

Water Quality Strategy

Madison County

New York

**Madison County
Water Quality Coordinating Committee**



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January 2011

Members of the Madison County Water Quality Coordinating Committee contributed to this report. The Central New York Regional Planning and Development Board (CNY RPDB) compiled and edited the narrative, designed the publication layout, and provided the cover photograph. The Madison County Planning Department generated the GIS maps and the restaurant placemat. For publication corrections or updates, contact Anne Saltman (CNY RPDB) at asaltman@cnyrpdb.org. For questions about the Water Quality Coordinating Committee, contact Steve Lorraine (SWCD) at steve-lorraine@verizon.net.

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I INTRODUCTION

The 2011 Madison County *Water Quality Strategy* is designed to provide an overview of the environmental setting, identify priority water resource issues of concern, and present goals and objectives for water resource protection. The report is an update of conditions and goals that were last published in the *2001 Madison County Water Quality Strategy*. It serves as a guidance tool for prioritizing and implementing water quality programming in the county. Specific issues of concern have changed since 2001, but the overall focus of county-wide efforts - that being the control of non-point source pollution and protection of water quality in local lakes and streams - remains the same.

A comprehensive list of county-wide issues of concern is found on page 15, followed by a list of water resource priorities on pages 16 and 17. Phosphorus and sediment loading from agricultural and urban land use and the control of stormwater runoff remain a primary focus for the Madison County Water Quality Coordinating Committee (WQCC). Aquatic invasive species and water quality concerns from gas well drilling (hydraulic fracturing) are additional county-wide priorities.

Water Quality Coordinating Committee

The Madison County Water Quality Coordinating Committee (WQCC) is comprised of government agencies, private organizations, lake associations, and individuals with an interest in water resources. This WQCC and similar groups throughout New York State were originally formed in 1993 using guidelines prepared by the NYS Department of Environmental Conservation and the NYS Soil and Water Conservation Committee.

The primary mission of the WQCC is to protect and improve water resources in Madison County by sharing information and resources. The committee meets six times a year and the participating representatives collaborate on county-wide water resource issues and priority waterbodies. WQCC meetings also provide an opportunity for members to share information and maintain open lines of communication. The WQCC does not report directly to any legislative body in the county but many of its participants report to their respective boards, agencies, and/or the Madison County Board of Supervisors.

WQCC membership is voluntary and meetings are open to the public. The core participants of the Madison County WQCC include the following:

- ◆ Madison County Soil and Water Conservation District (<http://www.nys-soilandwater.org/>)
- ◆ Madison County Planning Department (<http://www.madisoncounty.org/planning.php>)
- ◆ Madison County Health Department (<http://www.healthymadisoncounty.org>)
- ◆ Central New York Regional Planning and Development Board (<http://www.cnyrpdb.org/>)
- ◆ USDA Natural Resources Conservation Service (<http://www.nrcs.usda.gov/>)
- ◆ USDA Farm Services Agency (<http://www.apfo.usda.gov/FSA/>)
- ◆ Madison County Federation of Lake Associations
- ◆ Lake Moraine, Craine Lake, Eatonbrook Reservoir, Cazenovia Lake, and Lebanon Reservoir

II ENVIRONMENTAL SETTING AND CULTURAL INFLUENCES

Madison County encompasses 661 square miles and is located approximately 20 miles from both Syracuse and Utica. The County is divided into two physiographic regions. The Oneida Lake Plain in the north has a level to gently rolling topography. Remaining portions of the County consist of rolling hills and deep, steep-sided valleys of the Appalachian Uplands. The County is bordered on the north by

Oneida Lake and there are 14 inland lakes, most of which have active associations or homeowner groups. Six of the waterbodies are reservoirs built during the early to mid-1800's to serve as water supplies for the Erie and Chenango Canals. Information about Madison County lakes is summarized in Appendix A.

This region was originally a part of the territory of the Six Nations of the Iroquois and the area of Madison County was primarily occupied by the Oneida Nation. In 1788, New York bought from the Iroquois a large tract of land located on either side of the Chenango River. After surveying and dividing this tract, called the Chenango Twenty Towns, the land was sold at public auction. Beginning in 1795, New York State began purchasing Oneida Indian land between Oneida Lake and the Twenty Towns, until most of the Oneidas finally left New York for Wisconsin around 1840.

Madison became a part of Herkimer and Tioga Counties in 1791. It then became a part of Chenango County from 1798 until 1806, when it was set off as a separate entity. Named for President James Madison, the county was first comprised of five towns. By 1896 the final boundaries of the towns were drawn and in 1901, Oneida became a city. Madison County now contains one city, fifteen towns and ten villages (Appendix E). Additional information about local history is found in Appendix F.

Madison County's current economy is based primarily on agriculture and employment in the agricultural sector accounts for 4 percent of total employment for the County. The service, wholesale, and retail trade sectors have grown in importance in the past several years and the proximity to Syracuse and Utica provide employment opportunities to Madison County residents.

According to the U.S. Bureau of the Census, the population in Madison County in 2000 was 69,441 and the median age was 36. There were 25,368 households in 2000 with 2.5 people per household. The median household income in 2008 was \$51,166 and 13.6% of the population lived below the poverty level.

Approximately thirty-five percent of the County's land use is classified as agriculture (Appendix E) and there are approximately 744 active farms. Dairy farming is the primary form of agriculture, and the County is ranked 14th in total dairy production for New York State. The horse industry is also becoming well established and farms now support both racing and pleasure horses. About 2,500 acres of muck land in the northern part of Madison County produce potatoes and onions and various additional cash crops. The average farm size is approximately 253 acres.

III. DRINKING WATER

There are three distinct geographic regions in Madison County, each with its own qualities that affect drinking water. The uplands region is located in the southern part of the county and has glacially deposited soils. The lake plain region in the north is characterized by flat land, lake-laid soils, and poor yielding aquifers. The escarpment is located between the uplands and the lake plain and is characterized by shallow soils over limestone bedrock that is prone to groundwater pollution.

High yielding, unconsolidated aquifers are located in the glacial outwash valleys in the southern half of the County. These largely unprotected groundwater supplies serve as a drinking water source for many communities



(Photo source: townofaurora.com)

and individuals throughout the County and are therefore considered to be a priority issue for the WQCC. A map of the Madison County aquifers is found in Appendix E.

In the northern portion of Madison County, surface water is supplied primarily by the Onondaga County Water Authority (OCWA) and the City of Oneida. These suppliers serve two towns, one city, and three villages in the areas of the County that border Oneida Lake. The sources for these surface water supplies are located outside of the County (Lake Ontario and Skaneateles Lake, and the City of Oneida reservoir in Oneida County which is supplied by Florence Creek, a tributary to the East Branch of Fish Creek). The City of Oneida's inner district is completely served by their water district. The outer district relies on both public and private supplies. The villages are almost completely served by OCWA while the surrounding towns have between six to 72 percent of their housing units served by private wells.

Several Madison County municipalities have their own public water supply systems that rely on groundwater, including the Villages of Cazenovia, Morrisville, DeRuyter, Hamilton, Earlville, and Madison, and the Hamlets of Erieville, New Woodstock, and Georgetown. The more rural and less populated areas within Madison County rely heavily upon private wells.

Although the northern-most part of the county is primarily served by surface water sources, groundwater is used by as much as 12 percent of the total county population in these areas. An issue of concern especially in the southern part of the county is the high percolation rate for certain soil types which can contribute to groundwater contamination from agricultural and septic sources. Groundwater contaminants of concern in Madison County are total coliform bacteria, nitrates, herbicides, and pesticides.

IV. SURFACE WATER

Madison County water quality is generally considered to be good to excellent and high quality streams, lakes, and reservoirs are found throughout the county. The area also has several unique wetlands of national and state significance and high quality surficial aquifers. The county is located at the headwaters of three major drainage basins:

Susquehanna River Drainage Basin (304 square miles)

The southern 46.1% of the County is drained by streams flowing south into the Susquehanna River Basin, which flows to the Atlantic Ocean by way of the Chesapeake Bay in Virginia.

Seneca-Oneida-Oswego Rivers Drainage Basin (324 square miles)

Streams in the northern 49.2% of the County are in the Seneca-Oneida-Oswego River Basin and flow north to Lake Ontario by way of Oneida Lake and the Oswego River. The primary tributaries that drain to Oneida Lake are Oneida, Cowaselon, Chittenango, and Limestone. This water eventually makes its way to the Atlantic Ocean at the Gulf of St. Lawrence in Eastern Canada.

Mohawk River Drainage Basin (31 square miles)

A small area (4.7%) in the eastern part of the County is in the Mohawk River Basin. Oriskany Creek drains into the Mohawk River, which eventually flows into the Hudson River and enters the Atlantic Ocean at the New York Harbor.

Maps showing the Madison County drainage basins and watershed boundaries are found in Appendix E.

Susquehanna River Drainage Basin

- *Upper Chenango River Watershed*

The Chenango River headwaters are located near Morrisville and flow south for 119 miles through the Chenango Valley to join the Susquehanna River in Binghamton. Its average gradient is less than 4 feet per mile, making it one of the most gently sloping rivers in New York State.

This is the largest watershed (126,491 acres) within the County and contains 118 dairy farms that encompass approximately 49,427 acres. Twenty three percent of it is in intensive agricultural production. Large aquifers exist in the major river valleys that supply water to communities and private wells. Large dairy farms are also located in the valleys and are a potential source of nutrients and chemicals to the aquifer. Nitrate and nitrogen are of particular concern. Steep gradient tributaries have streambank erosion problems. Larger streams have erosion and flooding problems. Loss of riparian and wetland habitats are also of concern in this watershed.

The Chenango River is the headwaters of the Chesapeake Bay where phosphorus and nitrogen have been identified as nutrients of concern. Payne Brook, a Chenango River tributary, is listed on the Priority Waterbody List (PWL) for Madison County. The Chenango River is on the PWL for Chenango and Broome Counties. The Upper Chenango River was recently considered a high priority for restoration with regard to natural resources and water quality impairments, through a pilot Watershed Restoration and Protection Action Strategy (WRAPS) effort in conjunction with the NYS DEC and the Upper Susquehanna Coalition (USC).

- *Otselic River Watershed*

The drainage area of this watershed encompasses 23,039 acres in Madison County of which 14 percent is in intensive agriculture. Nine dairy farms are located primarily along the Otselic River. The remaining watershed area is largely forested.

The Otselic River is listed on the Madison County PWL because of impaired and stressed fisheries from thermal changes and siltation. The Otselic River is considered a high priority for restoration with regard to natural resources and water quality impairments, through a pilot Watershed Restoration and Protection Action Strategy (WRAPS) effort in conjunction with the NYS DEC and the Upper Susquehanna Coalition (USC).

- *Tioughnioga River Watershed*

The drainage area of this watershed encompasses 21,475 acres in Madison County of which 18 percent is in intensive agriculture including nine dairy farms. Sixty six percent of the watershed is forested including large holdings of State-owned lands. The Tioughnioga is not on the PWL in Madison County. The East Branch is on the Cortland County PWL due to sedimentation from agriculture and impacts from mining. The Upper Tioughnioga River has recently been considered as high priority for restoration with regard to natural resources and water quality impairments, through a pilot Watershed Restoration and Protection Action Strategy (WRAPS) effort in conjunction with the NYS DEC and the Upper Susquehanna Coalition (USC).

- *Unadilla River Watershed*

The drainage area of this watershed encompasses 33,957 acres in Madison County of which 19 percent is in intensive agriculture including 28 dairy farms. Several farms are located in glaciofluvial valleys where nutrients and chemicals are a concern. Several steep gradient tributary streams have farm

operations located on them. 72 percent of the watershed is forested. The Unadilla is characterized by a large silt load and unstable stream banks. The Lower Unadilla River is on the PWL for the Chenango River and is a high priority for neighboring Otsego County.

Seneca-Oneida-Oswego Rivers Drainage Basin

- *Oneida Creek Watershed*

This watershed encompasses 53,973 acres and has approximately 76 farms, 34 of which are dairy operations. Forty percent of the watershed is in intensive agriculture. There are steep valleys along the Stockbridge Valley and high stream gradients, and subsequent high streambank and farm field erosion rates. The erosion causes heavy sedimentation problems in Oneida Lake and at the base of Oneida Creek which serves as a spawning ground by fish populations. This watershed also has the City of Oneida and its sewage treatment plant, and a high residential population. Oneida Creek borders Oneida and Madison Counties, and is on the PWL in Oneida County because of fish habitat loss due to sedimentation and nutrients. The City of Oneida's wastewater treatment facility has recently undergone upgrades for improved treatment and discharge into the Oneida Creek.

- *Cowaselon Creek Watershed*

This watershed encompasses 70,601 acres of which 40 percent is used for intensive agricultural production. The watershed contains 59 dairy farms, the second largest number in the County. It also has a large residential population (including the villages of Canastota and Wampsville) and a sewage treatment plant. There is moderate concern over agricultural contamination and nutrient runoff in areas of extensive crop production, such as the mucklands north of Canastota. In the upland portion of the watershed in areas of intensive dairy farming, there have been problems associated with manure management and contamination of surface and ground waters. The Village of Canastota is currently in the process of a multimillion dollar upgrade to their wastewater treatment facility.

Cowaselon and Canaseraga Creeks are listed on the PWL because of loss of fish habitat and elevated stream temperatures in channelized sections. Sewage treatment and combined sewer overflows in the Village of Canastota are being corrected. Exceptional trout fisheries are located in the upland areas. Land uses in this watershed are rapidly changing due to modifications in muckland farming and wetland restoration. Increasing development is also occurring as the population migrates from Onondaga County, and public services (sewer and water) are expanding along the Oneida Lake shoreline.

- *Chittenango Creek Watershed*

The drainage area of this watershed encompasses 82,303 acres in Madison County of which 33 percent is in intensive agriculture. There are 60 farms of which 37 are dairy operations. This is the second largest watershed in the County. The watershed is characterized by concentrated populations including the Villages of Cazenovia and Chittenango. Chittenango Creek is a highly valued trout fishery.

Flooding and the loss of wetland habitat are common problems in the lowland and lakeshore areas. Flooding is a concern in lowland areas just north of the Village of



Chittenango Falls (Photo source: Cazpilot.com)

Chittenango. Problems occur due to the lack of capacity in the Chittenango Creek as a result of natural gravely material deposition. Flooding also occurs because of logjams and subsequent loss of capacity. Chittenango Creek is listed on the PWL because of development pressures. Oneida Lake is listed because of private septic systems in the lake shore area. The Village of Chittenango wastewater treatment facility is in its first year of operation after a multimillion dollar upgrade that expanded its capacity and improved the water quality of the discharge water.

Mohawk River Drainage Basin

- *Oriskany Creek Watershed*

The drainage area of the Oriskany Creek watershed encompasses 10,265 acres in Madison County. 46 percent is in intensive agriculture including 19 dairy farms. 38 percent of this watershed is forested. This is the only County watershed located in the Mohawk/Hudson drainage area. The Chenango Canal, now an Erie Canal feeder, is a managed trout fishery in Madison County and feeds Oriskany Creek.

The NYS Department of Environmental Conservation (NYS DEC) formed the Mohawk River Basin Program in 2009 to promote integrated and coordinated management of the environmental and cultural resources of the river and its watershed. The Mohawk River and its watershed drain directly into the Hudson River, providing major upstream inputs that can affect the estuary and Atlantic Ocean itself. Oriskany Creek receives treated wastewater from eight wastewater treatment facilities.



Mohawk River

Mohawk River Basin Coalition of Conservation Districts

The Madison County Soil and Water Conservation District and 13 additional counties serve on the Mohawk River Basin Coalition of Conservation Districts that was formed in March of 2009. Its mission is to implement conservation initiatives that protect, promote, and enhance the resources of the Mohawk River Watershed in partnership with local, state, and federal stakeholders. Through collaboration, the coalition hopes to augment and accent existing programs in the Mohawk Valley while conducting innovative, on-the-ground activities that cohesively conserve and improve both aquatic and terrestrial resources throughout the region. Additional information is available at:

http://www.dec.ny.gov/docs/water_pdf/mohawkaafnl2010.pdf.

V. WATERBODY INVENTORY / PRIORITY WATERBODIES LIST

The Waterbody Inventory/Priority Waterbodies List (WI/PWL) is an inventory of New York State's surface water quality. The dataset provides a summary of general water quality conditions, tracks the degree to which a water body supports its designated uses, and monitors progress toward the identification and resolution of water quality problems, pollutants, and sources. WI/PWL reports are produced for the 17 major drainage basins in the state on a schedule that allows each to be updated every 5 years. The review and updating of these reports involve a public participation component. The PWL for Madison County and other New York State waterbodies is available at the following site: http://www.dec.ny.gov/docs/water_pdf/pwlorflist.pdf.

VI. ASSESSED LAKE SHORE PROPERTY VALUES

The following table shows the 2010 assessed value of shoreline properties on Madison County lakes. This information, compiled by the Madison County Planning Department, was used while determining restoration needs for Madison County lakes with the County Board of Supervisors. The shoreline assessment for Oneida Lake shows only the Madison County portion of the shoreline. All other lake totals are inclusive of the entire lake shorelines. The assessment was calculated using parcels located 50 feet from the lake shoreline. The information marked in italics shows the total assessed value for the municipality where the lake is situated.

LAKE/POND	# of Parcels Within 50' of Lake Shoreline	Total Value*	Town / Village	Total # Parcels Town / Village	Total Value*
Cazenovia Lake	268	\$122,255,900	Vlg Caz/Twn Caz	3,259	<i>\$596,679,857</i>
Oneida Lake	868	\$143,555,330	Vlg Canastota/Twn Lenox	4,607	<i>\$484,568,686</i>
			Vlg Chitt/Twn Sullivan	7,054	<i>\$738,607,878</i>
DeRuyter Lake	301	\$46,736,400	Vlg Caz/Twn Caz	3,259	<i>\$596,679,857</i>
			Town DeRuyter/Vlg DeRuyter	1,326	<i>\$125,246,332</i>
Tuscarora Lake	239	\$23,805,300	Town Nelson	1,888	<i>\$176,975,000</i>
Eaton Brook Reservoir	194	\$17,969,600	Vlg Mo'ville/Twn Eaton	2,554	<i>\$299,604,549</i>
			Town Nelson	1,888	<i>\$176,975,000</i>
Hatch	120	\$13,187,601	Vlg Mo'ville/Twn Eaton	2,554	<i>\$299,604,549</i>
Bradley Brook	138	\$17,045,000	Vlg Mo'ville/Twn Eaton	2,554	<i>\$299,604,549</i>
Leland's Pond	176	\$9,054,601	Vlg Mo'ville/Twn Eaton	2,554	<i>\$299,604,549</i>
Lebanon Res	84	\$6,795,000	Town Lebanon	1,174	<i>\$102,211,751</i>
Lake Moraine	224	\$27,513,300	Vlg Madison/Twn Madison	1,982	<i>\$173,214,361</i>
Gorton Lake	35	\$1,340,400	Town Brookfield	1,937	<i>\$118,418,421</i>
Craine Lake	50	\$5,948,700	Town Lebanon	1,174	<i>\$102,211,751</i>

* Based on November 2009 tax data

Source: Madison County Planning Department, 2010

VII WATER QUALITY ISSUES OF CONCERN

Madison County agencies, organizations, and lake associations are working on several water quality issues of concern associated with ground and surface water. Significant issues are presented below in no particular order. The table found on page 15 provides a summary of each issue with a bulleted list of specific concerns.

Erosion and Sedimentation

Sediment is the most common pollutant in Madison County waterbodies. Excessive sediment loading can interfere with fish spawning at the base of tributaries such as Oneida Creek, and nutrients such as phosphorus that attach onto sediment particles can lead to excessive levels of algae and rooted aquatic vegetation in lakes. Sediment loading can also interfere with navigation. Marinas at the southeast corner of Oneida Lake, for example, occasionally have trouble maintaining boat access because of sediment deposits from Oneida Creek. Oneida Lake is part of the Barge Canal system. Commercial and recreational boats gain access to the lake by way of the Fish Creek outlet at Sylvan Beach in the east and the Oneida River to the west. Boats traversing the lake can encounter problems with a sediment delta at the mouth of Oneida Creek. Oneida Creek is listed on New York States Priority Waterbody List (PWL) as being stressed for aquatic life and recreation because of problems associated with sedimentation.

Nutrient Loading

Nutrients of concern in the southern portion of Madison County are nitrogen and phosphorus that primarily originate from agricultural practices, golf courses, wastewater treatment plants, malfunctioning septic systems, and lawn fertilizers. Phosphorus is the nutrient that is the least available, and is called "the limiting nutrient" for aquatic vegetative growth. Nitrogen is a highly soluble nutrient that easily leaches into groundwater. It can cause a condition referred to as "blue baby syndrome" when it interferes with the blood's ability to transport oxygen.

Nutrient loading limits called Total Maximum Daily Loads (TMDL) have been set for the Susquehanna River Basin. A TMDL is the amount of a specific pollutant that a water body can receive and still maintain water quality standards. In the Susquehanna River Basin, the two leading causes of stream impairment from non-point sources are acid mine drainage and agricultural runoff. Goals for phosphorus, nitrogen, and sediment in the Susquehanna River Basin have been set by the U.S. Environmental Protection Agency. The nitrogen allocation for New York is 8.23 million pounds per year, a reduction from the 2009 level of 10.94 million pounds. The phosphorus allocation for New York is 0.52 million pounds per year, a reduction from the 2009 level of 0.80 million pounds.

The sediment allocation is 292.96 million pounds per year, a reduction from the 2009 level of 326 million pounds. NYS DEC submitted a Watershed Implementation Plan in September 2010 which outlines how 60% of these goals will be reached by the end of 2017. The following link provides information about TMDLs: <http://www.epa.gov/chesapeakebaytmdl/>. Also refer to page 14 of this report for additional information.

The impending TMDL regulations can potentially have a significant impact on agriculture, stormwater control, and sewage treatment operations in Madison County's portion of the watershed. The TMDL could mean that areas of the watershed not impacted by the MS4 portion of the Phase II stormwater rules would become regulated MS4's, all farms in the watershed regardless of size would need to follow CAFO rules, and sewage treatment plants with design flows greater than one million gallons per day (MGD) would be held to "limit of technology" (very low standards that technology has only recently been able to meet) criteria for nutrient removal. No southern Madison County

wastewater treatment facility has design flows greater than one MGD. The WQCC will continue to monitor and assess the potential impacts to Madison County.

Unlike sediment, nutrients are not considered to be as big of a problem in the northern part of the county. In the Oneida Lake watershed, nutrients help to fuel the food chain and contribute to improved fishing.

Failing Septic Systems

Nutrients and pathogens originating from poorly maintained septic systems remain a concern in the non-sewered areas of Madison County. Improper system installation and poor maintenance can cause system failure. Failing septic systems release nutrients and pathogens to the environment, posing human health problems and degrading the aesthetic values and recreational potential for Madison County lakes and their tributaries. Bacteria, parasites, and viruses present in effluent can result in health problems for both humans and animals. Septic systems that are located too close to wells and groundwater supplies can also contaminate drinking water, and nutrients from failing systems can enter lakes and tributaries and cause algae blooms.

There have been significant advancements in the design of alternative septic systems that can improve treated effluent water quality. Several of these improved onsite systems have been installed around Madison County lakes. Many of the Madison County lakeshore properties have small property foot prints, poor soils, and steep grades. In addition, an increasing number of people are converting their seasonal lake camps to year-round residences which cause increased stress on their wastewater treatment systems. The New York State Department of Health recently upgraded section 75A of the Public Health Law pertaining to onsite systems which address alternative advanced treatment systems and adopts NSF recommendations with specific system certifications.

Madison County Lake associations are reviewing ways to address excessive aquatic plant growth. Abundant aquatic plants reduce property values and frustrate homeowners who often are assessed at higher levels than non lake residences. Improving onsite septic system maintenance, and reducing soil erosion and nutrient loading are extremely important to the economic and environmental well being of the county.

Lake Management

Madison County lake communities continue to work on protecting water quality while maximizing the lake recreational uses such as boating, swimming, and fishing. This often involves extensive planning, program implementation, data collection and analysis, and the development of regional partnerships. The Madison County Federation of Lake Associations is an example of a county-wide partnership that was formed several years ago to share resources and expertise on lake management.

Excessive growth of aquatic vegetation and the presence of aquatic invasive species are priority problems in most Madison County lakes (Appendix C). The Madison County Planning Department used funding from the Finger Lakes Lake Ontario Watershed Protection Alliance (FL-LOWPA) to fund aquatic weed harvesting between 1988 and 2009. In recent years, the weed harvesting program has been run by the Madison County Federation of Lake Associations. Additionally FL-LOWPA programs have long supported efforts to explore alternative control options, which have included extensive research and implementation of biological control mechanisms.

In addition to rooted aquatic vegetation, algae can also be problematic for some Madison County lakes. For example, *Microcystis Aeruginosa* (also referred to as cyanobacteria) is a type of blue-green algae that has recently been found in Craine Lake. The algae usually bloom in mid to late summer and prefer warm, nutrient-rich water. *Microcystis* is different from most other types of algae because it secretes a toxin into the water. During an algae bloom, the toxins can be potentially harmful to animals that drink the water and they may cause minor skin irritation and gastrointestinal discomfort in humans.

Drinking Water Quality

High yielding, unconsolidated aquifers are located in the glacial outwash valleys in the southern half of the County. These largely unprotected groundwater supplies serve as a drinking water source for many communities and individuals throughout the County and are therefore considered to be a priority issue for the WQCC. Groundwater contaminants of concern in Madison County are total coliform and nitrates that are usually caused by failing septic systems, agriculture runoff, and pharmaceuticals discharged by municipal, industrial, and onsite wastewater treatment systems.

Road Salt Runoff

County and municipal highway departments spread chemicals, abrasives, or a combination of the two in order to keep roads passable during winter snow and ice conditions. Sodium chloride (rock salt) and abrasives such as sand and stone dust are commonly used for deicing roads in Madison County. Chemicals and abrasives both pose environmental problems for lakes and streams because of salinization and siltation. High salt content in groundwater and surface water can alter water chemistry, making it unfit for aquatic life and human consumption. Siltation of water courses by sand and other abrasives is a problem especially in the Oneida Lake watershed. Road sand and natural and man-induced erosion can contribute to the formation of deltas that impede boat travel and impact fish spawning areas.

Flooding

Flooding in Madison County is caused by, or can occur in combination with, excessive precipitation, rapid snowmelt, ice jams, beaver dams, and dam failures. Urban or street flooding can be intensified by excessive precipitation and/or clogged storm sewers. Ruptured water mains can also cause urban flooding.

Madison County's flooding problems are closely related to topography. Priority flooding problems are found in the northern municipalities of the Town of Sullivan and Lenox, the City of Oneida, and the Villages Chittenango and Canastota. These municipalities are located on relatively flat land north of the steep north facing Onondaga Escarpment. When the floodwaters reach the lowland areas, the grade of the creeks flatten out, velocity slows, water carrying capacity drops, and creeks overflow their banks. Flooding problems can be exacerbated by the fact that creeks also drop much of their bedload of gravel at the base of these slopes as the water velocity drops. Tree limbs and other debris are carried down the hills and become log jams on the lowlands. Additional information about flooding is found in the County Hazard Mitigation Plan, located at: <http://www.madisoncounty.org/RevisedHazMitPlan310.pdf>.

7% of Madison County is located in the 100 year floodplain. Flood Insurance Rate Maps (FIRMs) are generated by the Federal Emergency Management Agency (FEMA). They serve as the official maps of communities that show areas at risk for flooding from a base flood. FIRMs for Madison County can be found on the Madison County Hazard Mitigation Plan web site: <http://www.madisoncounty.org/RevisedHazMitPlan310.pdf>.

Mining

Since the mid 1990's, Madison County has experienced natural gas drilling especially in and around the Town of Lebanon and in the southern reaches of the County. This drilling is primarily located in sandstone formations above the Utica shale. Drilling was initially done by means of vertical wells but as technology evolved, horizontal drilling techniques is now being used. In recent years, a few wells have been activated through low volume hydraulic fracturing (also known as hydrofracking), which is allowed under the 1992 final GEIS Findings for the Oil, Gas, and Solution Mining Regulatory program administered by the NYS Department of Environmental Conservation. Damage to surface water quality and infrastructure are potential impacts from hydrofracking. Additional information about this topic is found in Appendix B. A map showing bedrock geology and the gas and oil wells in Madison County is located in Appendix E.

Land Use Changes

44% of land use in Madison County is classified as agricultural. The next largest land use category is residential (35%). Many of the towns located in the northern portion of Madison County are experiencing an increase in residential growth rates as a result of the expanding Syracuse metropolitan area. This area is dealing with urban sprawl, loss of natural vegetation and open space, and a general decline in wetlands and wildlife habitat. The issues are noticeable when residential and commercial development replaces undeveloped land in shoreline communities.

Total Maximum Daily Load Requirements

A total maximum daily load (TMDL) is the amount of a specific pollutant that a water body can receive and still maintain water quality standards. The allocation, or allowable amount, of a specific pollutant takes into account both point and non-point sources of that pollutant in a watershed. In the Susquehanna River Basin, the two leading causes of stream impairment from non-point sources are acid mine drainage and agricultural runoff. TMDL requirements for phosphorus, nitrogen, and sediment loading are pending issues in the Susquehanna River Basin.

The table on the following page provides a summary of priority water quality issues in Madison County.

Water Quality Issues of Concern in Madison County	
Categories	Specific Concerns
Erosion and sedimentation	• erosion control from agriculture • stormwater management • stream bank stabilization • road ditch stabilization • lake shoreline protection • forestry • mining and gas well drilling
Nutrient Loading	• animal waste and nutrient management • milk house waste • wastewater plants • residential lawn and golf course fertilization • sewage sludge and septage disposal
Failing septic systems	• education and training • system installation & replacement guidelines • alternative technologies • maintenance and upgrading existing systems • conversion of seasonal residences to year-round residences
Lake management	• aquatic macrophyte and algae • invasive plants and animals • internal nutrient recycling • non-point source pollution • beach closings • geese • climate change
Drinking water quality (potable)	• animal waste and nutrient management • public water supply • individual wellhead protection • volatile organic compounds from leaking gas and oil tanks
Road salt runoff	• salt storage • application rates
Flooding	• Oneida Lake shoreline • flash flooding
Mining	• water quality concerns from gas well drilling • erosion and sedimentation
Land use changes	• farmland and wetland protection • urbanization • flood plain development • lake front development - conversion of seasonal residences to year-round residences
Total Maximum Daily Load (TMDL) requirements	• phosphorus, nitrogen, and sediment loading • pending issue in the Susquehanna River Basin

VIII WATER QUALITY COORDINATING COMMITTEE PRIORITIES

Madison County water quality is generally considered to be good to excellent but members of the WQCC continue efforts to protect and enhance surface and groundwater resources. Committee members protect high quality lakes and streams, while implementing restoration strategies for areas where water resources are impaired. Additional WQCC priorities are summarized below.

Maintain open lines of communication between federal, state, and local organizations and support partnerships to protect surface and groundwater quality and quantity

- Work with the Madison County Federation of Lakes to keep Madison County Supervisors informed of lake management and water resource issues.
- Encourage intermunicipal collaboration and resource sharing among agencies and municipalities.
- Review and comment on potential impacts of plans, programs, policies, laws, or regulations pertaining to water quality or quantity in Madison County.
- Identify and prioritize significant water quality and non-point source problems in the county.

Provide assistance to lake communities that are pursuing grant funds for lake and watershed projects

- Prepare/submit proposals for Federal funding through the Finger Lakes-Lake Ontario Watershed Planning Agency.
- Support projects administered through the Madison County Aquatic Vegetation Control Program.
- Provide letters of support for relevant water resource grant applications.

Control stormwater runoff and nutrient loading

- Manage stormwater runoff and reduce erosion, sedimentation, and nutrient loading to lakes and streams.
- Support programs that teach the public and municipal planning boards about land use practices that protect water quality (such as buffer zones and Better Site Design practices.)
- Support the SWCD and NRCS in the implementation of best management practices and AEM on farms.

Protect groundwater quality

- Support programs conducted by the Madison County Department of Health that protect and improve drinking water quality.
- Support programs that correct failing on-site septic systems.
- Support septic system maintenance education programs for shoreline homeowners.
- Assist with hazardous waste and pesticide collection days for agricultural and household waste.

Protect homes and properties against flooding

- Support the implementation of a maintenance program to provide for the inspection and clearance of Madison County streams.
- Provide opportunities to inventory and maintain culverts and highway infrastructure.

Compile water quality monitoring data on lakes and tributaries

- Work with the Madison County Planning Department to support lake communities that participate in the Citizens Statewide Lake Assessment Program and pursue funding assistance for continued participation.

- Support tributary monitoring and education programs for Madison County schools students, such as Project Watershed and the Oneida Lake Education Initiative.

Support education programming for Madison County residents, agency representatives, and municipal officials

- Increase public understanding of water quality and non-point source issues through the support and/or sponsorship of education workshops, conference, hands-on volunteer training, and publications.
- Encourage public participation in water resource protection and invasive aquatic plant control efforts.
- Provide guidance to the Planning Department in the updating and distribution of Madison County restaurant placemats (Appendix D).

Provide information to the public on gas drilling and hydrofracking

- Support education programs that teach Madison County residents about gas drilling and hydrofracking.
- Reduce water quality impacts from drilling / hydrofracking.
- Provide information and support for the Madison County Natural Gas Workgroup.

Prevent the spread and new introductions of invasive species

- Support the prevention, early detection and rapid response for the control of aquatic invasive species.
- Support outreach and education, biological controls, and mechanical methodologies as the first response to control and eradication.
- Work with the Madison County Federation of Lakes, Madison County Supervisors, and neighboring counties to explore options for using the weed harvester to control nuisance aquatic plants.
- Encourage boaters to remove plant fragments from the boat after use and draining the live well and bilge areas and bait buckets before leaving a lake.
- Encourage the use of non-invasive plants in landscaping projects.

Improve dam safety

- Work with municipalities on programs to improve dam safety.

Appendix A

MADISON COUNTY LAKE SUMMARY

MADISON COUNTY LAKE SUMMARY, NOVEMBER 2010

Lake name	Contact information	Size and general description	Is CSLAP data available?	Lake or watershed management plan?	Invasive plants or animals present	Plant control methods	Is shoreline sewered?	Priority issues of concern
Cazenovia Lake	Cazenovia Lake Association Preston Gilbert, President prestongilbert@esf.edu P.O. Box 55 Cazenovia NY 13035 http://www.cazlake.org	Size: 1184 acres	Yes	Yes	milfoil	Chemical	No	Invasives, plant control, development pressures
Eatonbrook Reservoir	Eatonbrook Lake Association Jim Cunningham, President 7967 Valley Road Madison, NY 13402 315-821-2325 jimcnwt@gmail.com Jerry Lindberg, jalclu@bcgcny.com	Eatonbrook Reservoir is a manmade lake created in the mid 19th Century to serve as a feeder for the Chenango Canal. The majority of the Reservoir is in the Town of Nelson with a smaller portion in the Town of Eaton. The NYSDEC has a public boat launch on the Reservoir. Size: 247 Acres	Yes Also data compiled by Paul Lord	Yes	Zebra mussels and water milfoil	Hand weeding		Aquatic plants Dredging Water quality
Gorton Lake		Size: 20 acres	Yes					
Hatch Lake	Jan Walterick janicew@peoplepc.com (315) 684-9461	Size: 134 Acres. Hatch is a kettle lake that feeds BB via a spillway. 230 cottages on both lakes, mostly seasonal with 8-10 year round residents. No public boat launch. Absentee family camps – some have old septsics, some have wells and others take water from the lake.	Yes 1986-2004 On waiting list in 2010	No	Milfoil and filament algae	Hand harvesting	No	Water quality, invasive plants and algae, fish balance and stocking
Bradley Lake	Jan Waltrick janicew@usadatanet.net (315) 684-9461							
Craine Lake	Paul Harvey (315) 691-2528 pharvey004@twcny.rr.com	Size: 26 acres Maximum depth: 35 feet Craine is a kettle lake	Yes; also Scott Ingmire’s summary and ESF findings				No	Microsystis aeruginosa (blue green algae) Septic runoff Water level management and slow flow through

Lake name	Contact information	Size and general description	Is CSLAP data available?	Lake or watershed management plan?	Invasive plants or animals present	Plant control methods	Is shoreline sewered?	Priority issues of concern
Lake Moraine	Jim Finch Jfinch852@aol.com John Slater Sjslater477@hotmail.com http://www.lakemoraineassociation.org	Size: 279 acres North – 80 acres South – 199 acres	Yes Approx 20 years	Yes - 2002	Water milfoil	Sonar in 1996, 2001, 2006, and proposed for 2010	no	Milfoil, algae, and protection from invasives
Lebanon Reservoir	Chris Rosbrook, crosbrook@hotmail.com	95 acres with a shoreline population of approximately 70 year round and seasonal homes.	Yes from 1985 to 2005 Also data compiled by Paul Lord	No	Water milfoil	Insect herbivores and harvesting	No	Milfoil control and funding Dam regulation and maintenance Lake association membership
Leland Pond								
Madison Lake		Size: 32 acres	Yes					
DeRuyter Reservoir	Tioughnioga Lake Assoc. - DeRuyter Reservoir Michael F. Curran President P. O. Box 179 DeRuyter, NY 13052 http://www.deruyterlakeassociation.org Person who maintains the website: shamus108@hotmail.com (put DeRuyter Lake in the subject area)	CSLAP narrative: The 1999 NYSDEC Priority Waterbody Listings (PWL) and federal 303d listings for the Susquehanna River basin for DeRuyter Reservoir indicate that public bathing and recreation are threatened by excessive weeds. Data usually indicate that the lake can be classified as mesotrophic, or moderately productive, although the lake was increasingly less productive (increasing water transparency, decreasing nutrient and algae levels) in the last three years. This may be due in part to zebra mussels, although the drop in nutrient levels must be attributable to other factors. The recreational suitability of DeRuyter Reservoir is most often described as “excellent” to “slightly impaired” for most uses—the latter was more common in 2008 due to slightly more extensive coverage of aquatic plants Size: 557 Acres	Yes Also data compiled by Paul Lord		Aquatic plant control has included mechanical harvesting and winter drawdown			
Tuscarora Reservoir	Dick Steinbach wazmru@juno.com 687-9845	Size: 375 Acres 250 families in the summer Good fishing and boating	Yes 1985-2009	No	Milfoil	Walleye, pike	No	Milfoil and geese
Oneida Lake	Matt Snyder		No	Yes	Milfoil, water chestnut, frog bit	Hand pulling	Partial	Cormorants, sedimentation, development pressures

Appendix B

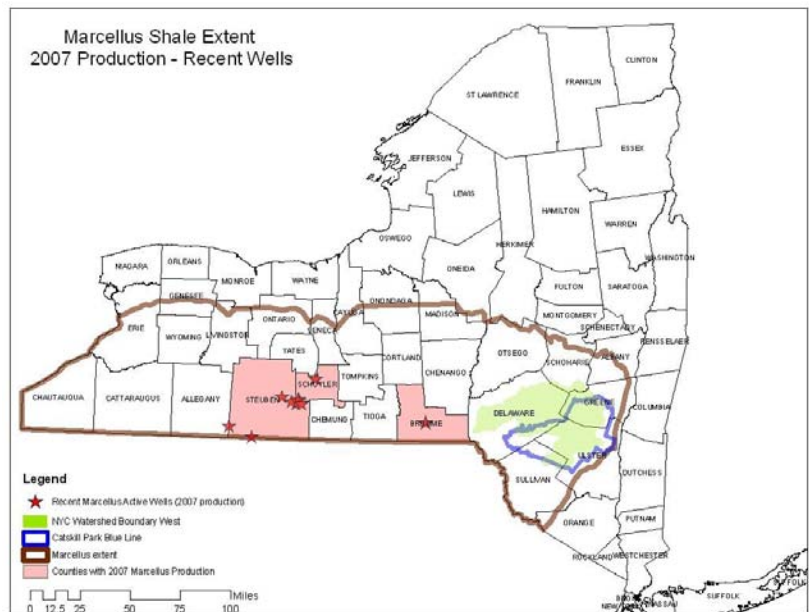
NATURAL GAS DEVELOPMENT IN MADISON COUNTY

Natural Gas Development in Madison County

Madison County Planning Department
October 2010

Since the mid 1990's, Madison County has experienced natural gas drilling focused in and around the Town of Lebanon in the southern reaches of the County. This drilling has primarily targeted sandstone formations above the Utica shale. Initially this drilling was done by means of vertical wells, but as technology evolved, horizontal drilling techniques were also used. In recent years, a few wells have been stimulated through low volume hydraulic fracturing, which is allowed under the 1992 final GEIS Findings for the Oil, Gas, and Solution Mining Regulatory program administered by the NYS Department of Environmental Conservation. These natural gas resources have been developed by a company called Norse Energy (formerly Nornew) and are distributed via minor collecting lines and larger main lines bringing the gas to market. Much of the gas developed in this area comes from the Bradley Brook field, which has specific regulations for well spacing and unit sizes.

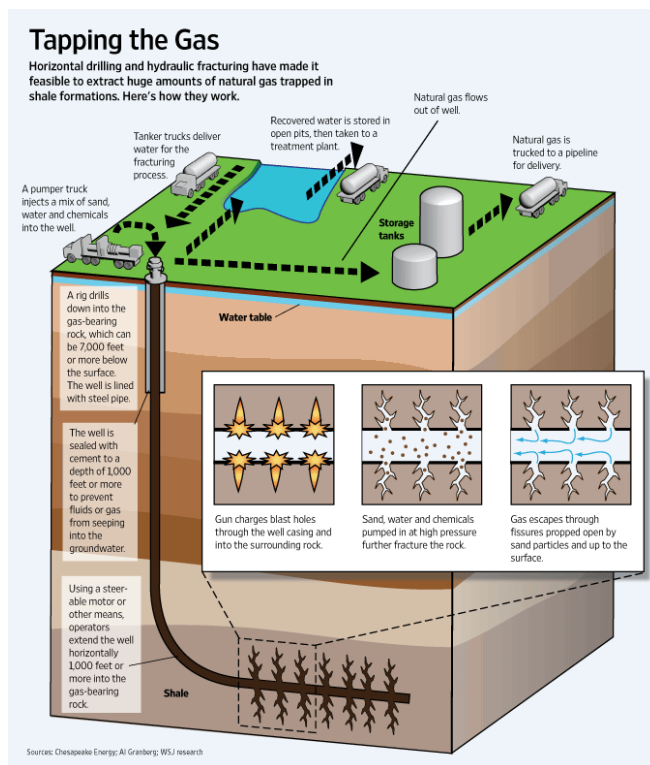
Since approximately 2008, the issue of Marcellus Shale has become a major topic, not just in New York State, but in the northeast. The Marcellus Shale is a dense hydrocarbon rich shale formation that extends from Ohio and West Virginia to the Southern Tier of New York State. Shale gas reserves had not been considered feasible for extraction until recent years with the advent of horizontal drilling and high volume hydrofracturing. Economically viable gas yields from the Barnett shale in Texas had caused geologists to rethink shale gas potential, and they ultimately turned their focus to the Marcellus formation. Estimates of the gas locked in the shale have varied widely, but range from 168 trillion cubic feet to 516 trillion cubic feet. The quality and quantity of gas within the formation varies, and generally the deeper and thicker the formation, the more productive the wells. The southern tier of New York State hold promise due to the depth and thickness of the formation, but here in Madison County, the shale is much closer to the surface (and under less pressure) and only about 100 feet thick or less. That isn't to say however that gas companies won't still look to the Marcellus shale here in Madison County. Though less focus has been placed on the Utica Shale (which is much deeper and thicker than the Marcellus in Madison County), it underlies all of Madison County and may become a more significant topic for us in the next few years.



The process of high volume hydraulic fracturing (hydrofracking) has received much of the attention in regard to the Marcellus Shale. The NYS DEC is undertaking a two year long SGEIS (to supplement the 1992 GEIS) address the issues and concerns associated with this new drilling technology. The DEC received over 14,000 public comments on this document and it is anticipated that perhaps by the end of 2010, they'll have a final document available for review and adoption. Much of the current debate on

the subject revolves around the source of the water used in the hydrofracking, the chemicals added to that water, the manner in which the wastewater is disposed of, and the potential for surface or groundwater contamination if an accident does occur.

The average hydraulically fractured Marcellus well uses between 4 and 7 million gallons of water to drill, though only a small percentage of that may come back up to the surface when extracted. With abundant clean lakes, reservoirs, rivers, and streams, the impacts to Madison County could be significant and warrant the attention of the Water Quality Coordinating Committee and others within the County. Additionally, our abundant water resources (including public water supplies) may become attractive sources of water for wells drilled in other areas as well. Currently the Susquehanna River Basin Commission regulates any water withdrawal in the Susquehanna River Basin (the southern half of Madison County) used in the drilling of natural gas wells. They have begun a water quality monitoring effort to examine the potential impacts of gas drilling that includes areas of both Pennsylvania and New York. However, currently there is no equal agency that monitors or regulates water withdrawals in the Great Lakes Basin (the northern half of Madison County). The 1989 Great Lakes Water Conservation and Management Act authorizes DEC to require entities to register if they plan to use greater than 3 million gallons of water during a consecutive 30 day period.



Additionally, the Great Lakes – St. Lawrence River Basin Water Resources Compact prohibits the transfer of water out of the Great Lakes basin in a container of greater than 5.7 gallons. It is unclear how that “registration” rule compares to the SRBC requirements and is something that warrants the attention of the WQCC in the future. Though the Marcellus Shale here will likely not become part of intense drilling activity, the Utica below it may turn out to be a significant play. This and the developments in Pennsylvania will have to be monitored closely over the next few years.

For additional information, contact S. Ingmire at the Madison County Planning Department, scott.ingmire@co.madison.ny.us.

Appendix C

AQUATIC INVASIVE SPECIES IN MADISON COUNTY

Invasive Species in Madison County
Central New York Regional Planning and Development Board
October 2010

Lake communities throughout Madison County place a high priority on controlling aquatic invasive species that out-compete native plants, limit recreational activities such as boating and swimming, and impact aesthetics. Priority terrestrial and aquatic invasive species in Madison County include: Eurasian water milfoil (*Myriophyllum spicatum*), curly leaf pondweed (*Potamogeton crispus*), purple loosestrife (*Lythrum salicaria*) - *photo by B. Blossey found below*, Japanese knotweed (*Polygonum cuspidatum*), pale swallow-wort (*Cynanchum rossicum*), frog bit (*Hydrocharis morsus-ranae*), zebra mussels (*Dreissena polymorpha*) *photo below*, quaga mussel (*Dreissena bugensis*), round goby (*Neogobius melanostomus*) and water chestnut (*Trapa natans*).



The threat of aquatic and terrestrial invasive species is far-reaching, impacting forest and freshwater resources throughout the world. In the absence of natural predators, invasives reproduce and spread at alarming rates, causing economic hardship while putting native plants and animals at risk. Aquatic invasive plants can inadvertently spread from lake to lake when plant fragments attach to boat bottoms, propellers, paddles, clothing or waders. A priority goal for Madison County is awareness when it comes to detecting new infestations and responding to them quickly. Everyone's help is needed to prevent the introduction and spread of invasives by checking and cleaning recreational equipment between uses. Lack of effective control techniques and limited funding are primary obstacles to control strategies.

Researchers at Cornell University Biological Field Station identified a new invasive invertebrate in Oneida Lake in August 2009. *Hemimysis anomala* is a small mysid shrimp, also known as the "bloody red shrimp." Although *Hemimysis* are currently present in low numbers, they could become abundant in Oneida Lake in the near future as they have relatively short generation time (4-6 weeks). This is thought to be the first introduction of this species in an inland lake outside of the Great Lakes. *Hemimysis* was most likely transported with boats travelling the canal system. It is unknown what the impact of this new invader will be in Oneida Lake. In Europe, *Hemimysis* feed on both algae and zooplankton.



Water chestnut is another invasive plant that could have a significant impact on local lakes so agencies and organizations are working together on education and outreach projects. Pamphlets and brochures are available to Madison County residents to inform them of water chestnut characteristics. Educational signs, designed by Madison County Planning Department and the Oswego Co. SWCD, are placed at DEC boat launches, marinas, and waterfront parks to help the public identify the invasive plant and learn how to control the spread by boats and recreational equipment. The CNY Regional Planning Board and the Madison County FOLA have conducted educational forums on invasive species. Madison County is one of 18 counties that participate in the Finger Lakes region of the Partnership for Regional Invasive Species Management (PRISM.) Three excellent sources of information about current lake infestations and regional threats are: <http://www.fingerlakesprism.org/>, <http://www.nysgextension.org/ans/anspages/AIPlants.html>, and the information page of the Oneida Lake Watershed Education Initiative website at <http://www.oneidalakeinfo.org/>. For additional information, contact A. Saltman, CNY RPDB at asaltman@cnyrpd.org.

Appendix D

MADISON COUNTY WATER RESOURCES RESTAURANT PLACEMAT

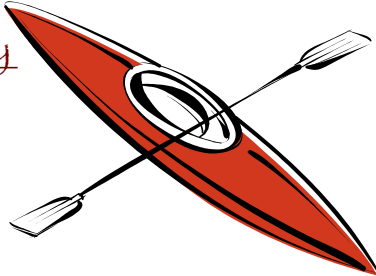


Madison County

Water Resources



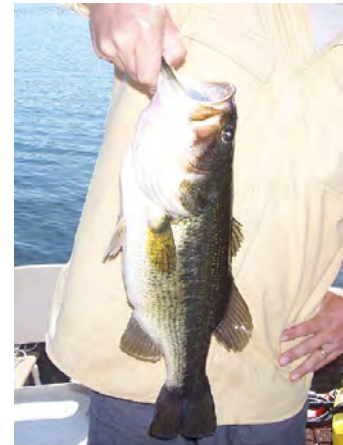
A Project of the Madison County
Water Quality
Coordinating Committee



For Further Information,
Contact:

The Madison County Soil and Water
Conservation District.....824-9849

The Madison County
Planning Department.....366-2376



Eaton Brook Largemouth

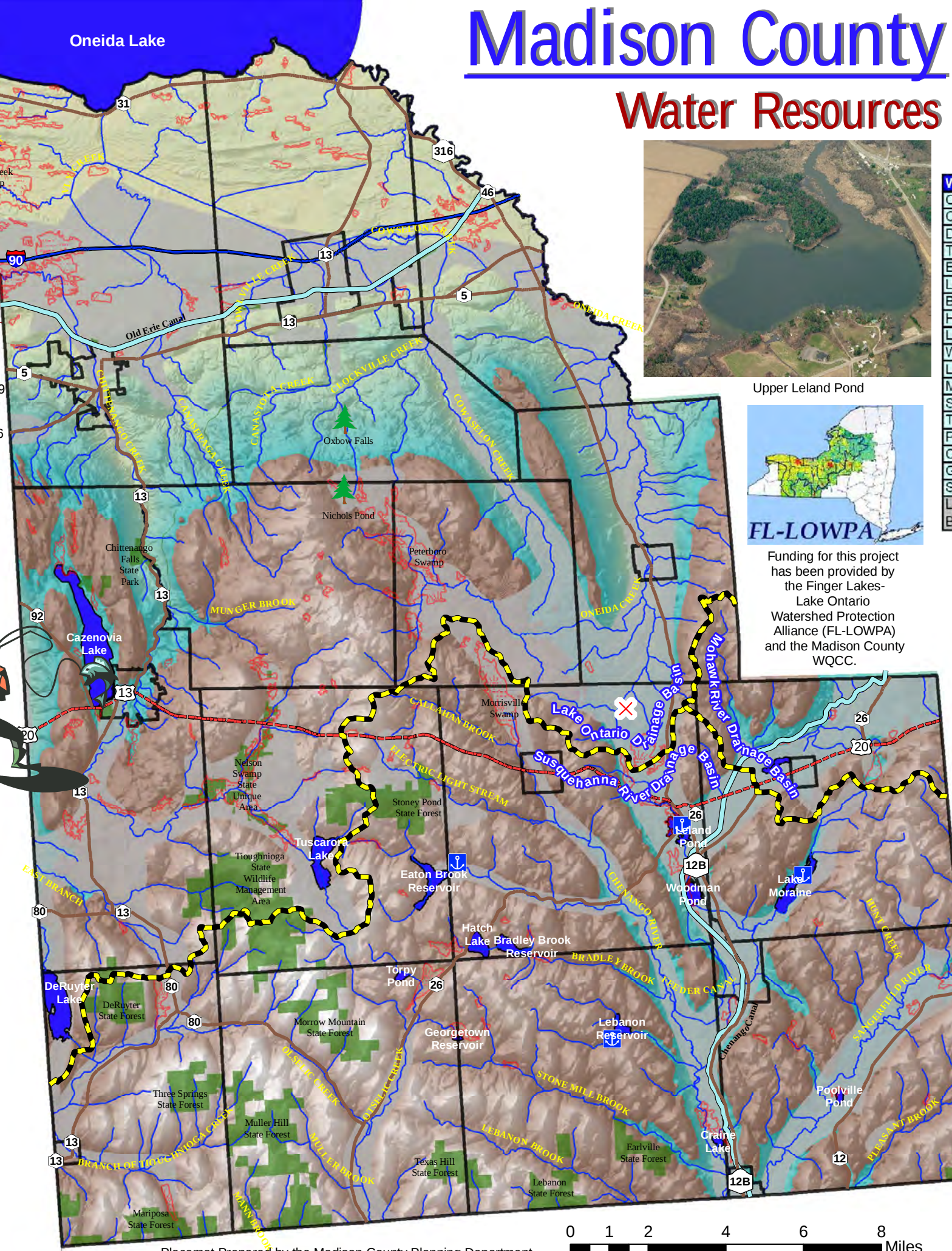
Legend

- County Park
- Geographic Center of New York
- Madison County Fairgrounds
- NYS Boat Launch
- Major Watershed Divides

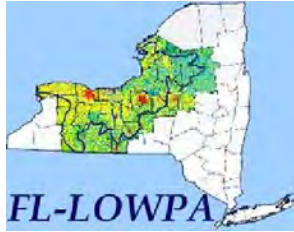
Roads

Road Type

- US Highway
- Interstate
- State Highway
- Canals
- DEC Wetlands
- Municipal Boundaries
- Streams
- State Recreation Lands
- Waterbodies
- Groundwater Aquifer
- Aquifer Area



Upper Leland Pond



Funding for this project
has been provided by
the Finger Lakes-
Lake Ontario
Watershed Protection
Alliance (FL-LOWPA)
and the Madison County
WQCC.

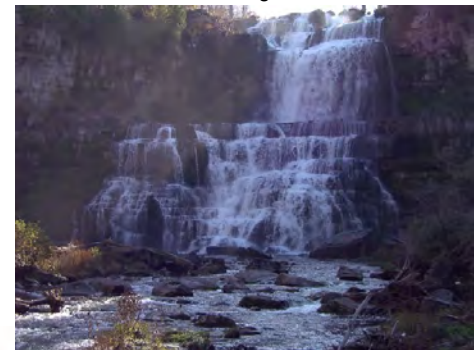
Waterbody	Area (Acres)	Max Depth	Fish Species
Oneida Lake	51,076	55	LMB,SMB,W,BRT,BH,C,NP,YP,CF,PKL
Cazenovia Lake	1,189	46	LMB,SMB,W,BH,C,YP,PKL
DeRuyter Reservoir	593	53	LMB,SMB,W,BH,C,YP,PKL
Tuscarora Lake	328	43	LMB,SMB,W,BH,C,YP
Eaton Brook Reservoir	289	52	LMB,SMB,W,RT,BRT,BH,C,YP,PKL
Lake Moraine	268	46	LMB,SMB,BH,C,YP,PKL
Bradley Brook Reservoir	144	26	LMB,SMB,W,BH,NP,YP
Hatch Lake	138	62	LMB,SMB,W,BH,NP,YP
Leland Ponds	134	51	LMB,BRT,BH,YP
Woodman Pond	118	69	LMB,BH,YP,PKL
Lebanon Reservoir	95	50	LMB,SMB,W,RT,BRT,BH,C,YP
Madison Lake	67	75	LMB,SMB,BH,PKL
Stoney Pond	44	11	LMB,BH,PKL
Torpy Pond	41	18	BH,PKL,C
Poolville Pond	41	48	LMB,BH,PKL
Craine Lake	31	33	LMB,BH
Gorton Lake	26	20	LMB,SMB,BH,C,YP,PKL
Sunset Lake	22	10	LMB,SMB,BH,YP

LMB (Largemouth Bass), SMB (Smallmouth Bass), Walleye (W), Brook Trout (BKT), Rainbow Trout (RT), Brown Trout (BRT), Bullhead (BH), Crappie (C), Northern Pike (NP), Yellow Perch (YP), Catfish (CF), Pickerel (PKL)

For Special Fishing Regulations in Madison County,
visit the following website:
<http://www.dec.ny.gov/outdoor/31460.html>



Oriskany Creek Brown Trout



Chittenango Falls

Watershed Facts

A drainage basin or watershed is all the land that contributes surface water runoff to a body of water. Madison County contributes surface water to three major drainage basins.

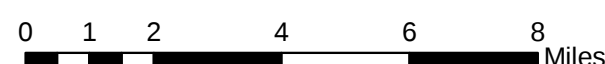
The southern half of the County is drained by streams flowing south into the Susquehanna River Drainage Basin. This water ultimately makes it to the Atlantic Ocean via the Chesapeake Bay.

The northern half of the County is in the Oswego River Drainage Basin. The water flows to Lake Ontario by way of Oneida Lake and the Oswego River. This water eventually enters the Atlantic Ocean at the Gulf of St. Lawrence in eastern Canada.

A small eastern portion of the County is in the Mohawk River Basin. Oriskany Creek drains into the Mohawk River, which eventually flows into the Hudson River. The Hudson enters the Atlantic Ocean at New York Harbor.

Attention Boaters:

Please help prevent the spread of invasive species. Clean all plant fragments from your boat and drain your live well, bilge area, and bait buckets before leaving the launch.



APPENDIX E

MADISON COUNTY MAPS

Municipalities

Watersheds

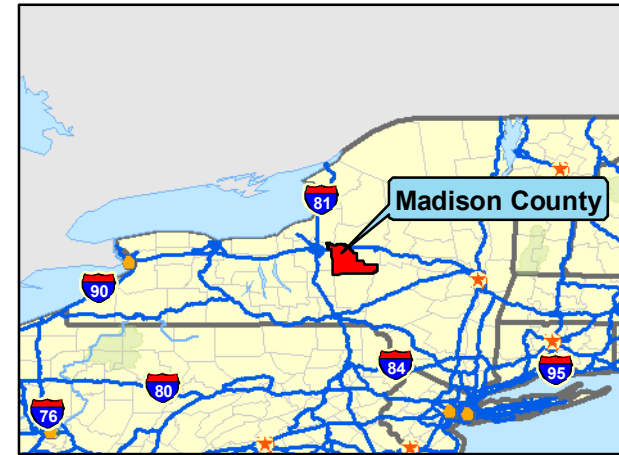
Watershed Boundaries Using HUC Codes

Bedrock Geology / Gas and Oil Well Status

Aquifers

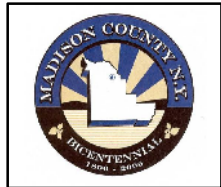
Land Cover

Madison County, NY



Legend

- | | | |
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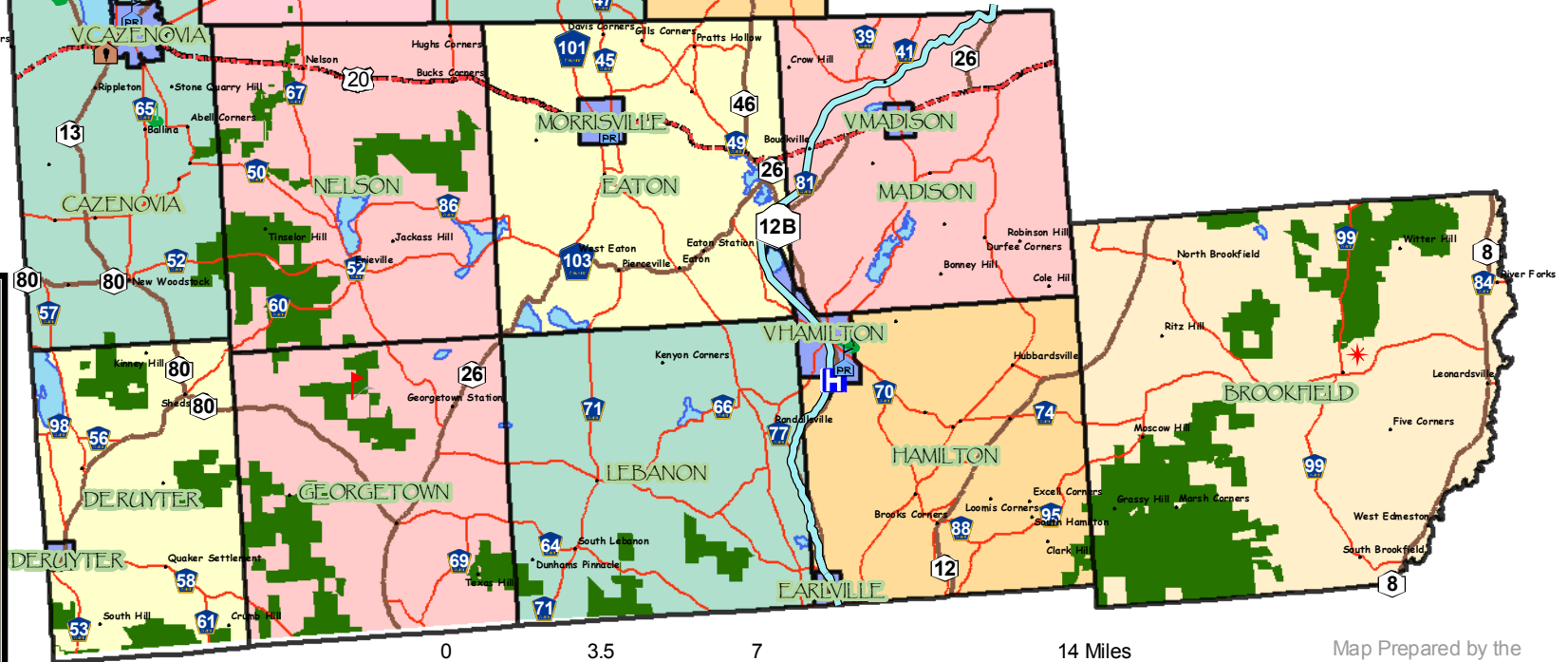
Legend

- Canals
- Municipal Boundaries
- State Recreation Lands
- Waterbodies

Roads

Road Type

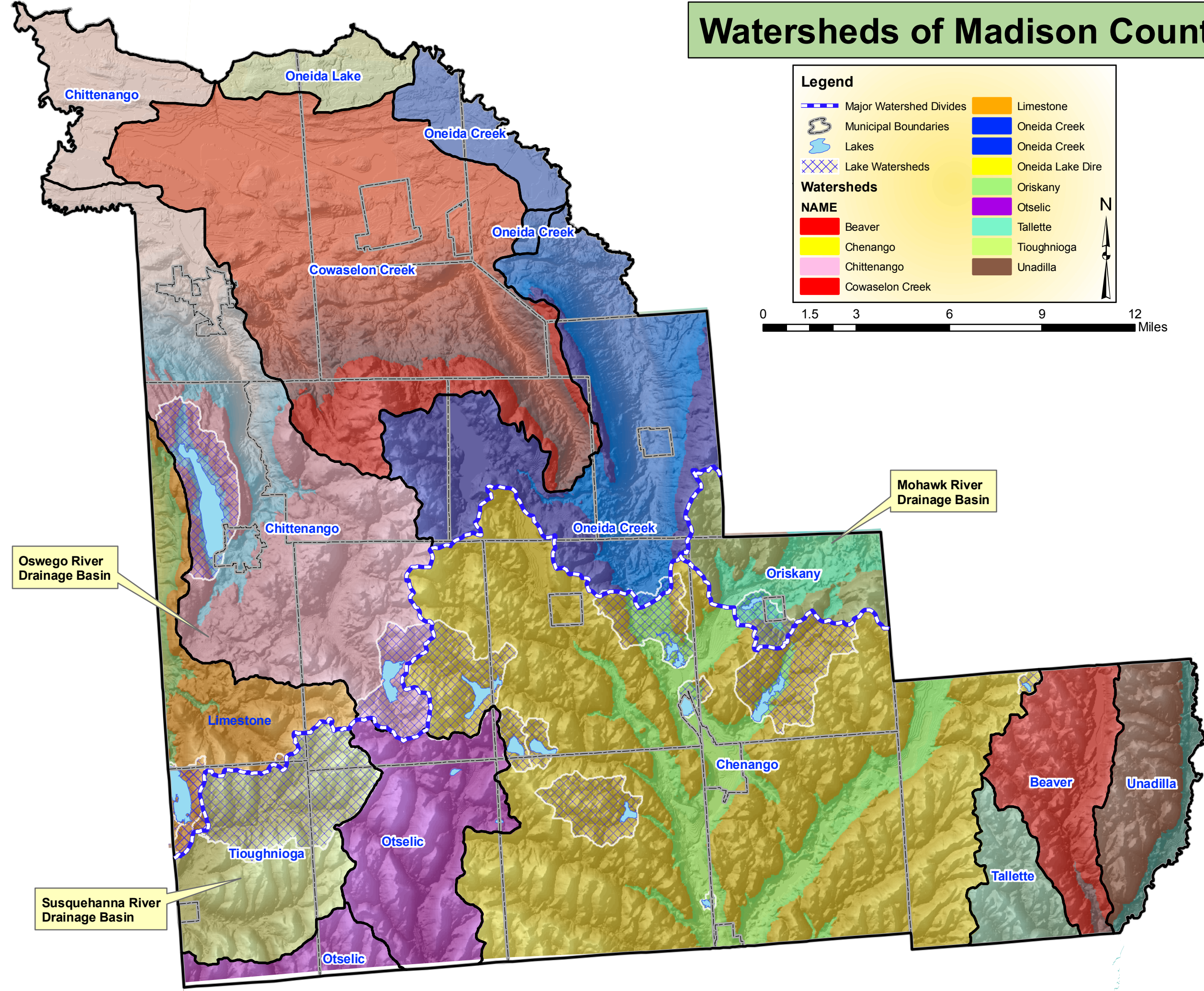
- US Highway
- Interstate
- State Highway
- County Highway



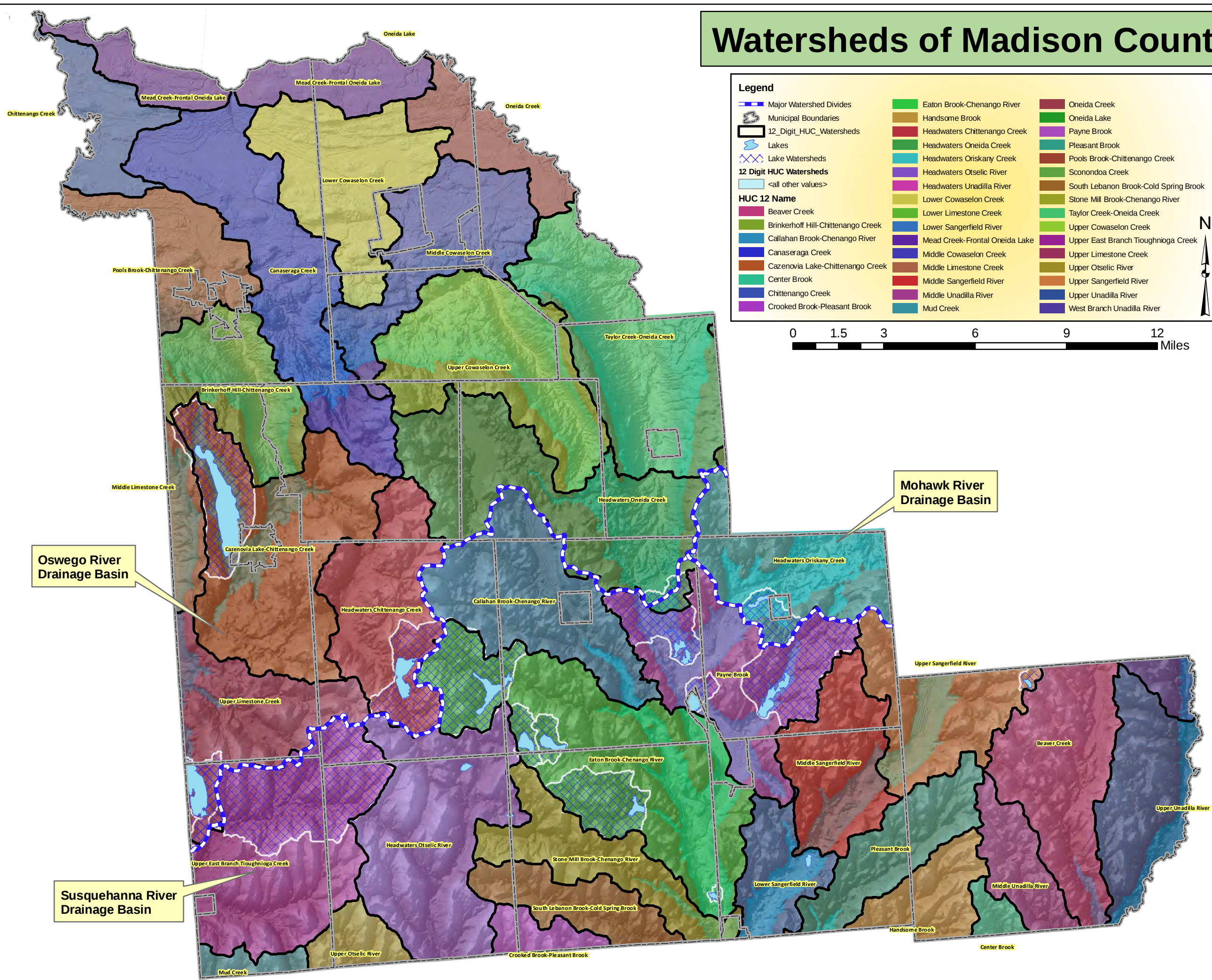
0 3.5 7 14 Miles

Map Prepared by the
Madison County Planning Department

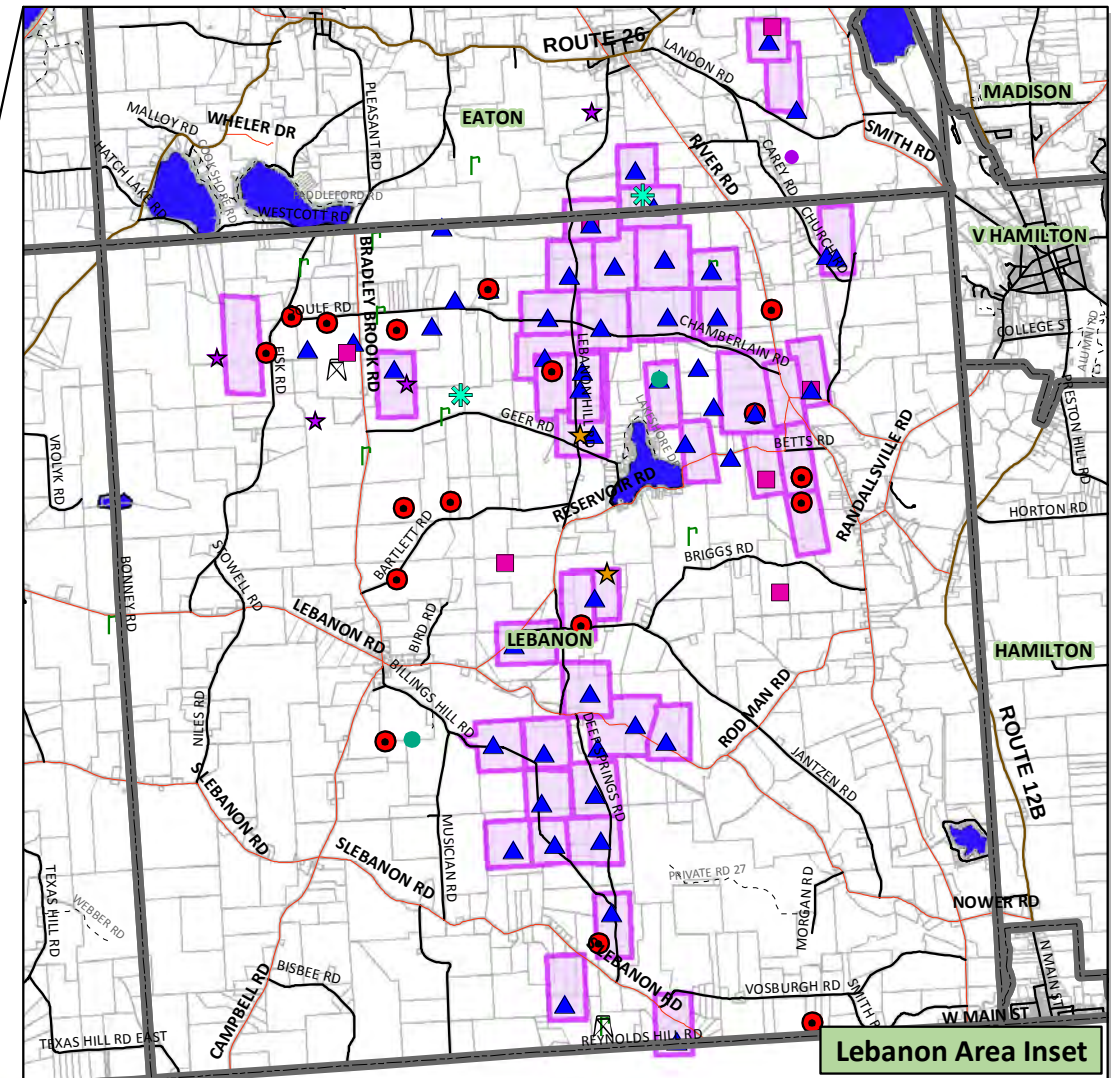
Watersheds of Madison County



Watersheds of Madison County



Bedrock Geology/
Gas and Oil Well Status
Madison County, NY
September 2010



Legend

- Active
- Application Received
- Cancelled
- Confidential
- Inactive
- Not Reported
- Plugged and Abandoned
- Permit Issued
- Temporarily Abandoned
- Transferred Permit
- Unknown

Natural Gas Pipelines

COMPANY

- Consolidated Gas Supply
- N.Y.S. Electric & Gas
- Niagara Mohawk
- Tennessee Gas Pipeline
- Undetermined

Bedrock Geology

CODE

- Rochester Shale
- Guelph Dolostone
- Vernon Formation
- Syracuse Formation
- Cobleskill Limestone
- Port Ewen Formation
- Onondaga Limestone
- Marcellus Formation
- Skaneateles Formation
- Ludlowville Formation
- Panther Mountain Formation
- Moscow Formation
- Tully Limestone
- West River Shale
- Water

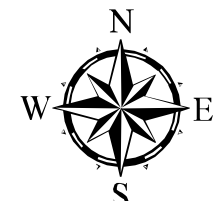
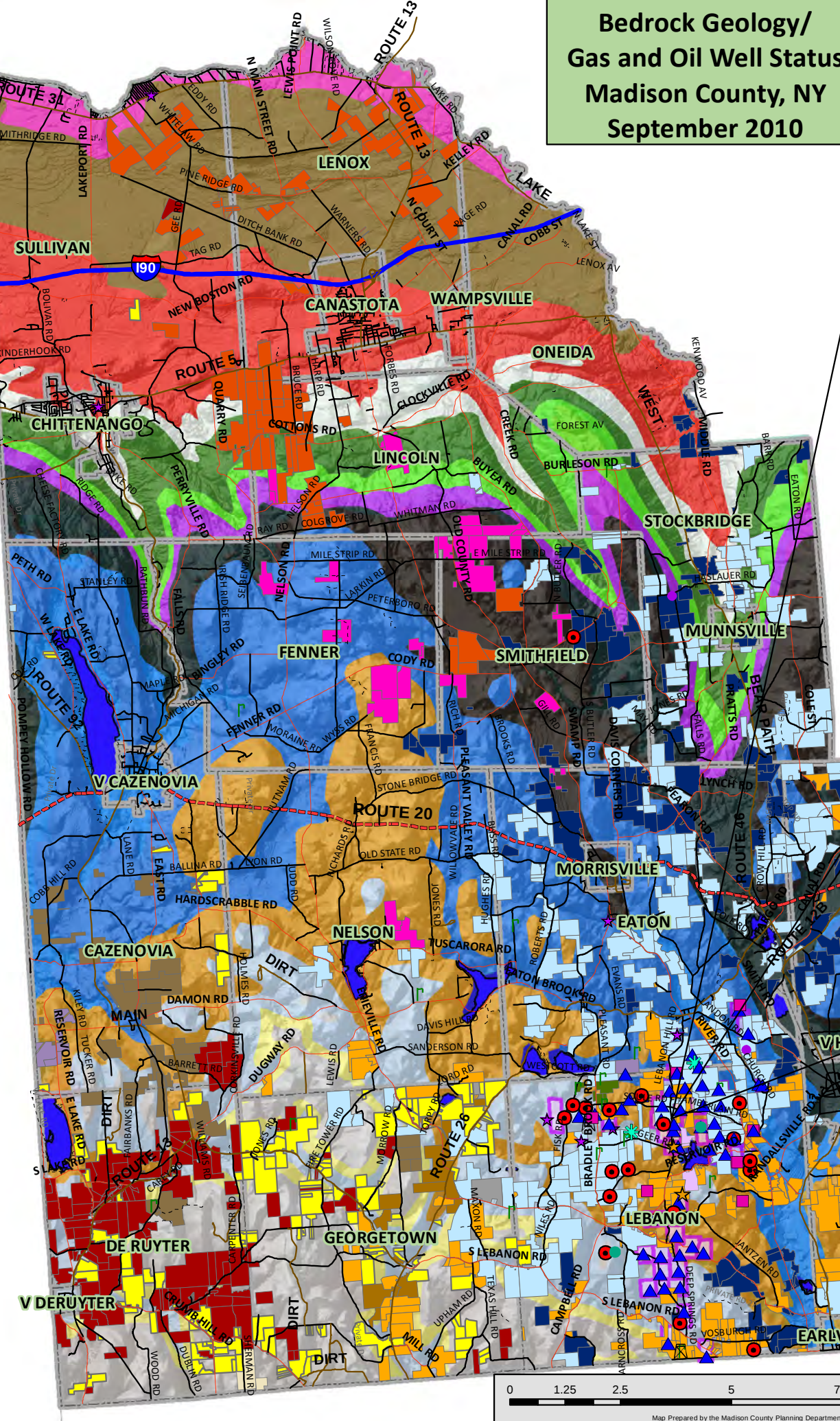
E911 Roads

CLASS

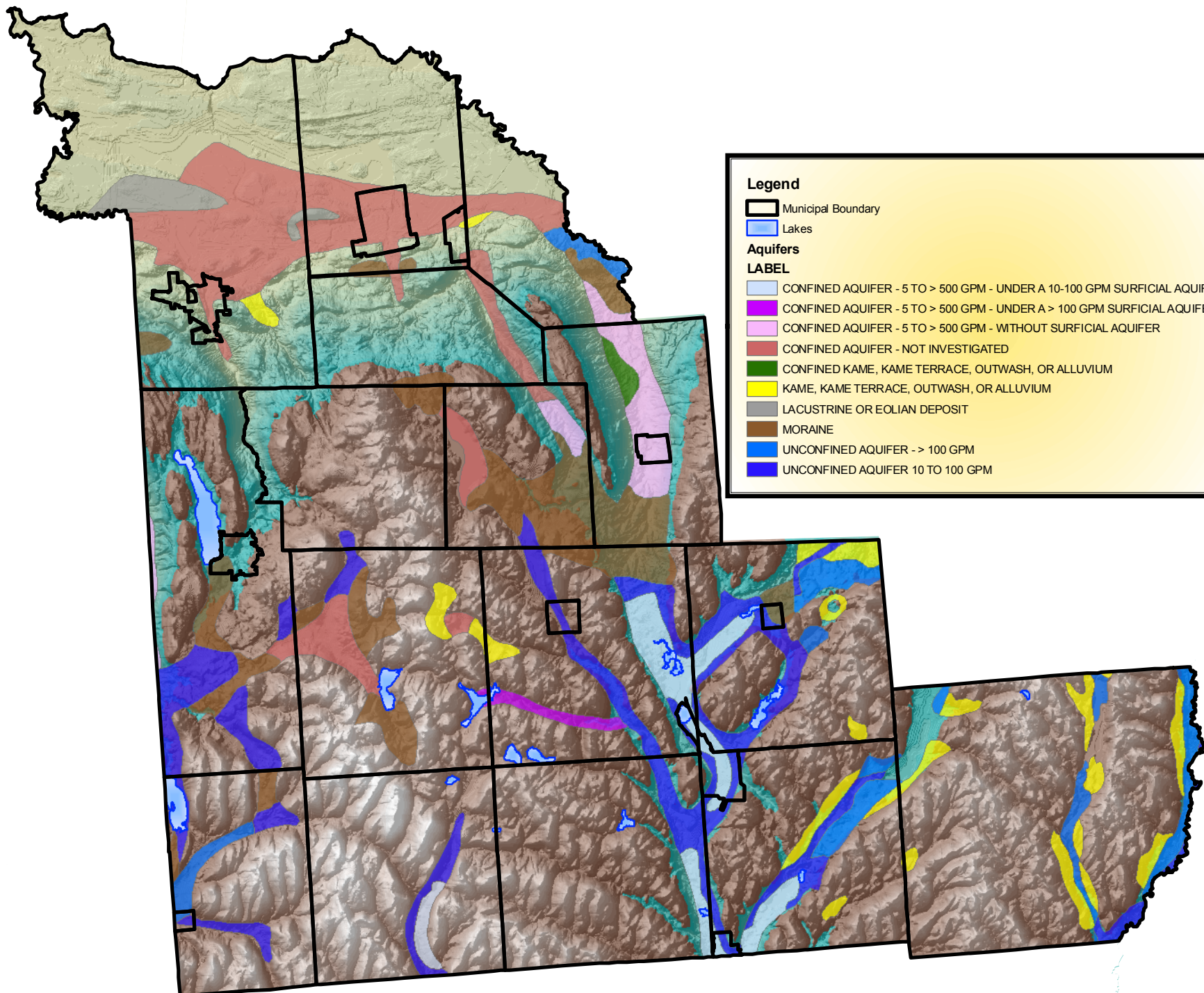
- Interstate
- State
- US Highway
- County
- Local
- Private

Geology

- Central Appalachian
- Chesapeake Appalachia
- Empire Explore
- Good Day Energy
- Hannon Oil
- Mason Dixon Natural Gas
- Mt. Pisca Development
- New York Shale Gas
- Nornew
- Norse Energy
- Phillips Production
- Prospect Land Services
- Salt City Resources
- Whitmar Exploration
- Ardent Resources
- Gas Well Spacing Units
- Municipal Boundaries
- surrounding county mask
- Waterbodies



Madison County Aquifers



Legend

Municipal Boundary
 Lakes

Aquifers

LABEL

- CONFINED AQUIFER - 5 TO > 500 GPM - UNDER A 10-100 GPM SURFICIAL AQUIFER
- CONFINED AQUIFER - 5 TO > 500 GPM - UNDER A > 100 GPM SURFICIAL AQUIFER
- CONFINED AQUIFER - 5 TO > 500 GPM - WITHOUT SURFICIAL AQUIFER
- CONFINED AQUIFER - NOT INVESTIGATED
- CONFINED KAME, KAME TERRACE, OUTWASH, OR ALLUVIUM
- KAME, KAME TERRACE, OUTWASH, OR ALLUVIUM
- LACUSTRINE OR EOLIAN DEPOSIT
- MORaine
- UNCONFINED AQUIFER - > 100 GPM
- UNCONFINED AQUIFER 10 TO 100 GPM

Madison County makes no guarantee or warranty concerning the accuracy of information contained on this map. Madison County further makes no warranty, either expressed or implied, regarding the condition of the product or its fitness for any particular purpose. The burden for determining fitness for use lies entirely with the user. This is not a survey product. Parcel data is updated twice a year. The user should assume parcel data to be a minimum of 6 months old at any time. For further information please call the Planning Department at (315) 366-2376.



2001 Landcover



Legend

Landsat 2001 Landcover

Cover Type

Open Water

Developed, Open Space

Developed, Low Intensity

Developed, Medium Intensity

Developed, High Intensity

Barren Land

Deciduous Forest

Evergreen Forest

Mixed Forest

Shrub/Scrub

Grassland/Herbaceous

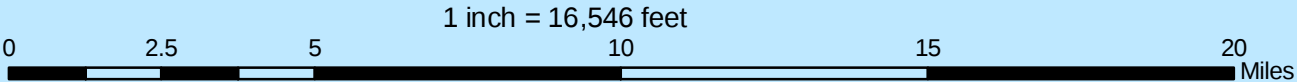
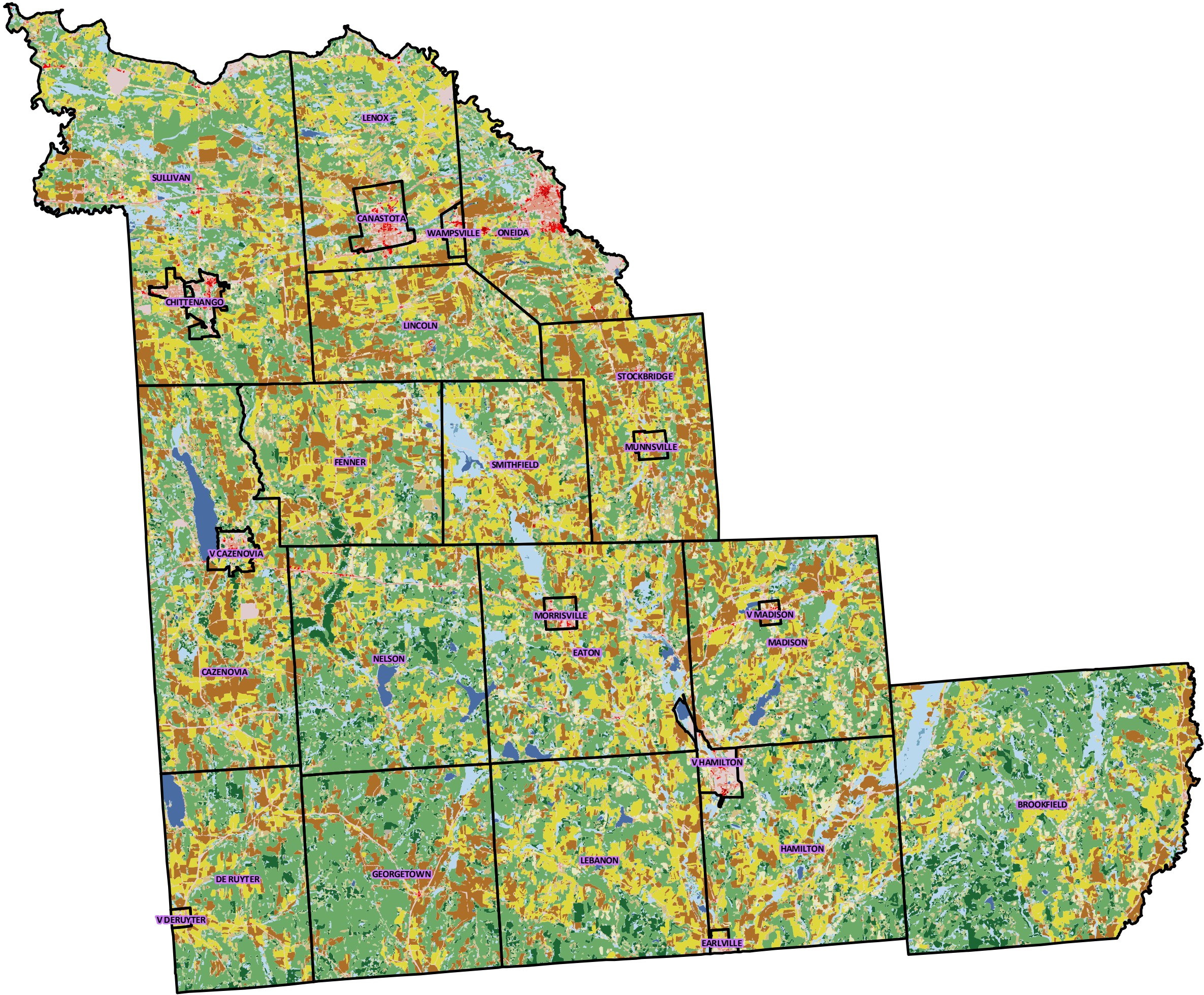
Hay/Pasture

Cultivated Crops

Woody Wetlands

Emergent Herbaceous Wetlands

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Appendix F

WATER RESOURCE HISTORY

APPENDIX F

Madison County Water Resources: An Historical Perspective

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Oriskany Creek waters are augmented by waters from the old Chenango Canal system of reservoirs and canal feeders. The Oriskany Creek watershed was expanded by the construction of the Chenango Canal in the mid-1800s, which affected the water volume and quality. When the Chenango Canal system was constructed in the mid-1800s, the original Oriskany Creek watershed was expanded. Manmade reservoirs and canals that once flowed south were diverted and designed to flow north into the Oriskany Creek watershed. The amount of water flowing into the Oriskany Creek was tremendously increased due to the Chenango Canal influence. The Chenango Canal ended its 44 years of operation in 1878. Water, however, continues to flow directly into Oriskany Creek just north of Solsville NY. The wooden sluice that once conveyed the Canal waters over the Oriskany Creek is long gone, and today water flows from three of the Madison County reservoirs, canal feeders and streams to provide added volume and water chemistry from distant watersheds.

Historically, the Chenango Canal was completed in 1836. It facilitated transportation from Binghamton to Utica, New York and connected the Susquehanna River to the Erie Canal. It was the first reservoir feeder canal design in the United States, and seven lakes, ponds and reservoirs were developed into what is referred to as the southern feeder system. Eaton Brook Reservoir, Hatch Lake, Bradley Brook, Lebanon and Lake Moraine reservoirs, and Woodman and Leland Ponds all fed the summit or high point for the Chenango Canal.

Waters from the Eaton Brook Reservoir were combined with the southerly flowing water of Calahan Brook (running through the Village of Morrisville) and further combined with waters of the Eaton Brook watershed and the Chenango River and flowed to a splitter just south of Eaton. The combined waters remain split today, flowing down both the Chenango River and the Chenango feeder with gates that are managed by the New York State Canal Corporation. The Chenango feeder flows south towards Randallville then flows back north along Village of Hamilton's western foothills. The Chenango feeder enters the Chenango Canal near Woodman Pond and continues past Bouckville where it passes under U.S. Route 20 just before it enters Oriskany Creek north of Solsville.

Hatch Lake and Bradley Brook Reservoirs also feed to the Chenango feeder canal system. Kingsley Brook Reservoir, now called Lebanon Reservoir, was designed to feed waters through the Kingsley Brook feeder to the Chenango Canal. The Kingsley Brook feeder is still intact and still owned by the state but is no longer used.

Madison Brook Reservoir, now called Lake Moraine, discharges into Payne Brook which flows through the Village of Hamilton and then into the Chenango River. Just below the Lake Moraine dam is a canal splitter that allows water to be diverted into the Madison Brook feeder flowing west to the south end of Woodman Pond and ultimately into the Chenango Canal system. The Canal Corporation manages this splitter to divert the reservoir's water as needed into the Chenango Canal and ultimately into the

Erie/Barge Canal. Woodman Pond became a water supply source for the Village of Hamilton until the Village developed its own wells. Woodman Pond is no longer used to feed the canal system.

Leland's Pond, now called Leland Pond, feeds into a stream flowing a short distance to the Chenango Canal. The old Leland Pond feeder, flowing south to enter at the southern end of Woodsman Pond, is still owned by the State but is no longer used.

Currently only Eaton Brook, Lake Moraine, and Leland Pond, three of the seven water sources that were the southern feeder system, continue to be managed by the Canal Corporation, directing waters to flow north into Oriskany Creek. Their combined flow and their respective watershed drainages collect and deliver nearly twice the volume of the original Oriskany Creek where the Chenango Canal mixes with the Oriskany Creek just north of Solsville.

There are three Madison County communities that discharge treated wastewater into the Chenango River, Village of Morrisville, SUNY Morrisville, and the Village of Hamilton. These facilities are operating well and in full compliance with their NYSDEC SPDES permits.