West Branch Salmon Brook

Watershed Summary

Watershed Description and Maps

The West Branch Salmon Brook watershed covers an area of approximately 17,019 acres in the mid-northern half of Connecticut, west of the Connecticut River (Figure 1). The watershed is located in Hartland, Simsbury, Barkhamsted, and Granby, CT.

The West Branch Salmon Brook watershed includes two segments impaired for recreation due to elevated bacteria levels. These segments were assessed by Connecticut Department of Energy and Environmental Protection (CT DEEP) and included in the CT 2010 303(d) List of Impaired Waters. 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).

West Branch Salmon Brook begins upstream of the Route 179 crossing in Hartland, heads east following Route 20 (Hartland Road), turns south following Simsbury Road, crosses Barndoor Hills Road, turns north following Barndoor Hills Road, turns east to cross Route 202 (10), and ends at the confluence with East Branch Salmon Brook in Granby.

The bacteria impaired segment, West Branch Salmon Brook (Segment 1a) (CT4319-00_01a), consists of 1.4 miles of river in Granby (Figure 2). West Branch Salmon Brook (Segment 1a) begins at the confluence with Bissell Brook just upstream of the Route 202 (10) crossing, and ends at the confluence with East Branch Salmon Brook to the west of Route 189 in Granby.

The bacteria impaired segment, West Branch Salmon Brook (Segment 1b) (CT4319-00_01b), consists of 11.29 miles of the river in Hartland, and Granby (Figure 2). West Branch Salmon Brook (Segment 1b) begins upstream of the Route 179 crossing in Hartland, heads east following Route 20, turns south following Simsbury Road, crosses Barndoor Hills Roads, turns north following Barndoor Hills Road, and ends at the confluence with Bissell Brook just upstream of the Route 202 (10) crossing in Granby.

The two impaired segments of West Branch Salmon Brook have a water quality classification of A.

Impaired Segment Facts

Impaired Segments:

1. West Branch Salmon Brook (Segment 1a) (CT4319-00_01a)
2. West Branch Salmon Brook (Segment 1b) (CT4319-00_01b)

Municipalities: Hartland, Granby

Impaired Segment Length (miles): 4319-00_01a (1.4), 4319-00_01b (11.29)

Water Quality Classification: Class A

Designated Use Impairment: Recreation

Sub-regional Basin Name and Code: West Branch Salmon Brook, 4319

Regional Basin: Farmington

Major Basin: Connecticut

Watershed Area (acres): 17,019

MS4 Applicable? Yes

Applicable Season: Recreation Season (May 1 to September 30)

Figure 1: Watershed location in Connecticut

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 these segments of West Branch Salmon Brook, the specific recreation impairment is for non-designated swimming and other water contact related activities.

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

Waterbody ID	Waterbody Name	Location	Miles	Aquatic Life	Recreation	Fish Consumption
CT4319-00_01a	Salmon Brook, West Branch (Granby)-01a	From mouth at confluence with East Branch Salmon Brook (part of Salmon Brook mainstem), DS of Route 10/202 crossing, just to West of Route 189, Granby, US to Bissell Brook (just US of Route 10/202 crossing), Granby.	1.4	FULL	NOT	FULL
CT4319-00_01b	Salmon Brook, West Branch (Granby)-01b	From confluence with Bissell Brook (US of Route 10/202 crossing), US to headwaters (just US of Route 179 (South Road) crossing), Hartland.	11.29	FULL	NOT	FULL

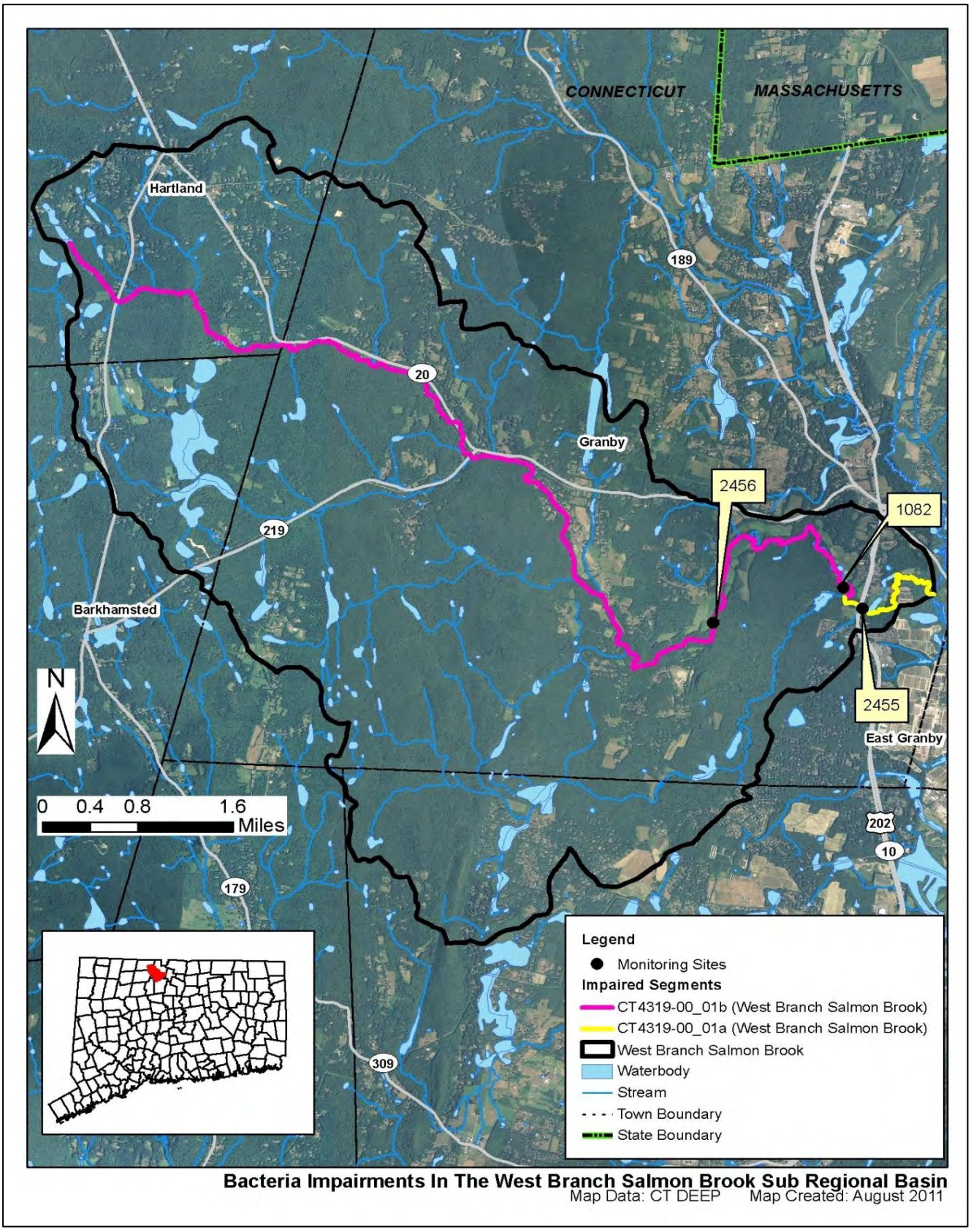
Shaded cells indicate impaired segment addressed in this TMDL

FULL = Designated Use Fully Supported

NOT = Designated Use Not Supported

U = Unassessed

Figure 2: GIS map featuring general information of the West Branch Salmon 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 West Branch Salmon Brook watershed consists of 78% forest, 11% urban, 7% agriculture, and 4% water land uses. The headwaters begin in a forested area with sporadic hayfields and rural residential development. The stream skirts closely to Route 20 (Hartland Road) where residential development is more prominent. Greater commercial and residential development intermixed with row crops and hayfields can be found along Simsbury Road and Barndoor Hills Road. The stream flows near several identified livestock pens, a game refuge, and Salmon Brook Park, which consists of 7 soccer fields, 5 baseball fields, tennis courts, parking lots, and a recreational swimming area. Downstream of the Route 202 (10) crossing, West Branch Salmon Brook flows between major row crop fields in suburban residential and commercial development.

Figure 3: Land use within the West Branch Salmon Brook watershed

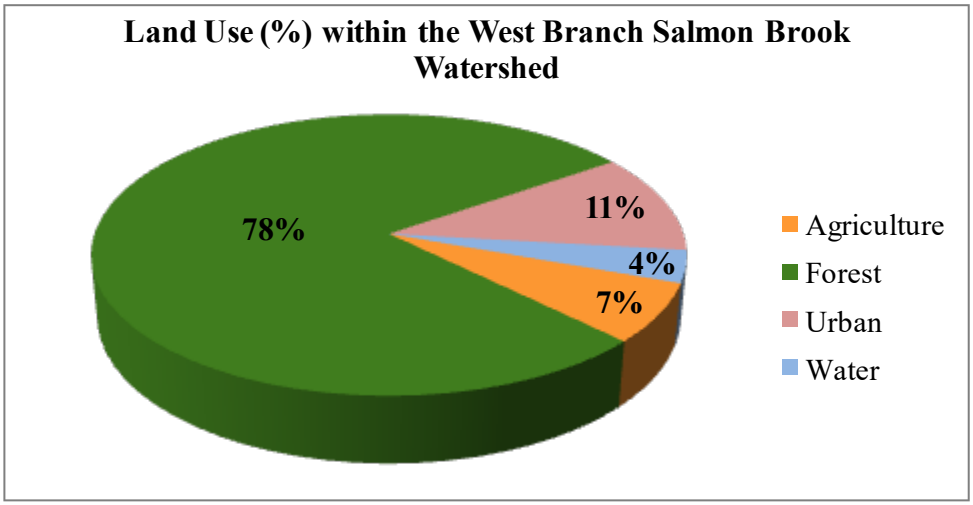
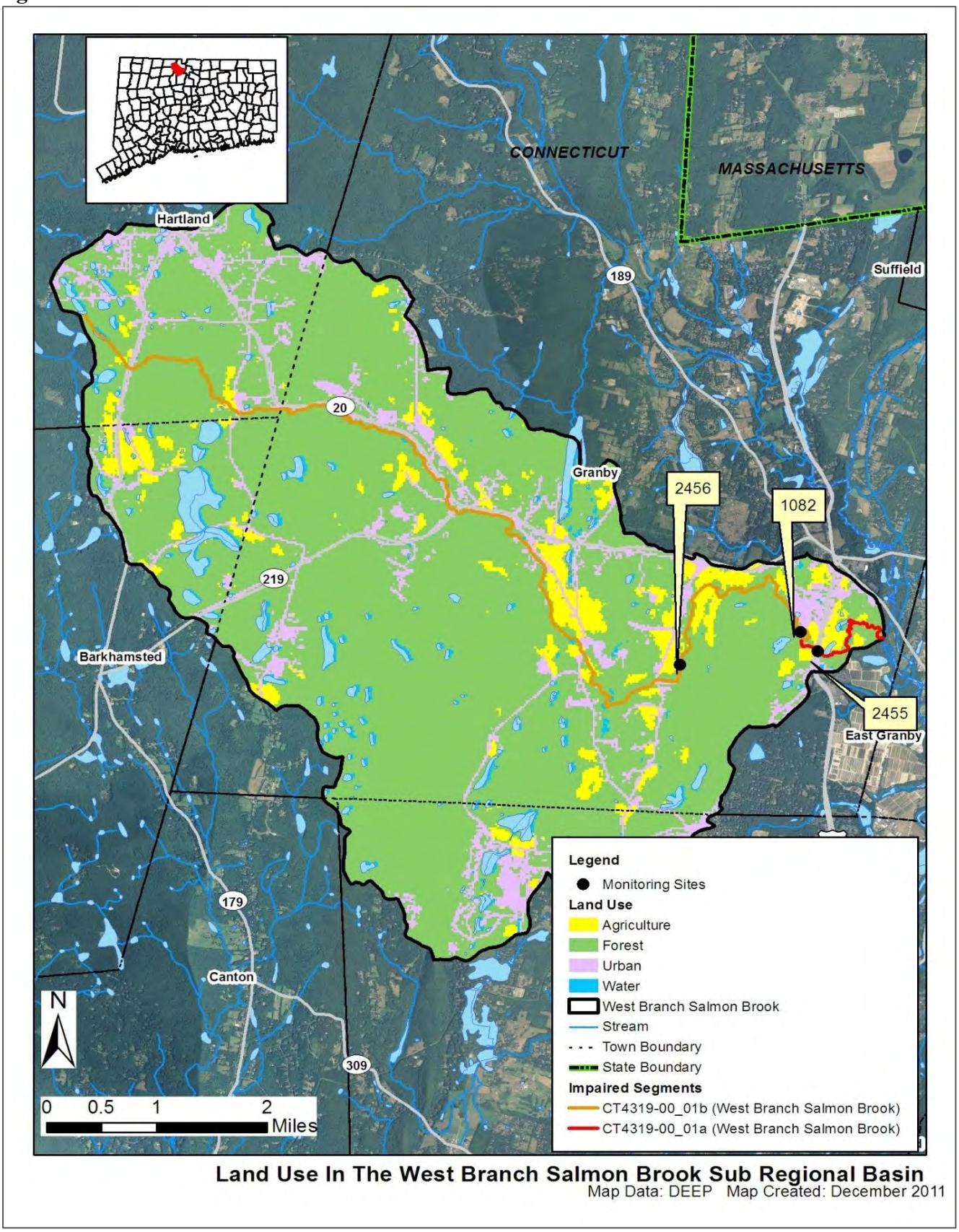


Figure 4: GIS map featuring land use for the West Branch Salmon Brook watershed at the sub-regional level



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 West Branch Salmon Brook watershed

Waterbody ID	Waterbody Name	Station	Station Description	Municipality	Latitude	Longitude
CT4319-00_01a	West Branch Salmon Brook	2455	Rte.10 Bridge, McLean Game Refuge	Granby	41.941107	-72.792581
CT4319-00_01b	West Branch Salmon Brook	1082	Salmon Brook Park	Granby	41.943781	-72.795675
CT4319-00_01b	West Branch Salmon Brook	2456	footbridge McLean Game Refuge, Barn Door Hills Road	Granby	41.939272	-72.816897

The two impaired segments of West Branch Salmon Brook (Segments 1a and 1b) are Class A freshwater rivers (Figure 5). Their 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 on West Branch Salmon Brook (Segment 1a) (Station 2455) from 2007-2008, and from two sampling locations on West Branch Salmon Brook (Segment 1b) (Stations 1082 and 2456) from 2007-2009 (Table 2).

For West Branch Salmon Brook (Segment 1a), the water quality criteria for *E. coli*, along with bacteria sampling results for Station 2455 from 2007-2008, are presented in Table 7. The annual geometric mean was calculated for Station 2455 and exceeded the WQS for *E. coli* in both sampling years. Single sample values at this station also exceeded the WQS for *E. coli* in 2007 and 2008 on at least one sampling date.

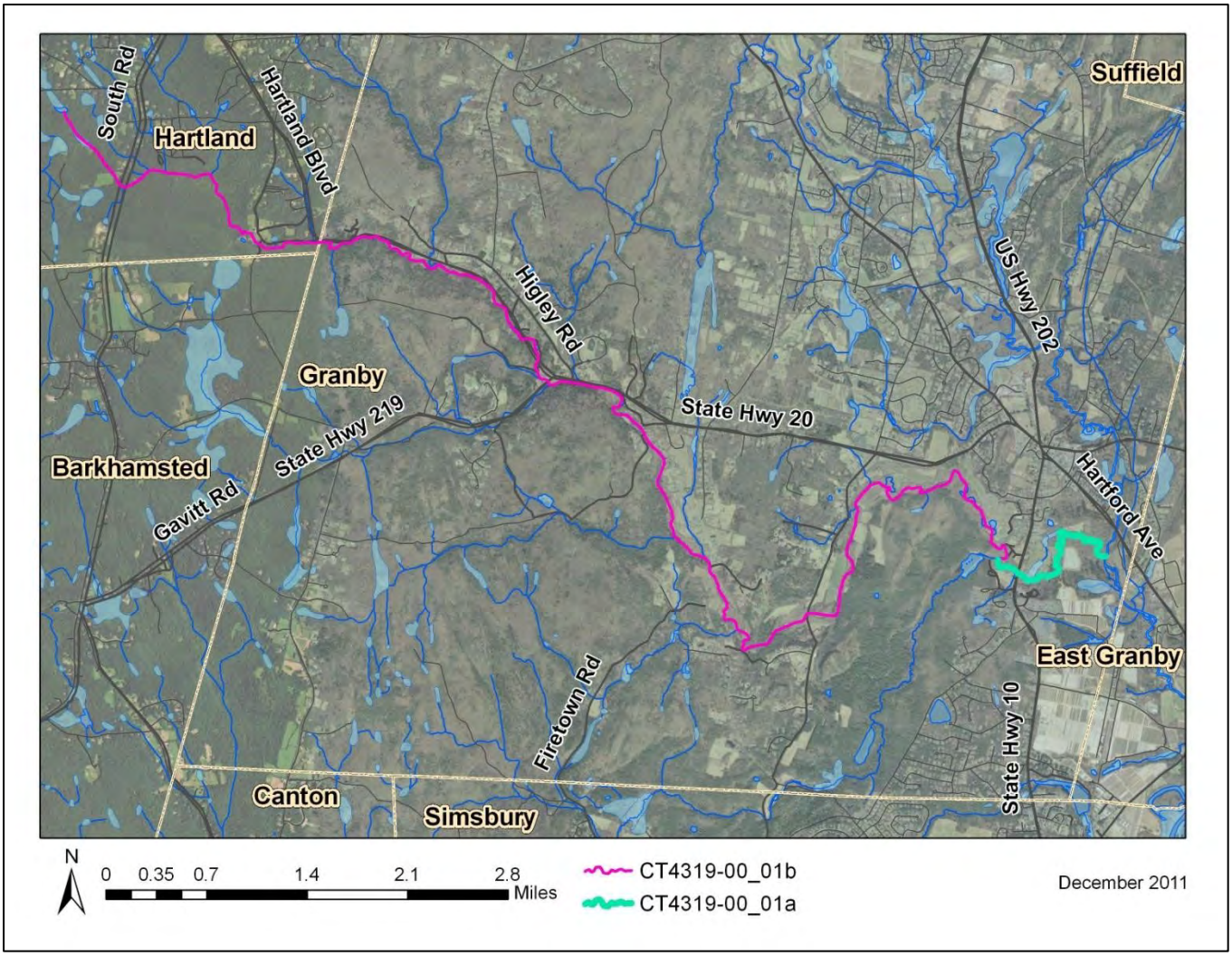
For West Branch Salmon Brook (Segment 1b), the water quality criteria for *E. coli*, along with bacteria sampling results for Stations 1082 and 2456 from 2007-2009 are presented in Table 8. The annual geometric mean was calculated and exceeded the WQS for *E. coli* in 2008. Single sample values at Station 1082 also exceeded the WQS for *E. coli* in 2008 and 2009 on at least one sampling 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 possible (Tables 7-8). For West Branch Salmon Brook (Segment 1a), geometric mean values during both wet and dry-weather at Station 2455 exceeded the WQS for *E coli*, and wet weather values were higher than dry weather. For West Branch Salmon Brook (Segment 1b), at Station 1082 only the geometric mean during wet-weather exceeded the WQS for *E. coli* and was four times higher than in dry weather; while at station 2456 there was no wet weather data, so comparison was not possible.

Due to the elevated bacteria measurements presented in Tables 7-8, these segments of West Branch Salmon Brook did not meet CT's bacteria WQS, were identified as impaired, and were 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 West Branch Salmon Brook



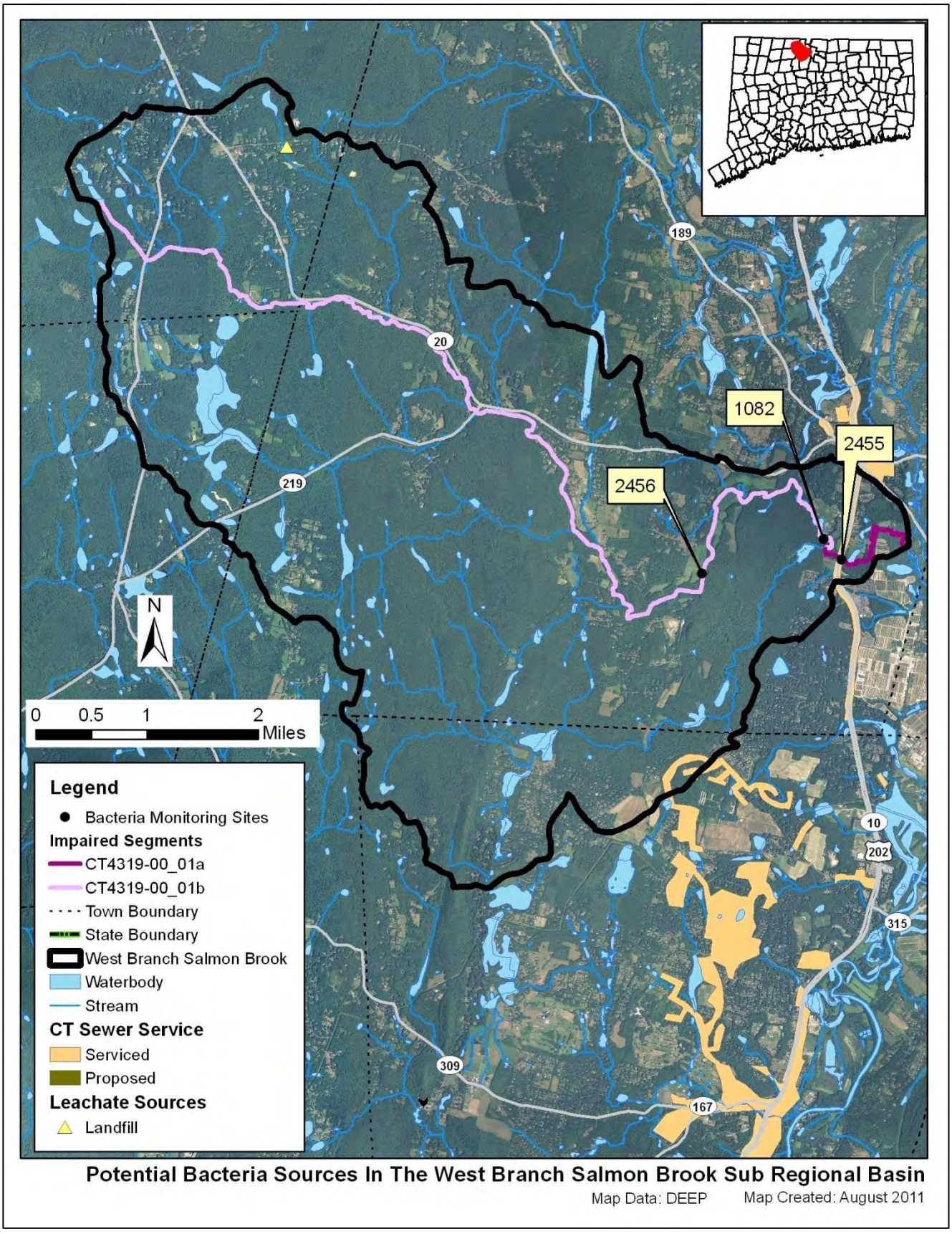
POTENTIAL BACTERIA SOURCES

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 may be 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 West Branch Salmon Brook watershed

Impaired Segment	Permit Source	Illicit Discharge	CSO/SSO Issue	Failing Septic System	Agricultural Activity	Stormwater Runoff	Nuisance Wildlife/Pets	Other
West Branch Salmon Brook CT4319-00_01a				x	x	x	x	
West Branch Salmon Brook CT4319-00_01b				x	x	x	x	

Figure 6: Potential sources in the West Branch Salmon 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. Future investigation and monitoring may reveal the presence of 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	0
GPL	Discharge of Swimming Pool Wastewater	0
GSC	Stormwater Discharge Associated with Commercial Activity	0
GSI	Stormwater Associated with Industrial Activity	0
GSM	Part B Municipal Stormwater MS4	0
GSN	Stormwater Registration – Construction	0
LF	Groundwater Permit (Landfill)	0
UI	Underground Injection	0

Permitted Sources

There is currently no permitted discharge information available for the West Branch Salmon Brook watershed. 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.

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.

Segment 1a of West Branch Salmon Brook is located within the Town of Granby, CT. Portions of the town particularly around Segment 1a are urbanized, as defined by the U.S. Census Bureau, and Granby is required to comply with the MS4 General Permit CT DEEP (Figure 7). This general permit is only applicable to municipalities that are identified in Appendix A of the MS4 permit that contain designated urban areas and discharge stormwater via a separate storm sewer system to surface waters of the State.

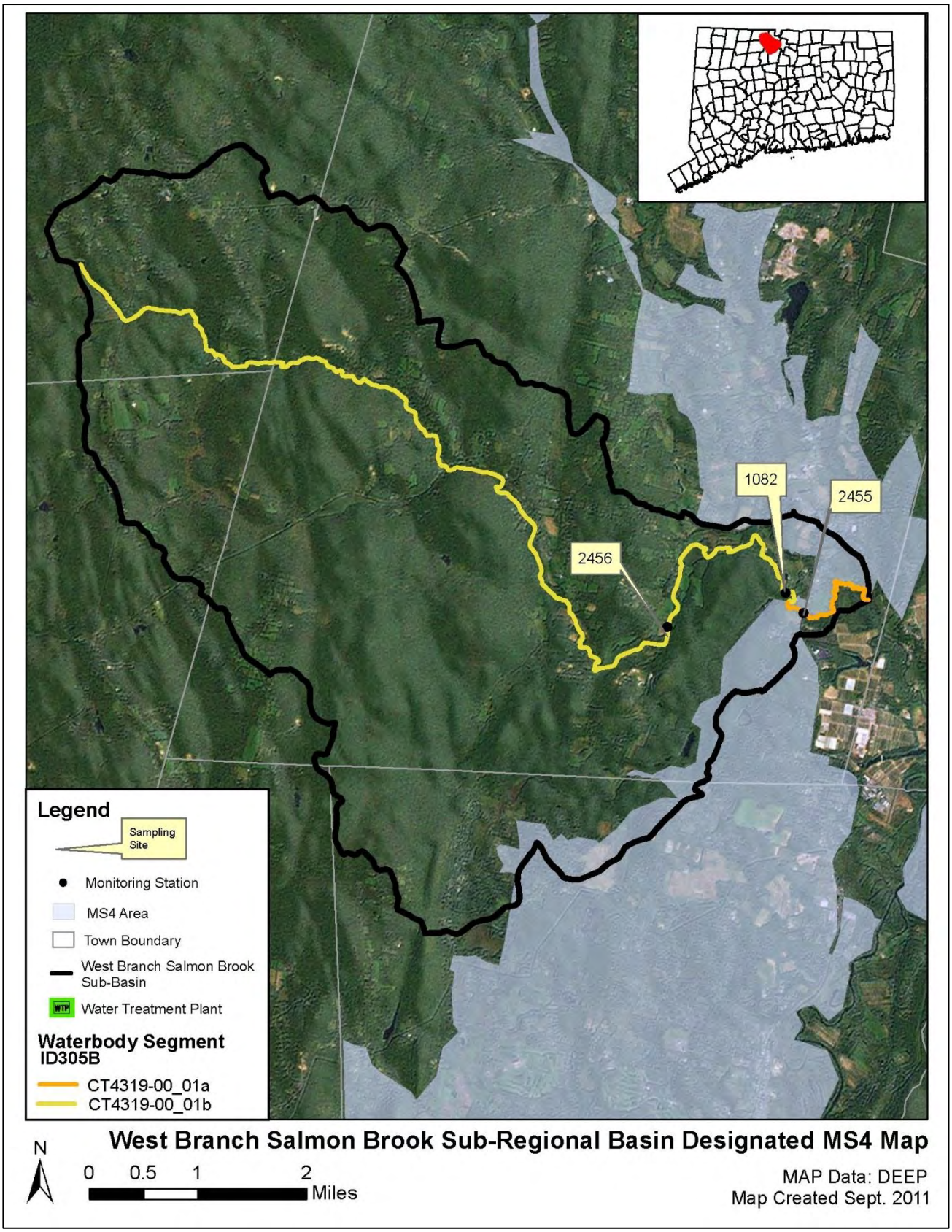
The permit requires municipalities to develop a Stormwater Management Plan (SMP) to reduce the discharge of pollutants and protect water quality. The MS4 permit is discussed further in the "TMDL Implementation Guidance" section of the core TMDL document. Additional information regarding stormwater management 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).

One MS4 outfall has been sampled for *E. coli* bacteria in the watershed (Table 5). This outfall, located in Granby, was sampled from 2007-2009, and exceeded the single sample water quality standard of 410 colonies/100 mL in 2008.

Table 5: List of MS4 sample locations and *E. coli* (colonies/100 mL) results in the West Branch Salmon Brook watershed

Town	Location	MS4 Type	Receiving Waters	Sample Date	Result
Granby	Mill Pond C-2	Commercial	Salmon Brook	10/19/07	50
Granby	Mill Pond C-2	Commercial	Salmon Brook	09/26/08	5,080
Granby	Mill Pond C-2	Commercial	Salmon Brook	11/14/09	50
Shaded cells indicate an exceedance of single-sample based water quality criteria (410 colonies/100 mL)					

Figure 7: MS4 areas of the West Branch Salmon 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 West Branch Salmon 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 7% of the West Branch Salmon Brook watershed, and the impaired segments of the West Branch Salmon Brook watershed flow through several agricultural corridors consisting of hayfields, row crops, and potential livestock pens, particularly along Simsbury Road, Barndoor Hills Road, and downstream of the Route 202 (10) crossing.

Wildlife and Domestic Animal Waste

Wildlife and domestic animals within the West Branch Salmon Brook watershed represent another potential source of bacteria. Wildlife, including waterfowl, may be a significant bacteria source to surface waters. 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 these natural sources on water quality (USEPA, 2001). The majority of the West Branch Salmon Brook watershed is undeveloped and wildlife waste may be a potential source of bacteria. The impaired segments of West Branch Salmon Brook run through residential development along Route 20 and near the Route 202 (10) crossing, so pet waste may also be a potential source of bacteria.

The impaired segments of West Branch Salmon Brook flow adjacent to agricultural fields, McLean Game Refuge, and Salmon Brook Park, which consists of 7 soccer fields, 5 baseball fields, tennis courts, parking lots, and a recreational swimming area. Geese and other waterfowl are known to congregate in open areas including recreational fields, agricultural crop fields, and golf courses. In addition to creating a nuisance, large numbers of geese can create unsanitary conditions on the grassed areas and cause water quality problems due to bacterial contamination associated with their droppings. Large populations of geese can also lead to habitat destruction as a result of overgrazing on wetland and riparian plants.

Stormwater Runoff from Developed Areas

While the majority of the West Branch Salmon Brook watershed is forested (78%), approximately 11% of the land use in the watershed is urban, and the impaired segments of West Branch Salmon Brook flow near Route 20 and Route 202 (10), which are characterized by suburban residential and agricultural development (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).

As shown in Figures 8 and 9, 98% of the West Branch Salmon Brook watershed contains less than 6% impervious cover, particularly along Segment 1b, and Segment 1a flows through an area characterized by 7-11% impervious cover. As indicated above, Segment 1b and Segment 1a flow through several urban-agriculture corridors with commercial and residential development along Route 20 and Route 202 (10); therefore, stormwater runoff pollution from adjacent urban development may be a higher contributor of bacterial contamination than the summarized statistics for land use and impervious cover reveal. Water quality data taken at Stations 2455 and 1082 along West Branch Salmon Brook exceeded wet-weather geometric mean limits, which suggests that stormwater runoff may be a source of bacteria to West Branch Salmon Brook (Tables 7-8).

Figure 8: Range of impervious cover (%) in the West Branch Salmon Brook watershed

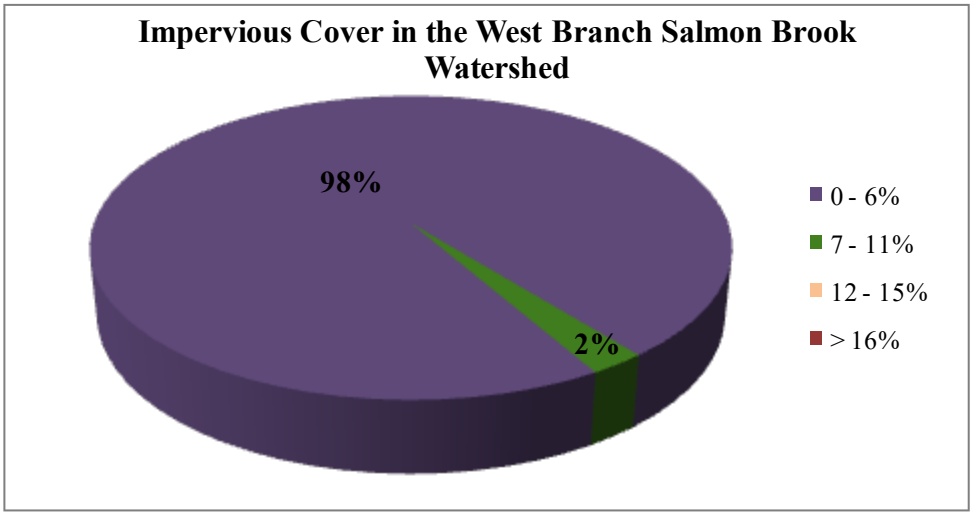
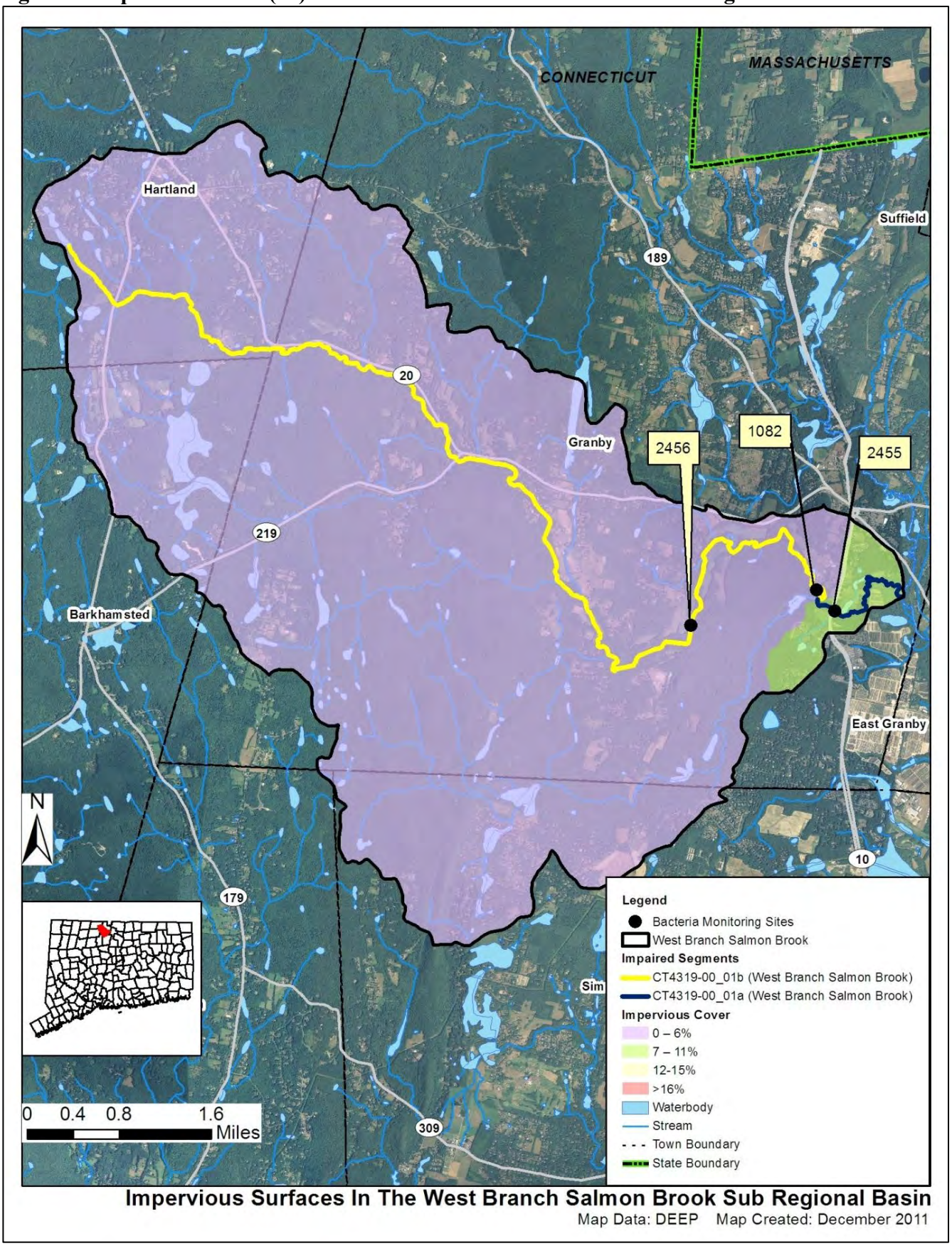


Figure 9: Impervious cover (%) for the West Branch Salmon Brook sub-regional watershed



Insufficient Septic Systems and Illicit Discharges

As shown in Figure 6, the entire West Branch Salmon 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. West Branch Salmon Brook (Segment 1a) at Station 2455 exceeded the dry-weather geometric mean limit for *E. coli*, which may indicate nearby failing septic systems. 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 Towns of Hartland and Granby are part of the Farmington Valley Health District (http://www.fvhd.org/).

There is only a very small area near the southern border of the West Branch Salmon Brook watershed that is serviced by the municipal sewer system (Figure 6). Given the very small size of this area, and the large distance from the impaired stream segments, sewer system leaks and other illicit discharges are not considered a potential source of bacteria in the watershed.

Additional Sources

As identified in Figure 6, a landfill is located along a tributary to Segment 1b, but is not considered a significant source of bacterial contamination to West Branch Salmon Brook given the distance from the impaired stream. There may be other sources not listed here or identified in Figure 6 that contribute to the observed water quality impairment in West Branch Salmon 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

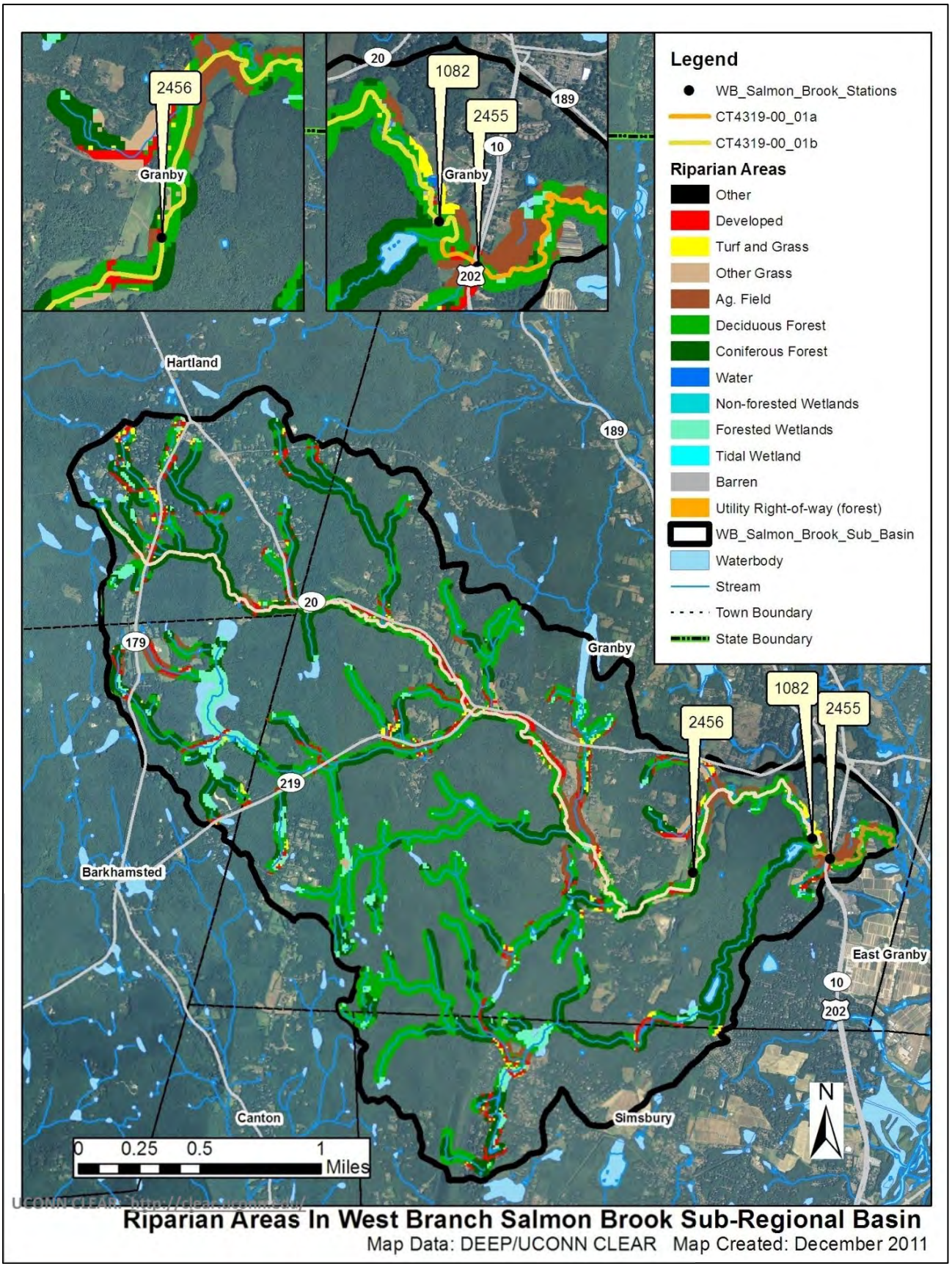
Riparian Buffer Zones

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 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 riparian zone for West Branch Salmon Brook (Segment 1a) is characterized by mixed forest with agricultural and developed land uses (Figure 10). Riparian areas along West Branch Salmon Brook (Segment 1b) are characterized by mixed forest with agricultural, turf-grass, and developed land uses. As previously noted, if not properly treated, runoff from agricultural and developed areas may contain pollutants such as bacteria and nutrients.

Figure 10: Riparian buffer zone information for the West Branch Salmon Brook watershed



CURRENT MANAGEMENT ACTIVITIES

As indicated previously, Granby is regulated under the MS4 program. The MS4 General Permit is required for any municipality with urbanized areas that initiates, creates, originates or maintains any discharge of stormwater from a storm sewer system to waters of the State. The MS4 permit requires towns to design a Stormwater Management Plan (SMP) to reduce the discharge of pollutants in stormwater to improve water quality. The plan must address the following 6 minimum measures:

1. Public Education and Outreach.
2. Public Involvement/Participation.
3. Illicit discharge detection and elimination.
4. Construction site stormwater runoff control.
5. Post-construction stormwater management in new development and redevelopment.
6. Pollution prevention/good housekeeping for municipal operations.

Each town is also required to submit an annual update outlining the steps they are taking to meet the six minimum measures. All updates that address bacterial contamination in the watershed are summarized in Table 6.

Table 6: Summary of MS4 requirement updates related to the reduction of bacterial contamination from Granby, CT (Permit # GSM000029)

Minimum Measure	Town of Granby Annual Report (2008)
Public Outreach and Education	1) Modified stormwater pollution section on website.
Public Involvement and Participation	No updates.
Illicit Discharge Detection and Elimination	1) Completed mapping of all storm sewer outfalls. 2) Will adopt illicit discharge detection and elimination ordinance.
Construction Site Stormwater Runoff Control	1) Continuing to review existing regulations regarding runoff and erosion control.
Post Construction Stormwater Management	No updates.
Pollution Prevention and Good Housekeeping	1) Developing a program to evaluate and clean stormwater structures for upgrades and necessary repairs.

RECOMMENDED NEXT STEPS

The Towns of Hartland and Granby have developed and implemented programs to protect water quality from bacterial contamination. Several municipalities have worked with the Farmington River Watershed Association (FRWA) www.frwa.org to develop and implement programs to protect water quality from bacterial contamination. Any municipalities not already working with this watershed association are encouraged to contact them for assistance with future efforts dealing with bacteria impairment in the West Branch Brook Watershed, a tributary of the Farmington River. Future mitigative activities are necessary to ensure the long-term protection of West Branch Salmon Brook and have been prioritized below.

1) Ensure there are sufficient buffers on agricultural lands along West Branch Salmon Brook.

Agricultural land use represents 7% of the West Branch Salmon Brook watershed, and is particularly concentrated around the impaired segments of West Branch Salmon Brook along Simsbury Road, Barndoor Hills Road, and downstream of the Route 202 (10) crossing. Potential livestock pens along West Branch Salmon Brook may be a concern for water quality. 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 from 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 West Branch Salmon Brook watershed is forested with developed residential and agricultural areas along Route 20, Simsbury Road, Barndoor Hills Road, and Route 202 (10) adjacent to the impaired segments, 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 municipalities and residents can take measures to minimize waterfowl-related impacts such as allowing tall, coarse vegetation to grow in the riparian areas of West Branch Salmon 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 West Branch Salmon 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) Identify areas along the West Branch Salmon Brook to implement Best Management Practices (BMPs) to control stormwater runoff.

As noted previously, 11% of the West Branch Salmon Brook watershed is considered urban, particularly near the impaired segments of West Branch Salmon Brook along Route 20 and Route 202 (10), and Stations 2455 and 1082 along both impaired segments exceeded wet-weather geometric mean limits. As such, stormwater runoff is likely contributing bacteria to the waterbodies. It may be beneficial to investigate the impact that Salmon Brook Park has on the adjacent West Branch Salmon Brook (Segment 1b). To identify other areas that are contributing bacteria to the impaired segments, the municipalities should conduct wet-weather sampling at any stormwater outfalls that discharge directly to the impaired

segments in the West Branch Salmon Brook watershed. To treat stormwater runoff, the municipalities should identify areas along the impaired segment to install BMPs designed to encourage stormwater to infiltrate into the ground before entering the waterbodies. These BMPs would disconnect impervious areas and reduce pollutant loads to the river. More detailed information and BMP recommendations can be found in the core TMDL document.

4) Develop a system to monitor septic systems.

The entire West Branch Salmon Brook watershed relies on septic systems, and a geometric mean exceedance during dry-weather at Station 2455 along West Branch Salmon Brook (Segment 1a) may indicate nearby failing septic systems. If not already in place, Hartland and Granby should establish programs 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 municipalities should also develop a program to assist citizens with the replacement and repair of older and failing systems.

BACTERIA DATA AND PERCENT REDUCTIONS TO MEET THE TMDL

Table 7: West Branch Salmon Brook Bacteria Data

Waterbody ID: CT4319-00_01a

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: **65%**

Single Sample: **79%**

Data: 2007-2008 from CT DEEP targeted sampling efforts, 2012 TMDL Cycle

Single sample *E. coli* (colonies/100 mL) data from Station 2455 on West Branch Salmon Brook (Segment 1a) with annual geometric mean calculated

Station Name	Station Location	Date	Results	Wet/Dry	Geomean
2455	DS of Route 10 bridge at McLean Game Refuge	6/4/2007	**1986* (79%)**	wet	**364* (65%)**
2455	DS of Route 10 bridge at McLean Game Refuge	6/18/2007	133	dry	
2455	DS of Route 10 bridge at McLean Game Refuge	7/2/2007	187	dry	
2455	DS of Route 10 bridge at McLean Game Refuge	7/16/2007	383	dry	
2455	DS of Route 10 bridge at McLean Game Refuge	8/13/2007	135	dry	
2455	DS of Route 10 bridge at McLean Game Refuge	8/27/2007	1664	dry	
2455	DS of Route 10 bridge at McLean Game Refuge	9/10/2007	771	dry	
2455	DS of Route 10 bridge at McLean Game Refuge	9/17/2007	146	dry	
2455	DS of Route 10 bridge at McLean Game Refuge	9/24/2007	169	dry	
2455	DS of Route 10 bridge at McLean Game Refuge	10/1/2007	512	dry	

Single sample *E. coli* (colonies/100 mL) data from Station 2455 on West Branch Salmon Brook (Segment 1a) with annual geometric mean calculated (continued)

Station Name	Station Location	Date	Results	Wet/Dry	Geomean
2455	DS of Route 10 bridge at McLean Game Refuge	6/9/2008	199	wet	259
2455	DS of Route 10 bridge at McLean Game Refuge	6/23/2008	563	wet	
2455	DS of Route 10 bridge at McLean Game Refuge	7/7/2008	318	dry	
2455	DS of Route 10 bridge at McLean Game Refuge	7/21/2008	241	wet	
2455	DS of Route 10 bridge at McLean Game Refuge	8/4/2008	262	dry	
2455	DS of Route 10 bridge at McLean Game Refuge	8/18/2008	135	dry	

Shaded cells indicate an exceedance of water quality criteria

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

Wet and dry weather geometric mean values for Station 2455 on West Branch Salmon Brook (Segment 1a)

Station Name	Station Location	Years Sampled	Number of Samples		Geometric Mean		
			Wet	Dry	All	Wet	Dry
2455	DS of Route 10 bridge at McLean Game Refuge	2007-2008	4	12	321	481	280

Shaded cells indicate an exceedance of water quality criteria

Weather condition determined from rain gage at the Hartford Bradley International Airport

Table 8: West Branch Salmon Brook Bacteria Data

Waterbody ID: CT4319-00_01b

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: **28%**

Single Sample: **60%**

Data: 2007-2009 from CT DEEP targeted sampling efforts, 2012 TMDL Cycle

Single sample *E. coli* (colonies/100 mL) data from Stations 1082 and 2456 on West Branch Salmon Brook (Segment 1b) with annual geometric mean calculated

Station Name	Station Location	Date	Results	Wet/ Dry	Geomean
1082	Adjacent to Salmon Brook Park	6/9/2008	908	wet	**174* (28%)**
1082	Adjacent to Salmon Brook Park	6/23/2008	134	wet	
1082	Adjacent to Salmon Brook Park	7/7/2008	63	dry	
1082	Adjacent to Salmon Brook Park	7/21/2008	295	wet	
1082	Adjacent to Salmon Brook Park	8/4/2008	144	dry	
1082	Adjacent to Salmon Brook Park	8/18/2008	86	dry	
1082	Adjacent to Salmon Brook Park	6/1/2009	30	dry	99
1082	Adjacent to Salmon Brook Park	6/15/2009	218	wet	
1082	Adjacent to Salmon Brook Park	6/29/2009	31	dry	
1082	Adjacent to Salmon Brook Park	7/13/2009	62	dry	
1082	Adjacent to Salmon Brook Park	7/27/2009	74	wet	
1082	Adjacent to Salmon Brook Park	8/10/2009	97	dry	
1082	Adjacent to Salmon Brook Park	8/24/2009	**1025* (60%)**	wet	

Single sample *E. coli* (colonies/100 mL) data from Stations 1082 and 2456 on West Branch Salmon Brook (Segment 1b) with annual geometric mean calculated (continued)

Station Name	Station Location	Date	Results	Wet/ Dry	Geomean
2456	Upstream of Barn Door Hills Road footbridge at McLean Game Refuge	9/10/2007	98	dry	65
2456	Upstream of Barn Door Hills Road footbridge at McLean Game Refuge	9/17/2007	86	dry	
2456	Upstream of Barn Door Hills Road footbridge at McLean Game Refuge	9/24/2007	41	dry	
2456	Upstream of Barn Door Hills Road footbridge at McLean Game Refuge	10/1/2007	52	dry	

Shaded cells indicate an exceedance of water quality criteria

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

Wet and dry weather geometric mean values for Stations 1082 and 2456 on West Branch Salmon Brook (Segment 1b)

Station Name	Station Location	Years Sampled	Number of Samples		Geometric Mean		
			Wet	Dry	All	Wet	Dry
1082	Adjacent to Salmon Brook Park	2008-2009	6	7	128	290	64
2456	Upstream of Barn Door Hills Road footbridge at McLean Game Refuge	2007	0	4	65	NA	65

Shaded cells indicate an exceedance of water quality criteria

Weather condition determined from rain gage at the Hartford Bradley International Airport

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