

# Maine Climate Council Special Resilience Meeting

---

**Council Co-Chairs:  
Commissioner Melanie Loyzim &  
Director Hannah Pingree**

---



GOVERNOR'S OFFICE OF  
**Policy Innovation  
and the Future**



MAINE DEPARTMENT OF  
**Environmental Protection**

**January 23, 2024**

# Agenda

## 1. Welcome

## 2. Roundtable Discussion

- a. Storm Experience, Impacts, and Response
- b. The Path Ahead

## 3. Maine Climate Council Discussion





# Welcome Governor Mills

---

## Maine Climate Council Special Resilience Meeting



# Welcome Maine Congressional Delegation

---

Maine Climate Council  
Special Resilience Meeting





# Maine Climate Council

---

## Special Resilience Meeting



*Photo credit: Island Institute*



GOVERNOR'S OFFICE OF  
Policy Innovation  
and the Future



MAINE DEPARTMENT OF  
Environmental Protection

January 23, 2024





# Storm Experience, Impacts, and Response



Photo credit: CMP



**Kathleen Billings**  
**Town of Stonington**

---

**Commercial Fish  
Pier  
Stonington, ME**



*Photo credit: Town of Stonington*

**Kathleen Billings  
Town of Stonington**

---

Damaged wharf for  
Isle au Haut Boat  
Company,  
mailboat, and ferry  
to Acadia National  
Park



*Photo credit: Town of Stonington*



**Kathleen Billings**  
**Town of Stonington**

---

**Lobster Co-Op**  
**Stonington, ME**



*Photo credit: Town of Stonington*

**Kathleen Billings**  
**Town of Stonington**

---

**Oceanville Road**  
**Stonington, ME**



*Photo credit: Town of Stonington*



# Kathleen Billings Town of Stonington

---

## Town Landing and Fire Department Stonington, ME



*Photo credit: Town of Stonington*

**Kathleen Billings**  
**Town of Stonington**

---

**Deer Isle Causeway**



*Photo credit: Town of Stonington*



Gary Lamb  
City of Hallowell

---

Hallowell, ME



Gary Lamb  
City of Hallowell

---

Hallowell, ME





**Gary Lamb**  
City of Hallowell

---

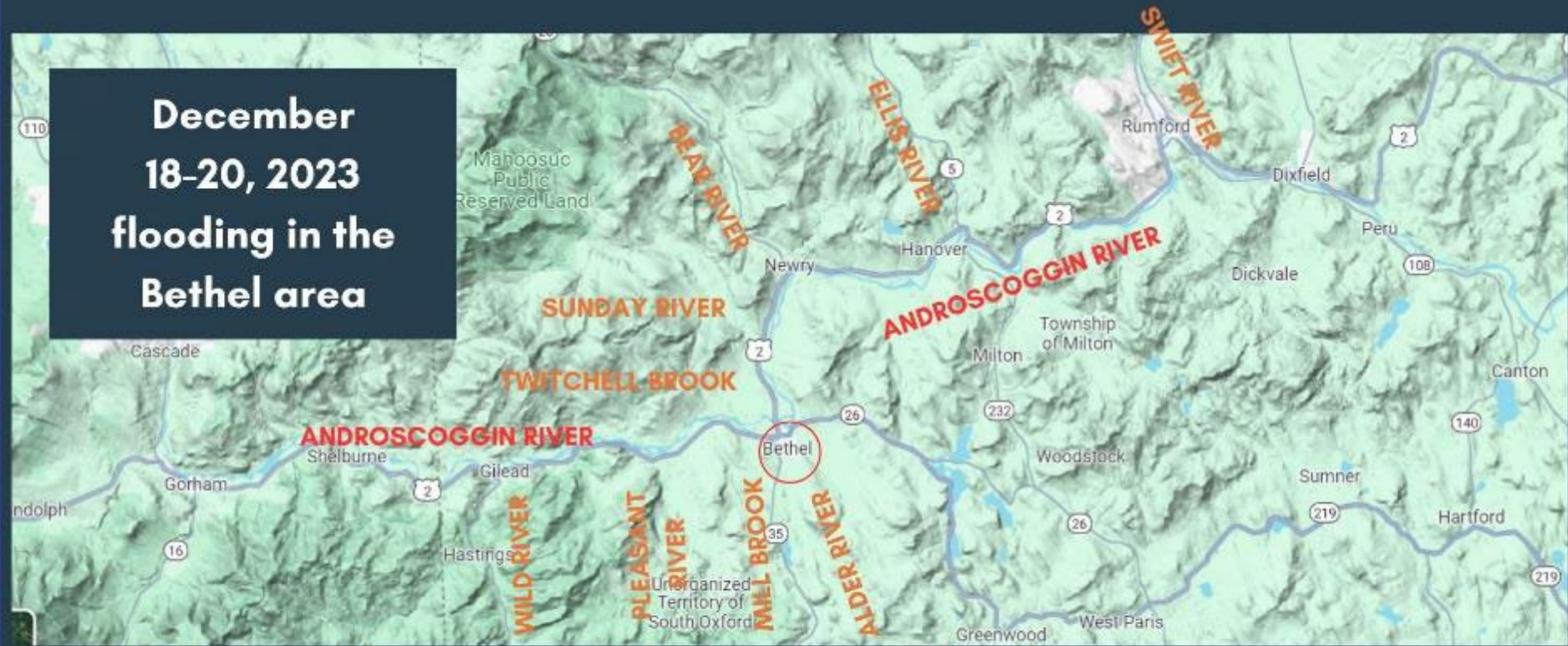
Hallowell, ME



# Jessie Perkins

## Bethel Area Chamber of Commerce

**December  
18-20, 2023  
flooding in the  
Bethel area**



- **5-7+'' of rain on frozen ground with snow in mountains**
- **27 water-related rescues made by Bethel Fire Department**
- **2 deaths**
- **No power in village for 48+ hours**
- **No school for 4 days**
- **Sunday River closed for 5 days**



Jessie Perkins  
Bethel Area Chamber of  
Commerce

---

## Bethel Village



Stonetree Creative photo

Jessie Perkins  
Bethel Area Chamber of  
Commerce

---





Jessie Perkins  
Bethel Area Chamber of  
Commerce

---

## In-town trails



Bethel Pathway



Bethel Pathway Extension



Bethel Inn Golf Course  
(should be XC skiing)



Jessie Perkins  
Bethel Area Chamber of  
Commerce

---

## Sunday River





**Commissioner  
Melanie Loyzim  
Department of  
Environmental  
Protection**

---

Residential oil  
tank spill due to  
flooded  
basement



*Photo credit: DEP*

**Commissioner  
Melanie Loyzim**  
Department of  
Environmental  
Protection

---

Commercial  
boiler tank spill  
*(left)*

Leaked fuel after  
floodwaters  
receded *(right)*



*Photo credit: DEP*



Joyce Taylor  
Department of  
Transportation

---

Route 26  
Newry, ME



*Photo credit: MaineDOT*



Joyce Taylor  
Department of  
Transportation

---

Route 145  
Strong, ME



*Photo credit: MaineDOT*



Joyce Taylor  
Department of  
Transportation

---

Route 16  
Coplin, ME *(right)*

Route 27  
Carrabassett, ME  
*(left)*



*Photo credit: MaineDOT*



Joyce Taylor  
Department of  
Transportation

---

Route 113  
Gilead, ME



*Photo credit: MaineDOT*



**Meredith Mendelson**  
Department of Marine Resources

---

Burnt Coat Harbor,  
Swan's Island, ME



*Photo credit: Department of Marine Resources*

**Meredith Mendelson**  
Department of Marine  
Resources

---

New Harbor, ME



*Photo credit: Department of Marine Resources*



Meredith Mendelson  
Department of Marine  
Resources

---

New Harbor  
Co-Op



*Photo credit: Department of Marine Resources*



**Meredith Mendelson**  
Department of Marine  
Resources

---

Five Islands



*Photo credit: Department of Marine Resources*



**Meredith Mendelson**  
Department of Marine  
Resources

---

Spruce Head



*Photo credit: Department of Marine Resources*



Commissioner  
Heather Johnson  
Department of Economic  
and Community  
Development

The Spinning  
Mill  
Skowhegan, ME



*Photo credit: DECD*



**Commissioner  
Heather Johnson**  
Department of Economic  
and Community  
Development

---

North Country  
Rivers  
Bingham, ME



*Photo credit: DECD*



# Commissioner Heather Johnson Department of Economic and Community Development


 **Rumford Polar Bears  
Snowmobile Club**  
Dec 18, 2023 · 🌐

Lots of water everywhere! Here is a photo by Eric Hamann and a short video by Ron Russell of water flowing over the crane bridge on ITS 82 just off the Isthmus Road.

Hopefully, the underpinning of this bridge, and our 31 other bridges, will hold up to this onslaught.



Photo credit: DECD

 **Mexico Trailblazers Snowmobile Club -  
Maine**  
Dec 29, 2023 · 🌐

We have been able to get out and inspect most of the trails in our area. We made out relatively well with the latest storm all things considered. We have a bridge that needs to be reset and a few washouts to fix.

There are several clubs in our area that have been hit hard and will need all hands on deck when the time comes to help repair trails and get things opened back up for when the snow flies.

Remember you can join or donate to the club online at [www.mexicotrailblazers.com](http://www.mexicotrailblazers.com). Every little bit helps us out.



 **Wild River Riders is in Gilead.** ·  
**Follow**  
Jan 2 · 🌐

Many thanks to Garrett Sullivan for volunteering this morning to retrieve our bridge decking downstream and rebuild the bridge. The extra set of hands made quick work of this project, and we can now move on to other projects.

If you can help us, we'll be working every day this week. Send us a message.





**Dr. Puthiery Va**  
**Maine Center for Disease**  
**Control and Prevention**

---

**Spinney Mill**  
**Road, Arrowsic**



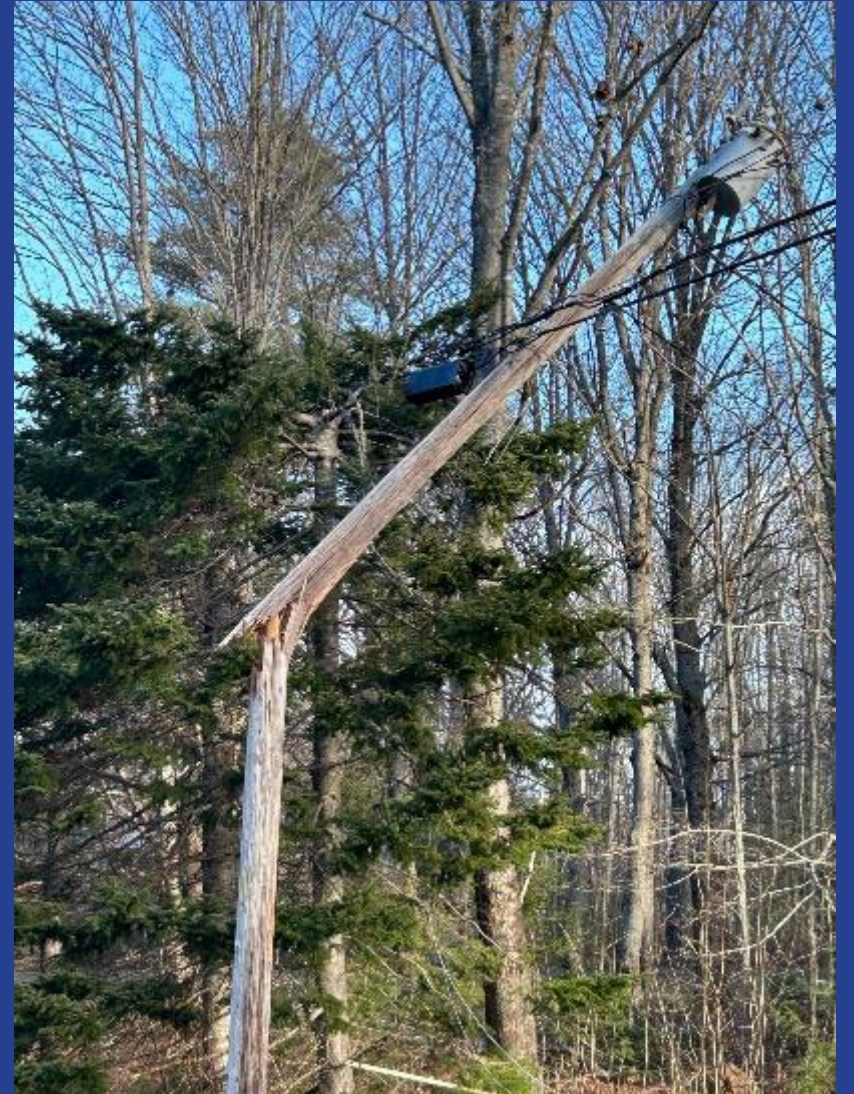
*Photo credit: via MaineDOT*





**Dan Burgess**  
Governor's Energy Office

---



*Photo credit: Versant Power*



**Dan Burgess**  
Governor's Energy Office

---

Capitol Island  
Road  
Southport, ME  
*(right)*

Belgrade, ME  
*(left)*



*Photo credit: CMP*





**Pete Rogers**  
**Maine Emergency**  
**Management Agency**

---

**Sunday River**  
**Access Road**



*Photo credit: Maine Forest Service*



**Pete Rogers**  
**Maine Emergency**  
**Management Agency**

---

Newry, ME *(left)*



*Photo credit: MaineDOT*



# The Path Ahead



*Photo credit: Island Institute*





# Perspective from Vermont

Secretary Julie S. Moore  
Vermont Agency of Natural  
Resources

---







# Floodplain Restoration & Infrastructure Hardening

State Office Complex  
Waterbury, Vermont  
July 2023



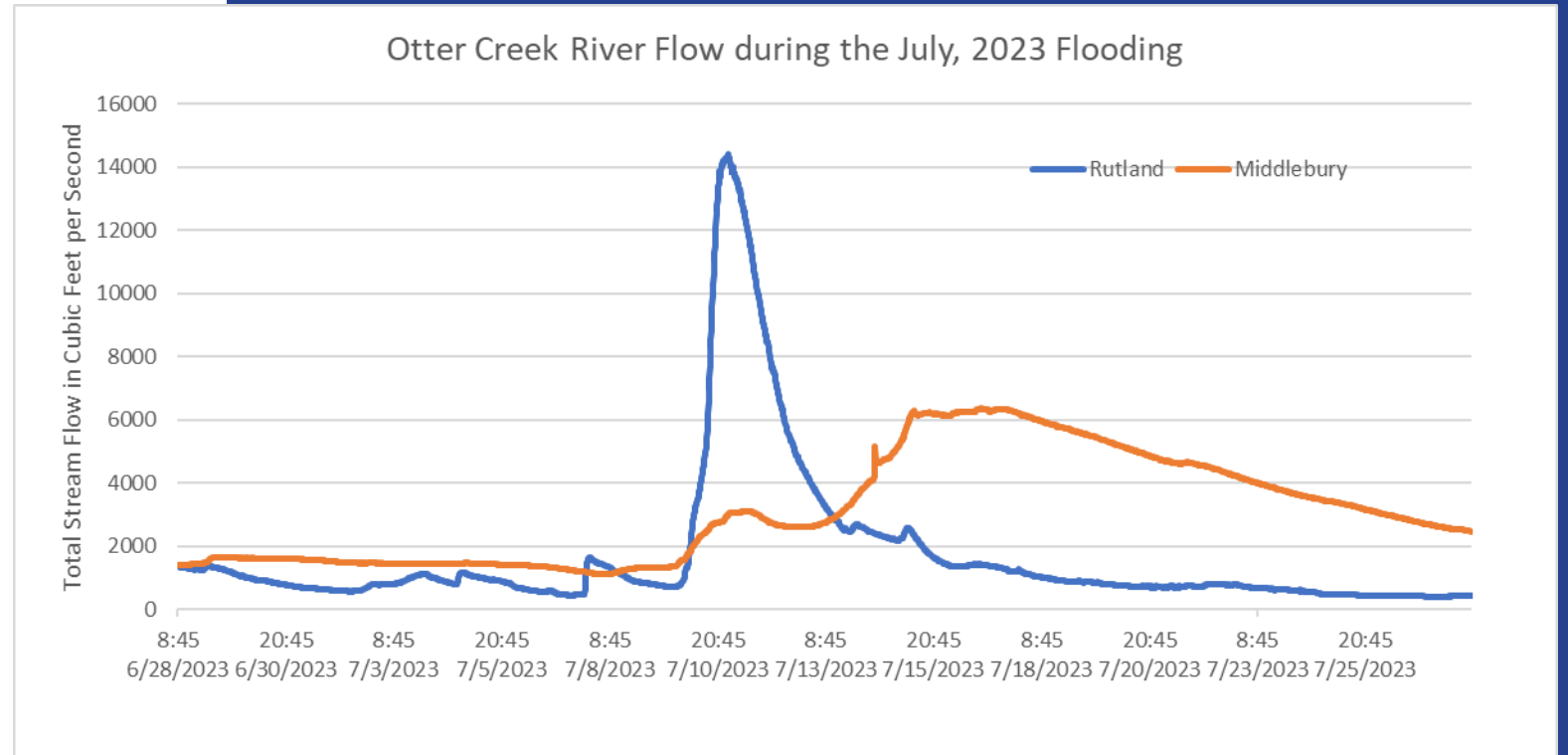
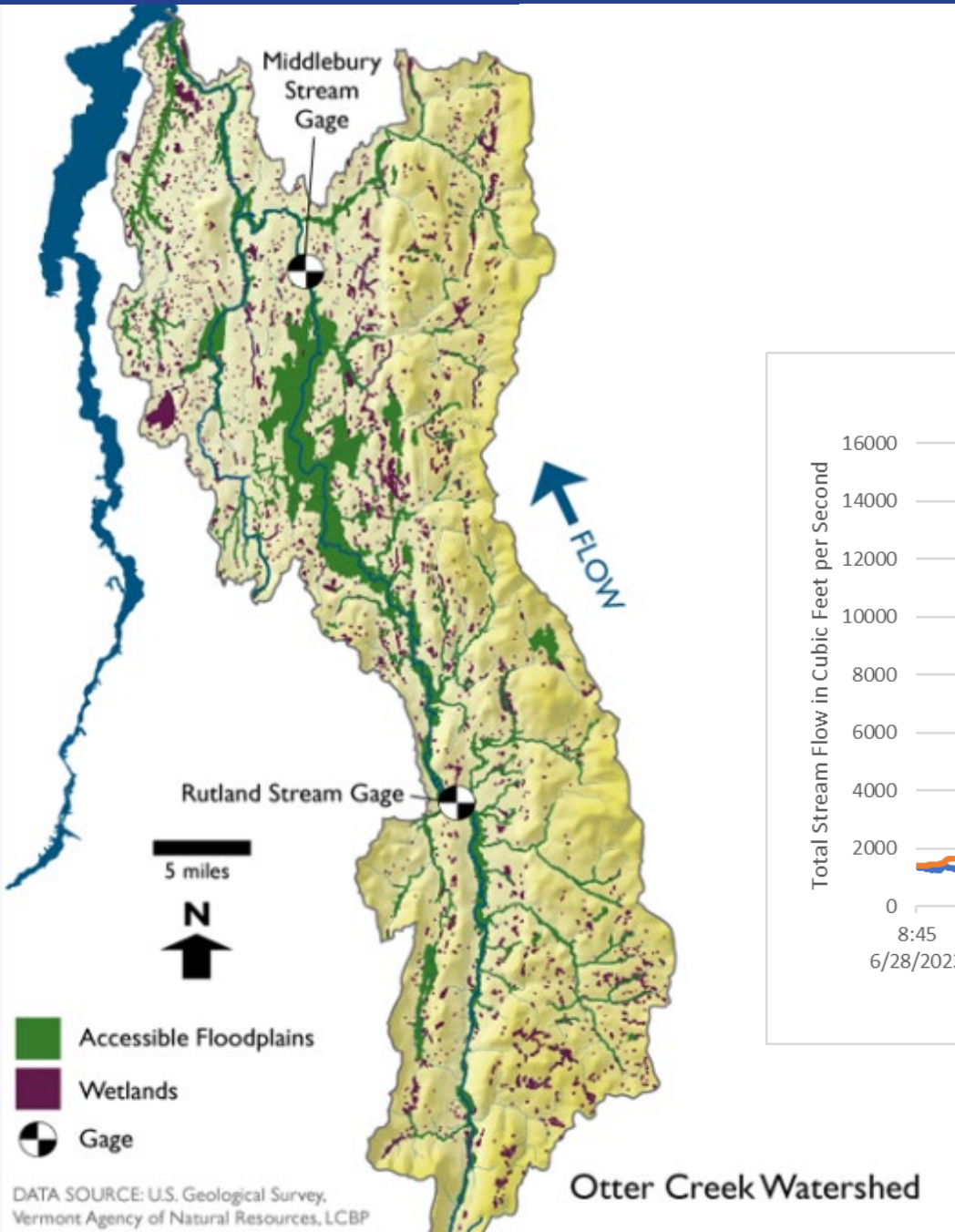
# Resilient Roads and Infrastructure

Jail Branch  
Orange, Vermont  
July 2023





# Wetland Protection and Restoration





# Looking Ahead: Climate Science

Susie Arnold  
Island Institute

---



*Photo credit: Island Institute*



## Trends in Precipitation

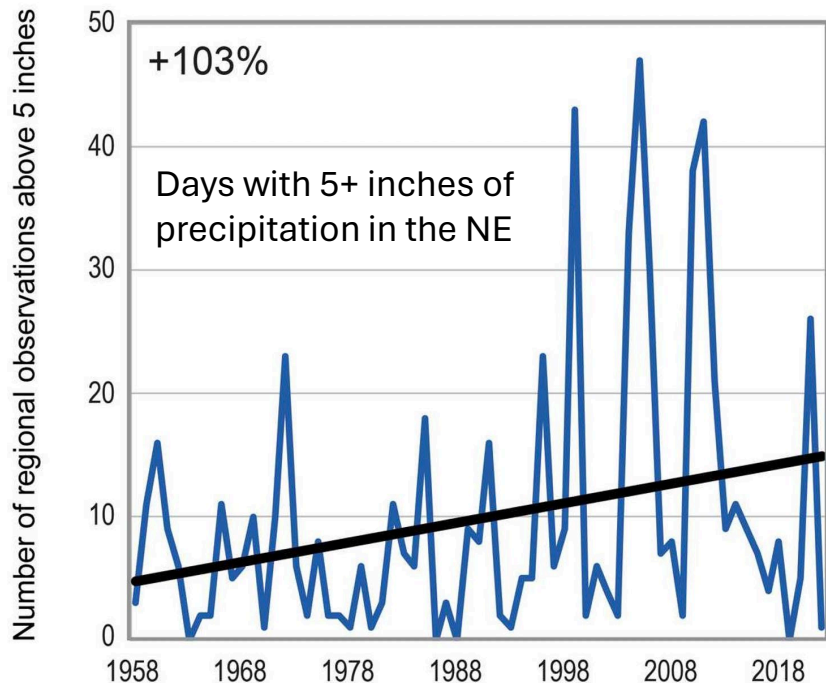
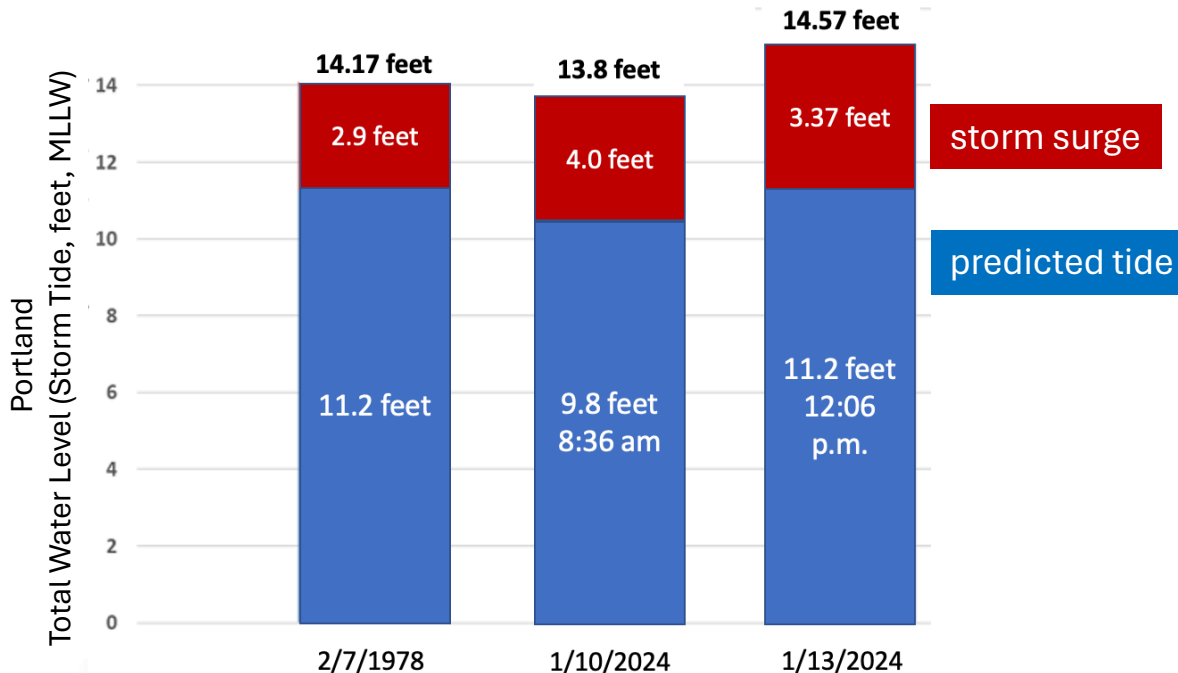


Figure credit: USDA Forest Service, Drexel University, NOAA NCEI, and CISESS NC.

## Jan. 10 and 13, 2024 Events



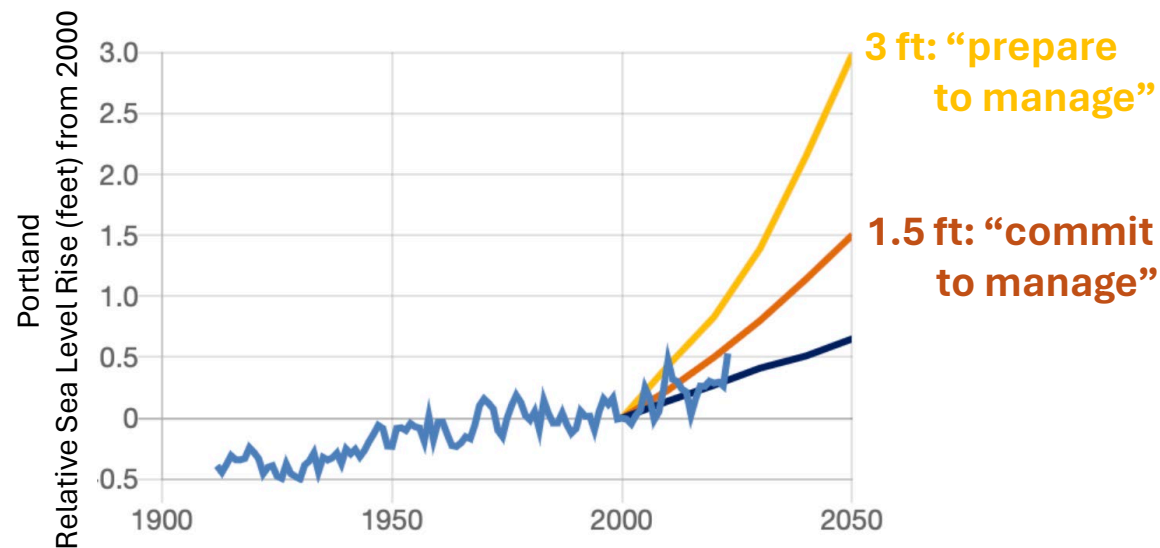
## Dec. 18, 2023 Event

- heavy rainfall (5-7 inches in parts of W. Maine)
- high winds (over 70 mph gusts in some areas)

On top of:

- warmer winter kept ground from freezing
- higher soil moisture due to chronic increased wetness
- watersheds full and thawed

## Trends in Sea Level Rise





# Maine Climate Council

---

## Special Resilience Meeting



*Photo credit: Island Institute*



GOVERNOR'S OFFICE OF  
Policy Innovation  
and the Future



MAINE DEPARTMENT OF  
Environmental Protection

January 23, 2024





# Discussion with the Maine Climate Council

---







# VERMONT'S APPROACH TO ADAPTATION AND INCREASING RESILIENCE

---

Julie Moore, P.E  
Secretary  
Agency of Natural Resources  
January 23, 2024



# Overview

- Vermont facts & figures
- Approach to adaptation
  - Fast, effective response and early recovery
  - Building long-term resilience
- Key Tools/Approaches
- Next steps





# A bit about Vermont...

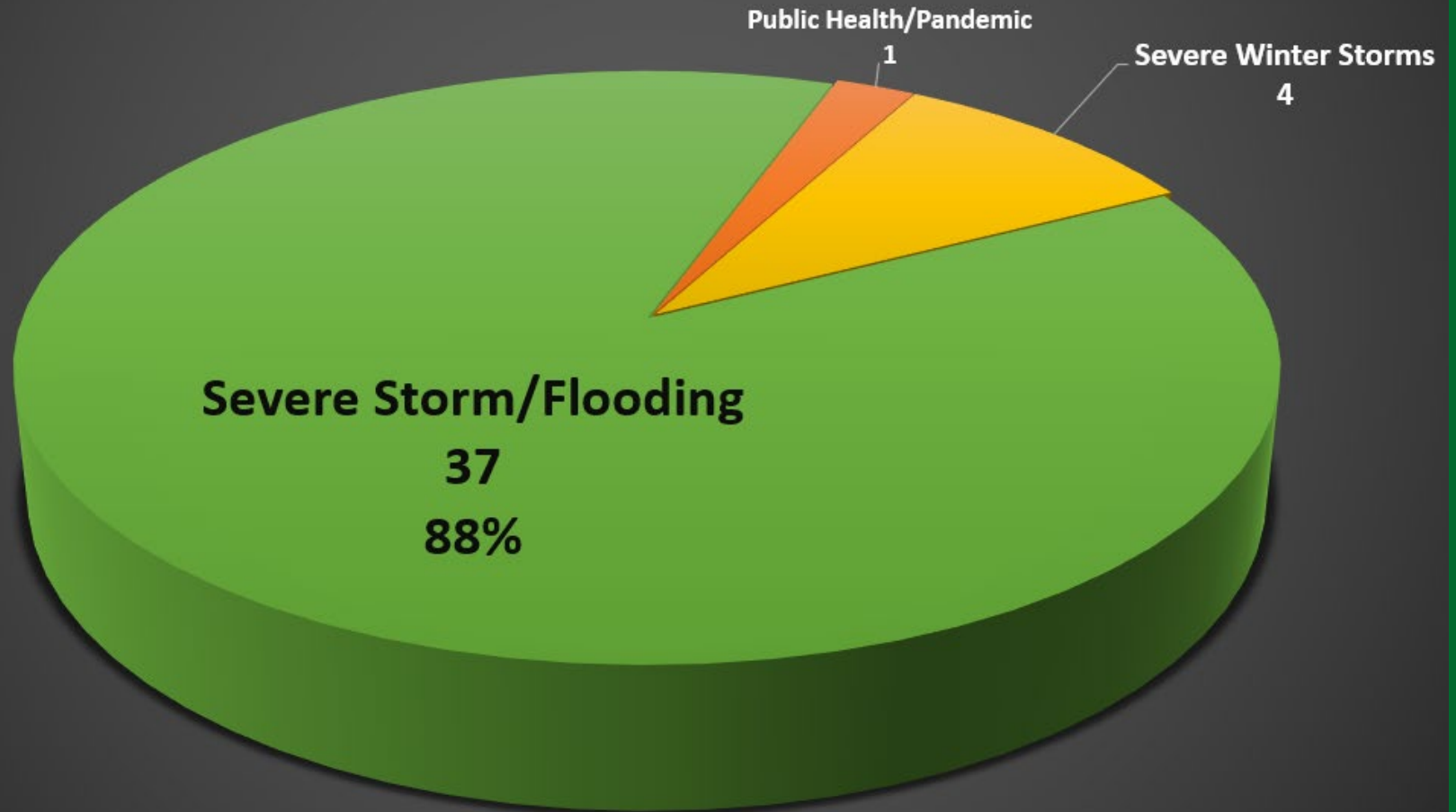
- Vermont's land area is just over 9,000 square miles (5,760,000 acres)
  - About  $\frac{1}{4}$  the size of Maine
- Roughly 650,000 residents
- 256 municipalities + 30 incorporated villages and no real county government
  - Only 4% of municipalities >10,000 residents
- 7,000 miles of rivers and streams
- 209,000 acres of [mapped] riparian area/river corridors
  - 274 municipal entities regulate land uses in FEMA-mapped flood hazard areas
  - More than 12,400 structures located in or immediately adjacent to FEMA mapped flood hazard areas statewide
- 250,000 acres of (mapped) wetlands
- More than 800 known dams







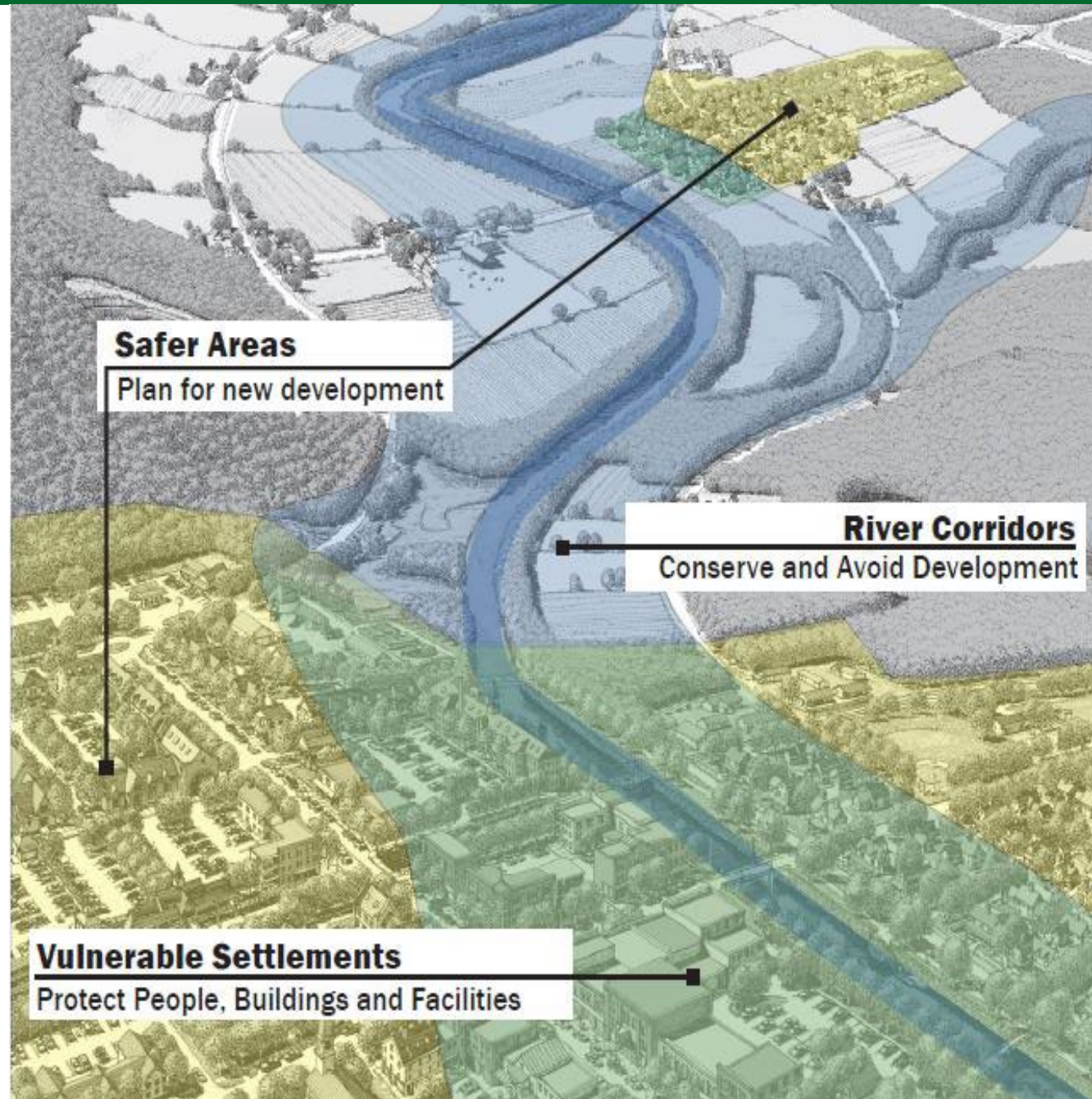
# 1990-2023 42 Federal Disaster Declarations





# Approach to Adaptation

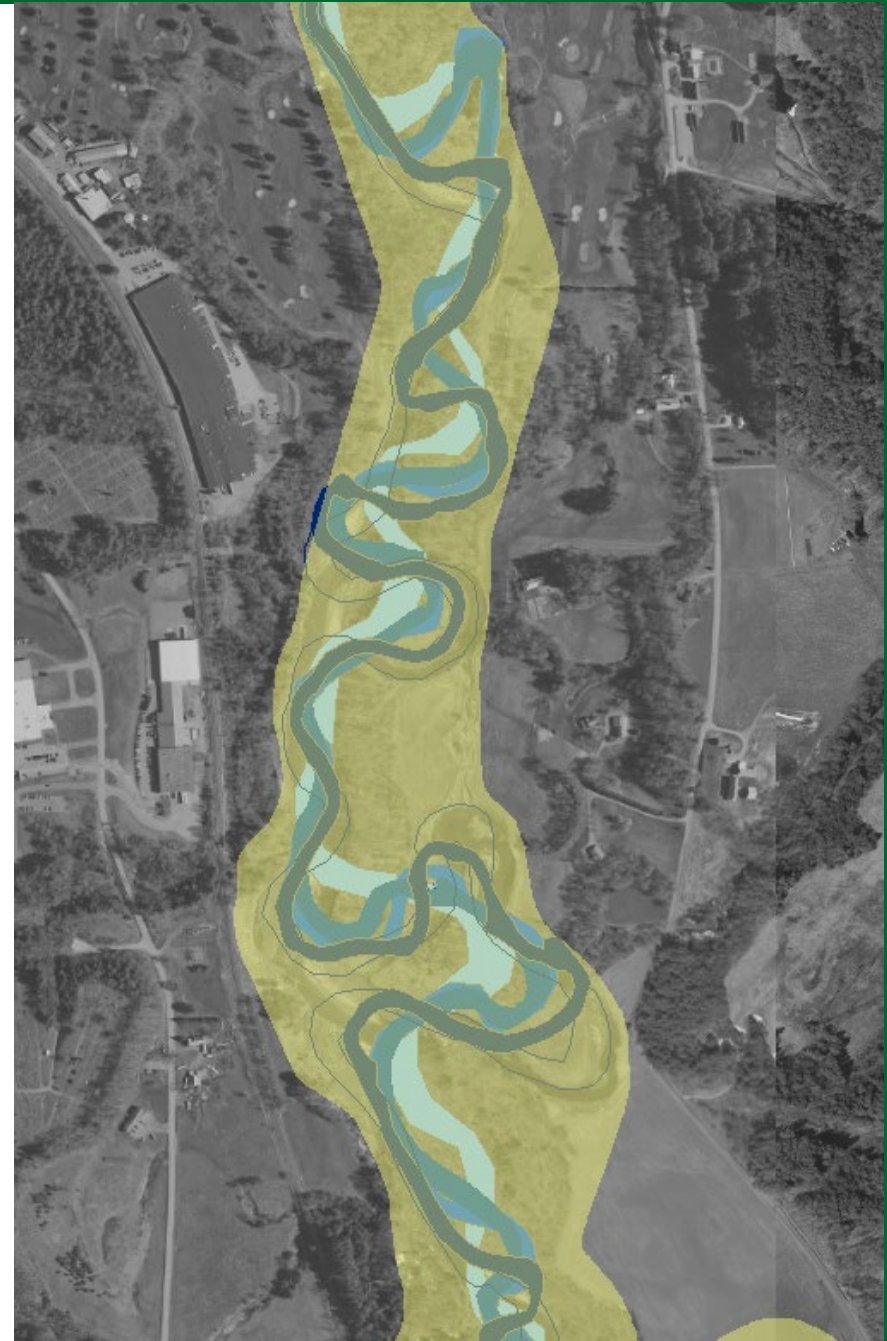
- Fast, Effective Response and Early Recovery
  - Emergency authorities
  - Survey 123 app
  - SEOC “recovery unit”
  - Local liaisons program
- Building Long-Term Resilience
  - Avoiding the unmanageable
    - Hazard mitigation
    - Land use planning and regulation
    - Nature-based solutions
  - Managing the unavoidable
    - Floodproofing and hardening existing assets
    - Designing and maintaining reliable infrastructure





# Key Tools/Approaches

- Aligning state programs, funding and incentives
  - Emergency Relief Assistance Fund (ERAF)
  - Flood Resilient Communities Fund (FRCF)
  - Climate Action Plan ↔ State Hazard Mitigation Plan
  - Climate Action Plan ↔ Comprehensive Energy Plan
- Mitigation, restoration and conservation
  - River corridor easements
  - Functioning floodplains
  - Wetland restoration
- Land use planning and regulation
  - Town road and bridge standards
  - Stream alteration general permit
  - River corridor model bylaw
- Evaluating vulnerabilities and establishing priorities
  - Municipal Vulnerability Index
  - Municipal Climate Toolkit





# Next Steps

- Maximize FEMA funding
  - Secure match
  - Complement with FRCF
- Establish statewide floodplain standards
- Capitalize unsafe dam revolving fund
- Develop *Resilience Implementation Strategy*
  - Inventory existing efforts
  - Identify gaps
  - Prioritize needs
  - Form funding strategy





# Susie Arnold Island Institute

---



*Photo credit: Island Institute*



# Storm Trends

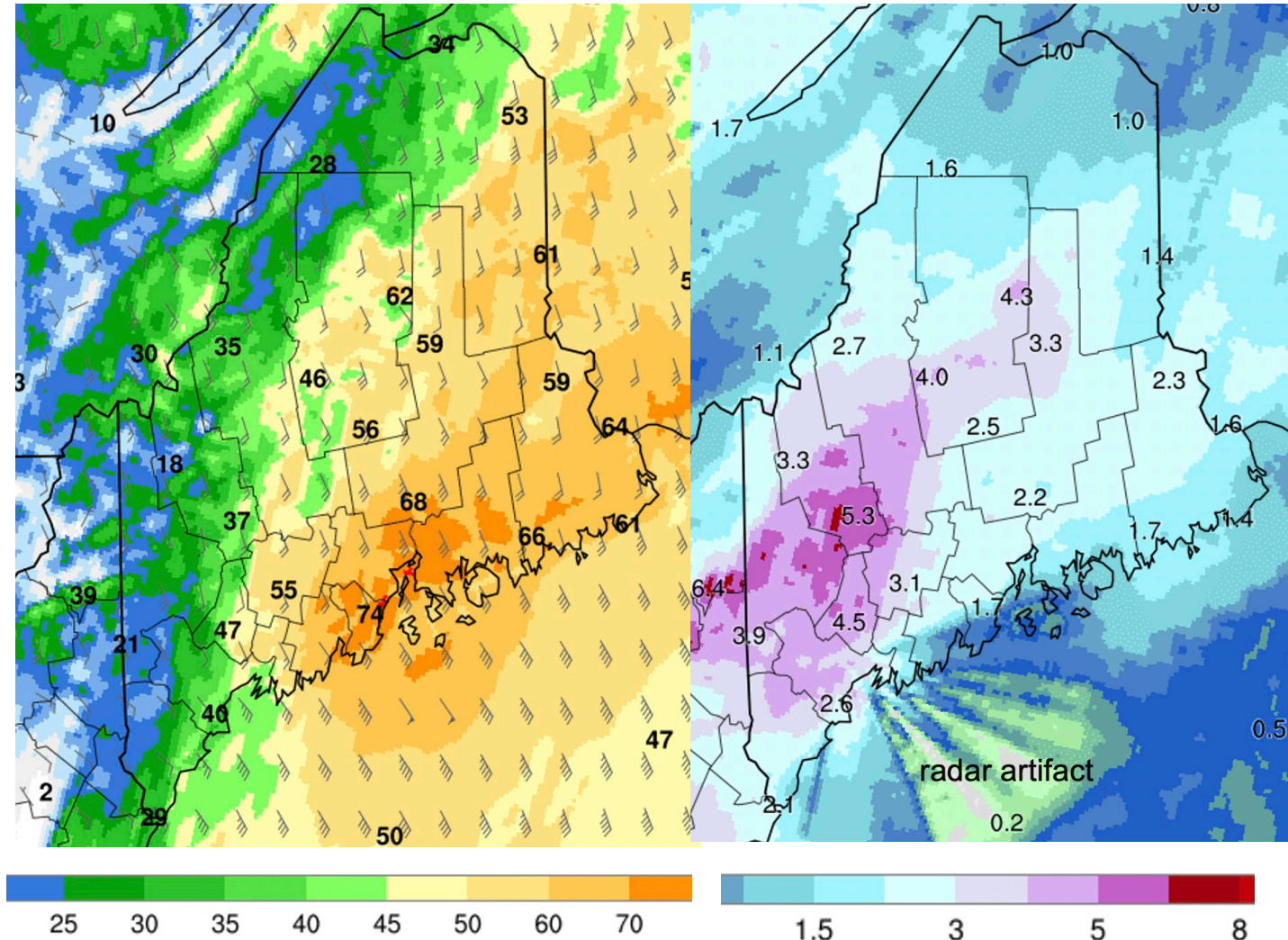
- Maine’s climate is getting wetter (annual mean and across seasons), and **heavy precipitation events are becoming more common** in Maine and the Northeast region in association with warming-driven intensification of the hydrologic cycle (MCF, 2020; STS 2020; NCA5).
- A study of mid-autumn (Oct–Nov) storms in New England found a significant trend toward **more precipitation accompanying wind storms with gusts > 58 mph**, but did not find any significant trend in storm frequency or wind intensity for the period 1979–2019 (Simonson et al., 2020).
- 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.

## December 18 Storm

NOAA Un-Restricted Mesoscale Analysis (URMA)

### Max Gusts (mph), 4PM

### Precipitation Totals (in)





# With storms and sea level rise- key points of vulnerability and actions/tools to improve resilience

- **Accessibility**- people are cut off during flood events  
*Action*- provide guidance on calculating future water levels and develop emergency flood protocols for before, during and after events



- **Infrastructure**-  
*Action*- re-envision our vulnerable infrastructure and develop engineering capacity and regulatory permitting to respond  
**Avoid** – don't build new structures in hazardous areas  
**Adapt** – adapt infrastructure to make it more resilient (e.g., elevate)  
**Protect** – where it makes sense, protect using armor and/or nature-based solutions  
**Relocate** – where it makes sense, relocate at-risk infrastructure

- **Natural Systems**- marshes/beaches/dunes/bluffs/mudflats/eelgrass  
*Action*- complete erosion hazard modeling and studies that account for future conditions for different shoreline types



- **Mental Health**- 1. direct exposure to climate hazard, and 2. emotional reaction to current and future threats  
*Action*- increased funding for mental health research, prevention and care, increasing access to mental health services, promoting community-level mental health initiatives





# ACCESSIBILITY

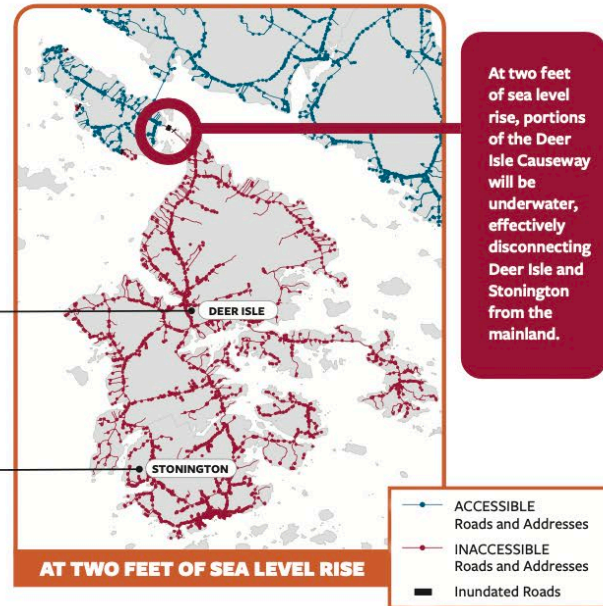
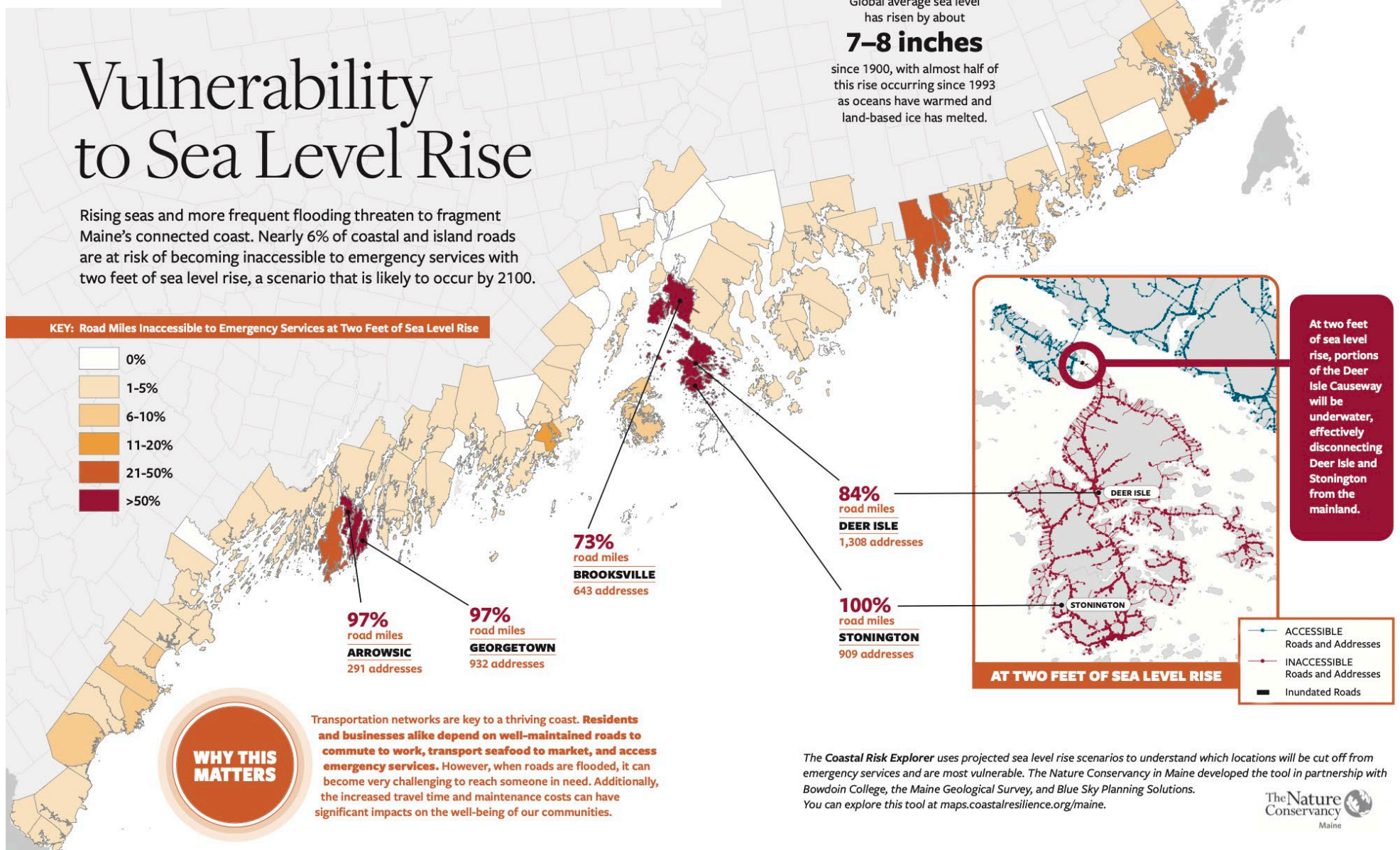
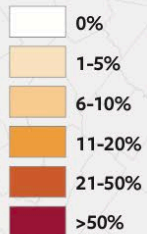
## Vulnerability to Sea Level Rise

Rising seas and more frequent flooding threaten to fragment Maine's connected coast. Nearly 6% of coastal and island roads are at risk of becoming inaccessible to emergency services with two feet of sea level rise, a scenario that is likely to occur by 2100.

Global average sea level has risen by about **7-8 inches**

since 1900, with almost half of this rise occurring since 1993 as oceans have warmed and land-based ice has melted.

KEY: Road Miles Inaccessible to Emergency Services at Two Feet of Sea Level Rise



**WHY THIS MATTERS**

Transportation networks are key to a thriving coast. Residents and businesses alike depend on well-maintained roads to commute to work, transport seafood to market, and access emergency services. However, when roads are flooded, it can become very challenging to reach someone in need. Additionally, the increased travel time and maintenance costs can have significant impacts on the well-being of our communities.

The Coastal Risk Explorer uses projected sea level rise scenarios to understand which locations will be cut off from emergency services and are most vulnerable. The Nature Conservancy in Maine developed the tool in partnership with Bowdoin College, the Maine Geological Survey, and Blue Sky Planning Solutions. You can explore this tool at [maps.coastalresilience.org/maine](https://maps.coastalresilience.org/maine).



TRANSPORTATION





### 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:

#### Coastal Roads Inaccessible to Emergency Services

##### Sea Level Rise Prediction



NUMBER OF ADDRESSES INACCESSIBLE TO EMERGENCY SERVICES  
**932**

APPROXIMATE COST TO UPGRADE INUNDATED ROADS  
**\$1,710,000**

TOWN TOTAL  
 --

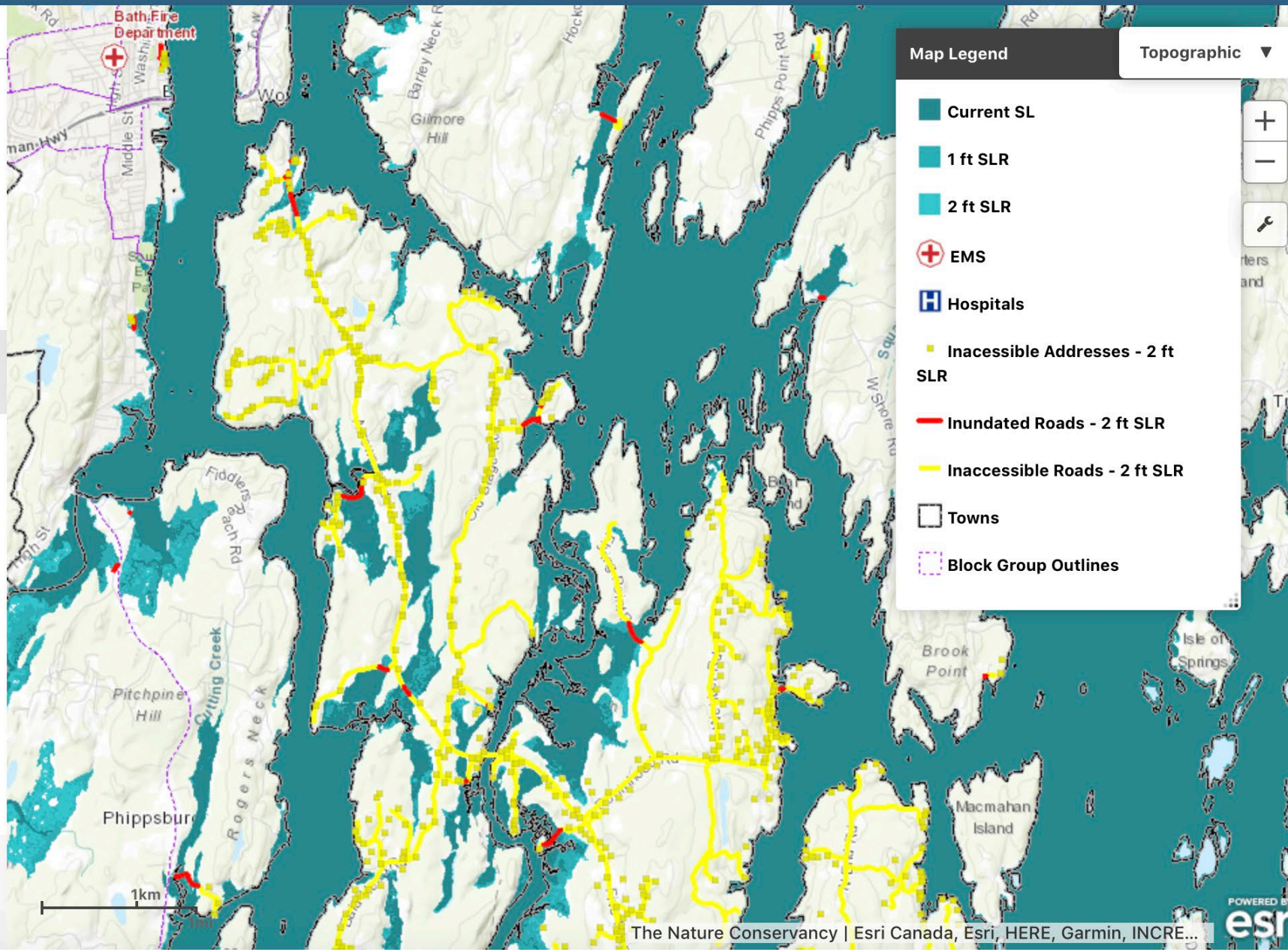
TOWN TOTAL  
 \$--

BLOCK GROUP TOTAL

BLOCK GROUP TOTAL

#### Social Vulnerability Ranking

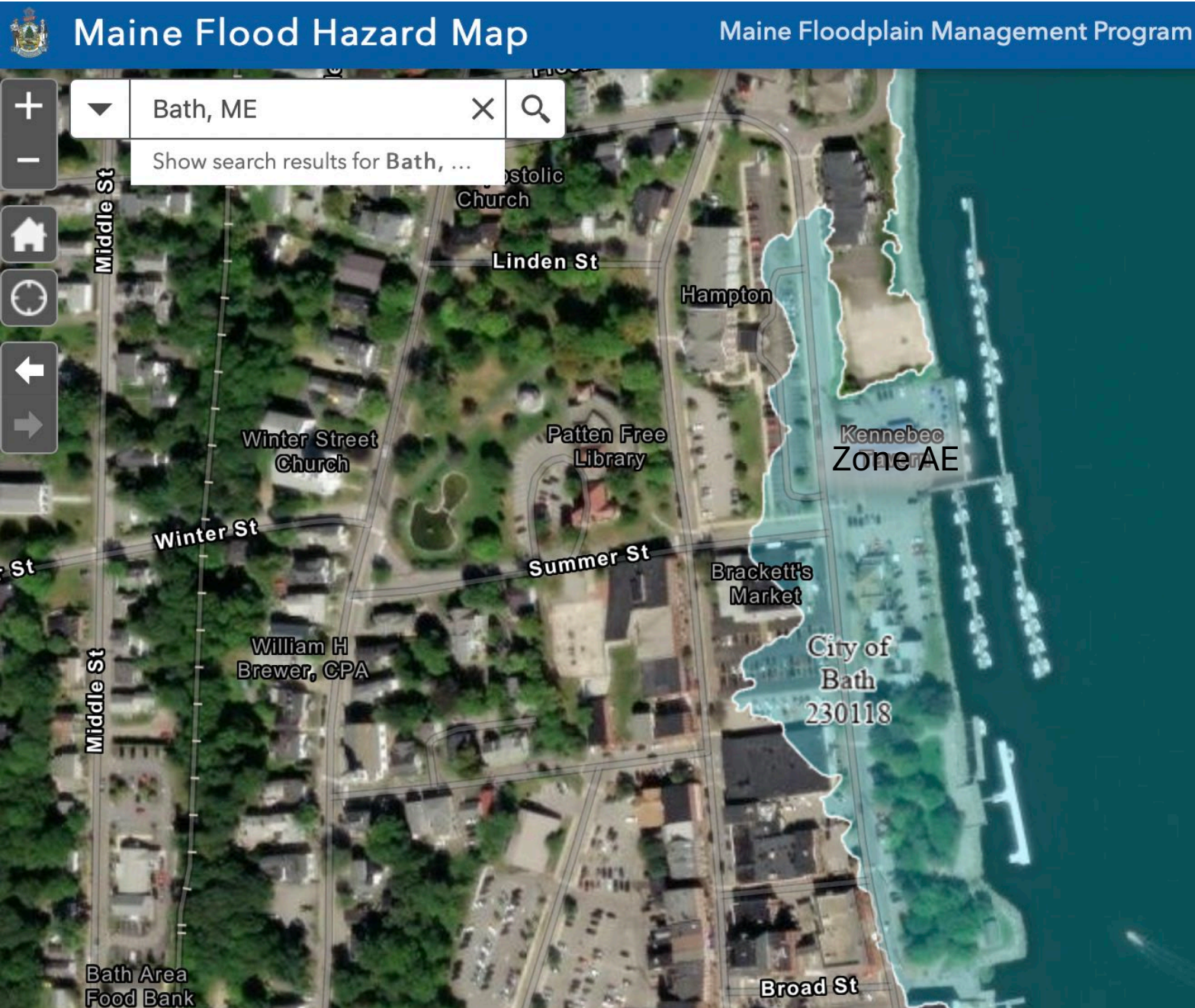
Least Vulnerable Most Vulnerable





# INFRASTRUCTURE

January 13, 2024



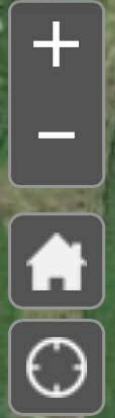


# NATURAL SYSTEMS



## Coastal Sand Dune Geology

Maine Geological Survey



Georgetown, ME



### Layer List

#### Layers

- Sand Dune Erosion Hazard Areas
  -
- Sand Dune Boundaries
  - D1
  - D2
- Coastal Sand Dune Geology Maps Extents
  -



Photo Credit: Dickson



Photo Credit: Dickson



# MENTAL HEALTH

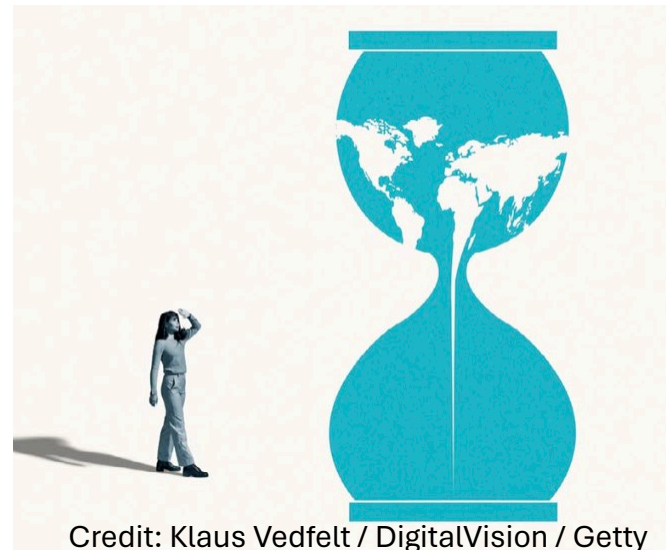
*A recent survey of Maine physicians revealed that many believe that climate change is worsening mental health and well-being among their patients.*

# Fishermen Wellness

*health and wellness for fishermen on land and sea*



The Fishermen Wellness Program advocates for more resources to support the mental health and well-being of commercial fishermen, and partners with organizations to create opportunities for fishermen to find help and information.





# Maine Climate Council

## Special Resilience Meeting



*Photo credit: Island Institute*



GOVERNOR'S OFFICE OF  
Policy Innovation  
and the Future

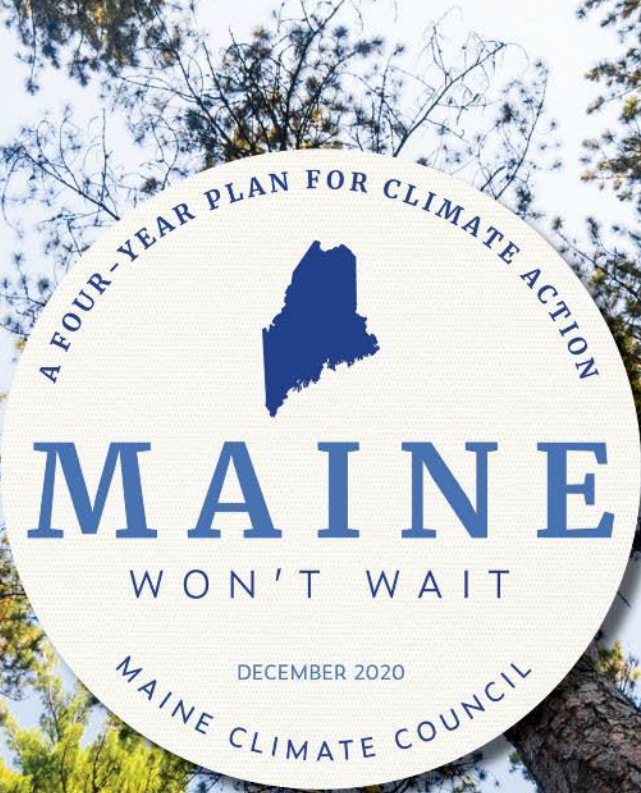


MAINE DEPARTMENT OF  
Environmental Protection

January 23, 2024







A FOUR-YEAR PLAN FOR CLIMATE ACTION



**MAINE**

WON'T WAIT

DECEMBER 2020

MAINE CLIMATE COUNCIL