
New York State Canal Corporation

Report on Economic Benefits of Non-Tourism Use of the NYS Canal System



"A 19th Century canal system contributing to a 21st Century economy"

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New York State Canal Corporation



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NEW YORK STATE CANAL CORPORATION REPORT ON ECONOMIC BENEFITS OF NON-TOURISM USE OF THE NYS CANAL SYSTEM

EXECUTIVE SUMMARY

CANAL SYSTEM'S PLACE IN HISTORY

Since 1825, the Erie Canal, the predominant component of the modern New York State Canal System has had a special place in history as an engineering marvel that opened up trade and transportation to interior parts of the country by connecting the Great Lakes to the Atlantic Seaboard. The Erie Canal was constructed as a navigation system used for commercial shipping, spurring development across New York State as it attracted new businesses and industries to locate along its banks. Towns and villages were established along the Canal changing theories of land use and altering the notion of land value based on proximity to the Canal not only for transporting goods but, for access to a reliable source of water for power generation, irrigation, water supply and industrial purposes. Today, nearly 80% of up-state New York's population lives within 25 miles of the Erie Canal.

STRUCTURE AND OPERATIONS OF THE CANAL

The New York State Canal System and its watershed, includes four historic waterways – the Erie, Champlain, Oswego and Cayuga-Seneca Canals. In addition, the 524 mile Canal System includes 39 smaller feeder canals and reservoirs as well as natural waterways regulated streams, and lakes which comprise approximately 40 percent of the freshwater resources of New York State.

The New York State Canal Corporation is responsible for all Canal System operations with many other agencies sharing a role in making the system work. For instance, the New York State Department of Environmental Conservation oversees wildlife, water quality and natural resources along the system and the U.S. Army Corps of Engineers regulates canal dredging projects. The Canal Corporation maintains the water levels in the Canal System through dredging methods, and operates all locks and river-flow-regulating structures such as guard gates and dams.

TODAY'S USE OF THE NYS CANAL SYSTEM

The Canal System's primary use for commercial shipping has changed over the years with the growth of the railroads and highways. While barges transporting large equipment and products are seldom seen on the Canal, it remains a viable waterway for recreational boating. In fact, the Canal System is a world-class destination for tourism and recreation. Thousands of recreational boaters travel along the far reaches of the waterways that comprise the Canal System. Segments of the Canalway Trail extend approximately 290 miles and are used by outdoor enthusiasts throughout the year.

While the main focus on the Canal System today is for its recreational and tourism use, many communities, businesses, industries and farming operations still rely on the Canal System as in historic times for its abundant, reliable and inexpensive supply of water. The Canal Corporation's management of the system's infrastructure provides land and water-based opportunities that still flourish and significantly contribute to the economic well-being of New York beyond its use for recreational purposes.

Just as in the past, communities, businesses and industries rely on the Canal System to support economic activity. Some communities utilize the system's reservoirs for public water supplies. Industries still locate near the Canal to use its plentiful water for processing, manufacturing, cooling and cleaning. In some areas, factories that once relied on the canals have been replaced by modern businesses doing important global research and development that require large quantities of water for their laboratories and operations. Despite changing technologies, the Canal System still remains relevant in today's world and New York's economy.

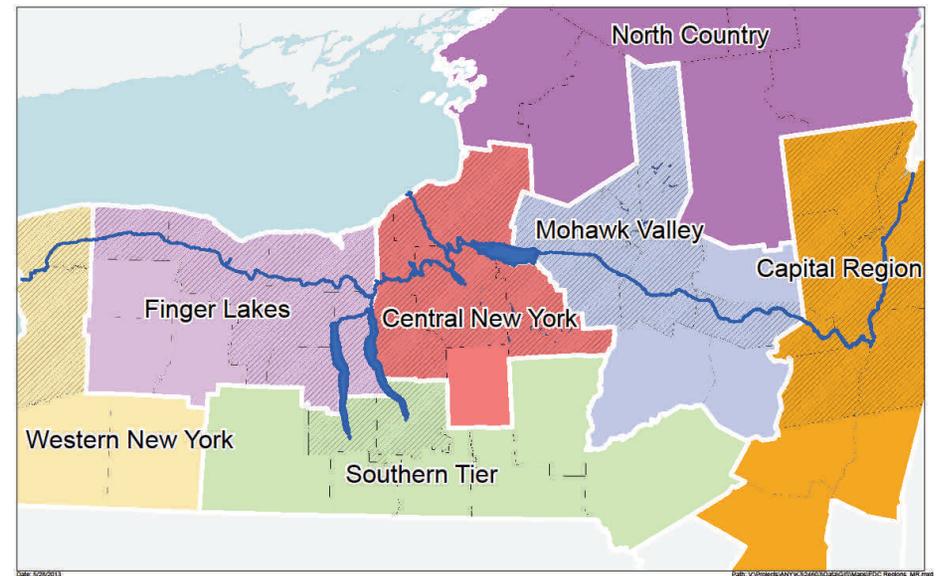


REGIONAL ECONOMIC IMPACTS OF THE NYS CANAL SYSTEM

Eastern regions of the Canal System, particularly in the Capital Region and Mohawk Valley historically supported industrial development and manufacturing based on the ability to use Canal water for processing and ship goods and materials via waterways to other areas. In addition, industrial development was, and continues to be supported by hydroelectric power generated by the Canal System's water. Today, thousands of highly skilled jobs exist along the Canal's waterways.

Western regions of the Canal System, by contrast, use water that is pumped and diverted for irrigation purposes. Local farming and agriculture in general rely on surface waters along the canals for irrigating specialty crops. The benefit of nearby accessible water supplies is especially critical to farmers during drought and to protect fruit and vegetable crops during frost and freeze conditions. The Canal System passes through some of New York's premier agricultural areas.

In central regions of the Canal System a combination of industrial and agricultural uses exist that utilize the canals for shipping raw materials along the Oswego Canal, such as corn used in ethanol production in Fulton, NY. Canal water is also used to generate energy. Finished products, some of which may be too large to ship overland, can also be transported more efficiently by waterways, such as through the Cayuga-Seneca Canal. Although some commonalities exist, each section of the Canal System contributes differently to the economy of New York State.



NON-TOURISM ECONOMIC USES OF THE CANAL

Research indicates that there are several categories (also referred to as sectors) of use along the Canal System that have a significant positive effect on local and regional economies. In some cases, these uses create substantial employment opportunities. In the case of research and development, for example highly skilled and high-paying jobs significantly contribute to the State's economy both directly in terms of employee spending and indirectly in terms of the employer spending on other goods and services. In addition, businesses generate considerable tax revenues for local, State and federal governments.

Nine sectors of use have been studied in detail to determine the economic benefits derived from water use and proximity to the New York State Canal System. These uses are not tourism or recreationally based uses that have been studied in the past. These nine sectors and their primary uses, but not only uses, include the following:

Industries - water used in manufacturing, processing, cooling and cleaning equipment

Research and Development - water used in research and processing in a laboratory setting

Agricultural – water used for irrigating crops

Hydroelectric Facilities – water used for energy production

Quarries and Mining - water used in washing materials, dust control and mine dewatering

Public Water Supply for municipal water systems

Waste to Energy Facilities – water used to generate steam to create energy

Golf Courses – water used to irrigate grounds

Commercial Shipping for transport of goods and materials

ECONOMIC STUDY GOALS

The goals of the New York State Canal Corporation's Report on Economic Benefits of Non-Tourism Use of the NYS Canal System were to:

- Identify the types of non-recreational and non-tourism based uses of the Canal System and their approximate locations derived primarily from Canal Corporation permit data and supplemented with additional research,
- Determine the extent of use of the Canal System's land and waters, for example water volumes withdrawn, to determine if there was an economic effect from specific uses,
- Estimate employment levels of significant users, and
- Calculate the *direct, indirect and induced impacts* on the economy by using user employment estimates to determine the *economic output/revenue* of significant non-tourism uses of the Canal System.

ECONOMIC IMPACTS OF NON-TOURISM USE OF THE NYS CANAL SYSTEM

The economic impact (benefits) of all businesses, industries and farming operations that rely on the Canal System for its abundant, reliable and inexpensive supply of water has been totaled in terms of the economic output values consisting of direct employment, total employment, total personal income, tax revenues and total economic impact. The definition of each of these values is provided in Chapter 3.

Economic Output Values	Measurement	Impacts
Direct employment	On-site jobs at industries and businesses that rely on the Canal System.	8,821 jobs
Total Employment	All direct employment (above) plus those produced through indirect and induced effects.	26,472 jobs
Total Personal Income	All wages, benefits and proprietor income earned in jobs counted in Total Employment.	\$1,698.3*
Tax Revenues	All taxes collected at the state, local and federal level.	\$702.0*
Total Economic Impact	Represents the sum of gross business revenue for all nine sectors, including the costs of labor and materials, as well as the business profits.	\$6,286.9*

**In millions of dollars.*

These impacts were measured using the IMPLAN economic model. Direct employment was used as the **input** into the model, which then feeds into a structural matrix simulating the relationships among all of the sectors in the region's economy, generating the **output** values listed above. Model outputs are expressed as total impacts which encompass direct, indirect and induced effects.

KEY FINDINGS FOR EACH ECONOMIC SECTOR

INDUSTRIAL FACILITIES

Industrial facilities contribute the greatest economic impact of all sectors evaluated for this study. The industrial facilities that depend on NYS Canal System water contribute an estimated \$4.7 billion in direct business revenue annually. Approximately 4,250 employees work directly at these facilities, and an additional 12,000 jobs are supported through indirect and induced means. In total, these employees earn approximately \$1.0 billion in annual wages and salaries.



A number of industrial facilities use the NYS Canal System as a relatively inexpensive, reliable source of water to support their operations. Water may be used as a production input or for purposes such as processing, rinsing or cooling. Information collected for the study suggests that industries such as advanced material products, chemical manufacturing, and paper & packaging may derive a particularly high value from the water they withdraw.

RESEARCH & DEVELOPMENT

Three research and development facilities located in the Capital Region withdraw Canal System water at a rate of approximately 14.5 million gallons of water per day for a variety of uses associated with R&D and building operations and maintenance. Access to the Canal System water is an important benefit realized by these facilities which significantly contribute to local and regional economies.

An estimated 3,600 people are directly employed by research and development facilities that use Canal System water, and an additional 5,075 people are indirectly employed. In total, these employees earn \$602.1 million in personal income annually. These facilities generate an estimated \$1.374 billion in business activity and \$202.4 million in combined local, state, and federal tax revenues each year.



KEY FINDINGS FOR EACH ECONOMIC SECTOR

AGRICULTURAL USES

Crop irrigation is the primary agricultural use of Canal System water. The greatest benefit is to local farms and economies in the Finger Lakes Region and Western NY Region, where irrigation supported by Canal System water is most common.

Permit information indicates that no fewer than 45 farms rely on the Canal System as a source of water for irrigation. In reality, the number of farms deriving benefit may be considerably higher since others downstream from siphon locations likely benefit from water diverted into local streams and drainage-ways. These downstream users are not tracked and would require field work and surveys of local farms. Farmers also utilize Canal System lands for storage and maintenance purposes, and in some cases to supplement cropland.

Agricultural operations supported by the NYS Canal System employ an estimated 449 people directly and an additional 162 indirectly. Related personal income totals \$10.3 million annually. These farms generate \$45.6 million in total economic output and provide \$4.4 million in combined state, local and federal tax revenues each year.

QUARRIES & MINING

Most of the quarries are located in the Mohawk Valley Region. The industry employs a total of 170 people and has a total economic impact of approximately \$26 million annually.

Nine quarry and mining operations benefit from proximity to the Canal System which influences their operations in a positive way. These facilities primarily provide construction sand and gravel materials to the construction industry. Six quarries utilize Canal System water as part of their operations by either withdrawing water for industrial use (washing source materials and dust control) at the mines or by dewatering groundwater from active mined areas. Three quarries utilize Canal System lands for storage or similar land-based uses. These three operations were not considered dependent on the canals so these were not included in the economic impact model or reflected in the summary of economic value.

KEY FINDINGS FOR EACH ECONOMIC SECTOR

PUBLIC WATER SUPPLY

Natural waterways along the New York State Canal System and associated feeders and reservoirs provide safe, reliable water to support more than 220,000 residents annually that reside in either the Capital Region or the Mohawk Valley Region.

Public water supply facilities supported by the NYS Canal System generate \$18.8 million annually in total economic impact through the distribution and sale of water. An estimated 35 employees work directly at these facilities, and an additional 55 jobs are supported indirectly or through induced spending. Related personal income is \$7.0 million annually. These water supply facilities generate an estimated \$3.25 million in local, state, and federal tax revenues each year.



WASTE TO ENERGY FACILITIES

In total, the economic impact attributed to the waste-to-energy plant utilizing water from the Canal System is estimated at \$10.8 million in total economic impact. An estimated 11 employees work directly at the facility, and an additional 20 employees are supported indirectly or through induced spending. Related personal income is \$3.0 million annually. This industry generates an estimated \$2.8 million in local, state and federal tax revenues.

The Oswego County Energy Recovery Facility uses more than 8.3 million gallons of water per day to generate steam and electricity from the combustion of municipal solid waste. The energy is used to provide power to local utilities for residential and business customers. The facility is an important part of the solid waste management system in Central New York.



KEY FINDINGS FOR EACH ECONOMIC SECTOR

GOLF COURSES

Twenty-five golf courses were identified that benefit from water withdrawal from the Canal System for irrigation. These courses are mostly privately owned, but publicly accessible. The majority of these courses are located in the Finger Lakes and Western New York regions.

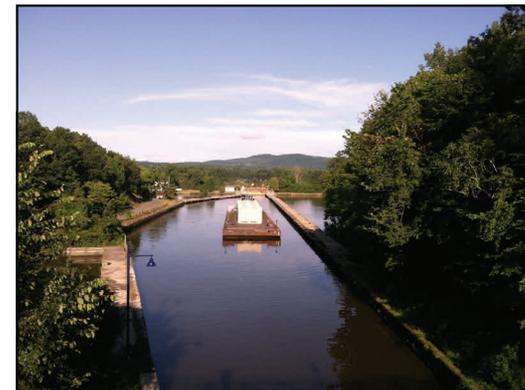
These golf courses contribute approximately \$41 million of total economic impact annually to the New York State economy, and employ 478 people with a personal income of approximately \$12 million.



SHIPPING

The commercial shipping industry serves various businesses required to move large pieces of equipment or goods between the Hudson River and the Great Lakes not easily moved by rail or truck. In 2012, over 42,000 tons of cargo at a value of approximately \$26 million was shipped on the Canal System. As markets change with the expansion of the Panama Canal, the New York State Canal System could once again become a viable transportation system for moving cargo.

Based on the economic model used for this study, the shipping industry contributes \$12.3 million in total economic impact annually, with a total employment (direct and indirect) of 50 employees earning \$2.7 million in annual wages and salaries. The industry generates a total of \$1.3 million in federal, state and local tax revenues each year.



KEY FINDINGS FOR EACH ECONOMIC SECTOR

HYDROELECTRIC FACILITIES

Hydroelectric power generation is a proven, clean source of renewable energy. The use of Canal System water is essential to the operation of 27 hydroelectric facilities with a combined maximum generating capacity of approximately 154.4 MW. Approximately 9% of New York State's hydroelectric facilities are located on the Canal System, and these facilities produce an estimated 2.3% of the state's hydroelectric power.

Hydroelectric facilities that use Canal System water employ 27 people directly and an additional 45 jobs are supported through indirect and induced economic activity. These facilities generate approximately \$24.8 million dollars in total economic impact, \$6.2 million in personal income, and \$6.4 million in local, state, and federal tax revenues annually.

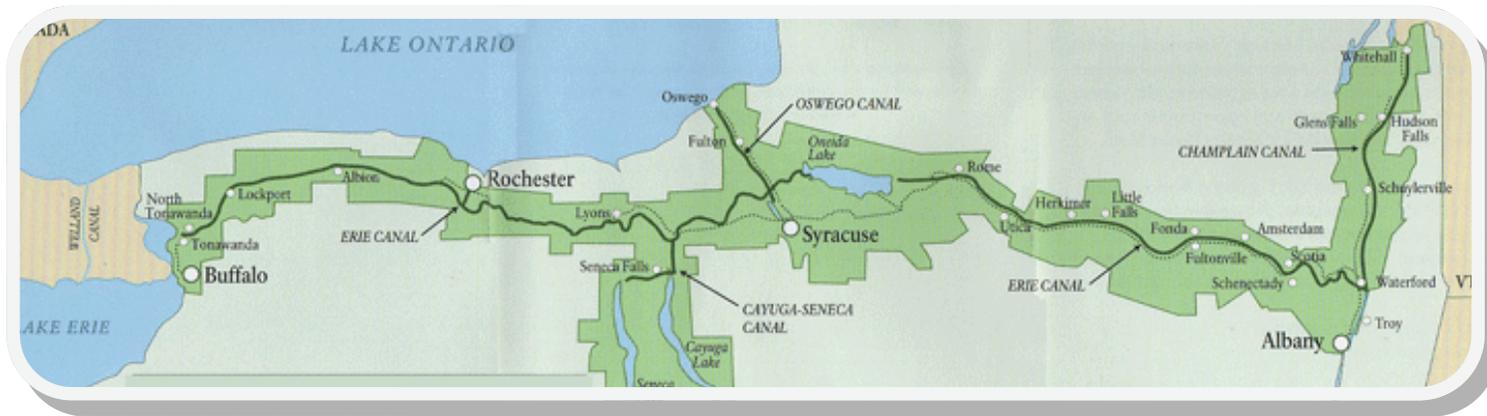


REAL ESTATE

Twenty-one significant real estate projects with a value of \$1.5 billion were identified across the Canal System, occurring in 8 different counties. These projects likely represent a fraction of the full impact on real estate development created by proximity to the Canal System. Research indicates that in most cases the Canal System plays a substantial role in the decisions on where these projects are located and the type of development occurring. The Canal System is an incentive for local investment, and is attractive to the development sector.



A 19TH CENTURY CANAL SYSTEM CONTRIBUTING TO A 21ST CENTURY ECONOMY



The New York State Canal System is more than a transportation network and tourism resource – it is an essential supplier of water to a number of businesses in New York State. Cost effective access to water can be a key consideration in site selection for certain businesses. Accordingly, the Canal System is vital to supporting existing businesses and attracting new commerce to the state.

KEY FACTS

- ◆ **The Canal System is used to ship goods not easily shipped by truck or rail.**
- ◆ **Canal water is a source of fresh water used by industries for processing, cooling, and cleaning.**
- ◆ **Canal water is used to irrigate farms and golf courses**
- ◆ **The Canal System provides drinking water to 221,000 people.**
- ◆ **The Canal System is used to generate enough electricity that could power approximately 54,000 homes per year.**
- ◆ **The Canal System may affect economic development and business decisions to locate in Upstate New York.**
- ◆ **Canal System users have a total economic impact of approximately \$6.2 billion annually.**

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CHAPTER 1: INTRODUCTION

The New York State Canal System stretches 524 miles across New York State. Built in 1825, it linked the Great Lakes to the Atlantic seaboard, and has played a crucial role in New York's history.

Consistent with its prominent role in our state's history and culture, the Canal System is critical to the State's economic well-being. In addition to the recreation benefits of the System, there are numerous individuals and industries that depend on it not only for transporting goods not easily shipped by rail or truck, but for irrigation, power generation, industrial processes, water supply, and other purposes.

As a result, the regional economies surrounding the Canal System as well as New York State's economy all benefit significantly from the operation and management of the Canal System. The economic benefits of recreational use of the canal system have been studied in the past. Non-recreational, non-tourism economic benefits of the System have never been quantified.

STUDY GOALS

The goals of the study were to:

- Identify the types of non-recreational and non-tourism-based uses of the Canal System and their approximate locations derived primarily from Canal Corporation permit data and supplemented with additional research,
- Determine the extent of use of the Canal System's land and waters, for example water volumes withdrawn, to determine if there was an economic effect from specific uses,
- Estimate employment levels of significant users, and
- Calculate the direct, indirect and induced impacts on the economy by using user employment estimates to determine the economic contribution of significant non-recreational uses of the Canal System.



STUDY AREA—NEW YORK STATE CANAL SYSTEM

The Erie, Champlain, Oswego and Cayuga-Seneca Canals are four historic waterways that today, along with 39 other smaller feeder canals and reservoirs, comprise the modern New York State Canal System. The system also includes the natural waterways of Tonawanda Creek in Western New York, the Oswego and Oneida Rivers in the Finger Lakes and Central New York, and the Mohawk and Hudson Rivers in Eastern New York.

The 524 miles of the NYS Canal System include approximately 154 miles of constructed and channelized sections of waterways and approximately 370 miles of natural waterways including both rivers and lakes. The activities along the canal lakes were not inventoried as part of this report (See Figure 1 on Page 3)

The Canal Corporation manages the Canal System from two divisional offices. The Eastern Division is located in Albany, and the Western Division is located in Syracuse. Within each Division there are sections that manage locks and other canal facilities. The Divisions are responsible for maintaining water-borne transportation for both recreational and commercial purposes. The Divisions issue permits for various water uses along the system including non-recreational uses that are the focus of this study.

The Eastern Division manages the Canal System from the Hudson River westward to Sylvan Beach in Oneida County. This division is also responsible for the Champlain Canal including the Glens Falls Feeder Canal. The Eastern Division also manages the network of reservoirs, feeder systems, and natural waterways located in this region.

The Western Division manages the Erie Canal from Sylvan Beach westward to the Tonawanda Creek in Erie County as well as northward from the Erie Canal to the Oswego Canal and southward to the Cayuga-Seneca Canal.

New York State Canal System



0 5 10 20 Miles



Legend

-  NYS Canal
-  Canal Reservoirs
-  Canal Feeders
-  Canal Lakes*
-  Canal Terminals
-  Canal Harbors

*not included in inventory

Canal Reservoir and Feeder Legend

- | | | | |
|-----------------------------|-------------------------------|-----------------------------|------------------------|
| 1. Jamesville Reservoir | 13. Hinckley Reservoir | 24. Woodhull Creek | 35. Butternut Feeder |
| 2. Cazenovia Lake | 14. Alder Pond Reservoir | 25. Little Woodhull Creek | 36. Chenango Canal |
| 3. DeRuyter Reservoir | 15. Alder Creek Reservoir | 26. S. Branch Black River | 37. Chenango Feeder |
| 4. Erieville Reservoir | 16. Forestport Pond Reservoir | 27. Tw in Lakes Stream | 38. Madison Feeder |
| 5. Eaton Brook Reservoir | 17. Chub Pond Reservoir | 28. Forestport Feeder Canal | 39. Glens Falls Feeder |
| 6. Hatch Lake Reservoir | 18. Tw in Lakes Reservoir | 29. Black River Canal | |
| 7. Bradley Brook Reservoir | 19. Sand Lake Reservoir | 30. Nine Mile Feeder | |
| 8. Kingsley Brook Reservoir | 20. North Lake Reservoir | 31. Mohawk River | |
| 9. Leland Pond Reservoir | 21. South Lake Reservoir | 32. Chittenango Feeder | |
| 10. Woodman Pond | 22. Woodhull Reservoir | 33. Old Erie Canal | |
| 11. Madison Reservoir | 23. Canachagala Reservoir | 34. Limestone Creek Feeder | |
| 12. Delta Reservoir | | | |

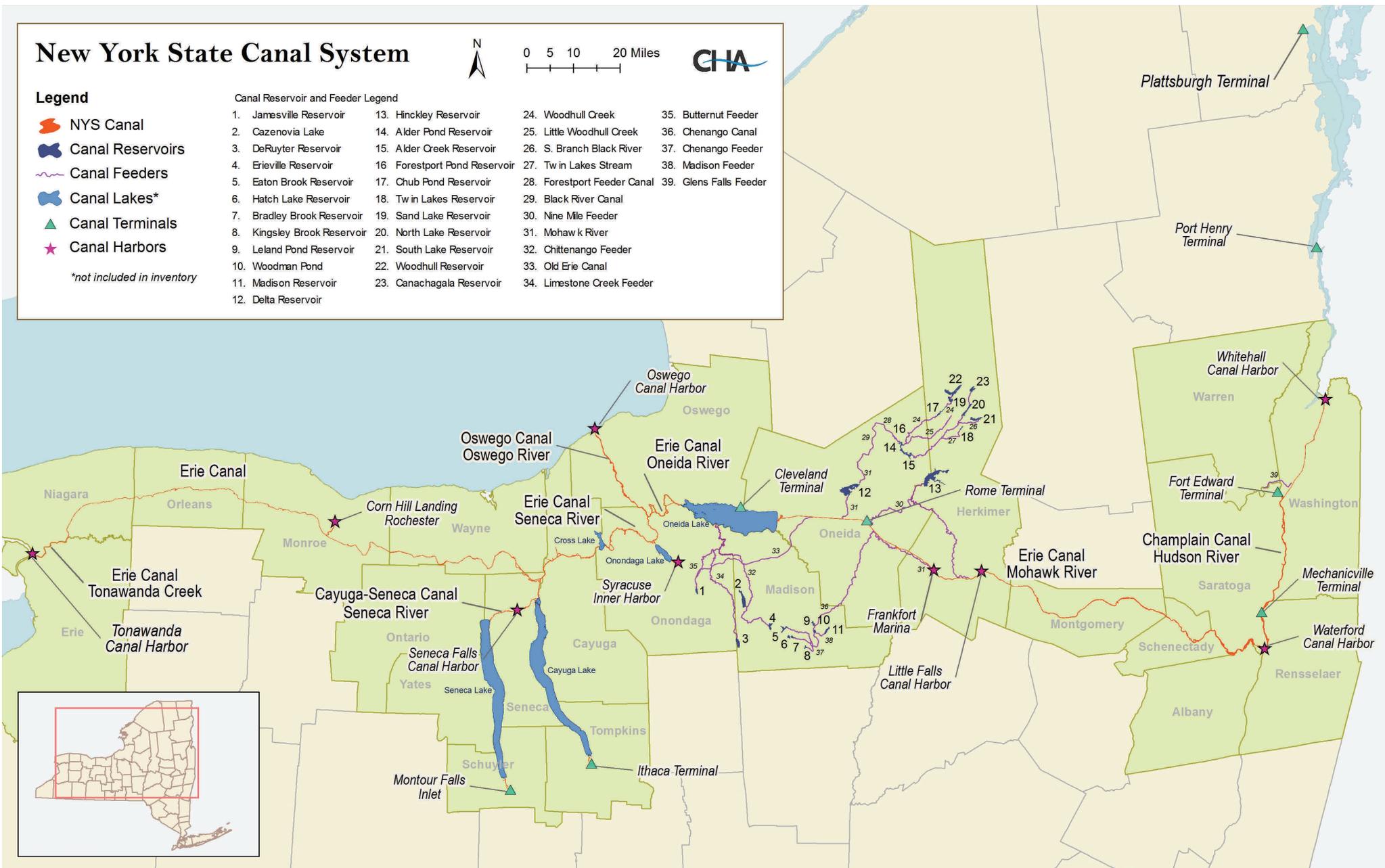


Figure 1

STUDY APPROACH

A review of agency reports, county-level information and website research was conducted to identify non-tourism, non-recreational users located along the Canal System. This included a review of previous reports prepared for the Canal Corporation and the Corporation's predecessor, the NYS Barge Canal Planning and Development Board. In addition to a literature review, the primary source of information regarding industrial sector uses was permit data compiled by the Canal Corporation and NYSDEC. Permit information identifies the name, location and type of user that has acquired permits for various activities along the system. A detailed study of how each sector of non-tourism users depends on the Canal System is described in *Chapter 2: Non-Tourism Canal Users Benefit from Water Use*.



Establishments from the following nine economic sectors (group of same type of user) clearly rely on the Canal System for their operations, drinking water, generation of energy and the shipment of goods. This information was put into an economic impact model specifically constructed for this assessment. The economic sectors studied include:

- ***Industrial Facilities***
- ***Research & Development***
- ***Agriculture***
- ***Hydroelectric Facilities***
- ***Quarries & Mining***
- ***Public Water Supply Facilities***
- ***Waste to Energy Facilities***
- ***Golf Courses***
- ***Commercial Shipping***

Other non-tourism sectors located adjacent to the canal system such as real estate development, utilities, not-for-profits, residences and governmental entities are recognized in this assessment, but their direct economic value was not quantified because they were not viewed as being totally dependent on the canal system.

An economic model developed specifically for this study was used to determine business revenue, total earning/personal income, and the effects on state, local, and federal taxes regionally and for New York State as a whole.



Employment information was used as a key model input for this study. This employment information was derived from facility reports, website research and various sources such as the *2010 US Census 2010 County Business Patterns for New York*, and *Economic Census for New York State*. When that information was not readily available, employment estimates were calculated according to industrial classification codes and from approximations of the square footage of each facility.

Economic benefits were determined for each non-tourism economic sector and are discussed further in *Chapter 3. Overview of Economic Benefits of Non-Tourism Users*. Included in this chapter is a discussion of these benefits organized according to New York State Regional Economic Development Council area.

REPORT STRUCTURE

The following chapters describe how non-tourism users benefit from use of canal water, and provide an overview of the economic benefits of each use. Individual chapters describe each of the economic sectors under consideration.

CHAPTER 2: NON-TOURISM USERS BENEFIT FROM WATER USE

The Canal System provides an abundant, reliable, and inexpensive source of water to communities and industries located along its waterways. It is considered a valuable commodity to the economic sectors identified in this report. Water withdrawn from the Canal System is used for a variety of purposes: as an input for manufacturing processes, cooling, electrical generation, irrigation, and for public water supply.

Users can access Canal System water at a reduced cost by directly withdrawing from the system, allowing them to benefit from lower production costs and potentially greater profit (net benefit) margins. A number of users located along the Canal System take advantage of the water resources it provides, making the Canal System an appealing location for their facilities. In turn, these users generate economic benefits for New York State through their operations.

The level of benefit a user receives from Canal System water depends on the volume withdrawn and the economic value derived from use of the water. In other words, some users benefit more from a given volume of water than others – depending on the manner and purpose for which it is used. This study provides an inventory of water users located along the Canal System and describes how they use this water.



The following table summarizes the water use of each economic sector analyzed, with industrial facilities presented at a higher level of detail because water use varies widely within this sector. The relative value of water use (per unit volume) is generally described on a scale from low to high, based on the nature of water use and goods produced within each sector.

TABLE 2-1: RELATIVE VALUE OF WATER WITHDRAWN FROM CANAL SYSTEM BY SECTOR

Economic Sector	Number of Users	Description of Water Use	Relative Value of Water Withdrawn
<u>Industrial Use:</u> Advanced Material Products	3	Includes the use of purified water as a process medium or chemical input to material products.	High
<u>Industrial Use:</u> Chemical Manufacturing	2	Used as a medium and to adjust concentration in many chemical products.	High-Moderate
<u>Industrial Use:</u> Paper and Packaging	4	Paper manufacturing requires several thousand gallons of water per ton of product. Pulp consists of water and plant fibers – water is removed from the pulp solution to create paper.	Moderate
<u>Industrial Use:</u> Other Manufactured Products	2	Water is used for cooling, rinsing, and cleaning.	Moderate
<u>Industrial Use:</u> Construction Products and Machinery	2	Used for mixing, cleaning, and dust control.	Low
<u>Research & Development</u>	3	Water serves many purposes, from cooling to the use of highly purified water used in laboratory settings.	Low-High
<u>Agriculture</u>	47	Water is used for irrigation of crops	Low
<u>Quarries and Mining</u>	6	Used for mixing, cleaning, and dust control.	Low
<u>Public Water Supply</u>	4	Distributed for public consumption.	Moderate-High
<u>Waste to Energy</u>	2	Water is used in large volumes to generate steam, which in moves energy-generating turbines.	Low
<u>Golf Courses</u>	25	Used for irrigation/course maintenance.	Low

The value of water withdrawn from the Canal System is highest for specialized manufacturing users such as advanced materials facilities and chemical manufacturing, as well as some research and development users. Much of the water distributed through public systems is used for high-value purposes such as residential drinking water.

Water withdrawn for use in agriculture, waste to energy, and golf courses has a lower relative value because these sectors use such large volumes of water to support their operations.



CHAPTER 3: OVERVIEW OF ECONOMIC BENEFITS OF NON-TOURISM USERS

The economic benefits of non-tourism users of the Canal System was determined through the use of a multi-regional input-output model (MRIO) using the IMPLAN version 3.0 software for this assessment. IMPLAN is a complete economic assessment package including data and software. More information on IMPLAN can be found at <http://implan.com/V4/>

Input-output (I-O) modeling is among the most accepted means to assess economic benefits. The approach provides a concise and accurate means to articulate the interrelationships among industry sectors such as those in this study.

A multi-step process was used to translate each activity of each Canal user into the inputs needed for the economic impact assessments. The analysis of each activity was done on a region-by-region basis organized by New York State Economic Development Council Regions. The first step, where possible, was to obtain actual on-site employment information for facilities located on the canal. If not available, the most recent federal information for New York State was referenced to obtain an average number of workers per establishment. This employment information was translated into the corresponding IMPLAN sectors.

Model outputs are expressed as total impacts, which encompass the following effects:

Direct effects – Economic activity directly attributed to a business that uses the Canal System.

Indirect effects – Economic activity occurring in support of the direct effects; the purchase of supplies and services required by businesses that use the Canal System.

Induced effects – Includes purchases (of such items as food, clothing, personal services, vehicles, etc.) made by employees whose wages are supported (directly or indirectly) by a business that uses the Canal System.

ECONOMIC IMPACT MEASUREMENTS

The economic measurements used in this analysis are defined as follows:

Direct Employment: Jobs located on site at businesses that use the Canal System. Direct employment was used as an input to the IMPLAN model.

Total Employment: Includes all jobs supported by the economic activity of businesses that use the NYS Canal System – through direct, indirect and induced effects. Total employment is an output of the IMPLAN analysis.

Total Personal Income – Includes all wages, benefits, and proprietor income earned in the jobs counted under Total Employment.

State and Local Tax Revenues – Employee, personal, proprietor, business, household and corporate taxes collected at the state and sub-state levels; result from production counted under the Total Economic Impact.

Federal Tax Revenues – Corporate income, personal income, social security, and excise taxes collected by the federal government; result from production counted under the Total Economic Impact.

Total Economic Impact – Represents the value of all industry production (i.e. revenues) resulting from the activity of businesses that use the Canal System – includes direct, indirect, and induced effects.

ECONOMIC IMPACT BY CANAL USER TYPE

The economic impact study indicates that non-tourism industries using the New York State Canal System make major contributions to the state's economy. These businesses support thousands of jobs and generates millions in tax revenues.

In summary, **industries and businesses who use the NYS Canal System:**

- *Employ approximately 8,800 workers at their operations;*
- *Support a total of nearly 26,500 jobs directly and indirectly throughout New York State;*
- *Generate \$702 million in total tax revenues;*
- *Support nearly \$6.3 billion in total economic impacts in the State;*
- *Support nearly \$1.7 billion in personal income within New York State.*

Table 3-1 summarizes the economic impacts of each economic sector at the New York State level.

TABLE 3-1: ECONOMIC IMPACT BY SECTOR—NEW YORK STATE TOTALS

Sector/User	Direct Employment	Total Employment	Total Personal Income	State & Local Tax Revenues	Federal Tax Revenues	Total Tax Revenues	Total Economic Impact
Industrial	4,249	16,291	\$1,042.8	\$201.5	\$269.4	\$470.9	\$4,732.5
Research & Development	3,600	8,675	\$602.1	\$75.1	\$127.3	\$202.4	\$1,373.6
Agriculture	449	611	\$10.3	\$1.8	\$2.6	\$4.4	\$45.6
Quarries & Mining	85	170	\$11.8	\$1.6	\$2.5	\$4.1	\$26.6
Public Water Supply	35	90	\$7.0	\$1.4	\$1.8	\$3.3	\$18.8
Waste to Energy Plants	11	36	\$3.3	\$1.7	\$1.1	\$2.9	\$11.5
Golf Courses	350	478	\$12.1	\$3.2	\$3.2	\$6.4	\$41.2
Shipping	15	50	\$2.7	\$0.6	\$0.7	\$1.3	\$12.3
Hydroelectric Plants	27	72	\$6.2	\$3.9	\$2.5	\$6.4	\$24.8
Totals	8,821	26,473	\$1,698.3	\$290.8	\$411.1	\$702.1	\$6,286.9

See Page 10 for definitions of the economic impact measurements summarized above. Values are expressed in millions of dollars.

NON-TOURISM USE BY NYS ECONOMIC DEVELOPMENT REGION

The non-tourism Canal System users contribute to each region within New York State differently, depending on the type and number of Canal System-dependent operations in the area. The Canal System follows the natural waterways of the Hudson and Mohawk Rivers through the Capital and Mohawk Valley Regions and historically has supported industrial development in these areas. In Western New York, where the Canal System is more channelized, agriculture is the dominant land use adjacent to the canal. The Finger Lakes, Central New York and the Southern Tier sections of the Canal System support a more diverse set of industries.



To determine where within New York State the non-tourism users are most prevalent, the Canal System was reviewed as it extends through municipalities and counties that are located in the following New York State Economic Development Regions shown in Figure 2:

- *Western New York*
- *Finger Lakes*
- *Central New York*
- *Mohawk Valley*
- *Southern Tier*
- *Capital Region*

Using the multi-regional input-output economic model developed for this assessment, the economic impacts were determined for each non-tourism sector within each of these regions. Table 3-2 summarizes the economic benefits/impacts of the Canal System on regional economies and for New York State in total. Appendix B presents this information in greater detail by showing the totals of each measurement of economic value (direct employment, total employment, business activity, etc.) for each sector and for each region.

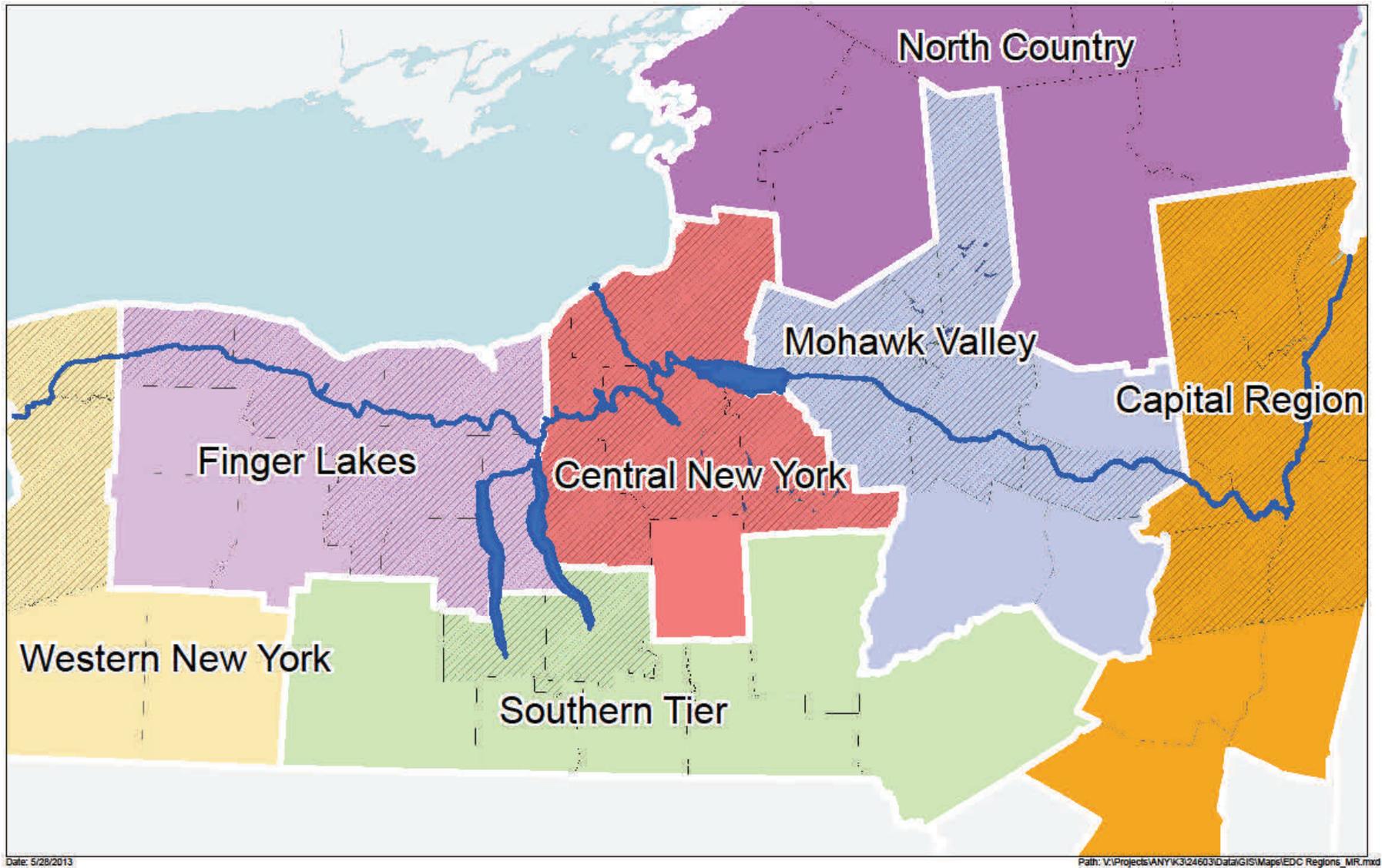


Figure 2

TABLE 3-2: REGIONAL AND STATE LEVEL ECONOMIC IMPACTS

Region	Direct Employment	Total Employment	Total Personal Income	State & Local Tax Revenues	Federal Tax Revenues	Total Tax Revenues	Overall Economic Impact/Revenue
Capital Region	5,543	15,266	\$1,018.7	\$158.8	\$234.7	\$393.5	\$3,341.3
Finger Lakes	1,239	3,288	\$221.6	\$35.7	\$54.1	\$89.8	\$775.3
Central NY	824	2,932	\$179.7	\$38.5	\$49.3	\$87.9	\$804.8
Mohawk Valley	968	3,057	\$150.6	\$37.5	\$43.7	\$81.2	\$989.8
Western NY	242	744	\$32.2	\$6.4	\$8.4	\$14.7	\$125.1
Southern Tier	5	222	\$10.9	\$2.0	\$2.5	\$4.7	\$39.8
Rest of NY State	---	964	\$84.6	\$11.9	\$18.4	\$30.3	\$210.8
All New York State	8,821	26,473	\$1,698.3	\$290.8	\$411.1	\$702.1	\$6,286.9

See Page 10 for definitions of the economic impact measurements summarized above. Values are expressed in millions of dollars.

CHAPTER 4: INDUSTRIAL FACILITIES

The NYS Canal System provides nearby industrial facilities with access to an inexpensive, abundant, and reliable source of fresh water for use in their operations. Virtually all industrial processes require fresh water for purposes including its use as a production input and/or coolant. Direct access to a water source such as the Canal System is considered desirable or even essential for some industrial operations.

Industrial facilities make key contributions to the economy by supporting suppliers of manufacturing inputs, employees of the facilities, the service providers who support operations and employees, and the end users who purchase manufactured products. As described below, industrial operations using Canal System water make significant contributions to New York State's economy.



DATA SOURCES & METHODOLOGY

The analysis used 2012 Canal Corporation and NYSDEC data to identify all industrial facilities known to withdraw water directly from the NYS Canal System waterways. Withdrawal volumes are available for NYSDEC-reporting users removing an average of more than 100,000 gallons of water per day from the Canal System. Canal Corporation permit data include users withdrawing any volume of water from the system (including users of less than 100,000 gallons/day), but do not provide withdrawal volume information.

Aerial images covering the length of the Canal system were scanned to identify potential industrial water users not included among the lists of permitted facilities. These potential users were reviewed and in some cases field-checked by NYS Canal Corporation staff to help ensure the study of industrial facilities is as complete as possible.

A total of thirteen industrial operations were identified as NYS Canal System water users, as described below.

Information collected for the industrial facilities was used to conduct the economic impact analysis. Industrial facilities that use the Canal System were allocated among the following IMPLAN sectors:

- IMPLAN Sector 31 – Electric power generation, transmission, and distribution
- IMPLAN Sector 105 – Paper mills
- IMPLAN Sector 108 – Coated and laminated paper, packaging paper and plastics film manufacturing
- IMPLAN Sector 116 – Asphalt paving mixture and block manufacturing
- IMPLAN Sector 125 – All other basic inorganic chemical manufacturing
- IMPLAN Sector 137 – Adhesive manufacturing
- IMPLAN Sector 152 – Other rubber product manufacturing
- IMPLAN Sector 177 – Copper rolling, drawing, extruding and alloying
- IMPLAN Sector 226 – Pump and pumping equipment manufacturing

To the degree possible, the number of direct employees (on-site workers) was identified for each establishment. If direct employment information could not be obtained for a given facility, the direct employment was estimated using standard industry multipliers based on facility square footage.

OVERVIEW OF INDUSTRIAL USES OF CANAL WATER

Industrial users of the NYS Canal System and its water can be categorized by the type of products they manufacture. Many of these facilities produce similar types of products – this suggests that facilities from these industrial categories benefit from their location in Upstate New York and along the NYS Canal System.

The industrial users are categorized as follows:

- Advanced Material Products (3 facilities)
- Chemical Manufacturing (2 facilities)
- Paper and Packaging (4 facilities)
- Construction Products and Machinery (2 facilities)
- Other Manufactured Products (2 facilities)

TABLE 4-1: INDUSTRIAL USES OF CANAL WATER

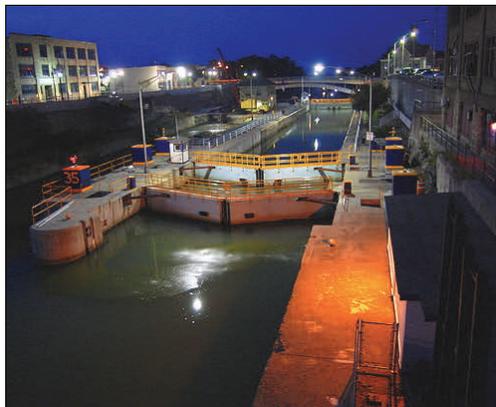
A complete list of these facilities is provided in Appendix C, organized by NYS Economic Development Council region. The following table describes each of the industrial categories identified during the user inventory, and characterizes the nature of their water use.

In some cases, permit information indicates that withdrawn water is returned to the system as treated wastewater. Stormwater is also discharged into the system at some industrial facilities.

Industry Category	Industry Description	Water Use Description
Advanced Material Products	Advanced materials are created through technical processes to enhance desired physical properties such as toughness, flexibility, permeability, adhesion, etc.	Water can be used for cooling, or highly purified water as a process medium or input to material products.
Chemical Manufacturing	Specialized compounds are created and sold for industrial or research and development purposes.	Used as a medium or to adjust the concentration of chemical products.
Paper and Packaging	Pulp materials are pressed and dried to produce paper.	Pulp consists of a high volume of water.
Construction Products and Machinery	Construction products are created, stored, and/or transported by specialized machinery.	Water is used in the mixing or sorting of aggregates, for dust control, and to clean sites/equipment.
Other Manufactured Products	Miscellaneous industrial operations on the Canal System include a mechanical pump manufacturer and a copper products manufacturer.	Cooling, rinsing, cleaning, potentially other uses.

SUMMARY OF ECONOMIC VALUE

Of the sectors evaluated for this study, industrial facilities contribute the greatest economic impact. The industrial facilities that depend on NYS Canal System water generate an estimated \$4.7 billion in total economic impact annually. Associated local, state, and federal tax revenues total \$470 million annually. Approximately 4,250 employees work directly at these facilities, with an additional 12,000 people employed through indirect or induced means. The 16,000+ total jobs provide more than \$1.0 billion in wages and salaries annually.



KEY FINDINGS

A number of industrial facilities use the NYS Canal System as a relatively inexpensive, reliable source of water to support their operations. Water may be used as a production input or for purposes such as cooling, rinsing or cleaning. Information collected for the study suggests that industries such as advanced material products, chemical manufacturing, and paper & packaging may derive a particularly high value from the water they withdraw.

CHAPTER 5: RESEARCH & DEVELOPMENT

Three research and development facilities are located along the Canal System (Mohawk River) in Schenectady County within the Capital Region. These include two GE Global Research facilities which are headquartered in Niskayuna and the Knolls Atomic Power Laboratory, also based in Upstate New York. These facilities are involved in advanced technology research and development, employing thousands of highly specialized R&D scientists, engineers and other skilled professionals.

DATA SOURCES & METHODOLOGY

The research and development facilities were initially identified from Canal Corporation and NYSDEC water withdrawal permit data.

The process used to translate collected information into the inputs for the economic impact analysis was allocated to IMPLAN Sector 376 – Scientific research and development services. If employment information could not be obtained for a given facility, it was estimated by calculating the approximate square footage of facilities using aerial photographs and assigning employment numbers accordingly at a rate per 1,000 square feet of floor space. The primary source for this rate information was the U.S. Department of Energy, U.S. Energy Information Administration’s Commercial Buildings Energy Consumption Survey (CBECS). Additional sources of information included work undertaken by Rutgers University and other research institutions.

Employment and business output information from the IMPLAN model database for the Capital Region was used to develop a business output per employee ratio. The total number of workers for this sector in Capital Region was translated to business output/industry sales using the ratio. The resulting values were used as inputs to the MRIO model.



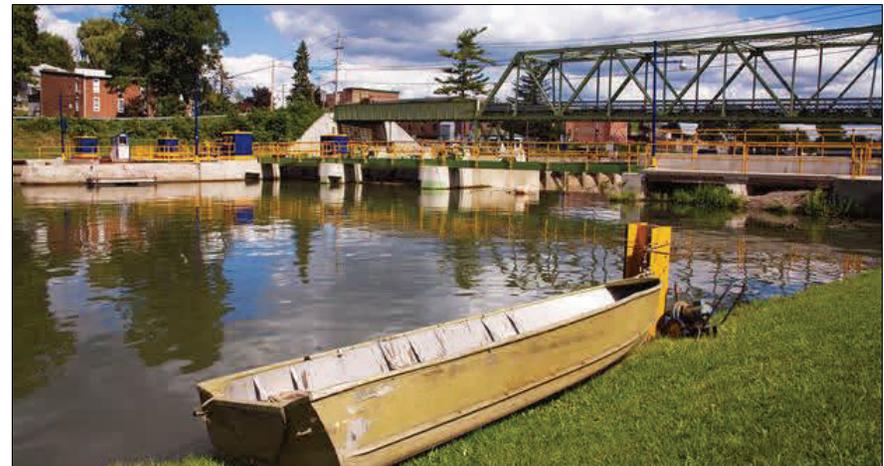
OVERVIEW OF RESEARCH AND DEVELOPMENT USES

GE Global Research is located on a large 525 acre technology campus in Niskayuna, New York adjacent to the Mohawk River. The Global Research Center employs approximately 1,800 highly specialized professionals and support personnel at the Niskayuna facility. Cutting-edge research and development in the biosciences, chemistry, materials science, nanotechnology and alternative energy technologies are conducted at the facility. Specialized research at the Niskayuna facility includes an Electrical Machines Lab, a Magnetic Resonance Imaging Lab and a Semiconductor Technology Lab (<http://ge.geglobalresearch.com/locations/niskayuna-ny-usa/niskayuna-ny-usa->).

Permit data indicate the facility uses an average of approximately 11 million gallons per day from the Mohawk River for its R&D operations. Water is also withdrawn for irrigation, fire protection, and as a back-up supply for cooling and air conditioning. Stormwater and treated wastewater are also discharged into the Canal System.

Knolls Atomic Power Laboratory (KAPL) is a world-class research and development facility that is operated for the U.S. Department of Energy by Bechtel Marine Propulsion Corporation. The facility conducts research and development of advanced nuclear propulsion technology in support of the U.S. Naval Nuclear Propulsion Program (<http://www.knollslab.com/nycapregion.html>). The facility provides technical support and training to naval personnel. KAPL employs more than 2,600 people.

Permit data indicate that the KAPL facility withdraws an average of approximately 3.5 million gallons per day from the Mohawk River for its operations. Stormwater and treated wastewater are also discharged into the Canal System.



SUMMARY OF ECONOMIC VALUE

In total, the economic benefit derived from the research and development facilities using the Canal System as part of operations is estimated to be 3,600 people directly employed, and an additional 5,075 employed through indirect and induced means. These employees earn \$602.1 million in personal income annually. These facilities generate an estimated \$1.374 billion in total economic impacts and \$202.4 million in combined local, state, and federal tax revenues each year.

KEY FINDINGS

The three research and development facilities directly employ more than 3,000 people in the Capital Region. As These facilities withdraw Canal System water at a rate of approximately 14.5 million gallons of water per day for a variety of uses associated with R&D and building operations and maintenance. Access to the Canal System water is an important benefit realized by these facilities which significantly contribute to local and regional economies.



CHAPTER 6: AGRICULTURAL USES

Although the Canal System is not used to transport agricultural materials and farm products to the extent it was in the past, it still plays an important role in the day-to-day operations of many farms located near its waterways. Each year, the Canal Corporation issues permits at very reasonable fees for various agricultural uses of the Canal System's lands and waters.

Some farm operators utilize Canal lands to supplement their cropland and pastureland. Others obtain permits providing access to their fields, to maintain fencing, and for material and equipment storage. Many farm operators and landowners withdraw water from the system for crop irrigation.

The 2007 Census of Agriculture, which is the most recent available source of detailed agricultural data for the state, indicates that less than 4 percent of all harvested cropland in New York State is irrigated. Although the percentage is relatively low because New York does not irrigate on an intensive level like southern and western states in the U.S., the irrigation of cropland using water from the Canal System is an important resource that benefits farmers across the region.

This is especially true in the highly agricultural areas of several Western NYS counties. In these western counties, local topography provides the opportunity to use siphons to divert water from the Canal System by gravity to augment irrigation water supplies.

DATA SOURCES & METHODOLOGY

The Canal Corporation maintains detailed permit data relative to farming and agricultural uses of Canal System lands and waters, including information on water withdrawal. Water withdrawal information was also obtained from the NYS Department of Environmental Conservation (NYSDEC), which maintains records for large-scale water users for all water withdrawal systems with the capability to withdraw 100,000 gallons per day or more. These two data sources were used to identify the number of farms using the Canal System for purposes including irrigation. Appendix D to this report provides additional information on agricultural uses.



Aerial photographs and mapping were reviewed along the Canal System to verify the locations of significant farmlands and other agricultural uses such as greenhouses, orchards and vineyards.

County Soil and Water Conservation District offices were contacted for information on agricultural use of the Canal System. In general, this information was not readily available or did not exist.

Information cited in this study was also obtained from the U.S. Department of Agriculture and the NYS Department of Agriculture and Markets. The *2007 Census of Agriculture - County Summaries and Profiles* and the *2008 Farm and Ranch Irrigation Survey* were particularly useful in identifying the type of crops typically irrigated in NYS and the overall degree of irrigation in each county.

The type of crops irrigated and acreage information were allocated among three IMPLAN sectors based on the crop type:

- IMPLAN Sector 2 – Grain farming
- IMPLAN Sector 3 – Vegetable and melon farming
- IMPLAN Sector 6 – Greenhouse, nursery and floriculture production

The 2007 US Census of Agriculture State Data for New York was used to determine the average market value per acre for various crop types located along the Canal System. The 2007 market value was indexed to 2012 dollars (the year used for the data in this analysis) using the Consumer Price Index. The 2012 market value per acre was applied to each IMPLAN sector acreage within each region to obtain the market value for sector by region. Market value was assumed to equal business output/industry sales. The resulting information was then used as the inputs to the MRIO model.

OVERVIEW OF AGRICULTURAL USES

Canal Corporation permit information from 2012 identified various farming uses across the Canal System, including water withdrawal for irrigation and the use of adjacent land for cropland, pasture, fencing and access. Permit fees are established based in part on whether uses are land-based or water-based.



The Albany Division recorded 10 farm-related permit holders in 2012, with 90 percent of those being land-based uses including cultivating crops, pasture, and sod farming. One permit noted both land and water use for farming. The Syracuse Division recorded four (4) farm-related permit holders, three (3) of which were land-based uses. These are related to farming and access across Canal lands. One permit noted both land and water (siphon) use. The Buffalo Division recorded 19 farm-related permits with 95 percent of those being water-based uses utilizing siphons of various sizes and capacities. One land-based permit indicated farming use.

Water withdrawal information for farming purposes was also obtained from the NYSDEC Bureau of Water Resources Management. Nine agricultural water users from across the Canal System were recorded by the NYSDEC in 2012. The average daily withdrawal among these users ranged from 10,000 gallons to 2.5 million gallons per day. All but two users averaged 140,000 gallons or less. These two exceptions had a combined average daily total of 3.0 million gallons. The nine users combined for a total average withdrawal of 3.49 million gallons per day.



Based on the current Monroe County Water Authority rate schedule for non-potable water of \$0.44 cents per 1,000 gallons these daily withdrawals are valued at \$1,536. If this volume of water were considered as treated and potable water, for example from a municipal water system, this average daily value would be \$6,107 based on a conservatively assumed non-residential water rate of \$1.75 per 1,000 gallons.



The crops most frequently grown in each region along the Canal System are shown in the following table.

TABLE 6-1: COMMON CROPS GROWN IN EACH REGION ALONG THE CANAL SYSTEM

NYS Economic Development Region	Crop 1	Crop 2	Crop 3	Crop 4	Crop 5/Others
Western NY	Forage (hay)	Corn (grain)	Corn (silage)	Soybeans	Vegetables
Finger Lakes	Corn (grain)	Forage (hay)	Soybeans	Corn (silage)	Wheat (grain)
Southern Tier	Forage (hay)	Corn (grain)	Corn (silage)	Oat (grain)	Wheat (grain)/ Grapes
Central NY	Forage (hay)	Corn (grain)	Corn (silage)/ Vegetables	Soybeans	Wheat (grain)/ Oats (grain)/ Onions
Mohawk Valley	Forage (hay)	Corn (silage)	Corn (grain)	Soybeans/ Oat (grain)	Vegetables
Capital	Forage (hay)	Corn (silage)	Corn (grain)	Vegetables	Sweet Corn/ Oats (grain)/ Berries

The Farm and Ranch Irrigation Survey identifies which crops are likely to be irrigated in New York State. In general, corn for silage, wheat for grain and seed, soybeans, alfalfa and other hay crops are not irrigated. Neither is pasture land. Vegetables are much more likely to require irrigation than other crops. In New York State, approximately 43 percent of the total acreage of vegetables planted in 2007 (over 11,300 acres) was irrigated. Almost all lettuce is irrigated, as are the majority of acres in sweet corn, berries, tomatoes and potatoes. Among orchards and vineyards the percentage of acres irrigated in 2007 was just slightly above 50 percent.

Forage materials and grains are the most commonly raised crops in regions along the Canal system. Vegetables and other crops such as sweet corn, which are typically irrigated, rank among the top five crops planted by acreage in Western New York, Central New York, the Capital Region, and the Mohawk Valley.



SUMMARY OF ECONOMIC VALUE

Agricultural operations supported by the NYS Canal System employ an estimated 449 people directly and an additional 162 through indirect and induced means. Associated income and wages total \$10.3 million annually. These farms generate \$45.6 million in total economic impact and contribute \$4.4 million in combined state, local and federal tax revenues each year.

KEY FINDINGS

Crop irrigation is the primary agricultural use of Canal System water. The greatest benefit is to local farms and economies in the Finger Lakes Region and Western NY Region, where irrigation supported by Canal System water is most common.

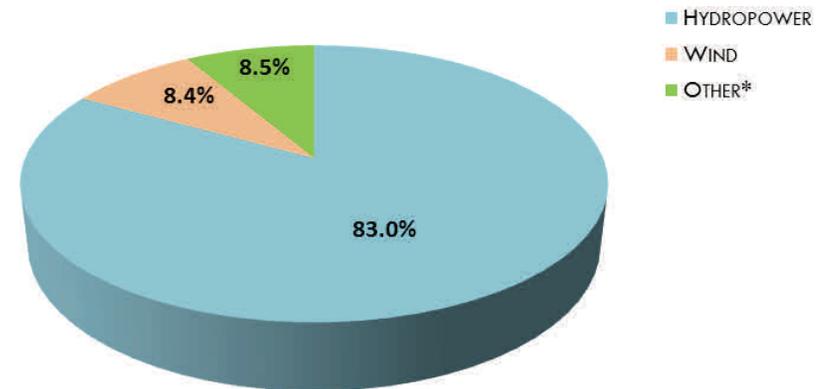
Permit information indicates that no fewer than 45 farms rely on the Canal System as a source of water for irrigation. In reality, the number of farms deriving benefit may be considerably higher since others downstream from siphon locations likely benefit from water diverted into local streams and drainage-ways. These downstream users are not tracked which would require field work and surveys of local farms. Farmers also utilize Canal System lands for storage and maintenance purposes, and in some cases to supplement cropland.

CHAPTER 7: HYDROELECTRIC FACILITIES

Hydroelectric power is a widely used form of renewable energy. Hydroelectric facilities produce less pollution and greenhouse gas emissions compared to fossil fuel sources. In 2011, renewable energy resources including wind, geothermal, biomass, solar and hydroelectric supplied approximately 24 percent or 33,251 gigawatt hours (GWh) of New York State's total electricity generation. As shown in Figure 7-1, the majority of renewable energy within the state was generated by hydropower (approximately 83 percent). Future production of electricity via renewable resources is anticipated to increase as a result of the New York State Public Service Commission's (NYSPSC) Renewable Portfolio Standard (RPS) which mandates a state goal of 30 percent renewable energy production by 2015.



FIGURE 7-1: ELECTRICITY GENERATION BY RENEWABLE RESOURCE TYPE (NEW YORK STATE 2011)



Source: New York State Energy Planning Board. New York State Energy Plan Transmission and Distribution Systems Reliability Study and Report. August 2012

**includes biomass, biogas, and solar power*

The infrastructure of the New York State Canal System has historically facilitated the production of clean or “green” energy at hydroelectric facilities. These facilities continue to supply the open market and the residents of New York State with reliable sources of renewable energy. Hydroelectric facilities have also supported past and present industrial uses and manufacturing activities adjacent to the Canal System. Hydropower is a water dependent use, and Canal System water is a crucial component to the operation of these facilities.

DATA SOURCES & METHODOLOGY

Identifying hydroelectric facilities situated along or made possible by the infrastructure of the NYS Canal System involved data provided by a NYS Canal Corporation hydrologist as well as a review of the Federal Energy Regulatory Commission (FERC) database of licenses, pending licenses, and exemptions for hydroelectric facilities in the state. Source information for these statewide data sets was cross-referenced with and/or confirmed by the NYS Canal Corporation. In addition, a review was conducted of historic documentation and previous Canal System hydropower studies, GIS data sets and National Inventory of Dam Information.

Employment information was obtained in order to accurately illustrate the staffing associated with each of these facilities. These data were also used to populate the IMPLAN model in order to accurately quantify the economic benefit attributed to the operation of these facilities. FERC annual generation filings as well as state level energy generation data were reviewed as part of this effort.

Hydro power facilities were identified as part of IMPLAN Sector 31 – Electric power generation, transmission, and distribution.

Employment and business output information from the IMPLAN model database were used to develop business output per employee ratios. The resulting information was then used as an input to the MRIO model.



OVERVIEW OF HYDROELECTRIC FACILITIES

As seen in Figure 7-2 there are a total approximately 27 hydroelectric facilities located across five regions encompassing the NYS Canal System. Of these facilities, approximately ten are located in the Central New York region, predominantly situated along the Oswego Canal. The Capital Region has the second most facilities, with eight, most of which are located along the Champlain Canal. Appendix E, provides an overview of hydroelectric facilities by region and includes maximum generation capacity, operator, and water source information.



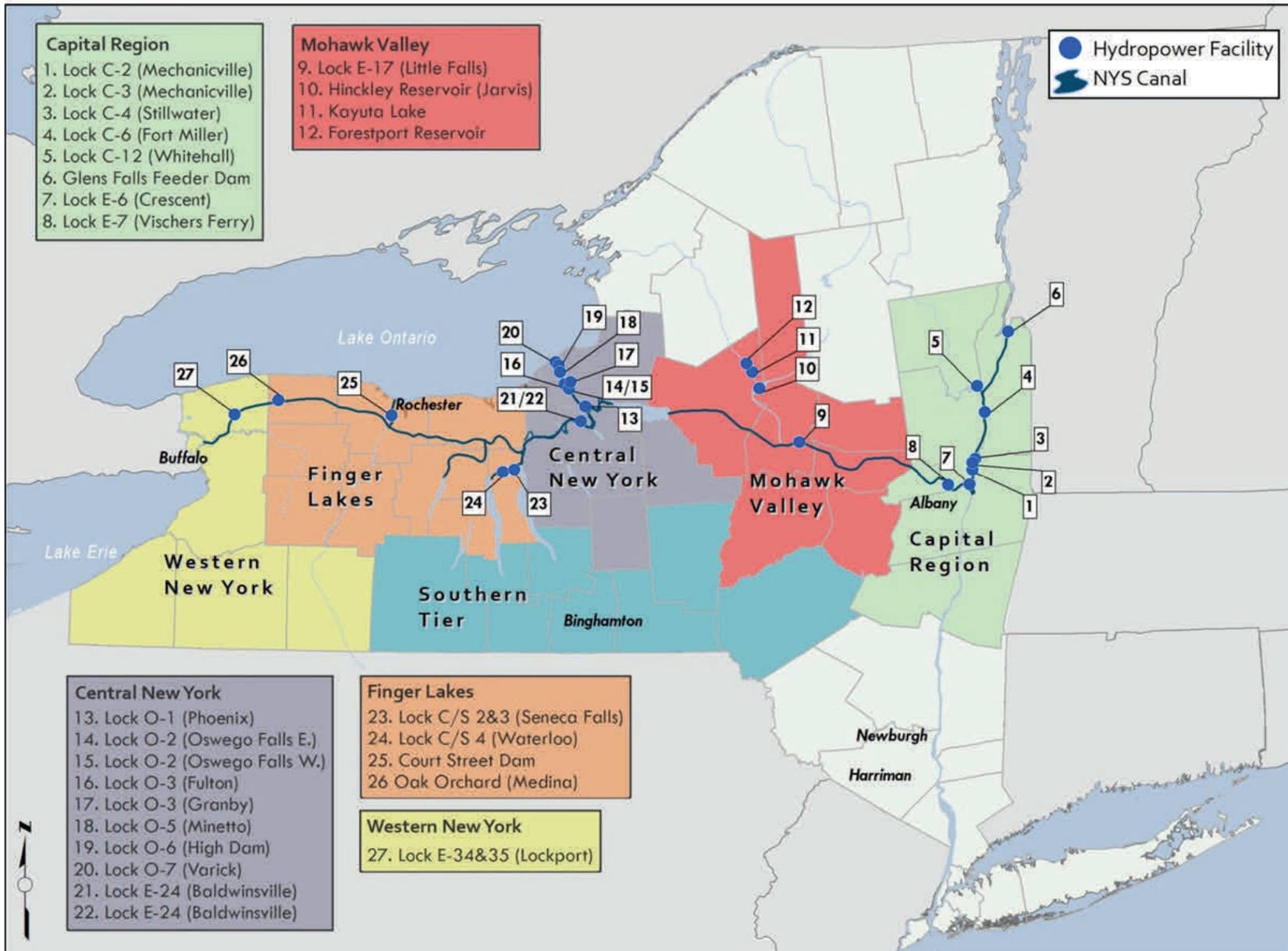
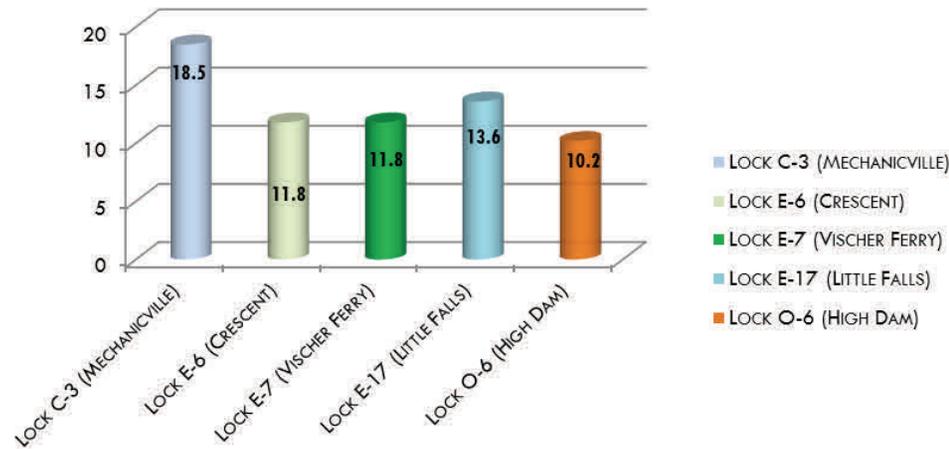


Figure 7-2

FIGURE 7-3: CANAL SYSTEM HYDRO-FACILITIES BY MAXIMUM GENERATION CAPACITY (MW)



The total annual maximum capacity of all hydroelectric facilities using Canal System water would equate to approximately 1,352,544,000 kilowatt hours (kWh) if each of these facilities were to operate continuously for 24 hours per day, year-long. However, this degree of system-wide output is not feasible due to a number of variables such as the fluctuating price and demand for hydro power; water levels and weather conditions; and seasonal effects.

In order to provide a more realistic estimate of generation capacity realized along the NYS Canal System, a comparison of annual generation for seven generation facilities operated by Brookfield Renewable Power (Brookfield) was conducted. Brookfield operates one of the largest renewable power platforms globally and is a large hydroelectric operator with jurisdiction of ten facilities along the NYS Canal System. Appendix E also includes annual generation revenue for seven Brookfield hydro facilities. The annual revenue was calculated based on \$0.03 per kWh. This data was derived from Brookfield's annual generation filings to the FERC.

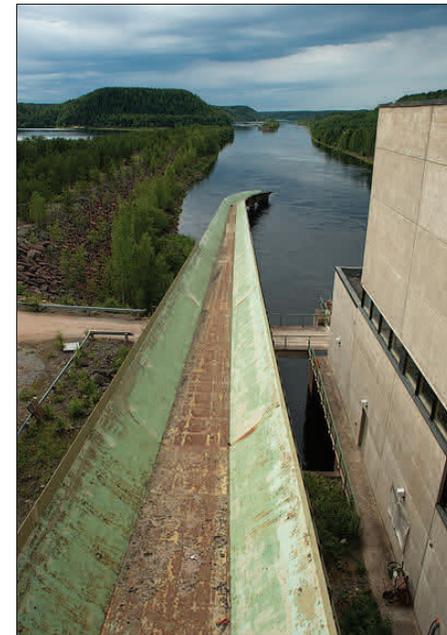
The seven Brookfield facilities collectively operated between 41 percent in 2010 and 42 percent of their maximum capacity in 2012. These facilities generated approximately \$4.7 million annually during 2010 and 2012. Based on this FERC data and discussions with NYS Canal Corporation personnel with confirmation from NYPA, it is estimated that approximately 40 to 45 percent of the maximum installed generation capacity is typically realized system-wide for hydro generation facilities along the Canal System.

SUMMARY OF ECONOMIC VALUE

Hydroelectric facilities that utilize Canal System water employ 27 people directly and an additional 45 jobs are supported through indirect and induced economic activity. These facilities generate approximately \$24.8 million dollars in total economic impact, \$6.2 million in personal income, and \$6.4 million in local, state, and federal tax revenues annually. The use of Canal System water is essential to the operation of these facilities.

KEY FINDINGS

Hydroelectric power generation is a proven, clean source of renewable energy. The use of Canal System water is essential to the operation of 27 hydroelectric facilities with a combined maximum generating capacity of approximately 154.4 MW. Approximately 9% of New York State's hydroelectric facilities are located on the Canal System, and these facilities produce an estimated 2.3% of the state's hydroelectric power.



CHAPTER 8: COMMERCIAL SHIPPING

The Erie Canal was the nation's first major transportation system. It evolved into what is now referred to as the New York State Canal System which provided a vital link for transporting cargo between the Hudson River and the Great Lakes, Finger Lakes, and Lake Champlain.

The Canal System was used to move people and cargo until the development of the railroad in the 19th century and the automobile in the 20th century. Commercial shipping on the Canal continues today, but on an infrequent basis. Recently, the federal government improved a section of the Canal between Waterford and Oswego to allow the increased passage between the Hudson River and the Great Lakes. This improvement was accomplished by creating a vertical clearance of at least 20 feet for larger vessels to pass through.

Opportunities for expanded use of the Canal System have been studied. In 2012, the New York State Department of Transportation and the Research and Development Authority commissioned a study referred to as *New York State Canal System, Modern Freightway* that points out the benefits of instituting a container-on barge service on the Canal.

DATA SOURCES & METHODOLOGY

The analysis of the shipping industry included a review of annual commercial traffic reports published by the Canal Corporation. These reports contain total tonnage shipped each year and the value of the cargo. Companies permitted to ship on the Canal System were contacted to inquire about the type of cargo they have moved in the past and if additional shipments are scheduled in the coming years.

An average number of workers per shipping company was derived based on the *2010 US County Business Patterns information for New York State* for NAICS Sector 483211 (Inland water freight transportation). This estimate was refined to three full-time workers per shipping firms based on the Canal Corporation's extensive knowledge of the companies.

The process used to translate collected information into the inputs for the economic impact analysis included identifying the shipping companies as part of IMPLAN Sector 334 – Water Transportation.



Employment and business output information was derived from the IMPLAN model database for each of the six economic development regions to develop business output per employee ratios. The total number of workers for the shipping industry in each of the regions was translated to business output/industry sales using the ratio. The resulting information was then used as the inputs to the MRIO model.



OVERVIEW OF COMMERCIAL SHIPPING

As shown in Table 8-1, the amount and value of cargo transported can vary significantly from year to year. The type of cargo shipped over the past five years included barges, turbines, generators, construction equipment, and drilling equipment. The value of the cargo may be significant in a given year because of the value of one piece of equipment moved that year. For instance, the value of the cargo transported in 2010 is listed as \$53,266,500 because the federal government required the transport of a single \$50 million piece of equipment. Most of the shipping activities occurred on the Champlain Canal and more recently on the Oswego Canal.

SUMMARY OF ECONOMIC VALUE

It is estimated that the commercial shipping industry contributes \$12.3 million in total economic impact annually. Approximately 15 employees work directly at the shipping companies listed above and an additional 35 people are indirectly employed, together earning approximately \$2.7 million in annual wages and salaries. These companies generate approximately \$1.3 million in total tax revenues each year.



KEY FINDINGS

The commercial shipping industry provides shipping services to a variety of businesses required to move large pieces of equipment or goods between the Hudson River and the Great Lakes not easily moved by rail or truck. In 2012, over 42,000 tons of cargo valued at approximately \$26 million was shipped on the Canal System. In 2013 over 100,000 tons of cargo are projected to be shipped on the Canal System.

As markets change with the expansion of the Panama Canal, the New York State Canal System could once again become a viable transportation system for moving cargo.



CHAPTER 9: QUARRY & MINING FACILITIES

Quarries and mining facilities derive economic benefit due to their locations along the Canal System. Six quarries and/or mining facilities were identified that benefit directly from water-related and mine-dewatering uses along the System. Three of these six facilities are located in the Mohawk Valley Region, two in Oneida County and one in Fulton County.

Three other mining related facilities are permitted by the Canal Corporation. These permits are for non-water uses but still derive some benefit from access, maintenance of above ground infrastructure and storage/encroachment on Canal lands.

In terms of economic benefits water-related uses are assumed to have the higher value use and benefit and were the focus of the economic assessment.

DATA SOURCES & METHODOLOGY

Permit data from the Canal Corporation were reviewed to identify commercial quarries and/or mining facilities that required a permit for the use of lands or waters within the System. Additionally, NYSDEC water withdrawal permit data were obtained to identify major quarry/mining related water users that are required to seek permits from the State.

These permit data were cross-referenced to aerial photos and maps of the Canal System to verify the location and use of these quarries and mining facilities. Information related to primary business activities at the six mine facilities was also obtained through website research (<http://mines.findthedata.org>).

The process used to translate collected information into the inputs for the economic impact analysis was allocated to IMPLAN Sector 26 – Sand, gravel, clay, and ceramic and refractory minerals mining and quarrying. Because employment at these operations can vary considerably depending on demand for materials an average number of workers were assigned to each quarry based on the *2010 U.S. County Business Patterns* information for New York State for NAICS Sector 21231 - Stone Mining and Quarrying. As with other industrial users where on-site employment and business output information could not be obtained it was estimated from the IMPLAN database which was used to develop business output per employee ratios. The total number of workers for this sector in the regions where facilities were located was translated to business output/industry sales using the ratio. The resulting information was then used as the inputs to the MRIO model.

OVERVIEW OF MAJOR MINING ACTIVITIES

Each of the six facilities identified in the inventory are deriving benefit from the Canal System. These facilities mine natural aggregates and are either active or intermittently active mines as identified in the following table. Employment varies depending on demand for materials, construction activity, and seasonal effects.

TABLE 9-1: MINING FACILITIES

Facility Name	Location	Water Source	Mining Source Material	Mine Status/ Production
Plant 5 427 Sacandaga Rd. Scotia, NY	Schenectady County	Mohawk River	Construction Sand & Gravel	Intermittent
Maple Ave Pit 1250 Riverfront Center Amsterdam, NY	Fulton County	Mohawk River	Construction Sand & Gravel	Active
Oriskany Falls Plant State Route 46 Boonville, NY	Oneida County	Black River Canal	Crushed, Broken Limestone	Active
Forestport 10959 Horton Rd Forestport, NY	Oneida County	Woodhull Creek	Crushed, Broken Granite	Intermittent
Jamesville Plant 4800 Jamesville Rd. Jamesville, NY	Onondaga County	Butternut Creek	Crushed, Broken Limestone	Active
Lockport Quarry 400 Hinman Rd. Lockport, NY	Niagara County	Erie Canal	Crushed, Broken Limestone	Active

Source: (<http://mines.findthedata.org>)

KEY FINDINGS

Permit data identify various uses of Canal System lands and waters by quarries and mining operations. These include water diversion, water withdrawal and water return. Water is used for typical industrial mining operations such as washing of mined material and equipment and for dust control. Data also indicates mine dewatering occurs in some locations. In these situations, it is assumed that groundwater is pumped from quarried areas and released into the Canal System.

NYSDEC permit data indicate that average daily water use at permitted facilities ranges from a low of approximately 0.46 million gallons per day (MGD) to a high of approximately 1.54 MGD. Maximum capacities of these facilities range between 1.44 MGD to 3.89 MGD.

SUMMARY OF ECONOMIC VALUE

Quarries and mines supported by the NYS Canal System generate approximately \$26 million annually in total economic impact. An estimated 85 employees work directly at these facilities, and an additional 855 jobs are supported through indirect or induced means. Related personal wages and income total \$7.0 million annually. This industry generates an estimated \$4.1 million in local, state, and federal tax revenues.

Nine quarry and mining operations benefit from proximity to the Canal System. These facilities primarily provide construction sand and gravel materials to the construction industry. Six quarries utilize Canal System water as part of their operations by either withdrawing water for industrial use (washing source materials and dust control) at the mines or by dewatering groundwater from active mined areas.

CHAPTER 10: PUBLIC WATER SUPPLY FACILITIES

Public water systems provide a tremendous level of benefit to the residents and businesses they serve. Communities depend on these water systems to provide safe, reliable water to support their quality of life.

Natural waterways along the New York State Canal System (i.e. the Hudson and Mohawk Rivers), and the system's feeder reservoirs, are suited to provide high-quality drinking water to public systems.

DATA SOURCES & METHODOLOGY

Water withdrawal permit information provided by NYSDEC and the NYS Canal Corporation was used to identify all public water supply facilities using the Canal System as a water source. Annual withdrawal volumes were available from the NYSDEC data. Service information was obtained from annual reports provided by each facility.

On-site employment information was unavailable for the water supply facilities. As a proxy, the average number of workers per public water supply establishment was calculated based on *2010 U.S. County Business Patterns* data for New York State (NAICS 22131 – Water, sewage and other systems). Output-per-employee ratios were used to determine the model input values entered under IMPLAN Sector 33 – Water, sewage and other systems.

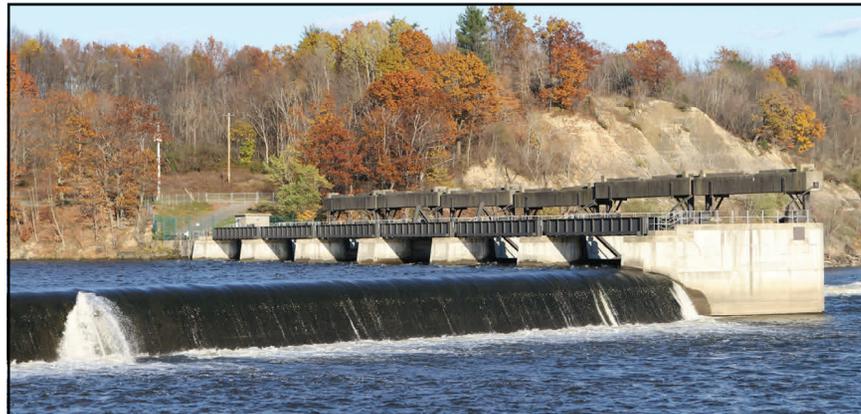
OVERVIEW OF PUBLIC WATER SUPPLY FACILITIES

Three public water supply facilities use Canal System water: the Town of Halfmoon, Latham Water district, and the Mohawk Valley Water Authority. The following table provides summary information for each of these facilities.



TABLE 10-1: PUBLIC WATER SUPPLY FACILITIES ALONG THE NYS CANAL SYSTEM

Facility/User Name	Water Source	Average Daily Water Withdrawn (MGD)	Annual Water Withdrawn (MGD)	Population Served
Town of Halfmoon	Hudson River	2.00	730	14,000
Latham Water District	Mohawk River	10.81	3,946	82,000
Mohawk Valley Water Authority	Hinckley Reservoir	20.60	7,519	126,000



The Town of Halfmoon’s public water facility is the smallest of the three located on the NYS Canal System. At the time this study was conducted, the Town of Halfmoon Water Department was temporarily receiving its water from the City of Troy distribution system due to a dredging project affecting the Hudson River upstream of Halfmoon’s intake point.

The Latham Water District serves the Town of Colonie, a heavily populated suburban community in the Capital Region. The Mohawk Valley Water Authority serves the City of Utica and surrounding areas.

Collectively, these public water facilities withdraw approximately 12.2 billion gallons of water from the Canal System annually, and serve more than 220,000 residents.



SUMMARY OF ECONOMIC VALUE

Public water supply facilities supported by the NYS Canal System generate \$18.8 million annually in total economic impact. An estimated 35 employees work directly at these facilities, and an additional 55 jobs are supported through indirect or induced means. Related personal income is \$7.0 million annually. These water supply facilities generate an estimated \$3.25 million in local, state, and federal tax revenues.



KEY FINDINGS

Natural waterways along the New York State Canal System and associated feeders and reservoirs provide safe, reliable water to support more than 220,000 residents annually that resided in either the Capital Region or the Mohawk Valley Region. Collectively, the public water supply facilities using Canal water generate approximately \$19 million in total economic impact.

CHAPTER 11: WASTE TO ENERGY FACILITIES

The Oswego County Energy Recovery Facility withdraws large volumes of water for conversion into steam through the incineration of municipal solid waste. The steam is used to generate electricity by moving turbines. The electricity is provided to residences and businesses.

DATA SOURCES & METHODOLOGY

NYSDEC water withdrawal permit data was used to identify the Oswego County facility as a Canal System water user.

The inputs for the economic impact analysis were allocated to IMPLAN Sector 31 – Electric power generation, transmission, and distribution facilities. As with other industrial users where on-site employment and business output information could not be obtained it was estimated from the IMPLAN database which was used to develop business output per employee ratios.

The total number of workers for this sector in the where facilities were located was translated to business output/industry sales using the ratio. The resulting information was then used as the inputs to the MRIO model.



The Oswego County Energy Recovery Facility is located along the Oswego River in Oswego County within the Central New York Economic Development Council Region. In operation since 1999 the facility uses approximately 8.3 million gallons of water daily from the Oswego River. The facility is capable of generating 3,600 kilowatts of electricity. In 2010 the facility processed more than 61,000 tons of waste (www.dec.ny.gov).

SUMMARY OF ECONOMIC VALUE

The total economic impact derived from the Oswego County waste-to-energy plant is estimated at \$10.8 million. An estimated 11 employees work directly at the facility, and an additional 20 employees are supported indirectly or through induced spending. Related personal income is \$3.0 million annually. This industry generates an estimated \$2.8 million in local, state and federal tax revenues.

KEY FINDINGS

The Oswego County Energy Recovery Facility uses more than 8.3 million gallons of water per day to generate steam and electricity from the combustion of municipal solid waste. The energy is used to provide power to local utilities for residential and business customers. The facility is an important part of the solid waste management system in Central New York.

CHAPTER 12: GOLF COURSES

Golf courses are included in the study because they are known to derive economic benefit from proximity to the Canal System. Although proximity and close access to the Canal System is a benefit to all courses along the System from an open space perspective the primary benefit may result from the availability of nearby water that can be easily withdrawn for irrigation of course grounds.

DATA SOURCES & METHODOLOGY

The inventory of golf courses is based on Canal Corporation permit data and water withdrawal information obtained from the NYSDEC. A total of 25 golf courses were inventoried based on permit data. Additional golf courses are located along the System, but do not use its water for irrigation. These courses were not included in the inventory or economic assessment.

Golf course locations were verified from review of aerial photography and maps of the Canal System. Information collected was reviewed and verified by local Canal Corporation Division staff most familiar with these locations.

Collected information was translated into the inputs for the economic impact analysis for each of the six regions that use Canal water. The average number of workers per golf establishment were developed based on the *2010 US County Business Patterns information for New York State* for NAICS Sector 71391 (Golf courses and country clubs).

Golf courses were identified as part of IMPLAN Sector 410 – Other amusement and recreation industries. Employment and Business Output information was obtained from the IMPLAN model database for each of the six regions to develop business output per employee ratios. The total number of workers for golf courses in each of the regions with this activity was translated to business output/industry sales using the established ratios. The resulting information was then used as the inputs to the MRIO model.



OVERVIEW OF GOLF COURSES

Both private golf and country clubs and courses open to the public were included in the inventory as long as permit data existed. Additional public courses associated with public parks, municipalities and governmental parks and recreation agencies were not included in the inventory if permit data did not exist.

Golf courses that were included in the study vary in size. These range from 9 to 27 holes. The majority of courses consisted of 18 holes. Courses are located in each of the 3 Canal Divisions and fall within four of the State's Regional Council economic development areas. The number of courses in each location is as follows:

- *Capitol Region: Saratoga (2), Rensselaer (1) and Washington (2)*
- *Central New York Region: Oswego (3) and Onondaga (2) counties*
- *Finger Lakes Region: Monroe (8) and Orleans (2) counties*
- *Western New York Region: Erie (1) and Niagara (5) counties*

SUMMARY OF ECONOMIC VALUE

In total, the economic benefit derived from golf courses utilizing water from the Canal System for irrigation is estimated at \$41.2 million in total economic impact. An estimated 350 employees work directly at these facilities, and an additional 128 employees are supported indirectly or through induced spending. Related personal income is \$12.1 million annually. This industry generates an estimated \$6.4 million in local, state and federal tax revenues.



KEY FINDINGS

Twenty-five golf courses were identified that benefit from water withdrawal from the Canal System for irrigation. These courses are mostly privately owned, but publicly accessible. The majority of these courses are located in the Finger Lakes and Western New York regions.

CHAPTER 13: REAL ESTATE DEVELOPMENT

An inventory of real estate projects was conducted to collect and review readily available information on development projects that have been proposed, permitted or completed by the private sector in proximity to the Canal System within approximately the past three years. The purpose of the inventory was to determine the effect, if any, that the Canal System may have on local real estate development.

The inventory focused on large private sector development because of its potential for significant direct, indirect and induced benefits to local and regional economies. Benefits include, but are not limited to direct employment, increased tax revenues to local jurisdictions, and spin-off business opportunities that typically result from large-scale investment. Inventoried projects did not distinguish between those projects that may be completely financed by the private sector from those that may be financed through private and public sector partnerships.

Public sector projects along the Canal System were not included in the inventory. Although publicly funded projects are an important stimulus to private development, they typically relate to smaller projects involving public access and beautification associated with waterfront development.

These public sector projects may not create direct economic effects on employment and economies once constructed because of tax exempt status. These projects are, however very important to canal-side communities as a means to improve local quality of life and stimulate investment in an area.

DATA SOURCES & METHODOLOGY

Information regarding recent private sector real estate projects and investment values were obtained from Canal Corporation permit information, local agencies, Comprehensive Economic Development Strategy (CEDS) reports and website research. Project locations were identified from a review of aerial photography. Project components were typically acquired from website research of real estate companies, consultants and development firms. The economic impacts of these projects were not included in the IMPLAN model.

OVERVIEW OF RECENT PROJECTS & THEIR VALUES

Real estate activity along the Canal System often involves redevelopment of formerly developed parcels and infill types of projects on vacant and undeveloped properties. Projects typically, but not always, occur in well-developed areas in cities, towns and villages. Projects may include rehabilitation of older structures and conversion of sites, including brownfields, into new uses. The inventory focused on large-scale residential, commercial, industrial, office and mixed-use development projects estimated in the millions of dollars. These projects are creating significant economic benefits and making tangible quality of life contributions to many Canal-side communities.

The majority of projects identified during the inventory are in the early stages of development prior to construction and either recently proposed or in various stages of planning. In some cases recently proposed projects are somewhat easier to identify than those that have been completed because completed projects are no longer in the public's eye and as newsworthy.

Among the three Canal System divisions, the number of projects being developed in western New York (the Buffalo Division) appears to outnumber the projects proposed in the Albany and Syracuse divisions. Details on projects according to each Regional Economic Development Council are provided in the appendix to this report.

SUMMARY OF ECONOMIC VALUES

More than \$150 million in private sector real estate development projects have been completed in proximity to the Canal System in the past three years. These projects appear to have been developed at least in part because of the presence of the Canal System and its amenities.

Nearly \$1.3 billion in additional development is estimated in new projects along the Canal System in the near future. These projects are in various stages of development ranging from the initial proposal and planning stages to being permitted or under construction. Projects have been identified across the System particularly in urban areas around Albany, Syracuse, Rochester and Buffalo.

The Capital Region accounts for approximately \$377 million in development of four major projects in Albany, Saratoga and Schenectady counties. These are large scale residential apartment and condominium developments.

In the Central New York Region two residential projects have been completed in the City of Oswego. These projects converted historic buildings into modern loft units near the Oswego River. These projects are estimated at approximately \$9 million.

KEY FINDINGS

The proposed development of the Syracuse Inner Harbor by COR Development is estimated at \$350 million. Environmental reviews for the project are moving forward and some additional real estate activity in nearby areas is occurring.

Three projects have been completed and another eight projects are in various stages of development in the Finger Lakes Region in the Rochester metropolitan area and its suburbs. These projects are largely mixed-use developments that include residential, commercial and office components. These projects account for approximately \$82 million in investment.

In the Western New York Region at least two mixed use projects have been completed in Niagara County. These projects are estimated at more than \$30 million in private investment.



Twenty-one significant real estate projects were identified across the Canal System occurring in 8 different counties representing almost \$1.5 billion dollars. These projects likely represent a fraction of the full impact on real estate development created by proximity to the Canal System. Research indicates that in most cases the Canal System plays a substantial role in the decisions on where these projects are located and the type of development occurring. The Canal System is an incentive for local investment and attractive to the real estate development sector.

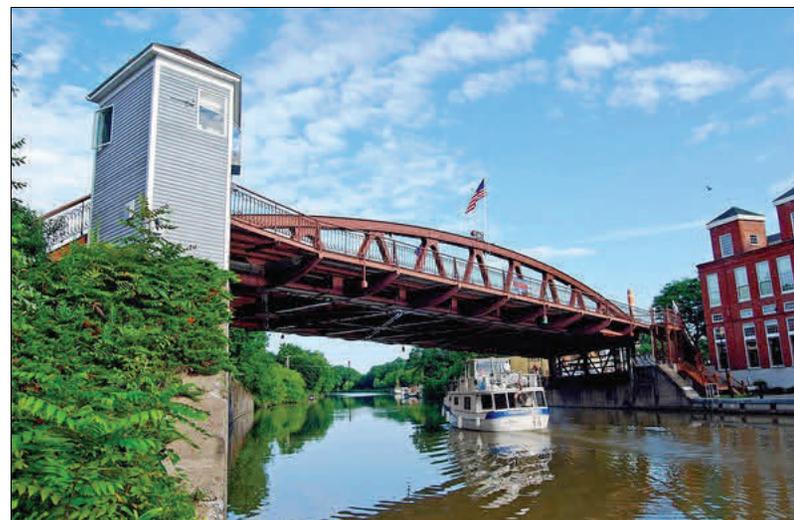
The assessment focused on large projects recently completed and those currently in various stages of planning, but progressing towards completion. The three year study period includes the recent nationwide economic downturn that is known to have adversely affected real estate activity.

CHAPTER 14: BENEFITS TO OTHER CANAL SYSTEM PERMIT HOLDERS

INTRODUCTION

The Canal Corporation issues permits on an annual basis for a diversity of uses. Permit holders run the gamut from individual homeowners and small not-for-profit organizations to large utilities and corporations, municipalities and government agencies. Because uses vary so greatly, some benefits derived from use of Canal System lands and waters are less tangible than others and assigning an economic value to these uses can be complex. For this reason some additional uses and benefits are discussed below in more qualitative and less quantitative terms.

Permit holders derive a wide range of benefits from access to the Canal System. For example, it is difficult to assign value to a group of property owners who have boat access to a waterway along the Canal System. Each owner will value this benefit differently and the effect on property value will vary due to many unrelated factors. Similarly utility corridors that service large population centers provide value to hundreds or thousands of people as well as the utility itself. Some of the most commonly permitted uses are discussed below.



RESIDENTIAL USES

The Canal Corporation annually issues permits to residents that utilize Canal System lands and/or waters for a variety of domestic and recreational uses. Permit fees are commensurate with anticipated uses. Permit fees under the residential category typically range between \$50 and \$1500 depending on the extent of the use. These uses may include access to canal water and to the banks of the canals for a variety of reasons. Some of the more typical uses include:

- *Canal-side property beautification, landscaping and maintenance;*
- *Access to footpaths and recreational trails;*
- *Boat access, ramps and docks;*
- *Stormwater drainage; and*
- *Use of water for domestic purposes including irrigation of gardens and lawns.*

Residential properties typically include year-round single-family homes, apartments and seasonal camps. More than 2,000 residential permits were issued in 2012. These included 443 permits issued by the Albany Division; 1,146 by the Syracuse Division; and 480 by the Buffalo Division.

The top three residential uses are boat docks, beautification and access. Other notable uses include: camps; boat launches and boathouses; siphons for withdrawing water for domestic irrigation; and activities identified as “encroachment” upon Canal lands. This encroachment may include the placement of fencing, structures or storage of materials and seasonal use items alongside Canal lands. These permitted uses significantly contribute to a resident’s quality of life and the day-to-day benefits derived from living in proximity to the Canal System.

USES BY UTILITIES

In 2012 more than 600 permits were issued to utilities across the Canal System for above ground and below ground infrastructure including poles, pipelines, transmission lines, overhead wires and cables. Utility providers include electric, natural gas, and communications companies providing telephone, cable and fiber optic services. Large utilities such as National Grid (formerly Niagara Mohawk), New York State Electric and Gas, Verizon and Time Warner are a few of the many providers that utilize canal lands for construction and long-term maintenance of transmission and distribution systems. Smaller utilities and municipal service providers also utilize the Canal system for water, sewer and stormwater systems.

Most utilities secure permits for crossing the Canal System often at multiple locations, such as alongside bridges rather than linearly following a Canal corridor. Some permitted uses date as far back as the early 1900's. Fees established by the Canal Corporation are commensurate with the use and typically range between \$50 and several hundred dollars or higher.

USES BY GOVERNING ENTITIES

Governmental entities utilize the Canal System for a variety of municipal services and agency uses. In 2012 nearly 800 permits were issued to governmental entities. Most permits were issued to county, city, town and village governments for municipal purposes. Fees have traditionally been waived for municipal services. For other uses fees are established based on use and can range between \$50 to several thousand dollars depending on location.

Permit data identify a range of typical governmental uses. These include:

- *waterfront access*
- *parking areas*
- *small parks and playgrounds*
- *boat and canoe launches*
- *nature trails and pedestrian paths*
- *fishing access*
- *municipal stormwater and drainage systems*
- *public utilities including municipal waterlines and wastewater discharge systems*
- *landscaping and shoreline protection*
- *emergency response training*

NOT-FOR-PROFIT USERS

A number of not-for-profit groups and organizations use Canal System lands and waters. In 2012, approximately 28 permits were issued by the Canal Corporation to not-for-profits. These organizations included the Boy Scouts of America, Girl Scouts, Lions Club, Fireman's Benefit Association, rowing and crew groups, and educational institutions including the University of Rochester and Cornell University. Uses include:

- *Canal-side beautification*
- *Maintenance of utilities*
- *Seasonal camps*
- *Maintenance of decks, floating docks, boat ramps, swim platforms and footpaths*

In many cases permit fees are waived including educational purposes. Others are charged a minimal fee typically between \$50 and \$100. In some cases as with the two universities the fees can be substantially higher due to installation and maintenance of utilities and related structures.