CHAPTER 1

INTRODUCTION

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What's in this chapter?

Introducing CLEAR

The Coastal Lakeshore Economy and Resiliency (CLEAR) Initiative supports local communities dealing with persistent high-water levels along Lake Ontario, the lower Niagara River, and the upper St. Lawrence River with the development of comprehensive resiliency strategies and plans to institute critical long-term protective measures and strengthen existing investments.

Process

A CLEAR plan has been developed for each of the five planning regions included in the initiative. Each plan reflects the diverse perspectives, needs, interests, and watersheds within its region and recommends both local and regional projects and actions to increase the resiliency of lakeshore communities and businesses.

These plans are the culmination of a multi-year, comprehensive planning process overseen by the New York State Department of State (DOS) and paid for using funds from the New York State Environmental Protection Fund (EPF) in partnership with the Department of State and Empire State Development (ESD). The planning process in each region was led by a team of professional planners and State and local experts and supplemented by a robust community engagement strategy.

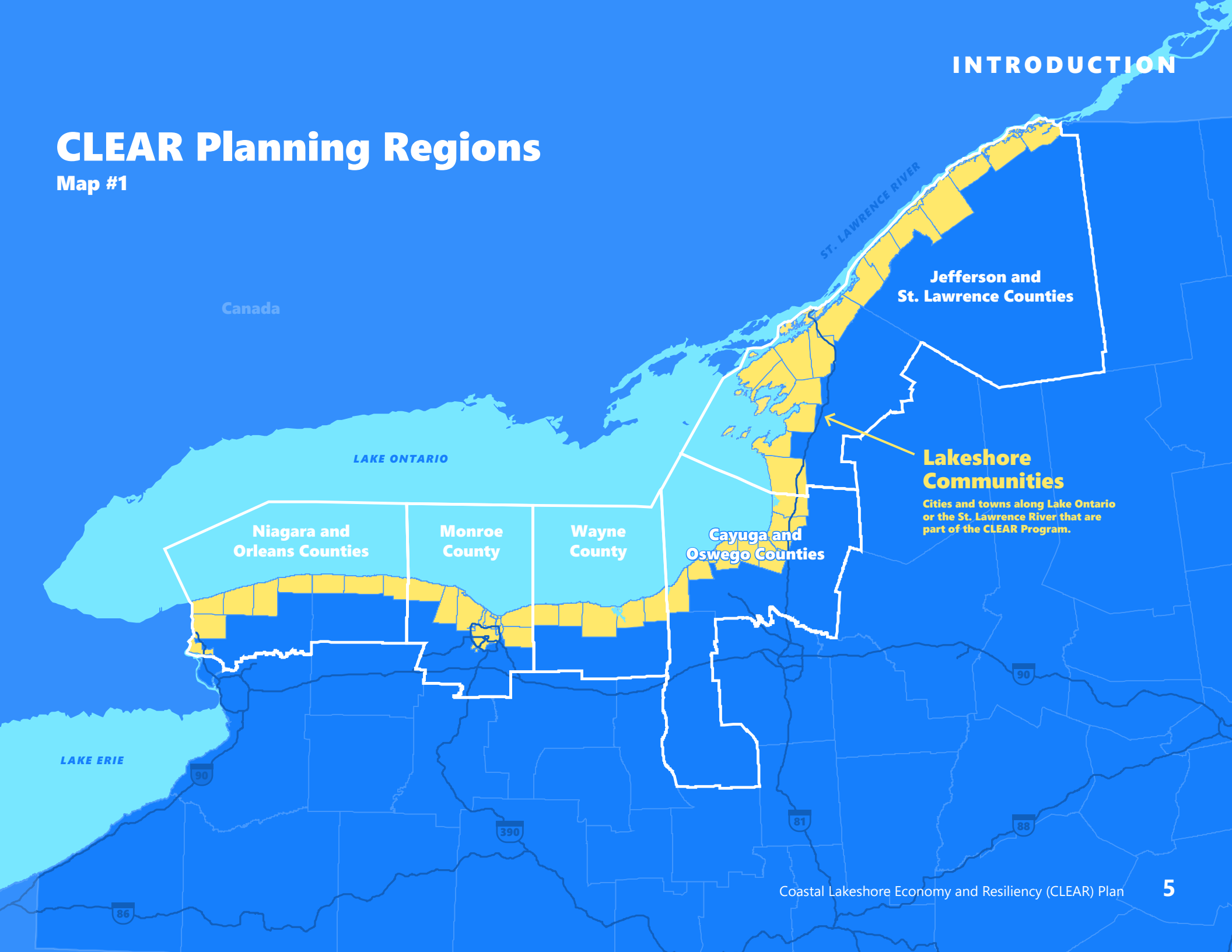
Outcomes

Communities participating in the CLEAR Initiative will receive State assistance to:

- Increase local capacity for applying resilience concepts to meet their specific needs.
- Integrate resiliency strategies and best practices into existing local plans, policies, and practices.
- Generate a list of priority resilience strategies screened for resilience capacity.
- Take initial steps to implement local and regional resilience strategies and initiatives identified through CLEAR.

CLEAR Planning Regions

Map #1



Introducing CLEAR

CLEAR Goals

Facilitate vibrant communities that can thrive in changing and variable lake levels and conditions.

Instill a deeper understanding and appreciation for the important role shoreline property owners play in their communities' resilience.

Empower local governments, organizations, and leaders to protect their communities and create new, more resilient paths.

Embrace the connectivity of the coastal environment through innovative designs for rebuilding and adaptive uses.

Identify coastal development patterns that provide continued opportunities for existing and new recreation and employment.


High water levels on Lake Ontario overrun the boat launches at Irondequoit Bay Marine Park.

Introducing CLEAR

Monroe County's CLEAR Study Area

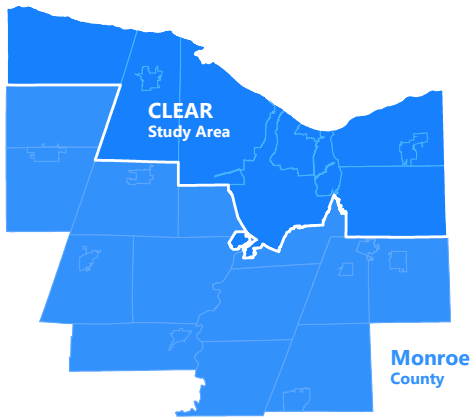
Monroe County's CLEAR Study Area includes the following municipalities:

- City of Rochester
- Town of Greece
- Town of Hamlin
- Town of Irondequoit
- Town of Parma
- Town of Penfield
- Town of Webster

The following ecological communities are included in the study area as well:

- Community of Braddock Bay/ Pond Complex: Includes Rose Marsh, Braddock Bay, Cranberry Pond, Long Pond, and Buck Pond.
- Community of Irondequoit Bay: Includes the Towns of Irondequoit, Penfield, and Webster where they border Irondequoit Bay.

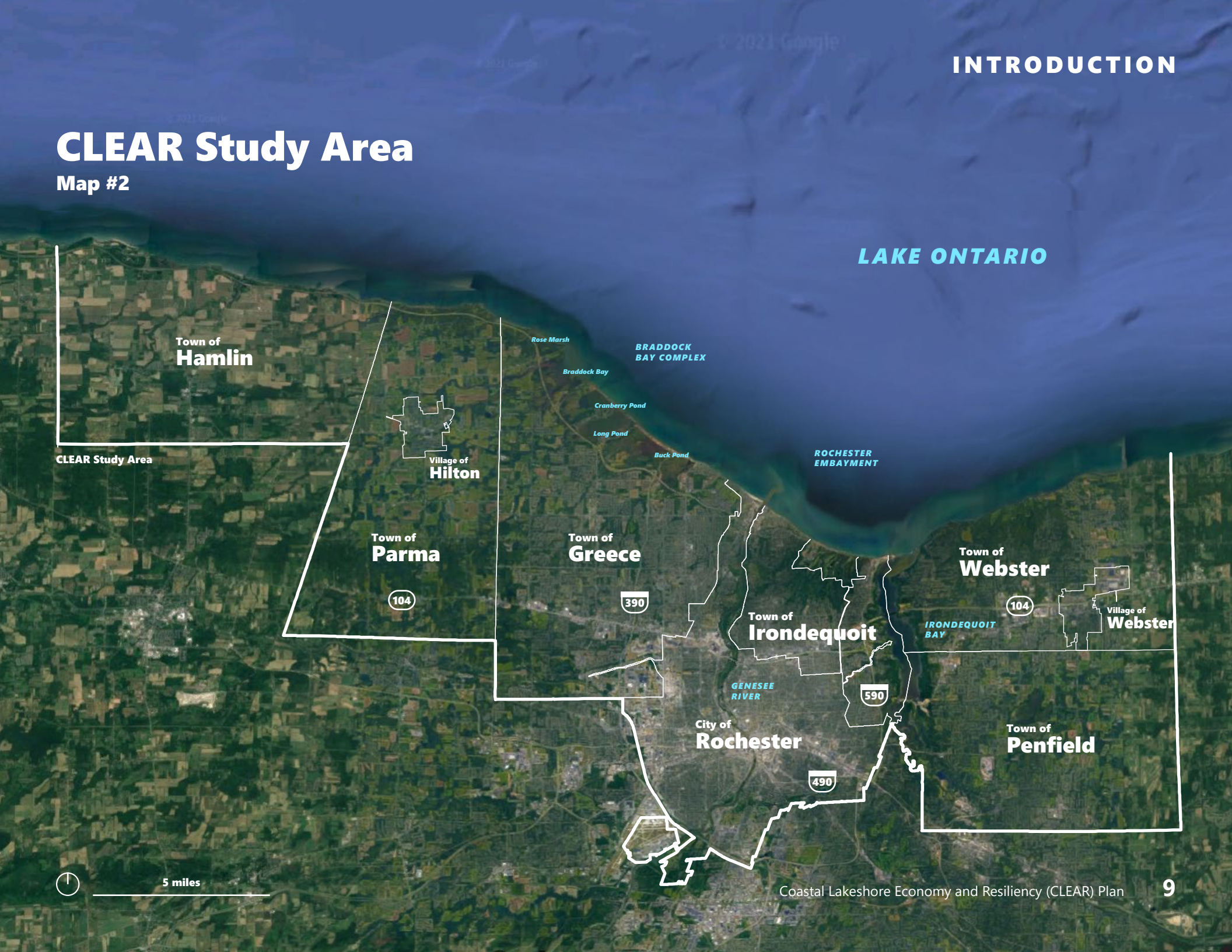
Buck Pond, Long Pond and Cranberry Pond are listed by the NYS Department of Environmental Conservation (DEC) as impaired water bodies because of algal blooms and excessive aquatic weed growth. Irondequoit Bay is also listed as an impaired water body. Urban and stormwater runoff has been identified as the primary source of pollutants to the bay. Braddock Bay and Irondequoit Creek have minor impacts.



Monroe County's CLEAR Study Area
The Monroe County CLEAR Study Area includes six of the county's nineteen towns, two of its ten villages, and the only city in the county – Rochester. It encompasses roughly 40% of the county's land area and 60% of its total population.

CLEAR Study Area

Map #2



Setting the Scene

Lake Ontario's water levels are driven by precipitation, evaporation, and runoff, which fluctuate naturally over the short, seasonal, and long-term. High-water levels and flood events result from the combination of processes that drive cycles of lake level variability. Due to these cycles, major episodic flood events have impacted the Lake Ontario shoreline approximately every 20 years, from 1929 to 1993. When these cyclical flood patterns crested in 2017 and 2019, communities along the Lake Ontario shoreline suffered from the worst flood events on record.[1]

Climate Change in the Great Lakes Region

Climate change trends like warmer air and water, decreased ice cover, lower lake levels over the long term, and increased extreme precipitation events, including lake-effect snowstorms, will have a myriad of impacts on the communities of Lake Ontario.[2] Several climate trends have been observed in the Great Lakes Region to date:

1. The Great Lakes Basin has experienced a greater temperature increase than the rest of the contiguous United States on average. Relative to 1901-1960, the Great Lakes Basin annual mean temperature has increased 1.6°F for the period 1985-2016. This exceeds average changes of 1.2°F for the rest of the contiguous United States. From 1901-2016, the global annual-average temperature has increased by 1.8°F (1.0°C).[3]

2. The Great Lakes Region has seen a higher percent increase in annual precipitation than the U.S. average. Overall U.S. annual precipitation increased 4 percent between 1901 and 2015, but the Great Lakes region saw an almost 10 percent increase over this interval.[4] Since 1951, total annual precipitation has increased by over 13% in the region.[5]

3. The frequency and intensity of extreme precipitation events in the Great Lakes Region has increased. A greater proportion of the overall amount of precipitation in the region came during unusually large events in the period between 1901 and 2015. The total amount of precipitation falling during extreme events has also increased over the last five decades in the region.[6] From 1951-2017, the region saw a 35% increase in heavy precipitation events (defined as the top 1% of storms).[7]

Setting the Scene

4. Summer lake surface temperatures have increased faster than surrounding air temperatures.[8] Between 1994 and 2013, summer surface water temperature in Lake Ontario increased at the rate of 0.01-0.18°F per year in the vicinity of Monroe County.

5. The duration of seasonal ice cover decreased in most areas of the Great Lakes. This decline was measured between 1973 and 2013; recent years have shown upward trends.[9]

1 Steinschneider, Scott and Alex Styler, Richard Stedman and Mary Austerman, "A Rapid Response Survey to Characterize the Impacts of the 2017 High Water Event on Lake Ontario," Journal of the American Water Resources Association, Volume 55, Issue 4, August 2019.

2 GLISA. Climate Change in the Great Lakes Region References. http://glisa.umich.edu/gl-climate-factsheet-refs. Accessed on February 11, 2021.

3 Environmental Law & Policy Center. An Assessment of the Impacts of Climate Change on the Great Lakes. 2018. https://elpc.org/wp-content/uploads/2020/04/2019-ELPCPublication-Great-Lakes-Climate-Change-Report.pdf. Accessed on February 3, 2021.

4 US Army Corps of Engineers and Institute for Water Resources. National Shoreline Management Study – Lake Ontario. 2020.

5 U.S. Global Change Research Program. Climate Science Special Report: Fourth National Climate Assessment, Volume I. 2017. https://science2017.globalchange.gov/downloads/CSSR2017_FullReport.pdf. Accessed on February 3, 2021.

6 Environmental Law & Policy Center. An Assessment of the Impacts of Climate Change on the Great Lakes. 2018. https://elpc.org/wp-content/uploads/2020/04/2019-ELPCPublication-Great-Lakes-Climate-Change-Report.pdf. Accessed on February 3, 2021.

7 GLISA. Climate Change in the Great Lakes Region References. http://glisa.umich.edu/gl-climate-factsheet-refs. Accessed on February 11, 2021.

8 U.S. Global Change Research Program. Climate Science Special Report: Fourth National Climate Assessment, Volume I. 2017. https://science2017.globalchange.gov/downloads/CSSR2017_FullReport.pdf. Accessed on February 3, 2021.

9 GLISA. Climate Change in the Great Lakes Region References. http://glisa.umich.edu/gl-climate-factsheet-refs. Accessed on February 11, 2021.

Setting the Scene

Historic Flood Events in Monroe County

Lake Ontario has a history of flooding, due in part to the cyclical variation in lake levels as well as the effects of climate change and increased precipitation. The recent 2017 and 2019 flood events were the most severe on record, resulting in significant damage in coastal communities.

The Federal Emergency Management Agency (FEMA) has issued four flood-related federal disaster declarations in Monroe County since 1953. Three of these declarations resulted from major precipitation events, which caused creek and riverine flooding, while DR-367 was issued in the spring of 1973 as a result of severe flooding along the Lake Ontario shoreline. During this event, lake levels rose to 249.6 feet as a result of record rainfall from the prior year, causing extensive property damage, destruction of roads, public utility interruption, and contamination of local water supplies.

A resident of Cranberry Drive in Greece pumps water out of his flooded basement after a high-water event in May 2019.

Setting the Scene

2017 Flood Events

In April and May of 2017, Lake Ontario's water levels rose 30 inches, reaching a high of 248.72 feet. The high lake level and wind-driven waves caused widespread damage to properties, homes, and businesses across Monroe County. The Towns of Hamlin, Parma, Greece, Irondequoit, and Webster, and the City of Rochester were hit the hardest.

Governor Cuomo appointed a Lake Ontario response team (comprised of the Monroe County Sheriff's Office, DEC, New York State Police, the National Guard, and the Department of Homeland Security) to assist with coordinating a response to the flooding in Monroe County and the City of Rochester. In addition, a variety of State equipment was brought in including hoses, pumping equipment, zodiac boats, and generators.

On November 14, 2017, the President officially declared the flood events a major disaster (FEMA-4348-DR-NY).

2019 Flood Events

In 2019, high winds caused waves to break over the top of protective barriers, resulting again in widespread property damage and impacting homes and businesses. Many shoreline communities received assistance from municipalities and the National Guard to construct temporary flood mitigation measures such as aquadams and sandbag walls.

Governor Cuomo declared a State of Emergency for lakeshore communities, including those in Monroe County, on May 20, 2019 extending until May 20, 2020.

Water levels on Lake Ontario rose to approximately 249 feet, surpassing the levels from the 2017 flood events.

Damage to the fragile lakefront ecosystem was observed as high waters revealed trash, chemicals, and contaminants. High waters also impacted plants and small animal habitats and killed upland trees and shrubs.

Past Planning Efforts

In the context of a changing climate, more frequent and intense storm events and altered precipitation patterns present challenges to maintaining Lake Ontario water levels and preventing coastal erosion. Several past planning efforts have studied these issues at larger scales both statewide and for New York's Great Lakes – St. Lawrence River region. This Plan carries these efforts through and narrows their focus to Monroe County, creating a comprehensive resilience strategy to address the county's unique vulnerabilities and needs.

Past Planning Efforts

Long before the record-high water levels on Lake Ontario and the associated flooding and erosion in 2017 and 2019, New York State has been developing plans, programs, and policies to adapt to the potential impacts of sea-level rise, flooding and erosion, and storm surge as well as to improve overall resilience across New York State. Several examples are highlighted below.

Integrated Assessment for Effective Climate Change Adaptation Strategies
The Integrated Assessment for Effective Climate Change Adaptation Strategies in New York State (ClimAID) was funded by the New York State Energy Research and Development Authority (NYSERDA) in 2008 as part of its Environmental Monitoring, Evaluation, and Protection Program (EMEP) to provide New York State decision-makers with cutting-edge information on its vulnerability to climate change. This plan also facilitated the development of adaptation strategies informed by both local experience and scientific knowledge.

NYS 2100 Commission
In response to Superstorm Sandy, Hurricane Irene and Tropical Storm Lee in 2012, the NYS 2100 Commission report examined and evaluated key vulnerabilities in the State's critical infrastructure systems and recommended actions to strengthen and improve the resilience of those systems.

Great Lakes Basin Interim Action Plan
New York's Great Lakes Basin Interim Action Plan (July 2014) focuses in particular on New York's Great Lakes – St. Lawrence River region and identifies enhancing community resiliency and ecosystem integrity as a priority goal to mitigate increased flooding and shoreline erosion resulting from warmer temperatures.

Past Planning Efforts

Plan 2014
Lake Ontario is distinguished from other coastlines and water bodies experiencing the effects of climate change. The Lake's outflow at the St. Lawrence River passes through the Moses-Saunders Dam, an international hydropower project that provides a limited ability to adjust the volume of water flowing out of Lake Ontario.

"Plan 2014" is the current regulatory framework for managing water flows and is overseen by the International Joint Commission (IJC). The IJC is a binational organization that cooperatively manages the Lake and river systems of the US-Canada borderlands, including the water levels within Lake Ontario and the St. Lawrence River. Controlling outflows at the dam is an attempt to balance the needs of municipal and industrial water users; commercial navigation; hydropower generation; recreational boaters; and - most recently - ecosystem health.

While regulating outflows has created more predictable lake levels overall, cyclical wet and dry periods have continued to lead to relatively extreme highs and lows. An over-reliance on the ability to maintain levels within a general range of highs and lows has resulted in development patterns along the Lake that not only increased density but also installed infrastructure for year-round use (e.g., primary residences) in areas still vulnerable to high and low lake levels. When unusual high-water events occur on Lake Ontario, communities are especially at risk of flooding for prolonged periods of time, stretching public resources and affecting local economies, with sustained winds exacerbating the flood risk and shoreline erosion.

As climate science and regional projections for future long-term trends continue to evolve, the variability is expected to include increased seasonal precipitation and changes in ice cover that would heighten periods of high water and continue to be beyond the ability to fully compensate through adjusting outflows. Building more resilient communities that enhance public safety and protect assets is a goal of the CLEAR initiative.

Hazard Mitigation Plan
Monroe County's Hazard Mitigation Plan was approved by the Federal Emergency Management Agency (FEMA) and adopted by the County in 2017. The plan identifies mitigation projects, actions, and strategies to reduce long-term vulnerability to hazards.

Past Planning Efforts

NYS Policies and Programs

Community Risk and Resiliency Act

The 2014 Community Risk and Resiliency Act (CRRA) includes five major provisions:

- *Official Sea-level Rise Projections:* CRRA requires DEC to adopt science-based sea-level rise projections by regulation.
- *Consideration of Future Physical Climate Risk:* As originally enacted, the CRRA required applicants for permits or funding in a number of specified programs to demonstrate that future physical climate risk due to sea-level rise, storm surge, and flooding had been considered in project design, and that DEC consider incorporating these factors into certain facility-siting regulations.[10]
- *Smart Growth Public Infrastructure Policy Act Criteria:* CRRA added mitigation of risk due to sea-level rise, storm surge, and flooding to the list of smart-growth criteria to be considered by state public infrastructure agencies.
- *Guidance on Natural Resilience Measures:* The CRRA requires DEC, in consultation with DOS, to develop guidance on the use of natural resources and processes to enhance community resilience.
- *Model Local Laws Concerning Climate Risk:* CRRA requires DOS, in cooperation with DEC, to develop model local laws to increase community resilience.

Climate Leadership and Community Protection Act (Climate Act)

The Climate Leadership and Community Protection Act (Climate Act) was signed into law in July 2019 to achieve the following targets:

- By 2040: achieve 100% zero-emission electricity.
- By 2050: reduce emissions at least 85% below 1990 levels.

10 The Climate Act amended the CRRA to include all permits subject to the Uniform Procedures Act. The Climate Act also expanded the scope of the CRRA to require consideration of all climate hazards, not only sea-level rise, storm surge, and flooding, in these permit programs.

Past Planning Efforts

Lake Ontario Resiliency and Economic Development Initiative
The Lake Ontario Resiliency and Economic Development Initiative (REDI) was created in 2019 in response to the extended pattern of flooding along the shores of Lake Ontario and the St. Lawrence River. $300 million in State funding was committed to projects across five REDI regions (which are the same as the CLEAR planning regions) to implement projects that at-risk infrastructure and assets, sustainably rebuild communities, and enhance economic development. In Monroe County, a total of 31 projects received $42.6 million in funding. Several projects are in-construction or have been completed to date. Monroe County's CLEAR Initiative builds on and leverages the REDI investments to further resiliency planning in the county.

Lakeshore erosion in the Town of Hamlin caused by the 2017 high-water events.