



## TMDL Assessment Summary

# Red Brook

### Watershed Description

This **TMDL** assessment summary applies to a 5.4-mile section of Red Brook, located in the Town of Scarborough and the City of South Portland, Maine. Red Brook, a tributary to Clarks Pond in South Portland, begins in a wetland area north of County Road (Route 22) in Scarborough. The stream flows through a large wetland area as it travels south along Gorham Road in Scarborough. It then crosses under the Maine Turnpike (I95) next to Exit 44 in Scarborough. The brook follows I-295 and passes under it several times on its way into Clarks Pond, an impoundment draining into the Fore River and then Casco Bay. There are several large ground water fed ponds in the Red Brook watershed with outlets running into the brook. The Red Brook watershed covers 2,048 acres in the town of Scarborough and the cities of South Portland and Westbrook.

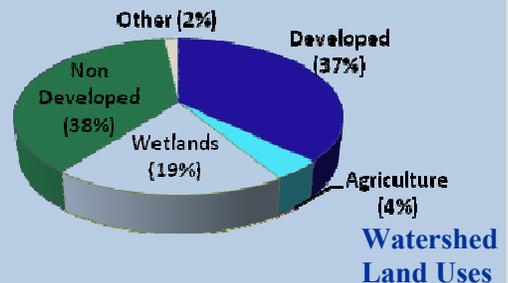
- Stormwater runoff from **impervious cover (IC)** is the largest source of pollution and stream channel alteration to Red Brook. Stormwater falling on roads, roofs and parking lots in developed areas flows quickly off impervious surfaces, carrying dirt, oils, metals, and other pollutants, and sending high volumes of flow to the nearest section of the stream.
- A number of Payne Road storm drains, which are linked directly to Red Brook, funnel runoff from roads and large parking lots down to the stream.
- Red Brook's close proximity to the Maine Mall and Maine Turnpike makes much of the undeveloped areas within the watershed susceptible to new development.
- Taking a proactive approach, the Town of Scarborough is developing the Red Brook Watershed Based Management Plan in collaboration with the Cumberland County Soil & Water Conservation District.

### 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:**  
ME0106000105\_610R07
- **City:** Scarborough and South Portland, ME
- **County:** Cumberland
- **Impaired Segment Length:** 5.4 miles
- **Classification:** Class C
- **Direct Watershed:** 3.2 mi<sup>2</sup> (2,048 acres)
- **Watershed Impervious Cover:** 11%
- **Major Drainage Basin:** Presumpscot River and Casco Bay Watershed



### Why is a TMDL Assessment Needed?

Red Brook, a Class C freshwater stream, has been assessed by DEP as not meeting water quality standards for polychlorinated biphenyls (PCBs) and 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.



*Red Brook downstream of Station 219.  
(Photo: Maine DEP Biomonitoring Program)*

Fish shocking by DEP in 1994 exposed PCB levels within fish tissue above the standard threshold. (DEP, 1996) The suspected sources for PCBs within Red Brook are inappropriate waste disposal and unspecified urban stormwater. The impervious cover TMDL assessment for Red Brook does *not* address the impairment for PCBs. It does, however, address the impairment for aquatic life use (stream habitat assessment). This impairment is 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

Sampling Station	Sample Date	Statutory Class	Model Results
S-412-HQ	2010	C	C
S-413	2010	C	C

The physical habitat within and surrounding a stream is important to its water quality. In Red Brook, due to development near the stream, the physical habitat has become degraded. Development has replaced natural forest and wetland areas with impervious cover around much of the stream. This degradation has

resulted in Red Brook being listed as impaired for habitat assessment. The impervious cover increases the volume and force of water entering the stream shortly after rain, bringing in pollutants and eroding the stream bank, further degrading the streams habitat (Varricchione, 2002).

Red Brook's impairment is based on a 2002 stream habitat assessment by DEP (Varricchione, 2002). DEP's 2010 benthic-macroinvertebrate assessment indicates that Class C Red Brook meets Class C aquatic life criteria.

### Impervious Cover Analysis

Increasing the percentage of impervious cover (%IC) in a watershed is linked to decreasing stream health (CWP, 2003). Because Red 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 Red Brook watershed has an impervious surface area of **11%** (Figure 1). DEP has found that in order to support Class C aquatic life use, the Red Brook watershed may require the characteristics of a watershed with **8%** impervious cover. The target for Red 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.

*8% IC represents an approximate **27% reduction** in stormwater runoff volume and associated pollutants when compared to existing pollutant loads.*

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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 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 relative contribution of this development needs to be evaluated during the development of a Watershed Specific Plan, as recommended in the IC TMDL.

#### **Impervious Cover GIS Calculations**

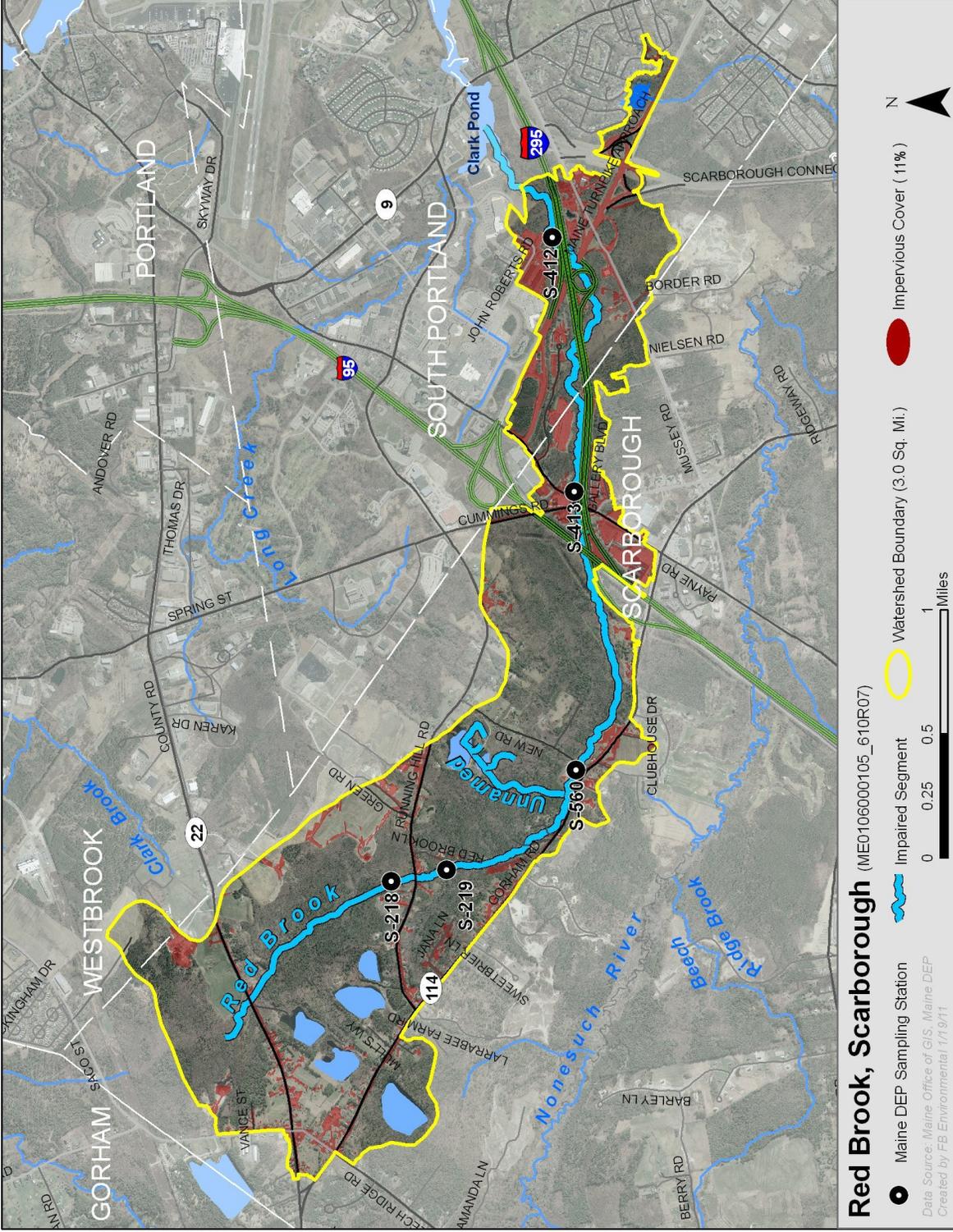
*The Impervious Cover Calculations are based on analysis of GIS coverage's presented in Figure 1. The impervious area is derived from 2007 1 meter satellite imagery and the watershed boundary is an estimation based on contours and digital elevation models.*

This WLA & LA 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 Red Brook's continued compliance with Maine's water quality criteria for aquatic life and attainment of compliance with the criteria for habitat assessment and PCB contamination.

#### **Next Steps**

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

- Continue to encourage greater citizen involvement to ensure the long term protection of Red Brook through processes such as the Red Brook Planning Project. Undertaken by the town of Scarborough and the Cumberland County SWCD in collaboration with the City of South Portland, Maine DOT, and DEP;
- Address existing stormwater problems in the Red Brook watershed by installing structural and applying non-structural best management practices (BMPs); and
- Prevent future degradation of Red Brook through the development and/or strengthening of local stormwater control ordinances.



**Figure 1: Map of Red Brook watershed impervious cover.** 4

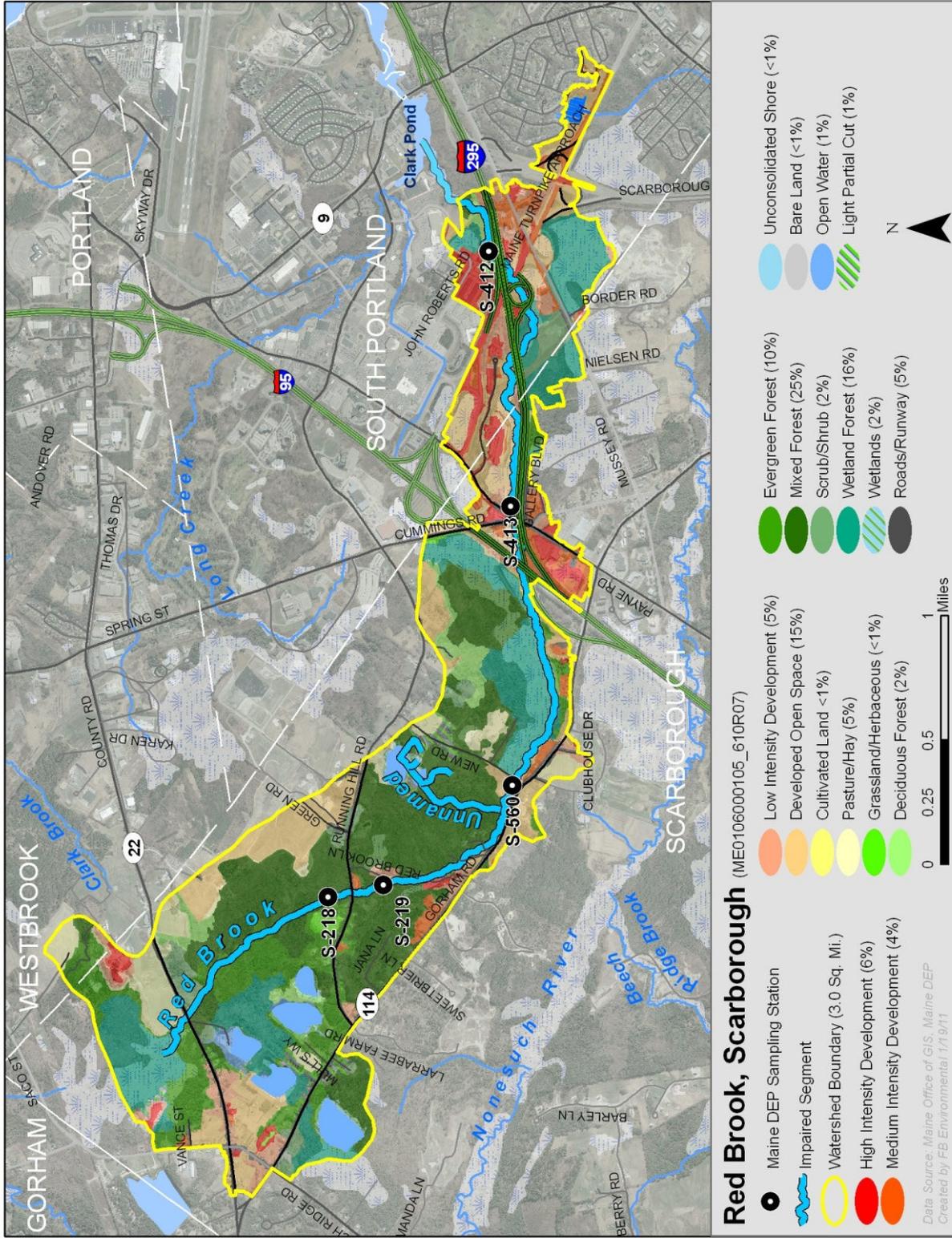


Figure 2: Map of Red Brook watershed land cover.

## 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.
- 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). 1996. Surface water ambient toxic monitoring program: 1994 report. Bureau of Land and Water Quality, Augusta, Maine.
- 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