

# Chapter 7: Environment

*The natural environment provides the foundation for the sustainable development of a community and thus must be protected for future generations.*

Evidence suggests that the global environment is deteriorating due to natural and man-made pressures including climate variability, population growth and rising consumption trends that are leading to over-harvesting of resources, and the pollution of air, water and land. These environmental changes impact human livelihoods by reducing food security, increasing vulnerability to natural hazards and disease, and limiting opportunities for economic growth. Society is continually challenged by a number of complex and ever changing realities including:

- + greenhouse gas emissions are having an increasingly detrimental impact on the atmosphere
- + urban air pollution is a growing health concern, triggering or exacerbating respiratory and cardiac problems
- + the growing frequency and intensity of natural disasters is impacting the consistency of surface and groundwater quality and quantity
- + aging water and wastewater infrastructure threatens the health of community water resources
- + native species are becoming endangered or extinct
- + wetlands are being drained and filled for development resulting in the loss of critical floodwater storage and water quality protection

- + invasive species are being introduced at an ever increasing rate
- + land degradation is accelerating and intensifying as a result of unsupported sprawl
- + forest ecosystems are being degraded, fragmented and cleared
- + urban centers are increasingly impacted by air and water pollution and solid waste disposal

There have been many successful attempts to protect and improve the environment over the past 70 years beginning with the passage important legislation at the federal level. The Federal Water Pollution Control Act was enacted in 1948 to address point source water pollution that was threatening public health. The Act established a 55% cost sharing mechanism for the construction of waste water treatment plants. This funding supported the construction of many waste water treatment plants operating in CNY today. Following several amendments, the FWPA became known as the Clean Water Act (CWA) and was termed a “technology-forcing” statute because of the rigorous and successful, demands it placed on regulated dischargers to achieve increasingly higher levels of point source pollution abatement. In 1987, the focus of the Act was expanded to address nonpoint source water pollution.

On July 21, 2006, the Oswego River, New York Area of Concern (AOC) became the first United States AOC to be formally delisted. The Oswego River is one of 43 Great Lakes "Areas of Concern" for which Remedial Action Plans (RAPs) were developed in the late 1980s to address water quality impairments. RAPs identify activities necessary to restore and protect beneficial uses by applying use impairment indicators developed by the International Joint Commission (IJC). The RAP Process identifies the sequence of necessary remedial measures needed to address goals and objectives. A Remedial Advisory/Action Committee (RAC) consisting of a diverse group of community stakeholders and citizens assures that the process responds to local interests and concerns.

The Oswego RAP targeted impairments involving fish consumption, fish habitat and populations, and eutrophication and algae. Through public participation, investigative studies, expert involvement and assessment efforts, pollution reduction activities to address hazardous waste sites, point and nonpoint water discharges, watershed best management practices, and local agency river corridor enhancement activities have addressed the indicators and beneficial uses for the Oswego AOC.

There is a true success story behind the delisting of the Oswego River Area of Concern. Historically, the Oswego watershed was a significant source of contamination. By taking an ecosystem approach, the RAC has accomplished the community's recognition of the importance of this area as a natural resource and thereby encouraged others to act responsibly to restore and to protect the environment and the beneficial uses of the waters. The RAC stakeholders have identified, influenced, and observed the implementation of many supportive activities in the Oswego watershed. As a result, the status of each of the Use Impairment Indicators have been resolved and significant impairments and/or threats to the AOC environment no longer exist.

Groundwater quality in NYS is monitored as part of a cooperative program between the NYS DEC and the US Geologic Survey (USGS) established under section 305(b) of the CWA. Each year, a total of 60 wells in two to three major hydrologic basins are sampled for bacteria, nutrients, inorganics, organics (including pesticides and VOCs), radiochemicals and a number of field and physical parameters. The annual program is jointly planned by DEC and USGS and designed so that all major drainage basins in the state are monitored once every five years.<sup>1</sup>

The Great Lakes Critical Programs Act of 1990, (GLWQA), is an international agreement between the U.S. and Canada to reduce toxic pollutants in the Great Lakes. The GLWQA addressed localized environmental problems in Areas of Concern (AOCs) where significant pollution problems exist through individual Remedial Action Plans (RAPs) to address. Six Areas of Concern (AOCs) were identified in New York: Buffalo River, Niagara River, Eighteen Mile Creek, Rochester Embayment, Oswego River/Harbor, and St. Lawrence River at Massena. The Oswego AOC is the only U.S. AOC to have been de-listed.

The Great Lakes Restoration Initiative (GLRI), enacted in 2009 is a federally funded, multi-year, multi-agency program that uses outcome-oriented performance goals and measures to target problems and track progress protecting, maintaining, and restoring the integrity of the Great Lakes. Eligible projects must address one of 5-core focus area identified in the 2010 – 2014 Great Lakes Action Plan: Toxic Substances and Areas of Concern; Nearshore Health and Nonpoint Source Pollution; Habitat and Wildlife Protection and Restoration; Accountability, Education, Monitoring, Evaluation, Communication and Partnerships; and, Invasive Species. GLRI represents the largest investment in the Great Lakes in two decades. GLRI Annual Funding 2010: \$474 million; 2011: \$300 million; 2012: \$300 million.

Prior to 1975, New York had lost almost half of its historic wetlands. The loss of wetlands has slowed in recent years as the result of laws that prohibit draining and filling or require mitigation for losses due to development. At the Federal level, Section 404 of the Clean Water Act established the authority of the US Army Corps of Engineers (USACE) to regulate by permit, the discharge of dredged or fill material into water of the United States, including wetlands. The USACE uses the 1987 Corps of Engineers Wetlands Delineation Manual, to identify wetlands for the Section 404 permit program.

The principal New York State regulations affecting development activities in and near wetlands is the Freshwater Wetlands Act (FWA). The Act regulates wetlands that are a minimum of 12.4 acres in size or which have been designated as being of "unusual local importance". The act also regulates a 100-foot-wide buffer adjacent to these wetlands.

Other state laws that may apply to activities in or near wetlands include the State Environmental Quality Review Act (SEQRA), the Waterfront Revitalization of Coastal Areas and Inland Waterways Act, the Coastal Erosion Hazard Areas Act, and the Use and Protection of Waters Program. In addition, the New York Uniform Procedures Act applies to procedural

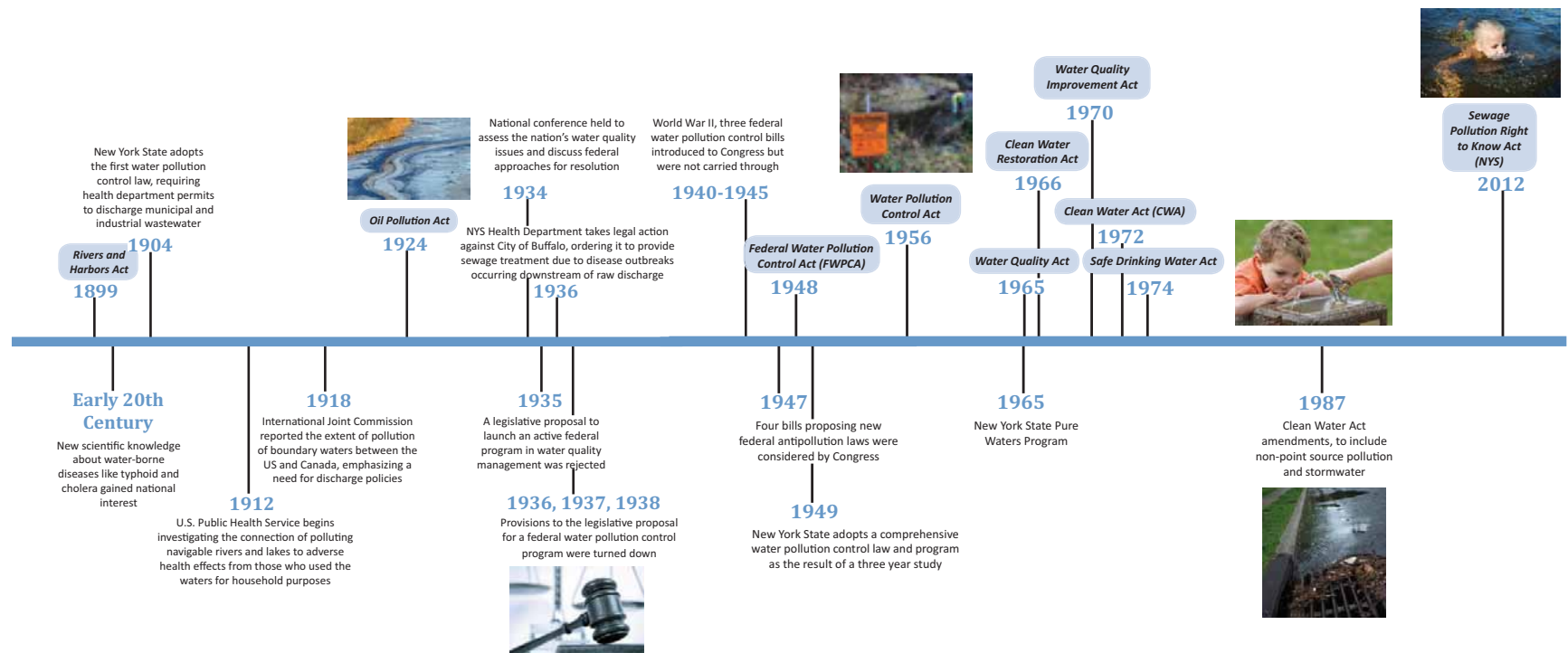
aspects of the review and permitting process. The Water Quality Certification program requires NYS Department of State certification that federal permits meet state water quality standards.

In addition to addressing issues associated with the nation's water resources, efforts have also been directed to issues concerning air quality in the United States. Initially enacted in 1963, the Clean Air Act (CAA) established funding for the study and cleanup of air pollution; however, it was not until the CAA was amended in 1970 that a comprehensive federal response to address air pollution was put in place. That same year, Congress created the U.S. Environmental Protection Agency (EPA) and gave it primary responsibility for carrying out the law. In 1990, the CAA was revised and expanded with an emphasis on cost effective

approaches to reducing air pollution and the EPA was given broader authority to implement and enforce emissions regulations.

The CAA requires EPA to set health-based standards for ambient air quality, sets deadlines for the achievement of those standards by state and local governments, and requires EPA to set national emission standards for large or ubiquitous sources of air pollution, including motor vehicles, power plants, and other industrial sources. The CAA mandates emission controls for sources of 187 hazardous air pollutants, establishes a cap and-trade program to limit acid rain, requires the prevention of significant deterioration of air quality in areas with clean air, requires a program to restore visibility impaired by regional haze in national parks

**FIGURE 1**—National and Statewide Wastewater Regulation Timeline



Source: Wastewater Management Handbook for Local Representatives, Second Edition,

and wilderness areas, and implements the Montreal Protocol to phase out most ozone-depleting chemicals.

Under the CAA, states are required to develop State Implementation Plan (SIPS) that outline how they will control air pollution using specified regulations, programs and policies. The NYS DEC Division of Air Resources administers the state air program. Under the NYS air permitting program, most large sources require a full air pollution permit, while smaller sources are covered by DEC's air source registration program.

The disposal of hazardous waste poses significant threats to human health as well as the environment. The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980 was enacted in the wake of the discovery of toxic waste dumps in the 1970s. It allows the EPA to clean up such sites and to compel responsible parties to perform cleanups or reimburse the government for EPA-lead cleanups. Superfund is the name given to the environmental program established to address abandoned hazardous waste sites. The Superfund cleanup process is complex and long term. It involves steps to assess sites, place them on the National Priorities List, and establish and implement appropriate cleanup plans. Invasive species infestations are a growing concern at the national, state and local levels.



Onondaga Creek

## THE NATURAL RESOURCES OF CENTRAL NEW YORK

Situated in the heart of New York State, the 6,322-square-mile (4,046,080 acre) region is comprised of Cayuga, Cortland, Madison, Onondaga and Oswego Counties. Onondaga County is the center of the region and the most urban county, accounting for almost 59% of region's population. Each of the four counties surrounding Onondaga County has at least one large city surrounded by open and agricultural lands. The region is recognized for its abundant water resources, clean air, scenic vistas, forests, woodlands and natural wetland areas. The region's natural resources provide a variety of social and environmental benefits and recreational activities that support a robust tourism industry.

### Water Resources in Central New York

Central New York's surface and groundwater resources adequately meet the collective municipal, residential, business and commercial water needs of the region, while supporting the local economy through recreational opportunities such as fishing and boating. Most lakes and rivers in the region are multipurpose waterbodies ranging from public water supply and wastewater assimilation, to recreation and hydroelectric power generation. High-yielding groundwater aquifers, such as those located in Cortland County and in the Tug Hill Plateau, serve as primary drinking water sources for many communities. More than 4 million acres of wetlands provide stormwater control and flood protection and serve as critical natural habitat for a diverse collection of plants and animals including many rare and endangered species such as the sand dune willow (*Salix cordata*) and the Massasauga Rattlesnake.

### Surface Water

There are 6,229 miles of streams and 104 lakes (with a surface area of 131,081 acres) within in the five-county region. The majority of the region's water supply is drawn from Lake Ontario and three Finger Lakes (Owasco, Skaneateles, and Otisco Lakes). Surface drinking water sources also include rivers, streams and ponds. Approximately 60 million gallons of surface water is withdrawn per day to meet the domestic, industrial, agricultural and mining needs of CNY. Currently, there is a greater than 100% surplus in available public water.<sup>3</sup>

Approximately 73% of the region's population is served by public water systems with 27% of the population on self supply. Table 1 shows the total water withdrawals by sector for region by county.

Per Capita water withdrawals in the region increased by 6% between 1995 and 2005 primarily due to a significant increase in nonconsumptive withdrawals for thermoelectric production. Despite relatively small increases in industrial and irrigation withdrawals during that same period, total per capita consumptive withdrawals declined by 13% as shown in Table 2.

### Groundwater/Aquifers

The groundwater resources underlying CNY are significant. 36.6 million gallons of groundwater per day are withdrawn from 115 square miles of Primary and 676 square miles of Principal Aquifers to help meet the domestic, industrial, agricultural and mining needs of the region. The Cities of Fulton and Cortland,

In addition to a number of small village systems and many individual residences rely on groundwater as a primary source of supply. Groundwater is also the source of base flow foremost rivers and streams in the region (Map 1). Portions of two Sole Source Aquifers (SSAs), totaling 390 square miles underlie the region – the Cortland-Homer-Preble (CHP) Aquifer System in Cortland County, and the Tug Hill Aquifer, in the southern portion of Oswego County. SSAs supply at least 50% of the drinking water consumed in the overlying area. Designation as a SSA provides additional review for projects at the federal, state and local levels to endure groundwater protection measures are built into the project.<sup>3</sup>

The CHP is the sole source of drinking water for approximately 35,000 residents in the City of Cortland, the Towns of Cortlandville, Homer, Preble, and Scott, and the Villages of Homer and McGraw.

The Tug Hill Aquifer spans 47-miles in the western and southwestern area of the Tug Hill region including the counties of Jefferson, Lewis and Oswego. The northern section of the aquifer and its tributary system was designated as a Federal SSA in 2006. The Villages of Sandy Creek, Lacona and Pulaski, and the Town of Orwell in Oswego County rely on the Tug Hill Aquifer as the drinking water source for both municipal and private water systems.

TABLE 1—2005 Water Withdrawals Per Sector (MGD)<sup>4</sup>

County	Public Supply	Domestic Supply	Industrial	Irrigation	Livestock	Aquaculture	Mining	Thermo-electric
Cayuga	9.48	7.44	1.44	0.46	1.22	0.00	0.12	0.00
Cortland	5.00	4.46	1.68	0.22	0.59	0.00	0.22	0.00
Madison	1.93	5.31	1.47	0.53	0.92	0.11	0.20	0.00
Onondaga	115.91	56.42	19.80	2.08	0.77	0.78	0.93	0.00
Oswego	10.99	11.14	2.71	0.69	0.26	2.76	0.38	1,233.66
Total	143.31	84.77	27.10	3.98	3.76	3.65	1.85	1233.66
Percent of Total	9.5	5.6	1.8	0.3	0.3	0.2	0.1	82.1

Source: USGS, 2005

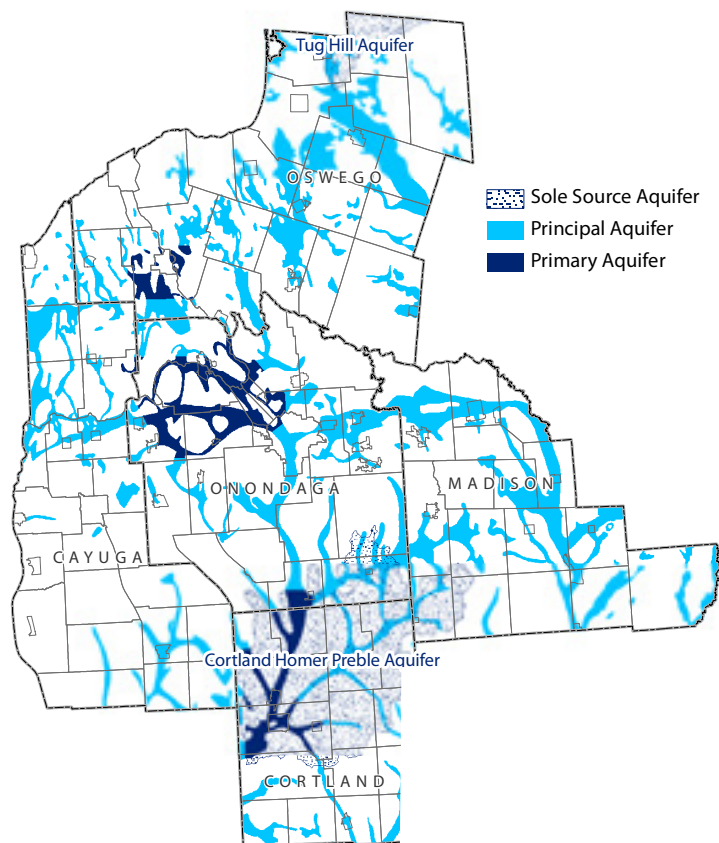
TABLE 2—Per Capita Water Withdrawals by Sector 1995 and 2005<sup>4</sup>

Year	Population	Public Supply, (GPD)	Domestic, (GPD)	Industrial, (GPD)	Thermo-electric, (GPD)	Mining, (GPD)	Livestock, (GPD)	Irrigation, (GPD)	Total Per capita Water Use(GPD)
1995	799,140	227.74	21.12	21.92	1435.64	3.42	5.54	2.79	1,728.8
2005	781,839	183.30	20.16	34.66	1577.90	2.37	2.11	5.59	1,832.9
Change	-17,301	-44.44	-0.96	+12.74	+152.26	-1.05	-3.43	+2.80	+10.41

Source:



## MAP 1—Groundwater



Source: CNY RPDB

Key issues facing the Tug Hill Aquifer are impacts from withdrawal and significant development pressure especially in the northern portion due to the expansion of the Fort Drum military base. Several changes in withdrawal rates from the aquifer have occurred or are proposed, including: the purchase of a defunct paper company's well to support expanded municipal water systems; a proposed water bottling operation plant; declining yields from an aging well field at the state fish hatchery in Altmar.

## Watersheds (Map 2)

The Central New York region lies within three of the state's major drainage basins: Oswego River/ Finger Lakes; Lake Ontario and Minor Tributaries; and the Susquehanna River.

The Oswego River/Finger Lakes Watershed is one of the largest in the state and includes the drainages of the Oswego, Oneida, Seneca and Clyde Rivers. The watershed includes large portions of Onondaga, Cayuga, Oswego and Madison Counties, and a small part of Cortland County. Drinking water sources include Owasco, Otisco and Cayuga Lakes, as well as Skaneateles Lakes, one of the few unfiltered drinking water sources in the nation. There are 15 subwatersheds located within the CNY portion of the Oswego River/Finger lakes Basin.

The Lake Ontario and Minor Tributaries Watershed is comprised of the smaller drainage area between the larger rivers that empty into Lake Ontario (Niagara, Genesee, Oswego and Black Rivers). Much of Oswego County and portions of Cayuga County are within the watershed which stretches along the Lake Ontario Shoreline. There are 8 subwatershed located within the CNY portion of the Lake Ontario and Minor Tributaries watershed.

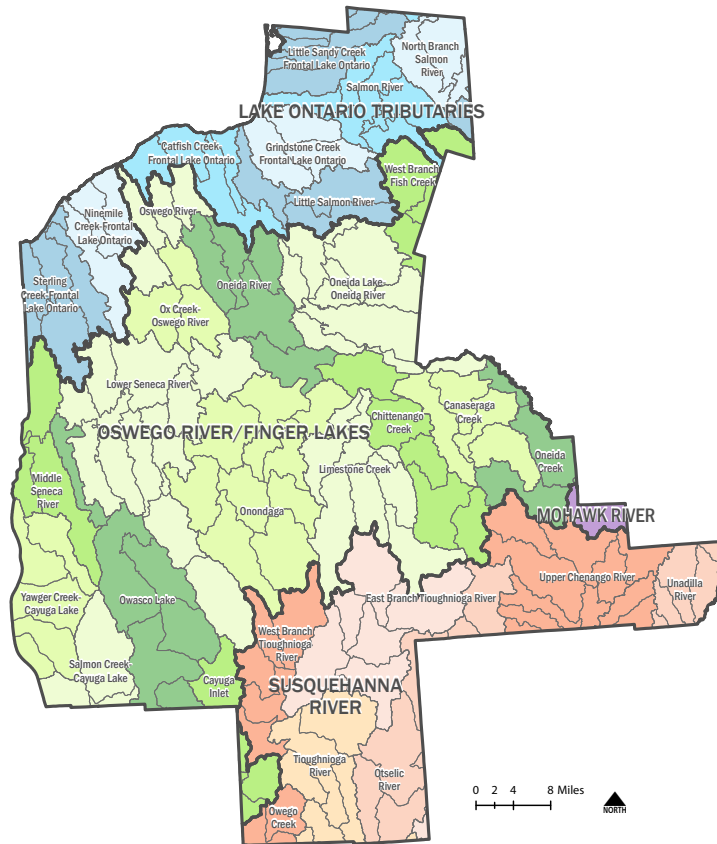
The Susquehanna River Basin is the second largest drainage basin east of the Mississippi River. The 444 mile Susquehanna River originates at Otsego Lake (Oneida County) and drains 27,500 square miles including Cortland County, portions of southern Madison County and a small portion of southern Onondaga County. There are 7 subwatersheds located within the CNY portion of the Upper Susquehanna River Basin.<sup>5</sup>

**Primary Aquifers** are highly productive and utilized as sources of water supply by major municipal water supply systems.

**Principal Aquifers** are known to be, or whose geology suggests abundant potential water supply but are not intensively used as a current source of water supply by major municipal systems.

**Sole Source Aquifers** are designated by the US EPA under the Federal Safe Drinking Water Act as the sole or main source of drinking water for a community.

## MAP 2—Watersheds



Source: CNY RPDB

**TABLE 3—CNY Wetland Distribution by County (acres)<sup>6</sup>**

Classification	Cayuga	Cortland	Madison	Onondaga	Oswego	Total
Total Acres	27,117 / 6.0	2,481 / 1.0	13,479 / 3.0	47,281 / 9.0	93,911 / 51.0	184,269 / 100.0
(Acres/% of CNY Total)						

Source:

## Wetlands

Wetlands are transition areas between uplands and aquatic habitats which perform a number of valuable functions and provide significant ecologic and environmental benefits including flood and stormwater control functions. While some wetlands function as groundwater discharge sites, others function as groundwater recharge areas that help to maintain base flow in streams and rivers, support ponds and lakes, and provide critical habitat for fish and wildlife, including many rare and endangered species. Wetlands comprise less than 5% of the region. Over half of the existing wetlands are concentrated in Oswego County as shown in [Table 3](#).<sup>6</sup>

There are several notable wetland complexes in Central New York. Chittenango Creek runs through the 890 acre Nelson Swamp Unique Area in Madison County. Over 400 species of vascular plants (including the endangered striped coral root and threatened spreading globeflower) and 105 bird species have been cataloged in Nelson Swamp. The NYS DEC released the Nelson Swamp Unit Management Plan in March, 2000, which includes specific objectives for habitat management, land conservation, public education, research and access for passive recreation.

The 8,000 acre Montezuma National Wildlife Refuge located at the north end of Cayuga Lake in the middle of one of the busiest bird migration routes on the Atlantic Flyway. More than 240 species of birds, 43 species of mammals, 15 species of reptiles, and 16 species of amphibians have been documented on the Refuge. There is a current effort to restore and preserve expanded areas of the marsh into an area known as the Montezuma Wetlands Complex. The Complex is part of the North American Waterfowl Management Plan, an international agreement between the United States, Canada, and Mexico to restore, conserve, and enhance wetland habitats and waterfowl populations throughout North America.

Cicero Swamp Wildlife Management Area encompasses 4,747 acres in the northeastern portion of Onondaga County and is commonly used for birding, hiking, cross country skiing, and hunting. The NYSDEC manages the Cicero Swamp to provide food, cover and shelter for various wildlife species. The state regulates hunting, trapping, and fishing in the area through a permitting system in accordance with statewide regulations. Wildlife commonly found in the area includes white-tailed deer, squirrel, beaver, muskrat, raccoon, mink, fox, coyote, turkey, and the pygmy rattlesnake which is an endangered species in New York State. A diverse collection of songbirds is also found in the swamp, in addition to ruffed grouse, woodcock, and waterfowl.

The Bear Swamp State Forest is located on 3,316 acres in Cayuga County and is known for the large wetland and creek that bisect the forest. Bear Swamp is managed for multiple uses including habitat diversity, recreation, water, wildlife, and wood products. Over 13 miles of multi-use trails provide access for hiking, biking, cross country skiing, trout fishing and



Onondaga Creek

deer, turkey, rabbit, squirrel and ruffed grouse hunting. The state forest is the location of the highest point within Cayuga County at 1,860 feet.

The Three Mile Bay Wildlife Management Area is a 3,966 acre tract adjacent to Three Mile Bay at the north shore of Oneida Lake in Oswego County. Much of the area is lowland swamp with ridges extending across the interior. Many breeding and migratory species of waterfowl utilize Three Mile Bay during the spring and fall. Other water birds, shorebirds, white tailed deer, varying hare, ruffed grouse, squirrel, numerous songbirds, beaver, muskrat, fox and wild turkey are also present.

The Three Rivers Management Area is located on 3,607 acres in Onondaga County at the junction of the Seneca and Oneida Rivers, where the Oswego River forms. The area is managed to provide wildlife habitat and compatible public uses of the land. Since 1940, twenty-nine water units totaling over 250 acres have been constructed, including potholes and small marshes ranging in size from .5 to 5 acres, and one large marsh over 100 acres. Water levels are actively manipulated to encourage certain aquatic vegetation. Over 50,000 evergreens and shrubs have been planted to improve the diversity of habitat and to provide food and cover for wildlife. An annual system of prescribed burning is utilized to keep open fields from reverting to brush and trees. Development and management activities are funded primarily through hunting license fees and federal taxes on sporting arms and ammunition.

## Water Resource Quality

### *Surface Water*

All waterbodies in NYS are assigned "best use" classifications based on their ability to support fish and aquatic wildlife, recreation, and, for some waters, public bathing, drinking water use or shell fishing. Water quality is considered to be Good if it fully supports its designated best use; Satisfactory if it fully supports its designated best uses, but with minor impacts; Poor (Impaired) if it does not support its designated best uses. Waterbodies for which insufficient data is available are classified as Unassessed.

Forty-one percent of the region's lakes and 57% of the stream miles have been assessed and generally found to be of good to satisfactory quality with only 8 lakes and 23 streams classified as being impaired. There are 1,942 miles of high quality, oxygen rich trout classified streams in the region. The most common pollutants responsible for surface water impairments in CNY are nutrients, pathogens, silt/sediment/ and priority



organics. Other known pollutants impacting lakes and streams in CNY are summarized in [Table 4](#) and [Table 5](#).

Agriculture and urban stormwater runoff are the primary sources of water quality impairments in CNY. Water quality impairments also occur as a result of failing on-site septic systems in some unsewered lakeshore communities, and toxic and contaminated sediments from past industrial and municipal point discharges.

Combined sewer overflows and untreated or inadequately treated sanitary discharges also negatively impact water quality in some older, urbanized areas including the Cities of Syracuse, Oswego, Oneida, Canastota and Auburn.

Section 303(d) of the CWA requires the development of remediation plans referred to as a Total Maximum Daily Loads (TMDL) for water bodies that are too degraded to meet water quality standards ([Table 6](#)). TMDLs address all sources of the pollutant of concern and establishes maximum amounts of the pollutant each source can discharge. Waters identified on the 303(d) list are ranked in priority order.

Four CNY lakes (with a total surface area of 7730.74 acres) and 2 rivers (totaling 150.6 stream miles) will require TMDLs. A TMDL for phosphorus is in effect for Onondaga Lake. Although this represents a

small percentage of the total surface water resource in CNY (2.4% of the total stream miles and 3% of the total lakes representing 6% of the total lake surface area), it should be noted that Owasco Lake, a pathogen listed 303(d) water, also serves as a public drinking water source for over 45,000 Cayuga County residents.

The 303(d) list also identifies waterbodies that are categorically impaired and may, due to their lower priority ranking, require a TMDL in the future. The categories of impairment are atmospheric deposition, fish consumption waters, and shell fishing (primarily restricted to waters located along Long Island). No Central New York waters are currently impaired as a result of acid deposition; however, fish consumption bans have been issued for several waterbodies representing 3.2% of the total stream miles and 2.4% of the total lake surface area in the region ([Table 7](#)). Fish consumption advisories are issued primarily as a result of PCB, Mirex and or Dioxin contaminated sediment as a byproduct of historic industrial and municipal discharges.

**TABLE 4**—Impaired Lakes in Central new York<sup>7</sup>

Waterbody	Pollutants	Miles Impaired
Cayuga Lake (southern end)	Algae, Nutrients, Pathogens, Silt	968.24
Lake Neatahwanta	Algae, Nutrients, Pathogens, Dissolved Oxygen, Silt, Salts	688
Little Sodus Bay	Nutrients, Algae, Dissolved Oxygen, Organics, Pathogens, Priority organics, Pathogens, Pesticides, Silt	728
Lower Salmon River Reservoir	Pesticides, Priority Organics	208
Onondaga Lake (northern end)	Metals, Nutrients, Priority Organics, Pathogens, Aesthetics, Algae, Dissolved Oxygen, Salts, Silt	1,711
Onondaga lake (southern end)	Metals, Nutrients, Priority organics, Pathogens, Aesthetics, Algae, Dissolved oxygen, Salts, Silt	1,277
Owasco Lake	Pathogens, Nutrients, Silt	6,799
Salmon River Reservoir	Silt, Metals	2,572

Source: NYS Department of Environmental Conservation, Waterbody Inventory/ Priority Waterbodies List, 2012.

**TABLE 5—Impaired Streams/Rivers in Central New York<sup>7</sup>**

Waterbody	Pollutants	Miles Impaired
Bloody Brook and Tribs	Pathogens, Aesthetics, Metals, Priority Organics, Dissolved Oxygen, Thermal Changes, unknown Toxicity	6.0
Canastota Creek, lower and tribs	Dissolved oxygen, Pathogens, Aesthetics, Nutrients	10.3
Chenango River, upper and minor tribs	Metals, Nutrients, Silt, Unknown Toxicity	86.4
Crane Brook and tribs	Nutrients, Silt, Salts	80.0
Geddes Brook and tribs	Aesthetics, Metals, Priority Organics, Nutrients, Ammonia	12.4
Harbor Brook, Lower and tribs	Aesthetics, Nutrients, pathogens, Priority Organics, Dissolved Oxygen, Thermal Changes, Other Pollutants, Ammonia	5.0
Ley Creek and tribs	Pathogens, Nutrients, Aesthetics, Priority Organics, Dissolved Oxygen, Unknown Toxicity, Thermal Changes, Ammonia, Other Inorganics	26.0
Limestone Creek, Lower and minor tribs	Silt, Nutrients, Dissolved Oxygen, Pathogens, Aesthetics	49.5
Minor tribs to Onondaga lake	Dissolved Oxygen, Other Inorganics, Ammonia, Nutrients, Pathogens, Aesthetics, Metals, Priority Organics	7.4
Ninemile Creek, Lower and tribs	Nutrients, pathogens, Aesthetics, Metals, Priority Organics, Ammonia	32.3
Onondaga Creek, Lower and tribs	Aesthetics, Other Pollutants, Ammonia, Nutrients, Pathogens, Unknown Toxicity, Metals, Priority Organics, Silt, Thermal Changes	2.8
Onondaga Creek, Middle and Tribs	Aesthetics, Ammonia, Nutrients, Pathogens, Un known Toxicity, Silt, Salts, Thermal Changes, Other Pollutants	17.5
Onondaga Creek, Upper and tribs	Silt	110.5
Onondaga Lake Outlet	Nutrients, Ammonia, Unknown toxicity, Metals, priority Organics, Dissolved Oxygen	0.7
Oswego River, Lower, Main Stem	Metals, Nutrients, Silt, pathogens, Priority Organics	10.7
Owasco Inlet, Upper and tribs	Nutrients	25.2
Salmon River, Lower and minor tribs	Priority Organics, Pesticides	89.1
Salmon River, Middle and minor tribs	Priority Organics, Pesticides	35.7
Seneca River, Lower Main Stem (portion 1)	Dissolved Oxygen, Nutrients, Ammonia, Pathogens, Priority Organics	6.9
Seneca river, Lower Mani Stem (portion2)	Dissolved Oxygen, Ammonia, Nutrients, Priority Organics, Pathogens, Silt	23.0
Skaneateles Creek and tribs	Priority Organics, Nutrients	36.5
Unadilla River, Upper and minor tribs	Metals	14.2
Unadilla River, Middle and minor tribs	metals	24.0

Source: NYS Department of Environmental Conservation, Waterbody Inventory/ Priority Waterbodies List, 2012.

**TABLE 6**—Individual Waterbody Segments with Impairments Requiring TMDL Development

Name	County	Municipality	Type	Class	Cause/Pollutant	Source	Year Listed
Lake Neatahwanta	Oswego	Fulton (C) Granby (T)	Lake	B	Nutrients (phosphorus)	Urban/Storm Runoff	1998
Pleasant Lake	Oswego	Schroeppel (T)	Lake	B	Phosphorus	Unknown	2010
Canastota Creek (lower & tribs)	Madison	Canastota (V) Lennox (T) Lincoln (T)	River	C	Oxygen Demand	Municipal, CSO	2008
Owasco Lake	Cayuga	Niles (T) Scipio (T) Owasco (T) Fleming (T)	Lake	AA(T)	Pathogens	Wildlife/Other Sources	1998
Owasco Inlet (upper & tribs)	Cayuga	Locke (T)	River	C(T)	Nutrients	Municipal/Agriculture	2008
Duck Lake	Cayuga	Conquest (T)	Lake	C	Phosphorus	Unknown	2012
Onondaga Lake (Approved TMDL for phosphorus in effect)	Onondaga	Syracuse (C) Salina (T) Geddes (T) Liverpool (V)	Lake	B (north end) C (south end)	Phosphorus	Municipal, CSOs, Urban Runoff, Agriculture	1996

Source: NYS Section 303(d) List, July 2012.

**TABLE 7**—Multiple Segment/Categorical Impaired Waterbody Segments (Fish Consumption)

Name	County	Type	Class	Cause/Pollutant	Source	Year Listed
Lake Ontario Shoreline	Oswego	Great Lake	A	PCBs, Mirex Dioxin	Contaminated Sediment	1998
Salmon River (lower & minor tribs)	Oswego	River	C(T)	PCBs, Mirex	Contaminated Sediment	1998
Salmon River Reservoir	Oswego	Lake	C (T)	PCBs, Mirex	Contaminated Sediment	1998
Salmon River (middle & tribs)	Oswego	River	C(T)	PCBs, Mirex	Contaminated Sediment	1998
Oswego River	Oswego	River	B	PCBs	Contaminated Sediment	1998
Onondaga Lake (north & south end)	Onondaga	Lake	C	PCBs, Dioxin, Mercury, other toxics	Contaminated Sediment	1998

Source: NYS Section 303(d) List, July 2012.

## Ground Water/Aquifer

There is relatively little groundwater quality data available through the NYS Groundwater Ambient Monitoring Program (Table 8). In general, groundwater quality is generally good statewide, but can vary significantly as a result of hydrology and land use. The most recent groundwater data for the 5-county region indicates that groundwater quality is generally acceptable to good for all uses, however, some constituents or bacteria exceeded at least one drinking water standard in all sampled areas. Regional threats to groundwater include pollution from inactive hazardous waste sites, pesticide application, animal feeding operations, on-site wastewater treatment systems, and chemical spills.

Within the Cortland-Homer-Preble-Homer aquifer, several private wells in the southwestern portion of the aquifer have been contaminated the by organic solvents; however, all public water supply wells meet or exceed State and Federal drinking water standards.<sup>28</sup>

**TABLE 8--Ambient Groundwater Quality in Central New York<sup>1</sup>**

Basin	Year	Results
Central New York	2007	Acceptable
Eastern Lake Ontario	2008	Good
Upper Susquehanna	2009	Acceptable

Source: USGS Groundwater Quality

## Watersheds

Water quality has been assessed for approximately 43% of river/stream miles, and 97% of lake, pond and reservoir acres in the Oswego River/ Finger Lakes Basin and is generally rated satisfactory to good. There are two significant concerns in the watershed. The first is the impact of legacy pollutants from past industrial activities, municipal discharges and urban runoff on Onondaga Lake. Extensive remediation and water quality improvements that are underway are addressing these issues. The second concern is the protection of the Finger Lakes from various point and nonpoint sources of pollution. Although these impacts are less severe, they constitute a more widespread threat to water quality in the watershed. Other water quality concerns in the watershed are:

- + Municipal Wastewater and Combined Sewer Overflows
- + Agricultural and Other Nonpoint Sources of nutrients
- + Contaminated urban Stormwater Runoff
- + Invasive aquatic plant and animal species
- + Protection of drinking water and recreational uses

Water quality has been assessed for approximately 53% of river/stream miles, 66% of lake, pond and reservoir acres, and 100% of Lake Ontario shoreline miles within the Lake Ontario and Minor Tributaries basin. Water quality is largely a reflection of water quality in Lake Ontario and the nearshore waters and embayments of the lake. The legacy of toxics discharged to the Lake and its tributaries result in fish consumption advisories for numerous species. Legacy industrial discharges are being remediated in Great Lakes Program Areas of Concern in Oswego, Rochester and Eighteen Mile Creek. While phosphorus levels in the open lake have declined over the years, nutrients and resulting aquatic plant growth continue to impact recreational uses in nearshore waters. Other water quality concerns in the watershed are:

- + Invasive Aquatic Plants and Animals
- + Agricultural and Other Nonpoint Sources of nutrients

Within the Susquehanna Watershed, approximately 33% of river/stream miles, and 77% of lake, pond and reservoir acres have been assessed and are generally rated as satisfactory. Most water quality impacts are the result of agricultural and other nonpoint sources which contribute nutrients and sediment to the waters. Municipal wastewater discharges (including combined sewer overflows) are concerns south of the CNY region in and around the Binghamton-Johnson City area. Inadequate wastewater treatment in some rural areas including on-site septic and smaller community systems also contribute to water quality issues. Impacts from flooding are a concern in this area. Major water quality concerns in the watershed are:

- + Agricultural and Other Nonpoint Sources of nutrients and various other pollutants
- + Rural Community Wastewater Treatment and On-site Septic in unsewered areas
- + Flooding Impacts in Southern Tier



**TABLE 9**—Wetland Classifications by County in Central New York

Classification	Cayuga*	Cortland*	Madison*	Onondaga*	Oswego*	Total*
Class I Acres	1,183 / 0.6	450 / 0.2	5,829 / 3.2	10,738 / 5.8	60,497 / 32.8	78,697 / 42.7
Class II Acres	19,689 / 10.7	1,956 / 1.06	7,222 / 3.9	32,047 / 17.4	24,934 / 13.5	85,848 / 46.6
Class III Acres	6,160 / 3.3	75 / 0.07	308 / 0.2	4,163 / 2.3	8,480 / 4.6	19,186 / 10.4
Class IV Acres	85 / 0.05	0 / 0.0	120 / 0.07	333 / 0.21	0 / 0.0	538 / 0.3
Total Acres	27,117 / 6.0	2,481 / 1.0	13,479 / 3.0	47,281 / 9.0	93,911 / 51.0	184,269 / 100.0
* Acres/% of CNY Total						

Source: NYS DEC, February, 2012

### Wetlands

The quality of CNY's wetland resources is quite good based on the NYS DEC wetland classification system which classifies wetlands according to their ability to perform wetland functions and to provide wetland benefits. The NYS DEC wetlands Classification system establishes four separate classes that rank wetlands in descending order from Class I to Class IV. 89% of the total wetland area in the five-county region is comprised of high quality, Class I and Class II wetlands (Table 9).

### Watershed planning

Watershed planning (Table 10) is typically undertaken voluntarily for the purpose of restoring or protecting community resources. For example, Lake Neatahwanta in the City of Fulton suffers from nutrient enrichment resulting in toxic blue-green algae, excessive aquatic vegetation, high phosphorus levels, and poor water clarity. To address these problems, residents and community leaders of the City of Fulton and Town of Granby formed the Lake Neatahwanta Reclamation Committee in 1989. The Committee released the Lake Neatahwanta Restoration Strategy in 2001, and has been key in overseeing the design and implementation of agricultural best management practices to reduce phosphorus inputs to the lake with funding from the U.S. EPA.

Oneida Lake is a renowned recreational resource and major asset to the local and regional economy. Oneida Lake is generally of good quality, but pressure from a number of sources threaten its ecological integrity and could undermine its value as a resource. The Oneida Lake and Watershed Protection Program, initiated in 1997 by CNY RPDB, pooled the resources

**TABLE 10**—CNY Watershed, Lake, and Stream Corridor Management Plans

Name	Date
Lake Como Watershed Management Plan	2007
Duck Lake Watershed Management Plan	2005
Oneida Lake Watershed Management Plan	2004
Cayuga Lake Watershed Restoration and Protection Plan	2001
Owasco Lake Watershed Management Plan	2001
Skaneateles Lake Watershed Management Plan	1998
Cazenovia Lake Management Plan	2009
Lake Moraine Management Plan	2002
Onondaga Lake: A Plan for Action	1993
Lake Neatahwanta Diagnostic Feasibility Study and Management Plan	1991
Otisco Lake Management Plan	In development due 2013
Onondaga Creek Conceptual Revitalization Plan	2009 (draft)
Sucker Brook Streambank Management Plan	2003

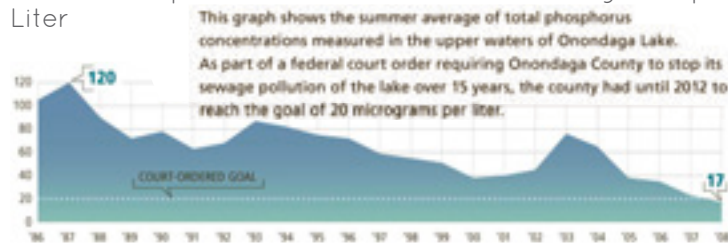
Source:

# THE ONONDAGA LAKE CLEANUP



Over \$1.3 billion has been invested in the remediation of Onondaga Lake including \$365 million by Onondaga County, \$160 million in Federal funds and \$30 Million in State funds for METRO upgrades, CSO elimination, treatment and storage facility construction and the County's Save the Rain program. Honeywell International has invested over \$700 million for wetland remediation projects, the construction of an underground barrier wall and groundwater treatment plant, and the recently initiated lake bottom dredge and cap project. Phosphorus discharges to the lake from METRO have decreased by more than 80% since 2005, and Ammonia discharges have been reduced by 98%.

**FIGURE 2**—Phosphorous Concentrations in Micrograms per Liter



Source: Update Freshwater Institute, Syracuse/The Post Standard

of citizens, local and state governments, and educational institutions from the 6-county watershed to form the Oneida Lake Advisory Council. Under their guidance, the Oneida Lake Management Plan was released in 2004. Since that time, the Advisory Council and numerous federal, state and local partners have implemented recommendations from the Plan, including invasive species control efforts, streambank stabilization projects, and public education programs. Improvement in several lake and watershed health indicators resulting from these efforts were documented in the CNY RPDB's 2011 "Oneida Lake Ecosystem Status Report".

In some instances, watershed planning is mandated. The Onondaga Lake planning effort originated in 1988 with a consent judgment against Onondaga County for violations of the Clean Water Act and NYS Environmental Conservation Law. The consent judgment required reductions in ammonia, phosphorus, floatables, pathogens discharged from the Metropolitan Wastewater Treatment Plant (METRO), combined sewer overflows, and other sources. In 1993, "Onondaga Lake: A Plan for Management" was released by the Onondaga Lake Management Conference, later known as the Onondaga Lake Partnership. The plan outlined a strategy for addressing the issues affecting Onondaga Lake.

Two decades later, Onondaga Lake has made a remarkable recovery resulting from major improvements at METRO and numerous projects to retrofit the County's sewage collection system including elimination of 22 combined sewer overflows, agricultural best management practices in the upper reaches of the watershed, and ongoing efforts of Honeywell International and others to remediate the industrial contamination in and around the Lake.

Implementation of many management plans is overseen by watershed stewards who act as an interface between the public and jurisdictional entities. Watershed steward programs have been established through

## COOPERATIVE WATERSHED PLANNING IN THE SKANEATELES LAKE WATERSHED

Skaneateles Lake is the primary drinking water source for the City of Syracuse and several neighboring communities. The watershed of the lake contains widespread agricultural use and low-density residential development. The Skaneateles Lake Watershed Agricultural Program (SLWAP) was established in 1994, as an alternative to a costly filtration system required by the 1986 Amendments to the Safe Drinking Water Act. SLWAP is a voluntary program that encourages whole farm planning and best management practices such as nutrient management and erosion and sediment control. The program is administered by the Onondaga County Soil and Water Conservation District. In addition to SLWAP, the Skaneateles Watershed Land Protection Program arranges for preservation of lands that are critical to maintaining the lake's water purity. Cornell Cooperative Extension of Onondaga County implements a comprehensive public education and outreach program. The result of these efforts is continued use of the lake for drinking water by over 200,000 people, and a savings of \$70 million in avoided cost for a filtration plant, along with another \$7 million annually that would have been needed to maintain the plant.

the City of Auburn to serve the Owasco Lake Watershed and through the Cayuga Lake Network to serve the Cayuga Lake Watershed. An Independent Environmental Monitor works under the direction of NYS DEC Region 7 to oversee Onondaga Lake remediation projects.

Public interest groups are also instrumental in advancing management plan objectives. The Oneida Lake Association (OLA) for example, actively addresses environmental issues impacting Oneida Lake including lake water levels, conservation legislation, public access, and water quality monitoring. The OLA was instrumental in securing funding for cormorant control programs and continues to seek long term cormorant control funding.





Electric car charging station

## Air Resources In Central New York

Air is an inexhaustible natural resource. It is essential for the survival of all living organisms on earth. The quality of air varies as the result of pollutants emitted in association with human activities such as energy generation, manufacturing, and transportation. Air pollution can harm human health, the environment and the economy in a variety of ways including increased incidents of respiratory and nerve damage, reduced agricultural and forest yields, and increased number of lost work days due to illness.

When air pollutants are deposited on the surface of the earth through acid deposition, they can result in acidification of lakes and streams, damage to sensitive forest soils and trees at high elevations, and accelerated decay of building materials and paints. The primary emissions responsible for acid deposition are sulfur dioxide (SO<sub>2</sub>) and oxides of nitrogen (NO<sub>x</sub>) from the combustion of coal, oil, and natural gas. SO<sub>2</sub> and NO<sub>x</sub> interact in the atmosphere to form fine sulfate and nitrate particles that can be transported long distances by winds, or penetrate indoor environments. Studies have identified a relationship between elevated levels of fine particles and increased illness and premature death from heart and lung disorders, such as asthma and bronchitis.

While the natural environment of the CNY region is not particularly sensitive to acidity because of limestone deposits and soils which neutralize the acid, many areas of the state including the Adirondacks, the Catskills, Hudson Highlands, Rensselaer Plateau and parts of Long Island are sensitive to acid deposition where soil and bedrock are not able to counteract the acid.

Air quality in Central New York is generally good as documented under the NYS Ambient Air Monitoring program at four CNY monitoring stations: western Oswego County (Fulton); Central Onondaga County (Syracuse and East Syracuse); and southern Madison County (Camp Georgetown). Monitored parameters are ozone, sulfur dioxide, inhalable particulates and carbon monoxide.

Ozone, measured at the Camp Georgetown, Fulton/Granby, and East Syracuse stations remained in compliance throughout the period 2009-2011, with values ranging from 0.061ppm to 0.073 ppm. The NYS DEC attributes Ozone attainment, and statewide air quality improvements to a number of statewide and regional initiatives, including vehicle exhaust emission controls, lower volatility fuels, industrial pollution source control and other measures that have reduced Ozone precursors.

Despite attainment, annual ozone values for CNY have been increasing since 2009, and came very close to reaching the non-attainment level of 0.075 in 2012. NYS DEC attributes this rise to conditions outside of regional control including the number of days with temperatures exceeding 80°F, and the transport of Ozone precursors from upwind sources including coal fired power plants located in the mid-west. The

**TABLE 11**—major air pollution emitting facilities in CNY that are monitored by NYS DEC and the US EPA

Nucor Steel Auburn, Inc	Sunoco Fulton Ethanol Plant
Owens-Brockway Glass Container, Inc (plant #35)	L & JG Stickley, Inc
Anheuser Busch Baldwinsville Brewery	General Chemical LLC
New Process Gear, Inc	Bristol-Myers Squibb Company
TGP Station 241 LaFayette	Interface Solutions, Inc
Novelis Corporation	Spear USA

Source: US EPA Air Markets Data Program, <http://ampd.epa.gov/ampd/QueryToolie.html>



**TABLE 12**—Ozone Data 2001-2011

Station	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Avg 2009-2011
Camp Georgetown (Madison Co) (Site 2655-01)	0.082	0.085	0.08	0.067	0.074	0.069	0.077	0.072	0.066	0.071	0.064	0.067
E. Syracuse (Onondaga Co) (Site 3353-09)	0.085	0.091	0.081	0.066	0.077	0.071	0.081	0.07	0.061	0.073	0.069	0.067
Fulton/Granby (Oswego Co) (Site 3754-01)	not avail	not avail	0.093	0.076	0.079	0.073	0.078	0.071	0.065	0.071	0.067	0.067
4th Highest Daily Maximum 8-Hour Average: Not to exceed an average of 0.075 ppm during the last 3 years												

Source:

**TABLE 13**—Sulfur Dioxide Data 2001 -2011

Station	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Camp Georgetown (Site No. 2655-01)	2.46	2.18	2.48	2.3	2.39	2.06	1.85	1.79	1.17	1.09	0.52
East Syracuse (Site No. 3353-09)	2.97	2.82	3.32	2.62	2.35	2.23	2.11	2.06	1.23	0.92	0.88
Annual averages 2001-2011 annual arithmetic mean (ppb) - Primary Standard (12-month average not to exceed 30 ppb)											

Source:

**TABLE 14**—Inhalable Particulate Data 2001-2011

Station	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
East Syracuse (Site No. 3353-09) Annual Mean (g/m3)	10.7	10.9	9.8	9.8	11.5	8	9.8	8.2	7.6	7.6	8.1
East Syracuse (Site No. 3353-09) 98th Percentile (g/m3)	35.3	38.5	22.7	24.6	34.8	19.2	31.5	22	21.2	22.5	24.1
Comparison Between NYS Ambient Air Quality and Ambient Air Quality Standards (Average of last 3 years= annual means not to exceed 15 g/m3 *; and average of 98th percentile.											

Source:

**TABLE 15**—Carbon Monoxide Data 2001-2011

Station	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Syracuse (Site No. 3301-22) highest 1-hr avg.	4.3	3.6	4.5	3	3.2	3.1	2.3	1.3	3.3	2.1	2.2
Syracuse (Site No. 3301-22) highest running 8-hr avg	2.5	2.4	2	1.6	2.3	2.1	1.3	1.1	1.3	1.5	1.4

Source:

U.S. Environmental protection Agency has indicated its intent to lower federal attainment levels. Because CNY's Ozone values are in the upper end of the currently acceptable range, the issue of ozone warrants continued and increased attention.

Sulfur dioxide levels were below threshold compliance levels throughout 2011 and have not exceeded the maximum allowed 30 ppb within the last 10 years. Inhalable particulate levels measured in East Syracuse remained within the compliance range throughout the previous three years (2009, 2010, 2011). Carbon monoxide levels monitored in Syracuse remained below the exceedance threshold throughout 2011. Annual arithmetic means values for CO at Syracuse have remained below 1 ppm for the past 10 years.

Carbon dioxide (ppm) One-Hour Average (Maximum not to exceed 35 PPM more than once per calendar year) and Running 8-Hr. Average, Non-Overlapping (Maximum not to exceed 9 PPM more than once per calendar year)

## Natural Resources In Central New York

### Forests

Although not evenly distributed, the combined urban and rural forest canopy of CNY covers approximately 44% of the region as shown in Figure 5. 98% of the forested area is privately owned. The largest stands of unbroken forest lands exist primarily in the Tug Hill region to the north, and in the Appalachian Uplands in the south. The top forest species are sugar maple, red maple, white ash, black cherry, hemlock, oaks, pines and other hardwoods. As these are not climax communities, the tree species will change and will affect the wildlife population over time.

In the deciduous forests, two major species of trees have virtually disappeared during the 20th century due to disease. The American chestnut and American elm both succumbed to fungal diseases. Other non indigenous species such as black locust and Norway maple were introduced and rapidly colonized the voids left in the deciduous forests. The recent arrival in NYS of the Emerald Ash borer, an invasive insect from Asia, virtually guarantees that ash trees, estimated to comprise between 8% and 20% of the regional forest canopy, will follow the same fate as the American chestnut and elm.

### Soils

Central New York soils are among the most productive and diverse in the state owing to the topological dichotomy between the Appalachian Plateau, the Lake Ontario Plain and the Tug Hill Plateau. Soil conditions range from alluvial bottomland soils and rich, saturated organic "muck" soils, to rich upland loams, and the rocky, nutrient-poor soils of Tug Hill. Soil fertility is generally the result of inheritance from the parent material. Sandy soils are derived from geologic material composed primarily of quartz which has no nutrient value. Silty and clayey soils may be derived from limestone or calcareous shales which are comprised of nutrient-containing minerals. Some of the most fertile soils are derived from limestone which produce phosphorus rich soils, such as those found throughout Central New York. The level of naturally occurring phosphorus in most CNY soils is sufficient to support turf growth without additional supplements.

Central New York's soil resources support a strong agricultural industry. In 2007, 30% of the region's total land area was classified as agricultural. Major farms in the region include dairy, livestock, fruit and vegetable. Major crops grown in the region include feed corn, oats, hay, onions, sweet corn and potatoes. The Madison and Oswego County mucklands are utilized for growing onions, sweet corn, and potatoes ([Table 16](#)).

### Minerals

The Marcellus Shale is a natural gas-bearing black shale formation underlying approximately 18,700 square miles in New York State ([Map](#)

**TABLE 16**—Central New York Agricultural Resources 2007

County	Number of Farms	Number of Acres in Farms
Cayuga County	936	249,476
Cortland County	587	124,824
Madison County	744	188,320
Onondaga County	692	150,499
Oswego County	639	100,195
CNY Total	3,598	813,314

Source: 2007 Census of Agriculture

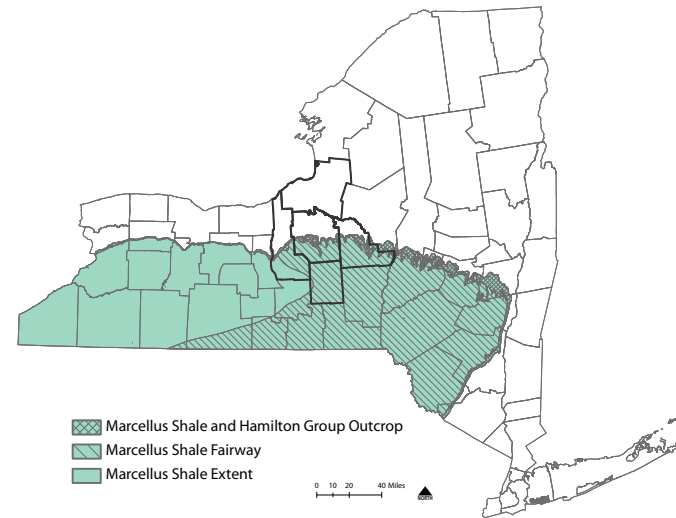
3). The Marcellus is exposed in outcrops to the north and east and reaches depths of more than 5,000 feet in the southern tier. In CNY, Marcellus Shale is present from Cortland County through the southern portions of Cayuga, Madison and Onondaga Counties. The maximum depth of the Marcellus shale across most of CNY is between 1,000 and 2,000 feet, although depths increase to more than 2,000 feet below the surface in southern Cortland County. Marcellus shale thicknesses range from 100 feet at the northernmost extent of the region, to as much as 200 feet in southeastern Cortland County. The formation is believed to contain nearly 500 trillion cubic feet of natural gas throughout its full extent, which continues south as far as Tennessee and Virginia and west into Ohio. Most of the natural gas that can be extracted is at depths of 2000 feet or more.

The Utica Shale (Map 4) is located a few thousand feet below the Marcellus Shale. The Utica Shale is thicker than the Marcellus and it is more geographically extensive underlying approximately 28,500 square miles in New York from the Adirondack Mountains to the southern tier and east to the Catskill front. Utica Shale ranges from less than 50 feet thick in north-central New York and increases eastward to more than 700 feet thick. The Utica Shale is exposed in outcrops along the southern and western Adirondack Mountains, and it dips gently south to depths of more than 9,000 feet in the southern tier of New York. [map]Utica shale underlies the entire five-county region.

The Utica Shale contains about 38 trillion cubic feet of undiscovered, technically recoverable natural gas (at the mean estimate). Undiscovered oil estimates range from 590 million barrels to 1.39 billion barrels (mean of 940 million barrels). The estimate of NGLs ranges from 4 to 16 million barrels (mean of 208 million barrels). The Utica Shale assessment covered areas in Maryland, New York, Ohio, Pennsylvania, Virginia, and West Virginia. (U. S. Geological Survey, 2012.)

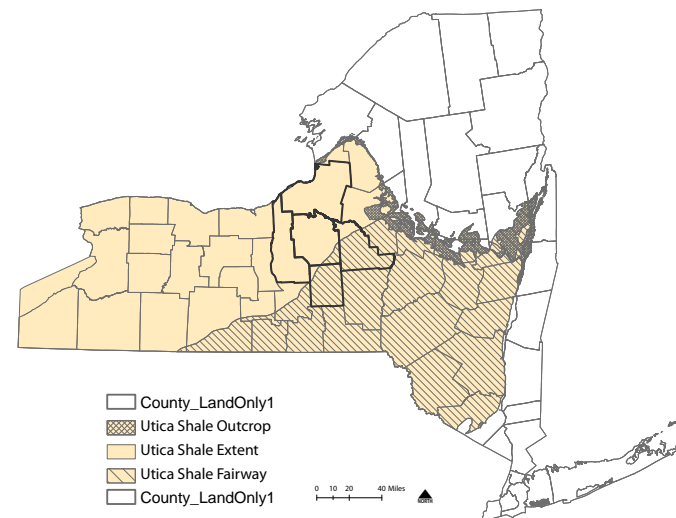
The gas potential in the Marcellus and Utica shale formations was evaluated based on analysis of geochemical data from rock core and outcrop samples using methods applied to other shale gas plays, such as the Barnett Shale in Texas. As a result of the evaluation process, the gas productive "fairway" for each of the formations was identified (Figures 6 and 7). The fairway represents the portion of the shale formation most likely to produce gas based on specific geologic and geochemical criteria; however, other factors, such as formation depth, make only portions of the fairway favorable for drilling. Operators consider a variety of these factors, besides the extent of the fairway, when making a decision on where to drill for natural gas. (NYS DEC SGEIS).

MAP 3—Marcellus Shale



Source: CNY RPDB

MAP 4—Utica Shale



Source: CNY RPDB

## *Fish and Wildlife*

Central New York offers a diverse and productive fishery from the Finger Lakes in the east, to Lake Ontario in the north, to the Susquehanna River in the south. The deep, cold waters of Lake Ontario produce record breaking Chinook and Coho salmon, brown trout, walleye and a broad range of panfish. The relatively shallow waters of Cazenovia Lake are renowned as

a productive largemouth bass, crappie and bluegill fishery. Otisco Lake's productive warm water fishery supports a healthy population of tiger muskies. Other notable natural fisheries located within the region include:

Cayuga Lake is particularly known for brown trout, lake trout and rainbow trout. Pickerel, large and small mouth bass and northern pike can be found in the warm and shallower areas of the lake. Pike, bass, bullhead and perch are

plentiful in the southern end of the lake.

The Salmon River in Oswego County s offers some of the finest sport fishing in the country. Two major fish records have been set in the Salmon River: the Great Lakes record Chinook salmon (47 lbs. 13 oz.) and the world record Coho salmon (33 lbs. 4 oz.).

Oneida Lake boasts one of the most productive fisheries in the northeast including the largest walleye population in NYS. Additional species include yellow perch, small and largemouth bass, catfish and brown bullhead. According to the Oswego County Office of Tourism, the lake provides anglers with more fish per acre than any other lake in the Northeast.

The natural productivity of the region's waterbodies is supplemented through stocking programs run by the State and Onondaga County. There are three active fish hatcheries in the region:

Oneida Hatchery is located in the Village of Constantia in Oswego County, on the north shore of Oneida Lake. The rearing program is focused on walleye, and includes egg collection from Oneida Lake, and stocking of millions of walleye fry and fingerlings. Experimental culture of rare or threatened fishes, such as round whitefish, lake sturgeon and paddlefish, also occurs here. Annual fish production is about 6,000 pounds.

Salmon River Hatchery located in the Village of Altmar in Oswego County, is the mainstay of DEC's stocking program for Lake Ontario and Lake Erie. The hatchery attracts up to 500,000 visitors annually, many of whom come to watch egg collections from steelhead, Coho salmon and Chinook salmon returning to the hatchery. Annual fish production totals 120,000 pounds.

Carpenter's Brook Fish Hatchery located in the Town of Elbridge in Onondaga County, is one of only four county run hatcheries in the state. Carpenter's Brook has been in continuous operation since its inception in 1938 and produces over 80,000 Brook, Brown and Rainbow Trout annually.

The fisheries of Central New York support a thriving tourism and sport fishing industry that is critical to local economies. In 2006, New York resident anglers alone spent \$104 billion and the fishing industry supported 16,500 fishing related jobs statewide (USFWS, 2006).

The topography, land cover and climate of Central New York provides a diverse range of habitats utilized by a wide variety of wildlife species. The region has healthy white tail deer and turkey populations, as well as a number of black bears, primarily in the southern tier. Fox, beaver, muskrat and an occasional bobcat can be found throughout the region. The Federally endangered Indiana Bat is known to winter in Onondaga County. A pair of peregrine falcons nest in Syracuse and have produced more than 20 young over the past several years. The region is the only known location of the endangered Chittenango Ovate Amber Snail. There are several bald eagle nests throughout the region, and in recent years many eagles have been seen wintering along the shores of Onondaga Lake.



## Conservation Resources

### *State Forests*

Much of the CNY region was cleared for farming during the 18th and 19th centuries and has since reverted back to forest land naturally or through state reforestation efforts. Turn of the century reforestation efforts were undertaken to combat the effect of aggressive commercial timber harvesting operations that threatened to deplete the state's timber stock within 50 years. These efforts were later expanded to include a massive tree planting program to restore abandoned farm lands for watershed protection, flood prevention and future timber production. Many of the early reforestation areas were established on some of the least productive land in the state. Today, these areas are covered with healthy forests. Currently, there are 156,297 acres of conserved land in the region, including 48 State Forests and 11 wildlife management areas as shown in Figure 8 and listed in Appendix A. State Forests are multi use areas that are actively managed to improve ecosystem health and enhance habitat, biodiversity, landscape ecology, and carbon sequestration.

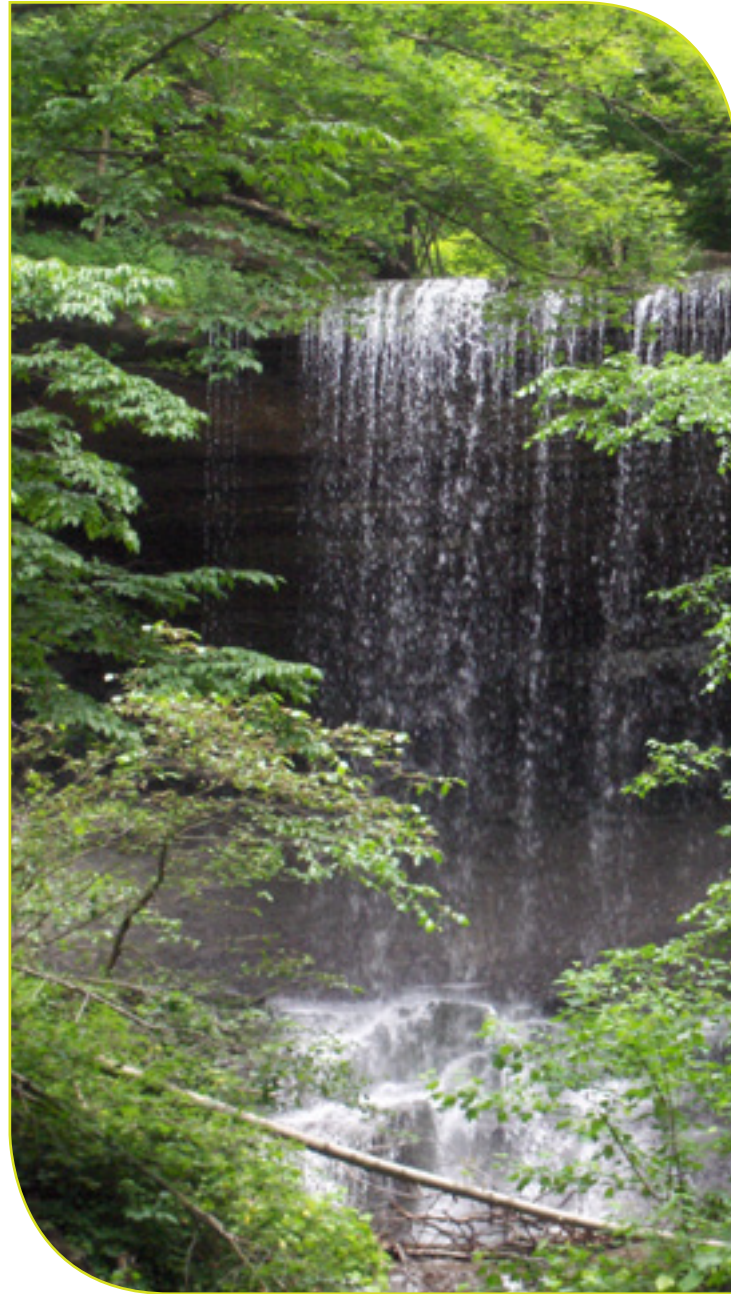
### *Wildlife Management Areas*

There are 11 NYS Wildlife Management Areas (WMAs) located in the region. The WMA program is part of a long term effort to establish permanent access to public lands in NYS for the protection and promotion of its fish and wildlife resources with an emphasis on game species. WMAs are also utilized for logging following NYS DEC forest management objectives.

Although municipal governments do not have direct control of these state owned lands, they may be able to use them in their planning efforts to create greenways, biological corridors and recreational trails. Refer to [Table 17](#) for the names and locations of WMAs in Central New York.

### *Unique Natural Areas*

CNY is home to four Unique Natural Areas (UNAs) as summarized in Table 20. UNAs are locally designated sites that are recognized because of the outstanding qualities that render them unique and deserving of preservation in a natural state. UNAs can lie on both public and private land and are generally not open to the public as the characteristics that make these sites unique are extremely vulnerable to a wide range of impacts and may be compromised by even minor site disturbances ([Table 18](#)).



[Caption]

**TABLE 17**—CNY Wildlife Management Areas

Name	Location	Size
Cross Lake Islands	Cayuga County	27 Acres
Northern Montezuma	Cayuga County	7,500 Acres
Tioughnioga	Madison County	3,803 Acres
Cicero Swamp	Onondaga County	4,947 Acres
Hamlin Marsh	Onondaga County	1,689 Acres
Three Rivers	Onondaga County	3,586 Acres
Curtiss Gale	Oswego County	47 Acres
Dale Creek Marsh	Oswego County	1,770 Acres
Happy Valley	Oswego County	8,895 Acres
Little John	Oswego County	7,912 Acres
Three Mile Bay/Big Bay	Oswego County	3,966 Acres

Source: NYS DEC Wildlife Management Areas in DEC Region 7

**TABLE 19**—Central new York Critical Environmental Areas

Critical Environmental Area	Location	Reason for Designation
Homer Public Water Supply Source	Town of Homer, Cortland County	Aquifer protection/public water supply source protection
City Water Works	Cortland City, Cortland County	Sole source aquifer protection
Groundwater Protection Overlay District	McGraw Village, Cortland County	provide groundwater protection
Portions of Nine Mile Creek	Camillus Town, Onondaga County	Not available
Onondaga Escarpment Nature Corridor	Manlius Village, Onondaga County	Karst topography
Sandy Ponds	Sandy Creek Town, Oswego County	Barrier dunes, wetlands protection

Source: NYS DEC Critical Environmental Areas by County, <http://www.dec.ny.gov/permits/6184.html>

**TABLE 18**—Central New York Unique Natural Areas

UNA	Location	Unique Features
Camillus Unique Area	Camillus Town, Onondaga County	145 acres of open fields, 135 acres of early successional trees and shrubs, 38 acres of old forest, and 18 acres of mature mixed tree species
Labrador Hollow Unique Area	Towns of Fabius and Truxton on the borders of Onondaga and Cortland County	Rare plant life, scarce animal habitats, unique topography, 100 acre pond
Nelson Swamp Unique Area	Towns of Cazenovia, Fenner and Nelson in Madison County	400 species of vascular plants including the endangered striped coral root and threatened spreading globeflower, 105 species of breeding birds
Salmon River Falls Unique Area	Orwell Town, Oswego County	110 foot waterfalls and 3,000 foot long gorge, 4 distinct plant communities

Source: NYS DEC, List of State Forests by Region, <http://www.dec.ny.gov/lands/34531.html>

### **Critical Environmental Areas**

There are 6 Critical Environmental Areas located in Central New York as summarized in Table 21. Under the NYS Environmental Quality Review Act (SEQRA), local agencies may designate areas within their boundaries that have an exceptional or unique character as Critical Environmental Areas (CEAs). CEA designation provides some regulatory protection for a site and functions as an indicator for developers, local officials and other governmental agencies that the site is of significant environmental value. There are 6 CEAs in the region (Table 19).

### **Challenges, Issues and Opportunities**

The natural resource base in Central New York is currently strong and resilient; however, it also subject to stresses and threats that must be continually guarded against.

Although the supply of freshwater is not an immediate issue in CNY, it is a finite resource that must be used wisely and protected against unnecessary loss. Water loss due to aging and poorly maintained infrastructure is a concern. Many drinking and wastewater systems in CNY have reached or exceeded 100 years of age and are still utilizing some of their original infrastructure. Infrastructure related water loss is made worse by normal CNY climate related factors, including snow load, ice formation and freeze/thaw cycles. It is believed that substantial water loss reductions can be achieved through enhanced leak detection and slip line repair programs.

Aging wastewater and drinking water systems account for approximately 3-4 percent of energy use in the United States, adding over 45 million tons of greenhouse gases annually. Further, waste water and drinking water plants are typically the largest energy consumers of municipal governments, accounting for 30-40 percent of total energy consumed. Energy as a percent of operating costs for drinking water systems can also reach as high as 40 percent and is expected to increase 20 percent in the next 15 years due to population growth and tightening drinking water regulations. By determining baseline energy use, wastewater, and water, utility managers and operators can better understand their electricity provider's rate structure and how their current operations impact energy costs within that structure. Further, energy-intensive processes such as pumping and aeration can be identified and prioritized for improvement.

Wastewater and clean water utilities face an increasingly complex landscape. Some recent challenges that are likely to persist into the foreseeable future include tight budgets, revenue that is flat or decreasing

as a result of water use rates that fail to reflect the true cost of providing and treating water, increasing regulations about environmental discharge qualities, including TMDLs and regulations for pharmaceuticals and personal care products, and the need to communicate with the public being served, including public messaging in the face of rate pressures. Additional transient issues may arise that require new efforts, such as security concerns and emergency planning post 9/11. Addressing these regulations can be challenging, especially in light of the inability to fund needed system upgrades through the SRF. Until adequate financial resources are available, regional collaboration may help utilities to efficiently address a variety of these challenges.

The potential for new or increased consumptive water use may result in additional stresses on existing water resources. Improvements in the use of hydraulic fracturing technology in combination with horizontal drilling techniques greatly increased the accessibility of the Marcellus Shale as a resource for natural gas exploration. Recent construction of the Millennium Pipeline through the Southern Tier of New York State has increased the interest and potential economic viability of developing the Marcellus Shale as a natural gas source. The volume of water needed to hydraulically fracture single deep shale well is estimated to be between two and five million gallons and is acquired from local surface and ground sources.

Once the formation is fractured, the fracturing fluids (water and chemical additives) are returned back to the surface for storage, recycling or treatment before being discharged back to the environment. Currently, wastewater treatment plants in NYS are not equipped to treat the residual additives and naturally occurring byproducts contained in the return water. It should be noted that the US EPA estimates between 15% and 80% of the volume of fracturing fluids are not recovered. As with any industrial activity, potential contamination risks to surface and groundwater resources exist at various points in the hydraulic fracturing process. These include impacts from accidental spills, improper treatment and disposal of wastewater as well as unintended impacts of water withdrawals on municipal supplies and riparian habitats during periods of seasonal low flows.

AS NYS DEC continues to develop statewide regulations regarding the use of hydraulic fracturing practices to mine shale gas in NYS, municipalities have an opportunity to document their existing resources and infrastructure, and to examine their local codes and ordinances to ensure that their long term interests are reflected in advance of potential major industrial activity.

## ONONDAGA COUNTY SAVE THE RAIN PROGRAM

The Save the Rain program, launched in 2010 by County Executive Joanie Mahoney, is a comprehensive plan to cleanup and restore Onondaga Lake. The program includes construction of traditional gray infrastructure projects and the development of an innovative green infrastructure plan to reduce the effects of storm water pollution to the Lake and its tributaries by capturing 95% of existing stormwater runoff.

The Save the Rain program is a multi-faceted program that incorporates several components:

Rain Barrel Program provides free rain barrels to homeowners in the City of Syracuse. The County has distributed over 600 rain barrels that will capture an estimated 2.1 million gallons of stormwater annually.

Green Improvement Fund provides financial incentives to encourage the installation of Green Infrastructure in new and redevelopment projects on private property in CSO sewersheds within the City of Syracuse. In 2011, the County exceeded its goal by implementing 60 projects. Combined, those projects are expected to capture 43.6 million gallons of stormwater annually.

Suburban Green Infrastructure Program provides grants to suburban communities in the County sanitary sewer district to implement projects to reduce inflow and infiltration into the sanitary sewer system. In 2012, the County awarded \$3 million in grants to 12 suburban communities that will capture 38.19 million gallons of stormwater.

Urban Forestry Program aims to develop a robust strategy for planting 8,500 trees over the life of the program in neighborhoods throughout the City of Syracuse. In 2011, 407 trees were planted that will capture 814,000 gallons of stormwater annually.

Because Save the Rain has been so successful, the County anticipates meeting its stormwater capture requirements ahead of schedule. Additional benefits of the program include an projected energy cost savings of \$20m by avoiding pumping and treating stormwater like sewage and an increased in landscaped green space within the urban environment of the City of Syracuse.

Excess stormwater runoff volumes due to high level of impervious surface area in urbanized areas of the region is a leading contributor to water quality impairments. High stormwater volumes and flow rates erode stream channels and banks. Introducing additional wet weather flows to combined sewer systems increases the occurrences of overflows which introduce pathogens, floatables and additional nutrients directly to surface waters in the form of raw sewage.

Opportunities to reduce stormwater runoff at the source through infiltration, stormwater capture and storage exist throughout the region. Referred to as Green Infrastructure, structural and non-structural practices and wetland restoration efforts that use or mimic natural process to infiltrate, evapotranspire, or reuse stormwater where it falls keeps rainwater out of the sewer system, thereby reducing the number of sewer overflows and the amount of untreated runoff discharged to surface waters.

Increasingly, green infrastructure techniques and technologies have been identified as best management practices at the local level, particularly in combination with traditional grey infrastructure, to achieve greater urban sustainability and resilience. For green infrastructure to be successful, it must be addressed at all scales, from the site specific and neighborhood, to the regional and watershed levels. It is important not to look at green infrastructure techniques in isolation, but to focus on their integration with grey infrastructure investments as a unified network that will deliver sustainable, cost effective benefits at scale over time. The Onondaga County Save-the-Rain program provides excellent examples and templates for implementing simple and complex green infrastructure stormwater management practices at all scales.

The benefits of green infrastructure extend beyond improvement and protection of water resources. By reducing the amount of impervious surfaces through the use of tree plantings and green roofs, it is possible to reduce local air pollution levels while simultaneously achieving other environmental and sustainability goals. Green roofs can filter air pollutants "including particulate matter (PM) and gaseous pollutants such as nitrogen oxide, sulfur dioxide, carbon monoxide, and ground level ozone. Researchers estimate that at 1,000 square foot green roof can remove 40 pounds of PM from the air annually, while also producing oxygen and removing carbon dioxide. Forty pounds of PM is roughly equivalent to the annual emissions of 15 passenger cars. The temperature benefits of green roofs extend to climate change mitigation as well. Vegetation and the growing medium on green roofs also can store carbon. Modeling has determined that green roofs may reduce building energy use for





[Caption]

electricity consumption by 2 – 6% over conventional roofs, particularly for summer cooking. Carbon sequestration is estimated at 375 grams per square meter for green roofs. (Center for Clean Air Policy, 2011)

The 60,000 square foot green roof at the OnCenter in Syracuse is one of the largest in the Northeast region. This self-sustaining system relies upon natural processes to retain and evapotranspire stormwater runoff and required little maintenance

Despite the numerous benefits green infrastructure can provide, many barriers continue to inhibit its wide-scale implementation, including: deficiency of data demonstrating benefits, costs, and performance; lack of codes and ordinances that facilitate the design, acceptance, and implementation of green infrastructure; insufficient data and information regarding ongoing maintenance and operation costs and economic benefits; lack of funding coupled with poor coordination or integration of programs at all levels.

Soil quality is at risk from a number of threats driven by a range of man-made and natural pressures including climate change, land use change and land management practices. Once soil is damaged or contaminated it can be extremely difficult or impossible to restore. Construction development and agricultural activities that disturb soil surfaces can lead to compaction and expose soils to the erosive effects of wind and rain. Soil loss from agricultural operations is cited as a primary contributor to

TABLE 20—CNY AEM Participation 2007

County	Number of Farms	Farms Enrolled in AEM (number)	Farms Enrolled in AEM (percent of county total)
Cayuga	936	397	42.4
Cortland	587	367	62.5
Madison	744	300	42.9
Onondaga	692	252	36.4
Oswego	639	106	16.5

Source:

regional water impairments including nutrient enrichment, sedimentation, aquatic habitat loss and turbidity. Conservation agricultural practices such as planting cover crops and utilizing no-till planting techniques are touted as being among the most important ways that farmers can help protect water resources from the impacts of nonpoint runoff while protecting and improving soil structure and productivity. Agricultural environmental management programs support the development and implementation of whole farm plans. Opportunities to expand access to on- farm planning and technical assistance programs have the potential to generate substantial water quality improvements while protecting and improving CNY's important soil resources.

Agriculture continues to contribute to water impairments including nutrient enrichment, turbidity, and toxicity and reduced dissolved oxygen rates. Several federal, state and local programs are in helping to address these problems at the source.

The Agricultural Environmental Management (AEM) program is funded by NYS Department of Environmental Conservation (NYS DEC) through the NYS Soil and Water Conservation Committee. AEM is a voluntary, incentive-based program that helps farmers make cost-effective, science-based decisions that meet business objectives while protecting and conserving the State's natural resources. Farmers work with local AEM resource professionals to develop comprehensive whole farm plans using a tiered process:

**Tier 1** – Inventory current activities, future plans and potential environmental concerns.



**Tier 2** – Document current land stewardship; assess and prioritize areas of concern.

**Tier 3** – Develop conservation plans addressing concerns and opportunities tailored to farm goals.

**Tier 4** – Implement plans utilizing available financial, educational and technical assistance.

**Tier 5** – Evaluate to ensure the protection of the environment and farm viability.

Participation in the AEM program is strong as summarized in [Table 20](#); however, because AEM maintains a strong focus on dairy farms, participation in Oswego County is relatively low due to the high concentration of fruit and vegetable farms.

The Conservation Reserve Enhancement Program (CREP) is a joint program of the USDA Farm Service Agency and the NYS DEC that addresses significant agricultural related environmental problems. Participants receive financial incentives to voluntarily remove marginal pastureland or cropland from agricultural production and convert it to native grasses, trees and other vegetation, thereby reducing erosion, improving water quality and increasing wildlife habitat. Approximately 30 million acres of land in NYS is enrolled in CREP.

Due to the rural nature of most farm operations, many rely on groundwater for their potable water supply. Contamination of groundwater by accidental spills is a major concern in all settings due to the difficulty and cost associated with groundwater remediation. The Wellhead Protection Program (WPP), created by the 1986 Amendments to the Safe Drinking Water Act, protects ground water sources and wellhead areas that supply public drinking water systems from contamination. New York's approach to wellhead protection incorporates several federal, state and county groundwater protection programs. In 1998, the administration of WPP was transferred from the NYS DEC to the NYS Department of Health (DOH) and integrated with the DOH's Source Water Assessment Program. The Source Water Assessment Program provides information on the potential threat of contamination to both ground water and surface water sources that supply New York's public drinking water systems. The NYS DEC retains the lead responsibility for several key wellhead and source water protection programs.

Eighty- nine percent of the forested land in Central New York is in private ownership, which presents a number of challenges to resource managers that are concerned with maintaining cohesive, well functioning forest ecosystems. Stewardship efforts must be of sufficient scale to target large

numbers of independent landowners responsible for managing small woodlots. Compared to owners of large tracts, owners of small forest parcels are less likely to manage their forests or allow access to their land by others for activities such as hiking, hunting, and fishing and are less likely to seek professional assistance regarding all aspects of forest management (Community and Rural Development Institute at Cornell University, 2007). When forest owners fail to actively manage their lands, or act without adequate knowledge and awareness of the environmental and ecologic impacts of their actions, the health and sustainability of forestland is threatened.

Numerous studies have linked forest health to carbon absorption and recovery rates. Healthy, actively managed forests absorb carbon more quickly and efficiently than mature trees. It is estimated that through intelligent forest management principles and practices that emphasize thinning, restoration and replanting, nationally, our forests could offset 1.6 billion tons of CO<sub>2</sub> per year.

Biomass energy, harvested from the region's forests has the potential to provide an important source of renewable energy. To effectively develop this energy sector will require changes to both public policy and private management practices. Biomass energy is a diffuse resource growing over a dispersed area. Use in large central facilities requires consolidation and transportation of fuel which can reduce the overall efficiency of the resource. The most energy efficient use for biomass in general is thermal energy at the community scale, where local wood resources are produced and used to provide local energy, and at heat-led combined heat and power (CHP) operations of a scale that can be accommodated by the resource. Directing biomass into appropriately scaled applications such as heat for schools, hospitals, office buildings, and district heating systems is essential for creating a wood-energy economy that is flexible and resilient over time. Biomass also has the potential for high efficiency use at industrial applications that are large heat and electricity users. Producing biomass through an array of appropriately scaled and local chip and pellet plants is also a critical component of a wood-energy supply chain and a dynamic and resilient local wood-energy economy.

Currently, it's estimated that fewer than 24,000 jobs rely on raw wood material from New York State's forests. Within the 5-county region, there are only 10 primary wood products companies in operation including Baldwin Lumber in Cayuga County, Dutchess Lumber in Cortland County, Johnson Brothers Lumber in Madison County, Paradise Milling in

Onondaga County, and Shutts Lumber in Oswego County (Directory of Primary Wood Using Industry in NYS, 2009).

There are 34 secondary wood products companies in the 5-county region producing products that include cabinets, trusses, flooring, moulding, wood stove fuel pellets, pallets and toys. Secondary wood products companies include Universal Forest Products- Auburn in Cayuga County, McGraw Box Co. in Cortland County, Madison County Woodwork in Madison County, L. &J.G Stickley in Onondaga County and Harden Furniture in Oswego County. (Directory of Secondary Wood Using Industry in NYS, 2009).

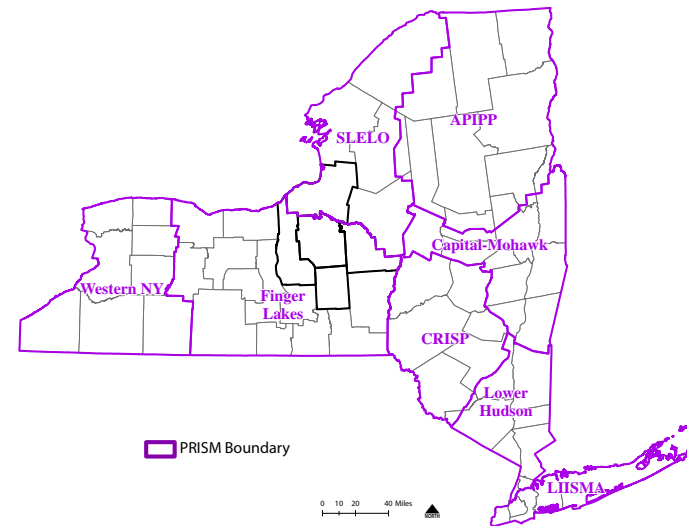
Opportunities to improve forest health and productivity in support of environmental and economic sustainability exist throughout the region, but require a renewed focus on land owner education and providing access to low cost professional forest management assistance for private landowners.

The rate of invasion is increasing at an alarming rate in response to the increase in international trade that accompanies globalization. Invasive species cause harm to the environment and/or human health and put at risk economically important industries including farming, forestry, tourism, and commercial and recreational fishing. Invasive species are expensive to manage or eradicate and cost taxpayers millions of dollars each year. Nationally, the impact of invasive species is estimated at \$167 billion annually. Central New York has seen the economic and environmental impacts that invasive species can have. It is estimated that in Cayuga Lake alone, the cost to manage hydrilla, an aggressive and fast spreading aquatic invasive plant, will be approximately \$5 to \$8 million.

Prevention is the first line of defense against invasive species. Prevention efforts must have the coordinated support of federal, state and local agencies, industry and other interested parties. The 2011 NYS Invasive Species Management Strategy calls for the development of an adaptive, statewide invasive species management plan that includes the establishment of eight Partnerships for Regional Invasive Species Management (PRISMs).

The goal of the PRISM program is to manage invasive plants, animals and pathogens using an integrated approach of protecting or restoring desired native communities through education, early detection and eradication, and management. The CNY region lies within both the Finger Lakes and St. Lawrence Eastern Lake Ontario PRISM regions (Map 5). Funding to fully administer and coordinate regional PRISMs was

MAP 5—PRISM Boundaries



Source: CNY RPDB

largely unavailable for the first several years of the program. As a result, the full potential of this effort has yet to be realized.

The NYS Invasive Species Prevention Act signed into law in 2012 will become effective in January, 2014. The Act is designed to slow the spread of invasive species and protect non-infested areas from infestation by requiring the NYS DEC and the NYS Department of Agriculture and Markets to develop regulations for the sale, purchase, possession, introduction, importation and transport of invasive species.

## GOALS, STRATEGIES AND RECOMMENDATIONS

The primary goal in support of sustaining CNY's environment is to conserve and protect the quality of the region's water, air, land and wildlife resources without compromising the ability to meet current and future resource dependent needs.

**Targets:** The region's goal for the Natural Environment is long-term and multi-faceted. Its success therefore cannot be easily measured in its entirety at any single point in time. To assess the region's progress toward attaining this goal, CNY RRPDB established the following measurable, sustainability targets:

- + Reduce per capita consumptive water demand 3% annually through 2030
- + Reduce the annual frequency of combined sewer overflow occurrences by reducing 25% of the current stormwater runoff volume from existing development within 5 years
- + Reduce 20% of the waterbodies currently impaired by nutrients and/or sediment

**Strategies:** To achieve this goal, the following strategies should be employed:

- a. Utilize and replicate natural systems in support of critical infrastructure services to protect and improve water quality.
- b. Utilize green Infrastructure to improve air and water quality and to reduce 25% of the current stormwater runoff volume from existing and new development within 5 years.
- c. Implement targeted infrastructure improvements for pollution sources known to impact impaired water bodies in CNY.
- d. Protect prime agricultural soils and reduce nutrient and sediment runoff from agricultural lands by expanding and improving access to existing effective agricultural support programs.
- e. Reduce consumptive water use by 5% within 5 years.
- f. Enhance the health, diversity and resiliency of regional forest resources.

g. Ensure natural resource managers have the tools to effectively meet their responsibilities.

### Project Recommendations

The following project recommendations are made to advance the identified environmental protection strategies:

1. Implement constructed wetland projects to treat septic leachate and other sources of nutrient loading in unsewered lakefront communities such as Duck Lake, Pleasant Lake and Song Lake.
2. Implement a program to demonstrate the effectiveness of using constructed wetlands/trickling filters at municipal landfills such as Belle Isle Landfill in the Town of Camillus.
3. Restore and utilize natural wetlands complexes on Nine Mile Creek to provide additional treatment of municipal wastewater effluent from the Marcellus W/WTP prior to reaching Onondaga Lake.
4. Implement the City of Fulton's lake bottom dredge project to reestablish the flow of natural springs in Lake Neathawanta.
5. Install bioretention, water quality swales and pervious pavement to reduce runoff from approximately 40 acres of developed land that is contributing to sanitary overflows in the Bayberry neighborhood of the Town of Clay.
6. Implement a combined residential rooftop disconnect and bioinfiltration project to treat stormwater runoff from approximately 100 acres in the Lake Oneida Beach West community of the Town of Sullivan.
7. Implement all green streets aspects of the "Green Gateway to the City of Oswego" program in support of the city's ongoing combined sewer separation program.
8. Implement unfunded Inflow and Infiltration projects as identified on the NYS CWSRF IUP to address overflows from the East Sullivan Sewer Districts.
9. Construct linear bioinfiltration filters in the vicinity of the Onondaga Lake Marina, and parking lot infiltration projects in

the vicinity of the Willow Bay entrance to Onondaga Lake Park to improve drainage and reduce the volume of untreated stormwater runoff entering Onondaga Lake.

- 10.** Implement commercial parking lot PILOT programs to incentivize the reduction of impervious surfaces in urban areas by 15% over the next 10 years
- 11.** Expand cover crop and no-till technical assistance programs in priority watersheds such as Owasco, Skaneateles, Otisco, and Oneida Lakes and the Tioughnioga and Seneca Rivers.
- 12.** Establish annual small farm enrollment targets as a percentage of funding available for county Agricultural Environmental Management (AEM) programs.
- 13.** Promote EPA's "Water Sense" program and implement a sliding scale residential subsidy program to encourage voluntary participation.
- 14.** Reduce the City of Syracuse's daily water demand by approximately 47% through a dedicated leak detection and line repair program that utilizes slip line technology.
- 15.** Implement a two-phased water rate restructuring program to promote conservation and more accurately reflect the true cost of water collection, treatment and delivery. Phase one to consist of three-year public outreach and education program to improve understanding and support for water use rate modifications as a means of supporting long term maintenance and infrastructure needs; Phase two to include equitable modification of user fee structures.
- 16.** Provide enhanced training for local code enforcement officials in support of grey water recycling.
- 17.** Establish a forest landowner outreach program to encourage private forest management planning for multiple benefits.
- 18.** Establish a uniform riparian buffer standard for publically owned properties in urban and suburban centers that defines minimum canopy coverage, understory densities and species diversity

requirements. Increase urban and suburban riparian buffers as defined by these standards by 5% annually.

- 19.** Establish an inter-county commission to develop a regionally coordinated Emerald Ash Borer response program, including a proactive removal and replacement program that adheres to species diversity standards for urban and suburban forests.
- 20.** Provide enhanced technical assistance in support of modifying local planning codes and zoning ordinances that prohibit or impede green infrastructure implementation.

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