TMDL Assessment Summary

Frost Gully Brook

Watershed Description

This **TMDL** assessment summary applies to Frost Gully Brook, a 3.2-mile stream located in the City of Freeport, Maine. Frost Gully Brook begins near Gay Drive. The stream flows southeast through a predominately forested area, crossing Griffin Road and Route 295. The stream then crosses the Maine Central Springfield Terminal Railroad before flowing into the Harraseeket River just below Upper Mast Landing Road. The Frost Gully Brook watershed covers 1,600 acres in the City of Freeport.

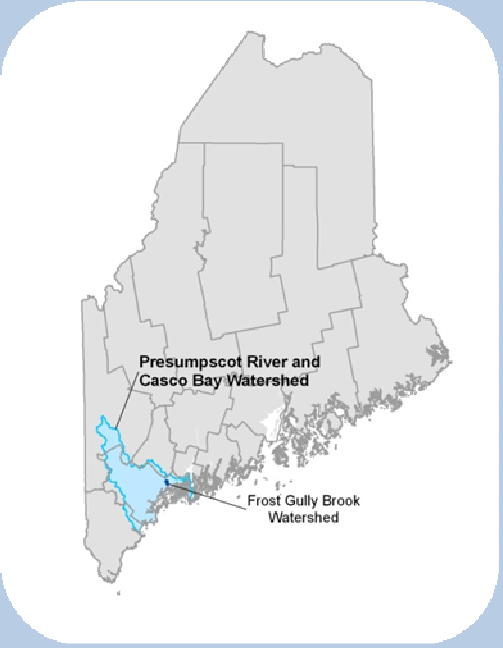
- Stormwater runoff from **impervious cover (IC),** particularly in the developed area near the Maine Central Springfield Terminal Railroad, is likely the largest source of pollution to Frost Gully Brook. Stormwater falling on roads, roofs and parking lots in developed areas flows quickly off impervious surfaces, carrying dirt, oils, metals, and other pollutants, and sending high volumes of flow to the nearest section of the stream.
- The Frost Gully Brook watershed is predominately non-developed (71%). Woodland areas within the watershed absorb and filter stormwater pollutants, and help protect both water quality in the stream and stream channel stability.
- The developed portion of the watershed (16%) is concentrated near the southwestern portion of the watershed, near the intersection of Frost Gully Brook and the railroad. This area is characterized by low intensity development.
- Frost Gully Brook is on to the list of Maine's Urban Impaired Streams (DEP, 2010).

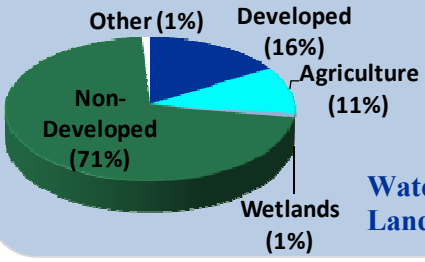
Definitions

- **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:** ME0106000106_602R01
- **City:** Freeport, ME
- **County:** Cumberland
- **Impaired Segment Length:** 3.2 miles
- **Classification:** Class A
- **Direct Watershed:** 2.5 mi^2 (1,600 acres)
- **Watershed Impervious Cover:** 9%
- **Major Drainage Basin:** Presumpscot River and Casco Bay Watershed





Watershed Land Uses

Why is a TMDL Assessment Needed?

Frost Gully Brook at Station 304.
(Photo: DEP Biomonitoring Program).

Frost Gully Brook, a Class A freshwater stream, has been assessed by DEP as not meeting water quality standards for recreational and aquatic life uses, 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.

Recreational impairments in Frost Gully Brook have already been addressed in DEP's 2009 statewide bacteria TMDL [http://www.maine.gov/dep/water/monitoring/tmdl/tmdl2.html]. The impervious cover TMDL assessment for Frost Gully Brook addresses the remaining water quality impairments to aquatic life use (benthic-macroinvertebrate and 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

Sampling Station	Sample Date	Statutory Class	Model Results
S-303	8/24/1998	A	B
S-303	8/11/2010	A	B
S-304	9/8/1997	A	B
S-304	9/30/1997	A	C
S-304	8/24/1998	A	B
S-304	8/25/2005	A	B
S-304	8/11/2010	A	A

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).

Frost Gully Brook impairment is based on data collected by DEP in three years between 1997-2005 at two sampling stations (303 and 304). Data collected at this station indicate Class A Frost Gully Brook attained only Class B, and C conditions on previous sample dates. During the last 5 years Freeport has made significant investments in stormwater BMPs and infrastructure in the watershed. New data collected in 2010 indicate Frost Gully attains Class A, which is encouraging; DEP will evaluate attainment status after another season of data collection.

***4% IC** represents an approximate **56% reduction** in stormwater runoff volume and associated pollutants when compared to existing pollutant loads.*

Impervious Cover Analysis

Increasing the percentage of impervious cover (%IC) in a watershed is linked to decreasing stream health (CWP, 2003). Because Frost Gully 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 Frost Gully Brook watershed has an estimated impervious surface area of **9%** (Figure 1), which is based on the best available public information. DEP has found that in order to support Class A aquatic life use, the Frost Gully Brook watershed may require the characteristics of a watershed with **4%** impervious cover. 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. These estimates may be refined in the future based on new information that becomes available either through the development of a watershed management plan or other watershed studies. Ultimate success of the TMDL will be Frost Gully Brook's compliance with Maine's water quality criteria for aquatic life and primary contact recreation.

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.

Since 2005, all commercial development in Freeport has been required to comply with the LID practices specified in the Maine Chapter 500 Stormwater Management Rules, even on sites smaller than 20,000 square feet of impervious area. In addition, the Town of Freeport has implemented several projects on the most urban tributary to Frost Gully Brook that are intended to reduce the stormwater impact of upstream impervious surfaces.

Next Steps

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

- Encourage greater citizen involvement through the development of a watershed coalition to ensure the long term protection of Frost Gully Brook;
- Address existing stormwater problems in the Frost Gully Brook watershed by installing structural and applying non-structural best management practices (BMPs); and
- Prevent future degradation of Frost Gully through the implementation and enforcement of Freeport's special local stormwater control ordinances.

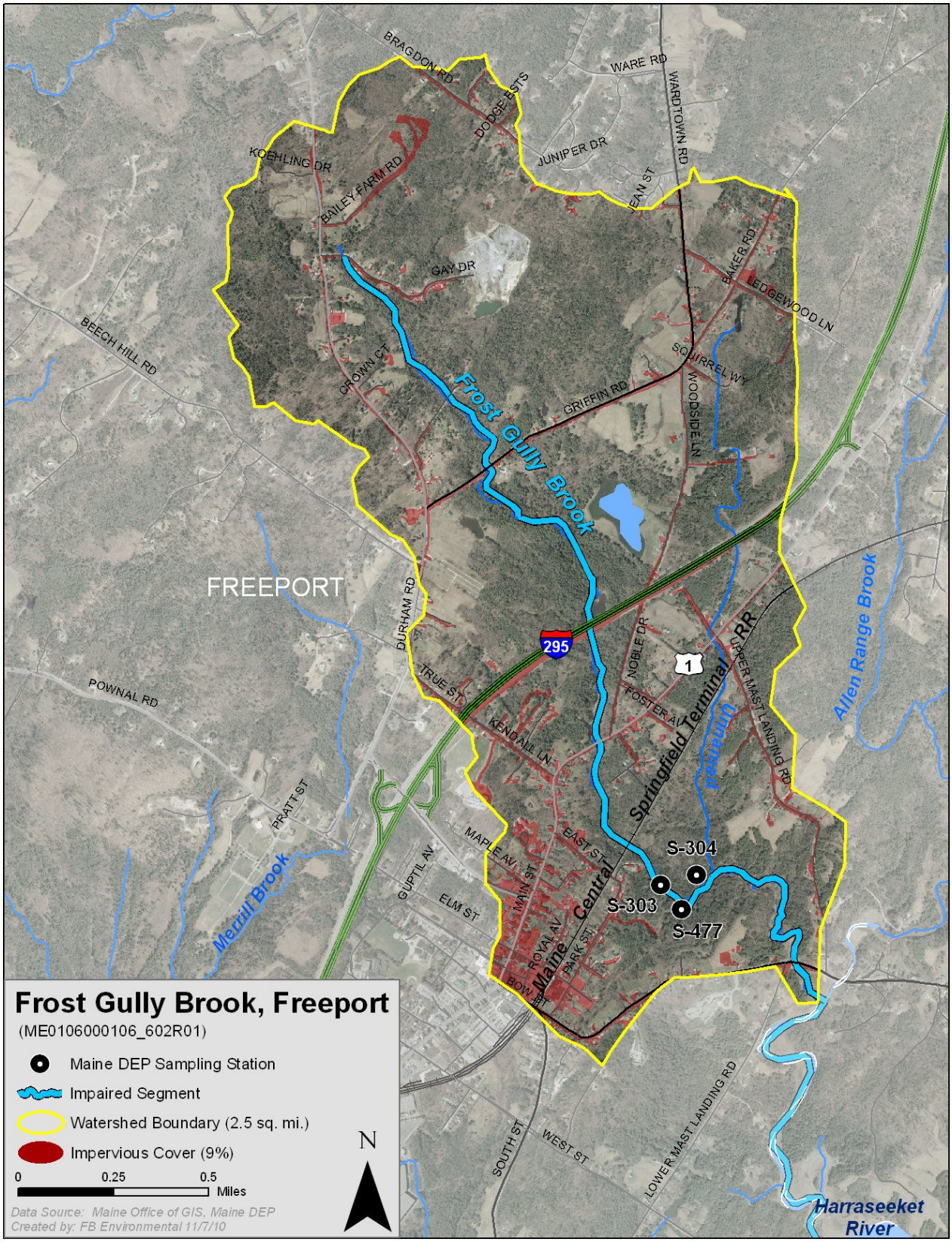


Figure 1: *Map of Frost Gully Brook watershed impervious cover.*

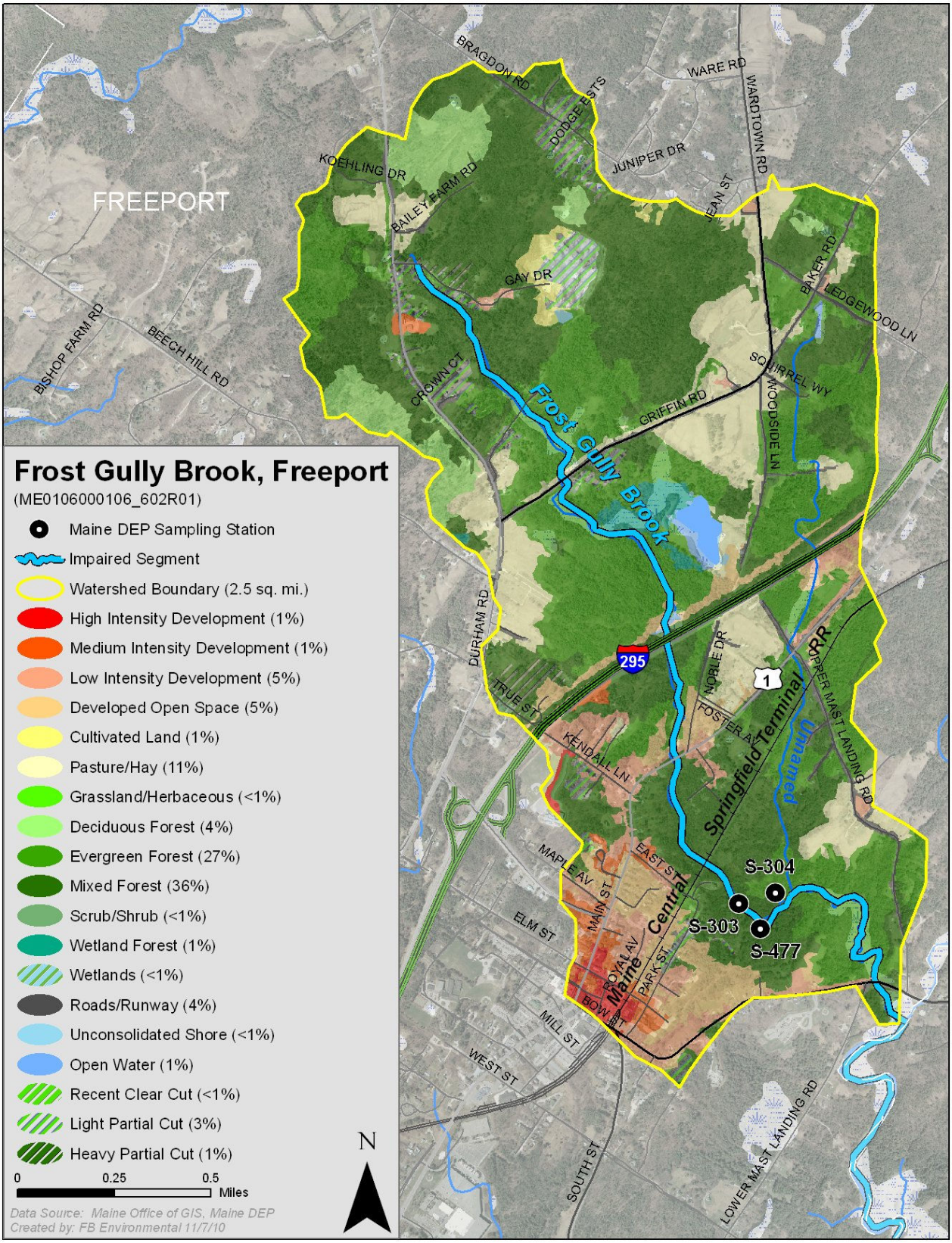


Figure 2: *Map of Frost Gully Brook watershed land cover.*

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). 2010. Assessment Database Detail Report for Frost Gully Brook. Bureau of Land and Water Quality, Augusta, ME.