CHAPTER 2: ONEIDA LAKE AND ITS WATERSHED

Madison County Farm (Photo: Saltman)

Environmental Setting

The information in this chapter was taken from the 2003 document titled, *The Oneida Lake State of the Lake and Watershed Report* (SOLWR). For additional information about these topics please refer to the SOLWR, which is available at municipal offices, public libraries, and agencies throughout the watershed. It can also be found on the Internet at www.cnyrpdb.org/oneidalake.

Limnology and Ecology

Oneida Lake has undergone significant ecological changes over the last four decades. The most notable changes have been associated with the collapse of the mayfly *Hexagenia limbata*, reductions in phosphorus concentrations, invasion by zebra mussels, declines in the walleye (*Stizostedion vitreum vitreum*) and yellow perch (*Perca flavescens*) sport fisheries, expansion of a population of double-crested cormorants, and the recent establishment of the water chestnut. The response to these ecological events has been the following: improved water quality conditions, increased water clarity, increased aquatic macrophytes at greater depths, increases in bottom dwelling macroinvertebrates, the extinction of three species of unionid bivalve clams, high mortality of walleye and yellow perch in their mid-life stages, and significant predation impacts by double-crested cormorants on the Oneida Lake fishery. As we move into the future, much of the uncertainty of the state of Oneida Lake rests in unwanted "pest organisms," and their impact on the food chain. Proper management practices in Oneida Lake and its watershed must remain a high priority to maintain a healthy ecosystem and high water quality. Ecological surprises in Oneida Lake's future are expected as climate warming and the introduction of new exotic species create increasing demands on water resources.

The Oswego River Basin

The Oneida Lake watershed is part of the Oswego River Basin, a diverse system made up of many hydrologic components that flow together. Water flows from upland streams down to Oneida Lake and the Finger Lakes, then to low-gradient rivers and the New York State Canal System, and eventually to Lake Ontario.

The Oswego River Basin drains an area of approximately 5,100 square miles and encompasses three physiographic regions: the Appalachian Uplands, the Tug Hill Uplands, and the Lake Ontario Plain. The Clyde/Seneca River-Oneida Lake trough is an "unofficial" geographic designation for the belt of lowlands that runs through the basin from west to east. The trough is key to understanding the Oswego River Basin flow system in its natural and human altered state. The New York State Barge Canal was constructed in this area due to its exceptionally low gradient. As it is very difficult to move large volumes of water through this low gradient, the area posses a challenge to water resources management.

The additive contribution of each stream and lake to the Canal results in a bottleneck at the Three Rivers Junction -- the confluence of the Seneca, Oneida, and Oswego Rivers. At this junction, 96 percent of the land area in the Oswego River Basin is represented. This is also the flattest, slowest moving stretch within the Oswego Basin. At times, the water discharged to the trough exceeds the channel capacity, resulting in flooding within Seneca, Cayuga, and Oneida Lakes, and along the Seneca and Oneida Rivers. Once the water reaches the Oswego River, downstream of Fulton, the gradient increases and the water has the potential to move more readily toward Lake Ontario.

Oneida Lake (Photo: Saltman)

The Oneida Lake Watershed

Oneida Lake, the largest waterbody entirely within New York State, is located approximately 11 miles northeast of Syracuse. It is 20.9 miles long and 5.5 miles at its widest point. The average depth is 22.3 feet. Many seasonal and permanent homes are located along the 54.7 miles of shoreline. The Oneida Lake watershed (all of the land that drains to the lake) comprises the eastern most part of the Oswego River Basin and contains 872,722 acres (approximately 1,364 square miles) of land draining parts of Lewis, Madison, Oneida, Onondaga, Oswego, and Cortland Counties. The watershed contains portions of 69 municipalities and has a population of 262,164 based on the 2000 U.S. Census.

The Oneida Lake watershed encompasses parts of the Appalachian Uplands, Tug Hill Uplands, and Lake Ontario Plain regions. The New York State Canal System traverses the Lake Plain Region as it flows east to west through the Oneida Lake watershed. The watershed has seven primary subwatersheds: Chittenango Creek subwatershed, Cowaselon Creek subwatershed, Fish Creek subwatershed, Limestone/Butternut Creek subwatershed, Oneida Creek subwatershed, Oneida Lake North Shore subwatershed, and Wood Creek subwatershed. Water exits the watershed through the western end of Oneida Lake via the Oneida River where it eventually makes its way to Lake Ontario.

Bedrock Geology

The Oneida Lake watershed is underlain by bedrock with significant variation in its resistance to erosion. It ranges in age from Middle Ordovician (beginning approximately 460 million years ago) to Upper Devonian (beginning approximately 365 million years ago) geologic periods. The bedrock is youngest in the southern part of the watershed and grows older with distance northward. The bedrock pattern is very important because it affects the nature of landforms, groundwater, soils, and land use. The watershed contains several geologically significant landforms, including beach ridges, alluvial plains, gorges, waterfalls, and unique mineral deposits.

Areas in the southern portion of the Oneida Lake watershed, including a large portion of the Cowaselon Creek subwatershed and along the deep valleys of the Appalachian Uplands, are composed of geologic units that have a significant impact on water chemistry. These highly erodible units (Vernon Shale, Syracuse Salt, Camillus Shale, and Bertie Limestone) contribute large amounts of dissolved minerals to surface waters draining the southern watershed region. In contrast, the northern half of the watershed largely contains erosion resistant bedrock that generally does not influence water quality.

Soils

The Appalachian Uplands are characterized by highly productive limestone soils formed in glacial till. Soil management efforts in the southern portion of the watershed are mainly restricted to improving natural drainage and controlling farmland erosion. Streams that flow into Oneida Lake from the south flow over Onondaga limestone through productive agricultural lands and concentrated population centers, and therefore tend to be nutrient-rich.

Soils in the Lake Plain region are typically flat, deep, have high lime content, and were formed in glacial till. Organic soils formed in glacial outwash, commonly referred to as "muck" soils, are found in this region, especially near the Village of Canastota. Soil management in the lowlands of the Lake Plain is generally restricted to improving natural drainage.

Soils in the Tug Hill region tend to be wet, stony, shallow, sandy or steeply sloping. The soils in the region are poorly drained and the soil fertility decreases in the upland areas. These soils are generally unfit for agriculture and are dominated by forests. Streams that flow into Oneida Lake from the northern uplands flow over erosion resistant sandstone and are characteristically nutrient poor.

Forests

The forest community in the Oneida Lake watershed reflects human activity as well as natural history. Land management practices, the introduction of non-native species, disease, and insect infestations have defined the current forest community that exists as private and public holdings. Regardless of ownership, forested lands improve the quality of life in the watershed by generating valuable renewable resources, improving water quality, providing opportunities for outdoor recreation, and providing a variety of wildlife habitats.

The once heavily forested southern areas of the watershed previously served as a source of fuel and construction materials for early settlers. Large tracks of forested land were eventually cleared for agricultural use in Onondaga and Madison counties but were later abandoned due to marginal productivity. These areas have naturally reverted back to forest land. In 1929, New York State initiated soil conservation and reforestation efforts on abandoned farmland and much of the land was replanted with coniferous species.

The area of heaviest tree cover is located in the northern half of the watershed where nearly two-thirds of the land is forested. Tug Hill's forests are an important resource of the timber industry and are a valuable component of the New York State economy. Approximately 88 percent of the Tug Hill region forests are privately owned. As more parcels of forestland are being managed privately, the ability to monitor the land becomes more difficult and thus increases the potential of impacting water quality. However, an agreement for the sale of 45,000 acres of property in the East Branch of Fish Creek subwatershed was negotiated in 2002 between Hancock Timber Resource Group and The Nature Conservancy. Some of the land will be under a conservation easement, part will be managed as state forestland, and the remainder will be kept in timber management and will be available for a mix of private leased hunting and public access.

Climate

The Oneida Lake watershed has a continental climate characterized by warm, dry summers and cold, snowy winters. Major climatic influences include topography, prevailing westerly wind direction, and proximity to Lake Ontario. In most years, the rate and distribution of precipitation in the watershed are sufficient for agriculture and domestic water supplies. Because the watershed is located in the Eastern Lake Ontario snowbelt, it is subject to significant lake effect snow events. Historical climatic records of precipitation and air temperatures for the northeastern United States show a generally calm and cyclic seasonal weather pattern. Between 1890 and 1960, relatively few extreme departures from the norm were recorded. More recently, however, regional weather patterns have displayed frequent extremes, including droughts, floods, and periods of very cold or very warm temperatures. Such extreme conditions add to the difficulty of maintaining ideal hydrologic conditions in the watershed.

Water from Cazenovia Lake flows into Oneida Lake (Photo: Saltman)

Surface Water

The Oneida Lake watershed has an extensive surface water network. Approximately 56 percent of the precipitation that falls in the watershed reaches the lake through surface inflow. The rest is lost through evaporation, absorption by trees and plants, and groundwater recharge. The Tug Hill region in the northern portion of the watershed contributes approximately 67 percent of total surface inflows, in part, as a result of the large volume of snowfall. Water that is stored in the snowpack slowly recharges wetlands and streams throughout the winter months.

Although surface inflow from the northern watershed region represents most of the total water volume entering the lake, the majority of the nutrients entering the lake are introduced from tributaries that flow through the nutrient rich farmlands and wetlands of the southern watershed. The significant volume of surface inflow from the northern watershed helps to dilute nutrient levels in the lake. Water flows out of Oneida Lake into the Oneida River, which is located at the western edge of the lake. Annual discharge to Lake Ontario from the Oneida River is estimated at 2.13 billion cubic meters per year.

In addition to the streams, there are also numerous small lakes and ponds scattered throughout the Oneida Lake watershed. Many are concentrated in the northern watershed, especially the Tug Hill Uplands. Some of the watershed's larger lakes (Cazenovia, DeRuyter, and Tuscarora) are located in the southern half of the watershed in the Appalachian Upland region.

Groundwater

Appropriate geologic settings combined with a suitable climate result in the Oneida Lake watershed having a wealth of groundwater resources throughout much of its watershed. An extensive system of aquifers was created when thick layers of unconsolidated deposits were laid down by glaciers during their retreat, approximately 10,000 years ago. These deposits overtop underlying bedrock aquifers of sedimentary rock formed millions of years earlier. Precipitation is the ultimate source of the groundwater recharging these aquifers. The Oneida Lake watershed receives an average of 35 inches of precipitation each year, with considerably higher amounts originating in the northern watershed and Tug Hill Uplands as lake-effect snowfall. These groundwaters are not static reservoirs. Rather, a growing body of evidence indicates that significant quantities of groundwater flow centrally from the northern and southern watersheds and discharge along the shallow shorelines of Oneida Lake. Despite the overall abundance of groundwater, dry wells and limitations on groundwater availability are arising more frequently. This is due to spatial variability in aquifer yield, seasonal and interannual fluctuations in precipitation recharge, and complications associated with

Catching crayfish in Chittenango Creek (Photo: Saltman)

land use, overwithdrawal, and groundwater contamination as development pressures increase, particularly in the southern portion of the watershed.

Flora and Fauna

Geology, topography, soil, climate, and land use patterns influence the distribution of flora and fauna. From uplands to lowlands, the Oneida Lake watershed provides diverse habitats that sustain a healthy and productive assemblage of plant and animal species. Changes in land use patterns have the potential to threaten the health, well being, and in some cases, the survival of several plant and animal wildlife species. Despite these changes, the Oneida Lake watershed is home to a number of rare, threatened, and endangered plants and animals of state, national, and global significance. For example, the Chittenango ovate amber snail, Bog Turtle, and Hart's-Tongue fern, all species on the United States Threatened Species List, are found in the Oneida Lake watershed. The Indiana bat, also found in the watershed, is a federally listed endangered species.

Wetlands

Wetlands are found throughout the Oneida Lake watershed but are especially concentrated in the Lake Plain region, an area characterized by a high water table and flooding. Wetland types found in the Oneida Lake watershed vary from forested, seasonally flooded swamps to open marshes of grasses, sedges, and other low growing species. Wetlands provide excellent habitat for migratory waterfowl and serve as wintering yards for many animal species that utilize the low growing vegetation for cover and a year-round food source. Wetlands also act as sedimentation areas and filtering basins to remove impurities, thereby enhancing water quality. By slowing runoff and temporarily storing excess surface water, wetlands protect downstream areas from flooding. Under certain hydrological conditions, wetlands can recharge groundwater and augment surface water flow. Wetlands adjacent to waterbodies also provide spawning and nursery grounds, supply food, and lend protection to fish and other aquatic species. As an added benefit, wetlands provide excellent recreational, aesthetic, and educational opportunities.

A significant threat to the wetlands of the Oneida Lake watershed is commercial and residential development. The impacts from urbanization have degraded wetlands near the lake as well as in upland areas. Reduced wetland acreage has decreased the potential for runoff retention of urban and agricultural pollutants, and has reduced water storage capacity during periods of excessive precipitation. Stormwater problems in the watershed are also more prevalent due to the conversion of wetlands to urban and agricultural land. Wetland losses reduce the ability of the watershed to store water and consequently increase the region's susceptibility to high water damage. Another threat to wetlands in the Oneida Lake watershed is a non-native plant called purple loosestrife. This plant thrives in marshes and ditches, out-competes indigenous flora, and makes wetlands less suitable for wildlife habitat.

Fisheries of the Oneida Lake Tributary System

Streams, lakes, and ponds throughout the Oneida Lake watershed provide habitat for warmwater and coldwater fish species. Several warmwater stream segments found in the lower sections of Oneida, Fish, Chittenango, Limestone, Butternut, Cowaselon, and Canaseraga Creeks provide seasonal walleye, perch, and bass fisheries. Warmwater fish species inhabit the Barge Canal at Sylvan Beach year-round. Numerous ponds and medium sized lakes (up to 1,280 acres) in the Oneida Lake watershed also support warmwater fisheries. Thirty-one ponds and lakes over ten acres in size, totaling 4,848 acres, provide fishing for warmwater species, primarily largemouth bass, chain pickerel, yellow perch, and panfish. Although warmwater species are stocked in the Oneida Lake watershed, the majority of these waterbodies are supported by natural reproduction.

Coldwater fisheries are also present throughout the Oneida Lake watershed. Trout require cool, clean water to survive and are often the first species to disappear from polluted waters; therefore the presence of trout in the watershed is highly regarded. Brown trout streams dominate Oneida Lake tributaries. The headwaters of the tributaries generally contain brook trout, especially in the Fish Creek section of the Tug Hill region in Lewis and Oneida Counties. There are 850 miles of trout streams in the Oneida Lake watershed, including 141 miles of stocked streams. Water quality is generally high and virtually all trout streams support natural reproduction. Many streams provide high quality fishing for brown trout.

According to the 1996 Statewide Angler Survey, Fish Creek and Chittenango Creek, two of the larger tributaries in the Oneida Lake watershed, are very popular trout streams, ranking 66th and 80th of all waters in New York in terms of angler use. New York State has acquired extensive Public Fishing Rights (permanent easements for access for fishing) along the larger trout streams in the watershed. A total of 70.5 miles of easements have been acquired in the watershed, primarily in the Fish Creek and Chittenango Creek subwatersheds.

Monitoring Programs

Several water quality monitoring programs have been implemented in Oneida Lake and its tributaries over the past decade. Extensive research on the water quality and biological characteristics in the Lake basin continues to be spearheaded by the staff at the Cornell Biological Field Station. Regional tributary water quality monitoring and biological monitoring programs throughout the watershed have been implemented by groups such as the NYS DEC (the Rotating Intensive Basin Studies), Project Watershed CNY, and the CNY RPDB.

Counties throughout the Oneida Lake watershed have conducted additional tributary water quality monitoring and stream erosion surveying programs. The United States Geological Survey (USGS) collects hydrologic measurements within the Oneida Lake watershed and at the Oneida River to measure outflow from the lake.

Priority Waterbodies List

The Priority Waterbodies List (PWL), last updated in 1996 for the Oswego-Seneca-Oneida Rivers Drainage Basin, includes surface waters that cannot be fully used as a resource and/or have problems that can damage their environmental integrity. There are 23 segments with known or suspected problems listed on the PWL for the Oneida Lake watershed.

Economic Profile

Spanning portions of six counties, the Oneida Lake watershed is a demographically diverse ecosystem that offers a variety of recreational and economic opportunities. Extending from the Tug Hill region in the north to the DeRuyter Reservoir in the south, and from the City of Syracuse in the west to the City of Rome in the east, the geographic diversity of the watershed is reflected in everything from population trends to local economic influences. The region boasts of a well-developed and extensive infrastructure, abundant wildlife, strong aesthetic appeal, and a wide range of tourism and recreational opportunities. Collectively, these features form the basis of a healthy, regional economy.

Population

Portions of six counties and 69 municipalities are located within the Oneida Lake watershed. According to the U.S. Census Bureau's 2000 statistics approximately 262,164 people live in the watershed (Table 1). The City of Rome in Oneida County and the City of Syracuse in

Onondaga County are significant population centers. Onondaga County, located in the southwestern portion of the watershed, is the most densely populated (698.2 persons per square mile of land area). A significant contributor to Onondaga County's population density is the City of Syracuse. At 5,834 persons per square mile, Syracuse is the single most densely populated municipality in the watershed. In direct contrast, Lewis County, located in the northern portion of the watershed, is the least densely populated county (11.7 persons per square mile). The Lewis County Town of Montague, with a population density of less than 2 persons per square mile, is the least densely populated municipality in the watershed.

Table 1: Estimated Oneida Lake Watershed Population

County	*Population*
Cortland	74
Lewis	996
Madison	50,607
Oneida	59,557
Onondaga	110,078
Oswego	40,852
Watershed Total	262,164

Population was computed by HOCCPP from 2000 block-level Census data.

Watershed Infrastructure

The Oneida Lake watershed infrastructure supports economic growth and development throughout the area. Affordable and abundant housing and an advanced transportation network of highways, railways, air transportation facilities, and the New York State Canal System make this region easily accessible and economically attractive. According to the 2000 U.S. Census of Population and Housing, there are 189,662 housing units located in the municipalities of the Oneida Lake watershed. In 1990, the last year for which this type of Census data is available, 81.2 percent of the housing units in watershed municipalities obtained their water from a public system or private company, the remaining relied on individual wells or other water source. For wastewater disposal, the vast majority of housing units (72.2 percent) in the municipalities that comprise the Oneida Lake watershed use public sewers. All of the remaining housing units rely on septic tanks or other on-site wastewater disposal systems.

Tourism, Recreational Opportunities and Economic Impacts

A variety of tourism and recreational opportunities are available in the Oneida Lake watershed.

Bridge over Chittenango Creek (Photo: Saltman)

Regional attractions, annual events, extensive park and recreational facilities, excellent boating and fishing access, and other tourism opportunities greatly enhance the watershed's value. The numerous municipal, county, and state parks and other recreational facilities located throughout the watershed offer a wide range of activities such as swimming, hiking, bird watching, fall foliage viewing, golfing, cross-country skiing, snowshoeing, snowmobiling, hunting, fishing, trapping, and camping. The NYS DEC operates the Oneida Lake Fish Cultural Station in Constantia. The station is the largest state-of-the-art walleye hatchery in the country. There are also two public piers on the lake, located in Sylvan Beach and Brewerton, and 12 state-run public fishing access sites throughout the watershed.

Throughout history, fishing and boating has played a major role in the social and economic development of the region, and today, is one of the main recreational uses of Oneida Lake. Over 75 fish species were identified in the lake in the 20th century. The lake's fishery is a major contributor to the region's tourism industry. Oneida Lake has been identified as the most important inland fishery and the fourth most important sport fishery in New York State. According to the *NY Statewide Angler Survey*, the 1996 net economic value of Oneida Lake's freshwater fishery was estimated to be over $9.4 million, ranking it first among New York State's inland waters. Millions of people from all over New York State and beyond annually spend millions of dollars throughout the watershed as they recreate on Oneida Lake, its tributaries, and other smaller lakes in the watershed. For this reason, the integrity of the lake and watershed has a direct impact on the economic livelihood of local municipalities.

In the Tug Hill region, fishing and hunting are enjoyed by many local homeowners and out of town visitors, and many industrial landowners sell fishing and hunting leases to clubs to provide sportsmen access to forestland. The money raised by these leases helps offset tax assessments against the property, making it easier for businesses to maintain ownership of large tracts in the northern part of the watershed. During the winter, approximately 10-15 thousand snowmobiles each weekend use the trails on Tug Hill according to the Lewis County Chamber of Commerce. A 1990 study found that snowmobiling generates $8 million each season in the Tug Hill region. Throughout the watershed, tourism benefits extend to surrounding businesses as visitors take advantage of the region's lodging, restaurants, shops, and other facilities.

Human Influences

Land Use

The Oneida Lake watershed covers 872,722 acres (about 1,363 square miles) of land area in Lewis, Madison, Oneida, Onondaga, Oswego, and Cortland counties (Figure 3). Approximately 15,000 acres (23 square miles) of land in the watershed within Madison and Oneida counties is owned by the Oneida Indian Nation and is primarily used for commercial and residential purposes as well as open space.

According to 2002 data from the NYS Office of Real Property Services, there are approximately 120,225 parcels (a plot or tract of land) in the watershed that vary greatly in size. The more populated cities and villages typically have a greater number of parcels that are smaller in size, while parcels in the more rural areas of the watershed tend to be much larger in size and consequently fewer in number.

Agricultural activity is concentrated in the southern portion of the watershed, especially Madison County and the southern portions of Oneida and Onondaga counties. Commercial and industrial activities and residential land uses are primarily centered in and around the cities and villages. There is a predominance of wild, forested, conservation lands, public parks, public and community service, and recreation and entertainment property in the Tug Hill Upland region (Lewis County and northern Oneida and Oswego counties), though isolated occurrences of this property can also be found throughout the watershed. Figure 4 shows the breakdown of land use for the watershed.

Agricultural Land Use

Much of the Oneida Lake watershed is characterized by productive soils, favorable climate, and good market outlets for agricultural products. Over 300 commercial, full-time farms currently operate almost one-third of the land within the watershed (Table 2). No operating farms are currently known to exist in the watershed portion of Cortland and Lewis counties. The majority of the farms are dairies located within Madison, Oneida, and Onondaga counties. These dairies have an average herd size of 159 cows and grow a crop rotation of corn and hay used for livestock feed. Non-dairy operations within the watershed include a thriving vegetable trade as well as burgeoning sheep, beef, and equine industries.

According to data from the NYS Office of Real Property Services, approximately 29 percent of the total land area in the Oneida Lake watershed is classified as agricultural and is primarily located in Madison, Oneida, and Onondaga counties (Table 3). Agriculture's economic impact in the Oneida Lake watershed is at least $126 million (data is not yet available for all

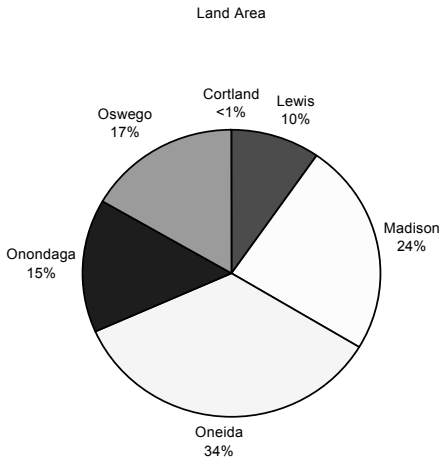

Figure 3: Oneida Lake Watershed Land Area by County

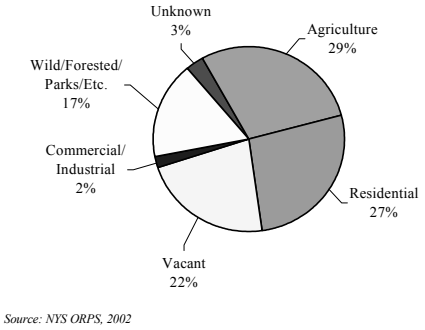

Figure 4: Oneida Lake Watershed Land Use

farms in the watershed). According to county-level statistics in Madison, Oneida, and Onondaga, where the watershed's farms are concentrated, agriculture has a combined economic impact of over $500 million annually and employs a workforce of over 5,000 people.

Agriculture's diversity and prosperity within the southern portion of the Oneida Lake watershed is due in large part to a favorable mix of physiographic and climatic conditions. While these conditions can be assets to a farm, they can also present farm management challenges. Soils on steep slopes on the Appalachian Uplands are subject to erosion. Heavy rainfall and snowmelt contribute to runoff from barnyards and cropland where manure is spread. High precipitation in the watershed coincides with a high rate of nutrient leaching, whereby they can be washed downward through the soil profile, below the roots of plants. Erosion, runoff, and leaching from farms are collectively known as agricultural non-point sources of pollution. Natural resource management challenges are one of many issues faced by the modern farmer. Nationally and locally within the Oneida Lake watershed, farmers are plagued by low profitability, high taxes, high costs of land and machinery, biosecurity, unstable prices, and suburban sprawl.

Watershed farmers voluntarily participate in a variety of available programs to alleviate agricultural non-point source pollution. Many farmers are participating in the Oneida Lake Watershed Agricultural Program where the NYS Agricultural Environmental Management (AEM) Program is being utilized. AEM is New York State's official tool to address agricultural non-point source pollution and is a key component of whole farm planning. Participants in the Oneida Lake Watershed Agricultural Program have improved their opportunities to receive state, regional and national funding to implement conservation management practices on their farms. This is due to the regional cooperation within the Agricultural Program and the statewide success of AEM.

Table 2: Farms in the Oneida Lake Watershed

County	*Farms (#)*
Cortland	0
Lewis	0
Madison	169
Oneida	93
Onondaga	43
Oswego	11
Total	316

Table 3: Percent Agricultural Land Use in the Oneida Lake Watershed

County	*Agriculture*
Lewis	4%
Madison	44%
Oneida	26%
Onondaga	23%
Oswego	5%

Source: Prepared by Herkimer - Oneida Counties Comprehensive Planning Program with data from the NYS Office of Real Property Services. Note: Percentages are based on the number of acres classified as agricultural.

Water Supply Systems

Residents of the Oneida Lake watershed receive drinking water from either municipal or private surface water or groundwater supplies from within as well as outside of the watershed. In addition to providing water to communities within the watershed, Oneida Lake tributaries are also used to provide water for communities beyond the watershed boundary. Under ordinary conditions, these supplies are ample for agriculture, industrial, and domestic use. However on occasion, such as the summer of 1999, drought conditions reduce surface water and groundwater supplies to the region.

The availability of a clean and dependable water supply is essential for human health and the economic survival of the Oneida Lake region. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and can pick up pollutants resulting from the presence of animals or from human activity. These contaminants can result in waterborne diseases that afflict humans as well as the ecosystem. Fortunately, water hardness and the presence of salt in the deeper bedrock wells are the primary naturally occurring water quality nuisances facing users in the watershed. Naturally occurring sulfur is also a common nuisance found in wells throughout the Oneida Lake watershed.

Contaminants such as E. coli and nitrates, and disease-causing organisms such as Cryptosporidium parvum and Giardia lamblia, come from human and animal wastes. In the Oneida Lake watershed, failing septic systems and agricultural runoff are two potential sources of these contaminants. In addition to microbial contaminants, fertilizers, pesticides, and other chemicals applied to the land may enter groundwater or runoff into surface water. All of these contaminants are harmful to human health at certain levels, and water containing them is considered unsuitable for human consumption if the pollutants exceed established limits.

Wastewater Treatment

The collection and treatment of wastewater is important to safeguard public health, protect water quality, and ensure the overall survival of a region. In the Oneida Lake watershed, sewage and septic systems have increased in number and capacity due to urbanization, development, and increased population. There are 17 municipal wastewater treatment plants serving communities in the watershed. Two treatment plants discharge directly into Oneida Lake, and 12 discharge to tributaries of the lake. The remaining three serve municipalities within the watershed, but discharge their treated wastewater to waterbodies outside the watershed. The treatment of municipal wastewater is highly regulated by the state and federal governments through wastewater discharge permits.

In rural and sparsely populated suburban areas it may not be economically feasible to construct community wastewater treatment facilities. In these areas, on-site septic systems are traditionally used to dispose of wastewater. Overall, properly sited and maintained individual on-site wastewater treatment systems can treat wastewater effectively and not threaten water quality. However, poor site conditions, improper system installation and maintenance, as well as overloading can drastically decrease the life of the system and pose a significant threat to water resources.

Flooding

Flooding occurs in the region surrounding Oneida Lake, often after major storm events or rapid winter thaws. No organization has the authority or responsibility for controlling Oneida Lake water levels to prevent flooding or to reduce the frequency and duration of flooding. The New York State Canal Corporation

Oneida Lake Task Force Conference (Photo: Westervelt)

assumes a limited role by monitoring the canal system throughout the year and making adjustments to the Caughdenoy Dam during the navigation season to meet their primary responsibility of navigation.

Flooding is not unique to Oneida Lake. The Federal Emergency Management Agency (FEMA) reports that floods have caused a greater loss of life and property, and have disrupted more people in the United States than the impact of all other natural hazards combined. Flooding on Oneida Lake and within its watershed is a naturally occurring and routine phenomenon. The majority of the high water levels occur during the spring runoff period when rain and melting snow result in runoff rates that exceed the combined storage and outlet discharge capacity, resulting in rising water levels. It is very rare to observe high water levels outside of the spring runoff period. Consequently, the impact associated with annual snowmelt runoff phenomenon is a driving force on high water levels observed on Oneida Lake.

Management of Oneida Lake for flood control either directly or indirectly involves several state and federal agencies, including the New York State Canal Corporation, the New York State Department of Environmental Conservation, the United States Federal Emergency Management Agency, and the United States Army Corps of Engineers as well as individual local communities. No organization is capable of preventing flooding on Oneida Lake; however, there are a variety of regulatory programs and strategies that attempt to reduce the impacts associated with flooding. The current floodplain management strategy that utilizes federal, state and local groups attempts, through various regulatory programs, to reduce the disruption and damage caused by floods while protecting the natural resources and functions of the floodplains. This approach is achieved through efforts to avoid the risks that exist within the floodplain; minimize the impacts of unavoidable risks; and mitigate the impacts of damages as they occur, all in a manner that protects and enhances the natural environment.

Water Level Management

Oneida Lake is a multi-use waterbody that serves as the primary navigation link in the heart of the New York State Canal System. The lake's shore also has numerous residential properties; marinas and fishing charters; and a complex ecosystem that contains an exceptional fishery, extensive wetlands, and waterfowl. Proper water level management for Oneida Lake is crucial to the lakes multiple uses. A balanced approach is used to maintain the primary navigation function along with the other secondary uses.

This discharge is regulated at the Caughdenoy Dam, located five miles downstream from the lake along the Oneida River. The Caughdenoy Dam is a movable dam that spans the Oneida River that includes seven 52-ft wide by 12-ft high water control gates. The New York State Canal Corporation is responsible for operating these gates to achieve desired levels during the navigation season. Oneida Lake level regulation efforts are aimed at providing sufficient water for navigation throughout the navigation season while minimizing flood damage.

Oneida Lake water levels are lowered after the navigation season to provide storage for spring snowmelt and storm runoff. This is accomplished by fully opening each of the seven water control gates that create the Caughdenoy Dam near the beginning of December each year. These gates remain open throughout of the winter and the observed lake levels are a function of precipitation and runoff. Given the uncertainty of the timing of spring rain and snowmelt, lake levels at times can rise above flood levels even with the Caughdenoy dam fully open. In the summer, levels are regulated to provide reserve capacity sufficient to contain moderate runoff.

NYS DEC Regulated Environmental Activities

Under the Federal Clean Water Act a permit is required to discharge point-source pollutants into waters of the United States. In New York State, the NYS DEC is the permitting authority of the State Pollutant Discharge Elimination System (SPDES) program. The program requires a permit for point-source discharges of wastewater into surface or ground waters of New York State; construction or operation of a disposal system, such as a sewage treatment plant; discharge of stormwater associated with industrial activity, including construction activities disturbing one or more acres; and discharge of ballast from ships. Under the SPDES program, 157 facilities are permitted to discharge to the Oneida Lake watershed. This list includes solid waste facilities, inactive hazardous waste sites, underground and above-ground storage tanks, hazardous spills, mines, and oil and gas wells.

Institutional and Regulatory Influences

Federal

The United States Environmental Protection Agency (US EPA) was created in 1970 in response to the growing public demand for cleaner water, air and land. More than a dozen major statutes or laws form the legal basis for the programs of the US EPA. In 1972, the Clean Water Act (CWA) was passed and signaled the creation of a centralized federal legislation to protect and restore the biological, chemical, and physical properties of the nation's water. The act was amended in 1977 and again in 1987, shifting focus to non-point sources of pollution, as well as point sources. Under the CWA, the stormwater program requires the implementation of programs and practices to control polluted stormwater runoff from urban areas and construction sites. Section 404 of the Clean Water Act establishes a program to regulate the discharge of dredged and fill material into waters of the U.S., including wetlands. Other important federal programs include the National Flood Insurance Program, the Safe Drinking Water Act, and the Farm Bill.

State

There are numerous other regulations and programs that also influence land use activities in the Oneida Lake watershed. Some of these are adopted and applied on a statewide basis. Regulations and programs administered by the NYS Department of Environmental Conservation, NYS Department of Agriculture and Markets, and the NYS Department of Health uniformly apply to all municipalities within the

watershed and are not subject to local modification.

County

Each county in the watershed has a planning department that oversees the development of planning activities, planning boards, and supports municipal local land use regulation and control efforts. Every county in the watershed also has a soil and water conservation district (SWCD). SWCDs protect soil, water and other natural resources by reducing agricultural and non-agricultural non-point sources of pollution through the use of best management practices. Madison, Oneida, Onondaga, and Oswego counties each have a county health department that oversees drinking water supplies, implementation of the Source Water Assessment Program, inspection of on-site wastewater systems, and enactment of watershed rules and regulations. In Lewis County, the NYS Department of Health's District Office in Watertown oversees these activities. Advisory agencies at the county level include water quality coordinating committees and environmental management councils.

Oneida Lake Task Force Conference (Photo: Westervelt)

Local

In New York State and the Oneida Lake watershed, the majority of land use control is accomplished at the local level of government. In most instances, the broad authority to adopt regulations to control the use of land is given by the State Legislature to the individual local unit of government – the towns, villages and cities. Through laws established by New York State, local governments have been authorized to establish planning boards and zoning boards of appeal. These municipalities also have the authority to prepare and adopt comprehensive plans, site plan review, zoning, subdivision, and other regulations such as those governing open space, erosion and sediment control, flood prevention, and wellhead or water supply protection. In the process of passing and enforcing these laws, it is necessary for local governments to work cooperatively with both the federal and state levels of government, which share in the responsibility for the planning and management of land and water resources.

Since specific land use controls are developed, adopted, and implemented at the local government level they can vary dramatically from one municipality to the next. Enforcement of these existing local regulations may also be inconsistent from one municipality to the next. Municipalities within the watershed have differing expertise, personnel, and financial resources. It may not be possible for municipalities to adequately review plans or enforce standards within existing manpower and budgetary constraints. It is important to note that possessing a solid regulation is no guarantee that the regulation will be applied. Therefore, it is necessary that all watershed communities have a commitment to applying these regulations in order for the standards to achieve the desired, uniform effect. The regulations must include methods to ensure that adequate review of development occurs and that development plans are implemented as proposed.

Oneida Lake Task Force Conference (Photo: Westervelt)

Other

The NYS Association of Regional Councils is composed of ten locally created Regional Councils throughout New York State. New York's Regional Councils provide comprehensive planning for the coordinated growth and development of their regions. Two Regional Councils serve the Oneida Lake watershed -- the Central New York Regional Planning and Development Board (CNY RPDB) and the Herkimer-Oneida Counties Comprehensive Planning Program (HOCCPP). The CNY RPDB and HOCCPP have been fundamentally involved with the Oneida Lake and Watershed Management Planning and Implementation Project.

The Finger Lakes – Lake Ontario Watershed Protection Alliance (FL-LOWPA) is a coalition of all 25 counties in New York State's Lake Ontario drainage basin, which includes all counties within the Oneida Lake watershed. FL-LOWPA fosters coordinated watershed management programs across the Lake Ontario Basin based on local needs. Funding for FL-LOWPA is provided through an annual appropriation by the New York State Legislature through the Environmental Protection Fund. Funding from the FL-LOWPA program has been used to undertake a variety of projects in the Oneida Lake watershed including barnyard, streambank stabilization, pasture management, aquatic weed harvesting, and tributary monitoring projects.

The Tug Hill region is represented by a number of agencies and organizations. The primary organization in the region is the Tug Hill Commission – a non-regulatory state agency charged with helping local governments, organizations, and citizens to shape the future of the region, especially its environment and economy. The Tug Hill region is also represented by five councils of government that help foster communication between communities and help individual towns and villages achieve a more regional perspective to enhance their communities. Another significant group in the region is the Tug Hill Tomorrow Land Trust, a regional, non-profit land trust and education organization helping to retain Tug Hill's farm, forest, recreation, and wild lands through education, research, and voluntary land protection. The East Branch of Fish Creek Working Group is composed of a variety of groups and individuals that have an interest in protecting the East Branch of Fish Creek.

The Oneida Lake Association (OLA) was founded in 1945 to protect, restore and preserve the natural resources of Oneida Lake and its surrounding ecosystem. The Association has a history of environmental activism and its efforts have promoted water quality, a renewable supply of game fish, and increased access to the lake. Other lakes located within the Oneida Lake watershed (Cazenovia, Tioughnioga, Tuscarora, Panther, and Kasoag Lakes) also have very active lake associations.