United States Environmental Protection Agency

Solutions-Driven Research Project: Building and Maintaining Coastal Community Resilience through Blue Carbon Resources

11/15/2022

Habitat Goal Team Meeting

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Coastal Resilience & Climate Change Mitigation

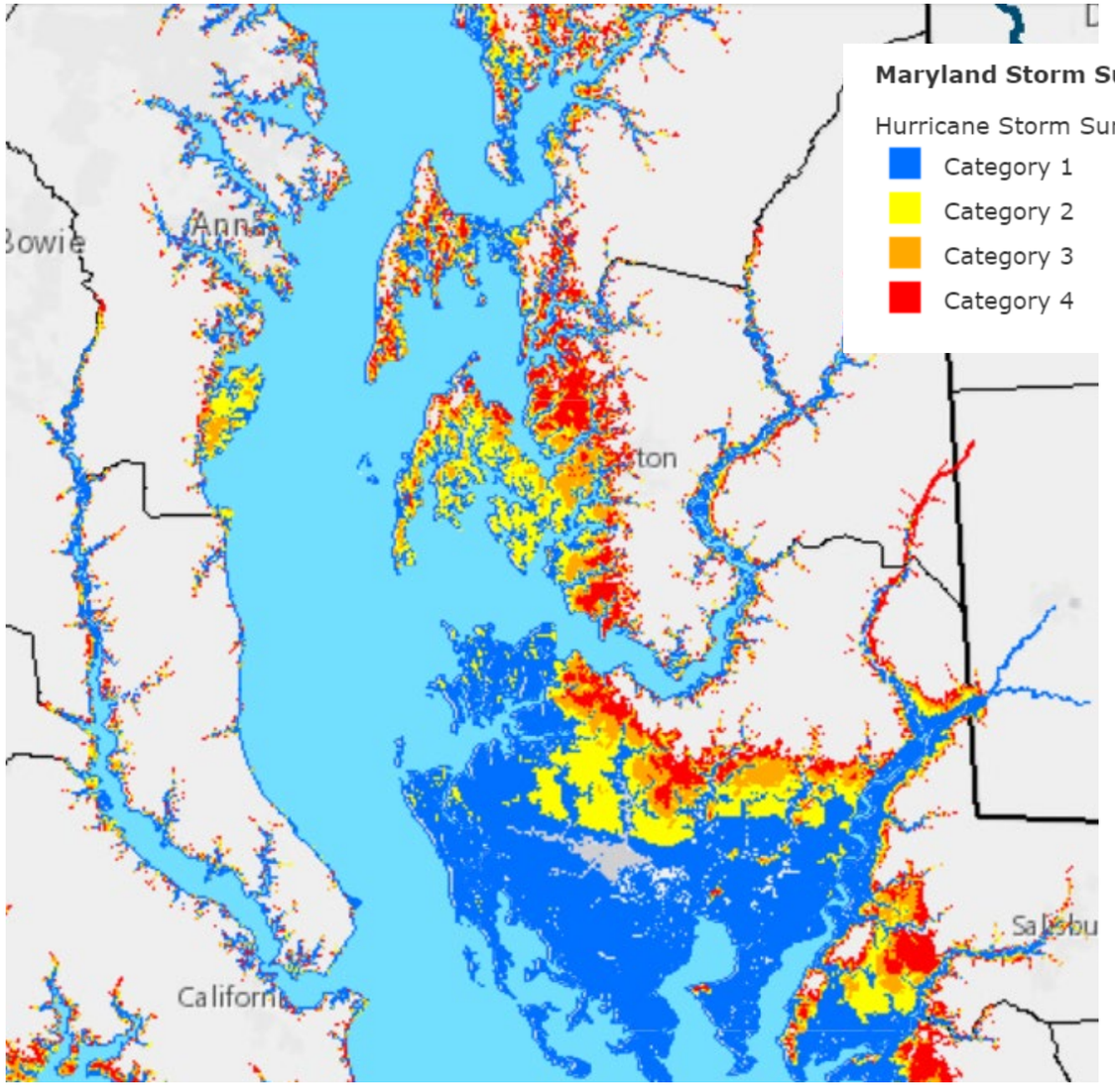
Goals:

- Work with a local Chesapeake Bay coastal community to help solve its **coastal resilience issues**.
- Identify and assess **co-benefits** associated with coastal resilience solutions.
- Incorporate/investigate natural infrastructure options that have **blue carbon sequestration potential**.

Process: *Co-develop research and engage community throughout.*

Community: Working with under-served, under-represented, and/or vulnerable community.

Example Coastal Resilience Issue: Storm Surge Flooding



Risk of storm tide flooding from hurricanes as predicted by NOAA SLOSH model. Obtained from Chesapeake Bay Program EJ and Equity Dashboard: https://chesapeake-deij2-chesbay.hub.arcgis.com/

What is Blue Carbon Natural Infrastructure?

- Intersection of coastal resilience and carbon sequestration
  - Saltmarsh (i.e., saline tidal wetlands)
  - Underwater seagrasses (i.e., submerged aquatic vegetation, SAV)

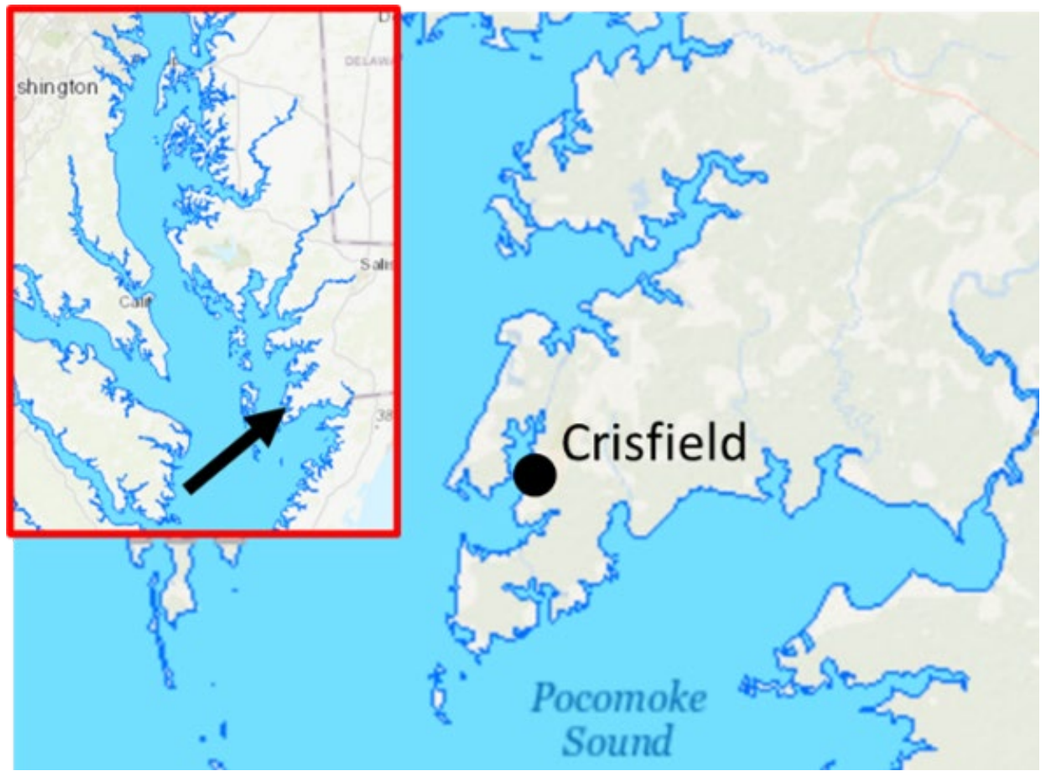
- Coastal, saline, vegetated systems that:
  - Provide protections against wave energy and erosion to improve coastal resilience
  - Sequester carbon in their leaves, stems, and root structures and surrounding sediment
  - Provide additional co-benefits such as water quality improvement; ecological habitat for fish, birds, and others; recreational and tourism opportunity

Engagement and Input Into Scope & Community

- **EPA:** Region 3, Chesapeake Bay Program Office, Office of Research and Development, Office of Air & Radiation, Office of Water/OWOW
  - EPA Region 3 incorporated SDR into ROAR proposal and Regional Climate Adaptation Plan
- **Chesapeake Bay Program**
  - Habitat, SAV, Wetland, and Climate Resiliency Workgroups
  - Local Government coordinators
- **Federal:** NOAA, DOE, USACE, NPS, FEMA
- **States:** Maryland Department of Natural Resources
- **Academic**: Virginia Institute of Marine Science, Duke University, University of Maryland
- **Non-profits:** The Nature Conservancy, The Conservation Fund, Chesapeake Bay Trust, Delmarva Restoration and Conservation Network

Community of Focus: Crisfield, MD

- Historically under-served and vulnerable community on Lower Eastern Shore of Maryland
- Facing coastal resilience and flooding issues
- Many natural infrastructure/blue carbon opportunities (salt marshes, seagrasses)
- Existing work/partners:
  - The Nature Conservancy, George Mason University, and University of Maryland
  - FEMA Direct Technical Assistance
  - National Park Service
- Community Advisory Committee of local leaders from businesses, churches, and nonprofits



Marsh area in town

Storm flooding

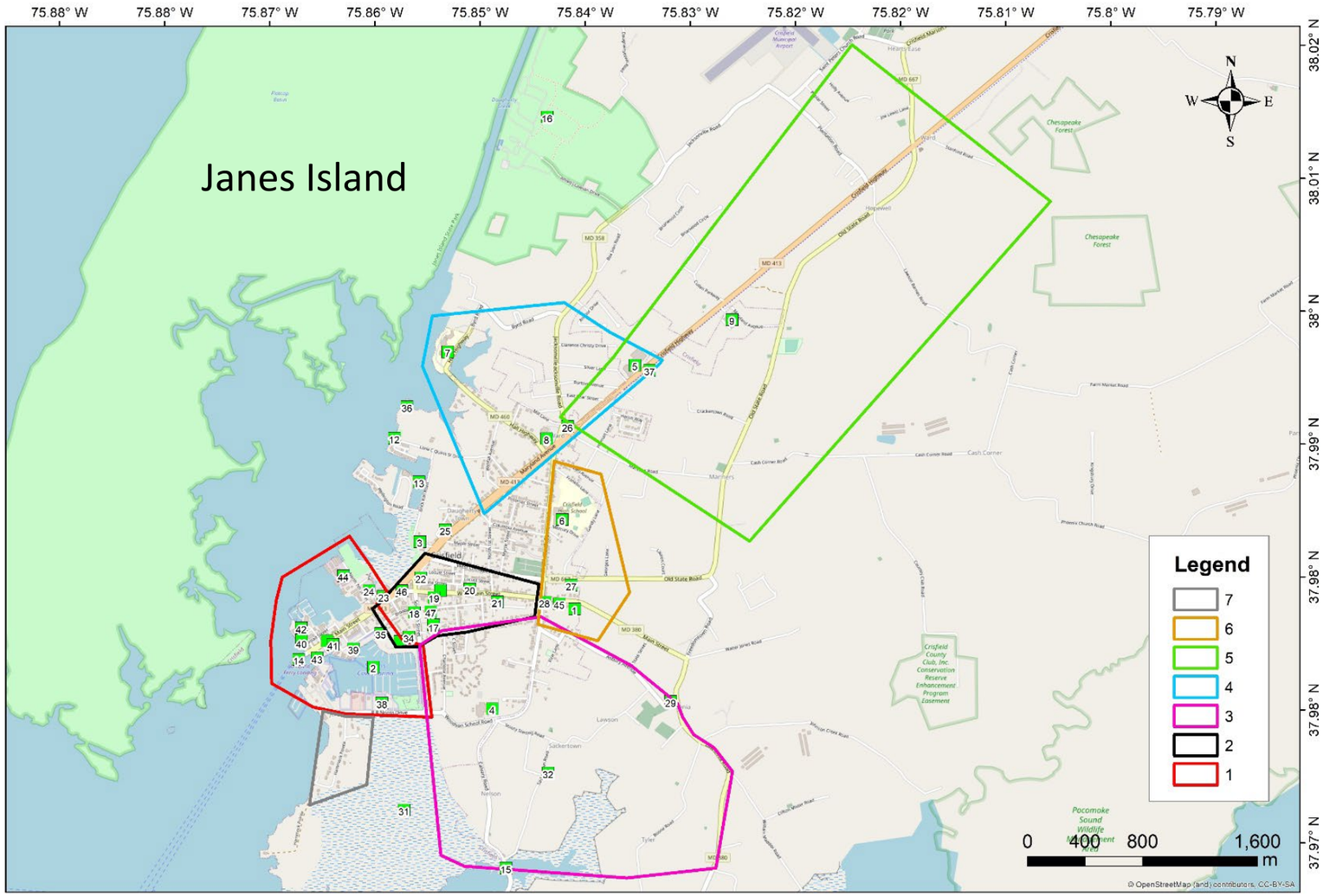
From: City of Crisfield Drainage Assessment Report

June Community Advisory Committee Meeting

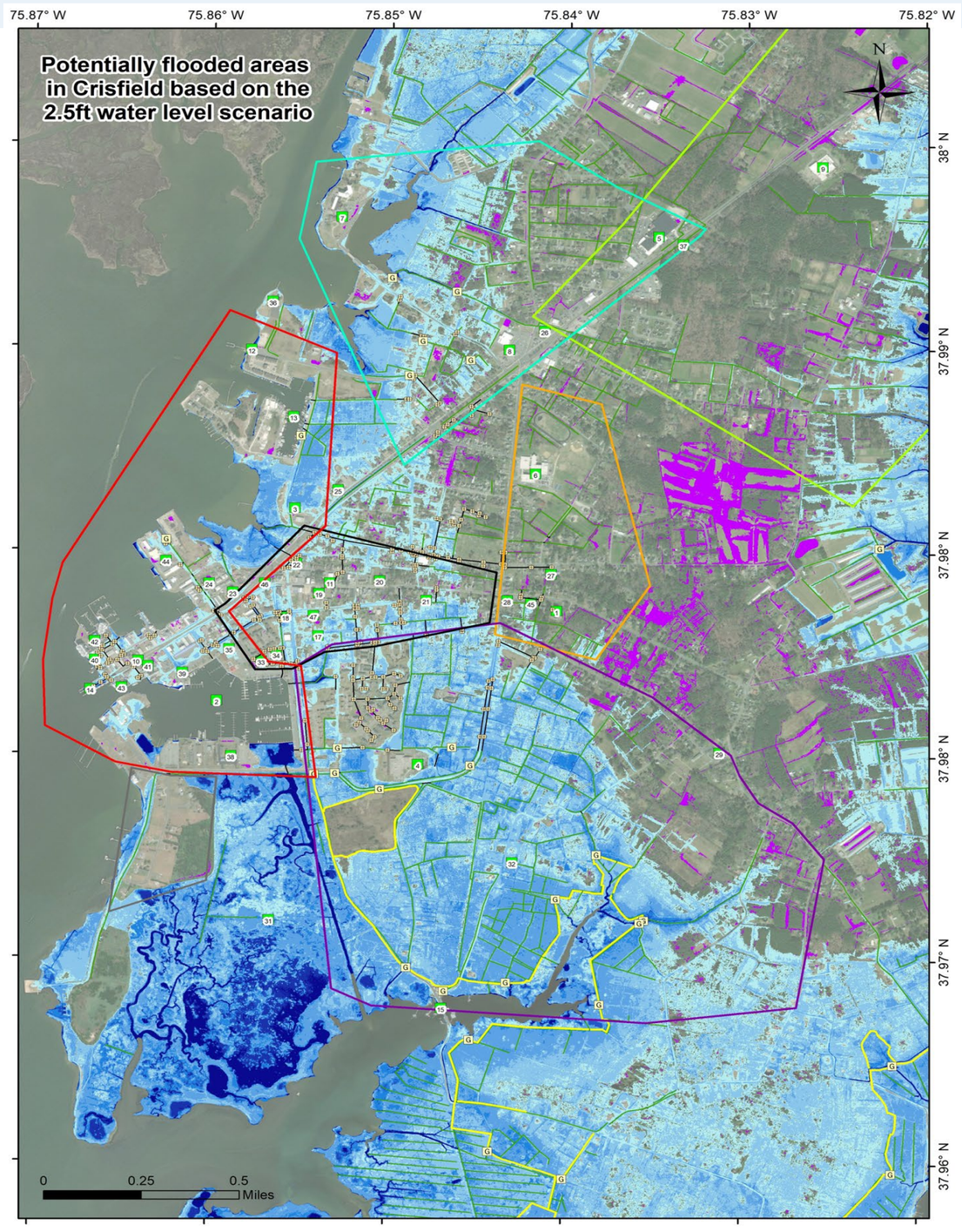
- **Community's coastal resilience goals:**
  - Resilient infrastructure, job creation and training, flood-safe and affordable housing, recreational opportunities, social/cultural spaces, youth development
  - Also interested in community retention and cultural preservation, tourism tied to the waterfront (maritime history/heritage tourism, boating, fishing, nature appreciation), and fisheries (oysters, blue crabs)
- **Sources of flooding:** poor drainage, storm events, higher tides (SLR), sinking land, erosion of islands
- **Impacts of flooding**: limited economic opportunity, increased costs, mental and physical health, declining quality of life, people moving away

Mapping of Priority Areas In and Around Crisfield

- The community identified priority locations containing assets critically linked to supporting the coastal resilience goals
- For each location, discussed flood vulnerability and adaptation timeline
- Also designated importance of Janes Island marshes
- Project team (with input from others) beginning to map which coastal adaptation strategies are appropriate to consider in each priority area



October Community Advisory Committee Meeting



- **Select flooding hazards to assess:**
  - What are we protecting against?
  - 1.5 ft water levels – 88 days in 2021
  - 2.5 ft water levels – 6 days in 2021
  - 3.5 ft water levels – Hurricane in 2003
  - 4 ft water levels – Storm in Oct. 2021
- **Discuss adaptation pathways:**
  - Over what time frame?
  - Short-term, no major shift in conditions
    - → Persistence strategies
  - Long-term, gradual shifts in conditions
    - → Adaptive strategies
  - Long-term, radical shifts in conditions
    - → Transformative strategies

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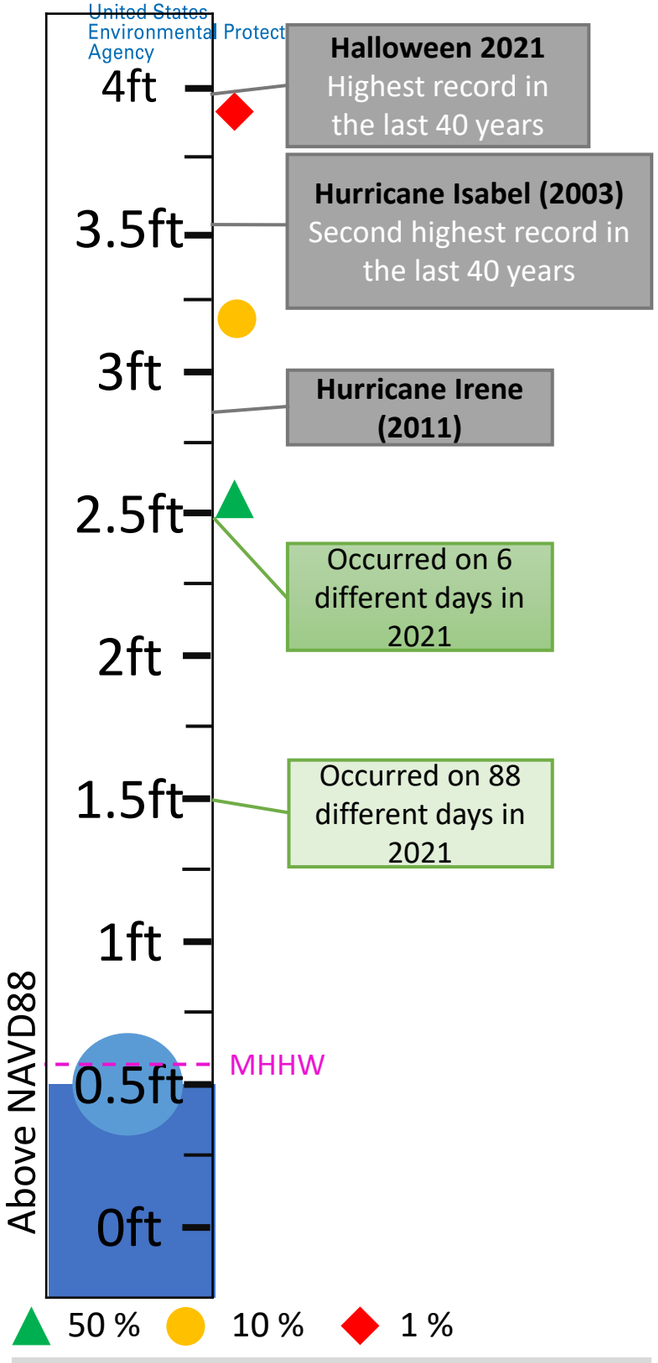
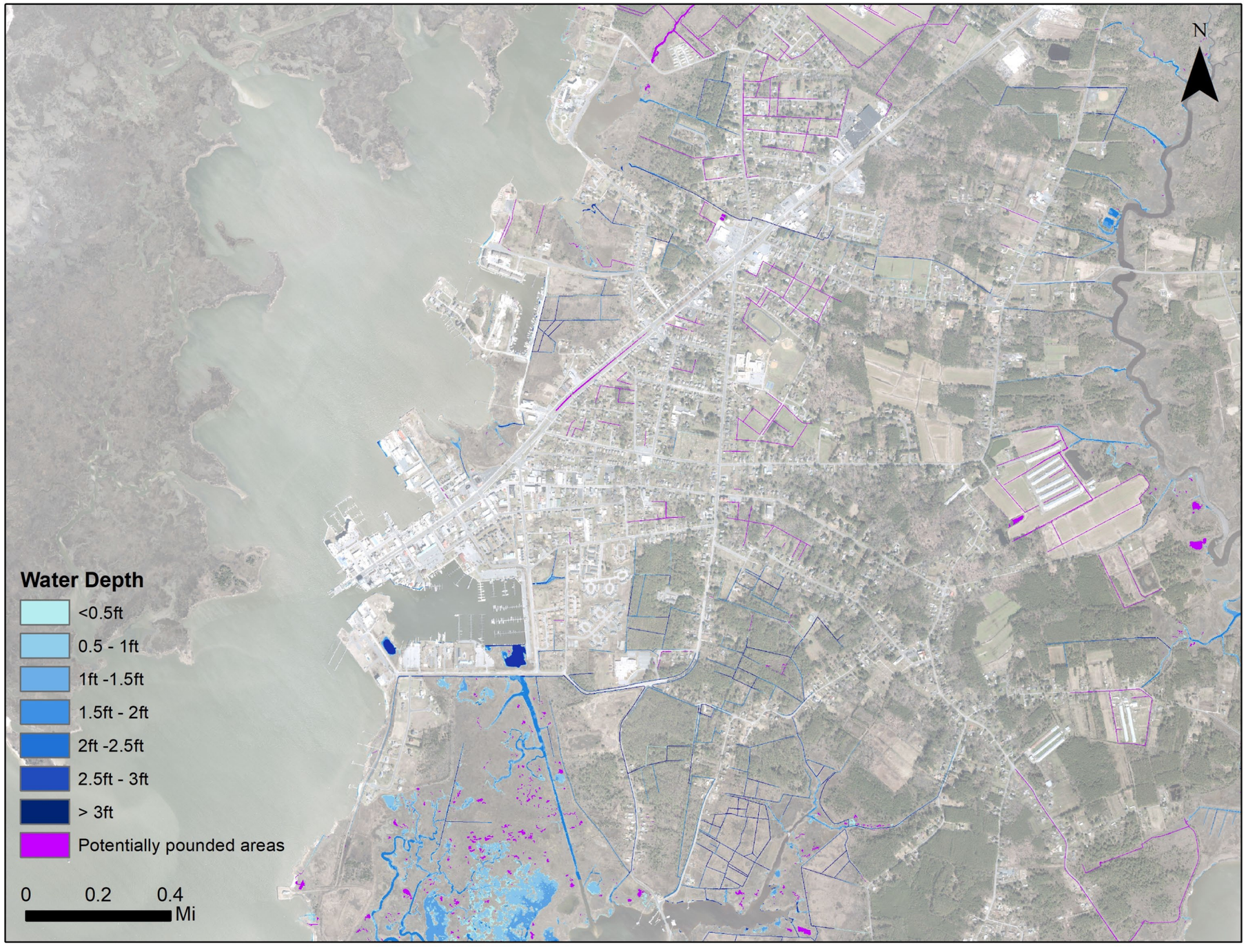


Annual exceedance probability and historical storms water levels at the Solomons Island NOAA Station (1982-2021).



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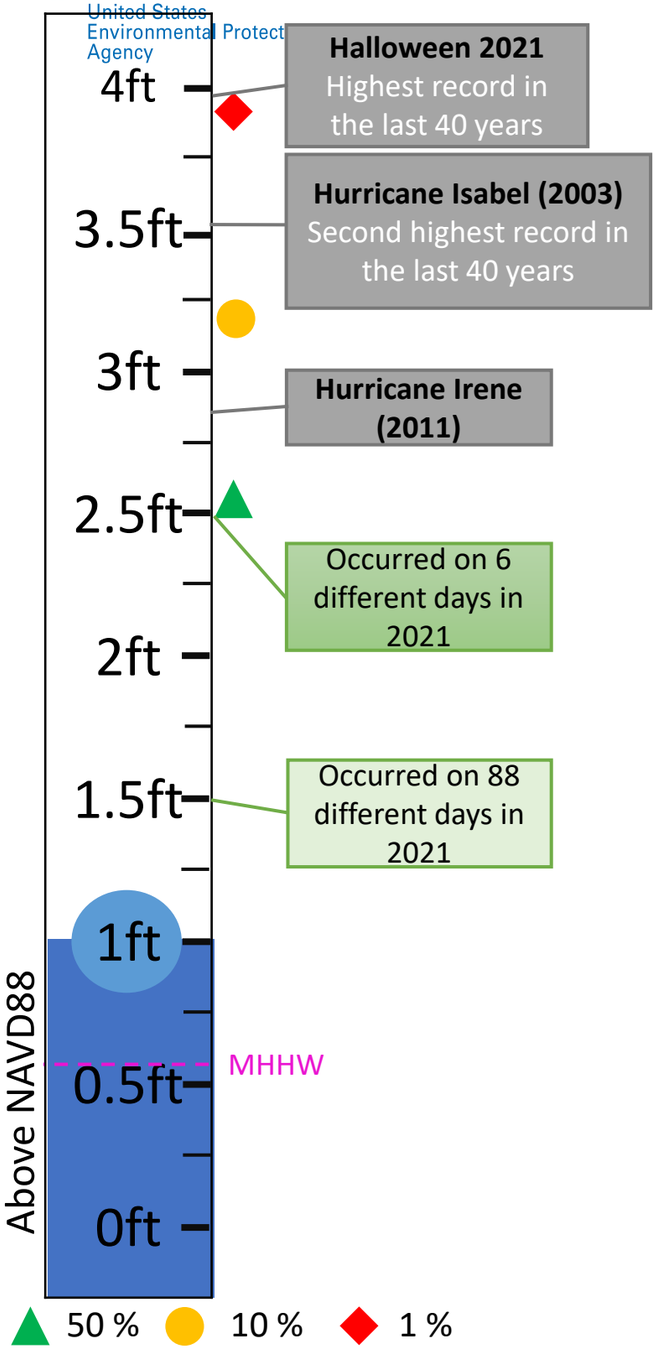

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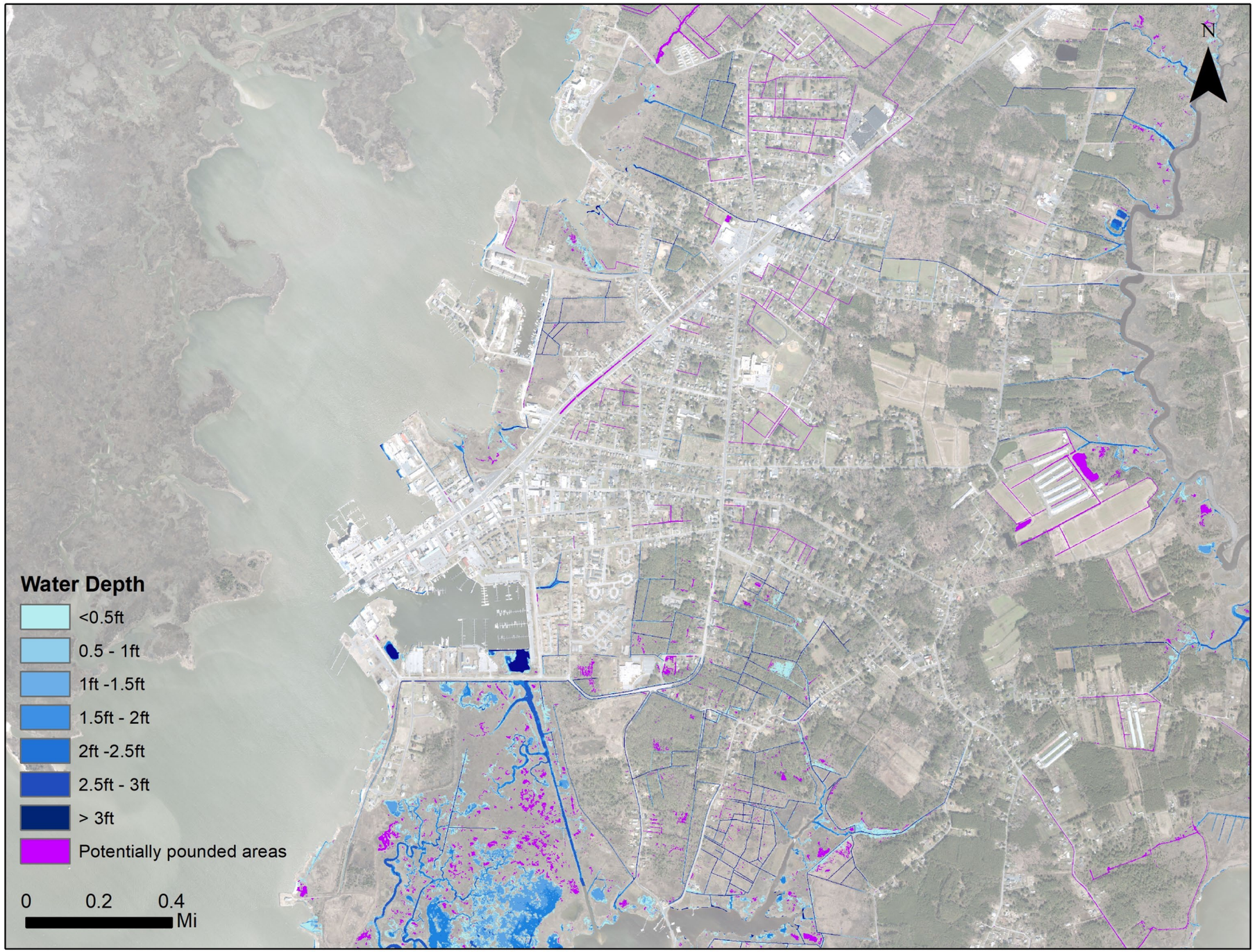

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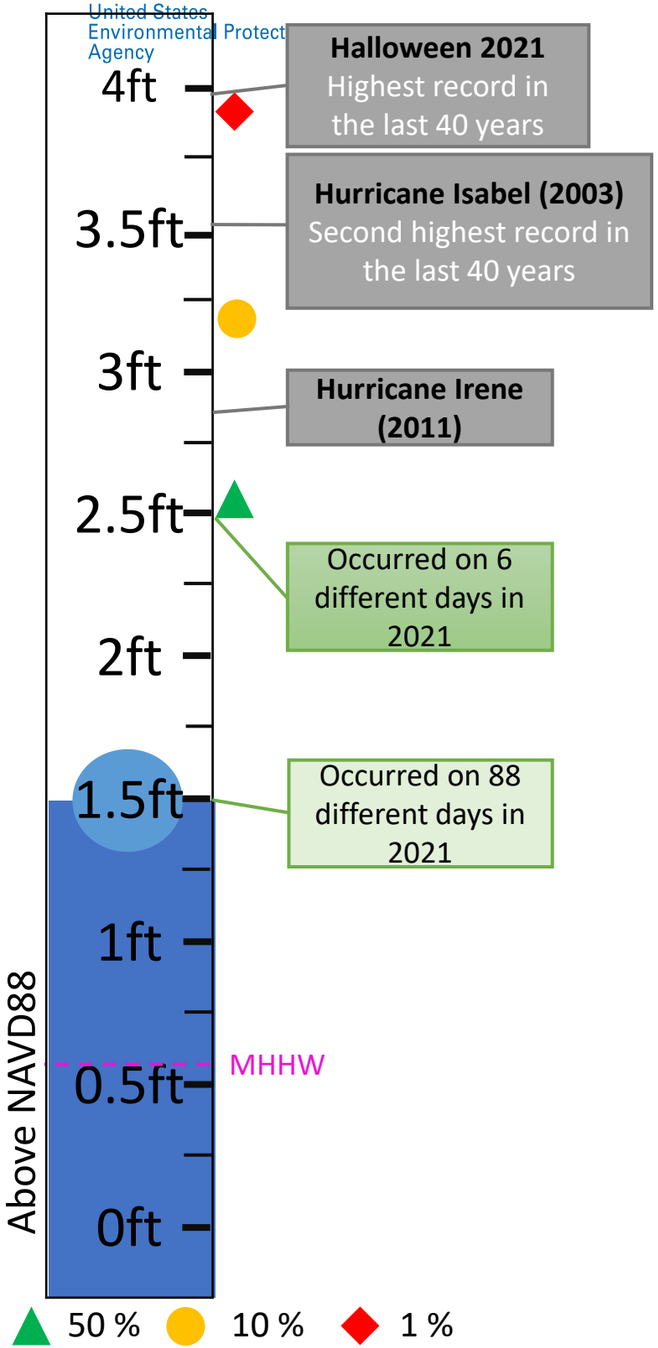

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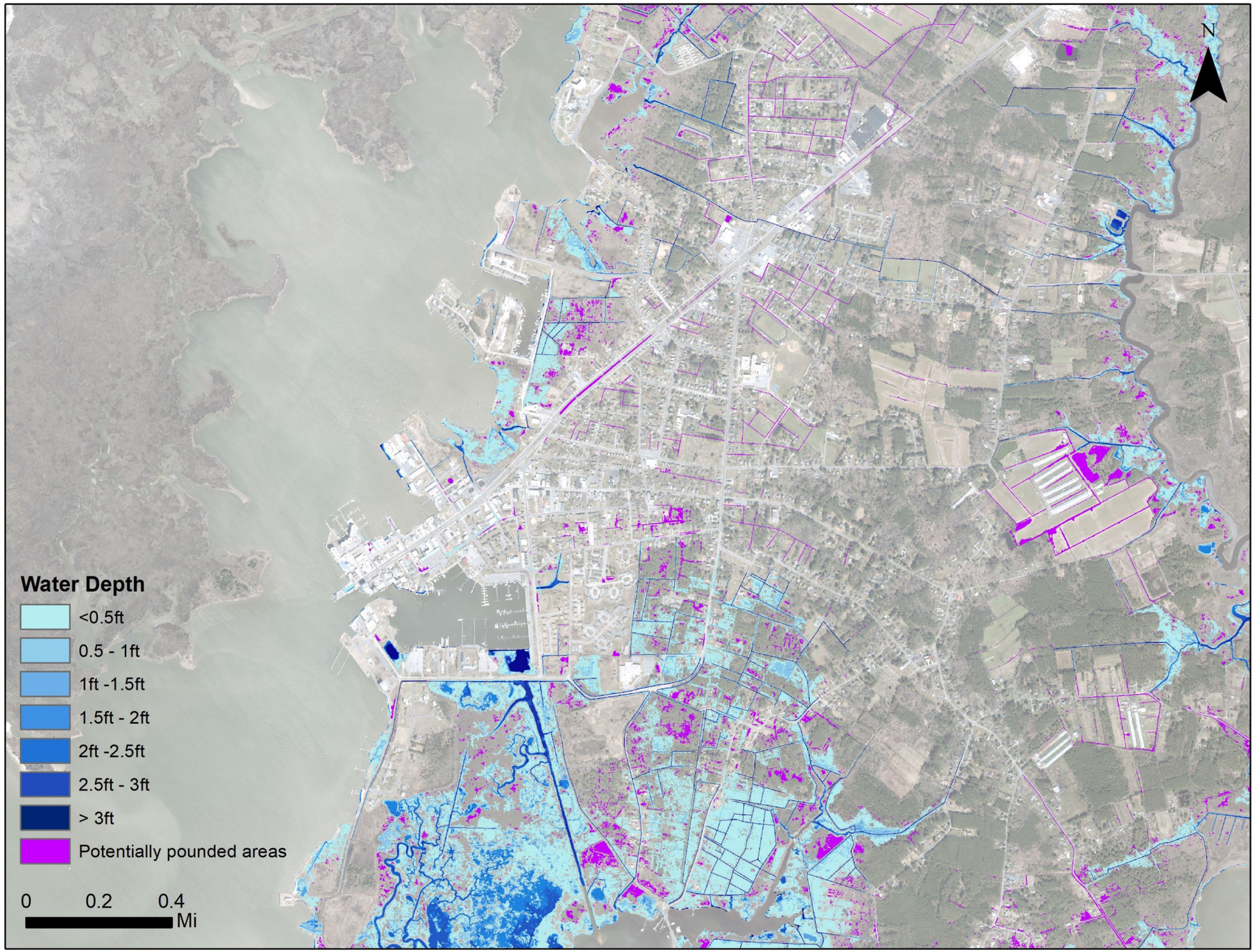

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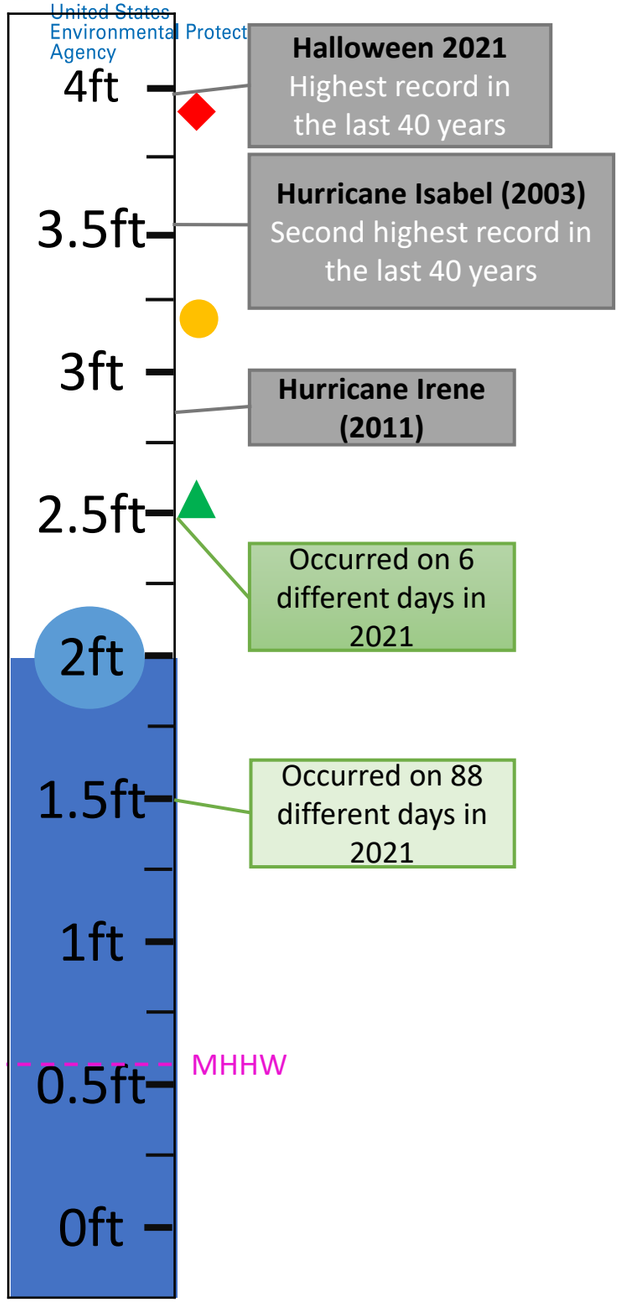

Halloween 2021
Highest record in the last 40 years

Hurricane Isabel (2003)
Second highest record in the last 40 years

Hurricane Irene (2011)

Occurred on 6 different days in 2021

Occurred on 88 different days in 2021

50 % 10 % 1 %

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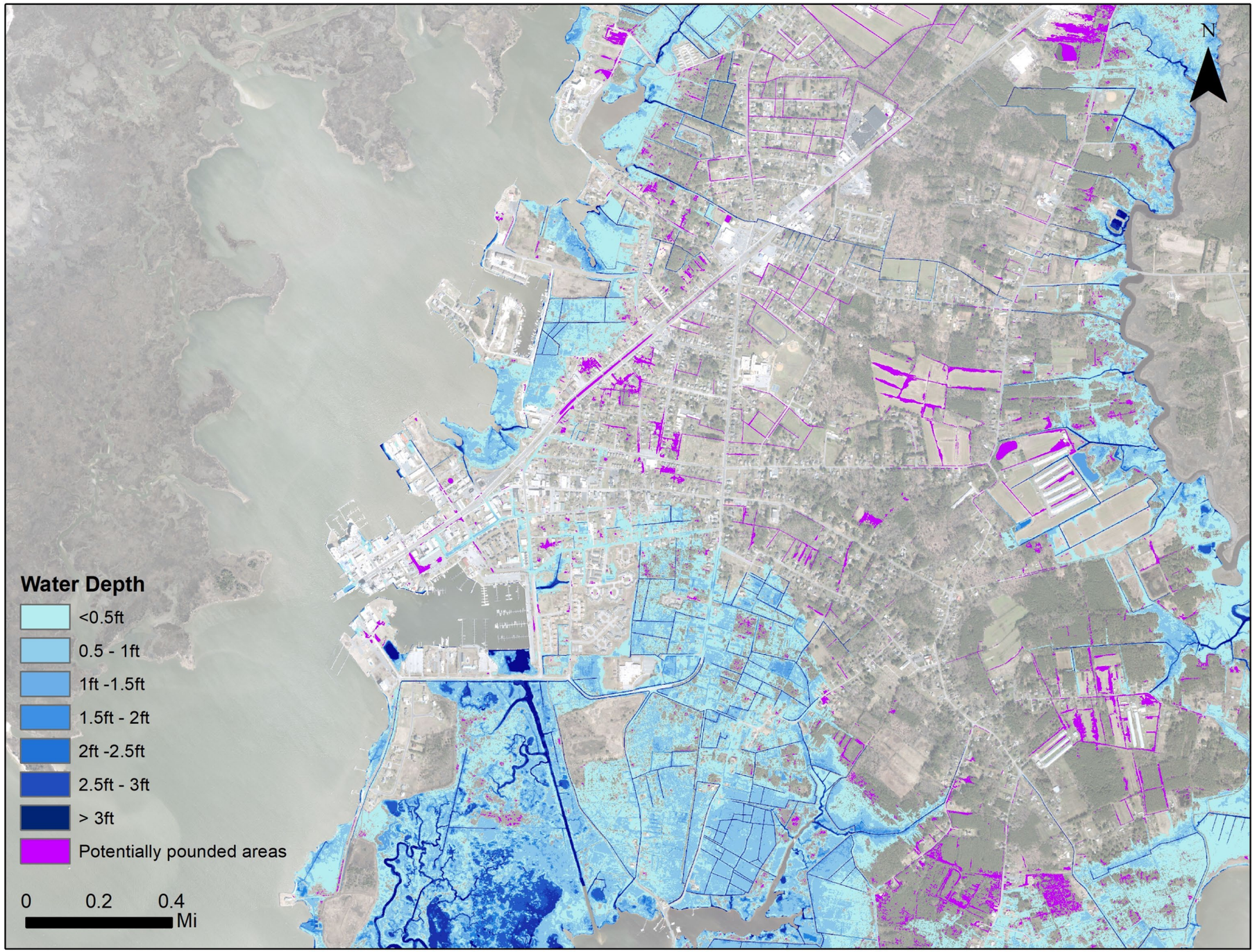

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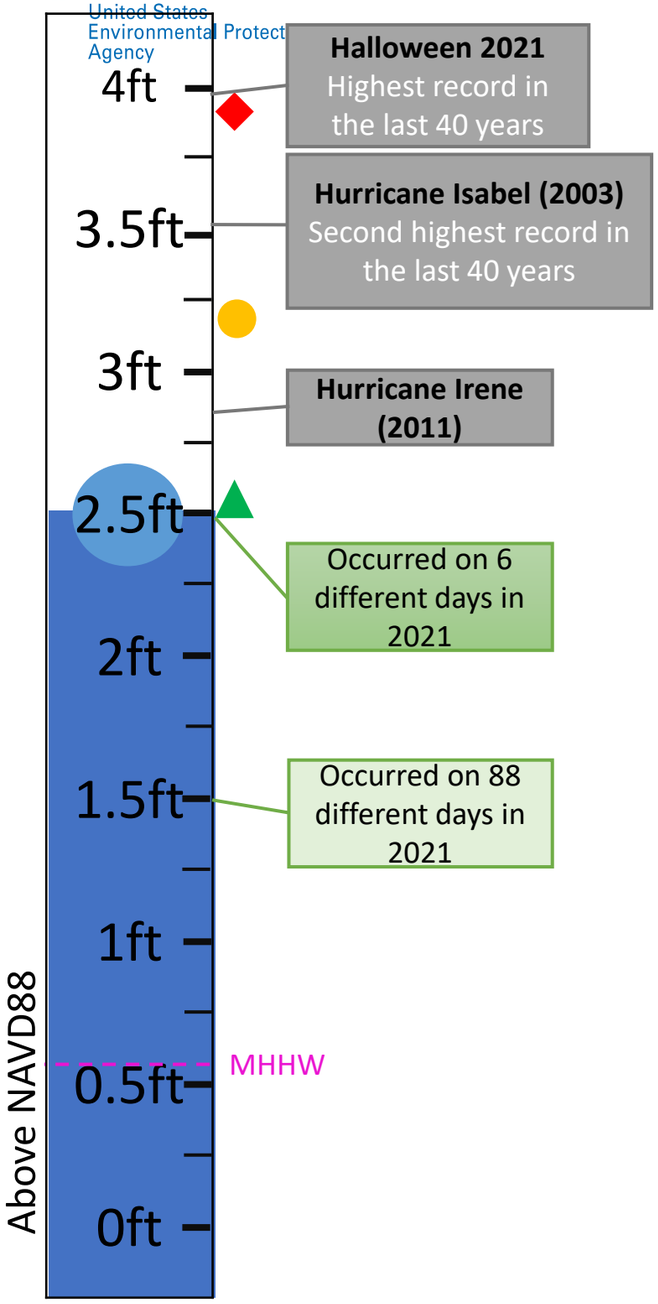

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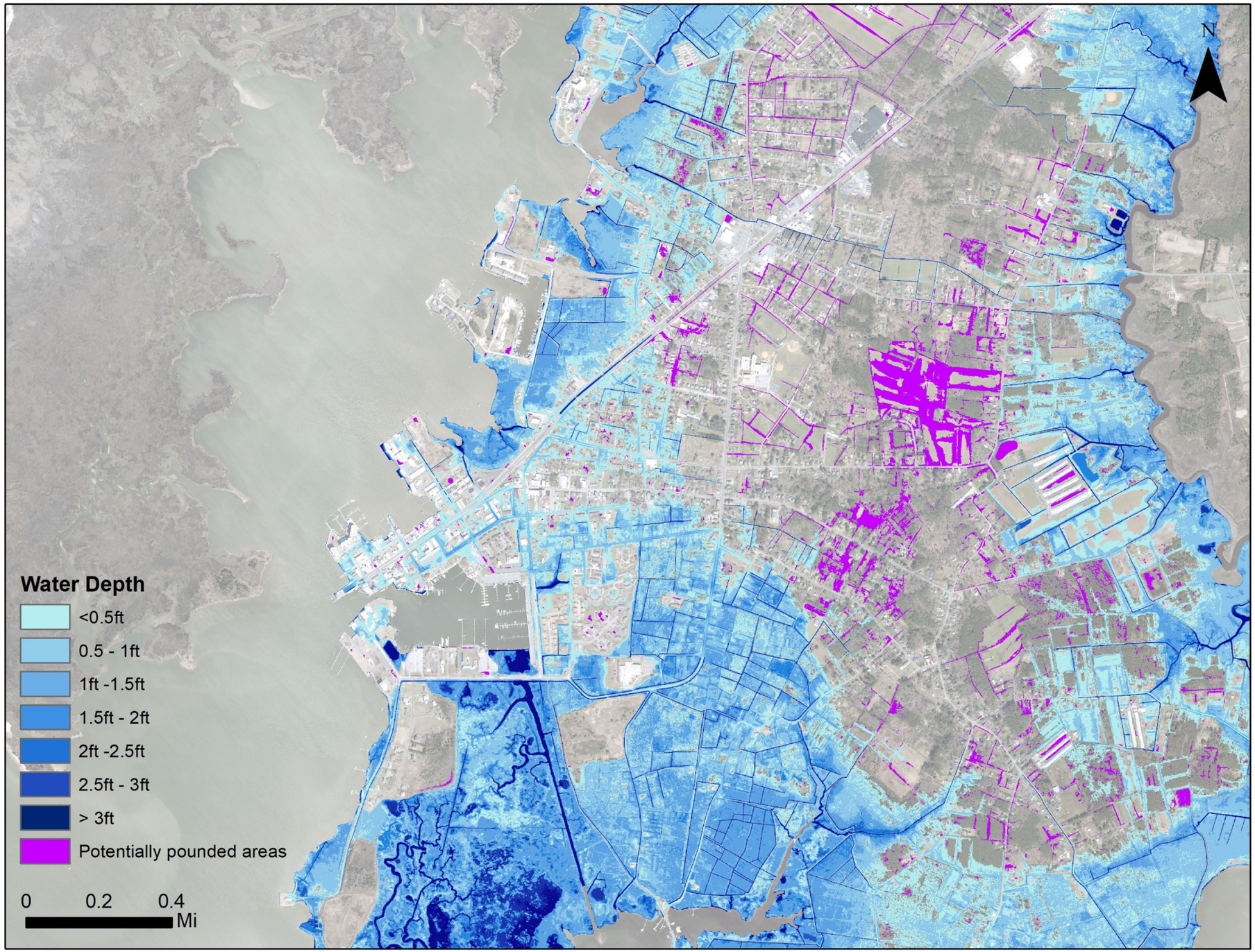

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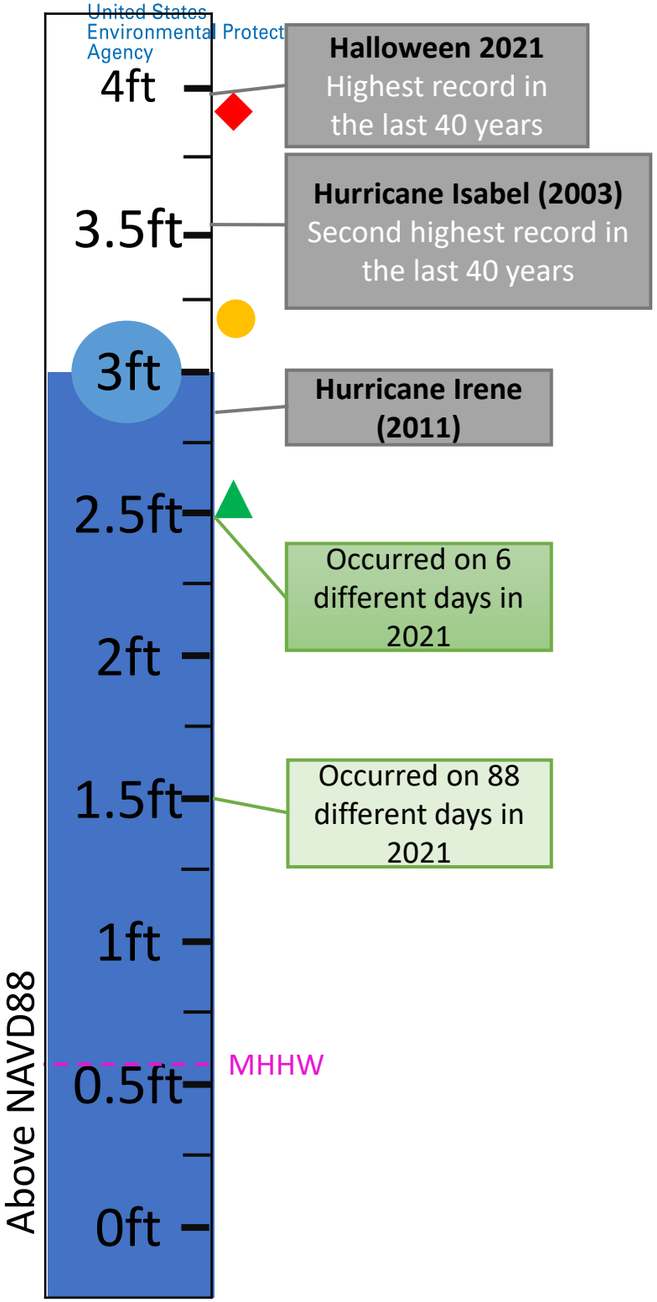

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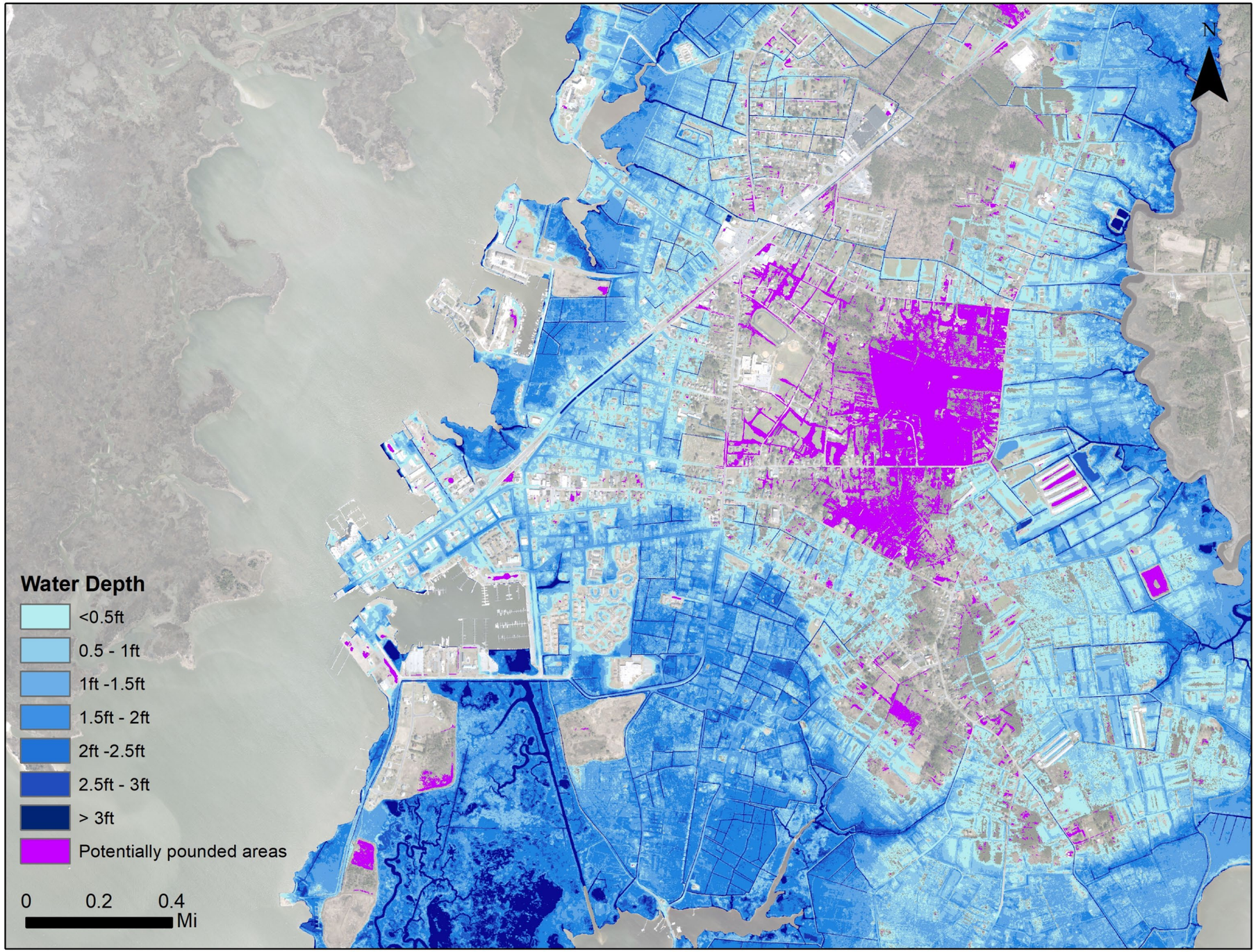

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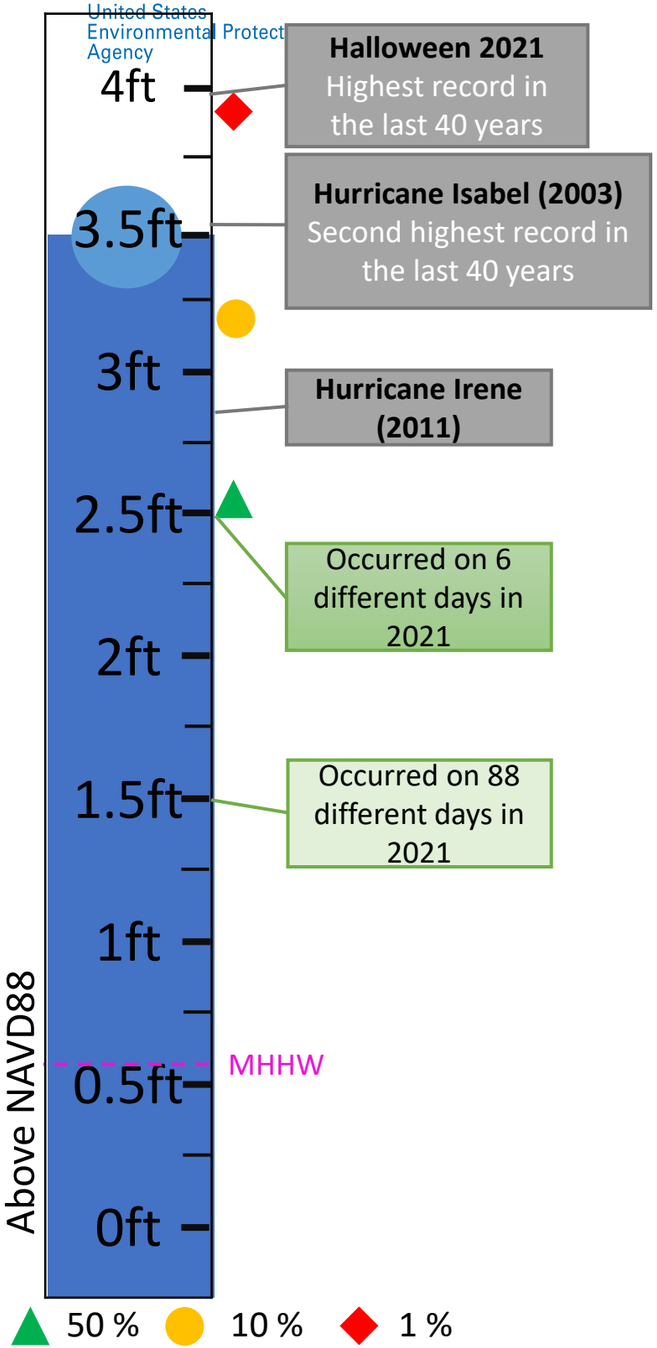

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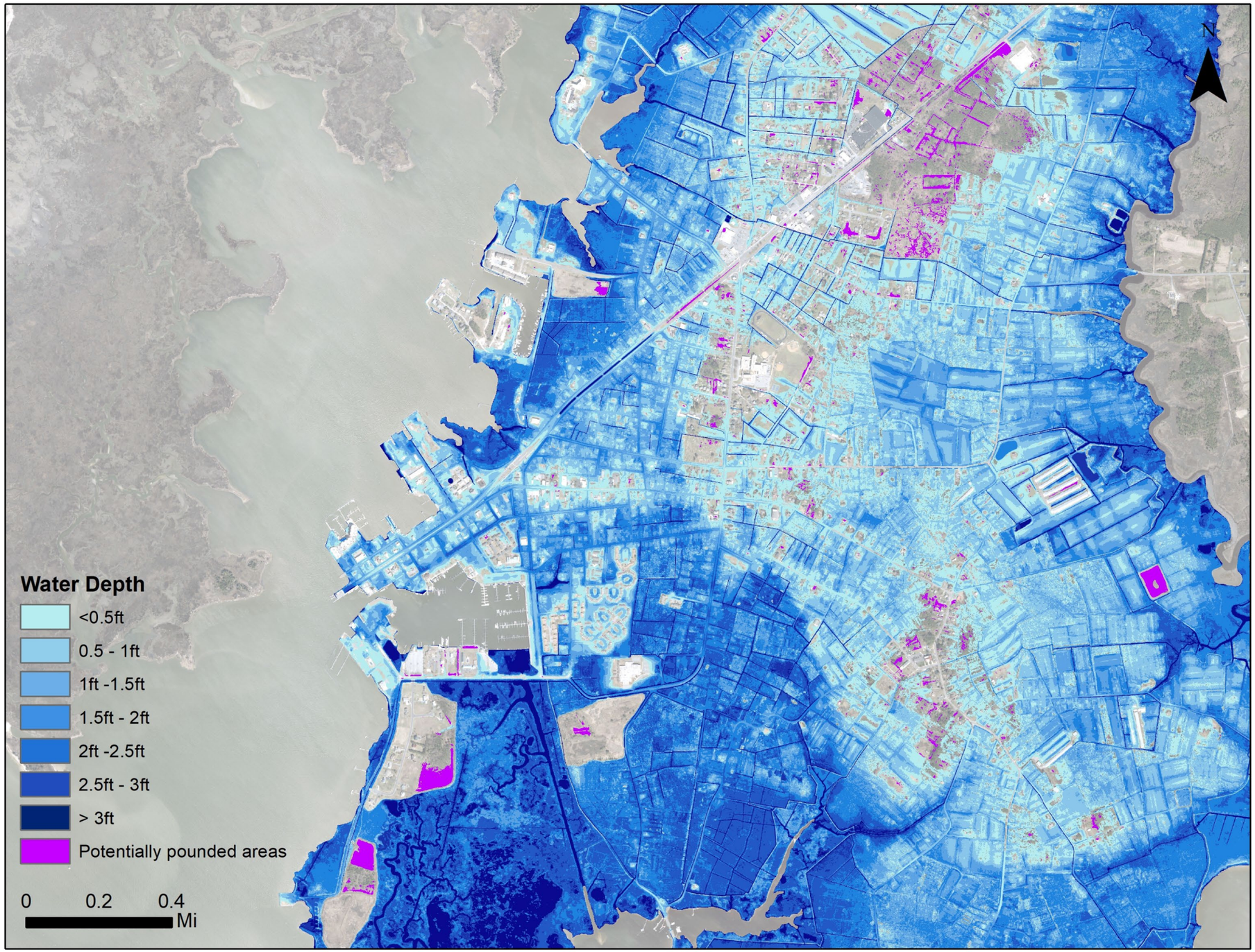

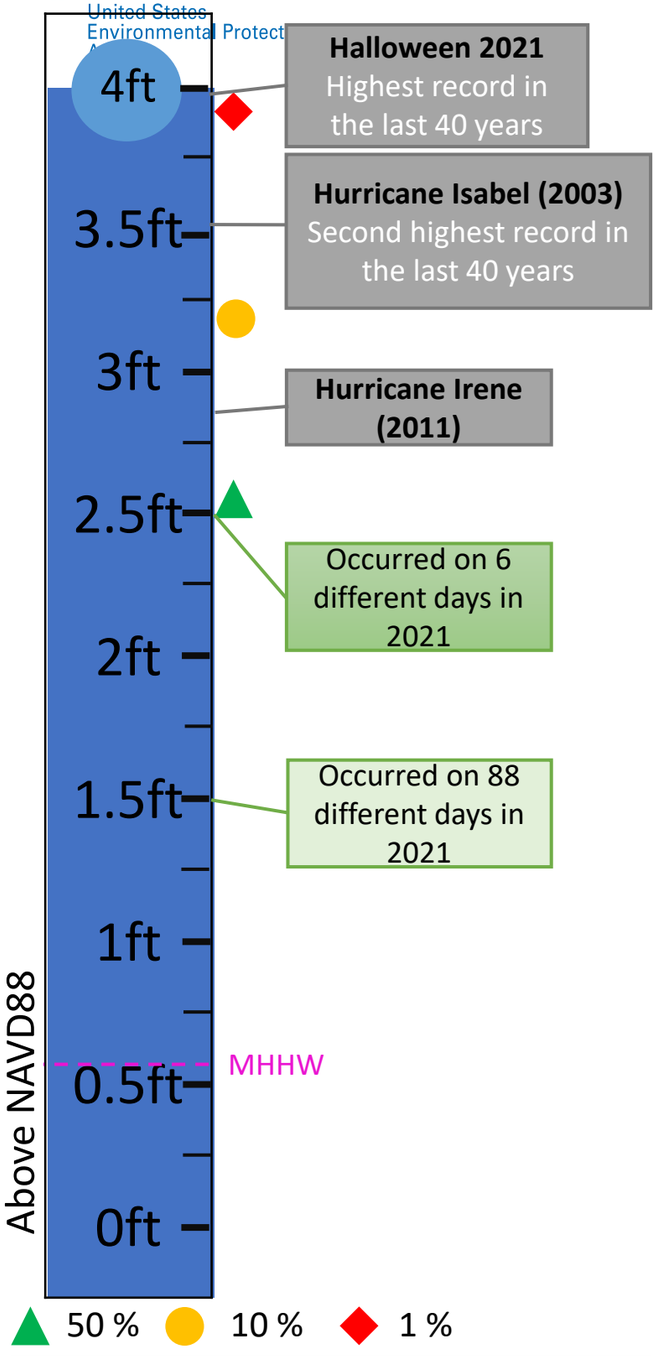

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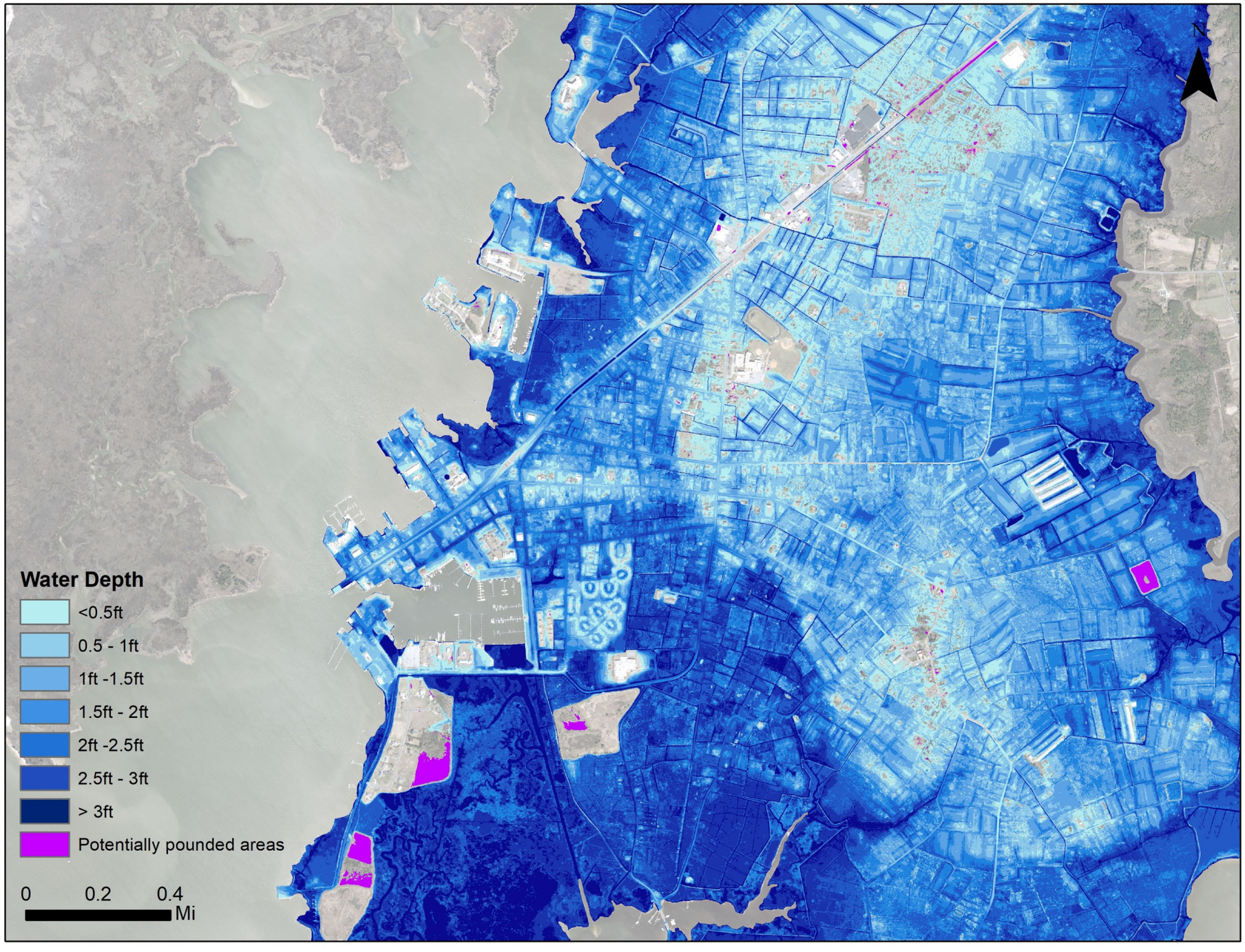

Potential Natural Infrastructure Strategies

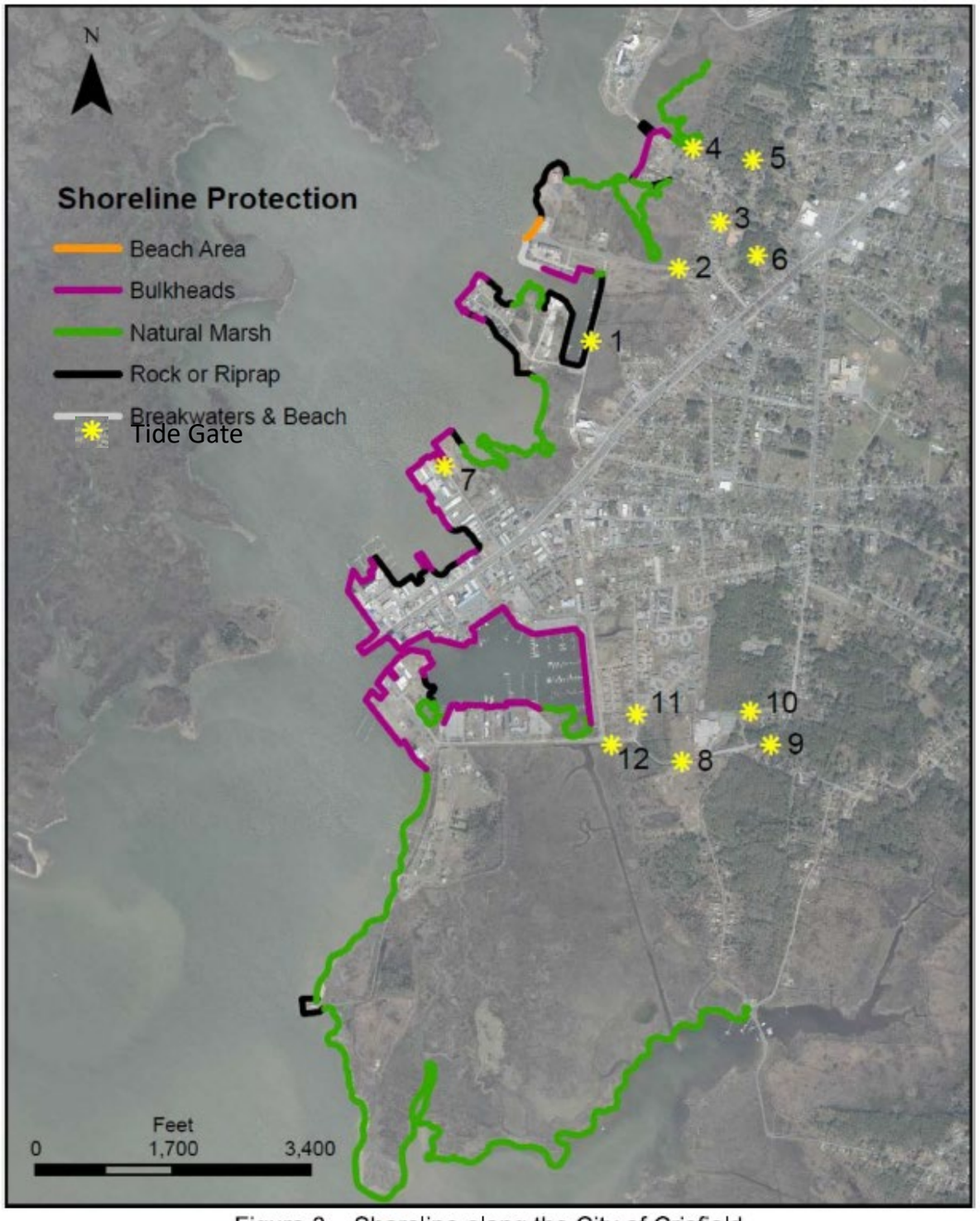

Figure 3 – Shoreline along the City of Crisfield

City of Crisfield: Drainage Assessment Report. 2021 Prepared by BayLand Consultants&Designers

Physical strategies:

- Marsh restoration/conservation
- Living shorelines
- Submerged aquatic vegetation (SAV) conservation/restoration
- Oyster reef restoration or aquaculture
- Green space or green infrastructure

Policy strategies:

- Converting land to open space (e.g., rec areas, waterfront parks, marsh migration)
- Zoning ordinances and future development planning

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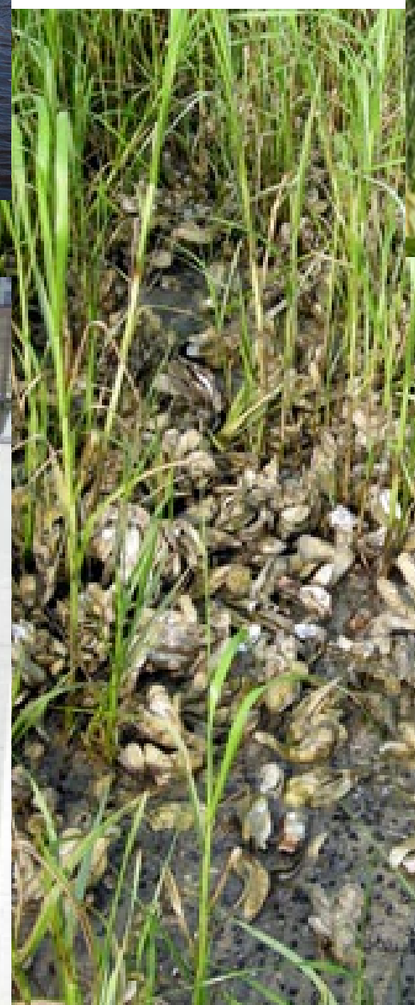
POTENTIAL ENVIRONMENTAL CO-BENEFITS FOR CRISFIELD

Tourism and recreation

Nature and wildlife enjoyment

Fisheries habitat



Stormwater management

Water pollutant filtration

Upcoming Plans for 2022-2023

Natural infrastructure:

- Literature review on use of natural infrastructure for coastal resilience
- Develop natural infrastructure adaptation suggestions for Crisfield and collaborate with GMU to model resilience impacts and co-benefits

Community engagement:

- Engagement with local government officials from City of Crisfield and Somerset County
- Continue to engage Community Advisory Committee and identify community needs:
  - December 2022: Costs and damages workshop
  - February 2023 (ORD-led): Environmental goals and benefits workshop

Upcoming Plans for 2022-2023 (continued)

Social science:

- Ecosystem services focus groups with key community demographic groups
- Crisfield history/social context timeline compilation
- Literature review on organized/managed coastal retreat examples

Blue carbon:

- Blue carbon sequestration foundational review and data consolidation
- Map and assess blue carbon potential of natural infrastructure solutions in Chesapeake Bay
- Collaborate with TNC on blue carbon feasibility study assessing sequestration benefits of Janes Island and Cedar Island marsh restoration

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Thank you!