N.C. Coastal Resilience Community of Practice Meeting

Thursday, May 1, 2025 – 10:00am - 11:30am

Purpose of the COP: Bring together diverse coastal stakeholders to focus on how ecosystem resilience can build local community resilience. We don't necessarily have to have a "thing" to work on but will take on projects as appropriate and mutually agreed on. Website: https://deq.nc.gov/coastal-resilience-cop

In attendance:

- Abby Williams, NC Coastal Reserve
- Aranzazu Lascurain, NOAA's Office for Coastal Management
- Arvin Maniktala, Moffatt & Nichol
- Brandon Puckett, NOAA's National Centers for Coastal Ocean Science
- Cat Bowler, Audubon NC
- Claire Rapp, NC Coastal Federation
- Dawn York, Moffatt & Nichol
- Doug Huggett, Moffatt & Nichol
- Eryn Futral, NC Department of Public Safety
- Forest Shepherd, NC Division of Water Resources
- Helene Wetherington, NC Office of Recovery & Resilience
- Holly White, NC Office of Recovery & Resilience
- Jacob Boyd, NC Coastal Federation
- Joe Heard, Town of Duck
- Kelly Garvy, Lighthouse Environment Partners
- Lee Duncan, Pender County
- Lisa Williams, Mid-East Commission
- Margaux Kerr, NC Coastal Federation
- Marica Thomas, NC Division of Water Resources
- Matt Pendleton, NOAA's Office for Coastal Management
- Maya Cough-Schulze, NC Natural Heritage Program
- Nicole Goddard, NC Office of Recovery and Resilience
- Riley Lewis, Coastal Carolina Riverwatch
- Russell Jackson, NOAA's Office for Coastal Management
- Sara Marschhauser, Audubon NC
- Stacey Feken, Albemarle Pamlico National Estuary Program
- Tashya Allen, NOAA's Office for Coastal Management
- Whitney Jenkins, NC Coastal Reserve

Sea Level Calculator Demos – Tashya Allen & Matt Pendleton, NOAA's Office for Coastal Management – **see slides**

Q&A

Holly: Are you incorporating groundwater tables in viewer? Currently not included, don't have good data for that. Do incorporate vertical land motion. Improving tide gauge coverage. In talks about what to incorporate next

- NCCOR/DEQ, would like to talk about what can be included -ground water, for septic functionality, connect NOAA to those resources. Would love to follow with NOAA staff.
    - Yes, would like to talk more – very important, groundwater drawdown issues
    - Connection with tech experts – Holly working with communities, groundwater is a variable in vulnerability

Climate Pollution Reduction Grants – Jacob Boyd, North Carolina Coastal Federation – **see slides**

Q&A

How does this connect with SASMI? Overlap will be with NC Salt Marsh action – lots of connection with project to meet goals of the plan. 600-acre goal, metric in NC salt marsh plan. Ensuring connections, as NCCF staff are lead for NC salt marsh plan

Resilience Round Robin

- Eryn – May 14 class -present on new FRIS site, went live last fall. Transition can be frustrating, this will help with the transition. Email Eryn for more info eryn.futral@ncdps.gov
    - Flood risk information system (FRIS) – find properties, if they are in flood zones, download. Official flood risk maps for NC
- Holly – Community Disaster Resilience Zone (CDRZ) work, Town of Creswell – viable utilities assessment. Address water and sewer problems, can't flush their toilets when it rains. Asset inventory will include future conditions, increased rainfall, subsidence, etc. Creswell is a Resilience Coastal Community Program (RCCP) community going through phase 1 & 2. Water/sewer issue in their RCCP plan
    - Another regional need – influence of rising ground water on septic. Viable utilities work group – how and where is it likely to occur in coastal plain. Potential affordable solutions, and funding

    - Resilience guidebook available, sign up for the resilience newsletter
- Riley – working with coastal communities – HAB response, coastal and statewide. Hosting semi-monthly meetings to discuss needs, benthic algae, remediation, public engagement, working with municipalities. If you want to join, let Riley know rileyl@coastalcarolinariverwatch.org
- Joe – northern beach towns applying for beach nourishment funds, working with an engineer
    - RCCP – implement nature-based stormwater controls along the road, becomes a model for other communities to see how nature-based solutions work
    - Joe is retiring – we wish you the best of luck! Thank you for being part of our community!
- Stacey – tribal coastal resilience project. Thanks to Aranzazu, there was a presentation on the project at the Coastal GeoTools conference in January
    - Future CR COP presentation
    - United Tribes presentation
    - Hoping to hire staff to keep resilience tribal connections/projects
- Whitney – update on the Scuppernong Water Management Study – final study report is out with recommendations to address flooding in the watershed located in Washington and Tyrrell Counties. Will be communicating recommendations to the project's steering committee, farmers, and residents in the coming months.

Next meeting topics –

- How things may be changing with federal government changes – organizations' structures, funding – how others are dealing with these changes
    - Funding changes –local communities and the state will be more responsible for disaster recovery. How we can help local communities. Huge undertaking to recovery
- Coastal plain septic system issues, hear from viable utilities (DWR group), would like more information on compound flooding modeling (who's doing what research) including future conditions (Holly White) – Fall 2025
- APNEP Coastal Tribal Initiative
- Bree Charron, North Carolina Coastal Federation: Resilience Projects Coordination Discussion
- Kelly Garvy, Lighthouse Environmental: Floodprint with Andy Fox's lab at NCSU in partnership with the North River/Laurel Road Ladies Outreach Committee and the North Carolina Coastal Federation; facilitating a trailer donation from CCC to North

River/Laurel Road community that will act as a classroom; piloted a workforce development pipeline and have enrolled young people from the community into the Carteret Community College Fire Academy to build capacity for emergency preparedness and community resilience

- Riley Lewis, Coastal Carolina Riverwatch: community organizing in North River; Study on public policy students, protecting wetlands in Carteret County with public policy changes

Sea Level Calculator

coast.noaa.gov/sealevelcalculator

NOAA Center for Operational Oceanographic Products and Services and NOAA Office for Coastal Management

Sea Level Calculator

Explore how sea levels and coastal flooding have changed in frequency and magnitude for your chosen location. Use the latest sea level scenario projections to plan for the future.

Background

- Developed by NOAA's Center for Operational Oceanographic Products and Services (CO-OPS) and Office for Coastal Management (OCM).
- Data originates from NOAA and 2022 Sea Level Rise Technical Report.
- Version one developed in 2024.
- Development guided and informed by users.

Audiences

- Chief Resilience Officer, Floodplain Administrator, Land Use Planner

- Engineer, Restoration Practitioner

Use Cases

- Generate water levels for a given return period to inform infrastructure design
- Compute water level(s) for a point in time and convert to user-selected datum
- Generate a table and a map to illustrate future flooding extents at the next county commission meeting
- Pair historical flood extents with sea level rise scenarios
- Determining best location for infrastructure
- Prioritizing conservation efforts
- Creating community climate action plans
- Understanding future flooding risks
- Reviewing community investment strategies
- Prioritizing flood reduction strategies

Sea Level Calculator

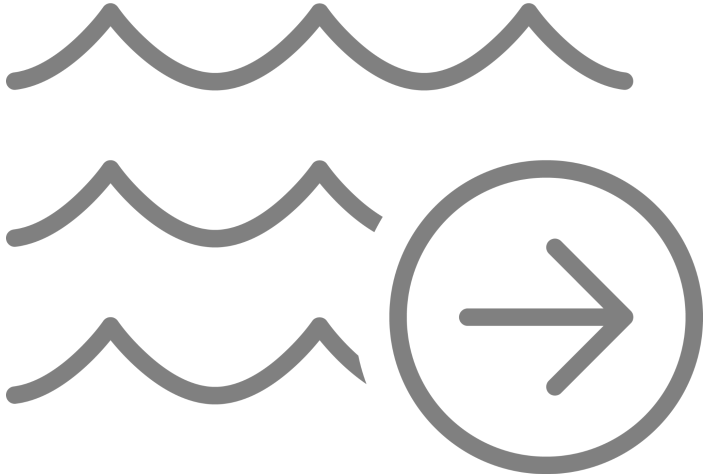
Five Quick Views

- Future Sea Levels
- Changes in Flood Frequency
- Extreme Water Levels
- Observed Sea Level Trends
- Seasonal Variation

Sea Level Calculator Quick View

Future Sea Levels

Explore sea level projections. Learn when high tide flooding is expected to become a daily occurrence.



Sea Level Calculator Quick View

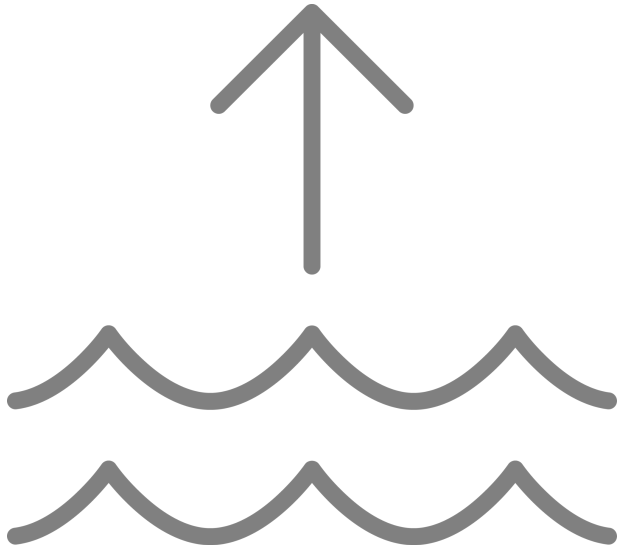
Changes in Flood Frequency

Determine if flood frequency has been increasing (or not!) and how these conditions may change in the future.

Sea Level Calculator Quick View

Extreme Water Levels

View past extreme water level (Top 10) events and exceedance probability levels and how these may change over time using different sea level rise scenarios.



Sea Level Calculator Quick View

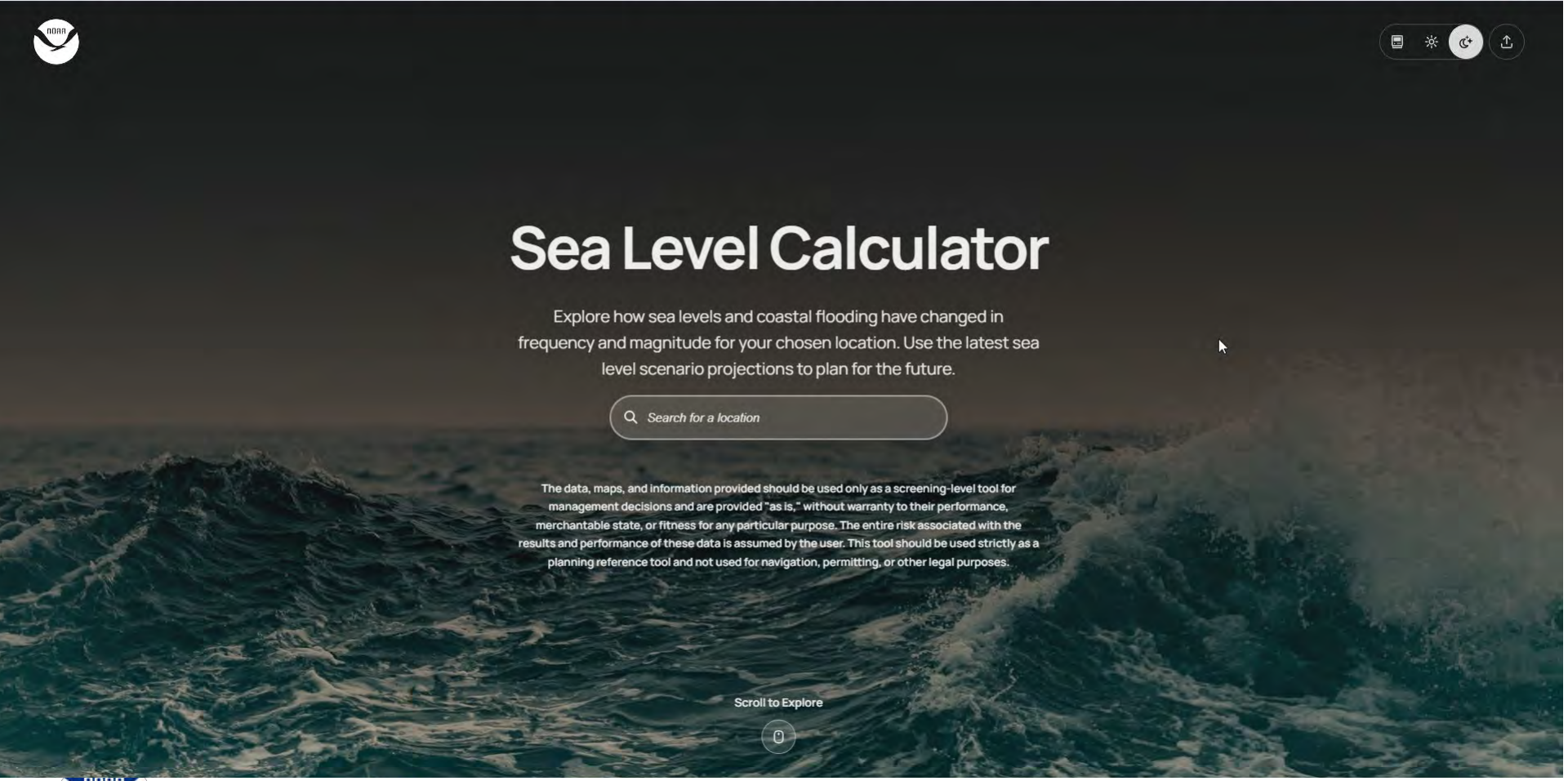
Observed Sea Level Trends

Explore historical water levels and estimated levels for 2050. Compare trends. See how vertical land motion contributes to the equation.

Sea Level Calculator Quick View

Seasonal Variation

See the ten most extreme flood events; determine which months your community is most likely to experience flooding.


Sea Level Calculator
Explore how sea levels and coastal flooding have changed in frequency and magnitude for your chosen location. Use the latest sea level scenario projections to plan for the future.
Search for a location
The data, maps, and information provided should be used only as a screening-level tool for management decisions and are provided "as is," without warranty to their performance, merchantable state, or fitness for any particular purpose. The entire risk associated with the results and performance of these data is assumed by the user. This tool should be used strictly as a planning reference tool and not used for navigation, permitting, or other legal purposes.
Scroll to Explore

Search for a location

After entering a location, you can select a tide station. The number of Quick Views depends on the data available for that tide station. When choosing a tide station, consider the proximity and similarity to your area of interest and the available Quick Views at each station. Alternatively, you can select anywhere on the map if you only want to access sea level rise scenarios for that location.

Future Sea Levels

Explore scenarios for your location.

Watch Video →

Changes in Flood Frequency

Explore how often flooding has occurred in your area and how it may change in the future.

Watch Video →

Extreme Water Levels

Compare past flood events to future flood probabilities.

Watch Video →

Observed Sea Level Trends

Explore how water levels have changed over time.

Watch Video →

Seasonal Variation

Determine when flooding and extreme events are most likely to occur throughout the year.

Watch Video →

Search for a location

Gridded Data

Select a grid section anywhere on the map if you only want to access **Sea Level Rise Scenarios** for that location.

Access Data

Access data used in the Calculator.

Calculator Data →

Real-time data is available through NOAA CO-OPS.

Real-time Data →

Interagency Collaboration

The Interagency Task Force on Sea Level Change, formed under the U.S. Global Change Research Program, is a forum for federal agencies contributing to and applying sea level science to coordinate and address national needs. The Task Force (DOD, DHS, EPA, NASA, NOAA, USACE, USAID, and USGS) recently launched an interagency sea level science platform – **sealevel.globalchange.gov** – to provide federally supported sea level science including educational information on causes, impacts, and solutions, as well as data from **Global and Regional Sea Level Rise Scenarios for the United States: Updated Mean Projections and Extreme Water Level Probabilities Along U.S. Coastlines** (the 2022 Sea Level Rise Technical Report).

This Calculator complements the content on the interagency platform by providing additional historical and seasonal data, as well as geospatial mapping functionality and the ability to set user-defined thresholds and customize datums, units, and vertical land motion rates.

Version one of the Calculator incorporates coastal water level data from NOAA, NASA, and the 2022 Sea Level Rise Technical Report. Data from additional agencies participating in the task force may be incorporated in future versions as interagency collaborations grow and research efforts are ready to transition to applications.

Development of the Calculator and the interagency platform took place over the past two years. While close coordination has been ongoing, it was not feasible to bring both online in a fully integrated manner. As a result, version one of the calculator is hosted within NOAA's Digital Coast platform.

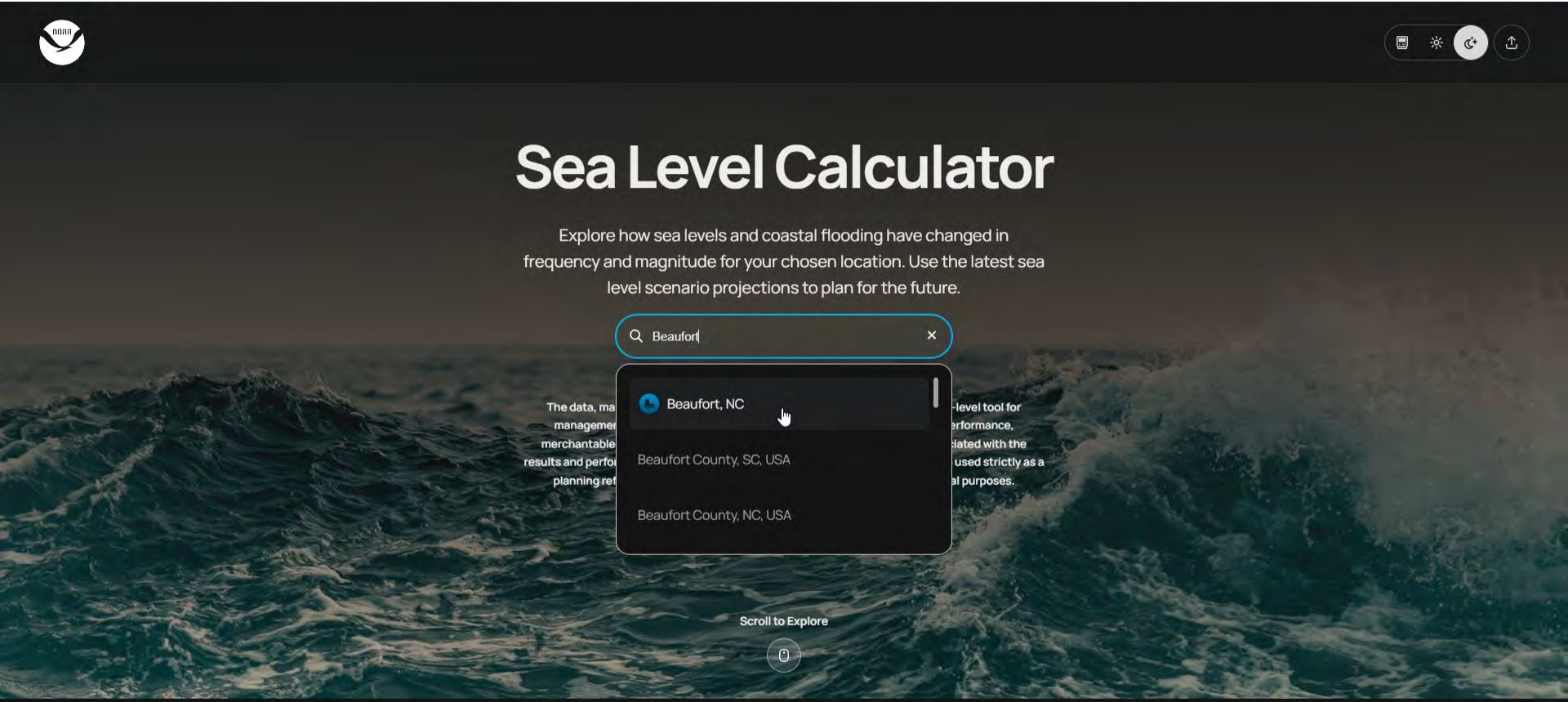
Search for a location

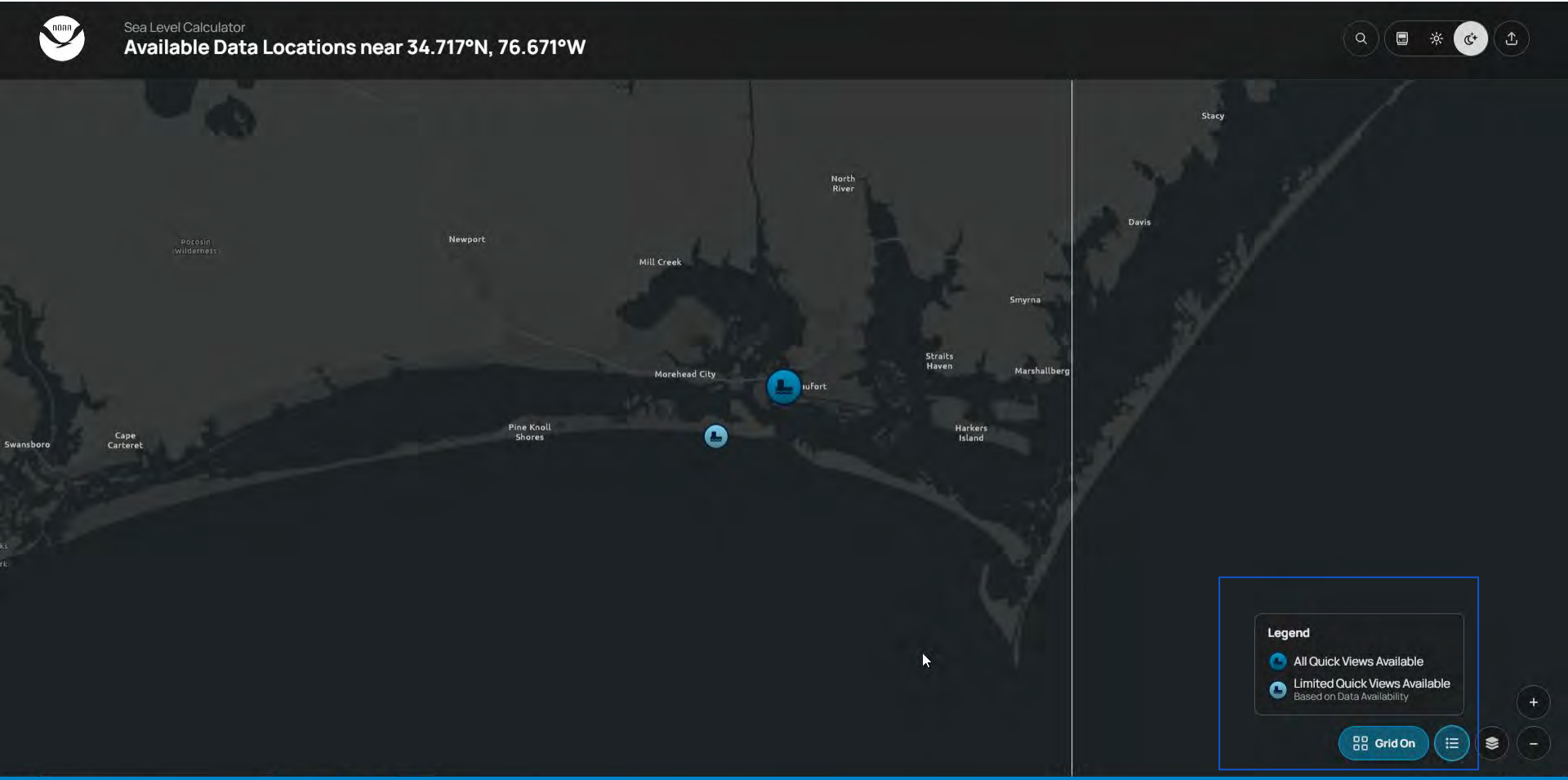
Frequently Asked Questions

We are here to help! Get answers, tips and tricks from the experts.

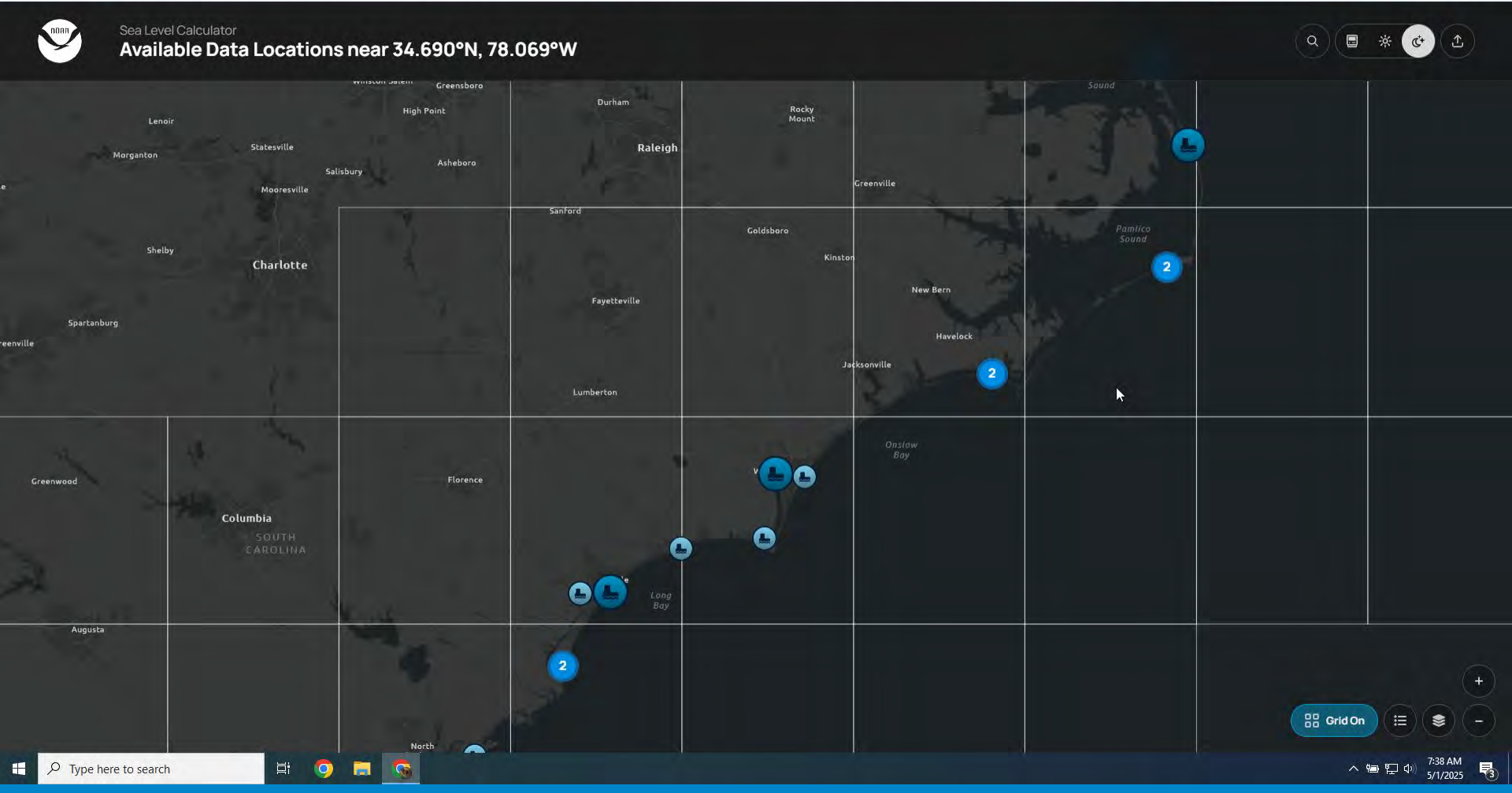
- Is there a glossary of terms and definitions to reference? +
- Why is this called a calculator? +
- Where does the data come from? +
- Can I use the Sea Level Calculator to project future sea level rise? +
- How can I report a problem or bug? +

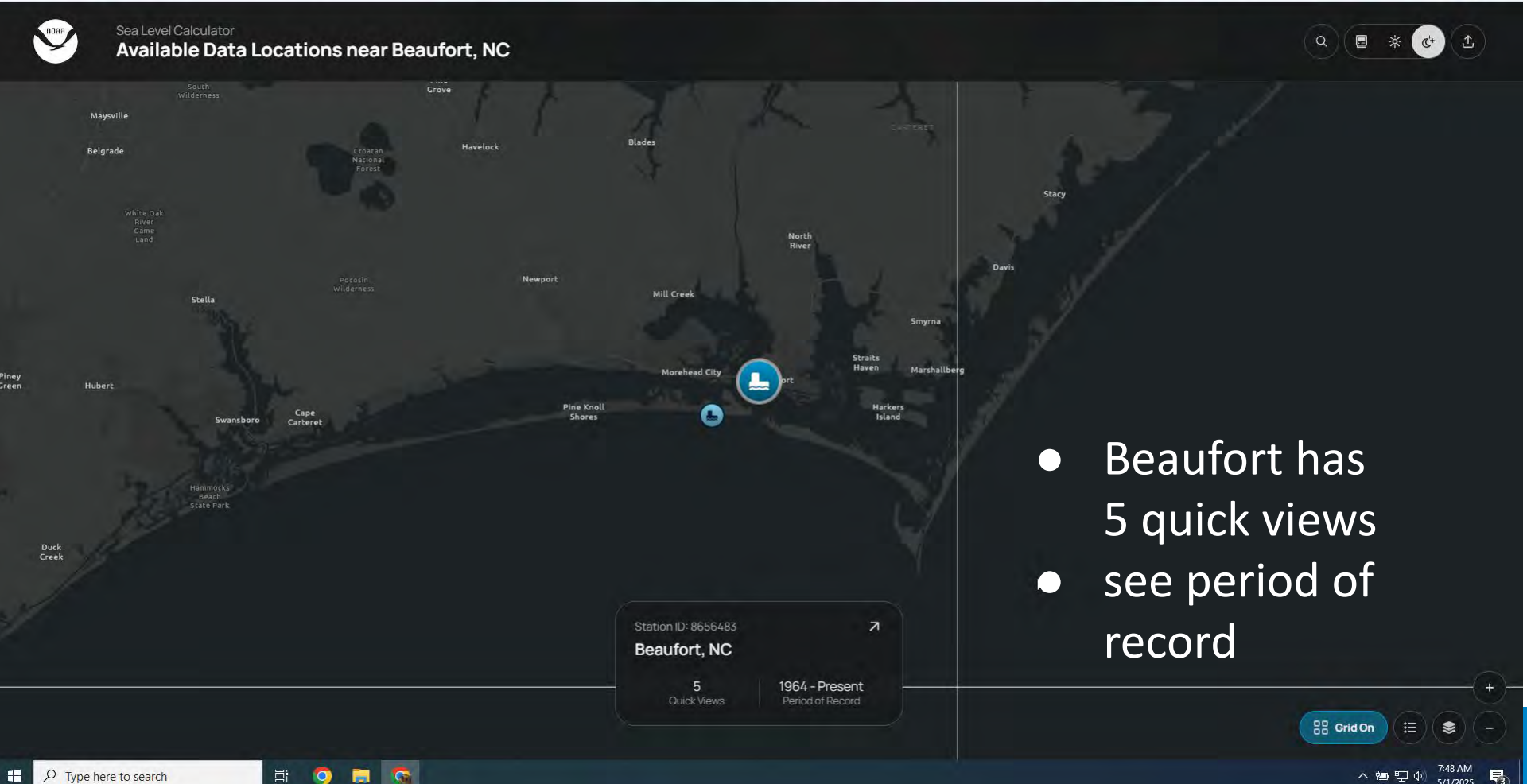
Enter location




Sea Level Calculator
Available Data Locations near 34.717°N, 76.671°W
Stacy
North River
Davis
Pocosin Wilderness
Newport
Mill Creek
Smyrna
Straits Haven
Marshallberg
Morehead City
Beaufort
Swansboro
Cape Carteret
Pine Knoll Shores
Harkers Island
Legend
All Quick Views Available
Limited Quick Views Available
Based on Data Availability
Grid On

Zoom out - See system of tide gages and grid turns on





- Beaufort has 5 quick views
- see period of record

Sea Level Calculator

Available Quick Views for Beaufort, NC

Video

Future Sea Levels

Explore scenarios for your location.

Video

Changes in Flood Frequency

Explore how often flooding has occurred in your area and how it may change in the future.

Video

Extreme Water Levels

Compare past flood events to future flood probabilities.

Video

Observed Sea Level Trends

Explore how water levels have changed over time.

Video

Seasonal Variation

Determine when flooding and extreme events are most likely to occur throughout the year.

Future Sea Levels for Beaufort, NC

Sea Level Calculator

Future Sea Levels for Beaufort, NC

View station data

Quick Views | Video

MSL Datum

Standard Units

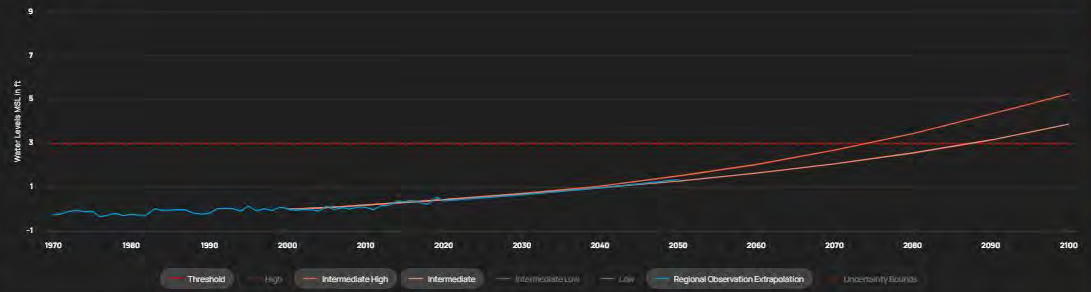
3.00 Threshold (ft)

0.065 VLM (in) per year

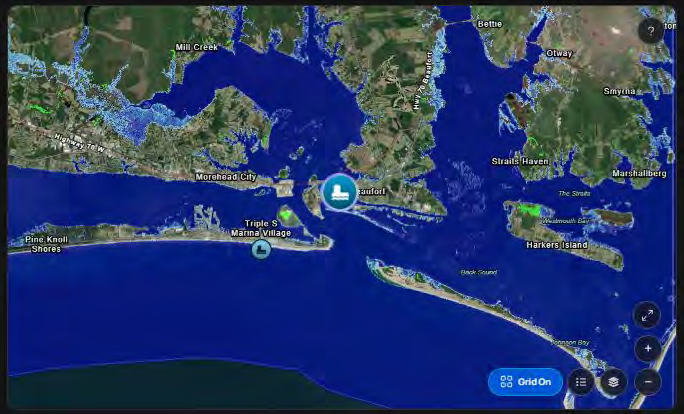
2040 Decade

2000 Reference Year

Sea Level Rise Projections



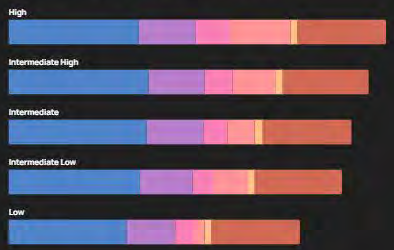
Observational and model-based data are plotted together to show past and future sea levels. The Southeast regional trajectory, based on local tide-gauge observations from 1970 to 2020, is extrapolated to 2050. Median values of model-based scenario projections are shown as solid lines, while the shaded regions represent likely ranges of 17–83 percent uncertainty. Comparing the extrapolated, observed data to the modeled scenarios help suggest which scenario is closest to your real world conditions. All data in the plot are permanently referenced to mean sea level, however values are displayed according to the user-selected datum. Map layers are referenced to MHHW but are being converted to the user-selected datum as well. Mean sea level is the default datum being displayed.



Year 3.00 ft MSL is Exceeded

Scenario	Average Sea Level	Average High Tide
High	2067	2042
Int. High	2075	2043
Intermediate	2088	2047
Int. Low	>2100	2051
Low	>2100	2058

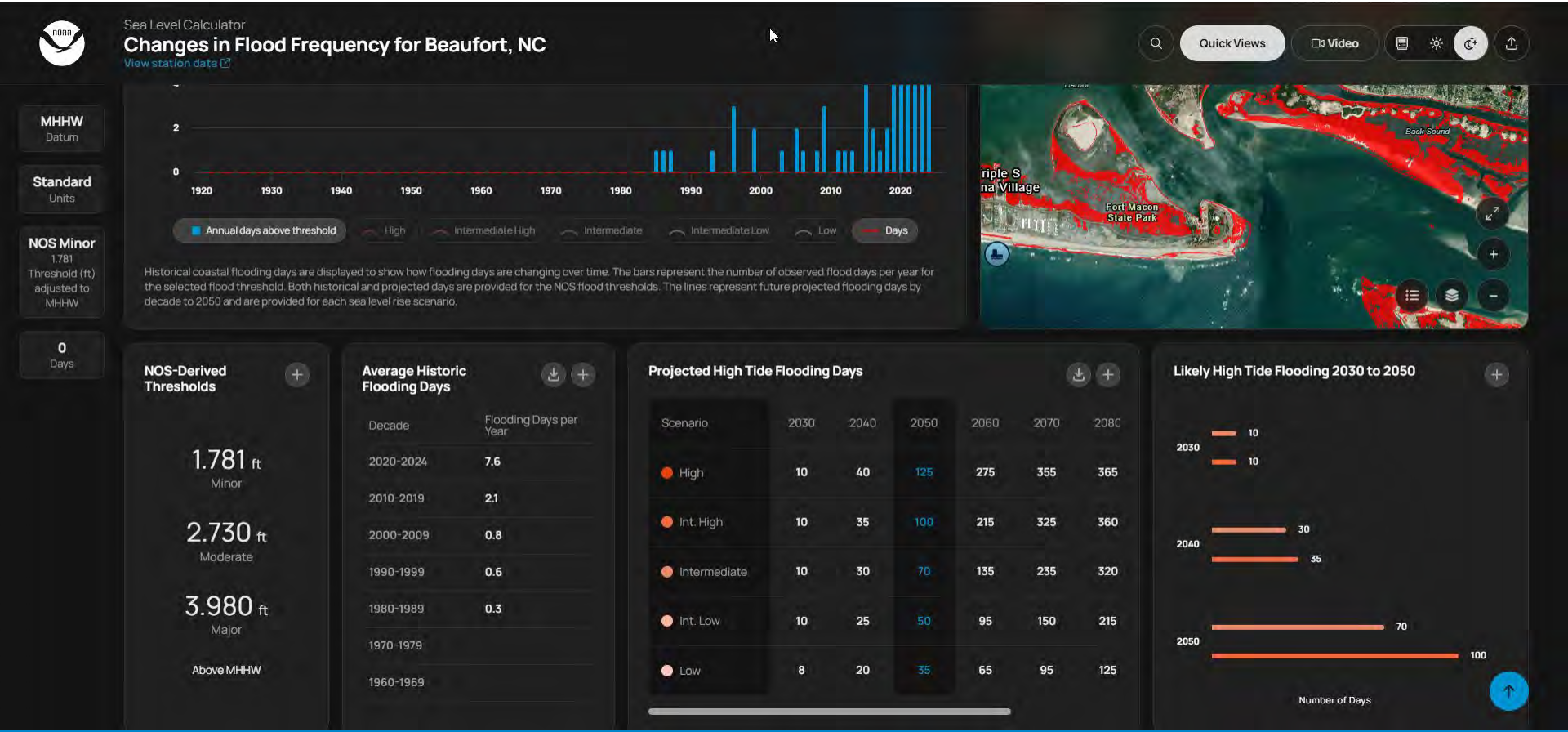
Regional Contributions to Sea Level Rise in 2040



Sea Level Rise Projections by Decade Since 2000 in MSL

Scenario	2030	2040	2050	2060	2070	2080	2090	2100
High	0.72	1.12	1.67	2.40	3.35	4.46	5.61	6.86
Int. High	0.72	1.05	1.51	2.03	2.69	3.44	4.33	5.25
Intermediate	0.69	0.98	1.28	1.64	2.07	2.56	3.15	3.87
Int. Low	0.66	0.92	1.15	1.41	1.64	1.90	2.13	2.36
Low	0.59	0.82	1.02	1.21	1.38	1.48	1.61	1.74

Changes in Flood Frequency



Extreme water levels

Sea Level Calculator

Extreme Water Levels for Beaufort, NC

View station data

Quick Views | Video

MHHW Datum

Standard Units

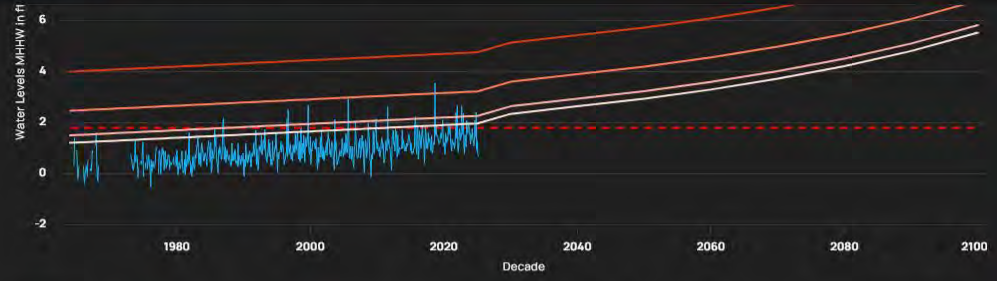
NOS Minor 1.781 Threshold (ft) adjusted to MHHW

2050 Decade

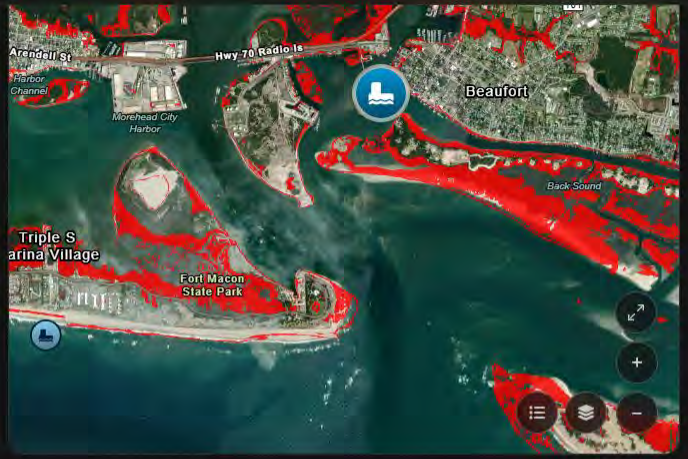
2022 Tec... Data Source

Intermed... Scenario

2000 Reference Year



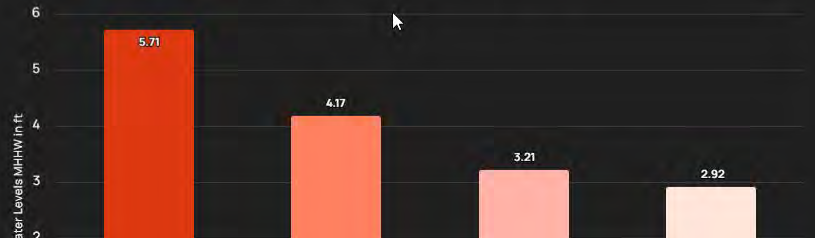
Historical and projected extreme water levels are displayed together. Using monthly maximum water level values (blue line), historical and projected extreme water level statistics are calculated and displayed as curves. For future time frames, the extreme water levels follow the user-selected sea level rise scenario projections. For historical time frames, the extreme water levels follow the station's mean sea level linear trend where available and the regional mean sea level trend if not. Use this graph to plan for future inundation potential, which differs from historical and current extreme likelihoods.



Top 10 Events by Water Level (MHHW ft)

Event	Source	Height	Date
Hurricane Florence	Observed Peak Water Level	3.65 ft	September 14, 2018
Hurricane Ione	Observed Peak Water Level	3.29 ft	September 19, 1955
Hurricane Hazel	Observed Peak Water Level	3.29 ft	October 15, 1954
Hurricane Ophelia	Observed Peak Water Level	3.01 ft	September 14, 2005

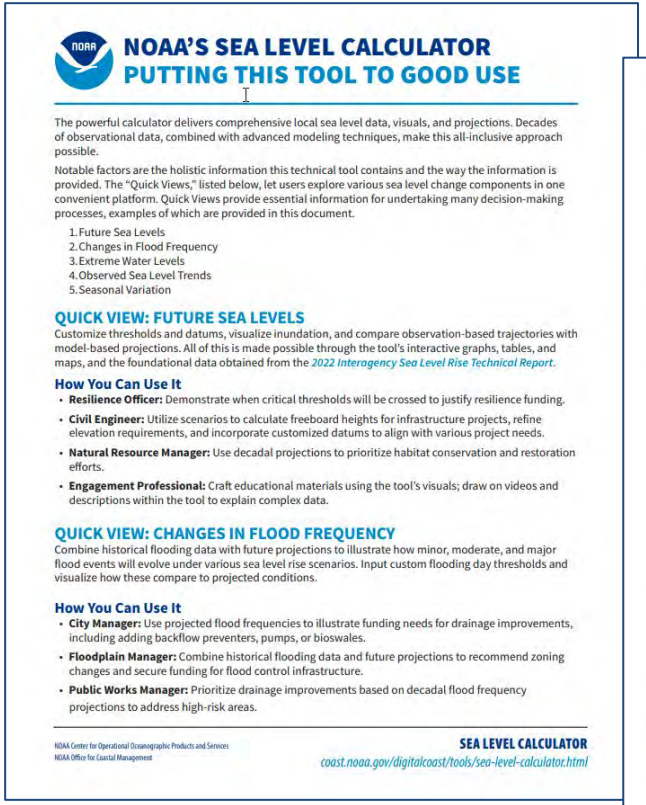
Average Event Frequency Levels in 2050 under the Intermediate Scenario



Observed sea level trends and how those are projected to change

Seasonal Variations - how flooding fluctuates throughout the year

Quick Reference



NOAA'S SEA LEVEL CALCULATOR
PUTTING THIS TOOL TO GOOD USE

The powerful calculator delivers comprehensive local sea level data, visuals, and projections. Decades of observational data, combined with advanced modeling techniques, make this all-inclusive approach possible.

Notable factors are the holistic information this technical tool contains and the way the information is provided. The "Quick Views," listed below, let users explore various sea level change components in one convenient platform. Quick Views provide essential information for undertaking many decision-making processes, examples of which are provided in this document.

1. Future Sea Levels
2. Changes in Flood Frequency
3. Extreme Water Levels
4. Observed Sea Level Trends
5. Seasonal Variation

QUICK VIEW: FUTURE SEA LEVELS

Customize thresholds and datums, visualize inundation, and compare observation-based trajectories with model-based projections. All of this is made possible through the tool's interactive graphs, tables, and maps, and the foundational data obtained from the *2022 Interagency Sea Level Rise Technical Report*.

How You Can Use It

- **Resilience Officer:** Demonstrate when critical thresholds will be crossed to justify resilience funding.
- **Civil Engineer:** Utilize scenarios to calculate freeboard heights for infrastructure projects, refine elevation requirements, and incorporate customized datums to align with various project needs.
- **Natural Resource Manager:** Use decadal projections to prioritize habitat conservation and restoration efforts.
- **Engagement Professional:** Craft educational materials using the tool's visuals; draw on videos and descriptions within the tool to explain complex data.

QUICK VIEW: CHANGES IN FLOOD FREQUENCY

Combine historical flooding data with future projections to illustrate how minor, moderate, and major flood events will evolve under various sea level rise scenarios. Input custom flooding day thresholds and visualize how these compare to projected conditions.

How You Can Use It

- **City Manager:** Use projected flood frequencies to illustrate funding needs for drainage improvements, including adding backflow preventers, pumps, or bioswales.
- **Floodplain Manager:** Combine historical flooding data and future projections to recommend zoning changes and secure funding for flood control infrastructure.
- **Public Works Manager:** Prioritize drainage improvements based on decadal flood frequency projections to address high-risk areas.

NOAA Center for Operational Oceanographic Products and Services
NOAA Office for Coastal Management

SEA LEVEL CALCULATOR
coast.noaa.gov/digitalcoast/tools/sea-level-calculator.html

QUICK VIEW: EXTREME WATER LEVELS

Access probabilities for extreme water levels, including projections developed using the various user-selected sea level rise scenarios. Review top historical flood events and compare them to future probabilities.

How You Can Use It

- **Structural Engineer:** Use extreme water level probabilities to set safe building elevations to prepare structures for current and future flooding.
- **Emergency Manager:** Review historical flood events to assess emergency services needed and use future probabilities to plan updated procedures and evacuation routes.
- **Planners and Public Works Managers:** Plan for high-risk events by comparing historical context to future flood probabilities and allocating resources effectively.

QUICK VIEW: OBSERVED SEA LEVEL TRENDS

Examine historical sea level trends with tide gauge and satellite data. Explore regional extrapolations to project future conditions. See how rates of rise have evolved over time, helping ground community planning in a historical context.

How You Can Use It

- **Land Use Planner:** Influence zoning policies by demonstrating historical sea level change and potential future acceleration.
- **Engineer:** Fine-tune elevation requirements for developments by assessing local trends against regional and global data.
- **Engagement Professional:** Build community trust by using local sea level trends to explain risks and justify planning priorities.

QUICK VIEW: SEASONAL VARIATION

Anticipate risk periods and plan for infrastructure maintenance, road closings, and public safety measures by using the monthly flooding and extreme events data.

How You Can Use It

- **Natural Resource Manager:** Plan seasonal trail closures and maintenance schedules to protect habitats during high-risk periods.
- **Public Works Manager:** Schedule maintenance strategically to address recurring seasonal flooding issues.
- **Floodplain Manager:** Educate residents and local governments about seasonal flood risks to improve preparedness efforts.

SEA LEVEL CALCULATOR
coast.noaa.gov/digitalcoast/tools/sea-level-calculator.html
NOAA OFFICE FOR COASTAL MANAGEMENT
NOAA CENTER FOR OPERATIONAL OCEANOGRAPHIC PRODUCTS AND SERVICES

coast.noaa.gov/data/digitalcoast/pdf/slc-uses.pdf

Sea Level Calculator

coast.noaa.gov/digitalcoast/tools/sea-level-calculator.html

Southeast and Caribbean Geospatial Coordinator *Matt.Pendleton@noaa.gov*
Southeast and Caribbean Learning Services Coordinator *Tashya.Allen@noaa.gov*

Climate Pollution Reduction Grant

Jacob Boyd

Salt Marsh Program Director

NC Coastal Federation

Coastal Resilience Community of Practice | May 1, 2025

NC COASTAL FEDERATION SALT MARSH PROGRAM

North Carolina Coastal Federation

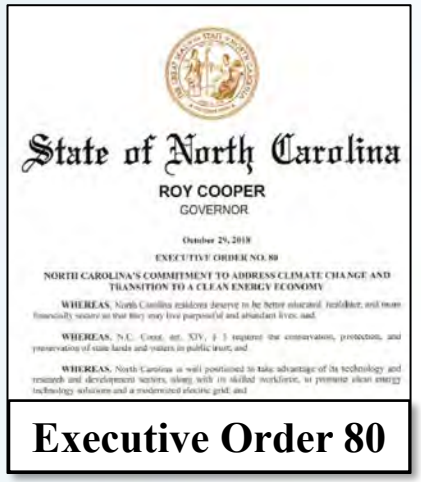
Working Together for a Healthy Coast

Overview

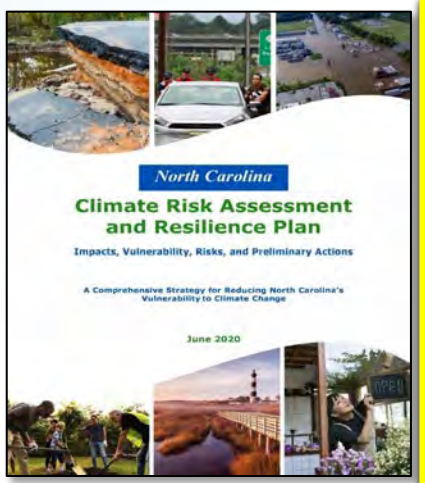
- Background
- EPA's Climate Pollution Reduction Grant Program
- Atlantic Conservation Coalition Climate Pollution Reduction Grant
- Coastal Habitat Enhancement Initiative

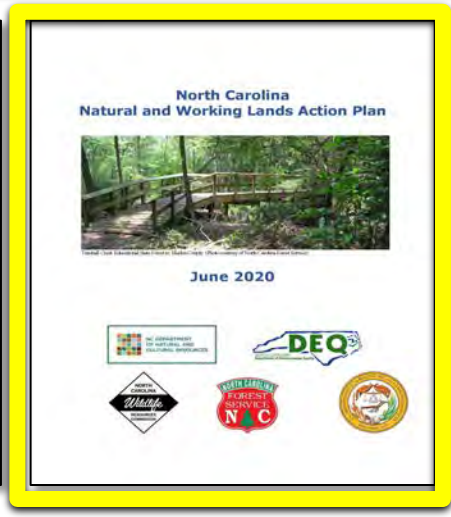
North Carolina Coastal Federation
Working Together for a Healthy Coast

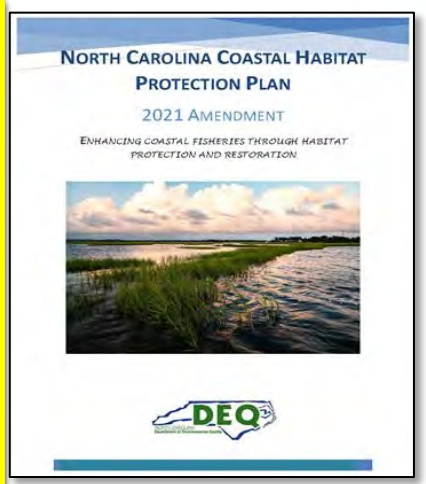
2018 2020 2021 2023

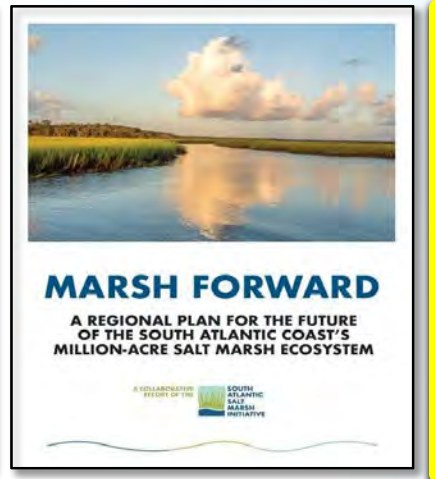


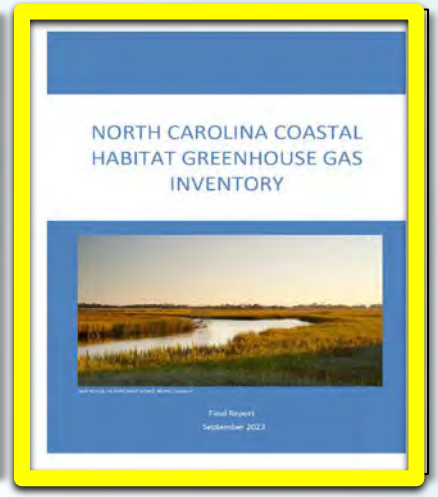
Executive Order 80



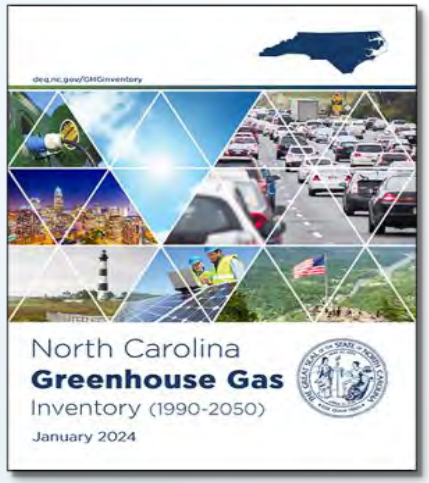




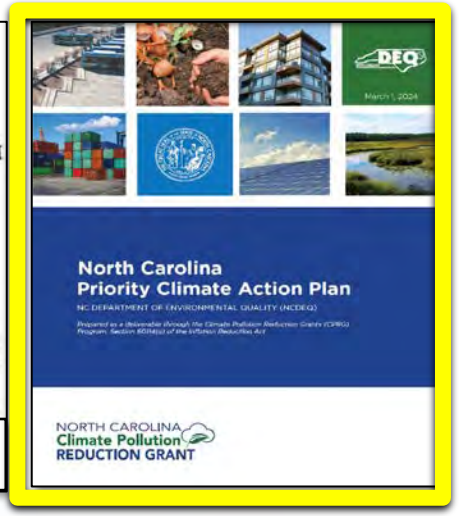


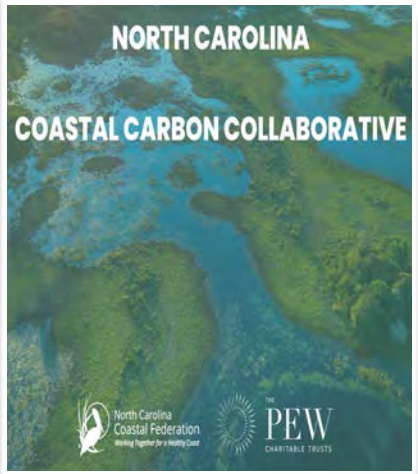


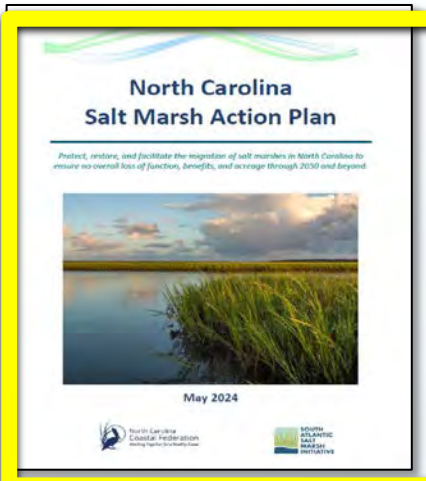
2024



Executive Order 305



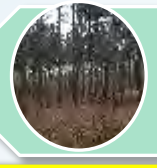




Atlantic Conservation Coalition

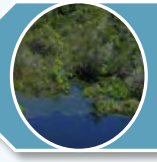
CPRG
CLIMATE POLLUTION REDUCTION GRANTS
U.S. Environmental Protection Agency

NC Natural and Working Lands Action Plan 2020



Forestry

Floodplains & Wetlands



Pocosins

Coastal Habitats

Agriculture

Urban Lands

Enhance carbon sequestration and mitigate GHG emissions

Build resilience in ecosystems and communities

Provide public health and ecosystem benefits

Create economic opportunities

Ensure implementation is socially equitable

North Carolina Coastal Federation
Working Together for a Healthy Coast

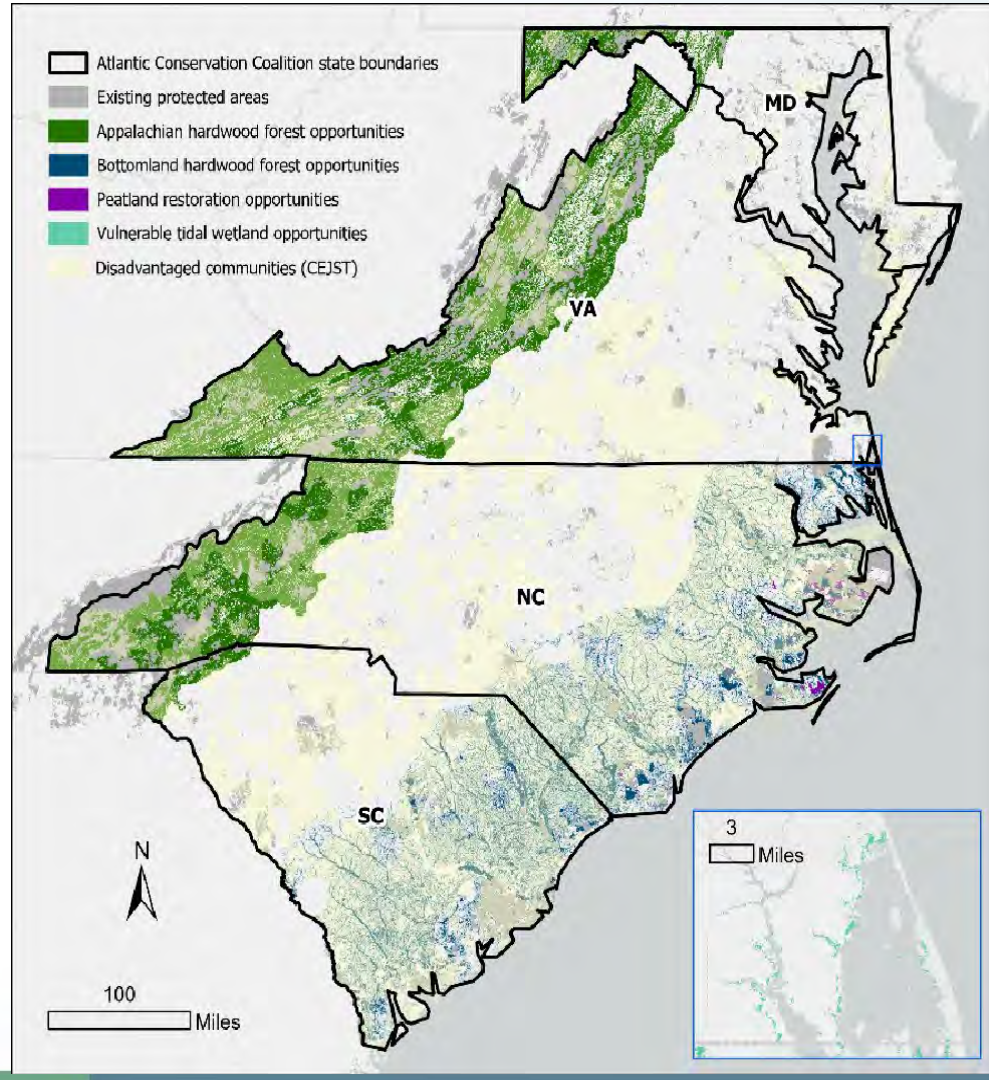
EPA's Climate Pollution Reduction Grant Program

- **Priority Climate Action Plan (Mar 2024)**
  - Aimed at reducing GHG emissions
  - Avoided carbon emissions and enhanced carbon sequestration
  - Protect and restore high-carbon coastal habitats and peatlands
- **Implementation Proposal (April 2024)**
  - Regional approach to implement PCAP on NWLs led by NC

North Carolina Coastal Federation
Working Together for a Healthy Coast

Atlantic Conservation Coalition (ACC)

- NC, SC, MD, VA, TNC, NCCF
- NC Dept. of Natural and Cultural Resources leading
- Numerous project partners



Aug 2024 - EPA announces historic $421M to ACC

$421 million over 5 years

- $50 million each in MD, VA, NC, and SC
- $200 million to The Nature Conservancy across region

28 million metric tons CO2e reduced by 2050

- = removing 6.6 million gas cars from road for a year

2 project measures

1. Protect and restore **coastal habitats and peatlands**
2. Protect, use, and restore **forested land**

Project Overview: North Carolina

Project 1: Coastal Habitat Enhancement Initiative ($30 million)	NC Coastal Federation - 100 acres of peatland restoration, living shoreline installation protecting 595 acres of salt marsh, 131 acres of conservation for marsh migration, USGS study on carbon sequestration in coastal habitats
Project 2: High Carbon Acquisitions for State Park System ($10 million)	Acquire up to 3,300 acres of forests and peatlands to add to the state park system and avoid conversion
Project 3: Climate Smart Forestry in Low-income and Disadvantaged Communities ($3 million)	Tree planting and climate smart forestry on 6,000 acres with historically marginalized landowners
Project 4: Rapid Tree Growth High-Carbon Forestry Cost Share ($5 million)	Cost share program to incentivize 49,000 acres worth of high-carbon tree seedling plantings across tree farms statewide
Project 5: Urban Tree Planting Program ($1 million)	1,250 urban trees to be planted and maintained. Priority will be given to small and medium-sized communities with limited financial capacity for urban forestry programs.
Project 6: Executive Order 305 Implementation ($1 million)	Funding for NCDNCR to implement goals and deliverables of EO 305

Project 1: Coastal Habitat Enhancement Initiative

NC Coastal Federation awarded $30M to restore and protect ~ 600 acres of high carbon coastal habitats

Protection Efforts

Restoration Projects

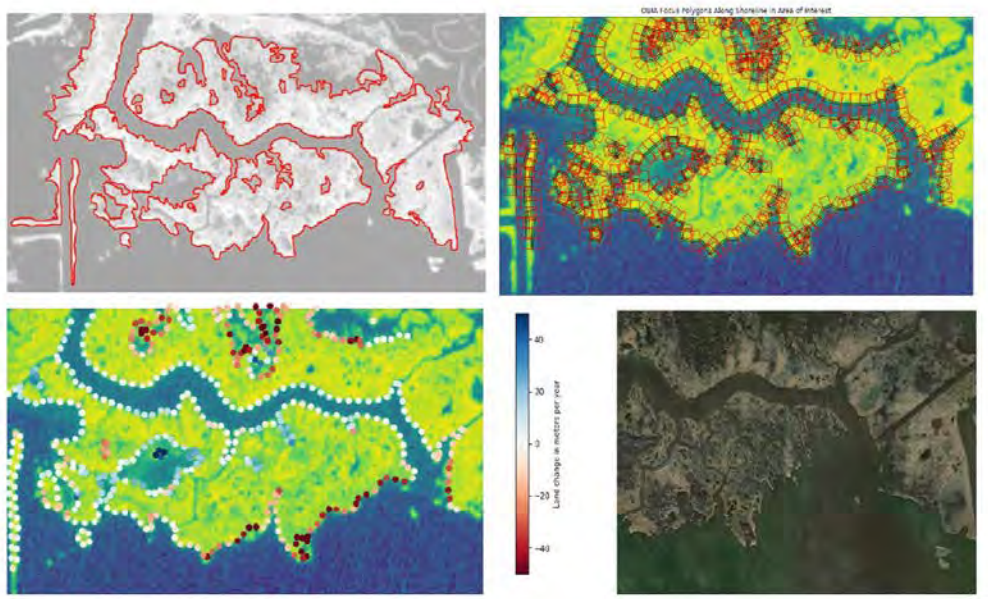
Community Involvement

Scientific Research

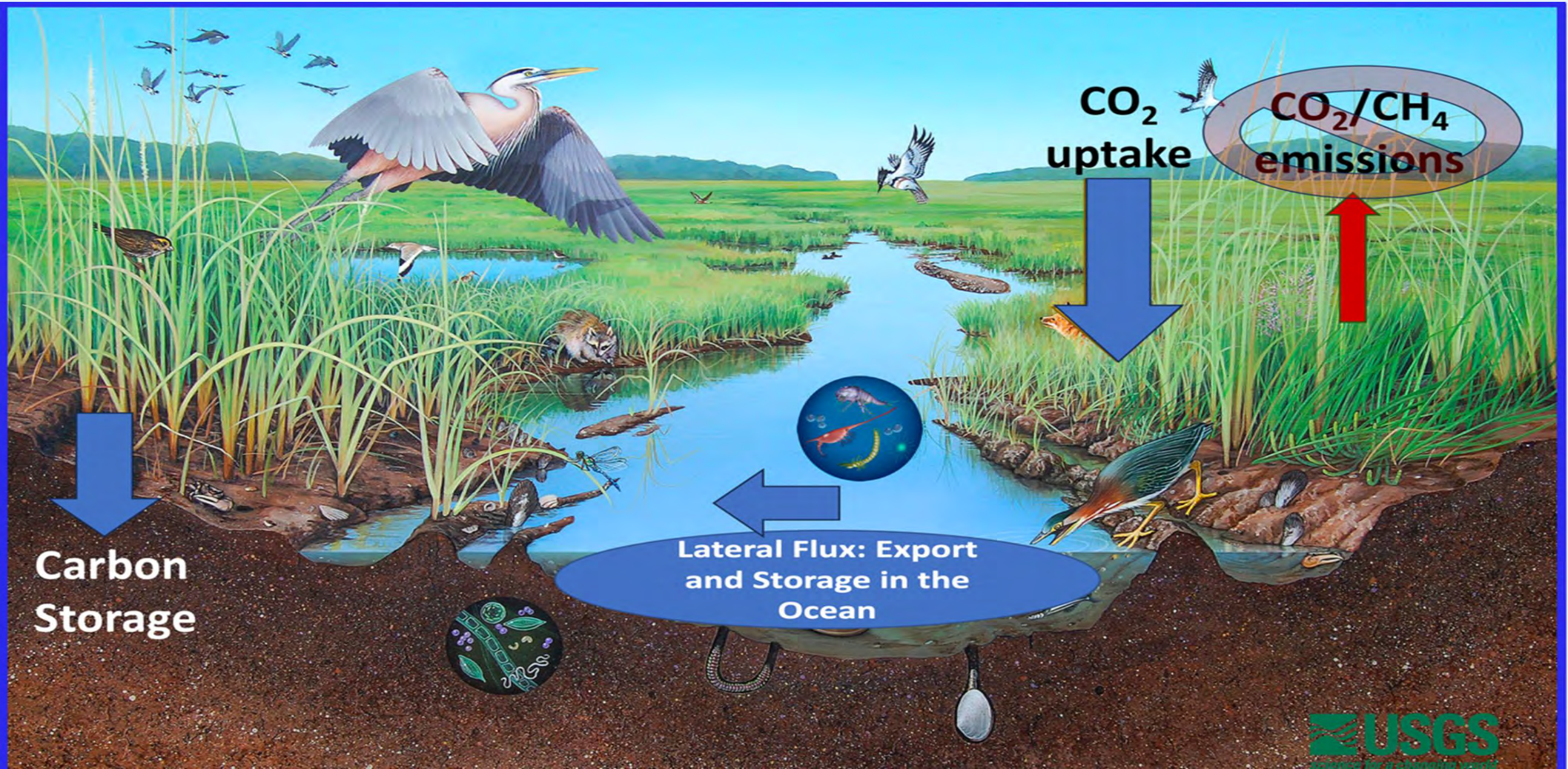
Identification and Prioritization of Projects

- **Natrx assess erosion and soil organic carbon analysis**
  - Prioritize potential sites through a multivariable approach
  - Understand baseline erosion conditions and GHG mitigation potential
  - Inform project development
- **Partner and stakeholder input**
  - Salt Marsh Steering Committee
  - ACC Research Coordination Workgroup
  - NC Coastal Wetlands Carbon Workgroup
  - Coastal carbon lateral flux workshop

Natrx Assess: Geospatial Analysis Technology



Research: Coastal Carbon Flux



www.resilienceexchange.nc.gov/

Thank You!

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https://www.nccoast.org/salt-marsh/

NC COASTAL FEDERATION
SALT MARSH PROGRAM

North Carolina
Coastal Federation
Working Together for a Healthy Coast