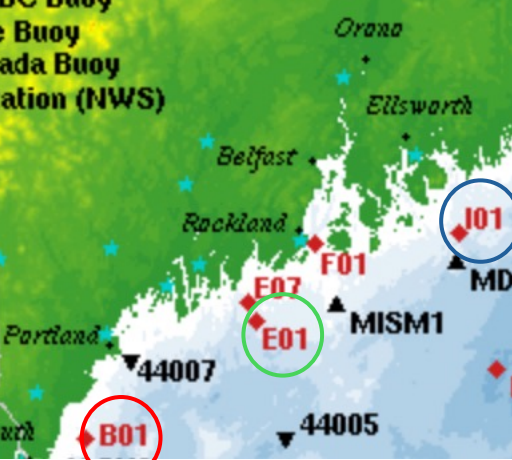ISLAND INSTITUTE

Storm Science: Understanding the New Normal
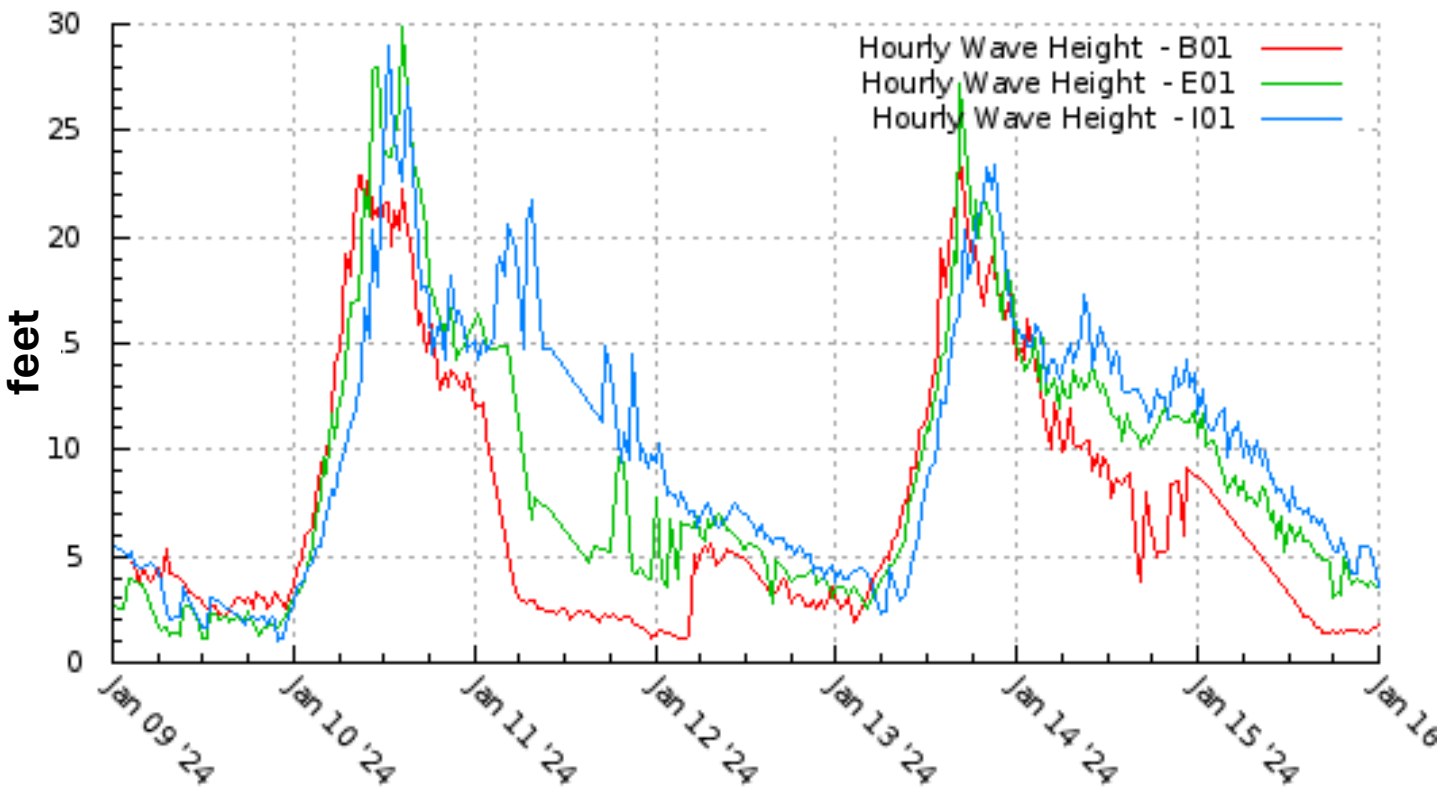## Webinar hosted on January 30, 2024

Jan. 10 and 13, 2024 Storm Events

Wave Height at NERACOOS buoys

Legend:
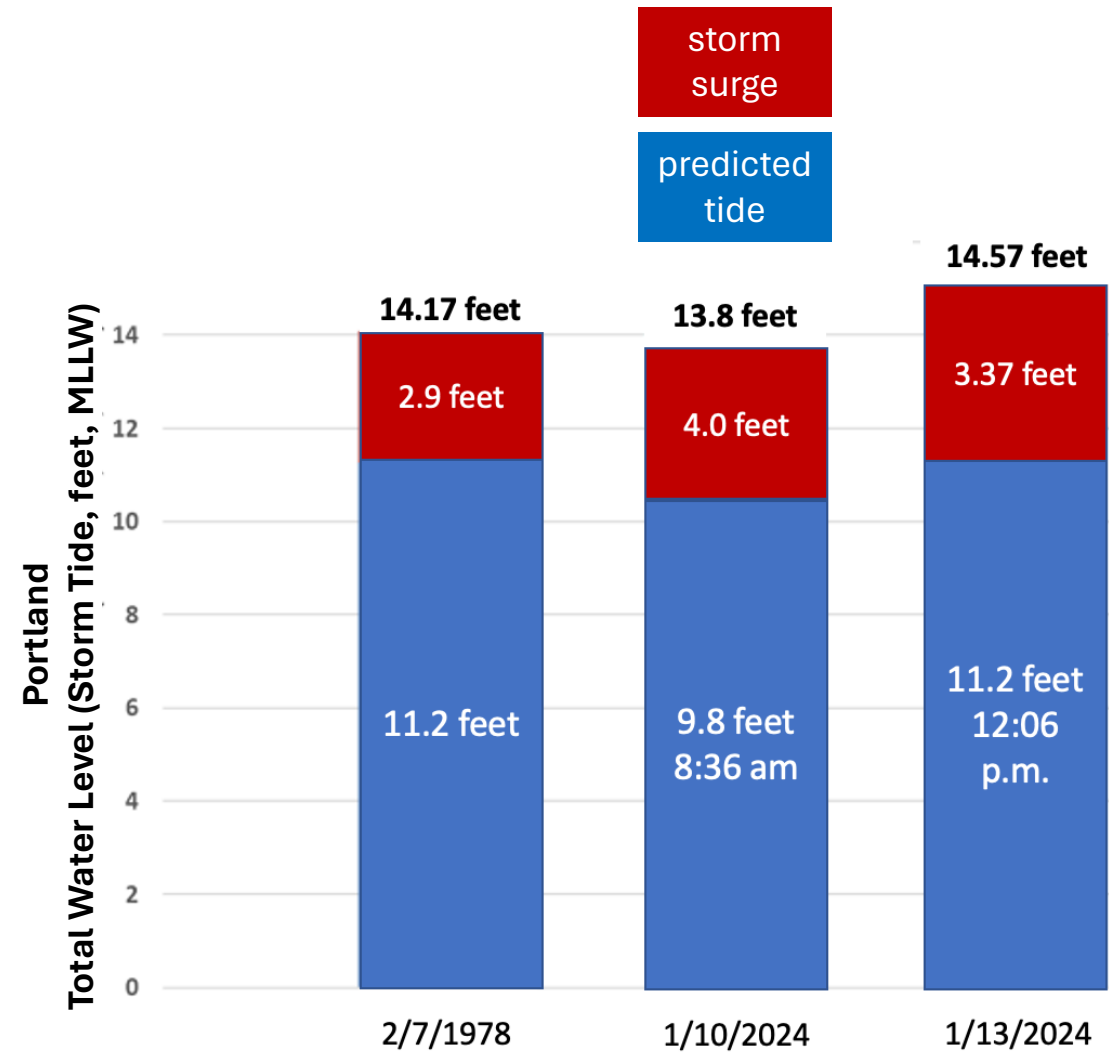- storm surge (red)
- predicted tide (blue)

Portland — Total Water Level (Storm Tide, feet, MLLW)

Date	Predicted tide	Storm surge	Total
2/7/1978	11.2 feet	2.9 feet	14.17 feet
1/10/2024	9.8 feet 8:36 am	4.0 feet	13.8 feet
1/13/2024	11.2 feet 12:06 p.m.	3.37 feet	14.57 feet

NERACOOS.org

Figure modified from Stephen Dickson

Portland

Maine's "Commit to Manage" targets:
1.5 ft in 2050, 4.0 ft in 2100

7.5 inches in 100 years
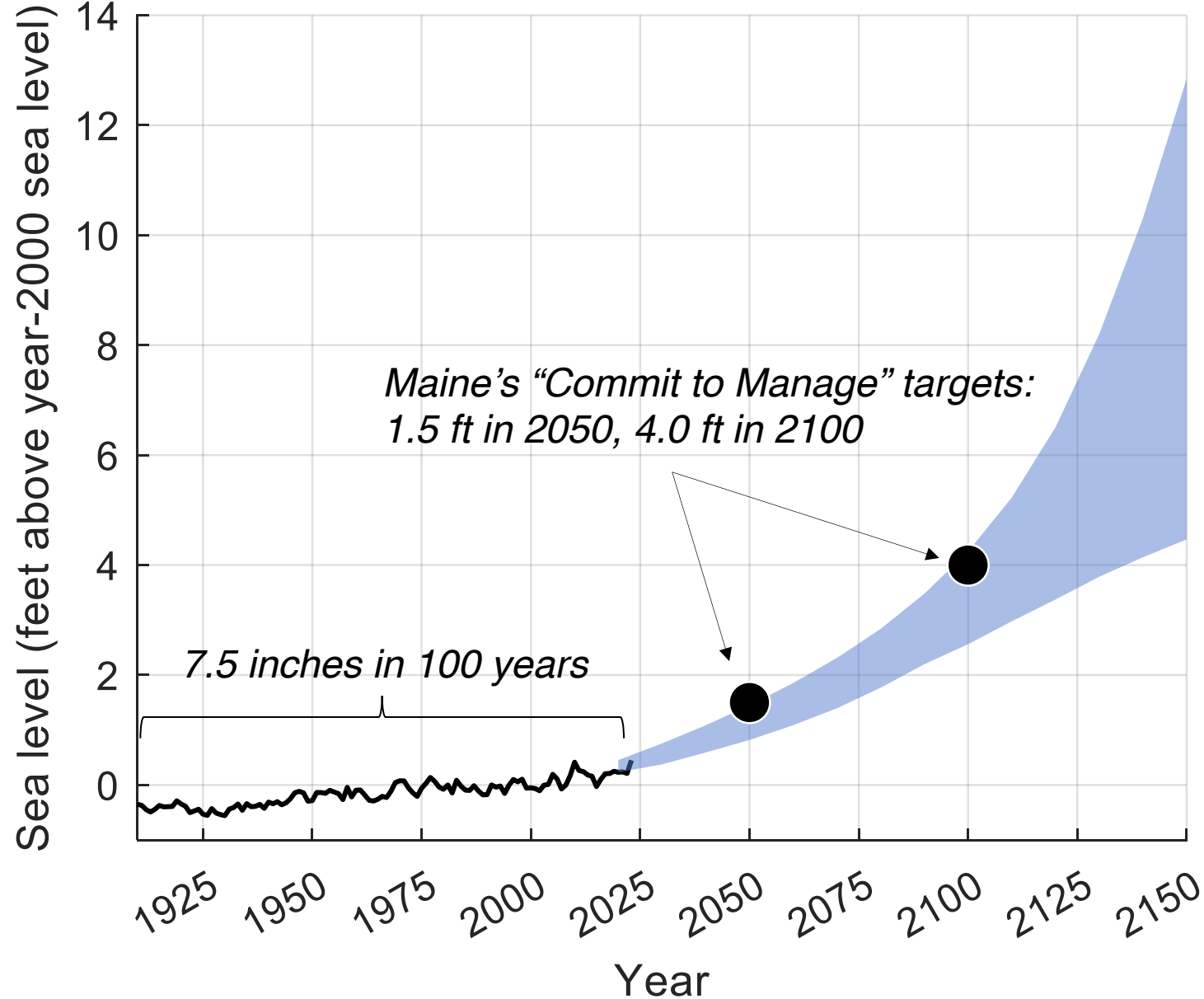
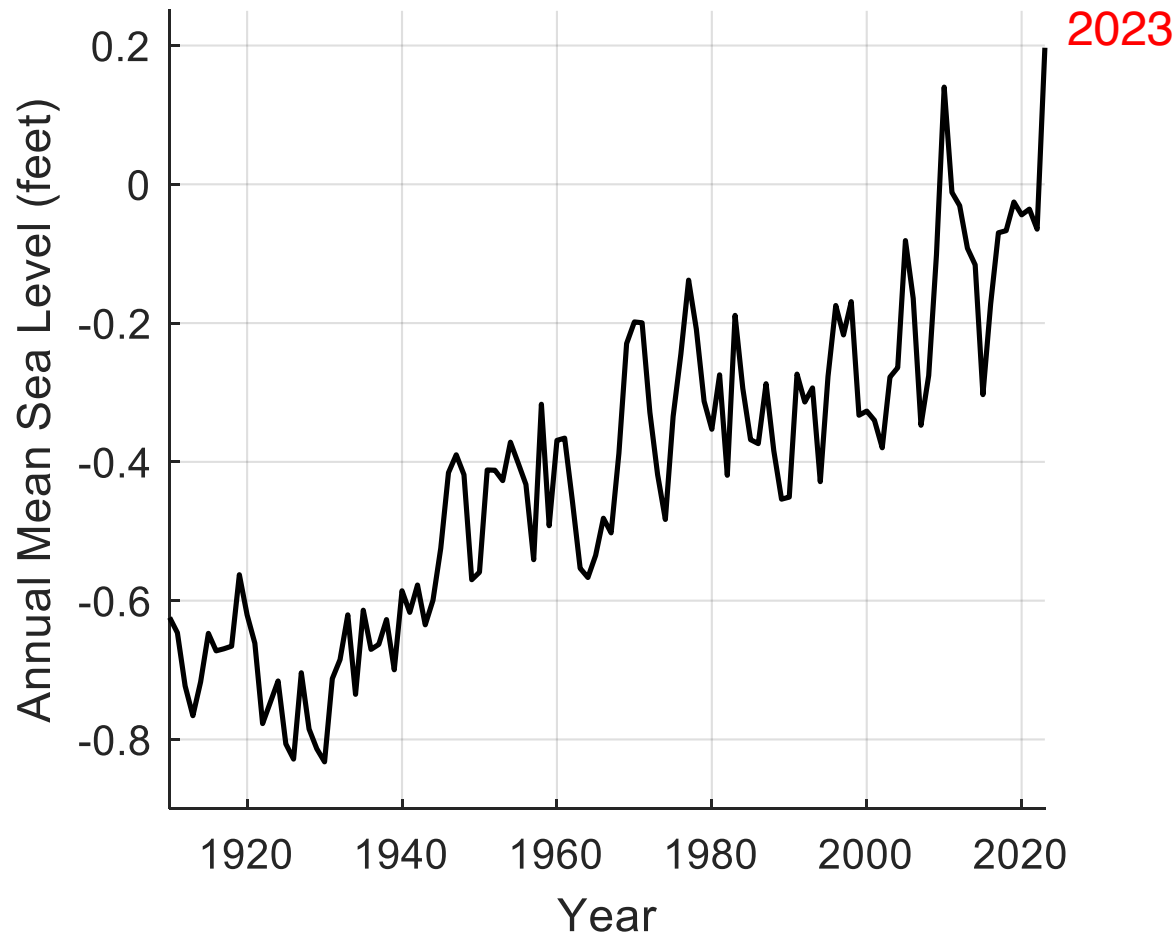— **Measured** sea level

Range of **modeled future sea level** for Maine's adopted scenario*

*US Interagency Task Force Intermediate Scenario (Sweet et al., 2022)

Sea level (feet above year-2000 sea level)

Year

Annual measured sea level (Portland)

If this annual sea level curve were flat over the past 100 years…

Stillwater level (not including waves) on Wednesday, January 10 was severe (5-to-25-year return period) but not as extreme as the "100-year" event we often plan for.

Saturday, January 13 was extreme in southern Maine, similar to the Blizzard of '78.

Storm Trends
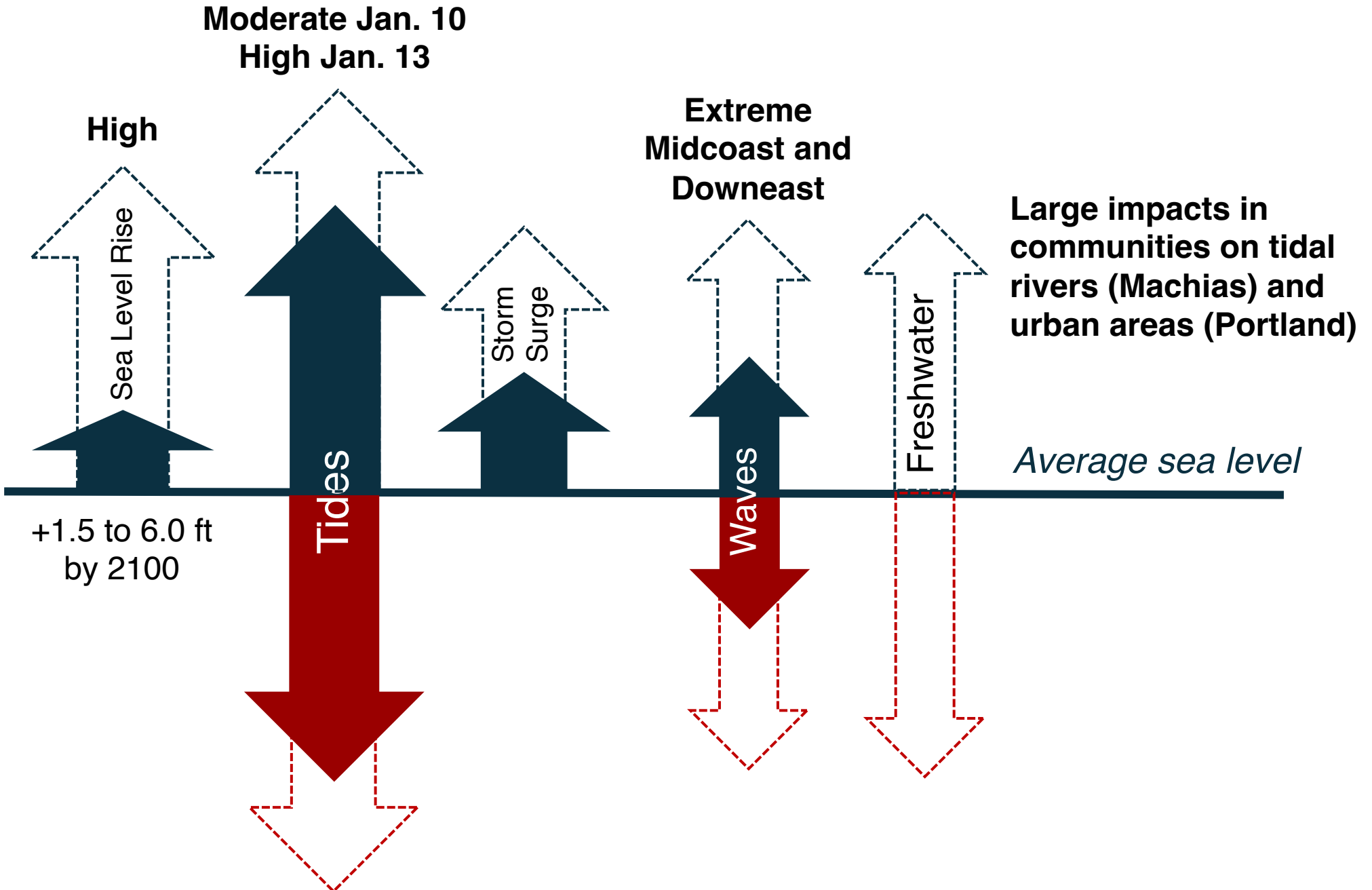
We are experiencing heavier rains. While still relatively uncommon, events of 2, 3, or 4 inches have increased in frequency.

4" 3× more common

3" 3.5× more common
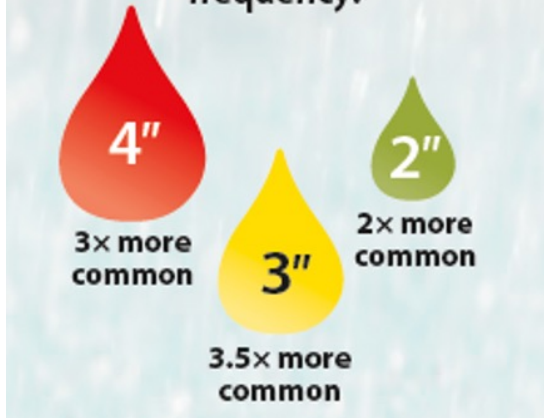
2" 2× more common

Maine's Climate Future 2020 Update

- More investigation is needed to understand both historical and projected storm trends in Maine, particularly around the increasing frequency and/or intensity of SE storm events

- Analysis of historical storms in Maine is underway- see Maine Climate Council's STS update

- Maine's climate is getting wetter; **heavy precipitation events are becoming more common** in Maine and the Northeast region in association with warming-driven intensification of the hydrologic cycle (MCF, 2020; STS 2020; NCA5)

- Oct–Nov storms in New England found a significant trend toward **more precipitation accompanying wind storms with gusts > 58 mph**; no significant trend in storm frequency or wind intensity for the period 1979–2019 (Simonson et al., 2020)

d) Days with 5+ inches of precipitation

+103%

Number of regional observations above 5 inches
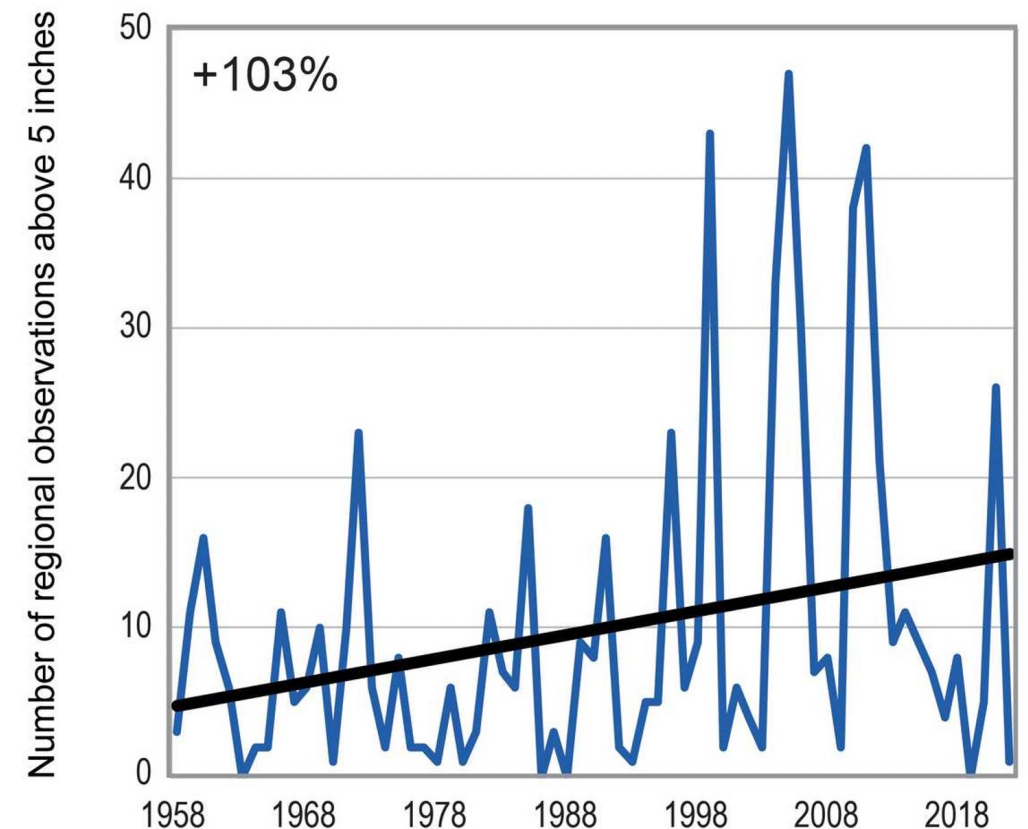
Figure credit: USDA Forest Service, Drexel University, NOAA NCEI, and CISESS NC.

NATIONAL WEATHER SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

GYX Homepage   Current Hazards   Current Conditions   Radar   Forecasts   Rivers and Lakes   Clim

Coastal Flood Threat Display   Selected View: Portland, ME   Recor

| Coastal Hazard Map | Water Level Quicklook | Inundation and Impact Resources | Local Resources |

High Tide Cycle

| 29th PM | 30th AM | 30th PM | 31st AM | 31st PM | 1st AM | 1st PM |
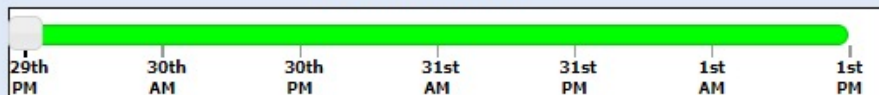
Display Peak Forecast   Display Cr

```
                                                        X
Issued: 859 PM EST Mon Jan 29 2024
Stonington Harbor
MLLW Categories - Minor 14.2 ft, Moderate 17.2 ft, Major 20.2 ft
MHHW Categories - Minor 3.6 ft, Moderate 6.6 ft, Major 9.6 ft

            Total     Total     Departure
            Tide      Tide      from Norm   Waves    Flood
Day/Time    ft MLLW   ft MHHW   ft          ft       Impact
--------    -------   -------   ---------   -------  -------
30/01 AM    11.2      0.6       2.0         2-3      None
30/01 PM    10.7      0.1       1.4         2        None
31/02 AM    10.3      -0.3      1.1         2        None
31/02 PM    9.9       -0.7      0.9         1-2      None
01/03 AM    10.1      -0.5      1.0         2        None
01/03 PM    9.7       -0.9      1.1         3        None
```

Small Craft Advisory
Gale Warning

Data Overlays
- Observed Wave Height
- Forecasts and Observations

☐ Forecast and Observations available
◇ Observations only
○ Forecast table only

Flood categories provided by NWS **forecast tables** below graphs - Select tide cycle in upper left.

| Major Flooding |
| Moderate Flooding |
| Minor Flooding |
| No Flooding |
| No forecast this cycle |

Flooding Thresholds

Options for accessing (we will follow up with links):

- weather.gov/gyx or weather.gov/car (see links to advisories, or go to "Forecasts" tab)

- Direct URL

- Sign up for alert distribution lists

Sea Level Rise/Storm Surge Scenarios   Maine Geological Survey

Find address or place

Layer List

☑ Highest Astronomical Tide Plus 1.6 Feet - Depths
- 6 to 8
- 4 to 6
- 2 to 4
- 0 to 2

☐ Highest Astronomical Tide Plus 3.9 Feet - Depths

☐ Highest Astronomical Tide Plus 6.1 Feet - Depths

☐ Highest Astronomical Tide Plus 8.8 Feet - Depths

☐ Highest Astronomical Tide Plus 10.9 Feet - Depths

Port of Portland
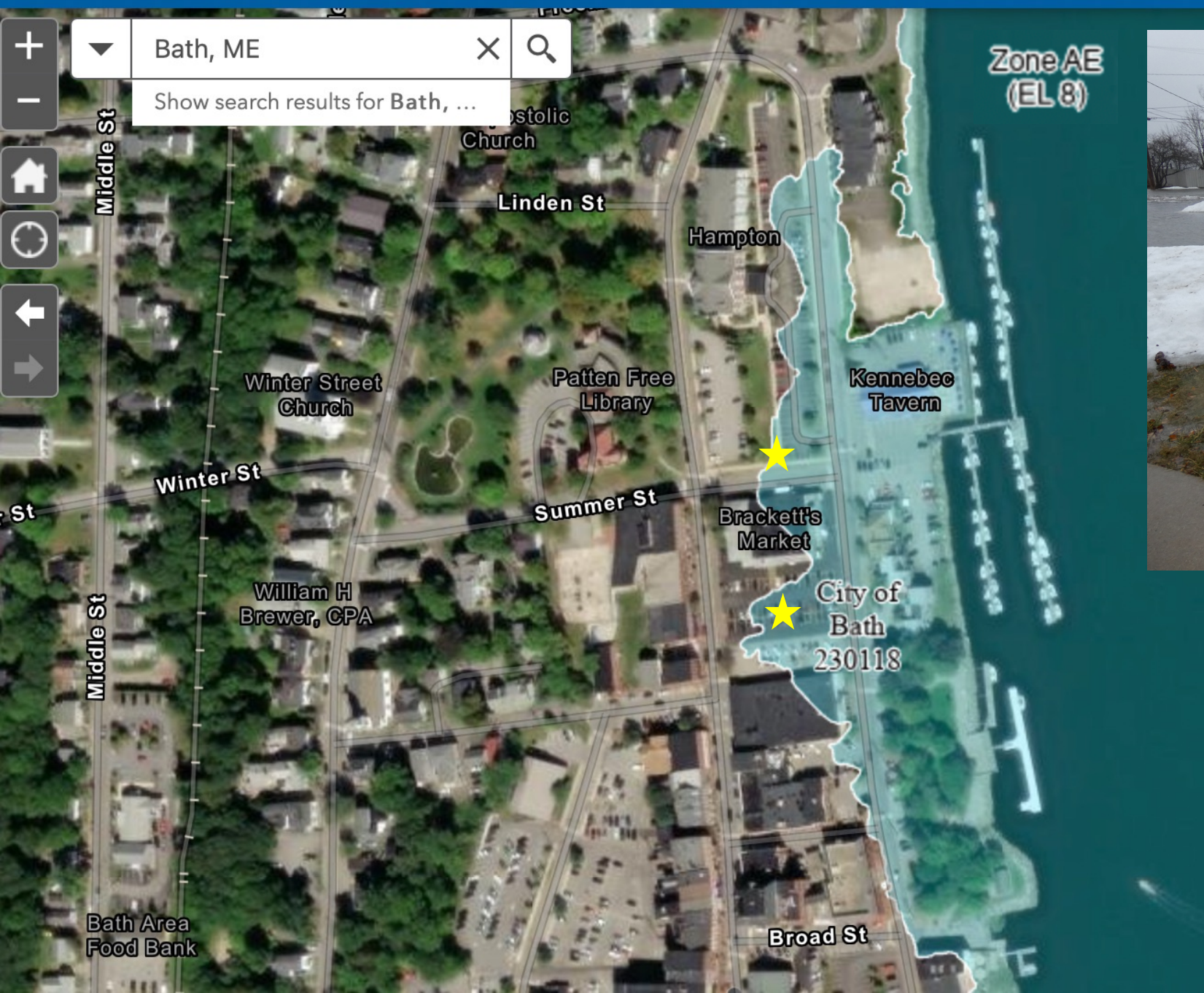
https://www.maine.gov/dacf/mgs/hazards/slr_ss/index.shtml

Maine Flood Hazard Map — Maine Floodplain Management Program

Bath, ME

Show search results for **Bath, ...**

Zone AE (EL 8)

January 13, 2024

Photo Credit: Arnold

Photo Credit: Arnold

Find address or place

Coastal Risk Explorer ✕

Rising sea levels will impact Maine's coast in many different ways. One important effect will be the inundation of roads, which will prevent access to homes and businesses as roads are flooded. Use this tool to explore how rising sea levels will affect roads in coastal cities and towns, see where road networks will be inaccessible to emergency responders, and how that relates to the overall social vulnerability of the community. Social vulnerability is provided for each coastal block group, based upon 17 socioeconomic and demographic factors.

Choose a Town to Explore:

Georgetown ▼

Coastal Roads Inaccessible to Emergency Services

Sea Level Rise Prediction

Current   1 ft   2 ft   3.3 ft   6 ft

NUMBER OF ADDRESSES INACCESSIBLE TO EMERGENCY SERVICES ⓘ	APPROXIMATE COST TO UPGRADE INUNDATED ROADS ⓘ
932	**$1,710,000**
TOWN TOTAL	TOWN TOTAL
--	$--
BLOCK GROUP TOTAL	BLOCK GROUP TOTAL

Social Vulnerability Ranking

Least Vulnerable   Most Vulnerable

Tour

Map Legend   Topographic ▼

- ■ **Current SL**
- ■ **1 ft SLR**
- ■ **2 ft SLR**
- ✚ **EMS**
- Ⓗ **Hospitals**
- ▪ **Inacessible Addresses - 2 ft SLR**
- ▬ **Inundated Roads - 2 ft SLR**
- ▬ **Inaccessible Roads - 2 ft SLR**
- ☐ **Towns**
- ⬚ **Block Group Outlines**

The Nature Conservancy | Esri Canada, Esri, HERE, Garmin, INCRE...

POWERED BY esri

www.maps.tnc.org/maine

Community Tools

Understanding & Addressing Vulnerabilities

Hazard Mitigation Planning

Vulnerability Assessments
assessing social vulnerability

Climate Action Planning

Community Planning Exercises

EMA Table Top and Scenario Planning Exercises

Maine Flood Resilience Checklist
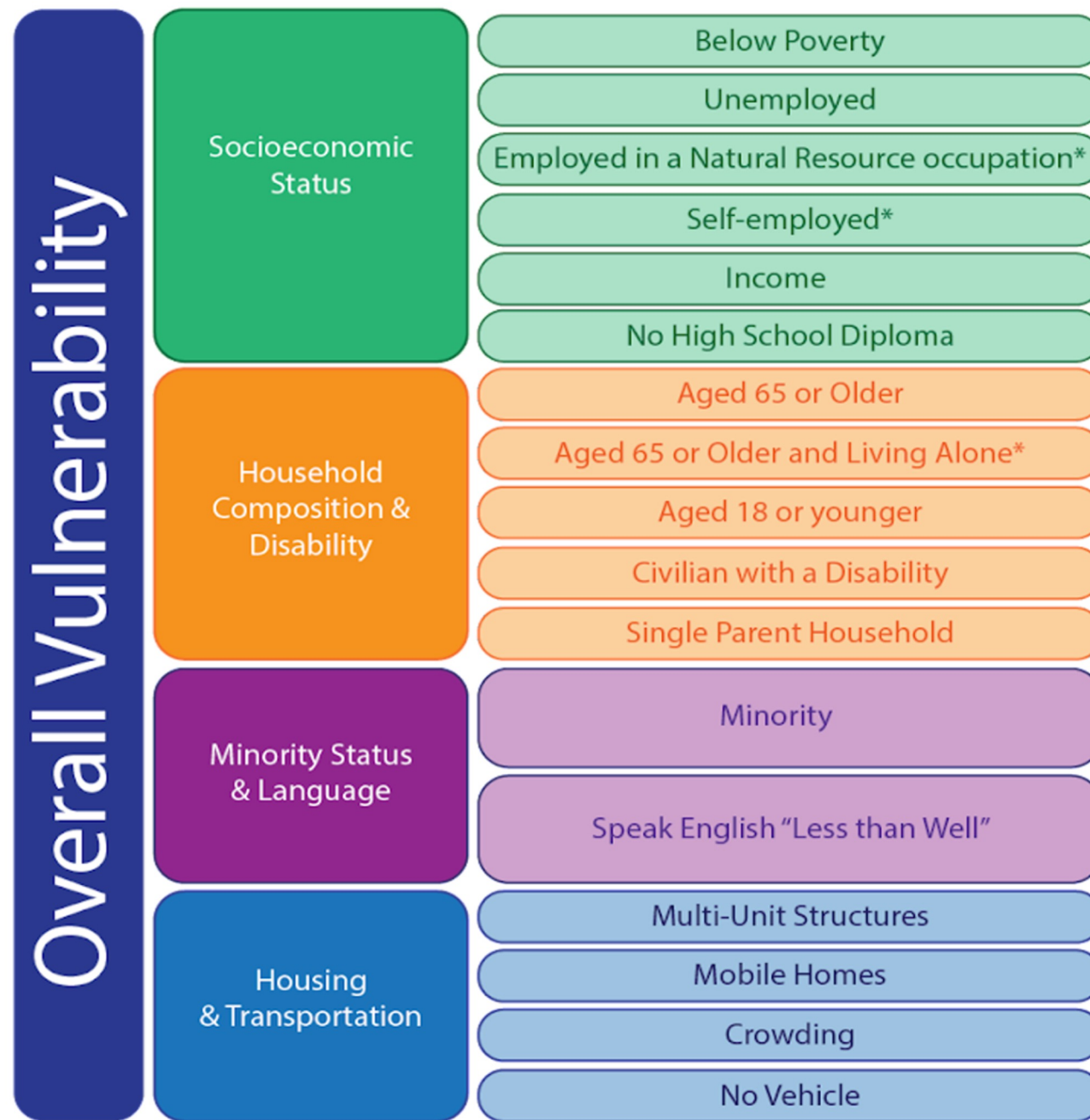
Planning Forward

Increasing Local Knowledge

Storm Readiness Tools
SKYWARN Storm Spotters

Early Warning Systems

Citizen Science Projects
local data collection

Local Groups & Committees

Building Community Resilience

Climate-based Capital Improvement Plans

Equitable Outreach & Engagement

Community Resilience Partnership

Maine Social Vulnerability Index

Overall Vulnerability

Socioeconomic Status
- Below Poverty
- Unemployed
- Employed in a Natural Resource occupation*
- Self-employed*
- Income
- No High School Diploma

Household Composition & Disability
- Aged 65 or Older
- Aged 65 or Older and Living Alone*
- Aged 18 or younger
- Civilian with a Disability
- Single Parent Household

Minority Status & Language
- Minority
- Speak English "Less than Well"

Housing & Transportation
- Multi-Unit Structures
- Mobile Homes
- Crowding
- No Vehicle

Source: Johnson, Bell, and Hertz 2016 (adapted from CDC/ATSDR SVI

Maine Climate Council Equity Subcommittee Priority Populations

Individuals and Households: Low-income individuals and households, older adults (age 65+), people with asthma or other health vulnerabilities, people with disabilities, people with limited access to transportation, Black, Indigenous and People of Color (BIPOC), people with limited English proficiency, low-income residents of rental housing (especially multifamily), mobile home residents, low-income homeowners, unhoused individuals, and families.

Individual Workers: Unemployed/underemployed, limited work authorization, students, people with limited English proficiency including New Mainers, gender, people transitioning from prison or in recovery, and/or migrant workers

Geographic Areas and Communities: Low-income communities, **rural communities, small towns with limited staff capacity,** disadvantaged communities (discussed below), **climate-frontline communities**, and/or Tribal and Indigenous communities.

Businesses: **Businesses in the natural resource industries like agriculture, forestry, and fishing,** clean energy industry (including energy efficiency), small businesses, minority- or women-owned business enterprises (MWBEs).

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