TMDL Assessment Summary

Phillips Brook

Watershed Description

This **TMDL** assessment summary applies to Phillips Brook, a 2.77-mile stream located in the Town of Scarborough, Maine. Phillips Brook, a small tributary to Scarborough Marsh, begins in a mixed forest area between the Maine Turnpike and US Route 1 in Scarborough. The stream flows parallel to U.S. Route 1 and through a field before passing under Broadturn Road. It then flows under Payne Road near the road's intersection with US Route 1. Shortly thereafter it flows into a very large wetland area where it passes under US Route 1. The brook then flows into Scarborough Marsh east of Pine Point Road in Scarborough. The Phillips Brook watershed covers 653 acres in the towns of Scarborough and Saco.

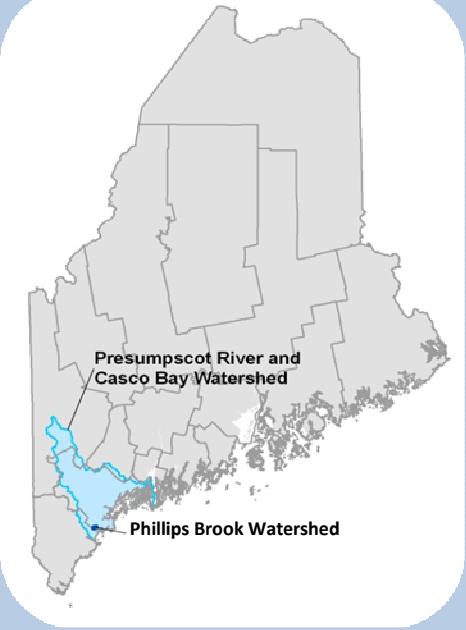
- Stormwater runoff from **impervious cover (IC)** is the largest source of pollution to Phillips Brook. Stormwater falling on roads, roofs and parking lots in developed areas flows quickly off impervious surfaces, carrying dirt, oils, metals, and other pollutants, and sending high volumes of flow to the nearest section of the stream.
- A number of Payne Road and US Route 1 storm drains and ditches, which are linked directly to Phillips Brook, funnel runoff from roads and parking lots down to the stream.
- Development has surrounded the stream near the end of its course around US Route 1 and Payne Road. This encroachment has removed important wetland areas and degraded the habitat around Phillips Brook in these areas.
- Remaining wetland and woodlands in a large portion of the lower Phillips Brook watershed absorb and filter stormwater pollutants, and help protect both water quality

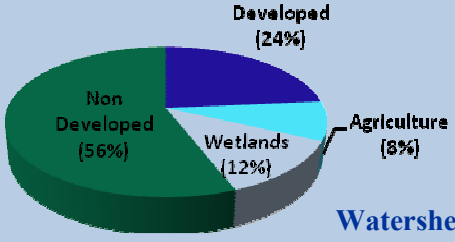
Definitions

- **TMDL** *is an acronym for* ***Total Maximum Daily Load****, representing the total amount of a pollutant that a water body can receive and still meet water quality standards.*
- **Impervious cover** *refers to landscape surfaces (e.g. roads, sidewalks, driveways, parking lots, and rooftops) that no longer absorb rain and may direct large volumes of stormwater runoff into the stream.*

Waterbody Facts

- **Segment ID:** ME0106000104_611R02
- **City:** Scarborough, ME
- **County:** Cumberland
- **Impaired Segment Length:** 2.77 miles
- **Classification:** Class C
- **Direct Watershed:** 1.02mi² (653 acres)
- **Watershed Impervious Cover:** 9%
- **Major Drainage Basin:** Presumpscot River and Casco Bay Watershed





Watershed Land Uses

in the stream and stream channel stability.

Why is a TMDL Assessment Needed?

Phillips Brook, a Class C freshwater stream, has been assessed by DEP as not meeting standards for aquatic life use, and has been listed on the 303(d) list of impaired waters. 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.

Phillips Brook upstream of site 953.
(Photo: FB Environmental)

The impervious cover TMDL assessment for Phillips Brook addresses water quality impairments for dissolved oxygen and aquatic life (stream habitat assessments). These impairments are associated with a variety of pollutants in urban stormwater as well as erosion, habitat loss and unstable stream banks caused by excessive amounts of runoff.

Sampling Results & Pollutant Sources

Due to development near the stream, the physical habitat in and around Phillips Brook has become degraded. Development has replaced natural forest and wetland areas with impervious cover around much of the stream. The new impervious cover increases the volume of water entering the stream shortly after rain, carrying pollutants and eroding the stream bank, further degrading the streams habitat (Varricchione, 2002). This impairment is based on DEP's stream habitat assessments. Phillips Brook was also sampled by DEP for macro-invertebrates for the first time in the summer of 2010, but the final results for that sampling event are not yet available (DEP, 2010b).

Sampling Station	Sample Date	Statutory Class	Model Results
S-953	8/16/2010	B	I

Phillips Brook was also sampled near Payne Road by DEP for aquatic life (instream macroinvertebrates) in the summer of 2010 and results indicate Phillips is "indeterminate" (I), meaning too few organisms were collected to meet the minimum needed to statistically determine classification (DEP, 2010b). 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).

Impervious Cover Analysis

***6% IC** represents an approximate **33% reduction** in stormwater runoff volume and associated pollutants when compared to existing pollutant loads.*

Increasing the percentage of impervious cover (%IC) in a watershed is linked to decreasing stream health (CWP, 2003). Because Phillips Brook's impairment is not caused by a single pollutant, %IC is used for this TMDL to represent the mix of pollutants and other impacts associated with excessive stormwater runoff. The Phillips Brook watershed has an impervious surface area of **9%** (Figure 1). DEP has found that in order to support Class C aquatic life use, the Phillips Brook watershed may require the

characteristics of a watershed with **6%** impervious cover. The target for Phillips Brook is lower than the target recommended for Class C streams in, IC Guidance (Appendix 2), of the TMDL report. Not all watersheds are created equally and the guidance does include an option to apply Best Professional Judgment when choosing streams' targets. The development is concentrated in the most downstream portion of the watershed (Figure 1) and exerts a disproportionate effect on the lower impaired stream segment. This segment does exhibit some characteristics associated with impairment due to stormwater runoff, therefore a target was chosen to reduce the impact of IC and achieve water quality classification. The stream is a low gradient flow system with associated wetland areas, which may also influence the downstream portion of the stream. The relative contribution of the slow flow and wetland needs to be evaluated during the development of a Watershed Specific Plan, as recommended in the IC TMDL.

Impervious Cover GIS Calculations

The Impervious Cover Calculations are based on analysis of GIS coverage's presented in Figure 1. The impervious area is derived from 2007 1 meter satellite imagery and the watershed boundary is an estimation based on contours and digital elevation models.

This TMDL target is intended to guide the application of Best Management Practices (BMP) and Low Impact Development (LID) techniques to reduce the *impact* of impervious surfaces. Ultimate success of the TMDL will be Phillips Brook's compliance with Maine's criteria for habitat assessment.

Next Steps

Because Phillips Brook is an impaired water, stormwater runoff in the watershed should be considered during the development of a watershed management plan to:

- Encourage greater citizen involvement (e.g. through the Friends of Scarborough Marsh) to ensure the long term protection of Phillips Brook;
- Address existing stormwater problems in the Phillips Brook watershed by installing structural and applying non-structural best management practices (BMPs); and
- Prevent future degradation of Phillips Brook through the development and/or strengthening of local stormwater control ordinances.

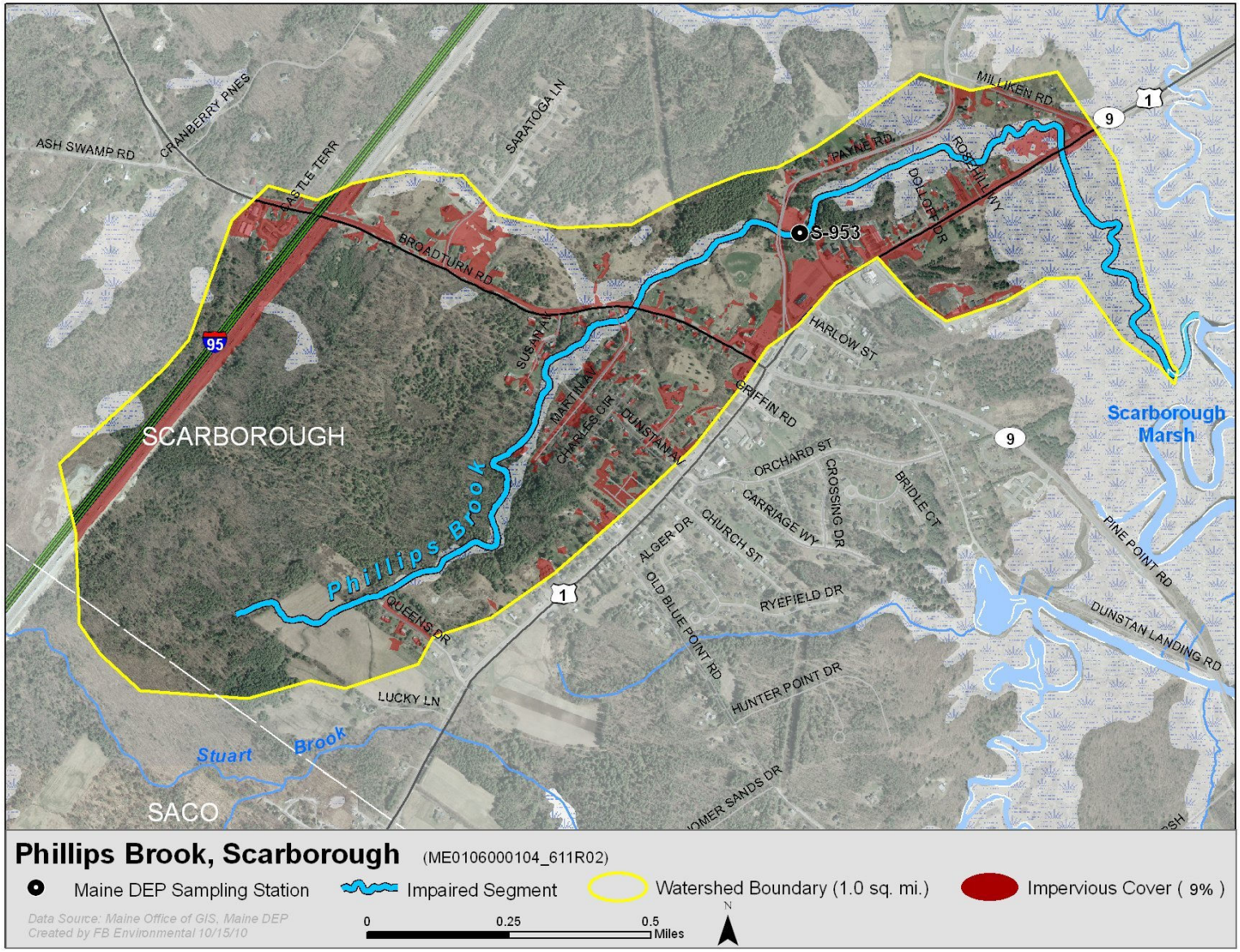


Figure 1: *Map of Phillips Brook watershed impervious cover.*

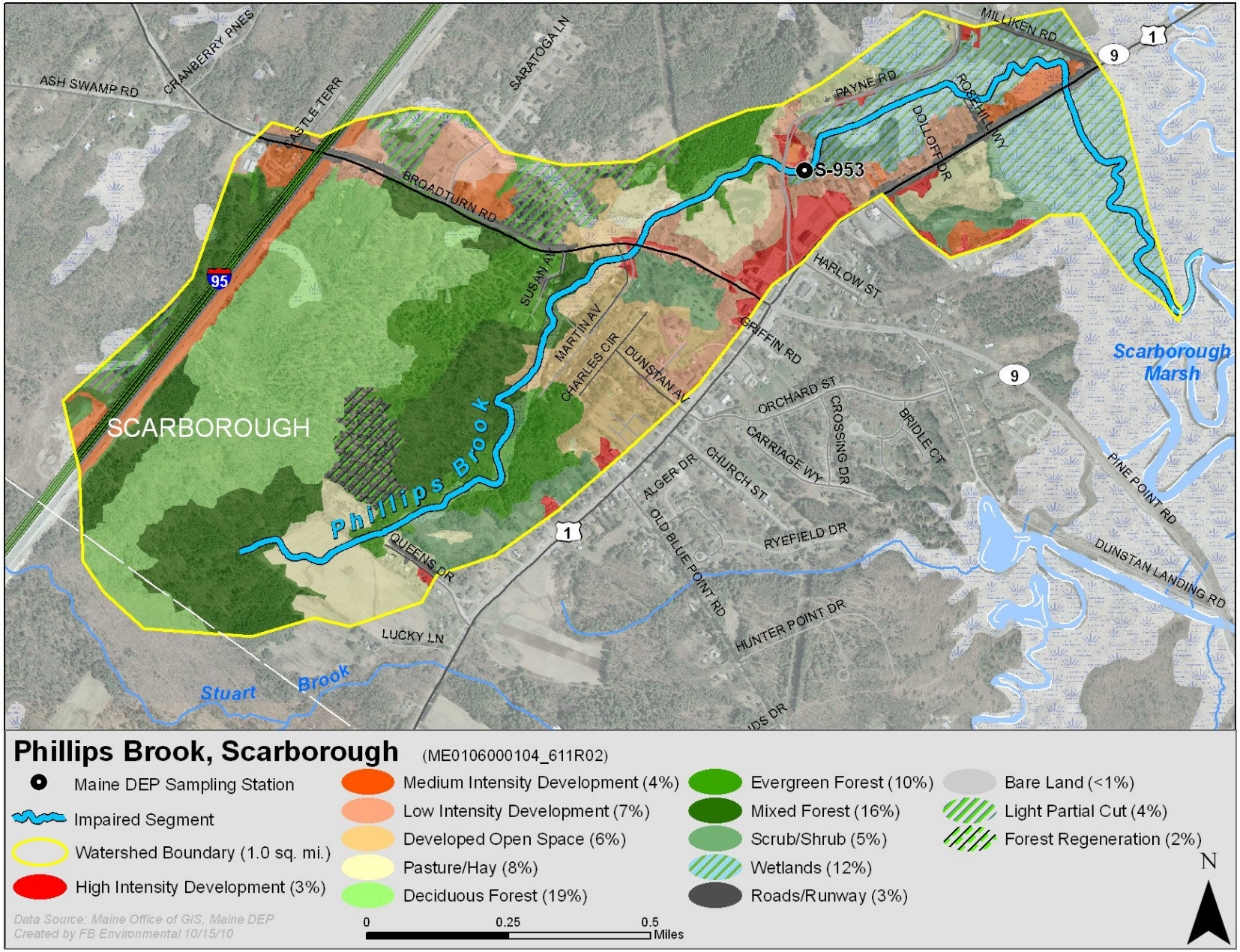

Phillips Brook, Scarborough
(ME0106000104_611R02)
Maine DEP Sampling Station
Impaired Segment
Watershed Boundary (1.0 sq. mi.)
High Intensity Development (3%)
Medium Intensity Development (4%)
Low Intensity Development (7%)
Developed Open Space (6%)
Pasture/Hay (8%)
Deciduous Forest (19%)
Evergreen Forest (10%)
Mixed Forest (16%)
Scrub/Shrub (5%)
Wetlands (12%)
Roads/Runway (3%)
Bare Land (<1%)
Light Partial Cut (4%)
Forest Regeneration (2%)
Data Source: Maine Office of GIS, Maine DEP
Created by FB Environmental 10/15/10
0
0.25
0.5
Miles
N
S-953
SCARBOROUGH
Phillips Brook
Stuart Brook
Scarborough Marsh
ASH SWAMP RD
CRANBERRY PNES
CASTLE TERR
SARATOGA LN
BROADTURN RD
MILLIKEN RD
PAYNE RD
ROSE HILL WY
DOLLOFF DR
HARLOW ST
GRIFFIN RD
SUSAN AV
MARTIN AV
CHARLES CIR
DUNSTAN AV
ORCHARD ST
CROSSING DR
BRIDLE CT
CARRIAGE WY
CHURCH ST
ALGER DR
OLD BLUE POINT RD
RYEFIELD DR
PINE POINT RD
DUNSTAN LANDING RD
HUNTER POINT DR
QUEENS DR
LUCKY LN
95
1
9

Figure 2: *Map of Phillips Brook watershed land cover.*

References

Center for Watershed Protection (CWP). 2003. Impacts of Impervious Cover on Aquatic Systems. Watershed Protection Research Monograph No. 1. Center for Watershed Protection, Ellicott City, MD. 142 pp.

Davies, Susan P. and Leonidas Tsomides. 2002. Methods for Biological Sampling and Analysis of Maine's Rivers and Streams. Maine Department if Environmental Protection. Revised August, 2002. DEP LW0387-B2002.

Maine Department of Environmental Protection (DEP). 2010a. Draft 2010 Integrated Water Quality Monitoring and Assessment Report. Bureau of Land and Water Quality, Augusta, ME. DEPLW-1187.

Maine Department of Environmental Protection (DEP). 2010b. Assessment Database Detail Report for Phillips Brook (Scarborough). Bureau of Land and Water Quality, Augusta, ME.

Varricchione, Jeffery T. 2002. A Biological, Physical and Chemical Assessment of Two Urban Streams in Southern Maine: Long Creek & Red Brook. Volume I Maine Department of Environmental Protection. Revised December, 2002. DEPLW0572