Developing localized flood projections to support climate solutions in the Gulf of Maine

Gayle Bowness
Municipal Climate Action Program, Manager

Dr. Hannah Baranes
Sea Level Rise Scientist

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Gulf of Maine
Research Institute

Science. Education. Community.

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Locally Focused

Globally Relevant

Integrated Approach:
Science, Education, Community

Independent, Objective, Nonpartisan

Inclusive and Collaborative

Climate Center Capabilities

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SCIENCE

- Fisheries Ecology
- Resource Economics
- Learning Sciences
- Sea Level Rise
- GHG Emissions
- Blue Carbon / Coastal Ecology
- Physical Oceanography
- Biological Oceanography
- Decision Science

ENGAGEMENT

- Fishermen
- Farmers
- Fisheries Managers
- Students
- K-12 teachers
- Informal Educators
- Municipal Leaders
- Elected Officials
- Marine Businesses

SOLUTIONS

- Ocean Data Products
- Sustainable Seafood
- Aquaculture
- Climate Finance
- Climate Risk
- Ocean Climate Policy
- Adaptation Engineering / Coastal Planning
- Climate Tech / Ventures

Municipal Climate Action Program

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Develop and deliver resources that build the knowledge, skills, and data capacity needed to develop community focused climate resilience plans.

- Community Programming
- High School Curriculum
- Community Science
- Community Mapping
- Capacity Building

Community Science

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Municipalities need:

- local flood data.
- engaged and informed citizens.

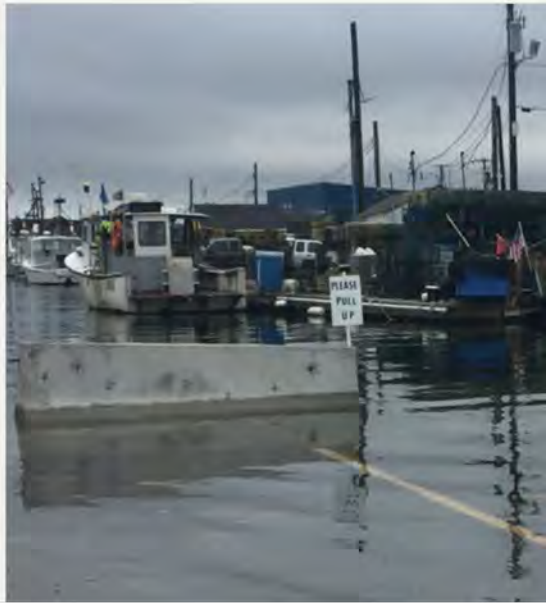
Ecosystem Investigation Network — Projects ▾ About FAQ Partners

Coastal Flooding: Storms and Sea Level Rise

What areas of our shoreline are most vulnerable and most important to us? What weather and tidal level conditions are associated with coastal flooding in our community?

Why this matters

Sea levels are rising, storms are intensifying, and coasts are flooding more frequently. The goal of this project is to help coastal communities gather data to understand their unique risks and begin to identify priorities for building resilience.



Community Science

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Coastal Flood Monitoring Sites in Maine

Ecosystem Investigation Network

The Coastal Flood Citizen Science Project (https://investigate.gmri.org/project/coastal_flooding/) supports communities in gathering local data from coastal sites they care about. Click below to view participating communities and their coastal flood monitoring sites. Want your community to join? Email gayle@gmri.org

Belfast | Portland | South Portland

Willard Beach

Bug Light

Portland Pier

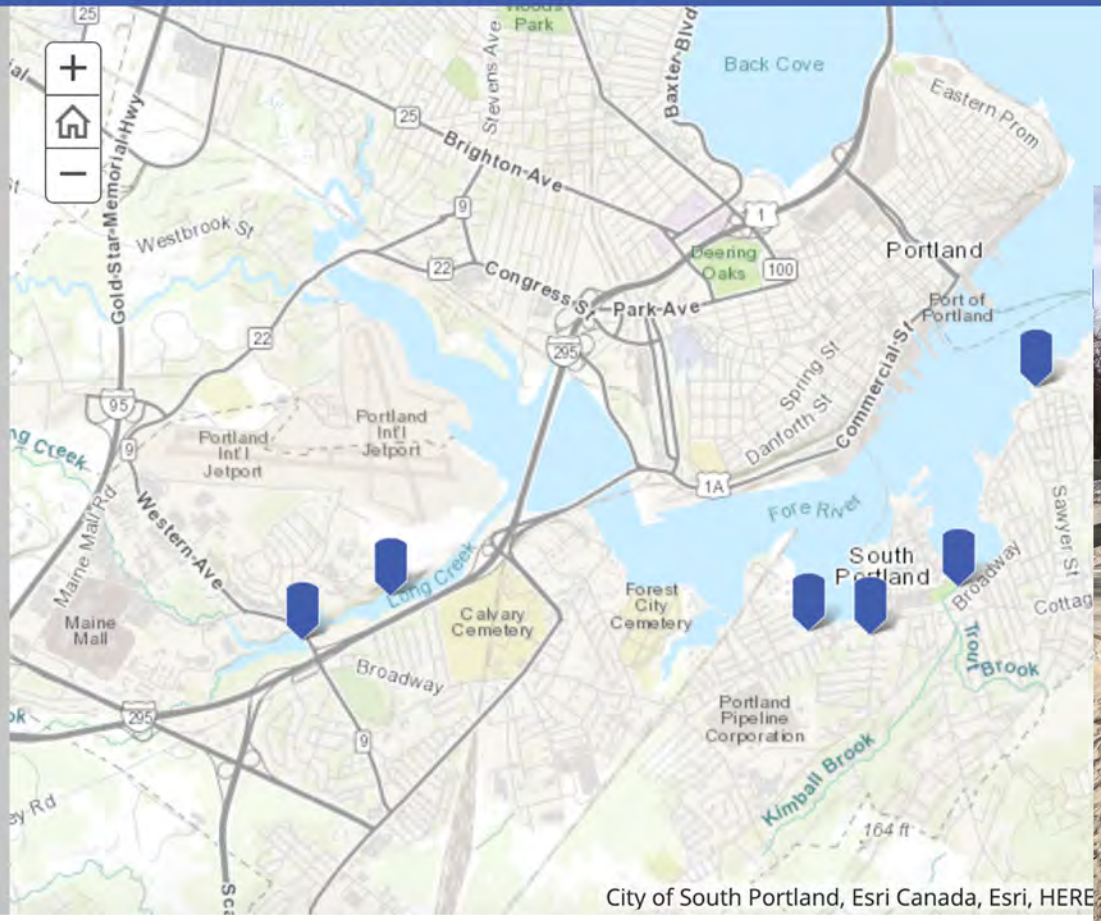
Mill Creek

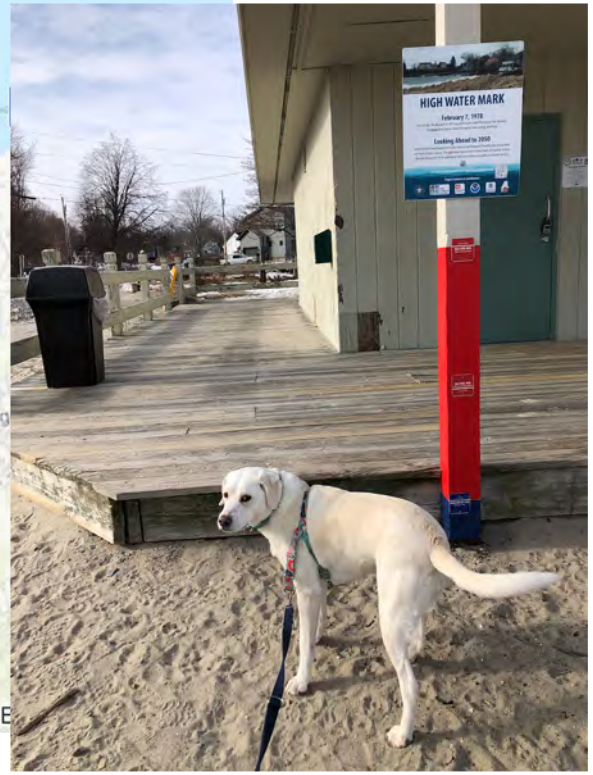
Anthoine Creek

Yerxa Park

Long Creek Trail

Clarks Pond Trail





Capacity Building

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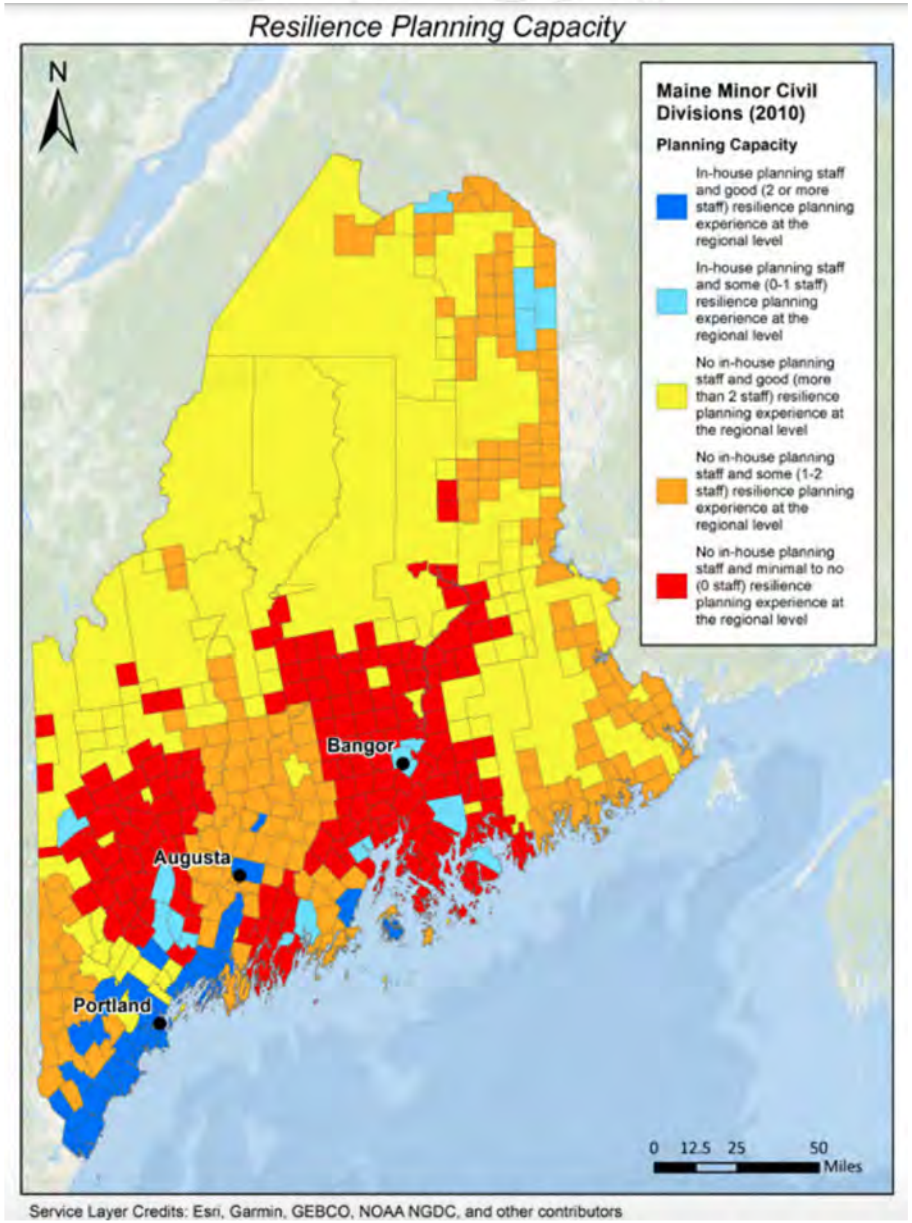

Comprehensive community planning needs to incorporate new modes of thinking and data sets that often raise more questions than bring answers.

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Resilience Planning Needs Assessment, 2019

- There is no common language.
- Communities don't have a sense of urgency.
- Framing decision-making through an economic lens makes the adaptation process more concrete, but it needs to be balanced with other perspectives, including social, cultural, and environmental.
- Decision support needs to be highly localized.
- A real focus on decision making would be less about tools, and more about a forum where communities can work together and learn from each other.
- Experts and stakeholders would benefit from understanding and working through different perspectives through exercises involving relevant, real-life scenarios.
- The importance of skills development and relationship building.

Community Resilience Trainings

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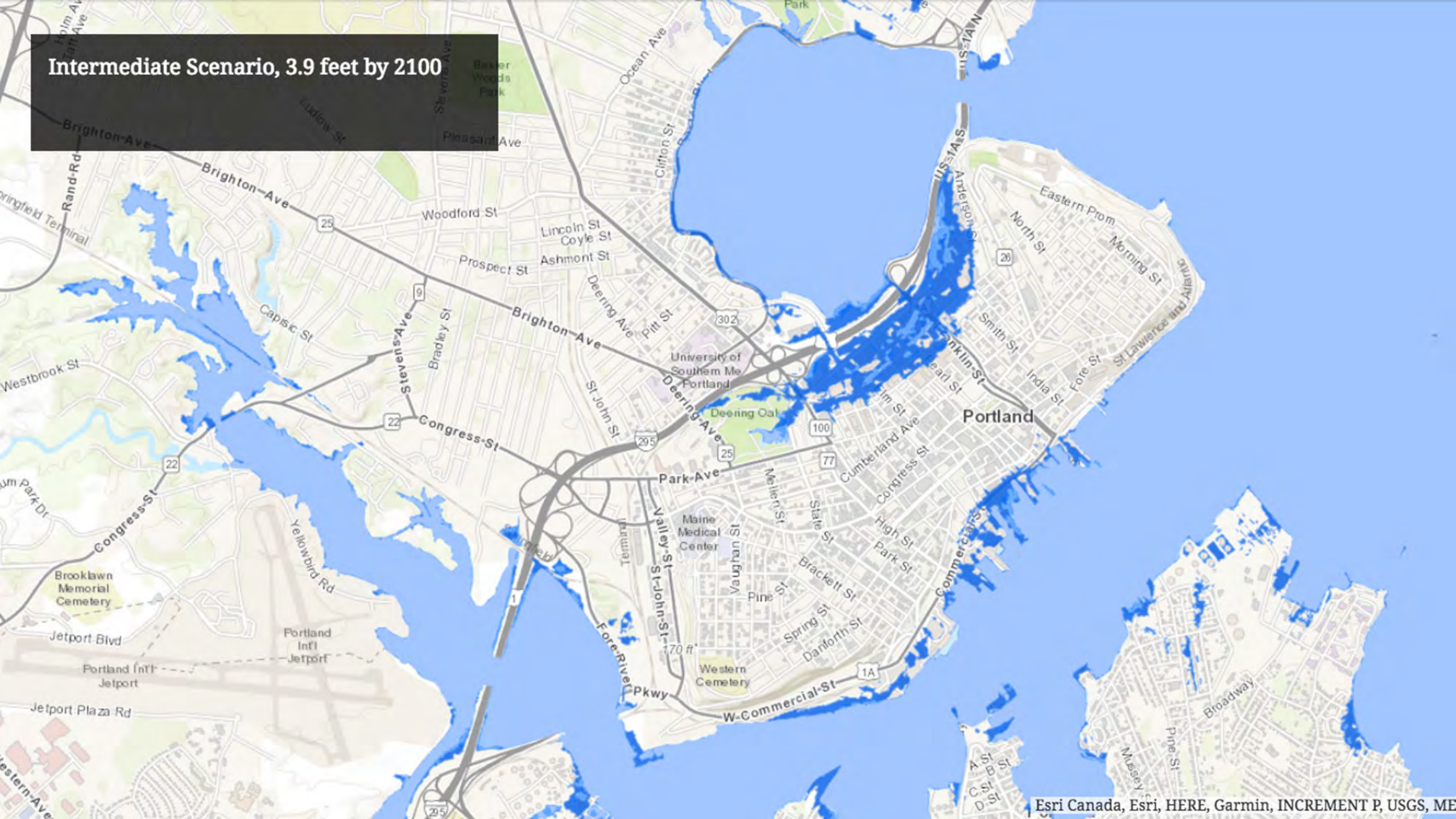
Rural Resilience Trainings for Coastal Communities

- Focus on knowledge, skill, and relationship building
- Current and emerging community leaders, representative of a community's diversity
- Support a process for decision making
- Build connections within and between communities
- Increase access to local/regional resources, tools, experts
- Provide space for conversation, reflection, planning
- Engage communities, broadly
- Hold equity at the heart of the work

Partners

Island Institute, UMO, Upswell, GOPIF, MGS, MDEP, MSG, Wells Reserve, NOAA, Vinalhaven, St. George


Intermediate Scenario, 3.9 feet by 2100
Portland
Brighton Ave
Congress St
Park Ave
Deering Ave
Stevens Ave
Bradley St
Woodford St
Prospect St
Lincoln St
Coyle St
Ashmont St
Capisic St
Westbrook St
Rand Rd
Ocean Ave
Clifton St
Pleasant Ave
Ludlow St
Baxter Woods Park
University of Southern Me Portland
Deering Oak
St John St
Valley St
Fore River Pkwy
W Commercial St
Commercial St
Maine Medical Center
Western Cemetery
Vaughan St
Mellen St
State St
Cumberland Ave
Congress St
High St
Park St
Brackett St
Pine St
Spring St
Danforth St
Anderson St
Eastern Prom
North St
Morning St
Smith St
India St
Fore St
St Lawrence and Atlantic
Brooklawn Memorial Cemetery
Jetport Blvd
Portland Int'l Jetport
Jetport Plaza Rd
Yellowbird Rd
Broadway
Pine St
Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, ME

Coastal flooding science initiatives

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Dr. Hannah Baranes

Sea level rise and coastal flooding

Coastal flooding science initiatives

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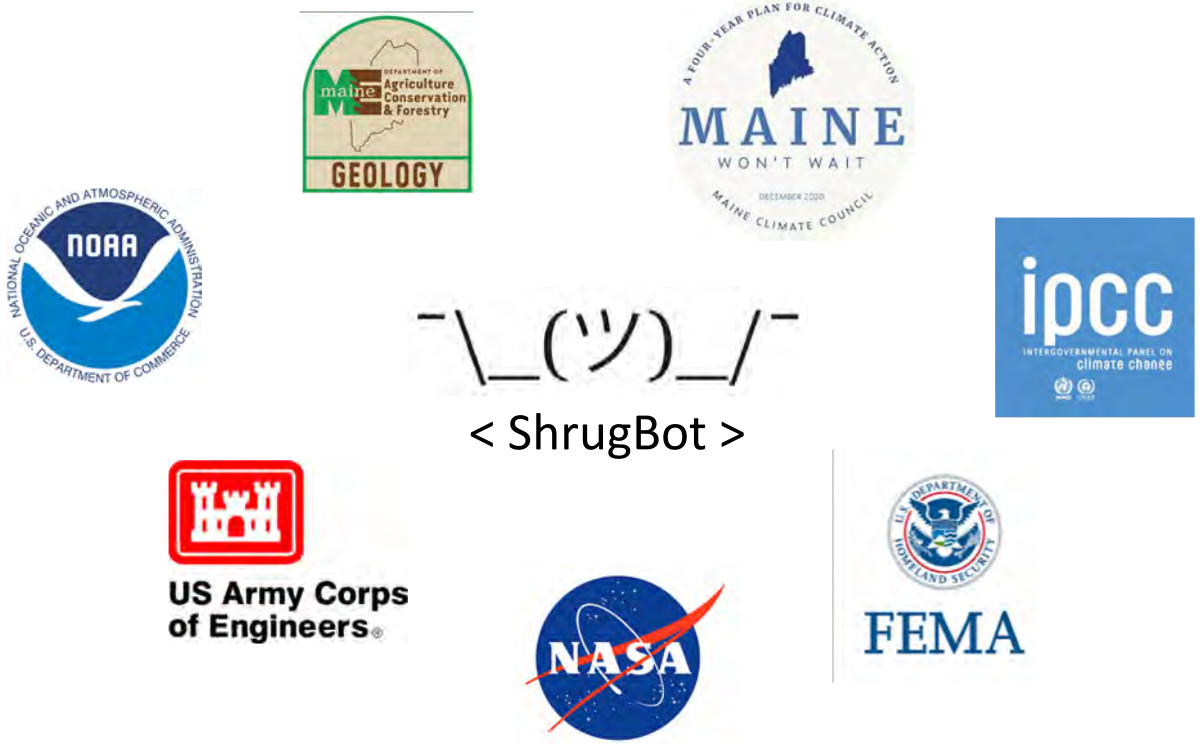
1. Develop centralized resource for Maine flood hazard data



Coastal flooding science initiatives

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1. Develop centralized resource for Maine flood hazard data
2. Maine DOT statewide hydrodynamic model

Coastal flooding science initiatives

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Michael Melford /
National Geographic Creative

Coastal flooding science initiatives

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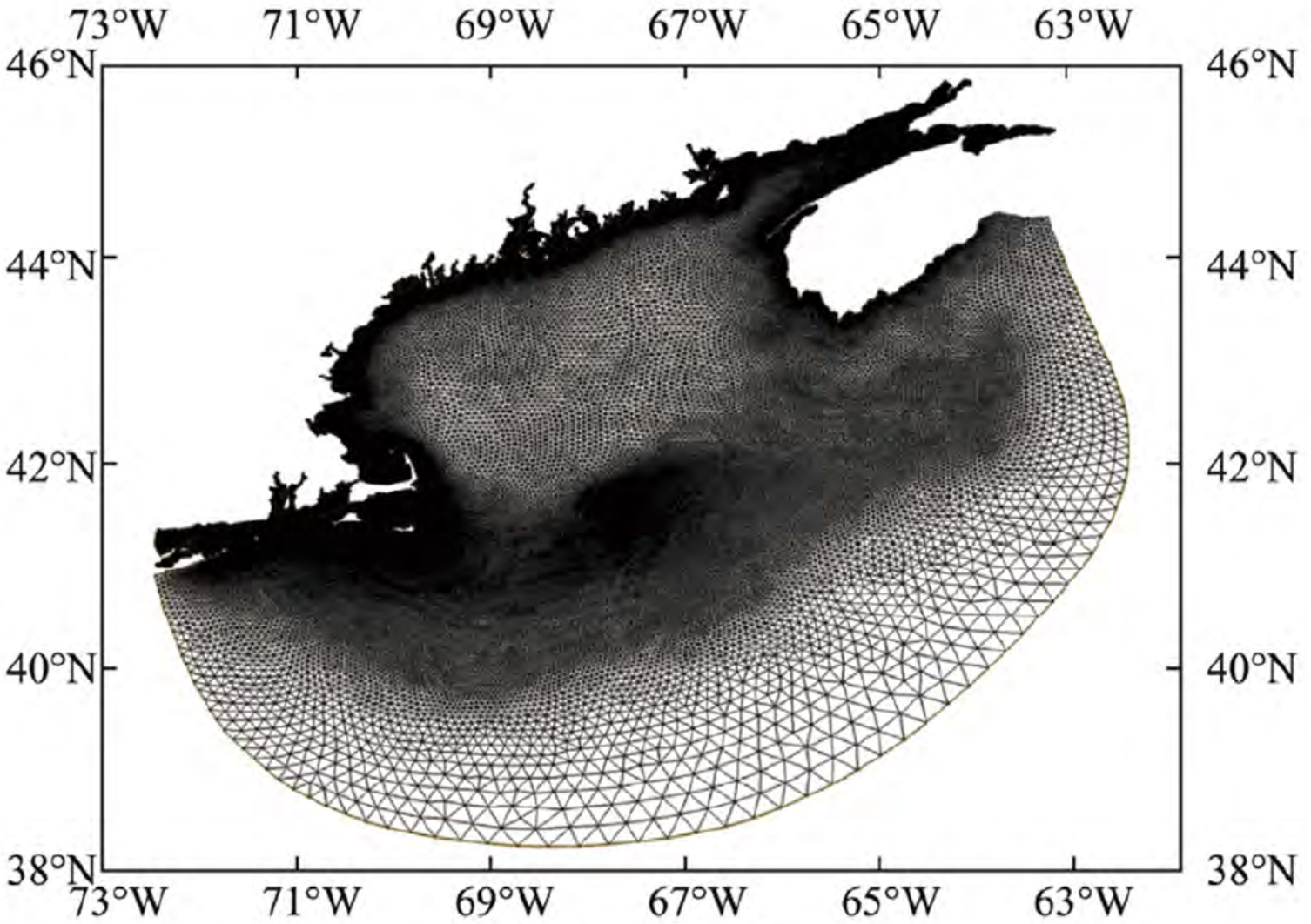

(a) Finite element grid

Xie et al. (2016)

Coastal flooding science initiatives

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Hydrodynamic modeling-based flood hazard assessments

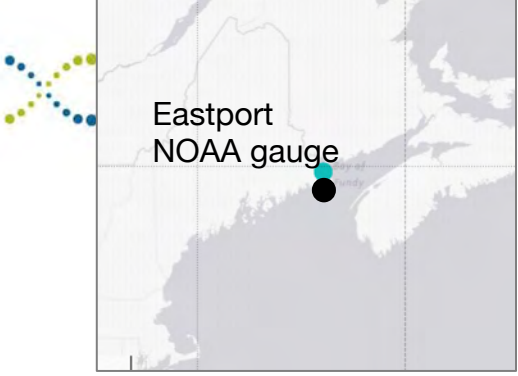
All physically plausible storm scenarios

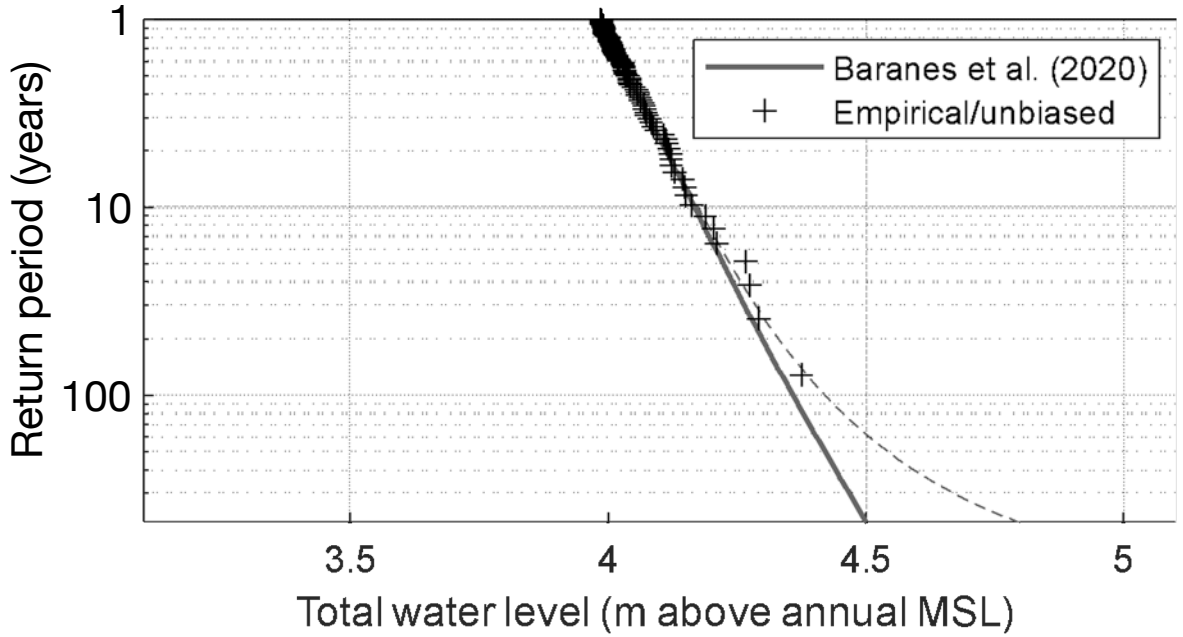
TCs, ETCs, present and future climatology

Sea level rise scenarios

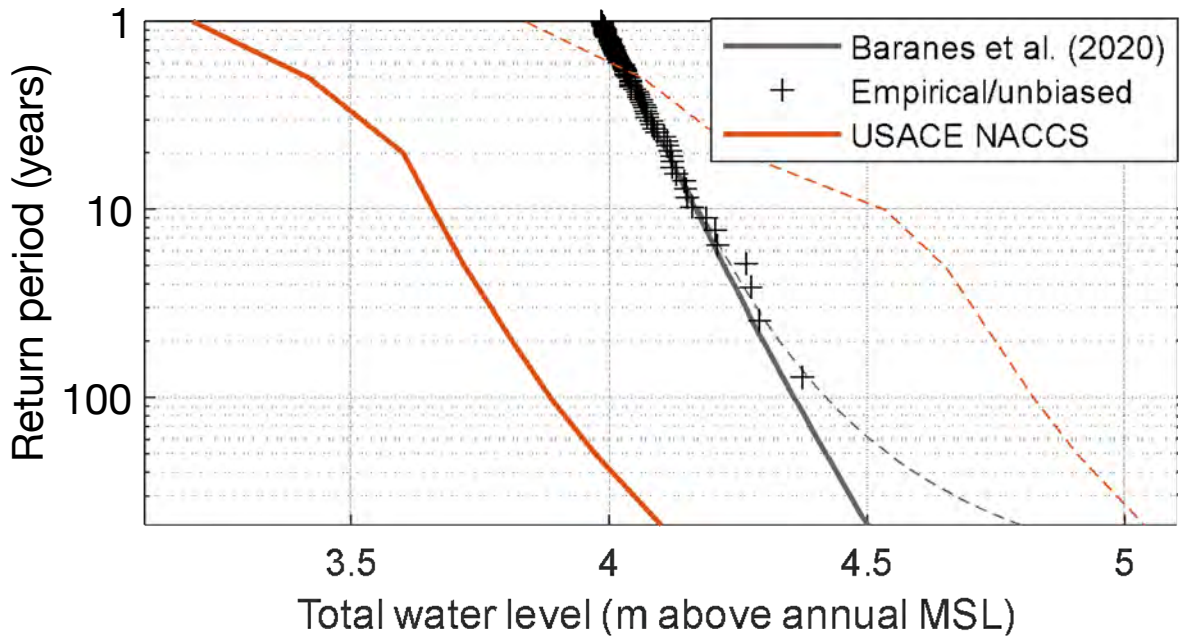
18.6 years of phasing with tides

Statistics


Eastport
NOAA gauge


Baranes et al. (2020)
Empirical/unbiased
Return period (years)
1
10
100
3.5
4
4.5
5
Total water level (m above annual MSL)

Eastport
NOAA gauge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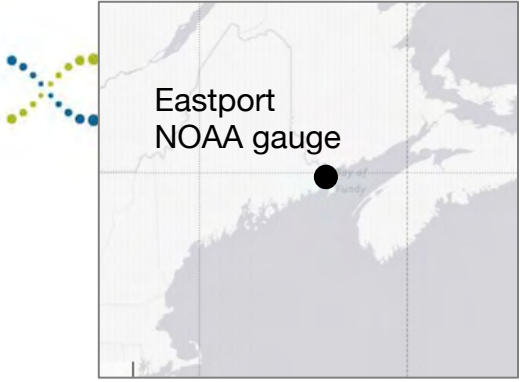
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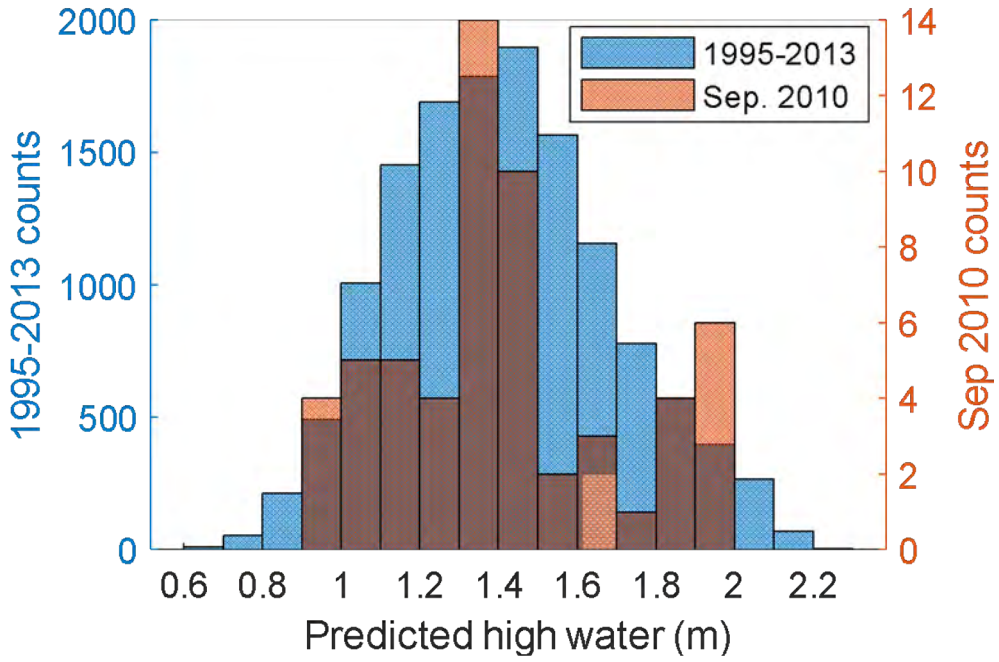
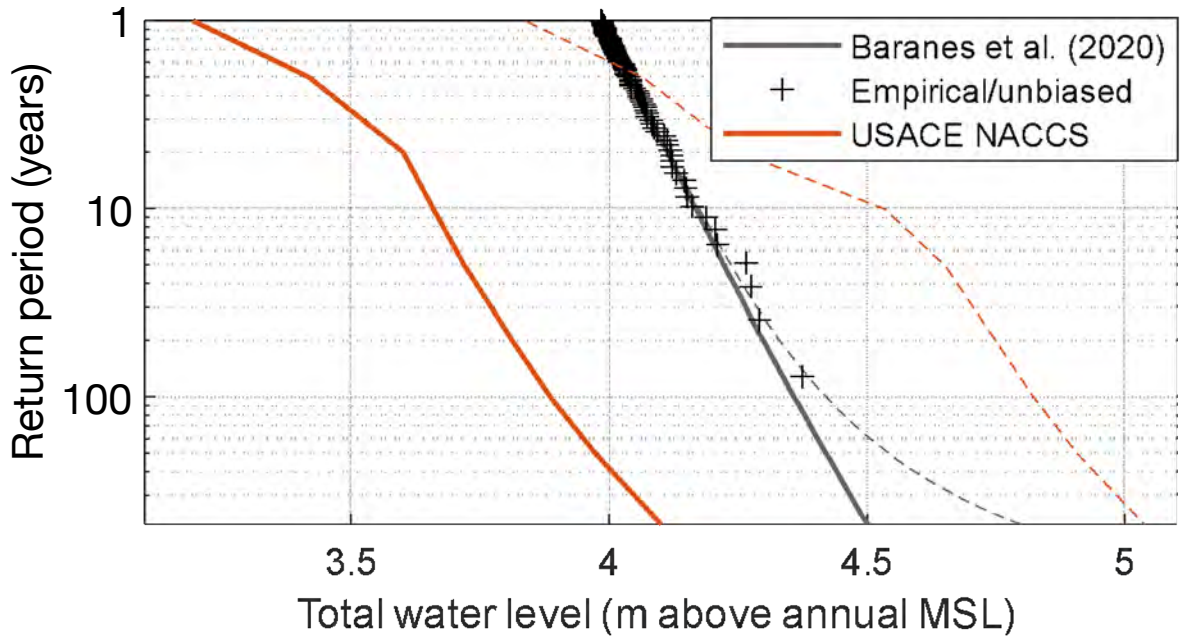

1995-2013
Sep. 2010
1995-2013 counts
Sep 2010 counts
Predicted high water (m)
0
500
1000
1500
2000
0
2
4
6
8
10
12
14
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2


Baranes et al. (2020)
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Total water level (m above annual MSL)
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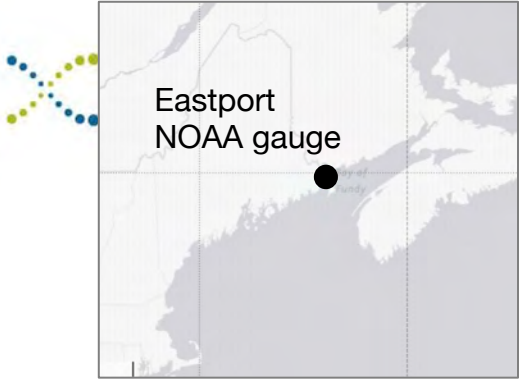
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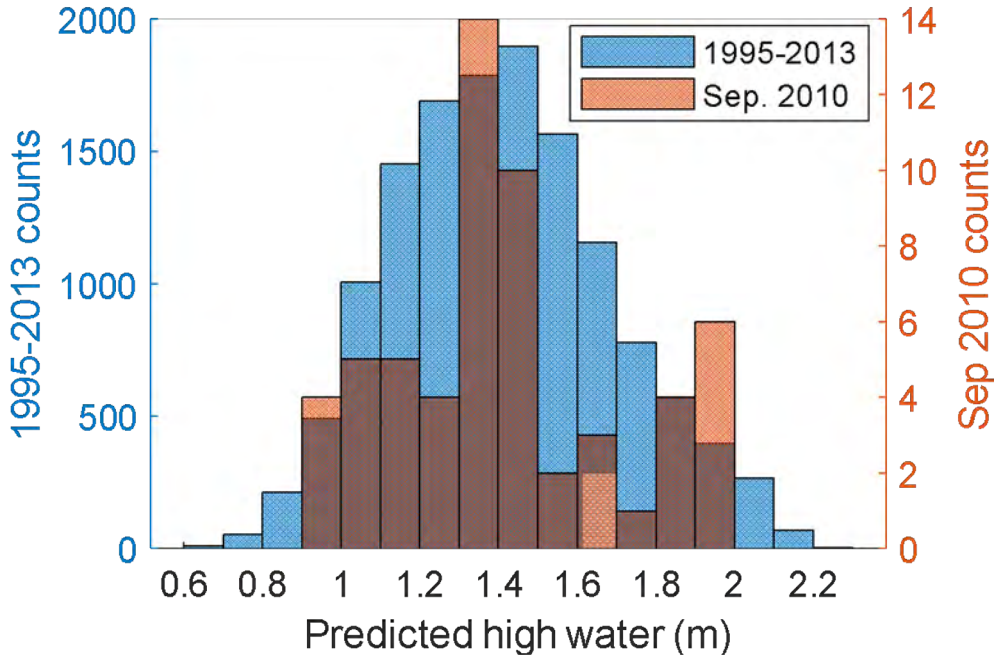
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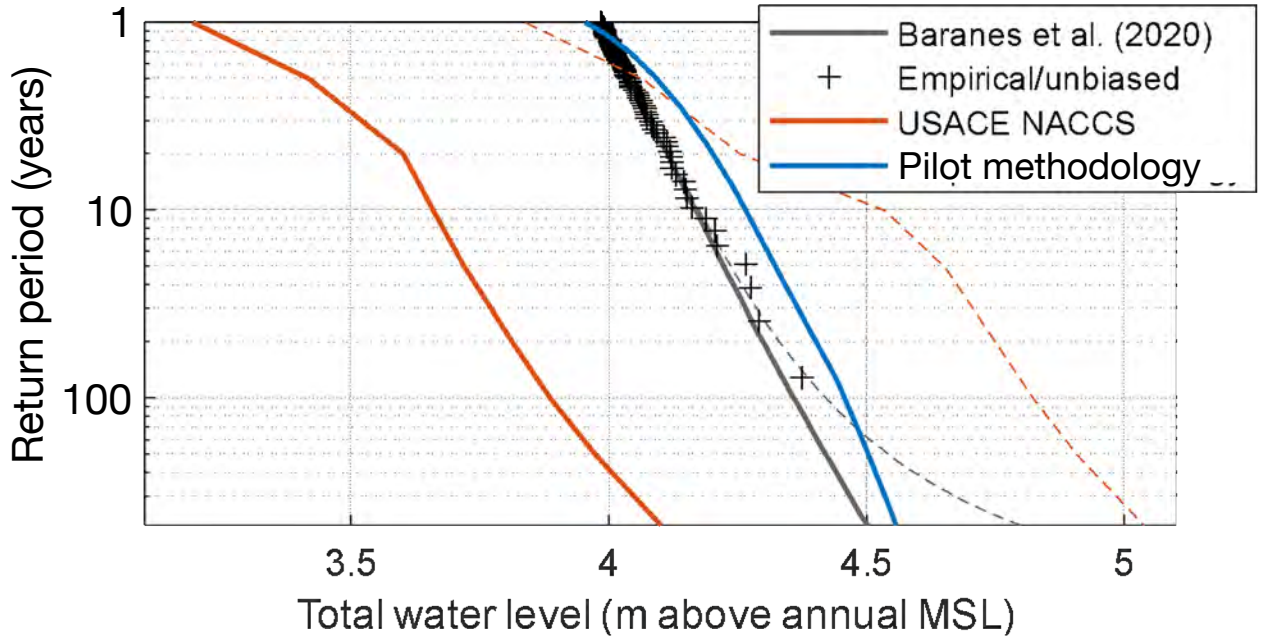
Baranes et al. (2020)
Empirical/unbiased
USACE NACCS
Pilot methodology
Return period (years)
1
10
100
3.5
4
4.5
5
Total water level (m above annual MSL)

Coastal flooding science initiatives

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1. ✓ Develop centralized resource for Maine flood hazard data
2. ✓ Maine DOT statewide hydrodynamic model
3. Pilot applying regression-based techniques to observed river flows, coastal water levels, and estuarine water levels to quantify joint marine-fluvial flood hazard in a Maine estuary

hbaranes@gmri.org

Thank You!

gayle@gmri.org (and hbaranes@gmri.org)
www.gmri.org/climate

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