







RI Climate Resilience Update

EC4 – February 2025



Rhode Island Climate Resilience

Statewide Collaboration

Planning

- Statewide Planning: Resilient Rhody
- Local Planning: MRP Community Resilience Building Workshops, Municipal Annual Resilience Updates

2. Implementation

- Resilience Technical Assistance (Project Scoping, Policy Development, Design & Engineering)
- State + Federal Resilience Grants

Capacity Building & Partnerships

- Resilience EC4 Subgroup
- RI Resilience Partner Group
- State Resilience Office (Regional Resilience Coordinators) Three (3) Regional Resilience Coordinators

Transparency & Information Sharing

- Resilience Web Resources
- Annual Rhode Island Resilience Summit

Rhode Island Climate Resilience

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2024 State of Resilience Report

EO 23-07

Providing a snapshot of our current climate resilience efforts statewide.

Structure:

- Collaborators & Opening Letter
- 2024 Report Introduction: Goal, Definitions, & Structure
- Rhode Island's Climate Change Impacts
- Rhode Island's Standards for Climate Resilience
- Statewide Resilience Initiatives (Government & Non-Governmental)
 - 1. Regional + Statewide Coordination
 - Data + Mapping
 - 3. Education + Workforce Development
 - 4. State Planning
 - 5. Local Planning + Project Scoping
 - State Funded Funding Opportunities
 - 7. Funding Programs + Incentive Programs
- 2018 Resilient Rhody Actions & Results
- What's Next? Resilient Rhody 2025 Statewide Coastal Resilience Plan

Statewide Collaborators

Resilient Rhody 2024 State of Resilience Report

ACKNOWLEDGMENTS

The Resilient Rhody 2024 State of Resilience Report would not have been possible without the following state agencies and partners.

EXECUTIVE CLIMATE CHANGE COORDINATING COUNCIL (EC4)

Terrence Gray, Chair Coastal Resource Management Council

Department of Administration (DOA) Department of Environmental Management (RIDEM)

Department of Education (RIDE) Department of Health (RIDOH) Department of Transportation (RIDOT) Division of Statewide Plannina

Emergency Management Agency (RIEMA) Executive Office of Health and Human Services (EOHHS)

Rhode Island Infrastructure Bank (RIIB) Office of Energy Resources (OER) Rhode Island Public Transit Authority (RIPTA) Division of Public Utilities and Carriers

Rhode Island Commerce Corporation

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Kai Lo Muscio, The Nature Conservancy

Olivia McGranahan, University of Rhode

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Partnership

Island

Partnership

Watershed Council

Narragansett Bay National Estuarine Research Reserve (NBNERR)

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Coastal & Ports

Compliance & Inspection

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Nancy Stairs

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Planning & Development Megan DiPrete Michelle Sheehan

- **EC4** Agencies
- Resilience EC4 Subgroup
- RI Resilience Partner Group
- **RI Department of Environmental Management**
 - Director's Office
 - Narragansett Bay National Estuarine Research Reserve
 - Water Resources
 - Coastal & Ports
 - Compliance & Inspection
 - Forestry
 - Planning & Development

Goal & Definitions

Resilient Rhody 2024 State of Resilience Report

State of Resilience Report Definitions

The 2018 Resilient Rhody strategy established Rhode Island's definition of Climate Resilience as:

The capacity of individuals, institutions, businesses, and natural systems within Rhode Island to survive, adapt, and grow no matter what chronic stresses and weather events they experience. While the effects of climate change are felt across the state, these impacts are not equally distributed. Effective climate resilience requires a focus on environmental justice and equity to support local leadership for sustained interaction between community, business, and government.

Further, in 2015, Rhode Island's Executive Climate Change Coordinating Council (EC4) defined the six key statewide manifestations of climate change, which the EC4 Science & Technical Advisory Board (EC4 STAB) are tasked to assess. These include:

- · Sea level rise
- · Warming air temperatures
- Warming water temperatures
- Storm frequency and intensity
- · Changing Biodiversity
- Precipitation and inland flooding

The Resilient Rhody 2024 State of Resilience Report continues to utilize these above definitions, given their role in shaping and defining our state's climate resilience initiatives to date. Any re-evaluation or amendments to these definitions will be conducted during the Resilient Rhody 2025 Statewide Coastal Resilience Plan process.

Goal:

- "provide a snapshot of Rhode Island's current climate resilience status..."
- "provide summary of Rhode Island's most recent climate change data & standards, state initiatives, and non-governmental initiatives furthering adaptation statewide..."
- "provides a snapshot of state progress towards the 61 goals outlined in Resilient Rhody..."

Definitions:

- "Climate Resilience" Resilient Rhody (2018)
- "Statewide Manifestations of Climate Change"
 EC4 (2015)

RI's Climate Change Impacts

Resilient Rhody 2024 State of Resilience Report

Rhode Island Climate Change Impacts

In 2018, Resilient Rhody provided an overview of climate change data and trends seen across Rhode Island's six manifestations of climate change. The most up to date information from these federal, regional, and state data sources is provided below.

Sea Level Rise

- The historic rate of sea level rise from 1930 to 2023 is 2.92 mm/year, or over 1" per decade. In other
 words, sea level has risen nearly 11" in Rhode Island since 1930.1
- Global mean sea level rise from 1993 has accelerated to 3.5 mm/year (satellite altimetry).²
- The mean annual rate of sea level rise in Newport is 4.25 mm/year from 1986-2022.3
- In February 2022, the National Oceanic and Atmospheric Administration (NOAA) projected high sea level rise scenarios for the Northeast at 1.77 ft by 2050, 6.89 ft by 2100, and 12.14 ft by 2150 (measured from the year 2000).⁴

Storm Frequency & Intensity

- Coastal inundation levels and storm surge impacts will increase due to sea level rise.
- With a 2°C temperature increase above pre-industrial levels, rainfall rates within tropical storms and hurricanes are projected to increase by about 14%.6
- Globally, tropical cyclone intensities are projected to increase by 1 to 10%, according to projections for 2°C global warming. The proportion of tropical cyclones that reach very intense (Category 4 and 5) levels is projected to increase due to anthropogenic warming over the 21st century.⁷
- Climate change is projected to magnify the impact of tropical cyclones in the US Northeast through
 increased rainfall and wind speed. The coastal region at severe risk from tropical storms is projected to
 expand northward within the US Northeast.⁸
- Annual economic damage from U.S. landfalling hurricanes has increased remarkably since 1900. Studies
 agree that the dominant driver of the increase has been the rise in the amount and economic value of
 built infrastructure and wealth along the U.S. coast in hurricane-prone regions.9

Precipitation & Inland Flooding

- The Northeast has experienced the largest national increase in the number of extreme precipitation days
 (the top 1% of heaviest precipitation events), with an increase of 60% from 1958 to 2021. The region's
 annual and 5-year maximum precipitation amounts have also increased by over 10%.¹⁰
- In New England, extreme precipitation days have increased 71% from 1901-2012.¹¹
- There is robust evidence that warming caused by humans has contributed to increases in the frequency and severity of the heaviest precipitation events across nearly 70% of the US.¹²
- Studies project that the observed increase in heavy precipitation events will continue in the future.
 Under the higher scenario (RCP8.5) the number of extreme events (exceeding a 5-year return period)
 increases by two to three times the historical average in every region by the end of the 21st century, with
 the largest increases in the Northeast. Under the lower scenario (RCP4.5), increases are 50%-100%.¹³

Key Rhode Island Impacts:

- Sea Level Rise:
 - Projected 1.77 ff by 2050, 6.89 ff by 2100, and 12.14 ff by 2150 (measured from the year 2000) (NOAA High Scenario for Northeast)
- Precipitation & Inland Flooding:
 - 60% increase in extreme precipitation days (top 1% of heaviest precipitation events) from 1958-2021 in the Northeast
- Warming Air Temperatures:
 - 2020: 23 days above 90 degrees and three heat waves, creating severe drought across 43% of RI.
 - 2022: Fourth-hottest July on record and the hottest August on record for RI, with 16 days above 90 degrees and two heat waves, leading to an extreme hydrologic drought & federal disaster declaration in Providence.

RI's Standards for Climate Resilience

Resilient Rhody 2024 State of Resilience Report

Standards for Climate Resilience

Elevation and setback guidance for sea level rise, storm surge, and inland flooding as implemented across Rhode Island's state agencies. These state standards inform project planning, implementation, and grant funding priorities.

PLANNING & DESIGN STANDARDS

These resilience considerations, implemented through state & local planning efforts and state design requirements, shape statewide prioritization, funding, and implementation of projects.

STANDARD RIDOT Resilience Improvement Plan: Whether the asset is located in a current floodway, 100yr and 500yr flooding event. (FEMA FIRM) RI Division of Statewide Planning Local Comprehensive Plans: Areas exposed to 100yr and 500yr slorm events. (SIDRMTOOLS) RIEMA Local Hazard Mitigation Plans: Must address all FEMA requirements including requirement to assess the risk and probability of future hazard events. (FEMA FIRM) RIDEM Wastewater Treatment Facility Guidance: 100yr flooding events + 2-3 additional freeboard (structural and electrical components, respectively. RIDEM Dam Safety Program: 100yr, 500yr, and half of Probable Maximum Flood (PMF). (FEMA FIRM) RIDEM Dam Safety Program: 100yr, 500yr, and half of Probable Maximum Flood (PMF). (FEMA FIRM) Paging Propriety of printing design of requirements for new dams and for requirements for new dams and for requirements for new dams and for require design dams

- Compiled & Reviewed by Resilience EC4 Subgroup & RIDEM Offices
- Standards predominantly addressed sea level rise, inland flooding, coastal erosion, and land conservation

25 Standards:

- Planning & Design 11
 - Sea level rise and design storm levels considered in state & local planning efforts
- Regulatory & Permitting 7
 - Sea level rise, design storm, and erosion setback levels/measurements enforced through regulation
- Grant & Funding Standards 7
 - Scoring criteria of statewide resilience and environmental grant programs

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SIANDARD

IMPACT

RIDOT Resilience Improvement Plan: Whether the asset is located in a current floodway, 100yr and 500yr flooding event. (FEMA FIRM)

RI Division of Statewide Planning Local Comprehensive Plans: Areas exposed to 100yr and 500yr storm events. (SIORMTOOLS)

RIEMA Local Hazard Mitigation Plans: Must address all FEMA requirements including requirement to assess the risk and probability of future hazard events. (FEMA FIRM)

RIDEM Wastewater Treatment Facility Guidance: 100yr flooding events + 2-3 additional freeboard (structural and electrical components, respectively. (NEIWPCCTR-16: FEMA FIRM)

RIDEM Dam Safety Program: 100yr, 500yr, and half of Probable Maximum Flood (PMF). (FEMA FIRM)

Strengths:

 Many planning & regulatory standards in place addressing SLR & inland flooding

Weaknesses/Gaps:

- Across agencies, standards do not always align
- Need for alignment with most up to date national standards
- Potential need for additional considerations such as urban heat, wind, drought & wildfire, etc.

RI's Statewide Resilience Initiatives

Resilient Rhody 2024 State of Resilience Report

Statewide Resilience Initiatives

Coordination, Data, Workforce Development, Education, Planning, Assistance, & Grants - How Rhode Island's EC4 Agencies, Non-Profits, and Universities are supporting statewide Climate Resilience. The listed initiatives engage across multiple scales and geographies, and provide a snapshot of climate resilience resources available across Rhode Island.

COORDINATION

SOUTHEAST NEW ENGLAND PROGRAM (SNEP) NETWORK New England Environmental Finance Center

The SNEP Network provides training and assistance to municipalities, organizations, and tribes to advance stormwater and watershed management, ecological restoration, and climate resilience in Rhode Island and Massachusetts. The network is committed to building capacity in conjunction with EPA's Southeast New England Program within EPA Region 1. The program is supported by sixteen nongovernmental and private-sector partners:

The Audubon Society of RI, the Blackstone Watershed Collaborative, the Cape Cod Commission, Elizabeth Scott Consultina, Mass Audubon, Kimberly Groff Consulting, Save the Bay, SRPEDD, The Environmental Finance Center at Syracuse University, The Nature Conservancy of Massachusetts, The Nature Conservancy of Rhode Island, The University of New Hampshire Stormwater Center, University of Rhode Island NEMO, The University of RI Onsite Wastewater Resource Center, Groundwork RI, and Groundwork Southcoast.

RESILIENCE EC4 SUBGROUP RIDEM & EC4 State Agencies

The Resilience EC4 Subgroup was formed to facilitate ongoing coordination across state agencies on climate resilience efforts. Comprised of representatives from each EC4 agency, the group meets bimonthly to discuss active resilience projects, explore inter-agency collaborations, review statewide resilience standards, and establish metrics for success. This subgroup plays a key role in preparing content for the Statewide Resilience Report and Plan, fostering interagency alignment, and ensuring consistent progress on resilience goals set by the Executive Climate Change Coordinating Council (EC4).

RHODE ISLAND RESILIENCE PARTNER GROUP

RIDEM & RI Non-Profits, Universities, & Subject Experts

The Resilience Partner Group brings together resilience experts from nonprofits, universities, community-based organizations, and private entities across the state. Similar to the Resilience EC4 subgroup, this group was formed to enhance collaboration and information sharing, explore inter-organizational initiatives, and provide input on state resilience standards and metrics. The group has played a key role in developing the Statewide Resilience Report and Plan by helping to align diverse expertise toward Rhode Island's resilience objectives.

14 State Agencies

participate in the Resilience EC4 Subgroup, re-launched July 2024.











Over 40 entities -

organizations, institutions, and subject matter experts participate in the RI Resilience Partner Group,

launched September 2024.

Compiled and reviewed by Resilience EC4 Subgroup, RI Resilience Partner Group, and RIDEM Offices

147 Statewide Initiatives

- Regional & Statewide Coordination 13
 - Working groups & partnerships developing or providing resilience resources
- Data & Mapping 22
 - GIS mapping, data hubs, and field tools
- **Education & Workforce Development** 15
 - High school, college, and professional education programs; films & educational tools; volunteer opportunities
- State Planning 34
 - Statewide plans developed by state agencies and/or regional entities
- Local Planning & Project Scoping 24 (3 of these municipally led)
 - Municipally focused plans; local technical assistance opportunities (conceptual design, policy development, etc.)
- State Grant Programs 14
 - Non-federally funded grant opportunities for resilience
- Federal Grant Programs 25
 - Federal awards RI has received for resilience

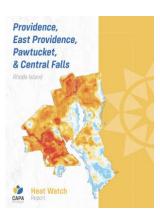
Statewide Initiatives - Examples

Resilient Rhody 2024 State of Resilience Report

State Plans









Local Planning

- MRP Community Resilience Building
- Local Comprehensive Plans
- Local Hazard Mitigation Plans
- Health Equity Zones

Data & Mapping



Rhode Island STORMTOOLS

Rhode Island Coastal Hazards, Analysis, Modeling & Prediction RI-CHAMP



SLAMM (Sea Level Affecting Marshes Model) Maps

URI Environmental Data Center and RIGIS



Local Project Scoping & Technical Assistance

- Coastal Hazards Application
- Designing for Resilience
- Microgrid Municipal Technical Assistance
- Municipal Ordinance Assistance

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Strengths:

- Several thriving initiatives 147 total
- Strong inter-agency and interorganizational collaboration

Weaknesses/Gaps:

- Workforce development, specific to climate adaptation measures
- Increased support for buyouts (data, technical assistance, & funding)
- Ensuring initiatives are complementary & support one another
- Reliable funding across all initiatives, but specifically state data resources, state-offered local technical assistance, & state grant programs

2018 Resilient Rhody Actions & Results

Resilient Rhody 2024 State of Resilience Report

Resilient Rhody Actions

Rhode Island's 61 Climate Resilience Actions - Where We Started and Where We Are Now.

ACTIONS	RESULTS
1. Assist water suppliers in	1. Evaluation process created for approval of emergency interconnections (RIDOH)
developing local Emergency Interconnection Programs to address supply vulnerability among small systems throughout the state. Emergency Water System interconnections provide redundancy of supply and the ability to address water emergencies rapidly and efficiently across water supply districts.	2. Standard operating procedures created for corrosion control evaluations prior to
	interconnecting (RIDOH)
	3. Emergency interconnections & redundant water sources funded (WRB), including
	 a. Portsmouth Water and Fire District and Stone Bridge Fire District emergency interconnection
	b. Block Island emergency well
	4. Emergency interconnections approved (RIDOH), including Pawtucket Water Supply Board (WSB) to Attleboro
	5. Merging of systems to advance regional collaboration, including:
	 a. <u>RI General Law 45-39.2—4</u>, which merges the Pascoag Utility District and the Harrisville Fire District Water Dept to create the Clear River Electric and Water District (will bring two new wells & increased vehicles and equipment)
	b. Barrington Inn merged with Block Island WC
	c. Johnston Congressional of Jehovah's Witness merged with Providence Water
	6. Water Supply Resiliency Survey conducted in 2024 (update from 2019 Survey); results will be analyzed and compiled to create an updated Resiliency Survey Story Map (WRB)
	7. Staff capacity increased (RIDOH & WRB)
2. Assess the vulnerability of near coastal drinking water reservoirs to storm surge and sea level rise.	1. Completed Saltwater Intrusion Water Systems Vulnerability Study (URI & WRB)
	2. RI Coastal Hazards, Analysis, Modeling and Prediction (RI-CHAMP) utilized to assess water system vulnerability to severe storms (RIDOH & URI), including: Jamestown, North Kingstown, Quonochontaug East Beach FD, and Bristol County Water Authority
3. Advance common goal setting and communication between water suppliers that manage reservoirs and downstream municipalities. Ensure downstream flood mitigation	Assisted local water suppliers through facilitating goal setting & communication to develop emergency interconnections (WRB), including for the East Providence and Portsmouth Water and Fire District / Stone Bridge Fire District connections
	2. Completing assessment of Big River Management Area to implement best management practices (BMPs) for future water sources (WRB)
via proactive spillway	
management without adverse impacts on safe yield.	

- Reviewed by Resilience EC4 Subgroup & RIDEM Offices
- Across the 61 Actions, 58 Actions had significant demonstrated progress
 - Only 3 Actions listed as "On Hold"

Types of Actions:

- Critical Infrastructure & Utilities (Water, Power, and Transportation)
- Natural Systems (Coastal and Inland)
- **Emergency Preparedness** (Evacuation Shelters & Routes, Building Design & Construction, and Emergency Services)
- Community Health and Resilience (Schools, Housing, and Local Resilience Planning)
- Financing Climate Resilience Projects (Existing & New Mechanisms for Financing)

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impacts on safe yield.	

Strengths:

- Of the 61 total actions, only 3 were listed as "On Hold"
- Many actions are being addressed by more than one agency, in collaboration with one another
- We have been flexible and adapted solutions as new resources
 & opportunities have become available

Weaknesses/Gaps:

- Some solutions are at the state planning stage and require implementation follow up, through local technical assistance or grants
- Many actions need additional capacity or funding to move forward, and several more that have been piloted require these resources to be sustained

What's Next?

Resilient Rhody 2025 Statewide Coastal Resilience Plan

2025 Statewide Coastal Resilience Plan

The Resilient Rhody 2025 Statewide Coastal Resilience Plan aims to build upon the Resilient Rhody 2024 State of Resilience Report, delving further into the following key focus areas:

- Gap Analysis & State Resilience Goal Development: The 2025 Resilience Plan will analyze the
 findings of the 2024 Resilience Report, outlining statewide resilience strengths, weaknesses, and gaps.
 Addressing state agency capacity, and coordinating original Resilient Rhody 2018 goals with those of
 the 2024 State Hazard Mitigation Plan, the 2025 Plan will propose updates to statewide resilience goals.
- Statewide Climate Vulnerability Assessment: The 2025 Resilience Plan encompasses an assessment
 of vulnerability across Rhode Island's infrastructural, economic, environmental, and societal assets,
 considering short, medium, and long term timelines for each asset type. Publicly owned sites (state &
 local), and privately owned sites that present public infrastructure risk, will be considered.
- RI Climate Resilience Priority Actions: Following review of national & regional resources and best
 practices for climate resilience, the 2025 Resilience Plan will incorporate prioritization of state resilience
 actions, including cost estimates for a subset of these actions.
- Community Engagement: Development of the 2025 Resilience Plan will incorporate statewide
 community engagement for municipal and community stakeholders at the decision-making stages of
 the planning process.
- Current and Future Investment Analysis and Strategy: The 2025 Resilience Plan will provide an
 overview of Rhode Island's public climate resilience investment to date, as well as recommendations for
 decision-making approaches for prioritization of resilience actions and a summary of proposed funding
 & financing resources and strategies that can support these actions.

Collaborative Process between Resilience EC4
 Subgroup, RI Resilience Partner Group, and
 Municipal & Community Resilience Partners

Key Elements:

- Gap Analysis & State Resilience Goal Development
- Statewide Climate Vulnerability Analysis
- RI Climate Resilience Priority Actions
- Community Engagement
- Current & Future Investment Analysis and Strategy
- Addressing Resilience Data Gaps
- Gap Analysis & State Resilience Goal Development
 - Jan Resilience EC4 Subgroup & RI Resilience Partner Group Meetings on Strengths & Weaknesses
 - Feb Resilience EC4 Subgroup Meeting on Actions addressing Resilience Standards
- Consultant support to be brought on late Feb 2025

Additional RI Resilience Updates

- Municipal Resilience Program has reached 100% participation!
- RIDEM's NFWF National Coastal Resilience Fund proposal received \$1.8mm in funding to support the Mill Creek restoration on Prudence Island in Portsmouth
- Regional Resilience Coordinator job postings are live! Priority deadline February 13th
 - 3 positions available Coastal, Urban, and Inland
 - Aquidneck Island will receive coordination support through Aquidneck Land Trust
 - Municipalities will be engaged in the decision-making process through opportunities to pose questions to finalist candidates
 - These are contract positions through Audubon Society of RI Apply here:
 https://asri.org/about/employment.html

Contact Information

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