Long Creek General Permit

Annual Report 2020

LONG CREEK
WATERSHED MANAGEMENT DISTRICT

Long Creek Watershed Management District
35 Main Street, Suite #3
Windham, ME 04062
www.restorelongcreek.org

Contents

Figures

Tables

Long Creek General Permit
Annual Report for Calendar Year 2020

Introduction and Background

This report has been prepared in fulfillment of Part IV.A of the Maine Department of Environmental Protection's ("Maine DEP") *General Permit — Post-Construction Discharge of Stormwater in the Long Creek Watershed*, Waste Discharge License #W-9052-5Y-B-N, dated April 15, 2015 (hereinafter referred to as the "Long Creek General Permit"), which states as follows:

> *"Annual progress reports shall be submitted by the permittee no later than May 31st of each calendar year and will include activities of the previous calendar year. The Long Creek Watershed Management District may submit an annual report on behalf of all permittees participating in the Plan."*

Where is Long Creek?

Long Creek is a meandering urban stream system with four primary branches that converge before flowing into Clark's Pond in South Portland, Maine. The Long Creek Watershed encompasses 3.5 square miles in a commercial and retail district located in four municipalities: Portland, Scarborough, South Portland, and Westbrook. The watershed with respective landmarks is illustrated in **Figure 1**.

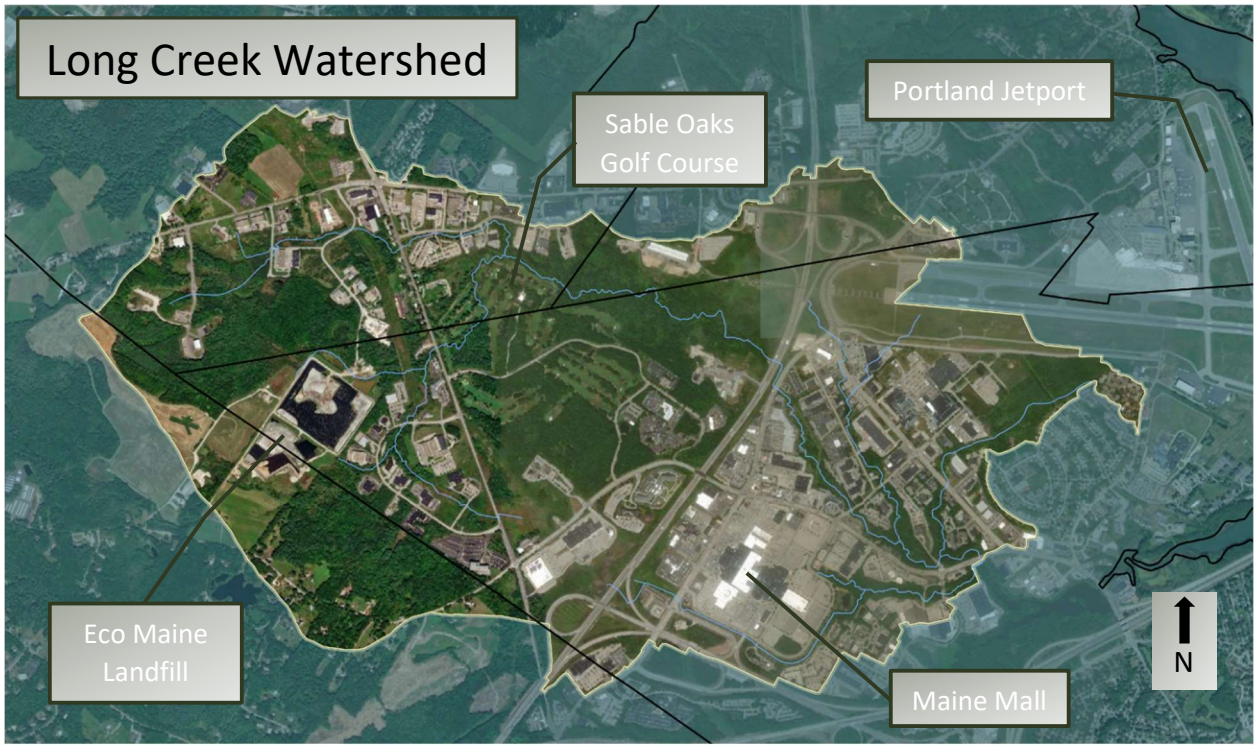


Figure 1 *Long Creek Watershed Overview Map*

Why is Long Creek Regulated?

Long Creek is an urban stream system that is classified by the Maine Water Classification Program as partially a Class B, and primarily a Class C, stream. Portions of Long Creek currently do not meet state water quality standards established for Class B streams which,

> *"must be of such quality that they are suitable for the designated uses of drinking water supply after treatment; fishing; agriculture; recreation in and on the water; industrial process and cooling water supply; hydroelectric power generation, except as prohibited under Title 12, section 403; navigation; and as habitat for fish and other aquatic life. The habitat must be characterized as unimpaired"*

and Class C Streams, which,

> *"must be of such quality that they are suitable for the designated uses of drinking water supply after treatment; fishing; agriculture; recreation in and on the water; industrial process and cooling water supply; hydroelectric power generation, except as prohibited under Title 12, section 403; navigation; and as a habitat for fish and other aquatic life"*

as provided for in Maine law, 38 M.R.S.A § 465(3)(A) & (4)(A).

Long Creek has been the subject of many studies and reports. What the data suggests is twofold:

1. As stated in the Long Creek Restoration Project Executive Summary, *"[y]ears of urbanization have significantly impaired the stream's health, as well as its ability to support recreation and wildlife, such as brook trout."*
2. The Long Creek Watershed Management Plan ("LCWMP") identified that water quality impairments are a result of increased concentrations of metals, chloride, phosphorus, nitrogen, polycyclic aromatic hydrocarbons, and reduced dissolved oxygen concentrations.

Historically, there have been very few regulated point source discharges and stormwater controls (*i.e.*, water quantity and quality) in the watershed. Over the years, increasing stormwater discharges from the built environment have contributed to degraded water quality. Increased water temperatures from lack of shading in certain areas and altered hydrological conditions have also adversely affected stream health and water quality.

In 2009, the U.S. Environmental Protection Agency ("EPA") exercised its authority under a provision in the Clean Water Act, known as Residual Designation Authority ("RDA"), requiring a permit for the discharge of stormwater for designated discharges in the Long Creek Watershed. The EPA's designation requires a permit for *"[s]torm water discharges from properties on which there are impervious surfaces or areas equal to or greater than one acre in the Long Creek watershed."* This precedent-setting use of the RDA provision led to the establishment of the Long Creek Watershed Management District ("LCWMD") to implement the LCWMP and to a corresponding annual fee to fund implementation of the plan.

Impervious Cover

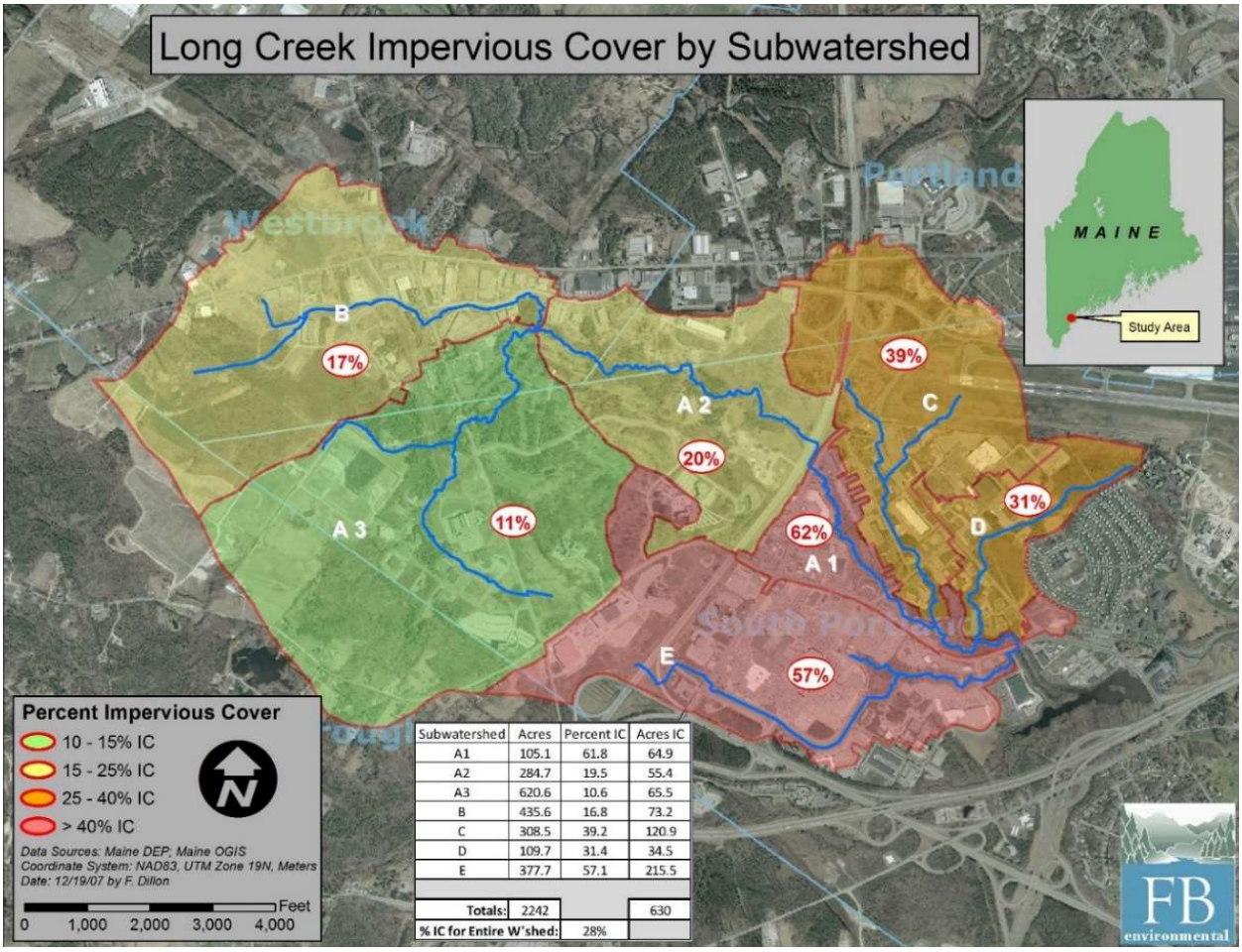
As defined in EPA's designation, "impervious surface" or "impervious area" (hereinafter collectively referred to as "Impervious Cover" or "IC") means:

"the total area of a parcel or right-of-way that consists of building and associated constructed facilities; areas that are covered with a low-permeability material such as asphalt or concrete; or areas such as gravel roads and unpaved parking areas that are compacted through design or use to reduce their permeability. Common impervious areas include, but are not limited to, roads, rooftops, walkways, patios, driveways, parking lots or storage areas, concrete or asphalt paving, packed earthen materials, and macadam or other surfaces which similarly impede the natural infiltration of storm water."

In the Long Creek Watershed, amount of IC is used to determine regulated discharges and assess annual fees for implementation of the LCWMP under the Long Creek General Permit. In general, IC is also used as a measure of watershed and stream health. Key figures for the watershed are as follows:

- Watershed size is 2,305 acres (3.5 square miles)
- Length of stream is approximately 10 miles
- Total IC is 701 acres (30% of watershed)
- Regulated IC is 604 acres (86% of IC in watershed)[1]

Regulated IC includes parcels with one acre or more of IC. Parcels with less than 1 acre of IC are not required to obtain a permit.



Subwatershed	Acres	Percent IC	Acres IC
A1	105.1	61.8	64.9
A2	284.7	19.5	55.4
A3	620.6	10.6	65.5
B	435.6	16.8	73.2
C	308.5	39.2	120.9
D	109.7	31.4	34.5
E	377.7	57.1	215.5
Totals:	2242		630
% IC for Entire W'shed:		28%	

***Figure 2** Impervious Cover by Subwatershed*

[1] There is a discrepancy in in the amount of regulated IC identified through permits and the amount of regulated IC determined using GIS methods. The regulated IC figures used in this report is the amount identified using GIS methods. In anticipation of the third permit cycle of the Long Creek General Permit, LCWMD is working on reconciling different methods of determining IC.

General or Individual Permit Requirement

Following EPA's designation, affected landowners and operators in the Long Creek Watershed had two permitting options: (1) participate in implementation of the LCWMP being managed by LCWMD via the filing of notice of intent to comply with the Long Creek General Permit or (2) obtain an individual permit. Individual permit holders are required to meet current stormwater management law requirements for development, as well as waste discharge requirements (*i.e.*, Maine DEP, Chapter 500 and Chapter 523, standards). Six landowners or operators within the universe of owners and operators of regulated IC do not participate in implementation of the LCWMP through the Long Creek General Permit and, therefore, are subject to individual permit requirements. Approximately 22 acres (4%), out of a total of 604 acres of regulated IC, are managed outside of the Long Creek General Permit under individual permits.

Long Creek Watershed Management Plan

Operators of properties who file a notice of intent to comply with the Long Creek General Permit are required to demonstrate that they have entered into a binding agreement with LCWMD which provides for participation in the implementation of the LCWMP. Operators that obtain permit coverage under the Long Creek General Permit are referred to as "Participating Landowners" and the agreements they enter into with LCWMD are referred to as "Participating Landowner Agreements." As stated in the Long Creek General Permit, the LCWMP was:

> *". . . developed jointly by the municipalities of South Portland, Portland, Westbrook and Scarborough, along with other entities, and approved by the Maine Department of Environmental Protection, for the purpose of restoring the water quality of Long Creek . . ."*

As stated in Participating Landowner Agreements:

> *". . . cooperative implementation of the Long Creek Watershed Management Plan, which includes but is not limited to design, engineering, construction, reconstruction, installation, operation, modification, alteration, use, maintenance, repair, replacement, inspection and monitoring of public and private stormwater management structures, facilities and improvements and in-stream and riparian restoration in and along Long Creek and within the Long Creek Watershed, is likely to reduce the cost and time for Long Creek to comply with Water Quality Standards . . ."*

Who are the Stakeholders?

LCWMD implements the LCWMP on behalf of 95 Participating Landowners. Approximately 85% of the watershed's total IC, and approximately 96% of the regulated IC in the watershed, is managed under the LCWMP. The permittees include:

- 89 private landowners, primarily commercial and retail properties with IC from rooftops, driveways, sidewalks, and parking lots.
- Three municipal entities, whose IC primarily consists of roads and sidewalks.
- Two state entities, which are both transportation agencies:
    - the Maine Department of Transportation ("Maine DOT"), and
    - the Maine Turnpike Authority ("MTA").

- One quasi-municipal entity, Eco Maine — a regional waste management facility providing recycling and waste-to-energy services to a number of southern Maine municipalities.

Administration

LCWMD was established by "Interlocal Agreement" among the municipalities of Portland, Scarborough, South Portland, and Westbrook, of which portions of each lie within the Long Creek Watershed, to oversee LCWMD activities. In accordance with the Interlocal Agreement and Participating Landowner Agreements, implementation of the LCWMP has been primarily delegated to LCWMD. LCWMD's Executive Director manages the day-to-day implementation of the LCWMP. LCWMD maintains a broad-based Services Agreement with the Cumberland County Soil & Water Conservation District ("CCSWCD") to provide administrative and technical support services to LCWMD concerning implementation of the LCWMP.

LCWMD Board of Directors

The Interlocal Agreement provides for up to sixteen Board members, which were apportioned in the Interlocal Agreement to represent private and public stakeholders relative to their respective interests in the watershed. The members and organizations represented on the LCWMD Board of Directors in 2020 are shown in **Table 1**.

Table 1 *LCWMD Board of Directors in 2020*

ORGANIZATIONAL REPRESENTATION		BOARD MEMBER
Portland	1 municipal representative	**Doug Roncarati**, City of Portland, Vice Chair
Portland	1 private Participating Landowner or non-profit representative	**Curtis Bohlen**, Treasurer, Casco Bay Estuary Partnership
Scarborough	1 municipal representative	**Angela Blanchette**, Town of Scarborough
Scarborough	1 public or private Participating Landowner	**Arthur Colvin**, Eco Maine
South Portland	2 municipal representatives	**Fred Dillon**, Chair, City of South Portland **Susan Henderson**, City of South Portland
South Portland	4 private Participating Landowners	**Brian Goldberg**, Secretary, The Bramlie Corporation **Craig Gorris**, GGP-Maine Mall L.L.C. **Ed Palmer**, Portland Marriott at Sable Oaks (1) Vacant
South Portland	1 non-profit representative	**Will Haskell**, Gorrill-Palmer Consulting Engineers, Inc., on behalf of the South Portland/Cape Elizabeth Community Chamber of Commerce
Westbrook	1 municipal representative	**Eric Dudley**, City of Westbrook
Westbrook	2 private Participating Landowners	(2) Vacant
State	1 Maine DOT representative	**Kerem Gungor**
State	1 MTA representative	**Sean Donohue**

More information on Board members and Board activities are posted on LCWMD's website under the Management and Documents sections.

Board Meetings

LCWMD's Board of Directors met on the following dates in 2020. Minutes and other information are available on the Long Creek website.[2] Board meetings are open to attendance and public comment by Participating Landowners and the general public.

- January 30, 2020
- March 31, 2020
- May 7, 2020
- June 24, 2020
- August 19, 2020
- October 28, 2020
- November 24, 2020
- December 16, 2020

Fiscal Summary

LCWMD maintains its accounting based on a fiscal year that runs from July 1 to June 30 each year. An estimated budget for the subsequent fiscal year is provided to Participating Landowners in February and the Board must adopt a final budget for the ensuing fiscal year no later than July 1 of each year. LCWMD's revenue generated from fees paid by Participating Landowners is approximately $1.5 million annually. As of the end of December 2020, LCWMD had current assets of approximately $3.12 million and was carrying approximately $4.76 million worth of fixed assets (primarily LCWMD-constructed BMPs) on its books. The $3.15 million in current assets includes approximately $1.1 million that is budgeted for design and construction of a gravel wetland BMP project. Long-term liabilities were approximately $0.83 million and are related to LCWMD's Maine Municipal Bond Bank loan.

Structural Management Opportunities

Implementation of the structural aspects of the LCWMP includes, but is not limited to, design, engineering, construction, and reconstruction of public and private stormwater management structures. Section 5.2 of the LCWMP identifies and recommends "structural management opportunities for the built environment" which are prioritized by catchment area. The goal of the structural management opportunities is to provide treatment for up to 150 acres of IC within the Long Creek Watershed, of which approximately 102 acres has been addressed by structural management projects to date.

Completed Projects

Maine Mall Road Porous Pavement Repaving

The porous pavement demonstration project on Maine Mall Road that was constructed by Maine DOT in 2009 was repaved with a new open graded friction course in September 2020. The over ten-year-old pavement had deteriorated, and the infiltration rate of the porous pavement had become significantly reduced. The work was undertaken by Maine DOT, which was provided a $112,000 credit against future assessments for the price differential between conventional pavement and porous pavement for the repaving project.

[2] Board agendas and minutes are available on LCWMD's website at: http://www.restorelongcreek.org/custom/documents.

Maine Mall Road being repaved with a new open graded friction course.

A summary of the structural management projects completed in the watershed to date is identified in **Table 2.**

***Table 2** Summary of Structural Project Construction to Date*[3]

Branch	Date	Catchment	Best Management Practice(s) Installed	Acres IC Treated	Other Total	LCWMD Total	Total Cost
South Branch	2009	E-07, 14, 16, 18, 20, 22, 24 (Philbrook Avenue)	Filterra tree box filters, Stormtreat filter units, and Stormtech storage chambers	2.12	$445,324[4]	0	$445,324
South Branch	2009	E-02 (Maine Mall Road)	Credits to Maine DOT for pervious asphalt project	2.95		$368,112	$368,112
North Branch	2010	C-03, 05, 07, 11 (Darling Ave I &II)	Filterra tree box filters, soil media filters, landscaped media filters	7.21	$596,387[6]		$596,387

[3] Additional details on each construction project are available on LCWMD's website at: http://www.restorelongcreek.org/pages/projects/overview.

[4] American Recovery & Reinvestment Act Funds; 0% Interest loan, 27.7% principal forgiveness.

Lower Main Stem	2010	A1-05, 06 (Mall Plaza Phase I & II)	Multi-cell soil media filter to collect and distribute stormwater to seven treatment cells, underground Stormtech chambers installed to store runoff, Stormtreat systems installed to treat runoff	16.41	$995,906[6]	$257,617	$1,253,523
Blanchette Brook	2012	B-21, 22 (Colonel Westbrook)	Gravel wetland, soil media filters, Stormtech chambers, and Brentwood Units	16.39		$615,796	$615,796
Upper Main Stem	2012	Port Resources	Installation of bioretention cells as part of a grandfathered addition to an industrial park	1.97	$57,145	0	$57,145
North Branch	2013	C-08 (Fairchild and Texas Instruments facilities)	Fairchild: basin retrofitted as a gravel wetland, removed IC and installed nine tree islands. Texas Instruments: installed one wet pond, one wet vegetated treatment system, and three bioretention cells	17.47	$200,000[5]	$323,484	$523,484
Lower Main Stem	2014	Gorham Road	Redesign of medians to provide shade, aesthetics, and treatment where the road drains to median	1.06	$150,000[6]	$476,348	$626,348

[5] Estimated costs of retrofits installed and paid for by Texas Instruments.

[6] City of South Portland contribution to the project.

Lower Main Stem	2014	A1-03, 14 (Maine Mall Road, Western Avenue to Gorham Road)	Redesign and treatment of road segment	8.42		$682,564	$682,564
South Branch	2015	E-24 (Maine Mall)	Detention basin retrofitted to a gravel wetland	28.29		$651,373	$651,373
South Branch	2020	E-02 (Maine Mall Road)	Credits to Maine DOT for repaving of pervious asphalt project	2.95		$112,062	$112,062
Totals				**102.29**	**$2,444,762**	**$3,119,244.00**	**$5,932,118.00**

Current Project

South Branch BMP Retrofits

The LCWMP identified expansion and enhancement of the *"Hannaford Shopping Plaza's existing stormwater detention basin to provide improved water quality treatment"* as a structural management opportunity. Design of this project is under way and construction is anticipated to take place in 2021. This project was originally scheduled to be constructed in 2020, however, geotechnical slope stability concerns raised by one of the landowners has delayed the project until 2021 so that a geotechnical analysis could be performed.

The project's primary objective is to implement stormwater BMP retrofits within a 48-acre catchment in order to address water quality concerns in Long Creek including temperature, dissolved oxygen, chlorides, nutrient levels, metal concentrations, and runoff volume. The project will retrofit an existing stormwater detention area with the construction of a new gravel wetland stormwater BMP. In addition to the gravel wetland, the project includes the construction of modular wetland BMP units which will allow stormwater from approximately 3.3 acres of impervious surface within the 48-acre catchment area to be redirected from the gravel wetland to these proprietary systems. The modular wetlands will provide water quality treatment for the smaller subcatchment area and will allow the gravel wetland to achieve a higher level of water quality treatment.

A summary of current structural management projects identified to be completed in the watershed is identified in **Table 3.**

Table 3 *Current Structural Projects Estimated Timeline*

Branch	Date	Catchment	Best Management Practice(s) Proposed	Acres IC Treated	Estimated LCWMD Total	Total Cost
South Branch	2021	E-24	Gravel Wetland; Modular Wetland System	47.4	$1,070,000 (based on 30% design)	$1,070,000
Totals				**47.4**	**$1,070,000**	**$1,070,000**

Structural BMP Inspection and Maintenance

Inspection and maintenance of structural BMPs continues to be a substantial ongoing effort and cost. LCWMD presently inspects and maintains 96 LCWMD-owned-or-operated structural BMPs in the Long Creek Watershed. Inspections and routine maintenance of structural BMP are completed throughout the year. Inspection and maintenance reports are reviewed by CCSWCD's District Engineer who assigns non-routine maintenance for structural BMPs.

Each BMP has been assigned an individual BMP number to allow the inspection and maintenance costs of individual BMPs to be tracked. This information is used to project future inspection and maintenance schedules and budgets and guides LCWMD's decision-making process should additional structural BMPs be considered. In addition to BMP inspection and maintenance, landscaping services for constructed BMPs requires significant ongoing effort and financial resources. Landscaping includes services such as mowing, mulching, weeding, trash removal, seeding, and cutting of vegetation for winter dormancy.

Restoration Opportunities for the Aquatic Environment

In addition to the structural management activities implemented to treat pollution for improved stormwater quality, the LCWMP calls for restoration measures to improve the aquatic environment. Section 5.4 of the LCWMP identifies in-stream habitat, riparian habitat, and floodplain restoration recommendations. These projects include improvements to riparian and in-stream habitats to mitigate damage that has been caused to aquatic habitats over time. As identified in the LCWMP, undertaking these projects will encourage the habitat conditions needed for the re-colonization of Long Creek by aquatic species more indicative of a healthy stream such as pollution-sensitive macroinvertebrates and brook trout.

Completed Projects

The stream restoration projects identified in the LCWMP, as amended, have been constructed. A summary of in-stream and riparian projects completed in the watershed to date is identified in **Table 4.**

Table 4 *Summary of Restoration Projects to Date*[7]

Branch	Date	Catchment	Restoration Project Implemented	Other Total	LCWMD Total	Total Cost
South Branch	2009	Upper South Branch	Vegetation	Included as part of 2009 Philbrook Avenue Structural BMP Project		Included as part of 2009 Philbrook Avenue Structural BMP Project
Blanchette Brook	2011	B-21 (Colonel Westbrook)	In-stream and riparian enhancement	$29,480[1]	$163,735	$193,215
Main Stem	2014	Lower Main Stem	In-stream and stream bank stabilization		$39,258	$39,258

[7] Additional details on each construction project are available on LCWMD's website at: http://www.restorelongcreek.org/pages/projects/overview.

Main Stem	2019	Middle Main Stem	In-stream structures to improve aquatic habitat, floodplain restoration, bank stabilization, replant floodplain with native plants		$981,425.13	$981,425.13
Totals				**$29,480**	**$1,184,418**	**$1,213,898**

Nonstructural Management Opportunities

Implementation of the non-structural aspects of the LCWMP include but are not limited to *"stormwater runoff management techniques that do not require extensive construction efforts and either limit the generation of stormwater runoff or reduce the amount of pollutants contained in the runoff."* In 2020, LCWMD implemented its standard operating procedure that applies to LCWMD's nonstructural obligations including pavement sweeping on Participating Landowner parcels, annual inspection and maintenance of LCWMD-owned-or-operated BMPs, annual inspection of Participating Landowner parcels as related to "pollution prevention" and "good housekeeping," and annual catch basin cleaning on Participating Landowners parcels.

Pollution Prevention

As identified in the LCWMP, pollution prevention is aimed at reducing or eliminating waste at the source, promoting the use of non-toxic or less-toxic substances, implementing conservation techniques, and re-using materials rather than putting them into the waste stream. Pollution prevention includes activities such as pavement sweeping, catch basin cleaning, parcel inspections, and education and outreach.

Pavement Sweeping

Pavement sweeping was completed by LCWMD on private parking lots and roads by a third-party contractor for most properties managed under the Long Creek General Permit. Solids collected through sweeping are designated for disposal at an identified solid waste handling facility.

In addition to general parcel sweeping, "hot spots" were identified on a site-specific basis based on known high-traffic areas (high-turnover parking lots, drive-thru windows, and other high usage areas) and observations of areas where street dust tends to accumulate. Specifics pertaining to sweeping in 2020 include the following:

- Spring cleanup, large particle collection, approximately **290 acres swept**
- Spring cleanup, collection of fines, approximately **300 acres swept**
- Hotspot sweeping completed two times, approximately **54 acres swept per event**
- Fall sweep, collection of fines, approximately **215 acres swept**[8]

In addition, Participating Landowners will receive credits against their annual assessments for sweeping approximately **117 acres of additional impervious area**.

[8] The Hot Spot #3 sweeping event was converted to a full sweep in calendar year 2018 and is now referred to as the "fall sweep."

A total of **166.62 tons of sweepings** were collected by LCWMD's contractor in 2020. **Figure 3** shows the total tons of sweeping collected by LCWMD's annual sweeping events from 2011 to 2020.

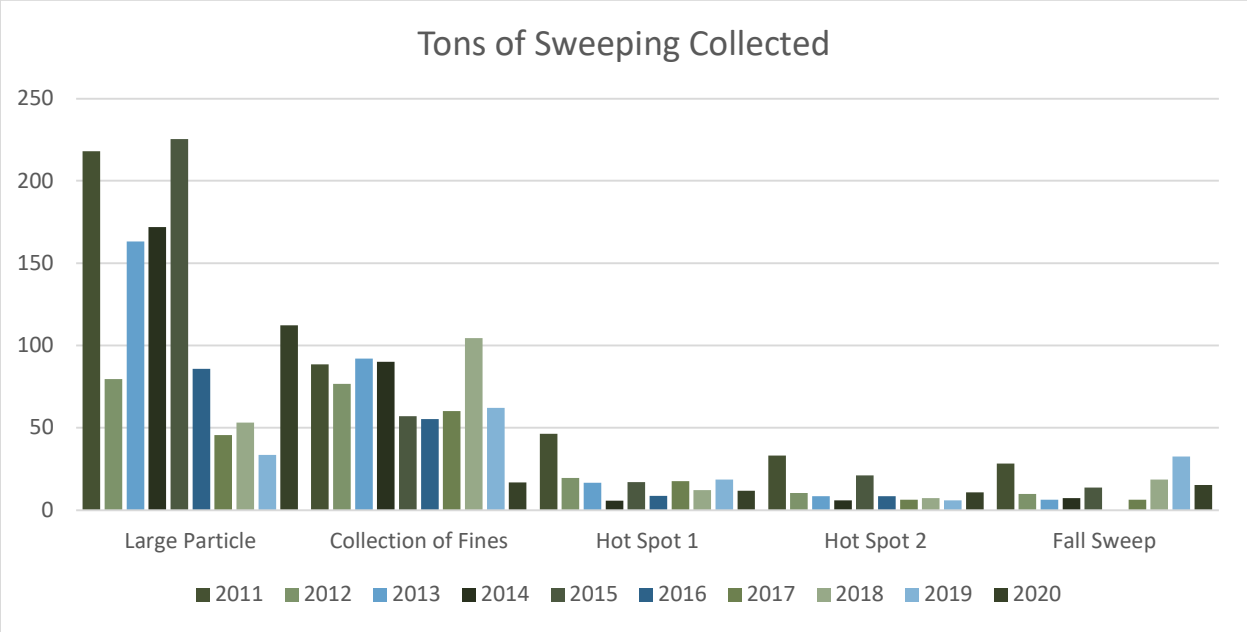


Figure 3 *Tons of Sweepings Collected by Year*

Catch Basin Cleaning

Catch basin cleaning was completed by a third-party contractor for properties managed under the Long Creek General Permit. Solids collected through catch basin cleaning are designated for disposal at an identified solid waste handling facility.

In 2020, **668 catch basins were cleaned** which is an increase from 575 in 2019. Approximately **43.44 tons of catch basin grit was collected**, an increase from 15.88 tons in 2019. In addition, Participating Landowners received credits against their annual assessments for cleaning an **additional 261 catch basins**.

Sustainable Winter Management (SWiM®)

The water quality monitoring program for Long Creek implemented by LCWMD has identified chlorides from the application of winter dicing salt as a significant impairment of water quality in Long Creek. Elevated chloride levels are known to impact the growth and reproduction of aquatic organisms. As a result, LCWMD has identified the reduction in the use of chlorides as a necessary element to meeting water quality standards in Long Creek.

In 2020, LCWMD entered into an agreement with WIT Advisers to develop a local program for adopting Sustainable Winter Management (SWiM®) guidelines throughout the Long Creek Watershed. As the initial phase of implementing the program for the 2020-2021 winter season, key stakeholders and property owners withing the watershed were identified as potential participants for this program, which begins with a broad stakeholder engagement process followed by a future needs assessment process that helps participants to identify opportunities to save money, manage risk, and reduce de-icing salt outputs entering the watershed.

Work during the 2020-2021 winter season included engaging with snow removal operators and others responsible for winter snow and ice management operations on participating properties. Engagement with participants included gathering information related to budgets, operational logistics, and landowner constraints.

Parcel Inspections

During 2020, LCWMD's parcel inspection program was carried out by staff from CCSWCD who conducted 109 inspections of Participating Landowner properties in the watershed. The parcel inspection program is the primary means for LCWMD to conduct outreach with Participating Landowners. CCSWCD staff makes a concerted effort to engage Participating Landowners in the inspection process to ensure that landowners are aware of site-specific operation and maintenance plans and to accomplish timely resolution of issues identified during inspections.

Subsequent to parcel inspections, Participating Landowners were sent annual inspection reports detailing follow-up actions requested by inspection staff. **Table 5** illustrates the relative frequency of the common issues identified during parcel inspections as needing corrective actions. Outreach to landowners was conducted to follow up on corrective actions and to provide technical assistance. LCWMD works with municipalities, and sometimes Maine DEP, to rectify issues identified during parcel inspections.

Table 5 *Common Issues Identified During Parcel Inspections as Needing Corrective Action*

Operation and Maintenance Inspection Element	Corrective Action Needed
Dumpster Management	21
Swales or Ditches in Poor Condition	14
Poor Outfall Stability	12
Pavement in Poor Condition	12
Poorly Vegetated or Bare Areas (Grass or Landscaped)	8
Hazardous Materials Storage or Oil Spill or Leak	6
Trash/Litter	5
Culverts in Poor Condition	5
Catch Basin Structural Maintenance Needed	3
Snow Storage Area in Poor Condition	2
Fats, Oils, Grease	1

Education and Outreach

Fact Sheets

A primary focus of LCWMD's pollution prevention initiatives is distribution of fact sheets to Participating Landowners, all of which are available on LCWMD's website.[9] Distribution of these fact sheets allows LCWMD to efficiently address the most commonly encountered issues in the Long Creek Watershed. Several of the most popular fact sheets are available in Spanish and Mandarin as the result of requests from Participating Landowners, or their tenants. During 2020, fact sheets were simplified to rely less on text and more on simple infographics.

Communications with Participating Landowners

Specific outreach communications to update Long Creek Participating Landowners and subscribers to the Long Creek list serve included the following:

- **March 10, 2020 – General News Eblast: Spring Cleanup Starting Soon.** Our pavement sweeping contractor, Maritime Farms and Land Management, LLC will begin sweeping roadways and parking lots on March 10th. In addition, our catch basin cleaning contractor ACV Enviro / Clean Venture, Inc. will start inspecting and cleaning approximately 800 catch basins and drain manholes in the watershed very soon. Our sweeping and catch basin cleaning programs help to remove sand, salt, grit, trash and other debris from paved areas and catch basins. They are an important part of the pollution prevention activities that LCWMD manages to maintain and improve the water quality of the creek!
- **April 23, 2020 – General News Eblast: Spring 2020 Update.** Despite the challenges presented by COVID-19, the Long Creek Watershed Management District's (LCWMD) work on restoring the Long Creek Watershed continues. LCWMD's pavement sweeping contractor, Maritime Farms and Land Management, LLC, will have completed the initial spring sweeping this week, with the exception of many snow dumps that only recently finished melting. LCWMD's Best Management Practice (BMP) stormwater infrastructure inspection and maintenance contractor, Sterling Stormwater Maintenance Services, LLC, will be inspecting LCWMD-managed BMPs in the coming weeks. During construction of the Main Stem Restoration Project last fall, it was apparent that large amounts of trash and debris have accumulated over the years in and adjacent to the stream corridor. LCWMD's contractor, Maritime Farms and Land Management, LLC, will be working in the area in the weeks ahead to remove the old shopping carts, tires, and other debris.
- **May 4, 2020 – General News Eblast: Board of Directors Meeting.** The next Long Creek Watershed Management District Board of Directors' Meeting is scheduled for May 7, 2020 at 9:00a.m.
- **July 1, 2020 – General News Eblast: What's Happening in Long Creek.** A status update on assessments, permitting, budgeting, and construction.
- **August 17, 2020 – General News Eblast: Main Stem Restoration Project.** Key functions of the Long Creek Main Stem were restored in 2019 as part of the long-term watershed management plan.

[9] Fact sheets are available on LCWMD's website at: http://www.restorelongcreek.org/custom/documents.

- **September 23, 2020 – General News Eblast: Fall 2020 Sweeping.** The Long Creek Watershed Management District ("LCWMD") provides Participating Landowners with periodic pavement sweeping services as a participant in implementing the Long Creek Watershed Management Plan. Three more pavement sweeping events are planned for this fall. Two "hot spot" sweepings and one "full sweep."
- **October 6, 2020 – General News Eblast: New Porous Pavement on Maine Mall Road.** Ever wonder why water acts differently on Maine Mall Road? That's because it's porous pavement, which means water can soak through the pavement into the ground instead of running on top of the pavement and creating stormwater. This month Maine DOT replaced the 10-year-old porous pavement (an impressive age for heavy use roads) on Maine Mall Road with new porous pavement to revitalize its stormwater BMP functions as part of the Long Creek Watershed Management District's restoration of Long Creek.
- **October 8, 2020 – General News Eblast: RFP for Stormwater Best Management Practice Inspection and Maintenance Services.** The Long Creek Watershed Management District ("LCWMD") is seeking proposals from qualified service providers to perform annual inspection and maintenance services for structural stormwater Best Management Practices ("BMPs") in the Long Creek Watershed.
- **October 8, 2020 – General News Eblast: Request for Proposals Landscaping Services.** The Long Creek Watershed Management District ("LCWMD") is seeking proposals from qualified service providers to perform landscaping services for stormwater Best Management Practices ("BMPs") in the Long Creek Watershed.
- **October 14, 2020 – General News Eblast: Stormwater BMP: Detention Pond.** Slow and steady baseflow keeps Long Creek going during dry summer months. During dry summers, Long Creek water levels can get low and many plants and animals that rely on the creek are impacted. Thankfully, we have a retrofitted detention pond to help store water to extend the baseflow of Long Creek during these dry times. This extra water also helps keep the stream cooler and has more dissolved oxygen for stressed fish, aquatic insects, and plants. At the end of the summer, we release any extra stored water in our detention pond so it can flow into Long Creek.
- **November 3, 2020 – General News Eblast: Request for Proposals - Water Quality Monitoring Services.** The Long Creek Watershed Management District ("LCWMD") is seeking proposals from qualified service providers to provide water quality monitoring services in the Long Creek Watershed.
- **November 12, 2020 – General News Eblast: RFP for Catch Basin Inspection and Cleaning Services.** The Long Creek Watershed Management District ("LCWMD") is seeking proposals from qualified service providers to provide annual catch basin inspection and cleaning services within the Long Creek Watershed.
- **November 12, 2020 – General News Eblast: RFP for Pavement Sweeping Services.** The Long Creek Watershed Management District ("LCWMD") is seeking proposals from qualified service providers to provide pavement sweeping services in the Long Creek Watershed.

Conferences, Meetings, and Events

- **January 8, April 16, May 21, 2020, June 18, July 16, August 20, September 17, November 18, December 16 – West End Trails Committee:** Stakeholder on the West End Trails Committee of the South Portland Land Trust. The West End Trails Committee provides input to the South

Portland Land Trust on the implementation of their plans to make the west end of the city (the Maine Mall area) more pedestrian friendly and help protect pockets of natural areas. Particular attention was paid to the potential redevelopment of the Sable Oaks Golf Course.

Monitoring

LCWMD has been implementing the *Long Creek Monitoring Plan*[10] ("Monitoring Plan") and associated *Long Creek Quality Assurance Project Plan*[11] ("QAPP") since late summer 2010. Detailed information about the various aspects of the Long Creek monitoring program is provided in the Monitoring Plan and QAPP.

Monitoring Locations

The monitoring locations depicted in **Figure 4** were identified for monitoring in 2020, which are consistent with the previous year's program.

Goals of Monitoring

Monitoring of conditions in the Long Creek Watershed reflects specific regulatory and management needs. These are: to determine whether or not Long Creek meets applicable water quality standards; to gather information to improve management of Long Creek; and, to document effectiveness of restoration programs and progress towards meeting standards. The Monitoring Plan was developed in order to evaluate baseline chemistry and flow conditions and monitor stream recovery at predetermined points across the watershed. The Monitoring Plan is focused on gathering the information needed to monitor Long Creek restoration efforts.

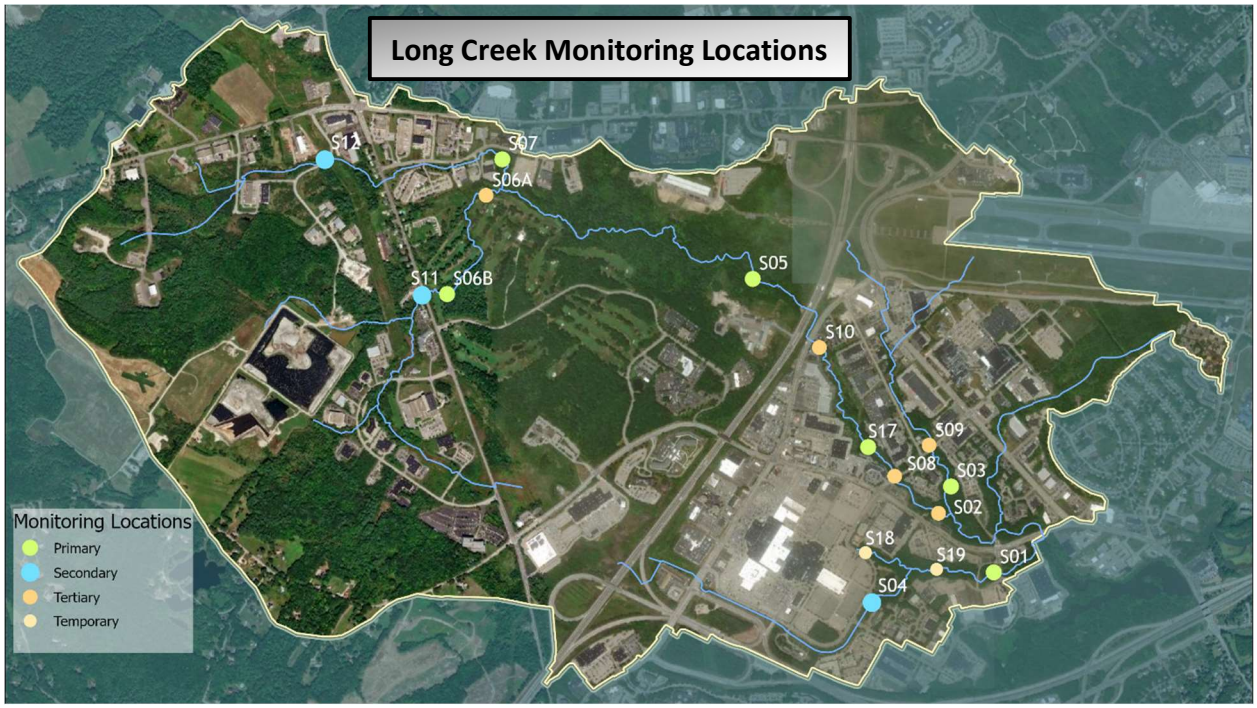


Figure 4 *Long Creek Monitoring Locations*

[10] The Monitoring Plan is available on LCWMD's website at: http://www.restorelongcreek.org/custom/documents.

[11] The QAPP is available on LCWMD's website at: http://www.restorelongcreek.org/custom/documents.

Monitoring Plan and Quality Assurance Project Plan

The Monitoring Plan requires water quality monitoring, biological monitoring, habitat assessment, and physical (geomorphic) assessment to determine the effectiveness of stormwater BMPs and watershed restoration projects on water quality, habitat, and the health of biological communities.

Monitoring Plan Implementation

The Monitoring Plan and QAPP were implemented in 2020 by LCWMD's monitoring contractor with support provided by CCSWCD and oversight provided by LCWMD. Long Creek's monitoring program includes primarily continuous monitoring, collection of grab samples, hydrologic monitoring, and biomonitoring. LCWMD's monitoring contractor provided a monitoring services summary report to LCWMD for the 2020 calendar year on January 29, 2021.[12]

Water Quality Monitoring Data Summary

LCWMD has identified water quality criteria for general water chemistry in Long Creek based on Maine DEP and U.S. Environmental Protection Agency water quality standards and recommendations for freshwater or urban streams. Specific conductance (used as a proxy for chloride), dissolved oxygen ("DO"), and temperature are measured nearly continuously with water quality data loggers. Phosphorus, metals (cadmium, copper, lead, nickel, and zinc), chloride, and Polycyclic Aromatic Hydrocarbon levels are measured periodically by in-stream grab sampling. These water quality parameters are monitored as ongoing indicators of water quality in Long Creek and its ability to support aquatic life. Long Creek's ability to support aquatic life, such as macroinvertebrates and fish, is ultimately determined through periodic biomonitoring (described below).

LCWMD uses the Criteria Continuous Concentration ("CCC") and Criteria Maximum Concentration ("CMC") as comparative criteria for contaminant concentrations in surface water. The CCC, or chronic criterion, is the highest in-stream concentration to which organisms can be exposed indefinitely without causing unacceptable effect (typically the four-day average concentration that should not be exceeded more than once every three years on the average), and the CMC, or acute criterion, is the highest concentration to which organisms can be exposed for a brief period of time without causing an acute effect (typically the one-hour average concentration that should not be exceeded more than once every 3 years on the average). LCWMD has developed a color-coded screening system to track each stream reaches' conformity with quality criteria referred to as "stoplights." **Table 6** reflects the structure of the stoplights system. The subsequent table are the outcomes of the stoplights at the identified monitoring locations.

Table 6 *Monitoring Criteria for Ranking*

Color Codes	Dissolved Oxygen	Chloride	Metals	Nutrients	Calculated Chloride
RED	Failed for more than 21 days	CMC exceeded or CCC exceeded for >50% samples			
ORANGE	Failed for 7-21 days	CCC exceeded for 30-50% of samples			
YELLOW	Failed for 1-6 days	CCC exceeded for 25% of samples (and not during baseflow)			
GREEN	Meets classification				

[12] *See* GZA GeoEnvironmental, Inc. January 2021. 2020 Annual Monitoring Services Summary Report— Long Creek Watershed — Portland, South Portland, Westbrook, and Scarborough, Maine. Edited portions reproduced for this report.

Blanchette Brook

Blanchette Brook Monitoring Summary (Secondary)

Location	Year	Calculated Chloride	Chloride	Dissolved Oxygen	Metals	Nutrients
S12	2011	GREEN	–	YELLOW	–	ORANGE
S12	2012	GREEN	–	YELLOW	–	RED
S12	2013	GREEN	GREEN	YELLOW	RED	RED
S12	2014	GREEN	GREEN	YELLOW	RED	RED
S12	2015	GREEN	GREEN	YELLOW	RED	RED
S12	2016	GREEN	GREEN	YELLOW	RED	RED
S12	2017	GREEN	GREEN	YELLOW	RED	RED
S12	2018	ORANGE	ORANGE	YELLOW	RED	RED
S12	2019	GREEN	GREEN	GREEN	RED	RED
S12	2020	GREEN	GREEN	YELLOW	RED	RED

Blanchette Brook Monitoring Summary (Primary)

Location	Year	Calculated Chloride	Chloride	Dissolved Oxygen	Metals	Nutrients
S07	2010	ORANGE	RED	RED	RED	RED
S07	2011	ORANGE	GREEN	RED	RED	RED
S07	2012	ORANGE	ORANGE	RED	RED	RED
S07	2013	YELLOW	GREEN	RED	RED	RED
S07	2014	YELLOW	ORANGE	RED	RED	RED
S07	2015	RED	ORANGE	RED	RED	RED
S07	2016	RED	RED	RED	RED	RED
S07	2017	RED	RED	RED	RED	RED
S07	2018	RED	RED	RED	RED	RED
S07	2019	ORANGE	RED	RED	RED	RED
S07	2020	RED	RED	RED	RED	RED

Main Stem

Upper Main Stem Monitoring Summary (Secondary)

Location	Year	Calculated Chloride	Chloride	Dissolved Oxygen	Metals	Nutrients
S11	2011	ORANGE	–	YELLOW	–	ORANGE
S11	2012	GREEN	–	YELLOW	–	ORANGE
S11	2013	GREEN	GREEN	YELLOW	RED	RED
S11	2014	YELLOW	YELLOW	YELLOW	RED	RED
S11	2015	ORANGE	ORANGE	YELLOW	RED	RED
S11	2016	ORANGE	RED	YELLOW	RED	YELLOW

S11	2017	ORANGE	ORANGE	YELLOW	ORANGE	RED
S11	2018	ORANGE	ORANGE	YELLOW	RED	RED
S11	2019	RED	GREEN	YELLOW	RED	RED
S11	2020	GREEN	GREEN	YELLOW	ORANGE	RED

Upper Main Stem Monitoring Summary (Primary)

Location	Year	Calculated Chloride	Chloride	Dissolved Oxygen	Metals	Nutrients
S06	2010	GREEN	GREEN	RED	RED	RED
S06	2011	ORANGE	GREEN	RED	RED	RED
S06	2012	YELLOW	GREEN	RED	ORANGE	RED
S06B	2013	YELLOW	GREEN	RED	RED	RED
S06B	2014	ORANGE	YELLOW	RED	RED	RED
S06B	2015	ORANGE	ORANGE	RED	RED	RED
S06B	2016	ORANGE	ORANGE	RED	RED	RED
S06B	2017	ORANGE	ORANGE	RED	ORANGE	RED
S06B	2018	ORANGE	ORANGE	RED	RED	RED
S06B	2019	ORANGE	ORANGE	RED	RED	RED
S06B	2020	YELLOW	YELLOW	RED	ORANGE	RED

Middle Main Stem Monitoring Summary (Primary)

Location	Year	Calculated Chloride	Chloride	Dissolved Oxygen	Metals	Nutrients
S05	2010	GREEN	GREEN	RED	RED	RED
S05	2011	YELLOW	GREEN	RED	RED	RED
S05	2012	GREEN	GREEN	YELLOW	RED	RED
S05	2013	GREEN	GREEN	RED	RED	RED
S05	2014	YELLOW	YELLOW	RED	RED	RED
S05	2015	ORANGE	GREEN	YELLOW	RED	RED
S05	2016	RED	GREEN	YELLOW	RED	RED
S05	2017	ORANGE	ORANGE	YELLOW	RED	RED
S05	2018	YELLOW	ORANGE	YELLOW	RED	RED
S05	2019	ORANGE	YELLOW	YELLOW	RED	RED
S05	2020	ORANGE	YELLOW	YELLOW	ORANGE	RED

Lower Main Stem Monitoring Summary (Primary)

Location	Year	Calculated Chloride	Chloride	Dissolved Oxygen	Metals	Nutrients
S02	2010	YELLOW	GREEN	RED	RED	RED
S02	2011	ORANGE	GREEN	RED	RED	RED

S02	2012	ORANGE	ORANGE	RED	RED	RED
S02	2013	ORANGE	GREEN	RED	RED	RED
S02	2014	ORANGE	RED	RED	RED	RED
S17	2015	RED	ORANGE	RED	RED	RED
S17	2016	RED	RED	RED	RED	RED
S17	2017	ORANGE	RED	RED	RED	RED
S17	2018	RED	RED	RED	RED	RED
S17	2019	ORANGE	RED	RED	RED	RED
S17	2020	RED	YELLOW	RED	RED	RED

South Branch

Middle South Branch Monitoring Summary (Secondary)

Location	Year	Calculated Chloride	Chloride	Dissolved Oxygen	Metals	Nutrients
S04	2010	RED	RED	ORANGE	RED	RED
S04	2011	RED	RED	RED	RED	ORANGE
S04	2012	RED	RED	YELLOW	RED	ORANGE
S04	2013	RED	RED	YELLOW	RED	YELLOW
S04	2014	RED	RED	YELLOW	RED	RED
S04	2015	RED	RED	YELLOW	RED	ORANGE
S04	2016	RED	RED	YELLOW	RED	ORANGE
S04	2017	RED	RED	YELLOW	RED	RED
S04	2018	RED	RED	YELLOW	RED	ORANGE
S04	2019	RED	RED	YELLOW	RED	ORANGE
S04	2020	RED	RED	YELLOW	RED	RED

Lower South Branch Monitoring Summary (Primary)

Location	Year	Calculated Chloride	Chloride	Dissolved Oxygen	Metals	Nutrients
S01	2010	RED	RED	RED	RED	RED
S01	2011	RED	RED	RED	RED	RED
S01	2012	RED	RED	RED	RED	RED
S01	2013	RED	RED	RED	RED	ORANGE
S01	2014	RED	RED	RED	RED	ORANGE
S01	2015	RED	RED	RED	RED	RED
S01	2016	RED	RED	RED	RED	RED
S01	2017	RED	RED	RED	RED	ORANGE
S01	2018	RED	RED	RED	RED	RED
S01	2019	RED	RED	RED	ORANGE	GREEN
S01	2020	RED	RED	RED	GREEN	ORANGE

North Branch

North Branch Monitoring Summary (Primary)

Location	Year	Calculated Chloride	Chloride	Dissolved Oxygen	Metals	Nutrients
S03	2010	RED	RED	RED	RED	ORANGE
S03	2011	RED	RED	RED	RED	ORANGE
S03	2012	RED	RED	RED	ORANGE	ORANGE
S03	2013	RED	RED	RED	RED	ORANGE
S03	2014	RED	RED	RED	RED	RED
S03	2015	ORANGE	ORANGE	RED	RED	RED
S03	2016	RED	ORANGE	RED	RED	RED
S03	2017	RED	RED	RED	RED	RED
S03	2018	RED	RED	RED	ORANGE	RED
S03	2019	RED	RED	RED	GREEN	GREEN
S03	2020	RED	RED	RED	GREEN	RED

Biomonitoring

Pursuant to the Monitoring Plan, invertebrate monitoring utilizing rock bags was to be performed at primary monitoring locations twice in every five-year period (*i.e.,* 2010, 2013, 2015, 2018). In 2019, off-cycle invertebrate evaluations were completed at three long-term monitoring stations; S07 in Blanchette Brook, S05 in the upper Main Stem of Long Creek, and S17 in the middle Main Stem of Long Creek to gather macroinvertebrate data in advance of the Main Stem Restoration Project. To supplement rock bag sampling data to document the effectiveness of the Main Stem Restoration Project, which was completed in 2019, D-frame sampling and habitat assessments were performed in 2019 just prior to implementation of the project and were performed again in 2020 following completion of the project.

Rock Bags

The macroinvertebrate community is sampled by deploying standardized sampling devices (rock bags or rock baskets) on the stream bottom for a period of four weeks and collecting the organisms that colonize the bags. The collected organisms are identified and quantified and the resulting data is used to calculate 23 variables that are used in linear discriminant models which predict the probability that the community will meet the aquatic life criteria for a given stream classification (A, B, or C). **Table 7** summarizes biomonitoring outcomes based on Maine DEP evaluations of rock bag data.

Table 7 *Summary of Aquatic Life Classification Attainment Reports*

Date	Biomonitoring Station	Monitoring Station	Statutory Class	Determination
2010				
8/18/2010	S-409	**S07** (Blanchette Brook)	B	NA
8/18/2010	S-411	**S06A** (Main Stem just above Blanchette)	B	NA
8/18/2010	S-570	**S05** (Main Stem above Turnpike)	C	C

8/16/2010	S-414	**S03** (North Branch)	C	NA
8/16/2010	S-752	**S17** (Main Stem just above Foden Road)	C	NA
8/13/2010	S-415	**S02** (Main Stem below Foden Road)	C	NA
8/13/2010	S-753	**S01** (South Branch above Clark's Pond)	C	NA
2013				
9/9/2013	S-409	**S07** (Blanchette Brook)	B	C
9/9/2013	S-1015	**S06B** (Main Stem Sable Oaks just below Cummings)	C	NA
9/9/2013	S-570	**S05** (Main Stem above Turnpike)	C	C
9/9/2013	S-414	**S03** (North Branch)	C	I
9/9/2013	S-581	**NONE** South Branch below S-408	C	NA
9/9/2013	S-415	**S02** (Main Stem below Foden Road)	C	NA
2015				
8/27/2015	S-411	**S06A** (Main Stem just above Blanchette)	B	C
8/27/2015	S-414	**S03** (North Branch)	C	NA
8/27/2015	S-408	**NONE** South Branch above S-581	C	NA
8/27/2015	S-752	**S17** (Main Stem just above Foden Road)	C	NA
2018				
8/1/2018	S-409	**S07** (Blanchette Brook)	B	NA
8/1/2018	S-1015	**S06B** (Main Stem Sable Oaks just below Cummings)	C	NA
8/1/2018	S-411	**S06A** (Main Stem just above Blanchette)	B	NA
8/1/2018	S-570	**S05** (Main Stem above Turnpike)	C	NA
8/1/2018	S-414	**S03** (North Branch)	C	NA
8/1/2018	S-752	**S17** (Main Stem just above Foden Road)	C	NA
8/1/2018	S-415	**S02** (Main Stem below Foden Road)	C	NA
8/1/2018	S-753	**S01** (South Branch above Clark's Pond)	C	NA
2019				
8/13/2019	S-409	**S07** (Blanchette Brook)	B	NA
8/13/2019	S-570	**S05** (Main Stem above Turnpike)	C	NA
8/13/2019	S-752	**S17** (Main Stem just above Foden Road)	C	NA

D-Frame Sampling

In 2019, the Main Stem riparian habitat restoration project was completed. The primary objective of this project was to restore the corridor of the Main Stem of Long Creek in the project area to enhance habitat conditions for macroinvertebrates and restore floodplain functions. To document the effectiveness of the project, d-frame macroinvertebrate sampling and habitat assessments are being utilized to supplement rock bag data.

During the 2020 Monitoring season, one round of benthic macroinvertebrate assessments with d-frame net sampling was performed in the main stem of Long Creek in the general areas of Long Creek Monitoring Station S17 (the "restoration reach") and Long Creek Monitoring Station S05 (the "reference reach"). The assessment was conducted in accordance with Section 7.2 of EPA's *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition*. Following EPA protocols, each monitoring station composite sample consisted of d-frame net 'dips' taken within each reach, within representative micro-habitats.

In general, the 2020 d-frame net samples were dominated by tolerant taxa. Caddisflies (Order Trichoptera) and mayflies (Order Ephemperoptera) were present in the reference reach (S05), but not at the restoration reach (S17). The d-frame net sampling method detected individuals of Order Ephemperoptera (mayflies) along the reference reach (S05), but not at the restoration reach (S17). No individuals of Order Plecoptera (stoneflies) were captured in 2020, which is similar to the 2019 results, but contrary to previous data collected in Long Creek (*i.e.,* see S05 data from 2013). Given that restoration in the Main Stem was completed in 2019, it is possible that additional time (*i.e.,* growing seasons) are required to detect positive increases in caddisflies and mayflies in the restoration reach. In addition, it is possible that weather conditions and ongoing drought also influenced dispersal of mayflies and caddisflies from nearby areas to the restoration reach.

Habitat Assessment

In addition to d-frame sampling, one round of instream habitat assessments was performed in 2020 in the Main Stem of Long Creek in the reference reach and the restoration reach where the Main Stem Restoration Project was implemented. The characterization of stream bottom substrate size was conducted in accordance with Section 5 of EPA's *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition*.

Habitat scores ranged from 102 to 139 (compared to 94 to 131 in 2019, and 90 to 137 in 2018) at the monitoring stations, with no scores in the lowest (< 50) or highest (>160) habitat assessment categories. Based on the scores, the stations are rated as having suboptimal habitat conditions, with neither of the stations rated as having marginal or optimal conditions. Station S17 (the restoration area) improved from a marginal rating (score of 94) in 2019 to a suboptimal rating (score of 102) in 2020. Station S05 (the reference reach) received a higher score but still within the suboptimal rating, consistent with the rating it received in 2019. These scores highlight the importance and success of the Main Stem Restoration Project, as scores improved in the restoration area after restoration field work was completed.

The 2020 assessment identified a statistically significant higher percentage of the clay, hard clay bottom, silt, and sand substrate types in the reference reach, in comparison with the restoration reach. There was a statistically significant higher percentage of the muck and aquatic bed substrate types in the restoration reach, in comparison with the reference reach. For the rest of the substrate types, there is no statistically significant differences between the reference and restoration reaches (S05 versus S17). The means and medians of gravel, cobble, boulder, leaf litter, and wood (percent coverage of micro-habitat) appeared to be fairly similar between the reference and restoration reaches during 2020.

Woody debris data was also collected for the reference reach and restoration reach, as they are expected to correlate with flow conditions. Small, narrow sticks are more mobile in faster velocities,

and offer less than optimal habitat. Larger woody debris typically offers better cover as habitat. Based on the results of the 2020 study, there was a statistically significant difference in the length of the woody debris between the reference and restoration reaches. In general, the woody debris were found to be slightly longer in the restoration reach (S17). The average value of the overall size is also slightly greater in the restoration reach (S17). However, there is no statistically significant difference in terms of width or overall size of the woody debris between the two reaches.