Mill Brook

Watershed Summary

Watershed Description and Maps

The Mill Brook watershed covers an area of approximately 7,629 acres in northwestern Connecticut (Figure 1). The watershed is located in the Town of Sharon, CT, and the southern portion extends into eastern New York.

The Mill Brook watershed includes one segment impaired for recreation due to elevated bacteria levels. This segment was assessed by Connecticut Department of Energy and Environmental Protection (CT DEEP) and included in the CT 2010 303(d) list of impaired waterbodies. The other segment (CT6302-00_01) in the watershed is currently unassessed as of the writing of this document. This does not mean there are no potential issues on this segment, but indicates a lack of current data to evaluate the segment as part of the assessment process. An excerpt of the Integrated Water Quality Report is included in Table 1 to show the status of other waterbodies in the watershed (CTDEEP, 2010).

Mill Brook begins at the Hatch Pond outlet dam just upstream of Mitchelltown Road crossing and the confluence with Bog Meadow Brook in Sharon, crosses West Wood 1 Road, flows parallel to Amenia Union Road (Route 41), and ends at the CT/NY border near the intersection of Route 41 and County Road 2 in Sharon. The bacteria impaired segment (CT6302-00_02) consists of 1.66 miles of the river in Sharon (Figure 2). This impaired segment begins at the Hatch Pond outlet dam just upstream of Mitchelltown Road crossing and the confluence with Bog Meadow Brook, and ends at the confluence with Beebee Brook just downstream of West Wood 1 Road crossing in Sharon.

The impaired segment of Mill Brook has a water quality classification of A. Designated uses include potential drinking water supplies, habitat for fish and other aquatic life and wildlife, recreation, navigation, and industrial and agricultural water supply. As there are no designated beaches in this segment of Mill Brook, the specific recreation impairment is for non-designated swimming and other water contact related activities.

Impaired Segment Facts

Impaired Segment: Mill Brook (CT6302-00_02)

Towns: Sharon

Impaired Segment Length (miles): 1.66

Water Quality Classification: Class A

Designated Use Impairment: Recreation

Sub-regional Basin Name and Code: Mill Brook, 6302

Regional Basin: Tenmile

Major Basin: Housatonic

Watershed Area (acres): 7,629

MS4 Applicable? No

Figure 1: Watershed location in Connecticut

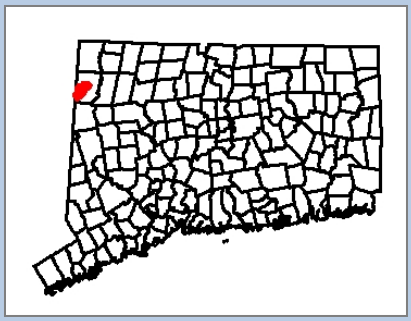


Table 1: Impaired segment and nearby waterbodies from the Connecticut 2010 Integrated Water Quality Report

Waterbody ID	Waterbody Name	Location	Miles	Aquatic Life	Recreation	Fish Consumption
CT6302-00_01	Mill Brook (Sharon)-01	From CT/NY border (US side of South Amenia Union Road crossing), US to confluence with Beebee Brook (just DS of Woods 1 road crossing), Sharon.	2.53	U	U	FULL
CT6302-00_02	Mill Brook (Sharon)-02	From confluence with Beebee Brook (just DS of Woods 1 road crossing), US to Hatch Pond outlet dam (just US of Mitchelltown Road crossing and confluence with Bog Meadow Brook), Sharon.	1.66	U	NOT	FULL

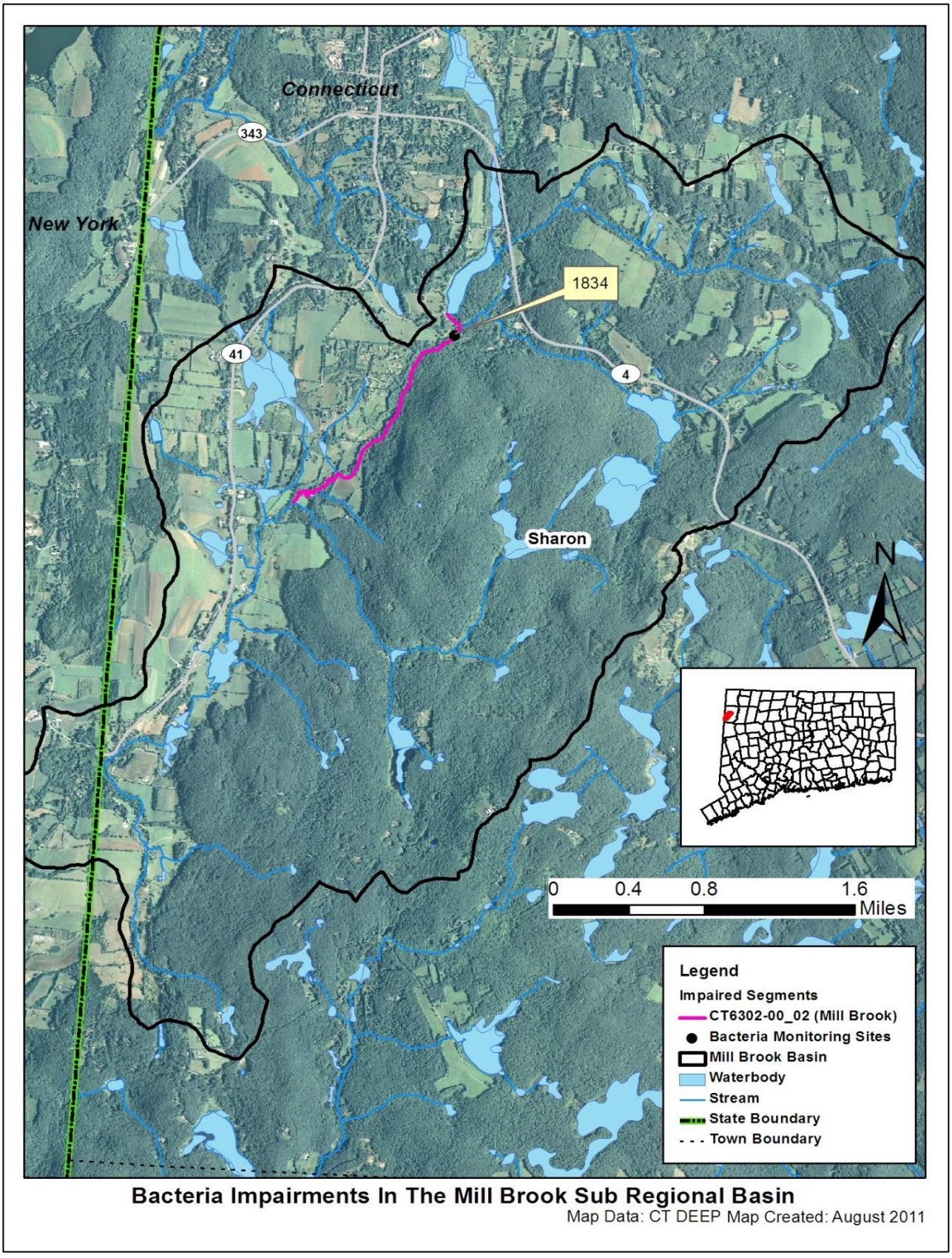
Shaded cells indicate impaired segment addressed in this TMDL

FULL = Designated Use Fully Supported

NOT = Designated Use Not Supported

U = Unassessed

Figure 2: GIS map featuring general information of the Mill Brook watershed at the sub-regional level



Land Use

Existing land use can affect the water quality of waterbodies within a watershed (USEPA, 2011c). Natural processes, such as soil infiltration of stormwater and plant uptake of water and nutrients, can occur in undeveloped portions of the watershed. As impervious surfaces (such as rooftops, roads, and sidewalks) increase within the watershed landscape from commercial, residential, and industrial development, the amount of stormwater runoff to waterbodies also increases. These waterbodies are negatively affected as increased pollutants from nutrients and bacteria from failing and insufficient septic systems, oil and grease from automobiles, and sediment from construction activities become entrained in this runoff. Agricultural land use activities, such as fertilizer application and manure from livestock, can also increase pollutants in nearby waterbodies (USEPA, 2011c).

As shown in Figures 3 and 4, the Mill Brook watershed consists of 61% forest, 27% agriculture, 8% urban, and 4% water land uses. The headwaters of Mill Brook begin at the outlet to Hatch Pond, which is surrounded by forest and hayfields. A large tract of forest known as West Woods lies to the east of Mill Brook, while major agricultural land uses make up the area west of Mill Brook. Immediately downstream of the Mitchelltown Road crossing, the impaired segment of Mill Brook flows near a livestock farm, residential complexes, hobby farms, and major hayfields.

Figure 3: Land use within the Mill Brook watershed

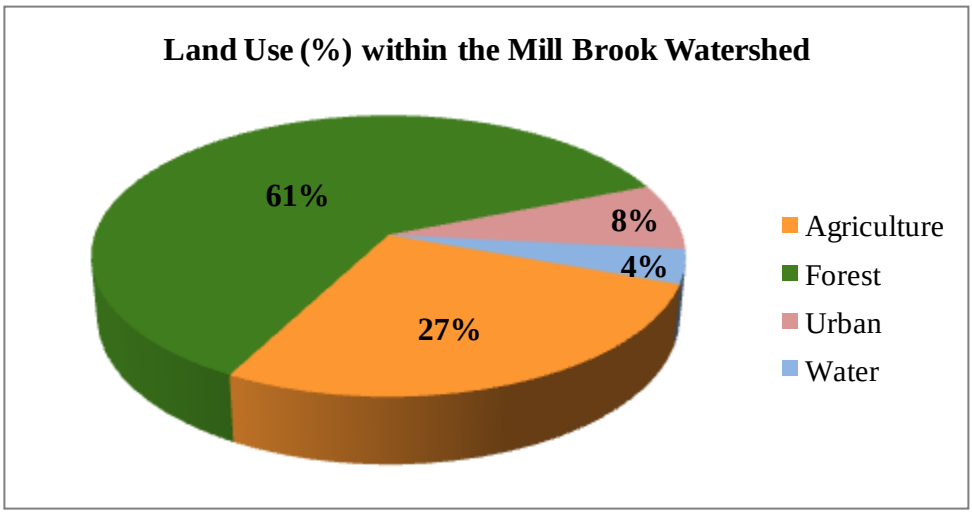
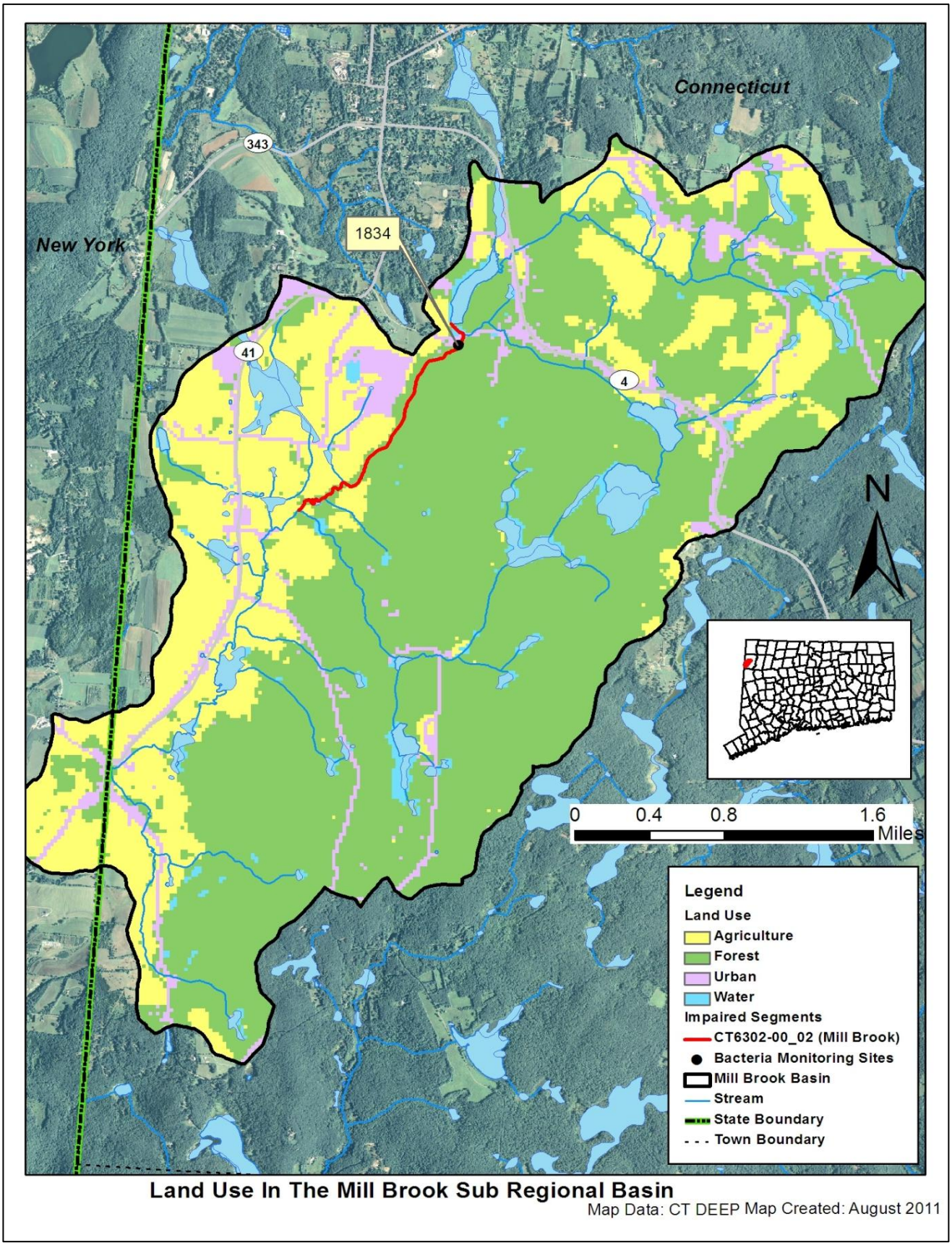


Figure 4: GIS map featuring land use for the Mill Brook watershed at the sub-regional level



WHY IS A TMDL NEEDED?

E. coli is the indicator bacteria used for comparison with the CT State criteria in the CT Water Quality Standards (WQS) (CTDEEP, 2011). All data results are from CT DEEP, USGS, Bureau of Aquaculture, or volunteer monitoring efforts at stations located on the impaired segments.

Table 2: Sampling station location description for impaired segments in the Mill Brook watershed

Waterbody ID	Waterbody Name	Station	Station Description	Municipality	Latitude	Longitude
CT6302-00_02	Mill Brook	1834	Hatch Pond outlet and Bog Meadow Brook (Mitchelltown Road)	Sharon	41.858400	-73.469100

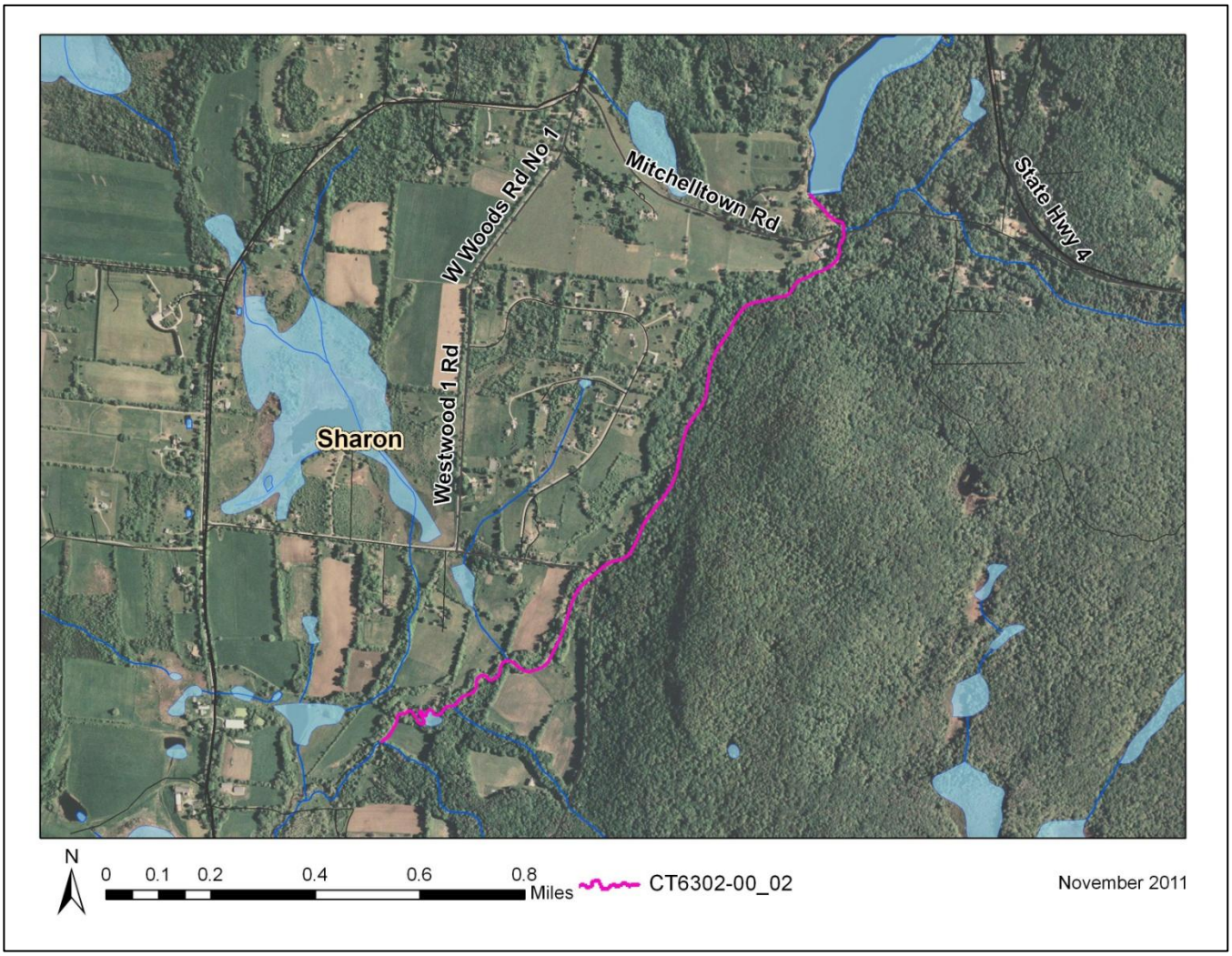
Mill Brook (CT6302-00_02) is a Class A freshwater river (Figure 5). Its applicable designated uses are potential drinking water supplies, habitat for fish and other aquatic life and wildlife, recreation, navigation, and industrial and agricultural water supply. Water quality analyses were conducted using data from one sampling location from 2006-2009 (Station 1834) (Table 2).

The water quality criteria for *E. coli*, along with bacteria sampling results for Station 1834 from 2006-2009, are presented in Table 6. The annual geometric mean was calculated for Station 1834 and did not exceed the WQS for *E. coli* in any sampling year. Single sample values at this station exceeded the WQS for *E. coli* in 2008 and 2009 on at least one sample date.

To aid in identifying possible bacteria sources, the geometric mean was also calculated for each station for wet-weather and dry-weather sampling days, where appropriate (Table 6). For the impaired segment of Mill Brook, geometric mean values during wet and dry-weather at Station 1834 did not exceed the WQS for *E. coli*.

Due to the elevated bacteria measurements presented in Table 6, this segment of Mill Brook did not meet CT's bacteria WQS, was identified as impaired, and was placed on the CT List of Waterbodies Not Meeting Water Quality Standards, also known as the CT 303(d) Impaired Waters List. The Clean Water Act requires that all 303(d) listed waters undergo a TMDL assessment that describes the impairments and identifies the measures needed to restore water quality. The goal is for all waterbodies to comply with State WQS.

Figure 5: Aerial map of Mill Brook



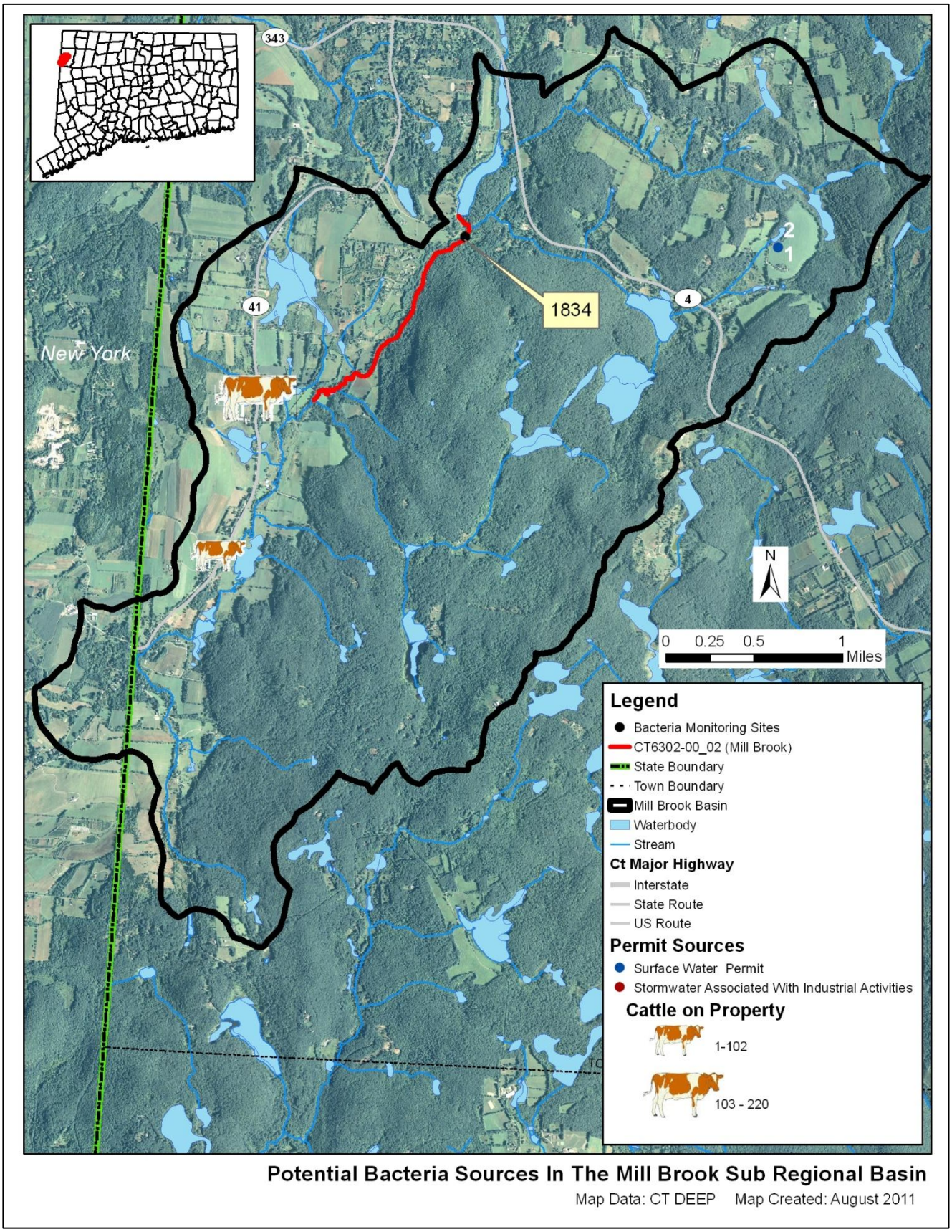
POTENTIAL BACTERIA SOURCES

Potential sources of indicator bacteria in a watershed include point and non-point sources, such as stormwater runoff, agriculture, sanitary sewer overflows (collection system failures), illicit discharges, and inappropriate discharges to the waterbody. Potential sources that have been tentatively identified in the watershed based on land use (Figures 3 and 4) and a collection of local information for the impaired waterbody is presented in Table 3 and Figure 6. However, the list of potential sources is general in nature and should not be considered comprehensive. There may be other sources not listed here that contribute to the observed water quality impairment in the study segments. Further monitoring and investigation will confirm listed sources and discover additional ones. Some segments in this watershed are currently listed as unassessed by CT DEEP procedures. This does not suggest that there are no potential issues on this segment, but indicates a lack of current data to evaluate the segment as part of the assessment process. For some segments, there are data from permitted sources, and CT DEEP recommends that any elevated concentrations found from those permitted sources be addressed through voluntary reduction measures. More detailed evaluation of potential sources is expected to become available as activities are conducted to implement these TMDLs.

Table 3: Potential bacteria sources in the Mill Brook watershed

Impaired Segment	Permit Source	Illicit Discharge	CSO/SSO Issue	Failing Septic System	Agricultural Activity	Stormwater Runoff	Nuisance Wildlife/Pets	Other
Mill Brook CT6302-00_02				**x**	**x**	**x**	**x**	

Figure 6: Potential sources in the Mill Brook watershed at the sub-regional level



The potential sources map for the impaired basin was developed after thorough analysis of available data sets. If information is not displayed in the map, then no sources were discovered during the analysis. The following is the list of potential sources that were evaluated: problems with migratory waterfowl, golf course locations, reservoirs, proposed and existing sewer service, cattle farms, poultry farms, permitted sources of bacteria loading (surface water discharge, MS4 permit, industrial stormwater, commercial stormwater, groundwater permits, and construction related stormwater), and leachate and discharge sources (agricultural waste, CSOs, failing septic systems, landfills, large septic tank leach fields, septage lagoons, sewage treatment plants, and water treatment or filter backwash).

Point Sources

Permitted sources within the watershed that could potentially contribute to the bacteria loading are identified in Table 4. This table includes permit types that may or may not be present in the impaired watershed. A list of active permits in the watershed is included in Table 5. Additional investigation and monitoring may reveal the presence of additional discharges in the watershed. Available effluent data from each of these permitted categories found within the watershed are compared to the CT State WQS for the appropriate receiving waterbody use and type.

Table 4: General categories list of other permitted discharges

Permit Code	Permit Description Type	Number in watershed
CT	Surface Water Discharges	1
GPL	Discharge of Swimming Pool Wastewater	0
GSC	Stormwater Discharge Associated with Commercial Activity	0
GSI	Stormwater Associated with Industrial Activity	1
GSM	Part B Municipal Stormwater MS4	0
GSN	Stormwater Registration – Construction	0
LF	Groundwater Permit (Landfill)	0
UI	Underground Injection	0

Permitted Sources

As shown in Table 5, there are multiple permitted discharges in the Mill Brook watershed. Bacteria data are currently not available for any of the permitted discharges in the watershed. The two permitted sources identified in Figure 6 are located far upstream of the impaired segment along a tributary, and are likely an insignificant source of bacteria to the impaired segment of Mill Brook. Since the MS4 permits are not targeted to a specific location, but the geographic area of the regulated municipality, there is no one accurate location on the map to display the location of these permits. One dot will be displayed at the geographic center of the municipality as a reference point. Sometimes this location falls outside of the targeted watershed and therefore the MS4 permit will not be displayed in the Potential Sources Map. Using the municipal border as a guideline will show which areas of an affected watershed are covered by an MS4 permit.

Table 5: Permitted facilities within the Mill Brook watershed

Town	Client	Permit ID	Permit Type	Site Name/Address	Map #
Sharon	Town Of Sharon	CT0101052	Surface Water Permit	Sharon WPCF	2
Sharon	State Of Connecticut Department Of Transportation	GSI001782	Stormwater Associated With Industrial Activities	Sharon Satellite Salt Storage Facility	1

Municipal Stormwater Permitted Sources

Per the EPA Phase II Stormwater rule all municipal storm sewer systems (MS4s) operators located within US Census Bureau Urbanized Areas (UAs) must be covered under MS4 permits regulated by the appropriate State agency. There is an EPA waiver process that municipalities can apply for to not participate in the MS4 program. In Connecticut, EPA has granted such waivers to 19 municipalities. All participating municipalities within UAs in Connecticut are currently regulated under MS4 permits by CT DEEP staff in the MS4 program.

The US Census Bureau defines a UA as a densely settled area that has a census population of at least 50,000. A UA generally consists of a geographic core of block groups or blocks that exceeds the 50,000 people threshold and has a population density of at least 1,000 people per square mile. The UA will also include adjacent block groups and blocks with at least 500 people per square mile. A UA consists of all or part of one or more incorporated places and/or census designated places, and may include additional territory outside of any place. (67 FR 11663)

For the 2000 Census a new geographic entity was created to supplement the UA blocks of land. This created a block known as an Urban Cluster (UC) and is slightly different than the UA. The definition of a UC is a densely settled area that has a census population of 2,500 to 49,999. A UC generally consists of a geographic core of block groups or blocks that have a population density of at least 1,000 people per square mile, and adjacent block groups and blocks with at least 500 people per square mile. A UC consists of all or part of one or more incorporated places and/or census designated places; such a place(s) together with adjacent territory; or territory outside of any place. The major difference is the total population cap of 49,999 people for a UC compared to >50,000 people for a UA. (67 FR 11663)

While it is possible that CT DEEP will be expanding the reach of the MS4 program to include UC municipalities in the near future they are not currently under the permit. However, the GIS layers used to create the MS4 maps in this Statewide TMDL did include both UA and UC blocks. This factor creates some municipalities that appear to be within an MS4 program that are not currently regulated through an MS4 permit. This oversight can explain a municipality that is at least partially shaded grey in the maps and there are no active MS4 reporting materials or information included in the appropriate appendix. While these areas are not technically in the MS4 permit program, they are still considered urban by the cluster definition above and are likely to contribute similar stormwater discharges to affected waterbodies covered in this TMDL.

As previously noted, EPA can grant a waiver to a municipality to preclude their inclusion in the MS4 permit program. One reason a waiver could be granted is a municipality with a total population less than 1000 people, even if the municipality was located in a UA. There are 19 municipalities in Connecticut that have received waivers, this list is: Andover, Bozrah, Canterbury, Coventry, East Hampton, Franklin, Haddam, Killingworth, Litchfield, Lyme, New Hartford, Plainfield, Preston, Salem, Sherman, Sprague,

Stafford, Washington, and Woodstock. There will be no MS4 reporting documents from these towns even if they are displayed in an MS4 area in the maps of this document.

The list of US Census UCs is defined by geographic regions and is named for those regions, not necessarily by following municipal borders. In Connecticut the list of UCs includes blocks in the following Census Bureau regions: Colchester, Danielson, Lake Pocotopaug, Plainfield, Stafford, Storrs, Torrington, Willimantic, Winsted, and the border area with Westerly, RI (67 FR 11663). Any MS4 maps showing these municipalities may show grey areas that are not currently regulated by the CT DEEP MS4 permit program.

The impaired segment of the Mill Brook watershed is located within the Town Sharon, CT. As there are no urbanized locations as defined by the U.S. Census Bureau within this area, the town is not an MS4 area and is not required to comply with the General Permit for the Discharge of Stormwater from Small Municipal Storm Sewer Systems (MS4 permit) issued by the CT DEEP (Figure 7). Information regarding stormwater management and the MS4 permit can be obtained on CTDEEP's website (http://www.ct.gov/dep/cwp/view.asp?a=2721&q=325702&depNav_GID=1654).

Publicly Owned Treatment Works

As shown in Figure 7, there are no publicly owned treatment works (POTWs), or wastewater treatment plants, in the Mill Brook watershed, and therefore, POTWs are not a potential source of loading to the impaired segment of the Mill Brook watershed.

Non-point Sources

Non-point source pollution (NPS) comes from many diffuse sources and is more difficult to identify and control. NPS pollution is often associated with land-use practices. Examples of NPS that can contribute bacteria to surface waters include insufficient septic systems, pet and wildlife waste, agriculture, and contact recreation (swimming or wading). Potential sources of NPS within the Mill Brook watershed are described below.

Agricultural Activities

Agricultural operations are an important economic activity and landscape feature in many areas of the State. Runoff from agricultural fields may contain pollutants such as bacteria and nutrients (USEPA, 2011a). This runoff can include pollutants from farm practices such as storing manure, allowing livestock to wade in nearby waterbodies, applying fertilizer, and reducing the width of vegetated buffer along the shoreline. Agricultural land use makes up 27% of the Mill Brook watershed. Mill Brook flows through a large agricultural area downstream and to the west of the impaired segment. This agricultural area includes several large hayfields, row crops, and hobby farms (Figure 6). Two cattle farms with 1-102 and 103-220 cattle were identified along Route 41 downstream of the impaired segment, and may pose a threat to the water quality of Mill Brook downstream of the impaired segment in the future. A potential livestock farm was identified immediately downstream of Mitchelltown Road crossing near Station 1834, and may be a direct source of contamination.

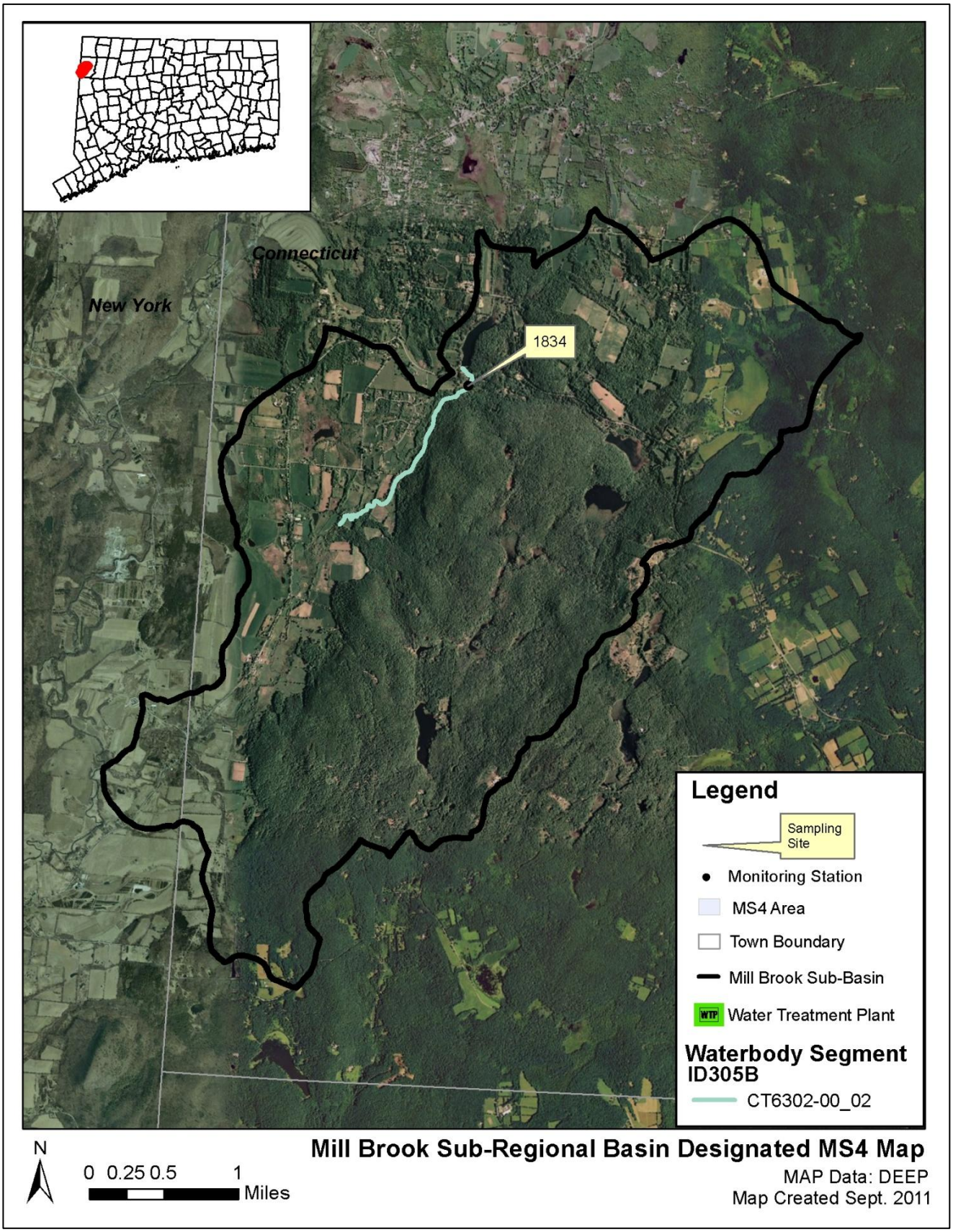
Wildlife and Domestic Animal Waste

Wildlife and domestic animals within the Mill Brook watershed represent another potential source of bacteria. With the construction of roads and drainage systems, these wastes may no longer be retained on

the landscape, but instead may be conveyed via stormwater to the nearest surface water. These physical land alterations can exacerbate the impact of natural sources on water quality (USEPA, 2001). As the majority of the impaired segment flows through undeveloped forested land, wildlife waste is a potential source of bacteria to Mill Brook. However, residential development in the watershed near the impaired segment of Mill Brook may also be contributing waste from domestic animals, such as dogs.

Large open agricultural spaces and cleared shoreline at Hatch Pond may be serving as geese attractants, which can create unsanitary conditions on the grassed areas and cause water quality problems due to bacterial contamination associated with their droppings (Figure 6). Large populations of geese can also lead to habitat destruction as a result of overgrazing on wetland and riparian plants.

Figure 7: MS4 areas of the Mill Brook watershed



Insufficient Septic Systems and Illicit Discharges

As shown in Figure 6, the entire Mill Brook watershed relies on onsite wastewater treatment systems, such as septic systems. Insufficient or failing septic systems can be significant sources of bacteria by allowing raw waste to reach surface waters. In Connecticut, local health directors or health districts are responsible for keeping track of any reported insufficient or failing septic systems in a specific municipality. The Town of Sharon has a part-time health director .
(http://www.sharonct.org/townhall.asp).

As shown in Figure 6, the Mill Brook watershed is not served by municipal sewer system. As such, sewer system leaks and other illicit discharges or connections are not a source of bacteria to nearby surface waters.

Stormwater Runoff from Developed Areas

Approximately 8% of the land use in the watershed is considered urban, and a portion of the impaired segment is located near an urban residential complex (Figures 4 and 9). Urban areas are often characterized by impervious cover, or surface areas such as roofs and roads that force water to run off land surfaces rather than infiltrate into the soil. Studies have shown a link between increasing impervious cover and degrading water quality conditions in a watershed (CWP, 2003). In one study, researchers correlated the amount of fecal coliform to the percent of impervious cover in a watershed (Mallin *et al.*, 2000).

While Figure 8 shows the entire watershed as having 0-6% impervious cover, land use in Figure 4 shows urban areas at a residential complex and along major roads near the impaired segment of Mill Brook. Water quality data taken at Station 1834 did not exceed the wet-weather geometric mean limit, which suggests that stormwater runoff may not be a significant source of bacteria to Mill Brook (Table 6). Stormwater pollution sources include fertilizer runoff, leaky septic systems, horse farms, golf courses, and impervious surfaces.

Figure 8: Range of impervious cover (%) in the Mill Brook watershed

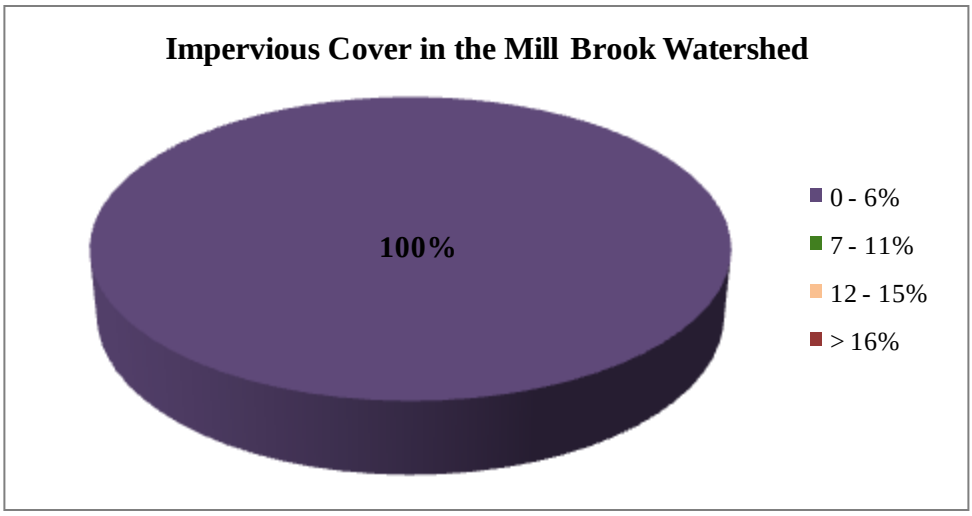
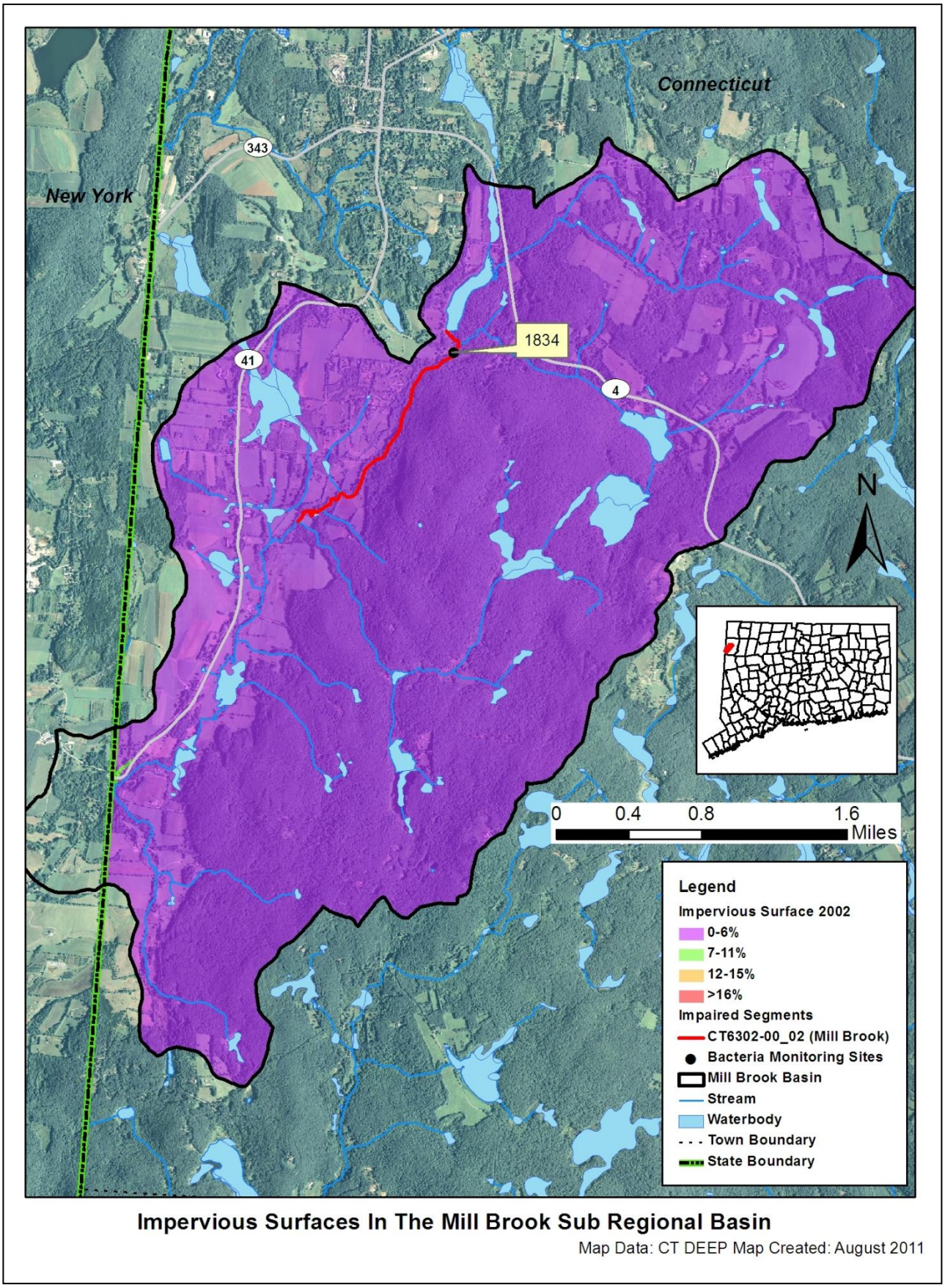


Figure 9: Impervious cover (%) for the Mill Brook sub-regional watershed



Additional Sources

There may be other sources not listed here or identified in Figure 6 that contribute to the observed water quality impairment in Mill Brook. Further monitoring and investigation will confirm the listed sources and discover additional ones. More detailed evaluation of potential sources is expected to become available as activities are conducted to implement this TMDL.

Land Use/Landscape

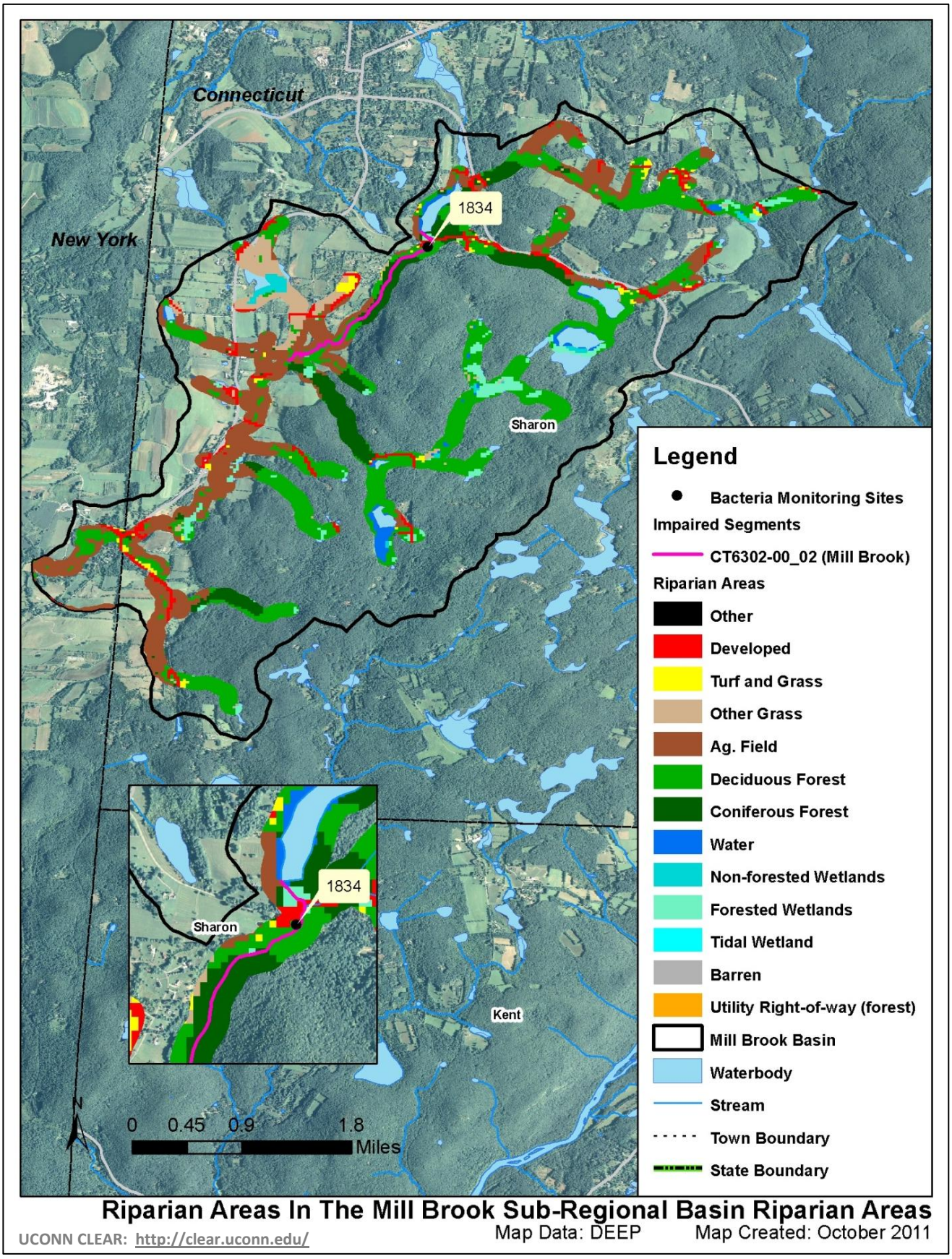
Riparian Buffer Zones

The riparian buffer zone is the area of land located immediately adjacent to streams, lakes, or other surface waters. The boundary of the riparian zone and the adjoining uplands is gradual and not always well-defined. However, riparian zones differ from uplands because of high levels of soil moisture, frequent flooding, and the unique assemblage of plant and animal communities found there. Through the interaction of their unique soils, hydrology, and vegetation, natural riparian areas influence water quality as contaminants are taken up into plant tissues, adsorbed onto soil particles, or modified by soil organisms. Any change to the natural riparian buffer zone can reduce the effectiveness of the natural buffer and has the potential to contribute to water quality impairment (USEPA, 2011b).

The CLEAR program at UCONN has created streamside buffer layers for the entire State of Connecticut (http://clear.uconn.edu/), which have been used in this TMDL. Analyzing this information can reveal potential sources and implementation opportunities at a localized level. The land use directly adjacent to a waterbody can have direct impacts on water quality from surface runoff sources.

The majority of the riparian zone for the upper half of the impaired segment of Mill Brook is characterized by forested land use. The downstream half of the impaired segment of Mill Brook is characterized by agricultural land use (Figure 10). As previously noted, if not properly treated, runoff from agricultural areas may contain pollutants such as bacteria and nutrients.

Figure 10: Riparian buffer zone information for the Mill Brook watershed



RECOMMENDED NEXT STEPS

Future mitigative activities are necessary to ensure the long-term protection of Mill Brook and have been prioritized below.

1) Ensure there are sufficient buffers on agricultural lands along Mill Brook.

Agricultural land use represents 27% of the Mill Brook watershed, and is a concern for water quality, particularly with several hayfields, row crops, and livestock farms identified along the impaired segment. If not already in place, agricultural producers should work with the CT Department of Agriculture and the U.S. Department of Agriculture Natural Resources Conservation Service to develop conservation plans for their farming activities within the watershed. These plans should focus on ensuring that there are sufficient stream buffers, that fencing exists to restrict livestock and horse access to streams and wetlands, and that animal waste handling, disposal, and other appropriate BMPs are in place.

2) Evaluate municipal education and outreach programs regarding animal waste.

As most of the area surrounding the impaired segment is forested with some residential neighborhoods, any education and outreach program should highlight the importance of managing waste from horses, dogs, and other pets and not feeding waterfowl and wildlife. The town and residents can take measures to minimize waterfowl-related impacts such as allowing tall, coarse vegetation to grow in the riparian areas of Mill Brook that are frequented by waterfowl. Waterfowl, especially grazers like geese, prefer easy access to water. Maintaining an uncut vegetated buffer along the shore will make the habitat less desirable to geese and encourage migration. In addition, any educational program should emphasize that feeding waterfowl, such as ducks, geese, and swans, may contribute to water quality impairments in Mill Brook and can harm human health and the environment. Animal wastes should be disposed of away from any waterbody or storm drain system. BMPs effective at reducing the impact of animal waste on water quality include installing signage, providing pet waste receptacles in high-use areas, enacting ordinances requiring the clean-up of pet waste, and targeting educational and outreach programs in problem areas.

3) Develop a system to monitor septic systems.

The entire Mill Brook watershed relies on septic systems. If not already in place, Sharon should establish a program to ensure that existing septic systems are properly operated and maintained, and create an inventory of existing septic systems through mandatory inspections. Inspections help encourage proper maintenance and identify failed and sub-standard systems. Policies that govern the eventual replacement of sub-standard systems within a reasonable timeframe can be adopted. The town can also develop a program to assist citizens with the replacement and repair of older and failing systems.

4) Identify areas along the Mill Brook to implement Best Management Practices (BMPs) to control stormwater runoff.

Although stormwater runoff may not be a significant source of bacterial contamination to the impaired segment of Mill Brook, there are still portions of the watershed near the impaired segment with impervious cover that should be mitigated for potential runoff. To identify areas that are contributing bacteria to the impaired segment, the towns should conduct wet-weather sampling along the impaired segment of Mill Brook. To treat stormwater runoff, the towns should install BMPs designed to encourage stormwater infiltration at areas along the impaired segment identified from the wet-weather sampling. These BMPs would disconnect impervious areas and reduce pollutant loads to the stream. More detailed information and BMP recommendations can be found in the core TMDL document.

BACTERIA DATA AND PERCENT REDUCTIONS TO MEET THE TMDL

Table 6: Mill Brook Bacteria Data

Waterbody ID: CT6302-00_02

Characteristics: Freshwater, Class A, Potential Drinking Water Supplies, Habitat for Fish and other Aquatic Life and Wildlife, Recreation, Navigation, and Industrial and Agricultural Water Supply

Impairment: Recreation (*E. coli bacteria)*

Water Quality Criteria for E. coli:

Geometric Mean: 126 colonies/100 mL

Single Sample: 410 colonies/100 mL

Percent Reduction to meet TMDL:

Geometric Mean: **NA**

Single Sample: **71%**

Data: 2006-2009 from CT DEEP targeted sampling efforts, 2012 TMDL Cycle

Single sample *E. coli* (colonies/100 mL) data from Station 1834 on Mill Brook with annual geometric means calculated

Station Name	Station Location	Date	Results	Wet/ Dry	Geomean
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	6/1/2006	390	dry	51
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	6/14/2006	26†	dry	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	6/29/2006	410†	wet	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	7/12/2006	52	dry	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	7/26/2006	63	dry	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	8/2/2006	41	dry	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	8/9/2006	20	wet	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	8/14/2006	20	dry	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	8/23/2006	10	dry	

Single sample *E. coli* (colonies/100 mL) data from Station 1834 on Mill Brook with annual geometric means calculated (continued)

Station Name	Station Location	Date	Results	Wet/ Dry	Geomean
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	6/6/2007	150	wet	94
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	6/12/2007	58†	dry	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	6/27/2007	280	dry	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	7/5/2007	110	wet	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	7/10/2007	85	dry	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	7/17/2007	240	wet	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	7/25/2007	20	wet	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	8/2/2007	290†	dry	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	8/9/2007	41†	wet	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	8/30/2007	74	dry	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	9/6/2007	20	dry	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	9/13/2007	250†	wet	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	5/22/2008	63	wet	82
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	6/5/2008	31	wet	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	6/9/2008	73	wet	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	6/19/2008	120	wet	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	6/26/2008	52	dry	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	7/8/2008	85	dry	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	7/23/2008	120	wet	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	8/4/2008	26†	wet	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	8/14/2008	110	dry	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	9/9/2008	530	wet	

Single sample *E. coli* (colonies/100 mL) data from Station 1834 on Mill Brook with annual geometric means calculated (continued)

Station Name	Station Location	Date	Results	Wet/ Dry	Geomean
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	6/11/2009	52	wet	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	6/17/2009	63	wet	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	7/2/2009	**1400* (71%)**	wet	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	7/9/2009	58†	dry	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	7/16/2009	52	dry	**98* (NA)**
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	7/23/2009	430	wet	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	8/6/2009	63	dry	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	8/12/2009	69†	dry	
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	8/19/2009	31†	dry	

Shaded cells indicate an exceedance of water quality criteria

†Average of two duplicate samples

***Indicates single sample and geometric mean values used to calculate the percent reduction**

Wet and dry weather geometric mean values for Station 1834 on Mill Brook

Station Name	Station Location	Years Sampled	Number of Samples		Geometric Mean		
			Wet	Dry	All	Wet	Dry
1834	Downstream of Mitchelltown Road at confluence of Hatch Pond outlet and Bog Meadow Brook	2006-2009	19	21	80	107	61

Shaded cells indicate an exceedance of water quality criteria

Weather condition determined from rain gage at the Norfolk 2 SW in Norfolk, CT

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