Section 5-6
Presumpscot River & Tributaries (Presumpscot Regional Land Trust)

Presumpscot River

The Presumpscot River originates at Sebago Lake Basin and flows approximately 25 miles (40 km) to the Atlantic Ocean (Casco Bay) through Cumberland County, Maine. The Presumpscot River contributes the largest freshwater input into Casco Bay, draining approximately 648 square miles. The Presumpscot watershed below Sebago Lake is slightly more than 200 square miles. Nine dams, seven of which are used to generate hydroelectric power, create impoundment and associated tailwater habitats. The uppermost dam is located at the Sebago Lake outlet, whereas the lowermost dam is located at the SAPPI Mill in Westbrook.

Major tributaries to the Presumpscot River include the Pleasant River, Little River, and the Piscataqua River; minor tributaries include Otter Brook, Nason Brook, Black Brook, Colley Wright Brook, Inkhorn Brook, and Mill Brook. Highland Lake and Forest Lake are the primary lakes in the Presumpscot River watershed; Mill Brook and the Piscataqua River, respectively, connect them to the mainstem of the Presumpscot River.

Windham, Gorham, Westbrook, Cumberland, Falmouth, and Portland represent primary municipalities in the Presumpscot River watershed, and are characterized by multiple land uses. Urban areas include residential and commercial dwellings, commercial businesses, light industry, and water and wastewater treatment plants. Westbrook and Portland contribute combined sewer overflow (CSO) discharge to the Presumpscot River below Saccarappa Falls. The SAPPI paper mill is located in Westbrook. Agricultural practices such as row crop and pasture constitute the agricultural land use component, whereas mixed deciduous and coniferous forest comprise the forest component.

Segments of the Presumpscot River are listed in the Maine Department of Environmental Protection (DEP) Integrated Monitoring and Assessment Report as impaired for recreational use (bacteria). These segments include: Colley Wright Brook, Hobbs Brook, Inkhorn Brook, Mosher Brook, Otter Brook, Nason Brook, Pleasant River, Piscataqua River and Presumpscot River-Westbrook (CSO abatement ongoing). The following segments are also listed as impaired due to dissolved oxygen: Colley Wright Brook, Hobbs Brook, Inkhorn Brook, Mosher Brook, Otter Brook, and Pleasant River (including Thayer Brook).

According to Maine's statutory Water Classification System, the Presumpscot River Basin has designations listed below.

- Presumpscot River, mainstem.
  - From the outlet of Sebago Lake to the confluence with the Pleasant River – Class A. (Note: Dundee Pond is a great pond, classified GPA)
  - From the confluence with the Pleasant River to Saccarappa Falls – Class B.
  - From the Saccarappa Falls to tidewater – Class C.

  - Below head-of-tide – Class SC.
- Presumpscot River tributaries below Sebago Lake – Class B.

Monitoring History

• The Maine DEP Biological Monitoring Program has been monitoring the river and tributaries since 1985. This data is available on DEP's website.

• Presumpscot River Watch (PRW), incorporated as a not-for-profit organization in 1989. The mission of PRW is to preserve and improve the health of the Presumpscot River watershed by scientifically monitoring water quality and sharing data to increase awareness of the condition of the river. PRW's commitment is primarily accomplished through a seasonal (summer) volunteer water quality monitoring program that enhances public awareness of river water quality in the Presumpscot River watershed. The data generated from the monitoring program also serve other purposes: (1) verification of State water quality standards; (2) identification of specific problem areas; (3) establishment of baseline water quality monitoring data; and (4) use of water quality monitoring results by other organizations.

• Presumpscot River Watch joined the Volunteer River Monitoring Program in 2009.

• Presumpscot River Watch merged with Presumpscot Regional Land Trust (PRLT) in 2017.

Methods and Sampling Sites

The volunteers monitor the Presumpscot River annually. There are forty-two monitoring sites in the watershed. Although PRLT's goal is to monitor all sites each year, they generally sample a subset of sites every year. All stations are above the head-of-tide at Presumpscot Falls. Four sites were added in 2018 on the Stroudwater River.

Monitoring is conducted every two weeks from May through September. At each of the sites, the monitors take measurements of dissolved oxygen and temperature using a YSI meter. Conductivity is measured with either a YSI meter or EC Testr 11/11+ pen. Grab samples are collected for *E. coli* bacteria and transported to the University of Southern Maine (Gorham) for analysis using IDEXX Quanti-Tray 2000 method.

Table 5-6-1. Presumpscot Regional Land Trust sampling sites, ordered from upstream down for the mainstem and the same for the tributaries at their confluence with the Presumpscot River (*indicates non-approved sites).

Site ID	Organization Site Code	Sample Location	Class
Mainstem (ordered from upstream to downstream)			
Presumpscot River-R225-VRMP	P200	Route 35 Crossing	A
Presumpscot River-R202-VRMP	P170	North Gorham Dam	A
Presumpscot River-R195-VRMP	P160	Dundee Park	A
Presumpscot River-R166-VRMP	P150	Covered Bridge	A
Presumpscot River-R163-VRMP	P140	Presumpscot River	B
Presumpscot River-R161-VRMP	P145	Confluence Pleasant R.	B
Presumpscot River-R157-VRMP	P135	Gambo Park	B
Presumpscot River-R133-VRMP	P110	Route 202	B
Presumpscot River-R129-VRMP	P089	Mallison Road	B
Presumpscot River-R126-VRMP	P080	Presumpscot River	B
Presumpscot River-R81-VRMP	P065	Presumpscot River	B
Presumpscot River-R76-VRMP	P060	Bridge Street	C
Presumpscot River-R69-VRMP	P050	Presumpscot River	C
Presumpscot River-R47-VRMP	P030	Riverton Trolley Park	C
Presumpscot River-R24-VRMP	P020	Blackstrap Road	C
Presumpscot River-R07-VRMP	P015	Overset Road	C
Pleasant River & Tributaries			
Pleasant River-RPL101-VRMP	PL050	Lawrence Road	B
Pleasant River-RPL89-VRMP	PL045	Pleasant View Road	B
Pleasant River-RPL47-VRMP	PL040	Route 302	B
Pleasant River-RPL37-VRMP	PL030	Windham Center Road	B
Pleasant River-RPL29-VRMP	PL020	Pope Road	B
Pleasant River-RPL06-VRMP	PL010	Lovett Bridge	B
Baker Brook-RPLBK17-VRMP	BB010	Falmouth Road	B
Ditch Brook-RPL00-VRMP	DB010	Route 302	B

Upper Presumpscot Tributaries			
Little River-RLT101-VRMP	L060	Little River	B
Little River-RLT89-VRMP	L050	Flaggy Meadow Road	B
Little River-RLT15-VRMP	L020	Route 202/4	B
Little River-RLT08-VRMP	L010	Route 237	B
Black Brook-RBK49-VRMP	BL020	Windham Center Road	B
Black Brook-RBK05-VRMP	BL010	River Road	B
Colley Wright Brook-RCW28-VRMP	CW020	Montgomery Road	B
Colley Wright Brook-RCW10-VRMP	CW010	River Road	B
Douglas Brook-RLTNBDG20-VRMP	DG010	Route 114	B
Inkhorn Brook-RIK05-VRMP	IN010	River Road	B
Nason Brook-RNS11-VRMP	N010	Wilson Road	B
Otter Brook-ROT10-VRMP	OB020	Windham Center Road	B
Otter Brook-ROT06-VRMP	OB010	River Road	B
Tannery Brook-RLTTN21-VRMP	TA040	Route 114	B
Tannery Brook-RLTTN06-VRMP	TA010	Queen Street	B
Lower Presumpscot River Tributaries			
Piscataqua River-RPS12-VRMP	PI020	Leighton Road	B
E. Branch Piscataqua River-RPSEB05-VRMP	PI010	Falmouth Road	B
Mill Brook-RML63-VRMP	M030	Below Highland Lake	B
Mill Brook-RML01-VRMP	M010	Bridge Street	B
Stroudwater River			
Stroudwater River-RFRST21-VRMP	SW010	Hutchins Drive	B
Stroudwater River-RFRST31-VRMP	SW020	Cardinal Street	B
Stroudwater River-RFRST56-VRMP	SW030	Wigeon Street	B
Stroudwater River-RFRST75-VRMP	SW040	Brackett Road	B

Presumpscot River Sampling Sites, Mainstem
Presumpscot Regional Land Trust

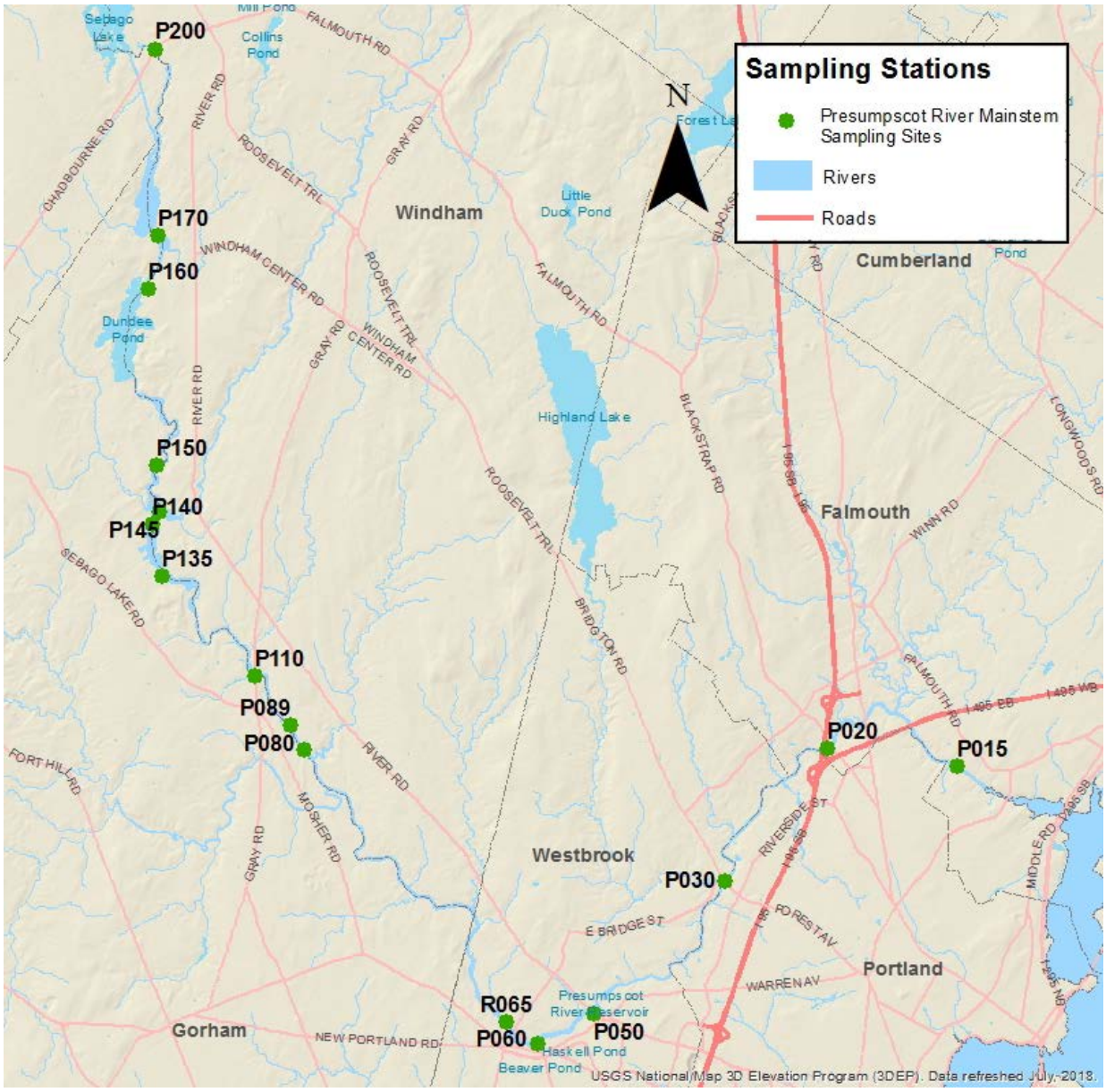

Figure 5-6-1: Map of Presumpscot Regional Land Trust mainstem sampling sites.

Presumpscot River Sampling Sites, Upper Area
Presumpscot Regional Land Trust

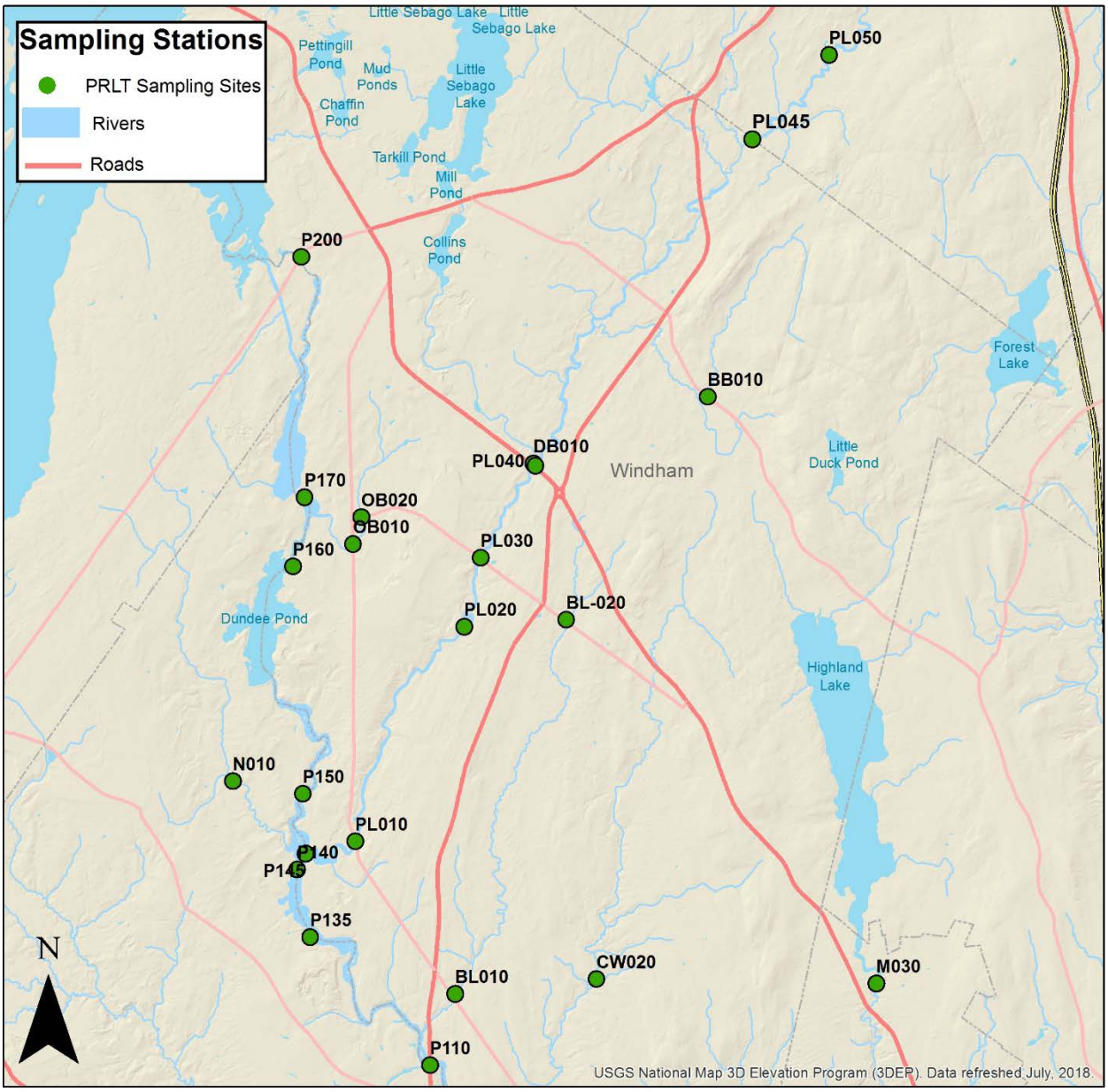

Figure 5-6-2: Map of Presumpscot Regional Land Trust sampling sites, upper area

Presumpscot River Sampling Sites, Middle Tributaries
Presumpscot Regional Land Trust

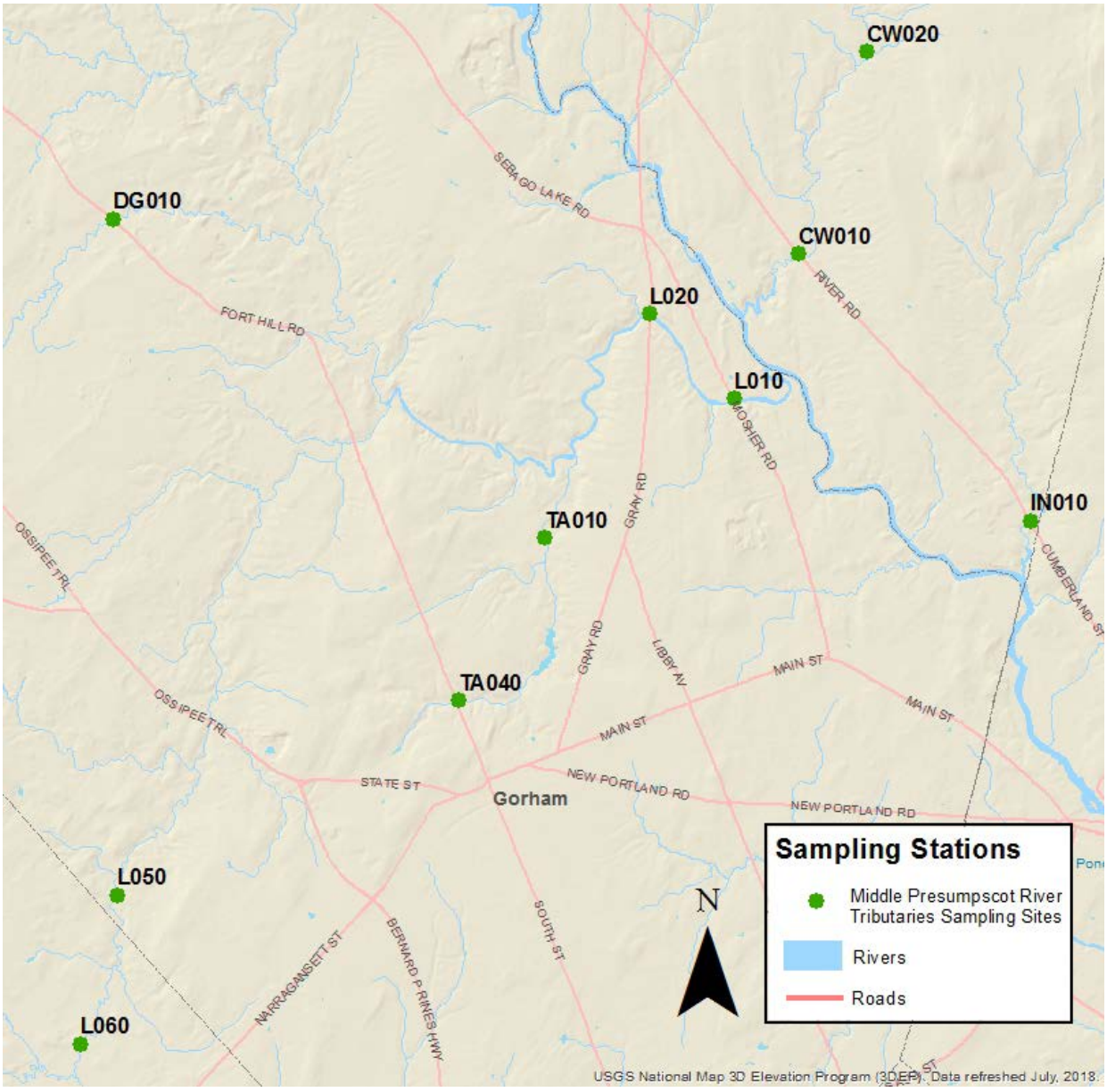

Figure 5-6-3: Map of Presumpscot Regional Land Trust sampling sites, middle Presumpscot tributaries.

Presumpscot River Sampling Sites, Lower Tributaries & Stroudwater
Presumpscot Regional Land Trust

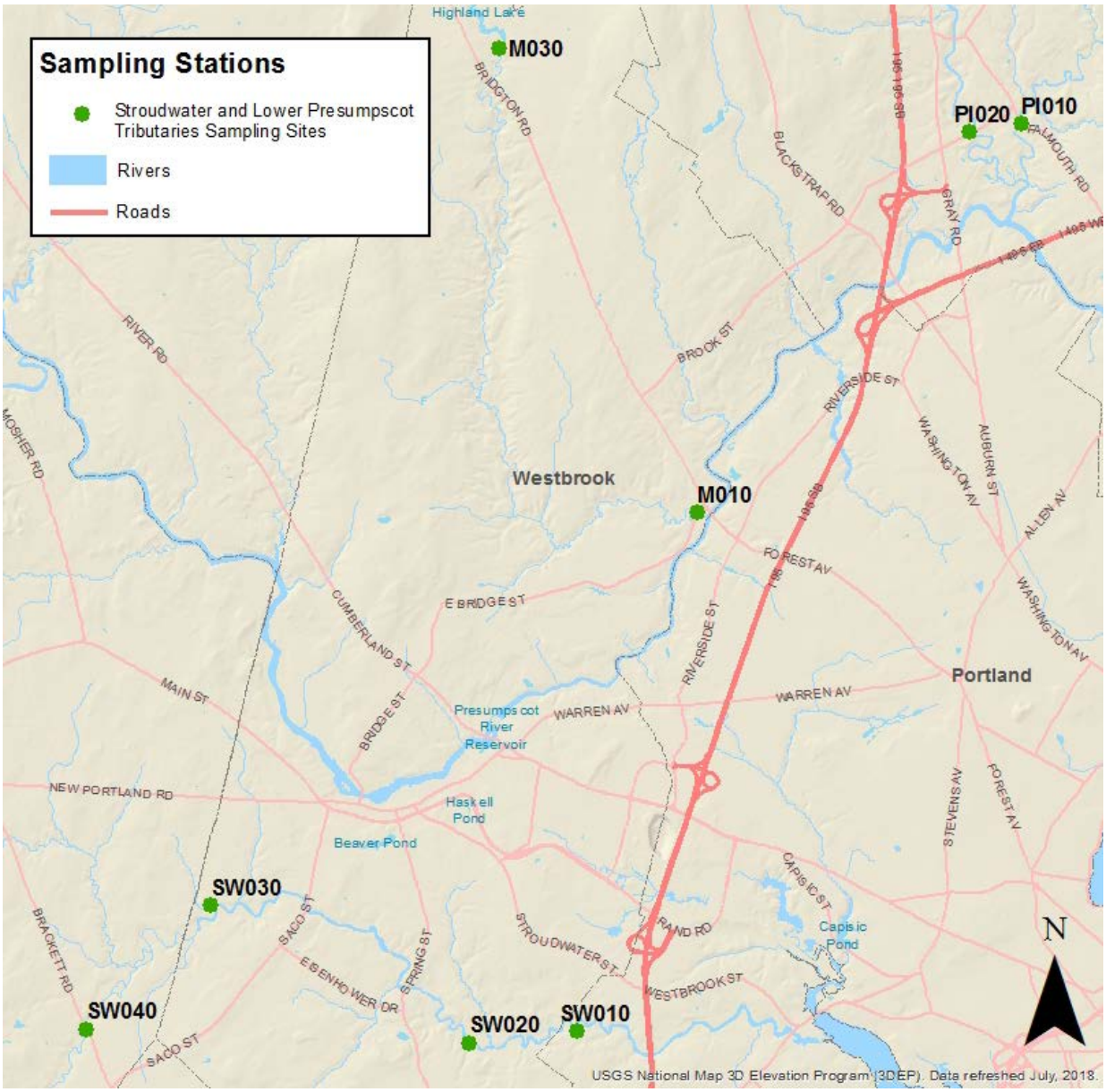

Figure 5-6-4: Map of Presumpscot Regional Land Trust sampling sites at Stroudwater River and lower Presumpscot tributaries.

Parameters

Dissolved Oxygen

Dissolved oxygen (DO) levels are generally lowest early in the morning and then increase during the day, peaking in the mid-to-late afternoon. Monitors should try to collect some samples early in the morning. Dissolved oxygen is also affected by flow conditions and temperature. During high flow conditions, more oxygen is added to the river from the atmosphere as the water is more turbulent and there is more opportunity for mixing. If flow during the summer months is higher or lower than normal, dissolved oxygen will be affected. Class A and Class B criteria for dissolved oxygen are a minimum of 7 mg/l (milligrams/liter) or 75% saturation. Class C criteria for dissolved oxygen are a minimum of 5 mg/l or 60 % saturation. To meet water quality criteria, both concentration and saturation standards must be met.

Water Temperature

Maine's regulations relating to temperature (06-096 CMR Chapter 582) require that discharge of pollutants not raise the temperature of any river and stream above the EPA criteria for indigenous species (23 °C maximum and 19 °C weekly average) or 0.3 °C (0.5 °F) above the temperature that would naturally occur outside a mixing zone established by the Board of Environmental Protection. Pollutant is defined in statute as many things including dirt and heat. For tidal waters, discharge of pollutants may not raise the temperature more than 4 °F (2.2 °C) or more than 1.5°F (0.8 °C) from June 1st to September 1st, and may not cause the temperature of any tidal waters to exceed 85 °F (29 °C) at any point outside a mixing zone established by the Board of Environmental Protection. These temperature criteria do not apply to this VRMP data.

Specific Conductance

Specific conductance (SPC) is related to the amount of dissolved materials in the water. While there are no numerical standards, a relationship exists between conductivity and chloride which has numerical criteria. In general, streams located in urban areas tend to have higher specific conductance due to polluted urban stormwater runoff. This may also in large part be due to salt buildup in surface and groundwater from road maintenance practices.

Bacteria

Escherichia coli (*E. coli*) bacteria are used as the indicator organism for freshwaters. While this type of bacteria is not a pathogen, its presence in the water may indicate the presence of other organisms including bacteria and viruses that can cause gastrointestinal illnesses. Monitoring should include at least six samples and include a mix of dry and storm event sampling.

Class A criteria for bacteria is "as naturally occurs". "As naturally occurs" means "conditions with essentially the same physical, chemical and biological characteristics as found in situations with similar habitats free of measurable effects of human activity". In practice, the Class GPA standard for *E. coli* may be used as a surrogate target if a freshwater's "natural" bacteria are unknown. Class B criteria bacteria (effective August 1, 2018) are as follows: "Between April 15th and October 31st, the number of Escherichia coli bacteria in these waters may not exceed a geometric mean of 64 CFU per 100 milliliters over a 90-day

interval or 236 CFU per 100 milliliters in more than 10% of the samples in any 90-day interval." Class C criteria for bacteria (effective August 1, 2018) are as follows: "Between April 15th and October 31st, the number of Escherichia coli bacteria in Class C waters may not exceed a geometric mean of 100 CFU per 100 milliliters over a 90-day interval or 236 CFU per 100 milliliters in more than 10% of the samples in any 90-day interval." Geometric means are calculated instead of averages because it is more appropriate to use this calculation for something like bacteria where there may be one or more high or low values that can skew the mean.

Discussion and Recommendations

There are numerous sources of pollution and other stresses to the Presumpscot River watershed that could potentially have an impact on water quality. Some of those sources of pollution and stress may include:

- Non-point source pollution (e.g., eroded soil, fertilizers, pesticides, heavy metals, petroleum residues, road salt, wildlife and pet feces) and polluted stormwater originating from impervious surfaces (e.g., streets, parking lots, driveways, rooftops), agriculture, and forestry.
- Dams and impoundments (which often create more pond-like aquatic habitat conditions that may have higher water temperatures and lower dissolved oxygen concentrations than if the river section was free-flowing).
- Natural effects of wetlands (such as contributing waters to a stream/river that have low dissolved oxygen levels due to the decomposition of large amounts of organic matter, respiration of abundant plant matter, and low re-aeration rates that is characteristic of many wetlands).
- Point sources (e.g., failing private septic systems, wastewater treatment plants, combined sewer overflows [CSO], and industrial discharges) of pollution.

The following are recommendations for future monitoring:

- Continue early morning sampling to document daily low dissolved oxygen readings. Later day monitoring is not likely to represent critical conditions, which makes it difficult to assess the overall river condition. Early morning monitoring is particularly important during the summer months of July to early September when temperatures are warmest, flows are low, and dissolved oxygen tends to be at the lowest levels.
- When sampling dissolved oxygen, make sure to record both dissolved oxygen concentration and percent saturation. At some sites, only percent saturation was recorded. It is important to record both values as dissolved oxygen criteria are based on both concentration and percent saturation. Also, differences in the two can indicate particular issues (e.g. high productivity).
- Further monitor *E. coli* bacteria in the tributaries in order to determine sources. Consider bracket sampling to track down possible sources. Possibly partner with DEP to do some follow-up monitoring.

Summary of Data by Site and Parameter

See prlt.org/water for an interactive map summarizing water quality data collected in the Presumpscot River watershed region from 2009 to 2019.