Chapter 3: Subwatershed Assessment

3.1 Objective of the Assessment

The structure of watersheds is dendritic or tree-like with smaller streams joining progressively larger ones (see Map 2-5). Thus, the watershed as a whole can be divided into a series of nested "subwatersheds" as illustrated by the HUC-8 through HUC-12 notation. Effective management of water quality in the basin as a whole depends on recognizing this fundamental structure of the watershed, starting with smaller units and addressing restoration and protection efforts to progressively larger, more inclusive ones. The objective, therefore, is to assess water-quality issues at their source, and to set priorities for remediating degraded parts of the watershed and protecting those that are not degraded but may be in danger of becoming so without effective management. Recommendations for addressing the restoration and protections issues uncovered in this assessment are discussed in Chapter 4.

3.2 Assessment Criteria and Procedure

To complete this assessment, each of the 12-digit HUC subwatersheds in the Mohawk River Watershed was evaluated using a set of quantitative indicators for three aspects of watershed health: water quality, land use, and habitat. The evaluation assigned a score of 1 to 5 for each of various quantitative indicators (metrics) of watershed health. The scores associated with these metrics of watershed health were combined to a final score; some were weighted for overall significance. The amalgamated scores can be used to help define priority areas (subwatersheds with the lowest overall scores), while preserving important information regarding the underlying causes for concern. Quantitative indicators and resulting scores for the three aspects of watershed health are described in this section. The selected metrics include both causal and response variables. Watershed assessment maps at the HUC-12 subwatershed level are available at the online Interactive Mapping Tool for the Mohawk River Watershed.

3.3 Summary of Assessment Results

While it is important to understand the relative health of 12-digit HUC subwatersheds, of which there are 116 in the Mohawk River watershed, consolidating this data at the 10-digit HUC subwatershed level provides a broader view. The following discussion will be based on the 18 10-digit HUC subwatersheds in the watershed.

3.3.1 Water Quality Indicators and Scores

Four metrics were used to evaluate water quality:

- *Percent Impaired per WI/PWL*. The sum of waterbody segments that are impaired, have minor impacts, or are threatened, as a percentage of the total length of waterbody segments. The data source for this assessment is the 2010 NYSDEC Waterbody Index/Priority Waterbodies List, a compendium of data and local knowledge regarding the extent to which lakes and streams support their designated use. Designated uses include drinking water supply, shell fishing, public bathing, recreation, fish consumption, aquatic life, habitat/hydrology, and aesthetics.

- *Percent Groundwater Recharge*. The area of principal aquifers as a percentage of the subwatershed area. This indicator is used to highlight where aquifer protection is needed.
- *Percent Wetland and Forest*. The total area of forest and wetland land cover as a percentage of the subwatershed area. Forest and wetlands provide excellent protection for waterbodies.
- *Percent Natural Riparian Cover*. The area of forest, wetland, and grasslands within 150 feet of waterbodies as a percentage of the total riparian corridor area within the subwatershed.

The relative water quality scores calculated from these four metrics are presented in Table 3-1 and displayed in Map 3-1. There is a strong correlation between the presumed causal variables (riparian buffers, wetlands/forests) and the response variable (extent to which waters support their designated best use).

Medium to high water quality scores are found in areas that are undeveloped and have a high percentage of wetland and forest cover and natural riparian buffers around waterbodies. In contrast, subwatersheds with extensive areas of residential/commercial development or lands in agricultural use exhibit more waterbody segments that are considered impaired. The land use indicators and scores that support this statement are described in section 3.3.2.

TABLE 3-1
Summary of Water Quality Assessment Scores at the 10-Digit HUC Subwatershed Level

Subwatershed	% Impaired	% Groundwater Recharge	% Wetland / Forest	% Riparian	Total Score
UPPER MOHAWK					
Oriskany Creek	4	2	2	4	24
Ninemile Creek	3	2	2	4	22
Nowadaga Creek	3	2	3	4	24
Lower W. Canada Ck.	4	2	3	4	26
Delta Reservoir	5	1	4	4	28
Middle W. Canada Ck.	4	2	5	4	30
Upper W. Canada Ck.	3	1	5	4	26
MAIN RIVER					
Cayadutta Creek	2	1	3	3	18
Canajoharie Creek	4	1	3	3	22
Alplaus Kill	3	3	3	3	24
Fly Creek	5	1	3	3	24
East Canada Creek	5	2	5	4	32
SCHOHARIE WATERSHED					
Cobleskill Creek	4	1	3	3	22
Batavia Kill	3	1	5	4	26
Fox Creek	5	1	5	4	30
West Kill	5	1	5	4	30
East Kill	3	1	5	5	28
Panther Creek	5	1	4	4	28

The highest possible score for water quality is 40 and the lowest score is 8. The most important indicator is Percent Impaired, which is based on NYSDEC Waterbody Index/Priority Waterbody List (WI/PWL). A score of 5 indicates good water quality. The metric Percent Ground Water (GW) Recharge was included to ensure that aquifers recharge areas were included in the assessment of priority regions for restoration and protection measures. The aquifer scores range from 1-5 indicating low to high aquifer recharge areas within the subwatersheds. Consequently, a score of 1 for Percent Ground Water Recharge does not indicate adverse ground water quality conditions, only that the subwatershed does not encompass extensive land areas overlying principal aquifers. A score of 5 for this metric indicates that there is substantial land area within the subwatershed that overlies principal aquifers, and thus that protective measures are likely indicated. Given the scoring criteria for these metrics, total water quality scores of around 30 can indicate excellent conditions, particularly when the Percent Impaired is assigned a value of 5. Because water quality is the most important factor in watershed health, it was assigned a weighting factor of 2 (i.e., the indicator scores were summed and multiplied by 2 to calculate the water quality score).

3.3.2 Land Use Indicators and Scores

Seven metrics were used to evaluate land use:

- *Percent Agriculture*. The sum of the cultivated crop cover plus hay/pasture cover as a percentage of the total subwatershed area.
- *Soil Erodibility*. The weighted average K-factor for the soil types in the subwatershed on a scale of 0.10–0.50.
- *Livestock/Acre of Pastureland*. Based on animal-unit data from the 2007 USDA Census of Agriculture, calculated by the dividing the total animal population in the subwatershed by the area of pastureland.
- *Percent Forest*. The land area classified as forested (deciduous, evergreen, mixed) as a percentage of the total area within the subwatershed.
- *Percent Urban*. The sum of the four urban classes (development intensity-high, medium, low, plus urban open space) as a percentage of the total area within the subwatershed.
- *Percent Impervious*. Shown on land cover maps as Percent Impervious, with the indicator for the subwatershed calculated as the average percent impervious.
- *Percent Change in Residential Development since 1990*. Based on the number of parcels for which building permits were issued for the period 1990-2011; calculated as the percent increase in residential parcels since 1990.

The relative land use scores are presented in **Table 3-2** and displayed in **Map 3-2**. It is clear that the HUC-10 subwatersheds exhibiting low scores are either highly developed or have extensive agricultural lands. Given that Schenectady, the Albany suburbs, and the Utica/Rome area comprise the only urbanized areas within the Mohawk River watershed, most of the subwatersheds that score low based on land use are associated with the agriculture regions, notably in the fertile Mohawk River lowlands. Medium to high scores are found in and adjacent to the Adirondacks and Catskills; these areas have little to no development or intensive agriculture. The range of possible scores for land use is 10.5–52.5. The subwatersheds with relatively low scores of 30–36 tend to be high in percent agricultural land use, low in percent forest, and/or high in percent change in development. Subwatersheds with higher scores of 37–45 are the opposite, low in agriculture, high in forest cover, and low in development. The assessment of land use was assigned a weighting factor of 1.5.

TABLE 3-2
Summary of Land Use Assessment Scores at the 10-Digit HUC Subwatershed Level

Subwatershed	% Ag	Soil Erodibil.	Livestock /acre	% Forest	% Urban	% Impervious	% Chg-Dev	Total Score
UPPER MOHAWK								
Oriskany Creek	1	2	2	2	5	5	3	30
Ninemile Creek	3	2	2	2	5	5	4	34.5
Nowadaga Creek	2	2	2	2	5	5	5	34.5
Lower W. Canada Creek	2	2	2	2	5	5	5	34.5
Delta Reservoir	4	2	2	3	5	5	3	36
Middle W. Canada Creek	5	3	2	3	5	5	4	40.5
Upper W. Canada Creek	5	3	5	5	5	5	4	48
MAIN RIVER								
Cayadutta Creek	1	2	2	2	5	5	5	33
Canajoharie Creek	2	2	2	2	5	5	5	34.5
Alplaus Kill	3	2	2	2	4	5	5	34.5
Fly Creek	2	2	2	3	5	5	5	36
East Canada Creek	5	2	2	4	5	5	5	42
SCHOHARIE WATERSHED								
Cobleskill Creek	1	2	3	3	5	5	3	33
Batavia Kill	4	2	3	4	5	5	5	42
Fox Creek	3	2	3	3	5	5	3	36
West Kill	4	2	3	4	5	5	2	37.5
East Kill	5	2	3	5	5	5	5	45
Panther Creek	4	2	3	4	5	5	4	40.5

3.3.3 Habitat Indicators and Scores

Four metrics were used to evaluate habitat:

- *Percent Aquatic Life Precluded, Impaired, or Stressed*. Focuses on in-stream habitat and benthic macroinvertebrates. Aquatic life is one of the uses assessed as part of the WI/PWL, and the indicator is calculated similar to Percent Impaired for water quality.
- *In-Stream Habitat Altered, Moderate, or Severe Assessments*. Based on results of NYSDEC biomonitoring program. For those streams that have been assessed, and other than "natural" conditions were observed, a low score is assigned. A high score is assigned to streams that have not been assessed.
- *Endangered Species Observations*. Based on sightings of endangered species by the National Heritage Program. If there have been sightings, the score is high, and if no sightings, the score is low.
- *Percent Intolerant Fish Species*. Based on Mohawk River watershed fish species using the USEPA's Index of Biotic Integrity (IBI) metrics. The indicator is the number of pollution-intolerant species found (e.g. trout) as a percentage of the total number of species found in the subwatershed.

The relative Habitat scores are presented in Table 3-3 and displayed in Map 3-3. Note that the relative Habitat scores do not track the relative Water Quality scores to the extent evident in the Land Use scores. One might expect a stronger correlation between habitat and water quality scores, given the inclusion of metrics related to in-stream habitat. The difference appears to be a result of the metric related to the presence of endangered species; the presence of endangered species raises the score even if an in-stream metric such as the Percent Aquatic Life scores low.

The metric for percent aquatic life classified with some degree of impairment is a key measure of water quality conditions and a robust metric for assessing the health of the subwatersheds. These data are readily collected using standard benthic macroinvertebrate community measures and are suitable for a (trained) volunteer monitoring effort. Benthic macroinvertebrate data have been reported for many streams throughout the basin.

The highest possible score for the habitat assessment is 20, and the lowest possible score is 4. The most important indicator is Percent Aquatic Life Impaired because of the robust relationship between water quality conditions and the benthic macroinvertebrate community in a stream. Moreover, it is important to note that the classification "impaired" encompasses the NYSDEC range of "threatened, stressed, impaired, and precluded" as used in the WI/PWL. A score of 3 or lower indicates that aquatic life is impaired in over 40% of the stream miles in the subwatershed. The assessment of habitat was assigned a weighting factor of 1.

TABLE 3-3
Summary of Habitat Assessment Scores at the 10-Digit HUC Subwatershed Level

Subwatershed	% Aquatic Life Impaired	In-Stream Habitat	Endangered Species	% Intolerant Fish Species	Total Score
UPPER MOHAWK					
Oriskany Creek	4	1	5	3	13
Ninemile Creek	3	1	5	3	12
Nowadaga Creek	3	1	5	5	14
Lower W. Canada Creek	5	1	5	3	14
Delta Reservoir	5	5	5	3	18
Middle W. Canada Creek	4	5	5	3	17
Upper W. Canada Creek	3	5	5	3	16
MAIN RIVER					
Cayadutta Creek	2	1	5	3	11
Canajoharie Creek	4	1	5	5	15
Alplaus Kill	2	5	5	3	15
Fly Creek	5	5	5	3	18
East Canada Creek	5	5	5	5	20
SCHOHARIE WATERSHED					
Cobleskill Creek	4	1	5	3	13
Batavia Kill	4	1	5	3	13
Fox Creek	5	5	5	3	18
West Kill	5	5	5	3	18
East Kill	5	1	5	3	14
Panther Creek	5	5	5	5	20

The indicator In-Stream Habitat is useful, but limited. It is based on the NYSDEC biomonitoring program, and not all streams within the Mohawk River Watershed have been assessed. A score of 1 indicates that some of the streams in the subwatershed have been assessed by NYSDEC, and were found to have conditions less than natural. A score of 5 indicates that none of the streams within the subwatershed have been assessed. The endangered species indicator is based on observations, with a score of 5 signifying "yes," these species are known to be present, and a score of 1 signifying "no," there is no documentation of the presence of endangered species. As is evident in Table 3-3, endangered species have been observed in all 18 of the 10-digit HUC subwatersheds in the Mohawk River Watershed. However, when assessed at the 12-digit HUC subwatershed level, there is better differentiation of location. The indicator Percent Intolerant Fish Species indirectly measures the degree of pollution in streams, with the higher the percent and score, the lower the level of pollution, and vice versa.

3.3.4 Overall Score

The total relative assessment scores (incorporating water quality, land use, and habitat results) for each of the 10-digit HUC subwatersheds are shown in **Map 3-4**. The dark-shaded subwatersheds exhibit the lowest one-third of the scores; these subwatersheds are associated with the highest percentages of residential, commercial, or agricultural land uses. These subwatersheds tend to be in the Mohawk River lowlands. The medium-shaded subwatersheds exhibit the mid-range of assessment scores; these also tend to be in the Mohawk River lowlands. The highest scoring subwatersheds are located in the pristine undeveloped areas of the Adirondacks and Catskills.

TABLE 3-4
Summary of Total Assessment Scores at the 10-Digit HUC Subwatershed Level

Subwatershed	Water Quality Score	Land Use Score	Habitat Score	Total Score
UPPER MOHAWK				
Oriskany Creek	24	30	13	67
Ninemile Creek	22	34.5	12	68.5
Nowadaga Creek	24	34.5	14	72.5
Lower W. Canada Creek	26	34.4	14	74.5
Delta Reservoir	28	36	18	82
Middle W. Canada Creek	30	40.5	26	87.5
Upper W. Canada Creek	26	48	16	90
MAIN RIVER				
Cayadutta Creek	18	33	11	62
Canajoharie Creek	22	34.5	15	71.5
Alplaus Kill	24	34.5	15	73.5
Fly Creek	24	36	18	78
East Canada Creek	32	42	20	94
SCHOHARIE WATERSHED				
Cobleskill Creek	22	33	13	68
Batavia Kill	26	42	13	81
Fox Creek	28	36	18	82
West Kill	30	37.5	18	85.5
East Kill	28	45	14	87
Panther Creek	28	40.5	20	88.5

The summary of scoring for the three sets of metrics (water quality, land use, habitat) is presented in Table 3-4. Within the three major regions, the 10-digit HUC subwatersheds are listed from the lowest to the highest total score. **Recall that relatively low scores indicate potential impairment and suggest the need restoration.** In contrast, relatively high scores indicate healthy conditions that warrant protection. Based on the scoring system, the lowest possible score for the combined total would be 22.5 and the highest possible score would be 112.5.

3.4 Discussion of Assessment Results

Referring to the assessment total scores as depicted on Map 3-4 and Table 3-4, there are three scoring categories, Low, Medium, and High, with the following ranges:

Low Scores of 62–72.5. Subwatersheds in this range are considered unhealthy and in need of *restoration.*

Medium Scores of 73–83.5. Subwatersheds in this range have a mix of unhealthy and healthy conditions and need both *restoration and protection.*

High Scores of 84–94. Subwatersheds in this range are considered healthy and in need of *protection.*

NOTE: For this discussion, refer to the maps and tables as follows:

Water Quality Scores	Map 3-1 and Table 3-1
Land Use Scores	Map 3-2 and Table 3-2
Habitat Scores	Map 3-3 and Table 3-3
Total Scores	Map 3-4 and Table 3-4

3.4.1 Low-Scoring Subwatersheds (Total Scores: 62–72.5)

The six subwatersheds with the lowest scores are primarily located in the lowlands along the Mohawk River. The Cobleskill Creek subwatershed is adjacent to and south of Canajoharie and Cayadutta Creek.

Upper Mohawk:	Oriskany Creek (67)
	Ninemile Creek (68.5)
	Nowadaga Creek (72.5)
Main River:	Cayadutta Creek (62)
	Canajoharie Creek (71.5)
Schoharie Watershed:	Cobleskill Creek (68)

Water Quality

Water quality scores are relatively low in each of these six subwatersheds. The Percent Impaired per the WI/PWL ranges from 20–80%, with aquatic life (benthic macroinvertebrates) as the impacted use. Cayadutta Creek has the highest percent impairment at 60–80%, with Ninemile Creek, and Nowadaga Creek at 40–60%. Percent impairment for Oriskany Creek, Canajoharie Creek, and Cobleskill Creek is in the 20–40% range.

Waterbodies on the 2012 NYS Compendium of Impaired Waters {303(d) List}

<u>Ninemile Creek</u>		
Mohawk River Main Stem	Part 1	Floatables, Pathogens, Oxygen Demand
	Part 2b	PCBs
Utica Harbor	Part 1	Floatables, Pathogens, Oxygen Demand
	Part 2b	PCBs
Ninemile Creek	Part 1	Pathogens
Ballou, Nail Creeks	Part 1	Oxygen demand, Phosphorus
Sauquoit Creek	Part 2b	PCBs
Threemile Creek	Part 2b	PCBs
<u>Nowadaga Creek</u>		
Mohawk River Main Stem	Part 1	Floatables, Pathogens, Oxygen Demand
	Part 2b	PCBs
Mohawk R/Barge Canal	Part 2b	PCBs
Steele Creek	Part 1	Silt/Sediment, Phosphorus
<u>Cobleskill Creek</u>		
Cobleskill Creek	Part 1	Pathogens

Land Use

The relatively low land use scores are due to a combination of high agricultural land use and development. The percent agricultural land cover ranges from 20% to more than 40%, which is considered to be high. Livestock density is also on the high side. Coincident with the relatively high agricultural land use, forest cover is on the low side at 20–40%.

Residential and commercial development is also high in these subwatersheds. Ninemile Creek has the highest population density with the cities of Utica and Rome, and has three of the fastest growing communities in the region, New Hartford, Whitestown, and Marcy. Oriskany Creek has areas of relatively high population density with Clinton and Westmorland, also one of the fastest growing communities. Nowadaga Creek, Canajoharie Creek, and Cayadutta Creek have high population densities in the communities along the Mohawk River with Frankfort, Ilion, Mohawk, Herkimer, Little Falls, Fort Plain, Canajoharie, and Fonda. Cayadutta Creek also has the developed areas of Gloversville and Johnstown.

Habitat

Percent aquatic life impaired ranges from 20–80%, which, along with percent intolerant fish at a median level of 5–20%, results in relatively low habitat scores. Endangered species have been observed in these subwatersheds.

Sources of Pollution

Both point and nonpoint sources of pollution affect the six low-scoring subwatersheds. A total of 33 municipal wastewater treatment plants (WWTPs) are located within the six subwatersheds, representing 40% of the total number of WWTP within the entire Mohawk River watershed. Ninemile Creek alone receives treated effluent from 14 WWTPs. Treated effluent from these facilities are discharged directly into the Mohawk River or its tributaries, and are regulated under the NYSDEC SPDES permit system. However, most of the WWTP are not designed to substantially reduce the concentrations of the nutrients phosphorus and nitrogen; these nutrients may contribute to eutrophication of waterbodies and cause algal blooms.

Other point sources of pollution include two USEPA Superfund sites, one in Rome at the former Griffiss AFB and one at the Johnstown landfill. There are also 16 brownfield sites (14 in Ninemile Creek), which are primarily old manufacturing sites in the cities of Utica and Rome where contaminants (chemicals, petroleum products) have leaked into the soil.

Nonpoint source pollution, which is due to runoff from the land, comes mainly from agricultural and urban areas. Agricultural runoff includes sediment, nutrients (nitrogen and phosphorus), pesticides, and herbicides. Urban runoff similarly includes nutrients, pesticides, and herbicides from lawn treatments, but also contaminants from roadways, automotive fluids and salt and particulates from winter deicing. In addition to contaminants, urban areas contribute high volumes of stormwater runoff from the impervious surfaces such as pavement and rooftops.

3.4.2 Mid-Scoring Subwatersheds (Total Scores: 73–83.5)

Six subwatersheds score in the mid-range, as listed below. Two of the subwatersheds, Alplaus Kill and Fly Creek, are located in Mohawk River lowlands, while the remaining four are located in the mid-uplands, two in the Upper Mohawk and two in the Schoharie Watershed.

Upper Mohawk:	Lower West Canada Creek (74.5)
	Delta Reservoir (82)
Main River:	Alplaus Kill (73.5)
	Fly Creek (78)
Schoharie Watershed:	Batavia Kill (81)
	Fox Creek (82)

Water Quality

The water quality exhibited by streams draining these subwatersheds varies significantly. The Alplaus Kill has low water quality with percent impairment of waterbodies in the range of 40–60%. The waterbody use most affected by the poor water quality is aquatic life. Of note for the Alplaus Kill is that 40–60% of the area has ground water resources, notably the Great Flatts aquifer. Protecting the recharge areas for the principal aquifers is important for preventing groundwater contamination.

An upland subwatershed, Batavia Kill, also has a percent impairment of 40–60%, but the use most affected is habitat and hydrology, which is considered stressed. During flooding conditions, water flowing over land areas with highly erodible soils can transport large amounts of sediment. The remaining subwatersheds have good water quality, with Delta Reservoir, Fly Creek, and Fox Creek exhibiting under 20% impairment. The metric for Lower West Canada Creek was calculated to be 20–40%.

Waterbodies on the 2012 NYS Compendium of Impaired Waters {303(d) List}

<u>Alplaus Kill</u>		
Collins Lake	Part 1	Phosphorus
Mariaville Lake	Part 1	Phosphorus
<u>Batavia Kill</u>		
Schoharie Reservoir	Part 1	Silt/Sediment

Land Use

Land uses also vary considerably within the six mid-scoring subwatersheds. Lower West Canada Creek and Fly Creek have relatively high percentage of lands in agricultural use (30–40%); Delta Reservoir and Batavia Kill have 10–20% agricultural land use; agriculture encompasses 20–30% of the land use within the Alplaus Kill and Fox Creek subwatersheds. Forest cover ranges from 20–40% in the lowland subwatersheds to 60–80% in the upland subwatersheds.

Residential and commercial development is concentrated in the Alplaus Kill subwatershed with the municipalities of Halfmoon, Amsterdam, Schenectady, Clifton Park, Colonie, Cohoes, and Niskayuna. The population density in the Schoharie region is relatively low, with the exception of Windham in the Batavia Kill subwatershed, which is experiencing growth pressure.

Habitat

The habitat scores are, in general, relatively high for the six mid-scoring subwatersheds. The exception is the Alplaus Kill, where the percent aquatic life impaired is relatively high at 60–80%, which is consistent with the high percent impairment for waterbodies. Throughout these subwatersheds, the percent of intolerant fish ranges from 5–20%, and endangered species have been observed.

Sources of Pollution

There are 36 municipal WWTP in these six subwatersheds (44% of the total in the watershed), with 26 discharging to stream segments within in the Alplaus Kill subwatershed, and 6 discharging treated effluent to streams within the Batavia Kill subwatershed. There are nine brownfield sites, all in the Alplaus Kill, and there are no USEPA Superfund sites.

Nonpoint source pollution varies with land use. The potential for agricultural runoff is highest in Lower West Canada Creek and Fly Creek and lowest in Batavia Kill and Delta Reservoir. Urban runoff is of most concern in the Alplaus Kill subwatershed, given the population density and high percentage of impervious surfaces.

3.4.3 High-Scoring Subwatersheds (Total Scores: 84–94)

Six subwatersheds scored high, and are located within the northern and southern uplands of the Mohawk River watershed. Major portions of the Middle and Upper West Canada Creek and East Canada Creek subwatersheds are within in the Adirondack Park, while West Kill, East Kill, and Panther Creek are located in the Catskill Park.

Upper Mohawk:	Middle West Canada Creek (87.5) Upper West Canada Creek (90)
Main River:	East Canada Creek (94)
Schoharie Watershed:	West Kill (85.5) East Kill (87) Panther Creek (88.5)

Water Quality

Five of the six subwatersheds exhibit high water quality scores. The high scores reflect the extent of intact wetland/forest cover and riparian buffers; these metrics vary between 60% and 80%. The metric indicating percent of impaired stream miles was mostly centered in the <20–40% range; three of the six subwatersheds scored under 20%, while two scored in the 40–60% range. Upper West Canada Creek in the Adirondacks has been impacted by

acid rain causing aquatic life to be impaired, while East Kill in the Catskills has had habitat and hydrology affected by large amounts of sediment transported during recent extreme storm events.

Waterbodies on the 2012 NYS Compendium of Impaired Waters {303(d) List}

Upper West Canada Creek

West Canada Creek, Upper	Part 2a	Acid/Base (pH)

Land Use

Land use in these subwatersheds is conducive to good water quality. The percent agriculture is less than 10% for four of the six subwatersheds and in the range of 10–20% for the remaining two. Forest cover is high, mainly in the range of 60–80%. Population density is low; communities are villages and hamlets, not cities. The two largest municipalities are Middleburg in the Schoharie region and Dolgeville in the Upper Mohawk.

Habitat

Habitat scores are high for four of the six subwatersheds. Upper West Canada Creek had a medium score due to effect of acid rain and low pH on aquatic life. East Kill also had a medium score, which was due to assessed in-stream habitat being less than natural. However, this does not appear to be a major problem since percent aquatic life impaired is low at less than 20%. Endangered species have been observed throughout these subwatersheds, and the percent of intolerant fish ranges from 5–20%, with the exception of East Canada Creek and Panther Creek at greater than 20%.

Sources of Pollution

Consistent with the lack of developed areas, there are few point sources discharging to stream segments within the subwatersheds. There are 13 permitted discharges from municipal WWTPs (16% of the total in the watershed); eight of the plants discharge to stream segments within the East Kill subwatershed. There are no brownfield or USEPA Superfund sites.

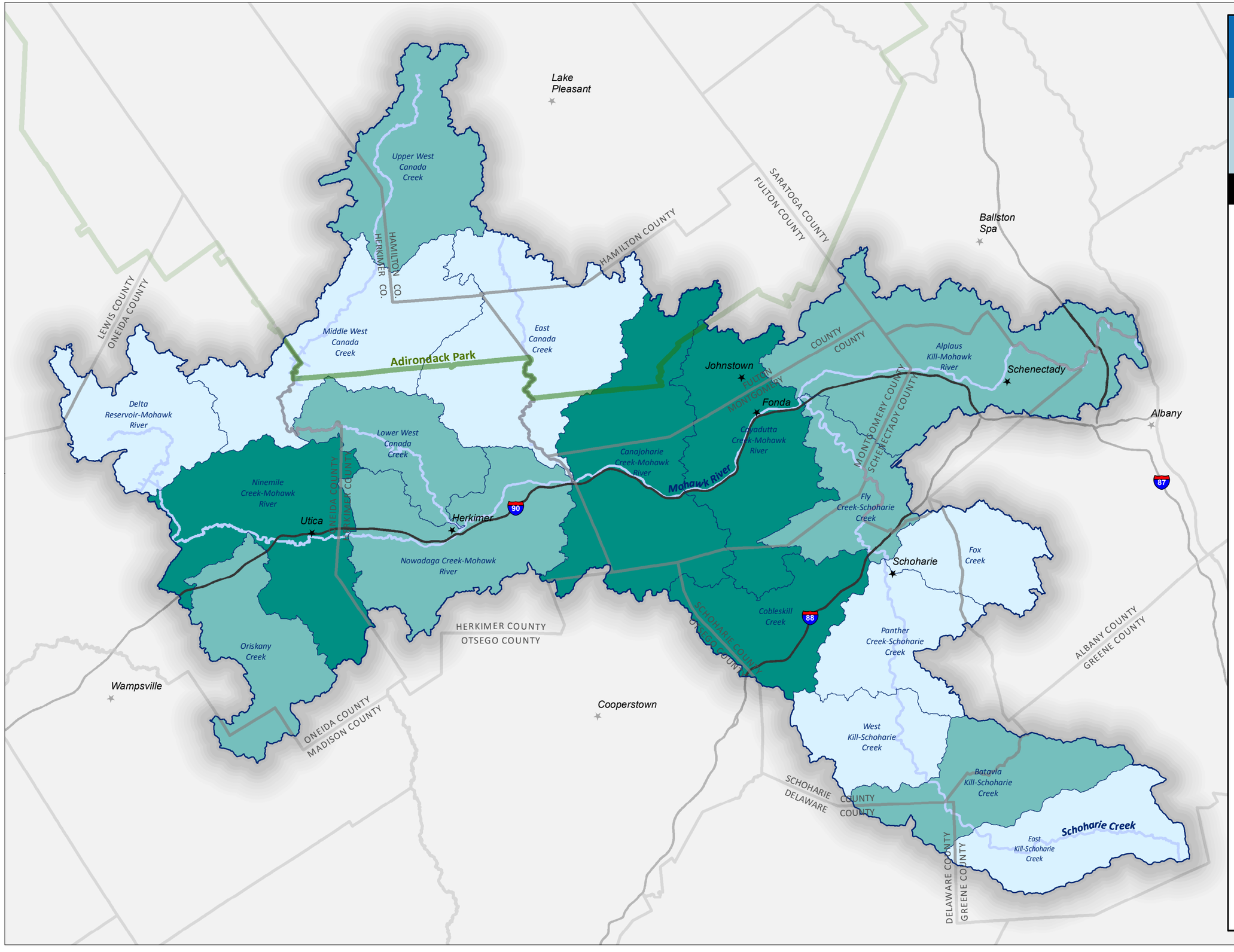
Nonpoint sources of pollution are also low, consistent with the minimal agricultural land use and lack of population centers with impervious surfaces. The preponderance of undisturbed land cover helps retain and infiltrate precipitation and snowmelt, greatly reducing runoff and the risk that nonpoint sources of pollution will reach the waterways.

WATERSHED ASSESSMENT: WATER QUALITY HUC 10

MAP 3-1

Mohawk River Watershed Management Plan

CHARACTERIZATION REPORT



Legend

Water Quality Score

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

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; 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.

Developed By:

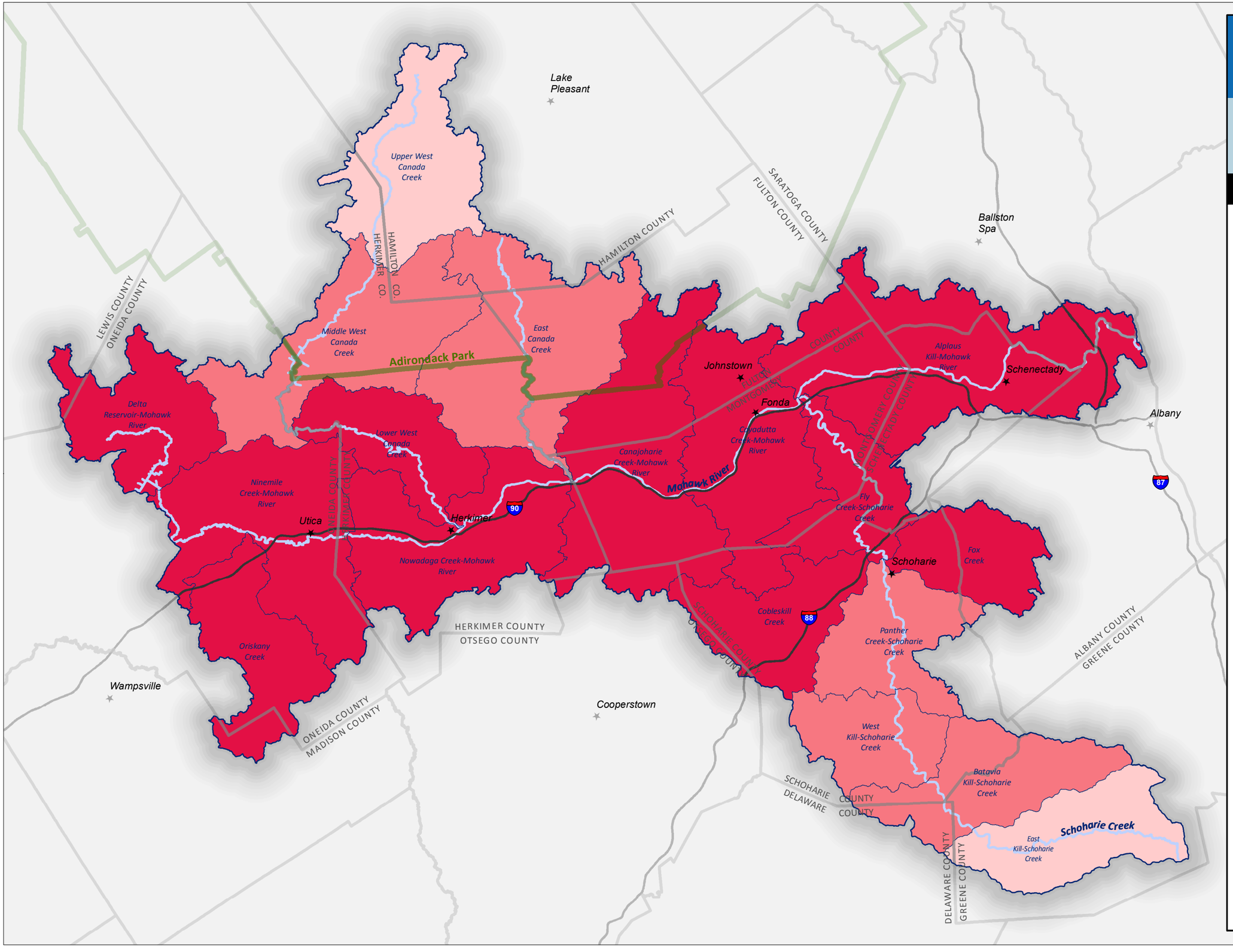
STONE ENVIRONMENTAL INC

WATERSHED ASSESSMENT: LAND USE HUC 10

MAP 3-2

Mohawk River Watershed Management Plan

CHARACTERIZATION REPORT



Legend

Land Use Score

- Low: 30 - 36
- Medium: 37 - 42
- High: 43 - 48

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; Watershed Assessment, Stone and Mohawk River Watershed Coalition of Conservation Districts.

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Developed By:

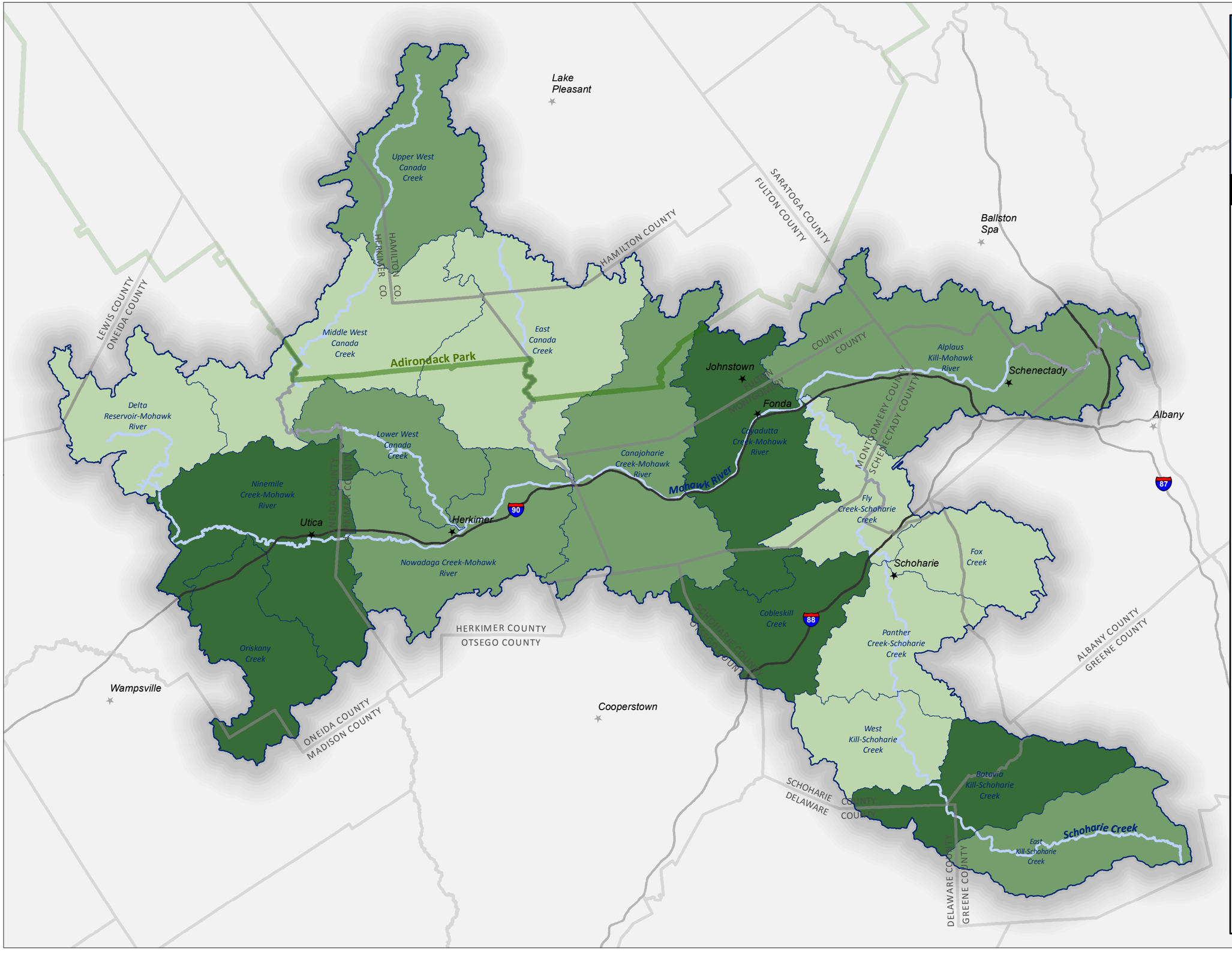
STONE ENVIRONMENTAL INC

WATERSHED ASSESSMENT: HABITAT HUC 10

MAP 3-3

Mohawk River Watershed Management Plan

CHARACTERIZATION REPORT



Legend

Habitat Score

- Low: 11 - 13
- Medium: 14 - 16
- High: 17 - 20

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; 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.

Developed By:

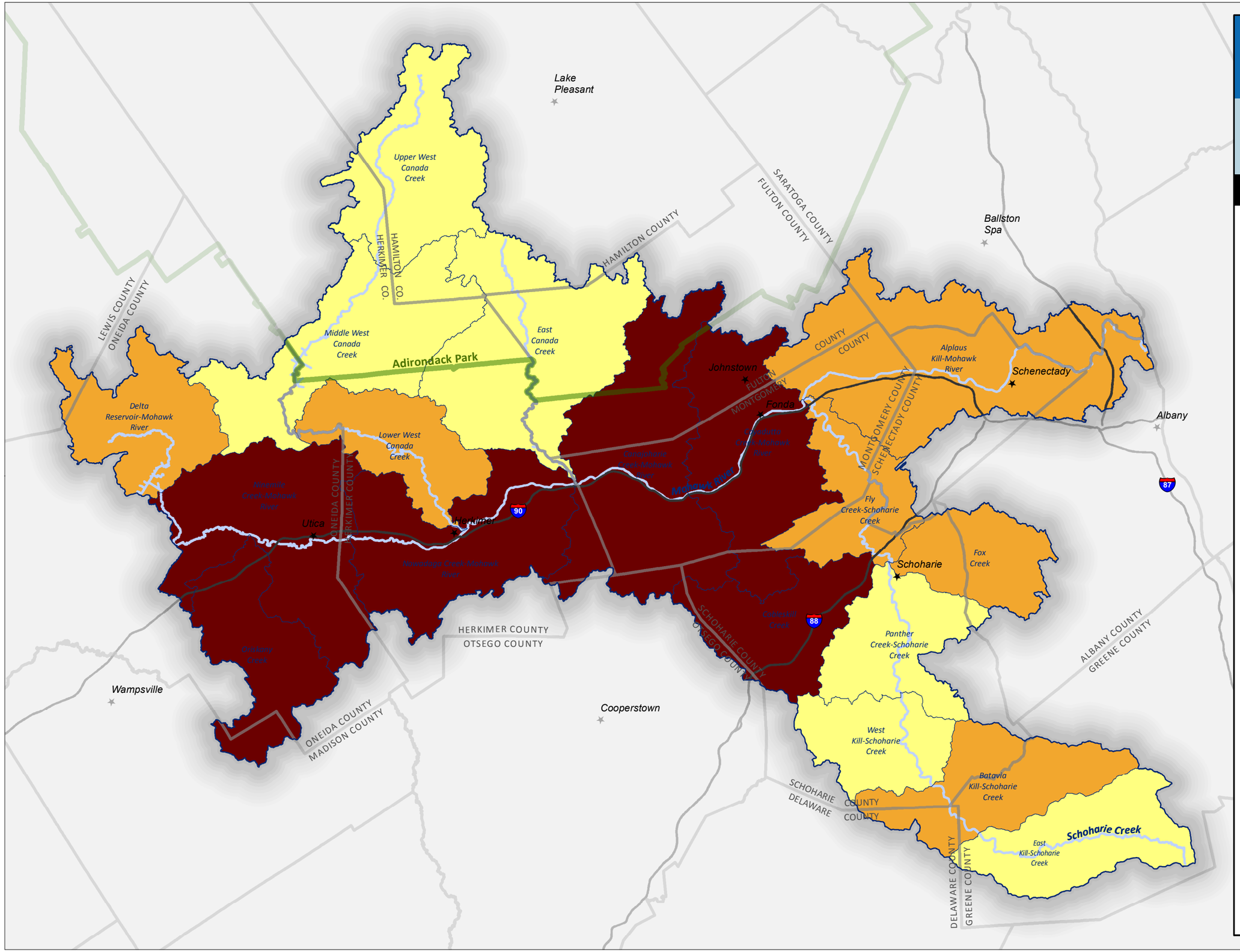
STONE ENVIRONMENTAL INC

WATERSHED ASSESSMENT: TOTAL SCORE HUC 10

MAP 3-4

Mohawk River Watershed Management Plan

CHARACTERIZATION REPORT



Legend

Total Score

- Low: 62 - 72.5
- Medium: 73 - 83.5
- High: 84 - 94

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; Watershed Assessment, Stone and Mohawk River Watershed Coalition of Conservation Districts.

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