Advancing Community-Level Resilience to Lake-Level Flooding in Wayne County, New York

Lake Level Scenario Planning Workshop

July 13-15, 2021
Summary Report

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Introduction and Overview of Scenario Planning and Process

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Project Background

After catastrophic flooding events in 2017 and 2019, waterfront property owners and community leaders in Wayne County are restoring damaged property and preparing for future inundation. Residents and community leaders need decision-support tools to accurately determine the risks future floods pose to property and livelihoods. Initiatives such as New York State's Lake Ontario Resiliency and Economic Development Initiative (REDI) have made major strides in developing projects to sustainably rebuild New York's Lake Ontario shoreline, including a $325 million-dollar investment in public projects and at-risk infrastructure. Even with these investments, Wayne County communities still need the best available tools to learn about potential flood and financial risks to property owners and communities.

Using a multi-pronged approach, the project team will:

- Identify economic vulnerabilities of flooding to: individual community members and businesses, and residential and commercial properties.
- In collaboration with Wayne County communities, develop recommended actions and policies.
- Develop strategies to communicate recommended actions, policies, and tools effectively.

One component of the project is scenario planning, which was led by the Great Lakes Integrated Sciences and Assessments (GLISA) and New York Sea Grant (NYSG). This report will summarize the outcomes of that workshop.

Scenario Planning

Scenario planning is a method to describe and incorporate uncertainty into decision making. The goal is to account for uncertainty by developing a framework to consider several novel situations, not just what may be expected based on the past. Planning for multiple plausible futures, including extremes, can increase the robustness of management practices and preparedness for climate change impacts.

GLISA's scenario planning approach brings together practitioners, who need science-based information about the future, and experts, who can translate and communicate available relevant science. The goal of this workshop was to develop scenarios to help plan for a future with lake levels that will likely look different than what has been experienced in the past. After the workshop, participants should:

1. Have a better understanding of scenario planning
2. More clearly be able to picture how their focus area activities are impacted by lake levels and weather/climate
3. Have created a set of recommendations based on lake level scenarios tailored to focus area needs

Past GLISA scenario planning experiences have shown that a few key elements are necessary for a successful scenario planning workshop. First, the scenarios and solution strategies must be collaboratively created by representatives of all relevant stakeholders. Project partners and workshop facilitators worked to ensure that a diverse group of stakeholders from different sectors and backgrounds were represented in the participant

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Figure 1:
Sodus Point lighthouse in Wayne County, NY. Photograph by Mary Austerman

list. Second, focus area goals must be clearly defined from the beginning of the process, because the development of the scenarios and actionable recommendations depends on the definition of goals and challenges that the scenarios are intended to address.

The following handouts were mailed to the participants ahead of the virtual workshop (all included in the Appendix).

1. Project description 1-pager
2. Workshop agenda
3. Wayne County climate and lake level fact sheet
4. Lake level scenarios description
5. Scenario planning activities

On day 1 of the workshop, participants were given an overview of the project, an explanation of scenario planning and goals for the week, and a local climate and lake level summary for Wayne County. On day 2, participants were split into 4 breakout groups to complete the scenario planning exercises. Each group was assigned a focus area and a scenario, with no two groups having the same combination. This allowed for each group to build their own unique scenarios out of the lake level scenarios they were provided with.

Focus Areas of this Workshop

Lake Ontario experienced record-high, catastrophic flooding that lasted for months in both 2017 and 2019. As a result, a number of efforts focus to improve flood resilience for waterfront communities such as Governor Cuomo's Lake Ontario REDI, New York Department of State's Coastal Lakeshore Economy and Resiliency (CLEAR) Initiative, this NOAA funded project and more. The combination of these efforts and the expertise of the NOAA project team afford the opportunity to focus efforts in the areas of septic systems and structures (i.e., homes, outbuildings, etc.) at risk of inundation. The following data was generated for this project by Syracuse University Center for Environmental Policy and Administration identified numbers of septic and structures most at risk of flooding.

Septic systems: Households that are not served by public sewers usually depend on septic systems to treat and dispose of wastewater. The purpose of a septic system is to store, distribute, and treat liquid wastes from your house on your property while preventing contamination of groundwater, drinking wells, and nearby lakes and streams. When a septic system is properly located, designed, installed, and maintained, it serves as an effective, economical, and safe on-site wastewater treatment system. Being a rural county, many homes rely on septic systems. In fact, along Lake Ontario and its embayments, there are 1,096 residential properties on septic that are below 249.3 feet (76 meters) elevation, which approximates the 100-year floodplain.

Structures: In general, structures (i.e., homes, garages, outbuildings, etc.) located closer to Lake Ontario and its embayments are at higher risk of flooding than those at higher elevations. In response to the 2017 and 2019 flooding events, state funding was made available to some waterfront property owners, to mitigate damage from inundation. There are 1,892 residential waterfront properties and their total assessed value is $393 million. There are 31,507 residential properties in the county as a whole, with a combined assessment value of $3.914 Billion. Although 6% of those residential properties are located on the Wayne County waterfront, they account for approximately 10% of the total county assessment value. As a result, policy and land use planning, particularly along our shorelines, will improve community resilience.

Figure 2:
Flooding in Ellisburg, 2017. Photo credit: Coastal Flooding Survey Project, Cornell University and New York Sea Grant.

Figure 3 (right):
Flooding in Hamilin, 2017. Photo credit: Coastal Flooding Survey Project, Cornell University and New York Sea Grant.

Lake Level Scenarios

Since this project is focused on flood risk from high lake levels, GLISA developed a set of 3 physically plausible scenarios for the workshop around high lake level conditions. The groups also briefly considered low lake level conditions, but it was not the focus of the scenario planning exercises. The scenarios below are informed by climate and lake level projections, historical trends, and the physical properties of the Great Lakes system (see appendix for more information).

1. Cold Air Outbreak Scenario
2. Excess Precipitation Scenario
3. Extremes Scenario

During days 2 and 3, the breakout groups worked through the following scenario planning exercises together to build upon the GLISA scenarios and discuss the potential actions they would take in response (see appendix for more detailed description).

1. Describe specific issues and goals related to your group's focus area (i.e., septic at risk of flooding, or structures at risk of flooding). These issues should be specific to Wayne County's waterfront communities
2. Discuss the boundary conditions of your scenario and how those impact the community goals for your focus area identified in activity 1.
3. Using the goals identified in Activity 2, think about which can be met easily, with additional effort, or not at all. Focusing on the difficult to achieve and unattainable goals from activity 2, talk about how you can still meet those goals given the boundary conditions. Of the goals that cannot be met, what will you do to get to those goals still?
4. Choose an event to build into the scenario and discuss how this further challenges focus area goals/activities. If time permits, discuss multiple events.
5. Briefly consider how low lake levels impact the goals/issues related to your focus area. Use an abbreviated version of all previous steps to do so.

Breakout Group Summaries

Figure 4:
Flooding in Greece, 2017. Photo credit: Coastal Flooding Survey Project, Cornell University and New York Sea Grant.

At the end of day 3, all breakout groups summarized the outcomes from the activities and recommended actions. This provided participants with a chance to learn about all scenarios and focus areas, beyond their own breakouts, and share their thoughts in a group discussion.

Group A: cold air outbreak scenario for septic systems with coastal erosion event

GOAL #1: Ensure septic systems are working properly by 2031

GOAL #2: Ensure access to community financial fund for cost share

Group A focused on septic systems under the cold air outbreak scenario (#1). In this scenario, water levels are already above average. Then, a cold air outbreak associated with arctic oscillation occurs, causing very cold temperatures. The lakes freeze, evaporation shuts off, and the ground is frozen with snow cover. Water levels that were already above average become extremely high. Group A chose to add a coastal erosion event to this scenario as they discussed goals and actions. Currently, there are some measures in place to mitigate erosion through the REDI project and by homeowners, but septic systems are at high risk of being lost to erosion if the conditions of this scenario occur. Group members focused on two main goals: 1) ensuring that septic systems are working properly by 2031, and 2) ensuring access to a community financial fund for cost sharing. Some of the challenges of achieving these goals under this scenario are coordination between federal, local, and state agencies; funding; and the urgency needed to get work done quickly. To achieve goal #1, the group recommended an integrated strategy to inventory and assess septic systems' risk of inundation. The strategy would include a regional coastal plan and participation from all agencies in order to reduce barriers in coordination. Under such a strategy, properties will be audited and assessed, with municipalities and inspection agents performing a coordinated inspection and audit. Code enforcement officers should also perform stress test on new home purchases. In some cases of septics along eroded shorelines, houses may not be livable. In these worst-case scenarios, houses would require a state or federally funded buyout.

To achieve goal #2, the group recommended federal investment in pilot programs for relocation and house buybacks; replication and adoption of model local septic laws to demonstrate seriousness and local commitment to federal and state agencies; and finding integrated local/state/federal funding solutions to erosion that may require federal investment in buyouts. The group noted that communities face significant challenges of revenue loss from lost value of tax assessments and recommended that buy out programs evaluate negative impacts to municipalities and allow for ample examination and public input before implementation. Such federal programs also often emphasize primary homes only, while many homes on Lake Ontario are secondary vacation homes that need to be considered in these programs as well.

Figure 5: Wayne County Flooding in Sodus Point, 2017. Photo credit: Coastal Flooding Survey Project, Cornell University and New York Sea Grant.

Group B: extremes scenario for septic systems with unusually wet season event

GOAL #1: Ensure 100% of high-risk systems are protected from flooding by 2025

GOAL #2: Ensure 100% of septic systems are up to UPP standard by 2025

Group B focused on septic systems under the extremes scenario (#3). In this scenario, global teleconnection patterns cause shifts in the location of storm tracks. This contributes to rapid fluctuations between extreme high and low lake levels. As a result, floods are bigger and droughts are longer. The event Group B chose to add to this scenario was an unusually wet season over the basin that leads to further flooding and water inundation. They deemed that such conditions become hazardous within 3-4 days. Group members focused on two main goals: 1) ensure that 100% of high risk systems are protected from flooding by 2025, and 2) ensure that 100% of septic systems throughout lakeshore towns are up to Uniform Procedures Program (UPP) standard by 2025.

To achieve goal #1, the group recommended that 60% of new homeowners attend a one-time standard septic maintenance education class, that lakeshore homeowners know the location of their septic systems with 100% certainty, and that lakeshore community leadership identify and develop funding mechanisms to help offset the costs of failing septic systems.

To achieve goal #2, the group recommended the creation of a landowner decision making tool or app and a municipal decision making tool to address community areas that may need to convert from septic systems to sewer systems, and consider the challenges that come with that. The group noted that switching to municipal sewer systems comes with financial and geographic challenges related to flow problems, pump stations, and weather conditions. Regulatory challenges can also arise between the time mismatch of construction season and permitting and design requirements needed to make such construction happen. The group recommended creating a program that would increase personnel and technical assistance by training and certifying individuals that could help with design and permitting activities in towns.

Group C: extremes scenario for structures with ice and high wind event

GOAL #1: Develop an immediate response plan to high or low water level events

GOAL #2: Ensure 100% of residential structures are resilient to low and high levels

Group C focused on structures at risk under the extremes scenario (#3). In this scenario, global teleconnection patterns cause shifts in the location of storm tracks. This contributes to rapid fluctuations between extreme high and low lake levels. As a result, floods are bigger and droughts are longer. Group C chose to add an ice and high wind event that contributes to even higher water levels. This can cause flood damage to properties and protective structures. Group members focused on two main goals: 1) develop an immediate response plan to high or low water level events, and 2) ensure that 100% of residential structures are resilient to both low and high water levels.

To achieve goal #1, the group recommended developing a priority contact list and prioritizing where resources are coming from for communication purposes. Such a contact list would include neighboring municipalities across the county and other agencies and organizations. This would allow for coastal communities to contact subject

Figure 6:
Flooding in Hamlin, 2017. Photo credit: Coastal Flooding Survey Project, Cornell University and New York Sea Grant.

matter experts and have an extra layer of knowledge for environmental considerations for the structures under different hazard and response plans.

To achieve goal #2, the group recommended creating an inventory of residential structures, including information about where the structures were built in relation to the shoreline, whether they are up to code, if they were impacted by flooding events of 2017 and 2019 and how protected or at risk they are. Then come up with adaptive strategies based on the inventory, and determine thresholds for buyouts and relocation. This is particularly important for communities with a large portion of older building stock that may not be viable to rebuild, elevate, or retrofit.

Group D: excess precipitation scenario for structures with prolonged seiche event

GOAL #1: All residents outside 100-year floodplain remain safely in their homes

GOAL #2: No municipal/publicly owned roadways are unpassable

GOAL #3: 100% of properties the municipality provides water to will maintain service

Group D focused on structures at risk under the excess precipitation scenario (#2). In this scenario, water levels are already above average. Then, excess precipitation falls in Spring and early Summer. A continual source of water into the lake system leaves the basin saturated. Upstream, downstream, and lake shoreline flooding occur. Water levels that were above average become extremely high. Group D chose to add a prolonged seiche/wind event to this scenario, which they deemed could create unmanageable conditions after 3 days with potential loss of barrier beach protection for the shoreline under high water levels. Group members focused on three main goals: 1) all residents living outside of 100-year floodplain can remain safely in their homes through the duration of a high water event, 2) no municipal or publicly owned roads would be impassable during a high water event, and 3) 100% of properties being serviced by municipal water and wastewater services would maintain some kind of function throughout the duration of a high water event.

To achieve these three goals, the group recommended improved forecasts for short-term (e.g. wind events) and long-term (weekly/monthly water levels) timescales as well as proper communication of those forecasts to everyone who needs them (what the implications are for those specific impact areas). Currently, a lot of infrastructure is being built and homeowners are trying to make improvements to shore protections for their homes, but no one feels they have guidance as to what level they should be designing to, so the group also recommended improved guidance for design levels and financial incentives to make those improvements (e.g. federal funding to private homeowners). The group also recommended creating risk assessment tools to show who and what is being threatened by hazardous conditions, enforcing code more rigorously, and putting valves on drains with a backup system of pumps in extreme wet conditions.

Big Picture Takeaways

At the end of day 3, we reserved time to discuss larger concepts and actions to move identified goals forward. These following concepts/actions are from that discussion.

Regional Approach

Water, wave energy, etc. don't follow property lines or even municipal boundaries. The group discussed the idea of encouraging property owners and municipalities to consider approaching flood adaptation in groupings that make sense for the situation and geography. For instance, in shoreline management practices, looking at the shoreline system as a whole for a road or tract, rather than a parcel-by-parcel basis, may be more effective and efficient. Similarly, municipalities both inside and outside Wayne County might consider a like minded strategy to better coordinate resilience efforts. This regional concept could streamline the work, given that many of the same people are involved in numerous projects related to flooding, water levels, coastal resilience, etc. In the long run, a regional approach to these efforts could streamline workflows, reducing cost and staff commitments.

Regional Practitioners

The value of regional practitioners was discussed. Because Wayne County is rural with small governments, municipalities have come to rely on regional practitioners (i.e., Wayne County Soil & Water Conservation District, NYSG, Wayne County Cooperative Extension, etc.) to help overcome barriers such as capacity, lack of technical expertise, awareness of funding programs and criteria, communication with and across state and federal agencies, and general transfer of knowledge about issues/solutions from outside the immediate Wayne County region. Although the collective of practitioners have developed areas of expertise, the group discussed the need for this network of entities as well as expertise to grow. One way is to look at models from outside the region to see what elements might be applicable and transferable to Wayne County. This concept is closely linked to Regional Approach, particularly because of the varying coverage area of each entity.

Funds for this project are provided through the Climate and Societal Interactions COCA/SARP competition by the National Oceanic and Atmospheric Administration Climate Program Office.

Project partners include the Environmental Finance center at Syracuse University, New York Sea Grant, Great Lakes Integrated Sciences and Assessments, Cornell University, Maxwell Lab at Syracuse University, and Wayne County Department of Planning and Economic Development.

Appendix

Handout 1

Project Description

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Advancing Community-Level Resilience to Lake-Level Flooding in Wayne County, New York

Powerful wind gusts of up to 50mph were recently observed in March 2020, at Sodus Point Beach Park and Lighthouse.
Photo: Mary Austerman, New York Sea Grant

About this project

After catastrophic flooding events in 2017 and 2019, waterfront property owners and community leaders in Wayne County are restoring damaged property and preparing for future inundation. But, residents and community leaders need decision-support tools to accurately determine the risks future floods pose to property and livelihoods. Initiatives such as New York State's Lake Ontario Resiliency and Economic Development Initiative (REDI) have made major strides in developing projects to sustainably rebuild New York's Lake Ontario shoreline, including a $325 million-dollar investment in public projects and at-risk infrastructure. Even with these investments, Wayne County communities still need the best available tools to learn about potential flood and financial risks to property owners and communities.

Goals

- Identify economic vulnerabilities of flooding to: individual community members and businesses, and residential and commercial properties.
- In collaboration with Wayne County communities, develop recommended actions and policies.
- Develop strategies to communicate recommended actions, policies, and tools effectively.

Contact

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Project trajectory

Economic Analysis and Heat Mapping

- Parcel-level flood inundation analysis
- Mapping characteristics of economic vulnerability and flood hazard

Scenario Development

- Summarizing historic and projected climate change for Wayne County communities
- Developing climate scenarios with local water resource managers
- Play-out the climate change scenarios to identify climate impacts
- Use the scenarios to generate management recommendations

Vulnerability Assessment

- Two public workshops to identify community assets and gather public input
- Implementation of the NY Great Lakes Coastal Resilience Index with each community

Local Plan and Policy Review

- Review and synthesis of municipal plans
- Development of model policies and land use guidance

Resiliency Recommendations

- Compiling results and sharing final maps, scenarios, and sets of recommendations

Message Testing

- Development and testing of messages and communication strategies to promote recommended actions
- Presentation of resiliency recommendations

Funds for this project are provided through the Climate and Societal Interactions COCA/SARP competition by the National Oceanic and Atmospheric Administration Climate Program Office.

Handout 2

Scenario Planning
Workshop Agenda

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Advancing Community-Level Resilience to Lake-Level Flooding in Wayne County, New York

Scenario Planning Workshop Agenda

Day 1	**July 13th, 10am-12pm**: Introductions and presentations	
	Introductions and overview of project	20 min
	Wayne County Climate and Lake Levels Summary + Q&A	45 mins
	Break	10 min
	Scenario planning overview + summary of pre-workshop activities	15 min
	Discussion + Q&A time	30 min
Day 2	**July 14th, 10am-12pm**: Scenario planning part I	
	Activity 1 - Focus areas of concern	25 min
	Overview of scenarios	10 min
	Break	10 min
	Activity 2 - Discuss boundary conditions of your group's scenario and how these stress your goals/activities	30 min
	Activity 3 - Discuss how you can still meet your goals given the boundary conditions	30 min
	What to expect next time + what weather events could cause disruptions	15 min
Day 3	**July 15th, 10am-12pm**: Scenario planning part II	
	Activity 4 - Choose event from menu to build into scenario and discuss how this further challengers goals/activities	30 min
	Activity 5 - Consider low lake level conditions	10 min
	Activity 6 - Regroup with everyone to share and discuss	30 min
	Break	10 mins
	Next steps: discussion on what to do with this information	30 mins
	Closing Remarks	10 mins

Handout 3

Climate and Lake Levels Fact Sheet for Wayne County, NY

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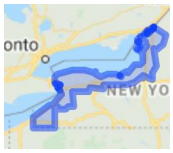
Advancing Community-Level Resilience to Lake-Level Flooding in Wayne County, New York

Climate and Lake Levels Fact Sheet for Wayne County, NY

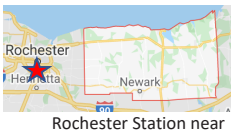
Description of the Data

Local climate data displayed in the tables below are derived from either NOAA U.S. Climate Division 9, NY data (Figure 1), or from the GHCN Rochester station data (Figure 2). Climate division data is used to identify seasonal and annual trends at the multi-county scale, while station data represents more local climate conditions.



Climate Division NY- 9

Six dynamically downscaled global climate models are used to assess future changes. Projections are reported as a change from the historical reference period of 1980-1999 and all use Climate Division 9, NY as a geographical boundary. Changes are reported as a range from the lowest model projection to the highest model projection rather than using an average of the six models. All projections assume a high emissions scenario (RCP 8.5).



Rochester Station near Wayne County

Temperature and Precipitation

- Average air temperature has increased 2.1°F with winter and spring warming the fastest
- Average air temperature is projected to rise between 3.2°F and 5.1°F by the mid-21st century with summer and fall showing the largest possible increases. Late-century can see as much as 6.5°F to 9.9°F of warming
- Total annual precipitation has increased 5.9in. with summer and fall increases being more than double those of winter and spring
- The future of precipitation is more uncertain than temperature. Annually, Climate Division 9, NY could experience a decrease of 0.9in up to an increase of 4.5in. by mid-century. Models show the largest uncertainty in spring precipitation.

	Historical Average (1981-2010)	Historical Change (1950 – 2019)	Projected Change (Mid-Century, 2040-2059)	Projected Change (Late Century, 2080-2099)
Temperature (°F)	Annual: 46.7 Winter: 25.1 Spring: 44.4 Summer: 67.6 Fall: 49.9	Annual: 2.1 Winter: 3 Spring: 2.3 Summer: 1.6 Fall: 1.5	Annual: 3.2 – 5.1 Winter: 1.5 – 4.5 Spring: 2 – 5.2 Summer: 3.7 – 5.9 Fall: 3 – 5.8	Annual: 6.5 – 9.9 Winter: 4.9 – 8.76 Spring: 4.9 – 10.8 Summer: 8.3 – 11.8 Fall: 6.9 – 10.8
Precipitation Totals (in)	Annual: 40 Winter: 8.5 Spring: 9.2 Summer: 10.8 Fall: 11.5	Annual: 5.9 (15.4%) Winter: 0.7 (7.8%) Spring: 0.5 (5.4%) Summer: 2.4 (24.2%) Fall: 2.2 (21.6%)	Annual: -0.9 – 4.5 Winter: -0.2 – 2.3 Spring: -1.7 – 2.3 Summer: -1.9 – (-0.1) Fall: -0.4 – 0.9	Annual: 1.3 – 6.9 Winter: 0.2 – 3.4 Spring: -0.9 – 2.6 Summer: -1.6 – 0.3 Fall: -0.3 – 1.7

Table 1: Temperature and precipitation trends for climate division NY-9.

Fact sheet created by GLISA in June, 2021

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Extremes and Snowfall

- Wayne County, NY can expect more extreme heat days in the future with an increase as much as 6.8 to 24.5 days by mid-century
- Extreme precipitation days have increased by 2.1 days and days with even higher precipitation can be expected to increase in the future
- The projected change in snowfall is more uncertain for mid-century as seen by the range of -32.3 to 2.13in., but as temperatures keep rising into the late-21st century, dramatic declines in snowfall can be expected

	Historical Average (1981-2010)	Historical Change (1950 - 2019)	Projected Change (Mid-Century, 2040-2059)	Projected Change (Late-Century, 2080-2099)
Days Over 90°F	5.23 days	-2.1 days	6.8 – 24.5 days	20.7 – 51.9 days
Extreme Precipitation (in)	2.4 days (> 1.25in. precip)	2.1 days (> 1.25in. precip)	0.2 – 1 days (> 2in. precip)	0.8 – 1.6 days (> 2in. precip)
Snowfall Totals (in)	98.9	11.3	-12.7 - 0.8	-23.5 – (-13.7)

Table 2: Trends in temperature extremes, precipitation extremes, and snowfall. Historic analysis based on Rochester, NY station data (GHCN). Future analysis based on projections (UW-RegCM4) for climate division NY-9.

Lake Ontario Water Levels

- Seasonally, water levels rise into the summer season then decrease into the fall and winter
- The lowest water level ever recorded was 241.93ft. and this occurred during the winter of 1934
- The highest water level ever recorded was 249.05ft. and this occurred during the summer of 2019

	Long-term Average	Winter (DJF)	Spring (MAM)	Summer (JJA)	Fall (SON)
Average (ft)	245.31	244.65	245.63	246.03	244.85
Record High (ft)	249.05 [2019]	246.95	248.69	249.05	247.41
Record Low (ft)	241.93 [1934]	241.93	242.59	242.78	241.96

Table 3: Long-term average and seasonal Lake Ontario levels based on monthly data from 1918-2019.

Data Sources

- **Climate Division Data**: National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI) Climate Division Data. glisa.umich.edu/division/great-lakes/
- **Climate Station Data**: NOAA NCEI Global Historical Climatology Network Station Observations (GHCN). Rochester INTL AP Station. glisa.umich.edu/station/rochester-gtr-intl-ap/
- **Future Projection Data**: Dynamical Downscaling for the Midwest and Great Lakes Basin (UW-RegCM4). nelson.wisc.edu/ccr/resources/dynamical-downscaling/index.php.
- **Water Level Data**: NOAA Great Lakes Environmental Research Laboratory. glerl.noaa.gov/data/dashboard/data/levels/1918_PRES/

Fact sheet created by GLISA in June, 2021

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Handout 4

Lake Level Scenarios

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Advancing Community-Level Resilience to Lake-Level Flooding in Wayne County, New York

Lake Level Scenarios

General Characteristics of High Lake Level Conditions

The overarching characteristics of high lake level conditions that apply to all individual scenarios below are defined by moderate increases in annual temperatures and large increases in annual precipitation and intensity, particularly in late winter and early spring. Annual evapotranspiration also increases, but more modestly, and not enough to offset the large precipitation increases. The lakes also experience a moderate surface warming, particularly in the spring months. Ice cover declines, particularly in February and March. There are declines in snowpack in the winter and early spring months that contribute to a decline in soil moisture, but the overall increase in annual precipitation still leads to increased overall runoff. The increases in evapotranspiration are dominated by substantial increases in precipitation and runoff, which lead to increases in lakes net basin supply (NBS), particularly in the winter months. The combination of these factors leads to lake level increases*

Air Temperature	Precipitation	Extreme Precipitation	Evaporation	Runoff	Ice Cover	Snowmelt	Net Basin Supply	Lake Levels
↑	↑↑	↑↑	↑	↑↑	↓	↓	↑	↑

*This description is based on results of a modeling study that used two dynamically downscaled climate models to project future Great Lakes water levels:

Notaro, M., V. Bennington, B. Lofgren, 2015: Dynamical downscaling–based projections of Great Lakes water levels. Journal of Climate, 28 (24), 9712-9745, doi: 10.1175/JCLI-D-14-00847.1

Lake Level Scenarios for Workshop

These scenarios build upon the description of high lake level conditions above. Each participant will work with one of the following scenarios in a breakout group.

1. **Cold Air Outbreak Scenario**
   - Water levels are already above average
   - A cold air outbreak associated with the arctic oscillation occurs, causing very cold temperatures
   - The lakes freeze, evaporation shuts off, and the ground is frozen with snow cover
   - Water levels that were above average become extremely high
2. **Excess Precipitation Scenario**
   - Water levels are already above average
   - Excess precipitation falls in Spring and early Summer
   - A continual source of water into the lake system leaves the basin saturated

- Upstream, downstream, and lake shoreline flooding occur
- Water levels that were above average become extremely high

3. **Extremes Scenario**
   - Global teleconnection patterns cause shifts in the location of storm tracks
   - Rapid fluctuations between extreme high and low lake levels
   - Floods are bigger
   - Droughts are longer

Handout 5

Lake Level Scenario Planning Activities

Page 1

Advancing Community-Level Resilience to Lake-Level Flooding in Wayne County, New York

Lake Level Scenario Planning Activities

These scenario planning activities will occur over the course of the 3-day workshop. Please keep this handout for your reference.

Activity #1 (25 minutes): *Get to know each other, your roles/expertise, and what each of you see as water level related issues and associated goals for your focus area. Identify the report out person for day 3 (this should not be the facilitator or notetaker).*

Directions: Describe specific issues and goals related to your group's focus area (i.e., septic at risk of flooding, or structures at risk of flooding). These issues should be specific to Wayne County's waterfront communities. Once you have a list of these issues and goals, prioritize them and work through them as time allows. The goals identified here will inform the rest of the scenario planning activities.

Discussion Questions

- How is your focus area impacted by water levels?
  - High water impacts:
  - Low water impacts:
  - Variable water level impacts:
    - You might consider recent years of highs (2017 or 2019) and lows (2021).
- What goals are in place to maintain normal operating function for your focus area?
- What goals are in place to address focus area-specific impacts associated with water levels?

Outcome: List of **goals** and impacts for your focus area that relate to water levels. Name of report out person.

Activity #2 (30 minutes): *Identify which goals are most impacted by the boundary conditions of your scenario, and how they are affected.*

Directions: Discuss the boundary conditions of your scenario and how those impact the community goals for your focus area identified in activity 1.

Discussion Questions:

- What are the additional impacts on your focus area from the boundary conditions of your scenario?
- At present, are you already preparing for conditions like these?
- Which goals can be met under these conditions? Do assets function under these conditions?
- Which goals will be more difficult to meet under these conditions? What are the functional deficiencies or vulnerabilities?
- Which goals cannot be met under these conditions? These are needed for the next activity.

Outcome: A list of goals that are difficult to achieve or not attainable given the boundary conditions and why (what are the stressors/impacts).

Activity #3 (30 minutes): *Identify what actions need to happen to make unattainable goals achievable. Identify new goals that may be needed to address the issues identified for your focus area.*

Directions: Using the goals identified in Activity 2, think about which ones can be met easily, with additional effort, or not at all. **Focusing on the difficult to achieve and unattainable goals from activity 2**, talk about how you can still meet those goals given the boundary conditions. Of the goals that cannot be met, what will you do to get to those goals still?

Discussion Questions:

- Which of the goals identified stay the same?
- Which ones need modification to be achieved?
    - How/what modifications are needed?
    - What is the effort/cost of these modifications?
- Are there new goals that should be considered? Is there something you need to do that you aren't doing now, based on this scenario?

Outcomes: A list of actions/modifications needed to make unattainable goals achievable again, and new goals needed for the conditions of the scenario.

Activity #4 (30 minutes): *Participants will use an event from the menu to explore vulnerabilities of goals related to their focus area.*

Directions: Choose an event from the menu to build into the scenario and discuss how this further challenges focus area goals/activities. If time permits, discuss multiple events.

Events Menu (subject to change):

- Shift in the timing of the annual water level cycle (e.g., earlier highs)
- Low/High ice cover winters
- Do ice cover characteristics during a winter matter? thin/thick ice; continual versus intermittent coverage
- Storm event leading to large debris washing up on shore/damming inlets
- Coastal landslide/erosion event
- Water contamination event
- Prolonged seiche/wind event
- Earlier ice on/off dates
- Unusually wet season (user can define the timing) over the basin that leads to further water inundation/flooding
- Extreme rain event over the basin causing flash flooding
- ["perfect storm"] Combination of wet + retainment of flows

Discussion Questions:

- Would you have to further modify your goals/activities?
  - If so, how? What actions would be needed to modify?
- At present, are you already preparing for events like these or do you wait and respond to events like these?
  - What is the tipping point that leads to these decisions, what are you using to inform these decisions?
- At what point, if ever, do these conditions become unmanageable? What time scale?
- How easy/costly is it to prepare for an event like this, even if it doesn't happen?
- What are the challenges of preparing for events like this?
- How may you plan differently if you knew this event was coming versus if you didn't know it was coming?

Outcomes:

List of additional actions to help the communities achieve focus area related goals, considering the selected event/s. List of challenges related to the addition of the selected event/s.

3

Activity #5 (10 minutes): *As a wind-down, and to collect some of the low water concerns that have likely been discussed already, identify how low water impacts the goals related to their focus area and actions to improve those goals. This exercise is helpful to consider how goals hold up under conditions of varying lake levels.*

Directions: Now briefly consider how low lake level impact the goals/issues related to your focus area. Use an abbreviated version of all previous steps to do so.

Outcome: A list of low water specific goals, issues, and related actions.

Activity #6 (30 minutes): *During this time, we will re-group to learn about discussions from the other groups.*

Directions: Have the report out person from each group summarize outcomes from Activity 1-4 and recommended actions, including whether there is communication/infrastructure in place to meet goals (3-4 minutes each). Have a full-group discussion on each scenario.

Participant List by Breakout Group

Groups A & B

Group A		
Meredith	Perreault	Facilitator
Tess	Clark	Notetaker
Jeff	Simonet	Town of Huron
Philip	Eygnor	Huron Supervisor
Brian	Pincelli	Wayne County
Beth	Claypoole	CCE Wayne
Lynn	Chatfield	Town of Wolcott
Nancy	Martel	NYS Dept. of State
William	Werick	IJC GLAM Committee
Group B		
Katie	Graziano	Facilitator
Jes	Eckerlin	Notetaker
Roger	Gallant	Town of Huron
Anthony	Verno	Town of Williamson
Ora	Rothfuss	Wayne County
Lindsey	Gerstenslager	Wayne County SWCD

Groups C & D

Group C		
Kyla	Semmendinger	Facilitator
Megan	Kocher	Notetaker
Brienna	Wirley	NYSDEC
Dave	McDowell	Village of Sodus Point
Grace	Costello	U.S. Army Corps of Engineers
Jayme	Thomann	Bergmann
Josh	Cerra	Cornell University
Karen	Catcher	NYS Department of State
Roy	Widrig	NY Sea Grant
Group D		
Kathy	Bunting-Howarth	Facilitator
Nikki	Hart	Notetaker
Shannon	Dougherty	NYSDEC
Kevin	Rooney	Wayne Co DPW
Kevin	Druschel	Village of Sodus Point
Mike	Shantz	IJC GLAM Committee
David	Scudder	WCWSA
Robert	Call	NYSDEC
Scott	Steinschneider	Cornell University

Breakout Group Summaries:
Goals and Recommended Actions

Group A: cold air outbreak scenario for septic systems with coastal erosion event

GOAL #1: Ensure septic systems are working properly by 2031

- An integrated strategy to inventory and assess septic systems' risk of inundation, including a regional coastal plan and participation from all agencies in order to reduce barriers in coordination.
    - Properties will be audited and assessed, with municipalities and inspection agents performing a coordinated inspection and audit.
- Code enforcement officers should perform stress test on new home purchases. In some cases of septics along eroded shorelines, houses may not be livable.
    - In these worst-case scenarios, houses would require a state or federally funded buyout.

GOAL #2: Ensure access to community financial fund for cost share

- Federal investment in pilot programs for relocation and house buybacks
- Replicate and adopt model local septic laws to demonstrate seriousness and local commitment to federal and state agencies
- Find integrated local/state/federal funding solutions to erosion that may require federal investment in buyouts.

Group B: extremes scenario for septic systems with unusually wet season event

GOAL #1: Ensure 100% of high risk systems are protected from flooding by 2025

- 60% of new homeowners attend a one-time standard septic maintenance education class
- Lakeshore homeowners know the location of their septic systems with 100% certainty,
- Lakeshore community leadership identify and develop funding mechanisms to help offset the costs of failing septic systems.

GOAL #2: Ensure 100% of septic systems are up to UPP standard by 2025

- Create a landowner decision making tool or app and a municipal decision making tool to address community areas that may need to convert from septic systems to sewer systems and consider the challenges that come with that.
- Create a program that would increase personnel and technical assistance by training and certifying individuals that could help with design and permitting activities in towns.

Group C: extremes scenario for structures with ice and high wind event

GOAL #1: Develop an immediate response plan to high or low water level events

- Develop a priority contact list and prioritizing where resources are coming from for communication purposes. Such a contact list would include neighboring municipalities across the county and other agencies and organizations.
    - This would allow for coastal communities to contact subject matter experts and have an extra layer of knowledge for environmental considerations for the structures under different hazard and response plans.

GOAL #2: Ensure 100% of residential structures are resilient to low and high levels.

- Create an inventory of residential structures, including information about where the structures were built in relation to the shoreline, whether they are up to code, if they were impacted by flooding events of 2017 and 2019 and how protected or at risk they are.
    - Come up with adaptive strategies based on the inventory, and determine thresholds for buyouts and relocation.

Group D: excess precipitation scenario for structures with prolonged seiche event

GOAL #1: Develop an immediate response plan to high or low water level events

- Create risk assessment tools to show who and what is being threatened by hazardous conditions
- Enforce code more rigorously
- Put valves on drains with a backup system of pumps in extreme wet conditions.

GOAL #2: No municipal/publicly owned roadways are unpassable

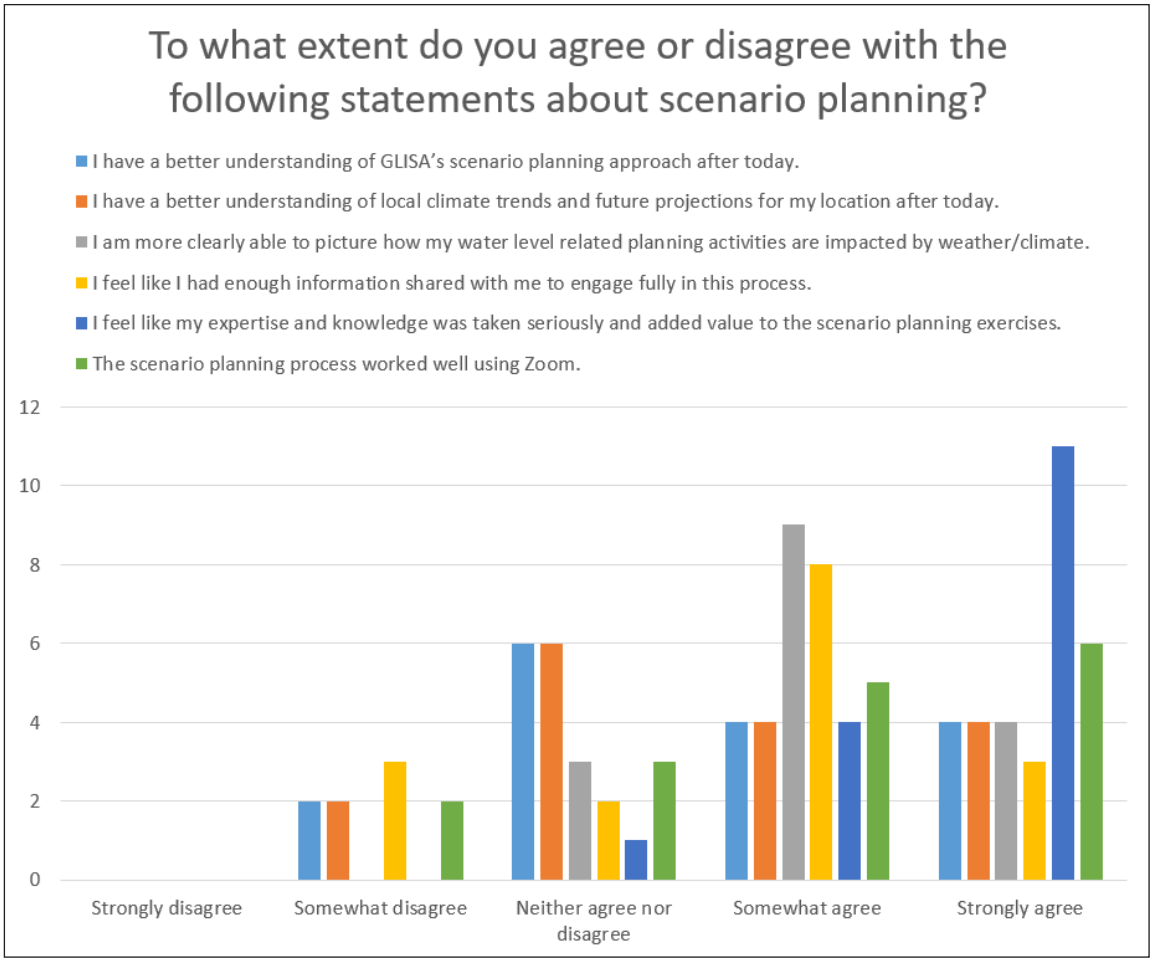
- Improve forecasts for short-term (e.g. wind events) and long-term (weekly/monthly water levels) timescales as well as proper communication of those forecasts to everyone who needs them (what the implications are for those specific impact areas).
- Improve guidance for design levels and financial incentives to make improvements (e.g. federal funding to private homeowners).

GOAL #3: 100% of properties the municipality provides water to will maintain service

- Create risk assessment tools to show who and what is being threatened by hazardous conditions
- Enforcing code more rigorously
- Putting valves on drains with a backup system of pumps in extreme wet conditions.

Survey:
Summary of Evaluation Results

After the workshop, participants were asked to anonymously respond to a multiple choice and short answer survey. Below is a summary of their responses.



Recommended Improvements for Future Workshops

This workshop was the first virtual scenario planning workshop GLISA has held. The following are recommended improvements to consider for future scenario planning workshops of this nature.

- Have a better explanation of what the scenario planning process is and what it's like. It's abstract (swirly) and will feel a bit strange - get out of your comfort zone. Meant to start the conversation - bring some ideas back with you to your higher-ups or people with decision making abilities.
- Carve out more time to discuss the scenarios and push to think about integrated effects beyond water levels (ice, etc.). Although the fine elements (i.e., reduction of winter evaporation, rapid fluctuations between high and low water levels, etc.) of each scenario were presented by GLISA, and shared in workshop materials, participants seemed to focus solely on the fact that the water was and then higher. This is not necessarily bad, possibly a result of having experienced catastrophic flooding events in recent years, paired with the various initiatives underway that are focusing at least in part on improving resilience to high water levels.
- Have scenario planning activities for only one group at a time: one group per day with the main facilitation team, instead of concurrent breakout rooms. All groups would join the final day for report out and group discussion. If this is not possible, build in considerable time for moving people in and out of breakout rooms.
- Have the climate 101 presentation be a recorded lecture ahead of time and start with asking for any questions.
- Clearly define the difference between goals and actions. Tie goals to impacts. Build in time to prioritize and rank goals to focus on top 2-4.
- Push people to think big picture things that they might think aren't possible/push beyond comfort level.
- Keep groups to 4 people or less.
- Provide more guidance to report out person.
- Clearer workbook to take facilitation notes in that is more interactive with participants.
- Allow more time for each activity, provide more time warnings.
- Add discussion to activity 1 for a local narrative about why each of those focus areas are important.
- Balance outsider and local knowledge.