

# **Climate Change Vulnerability Study and Resilience Plan Update**

Public Service Law (PSL) § 66(29) – PSC Case 22-E-0222

O&R Climate Resilience Working Group  
July 11, 2024

# AGENDA

- New York State Climate Impacts Assessment (NYSERDA)
- Environmental Justice Policy Statement Update
- Meteorology Update for Orange and Rockland Region
- Resilience Plan Update: Next Steps & Key Dates



# The New York State Climate Impacts Assessment: A Primer

Orange & Rockland Utilities

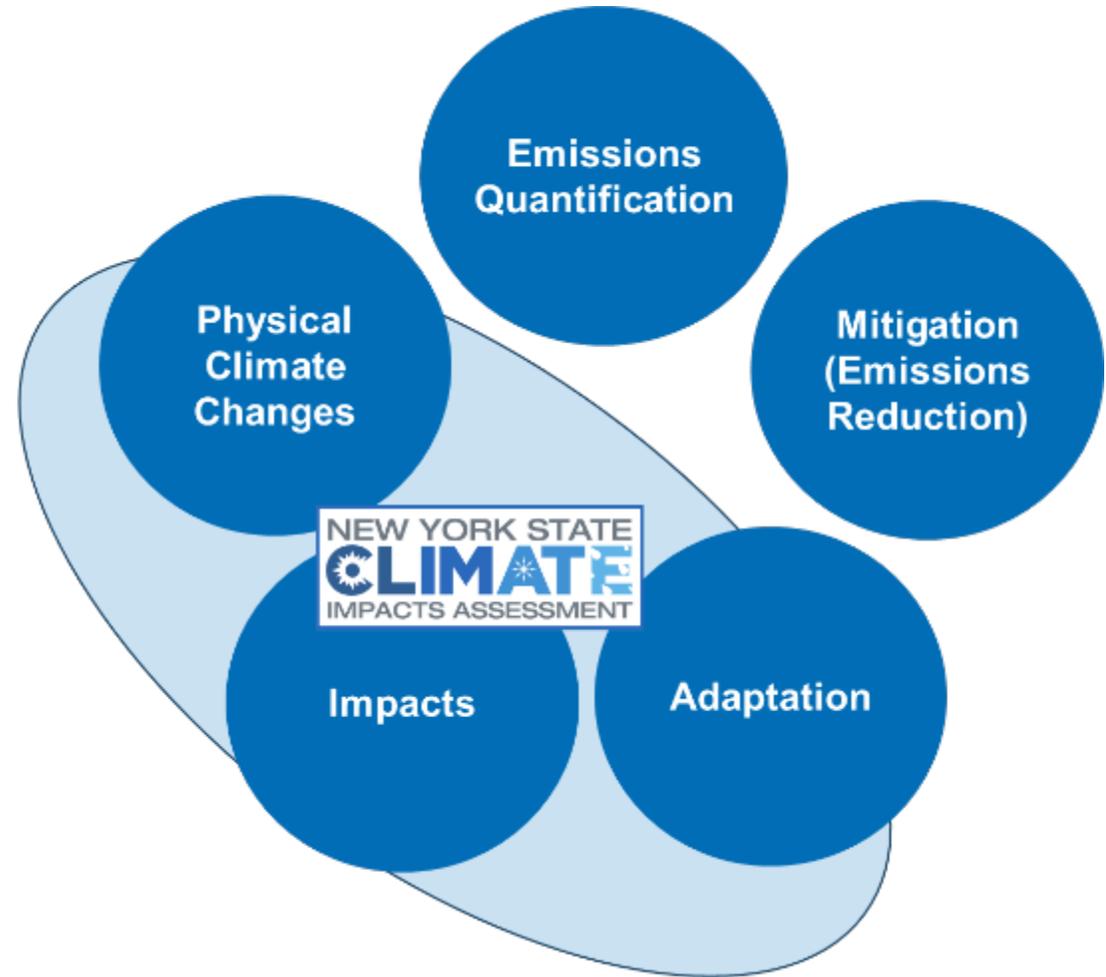
July 11, 2024



- What is it?
  - What information does it provide?
  - Who developed it?
  - Can I trust it?
- What is available on the website?
- Case study examples

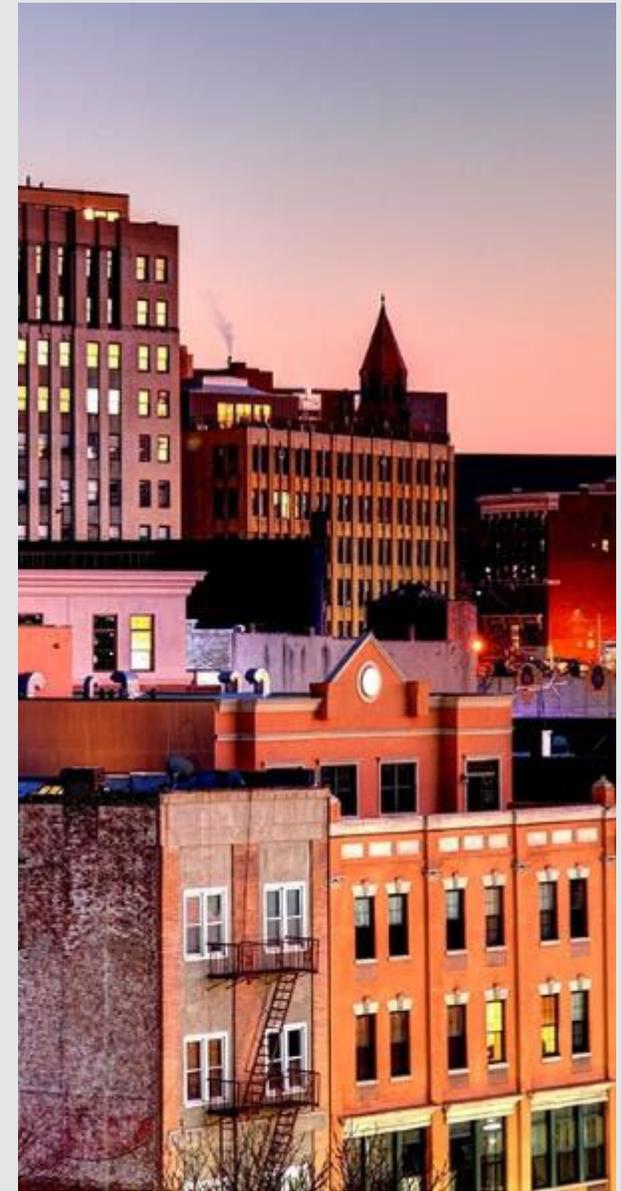
# What Is the Assessment?

- A scientific investigation into how climate change is affecting New York State's communities, ecosystems, infrastructure, and industries
- Focused on how the climate will change, how those changes will impact the state, and how we can prepare for those impacts



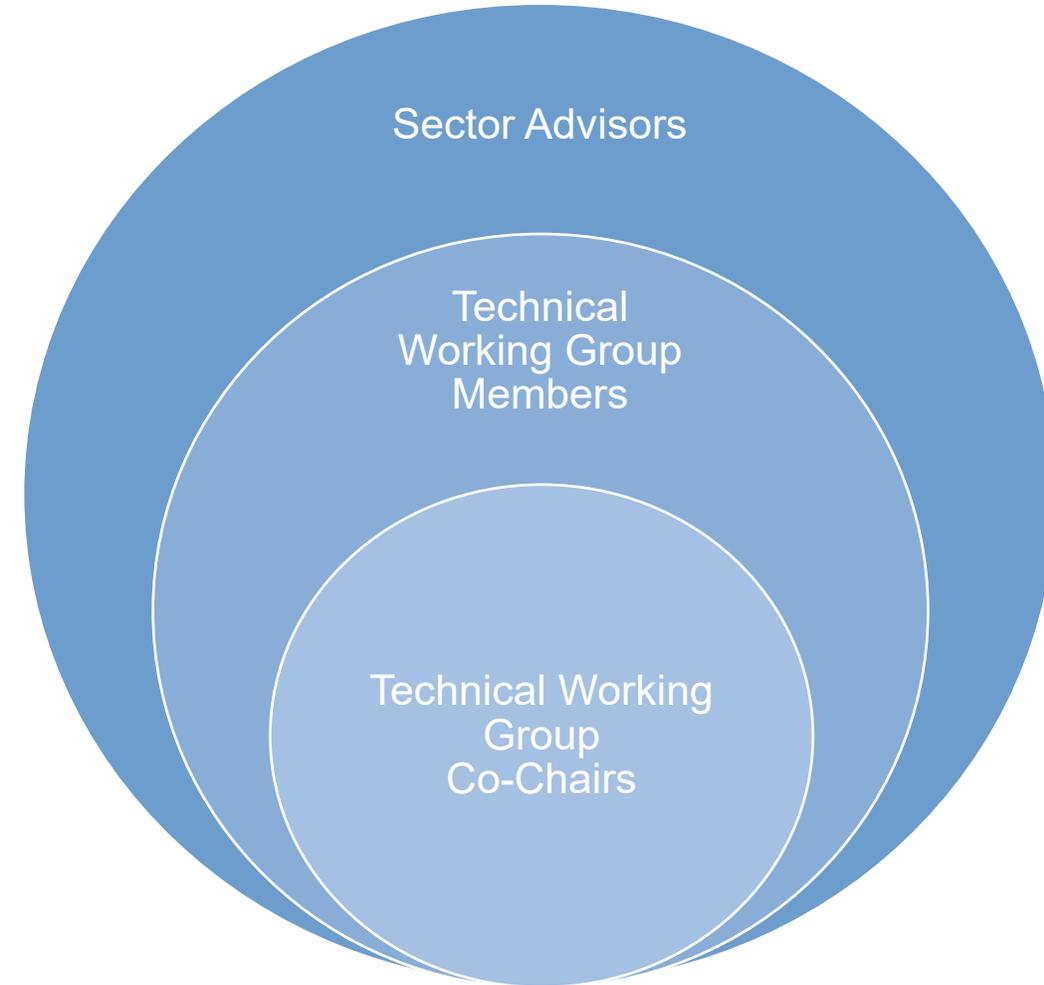
# What Are the Assessment Goals?

- **Document** how our changing climate will affect New York State's many diverse communities, ecosystems, and industries.
- Help **foster informed decisions** around climate resiliency and preparedness.
- **Present data and information** to help New Yorkers understand, plan, and act.



# Who Developed the Assessment?

- NYSERDA coordinated the assessment
- Academic institutions, science organizations, community leaders, industry representatives, and others have contributed
- Nearly **80 experts** from 60 organizations served as technical workgroup members
- More than **165 additional individuals** served as advisors
- Columbia University developed climate projections



# Can I Trust It?

- The assessment was developed with credibility in mind by a team of national **climate science experts**, as well as **members of diverse communities** and constituencies from across New York State, other U.S. states, Indigenous communities, and Canada
- The technical report has been **peer reviewed** by experts in the field
- The assessment contains links and references to primary sources for **full transparency**



# Website & Products

# What Does the Assessment Include?

- Up-to-date **projections** of future climate conditions in New York State
- A peer-reviewed **technical report** on climate change impacts across eight sectors
- **Adaptation strategies** and **case studies**
- Accompanying **communication materials** designed for various audiences

## Sectors

1.  **Agriculture**
2.  **Buildings**
3.  **Ecosystems**
4.  **Energy**
5.  **Human Health and Safety**
6.  **Society and Economy**
7.  **Transportation**
8.  **Water resources**



ABOUT ▾

PROJECTIONS AND  
MODELING

EXPLORE THE  
ASSESSMENT ▾

RESOURCES ▾

NEWS

## New York State Climate Impacts Assessment: *Understanding and Preparing for Our Changing Climate*

*A scientific investigation into how climate change is affecting the communities,  
ecosystems, infrastructure, and industries of the Empire State.*

### Explore the Assessment

*Assessment findings and climate change impacts  
by sector, climate hazard, and region*

### New York's Land and People

*Climate equity and justice  
and who's most at risk*

### New York's Changing Climate

*Observed and projected changes in  
New York State's climate*

New York State's climate is changing. Rising temperatures, increased precipitation, rising sea levels, and more frequent and extreme weather events are happening now and projected to worsen. The New York State Climate Impacts Assessment provides a science-based analysis of what to expect from climate change in New York.

In partnership with leading academic institutions, science organizations, community leaders, and others, New York State has undertaken a comprehensive research effort to enable decision-makers at all levels—from individual residents, businesses, and landowners to municipal and state government—to better understand the impacts of climate change and make informed choices about how to prepare for them. The assessment also strives to show how addressing climate change provides opportunities

# Website: <https://nysclimateimpacts.org/>



ABOUT ▾

PROJECTIONS AND MODELING

EXPLORE THE ASSESSMENT ▾

RESOURCES ▾

NEWS

## New York State Climate Impacts Assessment: Understanding and Preparing for a Changing Climate

A scientific investigation into how climate change is affecting New York State's communities, ecosystems, infrastructure, and the economy.

Explore the Assessment

New York State's Land and People

New York State's Changing Climate

Explore by Sector

Explore by Region

Case Studies

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# Climate Projections: Summary and Chapter

NEW YORK STATE CLIMATE IMPACTS ASSESSMENT

ABOUT | PROJECTIONS AND MODELING | EXPLORE THE ASSESSMENT | RESOURCES | NEWS

## New York State's Changing Climate

The sections below contain results from the portion of the assessment that focused on physical climate. These sections explore how variables like temperature, heat waves, rainfall, heavy storms, sea level rise, and other conditions are expected to change between now and the end of this century in New York State.

Select a topic to learn more about observed and projected changes to New York State's climate. To read the full chapter from the technical report, download [New York State's Changing Climate](#).

- Temperature
- Precipitation
- Extreme Events
- Ocean Conditions
- Rivers and Lakes
- Download the Chapter: New York State's Changing Climate

## New York State Climate Impacts Assessment

# 02 New York State's Changing Climate

Interim Publication

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RESOURCES | NEWS

[\[ Back To Top \]](#)

ed level, averaged over an entire year.

late have increased by almost 2.6°F. d history, New York has warmed over

so in all regions of the state. of the century.

posts to spread, increase drought. s also generally lead to longer

### uring the 21st Century

Figure 2. New York State's Changing Climate, to its assessment.

### nton's Changing Climate

14

# Climate Projections: Data Tables

**NEW YORK STATE CLIMATE IMPACTS ASSESSMENT**

ABOUT ▾ PROJECTIONS AND MODELING EXPLORE THE ASSESSMENT ▾ RESOURCES ▾

Ocean Conditions Rivers and Lakes State's Changing Climate

## About Our Future Climate Projections

These pages include information about what New York State's climate is likely to be in the future. These projections for the future are based on sophisticated computer models that scientists have developed to simulate how the Earth's atmosphere, oceans, and other physical features respond to the amount of heat-trapping greenhouse gas that accumulate in the atmosphere. To project not only how but *how quickly* the climate will change, modelers have to make assumptions about how the level of greenhouse gases in the atmosphere will change in the future. This means predicting if countries around the world will continue to produce more greenhouse gas emissions—and if and how quickly the world adopts renewable energy and other ways to reduce emissions.

There are many different possibilities. Climate scientists commonly use a set of scenarios called Shared Socioeconomic Pathways (SSPs) to represent these different possibilities. The New York-specific projections developed for this assessment are based on two future scenarios: "intermediate emissions" (called SSP2-4.5) and "very high emissions" (SSP5-8.5). The results from these two scenarios have been combined in many places to provide a single range of likely changes in the climate, which some users may find more useful than multiple set numbers. However, it is still important to recognize that the degree of future change projected here is not inevitable. If the world takes serious action to reduce greenhouse gas emissions and control future warming, the resulting climate changes could be closer to the low end of the projected range, or perhaps even lower.

More information on these projections can be found on our [About Our Future Climate Projections web page](#). Readers interested in more technical details about the projections can refer to the [New York State's Changing Climate](#) chapter and the accompanying methodology report below.

### Data Files

- Methodology report (models, scenarios, calculation approach, and key results)
- Data files (revised December 2023)

## Average Temperature and Precipitation - Adirondacks

Projections are based on 35GCMs and 2 Shared Socioeconomic Pathways. Shown are the low-estimate (10th percentile), middle range (25th to 75th percentile), the median (50th percentile), and the high-estimate (90th percentile). Projections are relative to the 1981-2010 base period.

Mean Annual Changes in Temperature					
	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
2030s	2.3°F	3°F	3.6°F	4.3°F	5.3°F
2040s	3°F	3.8°F	4.6°F	5.5°F	6.7°F
2050s	3.5°F	4.6°F	5.5°F	6.6°F	7.8°F
2060s	4.1°F	5.2°F	6.6°F	7.7°F	9.4°F
2070s	4.9°F	5.7°F	7.5°F	9.1°F	11°F
2080s	5.2°F	6.1°F	8.4°F	10.6°F	12.9°F
2100	5.6°F	6.7°F	9.1°F	12.3°F	15.2°F

Mean Annual Changes in Precipitation					
	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
2030s	-1%	1%	4%	7%	10%
2040s	-1%	2%	6%	9%	12%
2050s	-1%	2%	7%	11%	13%
2060s	-1%	4%	8%	12%	15%
2070s	0%	6%	9%	13%	17%
2080s	2%	7%	11%	14%	18%
2100	-2%	4%	11%	19%	26%

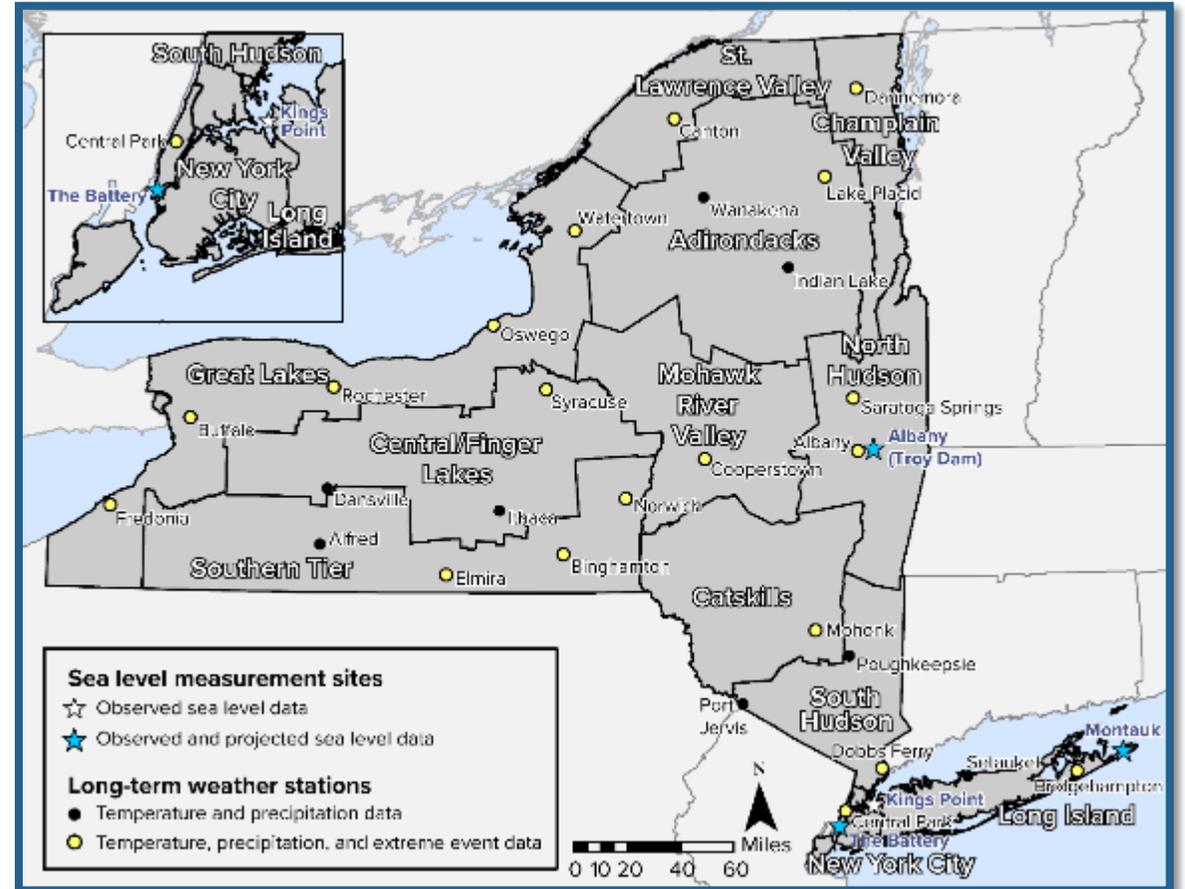
Like all projections, these climate projections have uncertainty embedded within them. Sources of uncertainty include data and modeling constraints, the random nature of some parts of the climate system, and limited understanding of some physical processes. Levels of uncertainty are characterized using state-of-the-art climate models, multiple scenarios of future greenhouse gas concentrations, and recent peer-reviewed literature. Even so, the projections are not true probabilities, so the specific numbers should not be emphasized, and the potential for error should be acknowledged.

## Contents

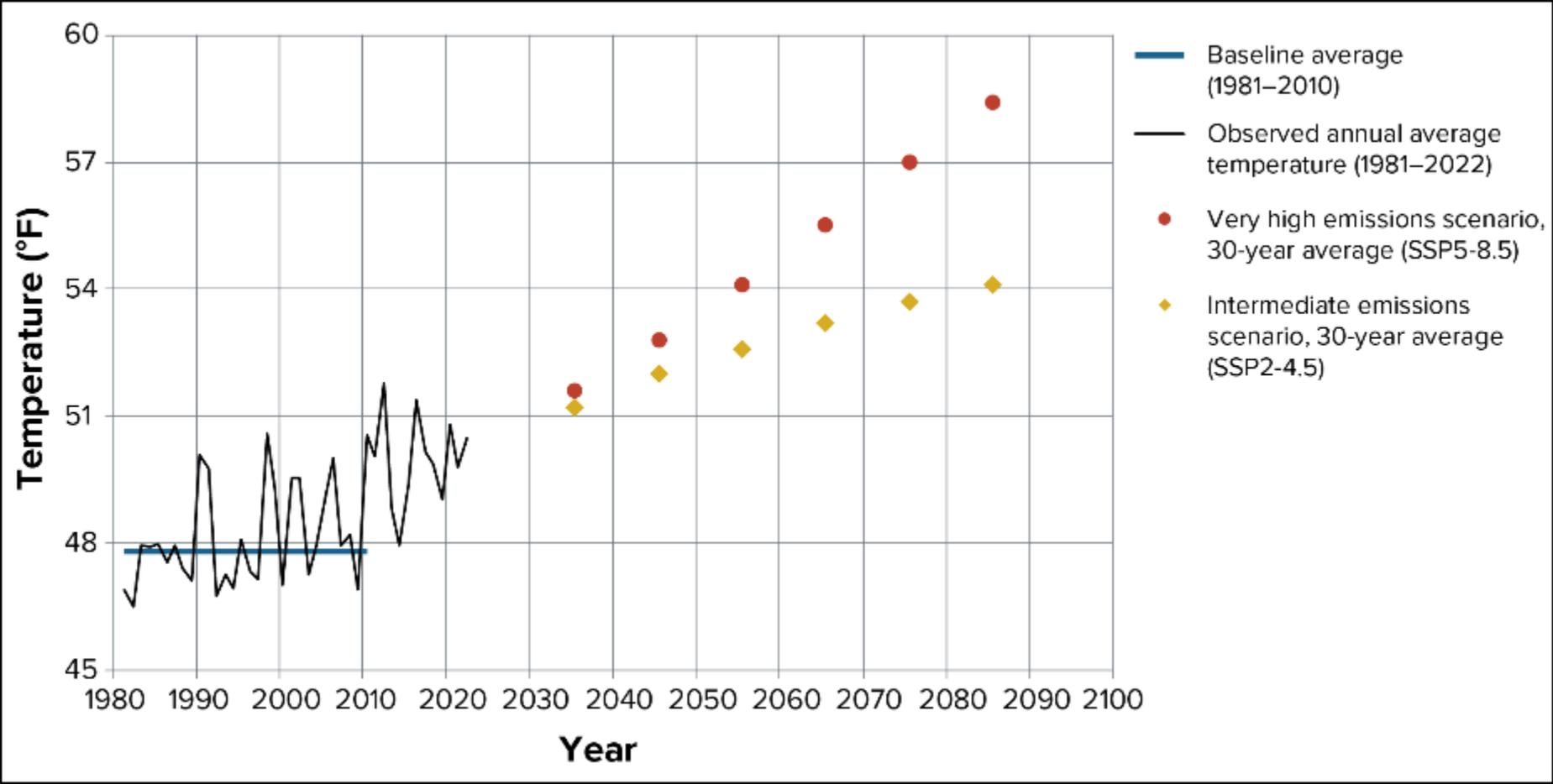
- Changes in Average Temperature and Precipitation
- Changes in Extreme Events
- Changes in Degree Days
- Changes in Sea Level

# What Do the Projections Cover?

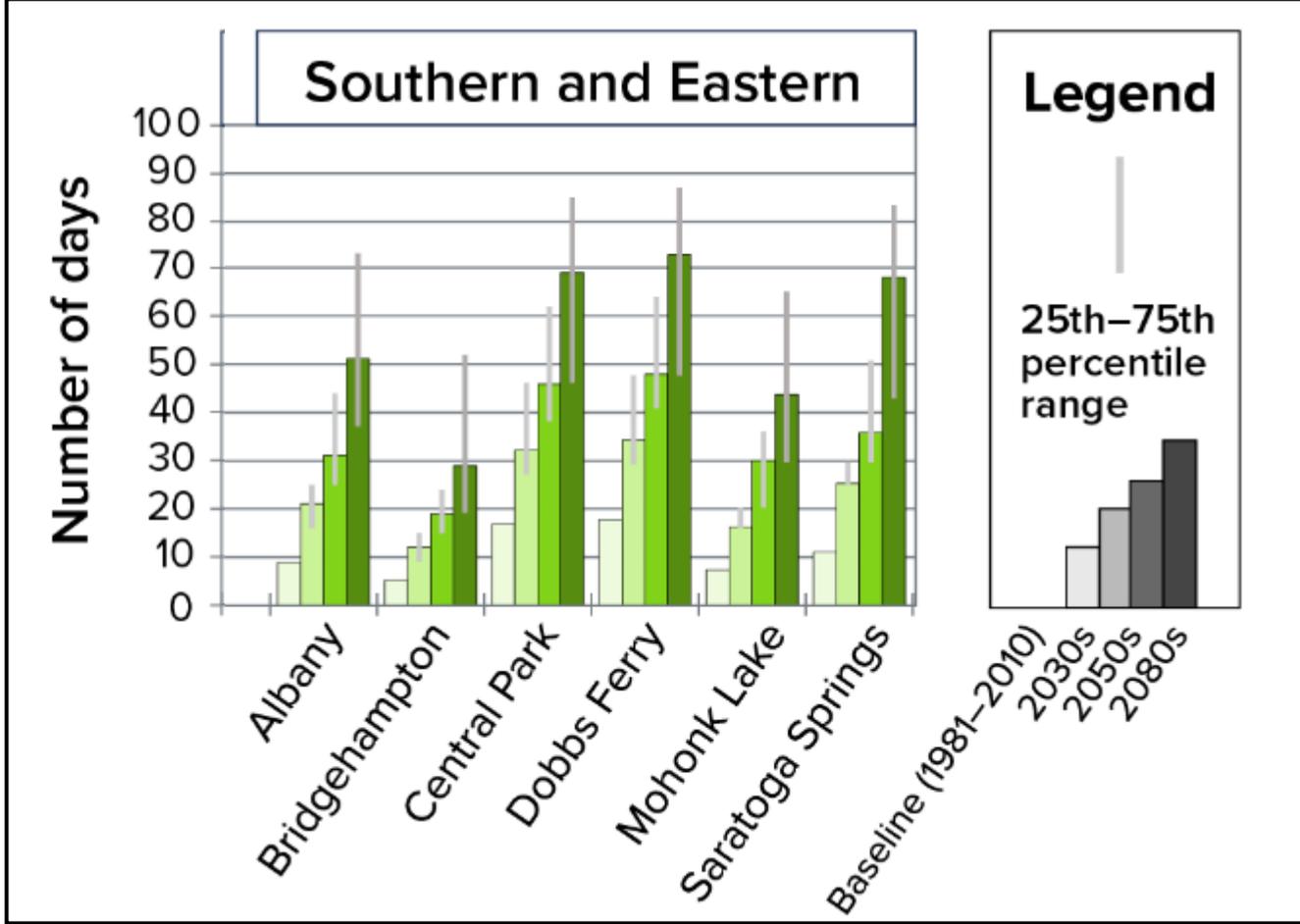
- Data are available for each region
  - Some data are available by station
- Average temperature and precipitation
  - Annual, seasonal, monthly
- Extreme events
  - E.g., Hot days, heat index, heat waves, cold days, heavy precipitation
- Degree days
  - i.e., heating and cooling degree days
- Sea level



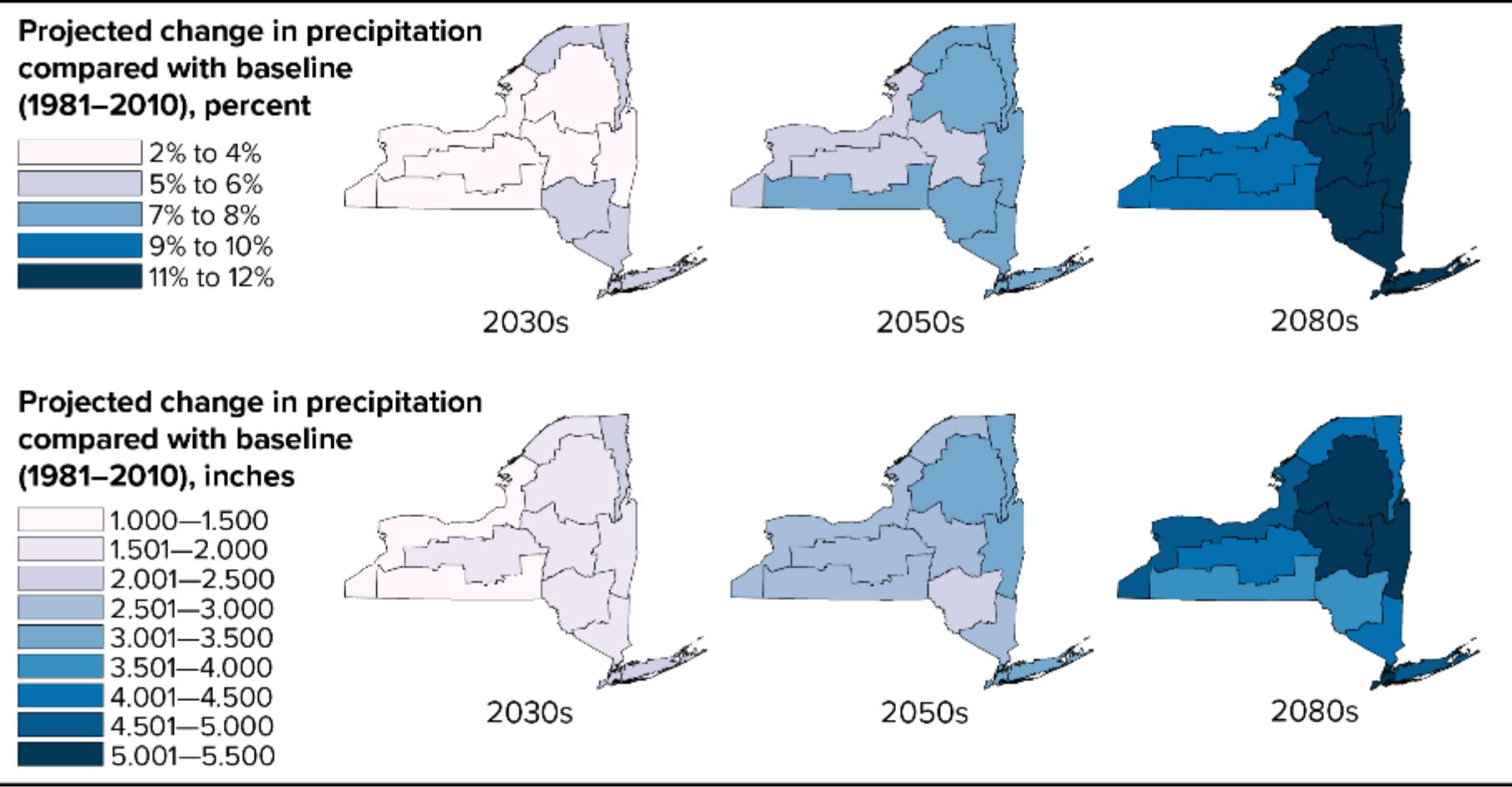
# Projections – Annual Temperature



# Projections – Days over 90



# Projections – Annual Precipitation



# Projections – Sea Level Rise

Station	2030s (inches)	2050s (inches)	2080s (inches)	2100 (inches)	2150 (inches)
Montauk	8–12	15–21	26–41	32–54	50–94
The Battery	7–11	14–19	25–39	30–50	47–89
Albany (Troy Dam)	7–10	12–17	21–35	25–46	41–82

# New York State Climate Impacts Assessment: *Understanding and Preparing for a Changing Climate*

*A scientific investigation into how climate change is affecting the communities, ecosystems, infrastructure, and economy of New York State.*

Explore the  
Assessment

New York State's  
Land and People

New York State's  
Changing Climate

Explore by Sector

Explore by Region

Case Studies

## Explore the Assessment

*Assessment findings and climate change impacts by sector, climate hazard, and region*

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# Explore by Sector

NEW YORK STATE CLIMATE IMPACTS ASSESSMENT

ABOUT | PROJECTIONS AND MODELING | EXPLORE THE ASSESSMENT | RESOURCES | NEWS

## Explore by Sector

For the assessment, experts evaluated climate change impacts on various sectors below to learn more about current and projected impacts, how to prepare for the impacts, community stories, and opportunities for adaptation.

- Agriculture
- Human Health and Safety
- Society and Economy

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## Agriculture

New York State has a complex and diverse agricultural sector. Agricultural production statewide includes dairy and other livestock, field crops, vegetables, fruit, maple syrup, specialty crops, and aquaculture.

Agriculture is heavily exposed to and dependent on weather and climate. Agricultural producers in New York State already experience many challenges that make it difficult to farm profitably and sustainably. As the climate changes, New York State's farmers face hazards such as too little or too much precipitation, rising temperatures, and increasing pressure from pests. These hazards can affect the quality and quantity of agricultural products, farm infrastructure, worker health, the supply chain, and more.

This chapter examines climate impacts on New York State's agriculture by commodity, identifies vulnerable populations and systems, explores adaptation strategies and opportunities for positive change, and summarizes emerging research needs.

[Read the Chapter Summary](#)

[Read the Chapter](#)

[See the Contributors](#)

[Explore Case Studies](#)

[Back to Explore by Sector](#)

## Agriculture Chapter Summary

Agriculture is a vital industry in New York State. It provides food and other products to communities, creates jobs, and contributes more than \$5.3 billion to the state's economy annually. At a national level, New York is a top producer of milk and dairy products, fruit, maple syrup, and more. Agriculture takes place in—and benefits—all regions of the state, including urban areas.

This summary provides an overview of climate change impacts on agriculture in New York State. It includes a synopsis of key climate change hazards, equity and justice considerations, impacts on Indigenous Peoples and Tribal Nations, key findings from the assessment's [Agriculture](#) chapter, and opportunities for the future.

[Climate Change Hazards and Impacts](#)

[Climate Equity and Justice](#)

[Indigenous Peoples and Tribal Nations](#)

### Climate Change Hazards and Impacts on New York State's Agriculture

Agricultural activities are heavily exposed to and dependent on weather and climate. The agriculture sector faces numerous challenges as the climate changes, including:

- More extreme heat events.
- Changes in the amount and duration of precipitation, including more frequent and intense storms.
- Sea levels rise, and saltwater intrusion into farmland and water resources.

## New York State Climate Impacts Assessment

# 03 Agriculture

*Interim Publication*

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NEW YORK STATE CLIMATE IMPACTS ASSESSMENT

# Explore by Sector – Key Findings

## Buildings

### 1 Technical Workgroup Key Findings

New York State has nearly 5.3 million buildings, and all of them are vulnerable in some way to the impacts of climate change. Understanding these impacts is critical, because risks to buildings not only threaten individual lives but also pose threats to community-level resilience. This chapter examines the impacts of climate change on buildings and, by extension, the people and communities they shelter and support. It also highlights building types and populations that are at particular risk and presents adaptation strategies to protect the state's existing and future building stock from climate impacts.

**Key Finding 1: Buildings of all ages, functions, and locations across New York State are vulnerable to the impacts of climate change.** Each of the state's 12 assessment regions will experience a range of impacts, including more severe storms, coastal and inland flooding, and increasing temperatures, all of which can affect building structures and systems, operations, and occupants. Local and regional factors, including geography, zoning, and socioeconomic disparities, also affect vulnerability and will shape site-specific adaptations.

**Key Finding 2: Given the long lifespan of buildings, new construction and retrofits that consider long-term climate projections will better address future climate risk.** New York State's new and existing buildings are expected to support many generations of use, while individual components of those buildings may be replaced more frequently. As climate change risks increase throughout this century, design decisions that align buildings' and building components' life cycles with future climate projections and expected hazards will lead to more cost-effective, sustainable, and future-ready buildings.

**Key Finding 3: Climate impacts to buildings can ripple to many different parts of a community.** Buildings are integrated and interdependent with other sectors, including agriculture, energy, transportation, and health services. Damage to buildings can disrupt these interdependent systems and compound the direct impacts of building loss and harm to individuals and communities. Addressing these cross-sector impacts will require not only resilient building design, but also a multidisciplinary approach and insight into interconnected sectors to improve community resilience.

**Key Finding 4: Communities of color, Tribal communities, and low-income communities are more likely to congregate, live, and work in buildings that have greater exposure to climate hazards.** In addition, people who are very young or very old, as well as those experiencing physical or developmental disabilities, are more vulnerable to building failures. Additional resources and policies will be required to respond to the disproportionate impacts of climate change in these communities.

**Key Finding 5: Individual adaptation and resilience strategies can address multiple climate impacts.** Buildings in New York State will face various climate hazards over their useful lives. Strategies such as green roofs, for example, can address both flooding and the urban heat island effect, while also providing co-benefits like reducing cooling load. Resilient design strategies can be implemented in many types of buildings and can increase community-level resilience to climate change.

## Climate Change and New York State's Buildings Sector: Technical Workgroup Key Findings

[\[ Back to Top \]](#)

Technical workgroups for each of the assessment's eight sectors developed key findings focused on climate change impacts, responses, and solutions. More detail on the key findings for the buildings sector, and the evidence base for each finding, can be found in the full [Buildings](#) chapter.

### Buildings of all ages, functions, and locations across New York State are vulnerable to the impacts of climate change.

Climate hazards—such as increased temperatures, heat waves, changes in precipitation, sea level rise, poor indoor air quality, pests, storms, and flooding—affect buildings in a variety of ways. These hazards can result in structural damage to roofs, framing, foundation, and walls; damage to indoor building materials; water damage and mold; damage to electrical, mechanical, and plumbing systems; and shorter lifespans of buildings and building systems (e.g., electrical systems; heating, ventilation, and air conditioning systems).



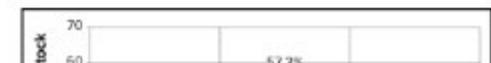
These buildings in Babylon Village, New York were damaged by Superstorm Sandy in 2012.

### What Can We Do?

Property owners of both existing buildings and new construction can begin by identifying climate hazards that might affect their property and by implementing climate resilience strategies to address those current and future risks. For example, [the University at Buffalo School of Architecture and Planning has developed information](#) to help building owners and managers, architects, builders, and others understand the vulnerability of buildings in different regions of the state to various climate hazards.

### Given the long lifespan of buildings, new construction and retrofits that consider long-term climate projections will better address future climate risk.

New York State's buildings are expected to support many generations of use, while individual components



# New York State Climate Impacts Assessment: Understanding and Preparing for a Changing Climate

A scientific investigation into how climate change is affecting the communities, ecosystems, infrastructure, and quality of life in New York State.

[Explore the Assessment](#)[New York State's Land and People](#)[New York State's Changing Climate](#)[Explore by Sector](#)[Explore by Region](#)[Case Studies](#)

## Explore the Assessment

Assessment findings and climate change impacts by sector, climate hazard, and region

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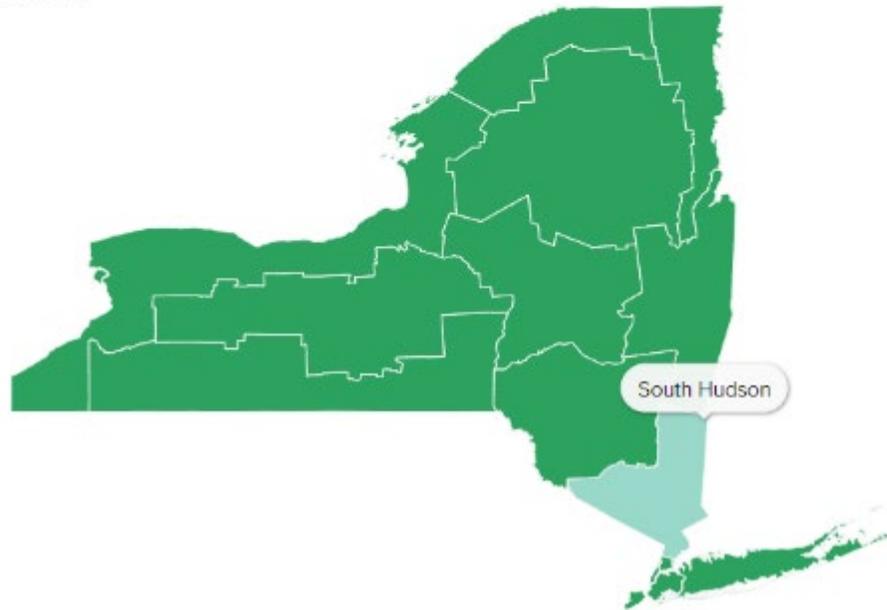
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# Explore by Region

## Explore by Region

Learn more about how the climate is changing in each of the assessment's 12 regions and read about impacts to key features of each region. Click on a region in the map below to read the related story, or scroll down to select the region from the list.



## Climate Impact Spotlight: The South Hudson Region



The Bear Mountain Bridge, linking Orange and Westchester Counties.

### Get to Know the South Hudson Region

For the purposes of the New York State Climate Impacts Assessment, the South Hudson region includes Dutchess, Orange, Putnam, Rockland, and Westchester counties. The region is a mix of urban, suburban, and rural areas. It contains coastal areas along Long Island Sound in Westchester County and the tidal portion of the Hudson River. Yonkers, the fourth largest city in the state as of the 2020 Census, is in the South Hudson region, as well as many other cities and smaller cities, towns, and villages. Residents in the region are served by Metro-North's commuter rail lines to and from Grand Central Terminal in New York City. The Hudson line runs up the east side of the Hudson River to Poughkeepsie; the Harlem line runs through Westchester, Putnam, and Dutchess counties; and the New Haven line serves communities along Long Island Sound. Commuter lines west of the Hudson that are operated by New Jersey Transit under a contract with Metro-North. The scenic Hudson River valley is a popular tourist destination and a spot for outdoor recreation for local residents and those traveling from nearby New York City. The region contains many historic estates and other sites and is home to landmarks such as Bear Mountain and the U.S. Military Academy in West Point.

### Topics on This Page

- [Get to Know the South Hudson Region](#)
- [The South Hudson Region's Changing Climate](#)
- [Climate Impacts to Important Regional Features](#)
- [Case Studies](#)
- [References](#)

# South Hudson Highlights

- Sea level rise in the Hudson River estuary
- Flooding impacts to commuter transportation
- Extreme heat and urban heat islands



# Equity and Justice

## Climate Equity and Justice

[ [Back to Top](#) ]

Everyone deserves to live, learn, work, and play in a safe and healthy environment, even as the climate changes. That is climate equity. However, some groups are more exposed to climate change hazards, are more at risk of harm, or have fewer resources to recover and adapt. This is often the case among historically underserved and underrepresented groups of people. Working to help these groups adapt to climate impacts is a form of climate justice.



Farmworkers planting corn in Upstate New York.

For agriculture, economic differences and a lack of diversity are important climate equity and justice considerations. These factors can magnify climate impacts and make it more difficult for farmers to adapt. For example, Indigenous, Asian, Black, and biracial farmers represent only 1.2% of New York State farm owners. Recent research has found that farmers of color, immigrant farmers, and female farmers typically have smaller farms and grow higher value, more labor-intensive crops. These farmers typically have fewer resources to adapt or respond to climate hazards that threaten their businesses.

The high cost of land also makes it harder for new farmers to enter and remain in agriculture. Available land is often of lower quality, making it harder for farmers to make a living or adapt to climate impacts. Farmers who cannot afford to buy and own land may choose to rent instead, and they may not have the resources to adapt or respond to climate hazards that threaten their businesses.

Because farmworkers work mostly outdoors, they are directly exposed to climate hazards. One major concern with this changing climate is the impact of more frequent and hotter heat waves have on farmworkers' health. About 50% of farmworkers in New York State are undocumented, and they face added challenges that limit their ability to cope with these hazards. For example, they may avoid seeking help because of the fear of deportation and potential lost wages. They may also live in housing that is unable to withstand extreme weather.

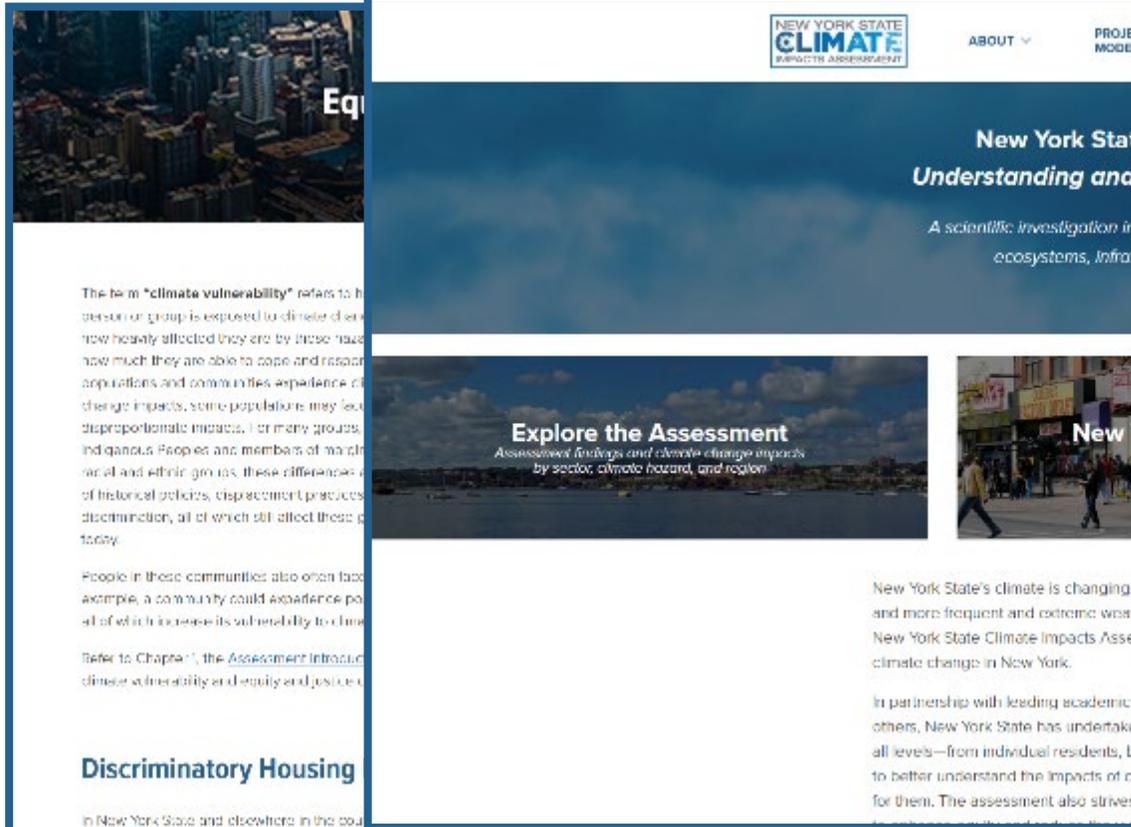
## Indigenous Peoples and Tribal Nations

[ [Back to Top](#) ]

There are eight federally recognized Tribal Nations and one state-recognized Nation in New York State, as well as several other Indigenous communities that maintain ties to the state and live in surrounding states. The colonization and dispossession of Tribal lands, as well as forced migration to lower quality lands, have contributed to the climate risks Indigenous Peoples face.

For example, Tribal Nations and Indigenous Peoples engage in agriculture for food, medicines, and materials for cultural traditions. Tribal Nations were forced off ancestral lands to lands with lower economic value. Agricultural activities on these lands are more exposed to climate impacts from extreme heat, less precipitation and more drought, and sea level rise. Climate change threatens some key products that are important as food and serve other purposes for Indigenous people, such as northern quahog, a type of clam that is essential for both sustenance and wampum making within the Shinnecock Nation. Indigenous Peoples in New York are working on climate adaptation solutions. For example:

- The Oneida Nation will produce certified organic maple syrup and cannabis to provide additional income in the



The screenshot shows the website for the New York State Climate Impacts Assessment. At the top, there is a navigation bar with the logo "NEW YORK STATE CLIMATE IMPACTS ASSESSMENT" and links for "ABOUT" and "PROJECT MODEL". The main heading is "New York State Understanding and Addressing Climate Impacts". Below this, a sub-heading reads "A scientific investigation into ecosystems, infrastructure, and communities." A large image of a city skyline is visible on the left. A central section titled "Explore the Assessment" features a smaller image of a coastal town and text stating "Assessment findings and climate change impacts by sector, climate hazard, and region." To the right, there is a section titled "New York State's climate is changing..." with text explaining that the state's climate is warming and becoming more extreme, leading to more frequent and severe weather events. It mentions that the assessment is a partnership with leading academic and other organizations, undertaken at all levels from individual residents to state policy, to better understand the impacts of climate change and to help New Yorkers prepare, respond, and adapt.

## Discriminatory Housing

In New York State and elsewhere in the country, discriminatory housing practices have caused some people and groups to be more exposed to climate change hazards, be more significantly affected, and have fewer resources to prepare, respond, and adapt. For example:

- **Redlining** was created by the federal Home Owners' Loan Corporation in 1933, to determine where to prioritize investment in the built environment. Lenders made loans based on "redlining" maps that were color-coded by community characteristics. Red, or redlined, areas were deemed undesirable for investment. These areas were often inhabited by Black and immigrant communities. This practice led to lower investment



Resources

Fact Sheets

Glossary

# New York State Climate Impacts Assessment

## Understanding and Preparing for Our Changing Climate

*A scientific investigation into how climate change is affecting the communities, ecosystems, infrastructure, and industries of the Empire State.*

### Explore the Assessment

*Assessment findings and climate change impacts by sector, climate hazard, and region*

### New York's Land and People

*Climate equity and justice and who's most at risk*

### New York's Changing Climate

*Observed and projected changes in New York State's climate*

New York State's climate is changing. Rising temperatures, increased precipitation, rising sea levels, and more frequent and extreme weather events are happening now and projected to worsen. The New York State Climate Impacts Assessment provides a science-based analysis of what to expect from climate change in New York.

In partnership with leading academic institutions, science organizations, community leaders, and others, New York State has undertaken a comprehensive research effort to enable decision-makers at all levels—from individual residents, businesses, and landowners to municipal and state government—to better understand the impacts of climate change and make informed choices about how to prepare for them. The assessment also strives to show how addressing climate change provides opportunities to enhance equity and reduce the vulnerability of those most at risk.

# Additional Resources

NEW YORK STATE CLIMATE IMPACTS ASSESSMENT

ABOUT ▾ PROJECTIONS AND MODELING EXPLORE THE ASSESSMENT ▾ RESOURCES ▾ NEWS

## Resources

In addition to the technical report, the New York Climate Impacts Assessment includes resources to help inform and prepare New York State's people and decision-makers at every level. Explore resources below.

- Glossary of Terms**  
A → Z  
View the glossary of terms used in the New York State Climate Impacts Assessment.
- Fact Sheets**  
High-level overviews of climate change impacts to different sectors in New York State.
- Figures Gallery**  
Coming Soon!

NEW YORK STATE CLIMATE IMPACTS ASSESSMENT

## Climate Change and Agriculture

### Highlights from the New York State Climate Impacts Assessment

Agriculture is a vital industry in New York State. It provides food and other products to communities, creates jobs, and contributes more than \$5.3 billion to the state's economy annually. At a national level, New York State is a top producer of milk and dairy products; fruits, such as apples, grapes, and cherries; maple syrup; and more. Agriculture takes place in—and benefits—all regions of the state, including urban areas.

#### Climate Change Impacts on New York State's Agriculture

Agricultural activities are heavily exposed to and dependent on weather and climate. As a result, agriculture in New York faces many challenges as the climate changes. A wide range of climate hazards can influence the sector, including:

- More extreme heat and cold events.
- Changes in the amount and duration of precipitation, including heavy rainfall and drought.
- More frequent and intense storms.
- Sea level rise and saltwater intrusion into farmland and water sources.

Because farmers rely on the weather, more uncertainty and more extreme weather events pose planning challenges for farmers and create a variety of risks to agricultural operations.

- **Extreme rainfall** can damage crops, flood fields, increase diseases and weeds, and cause delays in planting and harvesting. More frequent flooding has forced farmers to rethink which crops to plant and where to plant them.
- **Short-term drought** reduces crop yields and causes water shortages. Higher summer temperatures increase the risk of short-term droughts.
- **Warmer temperatures and longer growing seasons** could increase yields for some crops and offer opportunities to grow new crops.
- **Heat stress** affects livestock, crops, farmers, and farmworkers. High soil and air temperatures can harm plant growth and reduce crop yields. Heat stress can threaten the health of dairy cows and other livestock. Extreme heat can cause illness or death among workers exposed to high temperatures.
- **Increased weeds, diseases, and insects** damage crops. Warmer temperatures can increase the populations and ranges of some insects and other pests. Warmer temperatures might also allow new invasive species to take hold and increase the range of herbicide-resistant weed species, creating management challenges for farmers. Crops may become more susceptible to diseases as the climate becomes warmer and more humid.

Flooding caused by extreme rainfall has damaged this tomato crop on a farm in Upstate New York.

# Case Studies

# New York State Climate Impacts Assessment: *Understanding and Preparing for a Changing Climate*

*A scientific investigation into how climate change is affecting the communities, ecosystems, infrastructure, and quality of life across the Empire State.*

Explore the  
Assessment

New York State's  
Land and People

New York State's  
Changing Climate

Explore by Sector

Explore by Region

Case Studies

## Explore the Assessment

*Assessment findings and climate change impacts by sector, climate hazard, and region*

## New York's Land and People

*Climate equity and justice and who's most at risk*

## New York's Changing Climate

*Observed and projected changes in New York State's climate*

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# Case Studies

## Case Studies

New York State is experiencing climate impacts now. With these impacts come stories of consequences and challenges, as well as stories of action and adaptation.

The assessment case studies feature stories of how these climate impacts are affecting people and places statewide and the actions underway to adapt. Each assessment sector has a collection of related case studies developed by the technical workgroups. Some case studies have a regional focus and others have statewide relevance. Many case studies touch on several climate impacts and cut across multiple sectors. Refer to the list of sectors below to see the associated case studies.

<b>Agriculture</b>	<b>Buildings</b>
<b>Ecosystems</b>	<b>Energy</b>
<b>Human Health and Safety</b>	<b>Society and Economy</b>
<b>Transportation</b>	<b>Water Resources</b>

 **Agriculture** [\[ Back to Top \]](#)

- [A Tale of Two Dairies: Climate Change Impacts and Adaptation on Large and Small Dairy Farms in New York State](#)
- [Climate Change Threatens Apple Production, but It Is Not Too Late to Adapt](#)
- [Growing on Rooftops: How One Urban Farm Is Adapting to Climate Change](#)
- [Investing to Adapt to the Uncertainties and Extremes of Climate Change in Field Crop Production](#)
- [Shinnecock Nation Marine and Land Farming Adaptations](#)
- [Taking a Proactive Approach to Climate Change to Preserve Seven Generations of Grape Growing and Wine Making in the Finger Lakes](#)



## Exploring Paths to Long-Term Resilience: Evolving Options for Protecting the City of Kingston's Wastewater Treatment Plant from Rising Waters

*At the intersection of Roundout Creek and the Hudson River, the City of Kingston's East Strand Street wastewater treatment plant stands just a few feet away from a rising estuarial river. This case study explores impacts from prior flooding on the facility and examines how Kingston can treat its sewage over the long term without interruption from coastal storms and elevated sea levels.*

Built in the 1940s, Kingston's wastewater treatment plant sits at the outlet of Roundout Creek into the Hudson River. The base elevation of the facility is just a few feet above the normal tidal peak river elevation. Flooding at the facility occurs when hurricanes and tropical storms generate storm surge in the river. As sea level rises, the facility will suffer extensive damage from the upward shift in the base height of the river, even if tropical storms remain similar to current storms in intensity or frequency.

After sizable tropical storms in the mid-1950s, the Lower Hudson Valley experienced no major storm events until 2011 and 2012, when the remnants of Hurricane Irene and Superstorm Sandy moved north through the Hudson Valley. The remnants of Hurricane Irene only caused minor damage,<sup>1</sup> but Superstorm Sandy revealed the vulnerability of the facility. Workers pumped floodwaters out of the treatment plant as the storm surge subsided and vacuumed and wiped equipment to get the plant back online, but equipment that had been submerged started to fail.<sup>2</sup> An electrical transformer stopped working within the first few hours, and only an emergency generator supplied electricity. Over the next few years, previously submerged equipment failed at a higher rate than usual, leading the Federal Emergency Management Agency to agree in 2016 to provide \$2.7 million in funds to replace critical equipment.<sup>3</sup>

Soon after Superstorm Sandy, the City of Kingston formed a Tidal Waterfront Task Force. The task force recognized the wastewater treatment plant as one of the three most vulnerable pieces of infrastructure in the city.<sup>4</sup> In 2015, an engineering firm made an in-depth report on the facility and noted alternatives for minimizing its future flood risk.<sup>5</sup> This report numbered over 100 pages and detailed the mechanical, electrical, and structural components of the

### Highlights

- Even when treatment facilities are in locations vulnerable to flooding, certain factors can limit relocation plans. These factors include the possibly limited extent of historical damage, the potential to upgrade the existing facility to reduce flood risk, and the high cost of moving the facility.
- The need to comply with regulatory requirements (and avoid fines) can take precedence over long-term strategic plans to protect the facility from sea level rise and other climate hazards.

# Case Study

## Collaborative Approaches to Water Management in a Changing Climate in the Delaware River Basin

- This case study highlights the role of the Delaware River Basin Commission (DRBC) in establishing dialogue and building consensus across states and municipalities, including New York City and Philadelphia, that rely on the Delaware River for water.
- In particular, the case study investigates how a climate change advisory committee is guiding the development of new technical knowledge while grappling with potential regional changes in water availability and quality.



## *Case Study*

# From Disastrous Delays in Extreme Weather to Resilient Energy-Efficient Emergency Operations: Rebuilding the New Paltz Firehouse Through Community-Driven Commitment

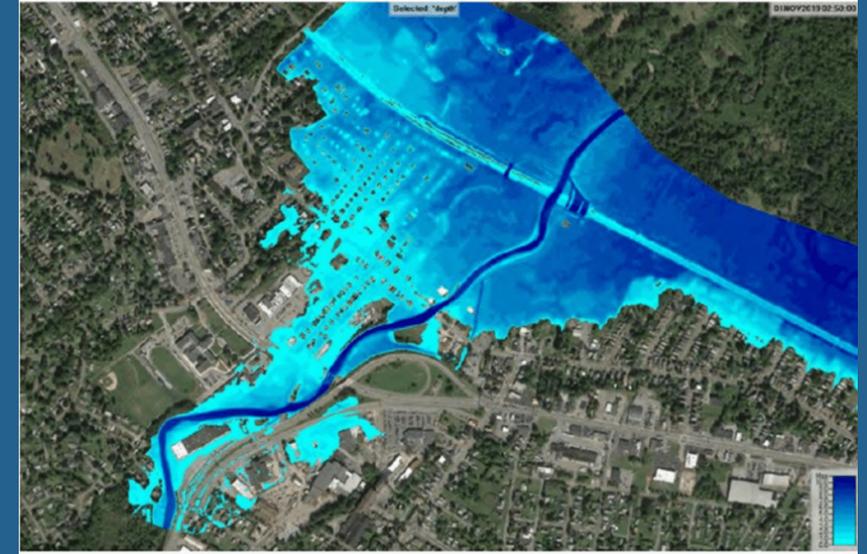
After flooding and power outages from back-to-back storms hampered emergency response in New Paltz, local and state leaders collaborated to create a model, climate-resilient firehouse that will remain operational even during power outages caused by extreme weather events.



*Photo by Chris Kendall*

# *Case Study* Of Infrastructure and Inundation: A Tale of Adaptation Along Sauquoit Creek

How one New York State community raised awareness of local transportation infrastructure problems and flooding—and persuaded stakeholders to work together to find solutions.



*Figure from Kandamby (2020).*

# Case Study

## Urban Heat Islands and Energy Inequality in Syracuse, New York

- Urban heat islands cause disproportionate energy burdens for people living in neighborhoods that are low-income and that have higher populations of people of color.
- To help combat the urban heat island effect, Syracuse adopted an Urban Forestry Master Plan to provide cooling where it is needed most.



*Photo by Lemir Teron*

## *Case Study*

# Innovative Housing Microgrid for Community Resilience at Marcus Garvey Village

The first-of-its-kind low- and middle-income housing microgrid project at Marcus Garvey Village in Brooklyn reduces local electricity demand on the power grid and provides the community with power resources after a power loss event, facilitating both community and grid resilience.

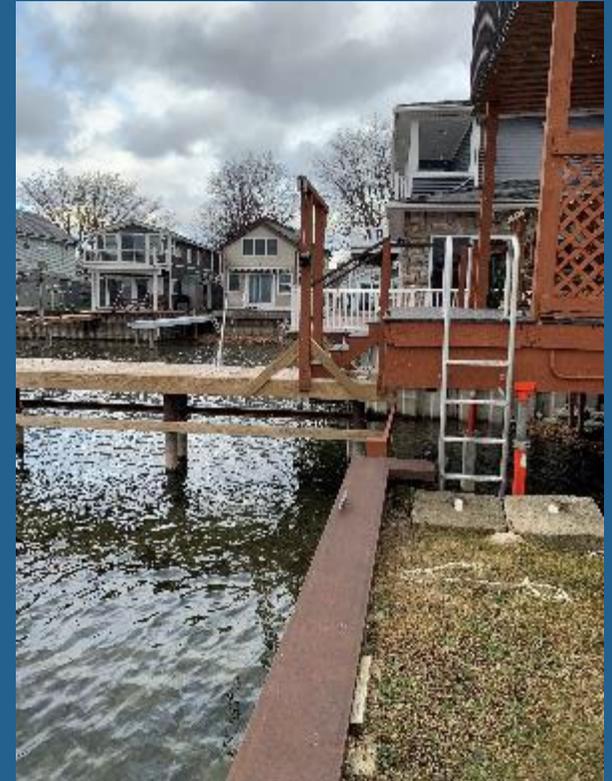


*Photo by Bright Power*

## *Case Study*

# It Takes a Village: How the Village of Sodus Point Is Adapting to Variable Water Levels

Partnerships and local knowledge can help municipalities—especially smaller ones, such as the Village of Sodus Point—find new ways to build climate resilience.



*Photo by Mary Austerman, Great Lakes Coastal Community Specialist, New York Sea Grant*

## *Case Study*

# Climate Change Threatens Apple Production, but It's Not Too Late to Adapt

Fruit producers are experiencing disruptions and losses due to climate change, requiring adaptation solutions. Financial incentives may provide opportunities to encourage adaptation.



*Photo by Deborah Aller*

## *Case Study*

# Growing on Rooftops: How One Urban Farm Is Adapting to Climate Change

As climate change affects urban farms, adaptation practices provide solutions for crops, farm operations, and workers, as seen in the example of Brooklyn Grange.



*Photo by Deborah Aller*

# Case Study

## Municipalities Across New York Respond as Extreme Heat Threatens Lives Statewide

- Reducing exposure to heat and increasing access to cool indoor spaces is an important health intervention.
- However, many New Yorkers lack choice in their personal exposure, and many also lack access to cooling.



Figure from NOAA's heat.gov (2022)

# Case Study

## Housing Policy, Climate Change, and Health

Community investments, housing codes, and lending practices all affect the built environment in ways that create health risks and protections for individuals as the climate changes.

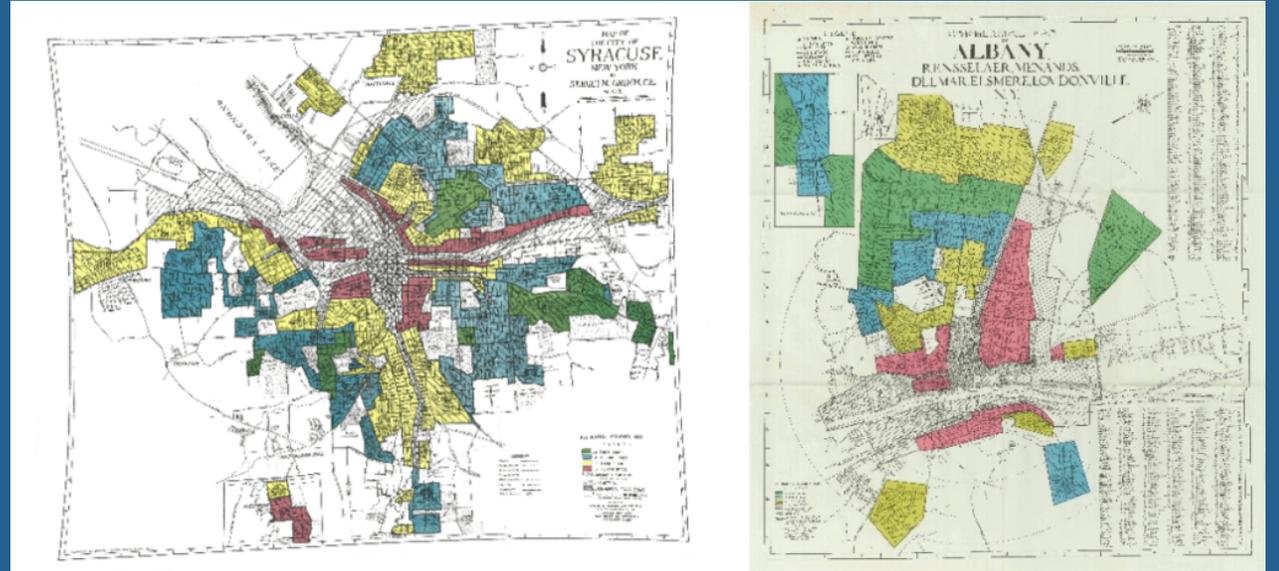


Figure from *Mapping Inequality: Redlining in New Deal America*



Visit [www.nysclimateimpacts.org](http://www.nysclimateimpacts.org)  
to access the assessment and  
supporting materials

# Environmental Justice

O&R Climate Resilience Working Group

July 11, 2024

Laurie J. Sands

# Agenda

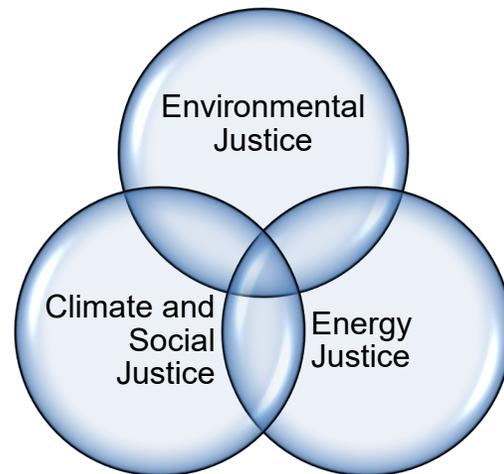
- Defining Environmental Justice
- Environmental Justice Working Group
- Environmental Justice Policy
- Questions

# Defining Environmental Justice

# What is Environmental Justice (EJ)?

\*The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations and policies

- Developed out of the Civil Rights Movement
- Addressed by federal, state and local policies and laws
- Evolving into Climate Justice aligned with larger Social Justice Movement



\*Source: US Environmental Protection Agency; New York State (DEC Commissioner's Policy 29) employs same definition.

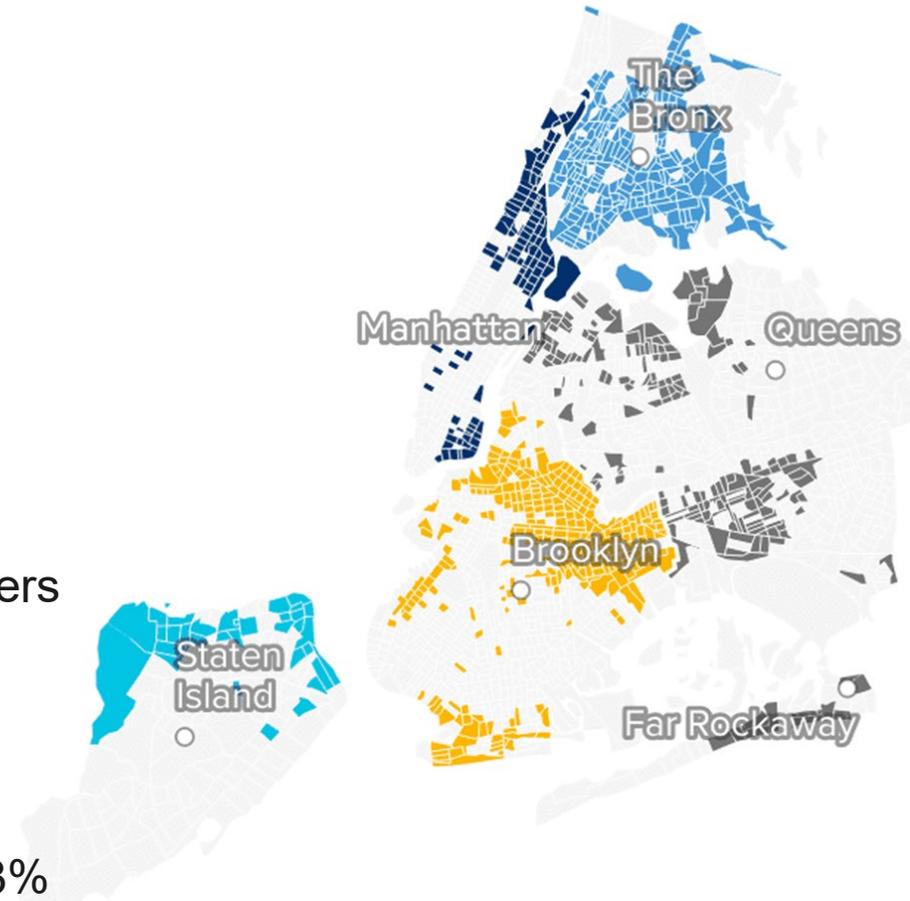
# EJ Context

## General Context:

- Environmental Justice (EJ) is dynamic, rapidly evolving into a Climate Justice movement with bold aspirations
- Climate Justice brings together EJ advocates with labor
- EJ is a “lens” not a metric

## Con Edison Context:

- NYS Climate Leadership and Community Protection Act (CLCPA) covers State agencies
- Five boroughs contain **60%** of State DACs with large pockets in Westchester and Orange counties
- **45%** of Con Edison customers live in DACs (46% for CECONY and 33% for Orange and Rockland)



*Disadvantaged Community census tracts in the five boroughs of New York City*

# Environmental Justice Stakeholder Landscape

EJ groups have an increasingly powerful voice politically, locally, and nationally

## Objectives:

- Ending fossil fuel use
- Closing “peaker” plants
- Focusing on energy affordability, bill impacts
- Developing community ownership
- Increasing Green Jobs, DAC workforce development, and “just transition”



PEAK Coalition



NEW YORK CITY  
ENVIRONMENTAL JUSTICE ALLIANCE

*On the ground – and at the table*

# **Environmental Justice Working Group**

# Working Group Priorities

Equitable and Inclusive Planning

Engaging with Radical Listening

Championing Needs/Investments in DACs

Educating

# **CON EDISON'S ENVIRONMENTAL JUSTICE POLICY**

## THE DRAFT POLICY

Con Edison is privileged to serve some of the most diverse communities in the world. As a company, we understand the need to consider potential environmental impacts of our activities and investments on all customers regardless of their race, color, religion, national origin or income. We can only do this by listening to, learning from and understanding the concerns of our customers in disadvantaged communities and working with them to make certain that they are treated fairly.

Con Edison, through its commitment to environmental justice, aims to ensure that:

- Disadvantaged communities are not disproportionately burdened by our operations, while at the same time continuing to maintain reliable, resilient energy service for all our customers;
- We engage with environmental justice advocates and other community stakeholders so that we may understand the concerns of disadvantaged communities with respect to the design and implementation of Con Edison projects and programs;
- Disadvantaged communities benefit from our clean energy investments in terms of improved quality of life and climate-resilient energy infrastructure;
- We provide opportunities for employment in our clean energy future, focusing on education and skills development in the communities we serve;
- We continue to support disadvantaged communities through volunteerism and contributions to local non-profit groups, particularly those with a focus on education and environmental stewardship;
- In collaboration with our government partners, we work to remediate former utility sites where there is a history of environmental damage;
- There is support for our commercial customers, government and other strategic partners to transition car, bus, and truck fleets to zero-emission vehicles, as we continue to take steps to improve air quality and support livable streetscapes, particularly in disadvantaged communities; and
- Our operations benefit all the communities in which our employees and our customers live, work and study.

# Breaking it Down

- Serve Diverse Communities
  - Environmental Justice is very real for the Company
- Understanding
  - Active listening
- Balance – Impacts, Reliability and Resiliency
- Share Benefits from Clean Energy Investments
- Clean Energy Employment Opportunities
- Support Disadvantage Communities
- Remediate Contaminated Sites
- Transition to Zero-Emission Vehicles
- Benefits for all Communities the Company Serves

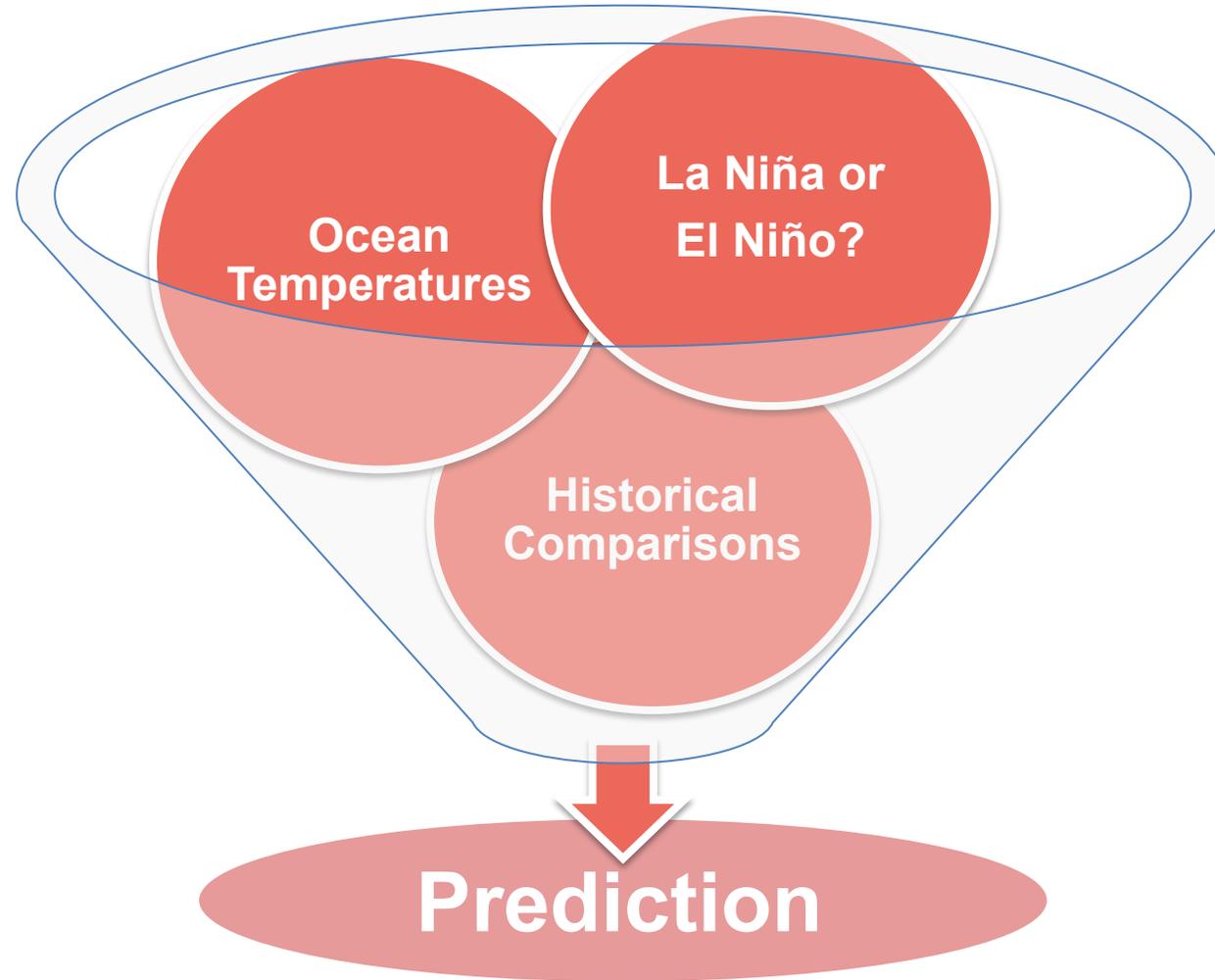
# Questions?



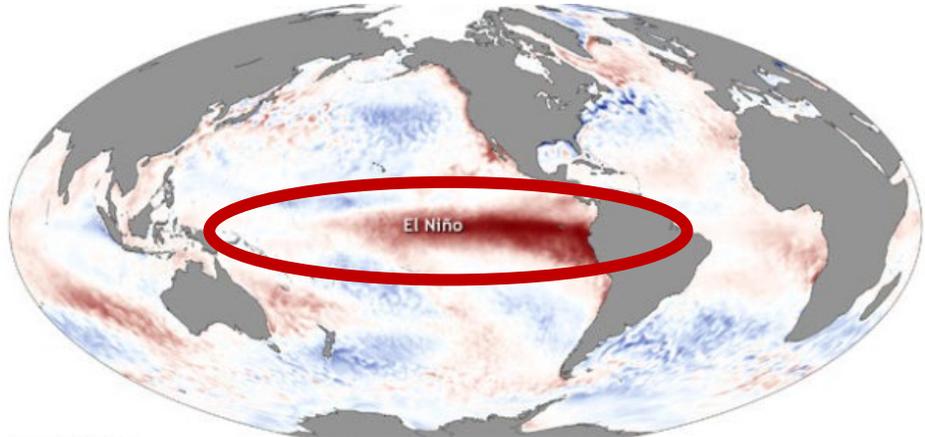
# Weather Update

Matt Leszak  
Project Specialist / Meteorologist - Emergency Preparedness

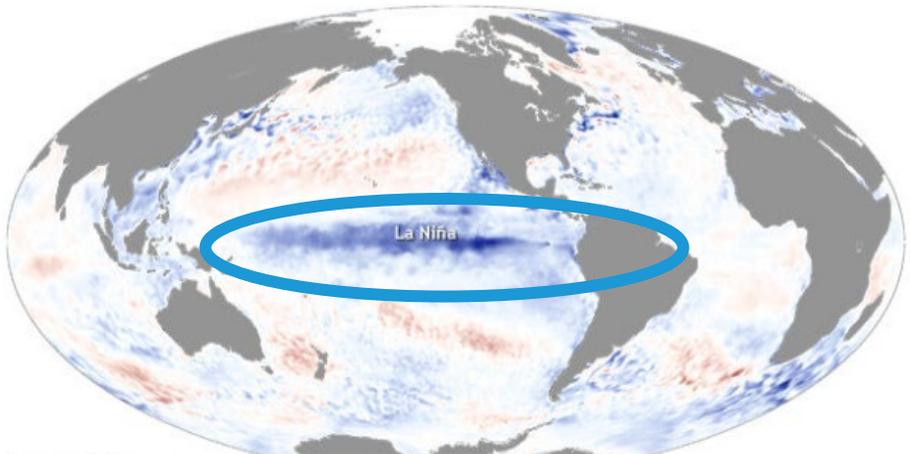
# Summer Outlook Process



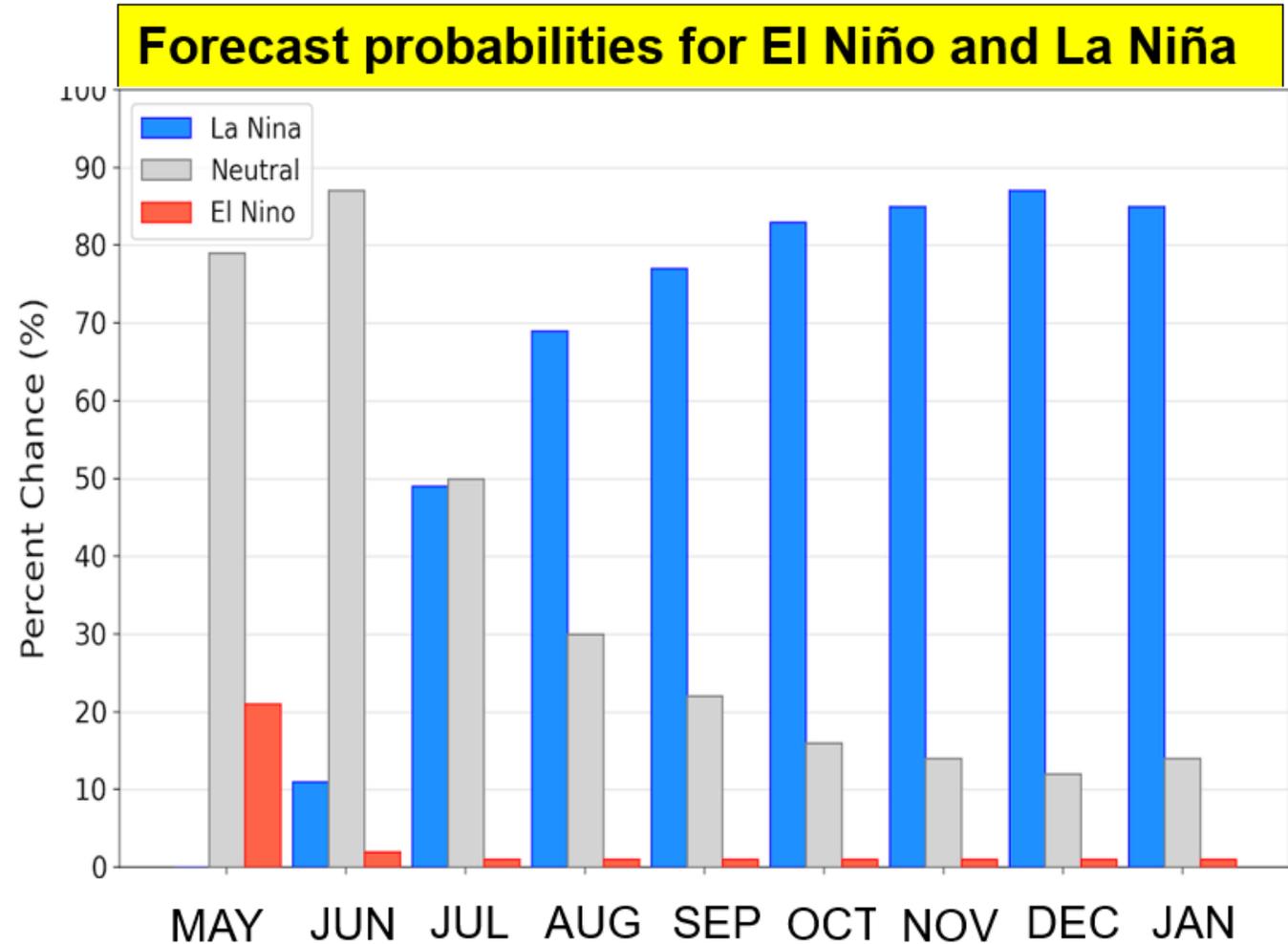
# Transitioning to La Niña by Late Summer



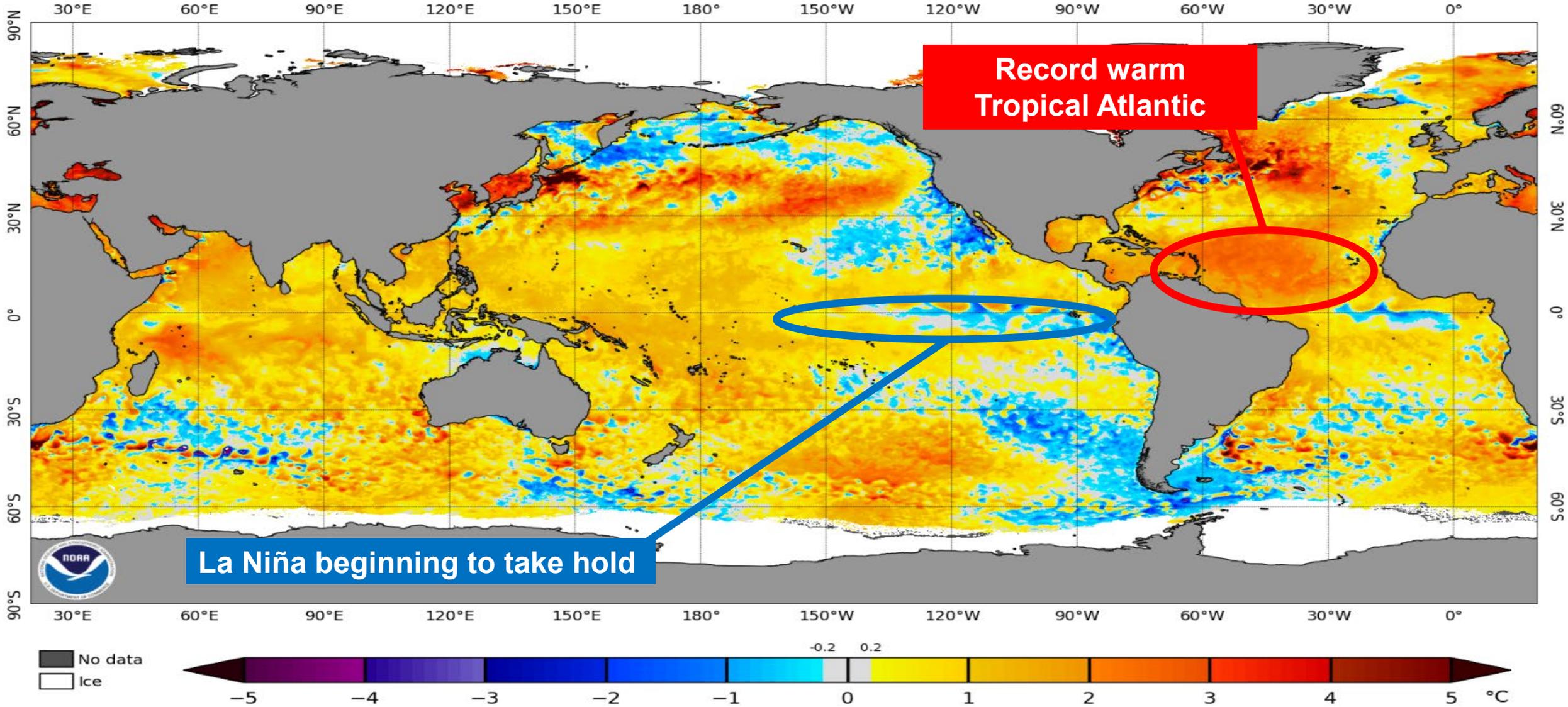
**El Niño → Warm water in Equatorial Pacific**



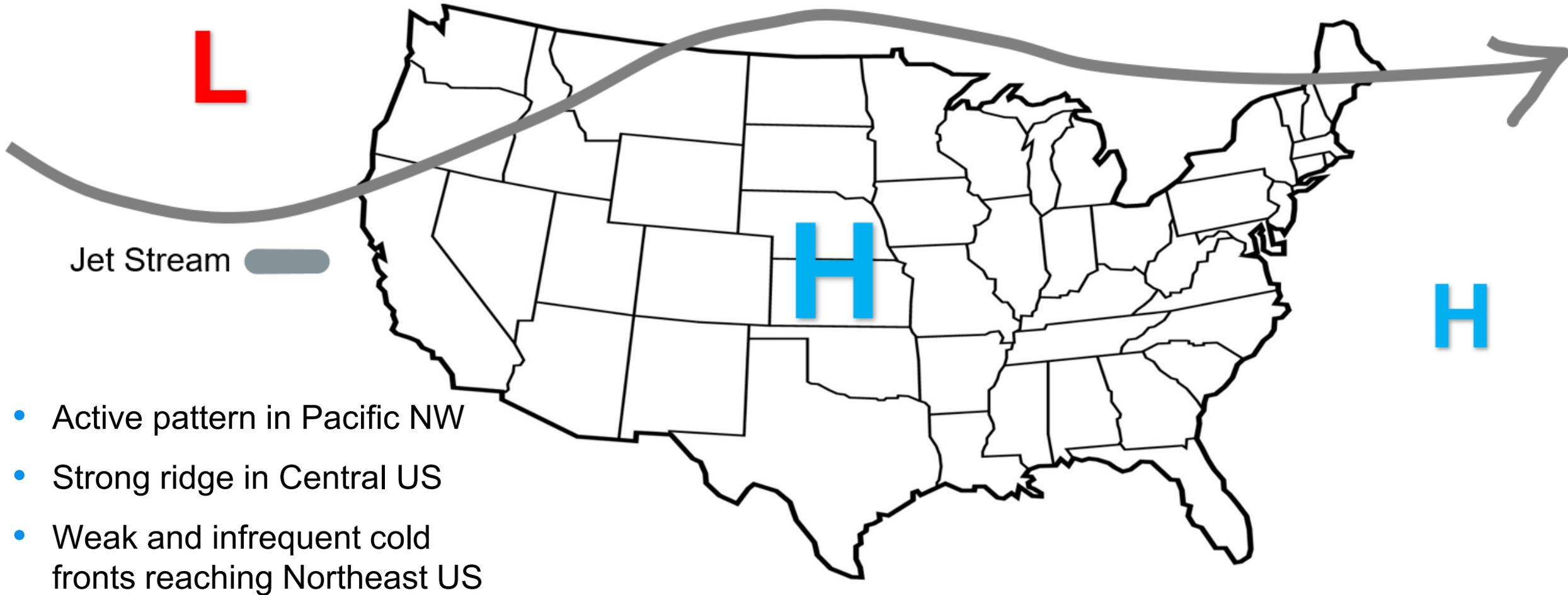
**La Niña → Cool water in Equatorial Pacific**



# Global Sea Surface Temperature Anomalies



# Forecasted Summer Weather Pattern



# 2024 Summer Outlook

Temperatures	Rainfall
Above normal	Near or below normal

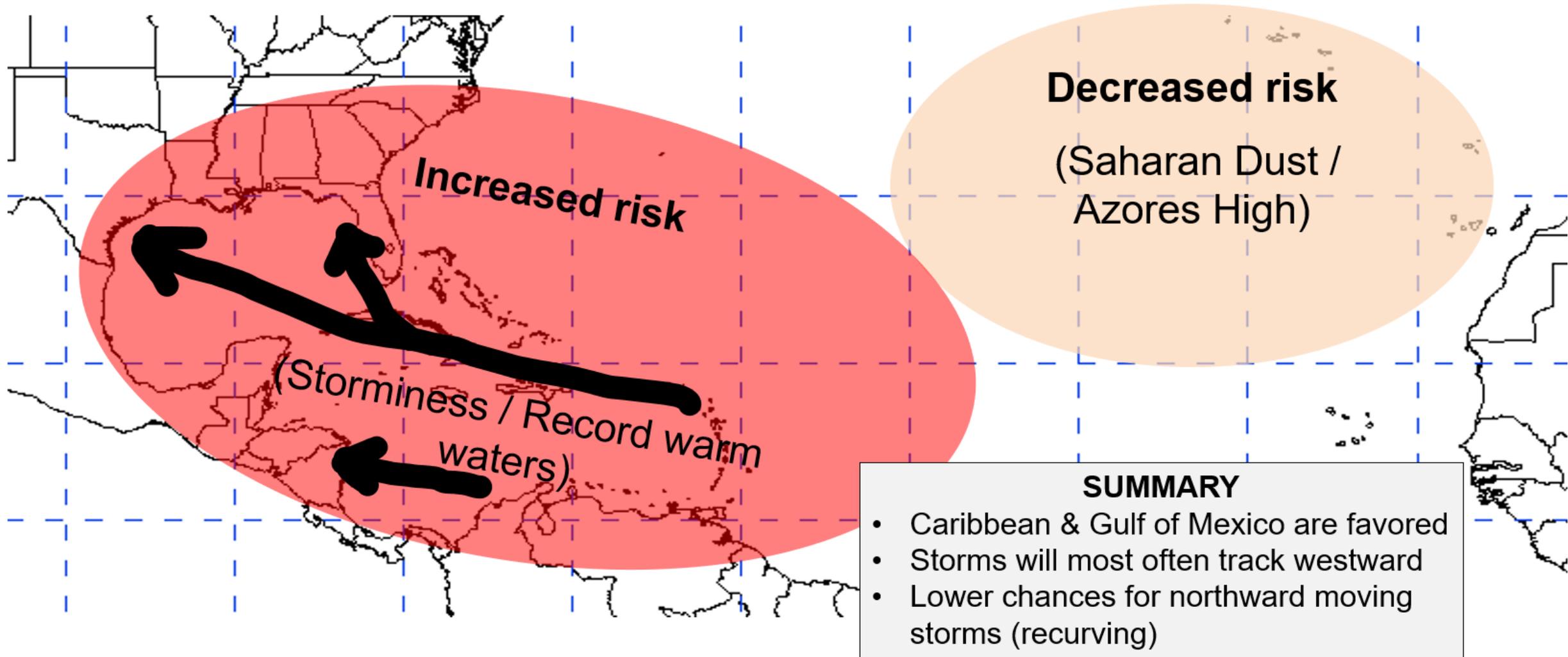
- Confidence is **moderate** in this outlook
- Reasons:
  - Variability in recent similar summer seasons
  - Onset of La Niña and how quickly it takes effect

# Active Hurricane Season Lies Ahead

- La Niña favors *above normal* tropical activity
- Favoring factors:
  - Record warm Tropical Atlantic
  - Lower wind shear
  - Increased storminess in Caribbean and Gulf of Mexico

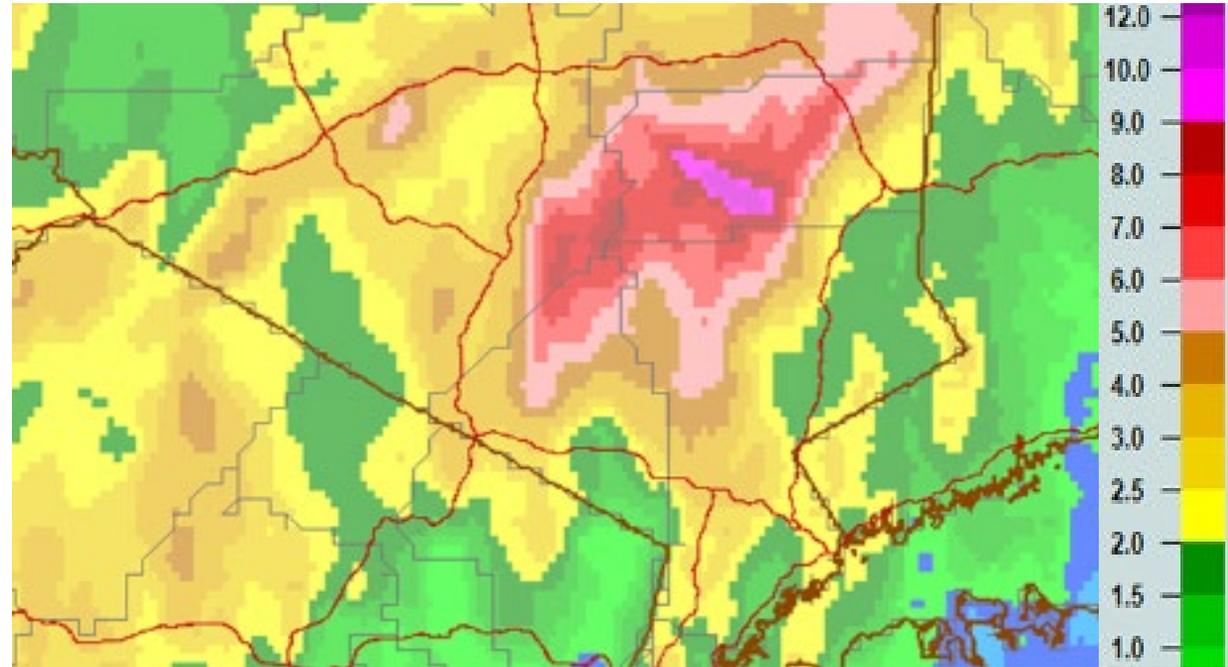
Storm Class	Normal	Forecast
Tropical Storms	14.4	↑
Hurricanes	7.2	↑
Major Hurricanes	3.2	↑

# Hurricane Season Outlook



# Recent Weather Events

- July 9, 2023 Deluge Rainfall
  - ~ 8 inches of rain in 3-4 hours
  - 1000-year return interval
  - Hyperlocal event



Radar Estimated Total Precipitation

# Recent Weather Events

- May 23, 2024 Microburst
  - West Milford, NJ
  - Greenwood Lake, NY
  - Exact max wind gusts unknown
  - Estimates of 80-100 mph based on damage



## RESILIENCE PLAN UPDATE

# Next Steps & Key Dates

Dates	Climate Change Resilience Plan (CCRP) Activities
Summer 2024	O&R Rate Case settlement discussions that cover Climate Change Resilience Plan investments for 2025-2027
July 30, 2024	Public Hearing on O&R's Climate Change Resilience Plan and Cost Recovery Surcharge
Q4 2024	Next O&R Climate Resilience Working Group Meeting (TBD)
<b>By October 21, 2024</b>	<b>Commission Action on 2023 O&amp;R Climate Change Resilience Plan filing</b>

Dates	Other Climate Resilience Activities
July 2024	Nonprofits notified of selection decision for Climate Justice RFP
Ongoing	Supplementary flood modeling and deluge rainfall study with CECONY



# Orange & Rockland

# Continued Stakeholder Engagement and Discussions on Climate Resilience

Public Service Law (PSL) § 66(29) – PSC Case 22-E-0222

For the Climate Resilience Working Group

November 18, 2024

# AGENDA

- Climate resilience investments in the current O&R electric rate case
- Deluge rain and flood modeling study
- Next steps

# Climate resilience investments in the current O&R electric rate case



# Joint Proposal summary of projects and programs in O&R's CCRP

Projects / Programs	Rate Case Years (2025 – 2027) Total (\$ in millions)
Selective Undergrounding	\$103.2
Enhanced Overhead Program	\$17.5
Overhead Structure Replacement	\$6.9
Distribution Automation / Smart Grid	\$25.8
Emergency Response Ops & Control	\$14.6
Storm Material Management	\$20.1
Micronet Weather Station Expansion (3 stations)	\$0.2
Substation Flooding Mitigation (3 sites)	\$13.8
Shoreline Erosion Protection	\$3.5
<b>Total</b>	<b>\$205.6</b>

# Wind & Ice



# Selective Undergrounding Program

## Program Scope & Resiliency Benefits

### Program Scope:

- 2025-2027: 20 specific projects for undergrounding with ~15 miles of overhead distribution lines and ~5 miles of underground transmission lines
- 9 of the projects are planned in disadvantaged communities (DAC) and will benefit a total of 44 circuits

### Resiliency Benefits:

- Enhance durability and reliability of distribution and transmission systems
- Mitigate exposure to external hazards such as weather events, wildlife contact, and car accidents
- Avoid customer service outages

## Climate Drivers

### Climate Change Vulnerabilities:



### Wind / Ice

- The service area is likely to experience higher wind speeds and gusts during tropical cyclones, extratropical cyclones, and thunderstorms.
- The potential remains for increased freezing rain frequency and ice accumulation.
- North Atlantic hurricanes could become more intense (~5% increase) relative to historical hurricanes.

### Program Funding in O&R Rate Case:

- Joint Proposal funding: \$103.2 million (capital)

	2025 (RY1)*	2026 (RY2)	2027 (RY3)
<b>CCRP Request (\$M)</b>	\$38.9	\$47.9	\$16.4
<b>Joint Proposal (\$M)</b>	\$38.9	\$47.9	\$16.4

\*RY denotes rate year in rate case period (3-years)

# Enhanced Overhead (Hendrix System)

## Program Scope & Resiliency Benefits

### Program Scope:

- 2025-2027: Reinforce ~16 miles of overhead distribution lines with Hendrix spacer cable

### Resiliency Benefits:

- Enhance durability and reliability of distribution system
- Mitigate exposure to external hazards such as weather events and tree contact
- Avoid customer service outages

## Climate Drivers

### Climate Change Vulnerabilities:



### Wind / Ice

- The service area is likely to experience higher wind speeds and gusts during tropical cyclones, extratropical cyclones, and thunderstorms.
- The potential remains for increased freezing rain frequency and ice accumulation.
- North Atlantic hurricanes could become more intense relative to historical hurricanes.

### Program Funding in O&R Rate Case:

- Joint Proposal funding: \$17.5 million (capital)

	2025 (RY1)	2026 (RY2)	2027 (RY3)
<b>CCRP Request (\$M)</b>	\$15.6	\$11.4	\$15.3
<b>Joint Proposal (\$M)</b>	\$7.5	\$3.2	\$6.8

# Overhead Structure Replacement Program

## Program Scope & Resiliency Benefits

### Program Scope:

- Supplement inspection-based pole replacement with a proactive approach that gives a weighted consideration of pole age

### Resiliency Benefits:

- Increased ability to withstand more frequent and intense storm events
- Reduces maintenance costs and minimizes unplanned repair expenditures
- Avoid customer service outages

## Climate Drivers

### Climate Change Vulnerabilities:



### Wind / Ice

- O&R is likely to experience higher wind speeds and gust during tropical cyclones, extratropical cyclones, and thunderstorms in the future.
- Projections show that maximum wind gusts could reach 110 mph in the future.
- The potential exists for increased radial icing intensity during ice storms.

### Program Funding in O&R Rate Case:

- Joint Proposal funding: \$6.9 million (capital)

	2025 (RY1)	2026 (RY2)	2027 (RY3)
<b>CCRP Request (\$M)</b>	\$2.3	\$3.1	\$4.0
<b>Joint Proposal (\$M)</b>	\$1.4	\$2.3	\$3.2

# Multiple Hazards



# Distribution Automation/Smart Grid

## Program Scope & Resiliency Benefits

### Program Scope:

- Continue current pace of installation and commissioning of SCADA controlled devices (reclosers, smart capacitors, remotely operated switches, and power quality sensors) per year on a feeder-by-feeder basis
- Install and upgrade field devices with command-and-control schemes
- Three-tiered approach: (1) Feeder Optimization, (2) Field Automation, (3) Centralized Automation Control

### Resiliency Benefits:

- Reduce potential customer outages during storms by automatically isolating faults
- Expedite storm response by remotely activating devices

## Climate Drivers

### Climate Change Vulnerabilities:



### Extreme Events

- Projections show that maximum wind gusts could reach 110 mph in the future.
- The frequency of strong storms could increase in the future, with higher rainfall amounts and stronger winds.
- The number of days per year with precipitation exceeding 2 inches could increase 45% by 2050 and 77% by 2080 at Dobbs Ferry.

### Program Funding in O&R Rate Case:

- Joint Proposal funding: \$25.8 million (capital)

	2025 (RY1)	2026 (RY2)	2027 (RY3)
<b>CCRP Request (\$M)</b>	\$12.0	\$12.1	\$12.1
<b>Joint Proposal (\$M)</b>	\$8.4	\$8.6	\$8.8

# Emergency Response Operation and Control Facility

## Program Scope & Resiliency Benefits

### Program Scope:

- Install a dedicated emergency response operation and control facility on land owned by O&R, across from the existing Blooming Grove Operating Center, to be placed into service in 2028.
- This location is centrally located within the O&R service territory and has easy highway access for emergency storm response events.
- This building will be co-located with the new storm material warehouse.

### Resiliency Benefits:

- Having a dedicated facility that will be configured as an emergency response control facility will save time when mobilizing for storm coordination and response.

## Climate Drivers

### Climate Change Vulnerabilities:



### Extreme Events

- The service area is likely to experience more frequent and intense events such as high winds, icing, and high heat.
- North Atlantic hurricanes could become more intense and have higher rainfall amounts (~10% to 15% increase) relative to historical hurricanes.
- The probability of coincident extreme events will likely continue to increase in both frequency and intensity in the future.

### Project Funding in O&R Rate Case:

- Joint Proposal funding: \$14.6 million (capital)

	2025 (RY1)	2026 (RY2)	2027 (RY3)
<b>CCRP Request (\$M)</b>	\$2.1	\$5.0	\$7.4
<b>Joint Proposal (\$M)</b>	\$1.3	\$5.5	\$7.8

# Multiple Hazards Storm Material Management

Program Scope & Resiliency Benefits	Climate Drivers
<p><b>Program Scope:</b></p> <ul style="list-style-type: none"> <li>This program will install a dedicated storm material warehouse on land owned by O&amp;R, across from the existing Blooming Grove Operating Center, to be placed into service in 2028.</li> <li>This location is centrally located within the O&amp;R service territory and has easy highway access for emergency storm response events</li> <li>Facility will house 20 days' worth of critical spare equipment inventory for catastrophic storm response (O&amp;R currently maintains 5 days' worth)</li> </ul> <p><b>Resiliency Benefits:</b></p> <ul style="list-style-type: none"> <li>Reduces event recovery time by making spare parts available more quickly</li> <li>Mitigates elongated lead times from existing supply chain issues</li> </ul>	<p><b>Climate Change Vulnerabilities:</b></p> <p style="text-align: center;">  </p> <p style="text-align: center;"><b>Extreme Events</b></p> <ul style="list-style-type: none"> <li>The service area is likely to experience more frequent and intense events such as high winds, icing, and high heat.</li> <li>North Atlantic hurricanes could become more intense relative to historical hurricanes.</li> <li>The probability of coincident extreme events will likely continue to increase in both frequency and intensity in the future.</li> </ul>

## Project Funding in O&R Rate Case:

- Joint Proposal funding: \$20.1 million (capital)

	2025 (RY1)	2026 (RY2)	2027 (RY3)
<b>CCRP Request (\$M)</b>	\$3.7	\$8.5	\$13.8
<b>Joint Proposal (\$M)</b>	\$0.7	\$7.8	\$11.6

# Micronet Weather Station Expansion

## Program Scope & Resiliency Benefits

### Program Scope:

- Install three (3) Micronet weather stations and instrumentation across O&R service territory
- These instruments can measure temperature, wind, precipitation, humidity, and barometric pressure to capture hyperlocal weather conditions

### Resiliency Benefits:

- Better understanding of the hyperlocal impacts of climate change
- Reduce restoration times and outage costs by providing a more granular view of weather progression and impacts

## Climate Drivers

### Climate Change Vulnerabilities:



### Extreme Events

- The service area is likely to experience more frequent and intense events such as high winds, icing, and high heat.
- The probability of coincident extreme events will likely continue to increase in both frequency and intensity in the future.

### Program Funding in O&R Rate Case:

- Joint Proposal funding: \$0.16 million (capital)

	2025 (RY1)	2026 (RY2)	2027 (RY3)
CCRP Request (\$000)	\$380	-	-
Joint Proposal (\$000)	\$160	-	-

# Flood Mitigation



# Summitville Substation Flooding Mitigation

## Program Scope & Resiliency Benefits

### Program Scope:

- Install a paved 30” perimeter berm to prevent or control flow of water until substation retirement in 2032
- Summitville substation set to be retired and replaced with the Wurtsboro station

### Resiliency Benefits:

- Reduced substation equipment vulnerability to damage failure from flooding due to extreme rain events, and location within FEMA 100-year floodplain
- Avoid restoration and replacement costs
- Avoid customer service outages

## Climate Drivers

### Climate Change Vulnerabilities:



### Precipitation

- FEMA 100-year flood map projection of an inundation depth of up to ~2 feet
- Maximum 5-day precipitation could increase 13% by 2050 at Dobbs Ferry.
- The number of days per year with precipitation exceeding 2 inches could increase 45% by 2050 and 77% by 2080 at Dobbs Ferry.

### Project Funding in O&R Rate Case:

- Joint Proposal funding: \$0.14 million (capital)

	2025 (RY1)	2026 (RY2)	2027 (RY3)
<b>CCRP Request (\$000)</b>	\$140	-	-
<b>Joint Proposal (\$000)</b>	\$140	-	-

# Flood Mitigation

## Hillburn Substation Flooding Mitigation

Program Scope & Resiliency Benefits	Climate Drivers
<p><b>Program Scope:</b></p> <ul style="list-style-type: none"> <li>In the near-term Install 48” perimeter berm to prevent or control water</li> <li>In the longer term, two possible paths to enhance resilience to flooding:               <ul style="list-style-type: none"> <li>Relocate substation to area less susceptible to flooding</li> <li>Elevate the entire facility on raised site grade elevation</li> </ul> </li> </ul> <p><b>Resiliency Benefits:</b></p> <ul style="list-style-type: none"> <li>Reduce substation equipment damage failure from extreme rain events</li> <li>Increased reliability and life expectancy of assets</li> <li>Avoid customer service outages</li> </ul>	<p><b>Climate Change Vulnerabilities:</b></p> <p style="text-align: center;"> <b>Precipitation</b></p> <ul style="list-style-type: none"> <li>FEMA 100-year flood map projection of an inundation depth of between 1-4 feet within the substation site.</li> <li>Maximum 5-day precipitation could increase 13% by 2050 at Dobbs Ferry.</li> <li>The number of days per year with precipitation exceeding 2 inches could increase 45% by 2050 and 77% by 2080 at Dobbs Ferry.</li> </ul>

**Project Funding in O&R Rate Case:**

- Joint Proposal funding: \$0.5 million (capital)

	2025 (RY1)	2026 (RY2)	2027 (RY3)
<b>CCRP Request (\$000)</b>	\$500	-	-
<b>Joint Proposal (\$000)</b>	\$500	-	-

# Lovett 138kV Substation Flooding Mitigation

Program Scope & Resiliency Benefits	Climate Drivers
<p><b>Program Scope:</b></p> <ul style="list-style-type: none"> <li>In the near-term construct two primary flood protection measures: raising the control house and installing waterproof cabinets</li> <li>In the longer term, two possible paths to enhance resilience to flooding:                             <ul style="list-style-type: none"> <li>Relocate substation to area less susceptible to flooding</li> <li>Elevate the entire facility and fortify with a retaining wall</li> </ul> </li> </ul> <p><b>Resiliency Benefits:</b></p> <ul style="list-style-type: none"> <li>Increased ability to withstand climate-driven flood risks</li> <li>Avoid restoration and replacement costs</li> <li>Avoid customer service outages</li> </ul>	<p><b>Climate Change Vulnerabilities:</b></p> <div style="text-align: center;">  </div> <p><b>Precipitation / Sea Level Rise</b></p> <ul style="list-style-type: none"> <li>FEMA 100-year flood map projection combined sea level rise resulting in an inundation of 4 feet by 2050</li> <li>Projections show sea levels could rise 16 inches by the 2050s.</li> <li>Maximum 5-day precipitation could increase 13% by 2050 at Dobbs Ferry.</li> <li>The number of days per year with precipitation exceeding 2 inches could increase 45% by 2050 and 77% by 2080 at Dobbs Ferry.</li> </ul>

**Project Funding in O&R Rate Case:**

- Joint Proposal funding: \$13.2 million (capital)

	2025 (RY1)	2026 (RY2)	2027 (RY3)
<b>CCRP Request (\$M)</b>	\$2.6	\$5.2	\$5.4
<b>Joint Proposal (\$M)</b>	\$2.6	\$5.2	\$5.4

# Flood Mitigation Shoreline Erosion Protection Program

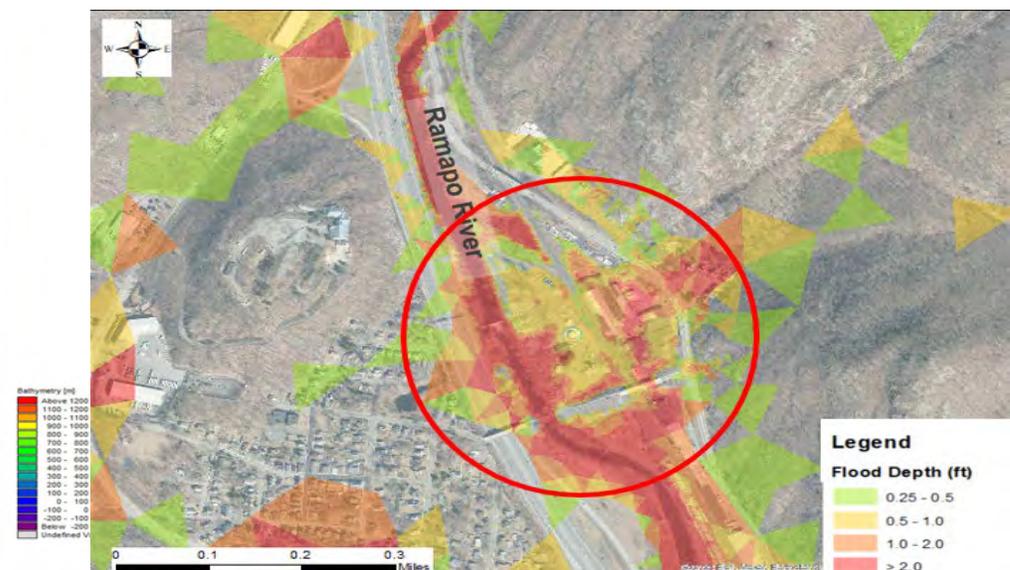
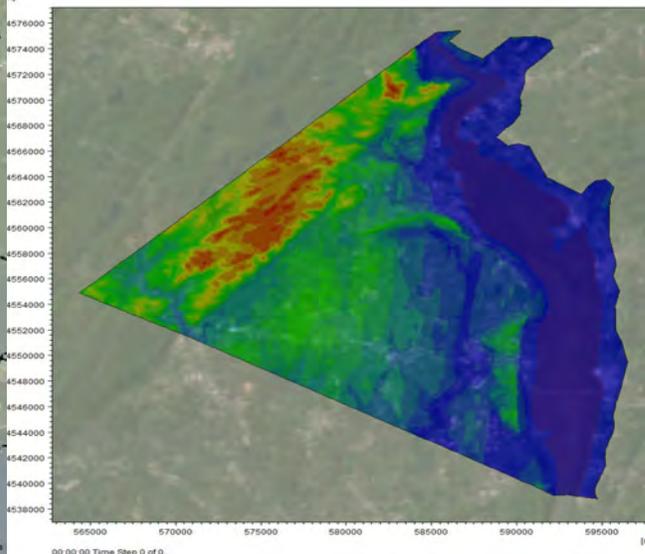
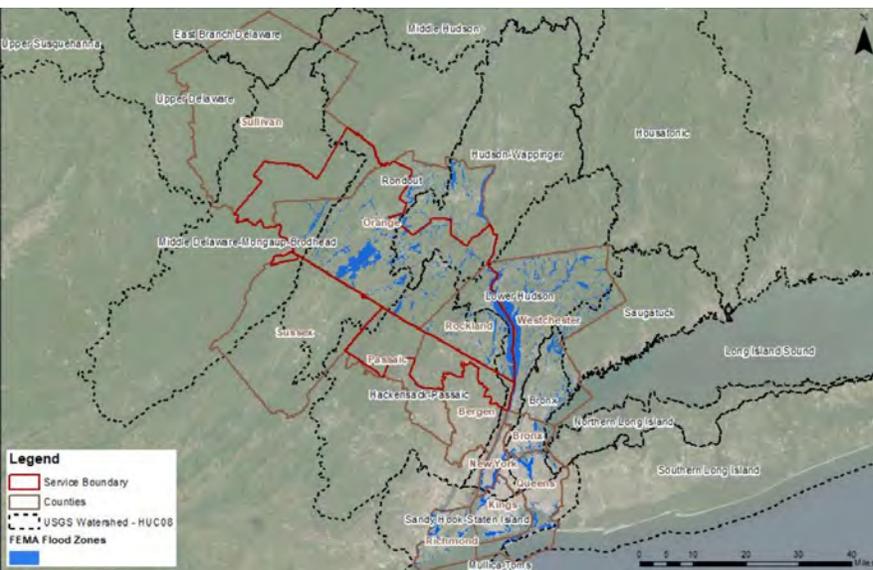
Program Scope & Resiliency Benefits	Climate Drivers
<p><b>Program Scope:</b></p> <ul style="list-style-type: none"> <li>Expand the existing inspection program with a more proactive mitigation approach</li> <li>Armoring additional structures along rivers per year</li> <li>Implement mitigation measures such as riprap or retaining walls to prevent erosion and potential failure of overhead structure</li> </ul> <p><b>Resiliency Benefits:</b></p> <ul style="list-style-type: none"> <li>Provide long-term solution for shoreline erosion damage due to sea level rise and flooding from severe coastal storms</li> <li>Reduce flood risk to O&amp;R's shoreline infrastructure</li> <li>Avoid customer service outages</li> </ul>	<p><b>Climate Change Vulnerabilities:</b></p> <div style="text-align: center;">   </div> <p style="text-align: center;"><b>Precipitation / Sea Level Rise</b></p> <ul style="list-style-type: none"> <li>Projections show sea levels could rise 16 inches by the 2050s for assets near the Hudson River</li> <li>North Atlantic hurricanes could become more intense with rainfall amounts increasing approximately 10% to 15% relative to historical hurricanes.</li> </ul>

**Program Funding in O&R Rate Case:**

- Joint Proposal funding: \$3.1 million (capital)

	2025 (RY1)	2026 (RY2)	2027 (RY3)
<b>CCRP Request (\$M)</b>	\$1.0	\$1.0	\$1.1
<b>Joint Proposal (\$M)</b>	\$1.0	\$1.0	\$1.1

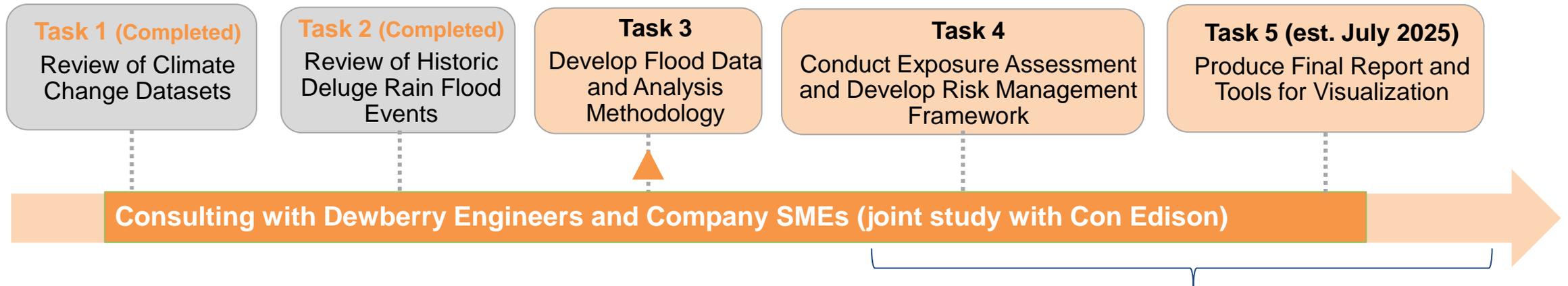
# Deluge rain and flood modeling study



# Deluge rain and flood modeling study

The study aims to evaluate regional inland and riverine flooding using hydraulic & hydrologic (H&H) modeling to develop new GIS Layers and guidance documents for five plausible future rainfall scenarios

- Goal is to assess data gaps and vulnerabilities not yet quantified or outdated
- Objective is to use study outputs to identify whether O&R needs to update or revise long term planning and engineering decisions and/or justify funding for future resilience investments



## Current Status

- Reviewing 2023 climate vulnerability study and existing datasets (e.g., LIDAR, GIS data, FEMA data)
- Identifying deluge rain flood scenarios
- Identifying flood modeling and analysis methodology

## Study Outputs

- Flooding insights (i.e., future trends)
- Exposure assessment and risk management framework
- Tools to visualize flood exposure for O&R facilities (i.e., GIS layers, maps)

# Deluge rain and flood modeling study

The Study Team will utilize the latest climate models and flood/intense rain projections to model plausible future events and identify the impact throughout the service territories.

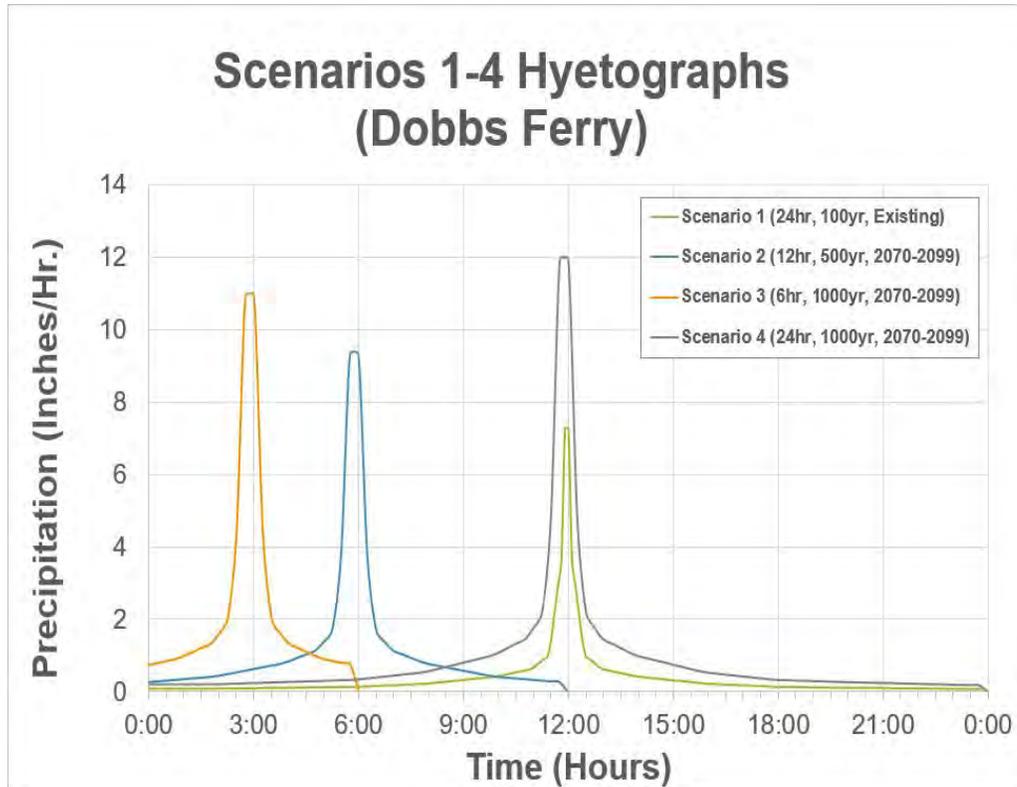


Fig. 1: Scenario hyetographs\* for Dobbs Ferry, NY

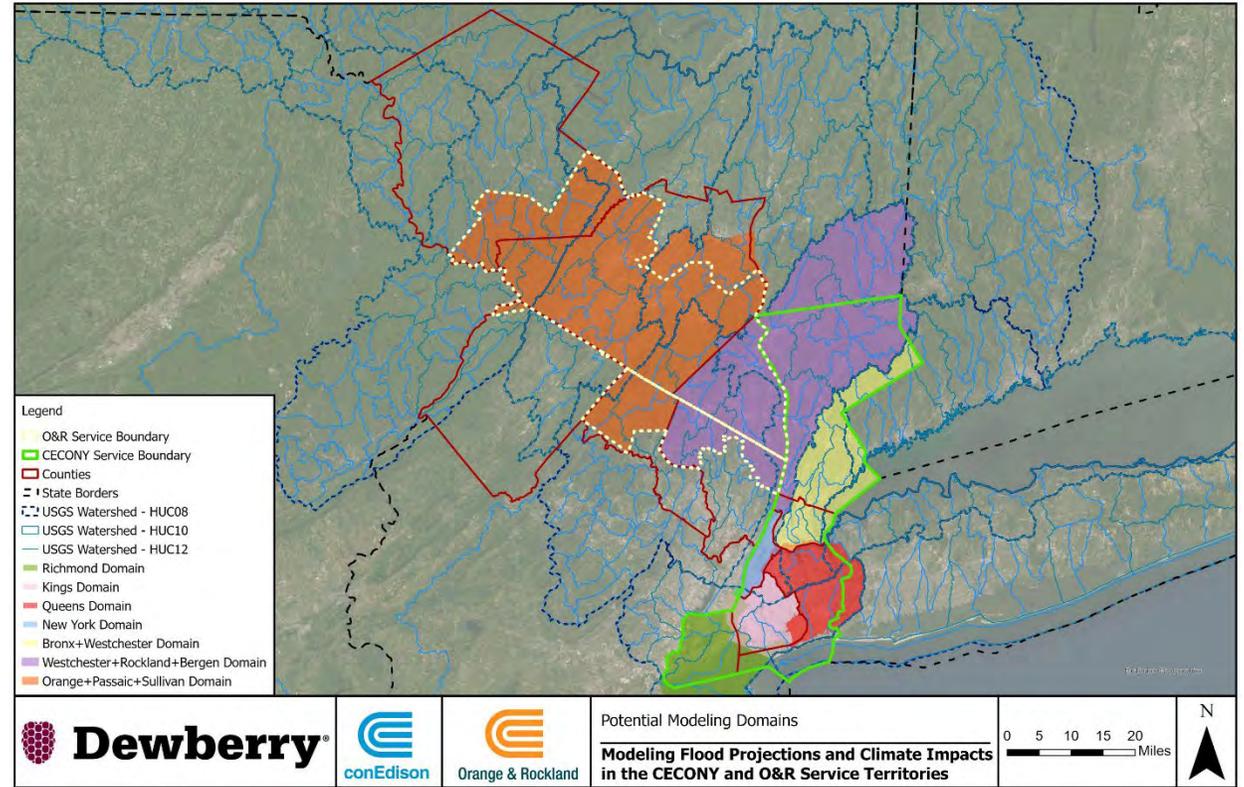


Fig. 2: O&R and Con Edison service area with USGS watershed boundaries and FEMA floodplain datasets shown

\*A hyetograph is a graph that shows how rainfall intensity changes over time

# Deluge rain and flood modeling study

The Study Team selected five rainfall scenarios for this study to model flood projections and climate impacts in the O&R service territory.

**~8.6"**

Total Rainfall Depth from a 100-year rain event over 24 hours at Dobbs Ferry

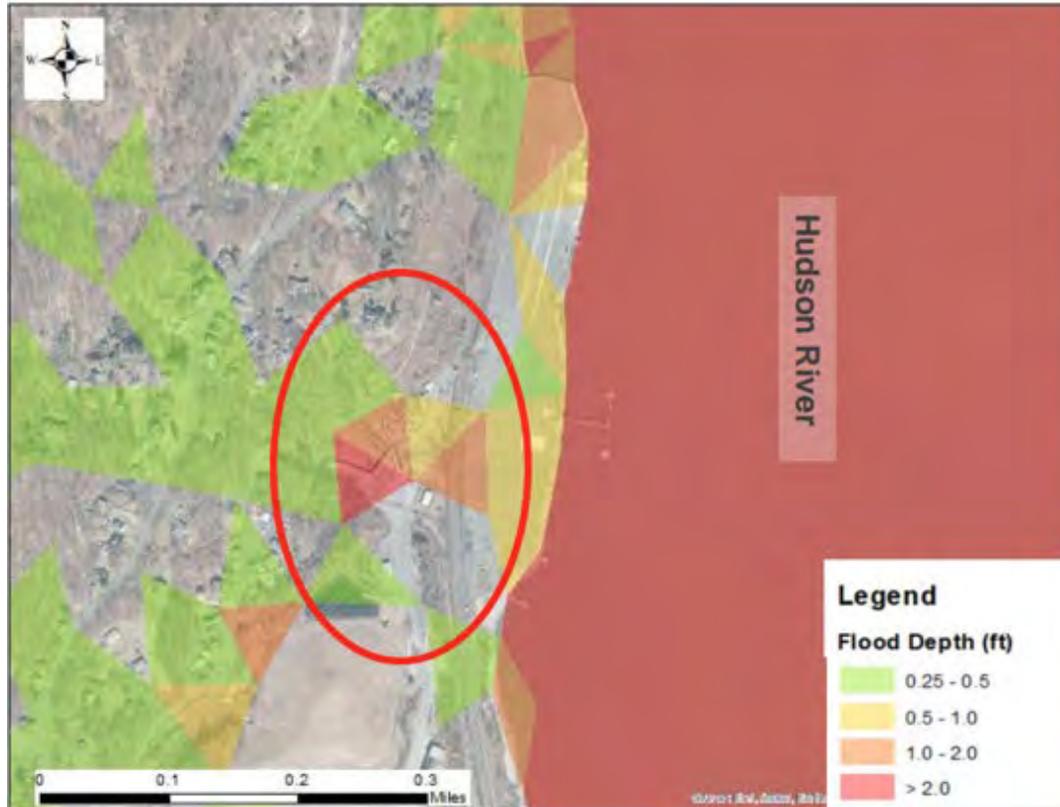
**~13.5"**

Total Rainfall Depth from a 1000-year rain event over 6 hours at Dobbs Ferry

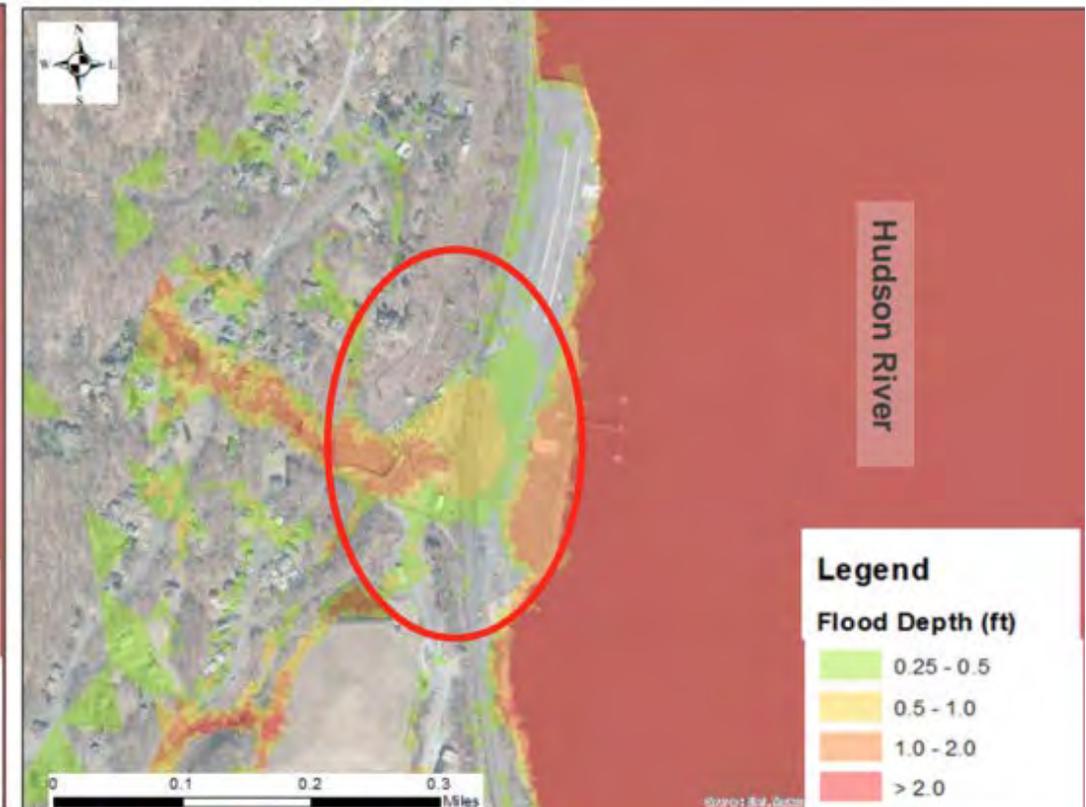
Scenario	Return Period	Rainfall Duration (Hours)	Climate Condition	Goal
1	100-year	24	Existing	Create baseline; reflect recent rainfall events
2	500-year	12	Future (late century)	Simulate overnight storm with high rainfall totals
3	1,000-year	6	Future (late century)	Simulate cloudbursts (flash flooding)
4	1,000-year	24	Future (late century)	Simulate stalled tropical storm
5	Probable Maximum Precipitation (PMP)	96	Existing PMP	Simulate dual-band or compound event over multiple days

# Deluge rain and flood modeling study

The GIS layers are two-dimensional ("coarse mesh") for all scenarios. We will also conduct a "hotspot analysis" using a "fine mesh" refinement for individual locations that are yet to be determined.



Coarse mesh (100x100m resolution)



Fine mesh (10x10m resolution)

# Next Steps

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- We will continue to share relevant updates with the Working Group
  - Next Working Group meeting will be scheduled for Q1/Q2 2025
- Continuation of the deluge rain and flood modeling study
  - Estimated completion in July 2025



# Orange & Rockland