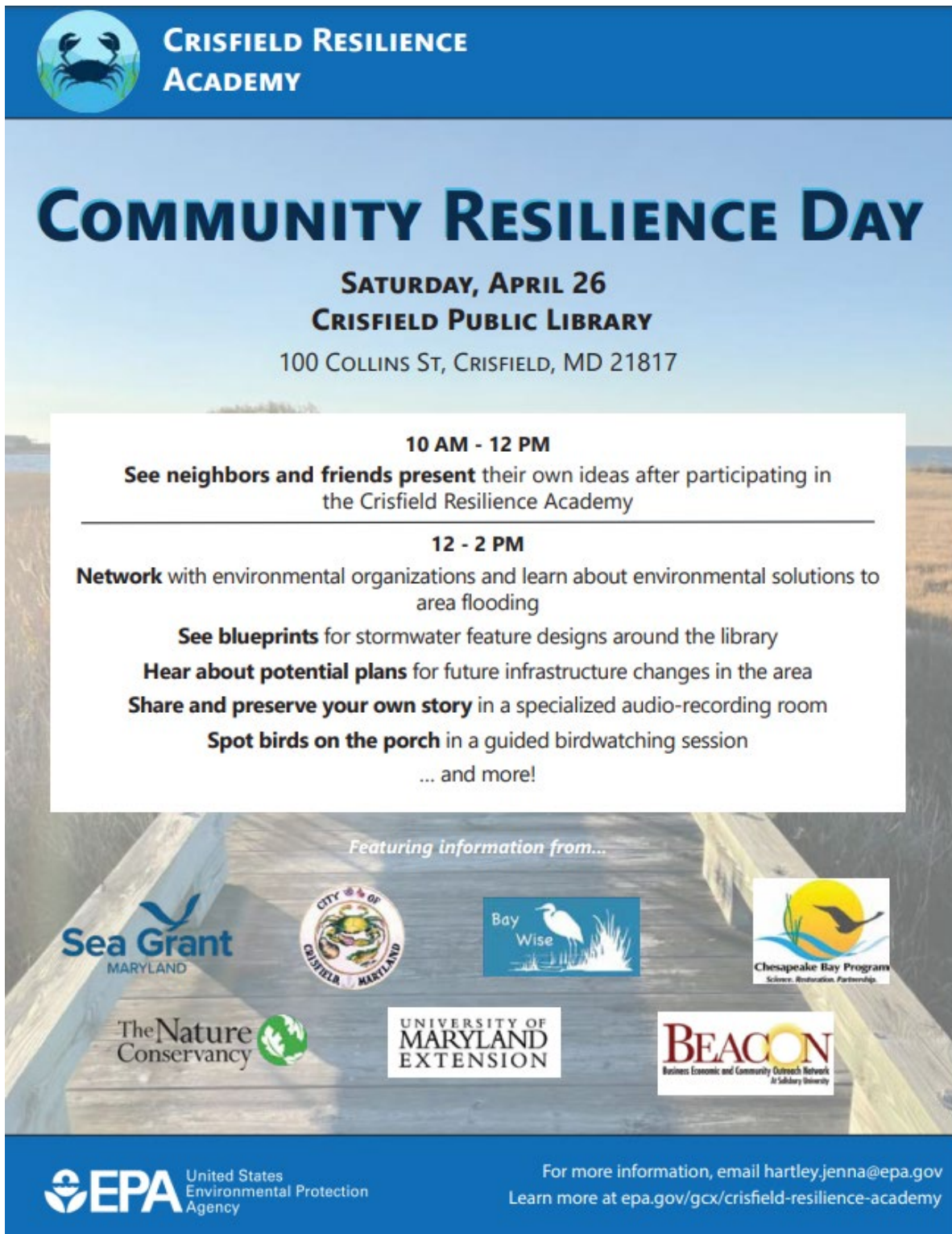
Please go to
<https://www.epa.gov/gcx/crisfield-resilience-academy>
to learn more and to apply today!



THE CRISFIELD RESILIENCE ACADEMY IS HOSTED BY THE INTEGRATED CLIMATE SCIENCES DIVISION (ICSD), WHICH IS IN THE CENTER FOR PUBLIC HEALTH & ENVIRONMENTAL ASSESSMENT (CPHEA) WITHIN THE OFFICE OF RESEARCH & DEVELOPMENT (ORD) AT THE U.S. ENVIRONMENTAL PROTECTION AGENCY

TOC
Intro
Resilience
Drainage
Flood warning
NBS
Capacity
Careers
Action Planning
Comms
Closing

9.1.4. Community Resilience Day Flyer



The flyer is for the Crisfield Resilience Academy's Community Resilience Day. It features a blue header with the academy's logo (a crab) and name. The main title 'COMMUNITY RESILIENCE DAY' is in large blue letters. Below it, the date 'SATURDAY, APRIL 26' and location 'CRISFIELD PUBLIC LIBRARY' and '100 COLLINS ST, CRISFIELD, MD 21817' are listed. A white box contains the event schedule: 10 AM - 12 PM for presentations and 12 - 2 PM for networking and various activities like blueprints, plans, audio-recording, and birdwatching. The bottom section, titled 'Featuring information from...', displays logos for Sea Grant Maryland, the City of Crisfield, Bay Wise, Chesapeake Bay Program, The Nature Conservancy, University of Maryland Extension, and BEACON. The footer includes the EPA logo and contact information.

CRISFIELD RESILIENCE ACADEMY

COMMUNITY RESILIENCE DAY

SATURDAY, APRIL 26
CRISFIELD PUBLIC LIBRARY
100 COLLINS ST, CRISFIELD, MD 21817

10 AM - 12 PM
See neighbors and friends present their own ideas after participating in the Crisfield Resilience Academy

12 - 2 PM
Network with environmental organizations and learn about environmental solutions to area flooding

- See blueprints** for stormwater feature designs around the library
- Hear about potential plans** for future infrastructure changes in the area
- Share and preserve your own story** in a specialized audio-recording room
- Spot birds on the porch** in a guided birdwatching session
- ... and more!

Featuring information from...

Logos featured include: Sea Grant MARYLAND, CITY OF CRISFIELD MARYLAND, Bay Wise, Chesapeake Bay Program, The Nature Conservancy, UNIVERSITY OF MARYLAND EXTENSION, and BEACON Business Economic and Community Outreach Network at Salisbury University.

EPA United States Environmental Protection Agency

For more information, email hartley.jenna@epa.gov
Learn more at epa.gov/gcx/crisfield-resilience-academy

9.1.5. SAV Watchers Training Recruitment Flyer



The flyer is a recruitment tool for the SAV Watchers Training program. It features a header with logos for the EPA, Crisfield Seagrass Academy, SAV Watchers, Maryland Department of Natural Resources, and the Chesapeake Bay Program. The main title is "SAV WATCHERS TRAINING" in large blue letters, preceded by the text "Join us for a FREE". The event details are listed below: "June 17, 2025, 9 AM - 5 PM" at "Janes Island State Park, 26280 Alfred J Lawson Drive, Crisfield, MD 21817". A light blue box contains the text: "Kayaks provided; please bring a lunch! Certificates and Continuing Education Units available Invite friends, teachers, neighbors, students - anyone is welcome!". A circular photograph shows several people kayaking on a body of water with submerged aquatic vegetation. To the right of the photo is a bulleted list of activities: "Learn about submerged aquatic vegetation (SAV) and the SAV Watchers program", "Identify SAV in Crisfield and surrounding areas", "Provide data that will help scientists and managers protect the Bay", and "...and more!". The bottom of the flyer has a blue background with white illustrations of fish and seaweed. It includes the text "SIGN UP AT" and the website "WWW.CRISFIELD SAVWATCHERS.EVENTBRITE.COM", along with a QR code.

EPA **CRISFIELD SEAGRASS ACADEMY** **SAV WATCHERS** **MARYLAND DEPARTMENT OF NATURAL RESOURCES** **Chesapeake Bay Program**
Solves. Activates. Fortifies.

Join us for a **FREE**

SAV WATCHERS TRAINING

June 17, 2025, 9 AM - 5 PM
Janes Island State Park
26280 Alfred J Lawson Drive
Crisfield, MD 21817

Kayaks provided; please bring a lunch!
Certificates and Continuing Education Units available
Invite friends, teachers, neighbors, students - anyone is welcome!

- Learn about submerged aquatic vegetation (SAV) and the SAV Watchers program
- Identify SAV in Crisfield and surrounding areas
- Provide data that will help scientists and managers protect the Bay
- ...and more!

SIGN UP AT
WWW.CRISFIELD SAVWATCHERS.EVENTBRITE.COM



"We are beyond excited to see the Chesapeake Bay SAV Watchers expand its reach. Jenna and her team have provided a great opportunity for our program to gain representation in areas where we currently don't have any SAV Watchers data. We are highly represented in locations where there are higher population densities - like the mid- to upper eastern and western shores. This effort will help us extend our efforts further south to Crisfield, which is such an important area. We look forward to seeing the type of impact this program has on the local community and to connect with new faces through our mutual interest in protecting the Bay and its SAV." - Kaitlin Scowen, Maryland DNR, SAV Watchers Training Program

9.2. Crisfield Stories

These are real accounts of stories and perspectives shared by Crisfield community members during the course of the Resilience Academy. These stories were used to share with EPA researchers working on the back-end of the project (e.g., the geospatial scientists developing maps for Crisfield, the engineers and ecologists researching economic outcomes of NBS in Crisfield, and others) to better illustrate the lived experiences of Crisfield Resilience Academy participants and their fellow citizens that they were working to better serve with their research products.

Names, ages, and identifiers have been changed to de-identify the speakers.

Lynn, 79, Smith Island

Your name is Lynn. You are 79 years old, and you were born in Smith Island and worked there for 35 years. You know so much about the area and have watched it change for a long time, including watching businesses close that you used to go to as a kid. The increase in flooding is upsetting to you, and you don't even really like Crisfield anymore because of how much you've watched it deteriorate since your childhood.

Keith, 49, Somerset County farmer

Your name is Keith. You are originally from Baltimore, but you moved just north of Crisfield in 2005 for the slower-paced lifestyle and to help run a farm owned by your cousins in Crisfield. The farm grows tomatoes, peppers, and green beans and has been owned and run by family for multiple generations. Things were going pretty well from 2005-2010, but in the last 15 years, some of your crops have been dying due to saltwater intrusion (reports on the levels of salinization on farmlands estimate that, even using conservative estimates, acreage has doubled since 2011-2013)¹.

Someone once asked you how you felt about the future of the City of Crisfield and you replied, "if it falls off the face of the Earth, it would be a good thing." Your cousins thought this was a bit harsh, knowing that your disdain for Crisfield is that it is too urban, and you moved here from Baltimore.

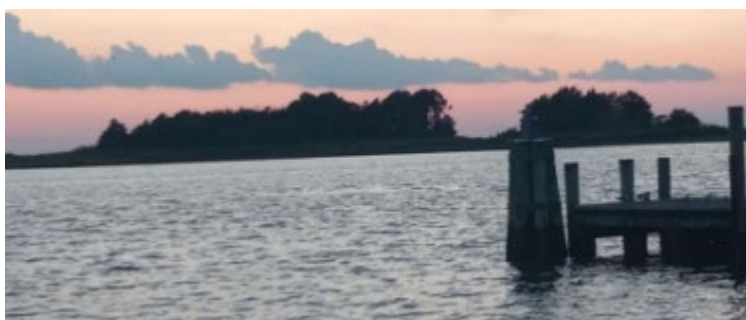
Mondal, P., Walter, M., Miller, J. et al. The spread and cost of saltwater intrusion in the US Mid-Atlantic. *Nature Sustainability* 6, 1352-1362, 2023.

Benton, 66, Pocomoke City resident

Your mother is a resident at the nursing facility in Crisfield. When flooding occurs in Crisfield, the nursing facility sometimes loses power, and you worry about your mom. You feel so sad and helpless to be separated from your mom when this happens. Last time it flooded, the power went out for a few days, and you got so worried that you ended up wading through flood waters to see her.

Buddy, 68, fishing charter

Your name is Buddy, and you work on a fishing charter. You have lived in the area for 48 years. As years have gone on, you have noticed that there are fewer and fewer fish. You suspect that it's because there is not enough seagrass to sustain the crabs and fish, and you want the City to work towards replenishing the seagrasses. You are in favor of the city planting/building oyster beds in the area and are excited that the Crisfield Resilience Academy is taking place. You can't make it to the Academy sessions because of the fishing charter taking place on Saturdays, but you're supportive of the program.

Jessica, 58, Crisfield High School teacher

Your name is Jessica, and you showed this picture that you took of the sunset last weekend to one of your colleagues on your lunch break. They recognized the location and told you that in the early 1900s, people who died in the area were taken to the island to be buried. Over the years, erosion has exposed caskets and supposedly, families go back over to re-bury their ancestors. This is not the first kind of story you've heard like this, and you're not sure if it's an "urban legend" or real. Your colleague also told you that as one side of the island has eroded away, Crisfield has been exposed to southwest winds and waves, increasing to the erosion on the Crisfield waterline.

Alex, 45, Security Guard

"The majority of people would probably give me the shirt off their back if I ever needed it, and vice versa. You know, Crisfield's always a friendly and communicative town, and that to me has always been the biggest plus of living in Crisfield. If you looked at Zillow at the city of Crisfield, houses were for sale everywhere. It was actually very good for a person like me who was looking at buying a house before COVID. Because you had a lot of these older homes that the elderly people were passing away and the children were just dumping because they didn't want to be responsible for anymore. Now a lot of people are coming, and prices are going up, and lower-income families are probably going to have to move outside of the town. But we love it here and couldn't imagine living anywhere else."

9.3. Promotion

9.3.1 Community Resilience Day Press Release

Crisfield Resilience Academy Presents Community Resilience Day

Contact: John Hickman, Director, Salisbury University's [BEACON](#) (Business Economic & Community Outreach Network), jnhickman@salisbury.edu

Crisfield, MD – On April 26, the [Crisfield Resilience Academy](#) is inviting the public to an interactive event at the Crisfield Library to learn about efforts to build resilience to coastal flooding and protect natural resources in the area.

The City of Crisfield recently partnered with researchers at the U.S. Environmental Protection Agency's Office of Research and Development to explore [coastal resilience solutions](#). [These solutions](#), such as marsh restoration and living breakwaters, can help protect Crisfield from the impacts of storms and benefit local fisheries, residences, drinking water, tourism, and business.

Through that partnership, locals from Somerset County have been participating in an educational training opportunity called the [Crisfield Resilience Academy](#). The Academy began offering sessions in Fall 2024 for community members to discuss their experiences as residents, learn from local experts, and work together to propose practical solutions to the coastal flooding that the community experiences.

The Crisfield Resilience Academy will present their findings to the public and bring together around 15 local, environmentally related organizations for a Community Resilience Day at the library on April 26. They will present from 10 a.m. – 12 p.m. and the community networking fair will run until 2 p.m.

Activities include:

- [Maryland Sea Grant](#) will lead a tour of green infrastructure around the Crisfield library to show how innovative technology and landscaping helps manage storm water and protect the community from flooding;
- University of Maryland's extension office and the [Master Gardener Bay Wise program](#) will have information about plants and landscaping that thrive in the Eastern Shore's unique environment;
- [The Nature Conservancy](#) will be available to discuss upcoming environmental internship and career opportunities;
- The Mid-Shore Chapter of the [Izaak Walton League](#) will have hands-on kits to demonstrate opportunities to engage with local water quality-focused citizen science projects;
- Representatives from the [City of Crisfield](#) will be on hand to answer questions about ditch maintenance and discuss upcoming area clean-up and beautification days;
- Salisbury University's [Business Economic & Community Outreach Network \(BEACON\)](#) will be collecting and preserving Crisfielders' stories in the library study room;
- Scientists from [TetraTech](#) will lead an interactive marsh birding experience on the library porch;
- ... and more!

All are welcome to this family-friendly event. For further questions or more information, please contact BEACON's John Hickman at jnhickman@salisbury.edu or EPA's Jenna Hartley at hartley.jenna@epa.gov. Hope to see you there!

9.3.2 State Support Story

Draft – in review



www.epa.gov/research

science in ACTION

Crisfield State Support Story

Partner: City of Crisfield, Maryland Park Program, Chesapeake Bay Program

Challenge: Environmental issues such as flooding, storm surges and erosion impacting Crisfield's seafood, and recreation and tourism industries

Resource: Educational training sessions and capacity building to implement solutions from the Chesapeake Bay Solutions-Driven Research Project.

Project Period: 2022 – Present



“With two years of sustained presence and hands-on support, EPA’s Office of Research and Development has become a trusted partner in Crisfield, a rural coastal town facing serious flood risks. Their collaboration has helped our community explore nature-based solutions like marsh restoration and living shorelines. Through the Crisfield Resilience Academy, they’ve made complex science understandable and actionable, ensuring both the City of Crisfield and the community have the knowledge to drive a stronger, locally-led resilience plan. Thanks to EPA ORD’s support, we’re not just planning for the future—we’re building it.”

- Jen Merritt, City of Crisfield Grant Administrator

Since the founding of Crisfield, Maryland on the Chesapeake Bay, the environment has been an important part of community life, economy and culture. As storm surges, flooding and erosion increase in frequency and intensity, the City of Crisfield and residents are looking for cost-effective solutions to protect against infrastructure damage and preserve their properties and culture as well as their seafood, recreation and tourism industries.

TOC

Intro

Resilience

Drainage

Flood
warning

NBS

Capacity

Careers

Action
Planning

Comms

Closing



www.epa.gov/research

science in ACTION

In 2022, EPA researchers initiated the [Chesapeake Bay Solutions-Driven Research Project](#) to explore the potential for natural infrastructure projects to reduce damage from flooding in Crisfield. They identified nature-based strategies such as marsh restoration, living breakwaters and artificial oyster reefs to protect against storm surges and flooding. These solutions also come with a host of other benefits to Crisfield's tourism and recreation industries, which are vital to the community's culture and economic sustainability. Implementing these solutions requires extensive community engagement and collaboration with local, state and federal agency partners to maximize local benefit and ensure that all explored solutions align with local goals.

In response to this need and at the direct request of local officials, the Crisfield Resilience Academy began offering sessions in Fall 2024 for community members to discuss their experiences as residents and learn from local experts about topics such as coastal flooding, ditch drainage systems, and flood warning systems to alert community members of potential hazards. The City of Crisfield recommended these topics in response to community interest. Using a process called co-production, the Crisfield Resilience Academy worked with local representatives to integrate scientific information with other forms of knowledge such as local knowledge. EPA researchers and other partners organized and strengthened the Academy by providing interactive activities, local expertise, and hosting the in-person Academy sessions in Crisfield. Local partners included the Maryland Department of Natural Resources, Maryland State Parks, Maryland SeaGrant, the National Weather Service, multiple universities in the area, and the Chesapeake Bay Program Office.

The Crisfield Resilience Academy and its partners provide a vital connection to the community. By working with local, state, and federal agency partners, EPA can ensure that their research is meeting the needs of Crisfield residents and that they have the tools to implement the most cost-effective strategies. If implemented correctly, nature-based strategies have the capacity to mitigate storm surges and flooding while supporting the culture and industries of Crisfield. As the Crisfield Resilience Academy participants, the EPA, and all associated partners continue to co-produce ideas and research these solutions, EPA researchers post research project updates to ensure transparency and public benefit. This research co-production and education framework is an effective resilience plan for rural, coastal communities across the United States prone to flooding.

TOC

Intro

Resilience

Drainage

Flood
warning

NBS

Capacity

Careers

Action
Planning

Comms

Closing

9.5. Correspondence

9.5.1 Use of FEMA Materials

Collaborative partnerships with other federal agencies, local experts, and Maryland-based organizations also made this work possible and enhanced the cooperative federalism of the work. For example, correspondences below show the type of exchanges that took place behind-the-scenes of the Academy to make everything possible.

Jazmine,

Thank you so much for tracking this down for us – really grateful for your time and energy. I'll be back in touch when we get materials finalized so we can get a final sign-off on using the materials for this purpose.

Thanks again for your help – more soon,
Jenna

--

Hi Jenna, following up on this: you are welcome to use the images and text as you propose for the Adaptation in Crisfield activity sheet. We'd normally ask that there be a citation to "fema.gov" and a link back as provided at the bottom of [our website use policy](#), but the images already have the DHS/FEMA seal on them, so we don't need such attribution in EPA's proposed activity material. I'm also including a snapshot of the privacy statement portion I'm referencing for awareness.

Reuse and Copyright

Most material on FEMA.gov is free of copyright and may be copied and distributed without permission. We are flattered that you want to share. Citation of FEMA.gov and a link back is much appreciated.

We sometimes use photos or graphics that we licensed or that are restricted. Check to see if there is a copyright or photo credit. **You need to request permission from the original source to use this material.** Read more about [copyright and other rights pertaining to U.S. government works](#).

Learn more about [DHS Intellectual Property usage](#), including using the official seal and other trade or certification marks for DHS programs.

Love that you're using the materials and finding value in our work! Let me know if this is sufficient for what you're looking for and/or if you have any additional questions/needs.

Thank you,
Jazmine Cofer

Thank you so much for this! And for what it's worth, the materials are very very draft-form. If we end up using them or publishing them beyond use in this one session of the Academy, we'll be sure to format them more professionally and follow-up again after that. 😊

Thank you so much for looking into this for me – and happy Friday,
Jenna

--

Double response 😊. I've tracked down the process and should have an answer for you sometime tomorrow! Hopefully that works with your timeline.

Thank you,
Jazmine

--

Hi Jenna—no problem! Let me see what I can track down. This week might be a little tight, but I will try to get you at least a contact if I can't get an answer.

Thank you,
Jazmine Cofer

--

Hi Jazmine,

I hope you're doing well in a time of so much loss and pain associated with hurricanes across the Southeast. Especially hoping that you and all of yours are safe and sheltered.

You're probably not the right person for this request, but **I am hoping to find out if I am allowed to use some FEMA products for an academy that I am running** called the [Crisfield Resilience Academy](#).

The session for these materials focuses on nature-based solutions, and I used [this FEMA site](#) to create “notecards” (attached) that participants will look at in small groups and discuss within their local context. **I want to make sure that using FEMA materials in this way is allowed, and/or get permission from someone to use them in this context. Do you know who might be able to help me answer those questions?**

Again, I am so sorry to ask this during a time when I know FEMA is responding to urgent emergencies, but thank you for the consideration.

Hope to see you again soon as we finish up the Climate Literacy Guide Skills table,
Jenna

9.5.2. Follow-up: Crisfield Resilience Academy – Session 1, Spring 2025

Hello, all!

Thank you so much for joining us at Session 1 of the [Crisfield Resilience Academy](#). We are looking forward to seeing you all again in a few weekends (**Sat., Feb. 22, 10am-12:15pm**) for Session 2. During Session 2, we will be learning about Crisfield's ditch drainage system, stormwater infrastructure, and flood warning systems.

Session 2 – Crisfield's ditch drainage system and flood warning systems

Session 2 will again be held at the [Crisfield Public Library](#). We'll have a few guests, including Emily Eisenhower from the EPA and some speakers from Crisfield and Somerset County. If you have any questions day-of, email John jnhickman@salisbury.edu or call Jenna (919) 541-2154.

Follow-up information from Session 1

- **Session Handouts/Copies of the Case Studies:** If you're interested in reading any of the other groups' case studies from Session 1, those are attached. You can also read about them at the following links:
 - Infrastructure in Norfolk, VA: <https://bit.ly/norfolkresilience>
 - Seagrasses in Spain: <https://bit.ly/spainresilience>
 - Oyster Reefs in the Netherlands: <https://bit.ly/netherlandsresilience>
 - Living Shorelines in Florida: <https://bit.ly/pensacolaresilience> (I am working on tracking down additional information for this one; I found [this website](#) and have contacted [Zach Schang](#) but I haven't heard back from him yet)
- **Community-Building Handout:** If you haven't yet completed the community-building handout, please try to do that between now and the next session. An extra copy is attached if you need it. We look forward to hearing the community stories of your families or close friends.
- **Kyle Buck's slides:** As requested, Kyle Buck's slides on "What does resilience mean for Crisfield?" are attached.
- **Crisfield-specific topics and actions:** A few of you mentioned on your Session 1 evaluation that you're interested in learning more specifics about what Crisfield is doing for flooding. You'll hear more about that in the upcoming session, but you can also find some of that information online here: <https://www.crisfieldfloodmitigation.com/>
- **Film screening opportunity:** *On Water's Edge* is a film that The Nature Conservancy co-produced with Modulation Studios about the City of Crisfield's relationship to the Chesapeake Bay. It was accepted to the upcoming [Ocean City Film Festival](#) (yay!) and will be screened on **Friday, March 7th from 3:00-4:45pm** as part of the "Maryland Life" Program ([festival program linked here](#)). **The Nature Conservancy has some free tickets (!)** available for you. Email Liz if you're interested (e.r.vandolah@tnc.org; cc:ed). If you can't make the film festival, the film will also be screened on Maryland Public Television as part of their [Chesapeake Bay Week](#), April 20-26.

I know I already said it at the end of Session 1, but thanks for your enthusiasm for this work. I commend you for really hitting the ground running last time – wow. It was inspiring to be with you all, hear about your passion for your community, and listen to your ideas for Crisfield's future. We're here to support you, and we're excited to move forward together (hopefully we'll be able to keep up with you!). 😊 As always, reach out anytime. See you on Feb. 22nd – stay safe, Jenna & the [Crisfield Resilience Academy](#) staff

9.5.3. See you tomorrow! Crisfield Resilience Academy – Session 1, Spring 2025

Hello, Crisfield Resilience Academy participants,

We look forward to seeing you tomorrow! We are so excited to have you join us through the Spring as we explore more about Crisfield's rich community and future resilience opportunities. Below are a few logistical details for tomorrow and the upcoming sessions.

Location: Crisfield Library, 100 Collins Street, Crisfield, MD 21817 – We will be meeting in the library conference room. Once you enter the library, take a left and walk all the way to the back of the library. Take a right into the conference room – that's where we'll be meeting.

Parking: Free parking on-site.

Time: 10:00 am - 12:15 pm

Food & Drink: A variety of beverages, including water, coffee (Keurig; mugs will be provided), sodas, and sparkling waters will be available. There is also an automated water dispenser at the library, so please feel free to bring your own water bottles. A few snack options will also be available.

Contact information: If you have any questions or concerns day-of, please email John (jnhickman@salisbury.edu) or call Jenna (919-541-2154). You can also call the library: (410) 968-0955 – someone usually arrives at or before 9am on Saturdays.

Pre-Survey: If you haven't yet, please complete [this pre-survey \(linked here\)](#) before tomorrow. Alternatively, if you do not plan to participate in this program, please email me as soon as possible (hartley.jenna@epa.gov) so that I can offer your spot to someone on the waiting list. If you need any type of accommodations or accessibility adjustments during the Academy sessions, please let us know.

Stipend information: For completion of all activities as listed above, you will be eligible for a stipend of up to \$300. Salisbury University's [BEACON \(Business Economic and Community Outreach Network\)](#) will be handling all stipend matters. You received the stipend paperwork in a previous email; please let me know if you did not receive that so that email. If you are emailing your stipend forms, you can send them to BEACON@salisbury.edu. You may also print your forms and bring them to the session. If you prefer to send the forms to us, but do not want to include your Social Security number, you may leave that blank and fill it in on the first day of the Academy.

On behalf of all the Crisfield Resilience Academy staff, we are so grateful for your interest in the program, and we look forward to seeing you tomorrow!

Jenna Hartley (U.S. EPA), John Hickman (Salisbury University's BEACON), & the [Crisfield Resilience Academy](#) staff

9.5.4. Follow-up: Crisfield Resilience Academy – Session 2: Economics & Careers, Spring 2025

Hello all and Happy Friday!

Hope everyone had a good week. A few quick things from the [Crisfield Resilience Academy](#).

1. **Somerset County Planning Board Meeting:** Did anyone attend? If so, how did it go? We'd love to hear.
2. **Make-up date:** We're working on the make-up date from the missed snow day and we found out that the library is available for a little bit longer on Saturday, April 5th. What do you think about combining Sessions 4 & 5 into one (slightly) longer session with a working lunch, running from approximately 10am-1:30pm? This would still count for both sessions 4 & 5. We would then have the final session on April 26th as initially planned. Please let me know by the end of the day Tuesday, 3/11 if you are unable to stay past 12:15pm on April 5th. If most folks can attend for the extended time (until about 1:30pm), I'll get the Agenda(s) finalized for that double-header session.
3. **Action Planning Meetings:** Mark your calendars! We'll be meeting from 1:30pm-3:30pm on March 22nd and April 26th to see some of your ideas and action plans come to life. More information on this coming soon.

As always, don't hesitate to reach out anytime with questions, and hope everyone has a great weekend,

Jenna, John, & the [Crisfield Resilience Academy](#) staff
hartley.jenna@epa.gov

Hi everyone,

Thanks so much for attending the second session of the [Crisfield Resilience Academy](#) this weekend. Thanks especially to our guest speakers: Carter, Danny, Shane, and William. Their email addresses are all cc'ed on this email if you would like to reach out to them directly with any follow-up questions.

Follow-up items from the session:

- **Community-Building Handout:** Please complete the community-building handout before the next session. A digital copy is attached if you need one.
- **Somerset County Planning Board Meeting:** If you're interested in attending this week's meeting that William mentioned, it is scheduled for March 6th at 5pm in the [Somerset County Commissioner's Meeting Room, 11916 Somerset Avenue, Room 111, Princess Anne, MD](#). The Session Agenda is [linked here](#). The Planning Commission meets regularly on the first Thursday of every month.
- **Green/Coastal Job Resources:**
 - o Professor Shane Hall spoke about the launch of the new [Green Futures program](#) at Salisbury University. Here is a link to some of the additional resources that he mentioned: <https://www.salisbury.edu/academic-offices/liberal-arts/environmental-studies/green-futures/green-job-resources.aspx>.
 - o Shane also provided the Maryland Conservation Careers Guide. It is a very robust resource, especially for those getting started in careers or considering career changes – [check it out here!](#)

Next Academy Session: Saturday, March 22 – Ditches & Flood Warning Maintenance

Our next session is in two weeks – same time, same location. It is the rescheduled session from the snow day, and we will discuss ditch maintenance and flood warning systems. We look forward to seeing you there.

Action Planning Meeting: Saturday, March 22 – 1:30pm-3:30pm

We hope you'll consider joining us for the action planning meeting in the afternoon on March 22nd! For that session, we will plan and strategize how to recruit folks to come to the education and outreach session (open to the public), tentatively scheduled for Saturday, April 26th. Have social media skills? Organizing skills? Ideas for how to make the event exciting for folks who attend? Please come share your skills with everyone for this first collection action event!

As always, reach out to us anytime with questions or suggestions, Jenna, John, & the [Crisfield Resilience Academy](#) staff

9.5.5. See you tomorrow! Crisfield Resilience Academy – Session 2, Spring 2025

Hello, Crisfield Resilience Academy participants and alum,

After a snow break last week, we are back on for tomorrow! Bring back your Community Building Handout (last-minute copy attached if you need one); we will discuss those briefly at the top of the meeting.

Tomorrow we'll be covering **Economics & Careers in Coastal Resilience** with quite a few local guest speakers (thanks for joining us, Danny, Shane, & William!). **For Academy alumni:** this is a new session that we didn't have last Fall; feel free to join if it is of interest to you!

We will also discuss potential rescheduling dates for the final session due to last week's snow cancellation. Ahead of the session tomorrow, check your availability for *Saturday, May 3rd (at Tawes TidalHealth)* or *Saturday, May 17th (at the library)*. We'll see if we can work together tomorrow to pick a reschedule date that works for the most folks. 😊

Location: Crisfield Library, 100 Collins Street, Crisfield, MD 21817 – same conference room as last time. Remember, the temperature in the room can vary a lot – we recommend dressing in layers.

Time: 10:00 am - 12:15 pm

Food & Drink: A variety of beverages, including water, coffee (Keurig; mugs will be provided), sodas, and sparkling waters will be available. Please bring a water bottle. A few snack options will also be available.

Contact information: If you have any questions or concerns day-of, please email John (jnhickman@salisbury.edu) or call Jenna (919-541-2154). You can also call the library: (410) 968-0955 – someone usually arrives at or before 9am on Saturdays.

Pre-Survey: If you haven't yet, please complete [this pre-survey \(linked here\)](#) before tomorrow. Alternatively, if you have decided to no longer participate in this program, please email me to let me know (hartley.jenna@epa.gov). If you need any type of accommodations or accessibility adjustments during the Academy sessions, let us know.

On behalf of all the Crisfield Resilience Academy staff, we are so grateful for your interest in the program, and we look forward to seeing you tomorrow!

Jenna Hartley (U.S. EPA), John Hickman (Salisbury University's BEACON), & the [Crisfield Resilience Academy](#) staff

9.5.6. Follow-up: Crisfield Resilience Academy Session 3, Spring 2025

Hi everyone,

Thanks so much for attending the third session of the [Crisfield Resilience Academy](#) this weekend – wow – what a jam-packed session! We learned so much from our guest speakers (Emily, Eric, & Brian), and we hope you did, too. The email addresses of our guest speakers are all cc'ed on this email if you would like to reach out to them directly with any follow-up questions.

Follow-up items from the session (buckle up, there are LOTS this time! 😊):

- **Community-Building Handout:** Please complete the community-building handout before the next session. A digital copy is attached if you need one.
 - Be sure to check out these local flood warning tools informational pages:
 - Crisfield CodeRED page: <https://www.crisfieldfloodmitigation.com/codered>
 - Somerset County informational page: <https://www.somerset911.org/>
 - If you aren't already signed up, sign-up for **CodeRED** alerts.
 - Crisfield sign-up link: <https://accountportal.onsolve.net/crisfieldmd>
 - Somerset County sign-up link: <https://public.coderedweb.com/CNE/en-US/BF949F78FDDF>
- **Maps, maps, and more maps, oh my!**
 - [Crisfield Flood Mitigation website](#): Lots of great Crisfield-specific information on [this site](#), including the ditch maps that the panelists mentioned.
 - [NOAA Sea Level Rise Viewer](#): Emily gave a quick demo of the [mapping simulator](#) from NOAA. A Crisfield-specific link is [here](#).
 - [Eastern Shore Regional GIS Cooperative](#): this is another great resource for maps of the area.
- **Additional resources from the session:**
 - [EPA CRWU program \(Creating Resilient Water Utilities\)](#): <https://www.epa.gov/crwu> - this is the program that Emily mentioned. You can even request free risk assessment technical assistance [here](#).
 - [1939 paper \(W.C. Lowdermilk\)](#): Link to the paper that Eric mentioned: "[Conquest of the land through 7,000 years](#)"
 - [Don't Mess With Texas!!](#) Since 1986 *Don't Mess with Texas* has educated Texans in litter prevention and has been endorsed by many Texas celebrities. Learn about the history of the campaign [here](#), and check out the [commercials here](#) or below when you need a little laugh.
 - [Ethan Hawke \(2023\)](#)
 - [Joe Jonas \(2022\)](#)
 - [Trashball \(2007\)](#)
 - [Willie Nelson \(1989\)](#)
 - Links re: ideas for the Crisfield High Junior Class Service-Learning Project – yippee! Keep us posted on this, Crabbers Class of 2026!
 - [Project Clean Stream](#), hosted by the Alliance for the Chesapeake Bay: Information on [how to lead a clean-up](#) linked [here](#)
 - [Ocean Conservancy, International Coastal Cleanup](#)
 - [Closest existing cleanup](#), [Assateague Coastal Trust](#)
 - [Maryland Adopt-a-Highway information](#)

Next session – April 5th, 10am-1:30pm

We will make up the snow-date session on April 5th with a double-header, combo session that will cover both Session 4 (Nature-Based Solutions) and Session 5 (Community Capacity Building). We're really looking forward to this one – [Skip Stiles](#) (Norfolk, Wetlands Watch) and [Kayle Krieg](#) (MD SeaGrant) will be joining us. If you attend for both sessions/the entire block (10am-1:30pm), you will be eligible for two session stipend payments.

Celebration & Graduation – April 26th!

- We're so excited to celebrate you and hear you present on April 26th! Please feel free to invite any friends, family, neighbors, coaches, and teachers (digital invite attached; paper copies in your folders).
 - The Academy presentation portion will run from 10am-11:30am. Then we will have graduation, cake, and a networking session with around 15 local environmentally-related organizations until 2pm. 😊 Please feel free to leave at 12:15pm or stay as long as you'd like. Anyone is welcome from 10am-2pm – spread the word!
 - Organizations in attendance for the networking/info fair:
 - Crisfield Public Library, Wicomico 4H, The Nature Conservancy, Maryland SeaGrant, Somerset Master Gardeners, FEMA, the City of Crisfield, the [Deal Island Peninsula Partnership \(DIPP\)](#), **and more!**
 - More information about DIPP: The University of Maryland and the [Chesapeake Bay National Estuarine Research Reserve](#) in Maryland (CBNERR-MD) have partnered with the Deal Island Peninsula communities, researchers, and governmental agencies and non-governmental organizations at local, state, and regional levels to increase the resilience of local environments and communities to coastal flooding, erosion, and other social and environmental changes. Want to learn more? Someone will be coming to provide more information about DIPP to Academy participants on April 26th.
 - High schoolers – consider bringing a resume on 4/5 if you'll be out 4/26 for the prom. We can pass them along for you in case any of the local orgs have summer internships or job postings!

Thanks again for joining us this weekend and for your contributions.

As always, reach out to us anytime with questions, ideas, recommendations, or suggestions. We love hearing from you.

Jenna, John, & the [Crisfield Resilience Academy](#) staff

9.5.7. Crisfield Resilience Academy Session 2 - Sat., Sept. 28, 10am | Crisfield Public Library

Hello, all!

We are looking forward to seeing you all again this weekend (**Sat., Sept. 28, 10am-12:15pm**) for the second session of the [Crisfield Resilience Academy](#) as we close out September's [National Preparedness Month](#). This week we'll be learning about Crisfield's ditch drainage system and stormwater infrastructure.

Session 2 – Crisfield's ditch drainage system

As a reminder, Saturday's session will be held at the [Crisfield Public Library](#) but will also include a short walk outside. **Please wear shoes and clothes for the weather and a brief walk along a stone path.** If you would rather not walk, John will be bringing a golf cart for folks to ride. We'll have a few guests, including my colleagues from the EPA, Emily Eisenhower & Candace May, as well as some speakers from Crisfield, including Mayor Darlene Taylor! We're looking forward to seeing you. Again, if you have any questions day-of, email John: jnhickman@salisbury.edu.

Follow-up information from Session 1

- **Community-Building Handout:** If you haven't yet completed the community-building handout, please try to do that between now and Saturday. An extra copy is attached if you need it.
- **Kyle Buck's slides:** As requested, Kyle Buck's slides on "*What does resilience mean for Crisfield?*" are attached.
- **Norfolk:** As promised, I've been in touch with a few folks from the [Norfolk Chesterfield Heights project](#) (the case study we read in Session 1) and we're seeing if we can add them to the speakers line-up later in the Academy. In the meantime, the link above and [this video](#) do a nice job of covering what types of projects were implemented in Norfolk and how they're turning out. Check it out!
- **Crisfield-specific topics and actions:** A few of you mentioned on your Session 1 evaluation that you're interested in learning more specifics about what Crisfield is doing for flooding and after storm surges. You'll hear more about that this weekend, but you can also find some of that information online here: <https://www.crisfieldfloodmitigation.com/>

We've been thinking about you all a lot recently, especially with [the recent flooding](#) and [news of the school closures](#). If you don't already, [this is a good resource](#) for tracking the current and projected flooding levels at high tides. We'll also talk more about these topics this weekend. We hope that you, your loved ones, and your properties are all safe right now.

See you Saturday – stay safe,
Jenna & the Crisfield Resilience Academy staff

9.5.8. Crisfield Resilience Academy Session 4 - Sat., Oct. 19, 10am | Crisfield Public Library

Hello, all!

Thanks for another great session last weekend. Big thanks also to last session's speakers: Jeff Orrock (National Weather Service), Tim Canty (UMD), and Mike Maddox (UMD). Their emails are cc'ed if you'd like to reach out to them directly and their slides are attached.

We are looking forward to seeing you all again **NEXT** weekend (**Sat., Oct. 19, 10am-12:15pm**) for the fourth session of the [Crisfield Resilience Academy](#).

Session 4 – Nature-based solutions

As a reminder, the next session will feature nature-based solutions and will be held at the [Crisfield Public Library](#). If you have any questions day-of, email John: jnhickman@salisbury.edu.

Follow-up information from Session 3 / preparing for Session 4

- - City of Crisfield CodeRed (flyer attached);
<https://www.crisfieldfloodmitigation.com/codered>
 - Also, of interest is the main page:
<https://www.crisfieldfloodmitigation.com/>
 - Somerset County; <https://www.somerset911.org/> Click on the image "Sign up for Code Red"
 - Direct link: <https://public.coderedweb.com/CNE/en-US/BF949F78FDDE>
- **Your responses to: "What I want people to take away from the session"**
 - Resources for the future
 - Community responsibility
 - Community network
 - Hope/ideas
 - Emphasize public participation
- **Your responses to: "Ideas for the final session"**
 - Projections for future hopefulness!!
 - Climate change & sea-level-rise scientist; no name to suggest
 - Presenter: Dan Satterfield
 - Presentation to mayor; small group discussion
 - Bring back Bob and local technical personnel who are actually doing the work
- Community-Building Handout: If you haven't yet completed the community-building handout, please try to do that between now and October 19th. An extra copy is attached if you need it.
- Preparing for Session 4: Next session, we'll learn about nature-based solutions, with a talk from Frank Deuter of the Lower Shore Land Trust on the value of marshes and wetlands to Crisfield. We'll also hear from Skip Stiles, who worked on [the Norfolk project](#) that we heard about in Session 1. We'll plan for the final two sessions together – we look forward to learning about this more with and from you!

See you a week from Saturday,
Jenna & the Crisfield Resilience Academy staff

9.5.9. Crisfield Resilience Academy Session 5 - Sat., Nov. 2, 10am | Crisfield Public Library

Hello, Crisfield Resilience crew!

Thanks for another great session last weekend. Special thanks to last session's speakers: Frank Deuter ([Lower Shore Land Trust](#)) and Skip Stiles ([Wetlands Watch](#)). Their emails are included if you'd like to reach out to them directly. Frank's slides and the interview with Skip are both attached.

We are looking forward to seeing you all again **NEXT** weekend (**Sat., Nov. 2, 10am-12:15pm**) for the fifth session of the [Crisfield Resilience Academy](#).

Session 5 – Coastal Tourism and Recreation

As a reminder, the next session will focus on coastal tourism and recreation and will feature one of our own, **Brent Sullivan**! Yay! The session will be held at the [Crisfield Public Library](#). If you have any questions day-of, email John: jnhickman@salisbury.edu.

Follow-up information from Session 4 – as forewarned, there's a lot here, folks! 🤔 😊

- - Link to Lower Shore Land Trust website: <https://www.lowershorelandtrust.org/>
 - Link to the Rural Legacy Program within Maryland Department of Natural Resources: <https://dnr.maryland.gov/land/pages/rurallegacy/home.aspx>
- **Follow-up links from Skip's interview:**
 - Link to Crisfield Comprehensive Plan (2007 with 2010 amendments): https://planning.maryland.gov/Documents/OurWork/compplans/10_CMP_Crisfield.pdf
 - The maps from the activity, including the one from the Crisfield Comprehensive Plan, are attached ("S4_CRA_HANDOUTS").
 - Link to the Chesapeake Bay Landscape Professional Certification: <https://cblpro.org/>
 - Upcoming CBLP events linked here: <https://cblpro.org/events/>
 - Jenna is emailing the CBLP folks to ask about the certification course for young people that Skip and I discussed. More soon on that – fingers crossed!

- **Follow-up from discussions/activity:**

- Link to the FEMA NBS notecards used in the activity: <https://www.fema.gov/emergency-managers/risk-management/climate-resilience/nature-based-solutions/types> (notecards also attached; "S4_CRA_HANDOUTS").
- Link to the video that Reverend Emanuel mentioned, "**Eroding History**": <https://www.pbs.org/video/eroding-history-bgagqv/>
 - 26mins – "Eroding History tells the story of two Black communities on the Deal Island peninsula on the Eastern Shore of Maryland that are losing their land and their history due to the intersection of historical racism and modern climate changes." -PBS
 - We're discussing ways to potentially incorporate the **Eroding History** film into the second cohort of the Crisfield Resilience Academy – big thanks for sharing that, Reverend!
 - There's also another video in that PBS series, "[Chesapeake Bay Week](#)," that discusses what Frank spoke about last session (the impacts of saltwater intrusion on agriculture and forests) called "**Salted Earth**" if you're interested: <https://www.pbs.org/video/salted-earth-nb6qjb/>
- Coming soon/Jenna is tracking down answers for:
 - Permeable pavement's efficacy for tidal-flooding vs. rain-flooding
 - Oyster reef / offshore reef planting design strategies
 - EPA sweatshirts 😊

Preparing for Session 5:

- **Session 5 will highlight coastal tourism and recreation. We'll also continue our work on planning for Session 6.**

- We'll spend about an hour working on your designs for Session 6.
- **If you haven't yet put yourself into a group (see photo or list below), please email Jess before November 2nd to let her know which group you're interested in joining:** jxiacona@salisbury.edu. As a reminder, you don't have to present on Nov. 16th, but you will work towards some form of a presentation that could be given on your behalf if you don't want to present yourself. Jess and I will give you lots of support on this between Nov. 2nd and Nov. 16th. 😊
 - **Group 1: Volunteer Corps** – [redacted]
 - **Group 2: Talking Points/face-to-face** – [redacted]
 - **Group 3: Other** – [redacted]
 - **Other recommended groups: Infographic, city sign, video**
 - **Not yet assigned** – [redacted]

- Community-Building Handout: I didn't mention it at the end of Session 4 (whoopsies!), but there is a community-building handout for next session. If you haven't yet completed it, please try to do that between now and November 2nd. An extra copy is attached if you need it.
- Invite your friends and family to Session 6! Invitation attached.

I'm increasingly impressed by your enthusiasm and motivation for building a better Crisfield for future generations. Thanks for letting all of us do this work with you – we're looking forward to seeing how your ideas continue to evolve over the next few weeks.

Happy weekends to all and see you on November 2nd,
Jenna & the [Crisfield Resilience Academy](#) staff

10. Evaluation and Closing

10.0

[Graduation / Celebration](#)

10.1

[Evaluation](#)

10.2

[Acknowledgments](#)

10.3

[Crisfield Rising](#)



TOC

Intro

Resilience

Drainage

Flood
warning

NBS

Capacity

Careers

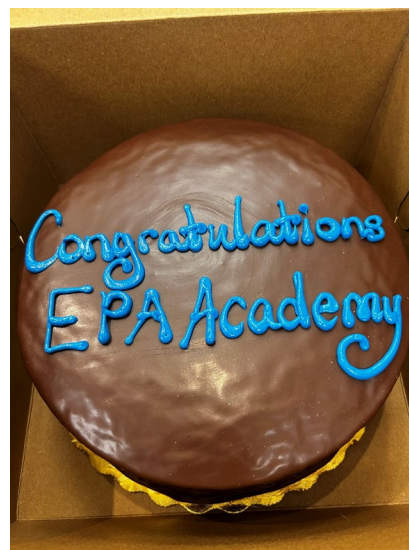
Action
Planning

Comms

Closing

10.0 Graduation / Celebration

At the end of each cohort, Academy participants had a graduation and celebration ceremony to honor their time and work, as well as provide them the opportunity to present their ideas about a resilient Crisfield to a wider audience. Academy participants were encouraged to invite their friends, family, and neighbors. They also had ongoing opportunities throughout the Academy to provide input into topics, ideas, and speakers to have at the final session. Participants presented their ideas and/or solutions to the audience, which included local decision-makers.



Participants in both cohorts created interactive presentations and shared with the group. All participants developed presentations and the [Crisfield Rising exhibit](#), which was on display at the Crisfield library April 26, 2025.

10.0.1 Crisfield Resilience Academy Certificate



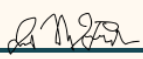
CRISFIELD RESILIENCE ACADEMY CERTIFICATE

AWARDED TO

[Name Here]

for completing the six sessions in the [Crisfield Resilience Academy](#), learning about flooding and adaptation and engaging with community members to strengthen community capacity.


 JENNA HARTLEY
 U.S. EPA - ORD
 Crisfield Resilience
 Academy Facilitator


 JOHN HICKMAN
 BEACON
 Crisfield Resilience
 Academy Facilitator


 WAYNE CASCIO
 U.S. EPA - ORD Center Director,
 Center for Public Health and
 Environmental Assessment



At the end of the Academy, participants received a certificate of completion for their time in the Academy. A blank certificate is shown here.

10.0.2 Agenda



Crisfield Resilience Academy Session 6: Celebration & Graduation

April 26, 2025

Today's Objectives

Participants will present ideas, engage in conversation, and facilitate ongoing community leadership around environmental solutions to flooding in Crisfield.

- 10:00 AM - 10:20 AM:** Welcome & Opening Activity: *Crisfield Rising*
Jenna Hartley, U.S. Environmental Protection Agency
- 10:20 AM - 10:30 AM:** Academy Participant Presentation #1 + Q&A
"Keep it Local"
- 10:30 AM - 10:40 AM:** Academy Participant Presentation #2 + Q&A
"Sister City Solutions"
- 10:40 AM - 10:50 AM:** Break (and cake!)
- 10:50 AM - 11:00 AM:** Academy Participant Presentation #3 + Q&A
"Oyster Reefs Rock"
- 11:00 AM - 11:10 AM:** Academy Participant Presentation #4 + Q&A
"title TBD"
- 11:10 AM - 11:20 AM:** "Working Towards a Resilient Future"
Darlene Taylor, *Crisfield Mayor*
- 11:20 AM - 11:30 AM:** Closing & Certificates
For current participants: Session Evaluation & Post-Survey
- 11:30 AM - 2:00 PM:** **Community Resilience Day!** Visit tables and booths! Tables in the conference room; oral histories in the study room

Informational tables include:

4H - Wicomico County | Chesapeake Bay Landscape Professionals | City of Crisfield | Crisfield Public Library | Izaak Walton League | Master Gardener Bay Wise Program | Maryland Sea Grant | On Water's Edge film | Southern & Northern Crisfield Flood Mitigation Projects | The Nature Conservancy | U.S. EPA





Congratulations, Crisfield Resilience Academy Participants!

"The primary takeaway from my experience as a participant in the *Crisfield Resiliency Academy* is that **Crisfield has an opportunity** that other at-risk communities do not have. Timely action with the support of the local community and federal funding can prepare this town to withstand the inevitable next storm event and the associated storm surge and flooding. The Academy has laid the groundwork for educating, organizing and empowering this community into action."

- Brent Sullivan, State Park Ranger, Supervisor Maryland Park Service, Maryland Department of Natural Resources, Janes Island State Park



Resources and Follow-up items

- For more information on the **Crisfield Resilience Academy**, please go to <https://www.epa.gov/gcx/crisfield-resilience-academy>
- For more information on the **City of Crisfield's flood mitigation efforts**, please go to <https://www.crisfieldfloodmitigation.com/>



10.1 Evaluation

10.1.1 Background

Pre- and post-surveys were administered to Academy participants before the first session and after the last session. Approximately 30 participants completed pre-surveys and post-surveys for the second cohort had not yet been collected at the time of writing (April 10, 2025), which were completed in-person on paper handouts and anonymized with unique codes, selected by and known only to survey-takers. The answers from the paper handouts were entered into Qualtrics exactly as participants wrote their answers. Participation in the survey was optional, and participants were not required to answer every question.

There were 11 short answer questions total, with questions in the following broad categories: knowledge, behavior, attitude, and capacity-building.

Pre- and post-survey qualitative data were analyzed using systematic coding methods such as deductive coding, thematic analysis, and content analysis in order to find themes and patterns.

There were 6 Likert questions (agreement scale), with 5-12 sections each. They measured participant's knowledge, attitudes, and behaviors before and after the Academy. Pre- and post-survey quantitative data were analyzed by assigning the agreement scale to a numeric scale and averaging participants answers before and after attending the academy. A change in average was categorized as substantial if the average increased at least one agreement level, or more than 1 on the numeric scale. These preliminary results capture the pre-survey responses from participants ($n = 33$) and pre-survey and post-survey comparisons ($n = 9$).

Time constraints outside of our control forced us to present these preliminary results instead of completed results from both cohorts.

10.1.2 Academy Feedback

Feedback on the Academy seemed to be generally positive. There were a few comments about wanting more hands-on experiences like field trips and volunteering opportunities. Speaking directly with government officials and employees was also a recommendation, one that the Academy facilitators worked to bring to fruition in the second cohort – participants from both cohorts were invited to present at subsequent Crisfield City Council meetings. Overall expectations seemed to have been met, while some participants felt there was too much information and not enough time.

10.1.3 Summary of Themes

The themes of flooding and community were the most present throughout the survey responses. Other common words in responses included resilience, alert systems/sensors, awareness, and ditches.

Flooding

The environmental issue that participants wrote most affected their lives was flooding. Participants expressed that flooding in the area has been getting worse. Many participants live in areas that regularly get flooded or have loved ones that live in areas that regularly get flooded. Participants indicated they have a stronger understanding of flood mitigation issues after their participation in the Academy. A desire for leadership to implement more flood mitigation projects was expressed.

Awareness

Participants agreed that they had a stronger knowledge of coastal issues and adaptation strategies after the Academy. Overall, there was an increased awareness of existing strategies in Crisfield, and ones yet to come.

Participants' views regarding the environment were either strengthened or changed to display an increase in environmental affect. Awareness of the need for action and technical knowledge were present in participants' changed views. This technical knowledge included an understanding of flood gates and plans to use flood sensor alert systems. Shortly after completion of the first cohort, the installation of the flood sensors in Crisfield was realized – Crisfield Resilience Academy connections with UMD researchers contributed to the installation of multiple sensors in Crisfield (see associated updates here: [video](#), [article](#)).

Community Resilience

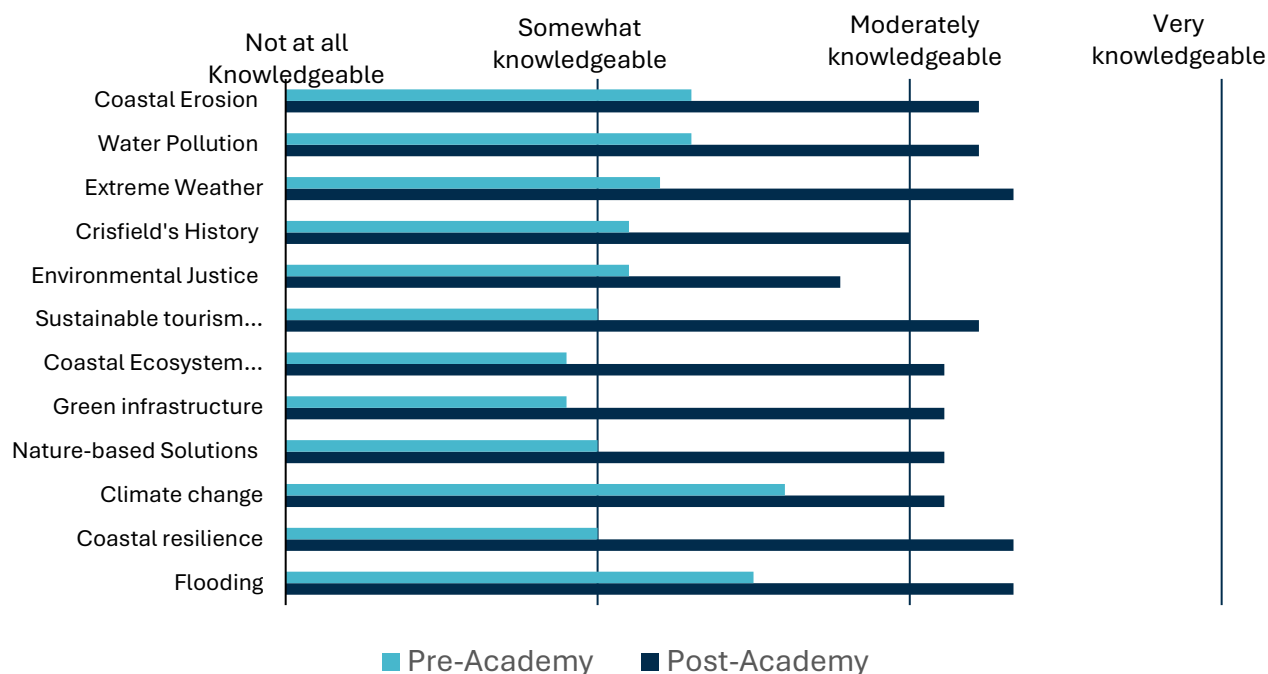
Most participants reported that they plan to incorporate what they have learned into their personal and professional lives, and plan to work with other community members to do so. These plans include enrolling in the flood alert system, talking to family and friends, volunteering, and spreading awareness in the community.

10.1.4 Individual Question Analysis

Knowledge

Question 1: Please indicate your level of knowledge or understanding on the following topics

All categories in this question showed some level of increase after the participants attended the academy



Question 2: What, if any, new skills, information, knowledge, organizations, activities, or understanding did you take away from this program?

The answers from Academy participants revolved around the themes of flooding, community resilience, and awareness. Flooding was mentioned in 5 out of 9 answers. New information the participants took away from the program induced knowledge of the flood sensors and alert system, Crisfield's mitigation efforts, and the important of community awareness and resiliency to mitigate flooding.

"Awareness of other coastal community resiliency projects. Some level of technical elements in flood gates and living seawalls and breakwaters."

"I learned about an organization that installs and monitors sensors that record tides and flooding events in real time."

Resources

Question 3: Have you learned about any resources that can help you deal with environmental issues that are affecting you or Crisfield? If so, please list them below.

The themes present in the answers from the Academy participants included flooding, community resilience, and awareness. Flood mitigation strategies that participants learned about included flood sensors, flood gates, containment vessels, green infrastructure, work FEMA has done, as well as work from many other organizations.

“Lower shore Land Trust. Use of flood sensors to provide real-time data/warning so local residents can act to prevent unnecessary property loss.”

“Army Corp[s] of Engineers; Lower Shore Land Trust; Chesapeake Service Corp; FEMA; EPA; Youth Program (75 hours of Community Service); Somerset County Solid Waste, Drainage, and Maintenance Departments”

“Flood mitigation is a community concern. We have people who HAVE organizational skills to share”

Environmental Issues

Pre-Academy Question: Are there any environmental issues that affect you personally? Please describe.

The themes of flooding and community resilience were present. Flooding, water quality, air temperature, air and water quality, and plastic pollution were the main environmental issues listed. The increased frequency of these issues was mentioned.

“Coastal flooding has always been an issue in the area where I live, however, it is becoming more and more frequent and more of an issue.”

“Flooding, air and water quality, safety of the community, etc.”

Question 4: Are there any environmental issues that affect you personally? Please describe.

Flooding was the main theme brought up in these answers. Participants wrote about flooding around their homes, as well as homes of loved ones. Concern about climate change and increasing storm intensity was another notable issue. Drought was brought up as well.

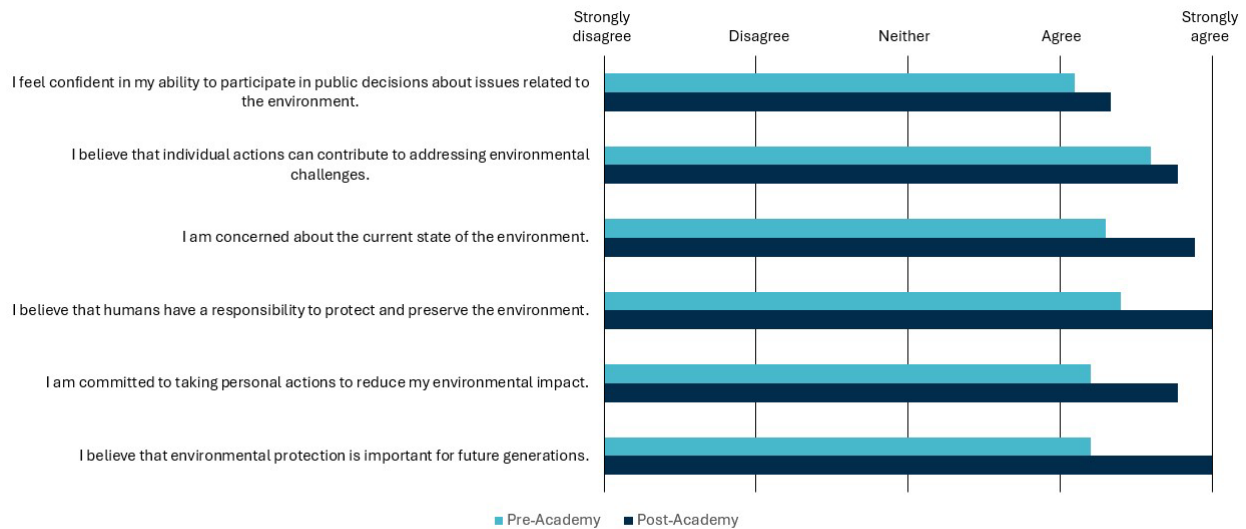
“**Tidal flooding/erosion and frequency of.** My elderly mother still lives in Rumbley, my childhood home and there are frequently times that she is isolated due to impassable roads.”

“**Flooding**, increasing storm intensity”

Attitudes

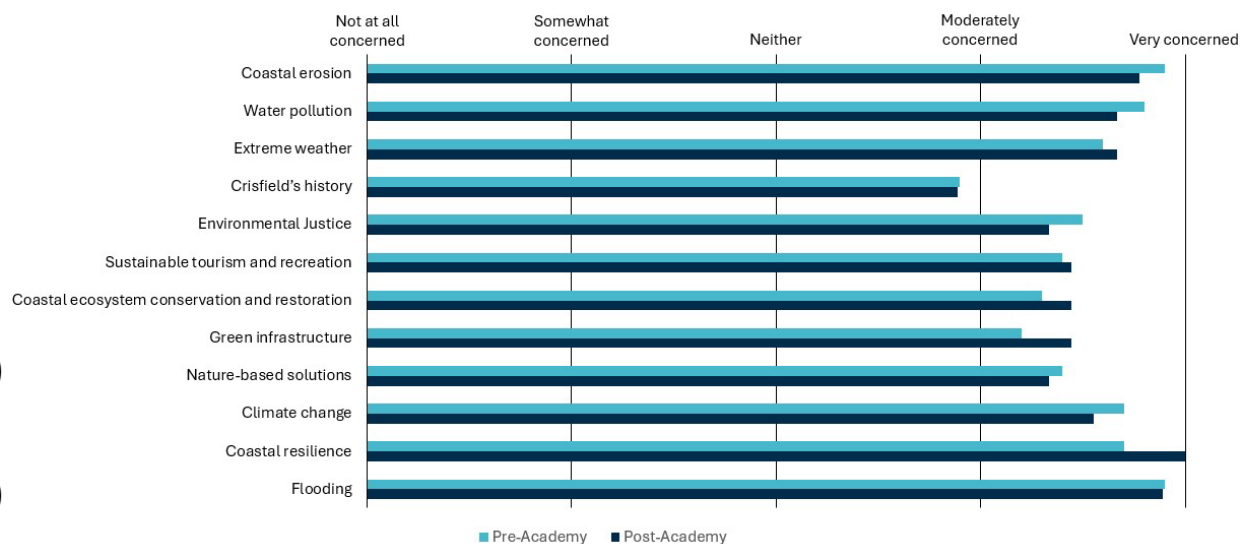
Question 5: Please indicate your level of agreement with the following statements.

There was a small increase in environmental attitudes in all categories.



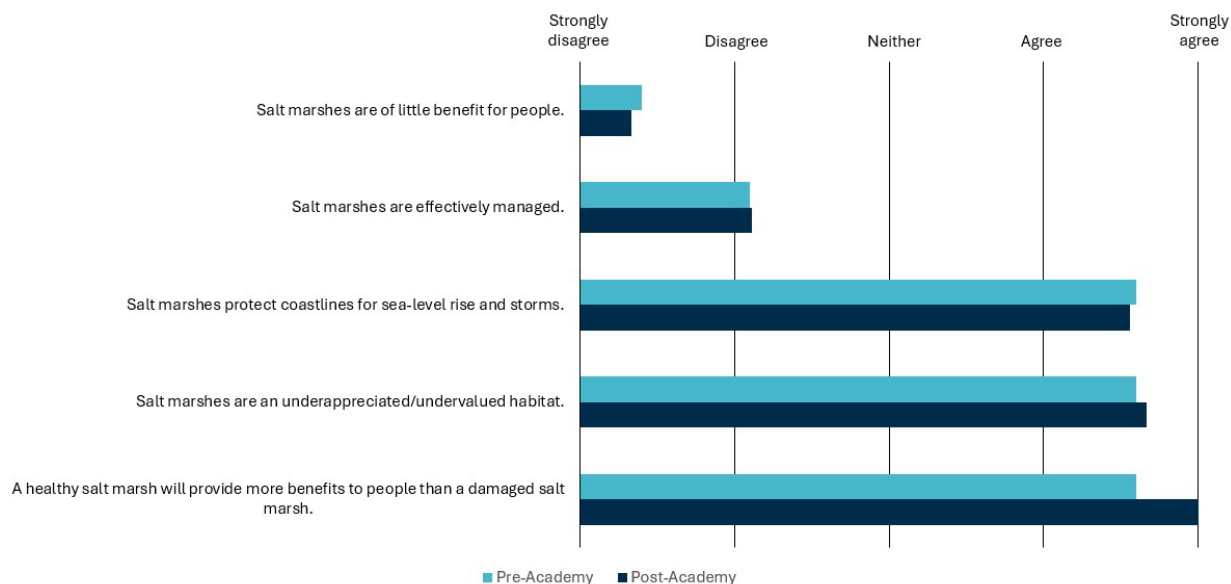
Question 6: People who live near the coast face many challenges, but some are more concerning to people than others. How concerned are you about the following challenges in the Crisfield community?

There was not a substantial change in levels of concern before and after the Academy.

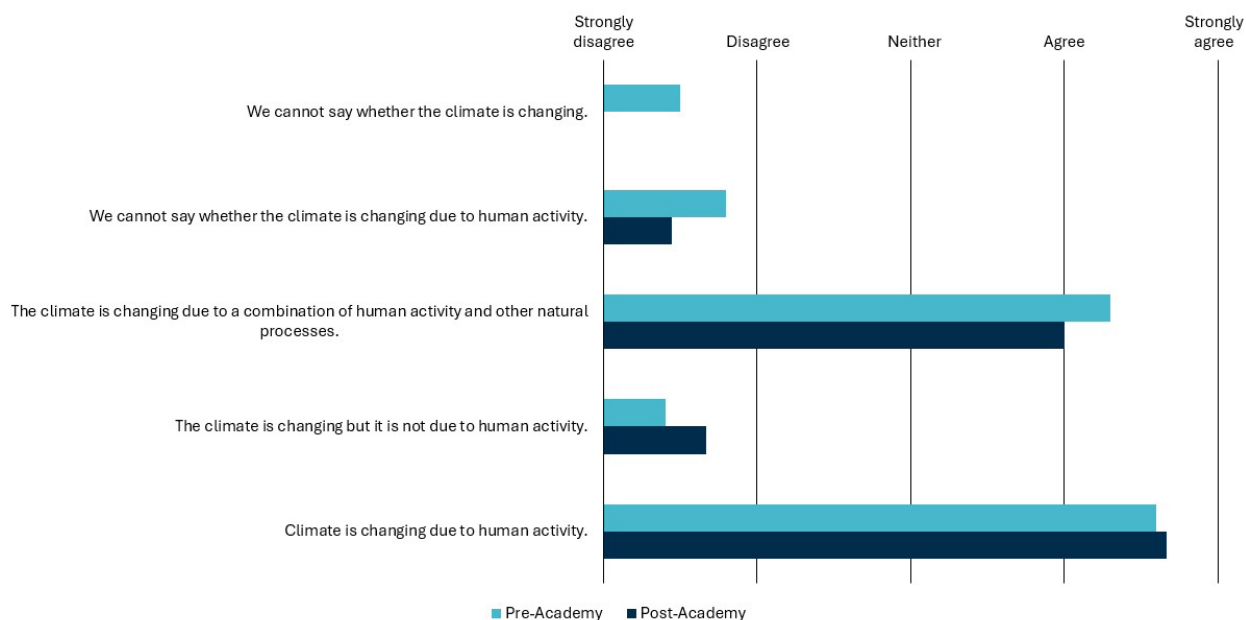


Question 7: Please indicate your level of agreement with the following statements. For the following questions, we define salt marsh as an area of coastal grassland that is regularly flooded by seawater.

There was not a substantial change in salt marsh knowledge before and after the Academy.



Question 8: Please indicate your level of agreement with the following statements. There was not a substantial change before and after the Academy.



Question 9: *Has the Academy changed any of your views about the environment or how the environment affects you? If so, please describe.*

Answers from participants focused on how the Academy strengthened existing participant views. Some participants brought up their increased understanding of environmental issues. One participant brought up that their views changed such that they now are more aware of the need for action.

“Yes. More awareness of need for action.”

“Not really. It merely confirmed the way I already felt.”

“Yes. **I better understand how local areas, wetlands, and marshes help to reduce storm effect and improve water quality.**”

Behavioral Intentions

Question 10: *Do you plan to apply anything that you have learned during the Academy in your personal or professional life? Based on your answer to the question above, please describe.*

Participants wrote about flood resilience, community awareness, and flood alert sensors. Most participants answered yes to the question, with two answering maybe, one of which said maybe because they might be moving. There was willingness to participate in volunteer community events expressed.

“Yes,” - “I plan to enroll in the alert system and participate in local efforts to increase awareness and partner with the Town of Crisfield.”

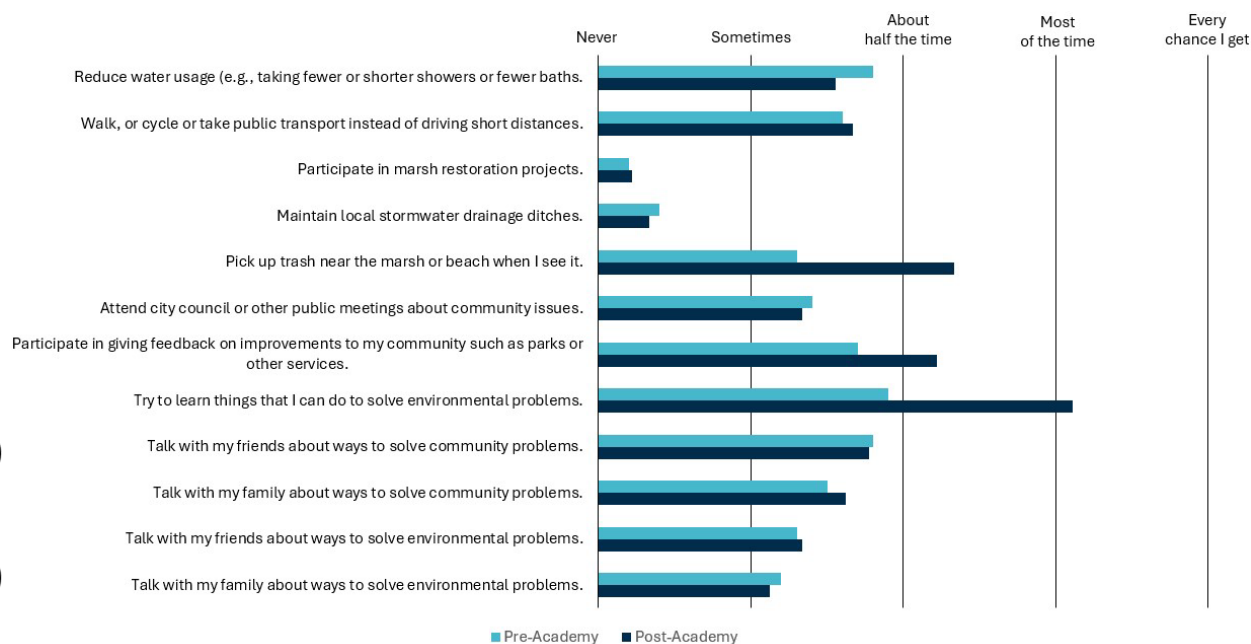
“Maybe,” - “We may be moving!”

“Yes,” - **“Planning to speak to family, friends, and youth about ways to help protect and preserve our local environment and become more resilient to flood events.”**

Question 11: Please indicate the frequency with which you engage in the following behaviors.

There was an increase of at least one category on average in participant's frequency of participating in the following behaviors:

- Pick up trash near the marsh or beach when I see it
- Try to learn things that I can do to solve environmental problems



Question 12: Do you plan to work together with others to address any of the environmental issues that Crisfield is dealing with? Based on your answer to the question above, please describe.

Similarly to the previous question, most responses were yes and a few were maybe. Responses focused on community and resilience. A willingness to participate in volunteer activities such as trash pick-ups and grass planting was expressed.

“Yes,” - “Provide input and participation in community efforts to enhance resilience!”

“Maybe,” - “Plan to promote and attend future Academy sessions”

“Yes,” - **“Participate in future ditch clean-up days, marsh grass planting days, and other discussions, planning events, to promote community involvement.”**

Community Capacity

Question 13: *What would you share with decision-makers (e.g., the Crisfield mayor) related to the environment or resilience?*

Community was a focus of these answers. Community engagement, especially with youth was brought up. The desire for more flood mitigation projects was expressed, as well as some displeasure at how the flooding in the town is currently being managed. A recommendation was made to increase advertising for recreation and tourism in Crisfield.

“I would encourage her to continue to seek solutions to help the city of Crisfield find a sustainable future. I think the nature-based solutions are important and could lead to positive outcomes in the community.”

“Form a youth task force in the future if possible for projects and input and volunteer opportunities to work with schools.”

Satisfaction

Question 14: *Did the Crisfield Resilience Academy meet your expectations? Based on your answer to the question above, please describe.*

The responses to this question were generally positive, people felt satisfied with the knowledge and experience they gained through the academy. One participant expressed they wished there were more sessions. It was also mentioned that the academy exceeded their expectations for one participant.

“Yes,” - “A lot of information to absorb in small amount of time. Very informative and motivating.”

“Yes,” - “I wanted to know more about the plans for Crisfield and that was achieved.”

Question 15: *Do you have any suggestions for improving future iterations of the Academy?*

Participants expressed wanting more field trips and hands-on experiences. One participant expressed a desire for more sessions. Including more government officials was also a suggestion from one participant. One participant suggested goal setting being an earlier part of the process.

“I feel 2+ additional sessions would be helpful. To find consensus and concrete ideas for action.”

“Field trips, goal setting for future endeavors before the end of the academy.”

Question 16: *Anything else that we need to know?*

Feedback was generally positive. One participant expressed feeling like the information was a bit too condensed.

“Graduates from the Academy should have learned the basic skills necessary to lead volunteers from the community to do the work necessary at the base level to clean up and save money for resiliency projects.”

“Very interesting and well presented. Seems a bit too condensed for the significant amount of information presented.”



10.2 Acknowledgements

Big thanks to all the Crisfield Resilience Academy participants!

and

Brent Sullivan
Brian Fowler
Britta Bierwagen (EPA)
Brooke Landry
Candace May (EPA)
Caroline Ridley (EPA)
Carter Finney
Charles Cavanaugh
Chris Weaver (EPA)
Danny Thompson
Darby Trout (B)
Dennis Cullison
Emily Eisenhauer (EPA)
Emily Snyder (EPA)
Eric Buehl
Frank Deuter
Jack Rehmann (EPA)
Jared Parks
Jeff Orrock
Jen Merritt
Jess Iacona (B)
Jessica Daniel (EPA)
Jim Rapp
John Hickman (B)
Jordan West (EPA)
Kaitlin Scowen
Kayle Krieg
Kaylyn Gootman (EPA)
Kelsey Swenson (EPA)
Kyle Buck (EPA)
Liz van Dolah
Louie Rivers (EPA)
Madelyn Chapman (EPA)
Mayor Darlene Taylor
Michael Maddox
Michelle Ryan (TT)
Mike Meloy (EPA)

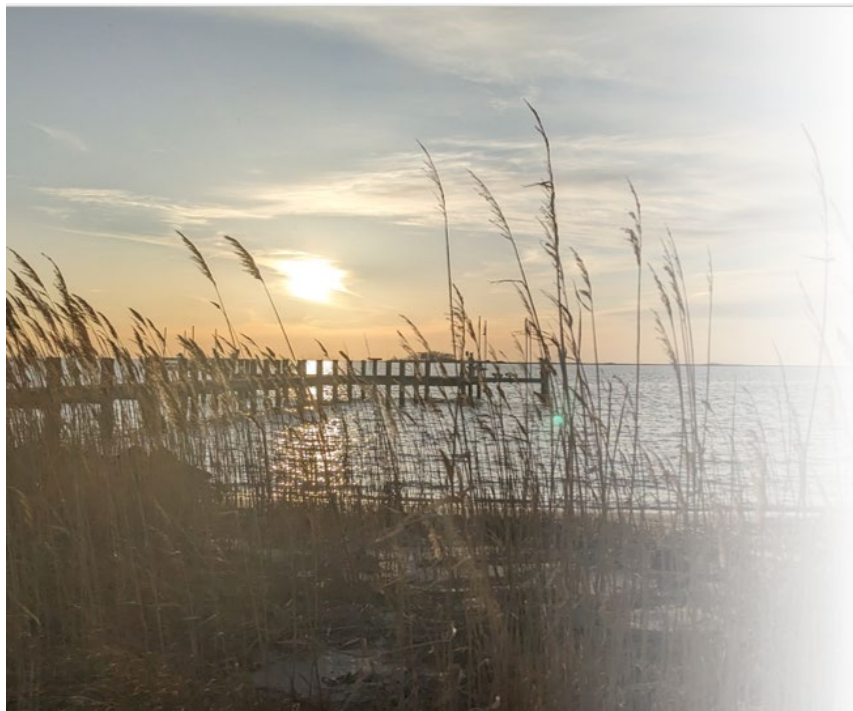
Molly Trendell-Nation
Rachel Szczytko
Robert Hoffman (B)
Rose Leek (EPA)
Roxolana Kashuba (EPA)
Sam Samuels (EPA)
Sarah Montague (EPA)
Scarlett VanDyke (EPA)
Shane Hall
Skip Stiles
Tim Canty
Trey Lodge (B)
Vincent Laisney (B)
Virginia Vichi-Miller (EPA)
William Cornish

Crisfield Public Library and Staff
Janes Island State Park

*With special thanks to BEACON (B),
TetraTech (TT) and U.S. EPA (EPA) contributors*



10.3 Crisfield Rising



Crisfield Rising

Crisfield Rising examines the resilience of the community of Crisfield, Maryland in the face of coastal change by bridging imagery and oral histories to help viewers better understand the complexities of living, working, and doing business in the area and how to collectively prepare and adapt for a more resilient tomorrow.

This exhibit was developed in association with the *Crisfield Resilience Academy* from 2024-2025.

For more information:
<https://www.epa.gov/gcx/crisfield-resilience-academy>

This exhibit is modeled after a project out of coastal North Carolina which can be found at www.rising.nc.com.

Crisfield Rising is an exhibit developed in association with the *Crisfield Resilience Academy* from 2024-2025. It will be displayed at the Crisfield Public Library on Saturday, April 26th.

Crisfield Rising examines the resilience of the community of Crisfield, Maryland in the face of coastal change by bridging imagery and oral histories to help viewers better understand the complexities of living, working, and doing business in the area and how to collectively prepare and adapt for a more resilient tomorrow.

For more information:

<https://www.epa.gov/gcx/crisfield-resilience-academy>

This exhibit is modeled after a similar project out of coastal North Carolina which can be found at www.rising.nc.com.



Community

"One of the key components to resilience is: **compare yourself to yourself**. None of what you're facing will be the same as any other community."

- Kyle Buck, U.S. EPA Scientist
and *Crisfield Resilience Academy* Guest Speaker

photo by Jenna Hartley, U.S. EPA, 2024



Local

"With two years of sustained presence and hands-on support, the EPA's Office of Research & Development has become a trusted partner in Crisfield, a rural coastal town facing serious flood risks. Their collaboration has helped our community explore nature-based solutions like marsh restoration and living shorelines. Through the Crisfield Resilience Academy, they've made research accessible, equipping us with the tools to shape a more effective, locally driven resilience plan. Thanks to EPA ORD's support, **we're not just planning for the future—we're building it.**"

- Jen Merritt, Grant Administrator, City of Crisfield

photo by Jenna Hartley, U.S. EPA, 2024



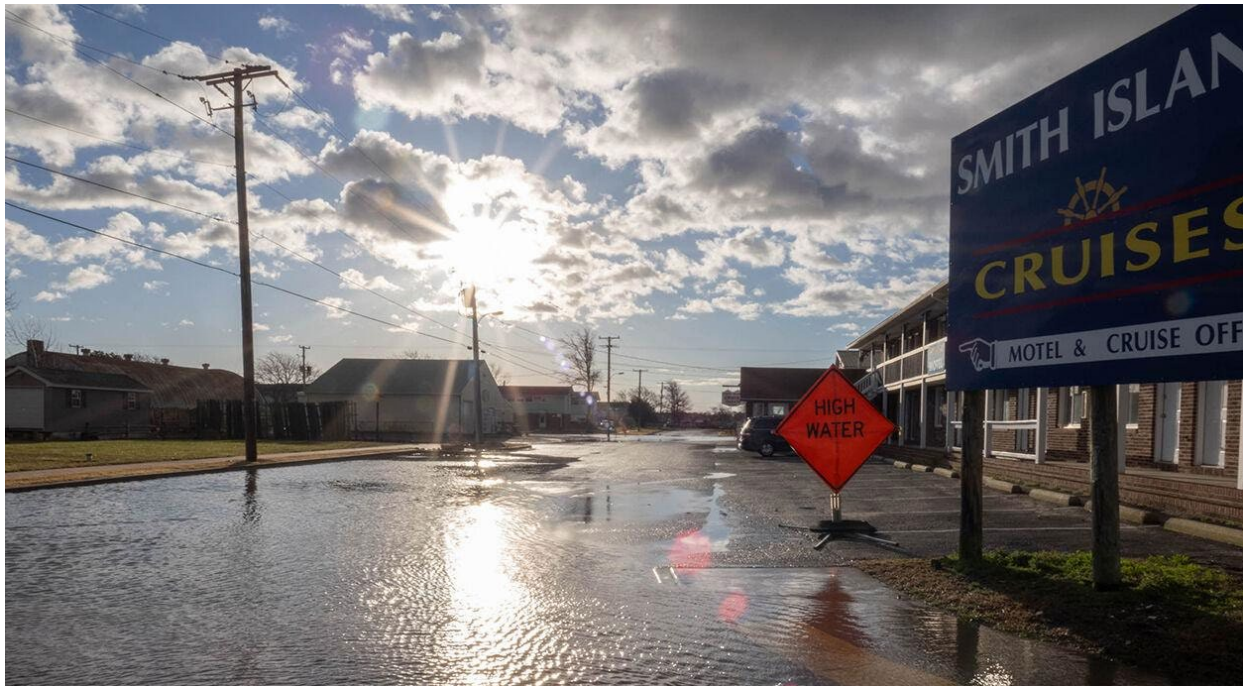
Opportunity

"The primary takeaway from my experience as a participant in the *Crisfield Resilience Academy* is that **Crisfield has an opportunity that other at-risk communities do not have.** Timely action with the support of the local community and federal funding can prepare this town to withstand the inevitable next storm event and the associated storm surge and flooding.

The *Academy* has laid the groundwork for educating, organizing and empowering this community into action."

- Brent Sullivan, State Park Ranger Supervisor, Maryland Park Service, Maryland Department of Natural Resources, Janes Island State Park

photo by Jess Iacona, Salisbury University's BEACON, 2024



Childhood Memory

"I have this distinct childhood memory. I remember that when it would flood, we would borrow a neighbor's kayak and go kayaking on the roads. Once we were out and we saw a sign - it looked like it was in the middle of the marsh - but when we looked down, we realized that we were in the middle of a boat that was underwater."

- Crisfield Resilience Academy participant, Spring 2025

photo by Dave Harp, Chesapeake Bay Journal



On Water's Edge

"Thank you so much for the invitation and ticket to this past Friday's Ocean City Film Festival event. Our movie was not only one of the best, based on the schedule, it was one of the more detailed in length of those shown during the weekend. In viewing the film, *On Water's Edge*, I felt really positive about Crisfield's future potential for both the residents (like myself) and visitors. There's much work that's needed from all stakeholders, and it is evident that community-wide support is a must!

As an alum of the first *Crisfield Resilience Academy*, it's great to know that members of the overall community have an **opportunity to learn and use the knowledge gained in playing a role making a positive change.**

- A.C. Alrey, Business & Community Advocate, Crisfield, MD

photo by Jenna Hartley, U.S. EPA, 2025



Resilience

"I would just like them to understand how important it is to preserve our place. If you think about it, we're in a situation where we are very vulnerable to climate. And so, I want them to understand how special a place Crisfield is so when we come asking for support, we're hoping that they will hear us. They'll understand because they will have been here."

- Darlene Taylor, Crisfield Mayor, in reference to the 2023 Clam Bake when Maryland Gov. Wes Moore attended and Crisfielders persevered with the important cultural event despite flood waters.

*photo of Demetria Marshall
by Bryan P. Sears, Maryland Matters, 2023*

<https://marylandmatters.org/2023/09/28/flooding-looming-federal-shutdown-dont-dampen-spirits-at-tawes/>



Isolated

"Tidal flooding and the frequency of tidal flooding affects me very personally. My elderly mother still lives in my childhood home in Rumbley. Frequently there are times that she is isolated due to impassable roads. Once, the power was out for days and the flooding didn't let up. Finally, I decided to wade through the flood waters to check on her."

- *Crisfield Resilience Academy* Participant

*photo by Vincent Laisney,
Salisbury University's BEACON, 2024*



United

"Aside from New Orleans and Galveston, you all [*Crisfield*] could be an East Coast laboratory on how to do nature-based solutions and do it well. This effort here has the real fire potential for making sense of the engineering and then communicating it to the public. **You've got citizen support.**"

- Skip Stiles, *Crisfield Resilience Academy* Guest Speaker and Wetlands Watch Founder and Senior Advisor

photo by Jessica Daniel, U.S. EPA, 2024



Living Near/In Water

"It's interesting, right? I guess I've kinda realized that if you want to live **near** water, you've gotta be comfortable living **in** water."

- Crisfield Resilience Academy Participant

photo by Jess Iacona, Salisbury University's BEACON,
2024

Close
the
Binder



Office of Research and Development

