

Assessment of the Economic Value of Clean Water in Lake George

December 2020



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The Village of Lake George



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Executive Summary

Upon his first glimpse of Lake George in 1791, Thomas Jefferson wrote, “Lake George is without comparison, the most beautiful water I ever saw; formed by a contour of mountains...finely interspersed with islands, its water limpid as crystal and the mountain sides covered with rich groves of fir, white pine, aspen and paper birch down to the water-edge: here and there precipices of rock to checker the scene save it from monotony.”

Many of the aspects that Thomas Jefferson admired over 200 years ago continue to attract visitors today. Approximately 3 million people visit Lake George annually, generating revenue, jobs, and direct income for the region. The purpose of this report is to understand and evaluate the impact that changes in water quality may have on the economy of the Lake George region and how those impacts may influence decision makers when enacting policies. To understand the role that changes in water quality may have, this report reviews available literature and analyses on the topic of water-based tourism economies, primarily in the northeast United States, to evaluate the correlation between clean water and regional economies. The findings of this report reaffirm the importance of a healthy lake to the regional economy and its various sectors including tourism, property values and public health.

Introduction

Lake George is a 32-mile-long lake in the southeastern portion of the Adirondack Park. The Lake George basin occupies over 233 square miles of land, spanning portions of Warren, Washington, and Essex Counties in New York State. The picturesque scenery and pristine waters have attracted visitors since the mid-1800s when the region was populated with Adirondack great camps and accessible only by train and steamboat. It was during this time that the tourism industry catering to summer vacationers to Lake George grew rapidly and accommodations for tourists grew and diversified. The tourism industry expanded even more with the development of the Adirondack Northway (Interstate 87) following World War II. The country’s new highway system exposed the area to a huge number of travelers from New York State and beyond. In addition to being a significant driver of the region’s economy, Lake George also serves as a source of drinking water for many watershed residents, and a prime recreation destination for residents and visitors alike.



Photo 1: Visitors are attracted to the Lake George Region for its picturesque scenery and pristine waters.

The natural environment of the Lake George and its watershed is unique and complex. The lake is classified as oligotrophic, meaning it is a low-nutrient, low productivity waterbody and is designated a Class AA Special

waterbody by the New York State Department of Environmental Conservation (NYSDEC), this designation indicates that the waters of Lake George are suitable for use as a public drinking water supply. Other water resources in the watershed are known to be impaired by land use activities and other human influences like erosion, stormwater runoff, winter road maintenance, municipal discharges, and on-site septic systems (New York State Department of Environmental Conservation, 2018).

The importance of keeping the waters of Lake George clean has long been understood and documented by scientist, planners, and municipal officials. Scientific investigations in the 1960s indicated that nutrient loading into the lake had doubled over natural background levels (Town and Village of Lake George, 2016). *The Plan for the Future of the Lake George Park* plan in 1987, the 2001 *Lake George – Planning for the Future* document and the current effort, *The Lake George Watershed Action Plan*, among others, highlight the need to maintain and improve the water quality of Lake George not only for the ecosystem and the environment, but also for the ecosystem services the lake provides to the region.

Lake George is visited by 3 million people per year, and economic activity tied to Lake George is estimated to be worth approximately \$2 billion annually (Williams, 2019). Small decreases in water quality, both perceived and actual, have been found to impact a region's economy. Studies have found that minor changes in water clarity - the measure of how far down light can penetrate through the water column - has dramatic impacts on property values and tourism (Rivard, 2020).

The purpose of this report is to review existing literature and analyses of impacts that water quality, good or bad, can have on a local economy as they relate to the Lake George Region. For this report, the Lake George Region refers to the areas of Washington, Warren and Essex Counties, New York that surround the lake. Please note that the industry analysis included in the following section includes only the Town of Queensbury, Town and Village of Lake George, and the Town of Bolton located primarily on the west side of Lake George in Warren County. This delineation was made due to the nature of tourism in that portion of the watershed and the conglomeration of hotels, restaurants, and other tourism related activities in those municipalities.

The Economy of the Lake George Region

Lake George is the region's chief economic and natural asset, and its water quality is a key economic driver for the area, supporting tourism, property values, employment. A decrease in water quality, perceived or otherwise, could have long lasting negative impacts on the regional economy. For this reason, protecting the water resources of the Lake George Region is also protecting the economy.

Tourism in the Adirondack Region is valued at \$1.5 billion dollars annually and generates approximately 19% of employment, amounting to approximately 20,000 jobs (ROOST, 2018). The Adirondack Region refers to area of New York State located within the "blue line" of the Adirondack State Park and stretches from Lake George to the Canadian border and west to Tug Hill near Syracuse.

Together, Warren County and the Lake George Region draw an average 8 million visitors a year and economic activity tied directly Lake George is estimated to be worth around \$2 billion annually (Town and Village of Lake George, 2016 and Williams, 2019). Should the lake not be maintained or if the water quality was irrepairably damaged in some way, it would result in significant economic loss to the Lake George Region and the Adirondack Region as a whole.

Warren County represents 42% of the Adirondack Region's tourism sales, reporting \$629 million in direct tourism spending in 2018. Additionally, in 2018, tourism in Warren County generated \$306 million in labor income, including direct, indirect and induced impacts (ROOST, 2018). These numbers reflect all of Warren County, however for the purpose of this report it is assumed that the majority of the County's tourism revenue is generated in the Lake George Region.

There are three types of impacts that are analyzed when studying economic impacts and they are used throughout this report: direct, indirect, and induced impacts. *Direct impacts* are the results of money initially spent in the region by an industry, this includes money used for salaries, supplies, raw materials, and operating expenses. *Indirect impacts* are the measure of subsequent spending at other local businesses as a result of the direct impacts. Indirect impacts are measured as business-to-business spending. The business that is initially benefitting from the direct impacts will increase spending at other local businesses (support businesses) for support services and other necessities. Finally, *induced impacts* are the results of increased personal income caused by the direct and indirect impacts and are measured by household-to-business activity. As businesses experience increased revenue from the direct and indirect impacts, they will increase

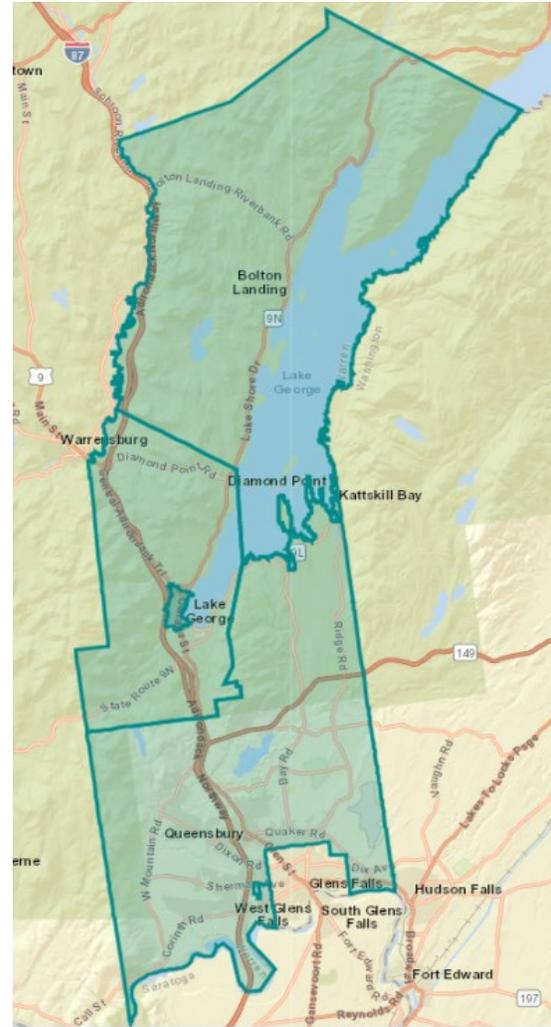


Figure 1: Geographies used for ESRI Business Analyst. Source: Camoin Associates.

payroll expenditures by hiring more employees; increasing payroll hours; or raising salaries. Households benefiting from this increase in payroll expenditures will in turn increase their spending at local businesses.

Industry Report Summary

The Lake Champlain Lake George Regional Planning Board commissioned Camoin Associates of Saratoga Springs, New York to conduct an industry analysis utilizing ESRI ArcGIS Business Analyst, a software system that uses locational data to examine the impacts of a specific industry in an area. For this analysis, the Town



Photo 2: There are a variety of business types that comprise the Lake George tourism industry, including hotels, rental boats, steamboat tours, restaurants, and beaches.

of Queensbury, the Town and Village of Lake George, and the Town of Bolton were used because of the density of tourism related establishments and attractions in those municipalities. It is important to note that these findings do not take into account any potential employment impacts of the 2020 COVID-19 pandemic. A summary of findings can be found in **Tables 1 and 2** below and the full report can be found in **Appendix A**.

Report findings: Overall, the tourism economy comprises 23% of all jobs within the Town of Queensbury, 65% of the jobs within the Town of Lake George, 61% of jobs in the Village of Lake George, and 78% of jobs in the Town of Bolton. These

include jobs in the broader tourism-related categories of Hotel and Lodging Establishments, Restaurants and Other Food Service Establishments, Marinas and Recreational Goods Rental Establishments and Other Tourism-related Establishments.

Hotels and Lodging: The Town of Bolton has the smallest number of hotel and lodging establishments (28), but the largest number of employees (1,328) in that sector. This is attributed to the Sagamore Resort, a large full-service hotel located in the Town. The Town of Lake George has the second highest number of establishments (62) and the second highest number of employees (769) working in the hotel and lodging industries.

Restaurants and Other Food Service Establishments: The Town of Queensbury has both the largest number of establishments (118) and employees (2,038), this is due to its location as a central commerce destination and its large year round population. The Town of Lake George has the second highest number of establishments (62) and employees (769).

Marinas and Recreational Goods Rental Establishments: This subsector is led by the Town of Queensbury with 16 establishments and 162 employees, this is due to the large number of boat dealers that often offer

boat rentals or storage to tourists. The Town of Bolton has the highest number of marinas which can be attributed to its large amount of shoreline on Lake George.

Other tourism-related establishments: This subsector includes industries such as Amusement facilities, Sightseeing establishments, Art Dealers, and Museums. The Town of Queensbury offers both the largest number of establishments (32) and the highest number of employees (1,521) in this subsector. This is driven by employment at the Great Escape/Six Flags Amusement Park located in the Town.

Table 1: Summary Table of Tourism Jobs

Source: ESRI

	Hotels and Lodging Establishments		Restaurants and Other Food Service Establishments		Marinas and Recreational Goods Rental Establishments		Other Tourism-related Establishments	
	Number of Establishments	Number of Employees	Number of Establishments	Number of Employees	Number of Establishments	Number of Employees	Number of Establishments	Number of Employees
Town of Queensbury	30	778	118	2,038	16	162	32	1,521
Town of Lake George	99	970	62	769	9	82	31	527
Village of Lake George	34	398	42	546	4	31	14	73
Town of Bolton	28	1,328	17	299	12	99	18	110
Totals	191	3,474	239	3,652	41	374	95	2,231

Table 2: Tourism Jobs as a Percent of All Jobs

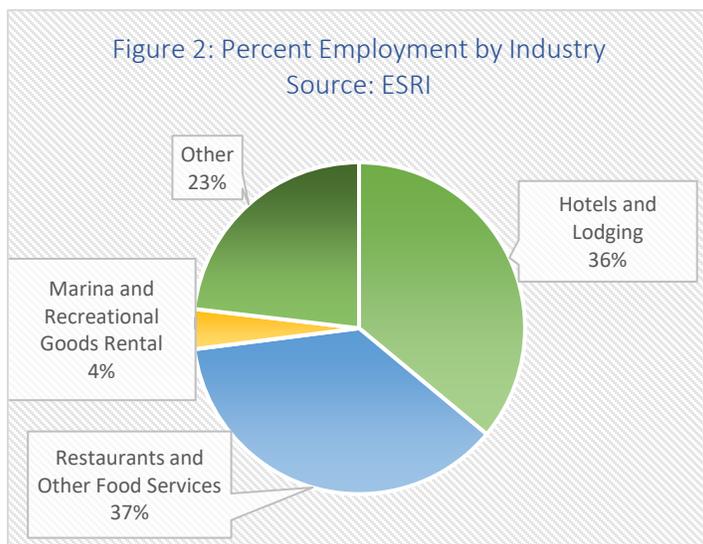
Source: ESRI

	All Tourism-related Establishments & Jobs		All Jobs & Establishments		All Tourism-related Establishments & Jobs	
	Number of Establishments	Number of Employees	Number of Establishments	Number of Employees	Percent of All Establishments	Percent of All Employees
Town of Queensbury	196	4,499	1,458	19,639	13.4%	22.9%
Town of Lake George	201	2,348	441	3,608	45.6%	65.1%
Village of Lake George	94	1,048	216	1,730	43.5%	60.6%
Town of Bolton	75	1,836	196	2,363	38.3%	77.7%

Within the study area, the greatest number of people are employed in the Restaurants and Other Food Service Establishments sector, followed by Hotels and Lodging. The greatest percentage of employees in tourism-related industries are employed in the Town of Bolton, followed by the Town of Lake George. This may be attributed to the highly seasonal populations of both towns resulting in a very tourism dependent economy.

It is clear from this data that tourism is a major driver of the economy of the Lake George Region, and much of this tourism is dependent upon the water quality and water-based resources provided by the lake. Visitors to Lake George want to be able to enjoy the lake in a variety

Figure 2: Percent Employment by Industry
Source: ESRI



of ways, over 85% of visitors to the Adirondacks wish to stay in waterside lodging and approximately 70% seek to swim, fish or boat while visiting the region (Johnstone, 2014). If the water quality of Lake George is not maintained, there likelihood that many of the visitors who seek water-based activities and lodging would choose to vacation elsewhere, taking tourism dollars outside the region.

Issues Impacting Water Quality

Water quality both perceived and actual can have an impact on visitor preferences, in turn impacting the local economy. A study in Iowa found that water quality is more important than either the travel distance required or the availability of local park facilities in determining where households choose to recreate, and 32% of poll respondents indicated that water quality was the single most important factor they consider when choosing a lake for recreation. Among water quality attributes, survey respondents viewed safety from bacterial contamination and water clarity as the most important (Iowa Lakes Valuation Project, 2020). This section evaluates the potential economic impacts of the following water quality indicators associated with Lake George: harmful algal blooms (HABs); contaminants and bacteria such as E-Coli; aquatic invasive species; and residential septic systems.

Harmful Algal Blooms (HABs)

Nutrient pollution has diverse and far-reaching effects on the U.S. economy and can impact tourism, property values, commercial fishing, recreational businesses, and many other sectors that depend on clean water. Harmful algal blooms in freshwater generally consist of visible patches of cyanobacteria, also called blue-green algae. Cyanobacteria are naturally present in low numbers in most marine and freshwater systems. However, under certain circumstances, including nutrient availability, warmer water temperatures, and calm winds, cyanobacteria may multiply rapidly and form blooms that are visible on the surface of the affected waterbody. Several types of cyanobacteria can produce toxins and other harmful compounds that can pose a public health risk to people and animals through ingestion, skin contact, or inhalation. Should nutrients and algae accumulate in concentrated areas, nearby recreational uses like beaches could experience negative impacts (USEPA, n.d.).



Photo 3: HABs identified on Lake George in November 2020.
Source: Lake George Association.

Due to its size and popularity, New York State created a HABs Action Plan for Lake George in 2018. The primary goal of the plan is to reduce nutrient loading into the lake. The plan also identifies a suite of priority actions to address water quality concerns in Lake George with the overall goal of decreasing the potential for HABs (New York State Department of Environmental Conservation, 2018). Lake George had not had a confirmed HABs incident until November 7, 2020 when staff from the Lake George Association (LGA) and the

NYSDEC confirmed a HAB in the southern portion of the lake known as Harris Bay, on the northeast side of Assembly Point. While no official source has been identified, it can be assumed that the perfect combination of warm weather, low water movement, and elevated nutrient levels are to blame (The Lake George Association, 2020).

A HABs outbreak produces toxins that pose serious health hazards to people, pets and aquatic life and remediating these health hazards could result in billions of dollars in documented expenses for communities as well as billions more in damage to recreation, property values, tourism, commercial fishing and municipal infrastructure every year. In Lake George, water samples analyzed by the NYSDEC at a state laboratory confirmed the presence of cyanobacteria but indicated that the toxin levels were below the EPA's 10-day drinking water health advisory level (New York State Department of Environmental Conservation, 2020).

Prevention of HABs in a waterbody may be costly, but the cost is far more once a bloom has been established, particularly in a drinking water source like Lake George. It is estimated that the annual costs of HABs to economies, water supplies, and property values is of \$4 billion in the United State alone (Menziez, 2020) and since 2010, New York communities alone have spent nearly \$50,000,000 across eight outbreak locations. In other parts of the country, communities have spent millions mitigating HABs in their drinking water sources. The City of Toledo spent more than \$815 million in 2014 when a HABs outbreak in Lake Erie made the tap water unsafe to drink, and in 2018, an outbreak in a lake near Salem, Oregon led to a do-not-drink warning for the city's tap water and resulted in \$75 million dollars in costs for the city. More locally, recent estimates show that it would cost more than \$1 billion to treat the algae outbreak that occurs in Lake Champlain annually (Schechinger, 2020). In addition to treatment and prevention costs, there are many other costs associated with algae outbreaks that are more difficult to quantify including lower property values and decreased revenue to businesses.

E. Coli

Bacteria, such as E. Coli are common organisms and are a natural component of lakes, rivers, and streams. Most of these bacteria are harmless to humans, however, certain bacteria have the potential to cause sickness and disease.

High E. coli levels in waterbodies can occur for several reasons. Occasionally, large rainstorms will wash animal feces into the water, carrying pathogens with them. Rain can also deliver contamination to our waterways through runoff from developed areas. Sometimes, aging sanitary sewer infrastructure can leak waste into storm sewers that run into the lakes. During the 2017 beach season, there were four swim area closures at the New York State owned Million Dollar Beach, on the southern end of Lake George, due to E. coli levels exceeding New York State Department of Health standards.

The lake and its beaches are valuable to the local economy, providing many benefits including direct and indirect consumer spending. Beach closures can result in significant economic losses to the region because many would-be visitors might forgo a trip if they are unable to visit the beach, therefore removing any additional revenue the region may have received from that visit. While no quantitative data is available at this time to illustrate economic losses due to beach closures during the 2017 season, the Fort William Henry Resort in Lake George Village received numerous calls from concerned guests and experienced room cancellations around the time of the 2017 beach closures (Muncil, 2020).

Aquatic Invasive Species

The proliferation of aquatic invasive species (AIS) in the Adirondacks is a critical threat to water quality, ecosystem health, and the economy. Invasive species are non-native species that are introduced beyond the borders of their historic range, reproduce rapidly, and displace native species. Without the ecological checks and balances found in their native environment, invasive species can have negative economic and ecological impacts, and can be a threat to human health within a waterbody and its watershed.

Lake George's most widely spread aquatic invasive plant is Eurasian watermilfoil (*Myriophyllum spicatum*). It is a submerged plant that grows vertically through the water column until it reaches the surface and then grows laterally, forming a dense mat.



Photo 4: Eurasian watermilfoil in Lake George. Source: Lake George Association.

These dense mats interfere with water recreation such as boating, fishing, and swimming, and interfere with the natural ecology of the waterbody by crowding out valuable native plants. In the two years following the introduction of Eurasian watermilfoil to Lake George, the number of native plant species in the lake significantly decreased (Johnstone, 2014). Eurasian milfoil infestations can also have large negative impacts on shoreline property values, a study in Vermont found a decrease in property values of up to 16% for lakes with very dense beds of the invasive species while a similar study of over 170 lakes in the northern forest Region of Wisconsin found that lakes invaded with milfoil experienced an average 13% decrease in land values after invasion (Zhang, 2010; Madsen, 1991; and Horsch, 2009).

In the United States, the annual cost of maintaining invasive species invasions is approximately \$1 billion (Pimental, Zuniga, and Morrison, 2009). Eurasian watermilfoil, water chestnut and Asian clam AIS populations are all actively managed in Lake George by various groups including the Lake George Park Commission (LGPC) and the LGA. Between the years 1985 and 2012, the management of Eurasian watermilfoil in Lake George cost over \$3 million, and in 2011 and 2012 the cost of managing Asian clams in the lake was around \$1.5 million over two years. Additionally, as of 2014 nearly \$1 million had been spent managing Zebra mussels and the costs of monitoring and managing AIS continues to rise annually (Johnstone, 2014).

The LGPC administers two invasive species programs in Lake George. The first is the Invasive Species Prevention Program which comprises mandatory boat inspections for boats utilizing the lake, with program costs running between \$500,000 and \$600,000 annually. The other, the milfoil control program, costs

between \$300,000 and \$500,000 a year utilizing funds from the LGPC, the LGA, the FUND for Lake George, and grant funding from New York State (Wick, 2020).

In addition to the costs of monitoring and managing AIS, the health, economic, and quality-of-life consequences of invasive species infestations can be enormous and include contamination of water resources, diminished recreational opportunities, and a decrease in shoreline property values all of which can have a serious implication for the local economy. Also, because the eradication of an AIS infestation is highly unlikely once one has been established, management costs for infestations must be regarded as an annual commitment of funds in perpetuity.

Septic Systems

Aging on-site septic systems and outdated technology can have significant impacts on water quality, public health, and the local economy. Approximately 23% of US households have on-site septic systems and the USEPA estimates that there is an average 20% failure rate for on-site systems nationwide. Many homeowners rely on their septic systems for safe and effective treatment of their wastewater before it filters into the soil. Recycled water from a septic system can help replenish groundwater supplies, but if the system is not working properly it can contaminate nearby waterbodies and drinking water wells. Aging and antiquated septic systems are among the main sources of increasing nutrients in waterbodies in the United States (USEPA, 2017; Navitsky, 2018; and FUND for Lake George, 2020).

About 6,000 homes and businesses around Lake George rely on private septic systems and it is estimated that about 4,000 of those are at risk of contaminating the lake because they are old or neglected (FUND for Lake George, 2020). The cost of replacing a failing septic system can range between \$20,000 and \$50,000 depending on the size of the home/business the system is serving and the composition of the ground soils in which it is located. While the monetary costs of replacing a septic system are quantifiable, there are more subtle environmental costs to failing septic systems. Leaky septic systems contribute to nutrient loading into nearby waterbodies, including phosphorus, which contributes to an increased likelihood of nuisance algae and HABs. Additional effects include decreased water clarity, which can contribute to a reduction in recreational use of a waterbody and a decrease in property values around the lake.

Property Values

Property values are inextricably linked to water quality. Higher water quality is associated with increased selling price for both single family and seasonal homes in lake-based economies across the country. Additionally, the public's perception of water quality and water clarity also have a significant bearing on residential property values. A 1992 study found that it is the perception of water quality, often in the form of water clarity, rather than actual water quality that has the most significant impact on property values (Kemp, Zhou, & Wu, n.d.). In the northern Vermont town of Georgia, three dozen homes near a polluted bay each lost \$50,000 in values because of pollution (Voight, Lees, & Erickson, 2015) and an Ohio study showed that property values near Grand Lake St. Mary's fell \$51 million due to algae outbreaks between 2009 and 2015, and property values near Buckeye Lake fell by \$101 million over the same time period (Schechinger, 2020).

In Lake Champlain, researchers found that at the parcel scale, both single family residential and seasonal home purchasers associated higher water quality with increased selling price, and a one-meter increase in water clarity was equated with a nearly 3% average increase in single family home value and a 37% average increase in season home value (Voight, Lees, & Erickson, 2015). Physical proximity to a waterbody also has a significant impact on sale value, single family and seasonal homes within 100 meters of Lake Champlain are expected to sell for approximately 30% and 49% more than similar residences that are located outside this area (Voight, Lees, & Erickson, 2015). This correlation is relevant to the Lake George Region's home values as well where the average assessed value of residential shoreline property is nearly 33% more than property that is not on the lake; \$720,000 per acres as compared to \$22,000 per acre, respectively. In the Towns of Bolton, Lake George, and Queensbury, residential shoreline properties account for 2% to 4% of the town's total land area but represent 23% to 48% of the total residential value (Lake George Association, 2016). In a recent property reassessment in the Town of Bolton, many lake front property owners saw their assessed values increase by as much as 30-40% (Doolittle, 2020).

Tourism

Tourism is a major driver of the economy in the Lake George Region, as evidenced by the Industry Report in **Appendix A**. Tourism generates approximately 19% of employment in the Adirondack Region and provides nearly 36% of all jobs in the region analyzed by the Industry Report (Towns of Queensbury, Lake George, and Bolton, and the Village of Lake George) (Town of Lake George, 2016). While this sector is generally strong in the Lake George Region, it is one that is most vulnerable to minor shifts in water quality and in consumer



Photo 5: Tourists on Beach Road in Lake George Village. Source: lakegeorgesorts.com

perceptions. Nationwide, the tourism industry loses close to \$1 billion each year due to nutrient pollution and harmful algal blooms in nearby waterbodies (USEPA, n.d.).

Warren County and the Lake George Region draw an average eight million visitors a year and economic activity tied directly to Lake George is estimated to be worth around \$2 billion annually (Town of Lake George, 2016). Tourism in the Adirondack Region generates \$1.5 billion annually and supports over 20,000 jobs. Warren County represents 42% of the region's tourism sales, reporting \$629 million in direct tourism spending in 2018. Additionally, in 2018, tourism in Warren County generated \$306 million in labor income and was responsible for 42.3% of the region's tourism tax base. While in 2019, the County generated \$4.8 million in occupancy tax at a rate of 4% (Tourism Economics, 2018). These numbers are reflective of all of Warren County, however it is generally accepted that a large porportion of the tourism revenue generated in the County is tied to the Lake George Region.

The Adirondack Region attracts visitors with both the active and passive opportunities offered by its water resources. For tourists, poor water quality conditions within a lake may lead an alternative destination choice, taking with them all the associated tourism expenditures that are a critical component to a thriving tourism-based regional economy. Water clarity is a priority factor for many visitors when choosing their vacation destination. A study on Lake Champlain found that the water clarity measurements during the peak summer months of July and August had a significant impact on lodging expenditures in the area, resulting in an estimated increase of \$2,303 per average lodging unit per meter of water clarity increase in the lake (Erickson, Lees, & Voight, 2015).



Photo 6: Much of the region's tourism economy centers around water-based activities. Photo Source: NYSDEC.

Much of the visitor experience in Lake George is reliant on water-based resources and activities which include beaches, swimming, boating, among others. There are numerous publicly accessible beaches on Lake George, in Warren County these include Million Dollar State Beach, Shepard's Park Beach, Usher's Park, Roger's Memorial Park Beach, Veteran's Park, and the Hague Town Beach. There are many other municipal beaches and numerous private beaches and beaches associated with lodging and campground facilities around the lake. In addition to beaches, there are six public boat launches, and numerous marinas and other facilities offering motorboat and kayak rentals, jet ski tours, parasailing, and other water-based recreational activities.

Tourism not only generates direct income from visitor spending, but it also generates secondary spending (indirect impacts) in the form of support services and other goods. A regional scale input-output model constructed for six lakeshore counties around Lake Champlain, in New York and Vermont assessed the

economic flows among sectors including employment, income, industry and household characteristics. The results of the model suggest that for each dollar of labor income earned within lake-related tourist sectors, an additional \$0.57 in labor income is generated through indirect industry inputs and induced impacts from additional spending of households. Additionally, for every new job related to the lake tourism economy, an additional 0.4 jobs that support tourism related activities are created. This model also found that in Vermont's four main lakeside counties the estimated \$300 million annual tourist expenditures generates an additional \$72.75 million in spending in the counties and nearly 1,070 jobs. Extrapolating from the town-scale model, a one-meter decrease in water clarity during the months of July and August would lead to a loss of 195 full time equivalent jobs, a \$12.6 million reduction in tourism expenditures and a total economic reduction of nearly \$16.8 million (Voight, Lees, & Erickson, 2015).

Public Health

Benefits to public health are notoriously hard to measure and many cost-benefit analyses exclude important categories such as the negative health effects of surface drinking water source pollution. In addition, health risks to humans from contact with polluted waters and risk of illness and death for animals who drink toxic



Photo 7: Lake George from Black Mountain.

bacteria are typically omitted from these analyses (Frazer, 2018).

Lake George is a primary drinking water supply for both residents and visitors. Approximately 75% of homes get their water directly from the lake or private wells within the watershed (NYSDEC, 2018). Treating drinking water for pollutants at a treatment facility is much more costly than preventing the pollutant from entering the water source in the first place. As mentioned previously in this report, the Cities of Toledo, Ohio and Salem, Oregon were required to spend millions of dollars to mitigate

the impacts of HAB outbreaks on their municipal water supplies. This has serious implications for Lake George where advocates have long been concerned about the potential for a HAB outbreak and the implications one may have on lake's public and private drinking water supplies. The November 2020 confirmation of a HAB in the southern end of the lake makes this threat a reality that must be addressed by municipalities and other groups.

Contaminants in waterbodies not only pose a threat to drinking water, but they may also result in several physical ailments for those recreating in the contaminated waterbody. Waterborne illnesses caused by boating, fishing, wading, swimming, paddling and otherwise recreating in contaminated water also have an economic impact associated with the healthcare cost of treating these ailments. Approximately 90 million waterborne illnesses occur annually in the United States, the majority of which are gastrointestinal and a

fewer number of which include skin, respiratory, eye, and ear symptoms. The estimated costs of these waterborne illnesses are between \$2.2 and \$3.7 billion annually, with 65% of the economic burden made up of illnesses of moderate severity requiring a visit to a health care provider or emergency department (Deflorio-Barker, 2018).

Conclusion

The findings of this report reaffirm the correlation between a healthy lake and a healthy regional economy, showing that even minor reductions in water quality may lead to negative economic consequences for the region. Lake George is a major economic driver for the lower Adirondack Region, an area that is heavily reliant on the tourism industry. The pristine water quality of Lake George is a major attraction for most visitors to the area and, in addition to tourism, has an influence on other sectors of the economy including property values and public health.

Decision makers must always strive to find a balance between economic development and environmental preservation, however in the case of the Lake George Region, they are one in the same. While the economy of the Lake George Region continues to be robust and attractive to visitors from New York State and beyond, the literature reviewed in this report illustrates that the health of the lake is intrinsically tied to the health of the economy, both of which are vitally important to protect. The positive correlation between high water quality and a strong regional economy must be considered by municipal and regional leaders when making decisions and enacting policies which may have an impact on the water quality of Lake George.

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Appendix A – Industry Report

Overall, the tourism economy comprises 23% of all jobs within the Town of Queensbury, 65% of the jobs within the Town of Lake George, 61% of jobs in the Village of Lake George, and 78% of all jobs within the Town of Bolton.

Within the Hotels and Lodging industry subsector, the Town of Bolton has the smallest number of establishments (28) but the highest number of employees (1,328). This is driven by employment at The Sagamore, a large full-service resort located in the town. The Town of Lake George had the highest number of establishments (99) in this sector and the second highest number of employees (970).

Within the Restaurants and Other Food Service Establishments subsector, the Town of Queensbury has both the largest number of establishments (118) and employees (2,038). This is due to its location as a central commerce destination. The Town of Lake George has the second highest number of establishments (62) and employees (769).

The Marina and Recreational Goods Rental Establishments subsector is also led by the Town of Queensbury with 16 establishments and 162 employees. The Town of Queensbury has many boat dealers that often offer boat rentals or storage to tourists. The Town of Bolton has the most of marinas due to its large amount of shoreline on Lake George.

Other Tourism-related Establishments include industries such as Amusement facilities, Sightseeing establishments, Art Dealers, and Museums. The Town of Queensbury offers both the greatest number of establishments (32) and the greatest number of employees (1,521) in this subsector, driven by employment at the Great Escape/Six Flags Amusement Park.

Tourism jobs were identified by a review of several NAICS tourism clusters, particularly from the U.S. Cluster Mapping Project, Institute for Strategy and Competitiveness at Harvard Business School. Additional NAICS codes were added to the analysis based on local applicability.

Data were obtained from Esri Business Online Analysis and was examined within the municipal boundary of each location. ESRI uses proprietary statistical models and data from the U.S. Census Bureau, the U.S. Postal Service, and various other sources to present current conditions and project future trends. For more information, visit www.esri.com.

Please note that these data do not take into account the recent employment impacts of the COVID-19 pandemic.

ASSESSMENT OF THE ECONOMIC VALUE OF CLEAN WATER IN LAKE GEORGE

Summary Table of Tourism Jobs

	Hotels and Lodging Establishments		Restaurants and Other Food Service Establishments		Marinas and Recreational Goods Rental Establishments		Other Tourism-related Establishments	
	Number of Establishments	Number of Employees	Number of Establishments	Number of Employees	Number of Establishments	Number of Employees	Number of Establishments	Number of Employees
Town of Queensbury	30	778	118	2,038	16	162	32	1,521
Town of Lake George	99	970	62	769	9	82	31	527
Village of Lake George	34	398	42	546	4	31	14	73
Town of Bolton	28	1,328	17	299	12	99	18	110
Totals	191	3,474	239	3,652	41	374	95	2,231

Source: Esri

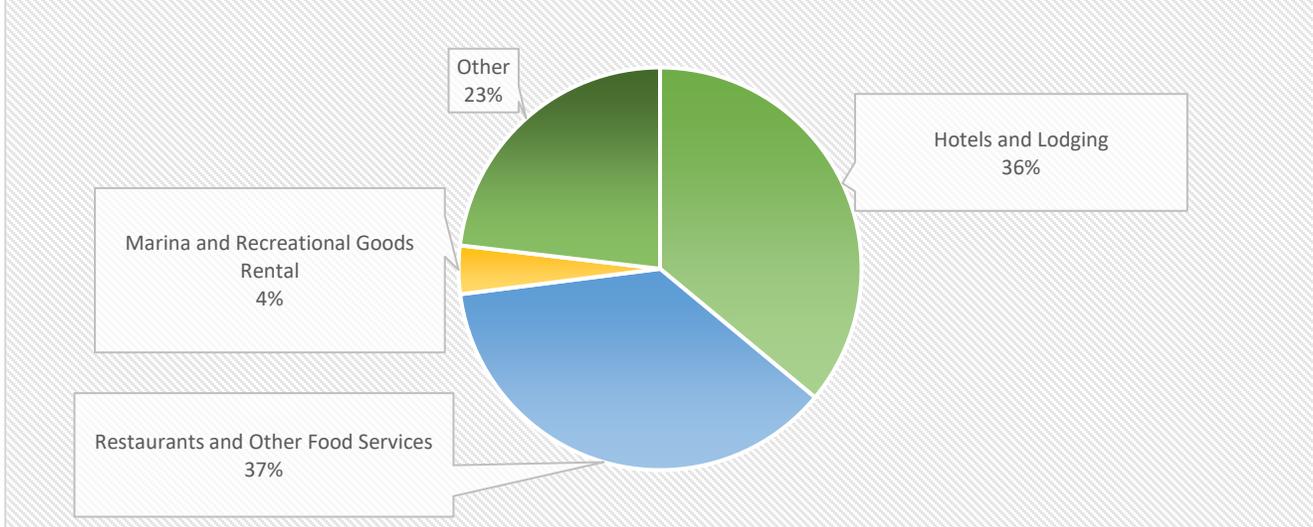
Tourism Jobs as a Percent of All Jobs

	All Tourism-related Establishments & Jobs		All Jobs & Establishments		All Tourism-related Establishments & Jobs	
	Number of Establishments	Number of Employees	Number of Establishments	Number of Employees	Percent of All Establishments	Percent of All Employees
Town of Queensbury	196	4,499	1,458	19,639	13.4%	22.9%
Town of Lake George	201	2,348	441	3,608	45.6%	65.1%
Village of Lake George	94	1,048	216	1,730	43.5%	60.6%
Town of Bolton	75	1,836	196	2,363	38.3%	77.7%

Source: Esri

Percent Employment by Industry

Source: ESRI



ASSESSMENT OF THE ECONOMIC VALUE OF CLEAN WATER IN LAKE GEORGE

Town of Queensbury			
Hotels and Lodging Establishments			
NAICS	Description	Number of Establishments	Number of Employees
721120	Casino Hotels	0	0
721191	Bed-and-Breakfast Inns	1	2
721199	All Other Traveler Accommodation	4	541
721211	RV (Recreational Vehicle) Parks and Campgrounds	3	74
721214	Recreational and Vacation Camps (except Campgrounds)	0	0
721110	Hotels (except Casino Hotels) and Motels	22	161
Total		30	778
Restaurants and Other Food Service Establishments			
NAICS	Description	Number of Establishments	Number of Employees
311811	Retail Bakeries	6	51
312120	Breweries	1	15
312130	Wineries	0	0
312140	Distilleries	0	0
492210	Local Messengers and Local Delivery	0	0
722320	Caterers	5	56
722330	Mobile Food Services	0	0
722410	Drinking Places (Alcoholic Beverages)	0	0
722511	Full-Service Restaurants	63	1,157
722513	Limited-Service Restaurants	26	543
722514	Cafeterias, Grill Buffets, and Buffets	0	0
722515	Snack and Nonalcoholic Beverage Bars	17	216
Total		118	2,038
Marinas and Recreational Goods Rental Establishments			
NAICS	Description	Number of Establishments	Number of Employees
441222	Boat Dealers	12	122
532284	Recreational Goods Rental	0	0
713930	Marinas	4	40
Total		16	162
Other Tourism-related Establishments			
NAICS	Description	Number of Establishments	Number of Employees
114210	Hunting and Trapping	1	1
453220	Gift, Novelty, and Souvenir Stores	5	34
453920	Art Dealers	3	5
485510	Charter Bus Industry	1	24
487110	Scenic and Sightseeing Transportation, Land	0	0
487210	Scenic and Sightseeing Transportation, Water	0	0

ASSESSMENT OF THE ECONOMIC VALUE OF CLEAN WATER IN LAKE GEORGE

487990	Scenic and Sightseeing Transportation, Other	4	22
561510	Travel Agencies	4	18
561520	Tour Operators	3	15
561591	Convention and Visitors Bureaus	0	0
561599	All Other Travel Arrangement and Reservation Services	1	8
711211	Sports Teams and Clubs	0	0
711212	Racetracks	1	20
711219	Other Spectator Sports	0	0
712110	Museums	1	1
712120	Historical Sites	0	0
712130	Zoos and Botanical Gardens	0	0
712190	Nature Parks and Other Similar Institutions	0	0
713110	Amusement and Theme Parks	3	1,200
713120	Amusement Arcades	0	0
713210	Casinos (except Casino Hotels)	0	0
713290	Other Gambling Industries	0	0
713920	Skiing Facilities	0	0
713990	All Other Amusement and Recreation Industries	5	173
Total		32	1,521
All Tourism-related Establishments & Jobs		196	4,499
All Jobs & Establishments		1,458	19,639

Source: Esri

ASSESSMENT OF THE ECONOMIC VALUE OF CLEAN WATER IN LAKE GEORGE

Town of Lake George			
Hotels and Lodging Establishments			
NAICS	Description	Number of Establishments	Number of Employees
721120	Casino Hotels	0	0
721191	Bed-and-Breakfast Inns	1	10
721199	All Other Traveler Accommodation	27	471
721211	RV (Recreational Vehicle) Parks and Campgrounds	4	24
721214	Recreational and Vacation Camps (except Campgrounds)	0	0
721110	Hotels (except Casino Hotels) and Motels	67	465
Total		99	970
Restaurants and Other Food Service Establishments			
NAICS	Description	Number of Establishments	Number of Employees
311811	Retail Bakeries	1	2
312120	Breweries	1	2
312130	Wineries	1	3
312140	Distilleries	0	0
492210	Local Messengers and Local Delivery	0	0
722320	Caterers	1	60
722330	Mobile Food Services	0	0
722410	Drinking Places (Alcoholic Beverages)	3	18
722511	Full-Service Restaurants	50	635
722513	Limited-Service Restaurants	0	0
722514	Cafeterias, Grill Buffets, and Buffets	0	0
722515	Snack and Nonalcoholic Beverage Bars	5	49
Total		62	769
Marinas and Recreational Goods Rental Establishments			
NAICS	Description	Number of Establishments	Number of Employees
441222	Boat Dealers	5	54
532284	Recreational Goods Rental	1	7
713930	Marinas	3	21
Total		9	82
Other Tourism-related Establishments			
NAICS	Description	Number of Establishments	Number of Employees
114210	Hunting and Trapping	0	0
453220	Gift, Novelty, and Souvenir Stores	8	63
453920	Art Dealers	0	0
485510	Charter Bus Industry	0	0
487110	Scenic and Sightseeing Transportation, Land	0	0
487210	Scenic and Sightseeing Transportation, Water	3	309

ASSESSMENT OF THE ECONOMIC VALUE OF CLEAN WATER IN LAKE GEORGE

487990	Scenic and Sightseeing Transportation, Other	0	0
561510	Travel Agencies	0	0
561520	Tour Operators	3	9
561591	Convention and Visitors Bureaus	0	0
561599	All Other Travel Arrangement and Reservation Services	0	0
711211	Sports Teams and Clubs	0	0
711212	Racetracks	0	0
711219	Other Spectator Sports	0	0
712110	Museums	4	14
712120	Historical Sites	0	0
712130	Zoos and Botanical Gardens	0	0
712190	Nature Parks and Other Similar Institutions	5	36
713110	Amusement and Theme Parks	0	0
713120	Amusement Arcades	2	30
713210	Casinos (except Casino Hotels)	0	0
713290	Other Gambling Industries	0	0
713920	Skiing Facilities	0	0
713990	All Other Amusement and Recreation Industries	6	66
Total		31	527
All Tourism-related Establishments & Jobs		201	2,348
All Jobs & Establishments		441	3,608

Source: Esri

ASSESSMENT OF THE ECONOMIC VALUE OF CLEAN WATER IN LAKE GEORGE

Village of Lake George			
Hotels and Lodging Establishments			
NAICS	Description	Number of Establishments	Number of Employees
721120	Casino Hotels	0	0
721191	Bed-and-Breakfast Inns	0	0
721199	All Other Traveler Accommodation	5	198
721211	RV (Recreational Vehicle) Parks and Campgrounds	0	0
721214	Recreational and Vacation Camps (except Campgrounds)	0	0
721110	Hotels (except Casino Hotels) and Motels	29	200
Total		34	398
Restaurants and Other Food Service Establishments			
NAICS	Description	Number of Establishments	Number of Employees
311811	Retail Bakeries	1	2
312120	Breweries	1	2
312130	Wineries	1	3
312140	Distilleries	0	0
492210	Local Messengers and Local Delivery	0	0
722320	Caterers	1	30
722330	Mobile Food Services	0	0
722410	Drinking Places (Alcoholic Beverages)	3	18
722511	Full-Service Restaurants	32	452
722513	Limited-Service Restaurants	0	0
722514	Cafeterias, Grill Buffets, and Buffets	0	0
722515	Snack and Nonalcoholic Beverage Bars	3	39
Total		42	546
Marinas and Recreational Goods Rental Establishments			
NAICS	Description	Number of Establishments	Number of Employees
441222	Boat Dealers	3	22
532284	Recreational Goods Rental	0	0
713930	Marinas	1	9
Total		4	31
Other Tourism-related Establishments			
NAICS	Description	Number of Establishments	Number of Employees
114210	Hunting and Trapping	0	0
453220	Gift, Novelty, and Souvenir Stores	1	4
453920	Art Dealers	0	0
485510	Charter Bus Industry	0	0
487110	Scenic and Sightseeing Transportation, Land	0	0
487210	Scenic and Sightseeing Transportation, Water	2	9

ASSESSMENT OF THE ECONOMIC VALUE OF CLEAN WATER IN LAKE GEORGE

487990	Scenic and Sightseeing Transportation, Other	0	0
561510	Travel Agencies	0	0
561520	Tour Operators	3	9
561591	Convention and Visitors Bureaus	0	0
561599	All Other Travel Arrangement and Reservation Services	0	0
711211	Sports Teams and Clubs	0	0
711212	Racetracks	0	0
711219	Other Spectator Sports	0	0
712110	Museums	4	14
712120	Historical Sites	0	0
712130	Zoos and Botanical Gardens	0	0
712190	Nature Parks and Other Similar Institutions	2	15
713110	Amusement and Theme Parks	0	0
713120	Amusement Arcades	1	15
713210	Casinos (except Casino Hotels)	0	0
713290	Other Gambling Industries	0	0
713920	Skiing Facilities	0	0
713990	All Other Amusement and Recreation Industries	1	7
Total		14	73
All Tourism-related Establishments & Jobs		94	1,048
All Jobs & Establishments		216	1,730

Source: Esri

ASSESSMENT OF THE ECONOMIC VALUE OF CLEAN WATER IN LAKE GEORGE

Town of Bolton			
Hotels and Lodging Establishments			
NAICS	Description	Number of Establishments	Number of Employees
721120	Casino Hotels	0	0
721191	Bed-and-Breakfast Inns	1	2
721199	All Other Traveler Accommodation	12	1,061
721211	RV (Recreational Vehicle) Parks and Campgrounds	0	0
721214	Recreational and Vacation Camps (except Campgrounds)	5	199
721110	Hotels (except Casino Hotels) and Motels	10	66
Total		28	1,328
Restaurants and Other Food Service Establishments			
NAICS	Description	Number of Establishments	Number of Employees
311811	Retail Bakeries	0	0
312120	Breweries	1	15
312130	Wineries	0	0
312140	Distilleries	0	0
492210	Local Messengers and Local Delivery	0	0
722320	Caterers	0	0
722330	Mobile Food Services	0	0
722410	Drinking Places (Alcoholic Beverages)	0	0
722511	Full-Service Restaurants	13	252
722513	Limited-Service Restaurants	0	0
722514	Cafeterias, Grill Buffets, and Buffets	0	0
722515	Snack and Nonalcoholic Beverage Bars	3	32
Total		17	299
Marinas and Recreational Goods Rental Establishments			
NAICS	Description	Number of Establishments	Number of Employees
441222	Boat Dealers	2	7
532284	Recreational Goods Rental	0	0
713930	Marinas	10	92
Total		12	99
Other Tourism-related Establishments			
NAICS	Description	Number of Establishments	Number of Employees
114210	Hunting and Trapping	0	0
453220	Gift, Novelty, and Souvenir Stores	3	27
453920	Art Dealers	0	0
485510	Charter Bus Industry	0	0
487110	Scenic and Sightseeing Transportation, Land	0	0
487210	Scenic and Sightseeing Transportation, Water	6	42

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487990	Scenic and Sightseeing Transportation, Other	0	0
561510	Travel Agencies	0	0
561520	Tour Operators	2	6
561591	Convention and Visitors Bureaus	0	0
561599	All Other Travel Arrangement and Reservation Services	0	0
711211	Sports Teams and Clubs	0	0
711212	Racetracks	0	0
711219	Other Spectator Sports	0	0
712110	Museums	4	17
712120	Historical Sites	0	0
712130	Zoos and Botanical Gardens	0	0
712190	Nature Parks and Other Similar Institutions	2	13
713110	Amusement and Theme Parks	0	0
713120	Amusement Arcades	0	0
713210	Casinos (except Casino Hotels)	0	0
713290	Other Gambling Industries	0	0
713920	Skiing Facilities	1	5
713990	All Other Amusement and Recreation Industries	0	0
Total		18	110
All Tourism-related Establishments & Jobs		75	1,836
All Jobs & Establishments		196	2,363

Source: Esri