VERMONT
ENVIRONMENTAL CONSERVATION

LaPlatte River & Mud Hollow Brook

Watershed Description

This bacteria TMDL summary applies to a 10.5-mile reach of the LaPlatte River, as well as a 3 mile reach of Mud Hollow Brook, a major tributary to the LaPlatte River. The LaPlatte River is about 20 miles long and drains the southern section of Chittenden County (CCRPC, 2006). The river eventually empties into Lake Champlain in Shelburne Bay (LWP, 2011). The LaPlatte River's headwaters originate in the western hills of Hinesburg in a conserved town forest (Forest, 2009). The river then travels west as it meanders through farmland for nearly its entire course. It also passes through the more developed areas of Hinesburg Village and Shelburne Village (LWP, 2010). The headwaters for Mud Hollow Brook originate in south-central Charlotte and the brook flows north for about 7 miles through agricultural areas before its confluence with the LaPlatte River to the west of Spear Street, in Charlotte (CCRPC, 2006).

The bacteria-impaired segment of the LaPlatte River begins at its confluence with Lake Champlain, continuing 10.5 miles upstream to Levensworth Road in Hinesburg. The impaired segment for Mud Hollow Brook begins 3 miles upstream from the brook's confluence with the LaPlatte River in an agricultural field between Mt. Philo Road and Spear Street in Charlotte. The LaPlatte River watershed (Figure 1) covers 53 square miles, primarily in the towns of Charlotte, Hinesburg, Shelburne, St. George, Williston, and Richmond. Overall, land use in the watershed is 47% forested, 46% agricultural, 3% developed, and 3% wetland, as shown in Figure 2 (based on 2006 Land Cover Analysis by NOAA-CSC). Mud Hollow Brook's watershed is included in the greater LaPlatte River watershed.

Waterbody Facts (VT05-11)

- **Towns:** Hinesburg, Charlotte, Shelburne
- **LaPlatte River Impaired Segment Location:** From mouth upstream to Hinesburg
- **LaPlatte River Impaired Segment Length:** 10.5 miles
- **Mud Hollow Brook Impaired Segment Location:** From mouth to 3 miles upstream
- **Mud Hollow Brook Impaired Segment Length:** 3 miles
- **Classification:** Class B
- **Watershed Area:** 47 square miles
- **Planning Basin:** 5 – Northern Lake Champlain

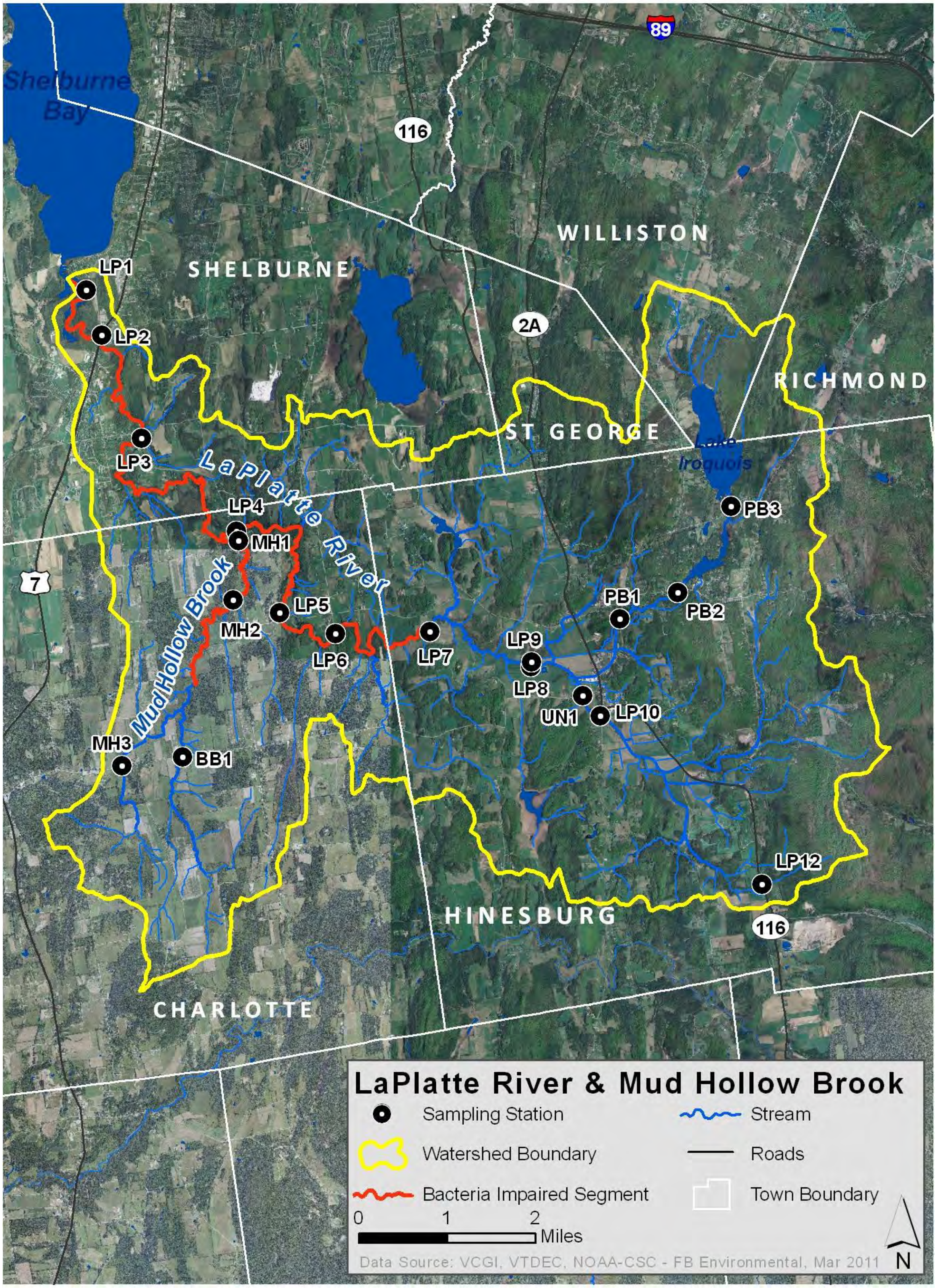

Figure 1: ***Map of LaPlatte River watershed with impaired segment and sampling stations***

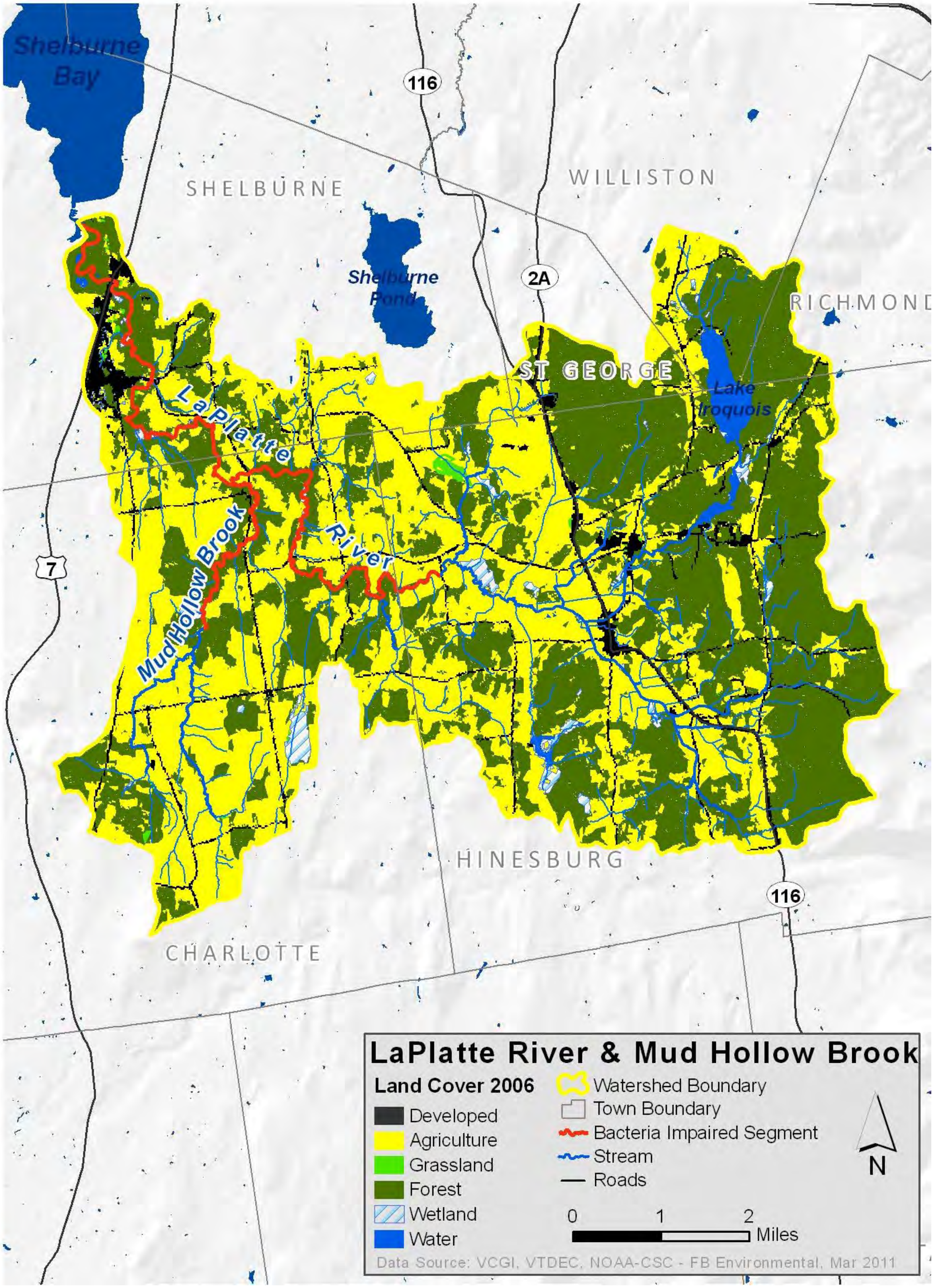

Figure 2: ***Map of LaPlatte River watershed with impaired segment and land cover indicated.***

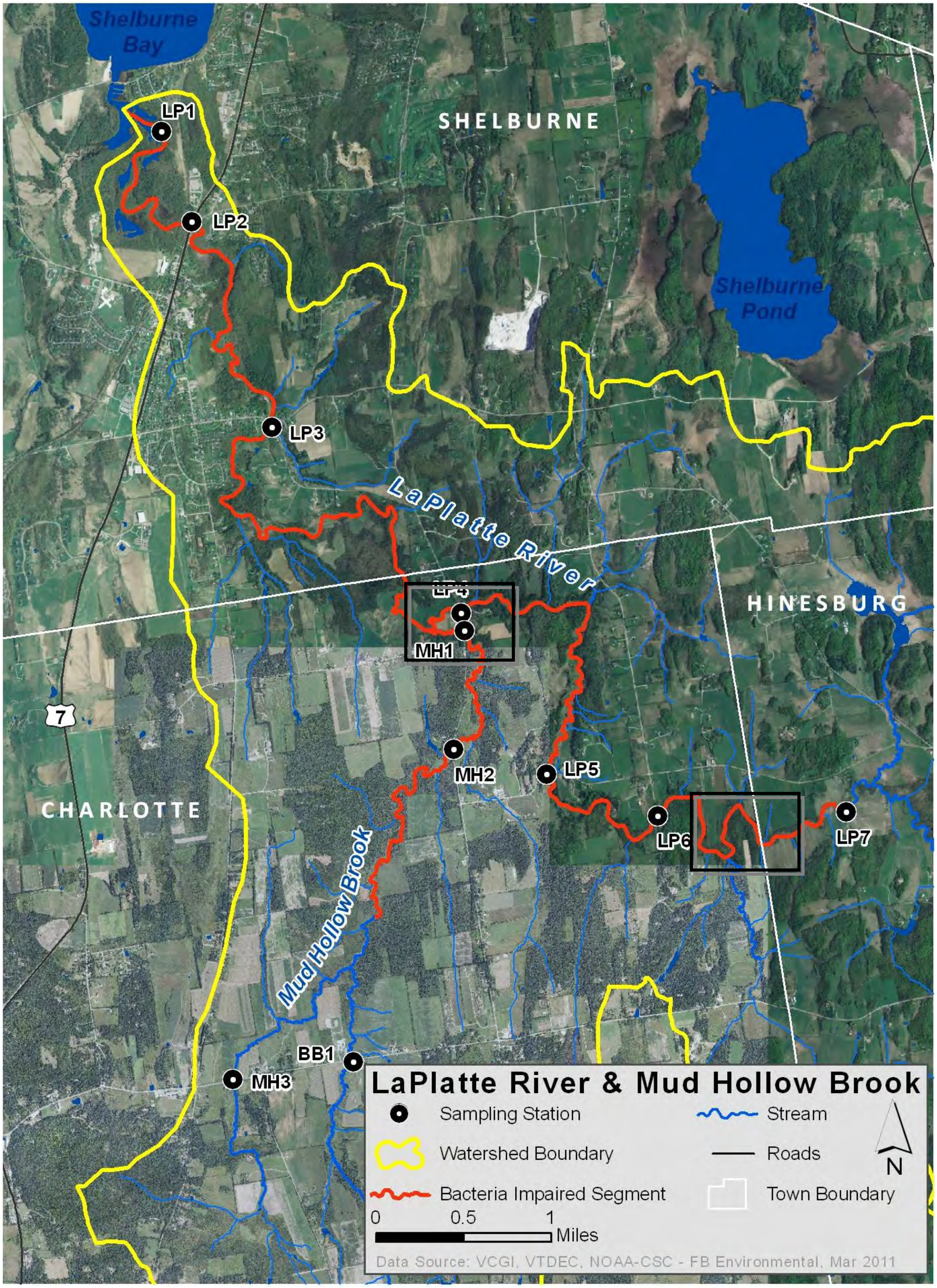

Figure 3: ***Map of downstream reaches of LaPlatte River with impaired segment and sampling locations indicated. Inset areas correspond to Figures 4 and 5 below.***

Figure 4. Aerial view of LaPlatte River and confluence with Mud Hollow Brook (lower-right) (Source: Google Maps.

The LaPlatte River and Mud Hollow Brook are important natural features within Chittenden County. Lands along the banks of both waterways have been identified as areas of known archeological sensitivity according the Vermont State Archeologist (Charlotte, 2008). The soils along their banks and within their floodplains are ideal for agriculture (CCRPC, 2006). Agriculture is important to the communities of Hinesburg, Charlotte, and Shelburne thanks largely to the fertile soils found along the LaPlatte River and Mud Hollow Brook (Hinesburg, 2010; Charlotte, 2008; Shelburne, 2007). Figure 3 provides a more detailed aerial view of the LaPlatte River in the downstream reaches with sampling stations indicated. The impaired segment of the LaPlatte River begins at sampling station LP7 at river mile 10.5 and continues downstream to where the river flows into Shelburne Bay (Figure 3). The bay is a water source for the Champlain Water District which provides clean water to over 65,000 Chittenden County residents and businesses (LWP, 2011).

Figure 4 shows the reach from approximately river mile 4.5 to river mile 5.5. At approximately river mile 5, Mud Hollow Brook flows into the LaPlatte River. Throughout the river's reach there are pockets of wetland areas within the historical floodplain. Much of the agricultural land surrounding the impaired segment of both the LaPlatte River and Mud Hollow Brook was once natural wetlands which helped to attenuate floods and filter excessive runoff. Wetlands along much of the rivers reach have, over time, been filled in or drained and converted to agricultural land (LWP, 2007). This restricts the rivers access to its natural flood plain and converts areas that once played a critical role in filtering runoff, into areas generating polluted runoff directly adjacent to the river (VTANR, 2007).

Figure 5. Aerial view of LaPlatte River from approximately river mile 10.5 to river mile 9.5.

Figure 5 provides an aerial view of a reach of LaPlatte River from approximately river mile 9.5 to the end of the impaired segment at sampling station LP7 at river mile 10.5. As seen in figures 4 and 5, there are large tracts of agricultural land along the banks of the LaPlatte River with minimal riparian buffers. The historical uses of agriculture so close to the river and Mud Hollow Brook have resulted in loss of in-stream and riparian habitat, which helps to filter and infiltrate potentially harmful runoff from agricultural fields (LWP, 2007). Without an adequate buffer to filter and remove pathogens and pollutants, *E.coli* readings are generally high at the sampling stations along the impaired segment. The long term health of the LaPlatte River and Mud Hollow Brook are closely linked to the use of best management practices (BMPs) on agricultural lands, aimed at reducing pollutant loads to the creek.

Why is a TMDL needed?

The LaPlatte River is a Class B waterbody with designated uses including swimming, fishing and boating (VTDEC, 2008). The river is a designated warm water fishery from its confluence with Patrick Brook in Hinesburg downstream to the Spear Street extension bridge in Charlotte, and a cold water fishery in all other reaches (VTNRB, 2008). Each summer, samples are collected from the sampling stations shown in Figure 3. Bacteria data from sampling locations LP7 down to station LP1 have consistently exceeded Vermont's water quality criteria for *E.coli* bacteria. Table 1 below provides bacteria data collected in these sampling locations from 2004 and 2005. Table 2 below provides bacteria data collected from sampling stations MH1 and MH2 on Mud Hollow Brook from 2004 and 2005. Both tables provide the water quality criteria for *E.coli* bacteria along with the individual sampling event bacteria results and geometric mean concentration statistics for each sampling season at the stations on the LaPlatte River and Mud Hollow Brook. For the LaPlatte River, the current single sample water quality criterion was exceeded in many of the sampling events. For Mud Hollow Brook, the current single sample water quality criterion is exceeded in almost half of the sampling events.

Due to the elevated bacteria measurements presented in Table 1, the LaPlatte River from the station at river mile 10.5 down to the rivers terminus in Shelburne Bay, did not meet Vermont's water quality standards, was identified as impaired and was placed on the 303(d) list. Due to the elevated bacteria measurements presented in Table 2, Mud Hollow Brook, from its confluence with LaPlatte River to 3 miles upstream, did not meet Vermont's water quality standards, was identified as impaired and was also placed on the 303(d) list (VTDEC, 2008). The 303(d) listing states that use of the LaPlatte River and Mud Hollow Brook for contact recreation (i.e., swimming) are impaired. 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 water quality standards.

Potential Bacteria Sources

Agricultural runoff is likely the greatest source of bacterial contamination to the LaPlatte River and Mud Hollow Brook (VTDEC, 2009). However, there are several other potential sources of bacteria in the watershed. Other potential sources include: failing or malfunctioning onsite septic disposal systems, leaking sanitary sewer pipes, and stormwater runoff from developed areas.

Given the high proportion of agriculture uses within the watershed, the proximity of these activities to the LaPlatte River and Mud Hollow Brook, and the general lack of riparian buffers, agricultural activities are likely the primary source of bacterial contamination. Cropland erosion and poor animal waste management practice have been identified as critical agricultural non point source (NPS) problems in the LaPlatte River watershed since 1978 (LaPlatte, 1990). All of the towns the LaPlatte River and Mud Hollow Brook flow through have large tracts of land devoted to agriculture. Hinesburg has nearly 12% of its land in agricultural use with over 89 farming operations. Hinesburg does not currently have any requirements for maintaining buffer strips around the LaPlatte River (Hinesburg, 2010). Dairy farming, requiring large numbers of cattle that deposit considerable amounts of fecal matter, is the major farming type in Charlotte. The major threats to water quality within Charlotte include bacterial contamination from manure spread too close to streams and animal grazing in close proximity to waterbodies, such as the LaPlatte River and Mud Hollow Brook (Charlotte, 2008).

When preformed properly, agricultural activities do not always equate to bacterial contamination. The LaPlatte River Angus beef farm in Shelburne was awarded the Sustainable Farm of the year Award from the Vermont Sustainable Agriculture Council in 2007. The farm employs various sustainable farming practices such as rotational grazing which allows pasture plants time to rest and regenerate after grazing. It also rotates spreading of the cattle's manure around various fields so that large amounts of manure are not concentrated on fields adjacent to the LaPlatte River (Kiesel). Multiple long term on-site improvement and restoration projects are being undertaken to help reduce agriculture runoff to the LaPlatte River (VTDEC, 2010). The Natural Resources Conservation Service, USEPA, and other agencies provided technical assistance and partial funding to support these projects (VTDEC, 2009). These improvements include actions such as extending riparian buffers which can reduce erosion and polluted runoff to streams while increasing water filtration on the land. The LaPlatte Watershed Partnership (LWP) has assisted in the past with native stream buffer plantings (LWP, 2011).

All of the residents residing in the LaPlatte River watershed within Charlotte and some residents within Hinesburg and Shelburne are not serviced by waste water treatment facilities and therefore rely on on-site septic systems to treat their waste. Soil characteristics are an important determinant in the suitability of septic disposal (Shelburne, 2007). When systems are old, unmaintained, or placed on soils with poor suitability they can malfunction and release high concentrations of dangerous bacteria to nearby surface waters (USEPA, 2002).

Extreme stoniness, shallow depth to bedrock, high water table, and low permeability create sever limitations for septic systems. Over two-thirds of the soils within Chittenden County are not properly suited for septic disposal including areas of the county within the LaPlatte River watershed (CCRPC, 2006). Within the town of Charlotte, only 12% of the underlying soils are considered to be suitable for conventional onsite septic waste disposal. Bacterial contamination from improperly functioning septic systems within Charlotte have been documented as a threat to water quality (Charlotte, 2008). These factors make malfunctioning or failing septic systems another likely source of bacterial contamination to the LaPlatte River and Mud Hollow Brook.

The towns of Shelburne and Hinesburg have their own wastewater treatment facilities that serve large portions of their towns (CCRPC, 2006). Many of the areas serviced by sanitary sewers surround the LaPlatte River, particularly in the densely developed areas of Shelburne Village and Hinesburg Village. If there were to be any leaks within this sewer, the waste from the sewer could enter the river. Spills and leaks from sanitary sewer systems can pose major threats to human health from high bacteria levels, and can cause significant ecological damage (Mallin et. al., 2007).

One way of determining if there is a leak in a sanitary sewer is to test for optical brighteners. These chemicals are added to laundry detergents to make whither whites and brighter colors. They give off fluorescence in their excited state when light from specific ranges of the spectrum are shined on them. Water from washing machines is carried from homes and businesses in the sanitary sewer. If leaking sanitary sewers are suspected, the presence of optical brighteners is one indication that leaks are present (Tavares et. al., 2009). In 2009 the LWP conducted tests for optical brighteners in Shelburne to detect possible sanitary sewer leaks. Two of the tests came back positive, indicating that there is a high probability there are some leaks within the town's sanitary sewer in these areas (Shelburne, 2010). Given this result, and the proximity of several sewer lines to the LaPlatte River, leaking sanitary sewer pipes are another potential source of bacterial contamination.

The areas of the watershed surrounding Hinesburg and Shelburne Villages are the most densely developed of the LaPlatte River watershed. Around these areas, the river has a reduced geomorphic habitat condition as well as reduced water quality (Milone, 2010). Increased development and impervious area generate more urban stormwater that can enter the river and cause these problems. Urban stormwater is known to carry a suite of pollutants, including bacteria. One source of bacteria within urban areas is improperly disposed pet fecal matter. If residents do not properly dispose of their pets fecal matter, the bacteria contained therein can be swept up by urban stormwater and contaminate the river. It is estimated that stormwater from urban and developed areas constitutes 62% of the stormwater that enters the LaPlatte River (LWP, 2010). Therefore, stormwater from developed areas represents another potential bacteria source to the LaPlatte River.

Recommended Next Steps

The LWP has been working within the LaPlatte River watershed to educate citizens and municipalities about the hazards of agricultural runoff, stormwater runoff, and the importance of riparian buffers (LWP, 2011). The LWP, municipalities surrounding the impaired segment, and other community and watershed based groups are encouraged to continue implementing education and outreach programs, restoration programs, and the identification of land use activities that might be influencing *E. coli* levels. Citizens should be encouraged and continually reminded of the importance of picking up after ones pet, especially in urban areas near the river and its tributaries. Protection and restoration of the LaPlatte River is important, but protecting the tributaries to the LaPlatte River, especially Mud Hollow Brook, are an essential component of the overall watershed goals of mitigating bacterial contamination.

An analysis of the data presented in Tables 1 and 2 reveals that the highest percentage of exceedances occurs at the stations on Mud Hollow Brook: MH1 and MH2. It is recommended that LWP expand bacteria sampling along Mud Hollow Brook. Having more reference points along the course of Mud Hollow Brook would help to identify areas and land uses within the watershed that are contributing bacteria loads to the brook. There are stations along the LaPlatte River which exceed the water quality criteria on several occasions, so additional bacteria data collection may be beneficial to support identification of sources of bacteria to the LaPlatte River as well. . While LWP does have numerous sampling stations along the LaPlatte River, the group could also sample upstream and downstream of potential on-site sewage and agricultural sources (a practice known as "bracket sampling"). Continued and expanded testing for optical brighteners within the areas of the watershed serviced by sanitary sewers would also be beneficial. Sampling activities focused on capturing bacteria data under different weather conditions (e.g., wet and dry) may also be beneficial in support of source identification.

Field reconnaissance surveys focused on stream buffers, stormwater runoff, and other source identification may also be beneficial. Since there is a high percentage (46%) of agricultural lands within the LaPlatte and Mud Hollow watersheds, it is important that these landowners are notified or reminded that organizations such as NRCS, USGS, the VT Department of Agriculture, and the Otter Creek

Conservation District can provide assistance with the installation of BMPs helping to reduce bacteria, nutrients, and suspended sediment loads to the LaPlatte River and Mud Hollow Brook. These organizations also provide education to landowners about ways to reduce the impact of those practices that may increase bacteria loading to the creek.

Previous investigations (Milone, 2010; Hinesburg, 2010; LWP, 2010; Shelburne, 2010; VTDEC, 2010) have recommended the following actions to support water quality goals in the LaPlatte River:

- On-Site Sewage System Management –Encourage residents to use new and more advanced onsite septic technologies. Reduce the rate of development in areas where there is no sanitary sewer access and soils are not well suited for septic disposal.
- Agricultural - Work with the USDA, NRCS and other agencies to assess the extent of agricultural waste application and potentially reduce applications through improved nutrient management planning. Encourage sustainable farming practices, such as those employed by the LaPlatte River Angus farm. Restore the land to health where damage to natural resources has already occurred due to poor land use.
- Stormwater – Shelburne is one of nine Vermont Communities that are regulated under EPA's Municipal Separate Storm Sewer System (MS4) program. As part of their permit, they already conduct education and outreach as well as implement BMPs within the town to reduce the impact of stormwater on the LaPlatte River. Shelburne should work with Hinesburg and Charlotte to help these communities to reduce the impact of their own stormwater. Continue and expand citizen education about the negative impacts of stormwater, with a focus on the importance of picking up after one's pet. Hold workshops on new and simple ways to reduce the impact of stormwater from ones property with BMPs.
- Land Use Protection - Preserve undeveloped portions of the watershed and institute controls on development near the LaPlatte River. Encourage communities to develop plans and regulations that afford greater protection of wetlands.
- Riparian Corridor – Encourage communities to install regulations addressing setbacks, buffers, and other tools that protect shoreline and/or riparian areas. Continue riparian corridor projects and seek to enhance buffers through a combination of buffer plantings, land conservation, and improved agricultural practices.

Several of the steps outlined above are ongoing and should be continued and enhanced to focus on the goals of bacteria TMDL implementation. If implemented, these actions will provide a strong basis toward the goal of mitigating bacteria sources and meeting water quality standards in the LaPlatte River and Mud Hollow Brook.

Bacteria Data

Vermont's current criteria for bacteria are more conservative than those recommended by EPA. For Class B waters, VTDEC currently utilizes an E. coli single sample criterion of 77 organisms/100ml. Although, Vermont is in the process of revising their bacteria WQS to better align with the National Recommended Water Quality Criteria (NRWQC) of a geometric mean of 126 organisms/100ml, and a single sample of 235 organisms/100ml. Therefore, in Table 1 below, bacteria data were compared to both the current VTWQS and the NRWQC for informational purposes.

LaPlatte River, from mouth of river to Hinesburg (10.5 miles).

***WB ID*:** VT05-11

Characteristics: Class B

Impairment: *E. coli* (organisms/100mL)

Current Water Quality Criteria for E. coli:

Single sample: 77 organisms/100 mL

Percent Reduction to meet TMDL (Current):

Single Sample: **97%**

NRWQC for E. coli:

Single sample: 235 organisms/100 mL

Geometric mean: 126 organisms/100 mL

Percent Reduction to meet NRWQC:

Single sample: **90%**

Geometric mean: **36%**

Data: 2004-2005, VTDEC

Table 1: *E.coli* (organisms/100 mL) Data for LaPlatte River (2004-2005) and Geometric Mean (organisms/100mL) for each Station based on Calendar Year.

Station Name	Station Location	Date	Result	Geometric Mean**
LP1	Laplatte R at Yacht Haven Trail	11/8/2005	43	75
LP1	Laplatte R at Yacht Haven Trail	10/4/2005	78	
LP1	Laplatte R at Yacht Haven Trail	9/6/2005	195	
LP1	Laplatte R at Yacht Haven Trail	8/2/2005	921	
LP1	Laplatte R at Yacht Haven Trail	7/5/2005	24	
LP1	Laplatte R at Yacht Haven Trail	6/7/2005	193	
LP1	Laplatte R at Yacht Haven Trail	5/3/2005	5	
LP1	Laplatte R at Yacht Haven Trail	11/16/2004	4	30
LP1	Laplatte R at Yacht Haven Trail	10/12/2004	21	
LP1	Laplatte R at Yacht Haven Trail	9/21/2004	56	
LP1	Laplatte R at Yacht Haven Trail	7/20/2004	104	
LP1	Laplatte R at Yacht Haven Trail	6/22/2004	48	
LP2	LaPlatte R at Route 7	11/8/2005	27	23
LP2	LaPlatte R at Route 7	10/4/2005	55	
LP2	LaPlatte R at Route 7	9/6/2005	199	
LP2	LaPlatte R at Route 7	8/2/2005	0	
LP2	LaPlatte R at Route 7	7/5/2005	64	
LP2	LaPlatte R at Route 7	6/7/2005	118	
LP2	LaPlatte R at Route 7	5/3/2005	15	

*Shaded cells indicate single sample and geometric mean used to calculate percent reduction.
**Only geometric mean values calculated with 5 data points or more are used to determine percent reduction.

Table 1: *E.coli* (organisms/100 mL) Data for LaPlatte River (2004-2005) and Geometric Mean (organisms/100mL) for each Station based on Calendar Year (continued).

Station Name	Station Location	Date	Result	Geometric Mean**
LP2	LaPlatte R at Route 7	11/16/2004	2	63
LP2	LaPlatte R at Route 7	10/12/2004	36	
LP2	LaPlatte R at Route 7	9/21/2004	45	
LP2	LaPlatte R at Route 7	7/20/2004	1120	
LP2	LaPlatte R at Route 7	6/22/2004	272	
LP3	LaPlatte R at Falls Road	11/8/2005	36	96
LP3	LaPlatte R at Falls Road	10/4/2005	49	
LP3	LaPlatte R at Falls Road	9/6/2005	101	
LP3	LaPlatte R at Falls Road	8/2/2005	770	
LP3	LaPlatte R at Falls Road	7/5/2005	144	
LP3	LaPlatte R at Falls Road	6/7/2005	204	
LP3	LaPlatte R at Falls Road	5/3/2005	19	
LP3	LaPlatte R at Falls Road	11/16/2004	3	197
LP3	LaPlatte R at Falls Road	10/12/2004	27	
LP3	LaPlatte R at Falls Road	9/21/2004	42	
LP3	LaPlatte R at Falls Road	8/31/2004	2419	
LP3	LaPlatte R at Falls Road	8/31/2004	2419	
LP3	LaPlatte R at Falls Road	7/20/2004	1120	
LP3	LaPlatte R at Falls Road	6/22/2004	517	
LP4	LaPlatte River at Spear Street Gecewicz	11/8/2005	32	93
LP4	LaPlatte River at Spear Street Gecewicz	10/4/2005	43	
LP4	LaPlatte River at Spear Street Gecewicz	9/6/2005	47	
LP4	LaPlatte River at Spear Street Gecewicz	8/2/2005	201	
LP4	LaPlatte River at Spear Street Gecewicz	7/5/2005	108	
LP4	LaPlatte River at Spear Street Gecewicz	6/7/2005	461	
LP4	LaPlatte River at Spear Street Gecewicz	11/16/2004	7	53
LP4	LaPlatte River at Spear Street Gecewicz	9/21/2004	46	
LP4	LaPlatte River at Spear Street Gecewicz	7/20/2004	299	
LP4	LaPlatte River at Spear Street Gecewicz	6/22/2004	81	
LP5	LaPlatte River at Carpenter Road	11/8/2005	35	69
LP5	LaPlatte River at Carpenter Road	10/4/2005	41	
LP5	LaPlatte River at Carpenter Road	9/6/2005	42	
LP5	LaPlatte River at Carpenter Road	8/2/2005	140	
LP5	LaPlatte River at Carpenter Road	7/5/2005	52	
LP5	LaPlatte River at Carpenter Road	6/7/2005	548	
LP5	LaPlatte River at Carpenter Road	5/3/2005	31	

Table 1: *E.coli* (organisms/100 mL) Data for LaPlatte River (2004-2005) and Geometric Mean (organisms/100mL) for each Station based on Calendar Year (continued).

Station Name	Station Location	Date	Result	Geometric Mean**
LP5	LaPlatte River at Carpenter Road	11/16/2004	17	92
LP5	LaPlatte River at Carpenter Road	10/12/2004	114	
LP5	LaPlatte River at Carpenter Road	9/21/2004	60	
LP5	LaPlatte River at Carpenter Road	7/20/2004	153	
LP5	LaPlatte River at Carpenter Road	6/22/2004	365	
LP6	LaPlatte River at Dorset Street	11/8/2005	31	55
LP6	LaPlatte River at Dorset Street	10/4/2005	48	
LP6	LaPlatte River at Dorset Street	9/6/2005	43	
LP6	LaPlatte River at Dorset Street	8/2/2005	190	
LP6	LaPlatte River at Dorset Street	7/5/2005	32	
LP6	LaPlatte River at Dorset Street	6/7/2005	184	
LP6	LaPlatte River at Dorset Street	5/3/2005	20	
LP6	LaPlatte River at Dorset Street	11/16/2004	10	98
LP6	LaPlatte River at Dorset Street	10/12/2004	114	
LP6	LaPlatte River at Dorset Street	9/21/2004	88	
LP6	LaPlatte River at Dorset Street	7/20/2004	770	
LP6	LaPlatte River at Dorset Street	6/22/2004	115	
LP7	LaPlatte River at Leavenworth North Road	11/8/2005	17	99
LP7	LaPlatte River at Leavenworth North Road	10/4/2005	77	
LP7	LaPlatte River at Leavenworth North Road	9/6/2005	102	
LP7	LaPlatte River at Leavenworth North Road	8/2/2005	1990	
LP7	LaPlatte River at Leavenworth North Road	7/5/2005	214	
LP7	LaPlatte River at Leavenworth North Road	6/7/2005	184	
LP7	LaPlatte River at Leavenworth North Road	5/3/2005	9	
LP7	LaPlatte River at Leavenworth North Road	11/16/2004	12	181
LP7	LaPlatte River at Leavenworth North Road	10/12/2004	77	
LP7	LaPlatte River at Leavenworth North Road	9/21/2004	142	
LP7	LaPlatte River at Leavenworth North Road	9/21/2004	133	
LP7	LaPlatte River at Leavenworth North Road	8/31/2004	2419	
LP7	LaPlatte River at Leavenworth North Road	7/20/2004	488	
LP7	LaPlatte River at Leavenworth North Road	6/22/2004	308	

*Shaded cells indicate single sample and geometric mean used to calculate percent reduction.
** Geometric mean used to calculate % reduction has no fewer than 5 data points.

Mud Hollow Brook, from mouth of brook to 3 miles upstream (3 miles).

***WB ID*:** VT05-11

Characteristics: Class B

Impairment: *E. coli* (organisms/100mL)

Current Water Quality Criteria for E. coli:

Single sample: 77 organisms/100 mL

NRWQC for E. coli:

Single sample: 235 organisms/100 mL

Geometric mean: 126 organisms/100 mL

Percent Reduction to meet TMDL (Current):
Sample: **97%**

Percent Reduction to meet NRWQC:Single
Single sample: **90%**

Geometric mean: **36%**

Data: 2010 TMDL Cycle

Table 2: *E.coli* (organisms/100 mL) Data for Mud Hollow Brook (2004-2005) and Geometric Mean (organisms/100mL) for each Station based on Calendar Year.

Station Name	Station Location	Date	Result	Geometric Mean**
MH1	Mud Hollow Brook at Spear Street Gecewicz	11/8/2005	31	166
MH1	Mud Hollow Brook at Spear Street Gecewicz	10/4/2005	214	
MH1	Mud Hollow Brook at Spear Street Gecewicz	9/6/2005	261	
MH1	Mud Hollow Brook at Spear Street Gecewicz	8/2/2005	1990	
MH1	Mud Hollow Brook at Spear Street Gecewicz	7/5/2005	98	
MH1	Mud Hollow Brook at Spear Street Gecewicz	6/7/2005	488	
MH1	Mud Hollow Brook at Spear Street Gecewicz	5/3/2005	21	
MH1	Mud Hollow Brook at Spear Street Gecewicz	8/31/2004	2419	NA
MH1	Mud Hollow Brook at Spear Street Gecewicz	7/20/2004	345	
MH2	Mud Hollow Brook at Spear Street	11/8/2005	39	265
MH2	Mud Hollow Brook at Spear Street	10/4/2005	488	
MH2	Mud Hollow Brook at Spear Street	9/6/2005	1200	
MH2	Mud Hollow Brook at Spear Street	8/2/2005	1300	
MH2	Mud Hollow Brook at Spear Street	7/5/2005	214	
MH2	Mud Hollow Brook at Spear Street	6/7/2005	411	
MH2	Mud Hollow Brook at Spear Street	5/3/2005	35	
MH2	Mud Hollow Brook at Spear Street	11/16/2004	10	58
MH2	Mud Hollow Brook at Spear Street	10/12/2004	38	
MH2	Mud Hollow Brook at Spear Street	9/21/2004	172	
MH2	Mud Hollow Brook at Spear Street	7/20/2004	172	

*Shaded cells indicate single sample and geometric mean used to calculate percent reduction.
** Geometric mean used to calculate % reduction has no fewer than 5 data points.

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