

# Still River Watershed Draft Existing Conditions Report

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*Prepared for*  
Connecticut Department of Energy and Environmental Protection

*In support of the*  
Still River Watershed Action Plan for Nonpoint Source Pollution Reduction  
(CT DEEP Contract #14-03f)

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## 1. INTRODUCTION



**Figure 1. Housatonic & Still River Watershed**

The Still River watershed includes portions of the communities of Bethel, Brookfield, Danbury, Newtown, New Fairfield, New Milford, Redding, and Ridgefield, CT in Litchfield and Fairfield counties. The major tributaries of East Swamp Brook, Limekiln Brook, Miry Brook, Padanaram Brook, and Sympaug Brook are confluent with the Still River mainstem. The Still River joins the Housatonic in New Milford, and waters from this largely urbanized area empty into Long Island Sound.

While water quality along the Still River has improved considerably since the passage of the 1972 Clean Water Act, it continues to suffer from a litany of water quality issues common to urban streams. Polluted stormwater runoff and other non-point sources of pollution are the primary cause of high concentrations of pathogens, excessive nutrients, thermal pollution, and sedimentation from upland runoff, as well as stream channel instability caused by “flashy” flow regimes and floodplain encroachment.

In the most recent (2016) State of Connecticut Integrated Water Quality Report to Congress, a significant portion of stream reaches in the watershed were listed as Impaired. Five of six main-stem segments, totaling 22.31 miles in length or 96.6% of the main-stem, were listed as Impaired for aquatic life (the 6th segment was not assessed). Four of six main-stem segments were listed as Impaired for recreational use (the remaining two segments were not assessed). Reaches along Miry Brook, Sympaug Brook, Padanaram and Limekiln Brook were listed as Impaired for aquatic life. The primary sources of these impairments are thought to come from nonpoint source pollution.

The group Still River Partners (SRP) came together in 2014 to restore water quality and address other watershed-scale management issues. The founding members of this group consisted of watershed municipalities, federal, state, and regional agencies, and conservation non-profits. The goal of the SRP is to develop a watershed-based management plan so that the community can enjoy all of the amenities the river has to offer. The mechanism through which the SRP is working to achieve this goal involves providing a framework for stakeholders to collaborate to reduce pollution and address other community priorities, such as recreation and flood prevention.

This Still River Watershed Existing Conditions Report (ECR) synthesizes available research and planning relevant to the management of the watershed with the results of field assessment of streams in the watershed to identify opportunities for restoration of water quality. The ECR represents a key step in the development of the watershed management plan for the Still River. The overview of current conditions it provides will help in the development of a shared vision for the state of the watershed in the future, and a set of goals to achieve that vision.



Well over 250 individual references were gathered as a Watershed Inventory and reviewed during the development of this ECR. These sources contain a wealth of information relevant to the management of the Still River (Appendix A).

Items in the Watershed Inventory were organized by geographic scope (e.g. state, watershed, municipality), and classified into the following categories: Physical and Natural Features; Land Use, Recreation and Population Characteristics; Waterbody and Watershed Conditions; Pollutant Sources and Management; Waterbody Monitoring Data; and News Articles (see Appendix A). Each reference was then reviewed and relevant sections of text were extracted and tagged with one of four main themes: Water Quality, Recreation, Flooding and Species/Habitats. Part 1 of this document (Sections 2 through 8), Synthesis of Existing Research and Planning, is a summation of the information gleaned from the Watershed Inventory. Part 2 (Section 9) includes the results of field assessment along over 30 miles of stream corridor in the watershed.

## **2. PHYSICAL & NATURAL FEATURES**

### **2.1 Geography**

The 71.5 square-mile Still River Watershed is located in northern Fairfield County, Connecticut (Appendix B, Still River Watershed Map: Subwatershed Areas). The Still River mainstem begins in the City of Danbury and flows north through the towns of Brookfield and New Milford, where it is confluent with the Housatonic River. Its drainage area includes portions of Bethel, Newtown, Ridgefield, New Fairfield and Redding in Connecticut, as well as a small portion of the Town of Southeast, New York.

The Still River is Connecticut's tenth-longest watercourse and one of the Housatonic River's most important tributaries. It twists and meanders for 25.4 miles, shedding oxbows, rushing through four narrow gorges and finally snaking through a broad floodplain a half-mile wide in places in its northern reaches. From two small ponds near the Danbury/New York State border, its course runs eastward through an extensive wetland and pools at Lake Kenosia; after which, it is joined by Miry Brook near the Danbury Municipal Airport. It is then channelized through downtown Danbury before meeting up with Padanaram Brook. At Danbury Commerce Park, the river turns northeastward at the confluence of Sympaug Brook. Limekiln Brook is the last major tributary into the Still River before it flows north to join the Housatonic River in New Milford.

### **2.2 Geology & Soils**

Two prehistoric geological events are primarily responsible for creating the Still River and its valley. First, the valley played a one-time role as part of the shoreline of an early incarnation of the North American continent known as proto-North America. Layers of calcareous shells, sand and other sediments on that ocean edge gradually formed into soft sedimentary rock. This rock then metamorphosed with time, heat and pressure underground, into marble. The Inwood marble and limestone of the Still River comprises the southernmost reach of the "Marble Valley" formation that extends northward into western Massachusetts and Vermont. Through this soft bedrock the river eventually formed as drainage to the surrounding highlands.<sup>1</sup>

The second major formative force in the Still River's history was glaciation. Melting glaciers at the end of the last ice age, approximately 10-15,000 years ago, left behind in the low-lying limestone basin created a huge glacial lake, which at one point covered most of the watershed. Rather than bedrock walls, the Still

River's broad floodplain is mainly flanked by sand and gravel terraces. All are remnants of this massive body of water, labeled Lake Danbury by geologists.<sup>2</sup>

This geologic history gives rise to the soils throughout the Still River valley, which range from loam to fine sandy loam (Appendix B, Still River Watershed Soils). The highest percentage of soil types are Charlton (24% of Fairfield County) and Hollis (11%). Together, these two soil types form complexes found in 55% of the area. Charlton soils are well drained, formed in deep, friable loamy glacial till, and have a surface layer and subsoil of fine sandy loam. The substratum is gravelly sandy loam. Hollis soils are moderately to excessively drained and found shallow to less than 20 inches to bedrock, depending on the complex. Other soils in the area are Paxton, Woodbridge, Ridgebury, Agawam, Hinckley, Haven, Carlisle, Adrian, Saco, Udorthents, Stockbridge, Georgia, and Nellis, all of which make up less than 3% individually and the remaining 45% of the watershed's soil altogether. It is important to note that much of the area is urbanized, and consequently native soils have been disturbed and/or covered with fill (see Land Use section).<sup>3</sup>

## 2.3 Hydrology

The headwaters of the Still River begin near the NY/CT border at Sanfords Pond. From the headwaters, the river flows east towards Mill Plain Swamp and Lake Kenosia before draining through downtown Danbury. East of downtown, the river turns north and flows through Brookfield and New Milford to its confluence with the Housatonic River just above Lovers Leap. Known for its low dry season flow and named for its sluggish current in a low lying valley, the river has also been the source of numerous disastrous and sometimes fatal floods throughout recorded history (see Flooding section). The river and its watershed include extensive wetlands, three white-water gorges, a small lake, several ponds, and streams that feed the reservoir system for the City of Danbury. Its mild gradient of ten feet per mile reflects its flow through the mostly flat terrain of an ancient glacial lakebed. However, the river narrows at several points, notably in Danbury and in Brookfield, where it falls 32 feet through a half-mile gorge called Halfway Falls. Two lesser gorges are located in Danbury, and a picturesque falls crashes through Harrybrooke Park near its mouth at Lanesville in New Milford.

Several human impacts have altered the hydrology of the Still River over time. Early industry constructed dams and mills attempting to harness and control the Still for commercial reasons. The Danbury Fair, resurrected after World War II by local entrepreneur John Leahy, constructed ponds in 1950 to complement a faux-New England Village feature, using water pumped from Mill Plain Swamp.<sup>4</sup> Shortly after the massive floods in 1955, the milldam at Halfway Falls in Brookfield was removed, releasing a former millpond that had backed up the river for miles. In 1969, the crumbling dam that had created Oil Mill Pond since the colonial era was dynamited by the City of Danbury. The only dams remaining today, out of what once were dozens along the stream, are the 150-year-old White's Dam behind Beaver Street in Danbury and Tuck's Dam in the Ironworks Gorge in Brookfield, a structure dating from 1930. While most dams have been destroyed, one notable structure built relatively recently is the Still River Channel through downtown Danbury, constructed after the 1955 flood. Following the dam removal at old Oil Mill Pond, the exploding residential and commercial construction of the time also stimulated large-scale sand and gravel mining in the terraces above the valley floodplain. Some of these resulted in permanent changes to the terrain, especially in Brookfield where a large groundwater-filled pond emerged over time after extensive gravel mining near Limekiln Brook.

## 2.4 Climate

The climate of Fairfield County (which includes the Still River) is typical of New England. It is influenced by cold, dry air masses from the subpolar region in the northwest and warmer, moisture-bearing tropical air from the south. The average annual precipitation and snowfall are 48 inches and 41 inches, respectively.<sup>5</sup> Fifty one percent of precipitation falls between April and September.<sup>6</sup> Temperatures range from summer highs above 90°F to below 0°F in the winter; the average annual temperature is 51.7°F.<sup>7</sup> The average winter temperature is 29°F in the winter and 70°F in the summer. The ground is frozen from approximately November 3<sup>rd</sup> to April 2<sup>nd</sup>. The average relative humidity is between 60% and 75%. The sun shines 60% of the time in summer and 50% in winter.<sup>8</sup>

### Climate Change

Climate change is affecting the Northeast U.S. in a variety of ways that impact water resources: sea levels are rising, snowpack is decreasing, and water temperatures are increasing. In the future, the climate is expected to get warmer and wetter with more frequent extreme storms. According to the Northeast Climate Impacts Assessments, the Northeast has been warming at a rate of 0.5° F since 1970 with winter temperatures rising by a faster rate of 1.3° F.<sup>9</sup> Western Connecticut temperature has increased an average of 2-2.5° F, twice as much as the rest of the contiguous lower 48 states. Additionally, climate change has led to increase precipitation both in frequency and amount.<sup>10</sup> This in turn leads to greater flooding of river systems such as the Still and threatens infrastructure built in the floodplain. As described in Section 5, the Still River has a history of flooding and climate change will worsen this natural characteristic of the river.

These changes affect the ability to reach water resource management goals such as improving water quality, managing floods, rehabilitating ecosystems and habitats, and creating and maintaining recreational access. Climate change introduces an added level of uncertainty to water resources. However, there are steps that can be taken to anticipate and plan for the potential changes in future climate. It is necessary to understand these changes and integrate climate change data into planning processes and decision-making now and in the future. What follows is a summary of the historical climate in the region of the Still River and projections for the future. The majority of the data is from the National Climate Change Viewer, modeling conducted by U.S. Geological Survey. The Viewer creates visualizations of the changes in temperature and water balance for USGS Hydrological Units through the end of the century. The projections here are for the Housatonic River Watershed, of which the

#### Historic Climatic Changes in the Northeast U.S.

**Rising temperatures:** Annual average temperature in the Northeast has increased by 1.43°F for the period 1986–2016 relative to 1901–1960. The average annual minimum temperature has risen by 1.70°F while the annual average maximum temperature has risen by 1.16°F. In general winters are becoming warmer with less snow and spring is coming earlier.

**Increased Precipitation:** The Northeast is getting wetter. Seasonally, the fall exhibits the largest precipitation increase, exceeding 15% over much of the region. Much of the increase is seen in heavy precipitation events.

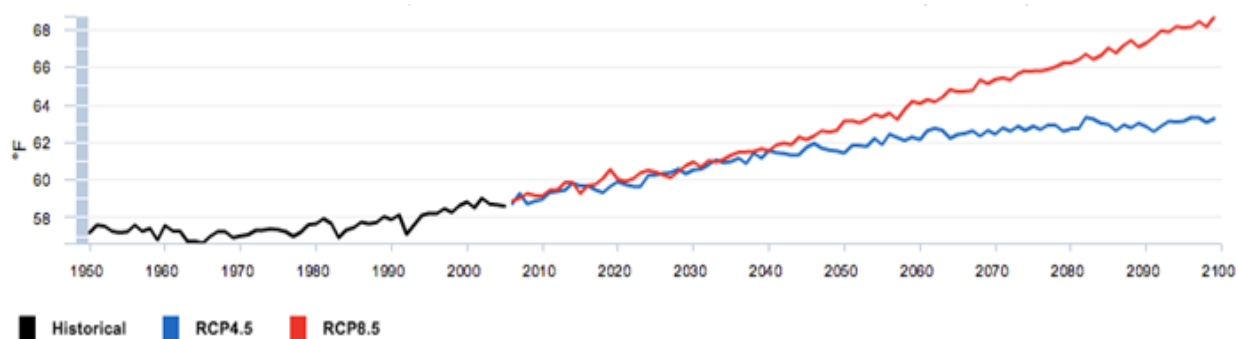
**More extreme precipitation events:** Between 1958 and 2012, the Northeast saw more than a 70% increase in the amount of rainfall measured during heavy precipitation events.

<https://science2017.globalchange.gov>  
<https://19january2017snapshot.epa.gov/climate-impacts>

Still River is a tributary. They model two emission scenarios- RCP4.5 in which greenhouse gas emissions (GHGs) are stabilized so they do not exceed about 650 ppm CO<sub>2</sub> and RCP8.5 in which GHGs rise unchecked through the end of the century leading to about 1370 ppm CO<sub>2</sub>.

#### *Maximum Temperature*

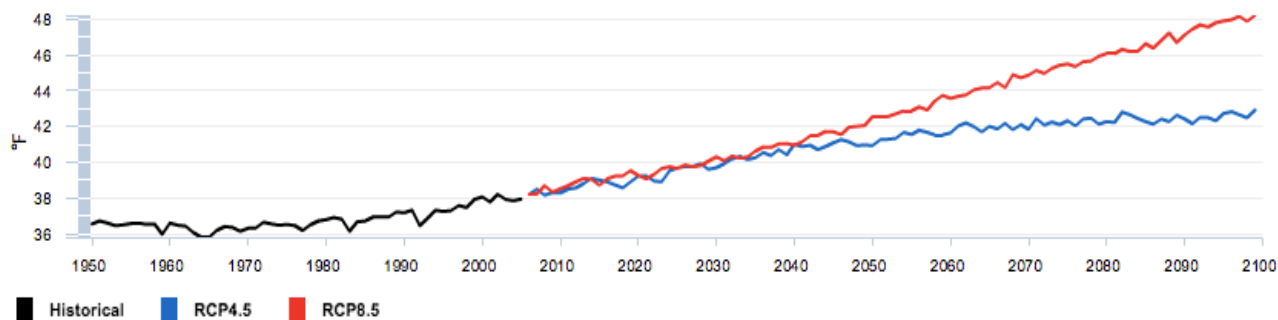
Highs (annual mean max temperature) have risen in the Housatonic Watershed since 1950 (black) and will continue to increase under both high (red) and low (blue) emission scenarios through the end of the century. Relative to the period 1981-2010, which saw an annual average high temperature of 58.1°F, in the period from 2025-2049 the watershed is projected to see warming of 2.9°F (low emissions)- 3.2°F (high emissions); by 2099 the warming increases to 5.2°F- 10.6°F. Although the warming is seen over all seasons, it is projected to be greater in summer months.<sup>11</sup>



**Figure 2: Historical (1950-2005) and Projected (2006-2100) Max Temperature Change in Degrees F**

#### *Minimum Temperature*

Lows (annual mean min temperature) are also projected to warm by similar margins as high temperatures, 2.9°F (low emissions) - 3.4°F (high emissions) for the period of 2025-2049. Whereas highs will see greater warming in the summer, lows will see greater increases in winter months. By the end of the century (2075-2099), January is projected to see a 5.9°F- 11.2°F temperature increase whereas July will see 4.7°F- 9.4°F. Winter warming affects the number of extreme cold days and makes the coldest days warmer. The coldest winters of the future will be closer to the warmest winters of recent years.<sup>12</sup>

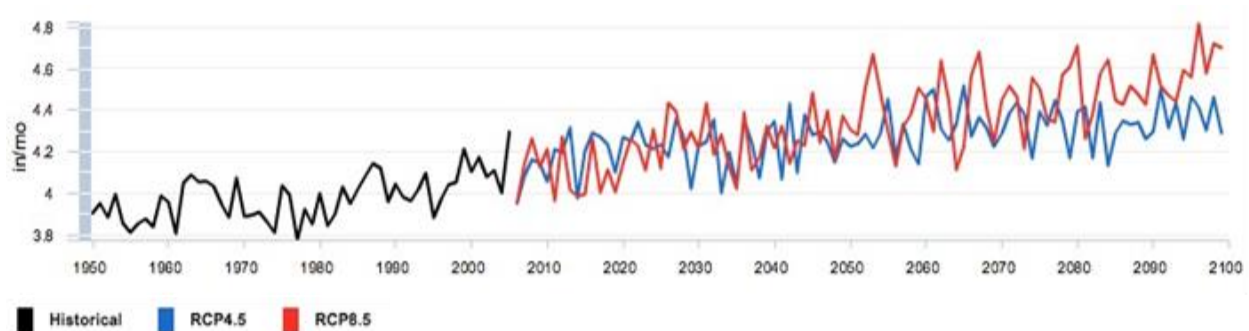


**Figure 3: Historical (1950-2005) and Projected (2006-2100) Min Temperature Change in Degrees F**

#### *Precipitation*

Precipitation will increase moderately throughout the year, especially in winter and spring. Annual mean precipitation is projected to increase 5% from 4.0 in/mo in 1981-2010 to 4.2 in/mo in 2025-2049 under low emissions. By the end of the century (2075-2099) this average is projected to be 4.3 in/mo (low emissions)- 4.5 in/mo (high emissions). Combined with warming winter temperatures, much of this

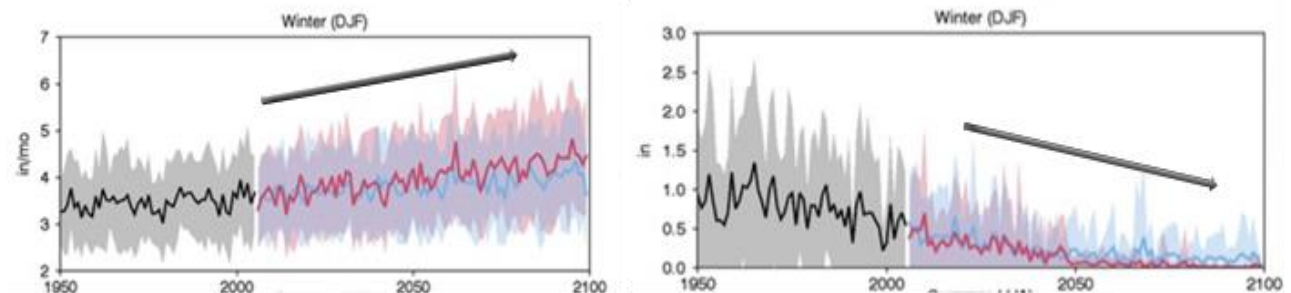
increased precipitation will be seen as rainfall in the winter, increasing the runoff in the winter and spring and decreasing it in the fall.<sup>13</sup>



**Figure 4: Historical (1950-2005) and Projected (2006-2100) Mean Precipitation in Inches/Month**

### *Snow Water Equivalent*

The snow water equivalent is the liquid water in inches that is stored in snowpack. Under both high and low emissions, the snowpack is decreasing in the Housatonic River Watershed throughout the 21<sup>st</sup> century. As seen in Figure 5, winter precipitation has increased and will continue to increase while the winter snowpack decreases. In general, increasing temperatures result in more precipitation falling as rain than snow. Snowpack is a strong control of seasonal runoff and less storage as snowpack combined with increases in precipitation as rain will result in more runoff instead of storage and earlier snowmelt, which affect the timing and magnitude of the hydrograph.<sup>14</sup>



**Figure 5: Increasing winter (DJF) precipitation (left) and decreasing winter snow water equivalent (right) historically (1950-2005) and projected (2006-2100)**

### *Runoff*

Runoff is defined as the sum of direct runoff that occurs from precipitation and snowmelt, and surplus runoff, which occurs when soil moisture is at 100% capacity. Annually, there is no significant change projected for runoff. However, runoff will shift seasonally. Winter runoff is projected to increase while spring and fall runoff will decrease. January runoff is projected to increase by 0.3 in/mo (both high and low emissions) for the time period of 2025-2049 over the historical 1981-2010 average of 3.3 in/mo. By the end of the century, it is projected to be 0.4- 0.7 in/mo higher than the historical period. Conversely, April and November, spring and fall months, are projected to decrease runoff, with November potentially seeing a close to 25% drop in runoff by the end of the century under high emission conditions. This corresponds with the seasonal change in runoff predicted from warming winters with earlier snowmelt and increased precipitation coming down as rain rather than snow.<sup>15</sup>



### 3. WATER QUALITY

The Clean Water Act (CWA) is a federal law, established in 1972, that regulates the discharge of pollutants into surface waters and the water quality of surface waters in the United States. The CWA made point source pollution discharge into navigable waters without a permit illegal through the National Pollutant Discharge Elimination System, or NPDES. It also required states and tribes to adopt and revise water quality standards. Most of the major watercourses in the Still River Watershed are classified as Impaired for aquatic life and/or recreation by state water quality standards (Appendix B, Still River Watershed Stream Impacts). Connecticut's Water Quality Standards (WQS) represent the foundation of waterbody management across the state, including pollution discharge permits and the development of Total Maximum Daily Loads (definition below). State WQS required by federal law, under section 303(d) of the Clean Water Act, indicate designated uses (e.g. drinking, swimming, fishing) and water quality classifications for surface water, groundwater, and coastal/marine surface waters (e.g. AA, A, B, C). A review of the WQS is conducted every three years by governing state agencies.<sup>16</sup> This document focuses on information pertaining to or stemming from WQS for inland surface waters in the Still River watershed. After the passage of the CWA, water quality in the river improved immensely. However, the most significant remaining threat is nonpoint source pollution, defined as pollution caused by rainfall and snowmelt moving over and through the ground.

#### CWA Glossary-at-a-Glance

*The watershed management process relies on information provided in specific sections of the CWA. Below is a brief outline and description of key sections that have subsequently become common terms in watershed management:*

- *Section 303(d): This section addresses impaired waters and total maximum daily loads. This section is often synonymous with a state's list of impaired waters.*
- *Section 305(b): This section requires states to monitor, assess and report on water quality in relation to the designated uses for each waterbody laid out in the state WQSs. The State of Connecticut reports to the EPA every two years.*
- *Section 319: This section provides grand funding to the state through Section 319 Nonpoint Source Management Program. Funding is used for a range of activities, including watershed planning, demonstration projects and monitoring.*

Every two years, the state of Connecticut is required to report on water quality with respect to designated uses for each waterbody. Below is a list of waterbodies in the Still River Watershed extracted from the most recent (2016) Integrated Water Quality Report. The majority of streams and rivers in the watershed remain impaired for aquatic life and/or recreation. These reaches include: the Still River mainstem, Miry Brook, Kohanza Brook, Padanaram Brook, Sympaug Brook, East Swamp Brook and Limekiln Brook. Other notable waterways, particularly Dibble's Brook in Bethel and West Brook in Brookfield/Danbury, fully support aquatic life but are unassessed for recreation.

A study of water quality impacts of stormwater runoff conducted for the City of Danbury in 1995 by Fuss & O'Neil, an environmental consulting firm, found that the biggest impact stemmed from a lack of stormwater "treatment" or attenuation. Based on their monitoring results, suspended solids, metals, bacteria, nitrogen and phosphorous were identified as the principal pollutants of concern. Notably, state highways I-84 and Route 7

and industrial land use contributed a large portion of metals to the watershed. Of the studied area throughout Danbury, those that were heavily urbanized and industrialized contributed the most to pollutants. Fuss & O'Neil recommended stormwater controls around the subwatersheds of Lower Limekiln Brook, Mainstem Section 3, and Miry Brook would have the greatest impact in reducing pollutant loads throughout the watershed.<sup>17</sup>

All eight municipalities in the basin are separate storm sewer system (MS4) communities, meaning they contain designated urban areas and discharge stormwater via a separate storm sewer system to surface waters of the state; as such, each municipality is required to maintain a Stormwater Management Plan according to Clean Water Act requirements. Water quality samples are collected at six different sites every two years by each town at approved locations. The compilation of results are then reported to CT DEEP in compliance with their MS4 permit. Table 1 shows the average of the most recent year (2013). It's important to note that these averages include results of water quality testing from areas outside of the Still basin. For example, large portions of New Fairfield, Newtown, Redding and Ridgefield and some of New Milford are outside of the Still River basin, but the results below include those outside areas in the average. Full copies of these MS4 Factsheets can be found on the CT DEEP website. For towns that exceed the recommended standard, follow up investigation is required.

**Table 1: Water Quality Data from 2013 by Watershed Town**

<b>Town</b>	<b>E. coli (CFU/100 mL)</b>	<b>Enterococci (CFU/100 mL)</b>	<b>Suspended Solids (TSS)</b>	<b>Nitrogen (mg/L)</b>	<b>Phosphorous (mg/L)</b>	<b>Turbidity (NTU)</b>
<b>Bethel</b>	533360	No data	84.683	2.7583	0.50333	167
<b>Danbury</b>	286.5	No Data	2.9667	13.533	0.2075	4.5333
<b>New Fairfield</b>	141713	No Data	24.667	3.2033	0.46667	24.458
<b>New Milford</b>	499.17	No Data	41.833	0.3475	0.094167	48.133
<b>Newtown</b>	178	No Data	7.5	42.237	0.17167	2.2
<b>Redding</b>	761.75	No Data	107.4	3.0275	0.56	33.55
<b>Ridgefield</b>	400928	No Data	20.833	3.4017	0.91667	17
<b>Brookfield</b>	1090.8	No Data	106.17	0.53333	0.0525	80.65

The recommended standard for an E. coli sample should be less than 235 CFU/100mL for designated swimming areas and less than 410 CFU/100mL in all other areas. There is no water quality target for suspended solids, however most towns report around 48 TSS. The target under the current MS4 permit is 2.5 mg/L total nitrogen and 0.3mg/L total phosphorous. In the draft MS4 permit turbidity targets were set at 5 NTU's, however there is no state standard.<sup>18</sup>



### 3.1 Pollutants & TMDLs

A Total Maximum Daily Load (TMDL) is a “management tool used to restore impaired waters by establishing the maximum amount of pollutant”, or “pollution diet”, that a waterbody can receive without adverse impacts to fish, wildlife, recreation, or other public uses. A TMDL takes into account pollution loads, background levels, and incorporates a margin of safety to account for uncertainties in establishing the relationship between pollutant loadings and water quality. In some TMDLs such as indicator bacteria, shown in Table 2, pollution loads are expressed as percent reduction necessary to meet water quality standards and designated recreational uses.

TMDLs provide a scientific basis for local stakeholders to develop and implement watershed-based management plans, which describe the control measures necessary to achieve acceptable water quality conditions.<sup>19</sup> In other words, watershed planning is a roadmap to implement the TMDL. Below is an overview of the TMDLs in the Still River watershed. What follows in this section is a breakdown of the main pollutants impacting water quality in the watershed.

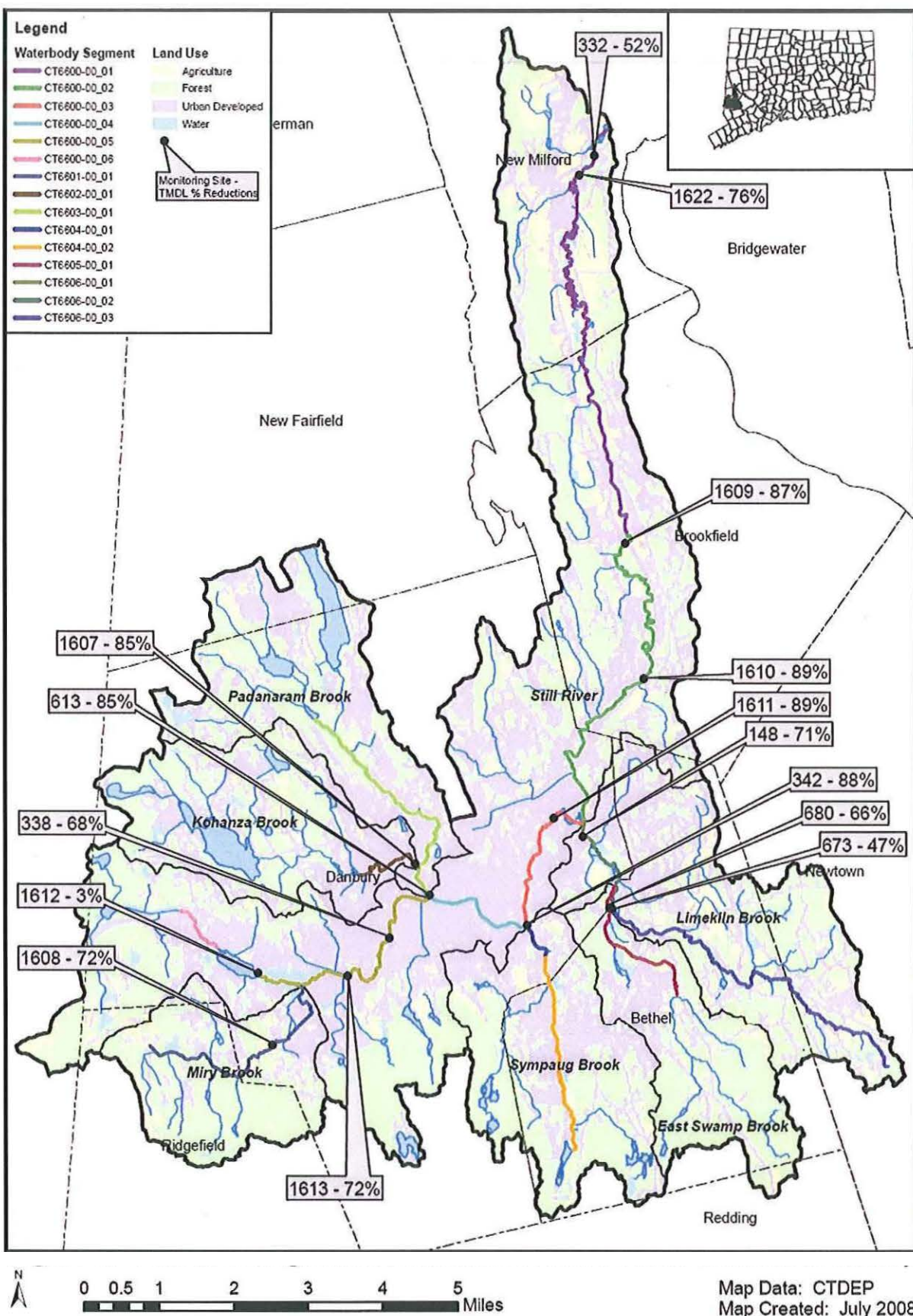
#### 3.1.1 Indicator Bacteria

EPA research estimates that *E. coli* bacterium causes an average of 8 illnesses per 1,000 swimmers exposed, an indicator of sanitary quality. *E. coli* is not pathogenic, but rather is a sign that water has been contaminated by fecal material and may introduce pathogenic organisms that cause gastrointestinal illness. The Connecticut Water Quality Standards (WQS) established criteria for bacterial indicators that are based on protecting recreational uses such as swimming (both designated and non-designated swimming areas), kayaking, wading, water skiing, fishing, boating, aesthetic enjoyment, etc.<sup>20</sup> The Still River watershed is managed by an indicator bacteria TMDL of *E. coli*. This TMDL is expressed as percent reduction in *E. coli* to meet WQS. To see a list of percent reduction necessary to meet the TMDL by waterbody see Table 2 and Figure 6: Still River Basin Land Use and *E. coli* TMDL Percent Reductions. To support recreational uses, the average amount of *E. coli* must be less than 126 col/100mL. At a designated swimming area a single sample must be less than 235 CFU/100mL, and at other areas must be less than 410 CFU/100mL.<sup>21</sup> It should be noted that bacteria densities are highest in the summer (which coincides with the designated recreational period, May 1-September 30). This may occur because summer temperatures more closely approximate the body temperature of the warm-blooded animals from which bacteria originate. Like people, wildlife are more active in the summer; in turn, the bacteria that they carry are shared in water systems.

The waterbodies included in the TMDL are the Still River, Miry Brook, Kohanza Brook, Padanaram Brook, Sympaug Brook, East Swamp Brook, and Limekiln Brook. All of these watercourses are impaired according to the CT DEEP’s 2016 Integrated Water Quality Report because they exceed the state’s standards for indicator bacteria. Waterbodies covered by the TMDL are classified as a Class 4 because they are impaired, but planning and implementation of pollution control and management measures have been initiated.<sup>22</sup>

Approximately 18 industrial and commercial stormwater dischargers operate in the watershed under MS4 general permits as of the 2010 TMDL outlined above. These facilities provide bacteria monitoring data for stormwater runoff in addition to samples collected by the town. It is expected that implementation of the TMDL analysis will be accomplished through implementing the MS4 permit and also through measures that address nonpoint source pollution.<sup>23</sup>

**Figure 6 - Still River Basin Land Use and E. coli TMDL Percent Reductions**



The 1995 study by Fuss & O’Neil found that areas upstream of downtown Danbury met Class B water quality standards for total coliform, fecal coliform and fecal streptococcus, whereas in the downstream area, bacteria concentrations generally far exceeded Class B standards. Class B standards are defined as less than 200 organisms per 100 milliliters. In their sample stations, Fuss & O’Neil found that bacteria concentrations significantly increased during storm events, increasing fecal coliform colonies from an average of 2417 cols/100mL during dry weather to an average of 6545 cols/100mL. Similar to E. coli, fecal coliform is often sourced from the excrement of warm-blooded animals, such as pets.<sup>24</sup>

**Table 2: Summary of E. coli TMDL Percent Reductions**

Waterbody Name	Waterbody Segment Description	Waterbody Segment	Monitoring Site	Average Percent Reduction to Meet Water Quality Standards			
				TMDL	WLA	LA	MOS
Still River (Brookfield / Danbury / New Milford)	From mouth at confluence with Housatonic River, New Milford, upstream to Lake Kenosia, Danbury	CT6600-00 01	332	52	62	49	Implicit
			1622	76	80	75	Implicit
		CT6600-00 02	1609	87	89	86	Implicit
			1610	89	92	88	Implicit
		CT6600-00 03	1611	89	93	88	Implicit
		CT6600-00 04*	338	68	77	66	Implicit
		CT6600-00 05	338	68	77	66	Implicit
			1613	72	72	72	Implicit
			1612	3	0	3	Implicit
Miry Brook (Danbury)	From confluence with Still River, Danbury, upstream to headwaters at North Ridgefield Pond outlet, Ridgefield.	CT6601-00 01	1608	72	77	71	Implicit
Kohanza Brook (Danbury)	From confluence with Padanaram Brook upstream to Ridgewood Country Club Pond outlet, Danbury.	CT6602-00_01	1607	85	84	85	Implicit
Padanaram Brook (Danbury)	From confluence with Still River upstream to headwaters at Padanaram Reservoir outlet, Danbury.	CT6603-00 01	613	85	89	84	Implicit
Sympaug Brook (Danbury)	From confluence with Still River upstream to Greatpasture Rd crossing, Danbury.	CT6604 -00_01	342	88	91	88	Implicit
East Swamp Brook (Bethel)	From confluence with Limekiln Brook upstream to confluence with Wolf Pit Brook, Bethel.	CT6605-00 01	680	66	79	61	Implicit
Limekiln Brook (Danbury / Newtown)	From confluence with Still River upstream to confluence with Danbury WPCF outfall, Danbury.	CT6606- 00 01	148	71	73	71	Implicit
		CT6606-00 03	673	48	60	43	Implicit

\*Data was unavailable for segment CT 6600-00\_04. Site 338 was determined to be representative of segment CT6600-00\_04 and used to provide a TMDL analysis. This table published by CT DEP July 8, 2010

### *3.1.2 Suspended Solids & Turbidity*

Both suspended solids and turbidity measure physical material in water. Suspended solids in stormwater runoff is caused by soil erosion and other solids such as pet droppings, vegetative matter (leaves and grass clippings), litter, street sand, solids from atmospheric deposition, and other debris that is washed away during stormwater events. High amounts of suspended solids and turbidity can block or absorb sunlight, reduce photosynthesis, make food harder for fish to find, clog fish gills, smother fish eggs, suffocate the organisms that fish eat, and may indicate other pollution in the water.

Turbidity measures the clarity of the stormwater sample; that is, how much material (soil, algae, pollution, microbes etc.) is suspended in the sample. Turbidity is reported in Nephelometric Turbidity Units (NTU), which is related to how easily light passes through the water sample. Total Suspended Solids (TSS) is a measurement of the amount of solids (including sand and silt) found in the stormwater sample, usually from agricultural, urban and industrial runoff. Both TSS and turbidity can be caused by erosion; however, turbidity can also come from failing septic systems, decaying plants or animals, and excessive algal growth. According to the MS4 permit, towns with higher than 5 NTU require further investigation. Similarly, while there is no standard for TSS, an average amount for a town is 48 TSS. Lower measurements indicate healthier water in both TSS and turbidity.<sup>25</sup>

Each town in the watershed measures both TSS and turbidity as part of their MS4 permit. Most towns in the Still River watershed are below the average of 48 TSS (with the exception of Bethel, Redding, and Brookfield). Similar to turbidity most towns are above the standard requirement of 5 NTUs (with the exception of Danbury and Newtown). Further investigation into turbidity is necessary and towns may be advised to put in more effective stormwater controls in place.<sup>26</sup>

According to the 1995 Fuss & O'Neil report for the City of Danbury, 20% of the total suspended solids come from low to medium density areas, likely from vegetative litter such as leaves and grass clippings. A more concentrated amount of total solids load came from heavily industrial areas (perhaps from materials storage) and highways I-84 and Route 7, where the source is likely deicing methods. TSS loading rates were highest through downtown Danbury Still River Mainstem Section 4 and out through the industrialized eastern side of Danbury Mainstem Section 3 and Lower Limekiln Brook.<sup>27</sup>

### *3.1.3 Metals*

Runoff and atmospheric deposition are the two most common sources of total metals in the Still River. While not widely recorded throughout the watershed, one stormwater study in Danbury showed concentrations of silver, cadmium, chromium, copper, nickel, lead, and zinc. Concentrations were higher in the industrial areas found in subwatersheds Lower Limekiln Brook, Mainstem Section 3, and downtown Danbury (Mainstem Section 4) and near highways I-84 and Route 7. Industrial areas collectively contributed 35% of total lead, copper, and zinc while only comprising 11% of the watershed in Danbury, while highway runoff contributed 20% of metals in Danbury. The most likely runoff sources come from the dissolution of exposed metals during rain including galvanized pipes, tires, wood preservatives, paints, roof gutters, and roofing materials, among others.<sup>28</sup>

### *3.1.4 Nutrients*

Nitrogen and phosphorous are the two main nutrients of concern throughout the Still River watershed. Excess nitrogen in the Still River contributes to eutrophication and excess nitrogen downstream in Long Island Sound. Nitrogen is a limiting nutrient in salt water systems, and excessive nitrogen loadings can



contribute to eutrophication and therefore oxygen depletion in salt waters. Similarly, phosphorous is a limiting growth nutrient in fresh water systems. Excess phosphorous in the Still River results in eutrophication in fresh water impoundments downstream such as Lake Lillinonah and Lake Zoar. Most of the nitrogen and phosphorous in non-point source pollution throughout the northeast is from atmospheric deposition or fertilizers used in landscaping. In plants, fertilizer nitrogen is converted to nitrate, a highly soluble form of nitrogen that easily washes into streams from nearby soils. Atmospheric deposition occurs largely due to the burning of fossil fuels, either from electric utilities or vehicles.<sup>29</sup>

The 2016 Integrated Water Quality Standards Report (WQS) identifies five sub-watersheds and one additional body of water as having issues with excess nutrients: Kohanza Brook, Padanaram Brook, Sympaug Brook, East Swamp Brook, Limekiln Brook, and Lake Kenosia. Limekiln Brook and Lake Kenosia are actively managed by additional nutrient TMDLs that limit nitrogen, phosphorous, and ammonia. These are the main nutrients that cause a body of water to become impaired for recreational use, as listed in the 2016 WQS. The major contributors of nutrients throughout the watershed originate from nonpoint sources, such as urban wastewater from roads and lawns.<sup>30</sup>

The other major source of nutrients is the City of Danbury Publicly Owned Treatment Works (POTW), a sewage treatment facility. The presence of this facility means that the lower 0.64 miles of Limekiln Brook are managed by additional TMDLs for zinc, copper, chlorine, and ammonia. According to a report by Hydro Technologies in 2004, this treatment plant is a significant contributor to the nutrients in the Still River and Housatonic River. The report states that Danbury POTW increases nitrate, total phosphorous, and the temperature of Limekiln Brook by 20 times, 40 times, and above or equal to 4 degrees, respectively. This, in part, leads to a total nitrogen increase in the Housatonic by 80% and total phosphorous increase by 78%.<sup>31</sup> However, according to a 2004 presentation by Friends of the Lake, these concentrations have decreased to a nitrogen contribution just over 50% and phosphorous contribution of 50%.<sup>32</sup> To read more about management of the Danbury POTW, see the 2002 Report “Total Maximum Daily Load for Limekiln Brook, Danbury, Connecticut”. For a summarization of Limekiln Brook’s TMDLs, see Table 3 below.<sup>33</sup> Lake Kenosia’s TMDL is measured by kilogram per year, as it is difficult to manage and measure nutrient loading in lakes. The TMDL for the lake is 7211 kg/yr of nitrogen and 475 kg/yr of phosphorous.<sup>34</sup> A 2011 study of nutrient loading in Lake Kenosia by Western Connecticut State University found average annual phosphorous and nitrogen baseline loading to be 6 mg/min and 674 mg/min respectively and 1,198 mg/min and 31,869 mg/min during storms respectively.<sup>35</sup> The remaining four waterbodies are on the List of Waters for Action Plan Development by 2022.

The 1995 Fuss & O’Neil study measured ammonia, organic, nitrate, and nitrite in both wet and dry weather conditions. In these studies, nitrite was not generally detected during dry events but was measurable and therefore higher during wet weather events. Nitrate was highest downstream of downtown Danbury (Mainstem Sections 3 and 4) and ammonia was detected upstream and downstream of downtown, which contributed the highest areal nitrogen loading rates. Areas in subwatersheds around Kohanza Brook, Padanaram Brook and Beaver Brook, contributed 50% of this study’s nitrogen load. All three areas consist mainly of low to medium residential density, indicating that over application of fertilizer is a significant contributor to nitrogen levels.<sup>36</sup>

Likewise, phosphorous increased slightly during wet weather events in dissolved form. The highest areas of contribution were the subwatersheds of Lower Limekiln Brook and the Mainstem Still through downtown Danbury (Mainstem Section 4). According to Fuss & O’Neil, low and medium density

residential areas likely contribute more than 40% of total stormwater phosphorous load in Danbury, indicating greater fertilizer use in these areas. An additional 25% of phosphorous loads in Danbury come from industrialized areas. These areas are located in the Lower Limekiln Brook subwatershed and the southernmost tip of Mainstem Section 3, where there is a mix of low to medium residential and industrial areas.<sup>37</sup>

**Table 3: Connecticut Freshwater Water Quality Criteria applicable to the Limekiln Brook TMDL**

<b>Pollutant</b>	<b>Acute Criterion</b>	<b>Chronic Criterion</b>
Copper <sup>1,2</sup>	25.7 ug/l	18.1 ug/l
Zinc <sup>2</sup>	65.0 ug/l	65.0 ug/l
Summer ammonia <sup>3</sup>	17.03 mg/l	2.02 mg/l (30-d average) 5.05 mg/l (4-d average)
Winter ammonia <sup>3</sup>	17.03 mg/l	3.98 mg/l (30-d average) 9.95 mg/l (4-d average)
Chlorine <sup>2</sup>	19 ug/l	11 ug/l

<sup>1</sup> Site specific criteria for copper

<sup>2</sup> For acute exposure, biological integrity is impaired when the acute criteria is exceeded for 1 hour more than once every three years on average. For chronic exposure, biological integrity is impaired when 4-day average exceeds the chronic criteria more than once every three years on average.

<sup>3</sup> The acute criterion (one-hour average exposure) is based on pH and presence or absence of salmonid species and the chronic criterion (30-day average exposure) is dependent on pH and temperature and presence or absence of early life stages of fish species. In addition, the highest four-day average can not exceed 2.5 times the chronic criterion. Also see EPA Ammonia Criteria Document<sup>5</sup> and TMDL Support Document<sup>6</sup> for further explanation.

### 3.1.5 Mercury

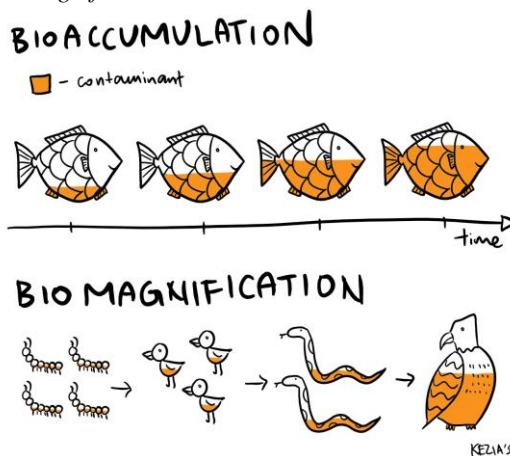
Centered in Danbury and beginning soon after the American Revolution, the making of men's hats from fur and wool felt grew into the region's major industry. The processes for making felt and shaping hat bodies required prodigious amounts of water that was at first supplied to small shops throughout the region by the Still River and its tributaries. During the height of hat manufacturing, a process called "Carrotting", which used mercury nitrate to turn fur pelts into felt, was used to produce five million hats a year in the dozens of factories located in Danbury.<sup>38</sup>

Danbury's hat industry slowly declined beginning in the late 1920s. Although the use of mercury had been banned by state law in 1940 and largely phased out by large hat firms even before that, there is both empirical and anecdotal evidence of unused supplies of mercury being dumped into the river or into Limekiln Brook in Bethel as hat factory closings accelerated in the 1950s and '60s. Mercury was not routinely disposed of as normal factory waste, but it remains in bottom sediments of the Still River today.<sup>39</sup> Studies from 2003 by Johan Varekamp found mercury levels that range from 1-60 ppm. This is significantly greater than samples found elsewhere in Connecticut of 2-5ppm and the natural background amount of 0.5-1ppm.<sup>40</sup> It should be noted that Varekamp measured elemental mercury in sediment samples and not the more harmful form, methylated mercury.

While the hatting industry may have had some impact on mercury levels in the Still River, throughout the State, the majority of mercury pollution comes from atmospheric deposition. This atmospheric mercury mytelates when it enters waterways in the presence of acid and dissolved organic carbon. Forty two percent of the mercury deposition comes from in state, while the remainder originates from surrounding states (NY 15%, PA 11.4%, MA 10.5%, and NJ 7.3%).<sup>41</sup> The mercury in the river washes downstream, especially during flood years, thereby depositing mercury into the Housatonic River and eventually into the Long Island Sound. This methylated mercury (methylmercury) both bioaccumulates and biomagnifies throughout aquatic food chains and therefore can be found in higher concentrations in fish, crayfish, shore birds, otters, and other aquatic organisms. As a result of the mercury concentrations, Connecticut has a statewide fish consumption advisory for freshwater that fish limits consumption to one meal per week of all freshwater fish (except trout) for the general population and no more than one meal per month for sensitive populations such as pregnant women and children under six.<sup>42</sup>

### **Bioaccumulation & Biomagnification**

*Bioaccumulation is the increase of a contaminant in a single organism over time. For example, fish eat mercury contaminated macroinvertebrates. Because mercury doesn't leave the fish's system, the more bugs it eats the more mercury bioaccumulates. This can then lead to biomagnification.*



*Biomagnification is when a contaminant, such as mercury, increases as it moves up the food chain.*

Built on efforts to address regional mercury emissions throughout the Northeast United States, state environmental protection agencies worked together to set TMDLs for methylmercury which was then approved by the US EPA to be managed at 0.3 ppm. Connecticut set a TMDL lower than that of 0.1 ppm.<sup>43</sup> This led to an implementation plan calling for a 50% reduction in regional mercury emissions by 2003 and a 75% reduction by 2010.<sup>44</sup> A study conducted by CT DEEP from 2006-2010 measuring methylmercury in crayfish in the Still River indicated levels of mercury higher than 0.3 ppm in 6% of samples. This amount was higher than crayfish tissue samples collected in any other project sites during the study.<sup>45</sup> The Still River is not regulated by a specific TMDL for mercury; rather, it is managed by the Connecticut Mercury TMDL of 0.1 ppm.

### **3.1.6 Polychlorinated biphenyls (PCBs)**

Polychlorinated biphenyls (PCBs) are organic chlorine compounds used in manufacturing processes for items such as paint and plastics and as an insulator or coolant. PCBs are classified as a persistent organic pollutant and are a known carcinogen and endocrine disruptor that accumulate in lipids. Because of the dangers of PCBs, production was banned by US Congress in 1979. However, they still makes their way into the Still River through landfills, storm runoff, and sediments. Background concentrations of PCBs range between 0-0.1 ppm. Like mercury, PCBs bioaccumulate in the lipids of animals. For this reason, higher concentrations of PCBs can be found further up the food chain. Sediment samples will have lower levels than benthic organisms such as crayfish, which in turn will have lower levels than fish tissue.



Studies of PCB in the region have focused mainly on the Housatonic River because of discharge from the General Electric plant in Pittsfield, Massachusetts. The PCB levels in the Housatonic River are well above the current FDA limit of 2 ppm, creating a health concern for those fishing and consuming fish from the river.<sup>46</sup> When PCBs levels in the Housatonic River were studied, samples were taken from sites along the Still River. Accordingly, some levels of PCBs have been found in the Still River. A 1982 study of sediment samples show average PCB concentrations of 0.25 ppm, about double that of background concentrations. Higher concentrations of PCBs in sediment downstream of the confluence of the Still River and the Housatonic River indicate movement of PCBs through sediment downstream. A later study (1993) showed PCB concentration in crayfish tissue in the Still to be 0.36 ppm.<sup>47</sup> The difference in these two amounts is likely due to the bioaccumulative and biomagnified effect of PCBs, as opposed to a rise in PCB levels. More recent studies of the Housatonic River show that due to regulation, PCBs in fish and macroinvertebrate tissue have decreased significantly. The same conclusion cannot be drawn about Still River without a proper study of its PCB concentrations. That being said, the inference can be made that the Still River is not elevating PCB levels in the Housatonic River, as concentrations above the mouth of the Still River (at stations in West Cornwall and Bull's Bridge) show higher concentrations than those below (Lake Lillinonah and Lake Zoar).<sup>48</sup>

### 3.1.7 Salt

Road salt is commonly used in the northern United States to melt ice and snow during winter months. Road salt can come in a few forms, magnesium chloride and calcium chloride for example, but it most commonly sodium chloride, or NaCl is applied. Whatever salt is being used, road salt easily dissolves in water. Thus when roads are treated this salt makes its ways into surface waters through surface runoff and eventually into groundwater through the infiltration of this stormwater runoff.<sup>49</sup> The impact of this salt on surface water is detrimental to natural ecosystems of streams as it can lead to acidification and increased mobilization of metals in streams. Salt water can alter the composition of riparian and wetland plant communities making way for more salt tolerant invasives, interfere with the natural mixing of lakes and alter or inhibit the microbial communities in particular in removing nitrate and maintaining water quality.<sup>50</sup> Salt in groundwater can interrupt healthy reproduction of aquatic plants and increase mortality by interrupting the ion exchange in plant root systems.<sup>51</sup>

In Connecticut road salt concentrations are increasing with the increase of developed area that requires salted roadways in the winter.<sup>52</sup> In the winter of 2013/2014 Connecticut Department of Transportation applied 227,511 tons total chloride. Compare this with 2003/2004 which experience roughly similar if not slightly greater snowfall but only applied 103,820 tons of chloride.<sup>53</sup> This is especially important in the Still River where impervious cover where salting is most likely to be applied on driveways, sidewalks, and roads, is concentrated around the waterways. As a result there is an increase in salts both in surface and groundwater throughout the Still as well as the state of Connecticut. One study that looked at this increase over the last century found that amounts in the watershed increase from a baseline of 0-2.5 ppm chloride in 1894 to its current amount of 25-50 ppm of chloride measured from 2005-2007.<sup>54</sup>

## 3.2 Drinking Water

### 3.2.1 Drinking Water Sources

The Still River watershed consists of 179 drinking water sources that result in 128 public drinking water systems. Of these 20 are Community Water Systems, 38 are Non-Transient, Non-Community Systems, and 70 are Transient Non-Community Systems. Four of these sources feed into drinking water reservoirs for the City of Danbury (Margerie Lake and West Lake) and the Town of Bethel (Chestnut Ridge Reservoir and Eureka Lake). Four sources are well fields in glacial stratified drift (gravel) deposits in the CT DEEP Aquifer Protection Program. The remaining 171 sources are typically bedrock wells that serve Still River watershed residents and businesses via private wells that draw from the groundwater (Table 4).

#### **Overlay protection zone:**

*A regulatory tool that creates a special zoning district, placed over an existing base zone(s), which identifies special provisions in addition to those in the underlying base zone. The overlay district can share common boundaries with the base zone or cut across base zone boundaries. Regulations or incentives are attached to the overlay district to protect a specific resource or guide development within a special area.*

### 3.2.2 Drinking Water Threats

To achieve the greatest public health protection, the groundwater in the Still River watershed must be protected. This is true regardless of the source or whether that source supplies public water systems or private residences. In 2003, the Connecticut Department of Public Health (CT DPH) Drinking Water Section completed a state-wide survey of drinking water supplies under the Source Water Assessment Program as mandated by the 1996 reauthorization of the Safe Drinking Water Act. This survey reported on contaminants detected in the source water of each system in the Still River watershed. While this data is somewhat dated, it provides a framework for the scope of contamination within the source water area (Table 5) In addition to the Source Water Assessments, CT DPH reported water system violations from 2011 through 2015 to scrutinize human impact of drinking water sources contamination (Table 6).

The following information was used to assess vulnerability under the Source Water Assessment Program:

- Sanitary conditions in the source water area
- The presence of potential or historic sources of contamination
- Existing land use coverages
- The need for additional source protection measures within the source water area

This process designated 39 systems with high susceptibility to potential contaminant sources, 36 with moderate susceptibility, and 29 with low susceptibility within the Still River watershed. No Source Water Assessments were available for 23 systems.

**Table 4: Drinking Water Supply By Municipality**

Municipality	Water supply description
Bethel	The Town of Bethel has had a municipal water supply since 1878. As of the publication of the Water Supply Resource Inventory (Nov. 2015), 26% of total land area (2,837 acres) in the southern part of Bethel is classified by CT DEEP as existing or potential water supply watershed land. CT Department of Public Health (DPH) recommends an overlay protection zone. The water supply for central Bethel originates in a northern land drainage that collects at the Eureka Reservoir and Mountain Pond Reservoir west of Bethel located in the Sympaug Brook Watershed in Danbury. An ongoing cosmetic issue with this drinking water is that the Eureka Lake supply has taste and odor problems that the existing plant cannot mitigate. Moreover, the Chestnut Ridge supply relies on an aged treatment plant in poor condition. A safe yield from both these water sources is .50 million gallons per day.
Brookfield	In 1987 Brookfield integrated a protection zone boundary for the Gallows Hill Aquifer and Still River Middle Aquifer into local regulations. Since 2001 Brookfield's small community water systems have been purchased centralized through Aquarion Water Company. This change resulted in the protection of Meadowbrook well fields, approved by CT DEEP as an Aquifer Protection Area Program.
Danbury	42% percent of Danbury's total land area use lies in its public water supply watershed, which includes Danbury and neighboring communities. Due to the need for an additional water supply, Candlewood Lake is being considered as a future source. This would affect drainage regulation for the western most sections of Brookfield. Danbury's zoning regulations maintain a protective overlay zone for the existing water supply watershed within the city which also cover Bethel, New York City, and Aquarion Water Company water supplies. This protective overlay zone compliments a citywide hazardous substance management ordinance. Danbury's surrounding watersheds; Lake Kenosia, Kohanza Brook, Padanaram Brook, and Sympaug Brook occupy a drainage area of 400 acres southeast of Danbury. Of these it should be noted that Lake Kenosia is used only occasionally during the non-swimming season and pumped to other surrounding reservoirs. Because of this a public push was made in 1997 to open Lake Kenosia up for development having been deemed a place of economic interest.
New Fairfield	Of the total water supply for New Fairfield, 30% is used to supply other communities in addition to its own. Of those the Padanaram Brook Watershed, part of the Still River watershed, drains south into Margerie Reservoir and East Lake Reservoir, important sections of Danbury's water supply system.
New Milford	All water for New Milford is supplied by ground water, as such there are no water supply watersheds after a small reservoir was decommissioned. Future water supplies may come from the drainage basins of West Aspetuck River Watershed and Shepaug River Watershed.
Ridgefield	Most of Ridgefield's land area (62%) is in use as water supply for other communities.

**Table 5: Source Water Assessment Contaminant Summary**

Contaminant Detected	Type & Number of Systems Impacted			
	Community Water System (CWS)	Non-Transient Non-Community (NTNC)	Transient Non-Community (TNC)	Total
Nitrate	12	19	23	54
Coliforms	0	17	17	34
Sodium	1	0	0	1
Trichloroethylene (TCE)	0	2	0	2
Methyl Tertiary Butyl Ether (MTBE)	1	0	1	2

The nitrate levels found in these wells are much lower than the maximum 10 mg/l allowed in drinking water and therefore are not a health risk; however, even at low levels they promote algal growth in surface waters. Detection of nitrate in public wells indicates that it has been released to surface and ground waters and is a potential contamination of concern. Typical sources of nitrates are septic systems, lawn care, and agriculture.

**Table 6: Drinking water supply Coliform Violations**

Year	Type & Number of Systems Impacted			
	CWS	NTNC	TNC	Total
2011	1	0	8	9
2012	1	1	7	9
2013	1	2	8	11
2014	2	1	3	6
2015	0	2	5	7

Coliform bacteria often indicate poor physical conditions at or near the wellhead and can be made worse during heavy rains. Coliform bacteria is not a health threat in and of itself, but is used to indicate whether other potentially harmful bacteria may be present. The detection of both nitrate and coliforms indicate that human activity is negatively impacting groundwater.

### 3.2.3 Future Drinking Water Sources

The Still River watershed contains stratified drift aquifers that may be used as drinking water sources in the future. These areas have been identified by the Connecticut Geological Survey (CGS) and are delineated on the Surficial Aquifer Potential Map of Connecticut (Appendix B). This map identifies areas with greater potential for ground water supply based upon the texture and thickness of surficial aquifer deposits in order to plan for statewide resource protection, water management, non-point source pollution prevention, and land use.

The map does not include information on saturated thickness, or depth to ground water, so further investigation is required to determine whether the aquifer will yield viable quantities of water. In addition, these aquifers often lie under and adjacent to the Still River in areas that have been developed, making them more susceptible to contamination (Appendix B, Still River Watershed Aquifer Protection Zone and Potential Geology).

### 3.3 Impervious Cover

Impervious cover (IC) refers to landscape surfaces such as pavement or buildings (hard surfaces) that do not absorb rain, often picking up pollutants along the way and delivering them to streams and waterways. The amount of IC affects both the quality and quantity of water resources by disrupting the natural hydrological cycle. Increasing the percentage of IC in a watershed is linked to decreasing stream health. Stormwater runoff from impervious surfaces contain pollutants such as oils, heavy metals, nutrients, and bacteria sediment and can cause temperature impacts to receiving waterbodies. The amount of stormwater pollutants transported during a rainstorm is directly related to the amount of IC in the watershed. Moreover directly connected impervious (DCIA) areas exacerbate the impact of IC on streams by concentrating runoff to fewer outfalls that lead to streams. While IC has been calculated in the Still basic, DCIA has not, thus the amount of DCIA is largely unknown, and impacts on the Still not studied.

#### **DCIA Definition**

*Any impervious surface which drains into another area of impervious cover without first directing the flow across a pervious surface (e.g. lawn). For example, a roof draining onto a parking lot.*

CT DEEP conducted studies on the relationship between impervious cover and water quality. A segment of the Still River (segment CT6600-00\_05) is one of 15 impaired waterways selected for inclusion in the Connecticut Watershed Response Plan for Impervious Cover. The report and its findings represent a draft version of a TMDL for impervious cover. With the relationship between impervious cover and water quality impacts well documented, it follows that impervious cover can be used as a proxy for mitigation efforts. CT DEEP has determined that to limit the effect of stormwater pollution, an IC area of less than 12% is needed to support habitat for fish, other aquatic life and wildlife use in these waterbodies.

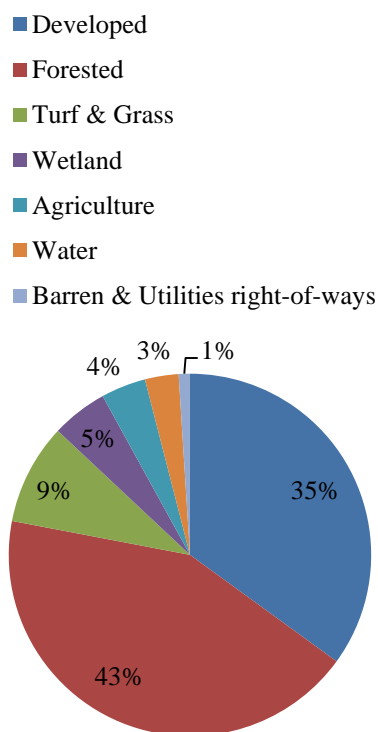
Stormwater pollution is categorized under two types of pollutant loads: point and nonpoint sources. Point sources are permitted as waste load allocation (WLA) and regulated under the National Pollutant Discharge Elimination System (NPDES). Nonpoint sources, or load allocation (LA) are not specifically regulated; however, in efforts to achieve TMDL requirements, towns may address nonpoint source pollution through their MS4 permit. It is not feasible to draw a clear distinction between stormwater pollution originating from point and nonpoint sources because insufficient data is available for each parcel in the watershed. In addition, stormwater pollution is highly variable in frequency and duration. Consequently, a margin of safety of 1% was subtracted from the target percent IC to account for uncertainties regarding the relationship between water quality and sources (point and non-point). The watershed has 14% IC, with an IC target of 11%. The percent reduction in IC necessary to meet the plan target is 21%.

All towns within the watershed have current management activities that include permitted stormwater sources (e.g. commercial, industrial, construction and MS4) outlined in Stormwater Management Plans (SMP). While each town's stormwater management plans are different, many include best management practices including impact mitigation of impervious surfaces in riparian buffer zones and along the riparian corridor, construction of catchment ponds, and evaluation of directly connected impervious surfaces. While the presence of IC may not be the sole cause of aquatic life use impairment, reducing the effect of IC within the basin is expected to improve water quality and support aquatic life use goals.<sup>55</sup>

## 4. LAND USE

The Still River watershed is considered a highly urbanized watershed. With over 14% impervious cover, 35% of the watershed land is developed (Appendix B, Still River Watershed Landcover). The remaining 65% is mostly forest but includes turf, wetland, agriculture, water, and some barren or utility right-of-ways (See Figure 7: Still River Watershed Percent Landcover).<sup>56</sup>

Figure 7: Still River Watershed Percent Landcover



As mentioned in the management section, the development of the watershed can be traced back to the hatting industry followed by new industries post-World War II that spurred rapid residential and commercial growth during the 1950s and '60s. This growth included several industrial parks and five different shopping centers with collectively hundreds of acres of paved parking in Danbury and Brookfield. These parking areas were built adjacent to or over tributaries of the Still River, beginning with the North Street Shopping Center in 1959. In addition, trailer parks around Lake Kenosia and Mill Plain swamp, new residential subdivisions that bordered or were located in the river's floodplain contributed to the development of the area. Furthermore, there was the gradual development of an intensive commercial strip in the heart of the Still River valley (between White Street in Danbury and southern Brookfield) including stores, fast food, outlets, bowling alleys, bank branches, and warehouses.

All this development brought with it concentrated impervious cover in the floodplain of brooks, streams and the river (see Water Quality Section 3.2 Impervious cover for additional detail). A study done in 1998 surveyed the land use within 1000 feet of the Still River and found 57% of land use within the 500-foot buffer of the river previously comprised of beneficial land cover such as wooded and scrub floodplain forest habitat. This left 43% of land cover comprised of non-beneficial or harmful land uses such as turf, or impervious cover.<sup>57</sup> While this study is dated, it demonstrates the historical land use within the riparian buffer.

## 5. FLOODING

The industrial revolution brought rapid urbanization in central Danbury. Dams were built for waterpower (especially for fur-processing operations), streambeds were filled in, and the river re-channeled in places to provide land for building lots, tributary streams like parts of Blind Brook were buried, and some buildings were even constructed directly over the Still River in the valuable real estate of central

Danbury. These changes to the natural stream channels contributed to frequent flooding, especially as much of the development was concentrated in floodplains. For example, Blind Brook, which flows from Tarrywile Park to join the Still River in central Danbury, was extensively buried, re-channeled and dammed, and continued to cause sporadic flooding events in residential neighborhoods through which it flowed into the early 2000s. The USDA Natural Resources Conservation Service, through their Emergency Watershed Protection Program (EWP) provided funding in 2000 and 2005 to restore flood damaged areas along Miry Brook and the Still River (\$326k). Sheet piling was installed along the Still River to protect Cap City, and streambank stabilization (rip rap), installation of a box culvert and debris removal was done along Miry Brook.

Historic major floods along the Still River and tributaries include that of March 1936 (caused by rain & snowmelt); September 1938 (Great New England Hurricane/Long Island Express); and those of August and October, 1955 (caused by hurricanes Connie & Diane), which is flood of record for the state.

Public perception of unfettered development started to change with the big floods of 1955. Two episodes of massive, deadly, and expensive flooding caused by hurricanes in August and October of that year killed four and caused millions of dollars of damage to factories and downtown Danbury businesses. Downtown residents had to be evacuated by boat and helicopter, and National Guard units from neighboring states had to be called in to help clean up the damage. The city's vulnerability threatened to halt the advance of Danbury's growing base of new industries. City officials, prodded by civic and business leaders, elected to participate in a federal flood control program. Structures built over the river were demolished, and flood control measures were combined with ambitious federally-funded redevelopment efforts. In the early 1960's as part of the Central Flood Urban Renewal Project, the US Army Corp of Engineers created a design for a concrete walled open channel with an improved trapezoidal shape. This rechanneled and redirected the Still River through downtown Danbury. The result was a concrete river with an entirely artificial flow. This segment stretches from the Conrail Yard to Rose Street and was designed to confine the river in the event of a flood equal to the 1955 floods. Other projects by the United States Army Corps of Engineers and the State of Connecticut have also channelized the river between Conrail yard and Cross Street (City of Danbury, 1995). The 1955 floods made the public aware for the first time of the connection between development of the floodplains above the city with the intensity of flooding downstream.

Despite these major flood control projects, flooding remains an issue in the watershed. Residents of Jansen's trailer park next to Lake Kenosia had to be evacuated during the 1999 flood event. All Still River communities participate in the National Flood Insurance Program (NFIP). The NFIP is a federal program administered by the Federal Emergency Management Agency (FEMA) that provides assessments of flood risk in the form of Flood Insurance Studies/Flood Insurance Rate Maps (Appendix B, Still River Watershed FEMA Flood Hazard Zones), establishes minimum regulations to guide development in floodplains, and provides federally subsidized flood insurance to property owners in participating communities. Most of the Still River Watershed (with the exception of New Milford) is covered by the Fairfield County Flood Insurance Study and associated Flood Insurance Rate Map that became effective in 2010. The following more recent storm events resulted in claims to the National Flood Insurance Program (NFIP) related to properties in the watershed:

- June 6-7, 1982 – Heavy Rain Event



- Sept. 16-17, 1999 – Tropical Storm Floyd
- April 15-16, 2007 – Nor’easter
- Sept. 6, 2008 – Tropical Storm Hanna
- March 25, 2010 – Rain & Snowmelt
- March 6-7, 2011 – Rain & Snowmelt
- August 28, 2011 – Tropical Storm Irene

**Table 7: Flood Insurance Statistics for Still River watershed as of 8/31/2014**

<b>Community</b>	<b># Policies</b>	<b>Premium</b>	<b># Claims</b>	<b>Claims Paid</b>	<b>RLP*</b>	<b>SRLP**</b>
Bethel	226	\$218,092	47	\$657,647	5	1
Brookfield	66	\$80,598	14	\$164,532	3	0
Danbury	455	\$631,185	162	\$5,725,544	29	2
New Fairfield	38	\$26,292	9	\$41,423	0	0
New Milford	121	\$203,505	113	\$3,303,981	15	0
Newtown	83	\$110,175	33	\$212,141	3	0
Redding	43	\$48,772	8	\$49,118	0	0
Ridgefield	112	\$104,894	36	\$182,866	6	0

\*RLP – Repetitive Loss Properties: Properties that have had four or more claims greater than \$1000 within any rolling period Jan. 1, 1978 and/or two or more claim payments within any rolling 10-year period since Jan. 1, 1978 that appear to equal or exceed the reported property value

\*\*SRLP – Severe Repetitive Loss Properties: A subset of RLP that have had at least four or more claim payments over than \$5000 (building and contents) and where the total claim payments exceed \$20,000 or in which two separate claim payments have been made in which the cumulative amount of the building portion of such claims exceed the market value of the building.

## 6. WATERSHED MANAGEMENT

Perhaps just as important as the physical or natural characteristics, the human impact, organizations, and laws that manage the watershed have had a tremendous influence on its health. Beginning in the early 1850s, the industrial revolution, stimulated by the first railroad that ran from Norwalk to Danbury following the route of the Sympaug Brook tributary of the Still, transformed the hatting industry. Large-scale industrialization and urbanization of Danbury and to a lesser extent some of the villages along the Still River, led directly to the degradation of the river. Large steam-powered hat factories in Danbury, Bethel, and Brookfield continued to be located on the Still River or one of its larger tributaries. After 1860, Danbury's hat factories increasingly relied on a growing reservoir system built from ponds, streams, and small lakes in northwestern Danbury that had fed the Still River. The first of these, Kohanza Reservoir, suffered a dam collapse that killed four people and devastated northern parts of Danbury in 1869. Danbury's reservoir system was expanded through the 1880s to stimulate industrial growth, and for almost a century provided the growing city with a sense of security about its water supply. Meanwhile, the rivers and streams adjacent to every hat factory were no longer needed for a source of clean water. They became instead a depository for factory wastes that included dyes and organic material from washing wool and fur, the contents of factory water closets and the residue of chemicals like copper sulfate and mercury, condensed from the massive amounts of steam generated in the plants, and washed into the streams.

Danbury's population doubled in the 1850s and again in the 1880s, prompting fears of water-borne disease from the now foul and discolored river, mostly due to the human waste from privies emptying into it. Casual dumping became a major problem as everything from household debris, store sweepings, and dead horses piled up in the river in the downtown area, a problem authorities had no success in stopping. Responding to fears of typhoid fever, cholera, and other water-borne diseases and lobbied by a local civic improvement group, municipal authorities began construction of a sewer system in the early 1890s. Rejecting expert advice, the city built a system that combined street and sanitary drainage and dumped the outflow with no treatment directly into the river in the narrow and swift-flowing gorge at Beaver Brook. Downstream mill owners and farmers formed an "alliance" of over 70 property owners, and, joined by the Town of Brookfield, sued the City of Danbury. The result was an injunction against the city, considered at the time a sweeping landmark decision in Superior Court and backed up by the State Supreme Court on appeal, which forced the city to provide a primary sewage treatment plant. City authorities purchased a farm in Beaver Brook district adjacent to East Swamp Brook where it built not only a treatment plant, only the fourth such plant in the state, but also a municipal dump on land abutting tributaries of the Still River.

North of Danbury the badly polluted river made its way through a valley increasingly being stripped of its natural resources. Large limestone-quarrying and lime-burning operations for production of agricultural lime took place in Beaver Brook and in Brookfield near the New Milford town line and along Lime Kiln Brook.

Danbury's hat industry slowly declined beginning in the late 1920s as fashionable men began to spurn hats and other formal outerwear. Although use of mercury had been banned by state law in 1940 and had been largely phased out by large hat firms even before that, there is both empirical and anecdotal evidence of unused supplies of mercury being dumped into the river or into Limekiln Brook in Bethel as hat

factory closings accelerated in the 1950s and '60s. Mercury had been used in preliminary treatment of fur and was not routinely disposed of, but it remains in bottom sediments of the Still River today.<sup>58</sup>

Concurrent with hatting's decline, after World War II the Danbury area experienced a burst of new industrial growth in electronics, metal fabrication, precision optics and other instrumentation, and medical supplies. This renaissance led in turn to a quadrupling of the population, dramatic changes in patterns of land use, and massive impacts on the Still River watershed. Virtually all of this growth took place in an atmosphere of little to no regulation until the mid-1960s. The prevailing attitude among both officials and the public was that any and all change represented progress. The maligned and foul-smelling Still River, hidden from sight for most of its course, was given little consideration. The exploding residential and commercial construction of the time also stimulated large-scale sand and gravel mining in the terraces above the valley floodplain into the 1970s, when towns began enacting ordinances to shut them down or prohibit new mining. Some of these operations have resulted in permanent changes to the terrain, especially in Brookfield, where a large groundwater-filled pond emerged over time after extensive gravel mining near a river tributary, Limekiln Brook.

Between 1960 and 1965, Connecticut experienced an extended drought that by 1965 had drawn Danbury's reservoirs down to only 10% of capacity, leading to emergency pumping of drinking water from Candlewood Lake. The drought shook the city's confidence that its seemingly overbuilt reservoir system would accommodate any future need. It particularly affected the thinking of Gino Arconti, who became Danbury's mayor in 1967 and who made protection of water supplies and open space a city priority for the first time. Underground aquifers, of which the Still River Valley, and Lake Kenosia in particular, were believed to be major sources, were mapped and incorporated into city planning and into regional planning, which at that time was in its infancy. As early as 1967, an engineering study recommended drilling ground water wells on the Owens-Kovacs property on the east side of Lake Kenosia, soon after it was acquired by the City ostensibly as a new school site. That recommendation proved to be prophetic when, during another drought in early 1981 which drew reservoir capacity to 40%, the Dyer administration added a \$2 million water line to "skim" water from Kenosia to West Lake Reservoir. The City began to address serious pollution problems around the lake, closing down an illegal septic dumping site near the lake that also had a buried trailer filled with chemical solvents that included the carcinogens trichloroethane and trichloroethylene that had infiltrated the community well at a trailer park downstream. A research report by the environmental study group King's Mark RC&D in 1981 recommended a ban on all industrial development and strict regulation of the area that surrounded the lake or that fed the Kenosia aquifer. With the exception of the city-owned beach already in operation (that has been closed to swimming since 2013), and pre-existing uses, development around the lake came to a halt after 1986. In 2008, the City established a Lake Kenosia Commission, and in 2013 planted a buffer of native plants.

During the era of hectic growth in the region, two new laws had a profound effect on the eventual cleanup of the river. In 1967, the State of Connecticut passed its own Clean Water Act, five years before the federal Clean Water Act would be passed. The act called for an upgrading of water quality in the Still River to make it suitable for fishing and boating, and ultimately as an approved source of water supply. Specific towns, including Danbury and Brookfield, were ordered by the Connecticut Water Resources Commission to "construct new or expanded sewage treatment facilities to abate water pollution." With no sewage treatment facilities of its own, Brookfield planned to utilize the treatment plants in Danbury and New Milford, opening up the southern Route 7 corridor in that town to intensive commercial growth.

Eighteen Danbury industrial firms received orders to modernize their industrial waste treatment facilities. While some longstanding businesses folded as a result of the order, others successfully upgraded, eliminating multiple sources of pollution.

A second law, the Inland Wetlands and Watercourses Act of 1972, established local regulation of the river, its tributaries and its floodplain for the first time. The act established a permit process for any activity within a hundred feet of a river. The main towns of the valley responded in different ways: Brookfield established a Wetlands Commission that began operation in 1974, while Danbury opted for a hybrid body composed of a panel representing municipal agencies and environmental expertise, a compromise intended to dampen any potential slowdown for environmental reasons of the rapid economic growth the city had been experiencing. New Milford allowed the state Department of Environmental Protection to enforce regulations as well as it could over the town's vast territory until finally establishing its own commission in 1988 over organized opposition from powerful development interests.

More recent development has reflected the impact of these laws. All major towns within the watershed regulate development through an Inland Waterways and Wetlands Commission or regulatory equivalent (for example, Danbury manages permits through the Danbury Environmental Impact Commission). Projects that would have impinged on the floodplain or feeder wetlands of the Still River had been scaled down or rejected. For example, the Danbury Fair Mall, the largest enclosed shopping mall in New England at the time it was built, was constructed along a series of ring roads to allow harmless flooding and with ponds to mitigate wetland loss adjacent to the river and Mill Plain Swamp.

All Still River municipalities are designated as Municipal Separate Storm Sewer Systems, based on population density. The General Permit for the Discharge of Stormwater from Small Municipal Separate Storm Sewer Systems (MS4 General Permit) is the product of a mandate by the U.S. Environmental Protection Agency (USEPA) as part of its Stormwater Phase II rules in 1999. This general permit requires each municipality to take steps to keep the stormwater entering its storm sewer systems clean before that stormwater enters water bodies.

The requirements of the current general permit include registration to obtain permit coverage, development and implementation of a Stormwater Management Plan, and monitoring of six stormwater outfalls once a year during a rain storm. The Stormwater Management Plan is the cornerstone of the MS4 general permit. It is a document prepared by the MS4 that contains information on its stormwater and municipal infrastructure along with Best Management Practices (BMPs) to reduce and/or eliminate the discharge of pollutants through the storm sewer system to the Maximum Extent Practicable (MEP). MEP is the standard promulgated in EPA's Phase II rule that MS4s are required to meet. The definition of MEP is "to reduce and/or eliminate to the extent achievable using control measures that are technologically available and economically practicable and achievable in light of best industry practice." EPA states that the MEP standard for MS4 discharges is an "iterative process consisting of a municipality developing a program consistent with specific permit requirements, implementing the program, evaluating the effectiveness of BMPs included as part of the program, then revising those parts of the program that are not effective at controlling pollutants, then implementing the revisions, and evaluating again ." This process continues until the goal of meeting water quality requirements is achieved.

The BMPs in the Stormwater Management Plan are organized into six categories of Minimum

Control Measures: public education and outreach; public participation; illicit discharge detection and elimination (IDDE); construction stormwater management; post-construction stormwater management; and pollution prevention and good housekeeping. Each of these categories includes several BMPs to implement the control measure. Certain BMPs are required and the permit provides for additional BMPs to be implemented, as necessary to address pollution, at the discretion of the MS4.

## 7. SPECIES AND HABITATS

Despite the impacts of urbanization, the Still River watershed contains a number of notable species and habitats of conservation concern. The CT DEEP Natural Diversity Data Base (NDDDB) indicates areas of the state that contain federally listed species and significant natural communities. According to the NDDDB Lake Kenosia and areas downstream, the main stem of the Still from downtown Danbury north, the upper section of Miry Brook, a southern section of Parks Pond Brook and westward, Braumies Brook, upper Sympaug Brook, Putnam Park Brook, Wolf Pit Brook, and lower Limekiln Brook are home to species and/or habitats of conservation concern (Appendix B, Still River Watershed NDDDB).

### 7.1 Terrestrial

The Still River is unusual among river systems in Connecticut in that it flows through calcareous bedrock for virtually its entire length, with a broad, low gradient floodplain.<sup>59</sup> This calcareous influence brings together many elements of biodiversity, potentially including unusual fauna.<sup>60</sup> A few notable species found in the watershed are those listed as rare, endangered, threatened, or a species of special concern by the State of Connecticut. Among those are a number of sedges such as Davis' sedge (*Carex davisii*), Tuckerman's sedge (*C. trichocarpa*), and hairy-fruited sedge (*C. trichocarpa*). Davis' sedge is currently listed as "Threatened" with only nine populations in the state with a likelihood of becoming endangered in the foreseeable future. Both Tuckerman's sedge and hairy-fruited sedge are classified as "Special Concern." Also found in the region are Great St. John's wort (*Hypericum ascyron*) and pale green orchid (*Platanthera flava* var. *herbiola*), both "Special Concern" species that have recorded populations as far back as 1990. Not on the CT DEEP list but of importance are the swamp agrimony (*Agrimonia parviflora*) and the cursed crowfoot (*Ranunculus sceleratus*). Many of these species are rare throughout the state, in particular hairy-fruited sedge, which seems to be abundant only in the Still River corridor and is found in few other places in Connecticut.

The biggest threat to all of these plant species is the pervasive spread of invasive species in floodplain forest habitat. Floodplains are highly susceptible to invasive species population growth and biotic homogenization due to the available water (soil moisture), nutrient-rich soil, and flowing waters that help spread seed. The invasives found most prevalently throughout the watershed include: Japanese stiltgrass (*Microstegium vimineum*), Japanese knotweed (*Fallopia japonica*), Mugwort (*Artemisia vulgaris*), mile-a-minute weed (*Persicaria perfoliata*), multiflora rose (*Rosa multiflora*) and the common reed (*Phragmites australis*).<sup>61</sup> While no comprehensive database exists on the extent of invasives, one can assume based on smaller mapping of invasive populations throughout the watershed that invasive species dominate the landscape of riparian zones and this watershed generally, making up the majority of plants. Moreover a warming climate creates conditions conducive to the spread of invasives as areas that were previously too cold become warmer.<sup>62</sup>

## 7.2 Aquatic

Given the extensive history of industrial pollution paired with heavy development, any aquatic life was unexpected without significant restoration. However, in 1997 and 1998, after the completion of the upgrade to tertiary treatment of the Danbury sewage plant, CT DEEP was surprised to find populations of fish which they remarked were “astounding, both in the numbers of species found and the total of individual fish in each species group.”<sup>63</sup> According to CT DEEP fish surveys, 35 species of fish have been found in the watershed since 2001, the most common of which are bluegill sunfish, white suckers, blacknose daces, and largemouth bass.<sup>64</sup> Since the 1993 upgrade to the Danbury Sewage Treatment Plant and subsequent decrease of ammonia in the plant discharge, the quality of aquatic life has greatly increased.<sup>65</sup> A survey by CT DEEP in the late 1990s resulted in a diversity of fish in areas that were previously devoid of any fish populations (according to a 1991 baseline survey). That being said, many of the waterways in the Still River continue to fail to support healthy habitat for aquatic life.

Impervious surface has a significant impact on aquatic life. A strong relationship between the percentage of IC in a watershed and aquatic life impacts has been identified, with changes in the biotic community expected at around 10% IC.<sup>66</sup> To read more about impervious cover, see Section 3.3 Impervious Cover.

## 8. RECREATION

Due to the many efforts of municipalities and local volunteer groups along the Still River, its health has improved tremendously since the mid-1990s. Many efforts to develop recreation opportunities within the watershed are underway. Significant progress has been made on river trails, both on and adjacent to the river. Open spaces and preserves within the watershed are encouraging accessibility, visibility, and awareness of the waterway as a recreational resource in a fairly urbanized area. Some of the major opportunities and notable projects related to recreation within the watershed are detailed in this section.

### 8.1 Parks & Open Space

There are a variety of parks and open space areas located in the watershed, several of which are located on or near the water. Approximately 24% of the Still River watershed land area is classified as Open Space (a designation which includes public parks and municipal lands, such as closed landfills and airports; Appendix B, Still River Watershed Public Lands and Open Spaces). The City of Danbury alone claims over 1,200 acres of public parks and open spaces including Lake Kenosia, Pine Mountain Preserve, Danbury Dog Park, Danbury Cemetery, and Ridgewood Country Club, as well as smaller urban parks such as Joseph Sauer Memorial Park.<sup>67</sup> North of Danbury, the river flows through Brookfield Municipal Center, a large public park then through the Candlewood Valley Country Club, before emptying into the Housatonic River near Lovers Leap State Park and Harrybrooke Park. Across the river from Lovers Leap State Park is Pickett District Park (10 acres), which contains four baseball fields. A proposed recreational improvement project in this area involves the construction of a steel truss pedestrian bridge over the Still River to connect this park with Lovers Leap State Park.<sup>68</sup>

To the east of Danbury, several Still River tributaries are adjacent to recreational spaces. East Swamp Brook and Limekiln Brook both flow through Bennett Memorial Park. Dibbles Brook runs by Mitchell Park, which contains four baseball fields and Bethel Supercross BMX Track. In southern Bethel, Wolf Pit Creek flows through Huntington State Park. Other recreational areas within the watershed include Rogers Park, Tarrywile Park and Mansion, Old Quarry Nature Center, Wooster Mountain State Park, and the

Richter Park Golf Course (adjacent to West Lake Reservoir). See Appendix B for locations of parks and open spaces.

## **8.2 Still River Greenway and Water Trail (SRGWT)**

Given the urban and exurban nature of the watershed, trails are not as abundant as they are in other subwatersheds throughout the Housatonic. That being said, there has been much progress made on a plan to build a trail along the length of the Still River mainstem. The Still River Greenway and Water Trail was originally proposed by Arthur Harris, Chair of Brookfield Conservation Commission who envisioned a “Lineal Park” along the Still River. It was then built upon in the 1970s as a long term compensatory mitigation for the construction of Route 7.<sup>69</sup> In 1996, the Still River Alliance (a collaboration among public agencies, conservation groups, corporate sponsors, and private citizens) began development and construction of the trail, with funds raised from corporate and environmental sponsors and government grants. The SRGWT is intended to be both a continuous recreational multi-use trail and uninterrupted waterway for boaters (kayak and canoe). The completed trail will roughly mirror highway 7 as it parallels the Still River, and will run from the commercial park in Danbury near Pitney Bowes, continuing northward along the river and ending at the river mouth near Lover’s Leap State Park in New Milford. Of the entire reach, two major sections have been completed: a 2.2 mile corridor follows the floodplain starting behind the Kimchuck building at Eagle Road and Corporate Drive and a 2.25 mile corridor in Brookfield, from the Brookfield Municipal Center to the Brookfield Town Center (Figure 8, Still River Greenway and Water Trail Project Map). Over half (mostly in Brookfield) of the completed miles are handicap accessible, paved, and 10 feet wide. As of early 2016, funds have been secured for the first and second phases of completing a two-mile multi-use section of the trail, which will connect the Brookfield town center to Four Corners. This is now completed, has educational signage, a pedestrian bridge, and is quite popular.

The resurgence of paddlers and hikers who wish to utilize the Still River is an encouraging sign, and the completion of the SRGWT will provide new opportunities for people of all abilities to enjoy the Still River. While some unique challenges must be addressed (i.e., a proposed section of the trail near a golfing area Candlewood Valley Country Club, where a covered bridge walkway to protect hikers has been proposed) the ultimate completion of the SRGWT will complement regional efforts to expand river recreational opportunities. For example, a planned connection with the New Milford River Trail would provide nearly 20 miles of trail.<sup>70</sup>

## **8.3 Boating**

The goal of the water trail portion of the SRGWT is to provide continuous river access from Brookfield to Danbury. There are currently three main boat launches on the Still River. Starting upstream, the first is located at Lake Kenosia the head of the Still River mainstem, a CT DEEP boat launch. Moving downstream, the second is behind the Danbury Marriot Hotel on Eagle Road, built in 2001 as part of the Still River water trail. From this launch, a paddler can travel 6.7 miles downstream before reaching a takeout point at the Brookfield Craft Center. The last and most recent boat launch is located off Erickson Road in New Milford, just north of Cross Road. Future boat launches are in development by way of the Still River Watershed planning process (Figure 8, Still River Greenway and Water Trail Project Map). There is a small informal put-in for kayaks and canoes behind the condos just north of the Halfway Falls gorge.







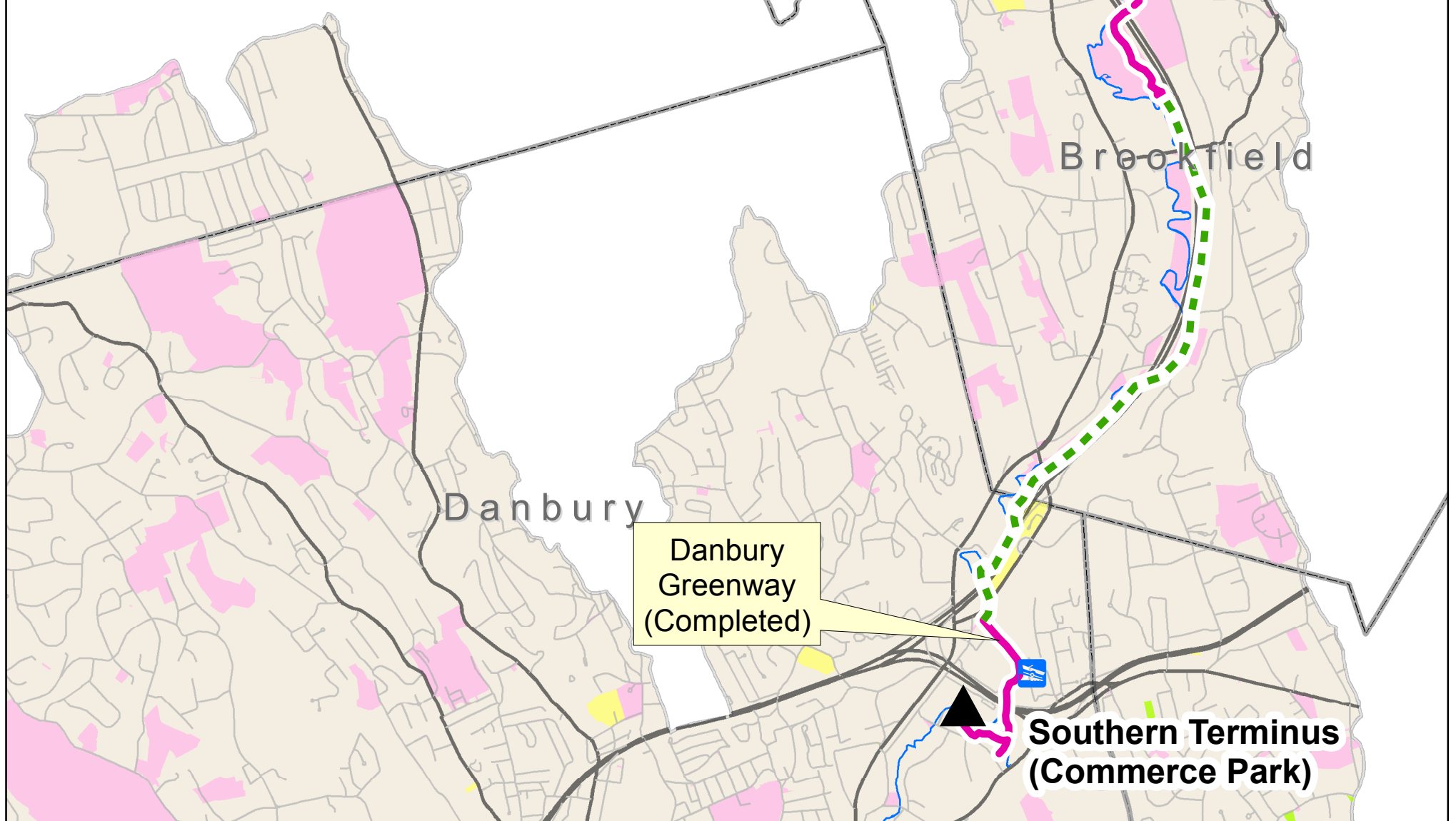
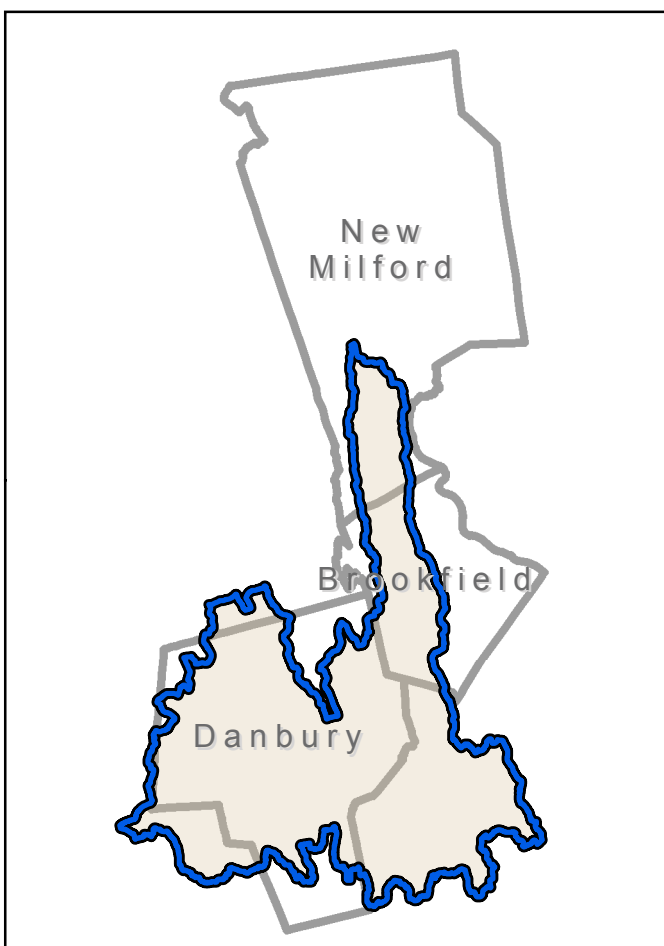
To fully implement a river trail, portage points and trails would need to be established around treacherous sections of rapids and signage updated. Some of this work has begun as signage has been established throughout the Still River by the Housatonic River Valley Trail noting dangerous rapids. However, there are still several sections of the river that require a portage, most notably Halfway Falls in Brookfield and the Harrybrooke rapids in New Milford.<sup>71</sup> In addition to these considerations, a river trail would require regular monitoring and maintenance to clear trees and debris that often block this river in particular. There have been resources in the past that helped in cleanup efforts, such as a river trail manager who checked on conditions and coordinated volunteer groups for litter cleanup. Additionally, Eastern Mountain Sports has sponsored an annual river clean-up day in May since 2005. Continued regular maintenance of the water trail will be necessary to avoid blockages and ensure continued use by boaters.<sup>72</sup>

# Figure 8: Still River Greenway and Water Trail Project Map



## Legend

-  Boat Launch
-  Proposed Greenway
-  Completed Greenway
-  Still River



## 8.4 Other Hiking

In addition to the Still River Greenway, trails are found in parks throughout the watershed including Wooster Mountain State Park and the Pine Mountain Preserve. The Ives Trail Greenway runs through Tarrywile Park and briefly along Parks Pond Brook, a tributary of the Still River. Near the area where the Still River flows past the Stew Leonard's in Danbury, there is a small area known as the Greenway Bird Sanctuary, which includes a half mile loop hike through a meadow, a wetland forest, and a riverine ecosystem.<sup>73</sup>

## 8.5 Fishing

The historic release of chemicals from the GE facility in Pittsfield, Massachusetts has contributed to long-term effects in down river fish populations, including an accumulation of PCBs.<sup>74</sup> Thus, any fishing in the Still River are for recreational purposes only, rather than consumption and subsistence.

According to a CT DEEP Trout Stocking Map (updated May 2016), there are four active stocking sites along a stretch of the Still River in northeast Danbury near the junction of routes 7 and 84, with about 300 trout stocked annually. These stocking sites are near the Danbury portion of the SRGWT and are likely popular fishing sites. In Bethel, the East Swamp Brook and the Limekiln Brook contain seven active stocking sites, with about 400 trout stocked annually. Another reported popular fishing site is located at the junction of the Still River and the Housatonic River, near the Pickett District Park.<sup>75</sup>

## 9. FIELD ASSESSMENTS

### 9.1 Unified Stream Assessment

In order to identify negative impacts and potential restoration opportunities, HVA conducted stream corridor field assessments in the Still River and associated tributaries between 2016 and 2018. HVA used Unified Stream Assessment (USA) continuous stream walk methods to survey all reaches within the watershed that are classified as impaired (approximately 40 stream miles). This protocol was developed specifically for urban watersheds by the Center for Watershed Protection (CWP). During USA field assessments, HVA staff and volunteers walked prioritized impaired reaches of the Still River and its tributaries, and recorded data on reach conditions, potential impacts, and potential restoration sites. We were unable to access certain impaired reaches for field assessments for a variety of reasons (i.e., wetlands, buried streams, extreme channelization). Thus, ten reaches were desktop assessed, using aerial imagery to identify stream impacts. Stream impacts were recorded on one of eight electronic data collection forms, according to type: Stormwater Outfall, Utility, Trash and Debris, Stream Crossing, Severe Erosion, Impacted Buffer, Channel Modification, and Miscellaneous. For each impact, multiple photos were taken and location data (points for the single point data and lines for Erosion, Impacted Buffers, and Channel Modification) were collected using a handheld GPS unit. Overall reach conditions were detailed on a reach data form. The reach form included fields for average bank stability, in-stream habitat, riparian vegetation, flood plain connectivity, access, flow, and substrate throughout the entire reach.

Outfalls included all storm water and other discharge pipes. If an outfall was flowing (all field assessments were conducted at least 48 hours after the most recent rainfall) and/or had a suspicious odor or color, a grab sample of the effluent was taken and tested for ammonia nitrogen concentration. This allowed HVA to flag certain outfalls for additional investigation and potential pollution trackdown surveys. Utilities in the stream corridor include exposed pipes and sewers. Trash and debris was noted if the accumulation was greater than the average trash levels throughout the reach, and was quantified by estimated number of truck loads. All stream crossing (i.e., bridges, culverts) assessments were conducted using methods outlined by the North American Aquatic Connectivity Collaborative (NAACC). NAACC data forms include details on the overall crossing and on the structure itself. Channel modifications included channelized and concrete-lined sections of stream. Severe bank erosion was noted if the conditions were significantly worse than erosion throughout the entire reach. Impacted buffers were noted when a portion of the reach lacked a 25 foot wide naturally vegetated buffer. Impacted buffers included both areas of overgrown invasive and areas where turf lawn bordered the stream. Miscellaneous included all other impacts that did not fit in those categories, such as livestock presence or fish kills. Taken together, this data will allow HVA to identify and prioritize future restoration projects focusing on pollution reduction and overall improved water quality within the Still River watershed.

For planning and management purposes, the Still River watershed was divided into twelve sub-watersheds around the river main stem (Main Stem 1 to Main Stem 5) and tributaries (Lower Limekiln Brook, Upper Limekiln Brook, East Swamp Brook, Sympaug Brook, Padanaram Brook, Kohanza Brook, and Miry Brook; Appendix B, Still River Watershed Subwatershed Areas). The subsequent maps are organized at the scale of these management units. Each section is centered on a single subwatershed and includes the following maps:

1. Stream Impacts (i.e., support for aquatic life or recreation) at the subwatershed level
2. Status of the USA stream corridor assessments for each reach in that subwatershed
3. USA Stream Corridor Assessment Results by reach (one map per reach), showing all recorded impacts (i.e., outfall, trash, stream crossing, utility, severe erosion, impacted buffer, channel modification, and miscellaneous)
4. Impervious surface within the entire subwatershed
5. Public lands within the entire subwatershed
6. Soils parent material within the entire subwatershed
7. Aquifer protection zone and potential geology within the entire subwatershed
8. Natural Diversity Database (NDDB) areas within the entire subwatershed

This GIS analysis combined with the USA data has allowed HVA to narrow down to a select number of sites that present a greater potential for negative impact on water quality. The next step will be to conduct reconnaissance on these sites assessing further the impact of that location and allow HVA and stakeholders to prioritize restoration projects as part of the Still River Watershed Plan implementation.

## ACKNOWLEDGEMENTS

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*William Devlin*, Regional Historian, former Adjunct Instructor in Geography at Western Connecticut State University, and former member of the Wetlands Commissions of Brookfield and New Milford

*Marc Cohen*, Atlantic States Rural Water and Wastewater Association

*Jessica Leonard*, Graduate of Western Connecticut State University

## COMMENTS AND DISSEMINATION

This document, as with the entire watershed planning process, is intended to be iterative. Comments and feedback are not only suggested, but required as part of any comprehensive planning process. This document will go through two review sessions. Draft 1 has been reviewed by relevant experts, primarily Still River Partners members. This second draft is distributed to the public for review and comments made and available on the watershed plan website, [www.stillriverwatershed.org](http://www.stillriverwatershed.org).

Please go to the Existing Conditions Report section of the website and submit your comments in the comments section at the bottom of the page or send your suggestions to HVA by emailing Courteny Morehouse at [courtenymorehouse.hva@gmail.com](mailto:courtenymorehouse.hva@gmail.com). Thank you!



## ENDNOTES

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# Appendix A: Still River Watershed Inventory

August 20, 2018

Place	File Name	Date	Source	Author(s)	Type
Connecticut (Statewide)	<b>Physical and Natural Features</b>				
	Community Resource Inventory		<a href="http://clear.uconn.edu/projects/cri/cr_online/">http://clear.uconn.edu/projects/cri/cr_online/</a>	CT NEMO Program	Interactive Map
	Aquifer Protection Area Maps	12/28/2015	<a href="http://www.ct.gov/CT_DEEP/cwp/view.asp?a:">http://www.ct.gov/CT_DEEP/cwp/view.asp?a:</a>	CT DEEP	Map
	Surficial Aquifer Potential Map of Connecticut	March 2008	<a href="http://cteco.uconn.edu/map_catalog/maps/st">http://cteco.uconn.edu/map_catalog/maps/st</a>	Margaret A. Thomas, CT Geological and Natural History Survey; CT DEP Aquifer Protection Program	Map
	Delineating Recharge Areas for Stratified-Drift Aquifers in Connecticut with Geologic and Topographic Maps	1986	<a href="http://pubs.usgs.gov/wri/1983/4230/report.pdf">http://pubs.usgs.gov/wri/1983/4230/report.pdf</a>	Elinor H. Handman, USGS	Report
	Connecticut Highlands Technical Report - Documentation of the Regional Rainfall-Runoff Model	2010	<a href="http://pubs.usgs.gov/of/2010/1187/pdf/ofr20101187.pdf">http://pubs.usgs.gov/of/2010/1187/pdf/ofr20101187.pdf</a>	Elizabeth A. Ahearn and David M. Bjerklie (USGS, USFS)	Report
	Natural Drainage Basins in Connecticut	1991	<a href="http://cteco.uconn.edu/guides/Subregional_B">http://cteco.uconn.edu/guides/Subregional_B</a>	CT DEEP	Map
	What Climate Change Means for Connecticut	August 2016	<a href="https://19january2017snapshot.epa.gov/sites">https://19january2017snapshot.epa.gov/sites</a>	US EPA	Factsheet
	The Impacts of Climate Change on Connecticut Agriculture, Infrastructure, Natural Resources and Public Health	2010	<a href="http://www.ct.gov/CT_DEEP/lib/CT_DEEP/clir">http://www.ct.gov/CT_DEEP/lib/CT_DEEP/clir</a>	Subcommittee to the Governor's Steering Committee on Climate Change	Report
	Connecticut's Endangered, Threatened, and Special Concern Species 2015	2015	<a href="http://www.ct.gov/CT_DEEP/lib/CT_DEEP/wil">http://www.ct.gov/CT_DEEP/lib/CT_DEEP/wil</a>	CT DEEP	Report
	The Forests of Connecticut	2004	<a href="https://www.fs.fed.us/ne/newtown_square/pu">https://www.fs.fed.us/ne/newtown_square/pu</a>	USDA Forest Service	Report
	<b>Land Use, Recreation &amp; Population Characteristics</b>				
	Conservation and Development Policies: The Plan for Connecticut, 2013-2018	2013	<a href="http://www.ct.gov/opm/lib/opm/igp/org/cdupd">http://www.ct.gov/opm/lib/opm/igp/org/cdupd</a>	Office of Policy and Management	Plan
	2014 Connecticut Natural Hazards Mitigation Plan Update	January-2014	<a href="http://www.ct.gov/CT_DEEP/lib/CT_DEEP/wa">http://www.ct.gov/CT_DEEP/lib/CT_DEEP/wa</a>	CT DEEP; Dept of Emergency Services and Public Protection	Plan
	Impervious Land Cover and Water Quality webpage	1/9/2012	No longer published - closest approximate	CT DEEP	Webpage
	Transportation Related Mapping webpage	12/17/2015	<a href="http://www.ct.gov/dot/maps">www.ct.gov/dot/maps</a>	Connecticut Department of Transportation	Maps
	Land Use Organizations Available to Municipalities and Land Owners	February-2005	<a href="http://www.ctcouncilonsoilandwater.org/Land">http://www.ctcouncilonsoilandwater.org/Land</a>	State of Connecticut Council on Soil and Water Conservation	Directory
	<b>Waterbody and Watershed Conditions</b>				
	Integrated Water Quality Report Fact Sheet	2014 *Updated every 2 years	<a href="http://www.ct.gov/CT_DEEP/lib/CT_DEEP/wa">http://www.ct.gov/CT_DEEP/lib/CT_DEEP/wa</a>	CT DEEP	Factsheet
	State of CT 2016 Integrated Water Quality Report	January 2017 *Updated every 2 years	<a href="http://www.ct.gov/CT_DEEP/lib/CT_DEEP/water/wa">www.ct.gov/CT_DEEP/lib/CT_DEEP/water/wa</a>	CT DEEP	Report
	State TMDL Webpage		<a href="http://www.ct.gov/CT_DEEP/cwp/view.asp?a:">http://www.ct.gov/CT_DEEP/cwp/view.asp?a:</a>	CT DEEP	Webpage
	Connecticut Statewide Bacteria TMDL webpage	1/14/2015	<a href="http://www.ct.gov/CT_DEEP/cwp/view.asp?a:">http://www.ct.gov/CT_DEEP/cwp/view.asp?a:</a>	CT DEEP	Webpage
	Statewide Bacteria TMDL Fact Sheet	2011	<a href="http://www.ct.gov/CT_DEEP/lib/CT_DEEP/wa">http://www.ct.gov/CT_DEEP/lib/CT_DEEP/wa</a>	CT DEEP	TMDL
	Characteristics of Macroinvertebrate and Fish Communities from 30 Least Disturbed Streams in Connecticut	2011	Available electronically from HVA	Cristopher J. Bellucci, Mary Beckner, Mike Beauchene	Study

**Pollutant Sources and Management**

Connecticut Nonpoint Source Management Program Plan	September-2014	<a href="http://www.ct.gov/CTDEEP/lib/CTDEEP/wa/CTDEEP">http://www.ct.gov/CTDEEP/lib/CTDEEP/wa/CTDEEP</a>	Plans
Draft Stormwater Management Plan	February-2018	<a href="http://www.ct.gov/dot/lib/dot/documents/dpoli">http://www.ct.gov/dot/lib/dot/documents/dpoli</a>	Plans
Stormwater Pollution Management in Connecticut: Interactive Mapping Tool		- <a href="http://ctCTDEEP.maps.arcgis.com/apps/Map">http://ctCTDEEP.maps.arcgis.com/apps/Map</a>	Interactive Map
Toxics in Connecticut: A Town-by-Town Profile	4/1/2007	<a href="http://www.toxicsaction.org/sites/default/files/">http://www.toxicsaction.org/sites/default/files/</a>	Report
Stormwater and Water Quality Webpage		- <a href="http://www.ct.gov/CTDEEP/cwp/view.asp?a:">http://www.ct.gov/CTDEEP/cwp/view.asp?a:</a>	Webpage
Stormwater Planning Tool for Impervious Cover (Connecticut Watershed Response Plan for Impervious Cover)	7/21/2015	<a href="http://www.ct.gov/CTDEEP/cwp/view.asp?a:">http://www.ct.gov/CTDEEP/cwp/view.asp?a:</a>	Webpage
General Permit for the Discharge of Stormwater from Small Municipal Separate Storm Sewer Systems (MS4)	1/20/2016	<a href="http://www.ct.gov/CTDEEP/lib/CTDEEP/pe/CTDEEP">http://www.ct.gov/CTDEEP/lib/CTDEEP/pe/CTDEEP</a>	Permit
Municipal Stormwater (MS4) Webpage	9/21/2015	<a href="http://www.ct.gov/CTDEEP/cwp/view.asp?a:">http://www.ct.gov/CTDEEP/cwp/view.asp?a:</a>	Webpage
Toward a Virtual Elimination of Mercury from the Solid Waste Stream	March-2000	<a href="http://www.ct.gov/CTDEEP/lib/CTDEEP/me/DEP">http://www.ct.gov/CTDEEP/lib/CTDEEP/me/DEP</a>	Report
Northeast Regional Mercury Total Maximum Daily Load	10/24/2007	<a href="http://click.neiwpcc.org/mercury/mercury-doc">http://click.neiwpcc.org/mercury/mercury-doc</a>	Report
Sources of Mercury Deposition in the Northeast United States	March-2008	<a href="http://click.neiwpcc.org/mercury/mercury-doc">http://click.neiwpcc.org/mercury/mercury-doc</a>	Report
Tissue Contaminant Monitoring 2006-2010	2010	<a href="http://www.ct.gov/CTDEEP/lib/CTDEEP/wa/CTCTDEEP">http://www.ct.gov/CTDEEP/lib/CTDEEP/wa/CTCTDEEP</a>	Report
PCB Concentrations in Fishes from the Housatonic River, Connecticut, 1984–2014, and in Benthic Insects, 1978–2014	2016	<a href="https://semsub.epa.gov/work/01/592435.pdf">https://semsub.epa.gov/work/01/592435.pdf</a>	Report
Effects of Road Salt on Connecticut's Groundwater: A Statewide Centennial Perspective	2013	<a href="https://www.researchgate.net/publication/236">https://www.researchgate.net/publication/236</a>	Report
Chloride in Groundwater and Surface Water in Areas Underlain by the Glacial Aquifer System, Northern United States	2009	<a href="https://pubs.usgs.gov/sir/2009/5086/pdf/sir20">https://pubs.usgs.gov/sir/2009/5086/pdf/sir20</a>	Report
Increased Salination of Fresh Water in the Northeastern United States	9/20/2005	<a href="http://www.pnas.org/content/102/38/13517">http://www.pnas.org/content/102/38/13517</a>	Study
Winter Highway Maintenance Operations: Connecticut Road Salt Use in Connecticut: Understanding the Consequences of the Quest for Dry Pavement	July-2015	<a href="http://www.ctcase.org/reports/WinterHighway">http://www.ctcase.org/reports/WinterHighway</a>	Report
	2/14/2017	<a href="https://clear.uconn.edu/webinars/CLEARseries">https://clear.uconn.edu/webinars/CLEARseries</a>	Webinar

**Waterbody Monitoring Data**

CT CT DEEP Fish Community Data - Inland Waters	7/8/1905	<a href="http://cteco.uconn.edu/projects/fish/viewer/in">http://cteco.uconn.edu/projects/fish/viewer/in</a>	Interactive Map
Riffle Bioassessments by Volunteers Program (with interactive map)	5/8/2015	<a href="http://www.ct.gov/CTDEEP/cwp/view.asp?a:">http://www.ct.gov/CTDEEP/cwp/view.asp?a:</a>	Webpage

**News Articles**

Republican-American: Reclaiming the river: PCB money restores access, fisheries and riverbank, ending decades of neglect on the Housatonic River	9/1/2014	<a href="http://www.ct.gov/CTDEEP/lib/CTDEEP/nat">http://www.ct.gov/CTDEEP/lib/CTDEEP/nat</a>	News Article
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## Still River Watershed Region

### Physical and Natural Features

State of Connecticut Geological and Natural History Survey (Bulletin No. 30): Drainage Modifications and Glaciation in the Danbury Region	4/3/1905	Available electronically from HVA	Ruth Sawyer Harvey	Report
Still River Drainage and Glacial History	11/12/1971	<a href="http://pubs.usgs.gov/of/1971/0283/report.pdf">http://pubs.usgs.gov/of/1971/0283/report.pdf</a>	Woodrow Thompson	Report
Still River Middle Aquifer in Brookfield and Danbury		Available electronically from HVA	HVCEO	Report
Soil Survey of Fairfield County, Connecticut	6/3/1905	<a href="http://www.nrcs.usda.gov/Internet/FSE_MAN">http://www.nrcs.usda.gov/Internet/FSE_MAN</a>	USDA Soil Conservation Service, CT Agricultural Experimentation Station and Storrs Agricultural Experiment Station	Report
Customized Soil Report	11/15/2017	Available electronically from HVA	USDA and NRCS	Report/Map
Water Supply Resource Inventory: Resources by Municipality, Potential Interconnections to Danbury, and Potential Water Supply Watersheds	Accessed November-2015	Available electronically from HVA	Western Connecticut Council of Governments (WESTCOG)	Report
A Survey of Connecticut Streams and Rivers - Lower Housatonic River and Naugatuck River Drainages	1991 -		CT DEP Fisheries Division	-
Still River Watershed Subregional Basin Map	2010	Available electronically from HVA	HVA	Map
Flood Insurance Rate Maps (available by town)	2010	<a href="https://msc.fema.gov/portal">https://msc.fema.gov/portal</a>	FEMA	Maps
Fairfield County Report of Endangered, Threatened, or Special Concern Species	2015	<a href="http://www.ct.gov/CT_DEEP/lib/CT_DEEP/enr">http://www.ct.gov/CT_DEEP/lib/CT_DEEP/enr</a>	CT DEEP	Report

### Land Use, Recreation & Population Characteristics

Still River Land Use and Greenway Inventory Final Report	3/12/1998	Available in-house at HVA (Cornwall Bridge,	Fairfield County Soil and Water Conservation District	Report
Still River Watershed: 2006 Land Use Map	2010	Available from HVA	HVA	Map
A River Runs Through It	6/2/1996 - 9/29/1996	<a href="http://www.hvatoday.org/assets/PDFs/ARiver">http://www.hvatoday.org/assets/PDFs/ARiver</a>	Danbury Preservation Trust; History Department-Western Connecticut State University	History/Background
Still River Greenway Report	March-07	<a href="https://westcog.org/wp-content/uploads/2015">https://westcog.org/wp-content/uploads/2015</a>	Prepared for HVCEO by Kozuchowski Environmental Consulting	Report
Housatonic Valley Greenway and River Trail Management Plan	9/15/2006	<a href="https://westcog.org/wp-content/uploads/2015">https://westcog.org/wp-content/uploads/2015</a>	HVCEO	Plans
Appalachian Mountain Club Connecticut Chapter. Still River Trail		<a href="http://www.ct-amc.org/flatwater/StillRiver2.htm">http://www.ct-amc.org/flatwater/StillRiver2.htm</a>	Appalachian Mountain Club CT Division	Information
Still River Paddling Trail	2010	Available electronically from HVA	Connecticut Water Trails Association	Guide
Title VI Policy for Civil Rights, Environmental Justice, Limited English Proficiency, and Public Participation	Updated November 25, 2014	Available electronically from HVA	Housatonic Valley Metropolitan Planning Organization	Policy
Still River CT CT DEEP Fish Monitoring Results	December-2017	Available electronically from HVA	CT DEEP	Data

## Still River Watershed Region Cont'd

Still River CT CT DEEP Macroinvertebrate Results	December-2017	Available electronically from HVA	CT DEEP	Data
Hydrologic Modeling of the Still River Watershed: Proposal and Workplan	November-2003	Available electronically from HVA	USGS (Connecticut District)	Proposal
<b>Waterbody and Watershed Conditions</b>				
Housatonic River Basin Final Natural Resources Restoration Plan, Environmental Assessment, and Environmental Impact Evaluation for Connecticut	7/9/2016	<a href="http://www.fws.gov/newengland/pdfs/HousC1">http://www.fws.gov/newengland/pdfs/HousC1</a>	CT DEEP, USFWS, NOAA	Report
Still River Regional Basin TMDL Summary (Bacteria)	7/8/2010	<a href="http://www.hvatoday.org/assets/PDFs/stillfac">http://www.hvatoday.org/assets/PDFs/stillfac</a>	CT DEEP	TMDL
Still River Regional Basin TMDL Analysis (Recreational Uses): Final E. coliTMDL	7/8/2010	<a href="http://www.ct.gov/CT%20DEEP/lib/CT%20DEEP/wa">http://www.ct.gov/CT DEEP/lib/CT DEEP/wa</a>	CT DEEP	TMDL
Total Maximum Daily Load Analysis for Limekiln Brook, Danbury, CT	6/6/2002	<a href="http://www.ct.gov/CT%20DEEP/lib/CT%20DEEP/wa">http://www.ct.gov/CT DEEP/lib/CT DEEP/wa</a>	CT DEEP	TMDL
Connecticut Watershed Response Plan for Impervious Cover Appendix: Still River (CT6600) Summary	March-2015	<a href="http://www.ct.gov/CT%20DEEP/lib/CT%20DEEP/wa">http://www.ct.gov/CT DEEP/lib/CT DEEP/wa</a>	CT DEEP	Report
Source Water Assessment Report: Danbury Water Department, Margerie Lake Reservoir System	May-2003	<a href="http://www.dir.ct.gov/dph/Water/SWAP/Com">http://www.dir.ct.gov/dph/Water/SWAP/Com</a>	State of Connecticut Department of Public Health; CT DEP	Report
Housatonic River Basin Plan	10/18/1979	-	CT DEP Water Compliance and Hazardous Substances	-
FirstLight Power provides news of the lake level	10/20/2015	<a href="http://www.friendsofthelake.org/about/news_">http://www.friendsofthelake.org/about/news_</a>	Friends of Lake Lillinonah	News Article
Status Report to HVA	7/17/2015	Available from HVA	Friends of Lake Lillinonah	Report
Community Resource Inventory		<a href="http://nemo.uconn.edu/">http://nemo.uconn.edu/</a>	UConn CLEAR	Webpage
Flood Insurance Study: Fairfield County, Connecticut	10/16/2013	<a href="http://darientct.gov/filestorage/28565/28567/2">http://darientct.gov/filestorage/28565/28567/2</a>	FEMA	Study
<b>Pollutant Sources and Management</b>				
Still River Stormwater Management Study Final Report Draft	December-1995	Available in-house at HVA (Cornwall Bridge, Danbury)	Prepared by Dean Audet for the City of Danbury	Report
Housatonic River Basin Final Natural Resources Restoration Plan, Environmental Assessment, and Environmental Impact Evaluation for Connecticut	July-2009	<a href="http://www.fws.gov/newengland/pdfs/HousC1">http://www.fws.gov/newengland/pdfs/HousC1</a>	CT DEEP, USFWS, NOAA	Report
Position Paper: Nonpoint Source Management, Still River	Unknown	Available from HVA	Unknown	Report
<b>Waterbody Monitoring Data</b>				
Still River Watershed Data- Query of CT-CT DEEP Planning and Standards Database	3/20/2015	Available from HVA		Data
Still River Study Final Report: Determination of Influence by the Still River Tributary to the Water Quality of Lake Lillinonah	10/15/2004	<a href="http://friendsofthelake.org/downloads/pollutio">http://friendsofthelake.org/downloads/pollutio</a>	Prepared for Friends of the Lake by Hydro Technologies, Inc	Report
Unified Stream Assessment/Unified Subwatershed and Source Assessment Quality Assurance Project Plan (QAPP)	2015	Available from HVA	HVA	QAPP
PCB in Housatonic River Sediments in Massachusetts and Connecticut: Determination, Distribution, and Transport	1982	<a href="https://archive.org/stream/polychlorinatedb00">https://archive.org/stream/polychlorinatedb00</a>	CR Frink, BL Sawhney, KP Kulp, and CG Fredette	Report
PCB Concentration in Fishes From the Housatonic River, Connecticut, in 1984 to 1992	1993	<a href="https://semspub.epa.gov/work/01/592435.pdf">https://semspub.epa.gov/work/01/592435.pdf</a>	Division of Environmental Research	Report
<b>News Articles</b>				
Housatonic Current: Still River, Forgotten and Abused	1994	Available from HVA	Mark Massoud, Housatonic Current	News Article
The Danbury News-Times: Still River runs CT DEEP, and runs clean, finally	9/21/1997	Available from HVA	Dave Dunleavy	News Article
HVA Special Report: Still River, A River Rebounds!	2001	Available from HVA	Jack Kozuchowski	News
Hartford Courant: Mercury in the Water, Mad Hatters' Legacy	9/22/2002	<a href="http://articles.courant.com/2002-09-22/news/">http://articles.courant.com/2002-09-22/news/</a>	Daniel P. Jones	News Article
The News-Times: GE, state await word on Housatonic pollution	6/28/2015	<a href="http://www.newstimes.com/business/article/C">http://www.newstimes.com/business/article/C</a>	Hugh Bailey	News Article
The News-Times: Still River Runs Still	8/23/2011	<a href="http://www.newstimes.com/local/article/The-">http://www.newstimes.com/local/article/The-</a>	Robert Miller	News Article

**Physical and Natural Features**

Natural Resources Plan Map	http://www.bethel-ct.gov/filestorage/1190/136	Planimetrics	Map
Natural Diversity Data Base Areas (Endangered and threatened species)	September-2015	ftp://ftp.state.ct.us/pub/dep/gis/endangereds	CT DEEP
CT CT DEEP Fish Community Data	December-2017	Available from HVA	CT DEEP
CT CT DEEP Macroinvertebrate Data	December-2017	Available from HVA	CT DEEP
Aquifer Protection Areas	12/28/2015	http://cteco.uconn.edu/map_catalog/maps/to	CT DEEP
Subregional Basins and Surface Water Flow Directions	November-1999	http://clear.uconn.edu/images/pdfmaps/BETH	NEMO
Community Resource Inventory	2009	http://clear.uconn.edu/projects/cr/pdfs/all_00	CLEAR
Q3 Flood Zone Data Map	September-2010	http://cteco.uconn.edu/map_catalog/maps/to	CT DEP
Flood Insurance Rate Map	6/10/2010	Available from HVA	FEMA
			Connecticut Environmental Conditions
Map Catalog	Varies by map	http://cteco.uconn.edu/map_catalog.asp?tow	Online

**Land Use, Recreation & Population Characteristics**

Plan of Conservation and Development	2007	http://www.bethel-ct.gov/filestorage/1190/136	Planning and Zoning Commission	Plans
Plan of Development	1997	http://www.bethel-ct.gov/content/117/262/296	Planning and Zoning Commission	Plan
Hazard Mitigation Plan	November-2014	http://www.brookfieldct.gov/pages/Brookfield	Milone & MacBroom, Inc.	Plan
Franc Property Open Space: King's Mark Environmental Review Team Report	March-2013	http://www.ctert.org/pdfs/Bethel_FrancPrope	Prepared by the King's Mark Environmental Review Team for the Conservation Commission of Bethel, CT	Report
Protected Open Space map	August-2011	http://cteco.uconn.edu/map_catalog/maps/to	CT DEEP	Map
Transit Oriented Development Plan	10/28/2015	http://www.bethel-ct.gov/filestorage/1190/136	Joe Balskus, David Sousa (CDM Smith)	Presentation
Trout Stocking Map: East Swamp Brook	December-2011	http://www.ct.gov/CT DEEP/lib/CT DEEP/fist	CT DEEP	Map
Regulations: Wetlands and Watercourses	3/18/2014	http://www.ct.gov/csc/lib/csc/pendingproceec	Town of Bethel	Regulations
Regulations: Zoning Regulations	11/30/2012	http://www.bethel-ct.gov/filestorage/1190/136	Planning and Zoning Commission	Regulations
Regulations: Zoning Map	November-2014	http://www.bethel-ct.gov/filestorage/117/262/	Planning and Zoning Commission	Map
<b>Pollutant Sources and Management</b>				
Town of Bethel Water Quality and Stormwater Summary (MS4 Factsheet)		http://www.ct.gov/CT DEEP/lib/CT DEEP/wa	CT DEEP	Factsheet

## Physical and Natural Features

FEMA Floodplain Map - Plan of Conservation and Development	2015	<a href="https://www.brookfieldct.gov/sites/brookfieldct">https://www.brookfieldct.gov/sites/brookfieldct</a>	Planning Commission	Map
State of Connecticut DPH Joint Proceeding with DPU re: The Brookfield Option	6/24/2011	Available from HVA		
Natural Diversity Data Base Areas (Endangered and threatened species)	September-2015	<a href="ftp://ftp.state.ct.us/pub/dep/gis/endangeredsr">ftp://ftp.state.ct.us/pub/dep/gis/endangeredsr</a>	CT DEEP	Map
CT CT DEEP Fish Community Data	December-2017	Available from HVA	CT DEEP	Data
CT CT DEEP Macroinvertebrate Data	December-2017	Available from HVA	CT DEEP	Data
Aquifer Protection Areas	12/28/2015	<a href="http://cteco.uconn.edu/map_catalog/maps/to">http://cteco.uconn.edu/map_catalog/maps/to</a>	CT DEEP	Map
Subregional Basins and Surface Water Flow Directions	November-1999	<a href="http://clear.uconn.edu/images/pdfmaps/BRO">http://clear.uconn.edu/images/pdfmaps/BRO</a>	NEMO	Map
Map Catalog	Varies by Map	<a href="http://cteco.uconn.edu/map_catalog.asp?tow">http://cteco.uconn.edu/map_catalog.asp?tow</a>	Connecticut Environmental Conditions Online	Maps

## Land Use, Recreation & Population Characteristics

Plan of Conservation and Development	2015	<a href="https://www.brookfieldct.gov/sites/brookfieldct">https://www.brookfieldct.gov/sites/brookfieldct</a>	Planning Commission	Plan
Hazard Mitigation Plan	November-2014	<a href="http://www.brookfieldct.gov/pages/Brookfield">http://www.brookfieldct.gov/pages/Brookfield</a>	Milone & MacBroom	Plan
Parks and Recreation Update from the Director, re: Parks Revitalization Program	Fall 2015	<a href="http://www.brookfieldct.gov/Pages/Brookfield">http://www.brookfieldct.gov/Pages/Brookfield</a>	Town of Brookfield Parks and Recreation	Plan
Brookfield Parks Reinvestment Plan: Still River Greenway (Public Hearing)	10/20/2010	Available from HVA	Town of Brookfield Parks and Recreation	Presentation
Still River Greenway Phase II Project Description	12/20/2013	Available from HVA	Fuss & O'Neill	Plan
Four Corners: Brookfield Town Center District Revitalization Plan	September-2012	<a href="http://www.brookfieldct.gov/pages/Brookfield">http://www.brookfieldct.gov/pages/Brookfield</a>	Fitzgerald & Halliday, Inc.	Plan
<i>Regulations: Zoning Regulations</i>	Latest Revision: 3/6/2015	<a href="http://www.brookfieldct.gov/Pages/Brookfield">http://www.brookfieldct.gov/Pages/Brookfield</a>	Zoning Commission	Regulations
<i>Regulations: Brookfield Aquifer Protection District</i>		<a href="http://www.brookfieldct.gov/Pages/Brookfield">http://www.brookfieldct.gov/Pages/Brookfield</a>	Town of Brookfield	Regulations
<i>Regulations: Brookfield Inland Wetlands Commission Regulations</i>	12/22/2012	<a href="http://www.brookfieldct.gov/Pages/Brookfield">http://www.brookfieldct.gov/Pages/Brookfield</a>	Inland Wetlands Commission	Regulations
<i>Regulations: Watershed Protection Districts</i>	11/5/2013	<a href="http://www.brookfieldct.gov/Pages/Brookfield">http://www.brookfieldct.gov/Pages/Brookfield</a>	Planning and Zoning	Regulations

## Waterbody and Watershed Conditions

### Pollutant Sources and Management

Town of Brookfield Water Quality and Stormwater Summary (MS4 Factsheet)		- <a href="http://www.ct.gov/CT_DEEP/lib/CT_DEEP/wa">http://www.ct.gov/CT_DEEP/lib/CT_DEEP/wa</a>	CT DEEP	Factsheet
Stormwater Management Plan	July-2014	<a href="https://www.brookfieldct.gov/.../stormwater-n">https://www.brookfieldct.gov/.../stormwater-n</a>	Town of Brookfield	Plan
Stormwater Pollution Control Plan: Town Park, 460 Candlewood Lake Rd, Brookfield, CT	8/29/2014	<a href="http://www.ct.gov/CT_DEEP/lib/CT_DEEP/wa">http://www.ct.gov/CT_DEEP/lib/CT_DEEP/wa</a>	Municipal Building Committee	Plan
Waterbody Monitoring Data				
Still River At RT 7 At Brookfield Center, CT	6/16/2015	<a href="http://waterdata.usgs.gov/usa/nwis/uv?site_r">http://waterdata.usgs.gov/usa/nwis/uv?site_r</a>	USGS	Data
Report of Analysis: Pocono & Dean Road Streams	5/11/2012	Available from HVA	Hydro Technologies Inc.	Data

### News Articles

The News-Times: Bicycle Path Plan Gets a Thumbs-Up from HVCEO	3/18/2003	Available from HVA	Heather Barr	News Article
Brookfield Patch: Wetlands Commission Approves Bike Path	6/30/2010	<a href="http://patch.com/connecticut/brookfield/wetlands-commission-approves-bike-path">http://patch.com/connecticut/brookfield/wetlands-commission-approves-bike-path</a>		News Article
Brookfield Patch: Public Hearing Held on New Design for Bike Path	7/21/2010	<a href="http://patch.com/connecticut/brookfield/public">http://patch.com/connecticut/brookfield/public</a>	Debra Siepmann	News Article
Brookfield Patch: Planning Commission Recommends Still River Greenway	8/22/2010	<a href="http://patch.com/connecticut/brookfield/plann">http://patch.com/connecticut/brookfield/plann</a>	Aaron Boyd	News Article
The News-Times: Don't Bank on Cleanup	8/7/2014	Available from HVA	Nanci G. Hutson	News Article

## Physical and Natural Features

Evaluation of Drainage Conditions in the Immediate Watershed of Kenosia Lake, Danbury, CT	2001	Copies available in-house through CT DEEP ENSR	Report
Natural Diversity Data Base Areas (Endangered and threatened species)	September-2015	<a href="ftp://ftp.state.ct.us/pub/dep/gis/endangeredst">ftp://ftp.state.ct.us/pub/dep/gis/endangeredst</a>	CT DEEP Map
CT CT DEEP Fish Community Data	December-2017	Available from HVA	CT DEEP Data
CT CT DEEP Macroinvertebrate Data	December-2017	Available from HVA	CT DEEP Data
Aquifer Protection Areas	12/28/2015	<a href="http://cteco.uconn.edu/maps/town/apasmall/">http://cteco.uconn.edu/maps/town/apasmall/</a>	CT DEEP Map
Subregional Basins and Surface Water Flow Directions	November-1999	<a href="http://clear.uconn.edu/images/pdfmaps/DANI">http://clear.uconn.edu/images/pdfmaps/DANI</a>	NEMO Map
Map Catalog	Varies by Map	<a href="http://cteco.uconn.edu/map_catalog.asp?tow">http://cteco.uconn.edu/map_catalog.asp?tow</a>	Connecticut Environmental Conditions Online Map

## Land Use, Recreation & Population Characteristics

Plan of Conservation and Development	Amended 2013	<a href="http://3ezdec3429u12dn5003td6zh.wpengine">http://3ezdec3429u12dn5003td6zh.wpengine</a>	City of Danbury Planning Commission	Plans
Comprehensive Planning Program 2002: Environmental Protection (Planning Studies)	2002	Available from HVA	Mayor: M.D. Boughton; City of Danbury Planning Commission	Plan
Natural Hazard Mitigation Plan	2007-2010	<a href="http://www.ct.gov/CTDEEP/lib/CTDEEP/wa">http://www.ct.gov/CTDEEP/lib/CTDEEP/wa</a>	DEP Inland Water Resources Division with assistance from FEMA and The Connecticut Department of Emergency Management and Homeland Security	Plan
Still River Property Owners and Tax Assessors Maps	1974	Available in-house at HVA (Cornwall Bridge, CT)		Map
Trout Stocking Map	2011	<a href="http://www.ct.gov/CTDEEP/lib/CTDEEP/fist">http://www.ct.gov/CTDEEP/lib/CTDEEP/fist</a>	CT DEEP	Map
Regualtions:Planning and Zoning Regulations	Amended 10/19/2015	<a href="http://www.ci.danbury.ct.us/content/21015/21">http://www.ci.danbury.ct.us/content/21015/21</a>	City of Danbury Zoning Commission	Regulations
Regulations: Zoning Map	11/30/2015	<a href="https://www.danbury-ct.gov/danbury-zoning-r">https://www.danbury-ct.gov/danbury-zoning-r</a>	Sewall	Map
Regualtions:Zoning Regulations Section 7.A. Floodplain Zones	Amended 10/19/2015	Available from HVA	City of Danbury Zoning Commission	Regulations
Regualtions:Zoning Regulations Section 7.C Public Water Supply Watershed Protection Zones, and 7.D. Aquifer Protection Zones	Amended 10/19/2015	Available from HVA	City of Danbury Zoning Commission	Regulations
Regulations:Zoning Regulations Section 8.A. Erosion and Sedimentation Controls	Amended 10/19/2015	Available from HVA	City of Danbury Zoning Commission	Regulations
Regulations:Inland Wetlands Regulations	January-1992	<a href="http://3ezdec3429u12dn5003td6zh.wpengine">http://3ezdec3429u12dn5003td6zh.wpengine</a>	Department of Environmental Protection of the State of Connecticut	Regulations
Regualtions:City of Danbury Aquifer Protection Area Regulations	2/25/2011	<a href="http://3ezdec3429u12dn5003td6zh-wpengine">http://3ezdec3429u12dn5003td6zh-wpengine</a>	Planning Commission	Regulations
Regualtions:City of Danbury Stormwater Management Regulation Compliance		<a href="http://rrstormwater.com/city-danbury-stormw">http://rrstormwater.com/city-danbury-stormw</a>	Restoration Recovery	Regulations
Regualtions:Instructions for Developing a Stormwater Management Plan for Regulated Activities in the City of Danbury	February-2013	<a href="http://3ezdec3429u12dn5003td6zh-wpengine">http://3ezdec3429u12dn5003td6zh-wpengine</a>	City of Danbury Aquifer Protection Agency	Regulations

## Waterbody and Watershed Conditions

Diagnostic/Feasibility Study of Kenosia Lake Danbury	2000	Copies available in-house through CT DEEP ENSR	Report
Investigation of Baseline Stormwater Loadings of Nutrients to Lake Kenosia	7/3/2005	<a href="https://water.usgs.gov/wrri/AnnualReports/2C">https://water.usgs.gov/wrri/AnnualReports/2C</a> PI: Theodora Pinou	Report
A TMDL Analysis for Kenosia Lake in Danbury, CT	7/23/2004	<a href="http://www.ct.gov/CTDEEP/lib/CTDEEP/wa">http://www.ct.gov/CT DEEP/lib/CT DEEP/wa</a> Connecticut Department of Energy and Environmental Protection	TMDL

Danbury Cont'd	Evaluation of the Impact of Phosphorous Removal at the Danbury, Connecticut Sewage Treatment Plant on Water Quality in Lake Lillinonah	Revised 6/25/1981 Available from HVA	Anne Jones and Fred Lee	Report
	Still River Watershed Management Study for Danbury		Fuss & O'Neill	Study
	<b>Pollutant Sources and Management</b>			
	City of Danbury Water Quality and Stormwater Summary (MS4 Factsheet)	<a href="http://www.ct.gov/CT_DEEP/lib/CT_DEEP/wa/CT_DEEP">http://www.ct.gov/CT_DEEP/lib/CT_DEEP/wa/CT_DEEP</a>		Factsheet
	Mercury in Housatonic River and Still River Sediments: A Legacy of Danbury (CT) Hatmaking	3/29/2003 <a href="https://gsa.confex.com/gsa/2003NE/finalprog">https://gsa.confex.com/gsa/2003NE/finalprog</a>	Billo Jallow et al.	Abstract
	The Mad Hatter Mercury Mystery	10/8/2002 <a href="http://digitalcommons.uconn.edu/cgi/viewcon">http://digitalcommons.uconn.edu/cgi/viewcon</a>	Peg Van Patten	Article
	<b>Waterbody Monitoring Data</b>			
	Nutrient-Algal Relationships in Lake Lillinonah, Danbury, CT	1975 <a href="https://nepis.epa.gov/Exe/ZyNET.exe/9101Y">https://nepis.epa.gov/Exe/ZyNET.exe/9101Y</a>	EPA Office of Enforcement	Report
	Exploratory Water Quality Study of Still River in Danbury, Connecticut	January-2001 Available from HVA	Marvelwood School (Kent, CT) Aquatic Ecology Class	Study
	<b>News Articles</b>			
	The News-Times: State coughs up cash to reclaim Still River shore	10/16/1995 Available from HVA	Dave Dunleavy	News Article
	The News-Times: Weekend events will celebrate revitalized, thriving Still River	6/2/2010 Available from HVA	Robert Miller	News Article
	The News-Times: Danbury to Open Still River Greenway with a Splash	6/10/2010 <a href="http://www.newstimes.com/news/article/Dant">http://www.newstimes.com/news/article/Dant</a>	Dirk Perrefort	News Article
	The News-Times: 2011 Still River Greenway Day	6/4/2011 <a href="http://www.newstimes.com/local/article/2011">http://www.newstimes.com/local/article/2011</a>	Unknown	News Article
	Danbury Patch: Eye on Danbury: Still River Still Runs CT DEEP	6/5/2011 <a href="http://patch.com/connecticut/danbury/eye-on">http://patch.com/connecticut/danbury/eye-on</a>	Christine Rose	News Article
	The News-Times: Tree clearing spruces up Still River	10/21/2002 Available from HVA	Mark Langlois	News Article
	The News-Times: Six straight days of rain couldn't dampen spirits	10/15/1995 Available from HVA	Dave Dunleavy	News Article
	The News-Times: Danbury granted \$40,000 for Still River restoration	7/31/1996 Available from HVA	Elizabeth Hamilton	News Article
	The New York Times: When Danbury shackled the Still River	8/27/1996 <a href="https://www.nytimes.com/1996/08/25/nyregio">https://www.nytimes.com/1996/08/25/nyregio</a>	Alberta Eiseman	News Article
	The News-Times: Flooding causes widespread damage throughout Danbury area	3/8/2011 <a href="http://www.newstimes.com/news/article/Floor">http://www.newstimes.com/news/article/Floor</a>	Robert Miller	News Article
	The New York Times: A Danbury Landfill Plagues Its Neighbors	2/2/1997 <a href="https://www.nytimes.com/1997/02/02/nyregio">https://www.nytimes.com/1997/02/02/nyregio</a>	Wayne D'Orio	News Article
	The News-Times: Officials dispute mercury threat	9/24/2002 Available from HVA	Robert Miller	News Article
New Fairfield	<b>Physical and Natural Features</b>			
	Natural Diversity Data Base Areas (Endangered and threatened species)	December-2017 <a href="ftp://ftp.state.ct.us/pub/dep/gis/endangeredsp">ftp://ftp.state.ct.us/pub/dep/gis/endangeredsp</a>	CT DEEP	Map
	Subregional Basins and Surface Water Flow Directions	November-1999 <a href="http://clear.uconn.edu/images/pdfmaps/NEW_NEMO">http://clear.uconn.edu/images/pdfmaps/NEW_NEMO</a>		Map
	Map Catalog	Varies by Map <a href="http://cteco.uconn.edu/map_catalog.asp?tow">http://cteco.uconn.edu/map_catalog.asp?tow</a>	Connecticut Environmental Conditions Online	Maps
	<b>Land Use, Recreation &amp; Population Characteristics</b>			
	Plan of Conservation and Development	10/15/2014 <a href="https://07cbdd2-a-c0154be5-s-sites.google">https://07cbdd2-a-c0154be5-s-sites.google</a>	Town of New Fairfield Planning Commission	Plan
	Protected Open Space in New Fairfield	August-2011 <a href="http://cteco.uconn.edu/maps/town/ProtOpen">http://cteco.uconn.edu/maps/town/ProtOpen</a>	CT DEEP	Map
	Regulations: Zoning Regulations	September-2014 <a href="https://07cbdd2-a-c0154be5-s-sites.google">https://07cbdd2-a-c0154be5-s-sites.google</a>	Town of New Fairfield	Regulations
	Regulations: Inland Wetlands and Watercourses Regulations	8/16/2000 <a href="https://07cbdd2-a-c0154be5-s-sites.google">https://07cbdd2-a-c0154be5-s-sites.google</a>	Inland Wetlands Agency of New Fairfield	Regulations
	<b>Waterbody and Watershed Conditions</b>			
	<b>Pollutant Sources and Management</b>			
	Town of New Fairfield Water Quality and Stormwater Summary (MS4 Factsheet)	<a href="http://www.ct.gov/CT_DEEP/lib/CT_DEEP/wa/CT_DEEP">http://www.ct.gov/CT_DEEP/lib/CT_DEEP/wa/CT_DEEP</a>		Factsheet



**Physical and Natural Features**

Natural Diversity Data Base Areas (Endangered and threatened species)	September-2015	<a href="ftp://ftp.state.ct.us/pub/dep/gis/endangeredsp">ftp://ftp.state.ct.us/pub/dep/gis/endangeredsp</a>	CT DEEP	Map
CT CT DEEP Fish Community Data	December-2017	Available from HVA	CT DEEP	Data
Northern Long-Eared Bat	February-2016	<a href="http://www.ct.gov/CT%20DEEP/lib/CT%20DEEP/en">http://www.ct.gov/CT DEEP/lib/CT DEEP/en</a>	CT DEEP	Map
Aquifer Protection Areas	3/23/2018	<a href="http://cteco.uconn.edu/maps/town/apasmall/">http://cteco.uconn.edu/maps/town/apasmall/</a>	CT DEEP	Map
Subregional Basins and Surface Water Flow Directions	November-1999	<a href="http://clear.uconn.edu/images/pdfmaps/NEW%20NEMO">http://clear.uconn.edu/images/pdfmaps/NEW NEMO</a>		Map
Community Resource Inventory	2009	<a href="http://clear.uconn.edu/projects/cr/pdfs/all_09">http://clear.uconn.edu/projects/cr/pdfs/all_09</a>	CLEAR	Map
Map Catalog	Varies by Map	<a href="http://cteco.uconn.edu/map_catalog.asp?tow">http://cteco.uconn.edu/map_catalog.asp?tow</a>	Connecticut Environmental Conditions Online	Maps
New Milford Natural Resources Inventory	2002	<a href="http://www.ci.milford.ct.us/sites/milfordct/files">http://www.ci.milford.ct.us/sites/milfordct/files</a>	Bartley Block	Report

**Land Use, Recreation & Population Characteristics**

Plan of Conservation and Development	8/6/2010	<a href="http://www.newmilford.org/filestorage/3088/5">http://www.newmilford.org/filestorage/3088/5</a>	New Milford Planning Commission	Plan
Hazard Mitigation Plan		(Still in Development)		
Project Narrative: Engineering and Environmental Assessment for Proposed Golf Course Renovations at the Candlewood Valley Country Club, Danbury and Erickson Roads, New Milford, CT	October-1990	Available in-house at HVA (Cornwall Bridge, Land Engineering Associates, Inc.		Report
Town GIS Map (Layers: Zoning, Hazard Mitigation, Land Conservation, Natural Resource Protection, Water Resource Protection, etc.)	Variable by layer	<a href="https://newmilfordct.mapgeo.io/?latlng=41.58">https://newmilfordct.mapgeo.io/?latlng=41.58</a>	Kathy Conway, New Milford Town Assessor	Interactive Map
<i>Regulations:Erosion and Sediment Control Regulations</i>	Effective 1/14/2000	<a href="http://www.newmilford.org/filestorage/3088/3">http://www.newmilford.org/filestorage/3088/3</a>	Zoning Commission of the Town of New Milford	Regulations
<i>Regulations:Zoning Regulations</i>	6/24/2014	<a href="http://www.newmilford.org/content/3088/315">http://www.newmilford.org/content/3088/315</a>	Zoning Department of the town of New Milford	Regulations
<i>Regulations:Inland Wetlands and Watercourses Regulations</i>	3/6/2010	<a href="http://www.newmilford.org/filestorage/3088/3">http://www.newmilford.org/filestorage/3088/3</a>	Inland Wetlands Commission	Regulations
<i>Regulations:Aquifer Protection Regulations</i>	2/28/2012	<a href="http://www.newmilford.org/filestorage/3088/4">http://www.newmilford.org/filestorage/3088/4</a>	Aquifer Protection Agency of New Milford	Regulations

**Waterbody and Watershed Conditions****Pollutant Sources and Management**

Town of New Milford Water Quality and Stormwater Summary (MS4 Factsheet)		<a href="http://www.ct.gov/CT%20DEEP/lib/CT%20DEEP/wa">http://www.ct.gov/CT DEEP/lib/CT DEEP/wa</a>	CT DEEP	Factsheet
Annual Monitoring Reports for MS4 Stormwater, 2011-2012	December-2012	<a href="http://www.newmilford.org/filestorage/3012/5">http://www.newmilford.org/filestorage/3012/5</a>	New Milford Public Works	Report

**News Articles**

Is hat industry's mercury an issue? State lacks resources for New Milford investigation	12/6/2002	Available from HVA	Asa Fitch	News Article
Mercury concerns discussed: Officials may seek grants to conduct investigation	12/13/2002	Available from HVA	Asa Fitch	News Article

Newtown	<b>Physical and Natural Features</b>			
	Natural Diversity Data Base Areas (Endangered and threatened species)	December-2017	<a href="ftp://ftp.state.ct.us/pub/dep/gis/endangereddsr">ftp://ftp.state.ct.us/pub/dep/gis/endangereddsr</a>	CT DEEP Map
	Aquifer Protection Areas	3/23/2018	<a href="http://cteco.uconn.edu/maps/town/apasmall/t">http://cteco.uconn.edu/maps/town/apasmall/t</a>	CT DEEP Map
	Subregional Basins and Surface Water Flow Directions	November-1999	<a href="http://clear.uconn.edu/images/pdfmaps/NEW">http://clear.uconn.edu/images/pdfmaps/NEW</a>	NEMO Map
	Map Catalog	Varies by Map	<a href="http://cteco.uconn.edu/map_catalog.asp?tow">http://cteco.uconn.edu/map_catalog.asp?tow</a>	Online Maps
	Natural Resources Inventory	October-2012	<a href="http://www.newtownconservation.org/upload">http://www.newtownconservation.org/upload</a>	Town of Newtown Inventory
	<b>Land Use, Recreation &amp; Population Characteristics</b>			
	Plan of Conservation and Development	2014	<a href="http://www.newtown-ct.gov/sites/newtownct/f">http://www.newtown-ct.gov/sites/newtownct/f</a>	Town of Newtown Plan
	Parks and Rec Activity Sites	10/9/2007	<a href="http://www.newtown-ct.gov/sites/newtownct/f">http://www.newtown-ct.gov/sites/newtownct/f</a>	Town of Newtown Map
	Parks and Open Space Resources	2004 Update	<a href="http://www.newtown-ct.gov/sites/newtownct/f">http://www.newtown-ct.gov/sites/newtownct/f</a>	Town of Newtown Map
	Future Land Use	2005 Update	<a href="http://www.newtown-ct.gov/public_document">http://www.newtown-ct.gov/public_document</a>	Town of Newtown Map
	Natural Resource Areas for Open Space Consideration	2006 Update	<a href="http://www.newtown-ct.gov/sites/newtownct/f">http://www.newtown-ct.gov/sites/newtownct/f</a>	Town of Newtown Map
	<i>Regulations: Zoning Regulations</i>	Updated January 2018	<a href="http://www.newtown-ct.gov/sites/newtownct/f">http://www.newtown-ct.gov/sites/newtownct/f</a>	Zoning Commission Regulations
	<i>Regulations: Inland Wetlands and Watercourses Regulations</i>	Latest Amendment: 11/14/2012	<a href="http://www.newtown-ct.gov/sites/newtownct/f">http://www.newtown-ct.gov/sites/newtownct/f</a>	Newtown Inland Wetlands Commission of Regulations
	<i>Regulations: Aquifer Protection Area Regulations</i>	Adopted: 9/19/2012	<a href="http://www.newtown-ct.gov/sites/newtownct/f">http://www.newtown-ct.gov/sites/newtownct/f</a>	Aquifer Protection Agency of Newtown Regulations
	<b>Pollutant Sources and Management</b>			
	Newtown Technology Plan: Stormwater Management Report	11/9/2010	<a href="http://newtown.org/wp-content/uploads/2015/">http://newtown.org/wp-content/uploads/2015/</a>	Newtown Economic Development Commission Plan
	Town of Newtown Water Quality and Stormwater Summary (MS4 Factsheet)		<a href="http://www.ct.gov/CT_DEEP/lib/CT_DEEP/wa">http://www.ct.gov/CT_DEEP/lib/CT_DEEP/wa</a>	CT DEEP Factsheet

## Physical and Natural Features

Natural Diversity Data Base Areas (Endangered and threatened species)	December-2017	<a href="ftp://ftp.state.ct.us/pub/dep/gis/endangeredsp">ftp://ftp.state.ct.us/pub/dep/gis/endangeredsp</a>	CT DEEP	Map
Subregional Basins and Surface Water Flow Directions	November-1999	<a href="http://clear.uconn.edu/images/pdfmaps/REDI">http://clear.uconn.edu/images/pdfmaps/REDI</a>	NEMO	Map
Map Catalog	Varies by Map	<a href="http://cteco.uconn.edu/map_catalog.asp?tow">http://cteco.uconn.edu/map_catalog.asp?tow</a>	Connecticut Environmental Conditions Online	Maps
Land Use Map	2008	<a href="http://townofreddingct.org/wp-content/upload">http://townofreddingct.org/wp-content/upload</a>	Town of Redding	Map
Areas of Natural Constraint Map	2008	<a href="http://townofreddingct.org/wp-content/upload">http://townofreddingct.org/wp-content/upload</a>	John Hayes, Consultant	Map

## Land Use, Recreation & Population Characteristics

Plan of Conservation and Development	2008	<a href="http://townofreddingct.org/app/uploads/2014/">http://townofreddingct.org/app/uploads/2014/</a>	Redding Planning Commission	Plan
Open Space Plan	2008	<a href="http://townofreddingct.org/app/uploads/2014/">http://townofreddingct.org/app/uploads/2014/</a>	Redding Conservation Commission	Plan
Open Space Map	2008	<a href="http://townofreddingct.org/wp-content/upload">http://townofreddingct.org/wp-content/upload</a>	Town of Redding	Map
Conservation and Development Map (refer to Plan of Conservation and Development)	2008	<a href="http://townofreddingct.org/wp-content/upload">http://townofreddingct.org/wp-content/upload</a>	John Hayes, Consultant	Map
Significant Historic and Cultural Sites (refer to Plan of Conservation & Development)	2008	<a href="http://townofreddingct.org/wp-content/upload">http://townofreddingct.org/wp-content/upload</a>	John Hayes, Consultant	Map
Public Facilities and Utilities Map (refer to Plan of Conservation & Development)	2008	<a href="http://townofreddingct.org/wp-content/upload">http://townofreddingct.org/wp-content/upload</a>	John Hayes, Consultant	Map
Greenbelts Map (refer to Open Space Plan)	2008	<a href="http://townofreddingct.org/wp-content/upload">http://townofreddingct.org/wp-content/upload</a>	John Hayes, Consultant	Map
Storm Water Management Plan	2/5/2007	<a href="http://townofreddingct.org/app/uploads/2015/">http://townofreddingct.org/app/uploads/2015/</a>	Dennis Paul Tobin, Ph.D; Assistant Zoning Enforcement/Wetlands Officer	Plan
<i>Regulations: Zoning Regulations</i>	7/30/2014	<a href="http://townofreddingct.org/app/uploads/2015/">http://townofreddingct.org/app/uploads/2015/</a>	Zoning Commission	Regulations
<i>Regulations: Inland Wetlands and Watercourses Regulations</i>	4/25/2013	<a href="http://townofreddingct.org/wp-content/upload">http://townofreddingct.org/wp-content/upload</a>	Redding Conservation Commission	Regulations

## Waterbody and Watershed Conditions

USGS Stream Flow Data: Saugatuck River	-	<a href="http://waterdata.usgs.gov/ct/nwis/inventory/?">http://waterdata.usgs.gov/ct/nwis/inventory/?</a>	USGS	Webpage
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## Pollutant Sources and Management

Town of Redding Water Quality and Stormwater Summary		<a href="http://www.ct.gov/CT_DEEP/lib/CT_DEEP/wa">http://www.ct.gov/CT_DEEP/lib/CT_DEEP/wa</a>	CT DEEP	Factsheet
Stormwater Management Plan for Redding, Connecticut	Varies	<a href="http://townofreddingct.org/government/servic">http://townofreddingct.org/government/servic</a>	Zoning Department	Plan

Ridgefield	<b>Physical and Natural Features</b>				
	Town of Ridgefield Natural Resource Inventory	April-2012	<a href="https://www.ridgefieldct.org/sites/ridgefieldct/">https://www.ridgefieldct.org/sites/ridgefieldct/</a>	Michael W. Klemens, Eric R. Davison, Benjamin K. Oko	Inventory
	Natural Diversity Data Base Areas (Endangered and threatened species)	12/1/2017	<a href="ftp://ftp.state.ct.us/pub/dep/gis/endangeredsp">ftp://ftp.state.ct.us/pub/dep/gis/endangeredsp</a>	CT DEEP	Map
	Aquifer Protection Areas	3/23/2018	<a href="http://cteco.uconn.edu/maps/town/apasmall/f">http://cteco.uconn.edu/maps/town/apasmall/f</a>	CT DEEP	Map
	Map Catalog	Varies by Map	<a href="http://cteco.uconn.edu/map_catalog.asp?tow">http://cteco.uconn.edu/map_catalog.asp?tow</a>	Connecticut Environmental Conditions Online	Maps
	<b>Land Use, Recreation &amp; Population Characteristics</b>				
	Plan of Conservation and Development	Effective 8/16/2010	<a href="https://www.ridgefieldct.org/planning-and-zor">https://www.ridgefieldct.org/planning-and-zor</a>	Planning and Zoning Commission	Plans
	<i>Regulations:Zoning Regulations</i>	Effective 5/1/2007	<a href="http://www.ridgefieldct.org/content/46/78/179">http://www.ridgefieldct.org/content/46/78/179</a>	Planning and Zoning Commission	Regulations
	<i>Regulations:Special Zones</i>	4/2/2010	<a href="https://www.ridgefieldct.org/sites/ridgefieldct/">https://www.ridgefieldct.org/sites/ridgefieldct/</a>	Planning and Zoning	Regulations
	<i>Regulations:Inland Wetlands and Watercourses Regulations</i>	Effective January 1995, amended 2018	<a href="https://www.ridgefieldct.org/sites/ridgefieldct/">https://www.ridgefieldct.org/sites/ridgefieldct/</a>	The Inland Wetlands Board	Regulations
	<b>Waterbody and Watershed Conditions</b>				
	<b>Pollutant Sources and Management</b>				
	Town of Ridgefield Draft Annual Report 2011: General Permit MS4	December-2011	<a href="http://ridgefieldct.qscend.com/filestorage/46/86/13">ridgefieldct.qscend.com/filestorage/46/86/13</a>	Town of Ridgefield	Report
	Town of Ridgefield Water Quality and Stormwater Summary (MS4 Factsheet)		<a href="http://www.ct.gov/CT_DEEP/lib/CT_DEEP/wa">http://www.ct.gov/CT_DEEP/lib/CT_DEEP/wa</a>	CT DEEP	Factsheet
	<b>Waterbody Monitoring Data</b>				
	USGS Stream Flow Data: Ridgefield Brook at Shields Lane	-	<a href="http://waterdata.usgs.gov/ct/nwis/inventory/?">http://waterdata.usgs.gov/ct/nwis/inventory/?</a>	USGS	Webpage

## **APPENDIX B: STILL RIVER WATERSHED MAPS**

### **List of Maps**

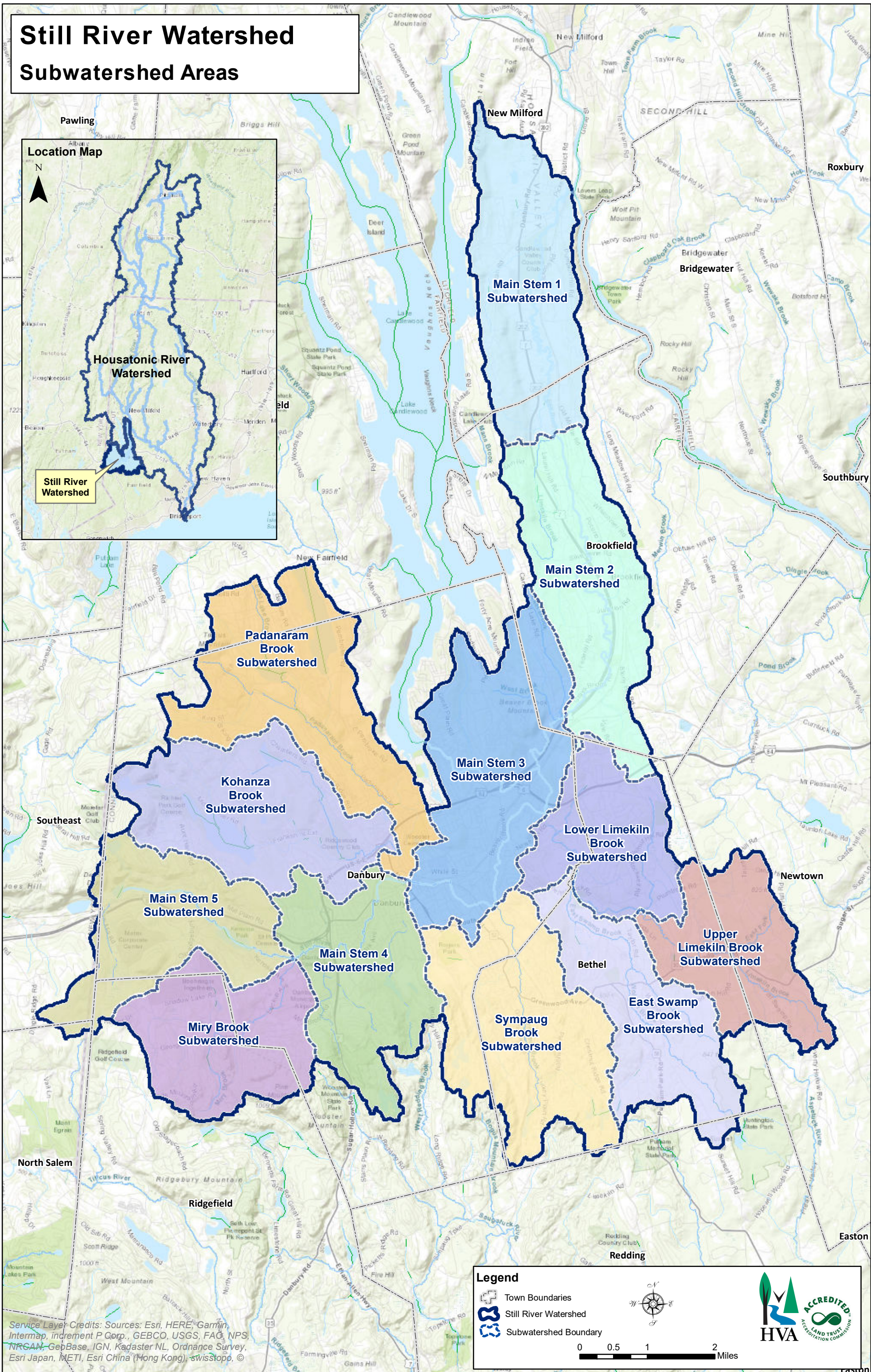
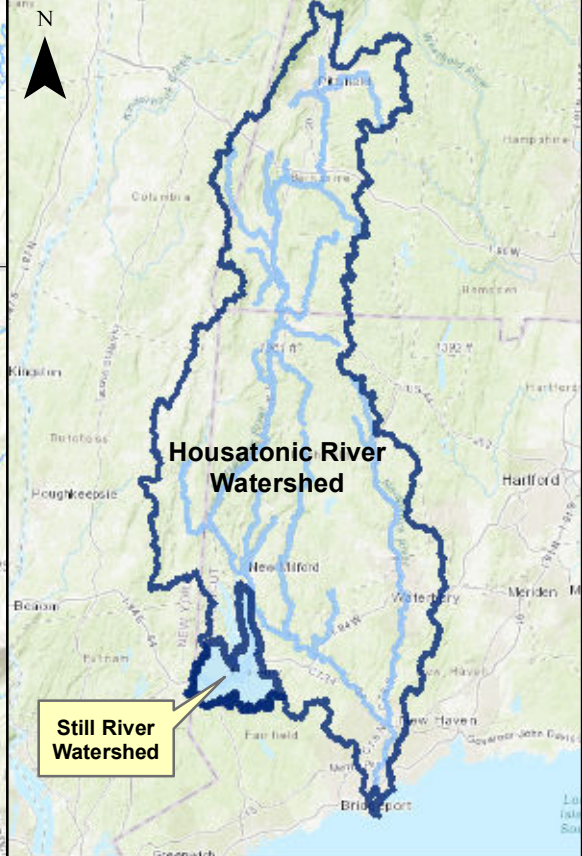
- Map 1 - Watershed: Subwatersheds
- Map 2 - Soils
- Map 3 - Impaired Streams
- Map 4 - Aquifer Protection Zone and Potential Geography
- Map 5 - Landcover
- Map 6 - FEMA Flood Hazard Zones
- Map 7 - Natural Diversity Database
- Map 8 - Public Lands and Open Space



# Still River Watershed

## Subwatershed Areas

Location Map



### Legend

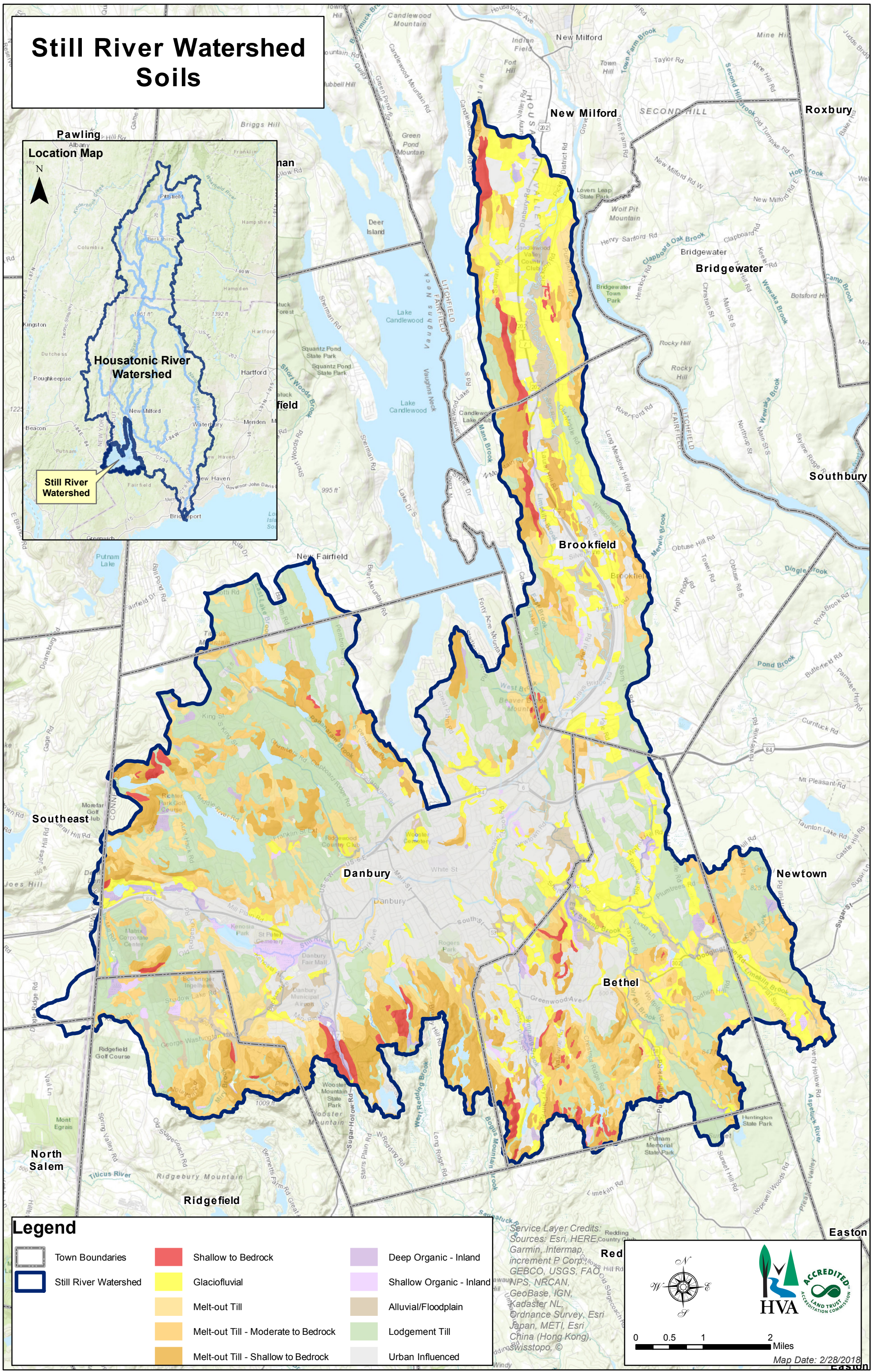
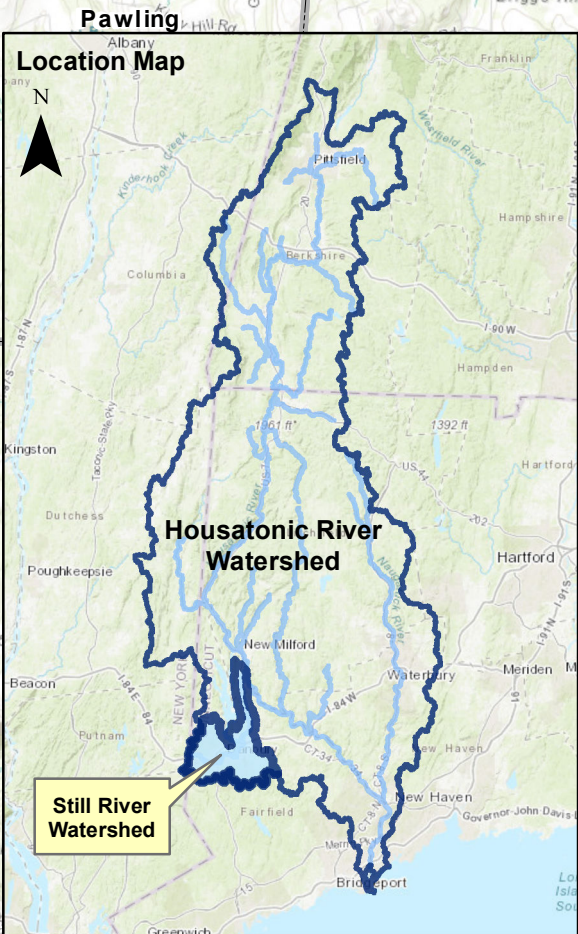
- Town Boundaries
- Still River Watershed
- Subwatershed Boundary



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeBCo, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, ©



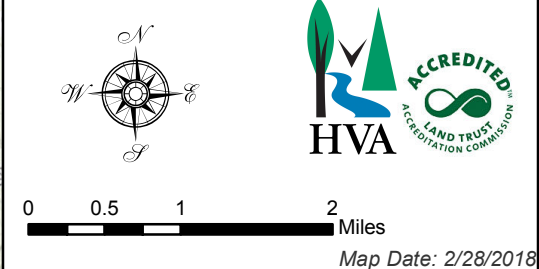
# Still River Watershed Soils



## Legend

	Town Boundaries		Shallow to Bedrock		Deep Organic - Inland
	Still River Watershed		Glaciofluvial		Shallow Organic - Inland
			Melt-out Till		Alluvial/Floodplain
			Melt-out Till - Moderate to Bedrock		Lodgement Till
			Melt-out Till - Shallow to Bedrock		Urban Influenced

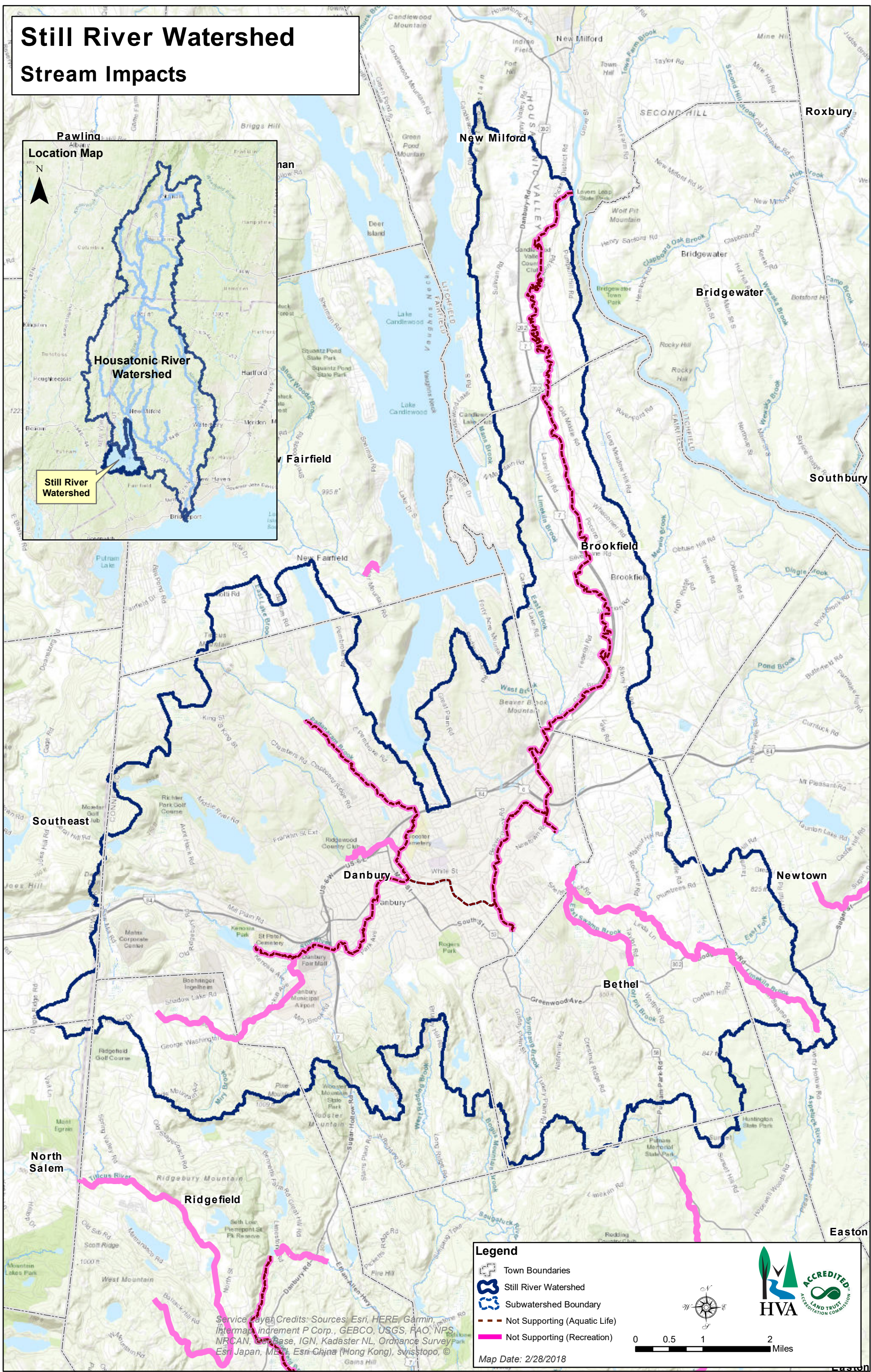
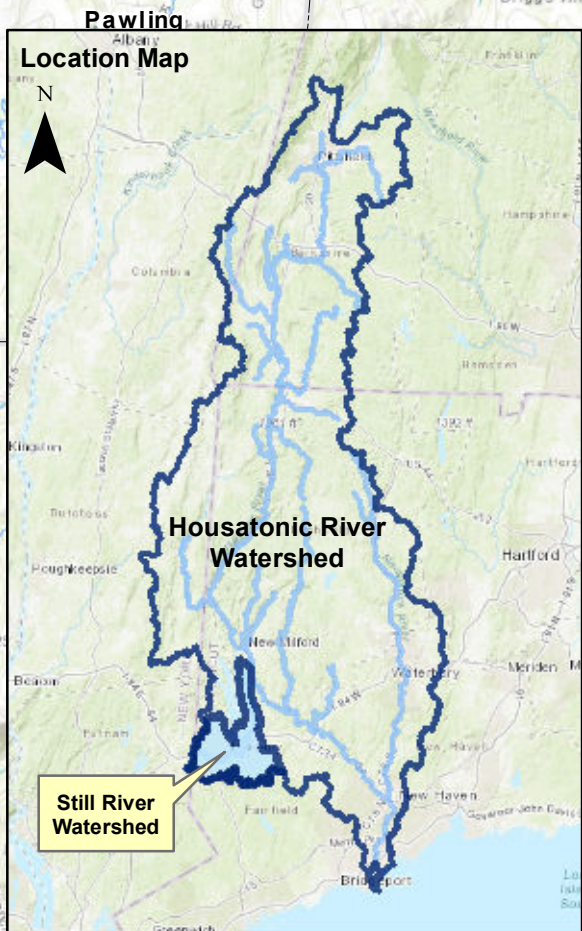
Service Layer Credits:  
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), Swisstopo, ©





# Still River Watershed

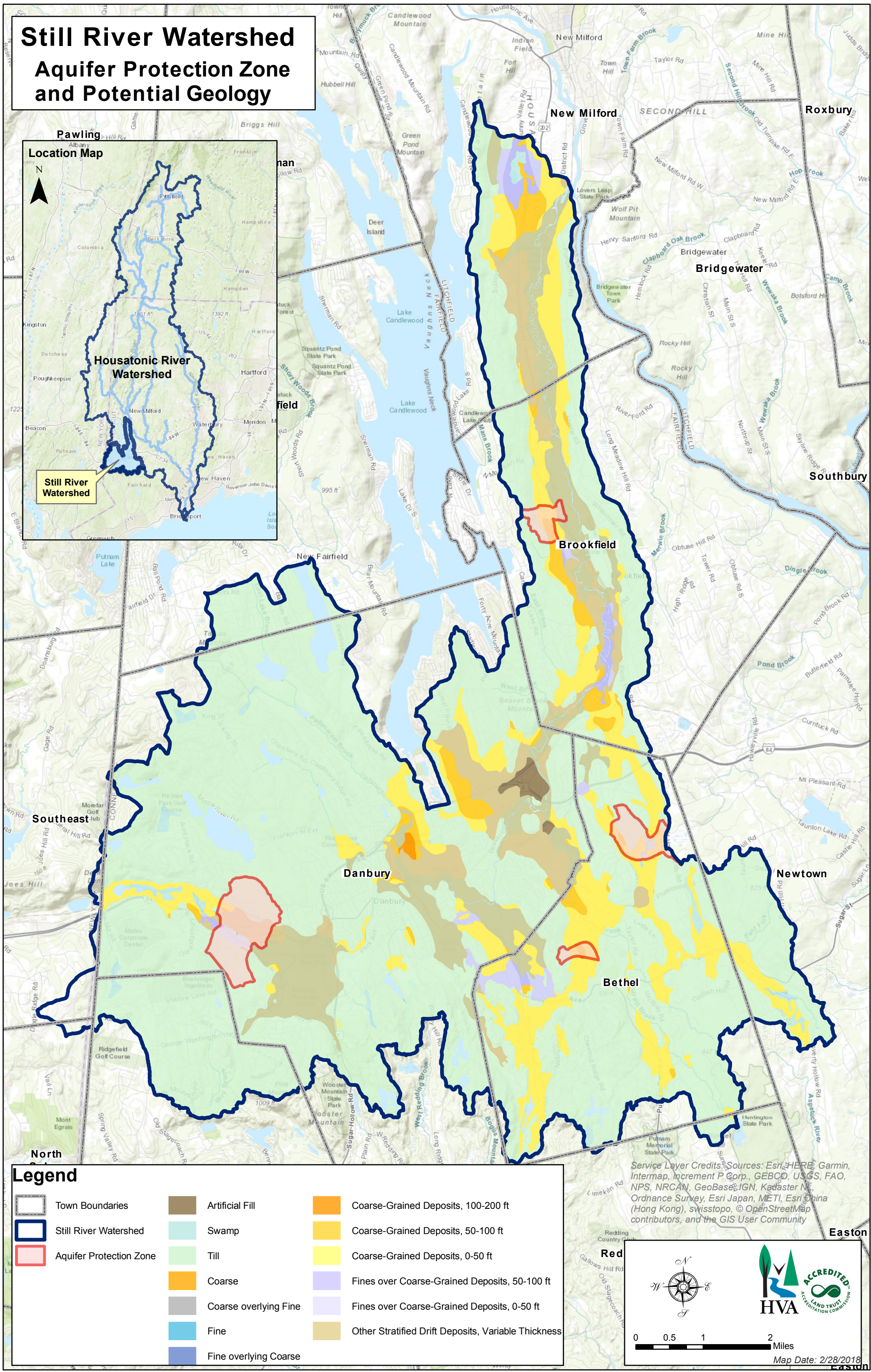
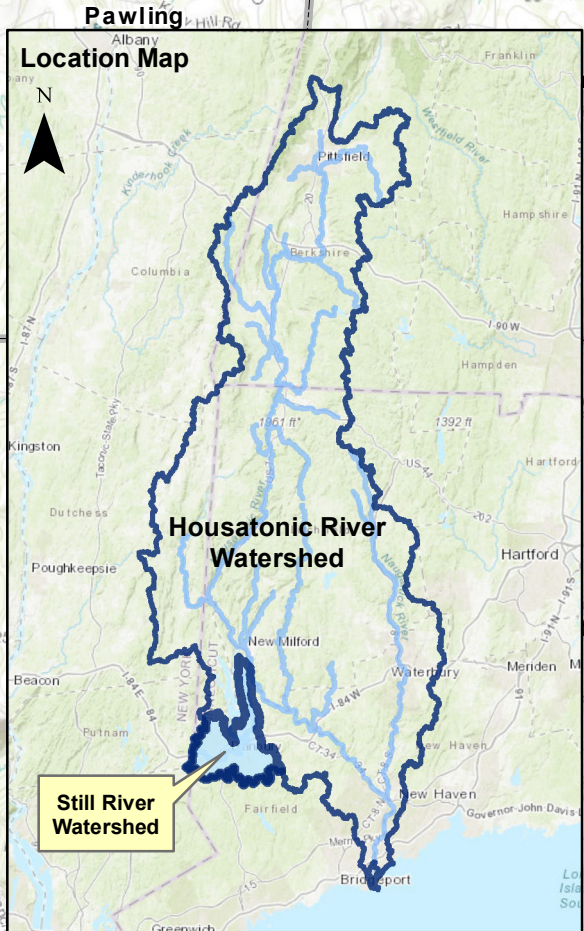
## Stream Impacts





# Still River Watershed

## Aquifer Protection Zone and Potential Geology



### Legend

- |                         |                       |   |
|-------------------------|-----------------------|---|
| Town Boundaries         | Artificial Fill       | Coarse-Grained Deposits, 100-200 ft                 |
| Still River Watershed   | Swamp                 | Coarse-Grained Deposits, 50-100 ft                  |
| Aquifer Protection Zone | Till                  | Coarse-Grained Deposits, 0-50 ft                    |
|                         | Coarse                | Fines over Coarse-Grained Deposits, 50-100 ft       |
|                         | Coarse overlying Fine | Fines over Coarse-Grained Deposits, 0-50 ft         |
|                         | Fine                  | Other Stratified Drift Deposits, Variable Thickness |
|                         | Fine overlying Coarse |   |

Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

**Red**

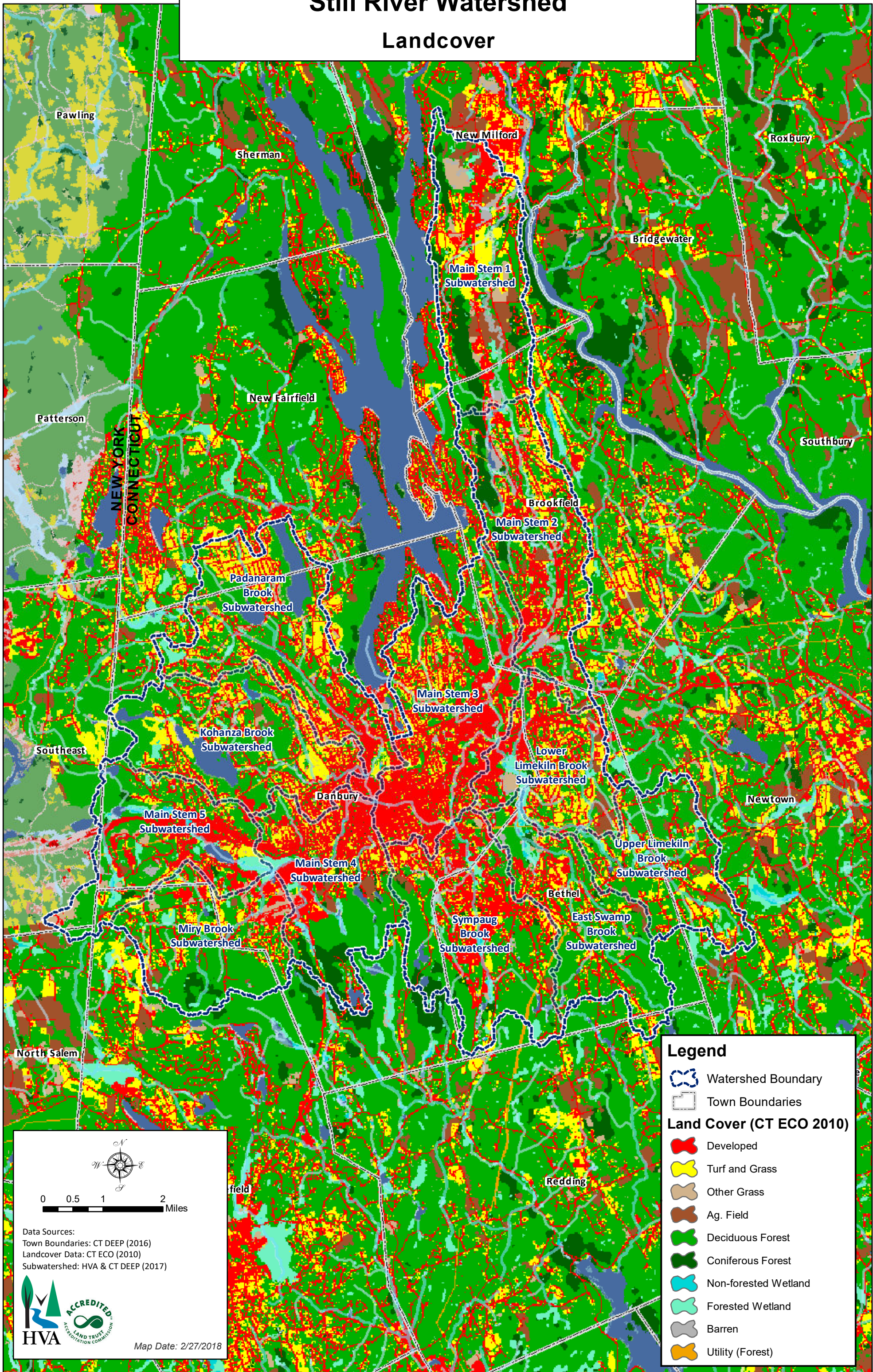
0 0.5 1 2 Miles

Map Date: 2/28/2018



# Still River Watershed

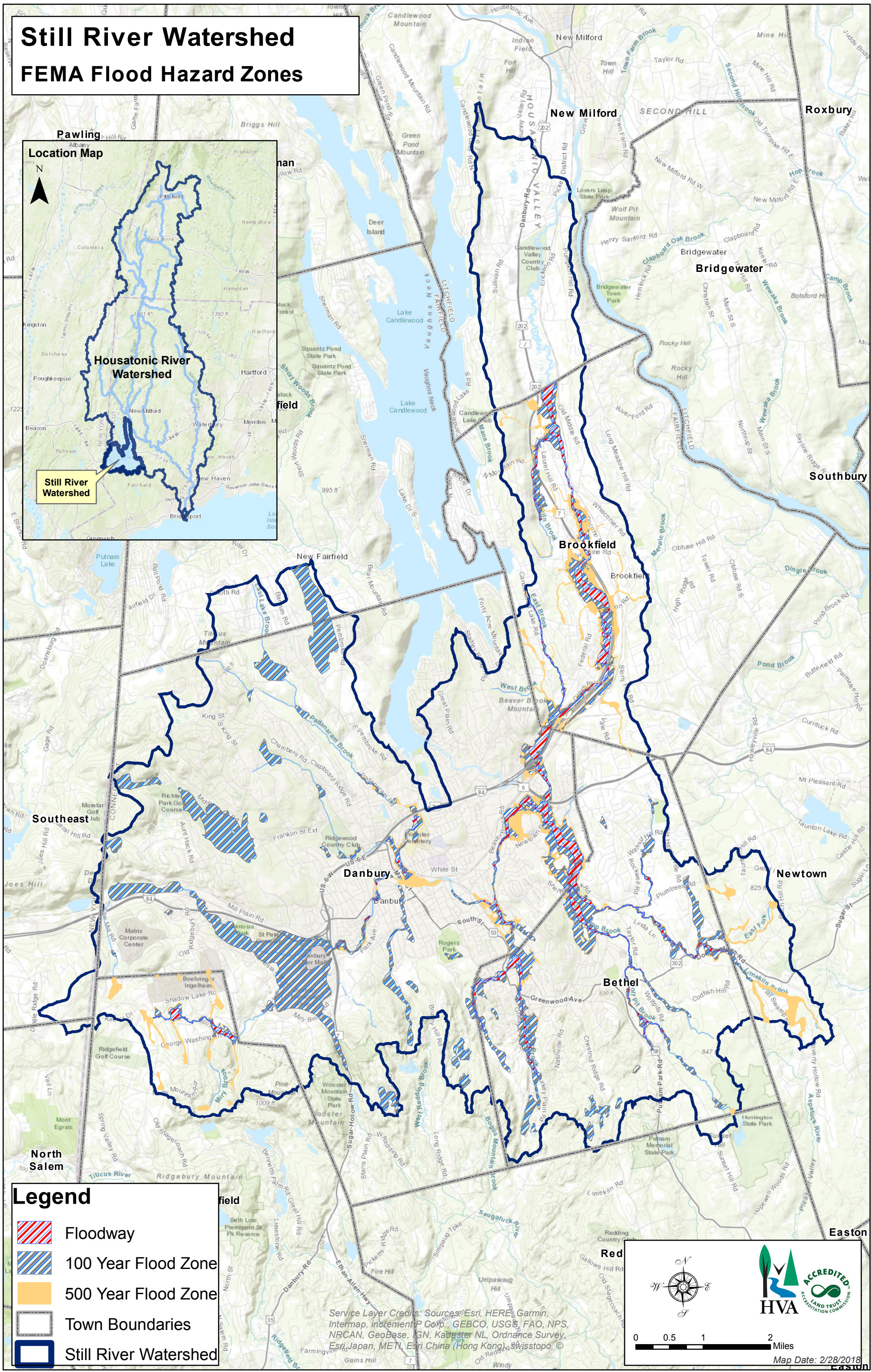
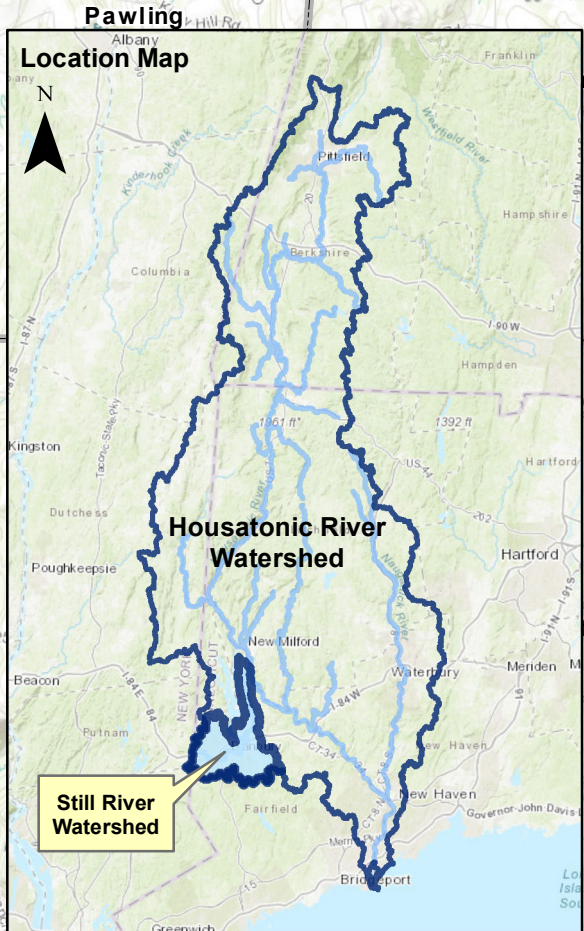
## Landcover





# Still River Watershed

## FEMA Flood Hazard Zones



**Legend**

- Floodway
- 100 Year Flood Zone
- 500 Year Flood Zone
- Town Boundaries
- Still River Watershed

Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), Swisstopo, ©

**Red**

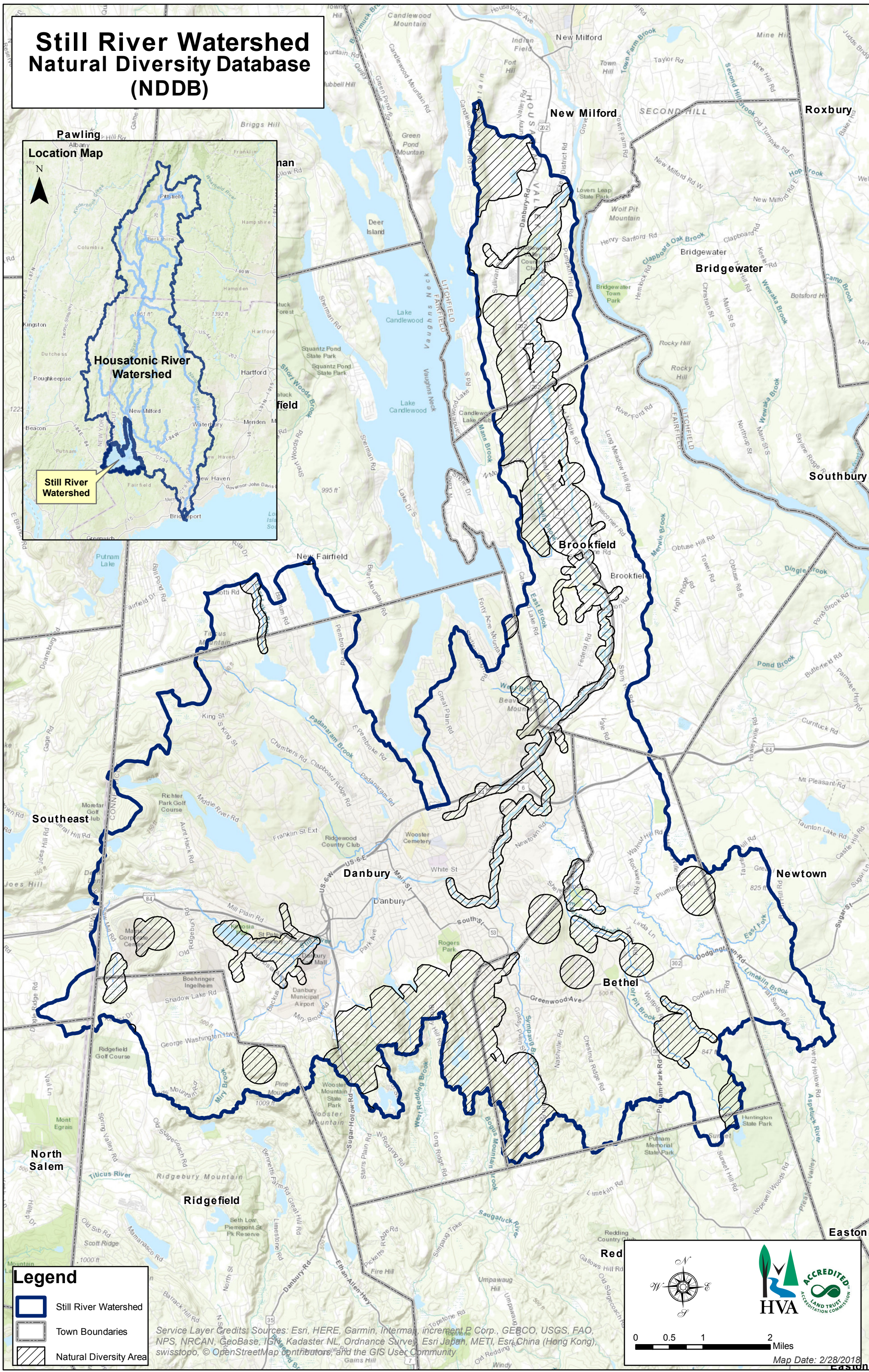
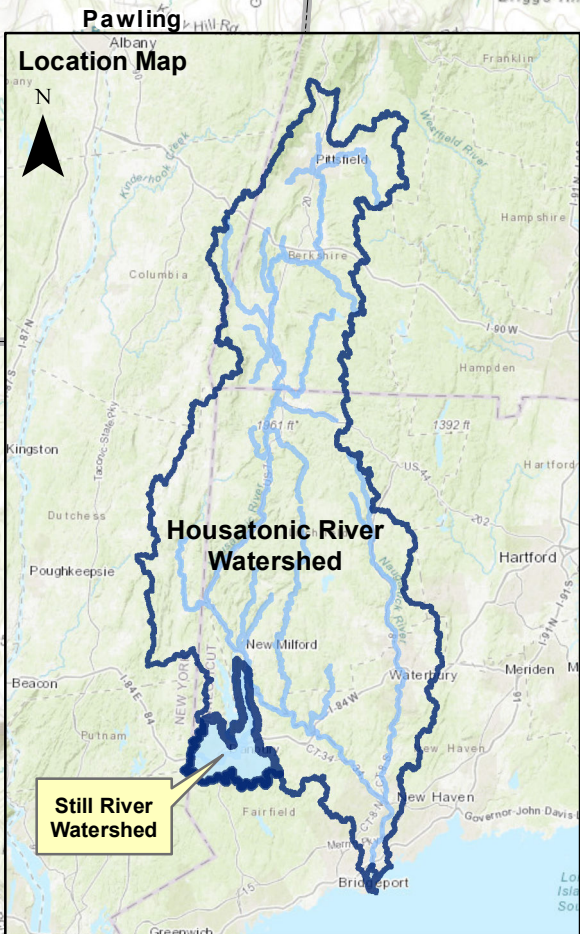
0 0.5 1 2 Miles

Map Date: 2/28/2018

**HVA** ACCREDITED LAND TRUST



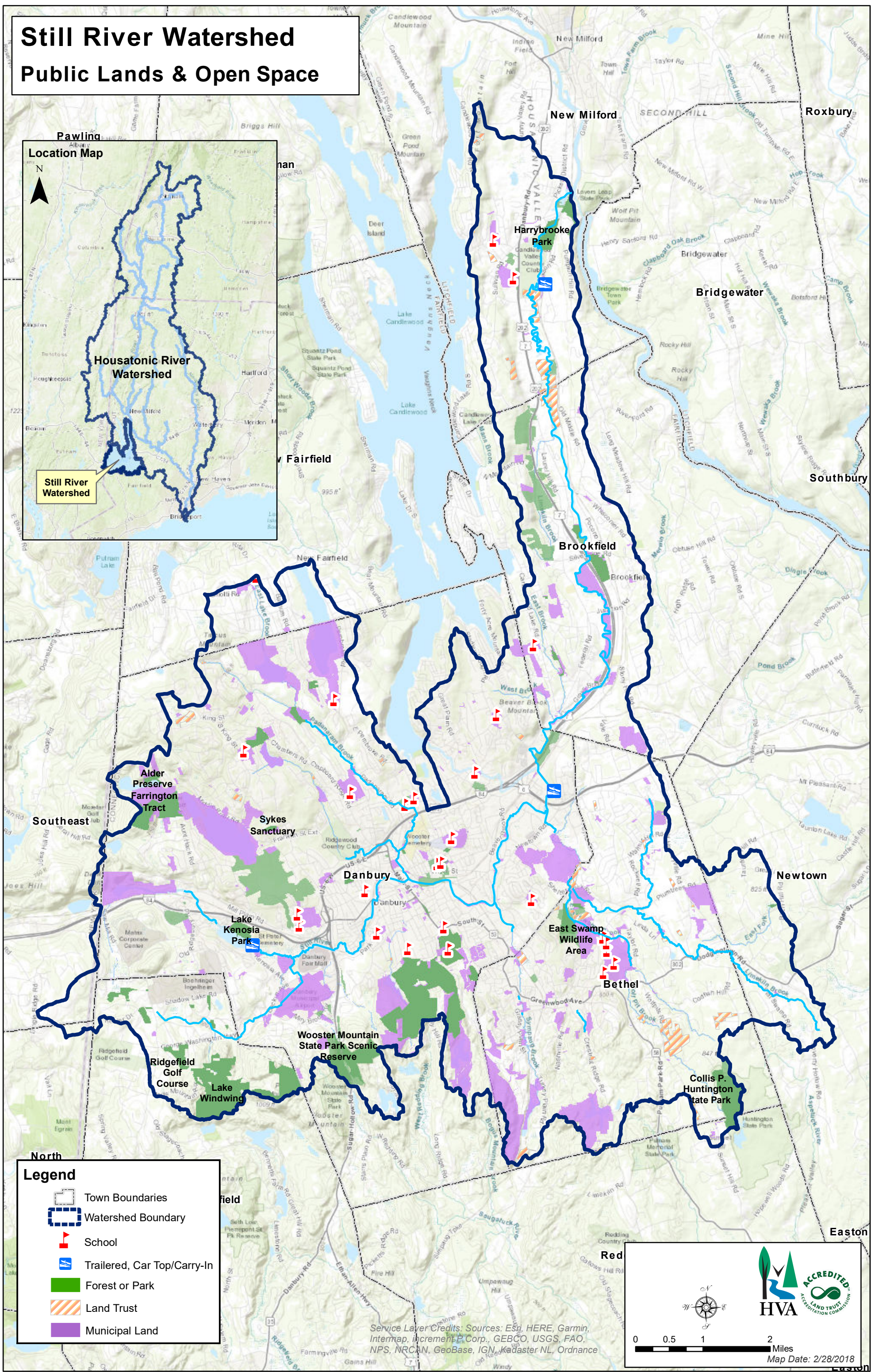
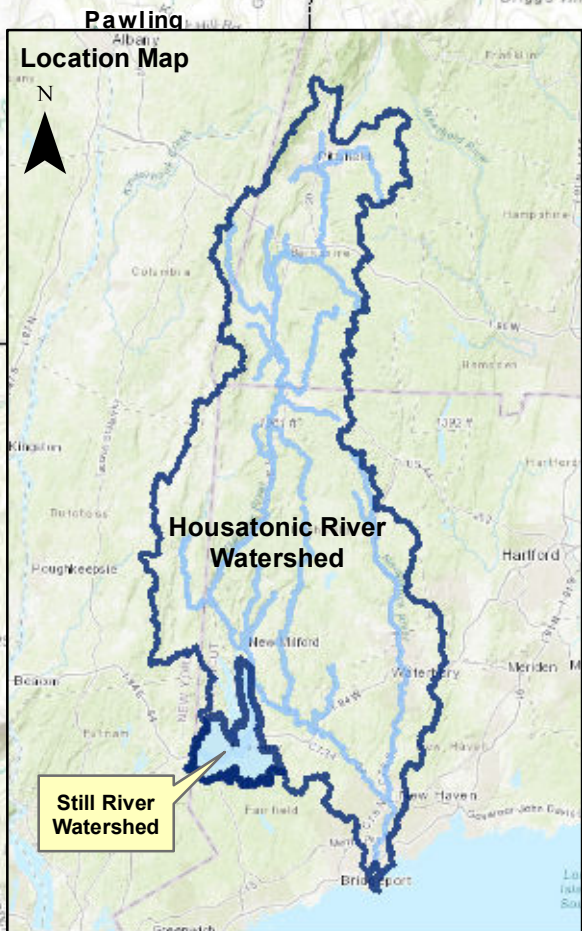
# Still River Watershed Natural Diversity Database (NDDB)





# Still River Watershed

## Public Lands & Open Space



**Legend**

- Town Boundaries
- Watershed Boundary
- School
- Trailered, Car Top/Carry-In
- Forest or Park
- Land Trust
- Municipal Land

Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance

**North**

**Red**

**ACCREDITED**

**HVA**

0 0.5 1 2 Miles

Map Date: 2/28/2018