



# Weekeepeemee River

## Watershed Summary

### WATERSHED DESCRIPTION AND MAPS

The Weekeepeemee River watershed covers an area of approximately 10,312 acres in western Connecticut (Figure 1). There are multiple municipalities located at least partially in the watershed, including Woodbury, Bethlehem, Washington, and Morris, CT.

The Weekeepeemee River watershed includes one segment 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 waterbodies. Some segments in the watershed are currently unassessed as of the writing of this document. This does not suggest that there are no issues on these segments, but indicates a lack of current data to evaluate the segments as part of the assessment process. An excerpt of the Integrated Water Quality Report is included in Table 1 (CTDEEP, 2010).

The Weekeepeemee River impaired segment emerges from a marsh near Bergman Hill Road, east of the intersection with Todd Hill Road, in Morris. From this location, very near the municipal border between Morris and Bethlehem, the river flows south and enters Woodbury. It terminates 9.61 miles downstream at its confluence with the Nonewaug River, just above the Pomeraug River downstream of Jacks Bridge Road crossing (Figure 2).

The impaired segment of the Weekeepeemee River has a water quality classification of A. Designated uses include existing or proposed drinking water supplies, habitat for fish and other aquatic life and wildlife, recreation, and industrial and agricultural water supply. This segment of the river is impaired due to elevated bacteria concentrations, affecting the designated use of recreation. As there are no designated beaches in this segment of the Weekeepeemee River, the specific recreation impairment is for non-designated swimming and other water contact related activities.

### Impaired Segment Facts

**Impaired Segments:**

Weekeepeemee River  
(CT6804-00\_01)

**Towns:** Woodbury, Bethlehem,  
Washington, and Morris

**Impaired Segments and Lengths  
(miles):** CT6804-00\_01 (9.61)

**Water Quality Classifications:**  
Class A

**Designated Use Impairments:**  
Recreation

**Sub-regional Basin Name and  
Code:** Weekeepeemee River, 6804

**Regional Basin:** Pomperaug

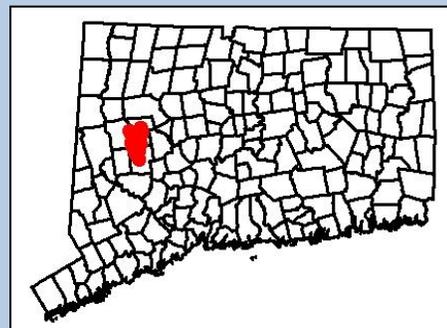
**Major Basin:** Housatonic

**Watershed Area (acres):** 10,312

**MS4 Applicable?** Yes

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

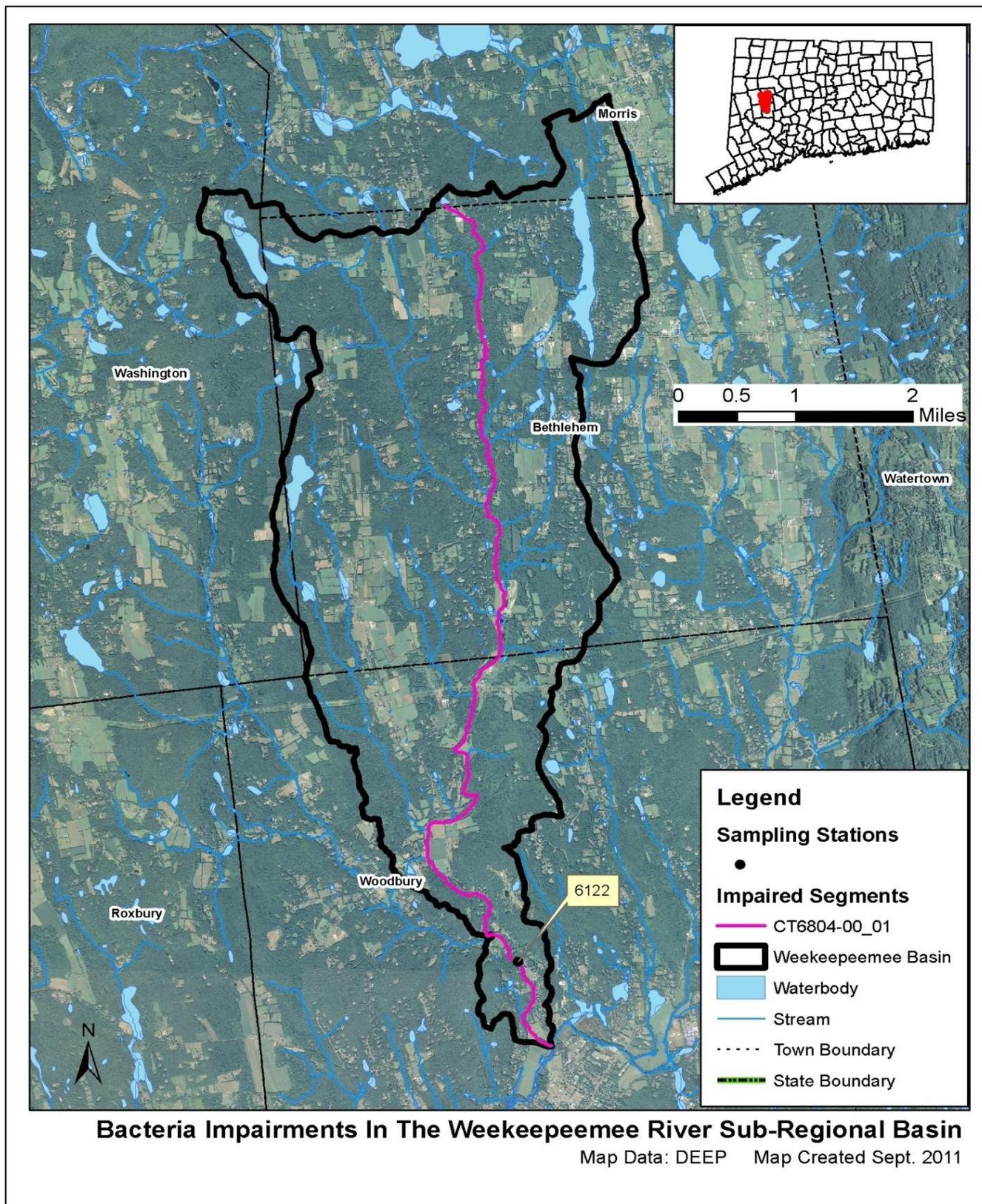
**Figure 1: Watershed location in  
Connecticut**



**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
CT6804-00_01	Weekepeemee River-01	From mouth at confluence with Nonewaug River, above Pomperaug River (DS of Jacks Bridge Road crossing), Woodbury, US to headwaters in marsh (just US of Bergman Hill Road crossing, east of intersection with Todd Hill Road), Morris.	9.61	FULL	U*	FULL
<p><b>*Impairment determined from 2010 data; will be listed as impaired on the 2012 303(d) List of Impaired Waters</b></p> <p><b>FULL = Designated Use Fully Supported</b></p> <p><b>NOT = Designated Use Not Supported</b></p> <p><b>U = Unassessed</b></p>						

Figure 2: GIS map featuring general information of the Weekeepemee River 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 Weekepeemee River watershed consists of 63% forest, 20% agriculture, 14% urban area, and 3% water. The watershed and river corridor are primarily forested, with many row crops and other agricultural fields, especially in the western portion. There are two moderate to low density developed areas in the watershed, including the village of Bethlehem and a part of Woodbury. The southernmost portion of the watershed is in the Woodbury MS4 area.

**Figure 3: Land use within the Weekepeemee River watershed**

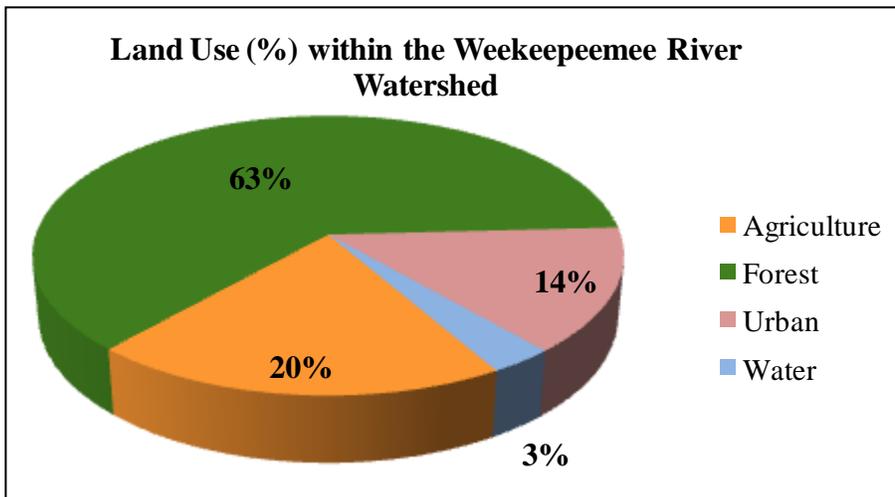
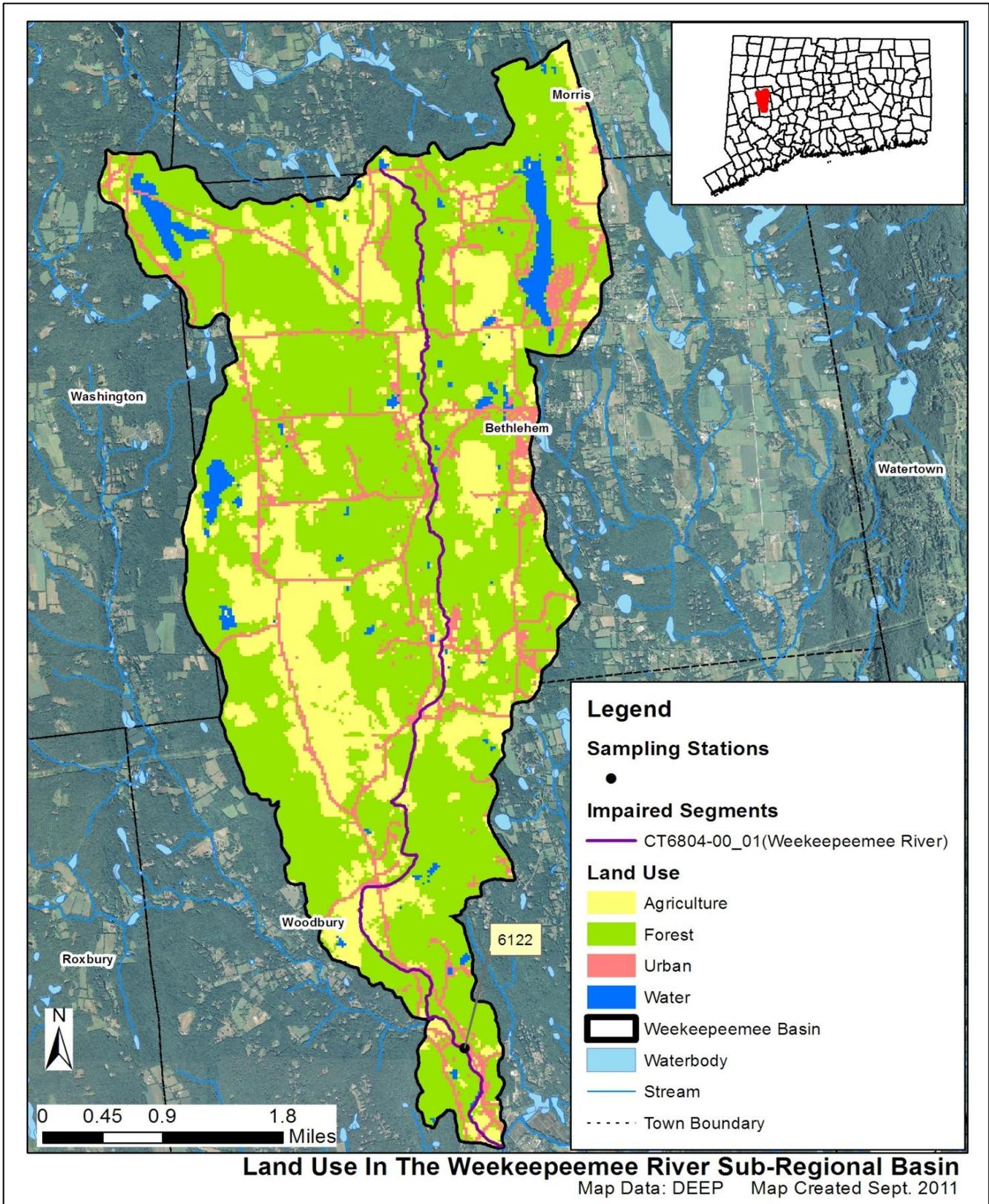


Figure 4: GIS map featuring land use for the Weekeepemee River watershed at the sub-regional level



**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 Weekepeemee River watershed**

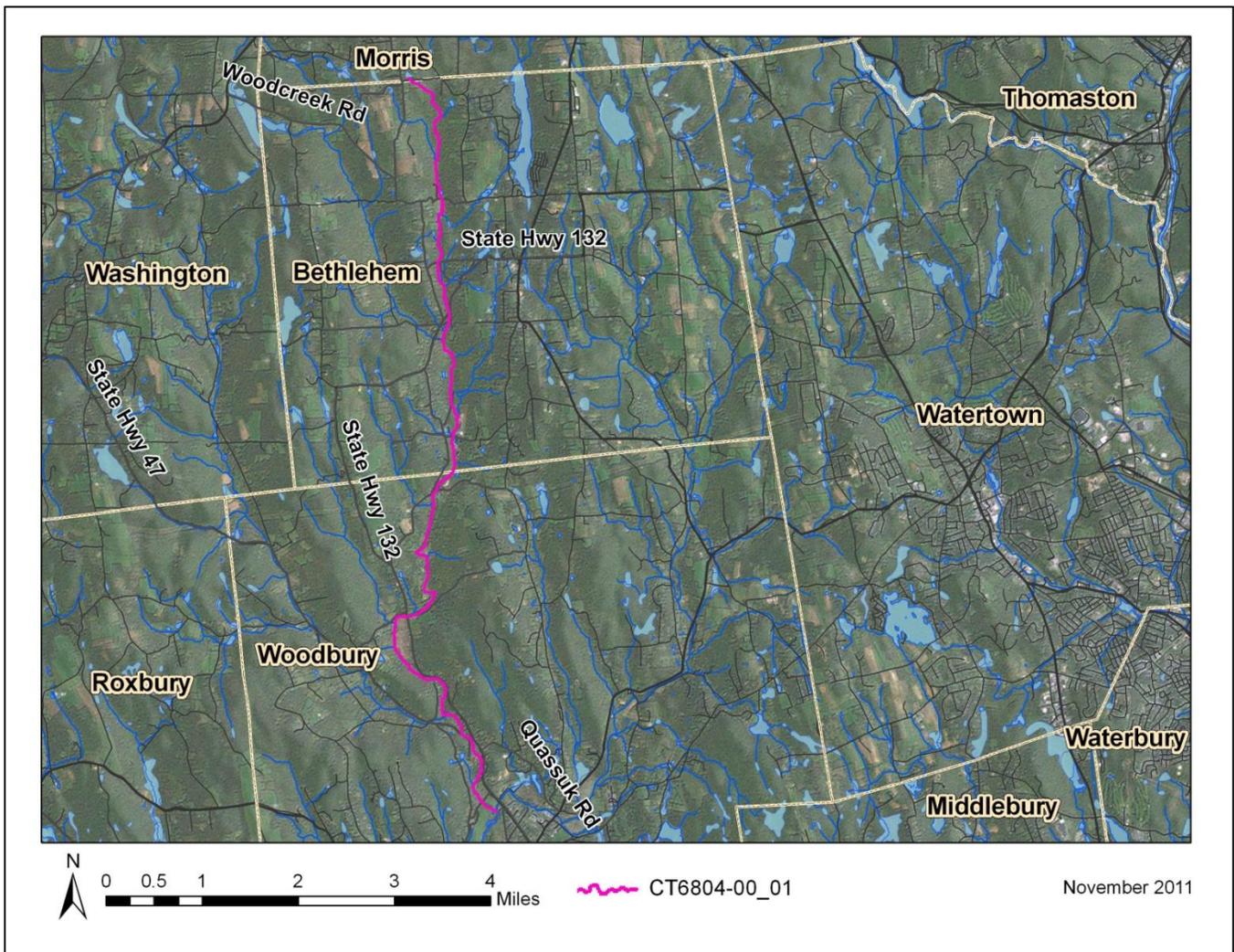
Waterbody ID	Waterbody Name	Station	Station Description	Municipality	Latitude	Longitude
CT6804-00_01	Weekepeemee River	6122	Rte 47 at bridge across from Ruffin Road	Woodbury	41.56722	-73.21816

The Weekepeemee River (CT6804-00\_01) 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 in 2010 (Station 6122) (Table 2). The *E. coli* water quality criteria and results are presented in Table 7. The geometric mean and one single sample result exceeded the water quality standard.

To aid in identifying possible bacteria sources, the geometric mean was also calculated for Station 6122 for wet-weather and dry-weather sampling days, where possible (Table 7). Bacteria concentrations were higher in wet weather conditions than dry, evidenced by the geometric means of 1175 and 133, respectively.

Due to the elevated bacteria measurements presented in Table 7, this impaired segment 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 the Weekepeemee River



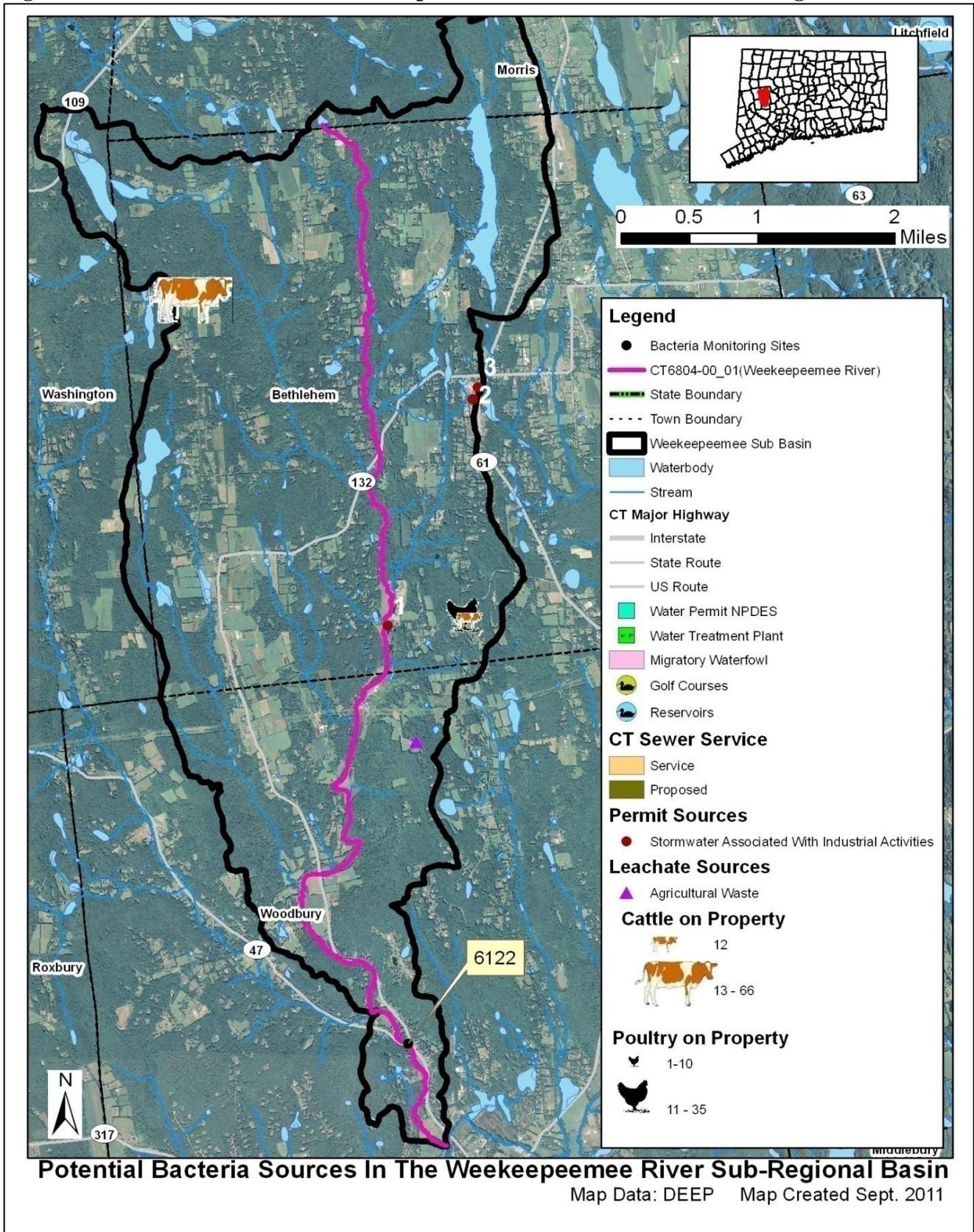
**POTENTIAL BACTERIA SOURCES**

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 Weekepeemee River watershed**

<b>Impaired Segment</b>	<b>Permit Source</b>	<b>Illicit Discharge</b>	<b>CSO/SSO Issue</b>	<b>Failing Septic System</b>	<b>Agricultural Activity</b>	<b>Stormwater Runoff</b>	<b>Nuisance Wildlife/Pets</b>	<b>Other</b>
Weekepeemee River CT6804-00_01	<b>x</b>	<b>x</b>		<b>x</b>	<b>x</b>	<b>x</b>	<b>x</b>	

Figure 6: Potential sources in the Weekeepemee River 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. No water quality sampling data were found for these permitted sources.

**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	3
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 several permitted discharges in the Weekepeemee River watershed. Bacteria data are currently unavailable for these industrial permitted facilities. 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 Weekepeemee River watershed**

Town	Client	Permit ID	Permit Type	Site Name/Address	Map #
Bethlehem	State Of Connecticut Department Of Transportation	GSI000006	Stormwater Associated With Industrial Activities	Bethlehem Salt Storage	2
Bethlehem	Town Of Bethlehem	GSI001299	Stormwater Associated With Industrial Activities	Town Of Bethlehem Public Works Garage	3
Bethlehem	First Student, Inc.	GSI002225	Stormwater Associated With Industrial Activities	First Student, Inc. #26014	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

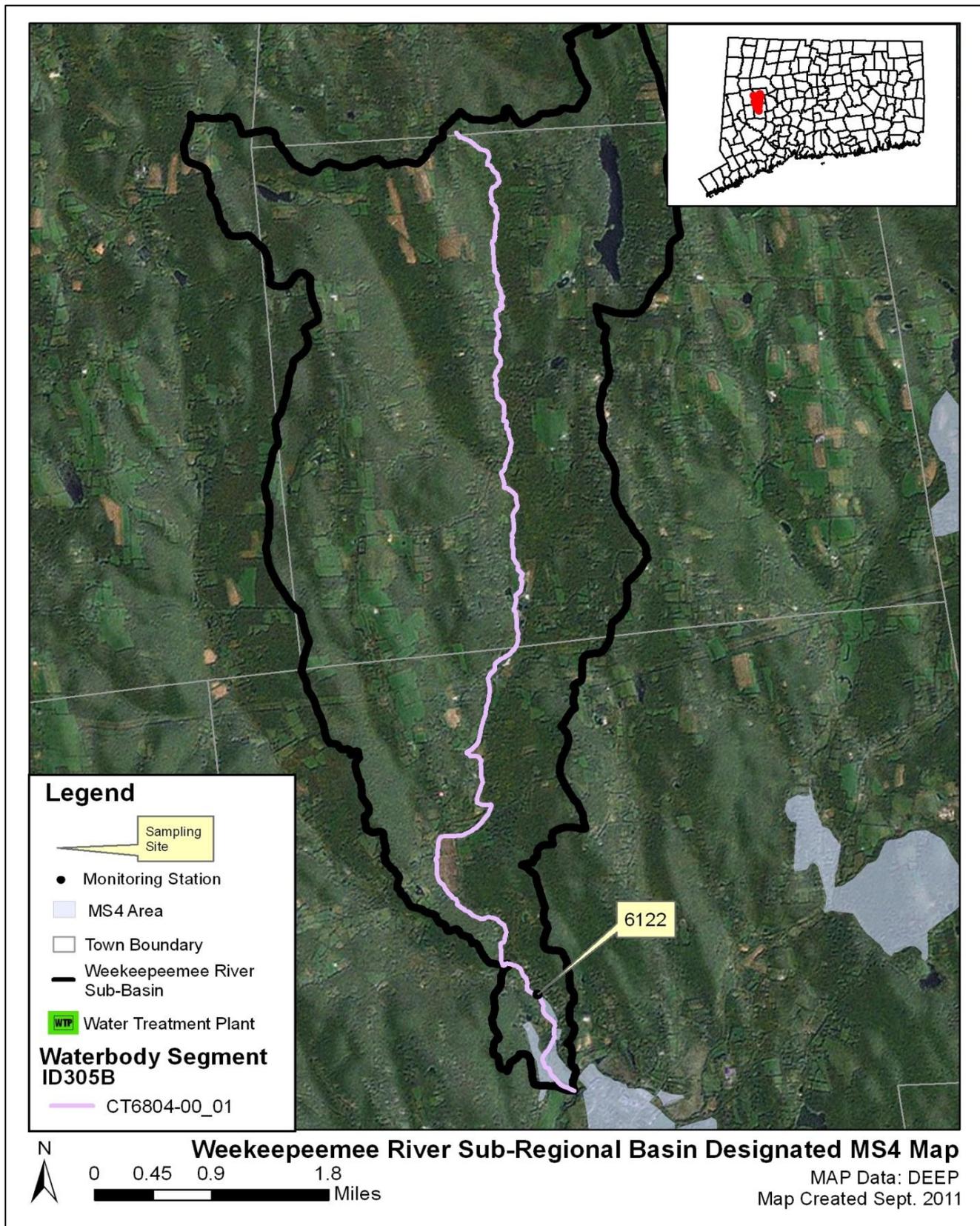
cluster definition above and are likely to contribute similar stormwater discharges to affected waterbodies covered in this TMDL.

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 in the Weekepeemee River watershed is located primarily in the Towns of Bethlehem and Woodbury, CT. Woodbury has designated urban areas, as defined by the U.S. Census Bureau, and is required to comply with the MS4 General Permit (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 as well as to 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](http://www.ct.gov/dep/cwp/view.asp?a=2721&q=325702&depNav_GID=1654)).

Figure 7: MS4 areas of the Weekepeemee River 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 Weekepeemee River watershed are described below.

### ***Insufficient Septic Systems***

None of the watershed is served by municipal sewer (see Figure 6). Therefore, the entire watershed relies on onsite wastewater treatment systems, such as septic systems. Insufficient or failing septic systems can be significant sources of bacteria if they allow raw or undertreated 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. Woodbury is served by the Pomperaug District (<http://pomperaughealthdistrict.org>), while Bethlehem and Morris are served by the Torrington Area District (<http://www.tahd.org>). Washington has a health director and is not part of a health district (<http://www.washingtonct.org/health.html>).

### ***Wildlife and Domestic Animal Waste***

Wildlife and domestic animals within the Weekepeemee River watershed represent another potential source of bacteria to the impaired waterbody. Elevated bacteria levels that are due solely to a natural population of wildlife are not subject to the WQS. Any exacerbation of wildlife population sizes or residency times influenced by human activities are subject to the CT WQS and TMDL provisions.

With the construction of roads and drainage systems, these wildlife wastes may no longer be retained on the landscape, but instead may be conveyed via stormwater to the nearest surface waterbody. As such these physical land alterations can exacerbate the impact of natural sources on water quality (USEPA, 2001). As the majority of the watershed is undeveloped, wildlife waste is a potential source of bacteria in the Weekepeemee River watershed.

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 also 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. Although there are no identified golf courses or large recreation fields in the watershed, there is a considerable amount of open fields in the watershed, which may attract waterfowl.

There are areas of residential development throughout the watershed. Most of it is low density, although there are a few moderate density areas. Abandoned waste from domestic animals, such as dogs, in these areas may also be contributing to bacteria concentrations in these impaired segments in the Weekepeemee River watershed.

### *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). Agricultural land use makes up 20% of the of the Weekepeemee River watershed, and includes row crops, especially along the Route 132 corridor in the western part of the watershed (Figure 4). Agricultural runoff is a potential source of bacteria to the Weekepeemee River.

### *Stormwater Runoff from Developed Areas*

The majority of the Weekepeemee River watershed is undeveloped. However, approximately 14% of the land use in the watershed is considered urban, with this area concentrated in the northeast corner of the watershed around Long Meadow Pond, in the center of the watershed in Bethlehem Village, and in the southern part of the watershed (Figure 4 and 7). 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). All of the Weekepeemee River watershed has less than 6% impervious surfaces (Figures 8 and 9).

**Figure 8: Range of impervious cover (%) in the Weekepeemee River watershed**

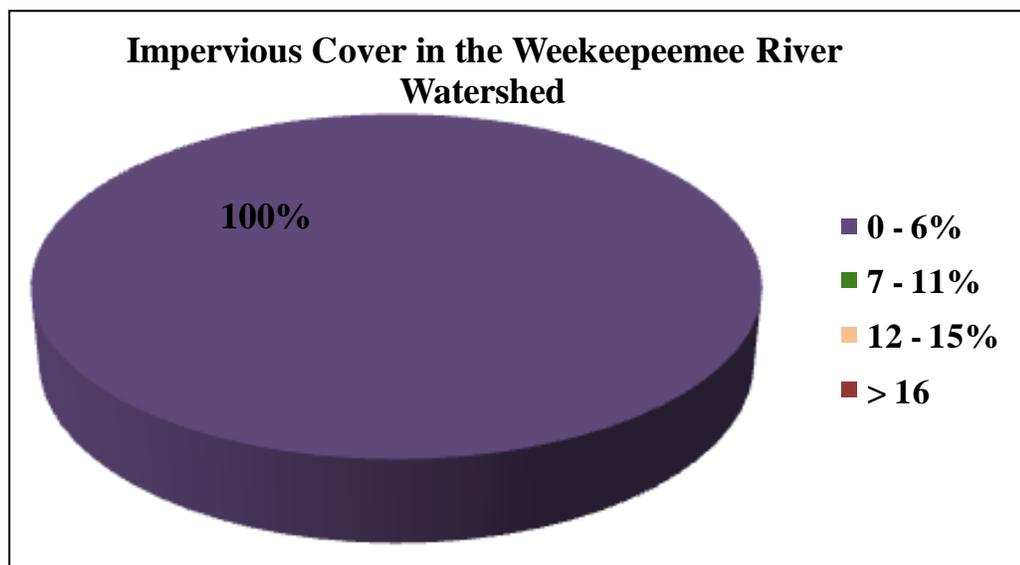
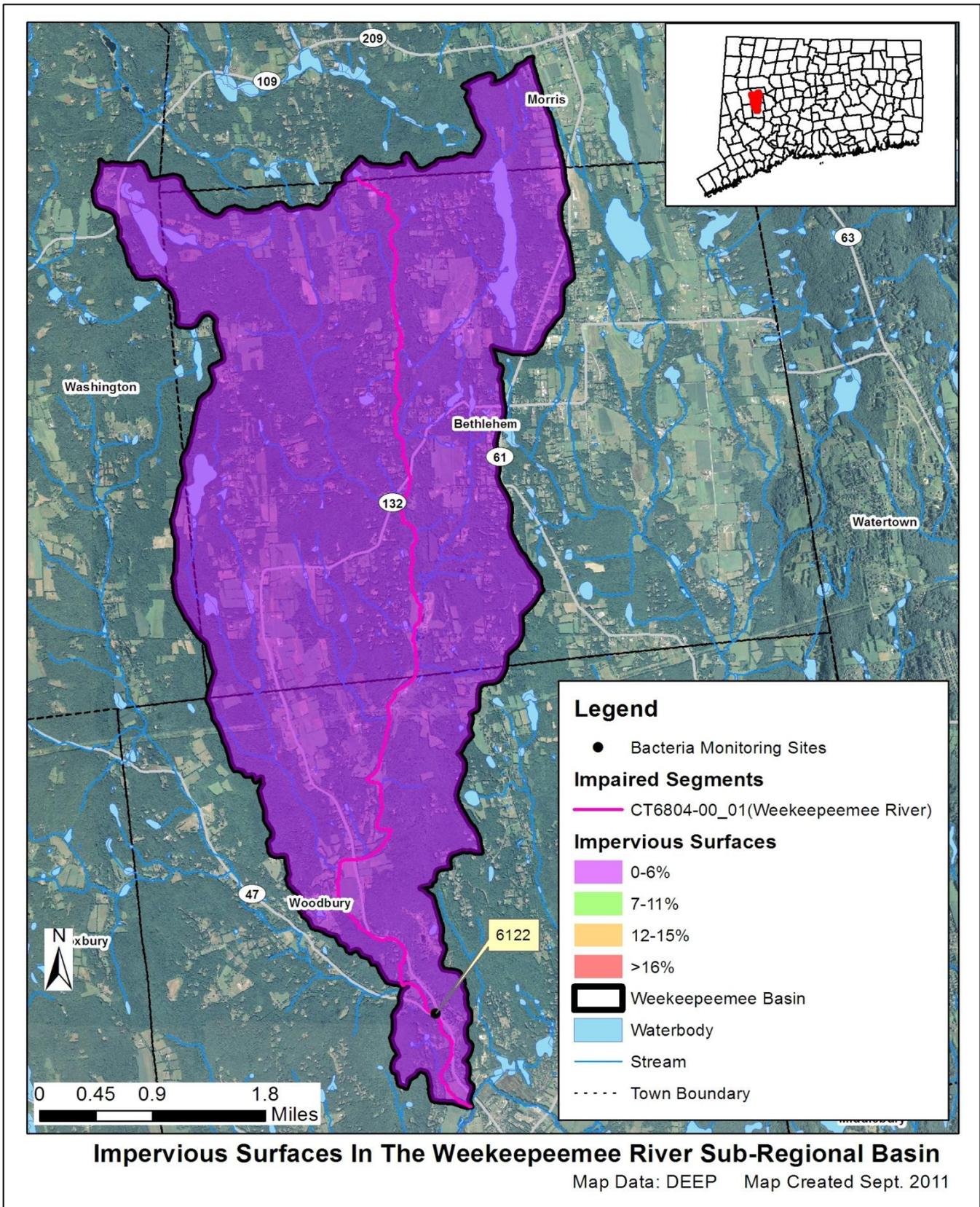


Figure 9: Impervious cover (%) for the Weekeepemee River sub-regional watershed



### **Additional Sources**

There may be other sources not listed here or identified in Figure 6 that contribute to the observed water quality impairment in the Weekepeemee River watershed. 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**

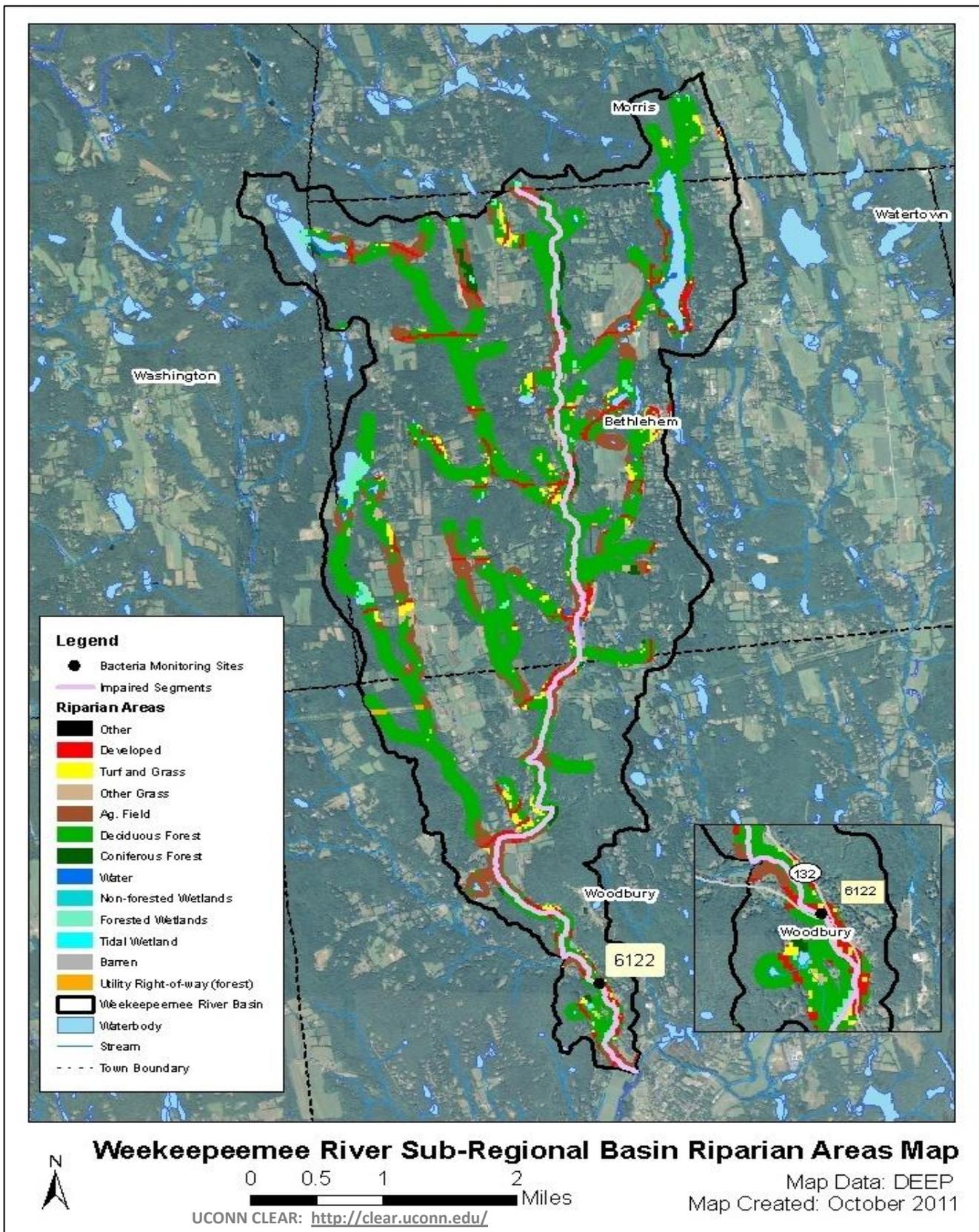
#### ***Riparian Buffer Zones***

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 the impaired segment of the Weekepeemee River is characterized by forested areas (Figure 10). As previously noted, waste from wildlife in non-developed areas can contribute bacteria to nearby waterbodies, though much of this waste may be treated by the natural vegetated buffer.

Figure 10: Riparian buffer zone information for the Weekeepemee River watershed



**CURRENT MANAGEMENT ACTIVITIES**

As indicated above, a portion of Woodbury in the southernmost point of the watershed 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 the 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 Woodbury, CT**

Minimum Measure	Town of Woodbury Stormwater Management Report (2008)
Public Outreach and Education	1) The Town of Woodbury partners with the Pomperaug River Watershed Association for public education on watershed issues.
Public Involvement and Participation	No updates.
Illicit Discharge Detection and Elimination	1) A municipal illicit discharge and elimination program was fully adopted in 2008 by Woodbury. 2) Mapping of stormwater outfalls greater than 12” in diameter within the MS4 area is ongoing. Mapping of 15” or larger stormwater outfalls has been completed.
Construction Site Stormwater Runoff Control	1) Town of Woodbury Land Use Department conducts ongoing erosion and sedimentation review of plans during the pre-construction/pre-application process.
Post Construction Stormwater management	1) A system of “random inspection and visual analysis” is being used to address stormwater runoff from development.
Pollution Prevention and Good Housekeeping	1) Swept 86 miles of municipal streets each spring. 2) Municipal catch basins are cleaned on a rotational basis, so that one third are cleaned each year.

**RECOMMENDED NEXT STEPS**

The Town of Woodbury has developed and implemented programs to protect water quality from bacterial contamination. If this municipality is not already working with the Pomperaug River Watershed Coalition (PRWC), they are encouraged to do so during future efforts. The PRWC has been involved in monitoring and education and outreach efforts in the basin. For more detailed information, view the group's website [www.pomperaug.org](http://www.pomperaug.org). Additional future mitigative activities are necessary to ensure the long-term protection of the Weekepeemee River and have been prioritized below.

**1) Begin monitoring stormwater outfalls as part of an Illicit Discharge Detection and Elimination (IDDE) program.**

Woodbury's 2008 MS4 update report indicates that mapping of stormwater outfalls was ongoing. This positive step should be followed by additional testing. Further monitoring will provide information essential to better locate, understand, and reduce pollution sources. If any current monitoring is not done with appropriate bacterial indicator based on the receiving water, then a recommended change during the next permit reissuance is to include the appropriate indicator species. If facility monitoring indicates elevated bacteria, then implementation of permit is required, and voluntary measures to identify and reduce sources of bacterial contamination at the facility are an additional recommendation. Regular monitoring should be established for all permitted sources to ensure compliance with permit requirements and to determine if current requirements are adequate or if additional measures are necessary for water quality protection.

Section 6(k) of the MS4 General Permit requires a municipality to modify their Stormwater Management Plan to implement the TMDL within four months of TMDL approval by EPA if stormwater within the municipality contributes pollutant(s) in excess of the allocation established by the TMDL. For discharges to impaired waterbodies, the municipality must assess and modify the six minimum measures of its plan, if necessary, to meet TMDL standards. Particular focus should be placed on the following plan components: public education, illicit discharge detection and elimination, stormwater structures cleaning, and the repair, upgrade, or retrofit of storm sewer structures. The goal of these modifications is to establish a program that improves water quality consistent with TMDL requirements. Modifications to the Stormwater Management Plan in response to TMDL development should be submitted to the Stormwater Program of DEEP for review and approval.

Table 7 details the appropriate bacteria criteria for use as waste load allocations established by this TMDL for use as water quality targets by permittees as permits are renewed and updated, within the Weekepeemee watershed.

For any municipality subject to an MS4 permit and affected by a TMDL, the permit requires a modification of the SMP to include BMPs that address the included impairment. In the case of bacteria related impairments municipal BMPs could include: implementation or improvement to existing nuisance wildlife programs, septic system monitoring programs, any additional measures that can be added to the required illicit discharge detection and elimination (IDDE) programs, and increased street sweeping above basic permit requirements. Any non-MS4 municipalities can implement these same types of initiatives in effort to reduce bacteria source loading to impaired waterways.

Any facilities that discharge non-MS4 regulated stormwater should update their Pollution Prevention Plan to reflect BMPs that can reduce bacteria loading to the receiving waterway. These BMPs could include

nuisance wildlife control programs and any installations that increase surface infiltration to reduce overall stormwater volumes. Facilities that are regulated under the Commercial Activities Stormwater Permit should report any updates to their SMP in their summary documentation submitted to DEEP.

**Table 7. Bacteria (e.coli) TMDLs, WLAs, and LAs for Recreational Use**

Class	Bacteria Source	Instantaneous <i>E. coli</i> (#/100mL)						Geometric Mean <i>E. coli</i> (#/100mL)	
		WLA <sup>6</sup>			LA <sup>6</sup>			WLA <sup>6</sup>	LA <sup>6</sup>
	Recreational Use	1	2	3	1	2	3	All	All
A	Non-Stormwater NPDES	0	0	0				0	
	CSOs	0	0	0				0	
	SSOs	0	0	0				0	
	Illicit sewer connection	0	0	0				0	
	Leaking sewer lines	0	0	0				0	
	Stormwater (MS4s)	235 <sup>7</sup>	410 <sup>7</sup>	576 <sup>7</sup>				126 <sup>7</sup>	
	Stormwater (non-MS4)				235 <sup>7</sup>	410 <sup>7</sup>	576 <sup>7</sup>		126 <sup>7</sup>
	Wildlife direct discharge				235 <sup>7</sup>	410 <sup>7</sup>	576 <sup>7</sup>		126 <sup>7</sup>
	Human or domestic animal direct discharge <sup>5</sup>				235	410	576		126

- (1) **Designated Swimming.** Procedures for monitoring and closure of bathing areas by State and Local Health Authorities are specified in: Guidelines for Monitoring Bathing Waters and Closure Protocol, adopted jointly by the Department of Environmental Protections and the Department of Public Health. May 1989. Revised April 2003 and updated December 2008.
- (2) **Non-Designated Swimming.** Includes areas otherwise suitable for swimming but which have not been designated by State or Local authorities as bathing areas, waters which support tubing, water skiing, or other recreational activities where full body contact is likely.
- (3) **All Other Recreational Uses.**
- (4) Criteria for the protection of recreational uses in Class B waters do not apply when disinfection of sewage treatment plant effluents is not required consistent with Standard 23. (Class B surface waters located north of Interstate Highway I-95 and downstream of a sewage treatment plant providing seasonal disinfection May 1 through October 1, as authorized by the Commissioner.)
- (5) Human direct discharge = swimmers
- (6) Unless otherwise required by statute or regulation, compliance with this TMDL will be based on ambient concentrations and not end-of-pipe bacteria concentrations
- (7) Replace numeric value with “natural levels” if only source is naturally occurring wildlife. Natural is defined as the biological, chemical and physical conditions and communities that occur within the environment which are unaffected or minimally affected by human influences (CT DEEP 2011a). Sections 2.2.2 and 6.2.7 of this Core Document deal with BMPs and delineating type of wildlife inputs.

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

As most of the Weekepeemee River watershed is undeveloped, any education and outreach program should highlight the importance of not feeding waterfowl and wildlife and managing waste from horses, dogs, and other pets. 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 the impaired segments 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 the Weekepeemee River watershed 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-uses 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.**

All homes in the Weekepeemee River watershed rely on onsite wastewater systems. If not already in place, Bethlehem and Woodbury should establish a program to ensure that existing septic systems are properly operated and maintained. For instance, communities can 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 the sub-standard systems within a reasonable timeframe could also be adopted. Towns can also develop programs to assist citizens with the replacement and repair of older and failing systems.

### **4) Ensure there are sufficient buffers on agricultural lands along the Weekepeemee River.**

There are a few small areas identified as agricultural land adjacent to the impaired segment of the Weekepeemee River, and there are large tracts of agricultural lands and livestock operations further upstream within the watershed. 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 Best Management Practices (BMPs) are in place. Particular attention should be paid to those agricultural operations located within the riparian buffer zone of the impaired segment of the Weekepeemee River (Figure 6).

**BACTERIA DATA AND PERCENT REDUCTIONS TO MEET THE TMDL****Table 7: Weekepeemee River Bacteria Data****Waterbody ID:** CT6804-00\_01**Characteristics:** Freshwater, Class AA, Existing or Proposed Public Drinking Water Supply, Habitat for Fish and other Aquatic Life and Wildlife, Recreation, 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/100ml (non-designated swimming areas)

**Percent Reduction to meet TMDL:**Geometric Mean: **98%**Single Sample: **48%****Data:** 2010 from CT DEEP targeted sampling efforts, 2012 TMDL Cycle**Single sample *E. coli* (colonies/100 mL) data from Station 6122 on the Weekepeemee River with annual geometric means calculated**

Station Name	Station Location	Date	Results	Wet/Dry	Geomean
6122	Route 47 bridge across from Ruffin Road	5/18/2010	10	dry	<b>241* (98%)</b>
6122	Route 47 bridge across from Ruffin Road	6/2/2010	260	wet	
6122	Route 47 bridge across from Ruffin Road	6/15/2010	230	dry**	
6122	Route 47 bridge across from Ruffin Road	6/24/2010	260	wet	
6122	Route 47 bridge across from Ruffin Road	7/6/2010	295 <sup>†</sup>	dry	
6122	Route 47 bridge across from Ruffin Road	7/12/2010	310	dry	
6122	Route 47 bridge across from Ruffin Road	7/22/2010	240	dry	
6122	Route 47 bridge across from Ruffin Road	7/29/2010	80 <sup>†</sup>	dry	
6122	Route 47 bridge across from Ruffin Road	8/5/2010	<b>24001* (48%)</b>	wet**	
6122	Route 47 bridge across from Ruffin Road	8/12/2010	160	dry**	
6122	Route 47 bridge across from Ruffin Road	9/2/2010	150	dry	

**Shaded cells indicate an exceedance of water quality criteria**<sup>†</sup> Average of two duplicate samples**\*\* Weather conditions for selected data taken from Hartford because local station had missing data****\*Indicates single sample and geometric mean values used to calculate the percent reduction**

**Wet and dry weather geometric mean values for Station 6122 on the Weekepeemee River.**

Station Name	Station Location	Years Sampled	Number of Samples		Geometric Mean		
			Wet	Dry	All	Wet	Dry
6122	Route 47 bridge across from Ruffin Road	2010	3	8	241	1175	133
<p><b>Shaded cells indicate an exceedance of water quality criteria</b></p> <p><b>Weather condition determined from rain gages in Danbury, CT and at Hartford Bradley International Airport</b></p>							

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