



REIMAGINE THE CANALS TASK FORCE REPORT

JANUARY 2020

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LETTER FROM THE CO-CHAIRS

The opportunity to lead the *Reimagine the Canals* Task Force has been immensely gratifying for all three of us. As former state and county officials, each of us knows well the Erie Canal – but in our wildest dreams could never have imagined a vision for its future as ambitious and exciting as the one we present in the pages that follow.

This Task Force report lays out a bold and inspiring vision that builds on the Canal System’s legacy by leveraging and adaptively reusing its unique ability to control one of our State’s most precious resources – its water. The Task Force was formed as a response to the many compelling ideas submitted to the New York Power Authority’s *Reimagine the Canals* ideas competition in 2017. From ecologic restoration to economic regeneration and from agricultural irrigation to flood mitigation, the Task Force studied a wide array of challenges and opportunities facing canal communities.

The findings presented in this report are the product of Task Force member meetings, public engagement sessions, stakeholder focus groups, and hundreds of hours of expert consultation. While no analysis undertaken over a six-month period could be fully comprehensive, we believe the

diversity of voices and opinions presented in this report provide a clear road map for the transformation that lies ahead.

We want to graciously thank our fellow Task Force members who provided their time and expertise to ensure that our work was grounded in a fine-grained understanding of the inter-related challenges and opportunities that the last half century of change has left in its wake. We benefitted greatly from their diverse knowledge bases - scientists, farm experts, former elected officials, geologists, developers, environmental and preservation advocates, fishermen, boaters, and marina owners, all of whom conveyed the concerns of their own constituencies.

We also want to thank the institutions participating in our effort, whose work in shaping New York State goes far beyond



Waterford, NY

this short effort. This includes both public institutions – such as SUNY’s College of Environmental Science and Forestry, Rockefeller Institute and Monroe Community College – and private ones, including Union College and Clarkson University. It includes federal agencies, such as the US Geological Survey and Corps of Engineers, and New York State ones – most notably the six agencies who participated directly in the Task Force.

The process of seeing through the work of this Task Force has been educational for all three of us. Despite our respective years of experience in government, no single individual could ever hope to fully understand the issues touching canalside communities across more than 350 miles of our great state. Every town, village, and city along the Canal has its own specific culture, industrial history, and set of physical challenges. By dividing the work into three watersheds – the Western, the Central and the Mohawk - we were able to engage in a depth of analysis and discussion that could not otherwise have been achieved over such a short period.

Though our panel’s deliberations are complete, the task of delivering this vision

has just begun. As we work together toward realizing these goals, we will inevitably encounter challenges – much like the visionaries behind the 19th century Erie Canal and its successor, the 20th century Barge Canal. As they were convinced of the wisdom of their ambitions, so too are we. The bicentennial of the original Erie Canal offers an opportune moment to reinvent and reinvest in our shared legacy, and we look forward to working with groups represented by Task Force members, with New York State agencies and the Governor, and with communities along the corridor to realize a vibrant third century for this storied waterway.

Joanie Mahoney

Joanie Mahoney, Task Force Chair

Joe Martens

Joe Martens, Task Force Co-Chair

Bob Duffy

Bob Duffy, Task Force Co-Chair

EXECUTIVE SUMMARY

Marking the beginning of the third century of the New York State Canal System, the *Reimagine the Canals* Task Force was convened in May of 2019 by Governor Andrew Cuomo to determine how this historic infrastructure asset can be mobilized anew to promote the health and well-being of upstate New York’s communities, economies, and ecosystems.

This panel, comprised of community leaders and experts in canal-related fields, worked over the ensuing six months to review studies and analyses that addressed a wide array of challenges and opportunities and to develop its own set of findings. This report outlines the panel’s work.

The *Reimagine the Canals* initiative takes place at an important juncture. Over the last half century, commercial shipping on the Erie Canal declined and then largely disappeared – a reflection of the decline of manufacturing industry in towns along its route. In response to this structural change, and to the demographic shifts it caused, canalside communities have been required to

embrace new land use patterns and modes of development to stabilize populations and encourage new industries and tourism. Recent investments by the State have supported and facilitated these changes, recognizing the shift from commercial to recreational use along the waterway and priming towns along the Erie spine to engage in adaptive reuse of land, buildings and infrastructure.

Yet challenges to fully realizing the waterway as an economic development engine over the course of the next century are significant. Climate change increasingly threatens upstate New York with extreme, unpredictable weather – ranging from damaging summer droughts in western New York to chronic flooding year-



Pittsford, NY

round in towns throughout the Mohawk River Valley. With 40 percent of the State’s water bodies connected to the NYS Canal System, the growth of recreational boating and fishing across the State is separately threatened by a rise in aquatic invasive species within, or poised to travel through, the canal vector. And water quality remains a major issue across the State – most notably in Mohawk Valley towns, some of whom draw water from the Canal.

The Task Force attempted to address and balance these opportunities and threats. Its work was largely inspired by the *Reimagine the Canals* competition run by the New York Power Authority (NYPA) in 2017, which produced innovative ideas for canal activation. But it also builds on work being done by a variety of state agencies actively engaged in upstate economic development and resilience – the Department of Environmental Conservation (DEC), the Office of Parks, Recreation and Historic Preservation (OPRHP), Empire State Development (ESD), the Department of Agriculture and Markets, NYPA’s Canal Corporation and the Department of State. Together, the Task Force’s 25 appointed members and six *ex-officio* agency nominees reached broad consensus on a variety of recommendations

designed to keep up the momentum initiated by local and state projects, most notably the imminent completion of portions of the Empire State Trail running along the Erie Canal from Albany to Buffalo.

Acknowledging the diversity of communities and economies located across more than 360 miles of the Erie spine, Task Force work was undertaken both in plenary sessions and in subcommittees devoted to each of three regions: the Mohawk Region, running approximately from Waterford to Rome; the Central Region, embracing the Finger Lakes area through Oneida Lake; and the Western Region, from Macedon to Buffalo. This report contains both system-wide findings and recommendations relating specifically to those individual regions.

The Task Force’s system-wide recommendations recognize opportunities to expand and improve existing recreational uses and also introduce new ones. A series of recommendations for immediate **operational improvements** have been made, most notably enhanced coordination among the constituencies that oversee and manage programs relating to the Canal and unified marketing and branding to greatly



Waterford Flight

EXECUTIVE SUMMARY

widen its renown and appeal. A range of new economic development opportunities were identified for near-term investment. **Novel forms of water recreation**, including paddleboarding, rafting, surfing, and ice-skating, can strengthen tourism and build on existing recreational boating activity as well as tap into ecotourism trends. **“Iconic Infrastructure” destinations** should be identified, to create year-round tourist attractions and a backdrop for community celebrations. Improvements in **overnight accommodations** can support forecasted growth in tourism and recreation, enabling visitors to stay longer and spend more in canal towns. **Redevelopment of industrial property** held by the Canal Corporation should be pursued at scale, activating now-moribund downtown waterfronts. **New connections to the Empire State Trail** should be made, providing better access to the trail from towns, cultural and educational institutions, and hospitality destinations.

In the Western Region, existing Canal infrastructure can be adaptively reused to greatly strengthen rural economies. Using Erie Canal water to **expand agricultural irrigation** will enable farmers to invest in high-value crops, such as apples or other fruits and vegetables, safeguarding these crops against the increasing droughts, which are forecast to accompany climate change. **Recreational fishing growth** in Lake Ontario tributaries will result from more reliable access to canal water, optimizing fish habitats and greatly expanding opportunities for angling-related tourism.

In the Central Region, restoring and **expanding wetlands** should be pursued now to increase ecotourism—sites like the Montezuma wetlands are an important habitat for migratory birds—and restore the health of a now-compromised ecosystem. **Combatting aquatic invasive species** would improve the health of New York State’s waterways, which today suffer from the ravages of hydrilla, algal blooms and a range of invasive fish and mollusks, and would protect investment in

new canal uses from being undermined by future invasive outbreaks. Further study of strategies to counter invasives is warranted to protect and enhance New York’s waterways and the businesses that depend on them.

The Mohawk Region, due to its riverine nature, continues to be plagued by flooding from summer storms and winter ice jams, both of which are exacerbated by the changing climate. The Task Force recognized there are significant opportunities to **mitigate the effects of ice jams, reduce summer flooding, and improve forecasting and early-warning systems** in ways that allow residents to better prepare for flood events and lead to the benefits that come from reviving natural systems. The Task Force also recommends further study into Mohawk **tributary restoration**, which could prove an important method for enhancing water quality and improving the health of fish and wildlife habitats in this region.

Together, the findings laid out by the *Reimagine the Canals* Task Force offer a road map for transformation - not simply from an industrial to a recreational waterway but also to a 21st century tool for communities to meet and overcome unprecedented economic and environmental challenges.



TASK FORCE OVERVIEW

INTRODUCTION

Stretching from Albany to Buffalo, perhaps no single piece of infrastructure is more responsible for New York’s rise as a state, and New York City’s rise as a global capital, than the storied Erie Canal.

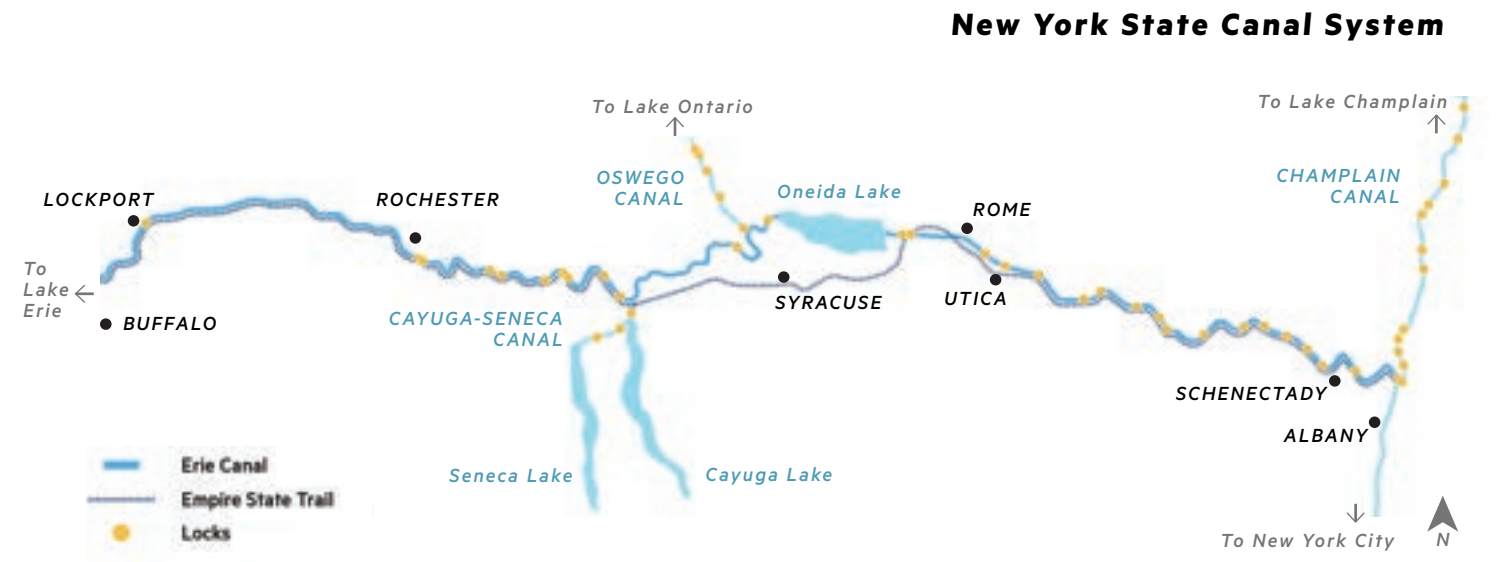
The 1817 plan to build a man-made ditch across hundreds of miles of wilderness was unprecedented in its reach—one of the most ambitious American engineering visions of all time. The construction of the original Erie Canal, and its expansion and eventual replacement by the present Barge Canal over the course of the 19th and early 20th centuries, supported the growth of industries across its breadth - powering the development of towns such as Schenectady, Amsterdam, Utica, Syracuse, Rochester, and Buffalo.

Yet over the last half century, commercial shipping on the Erie Canal waned and then virtually disappeared. Changing trade patterns and industrial decline, as well as competition from alternative modes of transport, have left the waterway devoid of the barges it was designed to serve. The Canal, however, continues to be operated much as it has been for the past hundred

years, including maintaining and operating the costly infrastructure designed for its original commercial uses.

In the absence of commercial traffic, recreational use along the waterway and its trail has grown steadily over the last several decades. Motorized boating is now accompanied by kayaking, canoeing and other forms of human-powered boating; biking, walking and running along the trail have expanded as well. The number of community-based events, such as concerts and festivals, has increased significantly and these now take place seasonally across the breadth of the Canal.

At the same time, under Governor Cuomo’s leadership, new forms of investment have supported the transformation of canalside communities. Programs like the Downtown Revitalization Initiative, the Local Waterfront



Revitalization Program, and the Canalway Grant Program have helped activate waterfronts along the Canal and continue to do so. Places like Pittsford, Baldwinsville and Fairport have become models for adaptive reuse of waterside infrastructure. Most recently, the *Reimagine the Canals* Ideas Competition, undertaken by NYPA, provided initial funding for the development of a new form of canalside housing on former industrial lands on a historic section of the Canal - a “pocket neighborhood” in Canastota, New York.

To explore these opportunities further, the *Reimagine the Canals* Task Force was convened by Governor Cuomo in May 2019 to investigate how the Erie Canal can be used as a catalyst for economic development and tourism, improved quality of life, and environmental resiliency. Chaired by Joanie Mahoney, former Onondaga County Executive, the Task Force was asked to:

- **Identify potential new uses for the Erie Canal aimed at improving the quality of life for New Yorkers**
- **Evaluate how the Erie Canal can support and enhance economic development along the canal corridor**

- **Find new opportunities to enhance recreation and tourism along the Erie Canal**
- **Assess how the Erie Canal can help mitigate impacts from flooding and ice jams to improve resiliency and restore ecosystems in canal communities**
- **Identify opportunities for using Erie Canal infrastructure to expand irrigation for Western New York farms**

The Task Force’s findings, described on the pages that follow, represent a bold, forward-looking vision designed to anchor resilient communities and improve the quality of life for the 3.6 million New Yorkers who live along the Erie Canal’s spine. Harnessing the full potential of this unique piece of infrastructure could transform the future for these New Yorkers and many others and cement the State’s place as a leader in the fight against the ravages of climate change.

TASK FORCE MEMBERS

The *Reimagine the Canals* Task Force included 25 members representing important constituencies and interests across the NYS Canal System.

In addition, six representatives of state agencies served *ex-officio* on the panel (Department of Environmental Conservation, Empire State Development, Department of Agriculture and Markets, Office of Parks, Recreation and Historic Preservation, Canal Corporation, and Department of State).

Because of the expansive geography that comprises the Canal System, Task Force work was undertaken both in plenary and in three regional subcommittees: the *Central*, chaired by Joanie Mahoney (Chief Operating Officer at the SUNY College of Environmental Science and Forestry in Syracuse and former County Executive of Onondaga County), the *Mohawk*, chaired by Joe Martens (Director of the New York Offshore Wind Alliance and former New York Department of Environmental Conservation Commissioner), and the *Western*, chaired by Bob Duffy (CEO of the Greater Rochester Chamber of Commerce and former Lieutenant Governor of New York).

Between May and November 2019, each regional subcommittee convened multiple times and the full Task Force convened three times. At each meeting, the Task Force reviewed commissioned analyses from technical experts in fields relevant to its appointed mission as well as public input garnered by the State University of New York (SUNY) Rockefeller Institute of Government, which conducted outreach with Canal communities across the State. Drawing on their varied areas of professional expertise, Task Force members produced the findings outlined in this report.

Task Force Chairs

Joanie Mahoney Chair; Central Region	SUNY College of Environmental Science and Forestry
Bob Duffy Co-Chair; Western Region	Greater Rochester Chamber of Commerce
Joe Martens Co-Chair; Mohawk Region	NY Offshore Wind Alliance

Task Force Members

Michael Arcuri	Arcuri Ward Law
Andy Beers	Empire State Trail, Hudson River Valley Greenway
Ron Bierstine	Oak Orchard Tackle and Lodge
Leslie Becraft-Corrigan	Winter Harbor Marina
David Buicko	Galesi Group
John Courain	Genesee Waterways Center
Marie Cramer	Canal New York
Maureen Doyle	Central NY Waterways
Robin Dropkin	Parks and Trails New York
John Garver	Union College
Stu Gruskin	The Nature Conservancy
Bruce Van Hise	Corn Hill Navigation/Sam Patch Tours
Jill Jedlicka	Buffalo Niagara Waterkeeper
Robert King	Monroe Community College, Agriculture and Life Science
Amanda Krenning-Muoio	New York Farm Bureau
Chris Lajewski	National Audubon Society
Cornelius B Murphy Jr.	SUNY College of Environmental Science and Forestry
Bill Nechamen	Association of State Floodplain Managers/Nechamen Consulting
Derrick Pratt	Erie Canal Museum
Bob Radliff	Erie Canalway National Heritage Corridor
John Robinson	Our Ability
David Wolfe	Cornell University, School of Integrative Plant Science

Task Force Ex-Officio Members

Richard Ball	Department of Agriculture and Markets
Erik Kulleseid	Office of Parks, Recreation and Historic Preservation
Rossana Rosado	Department of State
Basil Seggos	Department of Environmental Conservation
Brian Stratton	NYS Canal Corporation
Howard Zemsky	Empire State Development



Community engagement workshops in Schenectady and Brockport, July 2019

TASK FORCE OVERVIEW

TASK FORCE SUPPORT

BuroHappold Engineering served as lead consultant and secretariat to the Task Force. In addition to coordinating Task Force meetings and producing this report on behalf of the panel, the firm commissioned and managed a group of sub-consultants to undertake technical analysis for each of the topics under evaluation by the Task Force. A list of these sub-consultants as well as information about their reports is found in the Appendices.

To assist in and inform its mission, the Task Force appointed SUNY's Rockefeller Institute of Government to simultaneously carry out a community engagement process. The Institute held five open community engagement sessions across the Canal corridor in July 2019, attended by a total of 400 participants. Additionally, over 250 comments were submitted to the Rockefeller Institute's online survey tool for the public engagement process. The Institute's goals were to (1) share innovative concepts from the *Reimagine the Canals* Ideas Competition and precedents for waterway revitalization, (2) gather and report on the concerns and ideas of canalside communities, (3) identify projects likely to increase Canal engagement, and (4) encourage public participation in Canal transformation

going forward. The Rockefeller Institute also collected information online from Canal users across the country. A link to the full report is provided in the Appendices to the Task Force report.

Following the Rockefeller Institute's engagement with the general public, in September 2019, a separate series of stakeholder focus groups was organized by BuroHappold with the assistance of Task Force members. These brought together experts from government, academia, private industry, business owners, community leaders and non-profit advocacy organizations to further explore the concepts and opportunities raised in the public workshop sessions. The input from these sessions also helped to inform and shape the findings detailed in this Task Force report.



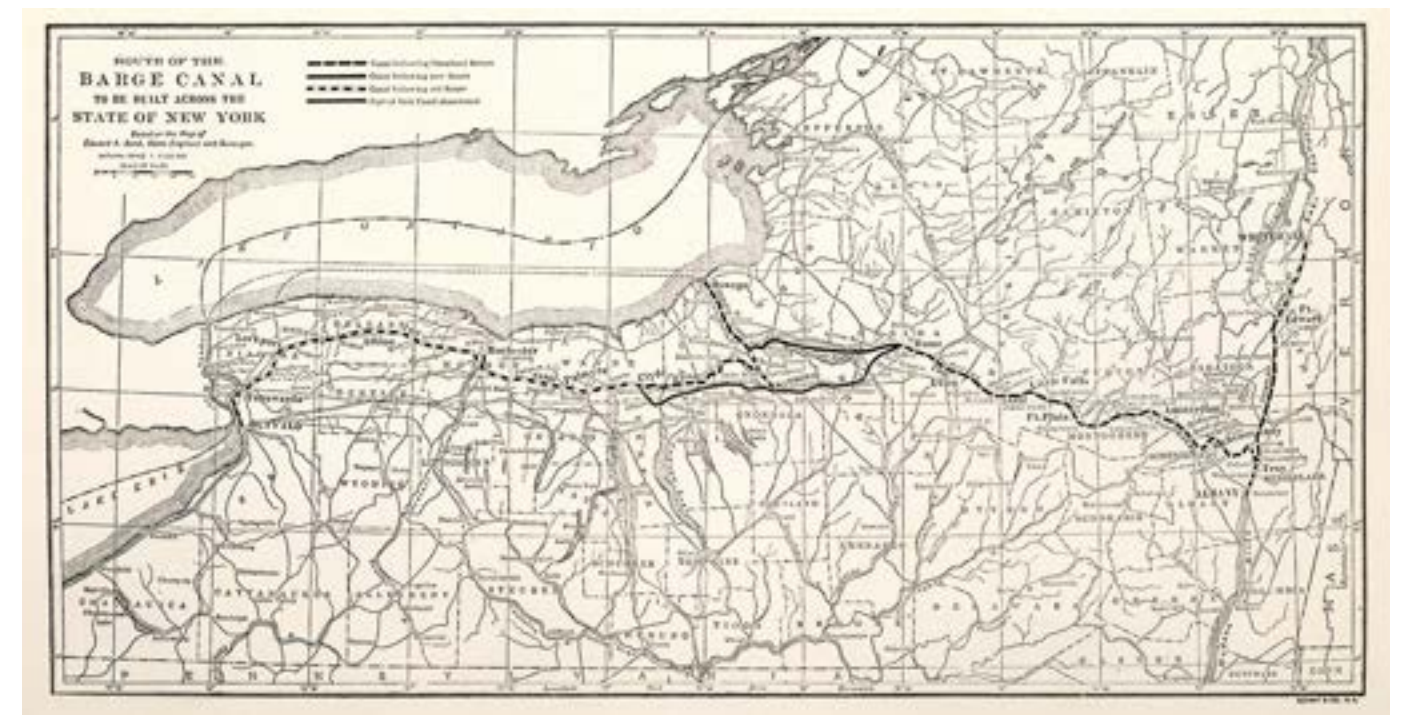
ERIE CANAL BACKGROUND

A HISTORY OF REIMAGINATION

The story of the Erie Canal is the story of America: a story of leadership in innovation and industry, of westward expansion, and of courage, foresight, and agile adaptation in the face of changing circumstances.

In 1817, New York Governor DeWitt Clinton approved funding for a wildly imaginative construction project: a canal that would cut clear across New York State, connecting the Hudson River to Lake Erie. Before the Erie Canal, a traveler between Albany and Buffalo would face a two-week journey on roads that baked in the summer and dissolved in a sea of mud in winter; after the Canal opened in 1825, that same trip could take five days. The Canal thus provided a critical supply line that in many ways “made the nation,” moving trade and settlement from the east coast into the center of the country. Its innovative engineering contributed to the founding of upstate New York’s many excellent engineering and science universities, such as Rochester Institute of Technology, Rensselaer Polytechnic Institute and Union College.

As the 19th century wore on, the Canal struggled to accommodate traffic and increasingly large barges. Between 1836 and 1862, the original Erie Canal—sometimes called “Clinton’s Ditch”—was made wider and deeper, resulting in what became known as the “enlarged Canal.” But commercial shipping continued to outgrow the Canal – and was increasingly shifting to rail. In an attempt to compete with the railroads for freight, New York State approved an ambitious plan to deploy new technologies to ‘canalize’ the Mohawk, Oswego, Seneca, and Clyde Rivers (i.e., building canal infrastructure in the rivers themselves) and reroute the central portion of the Erie Canal north through Oneida Lake. The reimagined and relocated “New York State Barge Canal” opened in 1918, with its Erie section featuring a deeper and wider channel as well as dams along the Mohawk River that allowed the river to be



Historic map showing 19th century and proposed 20th century Erie Canal routes

converted seasonally into a series of navigable pools for deep-draft vessels.¹

While the Barge Canal did attract a significant amount of cargo in its early decades, increasingly stiff competition from railroads and new competition from roads and highways would make its success short-lived. Commercial traffic on the system as a whole peaked in 1951 and, partially due to the opening of the St. Lawrence Seaway in 1959, has declined steadily since. Today, no regular commercial traffic remains on the Erie Canal portion of the Barge Canal.

Recognizing the decline in commercial shipping, New York State undertook a number of initiatives in the late 20th century to examine opportunities for recreation along the waterway. In 1992, the New York State Thruway Authority took ownership of the Barge Canal, and the New York State Canal Recreationway Commission was created to advise on canal-related activities. The Commission developed the Canal Recreationway Plan in 1995 and the New York State Canal Revitalization Program in 1996. These plans laid an early foundation for the repositioning of the Canal as a spine of recreation and tourism, yet were subject to the constraint that the Barge Canal continue to be

maintained and operated for commercial traffic. In 2000, Congress established the Erie Canalway National Heritage Corridor, which, together with the non-profit Erie Canalway Heritage Fund, partners with federal, state, and local organizations to preserve the Canal’s history, provide recreational and educational opportunities, and foster economic revitalization. In 2014, the Barge Canal was designated as a National Historic District in the National Register of Historic Places.

As the Erie Canal enters its third century, it also stands poised for its third reimagining. The year 2017 marked 200 years since construction on the Erie Canal began. That year, control of the Barge Canal shifted to NYPA, the *Reimagine the Canals* competition was launched, the NYS Canal System was designated as a National Historic Landmark, and construction began on the Empire State Trail - nearly half of which runs alongside the asset. These actions set the stage for the visioning, engagement and analysis undertaken by the *Reimagine the Canals* Task Force.

¹ The Barge Canal System consisted of four separate canals: the relocated Erie, the Cayuga-Seneca (connecting Cayuga and Seneca Lakes to the Erie Canal), the Oswego (following the path of the Oswego River from Baldwinsville and Clay to Oswego) and the Champlain (running north from Troy into Lake Champlain).

LOOKING FORWARD

Opportunities

Today, the Erie Canal (“the Canal”) operates seasonally from May to October as a recreational waterway. During what is referred to as “the navigation season,” most boaters spend time cruising ‘pools’ of water between locks; only about 24 percent of users travel through a lock, the majority of them in the Central region. Motorized boating still dominates on much of the Canal, but human-powered recreation - such as paddleboarding and kayaking - is growing rapidly: between 2011 and 2016, the number of human-powered boat lockages nearly tripled, and the Canal Corporation presently maintains over 125 kayak launches.

Most regular users of the Canal, however, are not on the water at all. The 750-mile long Empire State Trail, which upon completion in 2020 will be the longest multi-use trail network in the nation, runs alongside the towpath of the original Erie Canal from Albany to Buffalo. Known as the Canalway Trail, this 360-mile path is heavily used as a place of landside recreation in its fully completed sections – most notably along the channelized, western portions of the Canal. The Trail provides the communities along its banks with a place to bike, walk and run – or simply relax and enjoy views of the water.

Beyond the Trail itself, the canal waterfront has served to stimulate regeneration and redevelopment in communities along its banks. Supported by a variety of state programs, recent development projects in communities such as Fairport, Pittsford, Baldwinsville, Little Falls, Amsterdam and Schenectady have proven the viability of diverse types of canalside development and new waterfront public spaces. Regular programming in other canal towns attract visitors from nearby communities, primarily but not exclusively during the summertime navigation season.

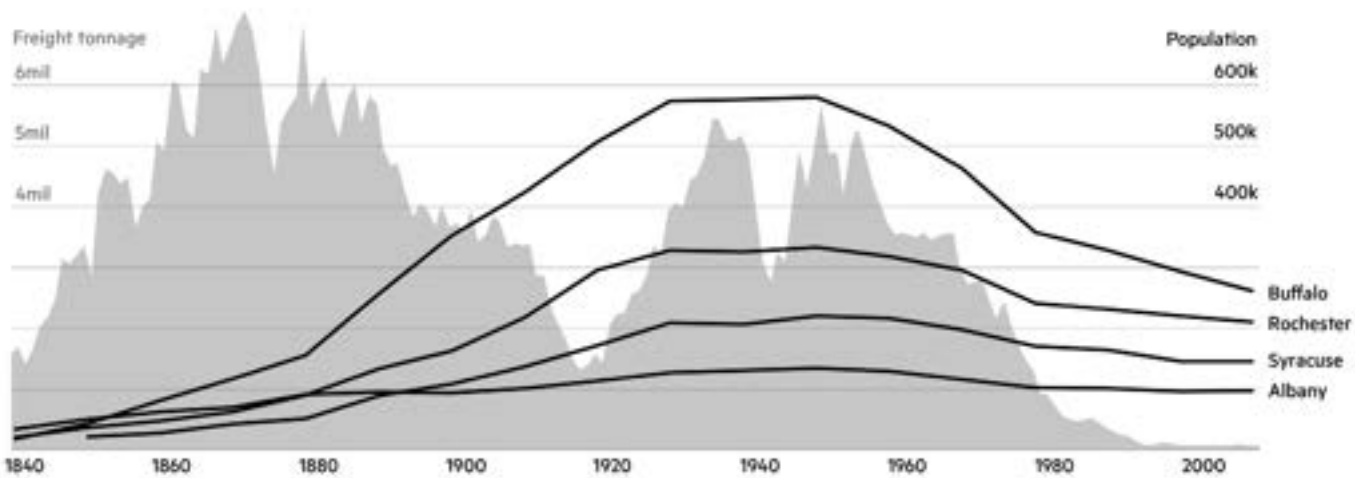
Other factors suggest that the Canal is ripe for a reimagining. Opportunities to attract tourists from other locations are close at hand, thanks to the steady flow of tourists who already visit upstate New York every year; the Canal is within an hour’s drive of Niagara Falls, the Adirondacks, and the Finger Lakes. A burgeoning millennial population coming out of upstate universities offers opportunities to expand local population bases, and constitutes a receptive audience for human-powered boating as well as new and innovative forms of canal activity. With increased recreational opportunities and improved branding and marketing, the Canal could take its place among New York State’s most popular attractions.

Programming and events in Amsterdam and the Tonawandas





Commercial Shipping and Upstate Population Decline



ERIE CANAL BACKGROUND

Challenges

As commercial shipping on the Canal has declined, so too have the populations of cities along its path. Cities like Buffalo, Rochester and Syracuse – industrial powerhouses during the era of waterborne transportation – are now much smaller than they were even a half century ago.

Apart from declining population and use, the Canal's infrastructure itself is now a century old – with much of it approaching the end of its useful life. Major components of this industrial-sized infrastructure, such as the locks, movable dams, and guard gates, constructed expressly to support commercial use, require either replacement or increased maintenance. The total budget for the Canal System is rising rapidly: while historic costs have been between \$90M and \$100M annually, total capital and operating costs during the last two years have increased to \$125M and \$140M respectively.

Canal infrastructure and the communities it abuts face significant climate-related and resilience challenges – challenges that are more acute with each decade. Floods have been recorded in the Mohawk River Valley since the 1600s, but climate change has increased the frequency and intensity of flood-inducing storms: four of the region's six most destructive floods have taken place in the last ten years and studies indicate that flood levels in the Mohawk Valley could rise nearly 20 percent over the next decade. Recent ice jams have further increased the risk of severe flooding along the Mohawk River, with 8- to 17-mile ice jams recorded in the Canal above Schenectady in 2017 and 2018. Both winter and summer flooding events contribute to the capital costs associated with canal infrastructure, in addition to the losses incurred in canal communities.

Climate change has also impacted canal communities in western New York. Increasingly severe droughts in Niagara, Monroe, and

Orleans Counties threaten the future of the State's primary region for fruit and vegetable production. Even in otherwise wet years, periods of drought can significantly lower the quality and yield of agricultural products. The absence of natural aquifers in the area leaves farmers in that region particularly vulnerable to these incidences of drought: Western New York faced a 43 percent crop yield loss on average during the 2016 drought, making it the hardest-hit region in New York State.

Challenges to the resilience of canal regions and their economies go beyond climate change. By connecting bodies of water that had historically been isolated, the Canal inadvertently created opportunities for aquatic invasive species to easily spread from the Great Lakes through New York waterways, undermining the natural ecosystem balance and leading to consequences such as depleted fish populations and the proliferation of hydrilla and harmful algal blooms among others. At the same time, canal infrastructure has changed the natural flows of the Mohawk River, disconnecting it from its tributaries and significantly impacting the health of the watershed as a whole. Such damage to ecosystems ripples across local economies as the number and quality of birding, fishing, ecotourism, and boating opportunities diminishes.

The size and scope of the Erie Canal make it a powerful tool for shaping the future of upstate communities. The Task Force's findings offer strategies to adaptively reuse the unique water control systems that power the Erie Canal in ways that anchor more resilient communities, provide expanded and new recreational opportunities, revive damaged ecosystems, and improve quality of life for the 3.6 million New Yorkers who live along its spine. In doing so, the Task Force intends to set precedents for reimagining yesterday's infrastructure to address the challenges of today and seize the opportunities of tomorrow.

Flooding at Lock E-10, June 2006

Water chestnut growth in the Finger Lakes



TASK FORCE FINDINGS



INTRODUCTION

The Erie Canal cuts across 360 miles of New York State - through major cities and small towns, mountains, marshes, and farmland. The Canal's reach thus incorporates areas with strikingly

different needs, topographies, and ecosystems: what is important to Rochester is likely less important to Rome, or to the dozens of smaller villages through which the Canal and Mohawk River pass. Indeed three separate and relatively distinct watersheds comprise the Erie portion of the NYS Barge Canal system: a man-made channel in the west (emptied for maintenance in the winter), the central portion (encompassing both man-made and riverine stretches), and the Mohawk River Valley in the east. Each watershed is characterized by unique forms of infrastructure necessary to support the waterway's integrity and use.

Reflecting this geographic and economic diversity, the *Reimagine Task Force* was undertaken in plenary as well as in three regional subcommittees: the Mohawk subcommittee, the Central subcommittee, and the Western subcommittee. Multiple subcommittee meetings were held to develop findings relevant to the challenges and opportunities in these respective regions. The Task Force subsequently came together as a group to debate the findings of these subcommittees. These deliberations, and the ultimate findings of the Task Force as a whole, are summarized in the sections that follow.



TASK FORCE FINDINGS

THE WESTERN REGION

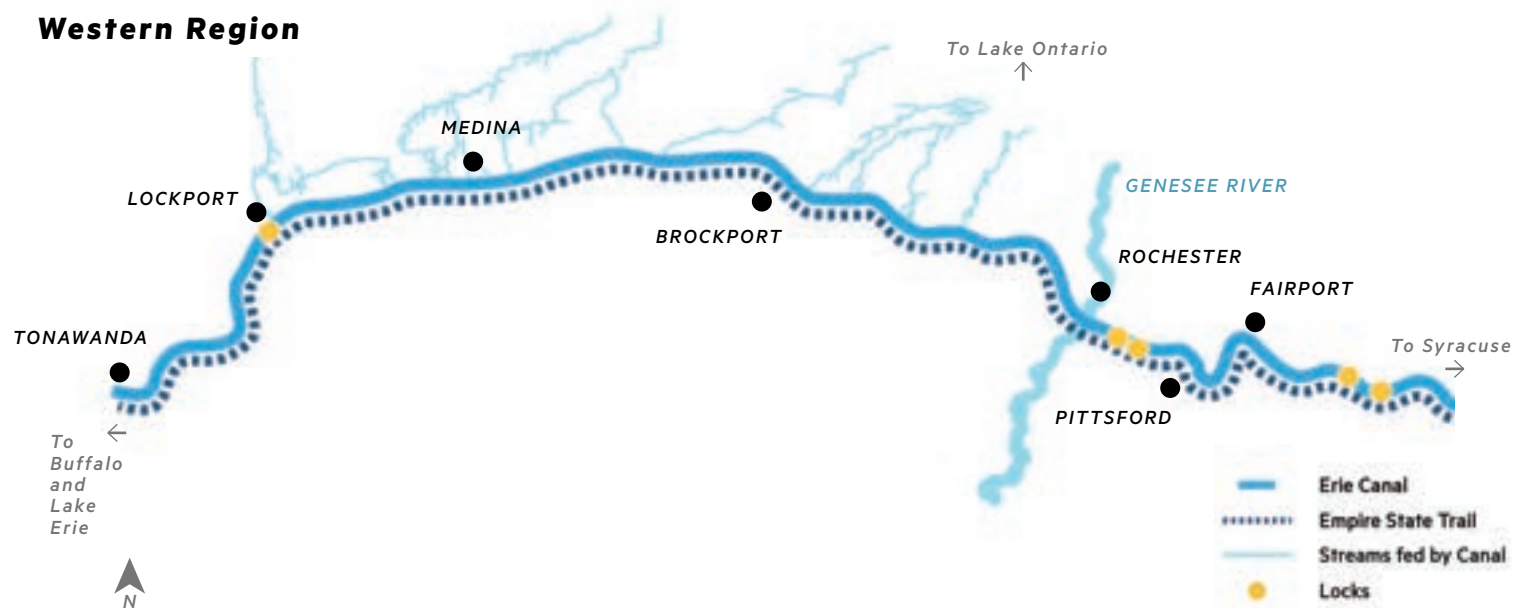
The Western region is loosely anchored by two of New York's largest cities, Buffalo in the west and Rochester in the east, but is largely rural. In this region, the Erie Canal is entirely a man-made channel supported by earthen berms with a uniform width and depth (unlike other regions where the Canal is mainly 'riverine' and manipulates the flows of a river). Small streams flow north to Lake Ontario, which is 270 feet lower than the man-made waterway. They serve as an outlet for many of the Canal's 16 waste weirs, which are gates raised or lowered to maintain water levels in the Canal and to empty it during the winter for maintenance.

Canal. Farmers with property adjacent to the Canal or streams have the option of siphoning water from the system for seasonal irrigation when it is available.

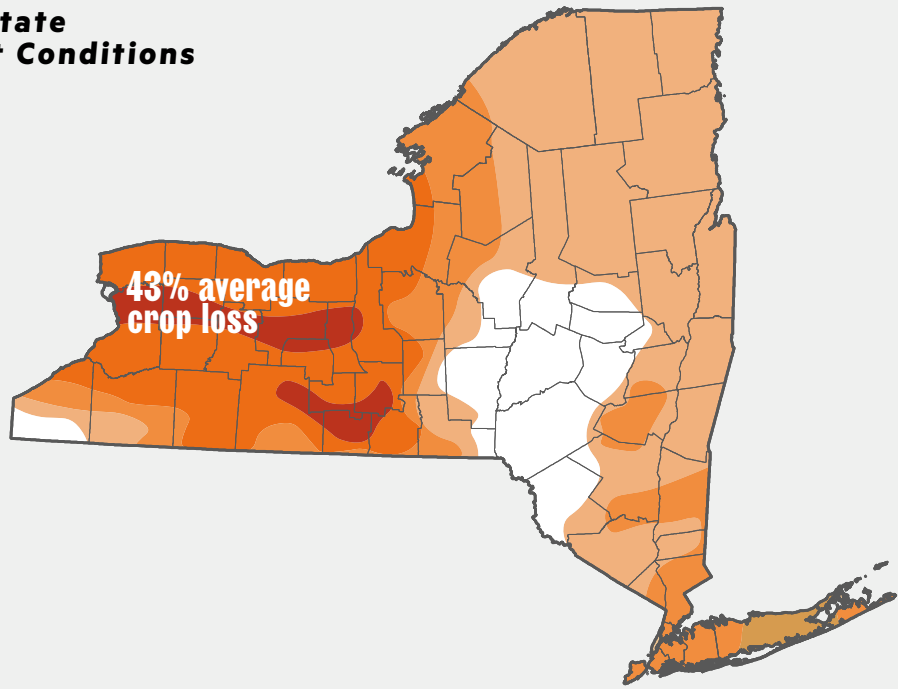
Western New York also boasts some of the best recreational fishing in the State, a main driver of tourism in this largely rural area. Flows from canal waste weirs enhance conditions in the tributaries running north to Lake Ontario - particularly in October or November, when the Canal is emptied. Brown-trout fishermen and others overwhelm available lodging during this brief window in time.

Water from the western portion of the Canal is used for purposes other than recreational boating - most notably for agriculture. For example, Orleans County, which is bisected by the Canal, boasts a robust agricultural economy: it has the second-highest annual revenue from vegetable production and the third highest from fruit production in the State. This high-value crop production is in part driven by fertile soils and temperature moderation by Lake Ontario, but it is also influenced by the ability to irrigate via the

Western Region



2016 New York State
Summer Drought Conditions



THE WESTERN REGION

Expanding Irrigation

The idea of using canal water to expand irrigation originated from a proposal by Dr. Stephen Shaw of SUNY’s School of Environmental Science and Forestry (ESF), submitted during the *Reimagine the Canals* competition in 2017. While the proposal was not one of the two financial winners of the competition, the jury determined that the short-listed idea merited further study. Dr. Shaw was retained as a consultant to better understand current irrigation usage as well as the potential value and feasibility of bringing canal water to a larger population of farmers in this region in the future.

Dr. Shaw’s report concluded that the opportunity to use canal water for irrigation is largely untapped, and that canal water could be feasibly used to combat drought and the vagaries of climate change. Once supplied with a reliable source of water during the season, western farms may be able to shift from low-value crops (like feed corn and soybeans) to high-value crops (like apples, berries and vegetables).

Dr Shaw’s report noted that:

- While New York is a relatively wet place with abundant rainfall on an annual basis, even brief periods of dry weather between rain events can significantly affect the yield and quality of crops.
- There is no readily available alternative water supply. Western New York has very limited groundwater, and using the municipal water supply for irrigation would quickly exceed the capacity of the water distribution system.
- Agricultural production can be sensitive to even brief rain-free periods during the season, especially in the case of fruits and vegetables. With only five percent of agricultural land in the region irrigated, the majority of farmers are susceptible to drought. For instance, 2016 saw the worst drought in two generations, dealing a massive blow to Western New York’s farmers.¹

- There is general consensus that the frequency of high-temperature, rain-free periods is likely to increase between 2020 and 2050, and that irrigation could serve as an important resilience measure in an area facing increasing periods of drought.
- Absent irrigation, farmers have a difficult time growing high-value crops such as apples and vegetables. These crops require a significantly higher investment in time and labor than low-value crops like feed-corn and soybeans, hence a guaranteed water supply is crucial for farmers to commit the investment needed to grow apples and vegetables.
- An increase in high-value crop production not only increases total revenue for farms, but employs more people and has a ripple effect on the food packaging and distribution industries. Unirrigated feed-corn yields approximately \$600 per acre, whereas a well-managed apple orchard can result in anywhere between \$10,000 to \$20,000 per acre for farmers.
- Southwest Michigan exemplifies a region similar to Western New York that has benefited significantly from expanding irrigation. Between 1982 and 2013, irrigated acreage more than doubled from 175,000 acres to 352,000 acres; acreage of blueberries increased by 200 percent and vegetables by 54 percent. Today, the value of crops per acre in Southwest Michigan is almost double that of the rest of the state.

Dr. Shaw and members of the BuroHappold team carried out a series of interviews in the fall of 2018 at 12 farms in Orleans and Monroe Counties. While farmers almost universally expressed an interest in expanded access to water, two major barriers were identified: (1) irrigation infrastructure can be a large capital expense, and investments associated with higher-value crops are even higher (specialized equipment, labor, etc.) and (2) farmers were unwilling to make such a large capital investment unless guaranteed a reliable water source during the critical season. While the Canal Corporation today issues permits

to farms for siphons to convey water from the Canal into streams, there is no guarantee that water will be present in those streams during summer’s low-flow months, when farmers need it the most. Farmers surveyed knew little about the policies of the Canal Corporation in relation to water distribution, making them hesitant to commit to large-scale investments in irrigation infrastructure.

This research was presented to the Task Force Subcommittee and then to the full Task Force. There was consensus that irrigation should be expanded given the value it offers to farmers, local economies, and the State as a whole. Task Force members emphasized the importance of moving forward with this initiative quickly, given forecasts of increasing frequency of drought in the area, and recommended developing a ‘smarter’ water management system that would have the ability to better monitor flows in streams and adjust them more frequently to respond to both weather conditions and the use of water by farmers.

The findings by the Task Force are as follows:

- **Enhance communication between irrigation users and Canal Corporation managers**
- **Identify water management programs to regulate water releases into streams as needed for irrigation, including implementation of smart metering**
- **Assess viability of, and parameters for, an “irrigation district” or other advisory entity to oversee water management associated with irrigation**
- **Develop a grant program to incentivize farms to invest in equipment needed to utilize Canal water**
- **Identify methods to ensure that agricultural needs are coordinated with other Canal Corporation capital investments on the Canal**

¹ On average, farmers lost 43 percent of their crops. Losses on vegetable farms were even higher, almost 60 percent.



THE WESTERN REGION

Enhancing Recreational Fisheries

Western New York is a popular recreational fishing destination for trout and salmon in New York State, partly due to the impact of the Canal's release of water into tributary streams of Lake Ontario. In similar fashion to the way DEC stocks fish in Lake Ontario, there is potential to enhance existing angling opportunities in these streams by providing more predictable fish runs; this would attract many more anglers to the region.

Currently, water is released into north-flowing streams from the Canal either to maintain water levels needed for navigation or at the end of the season when the Canal is drained. These releases are episodic, but do have some ancillary benefits - most notably in encouraging fish to enter these streams from Lake Ontario and thus creating angling hot spots on a few north-flowing streams fed by the Canal when it is drained each fall. The irregularity of releases is not optimum for fish habitat in these streams; it also creates unpredictable angling conditions and limits anglers' ability to plan trips during the most productive angling periods. Ron Bierstine, a Task Force member and owner

of Oak Orchard Tackle and Lodge, helped convene a focus group with five licensed NYS fishing guides, Orleans County Tourism Director and County legislators, as well as DEC regional managers to brainstorm ways in which recreational angling opportunities can be enhanced using canal water. Thomas McDonald, Dam Safety Manager at NYPA and a licensed fishing guide, facilitated this session and assisted the group in understanding the feasibility of various possible interventions. There was general consensus among stakeholders and supporting technical consultants that:

- modifying the Canal's water management regime could help enhance recreational fishing opportunities
- the period when the Canal is drained at the end of the navigation season could be extended and optimized in order to prolong the recreational fishing season in the fall, distribute fish into area tributaries more uniformly, and attract more anglers to the region for better and more predictable fishing
- sustaining elevated base flows in the north-flowing streams during the summer months

Recreational fishing on the Oak Orchard Creek

- would provide optimal conditions for fish to run upstream from Lake Ontario and promote natural reproduction
- because streams in this area have limited fishing access, public fishing access along these streams should be expanded to ensure that enhanced flows do not result in crowding that would negatively affect the fishing experience
 - a new water management regime designed to support recreational fishing will not affect current recreational boating activity on the Canal and will be able to support increased flows for expanded irrigation

The outcomes of the focus group meeting and technical analysis were presented to the Task Force. There was consensus among the group that a longer fishing season and more robust fish habitat would help increase ecotourism spending on lodging, meals, tackle, and other support businesses, and that the State should endorse any water management regime changes. Task Force members asked to make sure that the overall ecological impact from augmenting flows is assessed, and that expanding access along these streams includes a commitment to improve the amenities available to anglers (parking, toilets, etc.).

The findings by the Task Force are follows:

- **Develop, in conjunction with Department of Environmental Conservation, a program for summer and fall release of canal water into specific tributaries**
- **Work with local communities and Department of Environmental Conservation to increase public fishing access and amenities on private property along the tributaries**
- **Deploy water management strategy that includes flow and water quality monitoring**
- **Work with Department of Environmental Conservation to conduct basin stream biology assessments to analyze impacts of additional water releases into tributaries**
- **Develop a website or other mechanism to provide flow-release information to anglers and tourism entities**

Western Region Canal and Streams





Seneca Falls, NY

TASK FORCE FINDINGS

THE CENTRAL REGION

The Central region presents some of the most promising opportunities to expand tourism along the Erie Canal. It is home to some of the busiest locks on the entire NYS Barge Canal system, thanks to recreational traffic moving seasonally between the Finger Lakes, Oneida Lake, and Lake Ontario. The Finger Lakes, including Cayuga and Seneca, already attract tourists with their breweries, distilleries, and vineyards, and serve as a hub for localized recreational boating. Syracuse, Ithaca and many smaller college towns in the area draw in tens of thousands of young people during the academic year.

While new forms of tourism have proved a boon to local economies, this same area faces substantial ecological challenges - in part the legacy of moves made to expand the Erie Canal over time. The Erie Canal's first iteration consisted of a channelized canal that ran through Syracuse, south of Oneida Lake. However, the marshy areas north of the Finger Lakes were poorly suited to the needs of an expanded, industrial-sized canal; as a result, the Canal in the Central region was

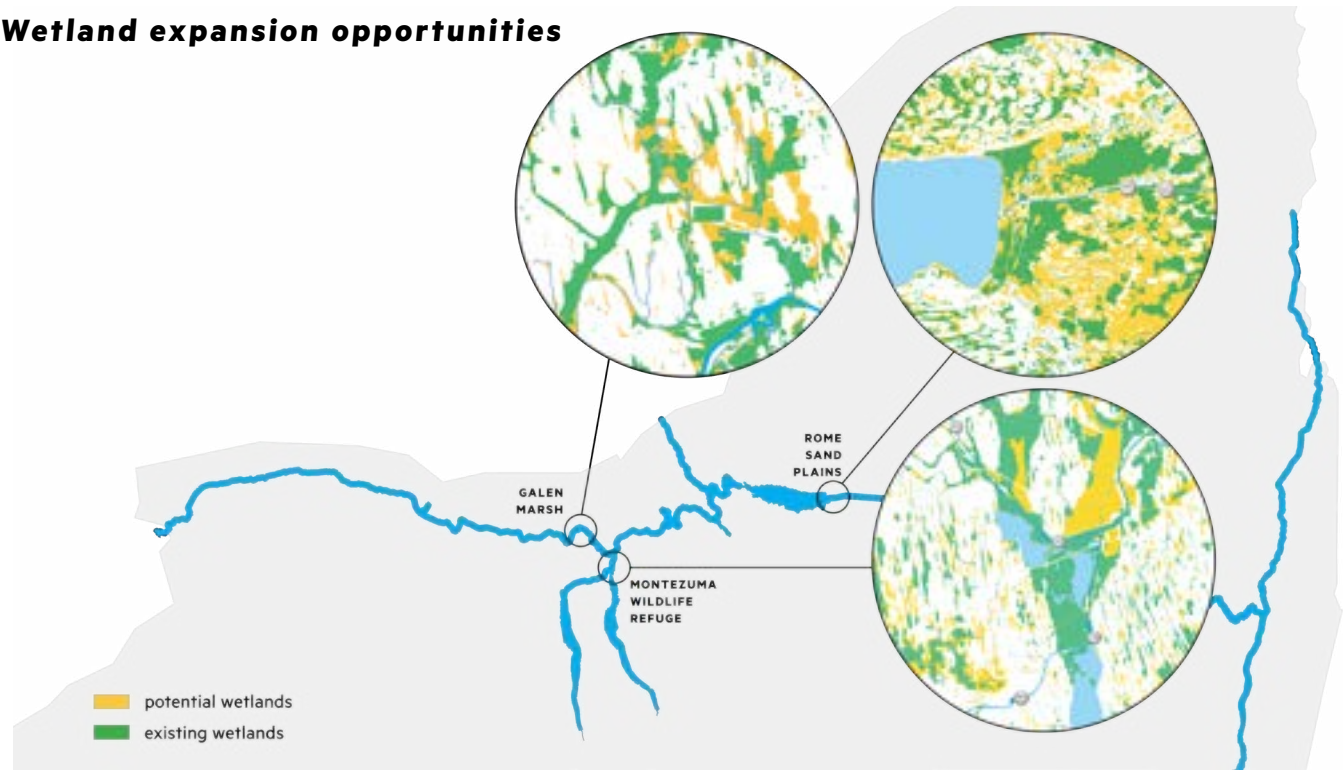
rerouted north to its current location to take advantage of and utilize existing waterbodies such as Oneida Lake and the Clyde River.¹

The construction of the Canal in the 20th century impacted the region's ecosystem in several ways. Wetlands were partially drained, including those associated today with the Montezuma Wildlife Refuge complex, a crucial stopover point for more than one million migratory birds annually along the Atlantic Flyway. In addition, the Canal channelized natural rivers and separated streams from their floodplains. Designers of this section cleverly connected multiple watersheds for freight passage – never imagining that this would over time facilitate the spread of aquatic invasive species from the Great Lakes and the Mohawk and Hudson Rivers into New York waters, and thus alter the ecosystems of the Finger Lakes and other local water bodies.

¹ Today this region of the NYS Barge Canal also includes the Oswego Canal, a riverine canal that links the Erie Canal with Lake Ontario via the Oswego River, and the Cayuga-Seneca Canal, a riverine canal along the Seneca River that connects Cayuga and Seneca Lakes to each other and to the Canal.



Wetland expansion opportunities



THE CENTRAL REGION

Restoring and Expanding Wetlands

Wetlands traditionally serve a variety of ecological functions, including providing habitat for many species and storing and filtering vast quantities of stagnant or slow-moving water from naturally-overflowing waterways. The Central region of the Erie Canal is home to three major wetland complexes: the Montezuma wetlands, Galen Marsh (known locally as the Marengo Swamp), and Rome Sand Plains. While these wetlands are now largely protected as federal and state lands and conservation areas, their volume and utility was impaired during the Barge Canal’s construction. Channelization of natural rivers isolated them from their water sources and led to a reduction in the natural water table; new canal infrastructure, such as locks and dams, blocked waterways and trapped nutrients and silt - the movement of which is critical to wetland health.

Today, there are opportunities to enhance and expand these wetlands by coordinating

their management with that of the Canal and by restoring hydrologic connections between former wetlands and the waterways that once fed them.¹ To that end, The Nature Conservancy was commissioned to identify and assess specific restoration opportunities. In addition, David Klein, a wetlands expert from The Nature Conservancy, facilitated a focus group consisting of Department of Environmental Conservation regional and wildlife management area managers, a United States Fish and Wildlife Service reserve manager, Cornell University faculty, a Cornell Cooperative Extension representative, and two Task Force members (Neil Murphy from SUNY-ESF and Chris Lajewski from the Montezuma Audubon Center). The group confirmed that restoration opportunities exist at the Montezuma wetlands and Galen Marsh (largely achievable by restoring floodways and hydrologic connections) and that the Rome

¹ This idea originated from a short-listed submission in the Reimagine the Canals competition in 2017 by Maria Goula and Jamie Vanucchi of Cornell University and Sandi Bastedo of Cornell Cooperative Extension.

Sand Plains could potentially be expanded beyond its current borders. The group also noted the lack of regional coordination between state/federal wetland managers and Canal management, highlighting this as a challenge to overcome in order to facilitate future restoration efforts.

The outcomes of the focus group session and The Nature Conservancy analysis were presented to the Task Force subcommittee. Some members initially expressed concerns about the potential impact of wetlands restoration on property values and recreational navigation, however the subcommittee (and subsequently the full Task Force) ultimately reached a consensus that wetland restoration and expansion has the potential to generate substantial ecological and recreational benefits without negatively impacting navigation or other stakeholders. It was agreed that the specific opportunities should be studied further and that potential environmental and economic impacts should be rigorously evaluated.

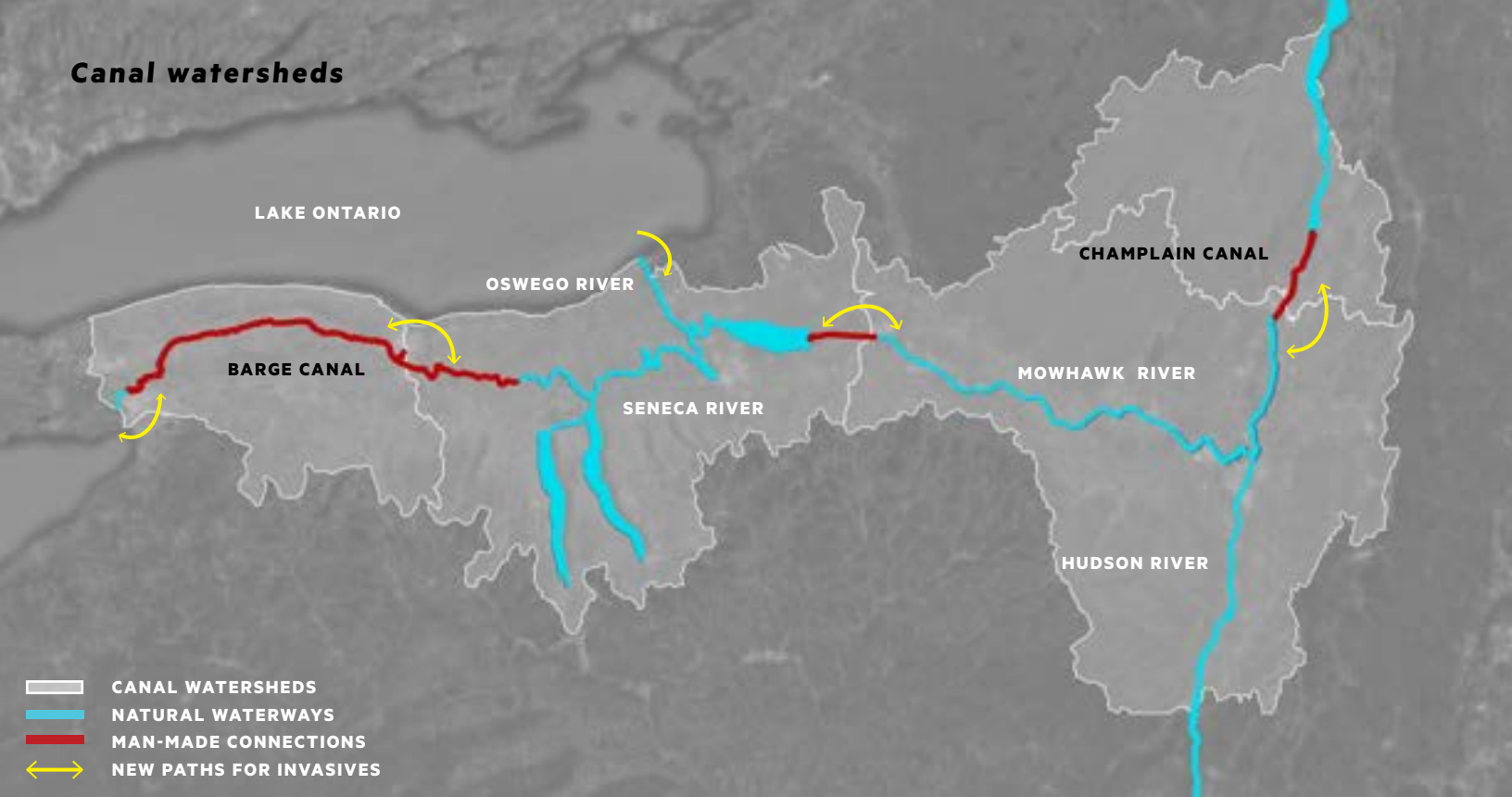
The findings by the Task Force are follows:

- **Identify specific opportunities for wetland expansion in three key locations:**
 - **At Montezuma, study potential restoration of floodways, flowpaths, and creation of new hydrologic connections**
 - **At Galen Marsh, study potential for enhancing flows in the Clyde River**
 - **At Rome Sand Plains, identify specific opportunities for westward expansion of wetlands**
- **Develop preliminary designs and assess cost, economic, environmental, and operational implications associated with restoration and expansion of wetlands in targeted areas**



Montezuma National Wildlife Refuge

Canal watersheds



THE CENTRAL REGION

Preventing the Spread of Aquatic Invasive Species

An aquatic invasive species (AIS) is a waterborne organism – fish, mollusk or vegetation - that causes ecological or economic harm in a new environment where it is not native. AIS outcompete native species for space and resources, destroying habitats, reducing property values, and hindering recreational activities such as fishing, boating, swimming, and kayaking. Such damage to ecosystems and infrastructure has ripple effects across a local economy as the number and quality of birding, commercial and recreational fishing, and boating opportunities diminish.¹

AIS invasions can be facilitated when naturally-separated watersheds become connected through human interventions, as in the case of the Erie Canal. In connecting the Hudson River to the Great Lakes, the designers of the Canal inadvertently created an “invasive species superhighway.” Many invasive species have already made their way into state waters, such

as water chestnut, a plant that forms thick nets that hinder navigation and lower property values, and zebra mussels, which create million-strong colonies that siphon nutrients from water that native species need to survive and that clog water conveyance infrastructure. The threats from AIS are quite literally at the doorstep (e.g., Asian carp in the Mississippi River Basin but not yet the Great Lakes). Any invasive species in the Great Lakes can, and likely will, travel into the internal waters of New York State, unless preventive measures are taken.²

R2 Resource Consultants, a leading natural resource consultant, was engaged to identify ways canal infrastructure might be used to stop AIS transport. The analysis was not designed to address or consider the impacts on navigation, property, or broader ecosystems associated with these alternatives but rather to examine the effectiveness of different AIS deterrents using canal infrastructure itself. R2

1 In the Great Lakes, a hotbed for AIS from global maritime shipping, it is estimated that \$200 million per year are lost to AIS.

2 US Army Corps of Engineers is conducting a study and preliminary design of measures to prevent invasive species from being conveyed via the Champlain Canal.

engaged dozens of NYS DEC scientists, lake association representatives, NGOs, research organizations, and academics to better understand: (1) AIS threats to state waters, (2) the successes and failures of existing mitigation efforts, and (3) potential deterrent approaches.

The R2 report examined a range of technologies, identified three alternatives, and assessed their suitability for further study based on effectiveness, cost, and permitting feasibility. The approach recommended for further study consisted of:

1. Hydrologic separation at Rochester to protect the Finger Lakes and Oneida Lake from invasive species coming from Lake Erie
2. Hydrologic separation at Rome to protect the Mohawk and Hudson River Estuary from threats coming from the Great Lakes;
3. Piloting a boat lift/wash station in Oswego to prevent threats moving from Lake Ontario to Oneida Lake and the Finger Lakes
4. Installation of a Bio-Acoustic Fish Fence (BAFF) near Tonawanda, to deter Asian carp flowing into the Canal from Lake Erie

Recognizing that “fail-safe” hydrologic separation at Rochester and Rome would impact navigation by requiring portage, “dry lock,” or boat lift mechanisms, the Central Region Subcommittee questioned the necessity to undertake such comprehensive measures. The consultants indicated that a variety of technologies can deter the spread of AIS, but that only hydrologic separation achieves the highest levels of effectiveness. One Task Force member questioned the potential economic impact of complicating the journey for the long-distance boaters who transit those two points along the Canal.³ Another noted that the Erie Canal has global recognition, and that impacts on through-navigation could alter the perception of the Canal, and hence its brand. Other Task Force members noted that stopping the spread of AIS has not only environmental benefits, but also economic ones: NYS DEC spends millions annually on mitigating the impacts of invasive species that are already

in New York, in an effort to protect recreation, property, water-dependent businesses, and the broader ecosystem. Some questioned how the State could justify *not seizing* the opportunity to prevent the spread of invasive species, given that the benefits of any *Reimagine* investments would be at risk should invasive species continue to spread. With one exception, the Task Force members came to a general consensus that ways of combatting invasive species merit further evaluation and that both alternatives proposed by the consultant and others should be studied further – including analyses of potential navigational impacts and associated costs and benefits.⁴

The findings by the Task Force are follows:

- **In cooperation with Department of Environmental Conservation, further study mechanisms for retrofitting canal infrastructure to establish AIS cordon points with potential locations in Rome, Rochester and Oswego. This study will:**
 - **evaluate new technologies**
 - **assess impacts on through-navigation and identify ways to mitigate them**
 - **calculate avoided environmental costs**
 - **identify any alternative or additional locations**
- **Further evaluate, with Department of Environmental Conservation, cost and feasibility of a “bio-acoustic fish fence” (BAFF/SILAS) or similar technologies to deter Asian carp near Tonawanda**
- **Coordinate with the US Army Corps of Engineers and Department of Environmental Conservation on existing AIS mitigation efforts on the Champlain Canal**

3 Initial estimates using Canal Corporation data for lock traffic indicate that only 24 percent of boats (5,100) go through locks, and only a small fraction of those would be impacted by the recommended approach.

4 The representative from the Erie Canal National Heritage Corridor expressed his opposition to further study of the issue as recommended by the remaining Task Force members.



Bellamy Harbor Park,
Rome, NY

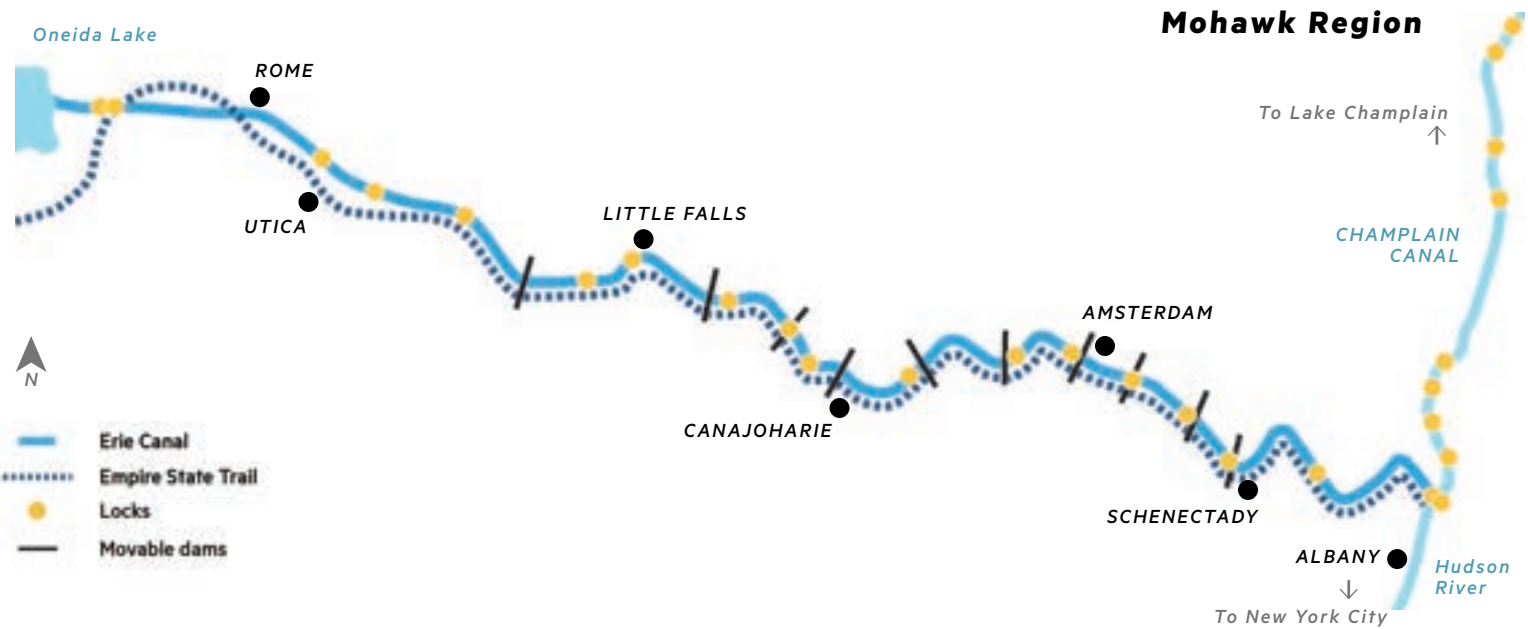
TASK FORCE FINDINGS

THE MOHAWK REGION

The Mohawk River Valley, reaching from Rome in central New York to Waterford on the Hudson River, includes some of New York State’s most disadvantaged communities. Once home to a thriving industrial manufacturing sector, post-industrialization in the region has led to significant economic decline. The region also suffers from chronic flooding – a function of many factors, both natural and man-made – which undermines property values. Despite these challenges, there are signs of regeneration across the region. Schenectady, Little Falls, and Utica now boast new waterfront developments; a number of other Mohawk towns and cities have recently been selected as winners of the Downtown Revitalization Initiative (DRI), which provides recipients funding towards economic and community development.

Creek. In places, the Canal is a man-made channel that runs parallel to the river, cutting the river off from its northern tributaries; in others it runs within it and manipulates its flows and depth. Construction of the NYS Barge Canal in 1918 ‘canalized’ (i.e., made into a canal) the eastern section of the River with the help of movable dams and locks; these dams permit Mohawk water levels to be increased during the navigation season (10-12 feet) to allow for the passage of commercial barges and then returned to normal (4-6 feet) in the winter. The riverine nature of this section of the Canal presented the Task Force with an unusual set of challenges and opportunities revolving primarily around potential strategies to address flooding.

From a water perspective, the Mohawk River is the largest tributary of the Hudson River, with a total length of 155 miles and a drainage area of 3,462 square miles. Major Mohawk tributaries include West Canada Creek, East Canada Creek, Oriskany Creek, and Schoharie





THE MOHAWK REGION

Mitigating Ice Jams

Ice jams are perhaps the most unique phenomenon native to this stretch of the Canal. Whereas flooding typically happens during springtime melts of snowpack or during heavy rainfall events at other times of the year, ice jams generate flood risk to Mohawk River communities during the winter. They typically occur when warming temperatures and heavy rains cause snow and ice to melt rapidly. As river waters rise and river discharge increases, the surface layer of ice breaks into chunks that are carried downstream by the rushing waters; the chunks lodge against one another, pushing river water into communities adjacent to the jams and causing significant structural and environmental damage, as well as health and safety risks.

On behalf of the Task Force, BuroHappold, with technical assistance from NYPA, convened an Ice Jam Mitigation Panel to review the historical ice jam-related flood

events in the Mohawk River, identify changes in climate and river conditions contributing to future ice jam formation, and determine ways that canal and NYPA infrastructure could be used to reduce or eliminate this threat. The Panel was comprised of representatives from the Canal Corporation, NYPA, US Geological Service, US Army Corps of Engineers, and academic experts - including Task Force member Dr. John Garver of Union College.

A bathymetric survey of the ice jam-prone areas was commissioned by NYPA and used by Dr. Hung Tao Shen of Clarkson University, a global expert in ice jam hydraulics, to develop a highly-sophisticated ice jam model which allowed Panel members to better assess both the causes of ice jams and the impact of various potential solutions.¹

The Ice Jam Panel considered ten potential interventions and recommended four for

Ice jam at Lock E-8, near Schenectady, NY

¹ Prior to this survey, NYPA/the Canal Corporation had only rudimentary surveys of the bathymetry of the area, rendering any predictive modeling extremely limited.

further analysis, noting that more modeling work and/or further analysis would need to be done to determine the specifics of each intervention as well as their combined impact:

1. Using specialized ice breakers/cutters to physically break up ice jams in hotspot areas
2. Modifying the Vischer Ferry Dam crest to better manage water flows, and potentially “flush out” ice jams
3. Modifying the Mohawk River channel through dredging and filling activities to alleviate choke points to water flow which contribute to ice jam formation
4. Deploying an Early Monitoring and Warning System that will better predict ice jam formation and flooding, providing communities and emergency managers more lead time to prepare for flood events

These potential interventions were presented to the Mohawk Region subcommittee and subsequently to the full Task Force by Dr. Garver of Union College and endorsed by all. A number of Task Force members who live in the Mohawk Valley stressed the importance of mitigating ice jams, not only for the hardest-hit areas around the Stockade District in Schenectady but also for other areas such as Herkimer and Little Falls. They also noted that the current warning system is ineffective, as emergency managers cannot forecast when ice jam flooding is going to occur. Enhancing this system to better forecast these events

and warn people in advance would be a significant benefit for communities.

The findings by the Task Force are follows:

- **In conjunction with NYS Office of Emergency Management, US Geological Survey, and the National Weather Service, develop an Early Warning System (EWS) for ice jams in the lower Mohawk and identify an approach for developing similar system to address ice jams in Herkimer County**
- **Assess alternative designs, and recommend one or more approaches, for modifying Vischer Ferry Dam with Obermeyer gates (pneumatically-actuated crest gates) to maximize reduction in ice jam and summer flooding impacts**
- **Assess (and subsequently recommend) potential river channel modifications to mitigate ice jams, including considerations of negative or positive impacts on summer flooding and the environment**
- **Further quantify effects of using ice breakers/cutters, including any downstream impacts, and identify appropriate equipment/deployment locations**



Ice jam-related flooding in the Stockade District, Schenectady, NY



THE MOHAWK REGION

Fort Plain, NY, June 2006

Mitigating Summer Flooding

Mohawk River flooding is documented back to the 17th century, but the ‘canalization’ of the River in the 20th century is generally agreed to have exacerbated the problem by placing additional structures in the river.¹ In recent times, Hurricane Irene (August 2011) and Tropical Storm Lee (September 2011) wreaked havoc in areas around Schenectady and Amsterdam, wiping out bridges and destroying homes; Fort Plain and Canajoharie were flooded in July 2006 and June 2013. Most recently, heavy rains in late-October 2019 caused record-level flooding in Little Falls and Utica. Climate predictions suggest that the frequency of floods in this region will double over the next two decades, and that the magnitude of floods will increase by 15 to 20 percent.

Bergmann Associates, an engineering consultancy with expertise in Mohawk River flood mitigation, was contracted to identify

potential interventions to reduce flood risk, model these interventions to assess their benefits, and provide associated cost estimates. Bergmann assessed a wide variety of solutions, then undertook analysis of six interventions that fell into three categories:

1 Infrastructure modifications:

Modifying Vischer Ferry Dam’s crest by adding gates that can be lowered preemptively during a flood to convey water downstream, reducing water levels in the Canal and thus mitigating flooding around Schenectady.

2 Operational changes:

- Reducing the summer water level in Delta Reservoir (that feeds water to the Mohawk River) to provide additional water retention storage, mitigating flooding in and downstream of Rome.
- Raising movable dams either (a) preemptively (prior to storms), or (b) permanently to allow the Mohawk River to flow at its natural (lower) water level.

3 Channelization improvements:

Using portions of the Canal where the Mohawk and the Canal are bifurcated (around Little Falls, Herkimer, and between Rome and Utica) as surge basins during floods, in order to reduce peak flows in the Mohawk River to mitigate flooding in those areas.

Bergmann presented these findings to the Task Force, noting that several of the potential interventions would impact water levels on the Mohawk portion of the Canal. These interventions would not, however, impact the majority of local, recreational boaters.

The Mohawk Region Task Force Subcommittee met multiple times to discuss Bergmann’s potential solutions. Some members welcomed the ability to adapt canal infrastructure to tackle flooding issues related to climate change and capture the ecosystem benefits that result from ‘naturalizing’ a river; others were opposed to interventions that could impact the ability of deep-draft vessels to navigate the Mohawk. It was noted that moving to a more natural Mohawk River would not eliminate flooding, but would contribute significantly to reducing its effects. It was also noted that the interventions that would have the highest flood mitigation impact would also have significant ecosystem benefits. Other Task Force members noted that any intervention that affects water levels in the Mohawk could impact businesses (such as marinas, restaurants, and shops), since deep-draft long-distance boaters spend more heavily than local boaters and would be forced to shift to the Champlain stem of the NYS Barge Canal system to access the Great Lakes from the Hudson.

Subcommittee members were curious to know more about the flood resilience efforts that the Canal Corporation had undertaken to date. It was noted that after Hurricane Irene, the Canal Corporation retrofitted movable dams in the Mohawk so they could be preemptively raised during a flood event to reduce water levels. However, this has not proved to be effective because the Canal Corporation requires at least two days’ notice before a storm to alert boaters on the system; the forecasting system rarely

provides that amount of advance notice and is subject to inherent uncertainties in weather forecasting.

Collectively, the Task Force recognized the value that flood reduction opportunities present, but did not come to a consensus as to how best to balance the goals of maximizing flood mitigation and maintaining navigability for deep-draft (long-distance) boaters. The Task Force accordingly recommended further evaluation of economic and environmental costs, benefits, opportunities, and impacts, before a decision is made to pursue one or more interventions.

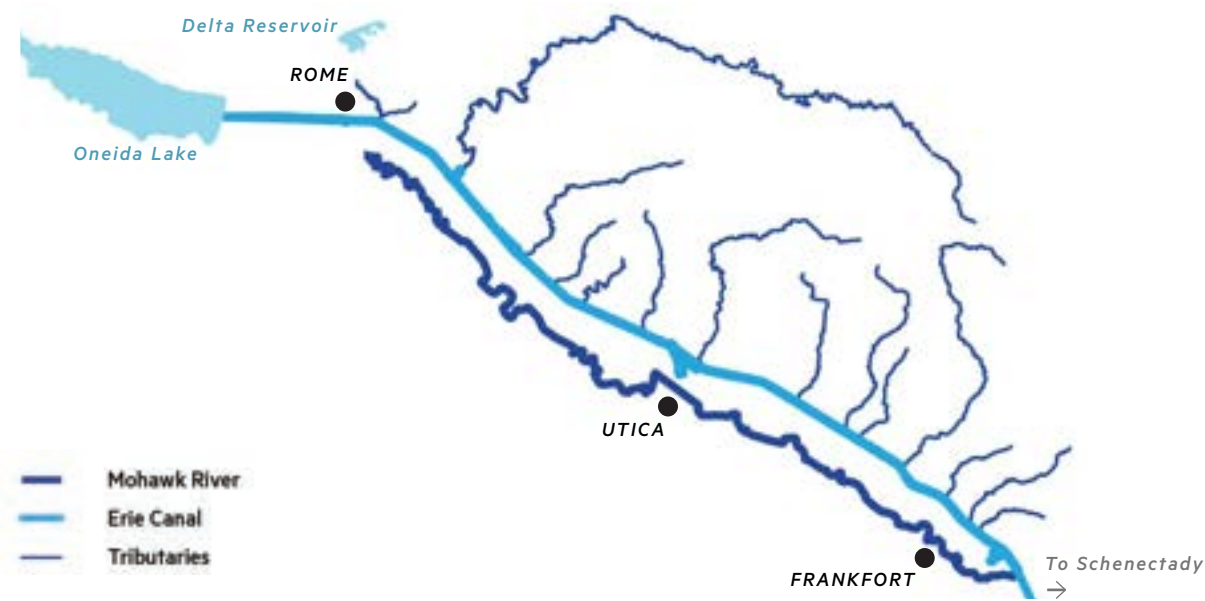
Members also asked that further work be done to consider compromise positions, such as reducing the depth of the Canal to maintain navigation and limiting full or partial draft navigation to a shorter navigation season. The Task Force agreed that the existing forecasting system needs to be improved to allow communities and NYS agencies to better plan for flood events.

The findings by the Task Force are follows:

- Further evaluate the following interventions to use Canal infrastructure to mitigate flooding in the Mohawk River, including assessing positive and negative impacts on navigation, local communities and businesses, and the environment:**
 - modification of Vischer Ferry Dam crest**
 - changes to Delta Reservoir operating water levels**
 - creation of in-channel stormwater retention basins and diversions (between Utica and Rome, Lock E-16 and MD 12, and Lock E-18 and MD 14)**
 - changes to movable dam operations**
- Investigate the impact and value of enhancing the Flood Warning Optimization System (FWOS) on flood forecasting and Canal operations**

¹ Although historic preservation focus is on the building and use of the Erie Canal, Task Force members noted the rich history of Native Americans and colonial settlers using the Mohawk River before it was industrialized.

Mohawk River tributaries and the Erie Canal



THE MOHAWK REGION

Restoring Tributary Connections with the Mohawk River

The Mohawk River was substantially altered by the Erie Canal’s construction. Between Rome and Frankfort, the Canal was built parallel to the River, which had the effect of intercepting Mohawk tributaries prior to their connection to the main stem of the River. This isolated the Mohawk River from over a third of its watershed and undermined its natural flow, impacting water levels, quality, and temperature as well as fish connectivity. The Nature Conservancy was asked to evaluate the potential to restore the River’s watershed and riparian ecosystems in this reach by reconnecting the disconnected tributaries to the River’s main stem.

The Nature Conservancy concluded that the impact of reconnecting tributaries could be

profound, and identified potential reconnection opportunities using aerial imagery. Identifying these potential ‘reconnection reaches’ allowed the Conservancy to evaluate their feasibility, assuming a future scenario in which this stretch of the Canal is largely naturalized. Given the nascence and complexity of restoration techniques, the Conservancy conceived of a phased approach that would start conservatively with the simplest reconnections and progress to those of increasing ecosystem complexity and ecological benefit. This implementation sequence was recommended to allow the lead agency to develop experience with such restoration practices and build trust with other stakeholders.

This research was presented to the Task Force to consider. While concerns were raised about the strategy’s incompatibility with the maintenance of high water levels (i.e., deep-draft navigation) in this reach of the Canal, the long-term nature and complex mechanics of this suite of interventions was also recognized. There was a consensus that the strategy could have significant ecotourism and ecological benefits, but that its implementation should be contingent on other Task Force findings. In acknowledgement of this contingency, further study was recommended, beginning with an evaluation of pilot reconnection opportunities that have minimal impact on water levels and navigation.

The findings by the Task Force are follows:

- **Evaluate options for a tributary reconnection pilot that has minimal impact on existing Canal operations**
- **Determine whether tributary reconnections align with the future hydrologic state and management regime of the Canal System**
- **If so, study the feasibility, ecological, operational and economic impact of tributary reconnections**



Healthy riparian corridors

SYSTEM-WIDE PLACEMAKING AND ACTIVATION

Over the last 50 years, upstate New York has seen a decline in economic activity concurrent with a decline in industrial manufacturing and shipping. Once an engine of New York State's economic growth, today's upstate

communities are uniformly smaller than they were a century ago – though they remain centers of education, health care and government among other industries. Despite historic declines in manufacturing industry once situated along the Canal, population remains concentrated along the waterways: roughly 80 percent of New York's upstate population lives within 25 miles of the four canals that comprise the NYS Barge Canal system.

The *Reimagine the Canals* effort seeks to reverse this long-term decline in population and offers recommendations to stabilize and grow upstate communities and economies. The Task Force has identified strategies that will use the Canal and its companion trail as a catalyst to support local populations, introduce novel forms of waterfront development to improve quality of life, promote economic development through tourism that activates canalside properties and destinations, and improve the health and well-

being of upstate residents through expanding access to outdoor recreation.

Task Force findings aim to capitalize on the momentum that recent state initiatives have set in motion. The Empire State Trail is close to completion - realizing the vision of an interconnected, state-wide, multi-modal trail system. New York's Downtown Revitalization Initiative, Restore NY, and Local Waterfront Revitalization Program among others now provide well-organized funding opportunities to help reinvigorate downtowns and waterfront communities, while Taste NY and I LOVE NY represent marketing efforts that champion New York's products and destinations. The operational improvements and activation opportunities outlined below should be viewed as complementary to these efforts, focusing on ways the Canal itself might accelerate revitalization efforts.



Bellamy Harbor Park,
Rome, NY

SYSTEM-WIDE PLACEMAKING

Operational Improvements

A series of recommended operational improvements were identified over the course of Task Force deliberations. These priorities emerged from discussions among Task Force members, reports and presentations submitted by subject matter experts, letters from canal constituents, stakeholder focus groups, and the Rockefeller Institute's community engagement events and online platform.

The Task Force found that the Canal Corporation should:

- **Serve the needs of existing constituencies while appealing to new ones:** The NYS Barge Canal system is widely used by recreational boaters and residents of canalside communities. Given the presence of so many universities across the Erie spine, there is an opportunity to expand the Canal's user base to younger and more diverse populations. More active forms of outdoor and water-based recreation and cultural programming were two of many ways identified to attract a younger demographic.

- **Finish building out a comprehensive set of trail amenities:** The Canal and the Empire State Trail should be seen as two parts of one network. Completion of the Empire State Trail highlights the need for more trail amenities to activate it, connect it to the waterway, and ensure that it appeals to a broad audience that includes local families and youth as well as visitors.
- **Establish better coordination between entities that have a stake in the Canal:** With different geographies and hydrologic conditions across its length, the Canal has many stewards and champions. Enhanced coordination between municipalities, state agencies, non-profits, business owners and residents is required to ensure that resources are well-prioritized and that organizations are not competing with one another for them.
- **Enhance ties to educational institutions to celebrate the Canal's history, reimagine its future, and engage its ecology:** Upstate New York is rich in academic institutions, many of which grew around expertise developed during the Canal's construction. Universities and colleges along the Canal



- corridor can be incubators for new projects, ideas and programs to transform the Canal corridor, while local schools can be tied more closely to the waterway as a source of experiential and academic learning.
- **Maximize connectivity between the Empire State Trail, New York State Canalway Water Trail, and adjacent communities:** More connections – bridges, pathways, and access points between the trails, canal, and local communities – are needed to expand recreational usage, improve quality of life, and ensure that local businesses capture benefits from an expanded user base.
 - **Address the issue of water quality to maximize recreational possibilities and support municipalities who draw drinking water from the Canal:** Canal infrastructure presents unique opportunities to cost-effectively introduce new forms of water recreation. Without clean and healthy water, however, the benefits of these facilities will be limited and ultimately undermined.
 - **Enhance the branding, image, and advertising for the Canal System:** The New

York State Canal System is a historical gem, but is largely unknown in the US outside certain niche audiences. A coordinated branding and communications strategy is needed to draw additional visitors from other parts of the country and expand the number of foreign visitors.

- **Find ways of increasing revenue, including considering the use of lockage fees:** Use of the Erie Canal is free to long-distance boaters, many of whom consider it a “short-cut” to get from New York to the Great Lakes (without having to travel through the St. Lawrence Seaway) and all of whom pay tolls or usage fees elsewhere. Separately, considerable land along the Canal not needed for operational purposes lies fallow and could be developed. These and other revenue opportunities should be pursued to help offset the cost of maintaining the Canal.

Waterford, NY



Cayuga Lake
whitewater course
at Lock CS-1



Existing conditions

SYSTEM-WIDE PLACEMAKING

Expanding Water Recreation

The Canal’s extensive early 20th century water management infrastructure offers unique opportunities for 21st century forms of water recreation – e.g., swimming, fishing, kayaking, rafting, floating, ice-skating, and paddleboarding in addition to motorized boating. Access to water recreation in all of its forms can help create world-class destinations, enhance quality of life in local communities, and offer youth—as well as people of all ages and abilities—the chance to learn new skills and stay healthy. New recreational opportunities can build on the New York State Canalway Water Trail, which runs alongside the Empire State Trail for much of its length and incorporates 524 miles of interconnected canals, lakes, and rivers.

The Task Force discussed various locations for new water-based recreational opportunities, among them a potential whitewater course at the top of Cayuga Lake adjacent to the Montezuma National Wildlife Refuge, an outdoor “water park” along the Mohawk River in Utica, a float course and winter ice park adjacent to Bellamy Park in Rome, and the expansion of waterskiing activities in Amsterdam. These and other opportunities that build on the expanding popularity of recreational water uses should be evaluated.

Task Force Findings:

- **Develop new water recreation destinations to attract a more diverse audience to the Canal and enhance health and well-being**



SYSTEM-WIDE PLACEMAKING

Celebrating “Iconic Infrastructure” Destinations

Much of the Canal System’s infrastructure is unique to its place and time, and – like the Erie Canal before it - represents the ambition and prowess of the State’s engineering heritage. These include locks, movable dams, lift bridges, guard gates, reservoirs and more. As part of the Erie Armada, a multi-day festival and *Reimagine the Canals* competition winner, Lock 30 near Macedon Canal Park was transformed into an iconic overnight destination; this included evening cruises on the *Colonial Belle* canal boat to experience a temporary lighting installation, demonstrating a new model for after-dark canal engagement.

Iconic and interactive lighting installations represent one among many ways of celebrating these historic structures, by offering programming opportunities for local communities and serving as an attraction for tourists year-round. Lighting projects along post-industrial waterways have contributed to redevelopment in former industrial centers

Hydro-powered illumination of movable dams in the Mohawk Valley



Existing conditions

across the globe – for example, Providence, Rhode Island’s WaterFire festival or Central Scotland’s 150-foot Kelpie sculptures. Like the historic bridges found in European capitals, the Canal offers the authenticity that comes with experiencing historic waterway infrastructure.

Task Force Findings:

- **Invest in “iconic infrastructure” destinations that celebrate the future by drawing attention to the waterway’s past and attracting local visitors and tourists**



Adaptive reuse of Guy Park Manor and new connection to the Empire State Trail, Amsterdam, NY



Existing conditions

SYSTEM-WIDE PLACEMAKING

Expanding Overnight Accommodation

Overnight accommodation options along the spine of the Erie Canal are at present uneven – easy to find in the larger cities and towns, but few and far between in smaller and more rural locations. Enhancing the supply of lodging options is one way to amplify canalside tourism and expand the economic benefits visitors bring to canalside towns. Extending stays mean more engagement with cultural and recreational assets, more traffic to restaurants, and more support for a variety of retail businesses – from canal tours to shops to sporting outfitters.

Numerous paths to expanding these options can be pursued simultaneously. Glampsites, a combination of “glamour” and “camping,” offer unique outdoor camping experiences and can be established on state land along the Canal or Empire State Trail in close proximity to local businesses.¹

For those looking to engage with the Canal’s history, the adaptive reuse of industrial and commercial buildings as well as private residences offers considerable appeal. Unused canal powerhouses, which once provided hydropower to locks, provide a particularly robust opportunity for accommodation. They are located across the Canal System, making them ideal for long-distance travelers, and were built in a uniform style, offering a distinct branding and marketing opportunity.

Task Force Findings:

- **Expand overnight accommodation, such as camping, ‘glamping’ and adaptive reuse of historic structures for hospitality**

¹ The Erie Armada, a multi-day festival and *Reimagine the Canals* competition winner, featured glamping tents designed by a Buffalo-based interior designer and enabled festivalgoers to forgo cars and take full advantage of the wide range of activities that the Erie Armada offered.



SYSTEM-WIDE PLACEMAKING

Transforming Industrial Property

The properties along the Canal reflect its industrial past, with underutilized or abandoned warehouses and factories occupying significant waterfront real estate. These industrial areas are slowly starting to be transformed with new types of businesses, residences, and recreational opportunities. By transforming the contaminated site of the defunct American Locomotive Company (ALCO) in Schenectady into a new marina, casino, hotel, retail, offices, and homes, the Mohawk Harbor project points the way towards a vibrant, mixed-use future for the revitalized canal waterfront. Smaller towns have also seen waterfront transformations, including the Residences at Canalside, which extends Fairport’s walkable downtown, and the continued investments made at Pittsford’s Schoen Place, widely considered one of the most charming spots on the entire Canal.

The Canal Corporation owns thousands of acres of upstate land, and has historically been willing to both grant permits and to sell, lease, or transfer property to facilitate new canalside projects. More can be done to incentivize these transformations, building on existing NYS programs such as the Downtown Revitalization Initiative, BOA, Restore NY, and a series of other grant programs now overseen by the Regional Economic Development Councils (REDCs) for each region. The Canastota Pocket Neighborhood, a *Reimagine the Canals* competition winner being undertaken by Madison County, provides one model; it will offer townhomes and cottages, communal workspaces and gardens, walking paths to nearby shops and restaurants, and direct access to the Canal.

Task Force Findings:

- **Facilitate canalside development on Canal Corporation-owned land and other public and private lands**

“Pocket Neighborhood” development, Canastota, NY



Existing conditions



Connecting the College at Brockport to the Empire State Trail



Existing conditions

SYSTEM-WIDE PLACEMAKING

Connecting Communities to the Empire State Trail

When it is completed in 2020, the Empire State Trail will be the United States’ longest multi-use trail, connecting Montreal with New York City and Albany with Buffalo. New York State has already committed \$200 million to completing the project, which will include “gateways” and “trailheads” replete with amenities such as parking, picnic tables, and self-service bicycle “fix-it” stations. The Trail’s smooth grade and ADA compliance will make it accessible to a wide array of visitors.

Yet connections between the Trail and the communities through which it passes between Albany and Buffalo remain uneven, and in some places are convoluted or non-existent. In Brockport, for example, the Trail along the Canal runs opposite the College at Brockport, but its students cannot access it directly. Here and in other places, canal infrastructure – guard gates, movable dams, and other forms of water control infrastructure – can be retrofitted to serve as the backbone for pedestrian and bike connections that do not currently exist.

Task Force Findings:

- **Connect local education, cultural and community destinations to the Empire State Trail**



THE FUTURE

Waterways have played a prominent role in societies throughout time; indeed the industries they fostered and the trade they facilitated form a large

part of the story of civilization. Across the United States, vestiges of late nineteenth and early twentieth-century canals, waterside factories, and mills pay homage to the industrial revolution that transformed a largely unpopulated and unheralded place into a global superpower. No example of this rich history is more recognized than the man-made Erie Canal, a symbol of the ingenuity, determination and political will, that made our nation.

In contrast to the silent mills, crumbling dams, and remnants of canals that can today be found in post-industrial towns across America, the Erie Canal offers something wholly unique: it is still functioning. Though its mission as a commercial waterway is long

gone, its extraordinary network of robust water control infrastructure can, as it was in the early 20th century, be reimagined – and adaptively reused to meet the 21st century challenges that threaten upstate communities. The Task Force’s findings identify just some of the opportunities at hand: water for irrigation, fishing, and ecological restoration, and infrastructure for place-making and to combat invasive species, ice jams, and flooding. Undoubtedly, further reflection and study will identify more.

As one member of the Task Force noted, the question that confronts us is no longer “what is the canal for?,” but rather “who is it for?” The Task Force answered that question clearly, in acknowledging that the waterway no longer



Potential walkway across
the Waterford Flight

TASK FORCE FINDINGS

serves anonymous barges making their way between New York City and the Great Lakes markets but now needs to be deployed to improve the lives of people in the communities of upstate New York. This report sets the stage for an ambitious reimagining of the Canal as a local amenity and an attraction for both old and new constituencies – a source of newfound resilience, a pillar of cultural identity, and an engine of economic development.

Though the direction of further ‘reimagining’ work is clear, the process of identifying and then implementing the specific programs and interventions that will bring most value to communities will be challenging. Protecting canalside towns from the ravages of climate change will demand new ways of using the State’s most precious resource – its water – and new ways of operating the infrastructure that carries it across the State. Maximizing economic development in communities abutting the Canal will require new and different forms of investment than those that have historically served to maintain the Canal in its original state.

The issues are complex and technical, and solutions are unlikely to be without controversy due to the wide range of stakeholders involved. Balancing the interests of those who rely on the Canal for their health, safety and quality of life – floodplain residents, waterfront property owners, hikers and boaters, fishermen and birders – with those who rely on it for business – developers and retailers, tour companies and marina operators – will not be easy. Thoughtful collaboration and inclusive discussion at a scale much wider than that undertaken by the Task Force will be required over the coming years. Compromises will need to be found and agreed upon; so too

will new resources – for scientific studies, for community engagement, and for the physical interventions that this report has identified.

Adapting the Canal for the next century does not mean walking away from its past. To the contrary, addressing the challenges of climate change, invasive species, and water quality is perhaps the safest way to ensure that this unique waterway recaptures its historic role as an economic engine for those who live along its path – strengthening local economies, reducing vulnerability to flooding, protecting and reviving ecosystems, and ensuring healthy levels of investment across its reach. New York has always been a national leader in progressive and creative thinking: successfully ushering in the “third coming” of the iconic Erie Canal will provide a global example of how the past can once again be put towards the service of the future.

ACKNOWLEDGEMENTS

The *Reimagine the Canals* Task Force would like to extend special thanks to a diverse group of people and organizations, without whom this report could not have been accomplished.

The Rockefeller Institute at the State University of New York ably mounted and delivered a comprehensive program of outreach to canal stakeholders, led by Laura Schultz and Robert Turner, during the summer of 2019. In addition to organizing five public workshops across the Canal corridor, the Institute hosted an online platform for the public to provide input and comments for the future of the Canals. This robust public engagement process was critical to ensuring that a wide cross-section of voices were heard by the Task Force. Additionally, the Task Force would like to thank stakeholders who participated in focus groups, generously lending their expertise to relevant discussions.

The work in this report relies in large part on the skill and insight of technical consultants. Dana Postlewait and MaryLou Keefe at R2 Resource Consultants performed a thorough analysis of potential strategies to prevent the spread of aquatic invasive species through the Canal System. Dr. Hung Tao Shen and Dr. Fengbin Huang at Clarkson

University and Dr. John Garver from Union College lent their unique expertise in ice jam hydrology to develop ice jam models based on new bathymetric surveys of the Mohawk Valley as members of the Ice Jam Mitigation Panel. The rest of the ice Jam Mitigation Panel participants included Stephen Couch and Roman Rakoczy from the US Army Corps of Engineers, Chandler Engel and Joseph Rocks from Cold Regions Research and Engineering Laboratory, Chris Gazoorian from US Geological Survey, as well as experts from NYPA and Canal Corporation. Kenneth Avery and Jim Guistina from Bergmann Associates and Bo Juza from Aquatrend, LLC lent their extensive engineering expertise with the Canal to identify potential strategies to mitigate flooding in the Mohawk Valley. Dr. Andrew Peck, Rebecca Shirer and Kristen France at The Nature Conservancy identified potential opportunities for restoring tributary connections to the Mohawk River; The Nature Conservancy's David Klein identified and assessed specific wetland restoration opportunities. Dr. Steven Shaw at SUNY College of Environmental Science and Forestry

proposed the idea for using the Canal for irrigation of western NY farms and then studied the possibilities in great detail. Thomas McDonald, a NYS Outdoor Fishing Guide and Waterways Dam Safety Manager at NYPA, developed strategies for enhancing recreational fishing in Western New York.

Various staff members from New York State agencies were appointed by their respective commissioners to serve on the Task Force. They provided valuable information on existing state initiatives and knowledge to the Task Force on various issues discussed. These staff members included Brian Stratton from the Canal Corporation, Matt Marko from NYS Department of Environmental Conservation, David Valesky from NYS Department of Agriculture and Markets, Sarah Crowell from NYS Department of State, Ross Levi, Tamara Mayberry, Jim Fayle and Daniel Kolinski from Empire State Development, and Alane Ball-Chinian, Robert Hiltbrand, Mark Mistretta, and Daniel Mackay from NYS Office of Parks, Recreation and Historic Preservation.

The SUNY College of Environmental Science and Forestry, The College at Brockport, the Rochester Chamber of Commerce, the Rockefeller Institute of Government, the NYS Fairgrounds, Orleans County Tourism, and Orleans County Cornell Cooperative Extension generously provided space and catering that facilitated multiple task force meetings and stakeholder focus group sessions.

Graphic support was provided by many talented firms and individuals. The graphic design and layout of this report document was provided by Pure+Applied with the talent of Paul Carlos and Ciara Mitchell. Drone photography was provided by Lenny Pridatko. Matthew Urbanski and Jack Ohly at Michael Van Valkenburgh Associates (MVVA) provided input on the concepts for iconic destinations and creative adaptive reuse of Canal infrastructure and generated the rendering visualizations for these

concepts. Lighting design and visualization was provided by Enrique Peiniger, Jean Sundin, and Markus Fuerderer at the Office for Visual Interaction. The Brockport Loop bridge designs and visualization were developed as part of a related pre-feasibility study that included designs by WXY Architecture and Urban Design, SHoP Architects, CLUAA, and John Ronan Architects as well as engineering support from Davood Liaghat at BuroHappold Engineering.

Stephanie Obkirchner from Amsterdam, NY contributed the image on the back cover of the report and the Erie Canalway National Heritage Corridor shared the photograph of the Albany Symphony's 2017 Water Music event in Amsterdam on pg. 20.

The work in this report could not have been done without the expertise and cooperation of the staff at the New York Power Authority and the New York Canal Corporation, among many others Gil Quiniones, Joseph Kessler, Kimberly Harriman, Thomas McDonald, Cindy Brady, Alex Brey, James Candiloro, Rob Daly, Robert Knowlton, Peter Ludewig, Brian Saez, Frank D'Eufemia, Chris Carey, Steve Gosset, John Joyce, Erin Nolan, Randy Kreis, Jeff Cohen, Darby Racey, Sharon Leighton, Jackie Schillinger, Sasha Eisenstein, and most notably Howard Goebel - whose decades of experience with the Canals and dedication to the *Reimagine the Canals* initiative has been integral to this effort.

And, finally, for bringing together dozens of stakeholders, managing multiple technical consultants, and providing insights, ideas, and enthusiasm, the Task Force would like to thank the staff of its secretariat BuroHappold Engineering, working under the direction of Kate Ascher, including: Adam Friedberg, Sabina Uffer, Alice Shay, Shivam Jumani, Josh Margul, Ian Nicholson, David Bigio, Anna Hippee, Samantha Fox, Huanyu Chen, and Luyun "Aurora" Shao.

APPENDICES

APPENDIX A

Technical Analysis and Sub-consultants

A wide group of sub-consultants, shown below, were commissioned to undertake technical analysis for each of the topics under evaluation by the Task Force subcommittees. The titles below provide links to the corresponding technical reports on the Task Force website.

Region	Topic	Consultant	Report titles and links
Mohawk Region	Mitigating summer flooding	Bergmann Associates	Mohawk Flood Assessment Report
	Eliminating ice jams	Ice Jam Mitigation Panel comprised of US Geological Service, US Army Corps of Engineers, Dr. John Garver (Union College), Dr. Hung Tao Shen and Dr. Fengbin Huang (Clarkson University), Canal Corporation, NYPA	Ice Jams in the Mohawk River Valley
	Restoring previously disconnected tributaries to the Mohawk River	The Nature Conservancy	Restoring Tributary and River Connections in the Mohawk Valley
Central Region	Preventing the spread of aquatic invasive species through the Canal System	R2 Resource Consultants	Erie Canal Aquatic Invasive Deterrent Study
	Restoring and creating wetlands	The Nature Conservancy	Restoring Wetlands in the Central New York Canal Region
Western Region	Expanding irrigation	Dr. Stephen Shaw, SUNY's College of Environmental Science and Forestry	Expanding Irrigation in Western New York Using Canal Water
	Enhancing recreational fishing	Thomas McDonald, NYPA	Opportunities for Enhancing Recreational Fishing in Western NY
Additionally, SUNY's Rockefeller Institute of Government report on the community engagement process is available at the following link: https://www.ny.gov/sites/ny.gov/files/atoms/files/Rockefeller_Institute_Reimagine_the_Canals_Community_Engagement_Report.pdf .			



APPENDICES

APPENDIX B

Stakeholder Meetings and Focus Groups

BuroHappold organized stakeholder meetings, phone calls and focus groups on specific topics to further explore the concepts raised in the public workshop sessions and garner input on opportunities being addressed by the Task Force. A list of people involved in these meetings and related calls follows.

Water recreation

- Marie Cramer, Canal New York, Task Force member
- Maureen Doyle, Central NY Waterways, Task Force member
- Leslie Becraft-Corrigan, Winter Harbor Marina, Task Force member
- Bruce Van Hise, Corn Hill Navigation/ Sam Patch Tours, Task Force member
- John Courain, Genessee Waterways Center, Task Force member
- Kim Russo, America’s Great Loop Cruisers’ Association
- Barb Castor, Boaters Industry Association of Upstate NY

Historic preservation

- Bob Radliff, Erie Canalway National Heritage Corridor, Task Force member
- Derrick Pratt, Old Erie Canal Community Working Group, Task Force member
- Jean MacKay, Erie Canalway National Heritage Corridor
- Erin Tobin, Preservation Society of NYS
- Jay DiLorenzo, Preservation Society of NYS

Recreational fishing

- Ron Bierstine, Oak Orchard Tackle & Lodge, Task Force member
- Jessie Hollenbeck, Wide Sky Fly Fishing
- Dave Agness, Trout Unlimited/OASIS Adaptive Sports/Project Healing Waters Fly Fishing
- Lindsay Agness, Lindsay Agness Fly Fishing Guide Service
- Danny Evans, Lone Wolf Sport Fishing
- Web Pearsall, NYSDEC
- Dawn Borchert, Orleans County Tourism Director
- John DeFilipps, Orleans County Legislator
- Ken DeRoller, Orleans County Legislator

Trail recreation

- Andy Beers, Empire State Trail, Task Force member
- Robin Dropkin, Parks and Trails NY, Task Force member
- Bob Radliff, Erie Canalway National Heritage Corridor, Task Force member
- John Robinson, Our Ability, Task Force member
- Derrick Pratt, Erie Canal Museum, Task Force member
- Sasha Eisenstein, Canal Corporation
- Kathy Moser, Open Space Institute

Wetlands restoration

- David Klein, The Nature Conservancy
- Neil Murphy, SUNY-ESF, Task Force member
- Chris Lajewski, Montezuma Audubon Center, Task Force member

- Matt Marko, NYSDEC
- Emily Sheridan, NYSDEC
- Elizabeth Tracy, NYSDEC
- Jean Foley, NYSDEC
- Jana Lantry, NYSDEC
- Mike Wasilco, NYSDEC
- Frank Morlock, NYSDEC
- Scott Healy, NYSDEC
- Bill Stewart, US Fish and Wildlife Service
- Maria Goula, Cornell University
- Jamie Vanucchi, Cornell University
- Sandi Bastedo, Cornell Cooperative Extension

Invasive species

- Matt Snyder, Oneida Lake Association
- Kristen Holleck, Cornell Biological Field Station
- Hilary Lambert, Cayuga Lake Watershed Network
- Jennifer Tufano Grillo, Cayuga Lake Watershed
- Kristin King, Western New York PRISM
- Andrea Locke, Western New York PRISM
- Hilary Mosher, Finger Lakes PRISM
- Gwendolyn Grace Temple, Capital-Mohawk PRISM
- Rob Williams, SLELO PRISM
- Meg Modley, Lake Champlain Basin Program
- Kathy Moser, Open Space Institute
- Rick Relyea, Rensselaer Polytechnic Institute
- Ian Smith, Finger Lakes Institute
- Stuart Gruskin, The Nature Conservancy
- Brittney Rogers, The Nature Conservancy
- Lindsay Chatterton, The Nature Conservancy
- Steve Hurst, NYSDEC
- Aimee Clinkhammer, NYSDEC
- Jean Foley, NYSDEC
- Jana Lantry, NYSDEC
- David Lemon, NYSDEC
- Matt Marko, NYSDEC

- Steven Pearson, NYSDEC
- Justin Perry, NYSDEC
- Emily Sheridan, NYSDEC
- Alexander J. Smith, NYSDEC
- Robert Breault, USGS
- Katherine Czajkowski, NYSDEC
- Judy Drabecki, NYSDEC
- Frances Dunwell, NYSDEC
- Heather Gierloff, NYSDEC
- Gregg Kenney, NYSDEC
- Sandra Keppner, USFWS
- Jacqueline Lendrum, NYSDEC
- Josh Thiel, NYSDEC
- Eric Wiegert, NYSDEC
- Cathy McGlynn, NYSDEC

Irrigation and Agriculture

- David Valesky, NYS Agriculture and Markets
- David Wolfe, Cornell Institute for Climate Smart Solutions, Task Force member
- Amanda Krenning-Muoio, NYS Farm Bureau, Task Force member
- Elizabeth Buck, Cornell Cooperative Extension
- Katie Sommerfeldt, Orleans County Soil & Water Conservation District
- Ken DeRoller, Orleans County Legislator
- John DeFilipps, Orleans County Legislator
- Craig Kahlke, Cornell Cooperative Extension
- Jeff Toussaint, Toussaint Farms
- Alan Panek, Panek Farms
- Peter Martin, Kreher Family Farms
- Maureen Torrey, Torrey Farms
- Gary Kludt, Kludt Brothers, Inc.
- Adam Kirby, A & J Farms
- Jim Kirby, A & J Farms
- Steve Nesbitt, Nesbitt Fruit Farms
- Oded Kalir
- Mike Kreher, Kreher Family Farms
- Amy Machamer, Hurd Orchards

