

THE UPSTATE NEW YORK FLOOD MITIGATION TASK FORCE REPORT

EXECUTIVE SUMMARY



A LETTER FROM THE CHAIR:

On July 1, 2022, Governor Kathy Hochul announced approval of legislation (S.8204a/A.9177) to reauthorize the Upstate Flood Mitigation Task Force, charging it with an essential mission: identifying and recommending reasonable measures to enhance flood management and mitigation along the New York Canal System.

The Governor explicitly recognized that a new, more robust effort was required to address upstate flooding. Consequently, with the Canal Corporation Director named as Task Force Chair, the updated legislation refined the scope of study to flood-related impacts within the sprawling Oswego River and Mohawk River Basins over the last five years.



Because New York's Canal system was designed for navigation and not flood control, the involvement and input of several other state agencies, as well as subject matter experts, was necessary and invaluable to the process. As we approach the celebration of the Erie Canal's bicentennial, we seek to honor the Canals' historic and storied mission while providing even greater protection for its communities across New York.

The Governor's action embraced that fact and empowered the Task Force with a clear direction and framework, setting a date for delivery of this Final Report, including findings and recommendations, by July 1, 2023. Our report meets this important deadline. Here is some essential background that guided the Task Force's thinking: combined, the geographic footprint of the Oswego River and Mohawk River Basins cover nearly one third of the Upstate New York region. Encompassing more than 8,500 square miles in all and spanning from the Capital Region west to the Finger Lakes, the two drainage basins are individually distinct in their respective geology, topography, and hydrological dynamics. In essence, their narrative is a tale of two watersheds:

The 3,460-square-mile **Mohawk River Basin**, with its steep elevation and lack of large water bodies to provide flood water storage, experiences fast-moving and violent flood events that leave destruction in their wake. By contrast, the **Oswego River Basin** is an expansive 5,122-square-mile geologic trough with minor elevation changes along the Canal, which receives the combined flows from seven of New York's 11 Finger Lakes and therefore experiences the insidious impacts of long exposure to standing floodwaters in the basin's relatively flat northernmost section.

Since August of 2022, the Upstate Flood Mitigation Task Force and three established subcommittees have convened more than a dozen times to assess the wide range of impacts

and associated costs of weather-related flooding respective to each basin. Expert analysis and public input from stakeholders provided the framework for this report and guided potentially cost-effective and sustainable flood-mitigation strategies to protect and relieve impacted communities.

Task Force recommendations include those for cross implementation, as well as basin-specific measures. For instance, there is broad agreement among Task Force members and subject matter experts that the development of basin-wide hydrologic flow models will immediately provide the basis for improved communication and outreach. In the near- and long-term, such information will provide the data-based foundation for measures such as the restoration of flood plains and regulatory and structural interventions.

The detailed basin models would allow State agencies to pursue the purchase and restoration of disconnected floodplains and the purchase of flood-prone structures in a more strategic fashion. When coupled with appropriate local zoning and property disclosure requirements, such interventions have the potential to achieve a marked improvement to the quality of life of those communities that are impacted by chronic flooding.

Specific to the Mohawk River Basin, the Task Force seeks to strengthen the water management findings published in Mohawk River Action Agenda, including improved management of the Canal System's movable dams and identifying measures to mitigate the impact of ice jams along the river's eastern corridor.

In the hydrologically-complex Oswego River Basin, there are multiple water-control entities that largely function independently. In this regard, the Task Force believes the creation of a multi-jurisdictional, basin-wide entity – a regulating body - with authority to coordinate water level management and flow releases in a singular fashion warrants further study and analysis. Accordingly, the Task Force strongly recommends further examination by the Governor, the Legislature, and stakeholders of the feasibility of a regulating body in this basin.

The Task Force also recommends studying improvements at Baldwinsville Dam, the restoration of the Montezuma floodplain, updating flood insurance maps and expanding the state's Resilient New York studies to include the Oswego River Basin.

Finally, while this report completes the Governor's initial assignment, Task Force members believe it should be viewed as the impetus for a workable blueprint for long-term action. The Canal Corporation, along with our New York State agency partners and stakeholders in the public and private sectors, look forward to working with Governor Hochul and the Legislature to establish a more sustainable flood mitigation strategy that is shared, fair to all and can improve the lives of millions of New Yorkers -- one that fully anticipates and supports the Canal system's third century of operation.

Brian U. Stratton
Director, NYS Canal Corporation
Task Force Chair

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GLOSSARY

The acronyms and terms listed below are frequently used and referenced throughout the document:

AHPS: Advanced Hydrologic Prediction Service

BCD: Barge Canal Datum

BEF: Base Flood Elevation

BRIC: Building Resilient Infrastructure and Communities

CAP-SSSE: Community Assistance Program – State Support Services Element

CRS: Community Rating System

CRRA: Community Risk and Resiliency Act

CSO: Combined Sewer Overflow

CTP: Cooperating Technical Partner

EAL: Expected Annual Loss

EB: Engineering Bulletin

EI: Engineering Instruction

EFC: Environmental Facilities Corporation

EPA: Environmental Protection Agency

EPF: Environmental Protection Fund

FEMA: Federal Emergency Management Agency

FERC: Federal Energy Regulatory Commission

FIRM: Flood Insurance Rate Map

FIS: Flood Insurance Study

FMAP: Flood Mitigation Assistance Program

HMGP: Hazard Mitigation Grant Program

IHP: Individuals and Households Program

LOMR: Letter of Map Revision

NFIP: National Flood Insurance Program

NGO: Non-Governmental Organizations

NRCS: Natural Resources Conservation Service

NYCDEP: New York City Department of Environmental Protection

NYS: New York State

NYSCC: New York State Canal Corporation

NYSDEC: New York State Department of Environmental Conservation

NYSDHSES: New York State Division of Homeland Security and Emergency Services

NYSDOT: New York State Department of Transportation

NYSFMA: New York State Floodplain and Stormwater Managers Association

NYSGOSR: New York State Governor's Office of Storm Recovery

NYSOPRHP: New York State Office of Parks, Recreation, and Historic Preservation

NYPA: New York Power Authority

O&M: Operation and Maintenance

PA: Public Assistance Program

RL: Repetitive Loss

SFHA: Special Flood Hazard Area

STORM: Safeguarding Tomorrow through Ongoing Risk Mitigation

SUNY ESF: State University of New York Environmental Science & Forestry

USACE: United States Army Corps of Engineers

USFMTF: Upstate Flood Mitigation Task Force

USGS: United States Geological Survey

1. INTRODUCTION

1.1 Purpose

NYS Legislature Article XIII-B, Section §139-c (1) was amended in 2022, S.8204A and A.9177, establishing the Upstate Flood Mitigation Task Force.

The Upstate Mitigation Task Force (USFMTF), Chaired by the Director of the New York State Canal Corporation (NYSCC), is tasked with conducting an “in-depth examination [...] of flood control study sectors and issues related to floodplain management, debris management, flood control and flood mitigation in the upstate flood mitigation region” encompassed by the Mohawk and the Oswego River Basins.

Specifically, this report must:

- Describe the cost or impact of flooding over the last five years to agriculture; transportation; land use; public health; insurance; and the economy as well as impacts on infrastructure such as bridges, roads, dams, locks, water and wastewater treatment plants and docks.
- Assess Erie Canal operation procedures and plans which may have a direct or indirect impact on flood mitigation and flood management.
- Provide a list of adaptive measures procedures and associated costs, including a mitigation grants program to provide funding, that could be executed to mitigate flood damages.

MOHAWK RIVER EAST OF LITTLE FALLS



Source: Bret Carrig

USFMTF MEMBERS



Appointed by the Governor

Appointed by the President Pro Tempore of the Senate

Appointed by the Speaker of the Assembly

SUBCOMMITTEES

GRANTS & POLICIES

- Chairperson: Tom Snow, NYSDEC Watershed Coordinator
- Identified applicable state and federal grants and funding sources
- Analyzed and recommended system-level policy technical interventions

HYDROLOGY & ENGINEERING

- Chairperson: Kenneth Kemp, NYPA, Interim Chairperson
- Reviewed prior reports and research
- Identified research gaps
- Recommended technical parameters and thresholds for final report recommendations

PUBLIC ENGAGEMENT & OUTREACH

- Chairperson: Rebecca Hughes, NYSCC
- Set up website for public information-sharing
- Identified and collaborated with relevant stakeholders
- Considered public impacts of any recommended actions

1.2 Scope

The geographic scope of this report includes areas in the Flood Mitigation Regions (upstate counties through which the Erie Canal passes in whole or in part) within the extent of the basin. When referred to as Flood Mitigation Counties, the data is inclusive of the entirety of the county, not just the region within the basin. Further, the data in this report explores where the Federal Emergency Management Agency (FEMA) Special Flood Hazard Area (SFHA), or 100-year floodplain, is potentially influenced by NYSCC operations.

- **Mohawk River Basin Flood Mitigation Regions (West to East):** Oneida, Herkimer, Montgomery, Schenectady, Saratoga and Albany Counties.
- **Oswego River Basin Flood Mitigation Regions (West to East):** Ontario, Wayne, Yates, Schuyler, Seneca, Tompkins, Cayuga, Onondaga, Oswego, Madison, and Oneida Counties.

This examination included impacts and issues identified within the past five years (2017-2022). The Erie Canal operations, procedures, and plans which may have a direct or indirect impact on flood mitigation and flood management will also be assessed.

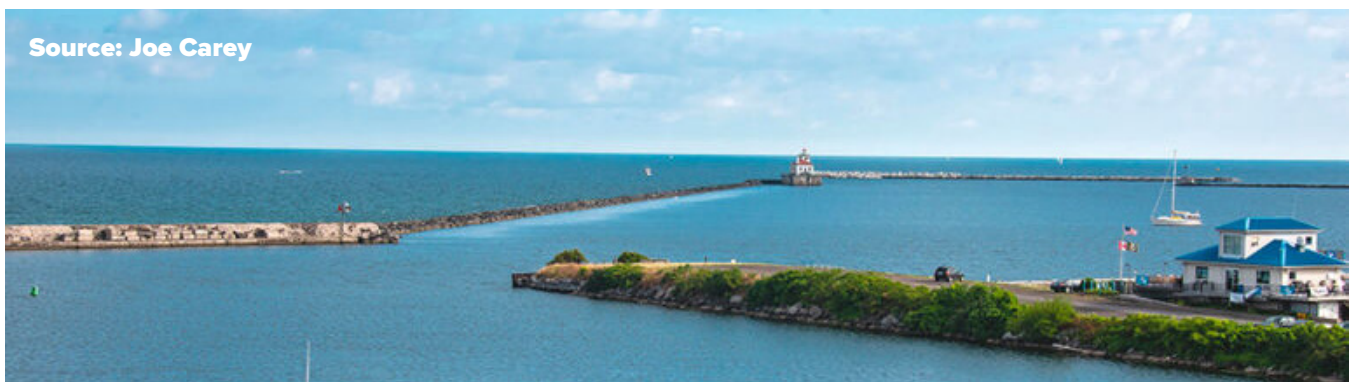
1.3 Study Approach + Limitations

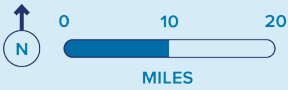
Data presented in this report was sourced from river and meteorological gages, previous studies conducted within the Flood Mitigation Regions, and available damage records from previous flooding events. River gage records were obtained from several sources including the Advanced Hydrologic Prediction Service (AHPS), HydroSphere, USGS WaterWatch, and NYS Mesonet.

No new engineering analyses were performed as part of this report. As this Report's focus is flooding in the last five years, the effects of climate change on recent flood events were not considered. However, the adaptive measures included in this Report will consider resiliency and adaptability for the potential effects of future climate change.

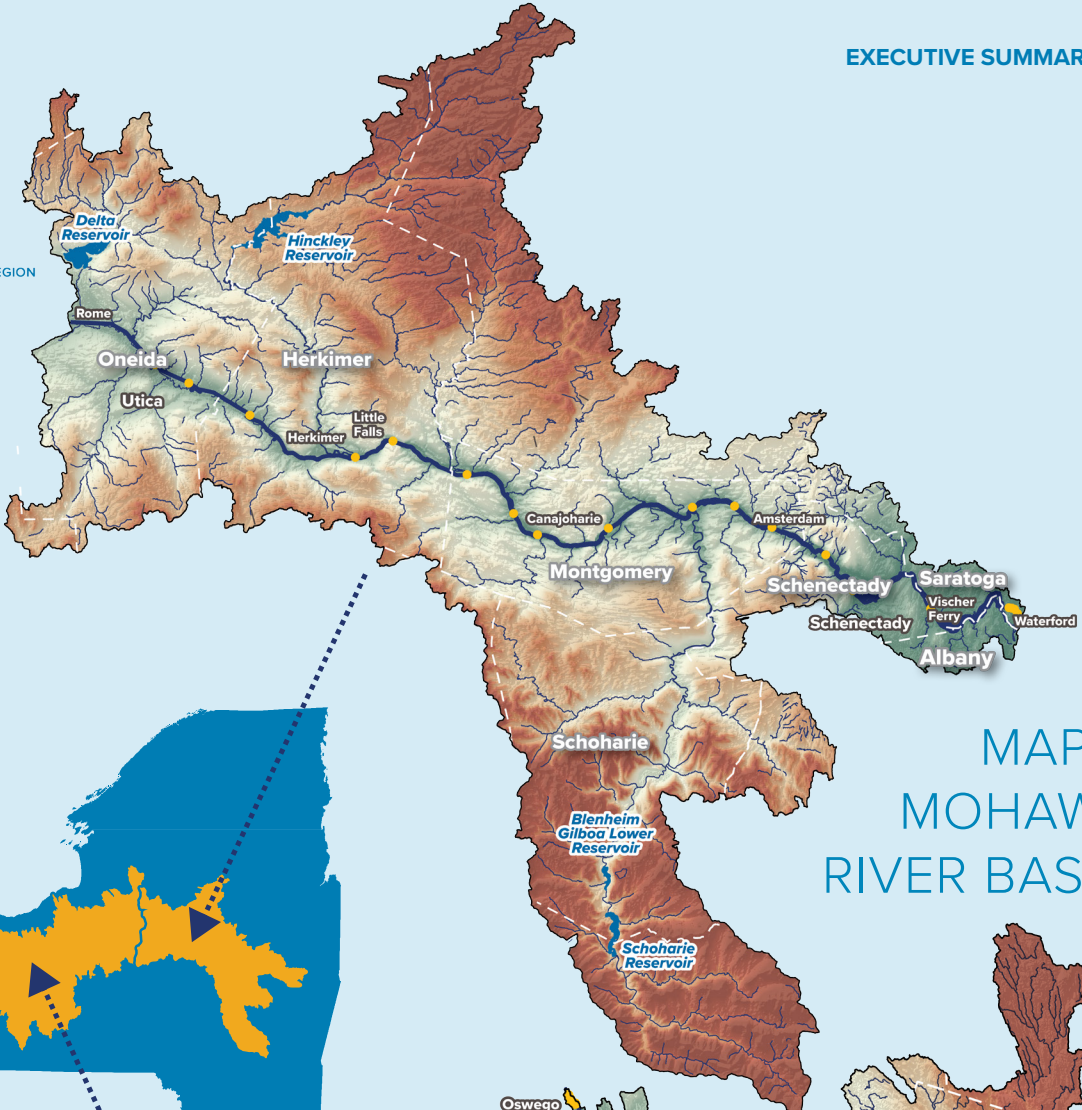
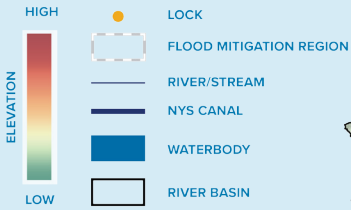
A total of 38 existing studies and reports were reviewed for the Mohawk River Basin, and 16 were reviewed for the Oswego River Basin. These studies and reports provided the foundation for understanding historic flood impacts, recent flood impacts (within the past five years), historic and current NYSCC operations, and recommendations that have or have not been implemented.

WRIGHTS LANDING OSWEGO HARBOR LIGHTHOUSE

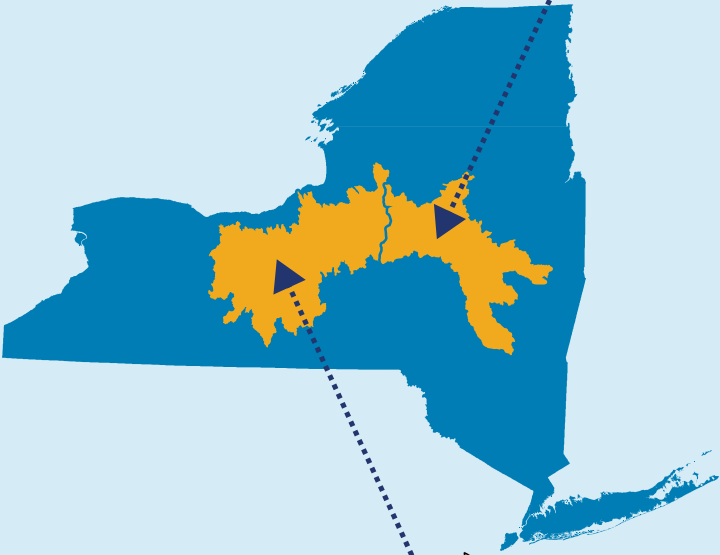




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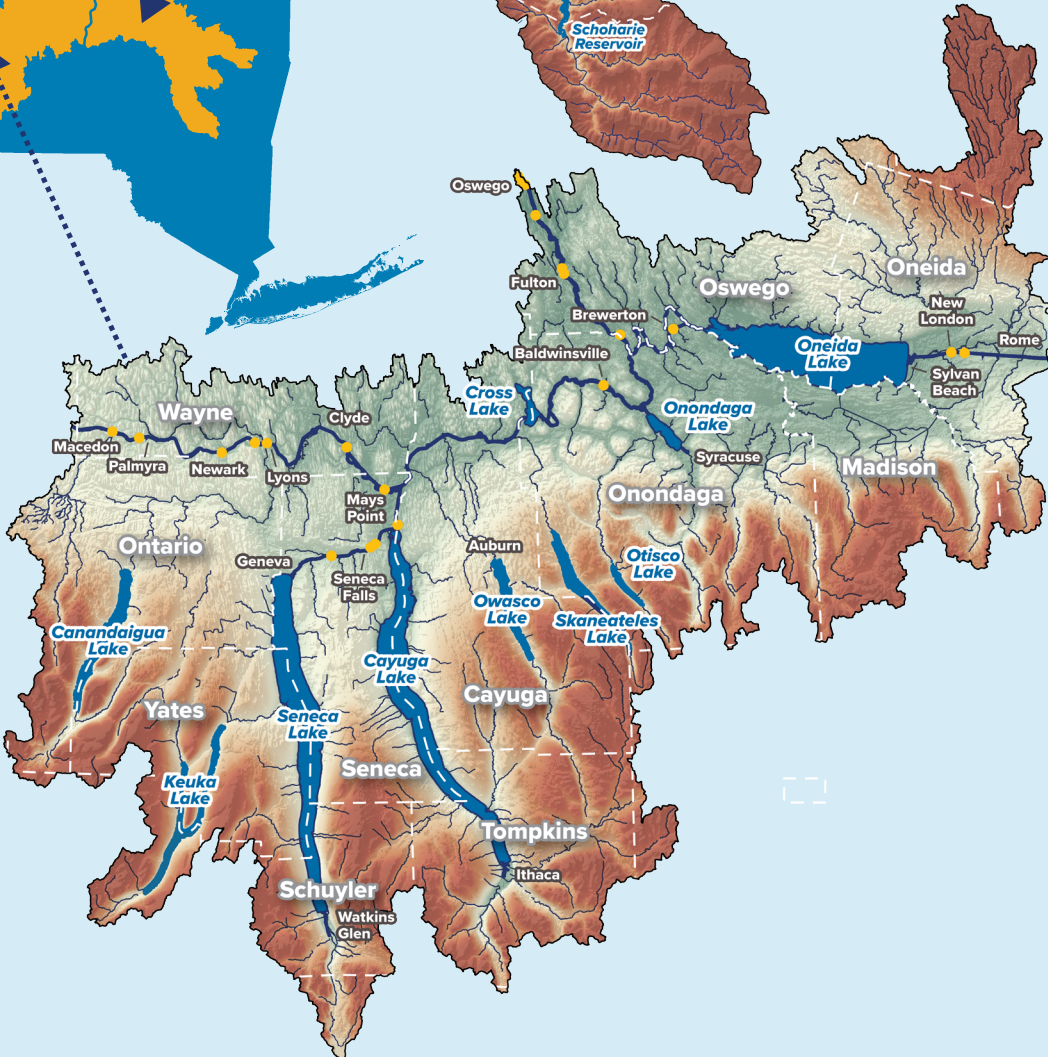
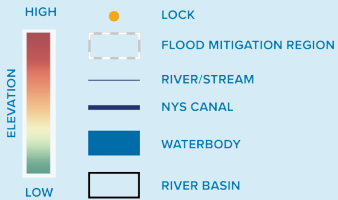
MAP 1.
MOHAWK
RIVER BASIN



MAP 2.
OSWEGO
RIVER BASIN



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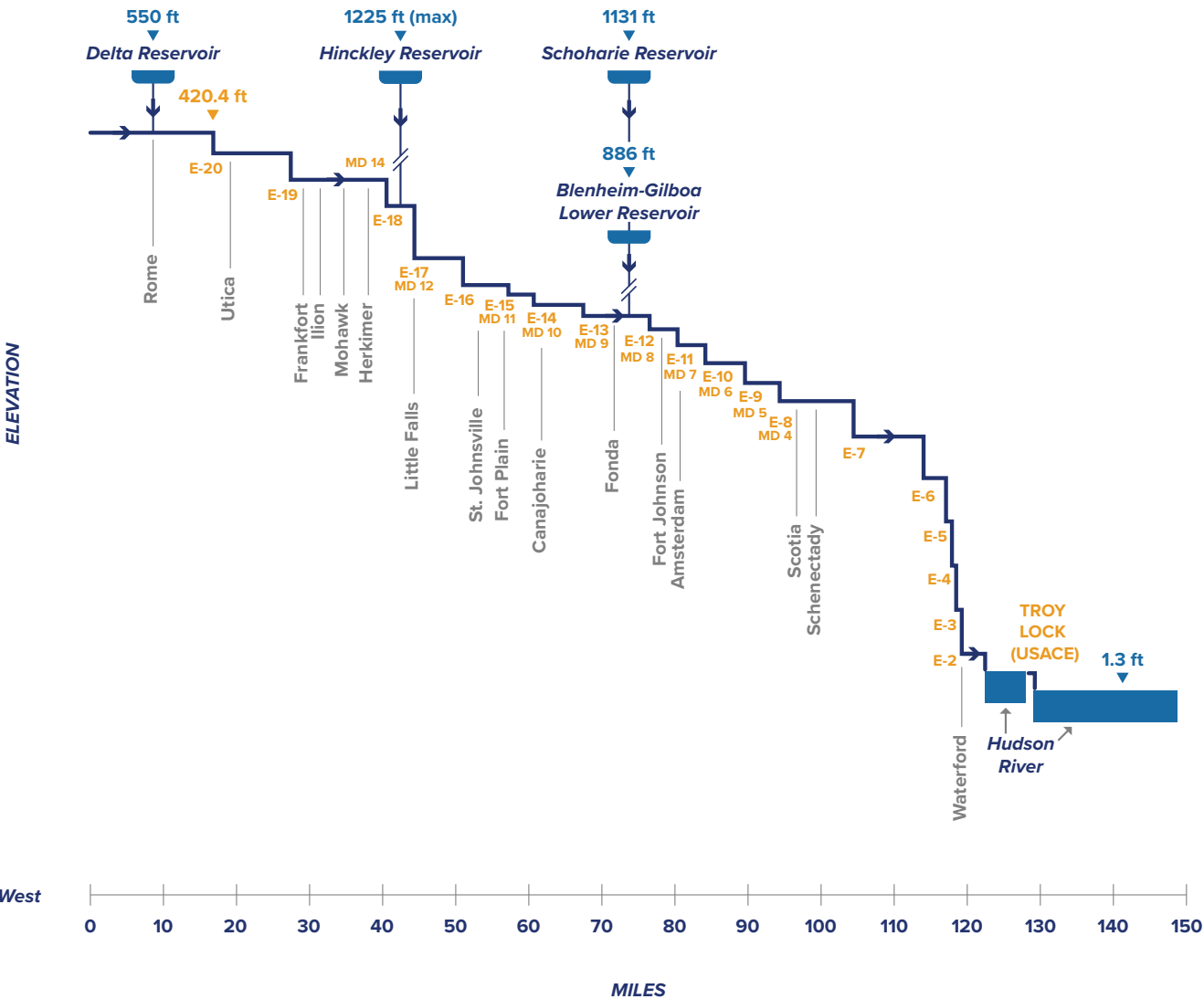


MOHAWK RIVER BASIN ELEVATION PROFILE

LEGEND

- E-XX ERIE CANAL LOCK NAME AND NUMBER
- MD XX MOVABLE DAM NUMBER
- NYS CANAL SYSTEM
- TRIBUTARY
- DIRECTION OF WATER FLOW
- CITY/VILLAGE
- ▼ ▼ ELEVATION OF WATERBODY OR CANAL
- // ELEVATION BREAK
- WATERBODY

This graphic depicts the elevation of water bodies that connect to, and the direction of water flows through the Erie Canal System.



1.4 Basin Descriptions

Mohawk River Basin

The Mohawk River Basin drainage area covers approximately 3,460 square miles from Central New York to the Capital Region. The total length of the Mohawk River within the basin is 155 miles. The Erie Canal runs within or parallel to the River, beginning 6.5 miles downstream from Delta Dam, where the Mohawk River joins the Erie Canal at Rome, to Crescent Dam (Erie Canal Lock E-6) at the upper end of the Waterford flight of locks. The Erie Canal passes through the cities of Rome, Utica, Little Falls, Amsterdam, and Schenectady. The Mohawk River Basin is characterized by a steep slope, and experiences a total elevation change of 400'.

The major tributaries of the Mohawk River make up 56% of its watershed and include:

- Oriskany Creek
- West Canada Creek
- East Canada Creek
- Schoharie Creek

Four significant reservoirs are located within the river basin as well:

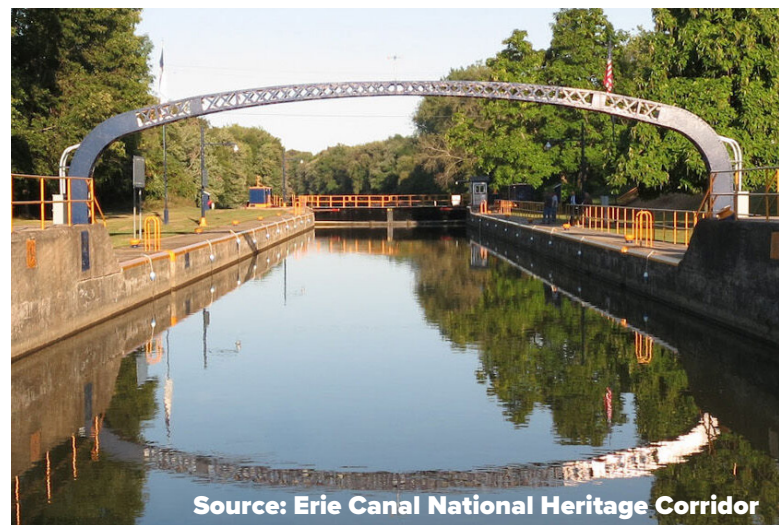
- Delta Reservoir (Mohawk River)
- Hinckley Reservoir (West Canada Creek)
- Schoharie Reservoir (Schoharie Creek)
- Bleheim-Gilboa Lower Reservoir (Schoharie Creek)

Oswego River Basin

The Oswego River Basin drainage area covers approximately 5,122 square miles in Central and Upstate New York. The western portion of the Basin drains to the Seneca River, while the eastern portion drains to the Oneida River. These two rivers combine 2.2 miles upstream of the Village of Phoenix at Three Rivers Junction to form the Oswego River, which flows northwest into Lake Ontario. All together, there are a total of 285 miles of Canal. The Oswego River Basin is characterized by a relatively flat slope, experiencing a 217' elevation change.

There are over 7,000 miles of rivers and streams, seven Finger Lakes (Canandaigua, Keuka, Seneca, Cayuga, Owasco, Skaneateles, and Otisco), two other large lakes (Onondaga and Oneida), and numerous smaller lakes that contribute to the Oswego River Basin.

LOCK 25, MAYS POINT, NY



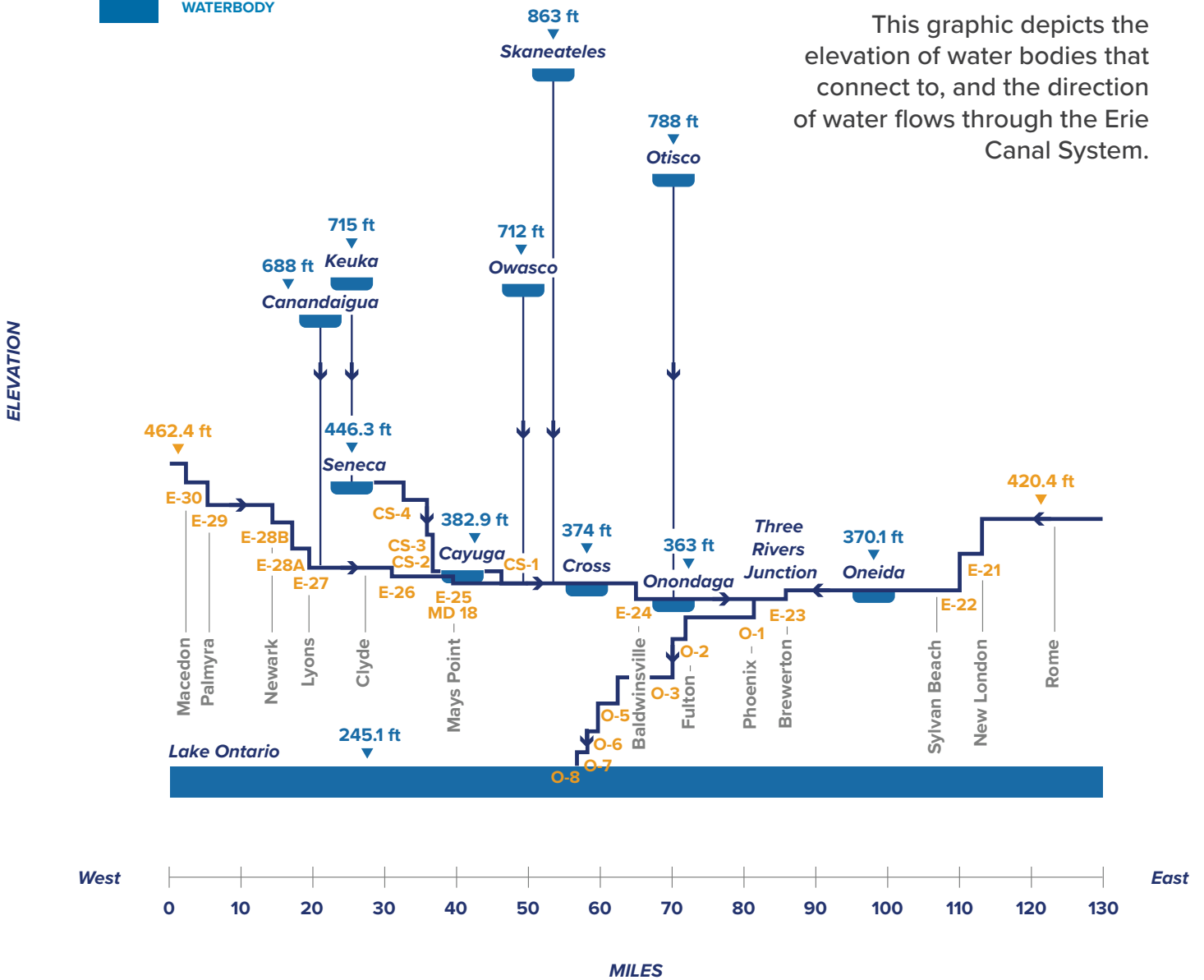
Source: Erie Canal National Heritage Corridor

OSWEGO RIVER BASIN ELEVATION PROFILE

LEGEND

- AB-XX** CANAL LOCK NAME (ERIE, CAYUGA-SENECA, OSWEGO) AND NUMBER
- MD XX** MOVABLE DAM NUMBER
- NYS CANAL SYSTEM
- TRIBUTARY
- DIRECTION OF WATER FLOW
- CITY/VILLAGE
- ▼** ELEVATION OF WATERBODY OR CANAL
- WATERBODY

This graphic depicts the elevation of water bodies that connect to, and the direction of water flows through the Erie Canal System.



EAST CANADA CREEK FLOODING, 10/31/19

1.5 Flood Characteristics

For both the Mohawk and the Oswego River Basins, seasonality drives variations in water flow into and out of the Canal System. High flows often occur in the springtime due to snowmelt and precipitation. However, the difference between monthly average flows and peak daily flows, or the highest measured peak flow that occurs in a 24 hour day, within each basin are drastically different and are indicative of the nature of flooding within the Basins.

In the Mohawk River Basin, peak daily flows range from five 5 to 890 times the monthly average discharge in the basin. Mohawk River storm events produce fast rising and fast receding floods lasting one to three days. This is due to the Mohawk River Basin having only a minor amount of off-channel water storage offered by floodplains, and most tributaries, in addition to the Mohawk River itself, having steep slopes.

In the Oswego River Basin, peak daily flows can range from 2 to 10 times the monthly average discharge in the subbasins. Oswego River Basin storm events produce slow rising and slow receding floods lasting several days to weeks. This is attributable to the significant amount of off-channel water storage offered by floodplains, waterbodies and flat slopes upstream of Erie Canal Lock E-24 (Baldwinsville).

Mohawk River Recent Flood History

From 2017 – 2022, there were two significant water flow events within the Mohawk River Basin. A peak flow event occurred on October 31-November 1, 2019, with significant flows from West Canada Creek (Halloween Storm). A second event occurred on August 18, 2021, with significant flows from the Upper Mohawk Sub-Basin tributary to Delta Reservoir.



Source: Sue Kowalski, Twitter

Oswego River Recent Flood History

From 2017 – 2022, there have been two basin-wide flood events within the Oswego River Basin. The first event occurred in the spring of 2017 and is indicative of the long duration flooding exemplified during spring thaw (snow melt) periods. The second event, which occurred in August 2021, was localized over the Oneida River subbasin, and is indicative of the sporadic major storm events that can occur in the Oswego River Basin.

ONEIDA LAKE FLOODING, 08/22/21



Source: National Weather Service

2. IMPACTS OF FLOODING

2.1 Flood Protection & Disaster Damage

Flood hazards pose a risk and cause millions of dollars of damage in the Mohawk and Oswego River Basins to individuals, communities, and their surrounding environment. The Federal Emergency Management Agency (FEMA) determines the level of risk, the quantitative impacts of flooding on the economy, and the necessary community insurance rates by delineating the Special Flood Hazard Areas (SFHAs) and the Base Flood Elevations (BFEs).

Expected Annual Loss (EAL) represents the average economic loss in dollars resulting from natural hazards each year. It is calculated for each hazard type and quantifies loss for relevant consequence types: buildings, people, and agriculture. An EAL score and rating represent a community’s relative level of expected losses each year when compared to all other communities at the same level. While the risk rating in the Mohawk and Oswego River Basin was very low to relatively low compared to other similar basins nationwide, the cumulative EAL in the combined Mohawk and Oswego River Basins amounts to nearly \$22.9 million.

FEMA provides flood insurance through the National Flood Insurance Program (NFIP) and supports municipalities and homeowners for post-storm response needs and restoration of damaged infrastructure through the Public Assistance (PA) Program and the Individuals and Households Program (IHP).

According to FEMA, “A Repetitive Loss (RL) structure is any insurable building for which two or more claims of more than \$1,000 were paid

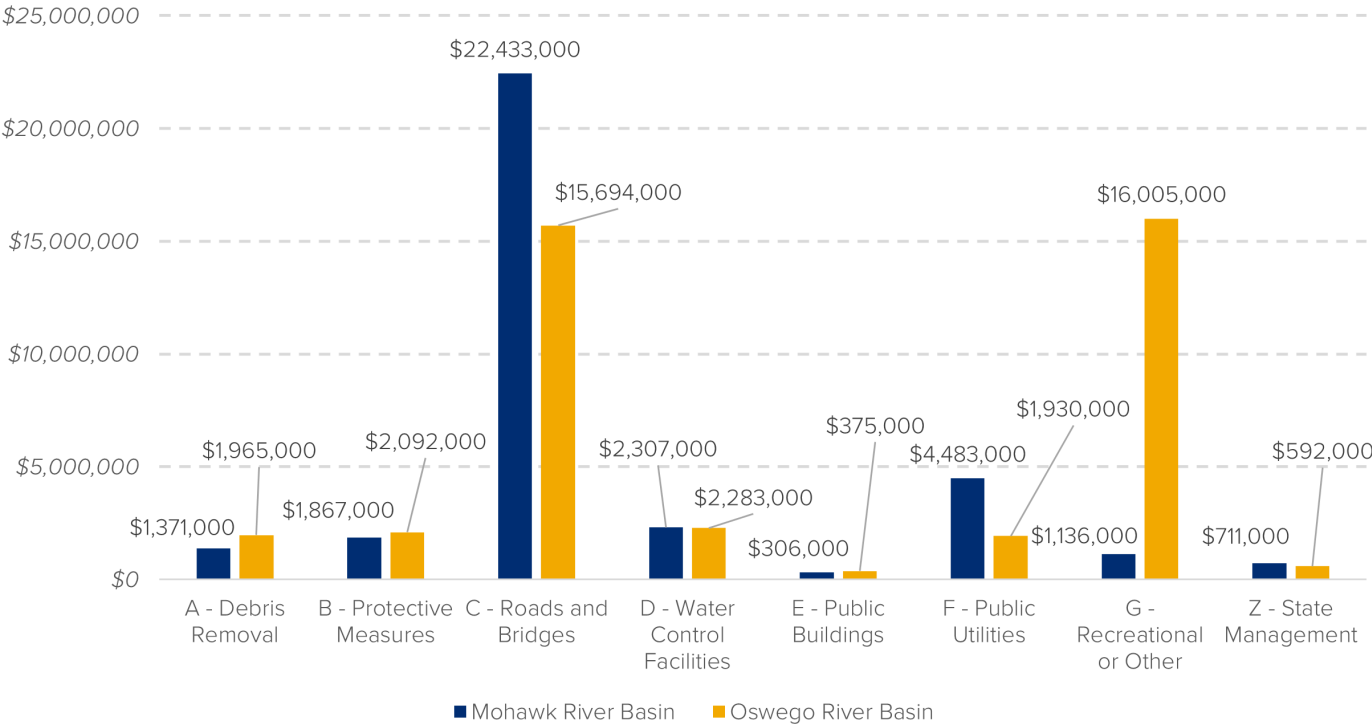
by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978.”

The table below summarizes the flood protection measures and context surrounding flooding in each river basin, as well as the amount of policies and claims related to flood impacts received in each river basin in the last five years (2017-2022).

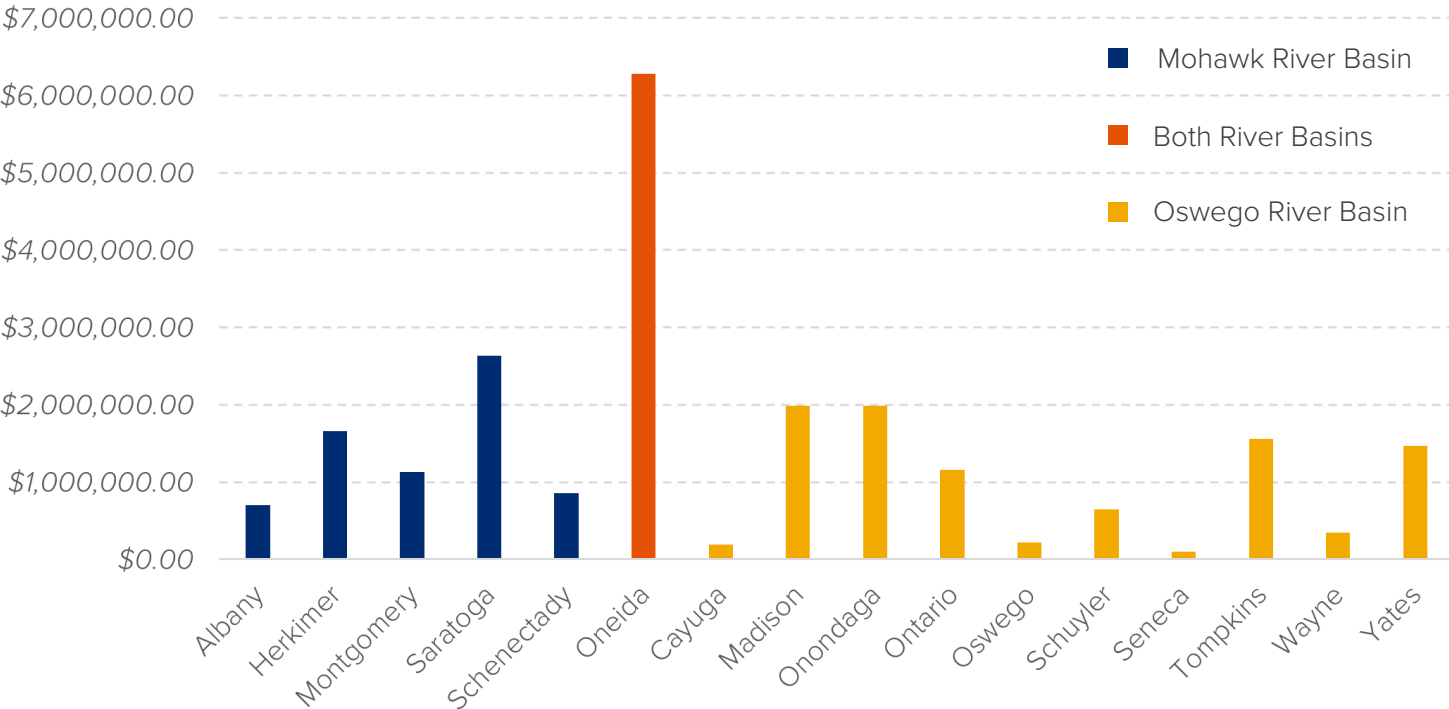
River Basin	Mohawk	Oswego
Inventory of Flood Protection Measures		
NFIP Policies	2,248	248
Total Policy Premiums	\$2.7 Million	\$3.3 Million
Total Property Coverage	\$505 Million	\$701 Million
Acres of SFHA	60,832 Acres	397,529 Acres
% of SFHA influenced by Canal	50% (30,298 Acres)	57% (226,985 Acres)
RL structures	181	144
Flood Impacts of the Last Five Years (2017-2022)*		
# of PA Claims	269	340
Total PA Project Spending	\$34.6 Million	\$40.9 Million
# of IHP Claims	107	186
Total Value of IHP Claims	\$12.4 Million	\$7 Million

NOTE: These estimates are based on publicly available data, which does not include damages that may have been filed through private insurance companies, or experienced by residents without insurance.

PUBLIC ASSISTANCE CLAIMS BY WORK CATEGORY



EXPECTED ANNUAL LOSS BY COUNTY



2.2 Land Use

The Mohawk and Oswego River Basins consist primarily of agricultural, forested, and wetland areas. The Mohawk River Basin passes through areas of higher density development in Rome, Utica, and Little Falls in the western section and Amsterdam and Schenectady in the eastern portion of the River Basin. The most prevalent land cover is forest (58% of total land cover) and agriculture (23%). The Oswego River Basin contains higher density development in the Syracuse area in the center of the River Basin and Phoenix and Oswego on the Oswego River, with the remainder of the basin consisting of low to medium density development along the Canal System with agriculture (38% of total land cover) and forest (34%) accounting for the majority of the Basin land coverage.

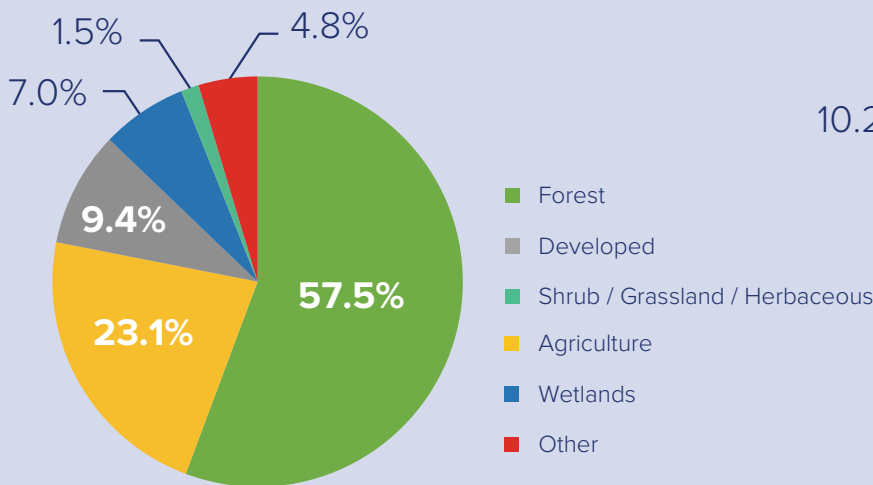
2.3 Agriculture

With a need for irrigation and high-organic content soils, agricultural lands are often concentrated along tributaries, major waterways, and wetlands, including SFHAs and the Canal System. Storm events and flooding have both a localized and regional impact on agriculture and water quality, due to nutrients and pollutants in stormwater runoff from agricultural lands, as well as damage to crops that can affect farm’s economic viability.

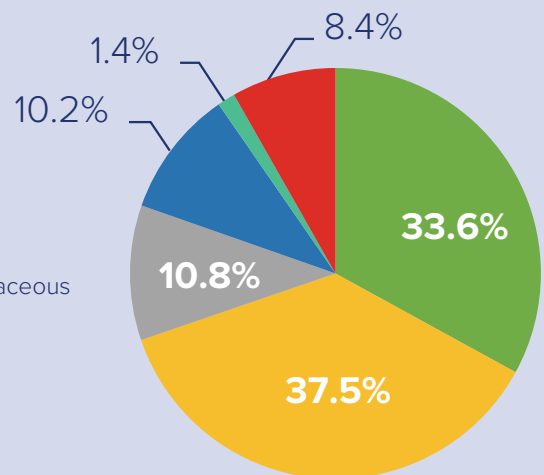
Agriculture is a dominant land use throughout both river basins. The farmland and agricultural products produced in both river basins are essential to the regional and state economy. In the Mohawk River Basin, the agricultural EAL has a value of \$660,000. In the Oswego River Basin the total agricultural EAL has a value of \$160,000.

LAND COVER

MOHAWK RIVER BASIN



OSWEGO RIVER BASIN



2.4 Tourism & Recreation

The New York State Canal System offers an abundance of recreational activities for hikers, cyclists, campers, kayakers, fishing enthusiasts, and boaters in and along the Canal revolving around the historical significance, structures, ecology, and character of its communities.

A portion of the 365-mile segment of the Empire State Trail, of which the Erie Canalway Trail is part of, traverses the Mohawk and Oswego River Basins, passing through more than 200 communities that depend on the approximate 3.3 million annual visits to the Trail, which generate over \$55.8 million annually in spending and over 731 jobs ([Who's on the Trail, The Economic Impact of the Erie Canalway Trail](#)). Flooding events can damage park amenities and trail surfaces, and cause downed trees, riverbank erosion, and damages that may require closure of the trail for extended periods of time.

In addition to land-based activities, over 40,000 motorized recreational vessels use the Canal System each year, and there are thousands of other non-motorized watercraft users for fishing opportunities, water cruises, and other recreational activities. Flooding impacts water-based recreation and tourism through Canal closures impeding overall navigation and recreation opportunities and potentially creating unsafe conditions. The graphic at right summarizes the tourism industry and the impacts of flooding and storm events.

TOURISM AT A GLANCE

River Basin **Mohawk** **Oswego**

Inventory of Recreation Facilities



Canal Trail

99
miles

123
miles



Boat Launches

34

22



Tourist Cruises

22

55



Lodging

24

80



Rental Facilities

5

22

Flood Impacts of the Last Five Years (2017-2022)*



Public Assistance
Claims

12

26



Public
Assistance
Spending

\$1.1M

\$16M

**Based on publicly available data.*

2.5 Public Infrastructure & Transportation

The flooding events in the past five years have impacted both Canal infrastructure and transportation infrastructure. Based on discussions with NYPA staff, it was determined that the 2019 Halloween event caused \$1M damage at Erie Canal Lock E-12. This was due to delayed implementation of the movable dam lifting. In May 2021, there was a failure of the Canal embankment dam adjacent to Lock E-29 from high water levels caused by runoff during a precipitation event. The Canal was closed in this section for a period and the pool was operated at a lower water level for a significant portion of the 2021 navigation season.

The table below summarizes the total amount of public infrastructure contained within each River Basin, as well as number of Public Assistance (PA) claims and associated project spending for public infrastructure and transportation between 2017-2022:

River Basin	Mohawk	Oswego
Inventory of Flood Protection Measures		
Miles of Roadway	9,327	15,740
% of Roadways in SFHA	1% (102 miles)	2% (261.4 miles)
# of Bridges in SFHA	167	256
Miles of Railroad	407	800
% of Railroad in SFHA	15% (61.6 miles)	12% (92 miles)
Flood Impacts of the Last Five Years (2017-2022)*		
# of Road & Bridge PA Claims	120	158
Total Road & Bridge PA Project Spending	\$22.4 Million	\$15.7 Million

*Based on publicly available data.

2.6 Power Generation

The New York State Canal System supports a significant amount of hydroelectric production. Generally, hydroelectric facilities are designed to withstand a major flooding/storm event due to their location adjacent to or within the river/canal channel so no significant loss due to storm events is anticipated. In extreme cases, flooding can overwhelm hydropower infrastructure, causing power interruptions and failure.

There are 12 known hydroelectric facilities in the Mohawk River Basin - three on the Erie Canal, one on the Mohawk River, four on West Canada Creek, three on East Canada Creek, and one on Schoharie Creek. There are 11 such facilities in the Oswego River Basin - two on the Cayuga-Seneca Canal, two on the Erie Canal/Seneca River, and seven on the Oswego Canal/Oswego River.

GREGORY B. JARVIS HYDROELECTRIC PROJECT



Source: NYPA

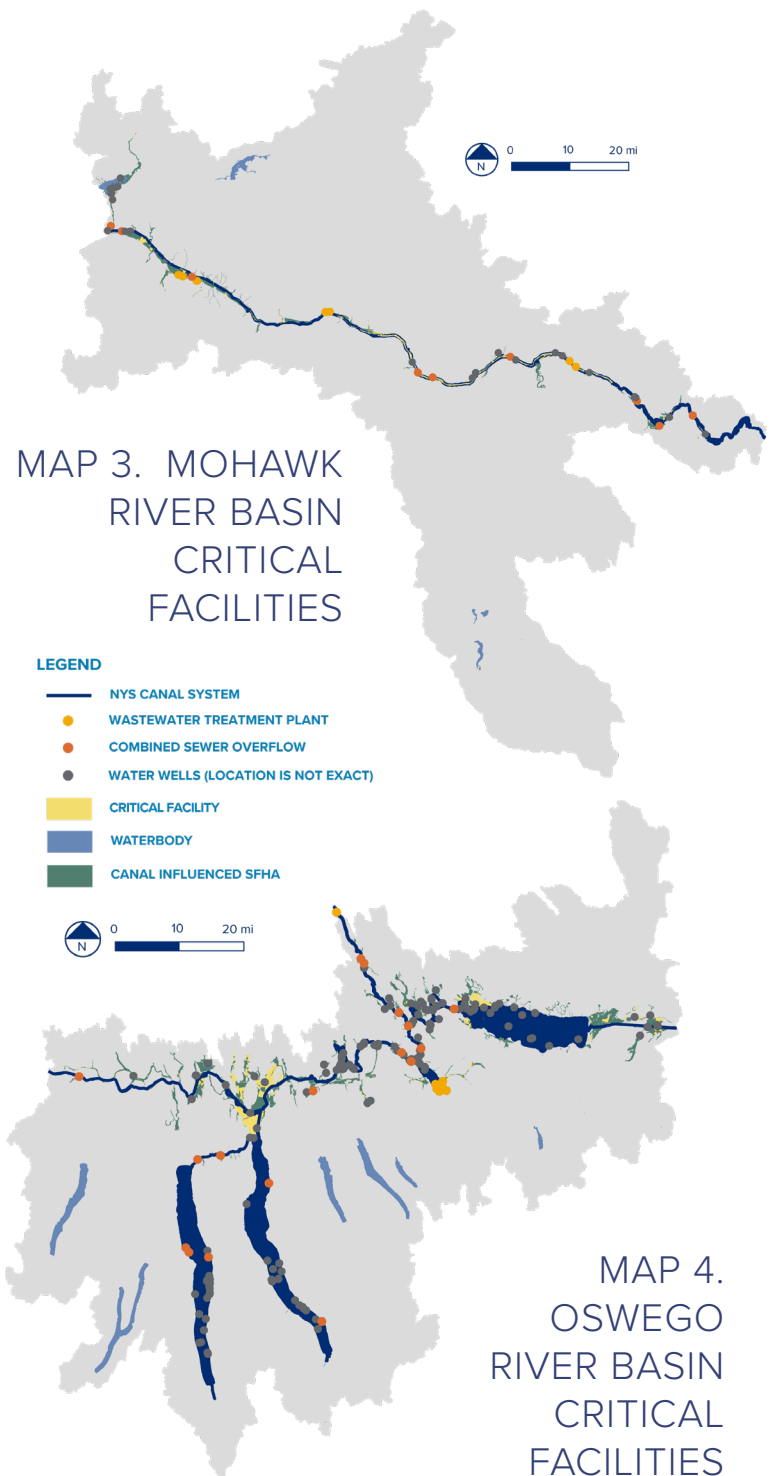
2.7 Public Health & Critical Facilities

Point source pollution generally arises from municipal, residential, industrial and agricultural sources and are regulated by state and federal agencies. Non-point source pollution also arises from various sources, but is unregulated by state or federal agencies. Pollution can impact public health if discharges exceed regulatory limits for industrial and municipal wastewater treatment plants, or private wells are contaminated due to flooding. In addition, sources such as Combined Sewer Overflows (CSOs) affect public health due to increased pollution levels and public perception of water quality and suitability for recreational use, especially after rainfall events. Other critical facilities based on their impact to public health and safety to be considered include facilities such as chemical or hazardous material storage facilities, hospitals, correctional facilities, power generation and transmission facilities, communication centers, and emergency services such as police and fire stations. The table below summarizes the number of public assistance (PA) claims and associated project spending for such facilities between 2017-2022:

River Basin	Mohawk	Oswego
Flood Impacts of the Last Five Years (2017-2022)*		
# of Water Control Facility PA Claims	6	6
Total Water Control Facility PA Project Spending	\$2.3 Million	\$2.2 Million
# of Public Utilities PA Claims	8	13
Total Public Utility PA Project Spending	\$4.5 Million	\$1.9 Million
# of Protective Measures Claims	47	60
Total Protective Measures PA Project Spending	\$1.9 Million	\$2.1 Million

*Based on publicly available data.

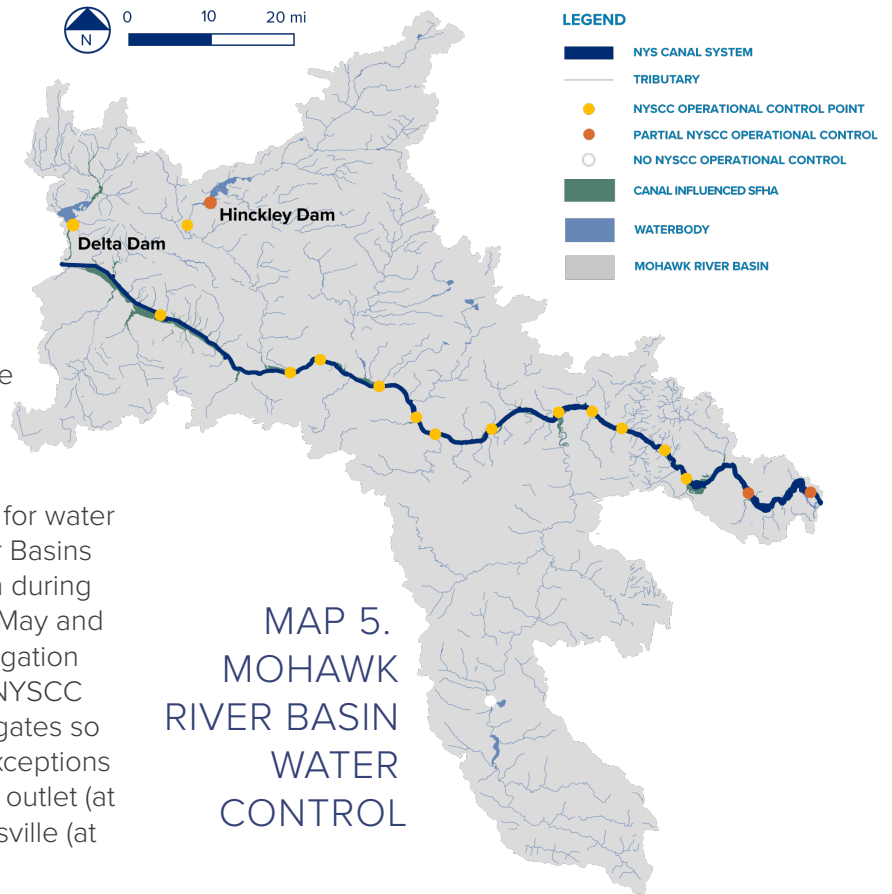
Point source pollution is defined by the U.S. Environmental Protection Agency (EPA) as “any single identifiable source of pollution from which pollutants are discharged, such as a pipe...” Non-point source pollution is a dispersed source that is difficult to measure and is highly variable due to different rain patterns and other climatic conditions (USEPA).



3. CANAL OPERATIONS

3.1 Water Control

Under the New York State Canal Law, the NYSCC’s primary function is to ensure that the Canal System is navigable for recreational and commercial vessels. To that end, there are operating guidelines for water levels in the Mohawk and Oswego River Basins that are designed to optimize navigation during the boating season, generally between May and October each year. During the non-navigation season, between November and April, NYSCC has historically opened their regulating gates so as not to impede flood flows, with the exceptions of the control structures at Cayuga Lake outlet (at Cayuga-Seneca Lock CS-1) and Baldwinsville (at Erie Canal Lock E-24).



MAP 5. MOHAWK RIVER BASIN WATER CONTROL

Mohawk River Basin

NYSCC is the primary operating entity in the Mohawk River Basin. The varying control NYSCC has over the Canal System in the Mohawk River Basin is summarized below:

NYSCC OPERATIONAL CONTROL
<ul style="list-style-type: none"> Movable Dams MD 4 through MD 11, adjacent to Erie Canal Locks E-8 through E-15 Movable Dam MD 12 at Rocky Rift Hinged crest gates and Movable Dam MD 14 associated with Erie Canal Lock E-18 Nine Mile Feeder Dam Utica Harbor Dam Guard Gates 1 through 7 Delta Dam

PARTIAL NYSCC OPERATIONAL CONTROL
<ul style="list-style-type: none"> Hinckley Reservoir in coordination with Brookfield Power and NYPA Blenheim Gilboa Lower Reservoir, owned and operated by NYPA Vischer Ferry Dam regulated through the NYPA Vischer Ferry Hydroelectric Project Crescent Dam regulated through the NYPA Crescent Hydroelectric Project

NO NYSCC OPERATIONAL CONTROL
<ul style="list-style-type: none"> Schoharie Reservoir, owned and operated by NYCDEP Hydroelectric projects on West Canada Creek downstream of Hinckley Reservoir Hydroelectric projects on East Canada Creek

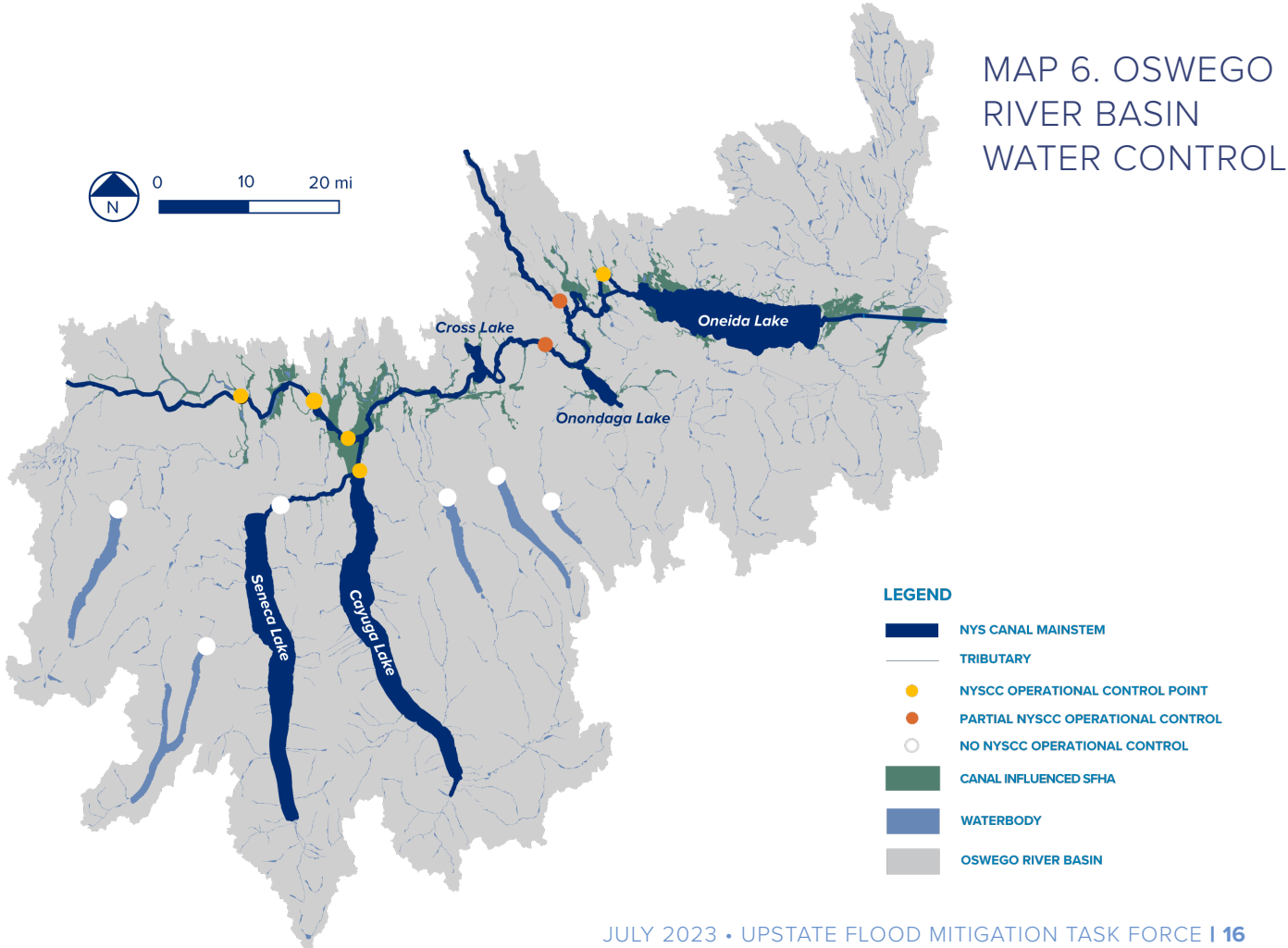
Oswego River Basin

There are several operating entities in the Oswego River Basin, which means that the NYSCC has more limited or interdependent influence over water management across the Basin. The varying control NYSCC has over the Canal System is summarized below:

- NYSCC OPERATIONAL CONTROL**
- Erie Canal Lock E-27 and gated dam
 - Erie Canal Lock E-26 and gated dam
 - Erie Canal Lock E-25 and movable dam MD 18 at Mays Point
 - Cayuga-Seneca Lock CS-1 (Mud Lock) at Outlet of Cayuga Lake
 - Erie Canal Lock E-23 and Caughdenoy Tainter gated dam, that controls Oneida Lake outflow

- PARTIAL NYSCC OPERATIONAL CONTROL**
- Erie Canal Lock E-24: Seneca River (Baldwinsville) in coordination with Eagle Creek Renewable Energy
 - Oswego Canal Lock O-1: Oswego River (Phoenix) in coordination with Eagle Creek Renewable Energy

- NO NYSCC OPERATIONAL CONTROL**
- Oswego Canal Locks O-2 through O-8
 - Canandaigua Lake Outlet
 - Keuka Lake Outlet
 - Seneca Lake Outlet
 - Owasco Lake Outlet
 - Skaneateles Lake Outlet
 - Otisco Lake Outlet



MAP 6. OSWEGO RIVER BASIN WATER CONTROL

3.2 Limitations to Water Control during Flood Events

The NYSCC has operational control of the movable dams in the Mohawk River Basin to enable navigation and to provide flood damage mitigation by lifting the movable dams out of the water in advance of flood events during the navigation season. In contrast, in the Oswego River Basin there are Finger Lake outlets that are not controlled by NYSCC, but significantly influence water levels in the Canal System. These lakes have seasonal operating guidelines for lake levels, called rule curves, that serve other priorities such as water supply, recreation, hydropower, and winter ice damages mitigation. For example, during the summer, lake levels are maintained at a higher water level than during winter to prioritize recreation. At all times, NYSDEC requires minimum water releases during low-flow periods to maintain adequate water quality downstream and support a healthy aquatic ecosystem.

The successes and limitations to water control during flood events are summarized below:

Mohawk River Basin

- Delta Reservoir water levels are maintained at the spillway crest, during the navigation season, which prioritizes activities, such as summer recreational boating. This means that there is no surplus storage in the reservoir during heavy precipitation events. In the fall, water levels are drawn down approximately six feet to provide flood retention storage during the non-navigation season.
- Hinckley Reservoir water levels vary over a range of 35 feet throughout the year based on water needs and inflows. Flows released by Hinckley Reservoir are regulated by

NYPA and NYSCC in accordance with the 2012 Hinckley Reservoir Operating Diagram. Reservoir levels are highest during navigation season, and lowest in late winter. Releases are made from Hinckley Reservoir into West Canada Creek, and reservoir management activities are coordinated with downstream hydropower producers. Hinckley Reservoir is not currently operated to provide flood mitigation.

- The Canal System that runs parallel to, or is co-located with, the Mohawk River was not designed and is not operated for flood mitigation.
- The operating document Movable Dam Lifting Procedure (K118-EMP- 0006) has been in use since 2018 for lifting the movable dams in advance of forecasted storm events during navigation season. This operational change has succeeded in providing flood mitigation benefits for both NYSCC infrastructure and surrounding properties. At the end of the navigation season, the movable dams are lifted and remain lifted until the start of the next navigation season.
- There are limitations in the current flood forecasting models, including their inability to account for sudden changes in weather patterns. Given the length of time required to complete the Movable Dam Lifting Procedure and provide advance Notification to Mariners, rapid flooding and damage to NYSCC infrastructure can occur. These limitations can also result in significant staff effort to lift the Movable Dams for flooding that does not materialize.



Source: New York Times

During the 2019 Halloween Storm precipitation in the West Canada Creek Basin region greatly exceeded forecasts, and some movable dams were not raised in sufficient time to mitigate flooding or prevent damage to Canal infrastructure. The image above shows the flooding impacts on North Main Street in Dolgeville, NY.



Source: LocalSYR.com

During Spring 2017, Cross Lake exceeded its damage initiation level for almost two months. While this was happening, many of the upstream lakes were operating near their rule curve. Cayuga Lake was the only lake operating above or within 0.5-ft of the lake's damage initiation level. The image above depicts flooding at Cross Lake that occurred again in Fall 2021.

Oswego River Basin

- **Seneca and Clyde Rivers Upstream of Three Rivers Junction:** NYSCC only regulates the Seneca and Clyde Rivers from May through October, during the navigation season. The majority of this part of the basin is either unregulated or regulated by other entities. Within the last eighteen years, a High Flow Management Rule, an agreement between Brookfield Power, Eagle Creek Renewable Energy, and NYSCC, has provided some flooding relief to low-lying lands along the Seneca and Oneida Rivers upstream of Phoenix Dam at Oswego Canal Lock O-1. While NYSCC does not have control over releases from Keuka and Seneca Lakes, which feed into Cayuga Lake, they operate the Cayuga-Seneca Canal to mitigate the impacts of high water on Cayuga Lake residents and downstream communities to the extent possible.
- **Oneida River Upstream of Three Rivers Junction:** Oneida Lake levels have not approached the Lake's initiation of flooding damage levels at any time in the last five years during the non-navigation season. Oneida Lake levels have exceeded the initiation of lake flooding damage level twice during the navigation season in the last five years but in both instances the gates at Caughdenoy Dam were fully opened as they are during the non-navigation season such that Canal System operations did not negatively effect flood levels.
- **Underutilized Flood Storage in Finger Lakes:** Operators of Owasco, Seneca and Keuka Lake outlets regulate their lake levels well below the initiation of flooding damage level, meaning that if these control points followed a different operating procedure during high flow events, downstream flooding could be mitigated. During a spring runoff period, a different operating procedure could allow a for a greater amount of surface runoff to be stored below the initiation of damage level.



Records from flooding that occurred in April 2023 along Cross Lake show that NYSCC began reducing outflow from Cayuga Lake at Cayuga & Seneca (C&S) Lock 1 in response to a spring rainfall-runoff event and did not begin to increase outflow from C&S Lock 1 until the water level at Cross Lake had fallen below the Cross Lake damage level. NYSCC conducted operations at CS-1 to limit downstream flooding but despite their best-efforts, water levels reached and exceeded the damage level along Cross Lake.

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4. ASSESSMENT OF FLOODPLAIN REGULATION POLICIES

4.1 Floodplain Management

Floodplain management involves strategic planning for development to ensure that when flooding occurs in a community, damages are minimized, and repairs and restorations can occur quickly and with minimal expense. Floodplain management is enacted through floodplain development regulations, land use planning, building codes, mitigation, and other techniques, and requires cooperation between all levels of government.

The Task Force recognizes that while flood control is not NYSCCs or NYPAs primary mission, there are steps that can be taken within the areas of the Erie Canal System jurisdiction to reduce flooding.

Floodplain Management Opportunities & Constraints

OPPORTUNITY/CONSTRAINT	DESCRIPTION
Solutions to flood damage cannot be accomplished by any single agency.	Within New York State, agencies that must contribute to reducing flood damages include, but are not limited to: NYSDEC, EFC, NYSDOT, NYSOPRHP, NYSDHSES, and NYSCC. These agencies may also partner with federal agencies including FEMA, EPA, USGS, USACE, NRCS, and others.
Approaches to flood damage cannot simply move flooding from one location to another.	While water must go somewhere, blocking flows, redirecting flows, or increasing flows should not be done if the result is to increase flooding elsewhere.
There needs to be sufficient weather and stream gages to accurately monitor conditions and study potential changes.	Floodplain development regulations are reliant on sufficient data to manage development and make decisions.

4.2 Flood Mapping

Detailed FEMA flood maps and accompanying Flood Insurance Studies (FIS) determine 10%, 2%, 1%, and 0.2% annual chance flood flows, flooding extents, and flood elevations.

Flood Mapping Opportunities & Constraints	
OPPORTUNITY/CONSTRAINT	DESCRIPTION
<p>Several flood mitigation counties in the Mohawk and Oswego River Basins do not have access to updated, digitized FIRMs.</p>	<p>Accurate, current floodplain maps are crucial to inform decisions about the design and placement of buildings and infrastructure. While much of the Mohawk River Basin has been remapped by FEMA in the past 15 years, much of the Oswego River Basin does not have updated, recent, digital flood maps. Counties without digital maps include:</p> <ul style="list-style-type: none"> • Mohawk: Fulton, Hamilton, Herkimer, Lewis, Madison, and Saratoga Counties • Oswego: Chemung, Cortland, Steuben, Ontario, Schuyler, Seneca, Tompkins, Wayne, and Yates Counties.
<p>FEMA is willing to add data to mapping products but is not able to do so within their limited mapping budget.</p>	<p>More useful maps and studies, including future conditions data and flood depth data, can be produced, but require non-federal partnerships. New York State through the NYSDEC Floodplain Management Section participates in FEMA's Cooperating Technical Partners (CTP) program that allows for non-federal partners to contribute to flood map production, outreach and non-regulatory mapping products.</p>
<p>FIS and FIRM maps need to consider debris blockages and potential ice jams.</p>	<p>Without factoring these into the mapping process, the current maps underestimate flooding extents where these barriers are present.</p>

FLOODING AT ERIE CANAL LOCK E-8, SEPTEMBER 2011



Source: John Carl D'Annibale | Times Union

4.3 Building Codes & Development Standards

FEMA has developed minimum standards for floodplain development in the SFHA, those areas that would be flooded during the 1% annual chance flood event. Through the NFIP, municipalities are held to certain development standards that minimize impacts to the floodplain derived from FEMA regulations and the Uniform Code of New York State, based on the International Building Code, that is updated every three years. The Floodplain Management Section of NYSDEC assists communities by helping them pass compliant local laws, by offering technical assistance and training, and by undertaking review of their floodplain permitting and enforcement.

Building Codes & Development Standards Opportunities & Constraints	
OPPORTUNITY/CONSTRAINT	DESCRIPTION
There are buildings in the Mohawk and Oswego River Basins built prior to 1970, when there were no floodplain laws, ordinances, or regulations.	These buildings are not subject to NFIP regulations unless they have been substantially damaged and/or are being substantially improved. FEMA defines “substantial” as the cost of repair or improvement being at least 50% of the pre-existing structure value.
Local land use activities other than buildings affect flood risk.	This is reflected in FEMA regulations and local laws with respect to floodways. Floodways are areas adjacent to rivers and streams that must be kept clear of development to pass the 1% annual chance of flooding without increasing flood elevations.
There needs to be consistent use of 6 NYCRR Part 502 on State projects.	This NYSDEC regulation requires state projects to meet FEMA’s floodplain standards. A state project is any project on state land, or any project undertaken or fully or partially funded by a state agency. No permit from FEMA is required, however, NYSDEC is authorized to issue variances from the floodplain standards and requirements.
NFIP regulations are minimum standards.	There is an opportunity for communities to enforce higher standards. Since 2006, the Uniform Code of New York has exceeded FEMA NFIP minimum standards by requiring the lowest flood of new or substantially improved buildings within the SFHA to be at least two feet higher than the BFE, which significantly reduces risk for new and substantially improved buildings.
Detailed recommendations are contained in the New York State Flood Risk Management Guidance for Implementation of the Community Risk and Resiliency Act (CRRA) do not apply to all development under state or local jurisdiction.	The CRRA applies to various state permit programs, however, the published guidance could apply to all development under state or local jurisdiction.

4.4 Local Government Assistance

Floodplain regulations are enforced at the local level except for state or federally owned land. Local governments are responsible for enforcing floodplain standards both under their local laws, passed as a condition of participation in the NFIP, and through the Uniform Code of New York State.

Local Government Assistance Opportunities & Constraints	
OPPORTUNITY/CONSTRAINT	DESCRIPTION
Federal and state governments cannot directly manage land use.	However, under the NFIP, local governments with land use authority agree to pass local laws or ordinances that meet or exceed FEMA regulations. There is a need for development regulations to become uniformly presented in the zoning code and uniformly enforced, to produce standardization between municipalities.
There is a lack of NYSDEC staffing to provide adequate NFIP assistance to communities in New York State.	With 1,500 NFIP participating communities in New York State (the second most of any state in the nation), and limited NYSDEC staff, existing staff cannot begin to offer the amount of assistance needed at the local level. Therefore, municipalities in the Mohawk and Oswego River Basins are not receiving the assistance they need to effectively administer the NFIP, access resources, and improve local enforcement.
Local government' buildings, code enforcement, zoning, and planning staff are constantly changing.	Many of New York State's municipalities are small and municipal employees often serve several functions. For this reason, local expertise is often lacking, and local governments depend on outside assistance to carry out their responsibilities.
The CAP-SSSE grant has not been sufficient to provide NYSDEC with all the resources needed to perform its functions.	NYSDEC receives an annual grant from FEMA, known as the Community Assistance Program – State Support Services Element (CAP-SSSE) to help fund the state's floodplain management program meant to help the state assist local communities with their NFIP requirements. Additional resources are needed either from FEMA, or potentially from the state.
Additional resources are needed to increase participation in FEMA's Community Rating System (CRS).	The CRS is a FEMA program that provides flood insurance discounts in communities that go beyond FEMA's minimum requirements. There is a need for additional assistance to encourage more communities to become involved in CRS.

4.5 Mitigation of At-Risk Structures

Floodplain management mitigation actions are those that reduce flooding risk to existing structures. Most hazard mitigation funding comes from FEMA in the form of the Hazard Mitigation Grant Program (HMGP) funds after disasters, Building Resilient Infrastructure and Communities (BRIC) annual funding, and Flood Mitigation Assistance Program (FMAP) funding.

Mitigation of At-Risk Structures Opportunities & Constraints	
OPPORTUNITY/CONSTRAINT	DESCRIPTION
The state must also be prepared to take advantage of new programs that can help leverage mitigation.	The federal STORM act (Safeguarding Tomorrow through Ongoing Risk Mitigation) authorizes FEMA to provide capitalization grants to states to establish low interest revolving loan funds that provide hazard mitigation assistance to local governments. The New York State Environmental Bond Act also creates a mechanism to utilize funds to increase flood mitigation.

4.6 Infrastructure Development Approaches

State and local governments make decisions on the location and expansion of infrastructure such as roads, water lines, stormwater collection systems, and wastewater conveyance and treatment systems.

Infrastructure Development Approaches Opportunities & Constraints	
OPPORTUNITY/CONSTRAINT	DESCRIPTION
Some infrastructure must be in floodplains, such as water supply sources, wastewater treatment plants, and bridges.	This infrastructure must be designed in a manner that does not increase flood risk for others, and that keeps them safe during floods.

4.7 Watershed Management

Reduction of flood risk cannot be accomplished only within the floodplains themselves. Every place is within a watershed, and what happens anywhere within that watershed affects water quality and quantity downstream.

Watershed Management Opportunities & Constraints	
OPPORTUNITY/CONSTRAINT	DESCRIPTION
In November 2018, New York State launched the Resilient NY program. There is an opportunity to fund more communities.	The overall goal of the program is to improve community resiliency to extreme weather events that result in flooding and ice jam formations. 48-high priority watersheds throughout the state were identified, and \$3 million in funding has been committed to the initiative through the NYS Environmental Protection Fund (EPF).

4.8 Flood Disclosure

Buildings that have had previous flood damages are those most likely to suffer future damages. However, there is a general lack of awareness during real estate transactions regarding the flood risk to structures.

Flood Disclosure Opportunities & Constraints	
OPPORTUNITY/CONSTRAINT	DESCRIPTION
There is a lack of detail included in New York State property disclosure laws and a lack of retribution for false reporting.	In New York State, disclosure includes a single question regarding flooding, which is, “Is any or all of the property located in a designated floodplain?” The response options are yes, no, or unknown. Failure to disclose or knowingly providing false information on the disclosure may result in a \$500 fine. Bills were introduced in both houses of the NYS Legislature, during the current legislative session, to improve the property notification laws and to allow for civil suits in the case of knowingly false statements. At the time of this writing, the bill has passed both the Senate and Assembly, and is awaiting the Governor’s signature.

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5. RECOMMENDATIONS

Recommended Adaptive Measures

The Task Force and its subcommittees have reviewed the available reports, NYSCC operational records, and historic flooding information as part of the preparation of this report. Based on the information available, discussions between Task Force members and subcommittees, public input, and each member’s area of expertise, the Task Force recommends the following adaptive measures be further studied or implemented to help reduce flooding in the Mohawk and Oswego River Basins. The table below summarizes the proposed investments by type and by River Basin:

Basin	Capital Project Costs	Study/Program Costs	Total Costs
MOHAWK	\$28M	\$20M	\$48M
OSWEGO	\$15M	\$18M	\$33M
TOTAL	\$43M	\$38M	\$81M

5.1 Common Measures

The Task Force recommends the following adaptive measures be applied to both the Mohawk River and Oswego River Basins, considering potential actions for implementation and potential barriers to implementation:

1. Numerical Watershed Models	
DESCRIPTION	Full models are unavailable to estimate normal or flood flows for either basin. Watershed models are critical to inform operational changes and estimates of recommended modifications.
EST. COST	\$1.3M (study)
ACTIONS	<ul style="list-style-type: none"> • Develop and calibrate hydrologic/hydraulic models using industry standard software • Enable scenario development and response simulation • Complete land and water-based surveys and update with new surveys • Consider partnering with federal forecasting and educational entities
BARRIERS	<ul style="list-style-type: none"> • Resource availability to conduct a model scoping study • Communication with state and federal agencies regarding existing models • Resource availability to conduct bathymetric and LiDAR survey to support and update models
2. Standing Committees	
DESCRIPTION	No single entity within the two basins has flood mitigation as its primary mandate when managing water releases from lakes and reservoirs. Certain uses are dictated by operating diagrams or flow requirements. There is a lack of communication between entities during flood events.
EST. COST	To be determined based on who participates on the committee and what incentives need to be offered to increase participation.
ACTIONS	<ul style="list-style-type: none"> • Establish a permanent, standing committee for each basin • Include water control entities, community stakeholders, NYSDEC, DHSES, and others • Develop better flood operational strategies, coordinated releases, and improved communication
BARRIERS	<ul style="list-style-type: none"> • No incentive for participation • Most hydroelectric facilities are licensed, and are required to adhere to FERC requirements • License amendments may be needed to maximize flood mitigation benefits and a significant amount of time and effort may be required to accomplish this.

3. Increase Public Outreach, Education, & Communication

DESCRIPTION	Several previous reports recommend a collaborative effort to conduct educational events and develop materials to better educate the public regarding flood risks.
EST. COST	\$100K (study)
ACTIONS	<ul style="list-style-type: none"> Establish a NYPA led informal working group to include water control entities, lake associations, local governments, the NYSFSMA, NYSDEC, and others to develop an improved education strategy within the next 12 months
BARRIERS	<ul style="list-style-type: none"> Resource availability to support the communication and development of educational materials

4. Communicate Flood Event Elevations using a Common Datum

DESCRIPTION	To improve and simplify communication with the public and other stakeholders during flood events, communicate publicly facing flood event elevations for storm events using a common datum. Presently, public facing elevations are presented using several datums (eg. BCD, NAVD88, NGVD29). Providing flood elevation on a common datum consistent with current NFIP maps that all use NAVD88 datum is recommended to help residents understand the frequency of flood event elevations.
EST. COST	\$250K (study)
ACTIONS	<ul style="list-style-type: none"> Recommend that all publicly facing flood event elevations be reported and displayed in NAVD88 datum, and that all agencies (NYSCC, USGS, NWS, DHSES) providing flood event elevations utilize NAVD88 datum Discontinue use of Barge Canal Datum (BCD) for publicly facing communications.
BARRIERS	<ul style="list-style-type: none"> The conversion from BCD to NAVD88 is non-linear, therefore NYSCC would need to help other entities convert to NAVD88 datum, some field survey will be required to confirm or determine the BCD to NAVD88 conversions, NYSCC would require additional resources to communicate with and assist other entities with the conversion.

5. Purchase and/or Restore Disconnected Floodplains

DESCRIPTION	Many floodplains have become disconnected from their rivers and streams, resulting in reduced flood storage, higher flood peaks, and higher flood levels.
EST. COST	\$2.0M (annual program cost)
ACTIONS	<ul style="list-style-type: none"> Support state and local entities and Non-Governmental Organizations (NGO's) efforts and initiatives to purchase and/or restore these areas for flood mitigation and water quality improvements
BARRIERS	<ul style="list-style-type: none"> Resource availability for property purchases and barrier removal Potential tax base loss due to public ownership of additional lands, although benefits provided by creating additional open space and reducing flood impacts would likely offset short term tax base loss

6. Purchase Flood-Prone Structures within Floodplains

DESCRIPTION	Each basin has a significant number of structures (residential and commercial) within the floodplain that include other impervious surfaces on their property. The presence of the structures reduces the available flow area during flooding events, increases run-off, and can present a significant hazard to the occupants.
EST. COST	\$2.0M (annual program cost)
ACTIONS	<ul style="list-style-type: none"> • Develop a more robust coordinated flood buyout program for homes within the FEMA floodplain, targeting properties subject to frequent flooding, but include all properties located within FEMA mapped floodways • Develop a 'toolkit' for municipalities and residents to navigate programs (NRCS, BRIC, and HMGP) and allow them to seek the best buyout program option for their situation • Investigate other grant funding opportunities to ensure the maximum benefits are achieved • Restore properties to provide additional flood mitigation capabilities and create permanent land use restrictions to prevent future development
BARRIERS	<ul style="list-style-type: none"> • Resource availability for property purchases and structure removal (permitting, construction) • Potential local community tax base loss due to public ownership of additional lands • Ensuring property owners have sufficient incentives to relocate outside of a floodplain

7. Address Tributary and Main Stem Erosion and Sedimentation

DESCRIPTION	Many tributaries originate in higher elevation areas and have steep gradients, which generally results in higher velocities and in higher levels of streambank erosion and sediment mobilization. Additionally, as areas adjacent to and within the floodplain are developed, the floodplain can become disconnected and riparian buffers are often deforested, leading to new or increased sediment entering a tributary. Once entering the Canal or reservoirs, flows are reduced, allowing sediments to settle and accumulate, changing the characteristics, impacting flood capacity, navigation, recreation, and water quality.
EST. COST	\$100k (program development) \$250k (study - 50 miles of streams)
ACTIONS	<ul style="list-style-type: none"> • NYSDEC and NYSCC initiate discussions with responsible local, state, and federal agencies and stakeholders to champion programs, provide information on grant programs, and work on basin-wide planning • Investigate a riparian reforestation program and support applications for riparian easements through NRCS, CREP, or CRP • Set aside seed money to develop a program that creates a framework and performs example study projects where erosion, scour, and sedimentation are problematic
BARRIERS	<ul style="list-style-type: none"> • Resource availability within responsible local, state, and federal agencies • Feasibility of a group discussion due to the size and number of agencies/stakeholders in each basin; smaller, tributary specific groups may be advisable

8. National Flood Insurance Program (NFIP) Support for Municipalities and NYSDEC

DESCRIPTION	Municipalities participating in the NFIP are required to follow guidelines to regulate development within their floodplains and are trained and audited by DEC to ensure compliance.
EST. COST	\$250K (annual program cost)
ACTIONS	<ul style="list-style-type: none"> • Pursue and implement additional measures to assist NYSDEC with program oversight and pursue additional funding or educational opportunities to assist communities with compliance • NYSCC/NYPA should pursue FEMA Cooperating Technical Partners (CTP) status
BARRIERS	<ul style="list-style-type: none"> • Resource availability at both NYSDEC and NYSCC to maximize benefits of CTP participation and expanded community outreach, especially to those communities that lack in-house capabilities • Limited FEMA funds available for FEMA Region 2 CTP program partners

9. Reduce Development in Flood Prone Areas

DESCRIPTION	Municipalities participating in the NFIP are required to have planning and land use requirements to control activities within the floodplain through Zoning and Subdivision laws. However, there are differences in enforcement for what is required to construct or alter a structure within the floodplain.
EST. COST	\$250k (annual program cost)
ACTIONS	<ul style="list-style-type: none"> • Offer municipalities training and assistance related to zoning code regulations • Develop an outreach program at the state level to assist municipal governments with having jurisdiction over properties in each basin • Hire two additional staff at NYSDEC dedicated to assisting communities in the Mohawk and Oswego River Basins • Provide municipalities with a 'toolkit' including recommended zoning and land development provisions, including higher standards for their local laws for flood damage prevention
BARRIERS	<ul style="list-style-type: none"> • Resource availability within NYSDEC to dedicate time to answering inquiries and assisting municipalities above the current level • Resource availability for review, audit, and enforcement

10. Sharing of Agency Developed Hydraulic Studies with Other Agencies and Stakeholders

DESCRIPTION	It has not been common practice for New York agencies to share hydraulic models and studies with other agencies, and many times, other agencies are unaware of the efforts. Sharing models would provide other agencies with useful data that could reduce flood mapping update costs, provide improved flood mapping information that could be used by the local floodplain administrators, and prevent redundant efforts.
EST. COST	\$600K (annual program cost)
ACTIONS	<ul style="list-style-type: none"> • Enable resource-sharing between NYSDOT, NYSDEC, NYSCC, NYSDHSES, DASNY, and NYSDOC related to hydraulic models and studies
BARRIERS	<ul style="list-style-type: none"> • Resource availability within State agencies.

5.2 Mohawk River Basin Measures

The Task Force recommends the following adaptive measures specific to the Mohawk River Basin be implemented.

1. Update FEMA FIRM Mapping based on NYSCC 2018 Procedural Change

DESCRIPTION	In 2018, NYSCC developed and implemented a new procedure for operation of their movable dams. The most recent FEMA Flood Insurance Rate Maps (FIRMs) do not take the procedure into account, and potentially overestimate the number of properties within the floodplain.
EST. COST	\$700K (study)
ACTIONS	<ul style="list-style-type: none"> • Update FIRMs in the vicinity of the NYSCC's movable dams based on the new procedure • Update all FEMA maps to incorporate this procedure (45 estimated FEMA Panels)
BARRIERS	<ul style="list-style-type: none"> • Resource availability to develop a model if the effective FIS models were not used and perform the map changes to the necessary level of effort • CTP participation by NYSCC to ensure cooperation and ease of implementation

2. Investigate Modernizing NYSCC’s Movable Dams

DESCRIPTION	NYSCC movable dams require significant maintenance, upkeep, and substantial time and manpower to remove prior to a flood event. Technologies have advanced that serve a similar function, but require significantly less time, maintenance, and manpower to operate.
EST. COST	\$5.0M (10 movable dam studies)
ACTIONS	<ul style="list-style-type: none"> Implement a movable dam modernization study to reduce time required to remove and install movable dams during flood events and reduce operational cost If modernization cannot be completed, make structural upgrades
BARRIERS	<ul style="list-style-type: none"> Resource availability to evaluate design alternatives, design, and construct modernized structures

3. Ice Jam Mitigation in the Schenectady Area

DESCRIPTION	During the past three winters, NYSCC/NYPA has deployed an ice breaking tugboat to break sheet ice between Vischer Ferry Dam (Lock E-7) and Lock E-8. No ice jam has formed during the limited operation. The Reimagine the Canals Task Force report recommended pursuing modifications at Vischer Ferry Dam to further benefit ice jam mitigation efforts and estimate benefits for flooding events.
EST. COST	\$27.75M (one time capital cost), \$350K (annual O&M cost)
ACTIONS	<ul style="list-style-type: none"> Continue and permanently fund ice breaking operations Find a capital project to pursue modifications to Vischer Ferry Dam to further benefit ice jam mitigation efforts
BARRIERS	<ul style="list-style-type: none"> Resource availability to pursue modifications, including annual operating costs

4. Investigate Modifying Operations at Delta Reservoir and Separated Canal Section

DESCRIPTION	Delta Reservoir could have increased flood storage capacity if the reservoir was not operated to keep water levels at the dam crest elevation during the navigation season. Several sections of the Canal are separated from the Mohawk River, and it is possible flood elevations on river sections could be reduced if the Canal sections and locks were modified to allow flood flow.
EST. COST	\$4.0M (study)
ACTIONS	<ul style="list-style-type: none"> Conduct additional study to better estimate the benefit of modified Delta Reservoir operation during navigation season Study other sections where the Canal and Mohawk River are separated to estimate if flood mitigation benefits would be sufficient to justify the estimated costs Continue to pursue grant funding for a capital program to reduce flooding in the Utica/Rome area
BARRIERS	<ul style="list-style-type: none"> Resource availability to further develop the initial study and obtain funding to construct the improvements

5. Update FEMA FIRMS within the Mohawk River Basin

DESCRIPTION	Within the six Flood Mitigation Regions of the Mohawk River Basin, there are complete digital coverage of flood studies and reports related to the flood prone areas for all counties, except Herkimer County.
EST. COST	\$6M (study)
ACTIONS	<ul style="list-style-type: none"> Prioritize an engineering study of the floodplains and a countywide digital FIRM
BARRIERS	<ul style="list-style-type: none"> Flood study funding is provided through Congressional Appropriations, which may fluctuate annually, and may also be directed to other parts of the FEMA program. Additionally, there is limited opportunity to direct which counties are studied within FEMA’s plan.

5.3 Oswego River Basin Measures

The Task Force recommends the following adaptive measures specific to the Oswego River Basin be implemented.

1. Basin Release Coordination	
DESCRIPTION	There is limited flow release coordination during flood events and normal conditions. The Finger Lakes have some limited capacity to store water during a flood event, but they are governed by a Rule Curve, and a different entity controls discharge from each one. There are a significant amount of structures in Seneca River's Canal operations influenced SFHA from Erie Canal Lock E-25 and Cayuga-Seneca Canal Lock CS-1 to Erie Canal Lock E-24 that experience "nuisance flooding" during events less than the 1% annual probability event.
EST. COST	To be determined based upon which water management entities participate and what authority the group will have in regulating flows and water levels.
ACTIONS	<ul style="list-style-type: none"> • Use Numerical Watershed Models to estimate the benefits from using flood storage above each Finger Lake's Rule Curve to provide a framework for watershed releases during high flow events • Create a stakeholder group to review model results, including all entities that control flood water discharges or a tributary thereof, community stakeholder groups, NYSDEC, and subject matter experts • Consider phasing of this group from initial group, to volunteer group, to water regulating district
BARRIERS	<ul style="list-style-type: none"> • There may be competing interests between the group members, federal and state agencies, which may complicate the recommendations or processes
2. Baldwinsville Dam (Erie Canal Lock E-24 Dam) Modification	
DESCRIPTION	During high flow periods, the infrastructure and hydroelectric facility capacities are generally exceeded. A previously completed USACE Report identified the most cost-effective solution to reduce flooding upstream was to replace a section of fixed crest dam with a new system capable of being lowered to provide additional discharge capacity during high flow events.
EST. COST	\$7.0M (capital cost)
ACTIONS	<ul style="list-style-type: none"> • Analyze and properly size any recommended alternative modification, provide cost estimates, and obtain funding for construction • Estimate/Analyze potential upstream constrictions that could impact the effectiveness of alternative modifications
BARRIERS	<ul style="list-style-type: none"> • A numerical watershed model is needed prior to beginning this analysis • Additional modifications to the dams at Locks O-1 and O-2 may be required • Resource availability to complete the analysis and implement the modification
3. Montezuma Area Floodplain Restoration	
DESCRIPTION	The Seneca River between Erie Canal Lock E-25, Cayuga-Seneca Canal Lock CS-1, and Erie Canal Lock E-24 has little flood storage capacity with most being within Cross Lake. The use of Cross Lake and the upstream floodplain is problematic as there are many structures built within the FEMA regulated floodplain. There are potentially 10,000 acres of the historic floodplain that are disconnected from the Seneca River and its tributaries.
EST. COST	\$8.0M (project cost for 1,200 acre parcel)
ACTIONS	<ul style="list-style-type: none"> • Obtain funding to implement the floodplain reconnection of 1,200 acres of presently farmed land that's been disconnected from its floodplain due to farming • Convey property to NYSDEC to be annexed to the adjacent Montezuma Wildlife Management Area (WMA) and incorporated into their ongoing conservation efforts
BARRIERS	<ul style="list-style-type: none"> • Willingness of current owners to sell property • Resource availability

4. Update FEMA FIRMs within the Oswego River Basin

DESCRIPTION	<p>Within the 11 counties within the Oswego River Basin, there is complete digital coverage of flood studies and reports related to flood prone areas for four counties (Cayuga, Oneida, Onondaga, and Oswego), but the modeling data behind these studies is outdated, and in some cases, may not be available for use. There are five counties (Ontario, Seneca, Tompkins, Wayne, and Yates Counties) that have full countywide studies underway. There are two counties (Madison and Schuyler Counties) that have no digital coverage available, with no plans in the near future for updates.</p>
EST. COST	<p>Mapping Updates: \$1.3M (Cayuga), \$2.3M (Oneida), \$4.3M (Onondaga), \$2.0M (Oswego), \$3.0M (Madison), \$0.7M (Schuyler), Total Cost = \$13.6M (study)</p>
ACTIONS	<ul style="list-style-type: none"> • For Cayuga, Oneida, Onondaga, and Oswego Counties, prioritize engineering studies • For Madison and Schuyler Counties, prioritize engineering studies and countywide digital FIRMS • Consider funding opportunities through the Environmental Bond Act
BARRIERS	<ul style="list-style-type: none"> • Flood study funding is provided through Congressional Appropriations, which may fluctuate annually, and may also be directed to other parts of FEMA's program. There is limited opportunity to direct which counties are studied within the FEMA's plan. • Resource availability

5. Resilient NY Studies

DESCRIPTION	<p>NYSDEC has completed a significant number of studies within the Mohawk River Basin as part of the Resilient New York program. It does not appear that any study of the Oswego River Basin has been conducted.</p>
EST. COST	<p>\$800K (four studies)</p>
ACTIONS	<ul style="list-style-type: none"> • Enact and fund a similar program for studying the main tributaries within the Oswego River Basin, including the Owasco River, Flint Creek, Clyde River, and Ganargua Creek
BARRIERS	<ul style="list-style-type: none"> • Resource availability

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6. NEXT STEPS

ERIE CANAL LOCK E-7 AT VISCHER FERRY DAM



Source: Sean Sullivan

This Executive Summary is a summary of the full Upstate New York Flood Mitigation Task Force Report. The work of the Task Force in development of the full Technical Report has identified many adaptive measures that can be implemented to support a reduction in flood damages and associated flood damage costs within the Mohawk and Oswego River Basins. These recommended measures include both physical interventions as well as policy driven adaptive measures.

The recommended adaptive measures, in general, utilize the development of a working

numerical model of each basin as a foundation to better understand and estimate the potential benefits. In addition, the model development would provide better understanding and prediction of system-wide storm event impacts and better inform operational changes in the short term.

Once numerical models are developed, they will support the efforts of the recommended Standing Committees in each basin and will provide the Committee members a better understanding of how changing the rate and timing of water releases from lakes and reservoirs can impact each basin. Model development will also enable estimation of the potential impacts of any proposed physical change or intervention and provide a means to establish criteria for project funding requests and recommendations for implementation.

Most recommended adaptive measures include ‘Resource availability’ as a barrier to implementation. This barrier was meant to identify funding requirements needed to advance the adaptive measures. Many physical adaptive measures provide funding values for studies and further investigation prior to full implementation which was done to allow the measures to progress in the near term with limited funding requirements to ensure the viability of the measure. It is anticipated funding requirements for full implementation will be developed during the study period and presented to the Task Force to assist in identifying funding sources. While grant opportunities will be pursued by the Task Force and all available public funding will be investigated, it is likely that, due to the magnitude of the overall funding necessary as well as the long-term view of the adaptive measures, targeted funding from the state legislature will be required to advance the recommendations.

While the scale of this ambitious Task Force undertaking is significant, the Technical Report has attempted to distill the information and recommendations into actionable opportunities. It is the Task Force’s belief that further investigation and implementation of the recommended adaptive measures is overdue. Previous efforts were not advanced, to the detriment of many New York residents, and the flooding events in just the past five years documented in the Technical Report, demonstrate the severity and significant variability in the locations and durations of flooding events. Therefore, every effort must be made to advance the recommendations of the Technical Report as soon as possible and to begin the task of doing what is possible to better assist and better protect the residents and infrastructure most vulnerable to flooding within the Mohawk and Oswego River Basins. For more detail on the contents of this Executive Summary, please refer to the full Upstate New York Flood Mitigation Task Force Report, and for project materials, including public meeting content, please visit the project website <https://www.canals.ny.gov/news/TaskForce.html>

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**Erie Canal Lock E-9,
Rotterdam, NY**



BERGMANN
ARCHITECTS ENGINEERS PLANNERS

Bergmann has joined Colliers Engineering & Design