Chapter 2: Watershed Characterization

2.1 Introduction

By the very nature of a watershed, the quality of the water is inextricably tied to the environmental conditions in the entire watershed—its hydrology (i.e., pattern of water movement), its climate, its soils, and other properties of the landscape. Inasmuch as human activities—settlement patterns, land use, impervious surfaces, waste disposal, and other modifications of the landscape—change the natural state, they too will affect water quality. A watershed management plan must recognize these factors and how they influence the current conditions of the land and waters.

In this chapter, both the natural environmental setting and the cultural (human-influenced) conditions of the Mohawk River Watershed are described. The data and information from the 2013 Mohawk River Watershed Characterization Report are incorporated, along with an analysis of the local laws adopted by the watershed municipalities and how those laws may affect water quality conditions.[1] Understanding the underlying environmental conditions as well as the constraints imposed by existing land use patterns and the regulatory environment provides a rational basis for recommending long-term protection and restoration strategies.

2.2 Watershed and Subwatershed Boundaries

2.2.1 Evolution of the Basin

The Mohawk River Watershed took final shape as a result of the last glaciation approximately 10,000 years ago. Glacial ice and melt water played a major role in forming the Mohawk Valley. Prior to the glaciation, the Mohawk drained south from Schenectady and entered the Hudson River near Coeymans, New York. During glaciation, it flowed north through what is now the Ballston Spa area. Following glaciation, this route was blocked by ice, and as the St. Lawrence lowland was also blocked by ice, a large river called the Iromohawk drained the Great Lakes and the melt water of the eastern Laurentide ice sheet through the area between the mountains of the Adirondacks and Catskills. The Iromohawk cut a wide channel, west to east, to the Hudson, forming the route the Mohawk River follows today. The geological remnants of this river, much larger than the current river, exist within the valley.

2.2.2 Current Basin Configuration

The present day Mohawk River Watershed (basin) is located in central New York State and covers an area of approximately 3,460 square miles. The watershed extends north to south from the southwestern Adirondacks to the northern Catskills, and east to west from Rome, New York, to the Hudson River at Cohoes, as displayed in Map 1-1. The watershed comprises approximately 25% of the total drainage area of the Hudson River. The headwaters of the Mohawk River are at the eastern edge of the Tug Hill Plateau, with the river flowing south towards Rome, and then turning east and continuing to the Hudson, for a total of 140 miles. The watershed is one of the major drainage basins in New York State (Map 2-1).[2]

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[1] Bergmann Associates. 2014 (January). *Mohawk River Watershed Regulatory Review & Analysis*. Prepared for the Mohawk River Watershed Coalition of Conservation Districts. Link to Executive Summary or Full Report.

[2] The Interactive Mapping Tool for the Mohawk River Watershed that was developed to supplement this Plan provides multilayered information about watershed boundaries, hydrology, soils, residential development, habitat, infrastructure, pollution, floodplains, governance, and more.

Major drainage basins throughout the United States are subdivided into drainage units, and are assigned a hydrologic unit code (HUC) based on four levels of classification, including region, subregion, accounting unit, and cataloging unit. Each major drainage basin is further divided into 8-, 10-, and 12-digit HUCs. The Mohawk basin is comprised of two 8-digit HUC subwatersheds (the Mohawk and Schoharie), eighteen 10-digit subwatersheds (**Map 2-2**), and 116 12-digit HUC subwatersheds (**Map 2-3**). The 12-digit HUC is the level at which watershed health is assessed and strategies and action plans for restoration or protection are implemented.

Other than the headwaters of the Mohawk River itself, north of Rome, the major tributaries or subwatersheds of the Mohawk include West Canada Creek, which drains the southwestern Adirondack Mountains and joins the Mohawk near Herkimer, and Schoharie Creek, which drains the northeastern Catskill Mountains and joins the Mohawk west of Amsterdam.

The main topographic features of the watershed are shown in **Map 2-4**, with the Mohawk River lowlands bounded by the Adirondack Mountains to the north and the Catskill Mountains to the south. The range in elevation is approximately 3,500 feet from mountainous areas in the southern Adirondacks to the confluence with the Hudson. The Mohawk lowlands developed due to the erodibility of the shale and siltstone bedrock compared to the harder bedrock types of the Adirondacks.

There are more than 6,600 miles of rivers, canals, and streams and 135 lakes, reservoirs, and ponds greater than 6.4 acres in size within the basin (**Map 2-5**). The main tributaries to the Mohawk represent a large portion of these stream and river miles. Flowing out of the Catskills, Schoharie Creek and its tributaries include 1,650 stream miles, or 25% of the stream miles. Two large tributaries flow from the Adirondacks: West Canada Creek (1,165 miles, 18% of the stream miles) and East Canada Creek (515 miles, comprising 8% of the stream miles). Of the lakes and reservoirs, three of the four largest are constructed reservoirs (Hinckley, Delta, and Schoharie reservoirs) which, along with the naturally formed Peck Lake, represent 42% of total lake acres in the watershed.

The Mohawk River Watershed can be conveniently divided into three geographic regions that reflect the wide-ranging diversity in the watershed: Upper Mohawk, Main River, and Schoharie Watershed (boundaries are shown in Map 2-2). The Upper Mohawk region encompasses portions of Lewis, Hamilton, Oneida, Herkimer, Madison, and Otsego Counties. The headwaters of the Mohawk River originate in this region at the eastern edge of Lewis County on the Tug Hill Plateau, from which the river flows south to Rome. It then turns eastward flowing through Oneida and Herkimer Counties. The subwatersheds in this region include a portion of the Adirondack Park that is heavily wooded and mountainous; this part of the watershed has very little development. In contrast, the Upper Mohawk also encompasses the western segment of the main stem of the river where the cities of Rome, Utica, Herkimer, and Little Falls have a long history as industrial regions and population centers.

The Main River region includes portions of Fulton, Montgomery, Schenectady, Saratoga, and Albany Counties. The majority of this region consists of what has been historically referred to as the Mohawk Valley, the highly fertile lowlands along the main stem of the river with extensive agricultural land use. The eastern segment of the Main River region is highly developed with the cities of Amsterdam and Schenectady and the suburbs of Albany. These cities have also been settled for centuries, and have served as centers of industrial production and commerce as well as an important transportation corridor to the Great Lakes.

The Schoharie Watershed region, which is the drainage basin for Schoharie Creek, includes portions of Schoharie, Greene, and Delaware counties. The Catskill Mountains encompass the uplands of this region, with steep slopes and wooded land cover. A unique feature of this region is that the portion in Greene County is in the New York City watershed because a portion of the water that enters the Schoharie Reservoir, located at the border of Greene and Schoharie Counties, is diverted to New York City for potable water supply. As part of the New York City

watershed, strict watershed rules and regulations are in effect in Greene County. The Schoharie Watershed has less agriculture than the fertile lowlands along the main stem of the Mohawk and a higher percentage of residential land use.

2.3 Environmental Setting

2.3.1 Water Resources

New York State has a humid continental climate. The average annual precipitation within the Mohawk basin ranges from 33 to 71 inches per year, depending largely on elevation (**Map 2-6**). Mean annual temperatures within the basin range from about 40° Fahrenheit in the Adirondacks to about 50°F in lowland areas.

Since the 1970s, annual temperatures in New York State have increased approximately 0.6°F per decade, with the rise in winter temperatures exceeding 1.1°F per decade. Mean annual temperatures may rise by 1.5°F by the 2020s. There has been no discernable trend in annual precipitation, but year-to-year variability has increased and intense precipitation events have become more frequent with the potential for more destructive flooding in flood-prone areas of the Mohawk River Watershed.[3]

Flooding of the Mohawk Valley and along its tributaries has been a long-standing natural phenomenon extending back to its formation 10,000 years ago. There are two main types of flooding events, *free-water* and *break-up*. Free-water events usually occur in the late summer and early fall during hurricane season and are associated with heavy precipitation. Break-up events are associated with the break-up of river ice due to rising temperatures, snow melt, and heavy rains in early spring. Flooding is exacerbated during break-up events when ice jams occur at structures along the river such as bridges and dams.[4]

Major flooding occurred in the Schenectady area during the 1800s and early 1900s when flood stages exceeded 15 feet for eight different flooding events over a period of 45 years, including the great flood of 1914. In recent years, flooding due to a stalled front in 2006 resulted in $200 million in damages. In 2011, Hurricane Irene deposited 4 to 8 inches of rain in the eastern part of the Mohawk watershed and up to 13 inches in the Schoharie Valley, causing severe flooding in that region and along the Mohawk from Amsterdam to Schenectady. Damages from the flood were estimated to be close to $300 million. Hurricane Irene was followed a couple of weeks later by Tropical Storm Lee, which caused further flood damage.

Since many of the developed areas in the watershed lie in floodplains, losses from floods like those of 2011 are likely to be great. The Federal Emergency Management Agency (FEMA) has mapped flood-prone areas in the watershed (**Map 2-7**), and many of these areas were heavily damaged in the 2011 floods.

Stream discharge is monitored at multiple locations along the Mohawk River and its major tributaries. The U.S. Geological Survey (USGS) maintains a network of stream gauges and river gauges, as summarized in **Table 2-1**. An online National Water Information System Mapping Tool displays the locations of the gauging stations and provides links to near real-time data. These monitoring data are an essential tool for managing hydrology and

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[3] Rosenzweig, C., W. Solecki, A. DeGaetano, M. O'Grady, S. Hassol, P. Grabhorn (Eds.). 2011. *Responding to Climate Change in New York State: The ClimAID Integrated Assessment of Effective Climate Change Adaptation*. Technical Report. New York State Energy Research and Development Authority (NYSERDA), Albany, NY. Available at http://www.nyserda.ny.gov/climaid.

[4] Garver, J.I., and Cockburn, J.M.H. 2009. *A Historical Perspective of Ice Jams on the Lower Mohawk River.* Proceedings from the 2009 Mohawk Symposium, Union College, Schenectady, NY, p. 25-29.

forecasting risk of flooding events. In the Schoharie watershed, the gauging network provides information the New York Power Authority requires to manage the Blenheim-Gilboa Pumped Storage Power Project.

TABLE 2-1

List of USGS Surface Water Gauging Sites within the Mohawk River Basin

River Segment	Site Name	Gauge Number
Upper Mohawk	WEST CANADA CREEK AT KAST BRIDGE NY	01346000
	SAUQUOIT CREEK AT WHITESBORO NY	01339060
	MOHAWK RIVER NEAR UTICA NY	01342602
	HINCKLEY RESERVOIR AT HINCKLEY NY	01343900
	WEST CANADA CREEK NEAR WILMURT NY	01343060
	BLACK CREEK NEAR GRAY NY	01343403
	MOHAWK RIVER BELOW DELTA DAM NEAR ROME NY	01336000
	FULMER CREEK NEAR MOHAWK NY	01342743
	MOHAWK RIVER NEAR LITTLE FALLS NY	01347000
	EAST CANADA CREEK AT EAST CREEK NY	01348000
	NORTH CREEK NEAR EPHRATAH NY	01348420
Main River	OTSQUAGO CREEK AT FORT PLAIN NY	01349000
	CANAJOHARIE CREEK NEAR CANAJOHARIE NY	01349150
	MOHAWK RIVER ABOVE STATE HIGHWAY 30A AT FONDA NY	01349527
	MOHAWK RIVER AT LOCK 8 NEAR SCHENECTADY NY	01354330
	Surveillance camera to detect ice jams at the Stockade	None
	MOHAWK RIVER AT FREEMAN'S BRIDGE AT SCHENECTADY NY	01354500
	MOHAWK RIVER AT REXFORD NY	01355475
	MOHAWK RIVER AT COHOES NY	01357500
Schoharie Watershed	WEST KILL BELOW HUNTER BROOK NEAR SPRUCETON NY	01349711
	EAST KILL NEAR JEWETT CENTER NY	01349700
	SCHOHARIE CREEK NEAR LEXINGTON NY	01349705
	WEST KILL NEAR WEST KILL NY	01349810
	BATAVIA KILL AT RED FALLS NEAR PRATTSVILLE NY	01349950
	SCHOHARIE CREEK AT PRATTSVILLE NY	01350000
	BEAR KILL NEAR PRATTSVILLE NY	01350035
	SCHOHARIE RESERVOIR NEAR GRAND GORGE NY	01350100
	MANOR KILL AT WEST CONESVILLE NEAR GILBOA NY	01350080
	SCHOHARIE CREEK AT GILBOA NY	01350101
	PLATTER KILL AT GILBOA NY	01350120
	MINE KILL NEAR NORTH BLENHEIM NY	01350140
	SCHOHARIE CREEK AT NORTH BLENHEIM NY	01350180
	SCHOHARIE CREEK AT BREAKABEEN NY	01350355
	SCHOHARIE CREEK AT BURTONSVILLE NY	01351500

2.3.2 Geology

The surficial material (Map 2-8) throughout the basin was deposited primarily during the last glaciations of the Pleistocene Epoch when the Wisconsin glaciers covered most of the Northeast. Till mantles the uplands, and ice-contact, deltaic, fluvial, and alluvial sand and gravel and lacustrine silt and clay deposits are present in the valleys. Till and lacustrine silt and clay deposits generally have low yields of water, whereas the well-sorted, coarse-grained deposits form important aquifers in the basin. The valley-fill sand-and-gravel aquifers may produce yields as high as 500 gallons per minute.[5]

Bedrock in the Mohawk River basin (Map 2-9) includes shale, sandstone, carbonate, and crystalline rocks. Black shale is present in the Mohawk Valley, with bands of carbonate rock along the edges of the valley. Bedrock in the southern part of the basin consists mainly of shale and sandstone, and bedrock in the northern part of the basin is mainly crystalline metamorphic rock. Of the bedrock aquifers in the basin, carbonate rocks generally produce the highest yields, and the crystalline rocks generally produce the lowest; the clastic rocks generally have low to moderate yields.

2.3.3 Soils

Soils are influenced by five factors: parent material, climate, living organisms, topography, and time. The hydrologic soil groups illustrated in Map 2-10 range from A soils (high infiltration), shown in light to dark green, through D soils (very slow infiltration), shown in light to dark red. Much of the watershed has C soils, which have slow infiltration. The potential for soil erosion, measured by the soil erodibility k-factor, is displayed in Map 2-11. As the k-factor increases—as shown by the darker orange on the map—soil erodibility increases. The online Interactive Mapping Tool for the Mohawk River Watershed provides more detailed information regarding the nature and distribution of soils within the watershed.

2.3.4 Habitat

An abundance of wildlife, both terrestrial and aquatic, thrives within the Mohawk River basin. The river itself supports an exceptional warm-water fishery, known regionally for its smallmouth bass. The abundance of migrating blueback herring in the river has provided a substantial high quality food source for bass.[6] The Mohawk River valley is also home to many important terrestrial habitats such as grasslands, wetlands, and forests. Specifically, grassland habitats act as refuge for many important bird species, while wetland and forest habitats support various important reptile, amphibian, and mammal populations.

The land cover map (Map 2-12), which is based on data from the 2006 National Land Cover Database, illustrates the diversity of habitats in the watershed, with forested areas in the Adirondacks and Catskills and the more open spaces in the Mohawk Valley. These distinct ecological zones are also shown in Map 2-13. Ecological zones are delineated land units of similar ecological and geographic characteristics, based on topography, vegetation types, and land use.

The Mohawk River basin contains many environmentally sensitive areas, including lakes and streams, steep slopes, wetlands, and hydric soils (Map 2-14), as well as floodplains (both 100-year and 500-year) and primary aquifers.

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[5] Nystrom, E. A. 2008. *Groundwater quality in the Mohawk River Basin, New York, 2006.* U.S. Geological Survey Open-File Report 2008-1086, 33. Available at http://pubs.usgs.gov/of/2008/1086/.

[6] McBride, N. D. 1994. *A Fisheries Management Plan for the Lower Mohawk River*. New York State Department of Environmental Conservation, Region 4, Fisheries. Technical Report. 109 pages.

Larger wetlands throughout the watershed are regulated by two state agencies: the Adirondack Park Agency (APA) designates wetlands in the Adirondack Park, and the NYS Department of Environmental Conservation regulates wetlands of 12.4 acres or more in the remainder of the watershed (**Map 2-15**). Additional unmapped wetlands within the watershed are regulated by the U.S. Army Corp of Engineers.

2.4 Cultural Setting

2.4.1 Historical Perspective

Native Americans referred to the Mohawk River as *Te-non-an-che*, the "river flowing through the mountains." The Mohawk River Valley provided Native Americans, and the American settlers who displaced them, a route through the mountains from east to west, which connected the Atlantic Ocean with the interior of North America. The fertile soils of the valley attracted farmers in the 1700s. The Mohawk Valley was strategically important during the French and Indian War and the Revolutionary War, and many important battles were fought in this region.

During the seventeenth and eighteenth centuries, the natural streams and lakes of the Mohawk/Oneida waterway served as an inland corridor for European exploration and military expansion before becoming a vital transportation link between the Hudson River and the Great Lakes for the new nation. Although planning for the Erie Canal was initiated in 1808, construction was delayed until 1817 because of the War of 1812; it was completed in 1825 at a cost of $7 million. The Erie Canal, which paralleled the Mohawk River, was enlarged in 1835, and again in 1891. The canal ceased operation in 1918 following the opening of the larger Barge Canal, which followed the main stem of the Mohawk River from the Hudson to Utica, and then continued west.

With the advent of the Erie Canal, industrialization of the Mohawk Valley increased rapidly. Between 1825 and the end of the Civil War in 1865, the Mohawk Valley saw rapid growth in the number and size of towns, the extent of railroads, and the beginning of manufacturing. From the mid-1800s to the early 1900s, industrial development increased on a large scale. Examples of industrial development along the river include the following: wood pulp and paper at Herkimer; brooms and carpets at Amsterdam; dairy machinery at Little Falls; knitting goods at Little Falls and Herkimer; leather goods at Little Falls, typewriters and firearms at Ilion, felt products at Dolgeville; copper at Rome, packaged food products at Canajoharie, and electric products at Schenectady. By 1912, there were 1,321 factories in the six Mohawk Valley counties.

Due to the fertile soils and transportation infrastructure of roads, railways, and waterways, human settlement and economic development flourished during the nineteenth and into the twentieth century. The population of the six Mohawk Valley counties was 500,000 by 1925. Agricultural and industrial development has had a significant negative impact on water quality in the Mohawk River and its tributaries. With the enactment of the Clean Water Act in the 1970s, water quality began to improve and has continued to improve to the present day. Many problems from the past remain unresolved, however, including PCB contamination and sediment build-up in streams. Pollution from inadequate sewage treatment facilities and the erosion of stream banks are ongoing problems.

2.4.2 Municipalities and Population

There are 170 municipalities—counties, towns, cities and villages—in the watershed (**Map 2-16**). The counties within the Mohawk River watershed include all of Montgomery, most of Schoharie, large parts of Schenectady, Greene, Fulton, Herkimer, and Oneida, and portions of Albany, Saratoga, Delaware, Otsego, Hamilton, Madison, and Lewis. The largest cities wholly in the watershed are Utica, Rome, Amsterdam, and Schenectady. The western edge of Albany is also included. The total watershed population in 2010 was 600,388, with Utica reporting 62,235,

Rome 33,725, Amsterdam 18,620, and Schenectady 66,135. Population density (persons per square mile) is shown in Map 2-17.

2.4.3 Infrastructure

Infrastructure within the watershed—including highways, railways, bridges, dams, and stormwater outfalls—is illustrated in Map 2-18. The built environment can have a significant and direct impact on water quality and hydrology due, for example, to the effects of impervious surfaces on stormwater runoff, potential pollution from vehicles, and outfalls of treated wastewater. In addition, infrastructure affects settlement patterns and land use.

Roads, Highways, and Railways. The greatest concentration of roadways is in the lowlands and mid-uplands of the watershed. The principal east-west highway is the NYS Thruway (Interstate 90), which runs parallel to the main stem of the Mohawk River between Utica and Schenectady, a distance of approximately 75 miles. NY Route 5, which pre-dates the Thruway, also runs along the river for the same distance. The main rail lines follow this same route. In contrast, the portion of the watershed in the Adirondack Park is practically devoid of roads and rail lines, as is the upper part of the Schoharie watershed in the Catskills.

Dams. There are 495 dams in the Mohawk River watershed, ranging from small earthen dams for ponds to large dams for major reservoirs. Of these, there are 37 high hazard dams, designated Class C by NYSDEC, which, if they fail, cause large-scale property damage and possible loss of life. More information about dams can be found at the online Interactive Mapping Tool for the Mohawk River Watershed (view infrastructure maps, then zoom in and click on a dam to get information such as name, location, hazard class, purpose, year built, length, height, maximum discharge, and impoundment storage and surface area). Dams that impound large reservoirs are listed in Table 2-2. All of these dams are Class C.

TABLE 2-2
Dams Impounding Large Reservoirs in the Mohawk River Watershed

Dam Name	Year Built	Length (ft.)	Height (ft.)
Delta	1912	1000	106
Hinckley	1914	3565	48
Peck Lake	1910	920	39
Gilboa	1926	2273	183

Delta Dam on the Mohawk River above Rome was built to supply water to the Erie Canal. Delta Reservoir helps attenuate high flows due to heavy rain events and thus provides a degree of flood protection downstream. Hinckley Reservoir, behind Hinckley Dam on West Canada Creek, provides water to 130,000 people in the greater Utica area. It also supplies the Gregory B. Jarvis hydroelectric plant with its 9,000-kW capacity, which began operation in June of 1986. This reservoir also provides attenuation of high flows. Gilboa Dam impounds the Schoharie Reservoir on Schoharie Creek and supplies water to New York City.

2.4.4 Land Cover and Land Use

Land cover (refer to Map 2-12) and land use (Map 2-19) are interrelated. Land cover documents how much of a region is covered by forests, wetlands, impervious surfaces, agriculture, open water, etc. Land use shows how people use the landscape, whether for development, conservation, or mixed uses. The different types of land cover can be managed or used quite differently. Two land parcels may have similar land cover, but different land use. For instance, an industrial assembly plant may look, from the outside, very much like an office building. The

first is an example of industrial use, the latter an example of commercial use. Similarly, two land parcels that have similar land use may have different land cover. A golf course and an office building are both commercial land uses. The former would have a land cover of grass, while the latter would be considered built up.

Both land cover and land use can significantly affect water quality. Forest cover, particularly along streams, protects against sediment and nutrient pollution and moderates flooding, as do wetlands. Open spaces such as grasslands and shrub/scrub cover can also protect waterbodies. Open spaces used for agriculture or residential and commercial development, however, can have a detrimental impact on nearby waterbodies, unless runoff is managed properly.

The two dominant *land cover* types in the Mohawk River watershed include forest, representing 50% of the total area, and agriculture representing 25%. Other land covers include wetland, developed, herb/shrub/scrub, and water (see Map 2-12; **Figure 2-1**; and **Table 2-3**). These data are from the 2006 USGS National Land Cover Database (NLCD). The Upper Mohawk region includes the heavily wooded northwestern headwaters in the Adirondack Park, and the Mohawk lowlands with the developed areas of Utica and Rome and agricultural land cover extending both north and south of the Mohawk River. Percentages of land cover types in this region are similar to those of the watershed as a whole. The Main River region, however, mainly in the lowlands, has less forest and more agricultural and developed land cover. It also contains more wetlands. The Schoharie Watershed region is significantly different from the watershed as a whole, with a much higher percentage of forest cover and lower percentages of developed and agricultural cover. Not surprisingly, this region has the best water quality compared to the other regions of the watershed.

Residential *land use* (28%) is the most prominent land use type in the watershed, followed by Wild, Forested and Conservation (20%), and Agriculture (20%) (refer to Map 2-19, **Figure 2-2**, and **Table 2-4**). As expected, land uses vary by region. Wild/Forested/Conservation land use is highest in the Upper Mohawk, due in part to the Adirondack Park. In the Schoharie Watershed, forest cover is 71%, whereas the land use for wild/forested/ conservation is only 17%. This is because other land uses such as residential have forest cover. Agricultural land use is highest in the lowlands of the Upper Mohawk and Main River, and lowest in the Schoharie Watershed, which is consistent with land cover.

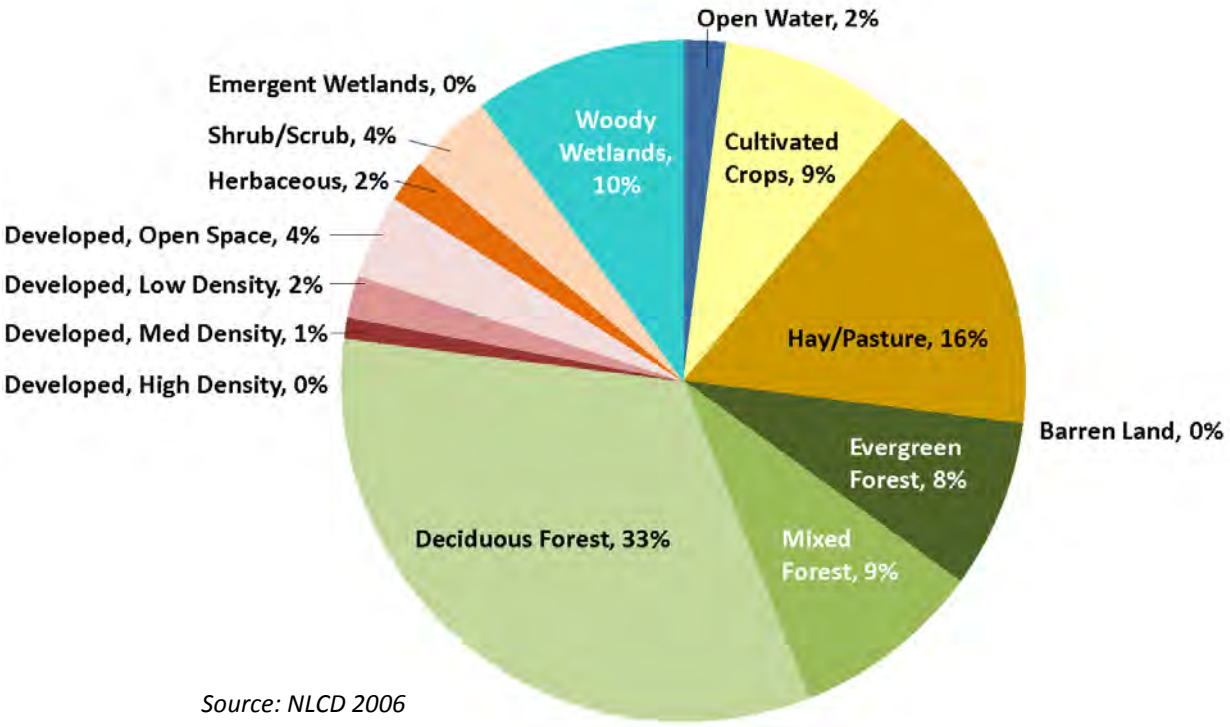
TABLE 2-3

Summary of the Main Land Cover Types for the Entire Watershed, and Comparison by Region (Upper Mohawk, Main River, and Schoharie Watershed)

Land Cover Type	Total Watershed (%)	Upper Mohawk (%)	Main River (%)	Schoharie Watershed (%)
Forest	50	48	41	71
Agriculture	25	24	21	18
Wetland	10	9	16	4
Developed	7	6	10	5
Herb/Shrub/Scrub	6	9	3	1

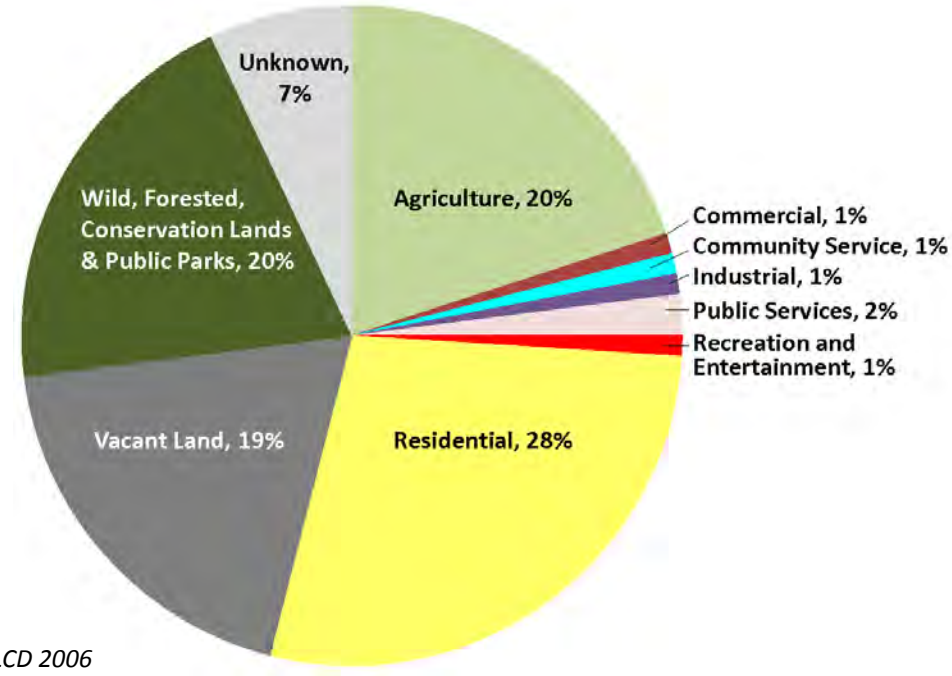
Source: NLCD 2006

Figure 2-1
Distribution of Land Cover, Mohawk River Watershed



Source: NLCD 2006

Figure 2-2
Distribution of Land Use, Mohawk River Watershed



Source: NLCD 2006

TABLE 2-4
Summary of the Main Land Use Types for the Entire Watershed, and Comparison by Region (Upper Mohawk, Main River, and Schoharie Watershed)

Land Use Type	Total Watershed (%)	Upper Mohawk (%)	Main River (%)	Schoharie Watershed (%)
Wild, Forested, Conservation	20	24	18	17
Agriculture	20	23	22	13
Residential	28	24	29	34
Vacant	19	17	17	25
Unknown	7	6	6	7
Misc. (commercial, industrial, recreation)	6	6	5	4

Source: NLCD 2006

2.5 Potential Sources of Pollution

There are many point sources of pollution in the basin (point sources refer to discharges that originate from a single, identifiable sources such as a regulated wastewater discharge). There are also areas of known contamination such as brownfield sites at former manufacturing facilities (Map 2-20). Superfund sites, of which there are a few, are highly contaminated areas that have been identified by USEPA as requiring remediation.

2.5.1 Municipal Wastewater Treatment Plants

Most of the point sources of pollution discharging to waterways within the Mohawk basin are the regulated discharges of municipal wastewater treatment facilities. These facilities operate with a State Pollution Discharge Elimination System (SPDES) permit from NYSDEC. While these are legally permitted discharges of treated effluent, they are not pollutant free. The pollutant discharges have regulatory limits; these limits typically include maximum load and/or concentrations of Biochemical Oxygen Demand (BOD) and Total Suspended Solids (TSS). These discharges also contain the nutrients nitrogen and phosphorus, which can cause algal blooms; phosphorus is of most concern in impounded waters. There are 82 municipal wastewater treatment facilities in the watershed. The distribution of the facilities by region is as follows: Upper Mohawk, 25; Main River, 37; Schoharie Watershed, 20.

2.5.2 Stormwater Outfalls (MS4s)

Stormwater outfalls included in Municipal Separate Storm Sewer System (MS4) program are displayed in Map 2-18. MS4 stormwater outfalls are managed by municipalities and regulated by NYSDEC SPDES general permits in compliance with federal requirements set forth by USEPA. MS4 operators are required to implement a stormwater management program (SWMP), which includes control measures ("Six Minimum Control Measures")[7] and utilizes Best Management Practices (BMPs).

The two main regions where these are found in the Mohawk River Watershed are the Greater Utica area in the west and the Greater Schenectady area in the east. In addition, there are MS4 communities in Albany and Saratoga Counties and in smaller cities throughout the watershed. Activities underway in Schenectady and Utica to manage stormwater and reduce this nonpoint source of pollution are described below.

[7] USEPA. 2014. Small MS4 Stormwater Program Requirements. Available at http://water.epa.gov/polwaste/npdes/stormwater/Small-MS4-Stormwater-Program-Requirements.cfm

The Schenectady County Water Quality Coordinating Committee manages the MS4 program for the Greater Schenectady area. All the MS4 municipalities have completed outfall mapping and have upgraded local ordinances to address stormwater regulations. In addition, the Schenectady County Soil and Water Conservation District has provided training to DPW crews and local contractors to control erosion and sediment loss due to stormwater runoff from roadways and construction sites.

For the Greater Utica area, the City of Utica and most of the surrounding towns and villages have been designated as MS4s. With support from the Oneida Soil and Water Conservation District (OSWCD) and the Herkimer Oneida Counties Comprehensive Planning Program (HOCCPP), the MS4 municipalities have implemented the Six Minimum Control Measures. Additional support from OSWCD and HOCCPP includes contractor training for Erosion and Sedimentation Control, writing annual reports, system mapping, managing web-based SWMPs, and implementing green infrastructure projects.

2.5.3 Combined Sewer Overflows

There are limited portions of the Mohawk River watershed served by combined (sanitary/storm) sewers. Combined sewers transmit sanitary wastewater from residences and businesses as well as stormwater in a single pipe. Characteristic of older cities, the combined sewers include relief points (combined sewer overflows, CSOs) to direct the mixture of wastewater and stormwater into waterways when the capacity of the pipes is exceeded. Some CSOs will activate more than 50 times each year; the number of overflows varies with the pattern of rainfall and the pipe capacity. This mixture of untreated wastewater and stormwater can contain elevated concentration of contaminants such as bacteria, nutrients, solids, and oxygen-demanding materials. The NYSDEC requires CSO communities to file annual reports on progress toward remediation. Each CSO outfall is marked by signage.

The NYSDEC maintains a Combined Sewer Overflow map on their website showing locations of CSOs within the state. From this map, it is evident that the highest numbers of CSO discharges to the Mohawk are within the City of Utica, with 47 CSOs. Several developed areas served by the Oneida Wastewater Treatment Plant have CSO outfalls to the river, as do Amsterdam, Schenectady, Waterford and Cohoes. There are no CSOs discharging to Schoharie Creek. NYSDEC is actively working with communities to abate CSOs.

2.5.4 Runoff from Developed Areas

Trends in residential and commercial development vary among areas within the watershed, and such development can significantly affect water quality. As indicated by the number of building permits issued over the past 20 years (**Map 2-21**), development appears to be highest in three principal areas: in the east in the Greater Capital District, in the west in the Utica/Rome area, and in the south in the Catskill towns of Windham and Cairo. The watershed municipalities exhibiting the highest growth pressure between 1990 and 2010 are listed in **Table 2-5**.

TABLE 2-5
Mohawk River Watershed Municipalities Exhibiting the Highest Growth Pressure

Sub-basin	High Growth Pressure Communities
Upper Mohawk	New Hartford, Whitestown, Westmoreland, Marcy
Main River	Colonie, Clifton Park, Niskayuna, Halfmoon, Amsterdam
Schoharie Watershed	Windham, Cairo, Durham, Hunter

Developed areas in the watershed typically have many impervious surfaces resulting from roads, sidewalks, driveways, and building rooftops. Because they impede infiltration, impervious surfaces result in increased runoff

to waterbodies, and this runoff carries automotive pollutants from roads and fertilizers and pesticides from lawns. Traveling west to east through the lowlands along the main stem of the river, areas with high percentages of impervious surfaces include the developed areas of Utica/Rome, Ilion/Mohawk/Herkimer, Little Falls, St. Johnsville, Fort Plan/Nelliston, Canajoharie/Palatine Bridge, Fultonville/Fonda, Johnstown/Gloversville, Amsterdam, and Schenectady/Greater Albany (**Map 2-22**). However, the older villages and cities in the watershed were developed in a more compact fashion than the newer developed areas in the suburbs of Schenectady/Greater Albany, and therefore have less impervious surfaces per capita than these newer, more sprawling areas.

2.5.5 Runoff from Agricultural Areas

Not surprisingly, agricultural land use is highest in the lowlands of the Upper Mohawk and Main River regions, where the prime farmland soils are located (**Map 2-23**). Agricultural land use has a high potential for a negative impact on water quality in nearby streams and lakes due to nonpoint source pollution from sediment and nutrient loading. The Water Quality assessment map (**Map 2-24**) reinforces this, with low to medium scores for the 10-digit HUC subwatersheds located in the Mohawk River lowlands.

2.6 Surface Water Quality Conditions and Compliance with Ambient Standards

The NYSDEC assigns water-quality classifications according to their designated best use, as displayed on **Map 2-25**. The current classifications indicate that the majority of streams should be suitable for fishing or fish propagation (displayed as green segments on the map) or for drinking water (displayed as blue segments on the map). Drinking water supplies from wellheads and from lakes and reservoirs are shown in Map 2-25, and the major aquifers in **Map 2-26**. The NYSDEC inventories all NYS waterbodies to evaluate the extent to which water quality and habitat conditions support these designated uses and reports the Waterbody Inventory/Priority Waterbodies List (WI/PWL). When the current water quality and/or habitat conditions are not adequate to support the designated use, the waterbodies are placed on the Priority Waterbodies List portion of the WI/PWL, and NYSDEC and local partners work to identify effective actions to improve these waterways.

2.6.1 Impaired Waterbodies

The status of waterbody assessments from the 2010 WI/PWL is illustrated in **Map 2-27**, with the waterbodies color-coded according to the assessment category. The streams mapped using darker colors are considered to exhibit varying degrees of water quality impairment, while those that are colored yellow or light gray on the map either have “no known impacts” or are unassessed. Using the Interactive Mapping Tool for the Mohawk River Watershed, one can click on an impaired stream segment to see what uses are affected and to what degree. The primary water quality use affected in the Mohawk River lowlands is aquatic life, due primarily to runoff and pollution from agricultural lands. In the Adirondacks, aquatic life in streams is precluded due to acid rain, whereas in the Catskills, the aquatic habitat may be stressed due to changes in hydrology leading to stream bank erosion and silt and sediment deposition.

About one-third (2,340 miles) of the more than 6,600 river miles in the Mohawk River Basin are included on the 2010 PWL as either not supporting uses or having minor impacts or threats to water quality. Most (79%) of these PWL-designated river miles are considered Stressed or Threatened; these waters fully support designated uses but exhibit declining water quality and/or aquatic habitat conditions. Only about 7% of all basin river miles are designated as Impaired, signifying that the waters do not fully support their designated uses.

Twenty-seven (27) of the 136 separate lake segments in the basin are included on the PWL as having either impaired uses or minor impacts/threats to uses. These impaired/impacted lakes represent nearly one-half (47%) of

the total lake acres in the basin. Impairments to two of the four largest reservoirs in the basin (Delta Reservoir and Schoharie Reservoir) account for over 3,500 impaired acres, or 58% of the total impaired lake acres in the basin where fish consumption, recreational uses, and/or aquatic life are not fully supported.

The most frequently cited sources of impacts affecting water quality in the basin are atmospheric deposition, agricultural activities, habitat/hydrologic modification, and streambank erosion. These sources, along with urban/storm runoff, toxic/contaminated sediments, CSOs, and municipal and industrial discharges, are responsible for the water quality impairment that occurs in the basin. The wide range of sources reflects the diverse nature of the basin, which includes older urban centers, extensive farming areas, and remote forested lands.

2.6.2 Sensitive Areas

While one goal of a functional watershed management plan is to restore degraded areas of the watershed to healthy status, another equally important goal is to protect areas that are pristine or nondegraded. The impaired watershed areas, shown in dark colors in Map 2-24, are examples of places that need restoration. Others, shown in light color, may have been assessed and appear not to be degraded, but some of these have not been assessed.

Some areas in the watershed are more vulnerable than others to ecological degradation by poor management (refer to Map 2-14) and require protection by the implementation of management practices appropriate for the nature of their vulnerability. It is important to note that these areas may provide essential ecosystem services—wetlands providing a buffer against flooding, woodlands buffering waterbodies from runoff, vegetative cover stabilizing steep slopes prone to erosion—that may be impossible or costly to replicate.

2.7 Groundwater Quality Conditions and Compliance with Ambient Standards

Just as the NYSDEC is committed to periodically evaluating surface water quality conditions throughout the state, they collaborate with the USGS on a program to evaluate groundwater quality in New York's major river basins on a rotating basis. This program parallels the Rotating Intensive Basin Study program and helps NYSDEC comply with the federal requirement to report on the chemical quality of groundwater. The groundwater quality assessment program began in 2002 with a pilot study in the Mohawk River Basin and has continued throughout upstate New York ever since. The most recent round of testing of groundwater quality in the Mohawk River basin was completed in 2011. The summary of the USGS report on Mohawk River basin conditions in 2011 is excerpted below:

> "Groundwater samples were collected during July 2011 from 21 wells in the Mohawk River Basin to characterize the groundwater quality. Sample collection and analysis followed standard USGS procedures and other documented procedures. Samples were analyzed for physical properties and concentrations of dissolved gases, major ions, nutrients, trace elements, pesticides, volatile organic compounds (VOCs), radionuclides, and bacteria. Many of the 148 constituents analyzed for were not detected in any of the samples.
>
> The depths of sand and gravel wells sampled in the Mohawk River Basin range from 28 to 395 ft. below land surface; the bedrock wells are 120 to 815 ft. deep and typically are completed in shale, sandstone, or carbonate bedrock. Ten of the 21 wells sampled are production wells; 11 are domestic wells. The samples generally indicated good water quality, although properties and concentrations of some constituents—color, pH, sodium, chloride, sulfate, dissolved solids, aluminum, iron, manganese, radon-222, and bacteria—equaled or exceeded primary, secondary, or proposed drinking-water standards. The constituents most frequently detected in concentrations exceeding drinking-water standards were radon-222 (10 samples had

concentrations equal to or greater than the U.S. Environmental Protection Agency (USEPA) proposed maximum contaminant level (MCL) of 300 picocuries per liter (pCi/L)), sodium (9 samples had concentrations greater than the USEPA Drinking Water Taste Advisory of 60 milligrams per liter (mg/L)), iron (8 unfiltered samples had concentrations greater than the New York State Department of Health MCL and USEPA secondary drinking-water standard (SDWS) of 300 micrograms per liter (µg/L)), dissolved solids (7 samples had concentrations greater than the USEPA SDWS of 500 mg/L), manganese (6 unfiltered samples had concentrations greater than the USEPA SDWS of 50 µg/L), and coliform bacteria (5 samples had detections).

Sample pH was typically near neutral or slightly basic. Methane was detected in 15 of the 21 samples; 2 samples had methane concentrations greater than 28 mg/L. The water typically was very hard, and the median dissolved solids concentration was 436 mg/L. The ions detected in the highest median concentrations were bicarbonate, chloride, calcium, and sodium. The dominant nutrient was nitrate; concentrations of nitrate and nitrite did not exceed established drinking-water standards. Strontium was the trace element with the highest median concentrations; some samples had moderately high (greater than 10,000 µg/L) concentrations of strontium or iron. Four pesticides and pesticide degradates were detected in four samples from sand and gravel wells; all were trace-level detections of broadleaf herbicides or their degradates. Three VOCs were detected in four samples, including chloroform, tetrachloroethene, and toluene. Radon-222 activities in 10 samples exceeded a proposed MCL, but none exceeded the proposed AMCL. Coliform bacteria were detected in five samples. Fecal coliform and *Escherichia coli* bacteria were detected in one sample each."[8]

2.8 Regulatory and Programmatic Environment

In response to effective outreach by county and regional planning agencies, NYSDOS, and others, many New York watershed municipalities have reviewed and updated facets of their local laws related to impervious surfaces, site plan reviews, setbacks from waterways, development in floodplains, and erosion and sedimentation controls. These code modifications are designed to help minimize the potential adverse water quality impacts of land development activities. Model codes and ordinances have been drafted to help bring municipal comprehensive plans and zoning and subdivision ordinances into alignment with best practices for controlling nonpoint source pollution. In the Mohawk River basin, there are significant differences among municipalities with respect to local laws that govern land use. Since New York is a "home rule" state, zoning and subdivision laws and other local codes must be revised at the municipal level. This can be an extended process that requires commitment and public support. Moreover, the majority of the municipalities within the watershed are not regulated MS4s and therefore are not compelled to implement the same programmatic and regulatory standards as those falling under the MS4 regulations.

2.8.1 Approach to Reviewing Local Laws, Plans, and Programs

For the Mohawk River Watershed Management Plan, the Coalition worked with a consultant (Bergmann Associates) to compile and review the local laws of the watershed municipalities and evaluate their effectiveness in protecting water quality and habitat from point- and nonpoint-source pollution. The NYSDOS assessment tool was used as a foundation for this analysis, although, because of the large number of municipalities in the watershed and because of time constraints, the assessment tool was rigorously applied to only ten of the most

[8] Nystrom, E.A., and Scott, T. 2013. *Groundwater Quality in the Mohawk River Basin, New York, 2011.* U.S. Geological Survey Open-File Report 2013-1021, 43 p. Available at http://pubs.usgs.gov/of/2013/1021/.

developed municipalities in the watershed. The resulting product is the *Mohawk River Watershed Regulatory Review & Analysis,*[9] which evaluates the current regulatory environment in watershed municipalities with respect to water quality and identifies improvements to local codes that would address water quality impacts from land development activities more effectively.

A wide range of municipal documents and programs were included in the regulatory review. These documents can generally be grouped into one of the following three categories:

- Comprehensive Plans/Land Use Plans/Rural Development Plans;
- Zoning, Site Plan Review and Subdivision Regulations; and
- Stormwater and Erosion Control Programs.

The report also includes a review of state and federal legislation, focusing on the existing roles and responsibilities of state and federal agencies, regulations, and programs as they affect point and nonpoint source pollution.

2.8.2 Findings: Comprehensive Plans

Comprehensive plans and other area-wide land use planning documents provide an overall framework for future public and private investment and decision making in a given municipality. By articulating an overall vision and the means to achieve the objectives identified by the community, comprehensive plans help to shape the physical, social, and economic character of the community. Where communities have adopted zoning regulations, the comprehensive plan forms the basis for those regulations. As such, comprehensive plans and other area-wide land use planning documents can play a pivotal role in protecting and preserving water quality.

Based on the results of the regulatory review and analysis, 76% of municipalities in the Mohawk River watershed have, or are currently preparing a Comprehensive Plan or other area-wide land use planning document.

2.8.3 Findings: Zoning, Subdivision Regulations, and Site Plan Review

Zoning, subdivision regulations, and site plan review are three of the primary means by which communities implement their comprehensive plans and ensure that development occurs in the desired manner. As such, communities often use various combinations of these regulatory tools to address the environmental and ecological impacts of land development, including impacts to water quality.

Based on the review of available regulatory documents, 81% of all watershed municipalities have enacted zoning legislation, 77% have enacted subdivision regulations, and 65% have enacted site plan review legislation. Ten percent of the watershed municipalities have enacted none of the aforementioned ordinances.

It is important to note that even though most communities in the watershed have adopted land use codes, many of these codes (and the comprehensive plans on which they are based) are outdated and do not adequately address water quality issues. For example, most codes require overly wide standards for residential streets in new subdivisions and oversized parking requirements for commercial development. Moreover, the majority of watershed zoning codes allows low-density, large-lot residential development throughout wide areas of these communities.

[9] Bergmann Associates. 2014 (January). *Mohawk River Watershed Regulatory Review & Analysis*. Prepared for the Mohawk River Watershed Coalition of Conservation Districts. Link to Executive Summary or Full Report.

2.8.4 Findings: Stormwater and Erosion Control Programs

The purpose of stormwater and erosion control programs is to ensure that increased runoff, erosion and sedimentation that typically results from land development activities does not negatively affect surrounding land uses and impact water quality. As part of the National Pollutant Discharge Elimination System (NPDES) Stormwater Phase II Program, permits are now required for stormwater discharges from Municipal Separate Storm Sewer Systems in urbanized areas and for construction activities disturbing one or more acres. The MS4 classification includes municipally owned storm sewer systems (e.g., underground pipes, roads with drainage systems, gutters and ditches), state departments of transportation, public universities, local sewer districts, public hospitals, military bases and prisons. In the Mohawk River Watershed, 35 municipalities have been designated as MS4s (see section 5.1.2 of the full *Mohawk River Watershed Regulatory Review & Analysis* for the complete list of MS4 communities in the watershed).

As part of this program, MS4s are required to develop, implement, and enforce a stormwater management program that includes six minimum control measures and identifies measurable goals and the implement management practices to achieve those measurable goals. The six minimum measures include

1. Public Education and Outreach
2. Public Involvement and Participation
3. Illicit Discharge Detection and Elimination
4. Construction Site Runoff Control
5. Post-Construction Runoff Control
6. Pollution Prevention and Good Housekeeping

As noted above, only 21% of communities in the watershed are required to develop comprehensive stormwater management programs. However, 76% of all watershed municipalities include stormwater management in their regulatory program, with 39% addressing the issue at a level somewhat consistent with accepted best management practices.

2.8.5 Gap Assessment as Related to the the Desired State

Based on the results of the evaluation, most municipalities in the Mohawk River Watershed do not adequately address the comprehensive protection and preservation of water quality in their regulatory programs.

Two factors crucial to the protection and improvement of water quality that are often unaddressed by watershed communities are Impervious Surfaces and Lake/Stream Protection. Across the entire watershed, 75% of municipalities do not address impervious surfaces at any level and only 8% are consistent with best management practices. Lake/Stream Protection does not fare much better—71% of watershed municipalities do not address the issue at a level at least somewhat consistent with BMPs.

The two factors most consistently addressed in the watershed are Junkyards and Stormwater Management and Erosion Control—38% of the municipal entities address Junkyards and 39% of them address Stormwater Management and Erosion Control at levels at least somewhat consistent with BMPs.

Additional key findings from the municipal evaluations include

- 67% of municipal regulatory programs do not address development on steep slopes. Of those that do allow cluster development, only 12% are consistent with BMPs.

- 65% of municipal regulatory programs do not have provisions for cluster development. Of those that do allow cluster development, only 4% are consistent with BMPs. However, 29% of municipalities do include cluster development in their comprehensive plans.
- 65% of municipal regulatory programs do not address the environmental impacts of timber harvesting; however, 24% of watershed municipalities lack large forest stands available for harvesting.
- 58% of municipal regulatory programs do not address the environmental impacts of marinas; however, 40% of watershed municipalities do not have navigable waterways within their boundaries.
- 37% of municipal regulatory programs address the environmental impacts of junkyards at a level consistent with BMPs.
- Only 24% of municipal regulatory programs do not address stormwater management and erosion control, with 39% being at least somewhat consistent with BMPs.

The results of this analysis have been summarized for the watershed as a whole (**Table 2-6**) and for its three main regions (**Table 2-7**, **Table 2-8**, and **Table 2-9**).

TABLE 2-6
Nonpoint Sources of Pollution Addressed by Local Municipalities, Mohawk River Watershed

Factors	Percent of Municipalities in Mohawk River Watershed Addressing a Given Factor at a Particular Level					
	N	1	2	3	C	NA
Cluster Development	65%	21%	12%	4%	29%	0%
Development on Steep Slopes	67%	12%	9%	12%	20%	0%
Environmental Impacts Identified as Overarching Issue	62%	16%	10%	10%	34%	0%
Floodplain Protection	35%	50%	9%	5%	25%	0%
Impervious Surfaces	75%	11%	6%	8%	9%	0%
Junkyards	55%	6%	1%	37%	4%	0%
Lake/Stream Protection	46%	25%	9%	20%	36%	0%
Lot Coverage Requirements	31%	54%	10%	5%	1%	0%
Lot Development Standards in Agricultural or Open Space Districts	30%	36%	12%	8%	20%	15%
Marinas	58%	1%	1%	1%	0%	40%
Mining Operations	63%	5%	6%	10%	4%	14%
On-Site Wastewater	50%	22%	9%	19%	9%	0%
Stormwater Management & Erosion Control	24%	37%	14%	25%	20%	0%
Timber Harvesting	65%	5%	1%	5%	4%	24%
Unique and Other Natural Areas Protection	47%	41%	6%	4%	28%	1%
Waterfront Development Standards	51%	1%	0%	3%	3%	44%
Wetland Protection	49%	31%	10%	9%	27%	0%

*The calculation of these statistics only included those municipalities for which documents were available at the time of the review.

NA: Not applicable (e.g., a municipality with no navigable waterways would receive a "NA" score for Marinas).

N: No document or ordinance addresses this issue within a given municipality.

C: This issue is addressed in a Comprehensive Plan or other relevant planning documents. Note that communities can receive a "C," as well as a second score (e.g., "2,C") if a given topic is addressed in both the comprehensive plan and a municipal regulation.

1: This issue is addressed in an ordinance, but local guidelines are generic and/or optional; or the ordinance defers to Federal/State/County regulations.

2: This issue is addressed in an ordinance, with general local guidelines provided.

3: This issue is addressed in an ordinance, with local guidelines that are consistent with accepted Best Management Practices.

TABLE 2-7
Nonpoint Sources of Pollution Addressed by Local Municipalities, Main River Region

Factors	Percent of Municipalities in the Main River Region Addressing a Given Factor at a Particular Level					
	N	1	2	3	C	NA
Cluster Development	52%	33%	12%	6%	45%	0%
Development on Steep Slopes	64%	15%	6%	15%	24%	0%
Environmental Impacts Identified as Overarching Issue	55%	21%	15%	9%	42%	0%
Floodplain Protection	33%	52%	9%	6%	21%	0%
Impervious Surfaces	67%	18%	6%	9%	6%	0%
Junkyards	52%	9%	0%	39%	0%	0%
Lake/Stream Protection	36%	27%	9%	27%	39%	0%
Lot Coverage Requirements	30%	52%	9%	9%	0%	0%
Lot Development Standards in Agricultural or Open Space Districts	48%	27%	6%	12%	18%	9%
Marinas	91%	3%	3%	0%	0%	3%
Mining Operations	73%	0%	6%	18%	9%	3%
On-Site Wastewater	42%	18%	3%	39%	3%	0%
Stormwater Management & Erosion Control	24%	27%	15%	33%	18%	0%
Timber Harvesting	70%	0%	3%	6%	6%	21%
Unique and Other Natural Areas Protection	48%	42%	3%	6%	27%	0%
Waterfront Development Standards	64%	6%	0%	9%	3%	21%
Wetland Protection	48%	24%	9%	12%	36%	0%

*The calculation of these statistics only included those municipalities for which documents were available at the time of the review.

NA: Not applicable (e.g., a municipality with no navigable waterways would receive a "NA" score for Marinas).

N: No document or ordinance addresses this issue within a given municipality.

C: This issue is addressed in a Comprehensive Plan or other relevant planning documents. Note that communities can receive a "C," as well as a second score (e.g., "2,C") if a given topic is addressed in both the comprehensive plan and a municipal regulation.

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2: This issue is addressed in an ordinance, with general local guidelines provided.

3: This issue is addressed in an ordinance, with local guidelines that are consistent with accepted Best Management Practices.

TABLE 2-8
Nonpoint Sources of Pollution Addressed by Local Municipalities, Upper Mohawk Region

Factors	Percent of Municipalities in the Upper Mohawk Region Addressing a Given Factor at a Particular Level					
	N	1	2	3	C	NA
Cluster Development	75%	16%	7%	1%	10%	0%
Development on Steep Slopes	75%	12%	9%	4%	16%	0%
Environmental Impacts Identified as Overarching Issue	67%	19%	6%	6%	28%	0%
Floodplain Protection	48%	41%	9%	3%	23%	0%
Impervious Surfaces	81%	3%	7%	7%	10%	0%
Junkyards	58%	3%	3%	36%	1%	0%
Lake/Stream Protection	48%	25%	9%	19%	32%	0%
Lot Coverage Requirements	29%	62%	7%	1%	3%	0%
Lot Development Standards in Agricultural or Open Space Districts	28%	41%	9%	4%	20%	17%
Marinas	57%	0%	0%	1%	0%	42%
Mining Operations	61%	4%	6%	7%	3%	20%
On-Site Wastewater	55%	23%	9%	13%	10%	0%
Stormwater Management & Erosion Control	30%	32%	12%	26%	13%	0%
Timber Harvesting	59%	10%	1%	1%	3%	28%
Unique and Other Natural Areas Protection	59%	30%	7%	1%	23%	1%
Waterfront Development Standards	54%	0%	0%	1%	1%	45%
Wetland Protection	59%	22%	14%	4%	23%	0%

*The calculation of these statistics only included those municipalities for which documents were available at the time of the review.

NA: Not applicable (e.g., a municipality with no navigable waterways would receive a "NA" score for Marinas).

N: No document or ordinance addresses this issue within a given municipality.

C: This issue is addressed in a Comprehensive Plan or other relevant planning documents. Note that communities can receive a "C," as well as a second score (e.g., "2,C") if a given topic is addressed in both the comprehensive plan and a municipal regulation.

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2: This issue is addressed in an ordinance, with general local guidelines provided.

3: This issue is addressed in an ordinance, with local guidelines that are consistent with accepted Best Management Practices.

TABLE 2-9
Nonpoint Sources of Pollution Addressed by Local Municipalities,
Schoharie Watershed Region

Factors	Percent of Municipalities in the Schoharie Watershed Region Addressing a Given Factor at a Particular Level					
	N	1	2	3	C	NA
Cluster Development	57%	19%	19%	8%	49%	0%
Development on Steep Slopes	54%	11%	11%	24%	24%	0%
Environmental Impacts Identified as Overarching Issue	59%	5%	14%	19%	38%	0%
Floodplain Protection	14%	65%	11%	8%	32%	0%
Impervious Surfaces	70%	19%	3%	8%	8%	0%
Junkyards	54%	8%	0%	35%	14%	0%
Lake/Stream Protection	51%	24%	8%	16%	41%	0%
Lot Coverage Requirements	35%	41%	16%	8%	0%	0%
Lot Development Standards in Agricultural or Open Space Districts	19%	35%	22%	11%	22%	16%
Marinas	30%	0%	0%	0%	0%	70%
Mining Operations	59%	11%	8%	8%	3%	14%
On-Site Wastewater	46%	24%	16%	14%	11%	0%
Stormwater Management & Erosion Control	11%	57%	16%	16%	35%	0%
Timber Harvesting	70%	0%	0%	11%	5%	22%
Unique and Other Natural Areas Protection	24%	59%	8%	8%	38%	0%
Waterfront Development Standards	35%	0%	0%	0%	5%	62%
Wetland Protection	30%	54%	3%	14%	27%	0%

*The calculation of these statistics only included those municipalities for which documents were available at the time of the review.

NA: Not applicable (e.g., a municipality with no navigable waterways would receive a "NA" score for Marinas).

N: No document or ordinance addresses this issue within a given municipality.

C: This issue is addressed in a Comprehensive Plan or other relevant planning documents. Note that communities can receive a "C," as well as a second score (e.g., "2,C") if a given topic is addressed in both the comprehensive plan and a municipal regulation.

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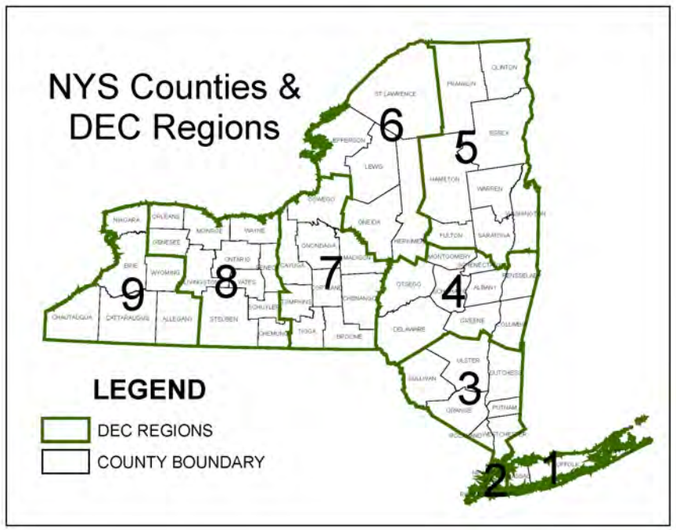
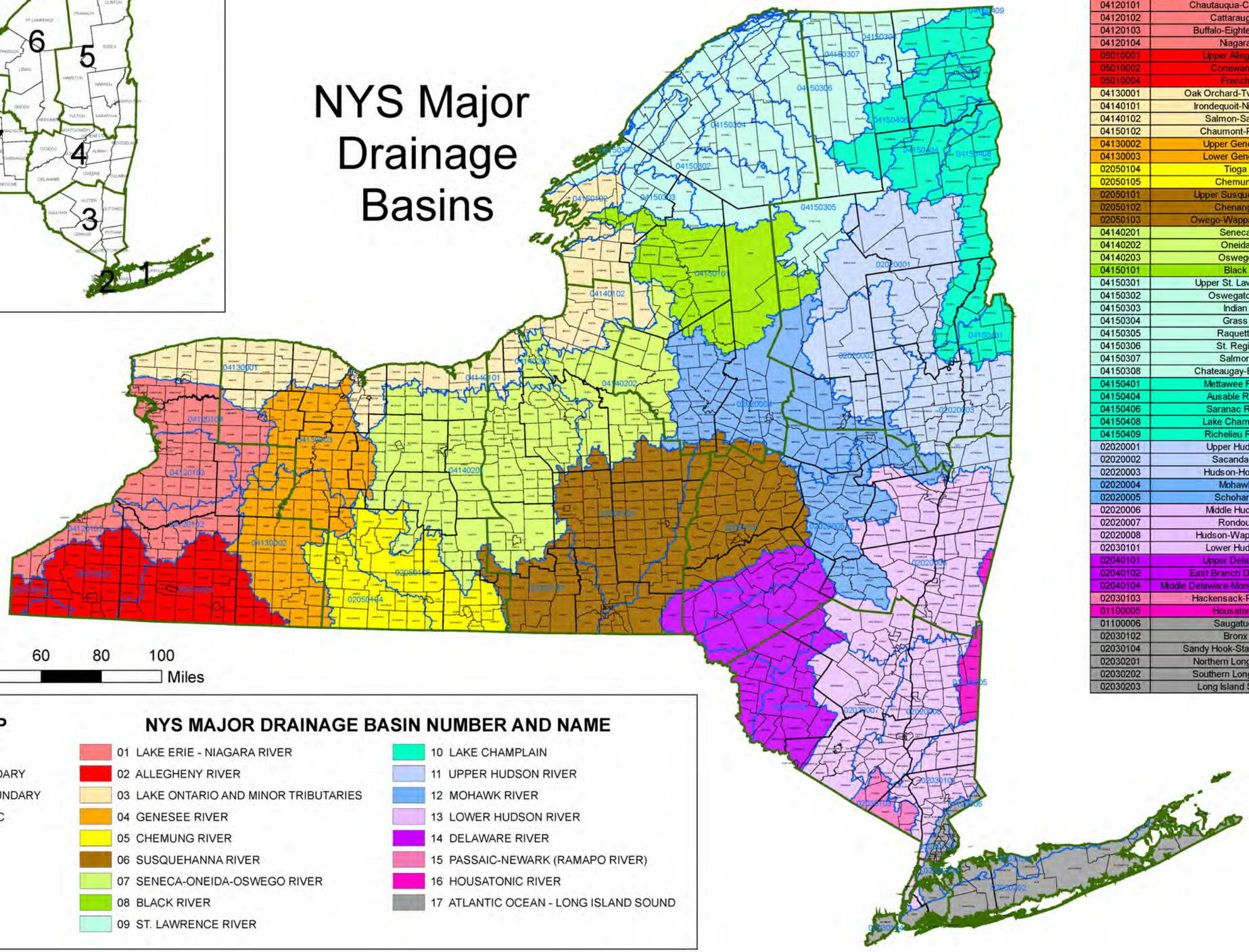
2: This issue is addressed in an ordinance, with general local guidelines provided.

3: This issue is addressed in an ordinance, with local guidelines that are consistent with accepted Best Management Practices.

NYS Major Drainage Basins





HUC 8	HYDROLOGIC UNIT NAME
04120101	Chautauqua-Conneaut
04120102	Cattaraugus
04120103	Buffalo-Eighteenmile
04120104	Niagara
05010001	Upper Allegheny
05010002	Conewango
05010004	French
04130001	Oak Orchard-Twelvemile
04140101	Irondequoit-Ninemile
04140102	Salmon-Sandy
04150102	Chaumont-Perch
04130002	Upper Genesee
04130003	Lower Genesee
02050104	Tioga
02050105	Chemung
02050101	Upper Susquehanna
02050102	Chenango
02050103	Owego-Wappasening
04140201	Seneca
04140202	Oneida
04140203	Oswego
04150101	Black
04150301	Upper St. Lawrence
04150302	Oswegatchie
04150303	Indian
04150304	Grass
04150305	Raquette
04150306	St. Regis
04150307	Salmon
04150308	Chateaugay-English
04150401	Mettawee River
04150404	Ausable River
04150406	Saranac River
04150408	Lake Champlain
04150409	Richelieu River
02020001	Upper Hudson
02020002	Sacandaga
02020003	Hudson-Hoosic
02020004	Mohawk
02020005	Schoharie
02020006	Middle Hudson
02020007	Rondout
02020008	Hudson-Wappinger
02030101	Lower Hudson
02040101	Upper Delaware
02040102	East Branch Delaware
02040104	Middle Delaware-Mongaup-Brodhead
02030103	Hackensack-Passaic
01100005	Housatonic
01100006	Saugatuck
02030102	Bronx
02030104	Sandy Hook-Staten Island
02030201	Northern Long Island
02030202	Southern Long Island
02030203	Long Island Sound

BASE MAP

- DEC REGIONS
- COUNTY BOUNDARY
- TOWN/CITY BOUNDARY
- NYS 8 DIGIT HUC

NYS MAJOR DRAINAGE BASIN NUMBER AND NAME

- 01 LAKE ERIE - NIAGARA RIVER
- 02 ALLEGHENY RIVER
- 03 LAKE ONTARIO AND MINOR TRIBUTARIES
- 04 GENESEE RIVER
- 05 CHEMUNG RIVER
- 06 SUSQUEHANNA RIVER
- 07 SENECA-ONEIDA-OSWEGO RIVER
- 08 BLACK RIVER
- 09 ST. LAWRENCE RIVER
- 10 LAKE CHAMPLAIN
- 11 UPPER HUDSON RIVER
- 12 MOHAWK RIVER
- 13 LOWER HUDSON RIVER
- 14 DELAWARE RIVER
- 15 PASSAIC-NEWARK (RAMAPO RIVER)
- 16 HOUSATONIC RIVER
- 17 ATLANTIC OCEAN - LONG ISLAND SOUND

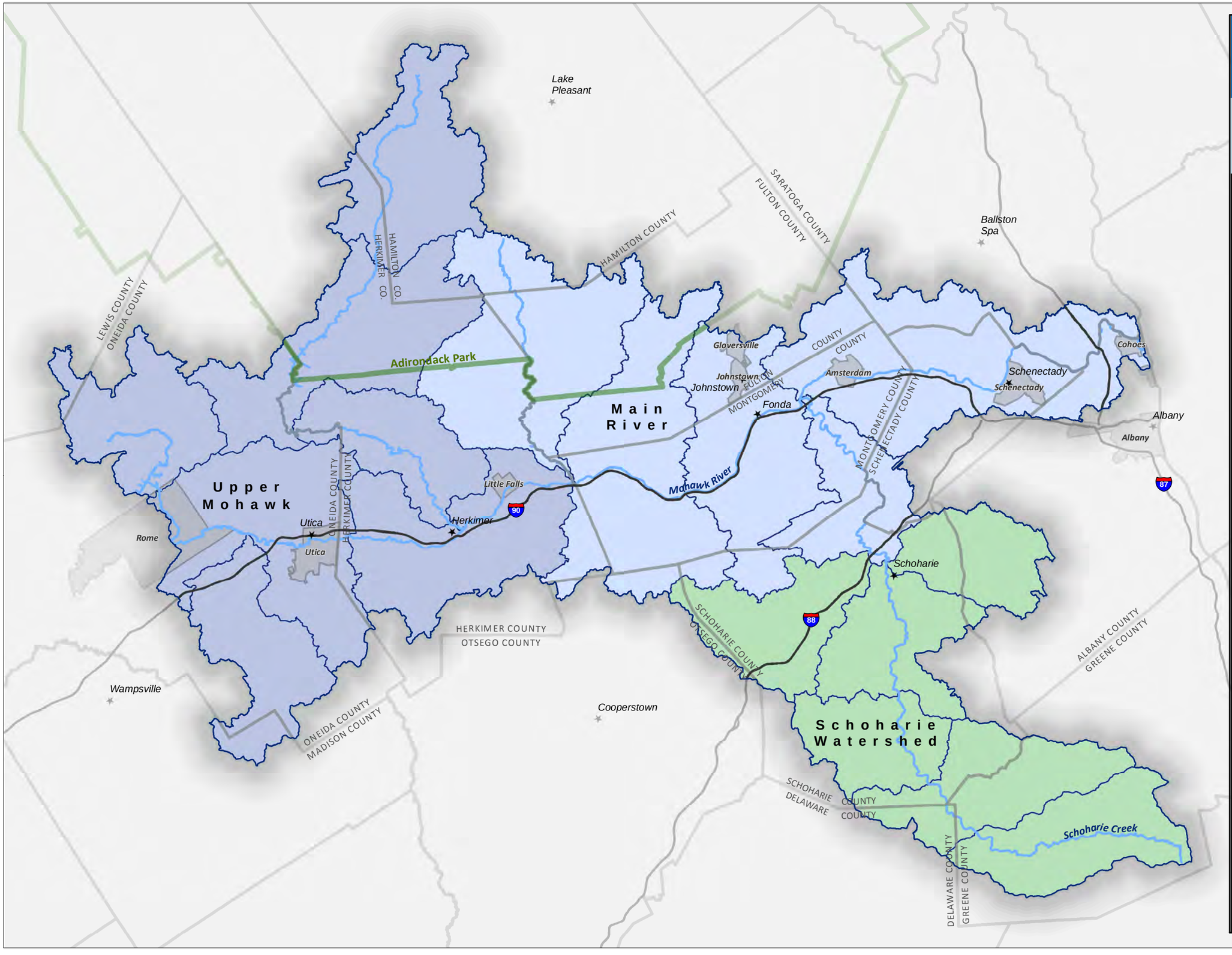
MAP 2-1

October 2012

WATERSHED

MAP 2-2

Mohawk River Watershed Management Plan



Legend

Watershed Boundaries

HUC 10 Watersheds

Regional Watersheds

- Main River
- Upper Mohawk
- Schoharie Watershed

NEW YORK STATE DEPARTMENT OF STATE

MOHAWK RIVER WATERSHED COALITION OF CONSERVATION DISTRICTS

N

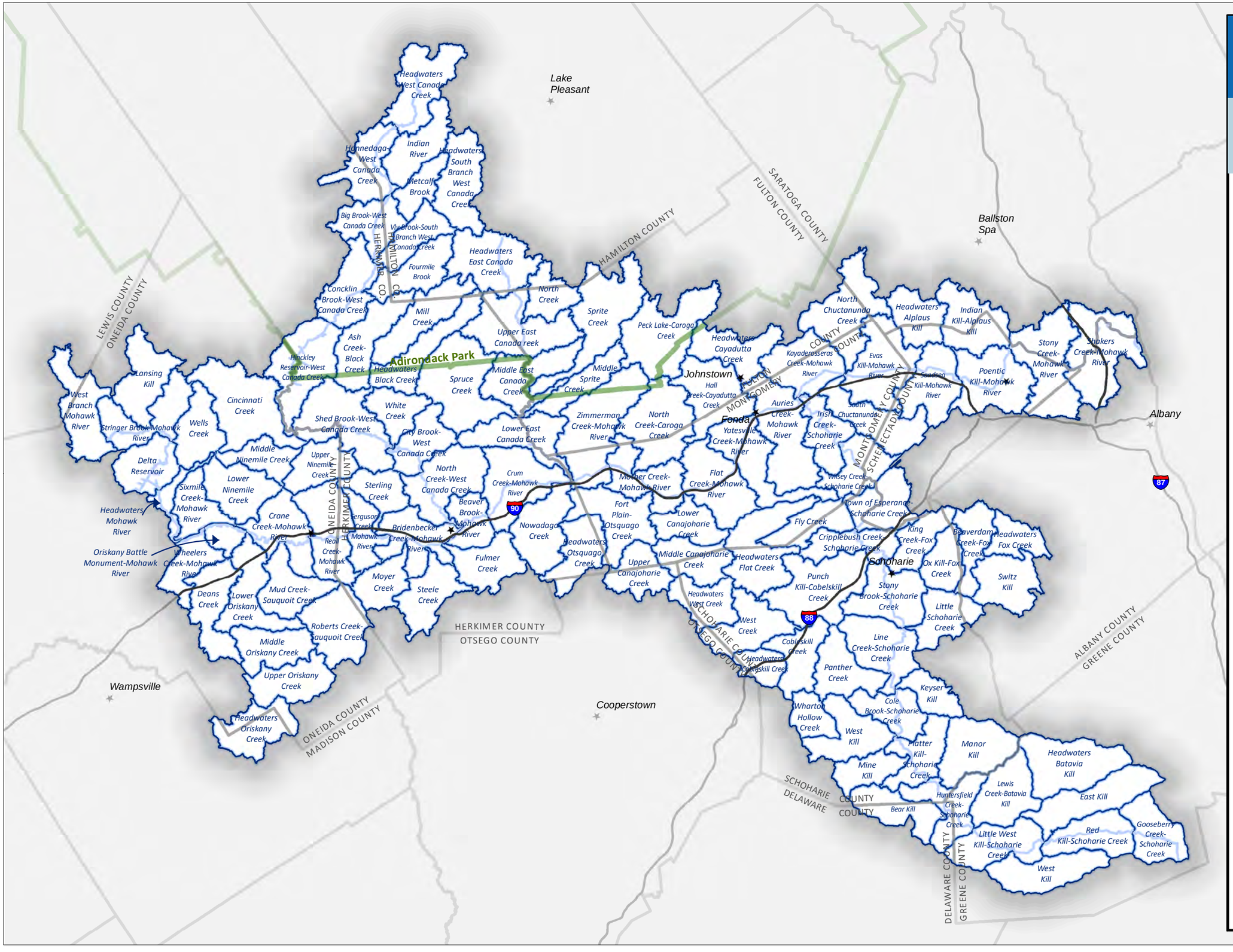
0 2.5 5 10 Miles

Sources: Watershed Boundaries and Regions: NYDEC; Hydrography, NHD; Administrative Boundaries: CSCIC; Adirondack Park Boundary, APA.

This map was prepared for the New York State Department of State with funds provided under Title 11 of the Environmental Protection Fund.

Developed By:

STONE ENVIRONMENTAL INC



SUBWATERSHEDS (HUC 12)

MAP 2-3

Mohawk River Watershed Management Plan

Legend

Watershed Boundaries

HUC 12

MOHAWK RIVER WATERSHED COALITION OF CONSERVATION DISTRICTS

0 2.5 5 10 Miles

Sources: Watershed Boundaries: NYDEC; Hydrography, NHD; Administrative Boundaries: CSCIC; Adirondack Park Boundary, APA.

This map was prepared for the New York State Department of State with funds provided under Title 11 of the Environmental Protection Fund.

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ELEVATION

MAP 2-4

Mohawk River Watershed Management Plan

Legend

Elevation

Feet AMSL

High : 4,046

Low : 6

Lake Pleasant
Ballston Spa
Johnstown
Fonda
Schenectady
Albany
Utica
Herkimer
Schoharie
Wampsville
Cooperstown

HAMILTON COUNTY
SARATOGA COUNTY
FULTON COUNTY
LEWIS COUNTY
ONEIDA COUNTY
HERKIMER CO.
HAMILTON CO.
Adirondack Park
FULTON COUNTY
MONTGOMERY COUNTY
SCHENECTADY COUNTY
ONEIDA COUNTY
HERKIMER COUNTY
Mohawk River
HERKIMER COUNTY
OTSEGO COUNTY
SCHOHARIE COUNTY
OTSEGO COUNTY
ALBANY COUNTY
GREENE COUNTY
ONEIDA COUNTY
MADISON COUNTY
SCHOHARIE COUNTY
DELAWARE COUNTY
Schoharie Creek
DELAWARE COUNTY
GREENE COUNTY

87
90
88

NEW YORK STATE DEPARTMENT OF STATE

MOHAWK RIVER WATERSHED COALITION OF CONSERVATION DISTRICTS

N

0 2.5 5 10 Miles

Sources: Watershed Boundaries: NYDEC; Hydrography, NHD; Administrative Boundaries: CSCIC; Adirondack Park Boundary, APA, Elevation: USGS NED (Seamless).

This map was prepared for the New York State Department of State with funds provided under Title 11 of the Environmental Protection Fund.

Developed By:

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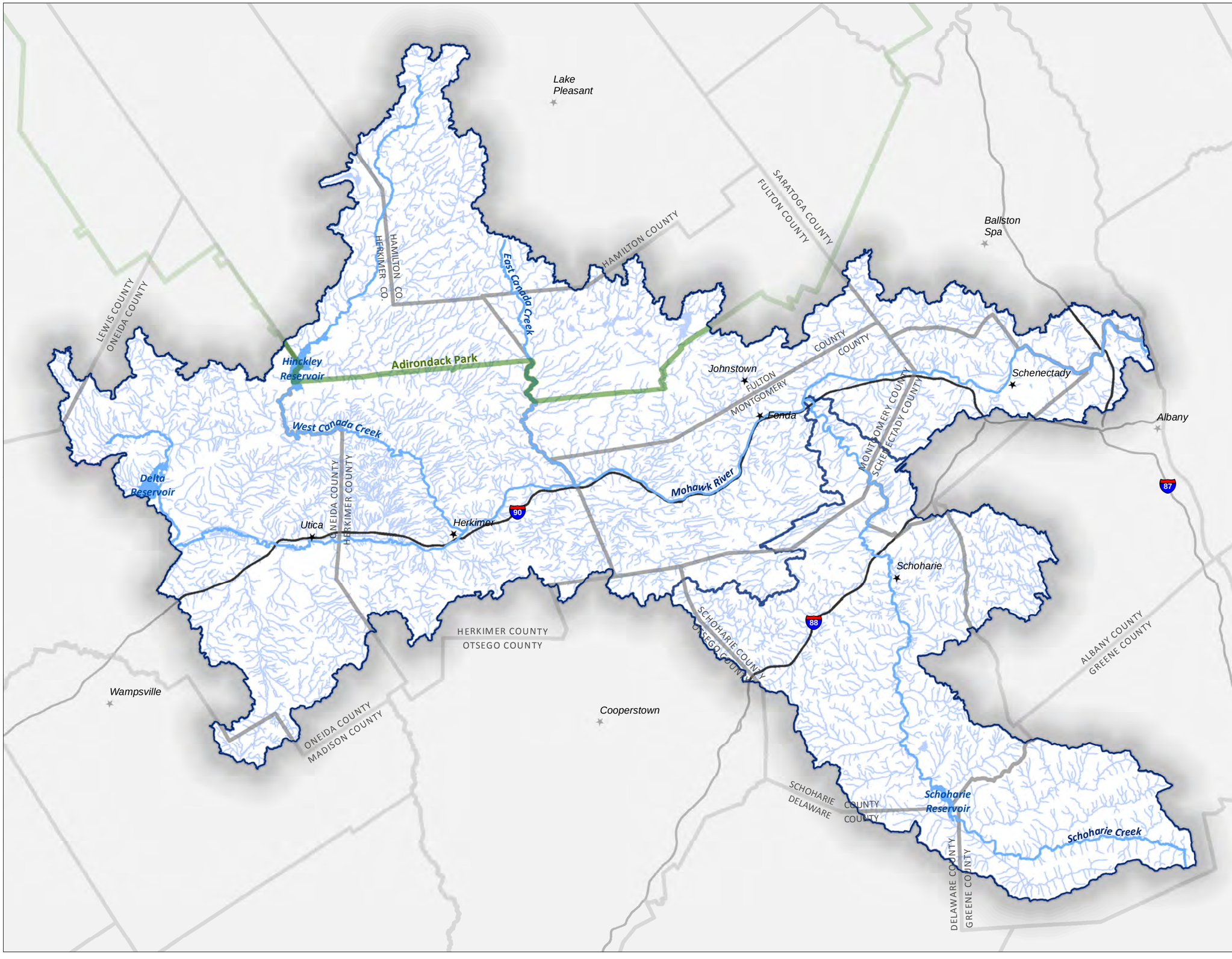

HYDROGRAPHY

MAP 2-5

Mohawk River Watershed Management Plan

Legend

- NHD Flowline / Line
- NHD Area / Waterbody

NEW YORK STATE DEPARTMENT OF STATE

MOHAWK RIVER WATERSHED COALITION OF CONSERVATION DISTRICTS

N

0 2.5 5 10 Miles

Sources: Watershed Boundaries: NYDEC; Hydrography, NHD; Administrative Boundaries: CSCIC; Adirondack Park Boundary, APA.

This map was prepared for the New York State Department of State with funds provided under Title 11 of the Environmental Protection Fund.

Developed By:

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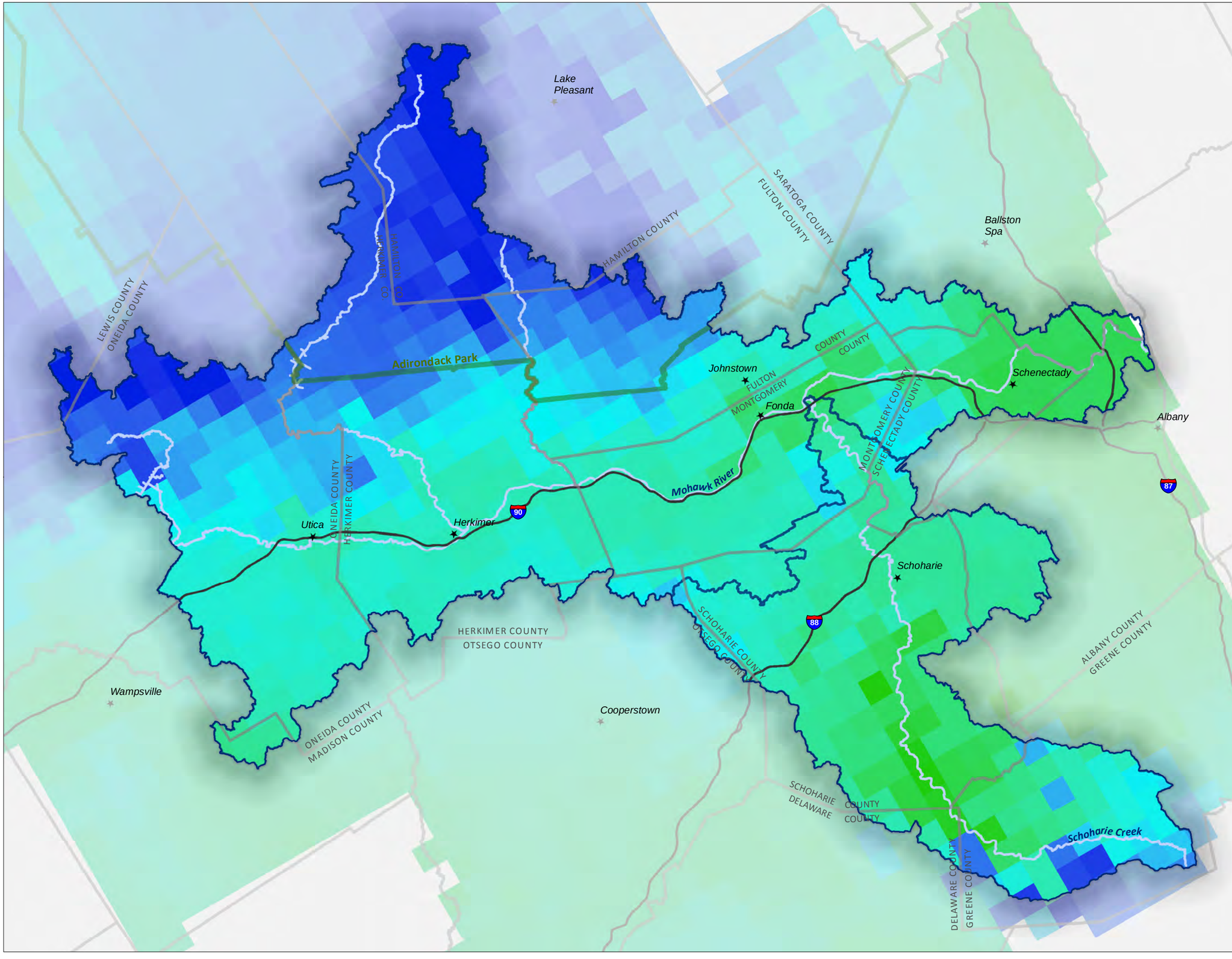
AVERAGE ANNUAL PRECIPITATION

MAP 2-6

Mohawk River Watershed Management Plan



Legend

Projected Precipitation

mm x 100

High : 180,296

Low : 84,507

NEW YORK STATE DEPARTMENT OF STATE

MOHAWK RIVER WATERSHED COALITION OF CONSERVATION DISTRICTS

N

0 2.5 5 10 Miles

Sources: Watershed Boundaries: NYDEC; Hydrography, NHD; Administrative Boundaries: CSCIC; Adirondack Park Boundary, APA; Average Annual Precipitation: PRISM 1971 - 2000 and 1961 - 1990.

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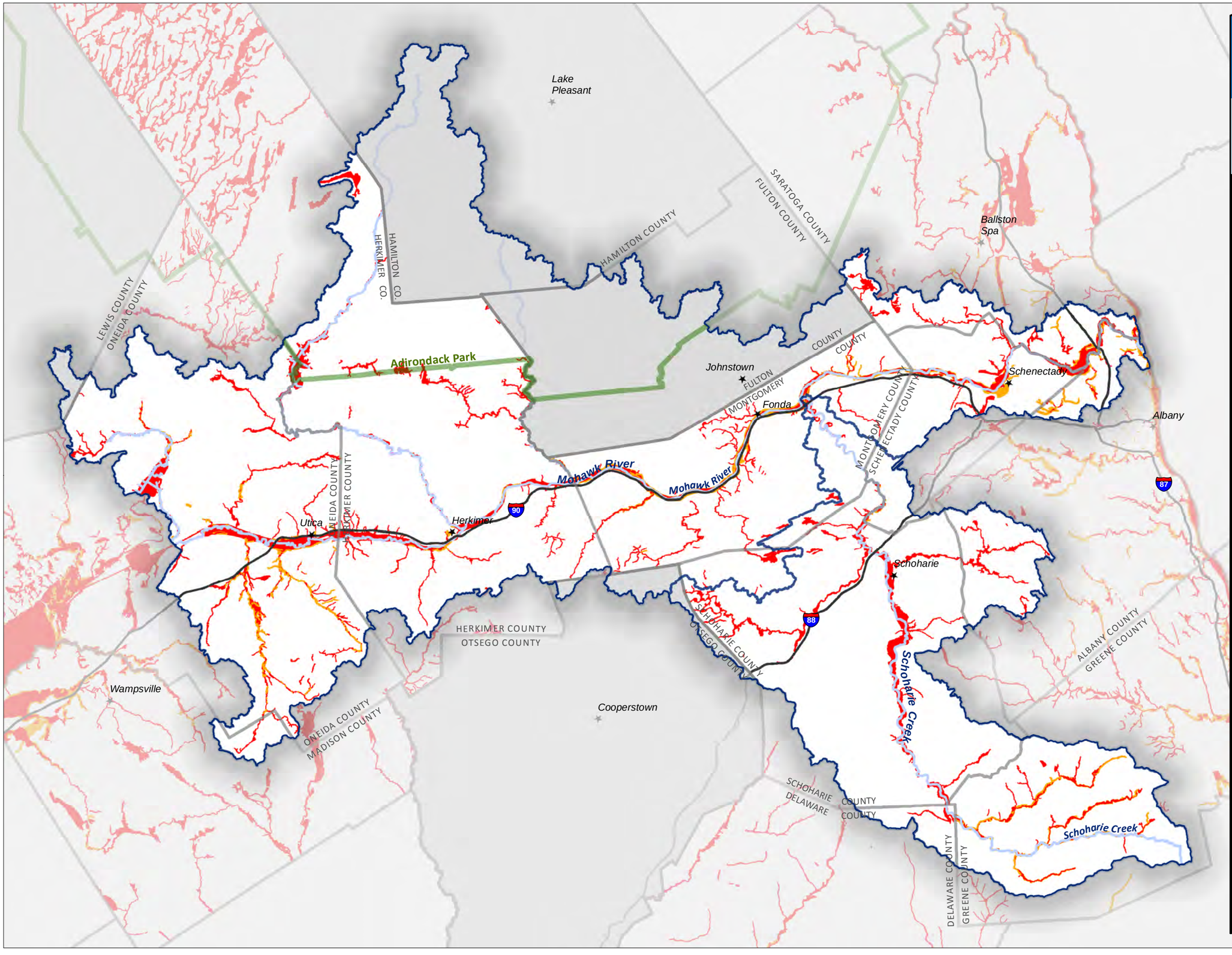
Developed By:

STONE ENVIRONMENTAL INC

FEMA FLOOD ZONE BOUNDARIES

MAP 2-7

Mohawk River Watershed Management Plan



Legend

Flood Zone

- 100-Year
- 500-Year
- No FEMA Data Available

NEW YORK STATE DEPARTMENT OF STATE

MOHAWK RIVER WATERSHED COALITION OF CONSERVATION DISTRICTS

0 2.5 5 10 Miles

Sources: Watershed Boundaries: NYDEC; Hydrography, NHD; Administrative Boundaries: CSCIC; Adirondack Park Boundary, APA; Flood Zones, derived from Flood Insurance Rate Maps published by FEMA. Montgomery flood data is preliminary data and has not yet been approved. Flood data not available for Hamilton, Fulton, Otsego, and Lewis Counties.

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Developed By:

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SURFICIAL GEOLOGY

MAP 2-8

Mohawk River Watershed Management Plan

Legend

SurficialGroup

- Rock
- Sand and Gravel
- Silt and Clay
- Till

Lake Pleasant
Ballston Spa
Johnstown
Fonda
Schenectady
Albany
Utica
Herkimer
Wampsville
Cooperstown
Schoharie
Adirondack Park
Mohawk River
Schoharie Creek
LEWIS COUNTY
ONEIDA COUNTY
HERKIMER CO.
HAMILTON CO.
HAMILTON COUNTY
FULTON COUNTY
SARATOGA COUNTY
MONTGOMERY COUNTY
SCHENECTADY COUNTY
HERKIMER COUNTY
OTSEGO COUNTY
SCHOHARIE COUNTY
ALBANY COUNTY
GREENE COUNTY
DELAWARE COUNTY
MADISON COUNTY
87
90
88

NEW YORK STATE DEPARTMENT OF STATE

MOHAWK RIVER WATERSHED COALITION OF CONSERVATION DISTRICTS

0 2.5 5 10 Miles

Sources: Watershed Boundaries: NYDEC; Hydrography, NHD; Administrative Boundaries: CSCIC; Adirondack Park Boundary, APA; Surficial Geology: NYS Dept. of Education, classifications based on input from Elizabeth Nystrom.

This map was prepared for the New York State Department of State with funds provided under Title 11 of the Environmental Protection Fund.

Developed By:
STONE ENVIRONMENTAL INC

BEDROCK GEOLOGY

MAP 2-9

Mohawk River Watershed Management Plan

Lake Pleasant
Ballston Spa
Gloversville
Johnstown
Amsterdam
Fonda
Clifton Park
Cohoes
Schenectady
Rotterdam
Albany
Utica
Rome
Herkimer
Wampsville
Cooperstown
Schoharie

HAMILTON COUNTY
HERKIMER CO.
FULTON COUNTY
SARATOGA COUNTY
LEWIS COUNTY
ONEIDA COUNTY
Adirondack Park
FULTON COUNTY
MONTGOMERY COUNTY
SCHENECTADY COUNTY
ONEIDA COUNTY
HERKIMER COUNTY
HERKIMER COUNTY
OTSEGO COUNTY
SCHOHARIE COUNTY
OTSEGO COUNTY
ALBANY COUNTY
GREENE COUNTY
ONEIDA COUNTY
MADISON COUNTY
SCHOHARIE COUNTY
DELAWARE COUNTY
DELAWARE COUNTY
GREENE COUNTY

Legend

Bedrock Groups

- Black Shale
- Carbonates
- Crystalline
- Glacial (bedrock type not mapped)
- Metamorphosed clastic
- Sandstone
- Shale
- Shale and Carbonates
- Shale and Sandstone
- Water

NEW YORK STATE DEPARTMENT OF STATE

MOHAWK RIVER WATERSHED COALITION OF CONSERVATION DISTRICTS

0 2.5 5 10 Miles

Sources: Watershed Boundaries: NYDEC; Hydrography, NHD; Administrative Boundaries: CSCIC; Adirondack Park Boundary, APA; Bedrock Geology: NYS Dept. of Education, classifications based on input from Elizabeth Nystrom.

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Developed By:

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HYDROLOGIC SOIL GROUPS

MAP 2-10

Mohawk River Watershed Management Plan

Lake Pleasant
Ballston Spa
Adirondack Park
Johnstown
Fonda
Schenectady
Albany
Utica
Herkimer
Mohawk River
Schoharie
Wampsville
Cooperstown
Schoharie Creek

HAMILTON COUNTY
FULTON COUNTY
SARATOGA COUNTY
HERKIMER CO.
LEWIS COUNTY
ONEIDA COUNTY
MONTGOMERY COUNTY
SCHENECTADY COUNTY
HERKIMER COUNTY
OTSEGO COUNTY
SCHOHARIE COUNTY
ALBANY COUNTY
GREENE COUNTY
ONEIDA COUNTY
MADISON COUNTY
SCHOHARIE COUNTY
DELAWARE COUNTY
DELAWARE COUNTY
GREENE COUNTY

90 87 88

Legend

Hydrologic Group (SSURGO)

- Unknown or Water
- A: High Infiltration
- A/D: High Infiltration, Shallow Water Table
- B: Moderate Infiltration
- B/D: Moderate Infiltration, Shallow Water Table
- C: Slow Infiltration
- C/D: Slow Infiltration, Shallow Water Table
- D: Very Slow Infiltration
- Data Not Available

NEW YORK STATE DEPARTMENT OF STATE

MOHAWK RIVER WATERSHED COALITION OF CONSERVATION DISTRICTS

N

0 2.5 5 10 Miles

Sources: Watershed Boundaries: NYDEC; Hydrography, NHD; Administrative Boundaries: CSCIC; Adirondack Park Boundary, APA; Hydrologic Soil Groups: Stone, derived from SSURGO.

This map was prepared for the New York State Department of State with funds provided under Title 11 of the Environmental Protection Fund.

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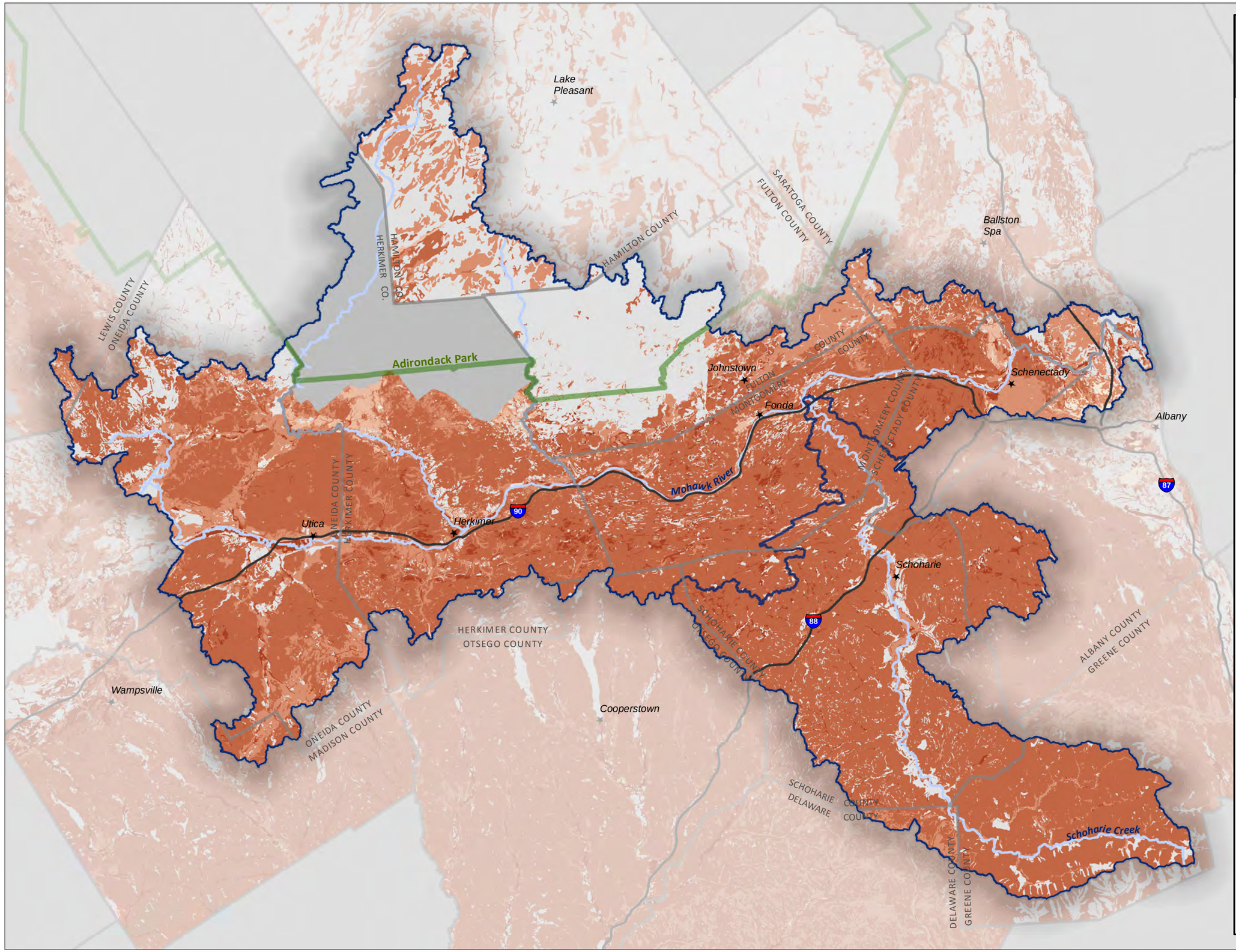
EROSION POTENTIAL

MAP 2-11

Mohawk River Watershed Management Plan



Legend

Soil Erodibility (SSURGO)

k factor

- 0.1
- 0.11 - 0.15
- 0.16 - 0.28
- 0.29 - 0.32
- 0.33 - 0.43
- Unknown
- Data Not Available

NEW YORK STATE DEPARTMENT OF STATE

MOHAWK RIVER WATERSHED COALITION OF CONSERVATION DISTRICTS

N

0 2.5 5 10 Miles

Sources: Watershed Boundaries: NYDEC; Hydrography, NHD; Administrative Boundaries: CSCIC; Adirondack Park Boundary, APA; Erosion Potential: Stone, derived from SSURGO.

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2006 LAND COVER

MAP 2-12

Mohawk River Watershed Management Plan

Legend

NLCD 2006

- Barren Land
- Cultivated Crops
- Deciduous Forest
- Developed, High Intensity
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed, Open Space
- Emergent Herbaceous Wetlands
- Evergreen Forest
- Hay/Pasture
- Herbaceous
- Mixed Forest
- No change
- Open Water
- Shrub/Scrub
- Woody Wetlands

0 2.5 5 10 Miles

Sources: Watershed Boundaries: NYDEC; Hydrography, NHD; Administrative Boundaries: CSCIC; Adirondack Park Boundary, APA; 2006 Land Cover: National Land Cover Database, USGS.

This map was prepared for the New York State Department of State with funds provided under Title 11 of the Environmental Protection Fund.

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NEW YORK STATE DEPARTMENT OF STATE

MOHAWK RIVER WATERSHED COALITION OF CONSERVATION DISTRICTS

Lake Pleasant
Ballston Spa
Albany
Schenectady
Johnstown
Fonda
Utica
Herkimer
Schoharie
Wampsville
Cooperstown
Adirondack Park
Mohawk River
Schoharie Creek
LEWIS COUNTY
ONEIDA COUNTY
HERKIMER CO.
HAMILTON COUNTY
SARATOGA COUNTY
FULTON COUNTY
MONTGOMERY COUNTY
SCHENECTADY COUNTY
ONEIDA COUNTY
HERKIMER COUNTY
HERKIMER COUNTY
OTSEGO COUNTY
SCHOHARIE COUNTY
OTSEGO COUNTY
ONEIDA COUNTY
MADISON COUNTY
ALBANY COUNTY
GREENE COUNTY
SCHOHARIE COUNTY
DELAWARE COUNTY
DELAWARE COUNTY
GREENE COUNTY
90
88
87

ECOLOGICAL ZONES

MAP 2-13

Mohawk River Watershed Management Plan

Ecozones

- CENTRAL APPALACHIANS
- HELDERBERG HIGHLANDS
- SCHOHARIE HILLS
- CATSKILL PEAKS
- DELAWARE HILLS
- ERIE-ONTARIO PLAIN
- MOHAWK VALLEY
- CENTRAL HUDSON
- TUG HILL TRANSITION
- CENTRAL TUG HILL
- BLACK RIVER VALLEY
- WEST ADIRONDACK TRANSITION
- WEST ADIRONDACK FOOTHILLS
- K03 CENTRAL ADIRONDACKS
- EAST ADIRONDACK FOOTHILLS
- EAST ADIRONDACK TRANSITION

N

0 2.5 5 10 Miles

Sources: Watershed Boundaries: NYDEC; Hydrography, NHD; Administrative Boundaries: CSCIC; Adirondack Park Boundary, APA; Ecological Zones, NYS Department of Environmental Conservation.

This map was prepared for the New York State Department of State with funds provided under Title 11 of the Environmental Protection Fund.

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NEW YORK STATE DEPARTMENT OF STATE

MOHAWK RIVER WATERSHED COALITION OF CONSERVATION DISTRICTS

Lake Pleasant
Ballston Spa
Adirondack Park
Johnstown
Schenectady
Albany
Fonda
Mohawk River
Utica
Herkimer
Schoharie
Wampsville
Cooperstown
Schoharie Creek

HAMILTON COUNTY
HERKIMER CO.
HAMILTON CO.
LEWIS COUNTY
ONEIDA COUNTY
SARATOGA COUNTY
FULTON COUNTY
FULTON COUNTY
MONTGOMERY COUNTY
MONTGOMERY COUNTY
SCHENECTADY COUNTY
ONEIDA COUNTY
HERKIMER COUNTY
HERKIMER COUNTY
OTSEGO COUNTY
SCHOHARIE COUNTY
OTSEGO COUNTY
ALBANY COUNTY
GREENE COUNTY
ONEIDA COUNTY
MADISON COUNTY
SCHOHARIE COUNTY
DELAWARE COUNTY
DELAWARE COUNTY
GREENE COUNTY

90
87
88

SENSITIVE ENVIRONMENTAL AREAS

MAP 2-14

Mohawk River Watershed Management Plan

Legend

- Stream/Lake Buffer (50 ft)
- Steep Slopes >= 15%
- Wetlands
- Hydric Soils

Flood Zone

- 100-Year
- 500-Year

Primary Aquifers

- Unconfined
- Confined
- Unknown

0 2.5 5 10 Miles

Sources: Watershed Boundaries: NYDEC; Hydrography, NHD; Administrative Boundaries: CSCIC; Adirondack Park Boundary, APA; Wetlands: Adirondack Park Agency, within Adirondack Park and NYS Dept. of Environmental Conservation outside of Adirondack Park; Stream buffers, Stone derived from NHD; Steep Slopes, Stone derived from USGS DEM; Hydric Soils, Stone derived from SSURGO; Primary Aquifers, NYDEC; Flood Zones, published by FEMA. Montgomery flood data is preliminary data and has not yet been approved. Flood data not available for Hamilton, Fulton, Otsego, and Lewis Counties.

This map was prepared for the New York State Department of State with funds provided under Title 11 of the Environmental Protection Fund.

Developed By:

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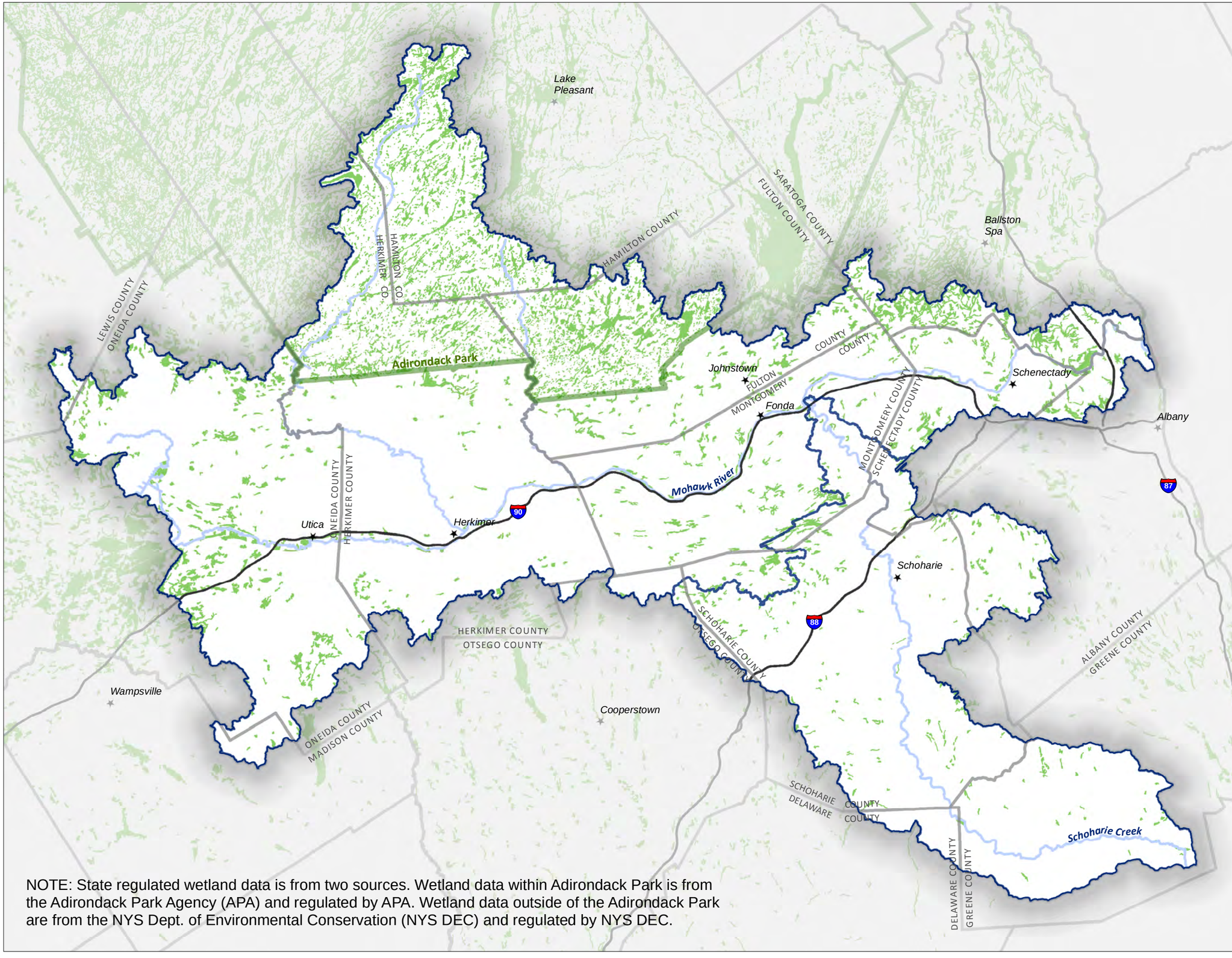
NEW YORK STATE DEPARTMENT OF STATE

MOHAWK RIVER WATERSHED COALITION OF CONSERVATION DISTRICTS

Lake Pleasant
Ballston Spa
Johnstown
Fonda
Schenectady
Albany
Utica
Herkimer
Schoharie
Wampsville
Cooperstown
Adirondack Park
Mohawk River
Schoharie Creek
LEWIS COUNTY
ONEIDA COUNTY
HERKIMER CO.
HAMILTON CO.
HAMILTON COUNTY
SARATOGA COUNTY
FULTON COUNTY
FULTON COUNTY
MONTGOMERY COUNTY
SCHENECTADY COUNTY
ONEIDA COUNTY
HERKIMER COUNTY
HERKIMER COUNTY
OTSEGO COUNTY
SCHOHARIE COUNTY
OTSEGO COUNTY
ALBANY COUNTY
GREENE COUNTY
ONEIDA COUNTY
MADISON COUNTY
SCHOHARIE COUNTY
DELAWARE COUNTY
DELAWARE COUNTY
GREENE COUNTY
90
87
88



NOTE: State regulated wetland data is from two sources. Wetland data within Adirondack Park is from the Adirondack Park Agency (APA) and regulated by APA. Wetland data outside of the Adirondack Park are from the NYS Dept. of Environmental Conservation (NYS DEC) and regulated by NYS DEC.

WETLANDS

MAP 2-15

Mohawk River Watershed Management Plan

Legend

Wetlands

MOHAWK RIVER WATERSHED COALITION OF CONSERVATION DISTRICTS

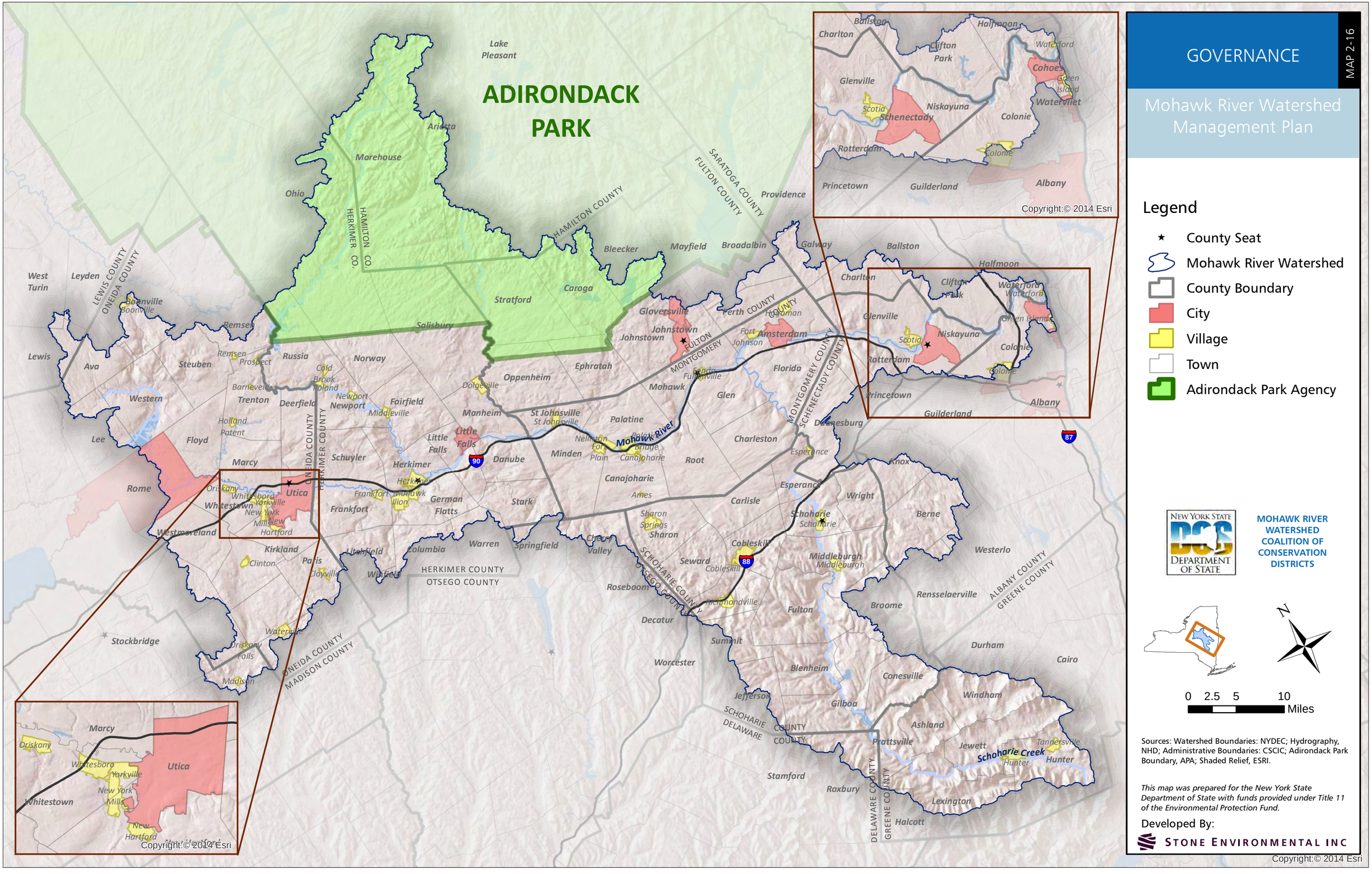
0 2.5 5 10 Miles

Sources: Watershed Boundaries: NYDEC; Hydrography, NHD; Administrative Boundaries: CSCIC; Adirondack Park Boundary, APA; Wetlands: Adirondack Park Agency, within Adirondack Park and NYS DEC outside of Adirondack Park.

This map was prepared for the New York State Department of State with funds provided under Title 11 of the Environmental Protection Fund.

Developed By:

STONE ENVIRONMENTAL INC



GOVERNANCE

MAP 2-16

Mohawk River Watershed Management Plan

Legend

- County Seat
- Mohawk River Watershed
- County Boundary
- City
- Village
- Town
- Adirondack Park Agency

NEW YORK STATE DEPARTMENT OF STATE

MOHAWK RIVER WATERSHED COALITION OF CONSERVATION DISTRICTS

N

0 2.5 5 10 Miles

Sources: Watershed Boundaries: NYDEC; Hydrography, NHD; Administrative Boundaries: CSCIC; Adirondack Park Boundary, APA; Shaded Relief, ESRI.

This map was prepared for the New York State Department of State with funds provided under Title 11 of the Environmental Protection Fund.

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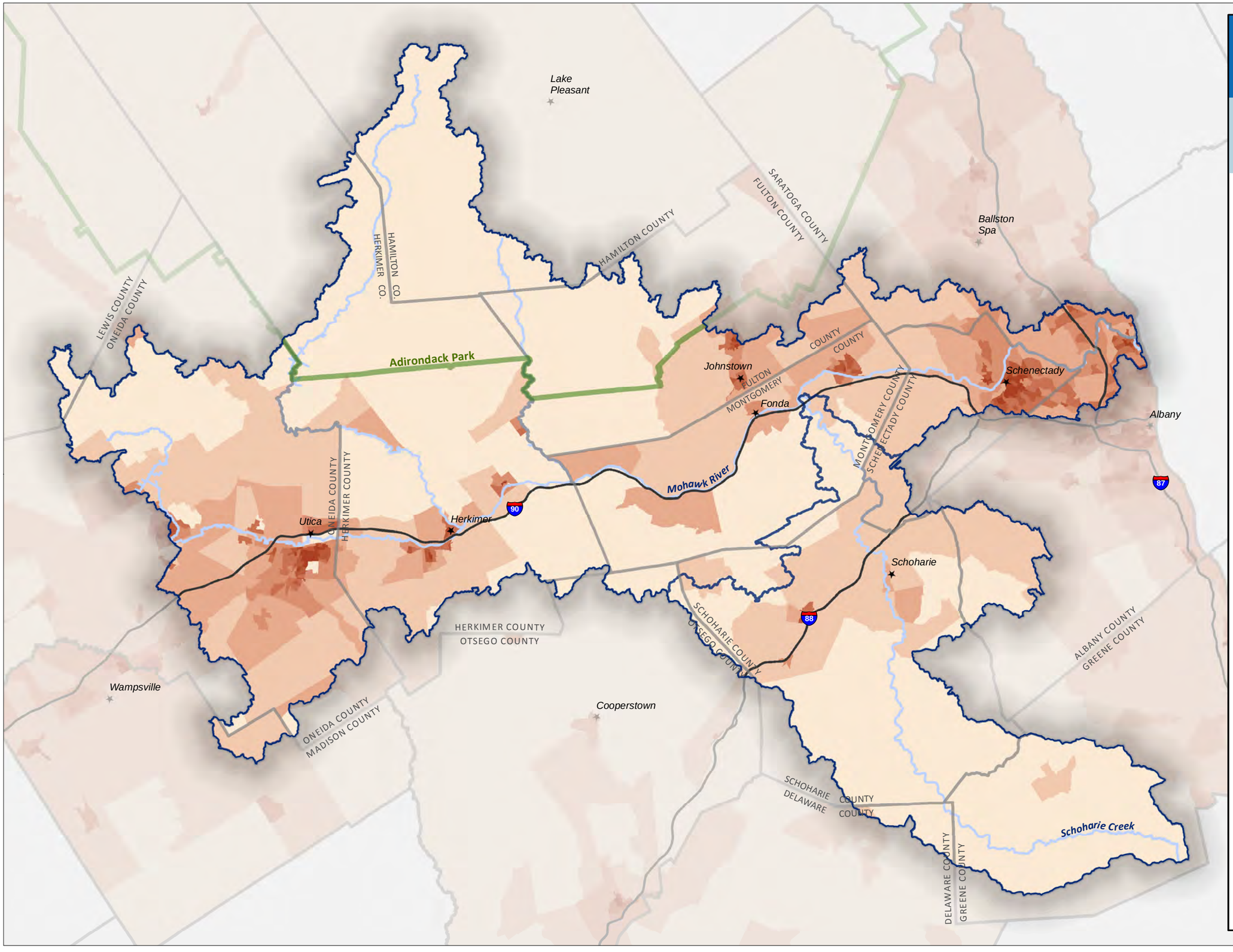
2010 POPULATION DENSITY

MAP 2-17

Mohawk River Watershed Management Plan



Legend

People Per Sq. Mile by Block Group

- 0 - 50
- 51 - 125
- 126 - 500
- 501 - 1,750
- 1,751 - 3,500
- 3,501 - 7,500
- 7,501 - 30,890

NEW YORK STATE DOS DEPARTMENT OF STATE

MOHAWK RIVER WATERSHED COALITION OF CONSERVATION DISTRICTS

N

0 2.5 5 10 Miles

Sources: Watershed Boundaries: NYDEC; Hydrography, NHD; Administrative Boundaries: CSCIC; Adirondack Park Boundary, APA; People Per Square Mile (2010 Block Groups), U.S. Census Bureau.

This map was prepared for the New York State Department of State with funds provided under Title 11 of the Environmental Protection Fund.

Developed By:

STONE ENVIRONMENTAL INC

INFRASTRUCTURE

MAP 2-18

Mohawk River Watershed Management Plan

Legend

Infrastucture

- Dam
- Bridge
- MS4 Stormwater Outfall

- Highway
- Secondary Road
- Local Road
- Ramp or Other
- Trail
- Railroad

MOHAWK RIVER WATERSHED COALITION OF CONSERVATION DISTRICTS

0 2.5 5 10 Miles

Sources: Watershed Boundaries: NYDEC; Hydrography, NHD; Administrative Boundaries: CSCIC; Adirondack Park Boundary, APA; Roads: NYS Office of Cyber Security, ALIS; Bridges and Rail Lines: NYS Department of Transportation; Stormwater Outfalls and Dams: NYS Department of Environmental Conservation.

This map was prepared for the New York State Department of State with funds provided under Title 11 of the Environmental Protection Fund.

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STONE ENVIRONMENTAL INC

LAND USE FROM ASSESSOR CODES

MAP 2-19

Mohawk River Watershed Management Plan

Legend

- Unknown
- Vacant Land
- Agriculture
- Wild, Forested, Conservation, Parks
- Residential
- Commercial
- Industrial
- Community Services
- Public Services
- Recreation and Entertainment

0 2.5 5 10 Miles

Sources: Watershed Boundaries: NYDEC; Hydrography, NHD; Administrative Boundaries: CSCIC; Adirondack Park Boundary, APA; Land Use: Stone, derived from Assessor data (Albany, Delaware, Fulton, Greene, Hamilton, Herkimer, Lewis, Madison, Montgomery, Oneida, Otsego, Saratoga, Schenectady, Schoharie Counties)

This map was prepared for the New York State Department of State with funds provided under Title 11 of the Environmental Protection Fund.

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MOHAWK RIVER WATERSHED COALITION OF CONSERVATION DISTRICTS

POLLUTION SOURCES

MAP 2-20

Mohawk River Watershed Management Plan

Legend

- Superfund Sites
- Brownfields
- Landfills
- Pollutant Discharge Sites

MOHAWK RIVER WATERSHED COALITION OF CONSERVATION DISTRICTS

0 2.5 5 10 Miles

Sources: Watershed Boundaries: NYDEC; Hydrography, NHD; Administrative Boundaries: CSCIC; Adirondack Park Boundary, APA; SPDES permits: NYS Dept. of Environmental Conservation (updated 10/2011; Landfills, superfund and brownfield sites: US EPA (updated 8/20/2007).

This map was prepared for the New York State Department of State with funds provided under Title 11 of the Environmental Protection Fund.

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STONE ENVIRONMENTAL INC

Lake Pleasant
Ballston Spa
Gloversville
Johnstown
Amsterdam
Schenectady
Cohoes
Albany
Fonda
Little Falls
Herkimer
Utica
Rome
Wampsville
Cooperstown
Schoharie
Adirondack Park
Mohawk River
Schoharie Creek
LEWIS COUNTY
ONEIDA COUNTY
HAMILTON CO.
HERKIMER CO.
HAMILTON COUNTY
SARATOGA COUNTY
FULTON COUNTY
FULTON COUNTY
MONTGOMERY COUNTY
MONTGOMERY COUNTY
SCHENECTADY COUNTY
ONEIDA COUNTY
HERKIMER COUNTY
HERKIMER COUNTY
OTSEGO COUNTY
SCHOHARIE COUNTY
OTSEGO COUNTY
ALBANY COUNTY
GREENE COUNTY
ONEIDA COUNTY
MADISON COUNTY
SCHOHARIE COUNTY
DELAWARE COUNTY
DELAWARE COUNTY
GREENE COUNTY
90
88
87

BUILDING PERMITS 1990 - 2010

MAP 2-21

Mohawk River Watershed Management Plan

Lake Pleasant
Ballston Spa
Johnstown
Fonda
Schenectady
Albany
Utica
Herkimer
Schoharie
Wampsville
Cooperstown
Adirondack Park
Mohawk River
Schoharie Creek

HAMILTON COUNTY
SARATOGA COUNTY
FULTON COUNTY
LEWIS COUNTY
ONEIDA COUNTY
HERKIMER CO.
HAMILTON CO.
MONTGOMERY COUNTY
SCHENECTADY COUNTY
HERKIMER COUNTY
ONEIDA COUNTY
OTSEGO COUNTY
SCHOHARIE COUNTY
ALBANY COUNTY
GREENE COUNTY
ONEIDA COUNTY
MADISON COUNTY
SCHOHARIE COUNTY
DELAWARE COUNTY
DELAWARE COUNTY
GREENE COUNTY

87
90
88

Legend

Building Permits by Place

- 0 - 15
- 16 - 75
- 51 - 75
- 76 - 150
- 151 - 250
- 251 - 500
- 501 - 3611

NEW YORK STATE DEPARTMENT OF STATE

MOHAWK RIVER WATERSHED COALITION OF CONSERVATION DISTRICTS

N

0 2.5 5 10 Miles

Sources: Watershed Boundaries: NYDEC; Hydrography, NHD; Administrative Boundaries: CSCIC; Adirondack Park Boundary, APA; Building Permits, U.S. Census Bureau.

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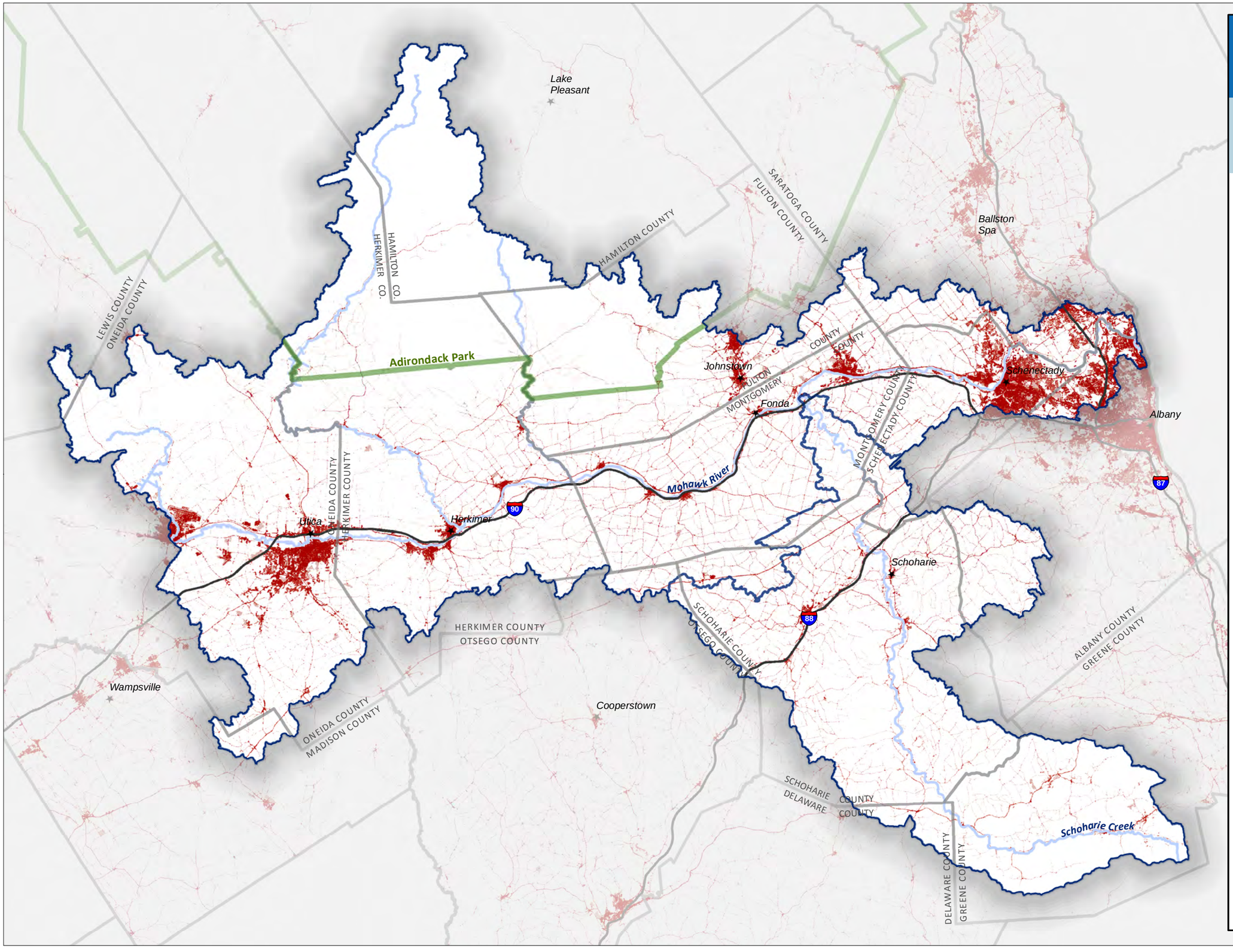
Developed By:
STONE ENVIRONMENTAL INC

2006 PERCENT IMPERVIOUS

MAP 2-22

Mohawk River Watershed Management Plan



Legend

NLCD 2006 Impervious

Percent Impervious

High : 100

Low : 0

NEW YORK STATE DEPARTMENT OF STATE

MOHAWK RIVER WATERSHED COALITION OF CONSERVATION DISTRICTS

N

0 2.5 5 10 Miles

Sources: Watershed Boundaries: NYDEC; Hydrography, NHD; Administrative Boundaries: CSCIC; Adirondack Park Boundary, APA; 2006 Percent Impervious Landcover: National Land Cover Database, USGS.

This map was prepared for the New York State Department of State with funds provided under Title 11 of the Environmental Protection Fund.

Developed By:

STONE ENVIRONMENTAL INC

PRIME FARMLAND SOILS

MAP 2-23

Mohawk River Watershed Management Plan

Legend

Prime Farmland (SSURGO)

- All areas are prime farmland
- Prime farmland if drained
- Farmland of statewide importance
- Not Prime Farmland
- Data Not Available

Lake Pleasant
Ballston Spa
Johnstown
Fonda
Schenectady
Albany
Utica
Herkimer
Schoharie
Wampsville
Cooperstown
Adirondack Park
Mohawk River
Schoharie Creek
HAMILTON COUNTY
HERKIMER CO.
LEWIS COUNTY
ONEIDA COUNTY
SARATOGA COUNTY
FULTON COUNTY
FULTON COUNTY
MONTGOMERY COUNTY
MONTGOMERY COUNTY
SCHENECTADY COUNTY
ONEIDA COUNTY
HERKIMER COUNTY
HERKIMER COUNTY
OTSEGO COUNTY
SCHOHARIE COUNTY
OTSEGO COUNTY
ALBANY COUNTY
GREENE COUNTY
ONEIDA COUNTY
MADISON COUNTY
SCHOHARIE COUNTY
DELAWARE COUNTY
DELAWARE COUNTY
GREENE COUNTY
90
87
88

NEW YORK STATE DEPARTMENT OF STATE

MOHAWK RIVER WATERSHED COALITION OF CONSERVATION DISTRICTS

N

0 2.5 5 10 Miles

Sources: Watershed Boundaries: NYDEC; Hydrography, NHD; Administrative Boundaries: CSCIC; Adirondack Park Boundary, APA; Prime Farmland Soils: Stone, derived from SSURGO.

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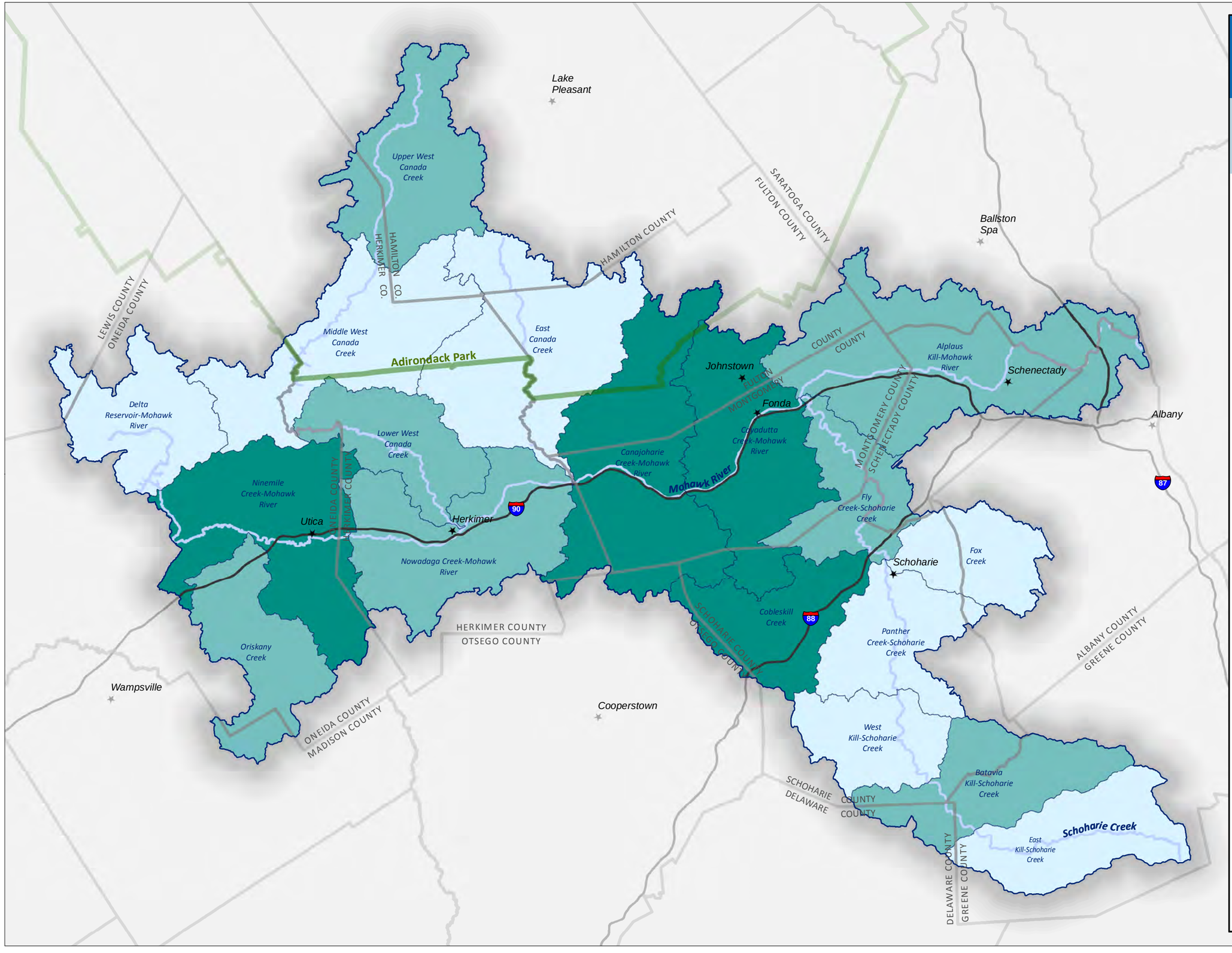
WATERSHED ASSESSMENT: WATER QUALITY HUC 10

MAP 2-24

Mohawk River Watershed Management Plan



Legend

Water Quality Score

- Low: 18 - 22
- Medium: 23 - 27
- High: 28 - 36

MOHAWK RIVER WATERSHED COALITION OF CONSERVATION DISTRICTS

0 2.5 5 10 Miles

Sources: Watershed Boundaries: NYDEC; Hydrography, NHD; Administrative Boundaries: CSCIC; Adirondack Park Boundary, APA; Watershed Assessment, Stone and Mohawk River Watershed Coalition of Conservation Districts.

This map was prepared for the New York State Department of State with funds provided under Title 11 of the Environmental Protection Fund.

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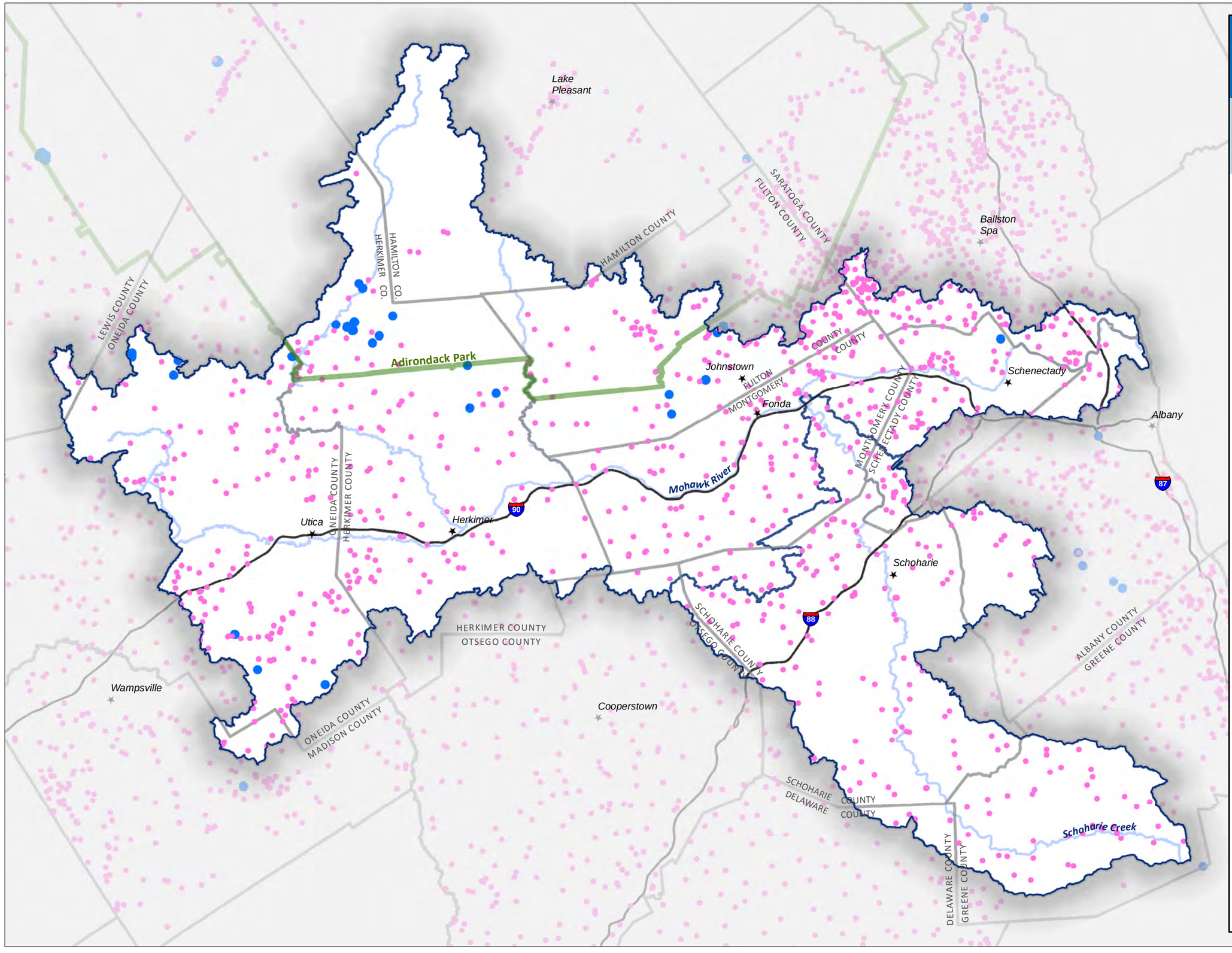
DRINKING WATER LAKES AND RESERVOIRS AND WELLHEADS

MAP 2-25

Mohawk River Watershed Management Plan



Legend

- Wellheads
- **Drinking Water Lakes and Reservoirs**

NEW YORK STATE DEPARTMENT OF STATE

MOHAWK RIVER WATERSHED COALITION OF CONSERVATION DISTRICTS

0 2.5 5 10 Miles

Sources: Watershed Boundaries: NYDEC; Hydrography, NHD; Administrative Boundaries: CSCIC; Adirondack Park Boundary, APA; Drinking Water Lakes and Reservoirs: NYDEC; Wellheads: DOW - Bureau of Water Resource Management.

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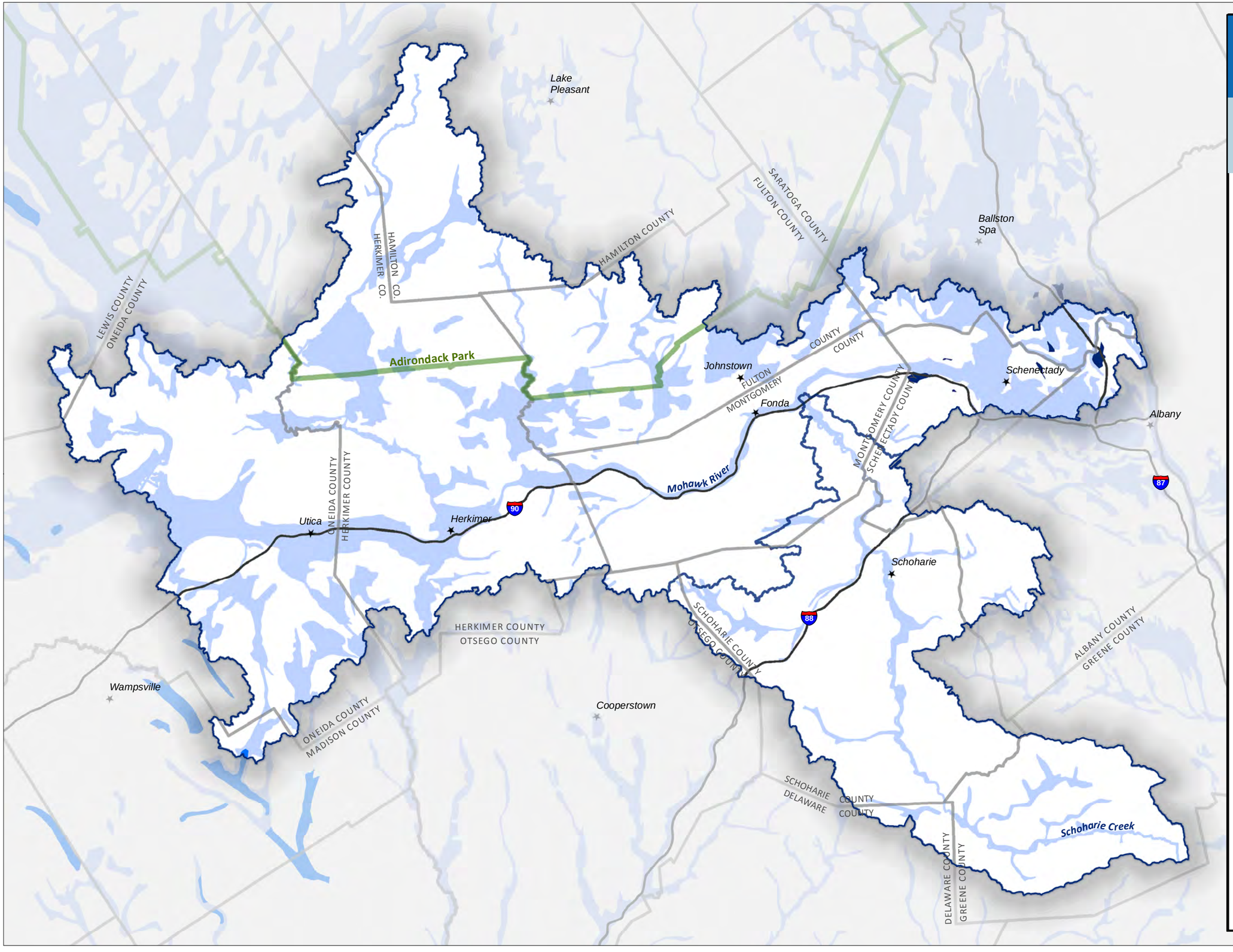
PRINCIPAL AQUIFERS

MAP 2-26

Mohawk River Watershed Management Plan



Legend

Aquifers

- Unconfined
- Confined
- Unknown

NEW YORK STATE DEPARTMENT OF STATE

MOHAWK RIVER WATERSHED COALITION OF CONSERVATION DISTRICTS

0 2.5 5 10 Miles

Sources: Watershed Boundaries: NYDEC; Hydrography, NHD; Administrative Boundaries: CSCIC; Adirondack Park Boundary, APA; Unconsolidated Aquifers, NYS Dept. of Health.

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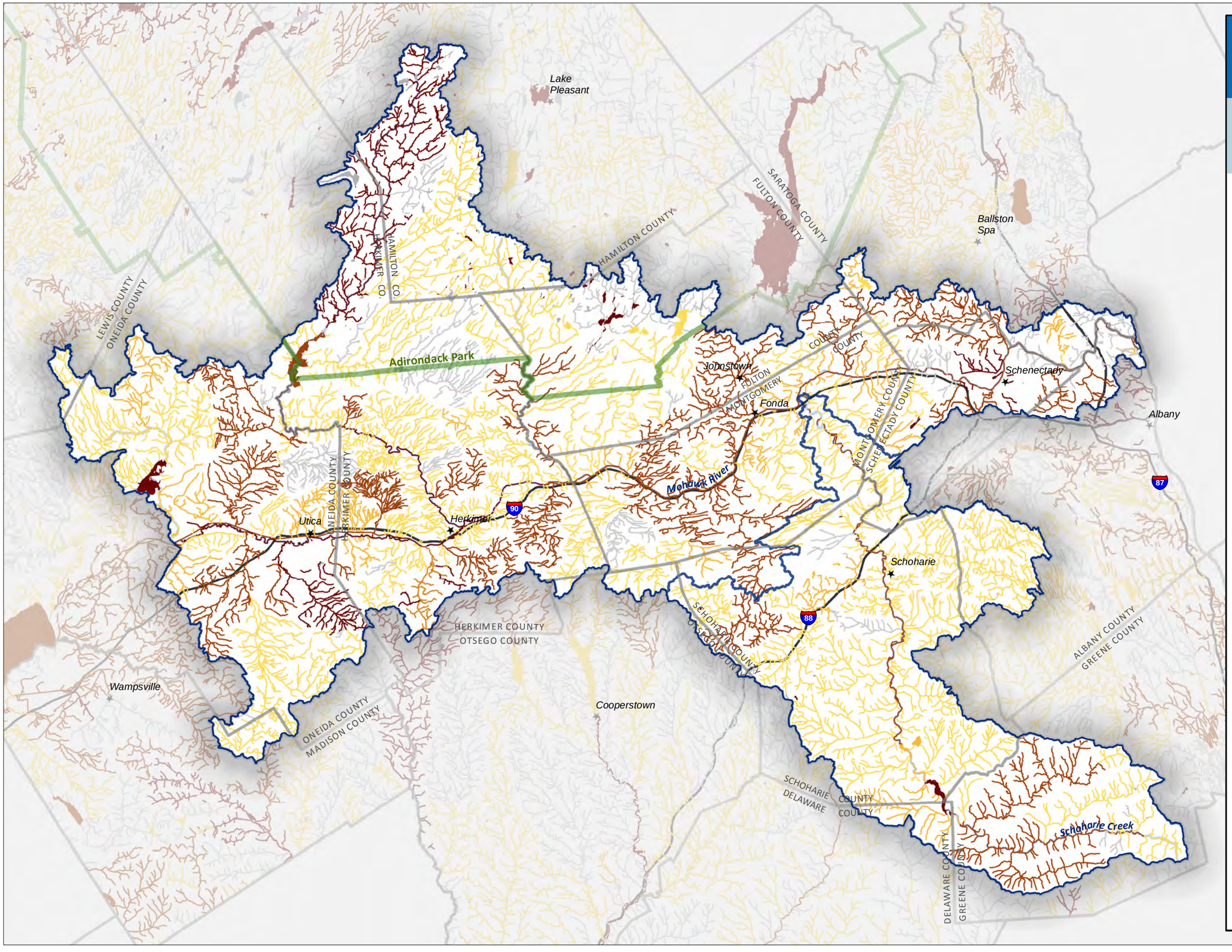
PRIORITY WATERS LIST STREAM IMPAIRMENT

MAP 2-27

Mohawk River Watershed Management Plan



Legend

Priority Waters List

- **Impaired Segment**
- **Minor Impacts**
- **Threatened**
- **Need Verification**
- **No Known Impacts**
- **UnAssessed**

NEW YORK STATE DEPARTMENT OF STATE

MOHAWK RIVER WATERSHED COALITION OF CONSERVATION DISTRICTS

0 2.5 5 10 Miles

Sources: Watershed Boundaries: NYDEC; Hydrography, NHD; Administrative Boundaries: CSCIC; Adirondack Park Boundary, APA; Priority Waters List Stream Impairment: NYS DEC.

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