DRAFT TMDL SUMMARY

Coloney Brook

WATERSHED DESCRIPTION

This **TMDL** applies to a 4.52 mile section of Coloney Brook, located in the Town of Fort Fairfield, Maine. The impaired segment of Coloney Brook begins in the northwestern portion of the watershed and flows south through a predominantly agricultural area, turning east before crossing West Limestone Road. The stream then continues east through dense agriculture, crossing Center Limestone Road, East Limestone Road, and Martin Road before converging with another tributary of the Aroostook River. The Coloney Brook watershed covers an area of 7.11 square miles.

- Runoff from agricultural land located throughout the watershed is likely the largest source of **nonpoint source (NPS) pollution** to Coloney Brook. Runoff from cultivated lands, active hay lands, and pasture transport nitrogen and phosphorus to the nearest section of the stream.
- The Coloney Brook watershed is predominately non-developed (97.8%). Forested areas (20.8%) within the watershed absorb and filter pollutants helping protect both water quality in the stream and stream channel stability. Wetlands (6%) may also help filter nutrients.
- Non-forested areas within the watershed are predominantly agricultural (71%) and are located throughout the watershed.
- Developed areas (2.2%) with impervious surfaces in close proximity to the steam may impact water quality.
- Coloney Brook is on the list of Maine's Impaired Streams (Maine DEP, 2012).

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 are typically transported by rain or snowmelt runoff.*

Waterbody Facts

Segment ID: ME0101000413_146R02

Town: Fort Fairfield, ME

County: Aroostook

Impaired Segment Length: 4.52 miles

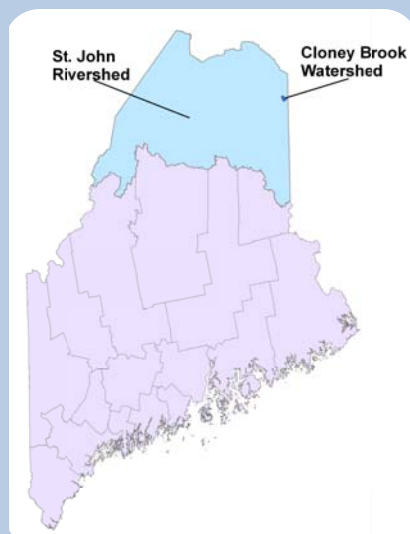
Classification: Class B

Direct Watershed: 7.11 mi^2 (4,550 acres)

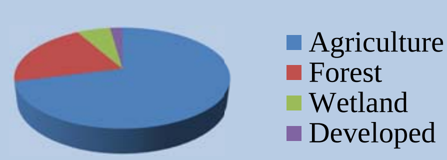
Impairment Listing Cause: Benthic macroinvertebrate and periphyton

Watershed Agricultural Land Use: 70.97%

Major Drainage Basin: St. John River



Watershed Land Uses



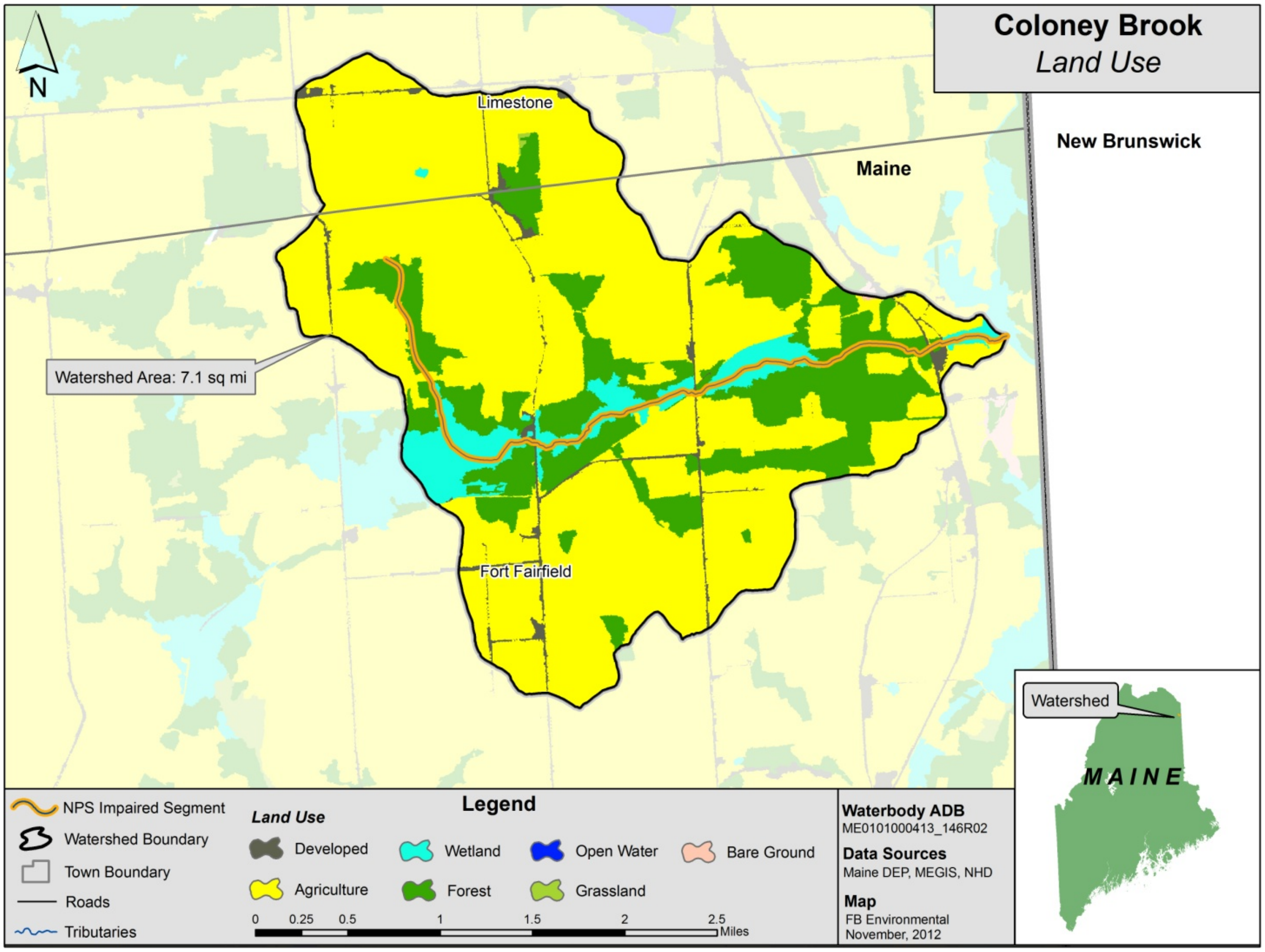


Figure 1: Land Use in the Coloney Brook Watershed

WHY IS A TMDL ASSESSMENT NEEDED?

Coloney 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.

*Algae in **Coloney Brook** in Fort Fairfield, ME.*

Agriculture is by far the largest single land use in the Coloney Brook watershed at 71% of the land area. Developed land is much smaller at 2.2%. Agriculture is therefore likely to be the largest contributor of sediment and nutrient enrichment to the stream. The close proximity of many agricultural lands to the stream further increases the likelihood that nutrients from disturbed soils, manure, and fertilizers may reach the stream. Eroding drainage ditches, washouts and runoff from agricultural fields are a few of the specific concerns in the watershed.

WATER QUALITY DATA ANALYSIS

Table 1: Assessment Data for Coloney Brook

Site	Assessment Parameter	Year	Statutory Class	Assessment Result
S-733	Macroinvertebrates	2009	B	C
S-733	Periphyton	2004	B	NA
S-733	Periphyton	2009	B	NA

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 Coloney Brook is based on benthic macroinvertebrates data collected at station S-733; and periphyton (algae) data collected at station S-733 in 2004 and 2009.

DEP makes aquatic life use determinations using a statistical model that incorporates 30 variables of data collected from rivers and streams, including the richness and abundance of streambed organisms, to determine the probability of a sample meeting Class A, B, or C conditions. Biologists use the model results and supporting information to determine if samples comply with standards of the class assigned to the stream or river (Davies and Tsomides, 2002). Maine DEP uses an analogous model for periphyton assessment.

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, nutrient loading estimates, and TMDL are presented below in Table 2.

Table 2: 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 survey was conducted for both the impaired and attainment stream. 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 Streams and Wadeable 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, Coloney Brook received a score of 117 out of a total 200 for quality of habitat. Higher scores indicate better habitat for fish and other aquatic life. 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 Coloney Brook watershed, the downstream sample station was located in a fairly forested portion of the stream. The majority of the stream and associated tributaries flow through agricultural lands with minimal buffer.

Figure 2 (right) shows the range of habitat assessment scores for all attainment and impaired streams, as well as for Coloney Brook. Though these scores show that habitat is clearly an issue in the impairment of Coloney 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 Coloney Brook watershed as potential sources of NPS pollution contributing to the water quality impairment.

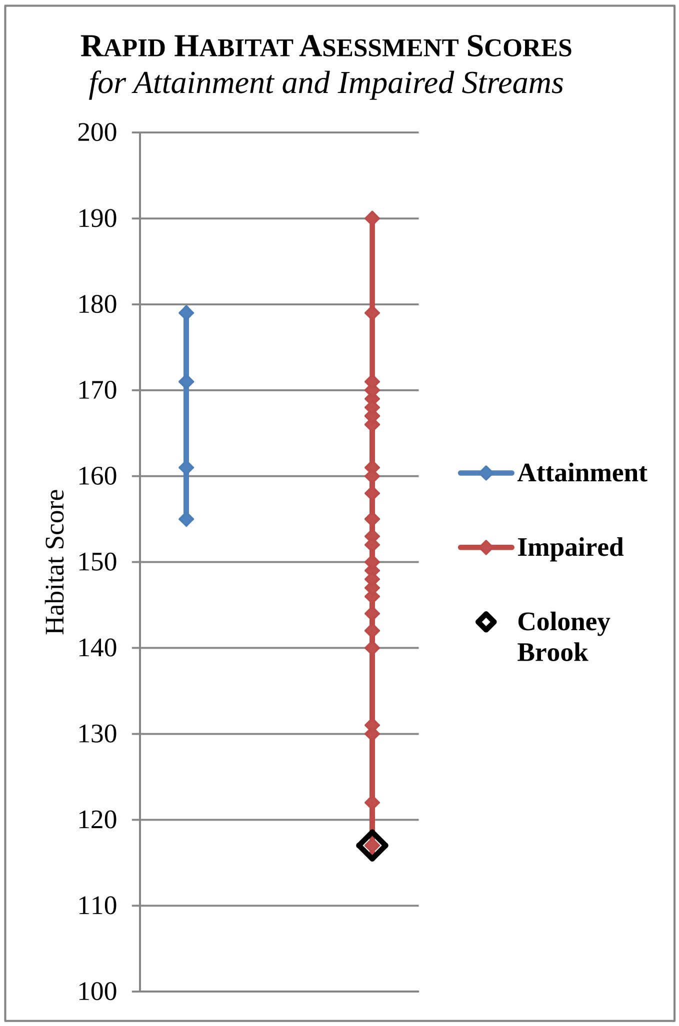


Figure 2: Habitat Assessment Scores

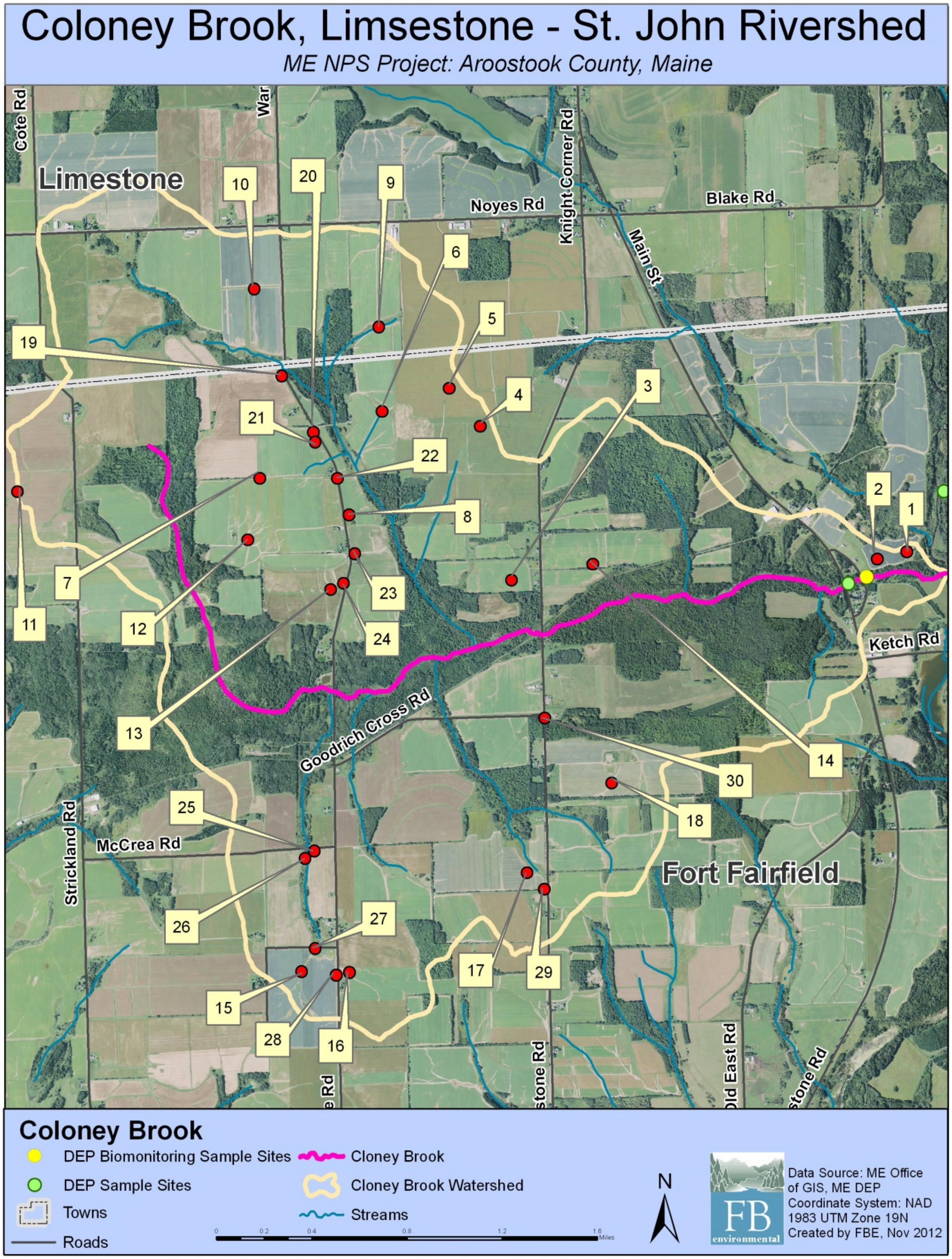


Figure 3: Aerial Photo of Source ID locations in the Coloney Brook Watershed

Pollution Source Identification

Pollution source identification assessments were conducted for both Coloney Brook (impaired) and the attainment streams. The source identification component of this study 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 Coloney Brook was completed on July 17, 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 3, Figure 3).

Table 3: Pollution Source ID Assessment for the Coloney Brook Watershed

Potential Source			Notes
ID #	**Location**	**Type**	
1	East of Martin Road off Limestone Road	Agriculture	• Washout in Broccoli field – field in potatoes during 2012 visit. • Washout is 37 meters long.
2	East of Martin Road off Limestone Road	Agriculture	• Two additional washouts in the broccoli field in location #1, above (potatoes in 2012). • Together these washouts are greater than 160 meters long.
3	West side of Center Limestone Road, north of RR crossing	Agriculture	• No public access – posted.
4	West side of Center Limestone Road, south of Route 223	Agriculture	• What may have been a historic intermittent stream is now a grass-lined waterway within an agricultural field that at time is an exposed soil ditch. • Ditch is estimated at 1,024 meters long. • No public access – posted.

5	Northwest of location #4, west side of Center Limestone Road, south of Route 223	Agriculture	• What may have been a historic intermittent stream is now a grass-lined waterway within an agricultural field that at time is an exposed soil ditch. • Ditch is estimated at 579 meters long. • No public access – posted.
6	East of W Limestone Road	Agriculture	• Visible from West Limestone Road. • 3 washouts converge into same location. • Total length is about 879 meters.
7	West side of W Limestone Road	Agriculture	• Ditch and Washout (may have been a grass lined waterway at one time) is present in field with exposed soil. Minimal stabilization. • This field is in broccoli in 2012. • Irrigation occurring here and resulting in runoff.
8	W Limestone Road, south east of Location #7	Agriculture	• 3 washouts in one field totally 254 meters in length. • In broccoli in 2012.
9	W Limestone Road	Agriculture	• This site is located on an intermittent stream draining to Coloney Brook's northern tributary. • No wooded buffer. • A farm road crosses stream dumping into drainage.
10	W Limestone Road	Agriculture	• Washout in broccoli field about 401 meters in length. • Field is in grain in 2012. • Access to site is limited to public road. • Evidence of past erosion is visible.
11	Western watershed boundary	Agriculture	• Washouts in field. • Bare drainage ways.
12	46 51 31.06N 67 51 17.63W	Agriculture	• No public Access. • Washouts.
13	West Limestone Road	Agriculture	• Soil erosion. • Sediment deposits in ditch from field washouts.
14	46 51 24.66N 67 49 27.48W	Agriculture	• Washouts. • Historically may have been grass lined waterways.
15	Turner Road	Agriculture	• Washout in broccoli fields. • Some areas are historical problems areas; some may have been grass lined waterways.
16	West Limestone Road	Agriculture	• No public access. • Washouts in field.

17	46 50 17.91N 67 49 49.90W	Agriculture	• Multiple washouts in one field. • No public access.
18	46 50 37.08N 67 49 22.45W	Agriculture	• Waterway with exposed soils.
19	West Limestone Road	Agriculture	• Potato rows empty into farm access road directing runoff into road ditch and directly into Coloney Brook.
20	West Limestone Road	Agriculture	• Severe ditch erosion. • Ditch is unstable due to water volume from fields and sediment.
21	West Limestone Road	Agriculture	• Unstable waterway washing into ditch transports water directly to brook.
22	West Limestone Road	Agriculture	• Unstable and eroding ditch. An irrigation pipe was observed in the ditch.
23	West Limestone Road	Agriculture	• Unstable and eroding waterway.
24	West Limestone Road	Agriculture	• Scouring of ditch by runoff from a potato field.
25	McCrea Road	Agriculture	• Unstable and exposed soil washing into and along ditch.
26	McCrea Road	Agriculture	• Lack of buffer. • Ditch is collecting water from field and directing it directly into the brook.
27	Turner Road	Agriculture	• Multiple fields dumping into ditch. • Farm access drive culvert has been overwhelmed in the past and recently replaced and is potentially undersized. • Road culvert/stream crossing also undersized – loads of sediment significant and many.
28	West Limestone Road	Agriculture	• Fields washing into ditch with eroding banks.
29	Center Limestone Road	Agriculture	• Farm access road showing historic erosion problems.
30	Center Limestone Road	Agriculture	• Ditch along Center Limestone Road near Goodrich Road is unstable.

NUTRIENT LOADING – MAPSHED ANALYSIS

The MapShed model was used to estimate stream loading of sediment, total nitrogen and total phosphorus in Coloney 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 section 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 4 (right) provides estimates of livestock (numbers of animals) in the watershed, based on direct observations made in the watershed, plus other publicly available data.

The Coloney Brook watershed is predominantly agricultural, with some forested areas and developed land. Large areas of broccoli crops were documented along with grain fields. Row crops dominated the landscape, and only four horses were observed in the watershed during the field visit.

Table 4: Livestock Estimates in the Coloney Brook Watershed

Type	Coloney Brook
Dairy Cows	
Beef Cows	
Broilers	
Layers	
Hogs/Swine	
Sheep	
Horses	4
Turkeys	
Other	
Total	**4**

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 5: Summary of Vegetated Buffers in Agricultural Areas

Coloney Brook
• 8.8 stream miles in watershed (includes ephemeral streams) • 6.9 stream miles in agricultural areas • 30% of agricultural stream miles have a vegetated buffer

Coloney Brook is listed by Maine DEP as a 4.52 mile-long impaired segment. As modeled, the total stream miles (including non-listed tributaries) within the watershed is calculated by MapShed to contain 8.8 stream miles. Of this total, 6.9 stream miles are located within agricultural areas. Within agricultural areas, 2.1 miles of which (30%) were found to have a 75 foot or greater vegetated buffer. Figure 4 (below) displays all agricultural stream buffers within the Coloney Brook watershed (Table 5, 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%.

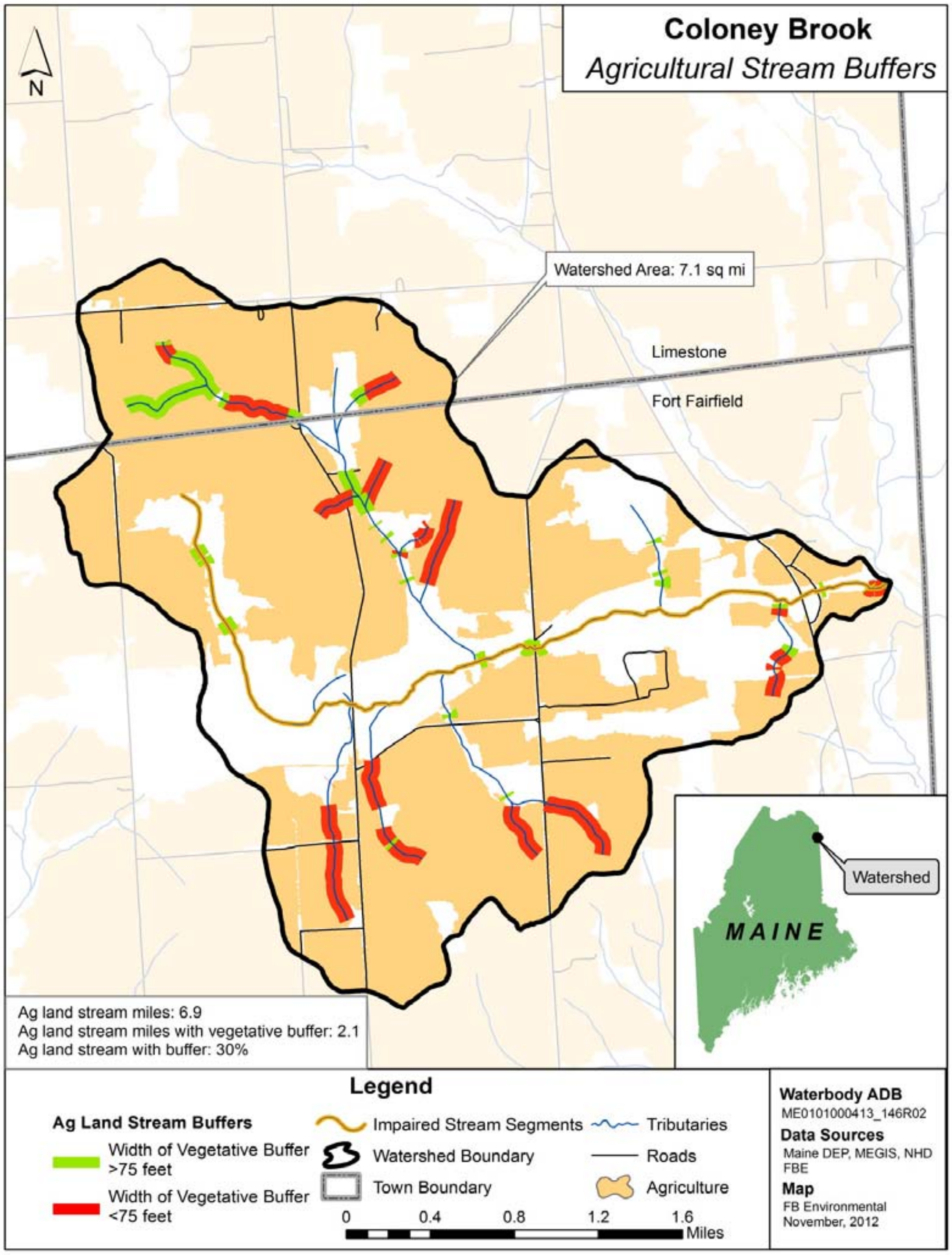


Figure 4: Agricultural Stream Buffers in the Coloney Brook Watershed

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 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 Coloney Brook watershed is 6% wetland. Wetlands surrounding the main stem of Coloney Brook are estimated to drain 5% of land area within the watershed. 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 Coloney Brook indicate significant reductions of nutrients and sediment are needed to improve water quality. Below, loading for sediment, nitrogen and phosphorus are discussed individually.

Sediment

Sediment loading in the Coloney Brook watershed is primarily attributed to crop land (Table 6, Figure 4). In Coloney Brook, it is reasonable to consider that much of the stream bank erosion is due to agricultural land use, since there are many stream miles passing through these areas with little to no buffers. Total loads by mass cannot be directly compared between watersheds due to differences in watershed area. See section *TMDL: Target Nutrient Levels for Coloney Brook* (below) for loading estimates that have been normalized by watershed area.

Table 6: Total Sediment Load by Source

Coloney Brook	Sediment (1000kg/year)	Sediment (%)
Source Load		
Hay/Pasture	0.18	0%
Crop land	435.79	99%
Forest	1.79	0%
Wetland	0.10	0%
Disturbed Land	0	0%
Low Density Mixed	0.19	0%
Medium Density Mixed	0	0%
High Density Mixed	3.70	1%
Low Density Residential	0.03	0%
Medium Density Residential	0	0%
High Density Residential	0	0%
Farm Animals	0	0%
Septic Systems	0	0%
Source Load Total:	**441.78**	**100%**
Pathway Load		
Stream Banks	5.65	-
Subsurface / Groundwater	0.00	-
Total Watershed Mass Load:	**447.43**	

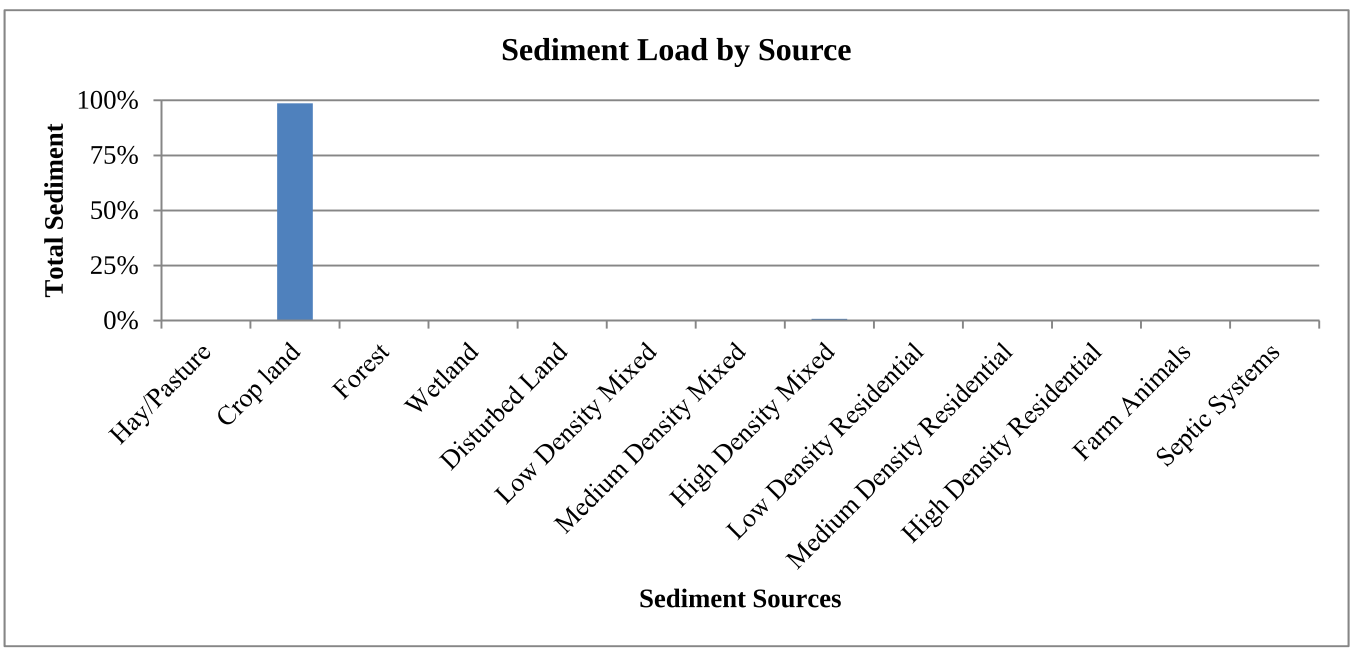


Figure 5: Total Sediment Loads by Source in the Coloney Brook Watershed

Total Nitrogen

Most nitrogen loading in the Coloney Brook watershed is attributed cropland which accounts for 97% of the total load (Table 7 and Figure 6). 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 Coloney Brook* (below) for loading estimates that have been normalized by watershed area.

Table 7: Total Nitrogen Loads by Source

Coloney Brook	Total N (kg/year)	Total N (%)
Source Load		
Hay/Pasture	2.0	0%
Crop land	6948.9	97%
Forest	29.7	0%
Wetland	34.9	0%
Disturbed Land	0	0%
Low Density Mixed	5.2	0%
Medium Density Mixed	0	0%
High Density Mixed	149.4	2%
Low Density Residential	0.7	0%
Medium Density Residential	0	0%
High Density Residential	0	0%
Farm Animals	16.6	0%
Septic Systems	0	0%
Source Load Total:	**7187.2**	**100%**
Pathway Load		
Stream Banks	3.0	-
Subsurface / Groundwater	25658.2	-
Total Watershed Mass Load:	**32848.4**	

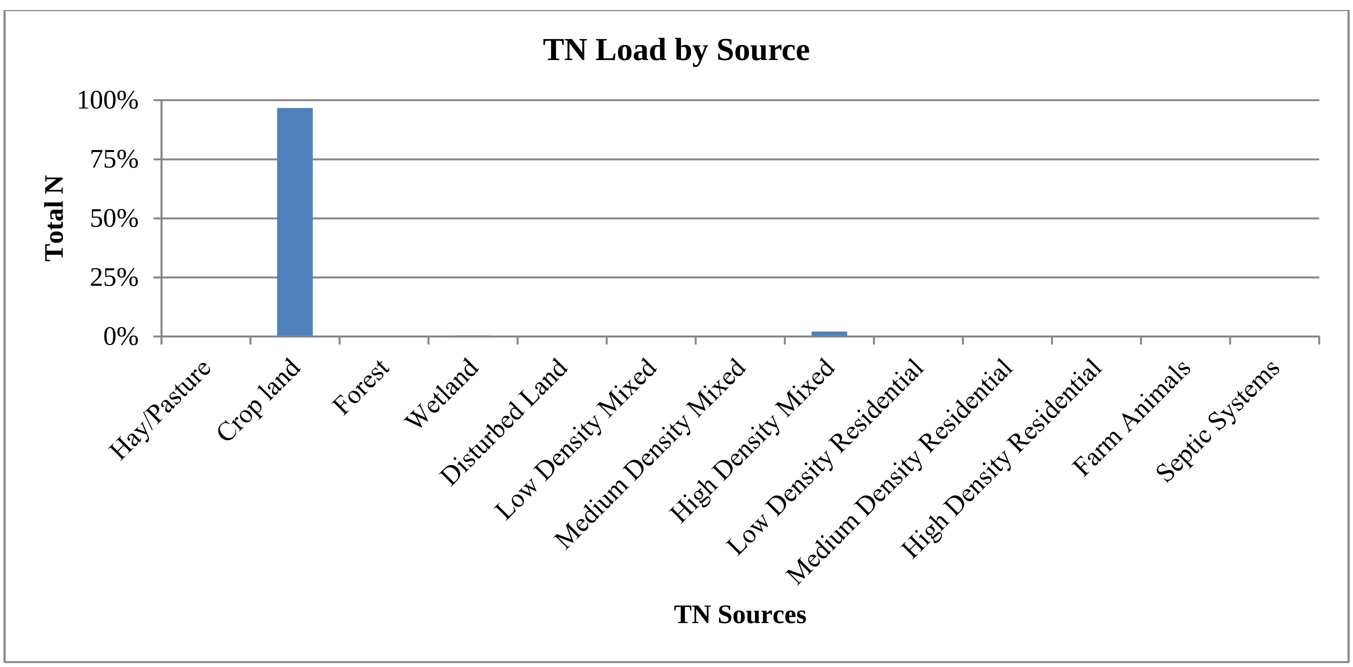


Figure 6: Total Nitrogen Loads by Source in the Coloney Brook Watershed

Total Phosphorus

Phosphorus loading within the watershed is attributed primarily to cropland which accounts for 98% of the total load (Table 8 and Figure 7). Total loads by mass cannot be directly compared between watersheds due to differences in watershed area. See section *TMDL: Target Nutrient Levels for Coloney Brook* below for loading estimates that have been normalized by watershed area.

Table 8: Total Phosphorus Loads by Source

Coloney Brook	Total P (kg/year)	Total P (%)
Source Load		
Hay/Pasture	1.0	0%
Crop land	1240.4	98%
Forest	3.3	0%
Wetland	1.9	0%
Disturbed Land	0	0%
Low Density Mixed	0.6	0%
Medium Density Mixed	0	0%
High Density Mixed	15.5	1%
Low Density Residential	0.1	0%
Medium Density Residential	0	0%
High Density Residential	0	0%
Farm Animals	4.2	0%
Septic Systems	0	0%
Source Load Total:	**1267.0**	**100%**
Pathway Load		
Stream Banks	2.0	-
Subsurface / Groundwater	311.2	-
Total Watershed Mass Load:	**1580.2**	

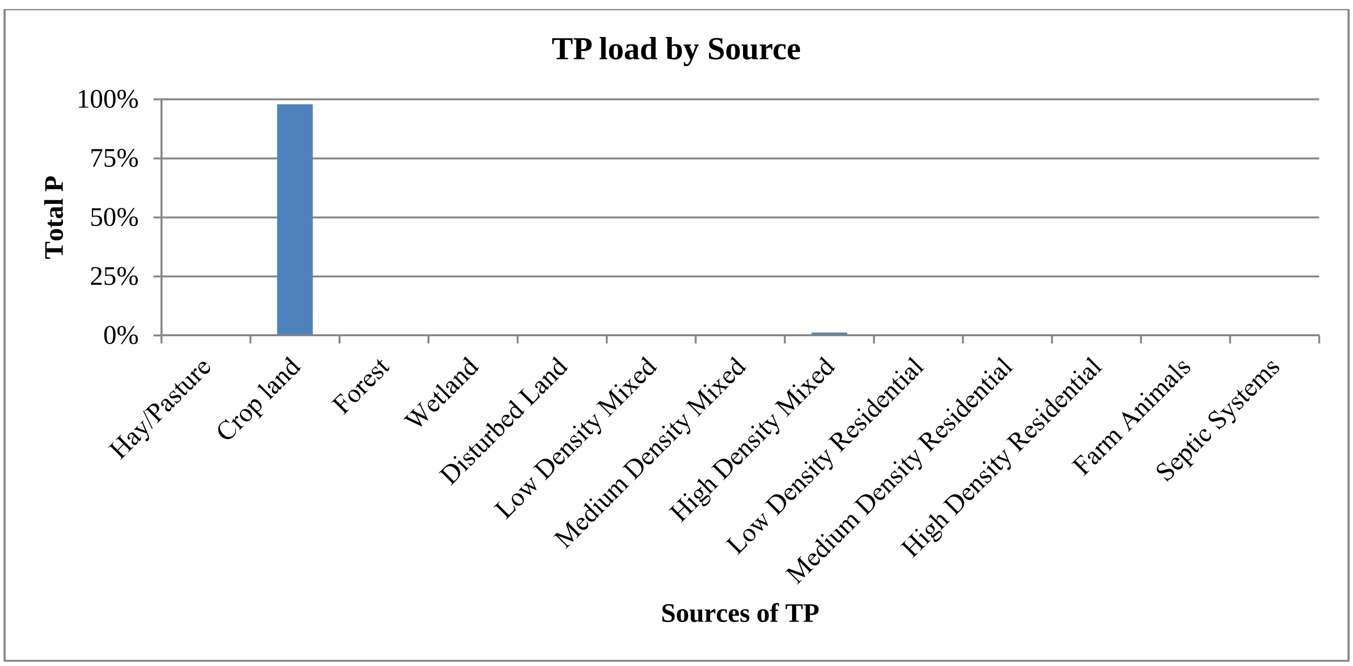


Figure 7: Total Phosphorus Loads by Source in the Coloney Brook Watershed

TMDL: TARGET NUTRIENT LEVELS FOR COLONEY BROOK

The existing loads for nutrients and sediments in the impaired segment of Coloney Brook are listed in Table 9, along with the TMDL which was calculated from the average loading estimates of five attainment watersheds throughout the state. Table 10 presents a more detailed view of the modeling results and calculations used in Table 9 to define TMDL reductions, and compares the existing nutrient and sediment loads in Coloney 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 9: TMDL Targets Compared to Coloney Brook Pollutant Loading

TMDL POLLUTANT LOADS Annual Loads per Unit Area	**Estimated Loads Coloney Brook**	**Total Maximum Daily Load**	**TMDL % REDUCTIONS Coloney Brook**
Sediment Load *(1000 kg/ha/year)*	**0.237**	**0.030**	**87%**
Nitrogen Load *(kg/ha/year)*	**17.43**	**5.2**	**70%**
Phosphorus Load *(kg/ha/year)*	**0.84**	**0.24**	**71%**

Future Loading

The prescribed reduction in pollutants discussed in this TMDL reflects reduction from estimated existing conditions. Expansion of agricultural and development activities have the potential to increase runoff and associated pollutant loads to the Coloney Brook. To ensure that the TMDL targets are attained, future agriculture or development activities will need to meet the TMDL targets. However, future growth from population increases is not a threat in the Coloney Brook watershed because Aroostook County has had decreasing population trends, with a 3.1% decrease between 2000 and 2008 (USM MSAC, 2009). Though decreasing population trends, the growth in agricultural lands is increasing, with a 15% increase in the total number of farms in Aroostook County between 2002 and 2007. This may bring a moderate threat to water quality within the watershed. 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 the same time period (USDA, 2007a). Future activities and BMPs that achieve TMDL reductions are addressed below.

Next Steps

The use of agricultural and developed area BMP's can reduce sources of polluted runoff in Coloney 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 Coloney Brook;
- Address existing nonpoint source problems in the Coloney Brook watershed by instituting BMPs where necessary; and
- Prevent future degradation of Coloney Brook through the development and/or strengthening of local Nutrient Management Ordinance.

Table 10: Modeling Results Calculations for Derived Numeric Targets and Reduction Loads for Coloney Brook

Coloney Brook				
	Area ha	**Sediment 1000kg/yr**	**TN kg/yr**	**TP kg/yr**
Land Uses				
Hay/Pasture	6	0.2	2.0	1.0
Cropland	1334	435.8	6948.9	1240.4
Forest	390	1.8	29.7	3.3
Wetland	113	0.1	34.9	1.9
Disturbed Land	0	0.0	0.0	0.0
Low Density Mixed	7	0.2	5.2	0.6
High Density Mixed	34	3.7	149.4	15.5
Low Density Residential	1	0.0	0.7	0.1
Other Sources				
Farm Animals			16.5	4.2
Septic Systems			0.0	0.0
Pathway Loads				
Stream Banks		5.6	3.0	2.0
Groundwater			25658.2	311.2
Total Annual Load		447 x 1000 kg	32848 kg	1580 kg
Total Area	1885 ha			
Total Maximum Daily Loads		**0.237 1000kg/ha/year**	**17.43 kg/ha/year**	**0.84 kg/ha/year**

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