February 2019 Volume 7, Issue 1

Sentinel Site Quarterly

North Carolina
Sentinel Site Cooperative

Winter 2019

Greetings, partners and stakeholders. The North Carolina Sentinel Site Cooperative (NCSSC) was established in 2012 as part of a National Oceanic and Atmospheric Administration (NOAA) effort to provide coastal communities and resource managers with information on the potential impacts of sea level rise on coastal habitats and communities.

Contact Sarah Spiegler if you have articles or events that you would like included in the next issue. Previous quarterly newsletters are available on the NC DEQ website.

In this issue:
Communities in North Carolina continue to recover from the impacts of Hurricane Florence. The photo below was taken the day before the hurricane in the town of Beaufort, in Carteret County. This quarterly newsletter includes research updates after the hurricane; how North Carolina communities are preparing for sea level rise; and resources for resiliency and adaptation planning.

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NOAA Sentinel Site Program

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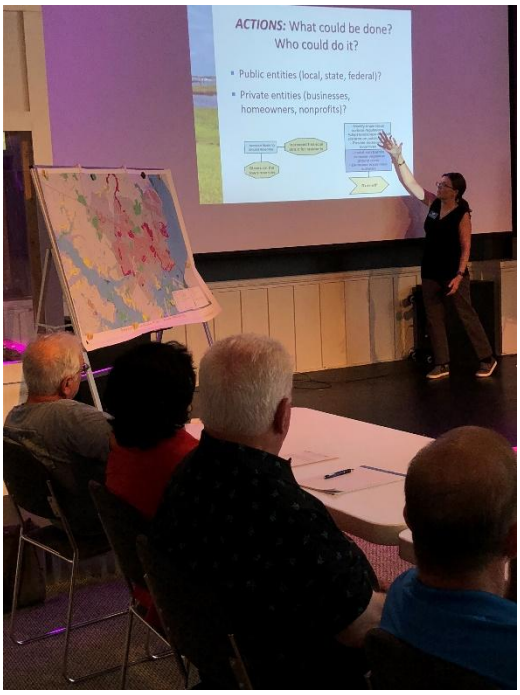
Photo by Sarah Spiegler

Town of Swansboro Updates Land Use Plan

Hurricane Florence made landfall in North Carolina on Sept. 14, 2018. Its arrival coincided with a resilience planning effort by the coastal town of Swansboro, in Onslow County.

Earlier in 2018, Swansboro leaders began a process to update the town's Coastal Area Management Act (CAMA) Land Use Plan. As a concurrent effort, the town also requested a Vulnerability, Consequences, and Adaptation Planning Scenarios (VCAPS)* process with local stakeholders. This process documents local knowledge to help communities better understand their specific vulnerabilities to coastal hazards.

In August 2018, the town held a VCAPS meeting. Attendees included town, county, and municipality staff; elected officials; community organizations; and business owners, among others. Facilitators from the N.C. Division of Coastal Management, The Nature Conservancy, North Carolina Sea Grant and South Carolina Sea Grant helped guide participants through the VCAPS process.

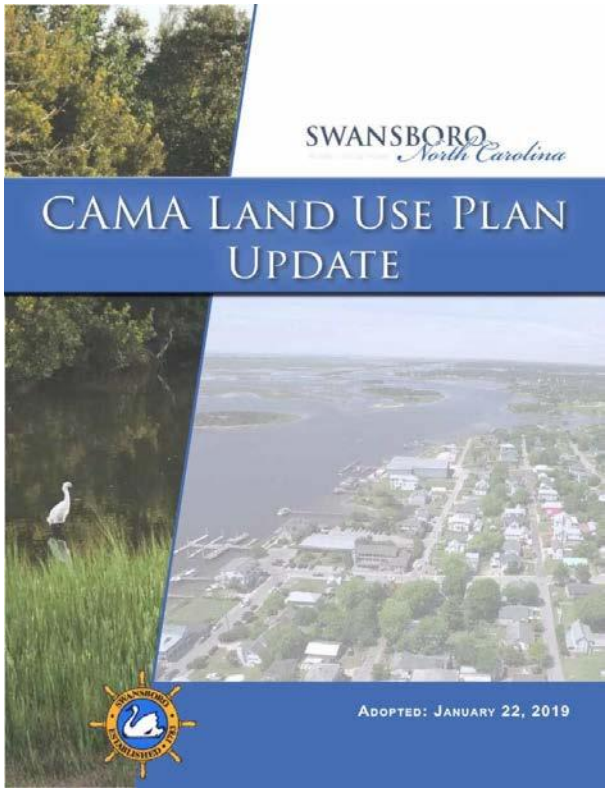


Jessica Whitehead of North Carolina Sea Grant explains VCAPS.

The facilitators helped participants brainstorm actions that the Town of Swansboro and its residents can take–through the updated land use plan–to become more resilient. The resulting prioritized list of actions is a tool to help Swansboro decision-makers and residents address impacts from climate change and sea level rise. Adaption strategies included preserving natural areas and clustering future development.

In the wake of Hurricane Florence--which dumped 34 inches of rain in the town–Swansboro held another public workshop in Nov. 2018. This time, participants were encouraged to think about current and future impacts from climate change; add input to a local map that included important community assets and socially vulnerable areas; and vote on potential actions the town and community can take to reduce risk to climate change and sea level rise.

The Swansboro CAMA Land Use Plan update was adopted by the Board of Commissioners on Jan. 22, 2019. The updated plan states, "The town experienced a hurricane in September 2018, that further crystallized the importance of climate resiliency and adaptation as crucial to the ongoing success and survival of the town...By incorporating climate resiliency planning into their long-range planning efforts, the Town has taken concrete efforts to prepare for an uncertain climate future."

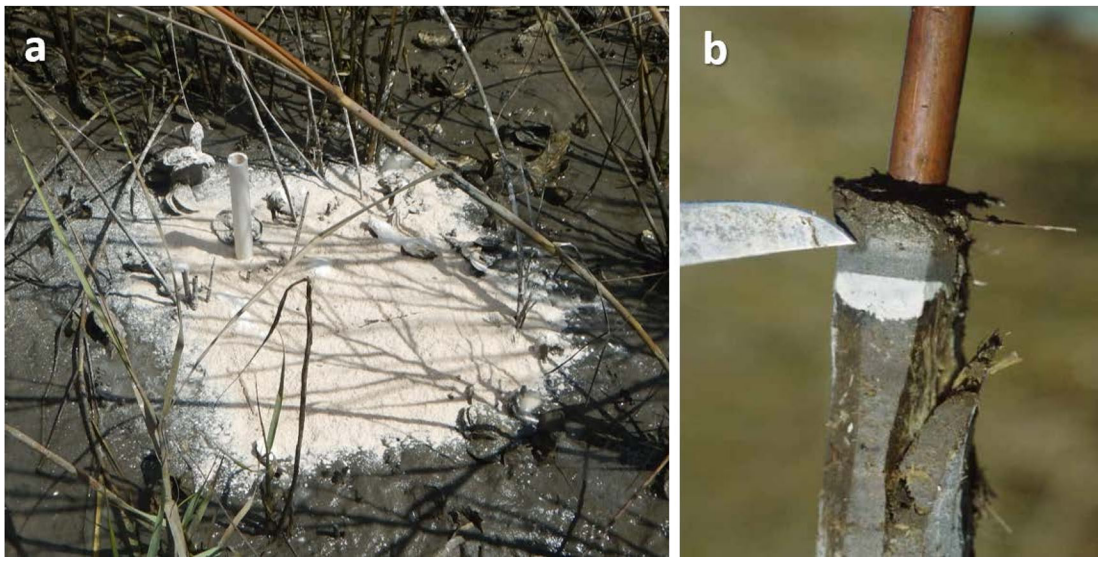


** The VCAPS process supports planning by local decision-makers, and is intended to help communities become more resilient to weather and climate change. VCAPS uses participatory modeling techniques to organize and document dialogue and learning. Local knowledge and experience are integrated with scientific knowledge. The process is flexible and can be fine-tuned to the interests of participants.*

- For more information about the VCAPS process, please visit vcapsforplanning.org.

Measuring the Impacts of Hurricane Florence on Local Marshes

The response of marsh shorelines to hurricanes is a concern of both coastal landowners and researchers alike. Under non-storm conditions, marshes have been shown to be effective at attenuating, or lessening, wave energy, trapping sediments and reducing shoreline erosion. The performance of marshes during extreme events like hurricanes is less well documented. To help fill this knowledge gap, researchers at NOAA's Beaufort Lab, including Carolyn Currin, Jenny Davis and Anna Hilting, conducted pre- and post-Hurricane Florence sampling. These researchers assessed the impact of Florence on local coastal marshes in September and October 2018.



(a) Feldspar clay deposited on marsh surface two days before the arrival of Hurricane Florence. (b) The depth of the feldspar layer in a core collected after Hurricane Florence provides an estimate of how much material was deposited as a result of the hurricane.

Just days before Hurricane Florence, NOAA researchers installed feldspar marker horizon plots and measured marsh surface elevation using Surface Elevation Tables (SETs) at living shoreline sites on Pivers Island. They also installed marker horizon plots and water level sensors at experimental thin-layer sediment placement sites on U.S. Marine Corps Base Camp Lejeune. The researchers revisited all sites within a month of the storm's passage to evaluate Florence's impacts on marsh surface elevation and vegetation density.

Jenny Davis and Anna Hilting use Surface Elevation Tables to measure pre- and post-hurricane marsh elevation.

Results showed little evidence of adverse storm impacts to the salt marshes that were examined. Marker horizon and SET data indicated either an increase (net addition) or no change of sediment to the marsh surface. Additionally, no evidence of decreases in vegetative biomass as a result of the hurricane was found.

Researchers at NOAA continue to collaborate with other coastal researchers in the region who are also conducting hurricane-related sampling. By working together as a research community, scientists can develop more holistic understanding of marsh performance during extreme events.

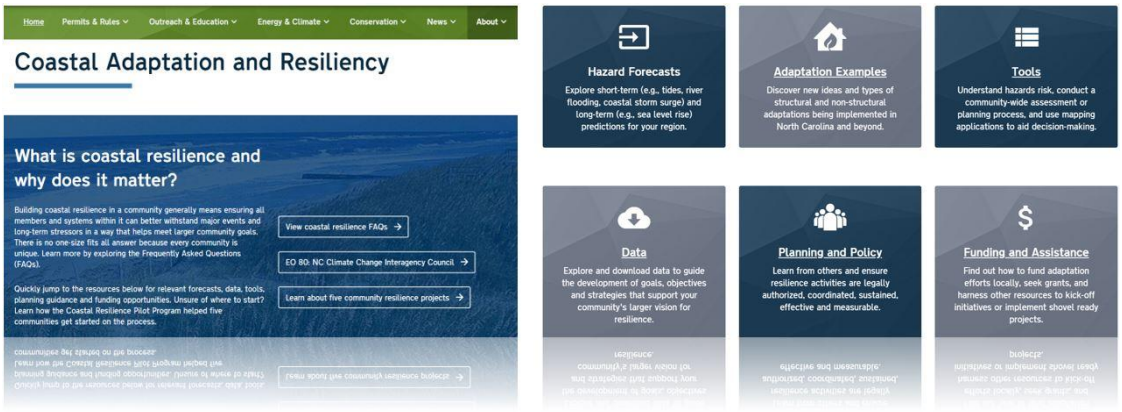
For more information, please contact Jenny Davis.

New Web Resource for Coastal Adaptation and Resiliency in North Carolina

Coastal communities in North Carolina continue to face challenges and difficult decisions about how to prepare for and adapt to natural hazards, such as hurricanes and sea level rise.

A Go-To Portal

To facilitate resilience efforts, the N.C. Division of Coastal Management(NCDCM) has launched the new Coastal Adaptation and Resiliency website. This website aims to foster better collaboration and lesson-sharing across jurisdictions and sectors that engage in coastal resilience work. Executive Order 80, signed by N.C. Governor Cooper in October 2018, calls for the development of a State Climate Risk and Resilience Plan by 2020. This website is a tool that can help communities begin planning for resilience.



The new homepage of the NCDCM Coastal Adaptation and Resiliency website.

The target audience for the website is local governments and staff in the 20 CAMA-designated counties. It brings together relevant resources grouped into the following categories: data, hazard forecasts, mapping and analysis tools, adaptation examples, planning and policy best practice guidance, and funding and assistance opportunities.

For example, local officials, staff and residents can explore coastal flood risk to storm surge, high tides and sea level rise with tools from partner organizations like NOAA and The Nature Conservancy. The website covers a range of topics that can assist communities on their path towards resilience, including tips on floodplain management practices, flood insurance rate reduction, and financial and technical assistance for installing living shorelines.

Learning from Others

One common question that community leaders often ask is, "How and where do we get started?" This website includes tools and checklists to help communities start considering challenges, vulnerabilities and opportunities. Visitors to the site will find examples of how communities like Nags Head and Morehead City used tools and public engagement processes to

educate residents, integrate planning efforts and determine how to best build resilience to increased flooding and other climate change impacts.

The Town of Nags Head has adopted a comprehensive plan, a hazard mitigation plan and land use regulations on zoning, storm water, flooding and dune protection to help guide and manage development.
Photo by Christian Kamrath.

The Coastal Adaptation and Resiliency website continues the efforts of the NCDCM Coastal Resilience Pilot Program. This pilot program assisted five N.C. communities–Oriental, Edenton, Duck, Pine Knoll Shores and Hatteras Village–in conducting resilience evaluations and needs assessments. This process included key stakeholder interviews, public workshops, and the development of a map of vulnerability hotspots. The process and results are contained in final reports and an interactive story map that are accessible on the new website.

NCDCM is seeking user feedback from local governments and other stakeholders to tailor the content and format of the new website to best serve those who are interested in and/or are working on coastal resilience efforts.

Please contact Christian Kamrath, NCDCM coastal resilience specialist, with questions and comments.

Sentinel Site Program Review in North Carolina

In 2012, NOAA established five sentinel site cooperatives–Chesapeake Bay, Hawaiian Islands, North Carolina, Northern Gulf of Mexico, and San Francisco Bay–as a part of the NOAA Sentinel Site Program (NOAA SSP).

The five cooperatives facilitate access to sea level rise information, models and tools, and help stakeholders and decision-makers as they apply new knowledge to protecting coastal communities and ecosystems. The cooperatives tailor NOAA's breadth of research into regional strategies that address sea level rise impacts.

The Sentinel Site Program has reached the end of the five-year pilot, and NOAA is reviewing the successes and challenges, as well as envisioning the future of the cooperatives. To gather information, NOAA is conducting workshops at each of the five cooperatives, and asking partners for their perspectives about the strengths, challenges and opportunities of the program.

The site-based workshops occurred in the Northern Gulf of Mexico in November 2018 and in North Carolina in December 2018. The workshops scheduled for Hawaii, Chesapeake Bay and San Francisco Bay were canceled in January 2019, due to the federal government shutdown. Because of these cancellations, the final summary report and results of the workshops and program review will be delayed. Details about rescheduling the January workshops are still to be determined.

In North Carolina, over 25 NCSSC partners discussed their work with the cooperative over the past five years. Federal contractors that were part of the NOAA SSP evaluation team met with NCSSC partners at the NOAA Beaufort Lab and NC State University's Center for Marine Sciences and Technology on Dec. 5-6, 2018. The SSP evaluation team conducted breakout group discussions and one-on-one interviews with attendees. NCSSC partners who were not available to attend in person spoke with the evaluation team after the workshops via phone.

The NCSSC core management team greatly appreciates the time and effort by all of our partners who participated in the evaluation process here in North Carolina!

Please contact NCSSC Coordinator Sarah Spiegler with questions about the SSP evaluation process.

Tool Spotlight: TNC Coastal Resilience

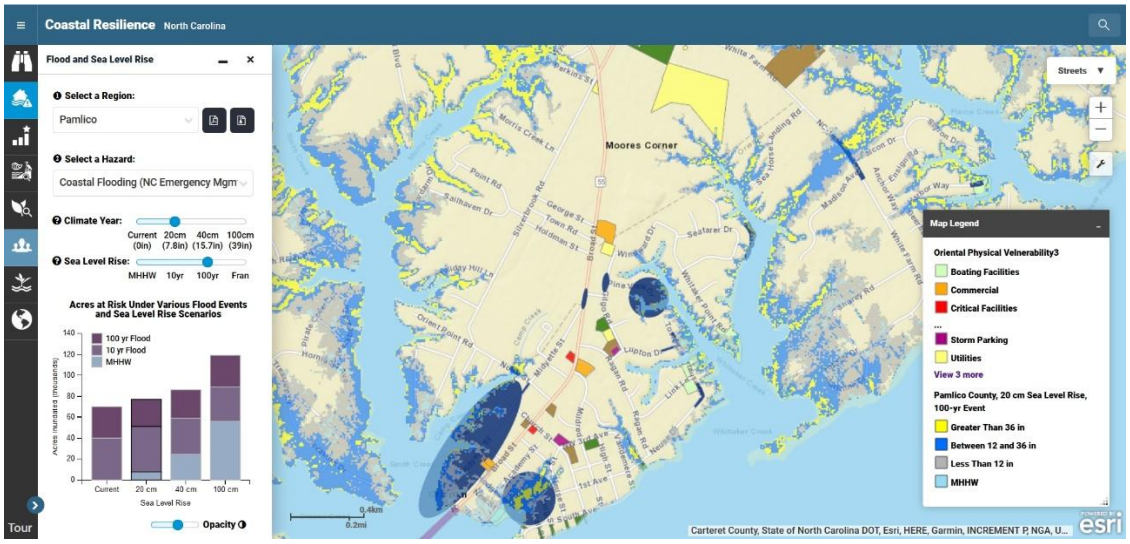
The Nature Conservancy in North Carolina (TNC) is one of the new partners in the expanded NCSSC geography. In 2018, a new "Flood and Sea Level Rise" app was added to the North Carolina TNC Coastal Resilience tool. This tool incorporates science and spatial data to create maps that coastal decision makers can use together with local data to inform management decisions.

To access the tool: https://maps.coastalresilience.org/northcarolina/

When the "*Flood and Sea Level Rise*" app 
(button in left-hand tool bar that depicts house and caution sign)

is overlaid with the "*Community Planning*" app 
(button in left-hand tool bar that depicts silhouettes of three people),

the user can identify local assets that are vulnerable to future flooding.



This screenshot from the TNC Coastal Resilience tool shows the overlap of the "Flood and Sea Level Rise" app with the "Community Planning" app in the town of Oriental.

The Coastal Resilience tool is updated regularly. TNC is interested in learning how communities have used the tool, and how it can be improved. Please send comments and questions to Lora Eddy, TNC coastal engagement coordinator.

Upcoming Conferences and Workshops

- **Citizen Science Association Conference**, March 13-17, Raleigh
- **NC Water Resources Research Institute Annual Conference**, March 21-22, Raleigh
- **NC GreenSTEM Conference**, March 30, New Bern
- **Southeast and Caribbean Climate Community of Practice Workshop**, April 1-3, Wilmington
- **NC Space Grant SPACE Symposium**, April 4-5, Raleigh
- **National Adaptation Forum**, April 23-25, Madison, Wisc.
- US CLIVAR workshop: **Sea Level Hotspots from Florida to Maine: Drivers, Impacts, and Adaptation**, April 23-25, Norfolk, Va.

The NOAA Sentinel Site Program leverages existing research and monitoring resources to ensure resilient coastal communities and ecosystems in the face of changing conditions. The program's place-based approach focuses on issues of local, regional, and national significance that impact habitats and species managed by NOAA as well as surrounding coastal communities.

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