TMDL Summary

Appendix B-10

No Name Brook

Watershed Description

This **TMDL** applies to a 10.02 mile section of No Name Brook, located in the City of Lewiston. The impaired segment begins in the northern corner of the watershed in a forested area and flows south crossing Lane Road, Old Greene Road, and No Name Pond Road before flowing into No Name Pond. At the outlet of the pond, No Name Brook continues south through a wetland, crossing Sabattus Street and Grove Street. The stream continues through a forest with sparse development, crossing Randall Road, power lines, Old Webster Road, I-95, Crowley Road, Foss Road, and Jordan Road. The stream then skirts multiple residential developments, crosses under Littlefield Road, and converges with the Sabattus River. The No Name Brook watershed covers an area of 15.42 square miles. The majority of the watershed is located within the City of Lewiston; however, small portions of the watershed lie within the surrounding towns of Greene, Sabattus, and Lisbon.

- No Name Brook is on Maine's 303(d) list of Impaired Streams as referenced in the 2016 Integrated Report (Maine DEP, 2018).
- The No Name Brook watershed is predominately non-developed (70.3%). Forested areas (56.3%) within the watershed absorb and filter pollutants helping protect both water quality in the stream and stream channel stability. Wetlands (12.4%) also help filter nutrients.
- Non-forested areas within the watershed are predominantly developed (19%) and agricultural (10.4%) and are located throughout the watershed.
- Developed areas (19%) with impervious surfaces in close proximity to the stream and runoff from agricultural land located throughout the eastern portion of the watershed are sources of nonpoint source (NPS) pollution to No Name Brook. Runoff from developed land, active hay lands, and pasture can transport sediment, nitrogen and phosphorus to the Brook.

Definitions

- ***Total Maximum Daily Load (TMDL)*** *represents the total amount of pollutants 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: ME0104000210_418R02

City: Lewiston, ME

County: Androscoggin

Impaired Segment Length: 10.02 miles

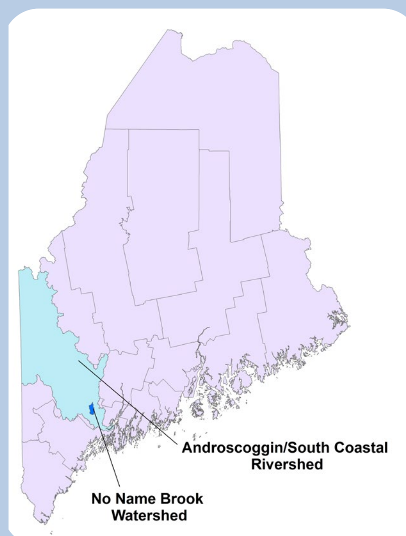
Classification: Class B

Direct Watershed: 15.42 mi^2 (9,869 acres)

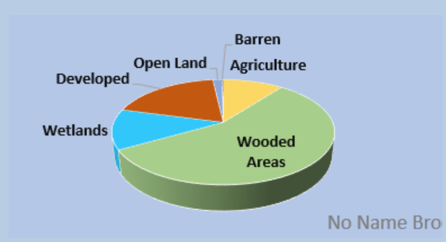
Impairment Listing Cause: Dissolved Oxygen

Watershed Agricultural Land Use: 10.4%

Major Drainage Basin: Androscoggin River



Watershed Land Uses



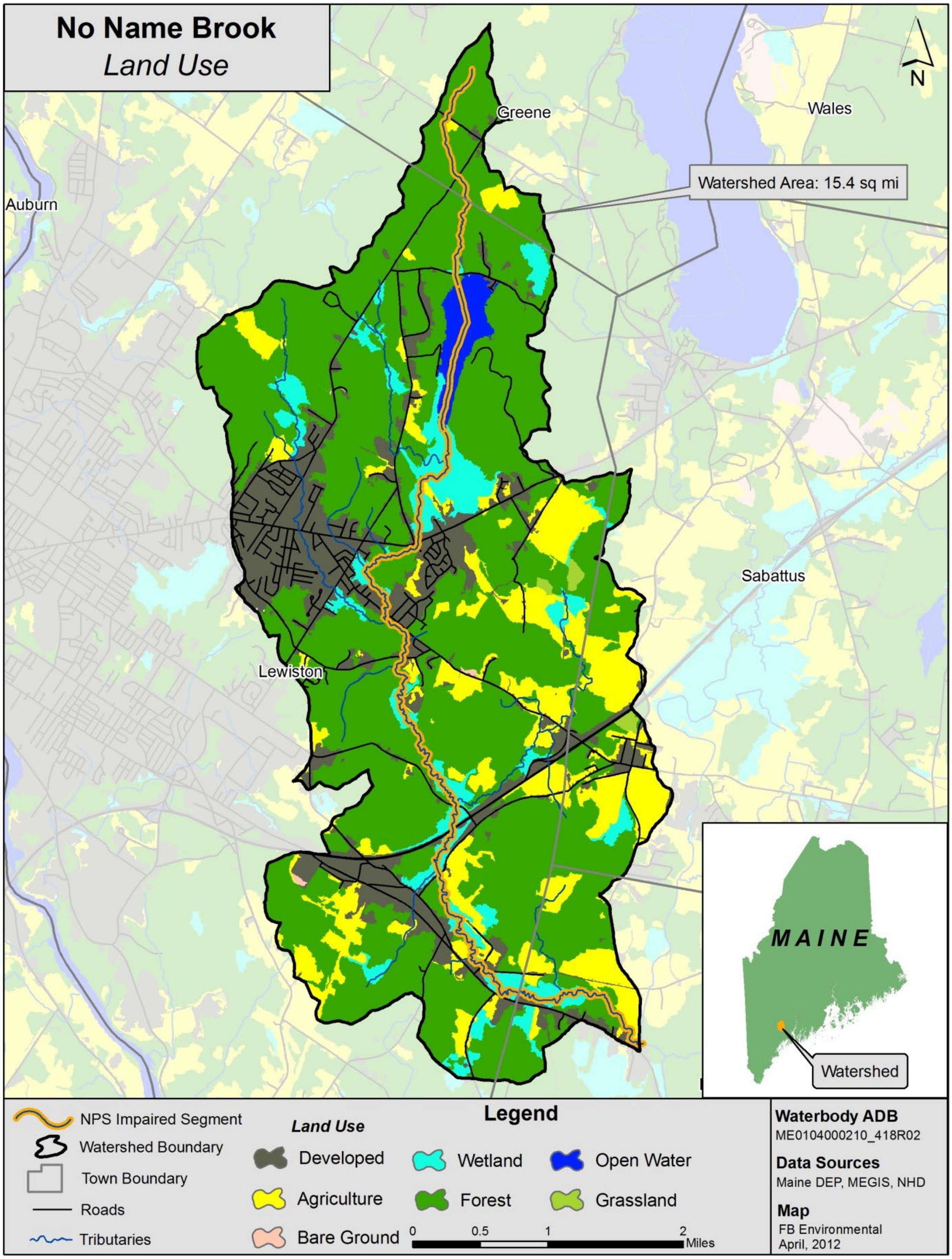


Figure 1: Land Use and Land Cover (from 2011) in the No Name Brook Watershed

WHY IS A TMDL ASSESSMENT NEEDED?

No Name 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 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.

***No Name Brook** near Mill Road crossing. Photo: FB Environmental*

Developed land makes up 19% of the total watershed area while agriculture makes up 10%. Runoff from impervious surfaces in developed areas as well as agriculture, may be the largest contributors of sediment and nutrient enrichment to the stream. The close proximity of some agricultural lands to the stream further increases the likelihood that nutrients from disturbed soils, manure, and fertilizers will reach the stream. Other potential contributors of nonpoint source pollution included a landscaping/auto repair facility off Lisbon Road and undersized culverts causing sedimentation in the stream. The No Name Brook wetland also has naturally low dissolved oxygen concentrations and may be effecting the concentrations within 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). For benthic macroinvertebrates, 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 the numeric aquatic life criteria of the class assigned to the stream or river (Davies and Tsomides, 2002). Maine DEP uses an analogous model to aid in the assessment of algal communities but makes aquatic life use determinations based on narrative standards.

The aquatic life impairment in No Name Brook is based on historic data. Dissolved oxygen data collected from 2009-2011 also found low values at many sampling stations. In addition to the stream stations, there were two wetland stations sampled in 2013 (W-101 and W-102) which were both were impaired for macroinvertebrates (only attained Class C).

TMDL ASSESSMENT APPROACH: NUTRIENT AND SEDIMENT 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, an online nutrient loading model, *Model My Watershed* (v. 1.32.0), was used to estimate the sources of pollution based on well-established hydrological equations (Stroud Water Research Center 2017). *Model My Watershed* makes use of the GWLF-enhanced model engine. The model incorporates detailed maps of soil, land use, and slope, daily weather and localized weather data (from the period 2009-2020), and direct observations of agriculture and other land uses within the watershed. *Model My Watershed* is derived from its parent MapShed developed by Evans and Corradini (2012). *Model My Watershed* replaced MapShed in 2017-2018.

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 Model My Watershed Outputs (2021) for Attainment Streams

Attainment Streams	Town	Total P Load (kg/ha/yr)	Total N Load (kg/ha/yr)	Sediment Load (kg/ha/yr)
Footman Brook	Exeter	0.17	1.73	35.2
Martin Stream	Fairfield	0.13	2.98	57.9
Moose Brook	Houlton	0.18	1.59	48.5
Upper Kenduskeag Stream	Corinth	0.16	1.72	100.5
Upper Pleasant River	Gray	0.16	4.26	86.5
Total Maximum Daily Load		**0.16**	**2.46**	**65.7**

Rapid Watershed Assessment

Habitat Assessment

A habitat assessment survey was conducted on both the impaired and attainment streams. The assessment approach is 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. The habitat assessments include a general description of the site, physical characterization and visual assessment of in-stream and riparian habitat quality.

Based on rapid bioassessment protocols for low gradient streams, No Name Brook received a score of 147 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 No Name Brook watershed, the downstream sample station was located just upstream on the Foss Road crossing in Lewiston. Pathway Vineyard Church with a large surrounding parking area is nearby to the north of the sample reach. The sample reach was surrounded by a forested buffer through the majority of the reach area. However, a minimal buffer was documented near the Foss Road culvert and the Vineyard Church parking lot.

Figure 2 (right) shows the range of habitat assessment scores for all attainment and impaired streams, as well as for No Name Brook. Though these scores show that habitat is clearly an issue in the impairment of No Name 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 No Name Brook watershed as potential sources of NPS pollution contributing to the water quality impairment.

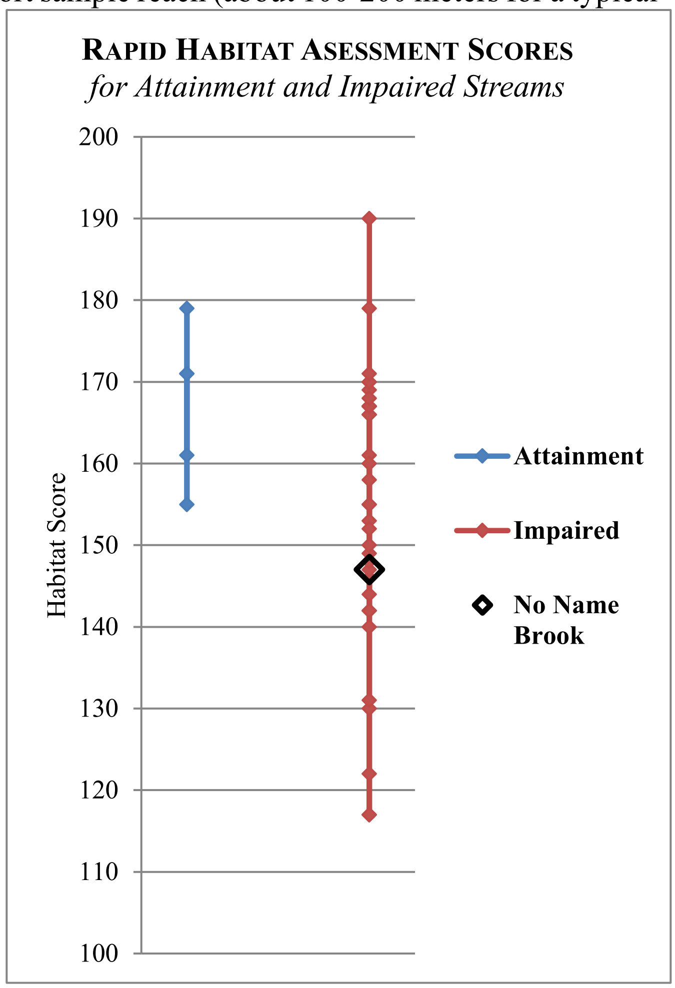


Figure 2: Habitat Assessment Scores for No Name Brook (2012) Compared to Region

Pollution Source Identification

Pollution source identification assessments were conducted for both No Name Brook (impaired) and all 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 No Name Brook was completed in June 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: Potential Pollution Source ID Assessment (2012) for the No Name Brook Watershed

Potential Source			Notes
ID#	**Location**	**Type**	
16	Jordan Road (Town Farm Road)	Agriculture	• Active row crops. • Evidence of manure/fertilizing application. • Bare soil observed in some areas.
24	Grove Street	Road Crossing	• A culvert on Grove Street has recently been replaced, yet high flow and flooding was evident from the significant sediment deposition on the south side (downstream) end of the culvert, and heavy accumulation of large woody debris deposited high on the rip-rap almost to the road. • Woody debris considered possible result of collapse of beaver activity upstream due to flooding. • The local landowner told of recent flooding since the replacement of the culvert and that water overtopped the roadway. • Two unknown pipes were documented emerging from the rip-rap into the stream. • A narrow buffer was documented between the stream and adjacent lawns.
26	Sabattus Street & Golder Road	Road Crossings/ Residential	• Multiple stream crossings indicate potential stormwater impacts to the stream. • Rooted emergent vegetation was documented growing immediately downstream toward Golder Road crossing. • Water flowing in from the storm drains appeared slightly turbid.
32	Old Webster Road	Road Crossing	• Undersized culvert resulting in widening of the stream. • Small area of erosion observed off roadway due to storm water runoff.
38	Lisbon Road	Commercial Development	• Auto sales business. • Potential hot spot. • Many junked vehicles on property.
39	Lisbon Road	Commercial Development	• Landscape/truck repair business. • Oil barrels, sand, and mulch piles located behind building. • Large waste oil tank without secondary containment. • Trash observed throughout area. • A white hose was seen running to adjacent tributary. Pumping or draining activity unknown.
40	South Lisbon Road	Town Sewage Station/Road Crossing	• Road crossing with south west tributary to No Name Brook. • Sewage pump station located nearby road crossing. • Strong septic odor at road crossing.
42	Lisbon Road	Agriculture	• Two horses observed grazing with hayfields surrounding. Fields do not look active.
43	Lisbon Road	Commercial Development	• Pools and spas business. • Quite close to No Name Brook. Large parking lot and building. • Possible chemical runoff from pool chemicals.

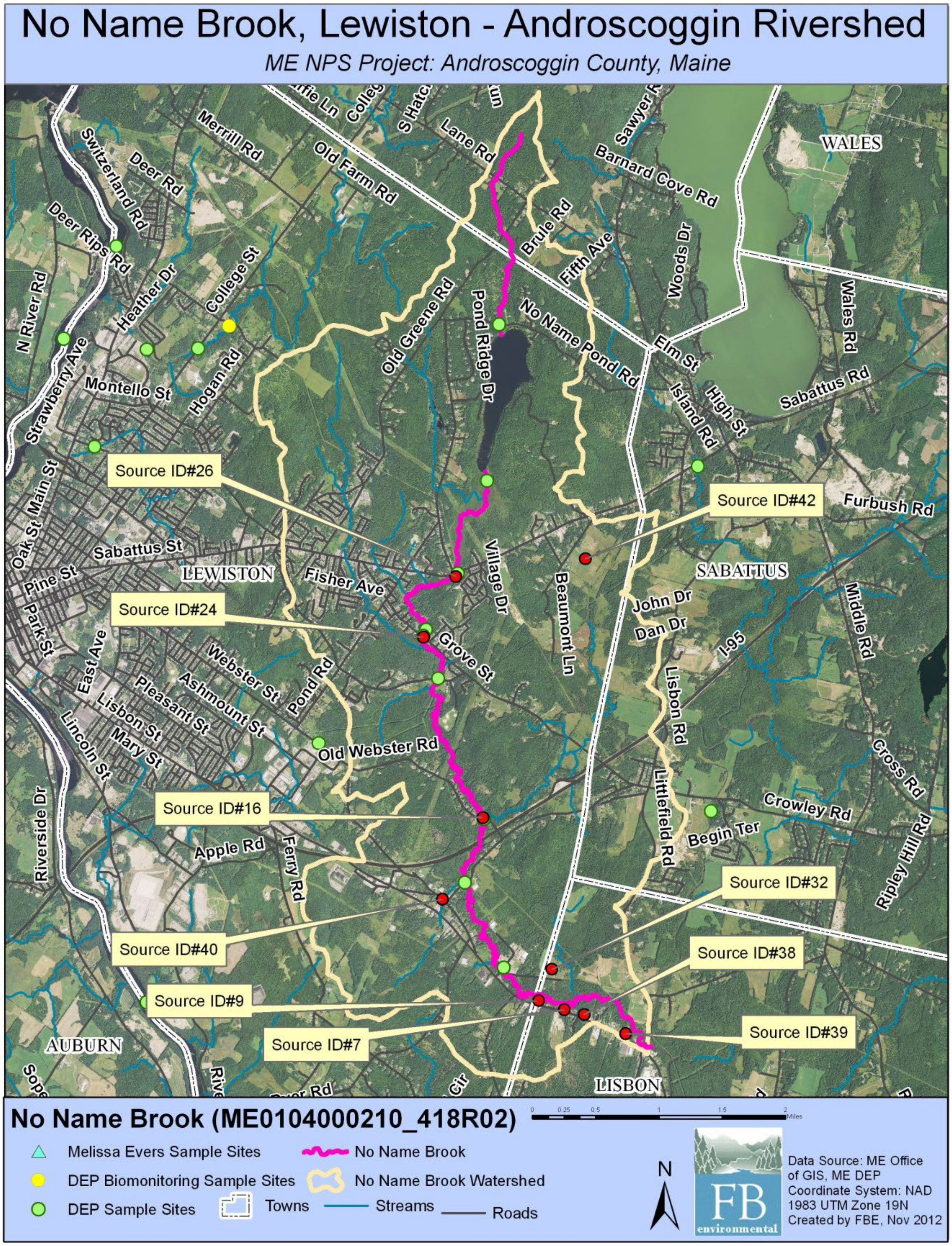


Figure 3: Aerial Photo of Potential Source ID Locations (identified in 2012) in the No Name Brook Watershed

NUTRIENT AND SEDIMENT LOADING – *MODEL MY WATERSHED* ANALYSIS

The *Model My Watershed* model was used to estimate stream loading of total phosphorus, total nitrogen, and sediment in No Name Brook watershed. The model estimated nutrient and sediment loads over a 12-year period (2009-2020), which was determined by local (Poland ME USC00176856) weather data inserted into *Model My Watershed*. This extended period captures a recent but wide range of hydrologic conditions to account for variations in nutrient and sediment loading over time. Loads for the attainment watersheds (five total; Table 1) were computed using the same model with the same recent inputs (i.e., regional weather, 2016 land use and land cover, 2016 wetland extent, and BMPs similar to the impaired watersheds).

Many quality assured and regionally calibrated input parameters are provided with *Model My Watershed*. However, several updates to some of the default parameters were made in this TMDL effort, and namely more recent land use/cover using **MRLC-NLCD 2016** [1], more recent and local weather (precipitation and temperature) data (as described above), and more regional estimates of Best Management Practices (BMPs; see ensuing discussion). Because land use/cover is more recent, the estimated filtration fraction of wetland and open water and the amount of stream buffer in agricultural land should be more accurate. It is also worth noting that improved classification algorithms were employed by MLRC in the NCLD 2016 and these new algorithm were used in the revisions of all previous NLCD versions (including the first version in 2001).

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 livestock (numbers of animals) in the watershed based on the USDA National Agricultural Statistics Service (NASS) estimation for 2017. To generate watershed-based livestock counts, NASS county-based livestock totals are converted to a per unit area (based on the total area of the county). The unit area amount is then multiplied by the total watershed area to derive a watershed total count (as seen in Table 3).

Table 3: Livestock Estimates in the No Name Brook Watershed

Type	No Name Brook
Dairy Cows	75
Beef Cows	28
Broilers	39
Layers	--
Hogs/Swine	21
Sheep	27
Horses	12
Turkeys	8
Other	--
Total	**208**

The No Name Brook watershed is predominantly forested, with substantial amount of development and some agriculture. Agricultural land use is dominated by active hay fields, though some row crops were observed. Two horses were observed grazing in a pasture off of Old Chadbourn Road.

[1] MRLC-NLCD 2016 : Multi-Resolution Land Characteristics – National Land Cover Dataset (version 2016) provided by the MRLC Consortium (Jin et al. 2019).

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 and Corradini, 2012). *Model My Watershed* considers natural vegetated stream buffers within agricultural land areas as providing nutrient load attenuation. A width of approximately 98 feet (30 m) on one side of a stream is required to be considered a streamside buffer per the *Model My Watershed* technical manual (Stroud Water Research Center 2017). Analysis of recent aerial photos was used to estimate the number of agricultural land 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

No Name Brook
• Agricultural Land Stream Length = 2.7 mi • Agricultural Land Stream Length with Buffer = 1.3 mi (or 48% of total agricultural land stream length) • Percentage of total stream length flowing through non-buffered agricultural land = 14%

No Name Brook is a 10.0 mile-long impaired segment as listed by Maine DEP. As modeled, the total stream miles (including tributaries) within the watershed was calculated as 13.7 miles. Of this total, 2.7 stream miles are located within agricultural areas and 1.3 miles of that area *appear* to have a 98 foot or greater vegetated buffer (Table 4, Figure 4). From a watershed perspective, this equates to 1.4 miles or 14% of the total stream length running through agricultural land with less than a 98 foot buffer. By contrast, for attainment stream watersheds, the percentage of total stream miles running through agricultural land without a 75 foot vegetated buffer ranged from 0% to 3.9% with an average of 1.3%. Note, a minimum vegetated buffer width of *75 feet* was used in an earlier (2012) effort to produce Figure 4 shown here. Differences in stream length estimates using a 98-foot or 75-foot buffer were practically insignificant.

Home Septic System Loads

Loads for "normally functioning" septic systems are calculated in *Model My Watershed* using an estimate of the average number of persons per acre in "Low-Density Mixed" areas. In these areas, it is assumed that the populations therein are served by septic systems rather than centralized sewage systems. All homes in such areas are assumed to be connected to "normally functioning" systems rather than those that experience "surface breakouts" (surface failures), "short-circuiting" to underlying groundwater (subsurface failures), or have direct conduits to nearby water bodies. Non-functioning systems would be modeled with a higher load contribution to the waterbody.

Best Management Practices (BMPs)

Best management practices (BMPs) are typically instituted to reduce the loading of sediment and nutrients from upland (i.e., non-point) sources. Ideally, information on BMPs for a specific watershed from local and regional sources would improve this component of the water quality model. Maine DEP sought information on BMP use in early 2021 from local, regional, and state agricultural agencies for rural BMPs and from nearby municipalities for urban BMPs. Very little to no information was returned in the solicitation. Hence, estimates for typical New England watersheds were derived from information available from Vermont. An upper limit of BMP use was garnered from watersheds entering the Chesapeake Bay where BMP use is intensive.

Four agricultural BMPs were used in this modeling effort and in the following manner:

- *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 cropland area in a cover crop BMP deployed was estimated at 25% and selected as the low end of the range (25 to 30 percent) expected for cropland in New England. This value was assigned to the five attainment watersheds.
- *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. This BMP was estimated to occur in 25% of cropland. This value was assigned to the five attainment watersheds.
- *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. Both interview sources suggest this practice is minimal to non-existent for New England watersheds. Hence, no BMP of this type was used in this modeling effort. This value was assigned to the five attainment watersheds.
- *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. Both interview sources were not aware of this practice being active and is likely minimal for New England watersheds. Hence, no BMP of this type was used in this modeling effort for both impaired and attaining watersheds.

Note that other agricultural and development BMPs likely exist in the watershed but their location and type were not available in a watershed-wide format that is necessary to include in the model. Agricultural BMPs recommended by Maine DEP to reduce sediment and nutrient loads include vegetated buffers, covered manure storage facilities, and stream exclusion fencing. BMPs for developed areas recommended by the Maine DEP include vegetated buffers, stormwater BMPs, and minimization of impervious cover.

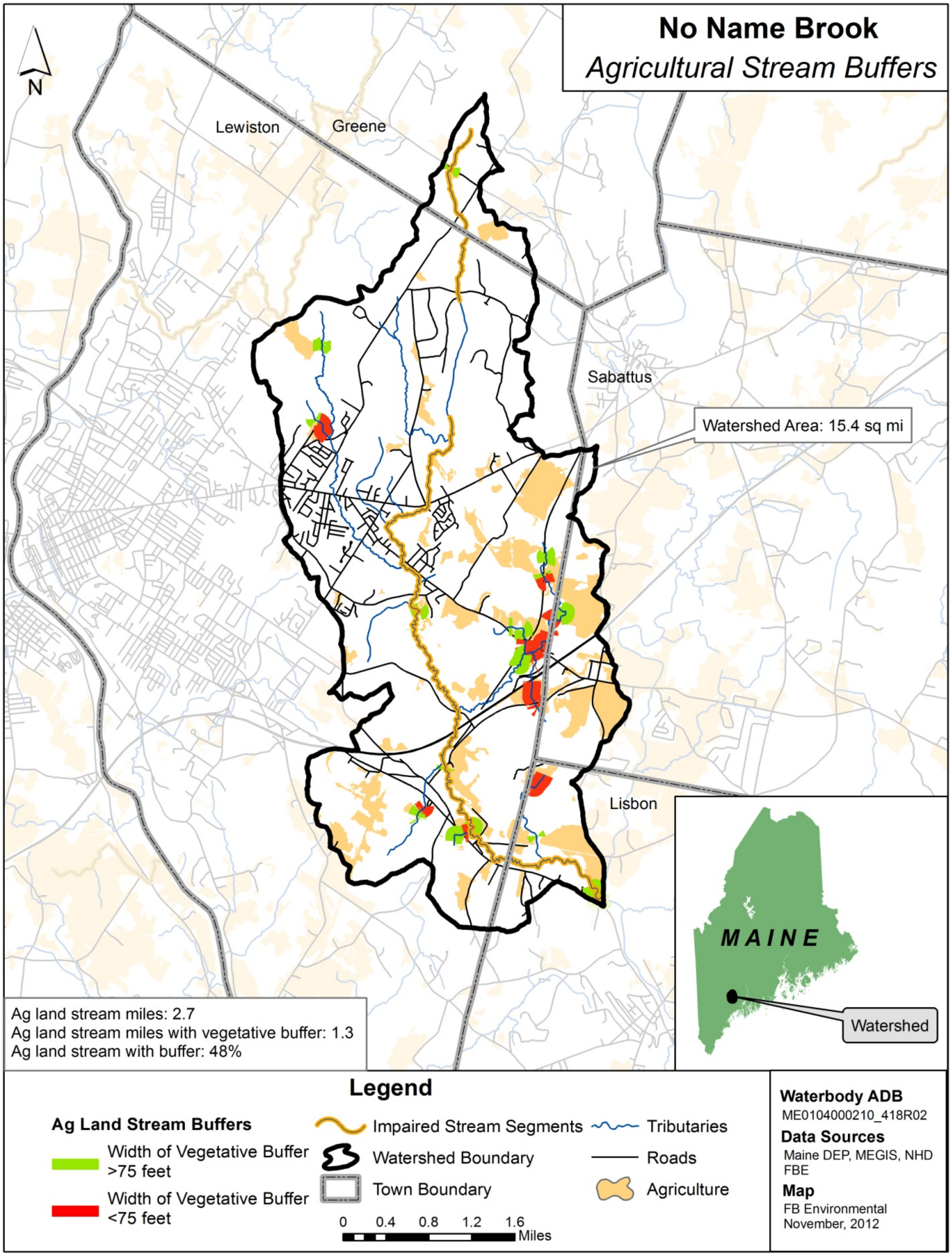


Figure 4: Agricultural Stream Buffers (from 2012) in the No Name Brook Watershed

Pollutant Load Attenuation by Lakes, Ponds and Wetlands

Depositional environments such as lakes, ponds, and wetlands can attenuate watershed sediment and nutrient loading. This information is entered into the nutrient loading model by a simple percentage of watershed area draining to a lake, pond, or wetland. The No Name Brook watershed is 13.1% wetland and open water (per the 2016 NLCD land use/cover) which includes No Name Pond. Multiple wetlands and open water surround tributaries throughout the watershed. Because of this proximity to streams, it is estimated that 90% of land area within the watershed drains to wetlands and open water. The percent of watershed draining to a wetland in the attainment watersheds, based on the 2021 analysis, ranged from 26 to 58 percent, with an average of 40%.

NUTRIENT AND SEDIMENT MODELING RESULTS

Selected results from the watershed loading model are presented here. 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 No Name Brook indicate moderate reductions of phosphorus and smaller reductions in nitrogen and sediment are needed to improve water quality. Below, loading for nitrogen, phosphorus and sediment are discussed individually.

There are two categories of loads – sources and pathways. Sources are determined by land use/cover and the overland flow they generate, livestock counts by animal type, and home sewage treatment systems in developed areas. Pathways represent additional loads derived from subsurface flow and streambank erosion. Subsurface loads are calculated using dissolved N and P coefficients for shallow groundwater and are mainly derived from atmospheric inputs. Sediment and nutrient loads produced by eroding streambanks are estimated using an approach developed by Evans et al. (2003). This pathway is comprised of loads originating from five sources, and listed in order of decreasing importance: amount of developed land area, soil erodibility (K-factor), density of livestock, runoff curve number, and topographic slope. For any given model run, the amount of developed land in the watershed is responsible for just over 72% of the total streambank load, whereas soil erodibility and animal density are responsible for 21% and 7% of the total streambank load, respectively.

Sediment

Aside from stream bank erosion which contributes 72.3% of the total watershed sediment load, the major source load in No Name Brook watershed originates from hay/pasture land (51% of total sources). Residential sources also contribute a significant source load (almost 40%). Note that residential sources also comprise 71% of the stream bank erosion load.

Note that total loads by mass cannot be directly compared between watershed TMDLs due to differences in watershed area. See section *TMDL: Target Nutrient and Sediment Levels for No Name Brook* below for loading estimates that have been normalized by watershed area.

Table 5: Total Sediment Load by Source

No Name Brook	Sediment (1000 kg/year)	Sediment (%)
Source Load		
Hay/Pasture	39.4	51.0%
Cropland	2.2	2.8%
Wooded Areas	2.9	3.8%
Wetlands	0.3	0.4%
Open Land	1.7	2.3%
Barren Areas	0.003	0.003%
Low-Density Mixed	5.7	7.3%
Medium-Density Mixed	17.3	22.4%
High-Density Mixed	2.5	3.2%
Low-Density Open Space	5.3	6.9%
Farm Animals	0	0
Septic Systems	0	0
Source Load Total:	**77.3**	**100%**
Pathway Load		
Stream Bank Erosion	208.5	-
Subsurface Flow	0	-
Total Watershed Mass Load:	**286**	

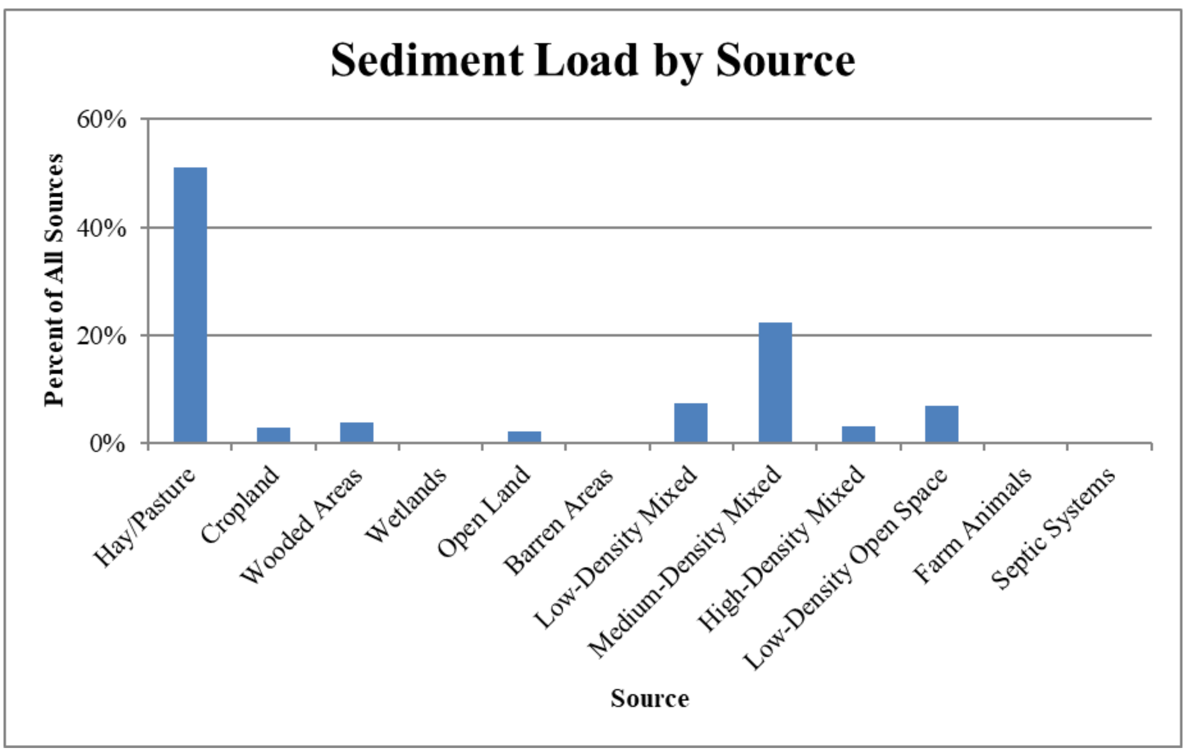


Figure 5: Total Sediment Load by Source in the No Name Brook Watershed

Total Nitrogen

Table 6 and Figure 6 (below) show the estimated total nitrogen load, in terms of mass and percent of total by source, in the No Name Brook watershed. Sources of N originate from several sources where all have an equivalent contribution. Residential areas contribute the most (34%). Home septic systems contribute 11.4%. Hay/pasture land and farm animals contribute a combined 33.3%.

Note that total loads by mass cannot be directly compared between watershed TMDLs due to differences in watershed area. See section *TMDL: Target Nutrient and Sediment Levels for No Name Brook* below for loading estimates that have been normalized by watershed area.

Table 6: Total Nitrogen Load by Source

No Name Brook	Total N (kg/year)	Total N (%)
Source Load		
Hay/Pasture	974	18.1%
Cropland	52	1.0%
Wooded Areas	641	11.9%
Wetlands	355	6.6%
Open Land	124	2.3%
Barren Areas	3	0.1%
Low-Density Mixed	403	7.5%
Medium-Density Mixed	894	16.6%
High-Density Mixed	127	2.4%
Low-Density Open Space	378	7.0%
Farm Animals	815	15.2%
Septic Systems	614	11.4%
Source Load Total:	**5,381**	**100%**
Pathway Load		
Stream Bank Erosion	450	-
Subsurface Flow	5,696	-
Total Watershed Mass Load:	**11,527**	

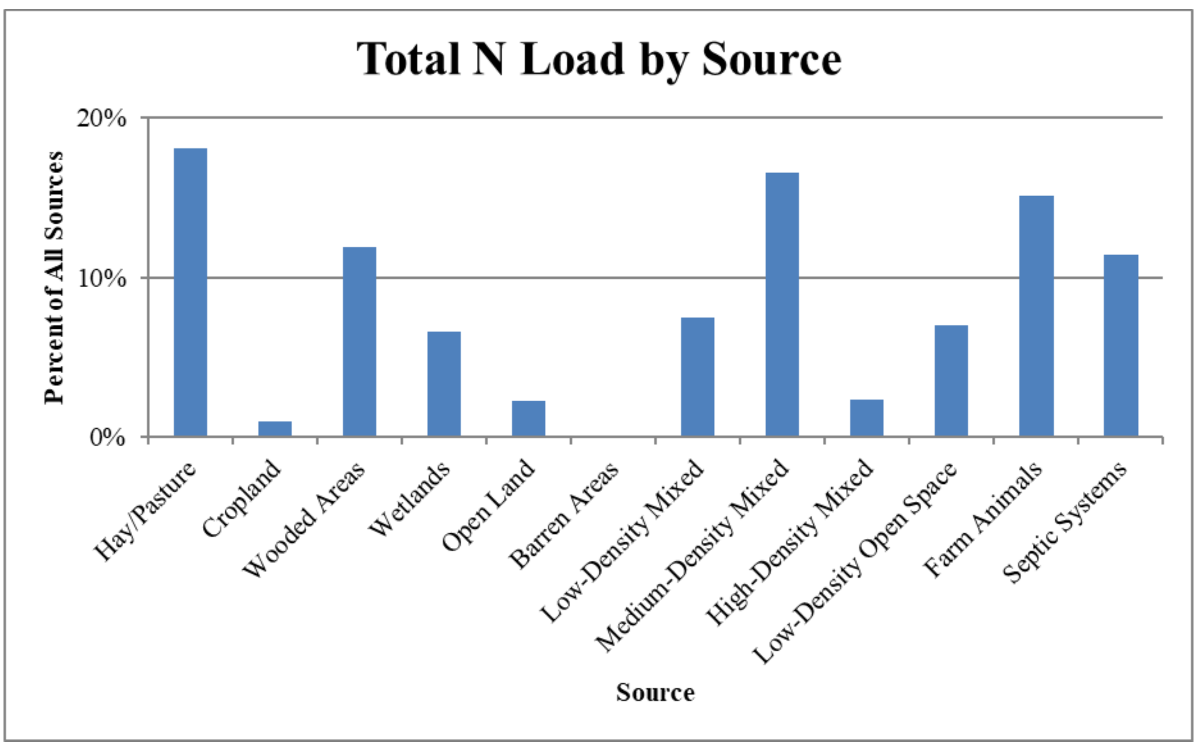


Figure 6: Total Nitrogen Load by Source in the No Name Brook Watershed

Total Phosphorus

Table 7 and Figure 7 (below) show the estimated total phosphorus load in terms of mass and percent of total by source, in the No Name Brook watershed. Hay/pasture land contributes a little over 50% of the source load. Farm animals contribute 19.6% whereas residential areas contribute 20.8%

Note that total loads by mass cannot be directly compared between watershed TMDLs due to differences in watershed area. See section *TMDL: Target Nutrient and Sediment Levels for No Name Brook* below for loading estimates that have been normalized by watershed area.

Table 7: Total Phosphorus Load by Source

No Name Brook	**Total P** (kg/year)	**Total P** (%)
Source Load		
Hay/Pasture	384.6	50.1%
Cropland	11.0	1.4%
Wooded Areas	36.9	4.8%
Wetlands	16.8	2.2%
Open Land	7.4	1.0%
Barren Areas	0.1	0.01%
Low-Density Mixed	36.8	4.8%
Medium-Density Mixed	77.6	10.1%
High-Density Mixed	11.0	1.4%
Low-Density Open Space	34.5	4.5%
Farm Animals	150.8	19.6%
Septic Systems	0	0
Source Load Total:	**767.5**	**100%**
Pathway Load		
Stream Bank Erosion	167.0	-
Subsurface Flow	183.4	-
Total Watershed Mass Load:	**1,118**	

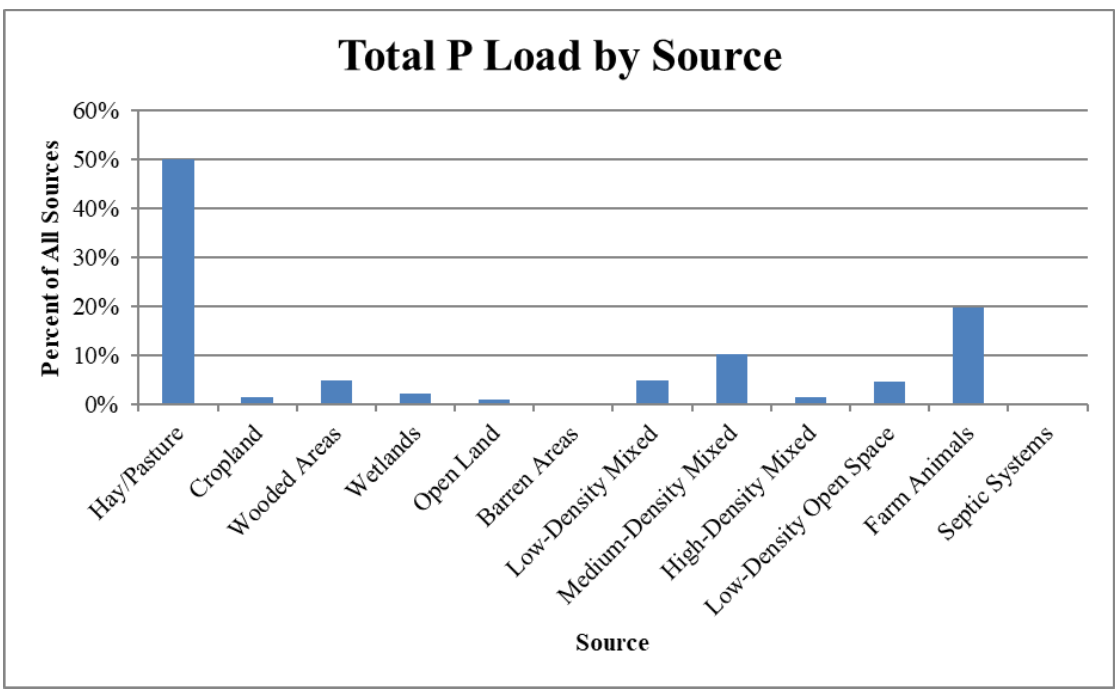


Figure 7: Total Phosphorus Load by Source in the No Name Brook Watershed

TMDL: TARGET NUTRIENT AND SEDIMENT LEVELS FOR NO NAME BROOK

The existing loads for nutrients and sediments in the impaired segment of No Name Brook are listed in Table 8, along with the TMDL 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 nutrient and sediment loads in No Name 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: No Name Brook Pollutant Loading Compared to TMDL Targets

No Name Brook			
Pollutant Load	**Existing Load**	**TMDL**	**Reduction Required**
Total Annual Load per Unit Area		Attainment Streams	
Sediment (kg/ha/yr)	72.8	65.72	9.8%
Total N (kg/ha/yr)	2.94	2.46	16.4%
Total P (kg/ha/yr)	0.28	0.16	43.9%

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 No Name Brook. To ensure that the TMDL targets are attained, future agricultural and development activities will need to meet the TMDL targets. Between 2012 to 2017 in Androscoggin County, the growth in agricultural lands was generally decreasing as both total land area in farms (6.4%) and average farm size (12.5%) have declined. However, the total number of farms has increased 7.1%. These values are extracted from the most recent (2017) Census of Agriculture (USDA 2017). Human population in Androscoggin County increased only slightly by 0.53% from 2000 to 2019 (US Census 2020). Future activities and BMPs that achieve TMDL reductions are addressed below.

Next Steps

The use of developed area and agricultural Best Management Practices (BMP's) can reduce sources of polluted runoff in No Name Brook. It is recommended that municipal officials, landowners, and conservation stakeholders in Lewiston 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 No Name Brook;
- Run a "Hot-Spot Analysis" in *Model My Watershed* to determine sub-watershed locations of higher existing contributions of sediment and nutrients to the outlet of No Name Brook watershed; then focus BMP mitigation in these hot-spot sub-areas of the watershed;
- Address existing nonpoint source problems in the No Name Brook watershed by instituting BMPs where necessary; and

- Prevent <u>future</u> degradation of No Name Brook through the development and/or strengthening of local Nutrient Management Ordinance.

Table 9: Annual Loads by Land Use, Other Sources, and Pathways for No Name Brook Based on Modeling

No Name Brook				
	Area (ha)	**Sediment** (1000 kg/yr)	**Total N** (kg/yr)	**Total P** (kg/yr)
Land Uses				
Hay/Pasture	404	39.4	974	384.6
Cropland	6	2.2	52	11.0
Wooded Areas	2,209	2.9	641	36.9
Wetlands	487	0.3	355	16.8
Open Land	63	1.7	124	7.4
Barren Areas	8	0.003	3	0.1
Low-Density Mixed	277	5.7	403	36.8
Medium-Density Mixed	185	17.3	894	77.6
High-Density Mixed	26	2.5	127	11.0
Low-Density Open Space	259	5.3	378	34.5
Total Area	3,923			
Other Sources				
Farm Animals		0.0	815	150.8
Septic Systems		0.0	614	0.0
Pathway Load				
Stream Bank Erosion		208.5	450	167.0
Subsurface Flow		0.0	5,696	183.4
Total Annual Load		286	11,527	1,118
Total Annual Load per Unit Area		0.073	2.94	0.28
		1000 kg/ha/yr	kg/ha/yr	kg/ha/yr

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