TMDL SUMMARY — APPENDIX 6-2

Everett Brook

WATERSHED DESCRIPTION

This **TMDL** applies to a 3.53 mile section of Everett Brook, located in the Town of Fort Fairfield, Maine. The entire length of Everett Brook is formally listed as impaired. Everett Brook begins in the southern portion of the watershed at the outlet of Fisher Lake. The brook then flows north through a agriculture, crossing Presque Isle Road, Stone Cross Road, Conant Road, and Currier Road before meeting Hockenhull Brook. The Everett Brook watershed covers an area of 3.72 square miles in Fort Fairfield, Maine.

- Runoff from agricultural land located throughout the watershed is likely the largest source of **nonpoint source (NPS) pollution** to Everett Brook. Runoff from cultivated lands, active hay lands, and livestock grazing areas can transport nitrogen and phosphorus to the nearest section of the stream.
- The Everett Brook watershed is predominately non-developed (92%). Forested areas (13.2%) within the watershed absorb and filter pollutants helping protect both water quality in the stream and stream channel stability. Wetlands (2.3%) may also help filter nutrients.
- Non-forested areas within the watershed are predominantly agricultural (76.3%) and are located throughout the watershed.
- Developed areas (8%) with impervious surfaces in close proximity to the steam may impact water quality.
- Everett Brook is on the list of Maine's Impaired Streams (Maine DEP, 2013).

Definitions

- ***Total Maximum Daily Load (TMDL)*** *represents the total amount of a pollutant that a waterbody can receive and still meet water quality standards.*
- **Nonpoint Source Pollution** *refers to pollution that comes from many diffuse sources across the landscape, and is typically transported by rain or snowmelt runoff.*

Waterbody Facts

Segment ID: ME0101000412_143R01

Town: Fort Fairfield, ME

County: Aroostook

Impaired Segment Length: 3.53 miles

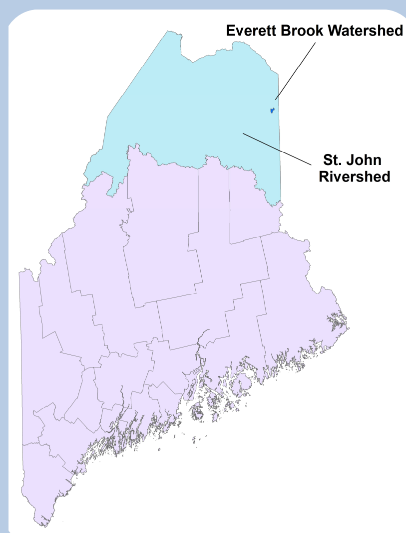
Classification: Class B

Direct Watershed: 3.72 mi^2 (2,381 acres)

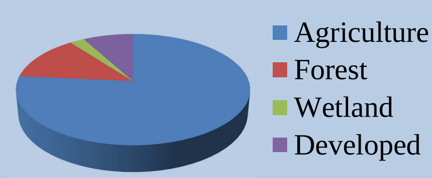
Impairment Listing Cause: Dissolved Oxygen

Watershed Agricultural Land Use: 76.33%

Major Drainage Basin: St. John



Watershed Land Uses



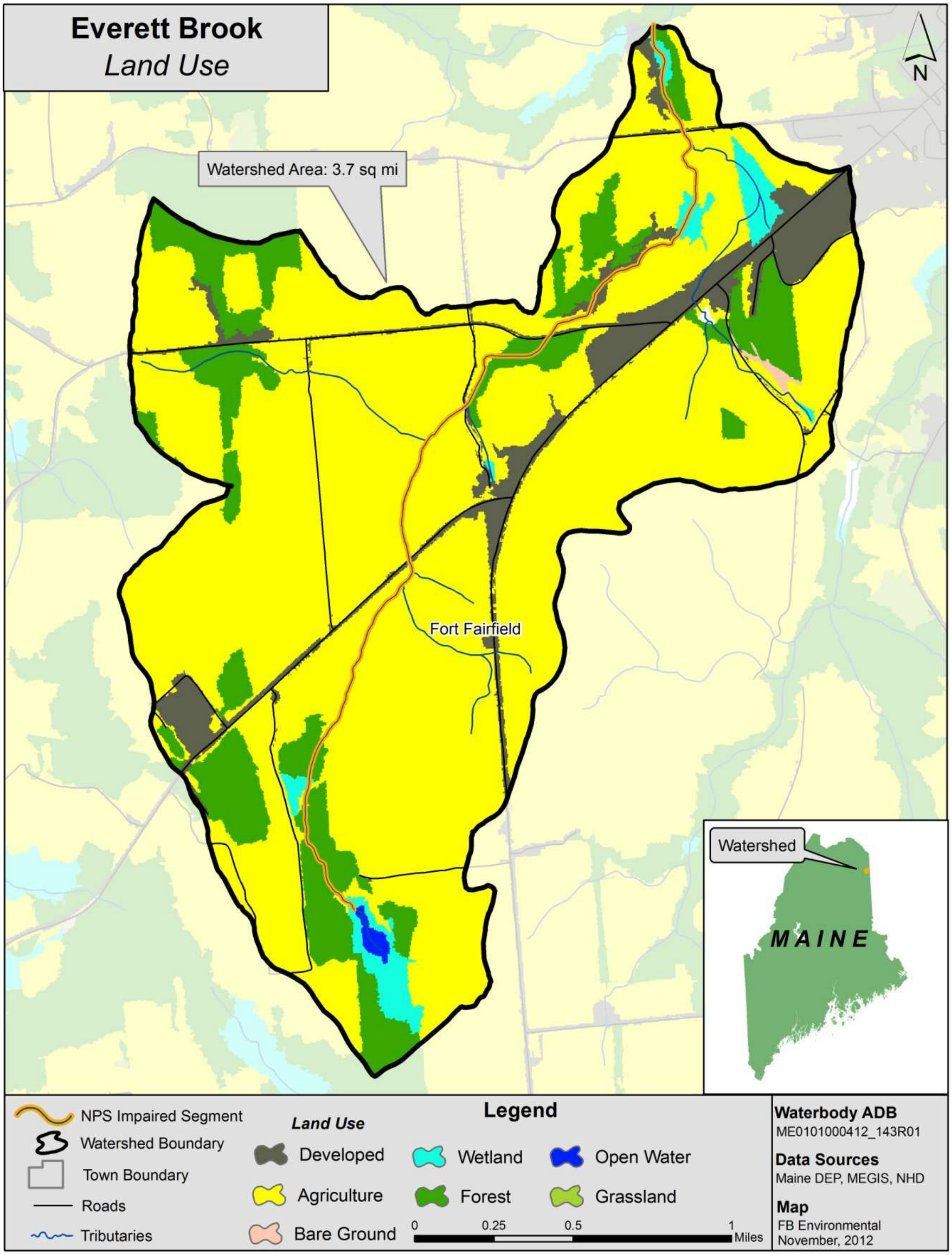


Figure 1: Land Use in the Everett Brook Watershed

WHY IS A TMDL ASSESSMENT NEEDED?

*Agricultural lands in the **Everett Brook** watershed off Route 1A and Conant Road. Photo: Maine DEP*

Everett Brook, a Class B freshwater stream, has been assessed by Maine DEP as not meeting water quality standards for the designated use of aquatic life, and placed on the 303(d) list of impaired waters under the Clean Water Act. The Clean Water Act requires that all 303(d)-listed waters undergo a Total Maximum Daily Load (TMDL) assessment that describes the impairments and establishes a target to guide the measures needed to restore water quality. The goal is for all waterbodies to comply with state water quality standards.

Agriculture in the Everett Brook watershed makes up 76% of total watershed land area. Developed land makes up only 8% of total watershed land area (Figure 1). High agricultural land uses make agriculture the most likely contributor of sediment and nutrient enrichment to Everett Brook, mostly in the form of unstable and eroding waterways. The close proximity of many agricultural lands to the stream further increases the likelihood that nutrients from disturbed soils, manure, and fertilizers will reach the stream.

WATER QUALITY DATA ANALYSIS

Maine DEP uses a variety of data types to measure the ability of a stream to adequately support aquatic life, including; dissolved oxygen, benthic macroinvertebrates, and periphyton (algae). The aquatic life impairment in Everett Brook is based on historic data. Additionally, dissolved oxygen data collected at station EB-1 in 2010 corroborates the impairment.

TMDL ASSESSMENT APPROACH: NUTRIENT MODELING OF IMPAIRED AND ATTAINMENT STREAMS

NPS pollution is difficult to measure directly, because it comes from many diffuse sources spread across the landscape. For this reason, a nutrient loading model, MapShed, was used to estimate the sources of pollution based on well-established hydrological equations; detailed maps of soil, land use, and slope; many years of daily weather data; and direct observations of agriculture and other land uses within the watershed.

The nutrient loading estimates for the impaired stream were compared to similar estimates for five non-impaired (attainment) streams of similar watershed land uses across the state. The TMDL for the impaired stream was set as the mean nutrient loading estimate of these attainment stream watersheds, and units of mass per unit watershed area per year (kg/ha/year) were used. The difference in loading estimates between the impaired and attainment watersheds represents the percent reduction in nutrient loading required under this TMDL. The attainment streams and their nutrient and sediment loading estimates and TMDL are presented below in Table 1.

Table 1: Numeric Targets for Pollutant Loading Based on MapShed Model Outputs for Attainment Streams

Attainment Streams	Town	TP load (kg/ha/yr)	TN load (kg/ha/yr)	Sediment load (1000 kg/ha/yr)
Martin Stream	Fairfield	0.14	3.4	0.008
Footman Brook	Exeter	0.33	6.4	0.058
Upper Kenduskeag Stream	Corinth	0.29	5.6	0.047
Upper Pleasant River	Gray	0.22	4.6	0.016
Moose Brook	Houlton	0.25	5.9	0.022
Total Maximum Daily Load		**0.24**	**5.2**	**0.030**

RAPID WATERSHED ASSESSMENT

Habitat Assessment

A habitat assessment was conducted for both the impaired and attainment streams. The assessments include a general description of the site, including a physical characterization and visual assessment of in-stream and riparian habitat quality based on the *Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers* (Barbour et al., 1999) which integrates various parameters relating to the structure of physical habitat.

Based on Rapid Bioassessment protocols for low-gradient streams, Everett Brook received a score of 146 out of a total 200 for quality of habitat. Higher scores indicate better habitat. The range of habitat assessment scores for attainment streams was 155 to 179.

Habitat assessments were conducted on a relatively short sample reach (about 100-200 meters for a typical small stream) near the most downstream Maine DEP sample station in the watershed. For both impaired and attainment streams, the assessment location was usually near a road crossing for ease of access. In the Everett Brook watershed, the downstream sample station was located in a forested portion of the stream at the Conant Road crossing. The sample reach was surrounded by a forested buffer, but many portions of the stream and its tributaries flow through agricultural areas with minimal buffer.

Figure 2 (right) shows the range of habitat assessment scores for all attainment and impaired streams, as well as for Everett Brook. Though these scores show that habitat is clearly an issue in the impairment of Everett Brook, it is important to look for other potential sources within the watershed leading to impairment. Consideration should be given to major "hot spots" in the Everett Brook watershed as potential sources of NPS pollution contributing to the water quality impairment.

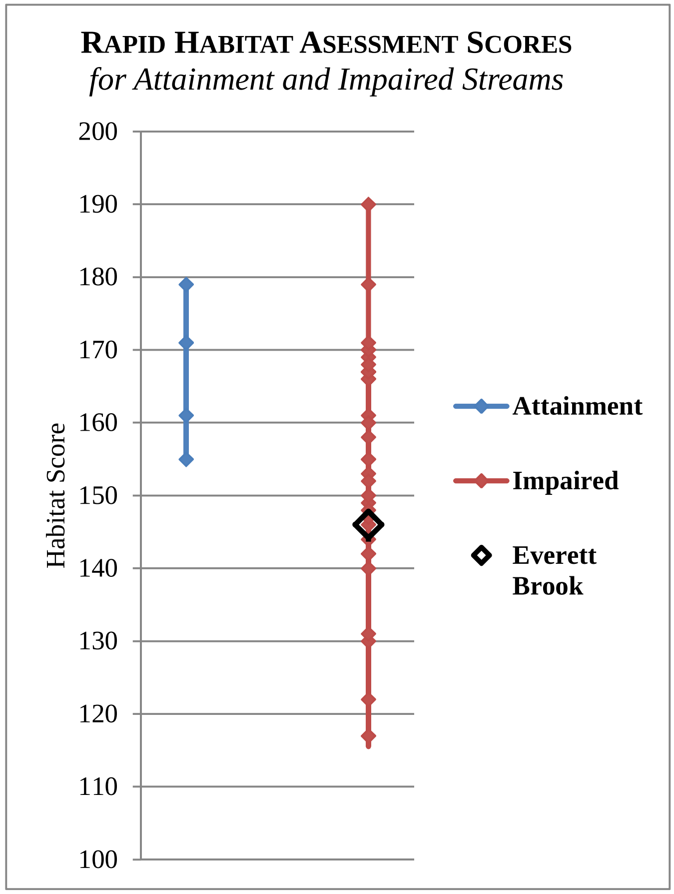


Figure 2: Habitat Assessment Scores

Pollution Source Identification

Pollution source identification assessments were conducted for both Everett Brook (impaired) and the attainment streams. The source identification work is based on an abbreviated version of the Center for Watershed Protection's Unified Subwatershed and Site Reconnaissance method (Wright, et al., 2005). The abbreviated method includes both a desktop and field component. The desktop assessment consists of generating and reviewing maps of the watershed boundary, roads, land use and satellite imagery; and then identifying potential NPS pollution locations, such as road crossings, agricultural fields, and large areas of bare soil. When available, multiple sources of satellite imagery were reviewed. Occasionally, the high resolution of the imagery allowed for observations of livestock, row crops, eroding stream banks, sediment laden water, junkyards, and other potential NPS concerns that could affect stream quality. As many potential pollution sources as possible were visited, assessed, and documented in the field. Field visits were limited to NPS sites that were visible from roads or a short walk from a roadway. Neighborhoods were assessed for NPS pollution at the whole neighborhood level including streets and storm drains (where applicable). The assessment does not include a scoring component, but does include a detailed summary of findings and a map indicating documented NPS sites throughout the watershed.

The watershed source assessment for Everett Brook was completed on July 20, 2012. In-field observations of erosion, lack of vegetated stream buffer, extensive impervious surfaces, high-density neighborhoods and agricultural activities were documented throughout the watershed (Table 2, Figure 3).

Table 2: Pollution Source ID Assessment for the Everett Brook Watershed

Potential Source			Notes
ID#	**Location**	**Type**	
1	Not visible from road: 19N5856855177549	Agriculture	• 2011 aerial photographs show a field washout approximately 125 meters in length. Not visible from the road. Would need permission to access.
2	Not visible from road: 19N5856825177373	Agriculture	• 2011 aerial photos show a field washout approximately 23 meters in length. Not visible from the road. Would need permission to access.
3	Not visible from road: 19N5858045177743	Agriculture	• Limited buffer width. • Not visible from the road. Would need permission to access.
4	Not visible from road: 19N5858505178628	Agriculture	• No wooded buffer. • Not visible from the road. Would need permission to access.
5	Route 167	Livestock	• Approximately 20-30 horses in pasture on side of grass-covered hill located off of Route 167.
6	Route 167	Livestock	• Only one horse in very large pasture off Route 167.
7	Route 1A	Agriculture	• Unstable/eroding waterway in cropland off Route 1A.
8	Route 1A & Conant Road	Agriculture	• Unstable and eroding waterway in agricultural field overwhelming a culvert at end of drainage.
9	Conant Road	Agriculture	• Unstable and eroding waterway in agricultural field depositing coarse material in ditch along Conant Road.

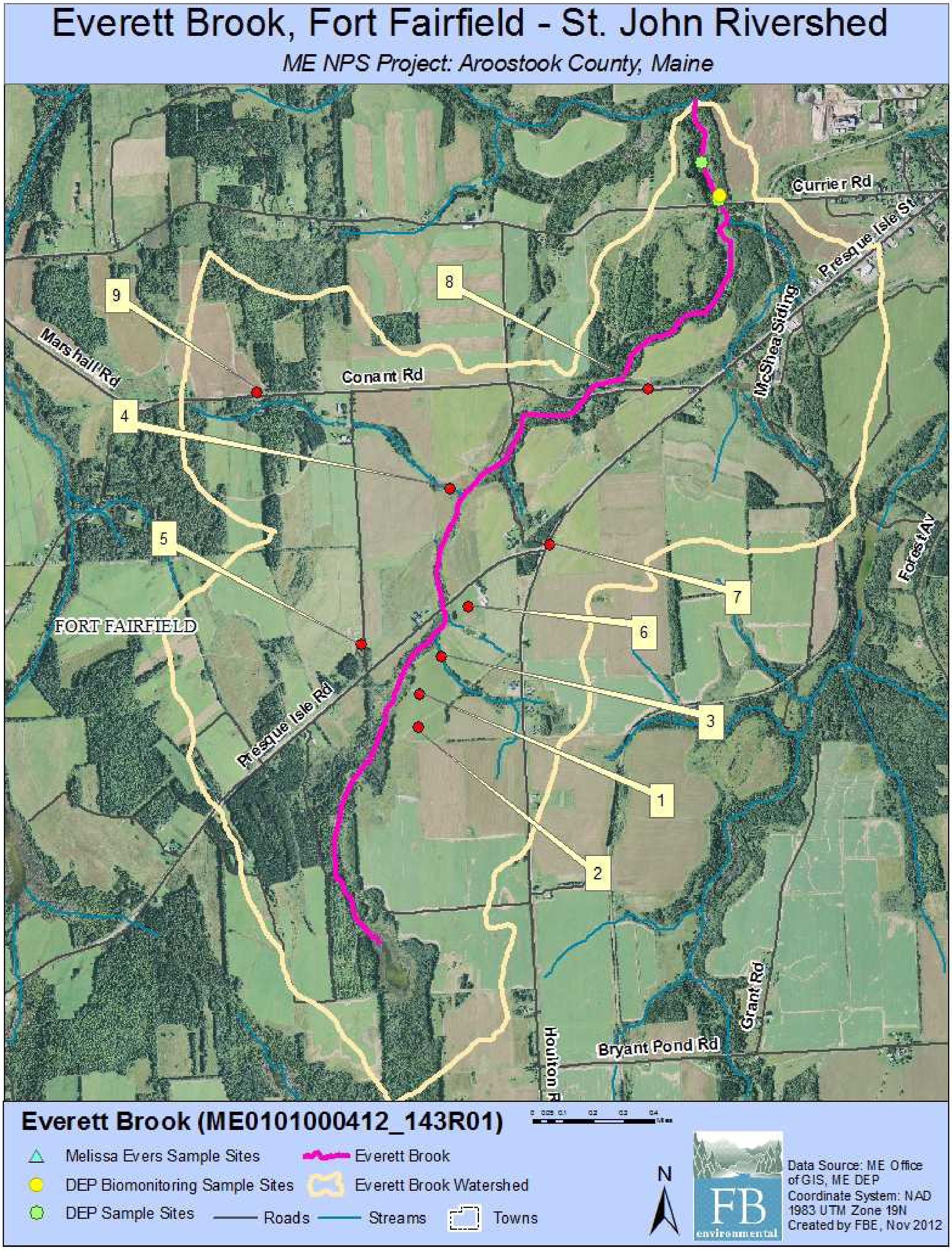


Figure 3: Aerial Photo of Source ID Locations in the Everett Brook Watershed

NUTRIENT LOADING – MAPSHED ANALYSIS

The MapShed model was used to estimate stream loading of sediment, total nitrogen and total phosphorus in Everett Brook (impaired), plus five attainment watersheds throughout the state. The model estimated nutrient loads over a 15-year period (1990-2004), which was determined by the available weather data provided within MapShed. This extended period captures a wide range of hydrologic conditions to account for variations in nutrient and sediment loading over time.

Many quality assured and regionally calibrated input parameters are provided with MapShed. Additional input parameters were manually entered into the model based on desktop research and field observations, as described in the sections on Habitat Assessment and Pollution Source Identification. These manually adjusted parameters included estimates of livestock animal units, agricultural stream miles with intact vegetative buffer, Best Management Practices (BMPs), and estimated wetland retention and/or drainage areas.

Livestock Estimates

Livestock waste contains nutrients which can cause water quality impairment. The nutrient loading model considers numbers and types of animals. Table 3 (right) provides estimates of livestock (numbers of animals) in the watershed, based on direct observations made in the watershed, plus other publicly available data.

Table 3: Livestock Estimates in the Everett Brook Watershed

Type	Everett Brook
Dairy Cows	
Beef Cows	
Broilers	
Layers	
Hogs/Swine	
Sheep	
Horses	30
Turkeys	
Other	
Total	**30**

The Everett Brook watershed is predominantly agricultural, with some forested areas and developed land. Row crops such as potato and corn dominated the landscape. Thirty horses were observed in a field by Route 167.

Vegetated Stream Buffer in Agricultural Areas

Vegetated stream buffers are areas of trees, shrubs, and/or grasses adjacent to streams, lakes, ponds or wetlands which provide nutrient loading attenuation (Evans & Corradini, 2012). MapShed considers natural vegetated stream buffers within agricultural areas as providing nutrient load attenuation. The width of buffer strips is not defined within the MapShed manual, and was considered to be 75 feet for this analysis. Geographic Information System (GIS) analysis of recent aerial photos along with field reconnaissance observations were used to estimate the number of agricultural stream miles with and without vegetative buffers, and these estimates were directly entered into the model.

Table 4: Summary of Vegetated Buffers in Agricultural Areas

Everett Brook
• 6.0 stream miles in watershed (includes ephemeral streams) • 5 stream miles in agricultural areas • 52% of agricultural stream miles have a vegetated buffer

Everett Brook is listed by Maine DEP as a 3.53 mile-long impaired segment. As modeled, the total stream miles (including non-listed tributaries) within the watershed were calculated to be 6.0 miles. Of this total, 5.0 stream miles are located within agricultural areas; of this length, 2.6 miles (52%) show a 75-foot or greater vegetated buffer (Table 4, Fig. 4). By contrast, agricultural stream miles (as modeled) with a 75 foot vegetated buffer in the attainment stream watersheds ranged from 34% to 92%, with an average of 61%.

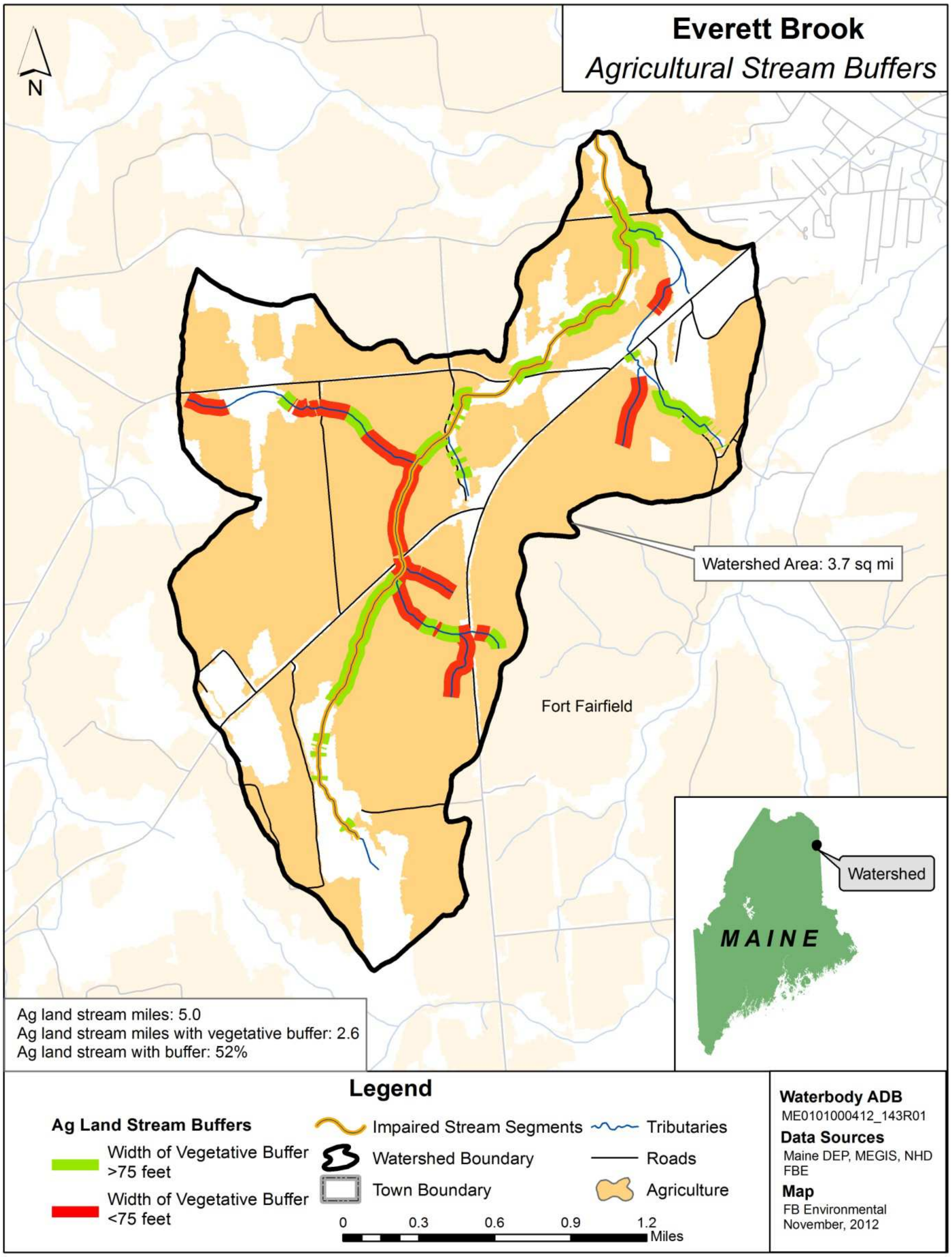


Figure 4: Agricultural Stream Buffers in the Everett Brook Watershed

Best Management Practices (BMPs)

For this modeling effort, four commonly used BMPs were entered based on literature values. These estimates were applied equally to impaired and attainment watersheds. More localized data on agricultural practices would improve this component of the model.

- *Cover Crops:* Cover crops are the use annual or perennial crops to protect soil from erosion during time periods between harvesting and planting of the primary crop. The percent of agricultural acres cover crops crops used within the model is estimated at 4%. This figure is based on information from the 2007 USDA Census stating that 4.1% of cropland acres is left idle or used for cover crops or soil improvement activity, and not pastured or grazed (USDA, 2007b).
- *Conservation Tillage:* Conservation tillage is any kind of system that leaves at least 30% of the soil surface covered with crop residue after planting. This reduces soil erosion and runoff and is one of the most commonly used BMPs. This BMP was assumed to occur in 42% of agricultural land. This figure is based on a number given by the Conservation Tillage Information Center's 2008 Crop Residue Management Survey stating that 41.5% of U.S. acres are currently in conservation tillage (CTIC, 2000).
- *Strip Cropping / Contour Farming:* This BMP involves tilling, planting and harvesting perpendicular to the gradient of a hill or slope using high levels of plant residue to reduce soil erosion from runoff. This BMP was assumed to occur in 38% of agricultural lands, based on a study done at the University of Maryland (Lichtenberg, 1996).
- *Grazing Land Management:* This BMP consists of ensuring adequate vegetation cover on grazed lands to prevent soil erosion from overgrazing or other forms of over-use. This usually employs a rotational grazing system where hays or legumes are planted for feed and livestock is rotated through several fenced pastures. In this TMDL, a figure of 75% of hay and pasture land is assumed to utilize grazing land management. This figure is based on a study by Farm Environmental Management Systems of farming operations in Canada (Rothwell, 2005).

Pollutant Load Attenuation by Lakes, Ponds and Wetlands

Depositional environments such as ponds and wetlands can attenuate watershed sediment loading. This information is entered into the nutrient loading model by a simple percentage of watershed area draining to a pond or a wetland. The Everett Brook watershed is 2.3% wetlands, and 5% of the watershed land area drains to wetlands. Percent of watershed draining to a wetland in the attainment watersheds ranged from 15% to 60%, with an average of 35%.

NUTRIENT MODELING RESULTS

The MapShed model simulates surface runoff using daily weather inputs of rainfall and temperature. Erosion and sediment yields are estimated using monthly erosion calculations and land use/soil composition values for each source area. Below, selected results from the watershed loading model are presented. The TMDL itself is expressed in units of kilograms per hectare per year. The additional results shown below assist in better understanding the likely sources of pollution. The model results for Everett Brook indicate significant reductions of sediment and nutrients are needed to improve water quality. Below, loading for sediment, nitrogen and phosphorus are discussed individually.

Sediment

Sediment loading in the Everett Brook watershed is primarily derived from crop land, which accounts for 96% of the total load (Table 5, Fig. 5). Total loads by mass cannot be directly compared between watersheds due to differences in watershed area. See section *TMDL: Target Nutrient Levels for Everett Brook* (below) for loading estimates that have been normalized by watershed area.

Table 5: Total Sediment Loads by Source

Everett Brook	Sediment (1000kg/year)	Sediment (%)
Source Load		
Hay/Pasture	0.05	0%
Crop land	163.18	96%
Forest	0.46	0%
Wetland	0.04	0%
Disturbed Land	0	0%
Sandy Areas	0	0%
Low Density Mixed	1.09	1%
Medium Density Mixed	0	0%
High Density Mixed	4.25	3%
Low Density Residential	0.05	0%
Medium Density Residential	0	0%
High Density Residential	0	0%
Farm Animals	0	0%
Septic Systems	0	0%
Source Load Total:	**169.12**	**100%**
Pathway Load		
Stream Banks	3.22	-
Subsurface / Groundwater	0	-
Total Watershed Mass Load:	**172.34**	

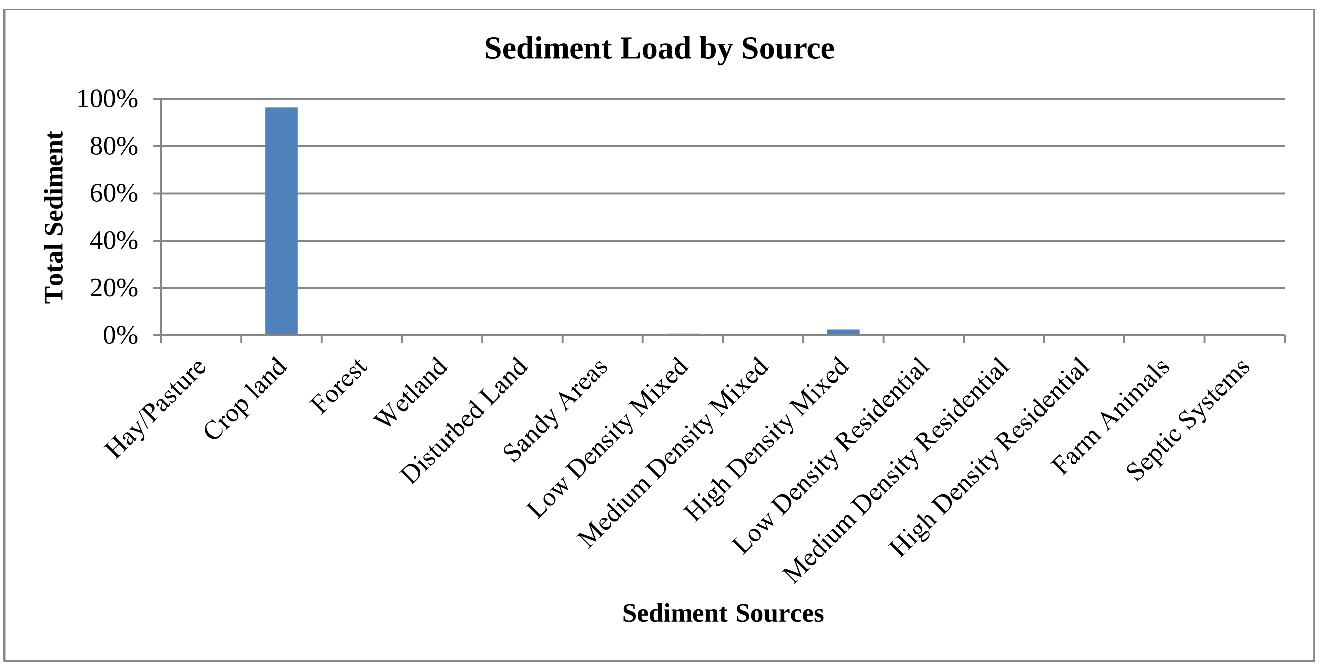


Figure 5: Total Sediment Loads by Source in the Everett Brook Watershed

Table 6: Total Nitrogen Loads by Source

Total Nitrogen

Nitrogen loading is primarily attributed to crop land, which accounts for 90% of the total nitrogen load to Everett Brook. Table 6 and Figure 6 (below) present estimated total nitrogen load in terms of mass and percent of total, and by source, in Everett Brook. Total loads by mass cannot be directly compared between watersheds due to differences in watershed area. See section *TMDL: Target Nutrient Levels for Everett Brook* (below) for loading estimates that have been normalized by watershed area.

Everett Brook	Total N (kg/year)	Total N (%)
Source Load		
Hay/Pasture	2.8	0%
Crop land	3380.8	90%
Forest	24.8	1%
Wetland	11.4	0%
Disturbed Land	0	0%
Sandy Areas	0.0	0%
Low Density Mixed	30.2	1%
Medium Density Mixed	0	0%
High Density Mixed	171.4	5%
Low Density Residential	1.5	0%
Medium Density Residential	0	0%
High Density Residential	0	0%
Farm Animals	118.6	3%
Septic Systems	0	0%
Source Load Total:	**3741.3**	**100%**
Pathway Load		
Stream Banks	2.0	-
Subsurface / Groundwater	12242.9	-
Total Watershed Mass Load:	**15986.2**	

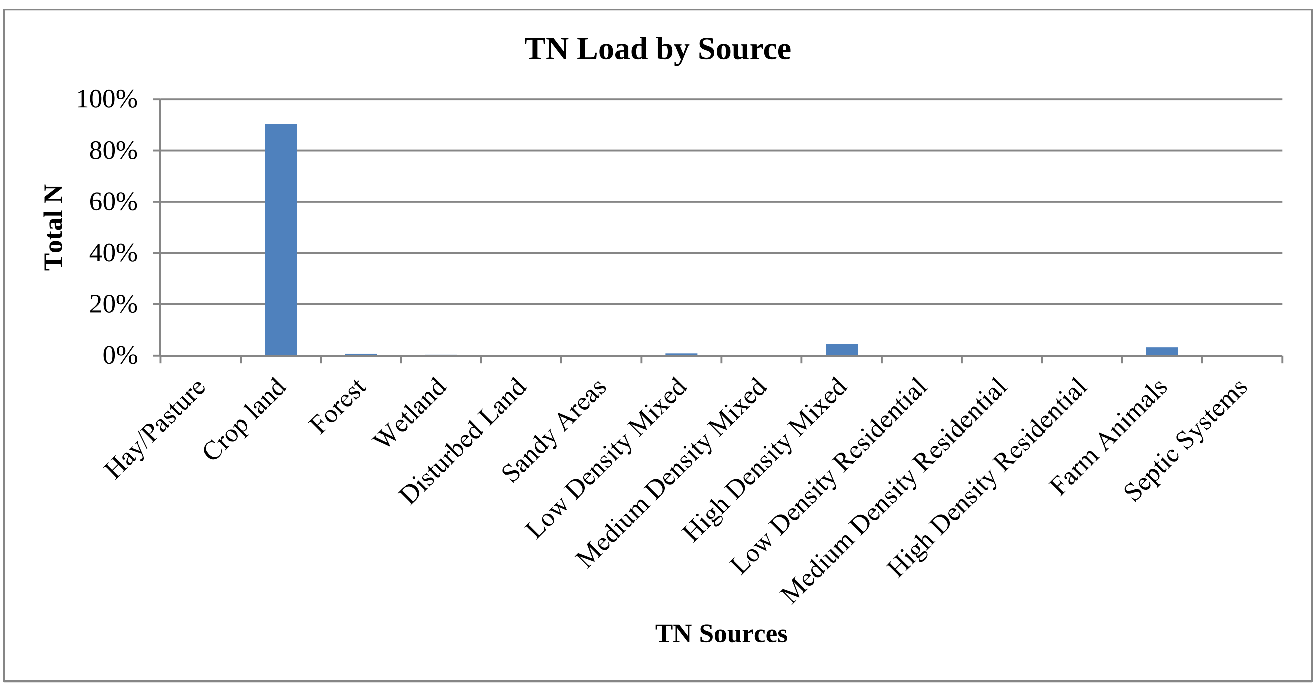


Figure 6: Total Nitrogen Loads by Source in the Everett Brook Watershed

Total Phosphorus

Phosphorus loading in the Everett Brook watershed is mainly derived from crop land, which contributes 91% of the total load. Total agricultural sources combined make up 96% of the phosphorus load in Everett Brook. Phosphorus loads are presented in Table 7 and Figure 7. Note that total loads by mass cannot be directly compared between watersheds due to differences in watershed area. See section *TMDL: Target Nutrient Levels for Everett Brook* below for loading estimates that have been normalized by watershed area.

Table 7: Total Phosphorus Loads by Source

Everett Brook	**Total P (kg/year)**	**Total P (%)**
Source Load		
Hay/Pasture	1.4	0%
Crop land	578.0	91%
Forest	1.8	0%
Wetland	0.6	0%
Disturbed Land	0	0%
Sandy Areas	0	0%
Low Density Mixed	3.4	1%
Medium Density Mixed	0	0%
High Density Mixed	17.8	3%
Low Density Residential	0.2	0%
Medium Density Residential	0	0%
High Density Residential	0	0%
Farm Animals	29.7	5%
Septic Systems	0	0%
Source Load Total:	**632.9**	**100%**
Pathway Load		
Stream Banks	1.0	-
Subsurface / Groundwater	155.7	-
Total Watershed Mass Load:	**789.6**	

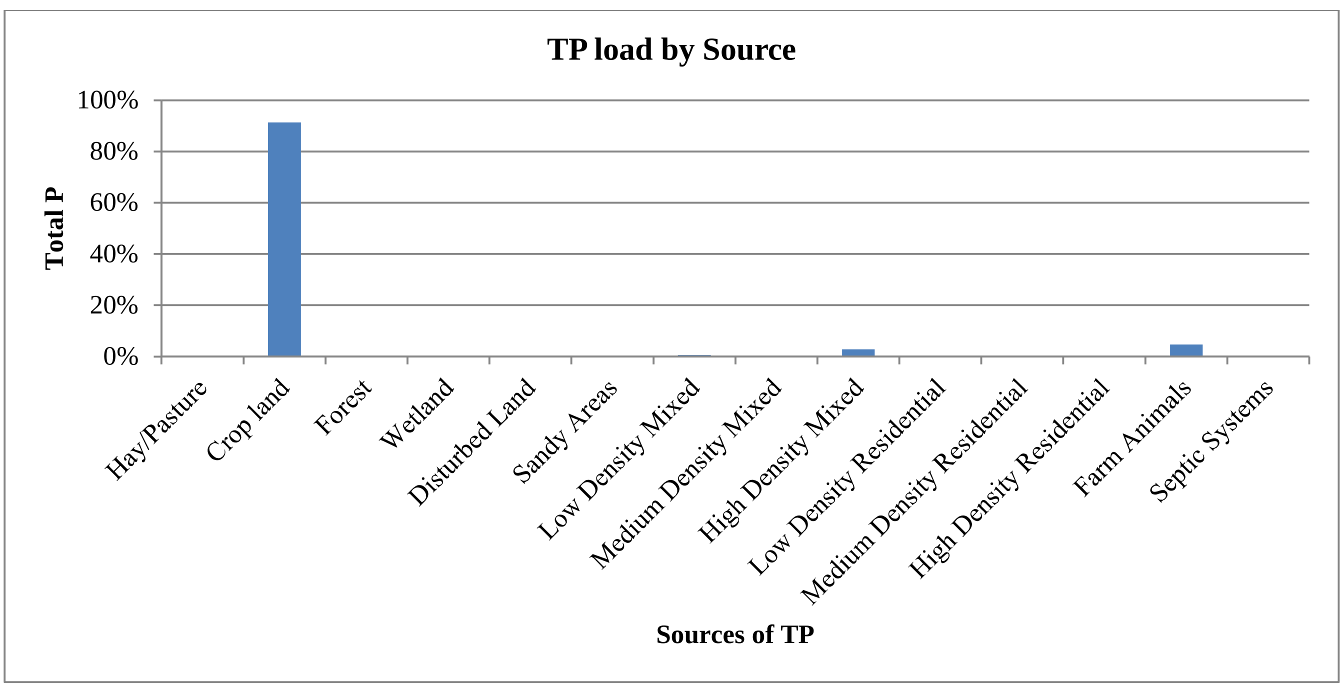


Figure 7: Total Phosphorus Loads by Source in the Everett Brook Watershed

TMDL: TARGET NUTRIENT LEVELS FOR EVERETT BROOK

The existing sediment and nutrient loads for the impaired segment of Everett Brook are listed in Table 8, along with the TMDL numeric target which was calculated from the average loading estimates of five attainment watersheds throughout the state. Table 9 presents a more detailed view of the modeling results and calculations used in Table 8 to define TMDL reductions, and compares the existing sediment and nutrient loads in Everett Brook to TMDL endpoints derived from the attainment waterbodies. An annual time frame provides a mechanism to address the daily and seasonal variability associated with nonpoint source loads.

Table 8: TMDL Targets Compared to Everett Brook Pollutant Loading

TMDL POLLUTANT LOADS Annual Loads per Unit Watershed Area	**Estimated Loads Everett Brook**	**Total Maximum Daily Load Numeric Target**	**TMDL % REDUCTIONS Everett Brook**
Phosphorus Load *(kg/ha/year)*	0.80	0.24	**70%**
Nitrogen Load *(kg/ha/year)*	16.21	5.2	**68%**
Sediment Load *(1000 kg/ha/year)*	0.175	0.030	**83%**

Future Loading

The prescribed reduction in pollutants discussed in this TMDL reflects reduction from estimated existing conditions. Expansion of agricultural and development activities in the watershed have the potential to increase runoff and associated pollutant loads to the Everett Brook. To ensure that the TMDL targets are attained, future agriculture or development activities in the watershed will need to meet the TMDL targets. However, future growth from population increases is not a threat in the Everett Brook watershed because Aroostook County showed a decreasing population trend (-3.1%) between 2000 and 2008 (USM MSAC, 2009). Although the population trend is decreasing, the growth in agricultural lands is increasing, with a 15% increase in the total number of farms in Aroostook County between 2002 and 2007. However, a decrease of 4% was seen in the land (acres) in farms between 2002 and 2007, and a 17% decrease occurred in the average farm size in this time period (USDA, 2007a). Future activities and BMPs that achieve TMDL reductions are addressed below.

Next Steps

The use of agricultural and developed area BMPs can reduce sources of polluted runoff in Everett Brook. It is recommended that municipal officials, landowners, and conservation stakeholders in Fort Fairfield work together to develop a watershed management plan to:

- Encourage greater citizen involvement through the development of a watershed coalition to ensure the long term protection of Everett Brook;
- Address existing nonpoint source problems in the Everett Brook watershed by instituting BMPs where necessary; and
- Prevent future degradation of Everett Brook through the development and/or strengthening of a local Nutrient Management Ordinance.

Table 9: Modeling Results Calculations for Derived Numeric Targets and Reduction Loads for Everett Brook

Everett Brook				
	Area ha	**Sediment 1000kg/yr**	**TN kg/yr**	**TP kg/yr**
Land Uses				
Hay/Pasture	4	0.1	2.8	1.4
Cropland	749	163.0	3380.8	578.0
Forest	128	0.5	24.8	1.8
Wetland	22	0.0	11.4	0.6
Disturbed Land	0	0.0	0.0	0.0
Sandy Areas	1	0.0	0.0	0.0
Low Density Mixed	41	1.1	30.2	3.4
High Density Mixed	39	4.3	171.4	17.8
Low Density Residential	2	0.1	1.5	0.2
Other Sources				
Farm Animals			118.6	29.7
Septic Systems			0.0	0.0
Pathway Loads				
Stream Banks		3.2	2.0	1.0
Groundwater			12243.0	155.7
Total Annual Load		172 x 1000 kg	15986 kg	790 kg
Total Area	986 ha			
Total Maximum Daily Load		**0.175 1000kg/ha/year**	**16.21 kg/ha/year**	**0.80 kg/ha/year**

REFERENCES

Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C.

Conservation Tillage Information Center (CTIC). 2000. Crop Residue Management Survey. National Association of Conservation Districts. Retrieved from: http://www.ctic.purdue.edu.

Davies, S. P., and L. Tsomides. 2002. Methods for Biological Sampling of Maine's Rivers and Streams. DEP LW0387-B2002, Maine Department of Environmental Protection, Augusta, ME.

Evans, B.M., & K.J. Corradini. 2012. MapShed Version 1.0 Users Guide. Penn State Institute of Energy and the Environment. Retrieved from: http://www.mapshed.psu.edu/Downloads/MapShedManual.pdf

Lichtenberg, E. 1996. Using Soil and Water Conservation Practices to Reduce Bay Nutrients: How has Agriculture Done? Economic Viewpoints. Maryland Cooperative Extension Service, University of Maryland at College Park and University of Maryland Eastern Shore, Department of Agricultural and Resource Economics, 1(2).

Maine Department of Environmental Protection (Maine DEP). 2013. Draft 2012 Integrated Water Quality Monitoring and Assessment Report. Bureau of Land and Water Quality, Augusta, ME.

Rothwell, N. 2005. Grazing Management in Canada. Farm Environmental Management in Canada. http://publications.gc.ca/Collection/Statcan/21-021-M/21-021-MIE2005001.pdf.

University of Southern Maine Muskie School of Public Service, Maine Statistical Analysis Center (USM MSAC). December, 2009. Retrieved from: http://muskie.usm.maine.edu/justiceresearch/Publications/County/Aroostook.pdf

United States Department of Agriculture (USDA). 2007a. 2007 Census of Agriculture: Aroostook County, Maine. Retrieved from: http://www.agcensus.usda.gov/Publications/2007/Online_Highlights/County_Profiles/Maine/cp23003.pdf

United States Department of Agriculture (USDA). 2007b. 2007 Census of Agriculture: State and County Reports. National Agricultural Statistics Service. Retrieved From: http://www.agcensus.usda.gov/Publications/2007/Full_Report/Volume_1,_Chapter_1_State_Level/Maine/st23_1_008_008.pdf

Wright, T., C. Swann, K. Cappiella, and T. Schueler. 2005. Unified Subwatershed and Site Reconnaissance: A User's Manual. Center for Watershed Protection. Ellicott City, MD.