A Total Maximum Daily Load Analysis for the Pequabuck River Sub-Regional Basin

Proposed – July 27, 2009

This document has been established pursuant
to the requirements of Section 303(d)
of the Federal Clean Water Act

_____ _____

Betsey Wingfield, Chief — Date
Bureau of Water Protection and Land Reuse

_____ _____

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INTRODUCTION

A Total Maximum Daily Load (TMDL) analysis was completed for indicator bacteria in the Pequabuck River Sub-Regional Basin. The waterbodies included in this TMDL analysis are the Pequabuck River, Coppermine Brook, and Poland River (Figure 1). These waterbodies are included on the *2008 List of Connecticut Waterbodies Not Meeting Water Quality Standards*[1] (*2008 List*) due to exceedences of the indicator bacteria criteria contained within the State *Water Quality Standards* (WQS) [2]. Under section 303(d) of the Federal Clean Water Act (CWA), States are required to develop TMDLs for waters impaired by pollutants that are included on the *2008 List* for which technology-based controls are insufficient to achieve water quality standards. Please refer to the *2008 List* for more information on impaired waterbodies throughout the State. The *2008 List* is included as Appendix C in the *2008 Integrated Water Quality Report to Congress*[3], which contains information regarding all assessed waterbodies in the State.

In general, the TMDL represents the maximum loading that a waterbody can receive without exceeding the water quality criteria, which have been adopted into the WQS for that parameter. In this TMDL, loadings are expressed as the average percent reduction from current loadings that must be achieved to meet water quality standards. The United States Environmental Protection Agency's (EPA) November 15, 2006 memorandum entitled *Establishing TMDL 'Daily' Loads in Light of the Decision by the U.S. Court of Appeals for the D.C. Circuit in Friends of the Earth, Inc. v. EPA, et al., No.05-5015, (April 25, 2006) and Implications for NPDES Permits*[4], recommends that TMDL submittals express allocations in terms of daily time increments. The percent reduction TMDLs for the Pequabuck River Sub-Regional Basin are applicable each and every day until recreational use goals are attained. Federal regulations require that the TMDL analysis identify the portion of the total loading which is allocated to point source discharges (termed the Wasteload Allocation or WLA) and the portion attributed to nonpoint sources (termed the Load Allocation or LA), which contribute that pollutant to the waterbody. In addition, TMDLs must include a Margin of Safety (MOS) to account for uncertainty in establishing the relationship between pollutant loadings and water quality. Seasonal variability in the relationship between pollutant loadings and WQS attainment is also considered in this TMDL analysis.

The Pequabuck River Sub-Regional Basin extends into the Connecticut municipalities of Harwinton, Burlington, Plymouth, Farmington, Bristol, New Britain, Plainville, and Wolcott. Within each of these municipalities are designated urban areas, as defined by the US Census Bureau [5] (Figure 2). These municipalities are required to comply with the General Permit for the Discharge of Stormwater from Small Municipal Separate Storm Sewer Systems (MS4 permit). The general permit is applicable to municipalities that are identified in Appendix A of the MS4 permit, that contain designated urban areas and discharge stormwater via a separate storm sewer system to surface waters of the State. The permit requires municipalities to develop a program to reduce the discharge of pollutants, as well as to protect water quality. The Stormwater

Management Plan (plan) must include the following six control measures: public education and outreach; public participation; illicit discharge detection and elimination; management of stormwater from construction sites (greater than 1 acre); post-construction stormwater management; and pollution prevention and good housekeeping. Each regulated municipality must identify, implement, and measure the effectiveness of measures utilized to comply with plan requirements. Additional information regarding the general permit can be obtained on the Connecticut Department of Environmental Protection (DEP) website at http://www.ct.gov/dep/cwp/view.asp?a=2721&q=325702& depNav_GID=1654.

TMDLs that have been established by states are submitted to the Regional Office of the (EPA) for review. The EPA can either approve the TMDL or disapprove the TMDL and act in lieu of the State. TMDLs provide a scientific basis for local stakeholders to develop and implement Watershed Based Management Plans (WBMP), which describe the control measures necessary to achieve acceptable water quality conditions. Therefore, WBMPs derived from TMDLs typically include an implementation schedule and a description of ongoing monitoring activities to confirm that the TMDL will be effectively implemented and that WQS are achieved and maintained where technically and economically feasible. Public participation during development of the TMDL analysis and subsequent preparation of WBMPs is vital to the success of resolving water quality impairments.

TMDL analyses for indicator bacteria in the Pequabuck River Sub-Regional Basin are provided herein. As required in a TMDL analysis, load allocations are determined, a margin of safety is included, and seasonal variation is considered. This document also includes recommendations for a water quality monitoring plan, as well as a discussion of guidance for TMDL Implementation.

PRIORITY RANKING

Table 1. The impairment status and TMDL development priority for each subject waterbody based on the 2008 *List*.

Waterbody Name	Waterbody Segment ID	Waterbody Segment Description	303(d) Listed (Yes/No)	Impaired Use Cause	Priority
Coppermine Brook	CT4314-00_01	From mouth at Pequabuck River, upstream to New Britain drinking water watershed boundary and water diversion (just upstream of confluence with Polkville Brook), Bristol.	Yes	Recreation *Escherichia coli*	H
Poland River	CT4313-00_01 CT4313-00_02	From confluence with Marsh Brook, upstream to confluence with unnamed Brook4313-03_01, upstream of Judd Road crossing (parallel with route 72), Plymouth.	Yes	Recreation *Escherichia coli*	H
Pequabuck River	CT 4315-00_01 CT 4315-00_02 CT 4315-00_03 CT 4315-00_04 CT 4315-00_05 CT 4315-00_06	From mouth at Farmington River, Plainville upstream to headwaters South of Rocky Road, Harwinton	Yes	Recreation *Escherichia coli*	H

"H" indicates that the waterbody is a high priority because assessment information suggested a TMDL may be needed to restore the water quality impairment and a TMDL was planned for development within 3 years.

DESCRIPTION OF EACH WATERBODY

See "Site Specific Information" in Appendix A-1, A-2, and A-3.

POLLUTANT OF CONCERN AND POLLUTANT SOURCES

Potential sources of indicator bacteria include point and nonpoint sources, such as stormwater runoff and illicit discharges/hook ups to storm sewers. Potential sources that are tentatively identified based on land-use (Figure 3) for each of the waterbodies are presented in Table 2.

Table 2. Potential sources of bacteria for each subject waterbody.

Waterbody Name	Nonpoint sources	Point Sources
Coppermine Brook	Unspecified Urban Stormwater, Source Unknown	Regulated stormwater runoff, Illicit connections/Hook ups to storm sewers,
Poland River	Unspecified Urban Stormwater, Source Unknown	Regulated stormwater runoff, Illicit connections/Hook ups to storm sewers
Pequabuck River	Unspecified Urban Stormwater, Source Unknown	Regulated stormwater runoff, Illicit connections/Hook ups to storm sewers

There are three municipal wastewater treatment plants (Bristol WPCF, Plymouth WPCF, and Plainville WPCF) that discharge to the Pequabuck River and receive indicator bacteria limits in their National Pollutant Discharge Elimination (NPDES) Permits. Disinfection required under the NPDES Permit is sufficient to reduce indicator bacteria densities to below levels of concern in the effluent when in use and functioning properly (See Numeric Water Quality Target for further explanation).

Table 3. Treatment plant discharges and the associated NPDES permit numbers.

Facility Name	NPDES Permit #	Discharges to
Bristol Water Reclamation Facility	CT0100374	Pequabuck River (CT4315-00_01)
Plainville WPCF	CT0100455	Pequabuck River (CT4315-00_03)
Plymouth WPCF	CT0100463	Pequabuck River (CT4315-00_06)

APPLICABLE SURFACE WATER QUALITY STANDARDS

Connecticut's WQS establish criteria for bacterial indicators of sanitary water quality that are based on protecting recreational uses such as swimming (both designated and non-designated swimming areas), kayaking, wading, water skiing, fishing, boating, aesthetic enjoyment and others. Indicator bacteria criteria are used as general indicators of sanitary quality based on the results of EPA research[5] conducted in areas with known human fecal material contamination. The EPA established a statistical correlation between levels of indicator bacteria and human illness rates, and set forth guidance for States to establish numerical criteria for indicator bacteria organisms so that recreational use of the water can occur with minimal health risks. However, it should be noted that the correlation between indicator bacteria densities and human illness rates varies greatly between sites and the presence of indicator bacteria does not necessarily indicate that human fecal material is present since indicator bacteria occur in all warm-blooded animals.

The applicable water quality criteria for indicator bacteria to the Pequabuck River Sub-Regional Basin are presented in Table 3. These criteria are applicable to all recreational uses established for these waters. However, it should be noted that the water quality classification and target criteria should not be considered as a certification of quality by the State or an

approval to engage in certain activities such as swimming. Full body contact should be avoided immediately downstream of wastewater treatment plants, in areas known to have high levels *E.coli*, and during times when *E.coli* levels are expected to be particularly high, such as during and following storm events.

Table 4. Applicable indicator bacteria criteria for the subject waterbodies.

Waterbody	Waterbody Segment ID	Class	Bacterial Indicator	Criteria
Coppermine Brook	CT4314-00_01	A	*Escherichia coli* (*E. coli*)	Geometric Mean less than 126/100ml Single Sample Maximum 576/100ml
Poland River	CT4313-00_01 CT4313-00_02	A		
Pequabuck River	CT 4315-00_01 CT 4315-00_02 CT 4315-00_03 CT 4315-00_04 CT 4315-00_05 CT 4315-00_06	A, B/C, B		

NUMERIC WATER QUALITY TARGET

TMDL calculations are performed consistent with the analytical procedures presented in the guidelines for *Development of TMDLs for Indicator Bacteria in Contact Recreation Areas Using the Cumulative Frequency Distribution Function Method* [7] included as Appendix B. All data used in the analysis and the results of all calculations are presented in Appendix A. The results are summarized in Table 4 below.

Table 5. Summary of TMDL analysis.

Waterbody	Waterbody Segment Description	Segment ID	Monitoring Site	Average Percent Reduction to Meet Water Quality Standards			
				TMDL	WLA	LA	MOS
Coppermine Brook	From mouth at Pequabuck River, upstream to New Britain drinking water watershed boundary and water diversion (just upstream of confluence with Polkville Brook), Bristol.	CT4314-00_01	33	89	90	88	Implicit
Poland River	From confluence Pequabuck River, upstream to confluence with unnamed Brook4313-03_01, upstream of Judd Road crossing (parallel with route 72), Plymouth.	CT4313-00_01#	277	14	17	12	Implicit
		CT4313-00_02					
Pequabuck River	From mouth at Farmington River, Plainville upstream to headwaters South of Rocky Road, Harwinton.	CT4315-00_01	1974	79	81	78	Implicit
		CT4315-00_01	1095	79	81	78	Implicit
		CT4315-00_02	258	83	85	82	Implicit
		CT4315-00_02	267	79	83	77	Implicit
		CT4315-00_03	399	36	19	46	Implicit
		CT4315-00_03	781	76	78	75	Implicit
		CT4315-00_03	712	63	61	64	Implicit
		CT4315-00_04*					
		CT4315-00_05	711	55	56	54	Implicit
		CT4315-00_05	265	17	39	4	Implicit
		CT4315-00_06	264	62	71	56	Implicit
		CT4315-00_06	263	61	68	57	Implicit

*Current data is unavailable to conduct a TMDL analysis for segment CT4315-00_04 on the Pequabuck River. However, this small segment (< 0.33 miles) is located adjacent to segments that require percent reductions. Therefore, it is reasonable to presume that the same percent reduction applies to these segments.
#Current data is unavailable to conduct a TMDL analysis for segment CT4313-00_01 on the Poland River. However, the segment is small (.42 miles) and is directly downstream of a segment (CT4313-00_02) that requires percent reductions. Landuse is similar for both segments and therefore, it is reasonable to presume that the same percent reduction applies to both segments.

The numeric target allocated to NPDES permitted discharges is "0% reduction" because

disinfection reduces bacteria densities to below levels of concern as stated in the Guidelines[7]. The current NPDES permits for the three municipal wastewater treatment plants (WWTPs) require disinfection from May 1 - September 30 (See Seasonal Analysis below). Under the NPDES Permits, indicator bacteria (fecal coliform) cannot exceed a geometric mean of 200 col/100mLs over a 30-day period or a single sample maximum of 400 col/100mLs. The indicator bacteria used in this TMDL is *E.coli*, which is one of several species that make up the fecal coliform group. Therefore, only a portion of fecal coliform densities account for *E.coli* in the sample and *E.coli* densities are always lower than total fecal coliform densities. Based on this information, NPDES Permit limits for the WWTPs are sufficient to reduce *E.coli* to below levels of concern and do not need to be reduced further as part of the waste load allocation. Also, WWTPs and industrial dischargers are required to sample effluent through the disinfection period and submit monitoring reports to DEP. DEP reviews the monitoring reports and takes action to mitigate any problems when there are consistent violations of the Permit. Based on monitoring reports submitted to DEP during the past year, there were no WWTPs which were consistently violating their permit limits for indicator bacteria in the Pequabuck River Sub-Regional Basin.

MARGIN OF SAFETY

TMDL analyses are required to include a margin of safety (MOS) to account for uncertainties regarding the relationship between load and wasteload allocations, and water quality. The MOS may be either explicit or implicit in the analysis.

The indicator bacteria criteria used in this TMDL analysis were developed exclusively from data derived from studies conducted by EPA at high use designated public bathing areas with known human fecal contamination[6]. Therefore, the criteria provide an additional level of protection when applied to waters not used as designated swimming areas or contaminated by human fecal material. As a result, achieving the criteria results in an "implicit MOS". Additional explanation concerning the implicit MOS incorporated into the analysis is provided in Appendix B.

SEASONAL ANALYSIS

The TMDLs presented in this document are applicable during the typical disinfection (summer) season from May 1 to September 30. Previous investigations by the DEP into seasonal trends of indicator bacteria densities in surface waters indicate that the summer months typically exhibit the highest densities of any season[8]. This phenomenon is likely due to the enhanced ability of indicator bacteria to survive in surface waters and sediment when ambient temperatures more closely approximate those of warm-blooded animals, from which the bacteria originate. In addition, resident wildlife populations are likely to be more active during the warmer months and more migratory species are present during the summer. These factors combine to make the summer, recreational period representative of "worst-case" conditions. Achieving consistency with the TMDLs through the summer months will result in achieving full support of recreational uses throughout the remainder of the year.

TMDL IMPLEMENTATION GUIDANCE

The percent reductions established in this TMDL can be achieved by implementing control actions where technically and economically feasible that are designed to reduce *E. coli* loading from nonpoint sources (Load Allocation) and point sources (Waste Load Allocation). These actions may be taken by State and Local government, academia, volunteer citizens groups, and individuals to promote effective watershed management.

It is important to note that the TMDLs are effective for the entire watershed because they are a measurement of compounded impacts at a single point. As such, corrective actions must be undertaken at the source(s) whether it is a tributary or illicit discharge pipe, in order to achieve the required percent reductions. Also, the approach to TMDL Implementation is anticipated to be on a watershed wide scale, which will require that all sources within the regional basin that are contributing to the in-stream impairment be addressed. The DEP advocates that a watershed based plan for the Pequabuck River Sub-Regional Basin be developed to implement the TMDLs. This plan should follow guidelines provided by the EPA and include participation from all watershed towns. The following guidance offers suggestions regarding BMP implementation, however the goal is to allow responsible parties flexibility in developing a TMDL implementation plan (watershed based plan). The DEP supports an adaptive and iterative management approach where reasonable controls are implemented and water quality is monitored in order to evaluate for achievement of the TMDL goals and modification of controls as necessary.

Potential point sources of *E. coli* to the Pequabuck River Sub-Regional Basin include waste water treatment plants and regulated stormwater. During the disinfection season the treatment plants should not be significantly contributing *E.*coli to the waterways. Control actions for regulated stormwater include the General Permit for the Discharge of Stormwater from Small Municipal Separate Storm Sewer Systems (MS4 Permit). Under this permit, municipalities are required to implement minimum control measures in their Stormwater Management Plans to reduce the discharge of pollutants, protect water quality, and satisfy the appropriate water quality requirements of the Clean Water Act. The six minimum control measures are:

- Public Education and Outreach
- Public Participation/Involvement
- Illicit Discharge Detection and Elimination
- Construction Site Runoff Control
- Post-construction Runoff Control
- Pollution Prevention/Good Housekeeping

The minimum control measures include a number of Best Management Practices (BMP) for which an implementation schedule must be developed and submitted to the DEP as Part B

Registration. Under the MS4 permit, all minimum control measures must be implemented by January 8, 2009. Information regarding Connecticut's MS4 permit can be found on the DEP's website at http://www.ct.gov/dep/cwp/view.asp?a=2709&q=324154&depNav_GID=1643#MS4GP. In addition, the EPA has developed fact sheets, which provide an overview of the Phase II final rule and MS4 permit, and provide detail regarding the minimum control measures, as well as optional BMPs not required in Connecticut's MS4 permit. The fact sheets can be found on the EPA's website at: http://cfpub.epa.gov/npdes/stormwater/swphases.cfm. Some of the information includes guidance for the development and implementation of Stormwater Management Plans, as well as guidance for establishing measurable goals for BMP implementation.

Upon approval of a TMDL by EPA, Section 6(k) of the MS4 Permit requires the municipality to review its plan to determine if its stormwater discharges contribute the pollutant(s) for which the TMDL had been designated. If the municipality contributes a pollutant(s) in excess of the designated TMDL allocation, the municipality must modify its plan to implement the TMDL within four months of TMDL approval by EPA. For the discharges to the TMDL waterbody(ies), the municipality must assess the six minimum measures of its plan and modify the plan to implement additional, necessary controls for each appropriate measure. Particular focus should be placed on the following plan components: public education program, illicit discharge detection and elimination, stormwater structures cleaning, priority for the repair, upgrade, or retrofit of storm sewer structures.

The TMDLs establish a benchmark to measure the effectiveness of BMP implementation. Achievement of the TMDLs is directly linked to incorporation of the provisions of the MS4 permit by municipalities, as well as the implementation of other BMPs to address nonpoint sources. Potential nonpoint sources include domestic animal waste, wildlife and surface water base flow. BMPs for the management of nonpoint sources include nuisance wildlife control plans and pet waste ordinances. Nuisance wildlife information can be found on the DEP's website at http://www.ct.gov/dep/cwp/view.asp?a=2723&q=325944&depNav_GID=1655. Pet waste information can be found on the CT River Coastal Conservation District website at http://www.conservect.org/ctrivercoastal/give_a_bark_resources.shtml. As progress is made implementing BMPs, the "percent reduction" needed to meet criteria will decrease.

The DEP encourages all local stakeholders to continue their efforts by working together to formulate a watershed based plan to implement the TMDL. A watershed based plan formulated at the local level will most efficiently make use of local resources by assigning tasks to responsible parties and serving as an agreed roadmap to reducing bacteria levels in the Basin.

In addition, the members of the DEP's watershed management program will continue to provide technical and educational assistance to the local municipalities and other stakeholders, as well as identify potential funding sources, when available, for implementation of the TMDL and monitoring plan. Please use the following link for contact information for involved DEP staff: http://www.ct.gov/dep/cwp/view.asp?a=2719&q=325624&depNav_GID=1654.

WATER QUALITY MONITORING PLAN

A comprehensive water quality monitoring program is necessary to guide TMDL implementation efforts. The monitoring program should be designed to accomplish two objectives: source detection to identify specific sources of bacterial loading and to direct BMP implementation efforts with fixed station monitoring to quantify progress in achieving TMDL established goals.

Section 6(h)(1)(a) of the MS4 Permit specifies the following monitoring requirement:

> *"Stormwater monitoring shall be conducted by the Regulated Small MS4 annually starting in 2004. At least two outfalls apiece shall be monitored from areas of primarily industrial development, commercial development and residential development, respectively, for a total of six (6) outfalls monitored. Each monitored outfall shall be selected based on an evaluation by the MS4 that the drainage area of such outfall is representative of the overall nature of its respective land use type."*

This type of monitoring may be referred to as event monitoring because it is scheduled to coincide with a stormwater runoff event. Event monitoring can present numerous logistical difficulties for municipalities and may not be the most efficient way to measure progress in achieving water quality standards. This is particularly true for streams draining urbanized watersheds where many sources contribute to excursions above water quality criteria.

However, a comprehensive water quality monitoring program is necessary to guide TMDL implementation efforts. Therefore, the monitoring program should be designed to accomplish two objectives; source detection to identify specific sources of bacterial loading and direct BMP implementation efforts with fixed station monitoring to quantify progress in achieving TMDL established goals. In order to customize their monitoring plan to better identify TMDL pollutant sources and track the effectiveness of TMDL pollutant reduction measures, the municipality may request written approval from the DEP for an alternative monitoring program as allowed by Section 6(h)(1)(B) of the permit:

> *"The municipality may submit a request to the Commissioner in writing for implementation of an alternate sampling plan of equivalent or greater scope. The Commissioner will approve or deny such a request in writing."*

The DEP advises municipalities with discharges that contribute pollutant(s) for which a TMDL(s) has been designated to request approval for an alternative monitoring program to address both source detection and progress quantification objectives. Source detection monitoring may include visual inspection of storm sewer outfalls under dry weather conditions, event sampling of individual storm sewer outfalls, and monitoring of ambient (in-stream) conditions at closely spaced intervals to identify "hot spots" for more detailed investigations

leading to specific sources of high bacteria loads. Such monitoring may be performed by municipal staff, citizen volunteers, or contracted to an environmental consulting firm.

Progress in achieving TMDL established goals through BMP implementation may be most effectively gauged through implementing a fixed station ambient monitoring program. DEP strongly recommends that routine monitoring be performed at the same sites used to generate the data used to perform the TMDL calculations. Sampling should be scheduled at regularly spaced intervals during the recreational season (May 1- Sept 30). In this way the data set at the end of each season will include ambient values for both "wet" and "dry" conditions in relative proportion to the number of "wet" and "dry" days that occurred during that period. As additional data is generated over time it will be possible to repeat the TMDL calculations and compare the percent reductions needed under "dry" and "wet" conditions to the percent reductions needed at the time of TMDL adoption. Additional schedule sampling guidance can be found in Appendix C of this document.

All pollutant parameters must be analyzed using methods prescribed in Title 40, CFR, Part 136 (1990). Electronic submission of data to DEP is highly encouraged. Results of monitoring that indicate unusually high levels of contamination or potentially illegal activities should be forwarded to the appropriate municipal or State agency for follow-up investigation and enforcement. Consistent with the requirements of the MS4 permit, the following parameters should be included in any monitoring program:

pH (SU)
Hardness (mg/l)
Conductivity (umos)
Oil and grease (mg/l)
Chemical Oxygen Demand (mg/l)
Turbidity (NTU)
Total Suspended Solids (mg/l)
Total Phosphorous (mg/l)
Ammonia (mg/l)
Total Kjeldahl Nitrogen (mg/l)
Nitrate plus Nitrite Nitrogen (mg/l)
E. coli (col/100ml)
precipitation (in)

DEP will continue to explore ways to provide funding support for monitoring efforts linked to TMDL implementation or other activities that exceed the minimum requirements of the MS4 permit. DEP is also committed to providing technical assistance in monitoring program design and establishing procedures for electronic data submission.

REASONABLE ASSURANCE

The MS4 Permit is a legally enforceable document that provides reasonable assurance that the municipalities will take steps towards achieving the target TMDLs and reducing point sources of stormwater containing bacteria.

The DEP further supports the development of a watershed based plan specific to bacteria reductions and source mitigation in order to implement the TMDLs. Such a plan may also make projects aimed at reducing nonpoint sources of bacteria in the Pequabuck River Sub-Regional Basin eligible for funding, as along as such projects are not used for permit compliance.

PROVISIONS FOR REVISING THE TMDLs

The DEP reserves the authority to modify the TMDLs as needed to account for new information made available during the implementation of the TMDLs. Modification of the TMDLs will only be made following an opportunity for public participation and will be subject to the review and approval of the EPA. New information, which will be generated during TMDL implementation, includes monitoring data, new or revised State or Federal regulations adopted pursuant to Section 303(d) of the Clean Water Act, and the publication by EPA of national or regional guidance relevant to the implementation of the TMDL program. The DEP will propose modifications to the TMDL analysis only in the event that a review of the new information indicates that such a modification is warranted and is consistent with the anti-degradation provisions in Connecticut Water Quality Standards. The subject waterbodies of this TMDL analysis will continue to be included on the *List of Connecticut Water bodies Not Meeting Water Quality Standards* until monitoring data confirms that recreational uses are fully supported.

PUBLIC PARTICIPATION

This TMDL document will be public noticed for review and comment by the general public. It is expected that open forums will continue as implementation of the TMDL occurs.

REFERENCES

(1) Connecticut Department of Environmental Protection, 2006. Appendix C: List of Connecticut Water bodies Not Meeting Water Quality Standards. In: *Integrated Water Quality Report to Congress. Bureau of Water Protection and Land Reuse*, 79 Elm Street, Hartford, CT 06106-5127.

(2) Connecticut Department of Environmental Protection, 2002. *Connecticut Water Quality Standards*. Bureau of Water Management, 79 Elm Street, Hartford, CT 06106-5127.

(3) Connecticut Department of Environmental Protection, 2006. *Integrated Water Quality Report to Congress*. Bureau of Water Protection and Land Reuse, 79 Elm Street, Hartford, CT 06106-5127.

(4) United States Environmental Protection Agency, 2006. *Establishing TMDL "Daily" Loads in Light of the Decision by the U.S. Court of Appeals for the D.C. Circuit in Friends of the Earth, Inc. v. EPA, et al., No.05-5015, (April 25, 2006) and Implications for NPDES Permits*.

(5) U.S. Census Bureau, March 2002. www.census.gov/geo/www/ua/ua_2k.html.

(6) United States Environmental Protection Agency, 1986. *Ambient Water Quality Criteria for Bacteria -1986.* EPA 440/5-84-002.

(7) Connecticut Department of Environmental Protection, 2005. *Development of TMDLs for Indicator Bacteria in Contact Recreation Areas Using the Cumulative Frequency Distribution Function Method*. Bureau of Water Protection and Land Reuse, 79 Elm Street, Hartford, CT 06106-5127.

(8) Connecticut Department of Environmental Protection, 2002. *Water Quality Summary Report for Sasco Brook, Mill River, Rooster River, Fairfield County Connecticut*. November 2002.

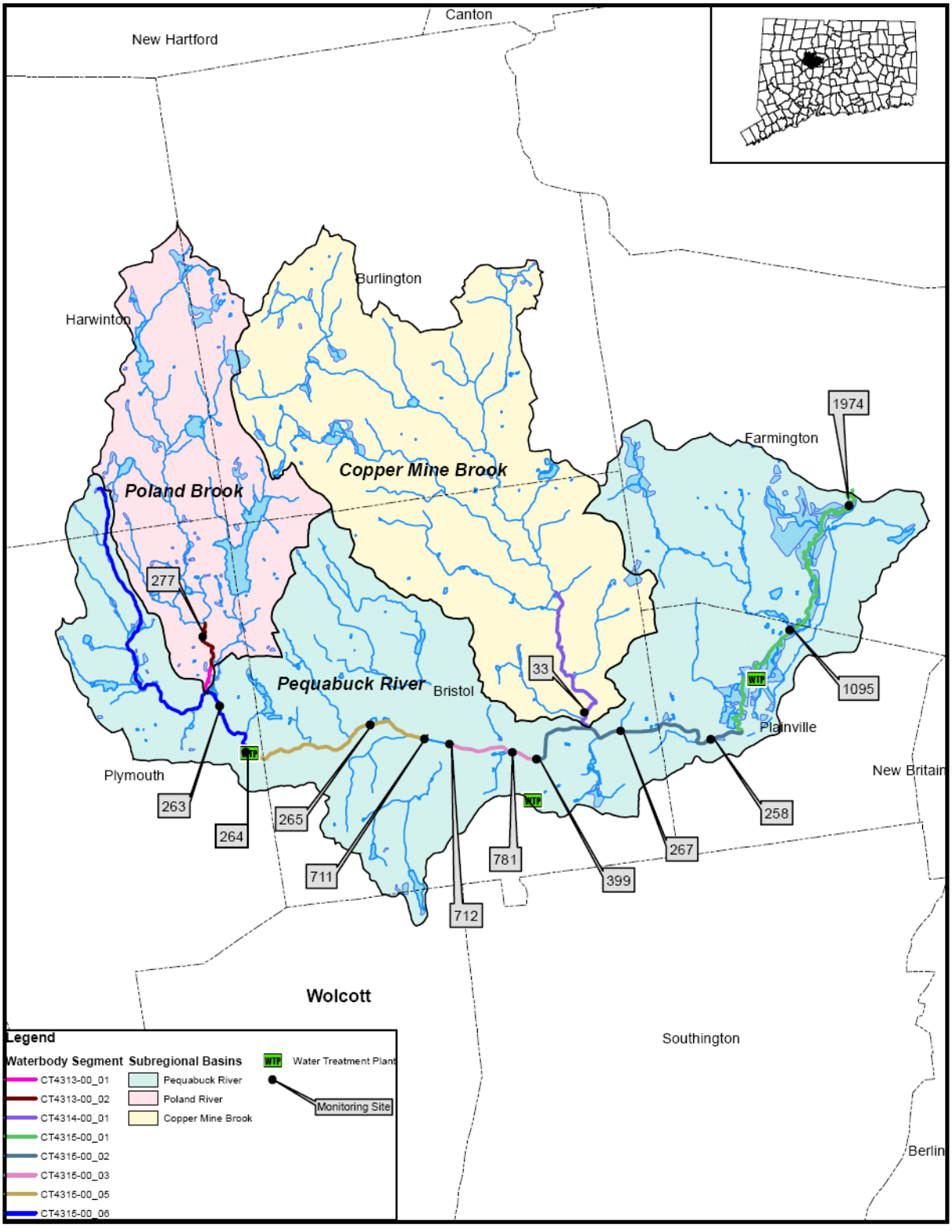


Figure 1: Pequabuck Regional Basin Location Map

Map Data: CTDEP
Map Created: August 2008

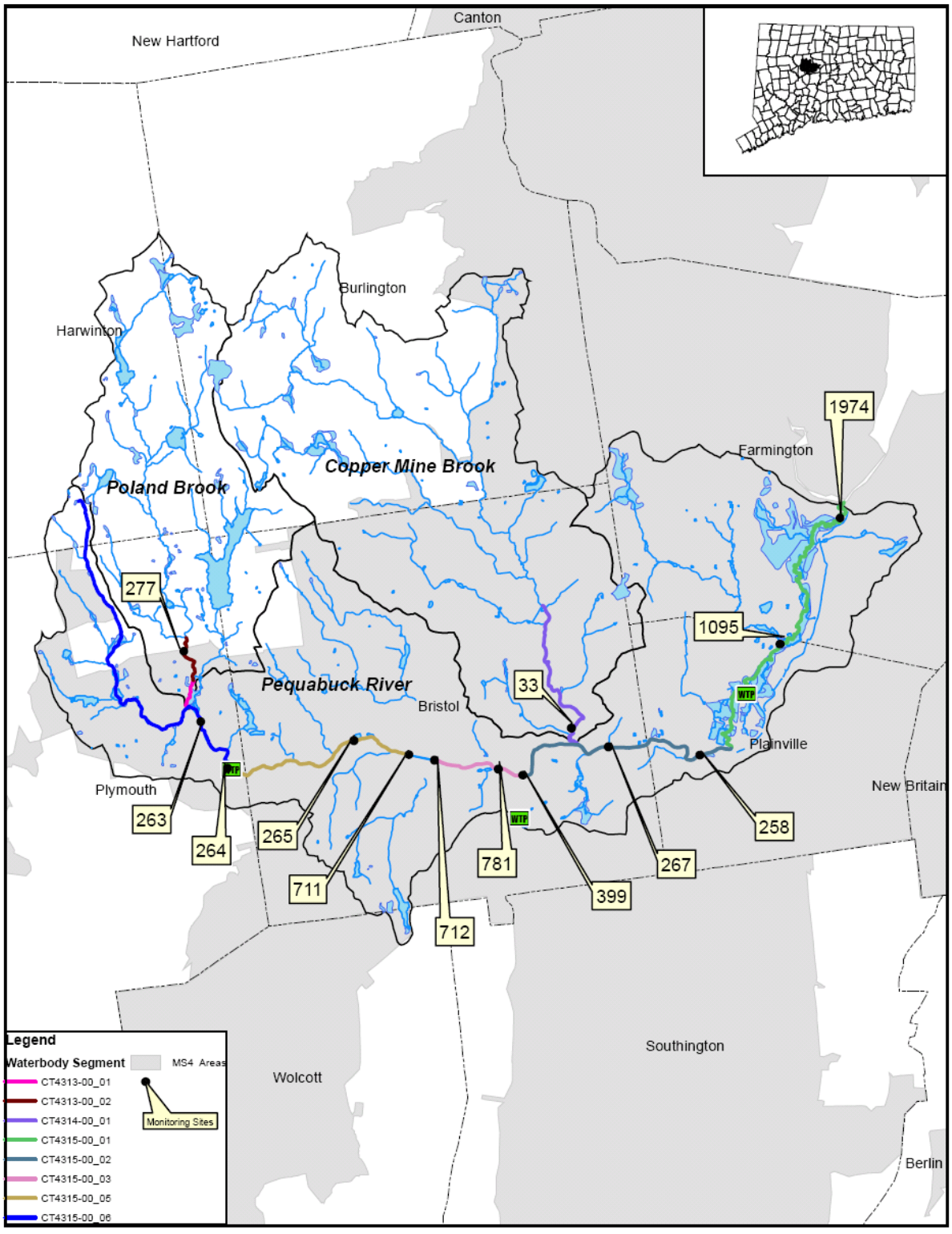


Figure 2: Pequabuck Regional Basin Designated MS4 Area Map

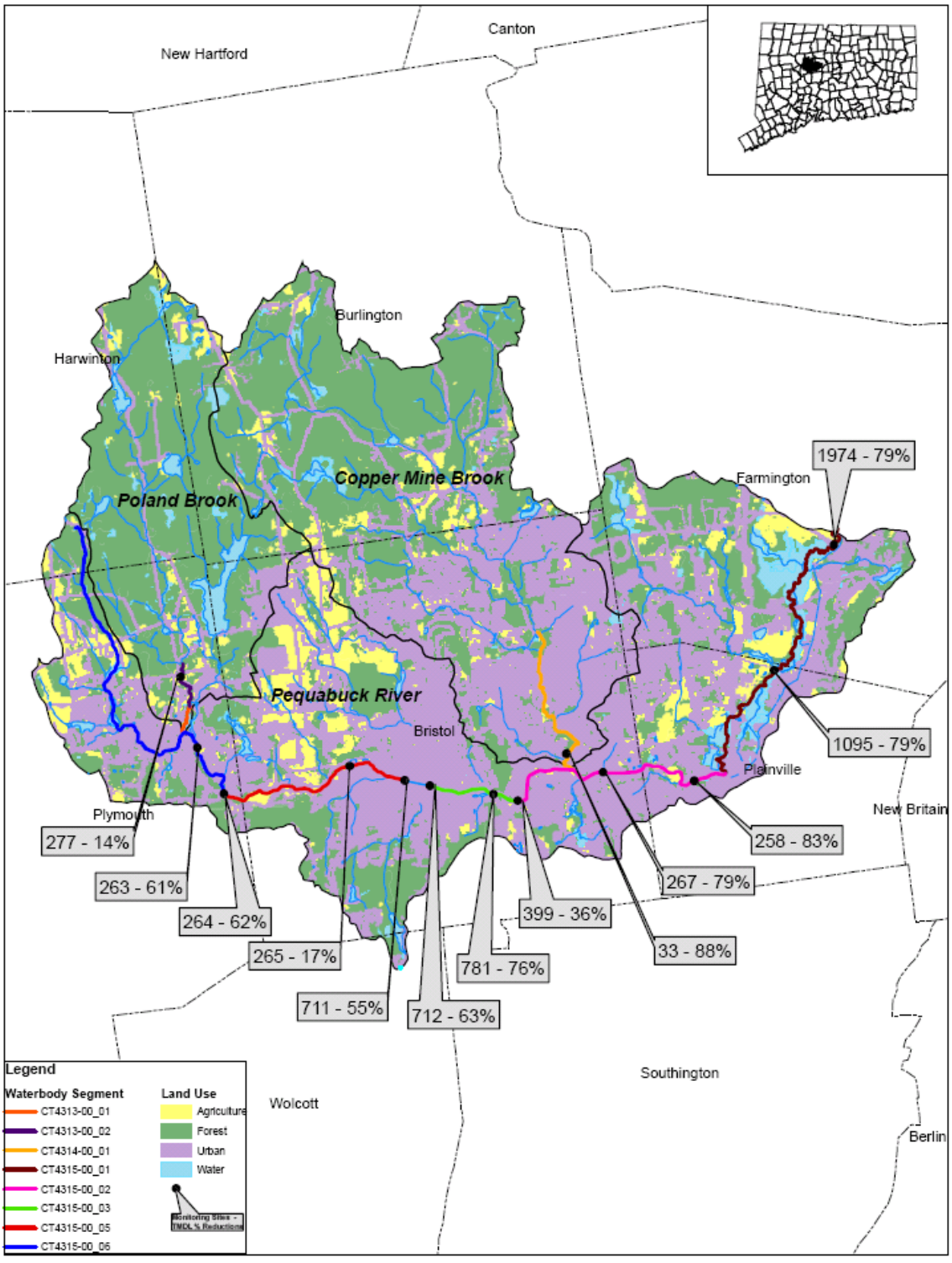


Figure 3: Pequabuck Regional Basin Land Use & TMDL % Reductions

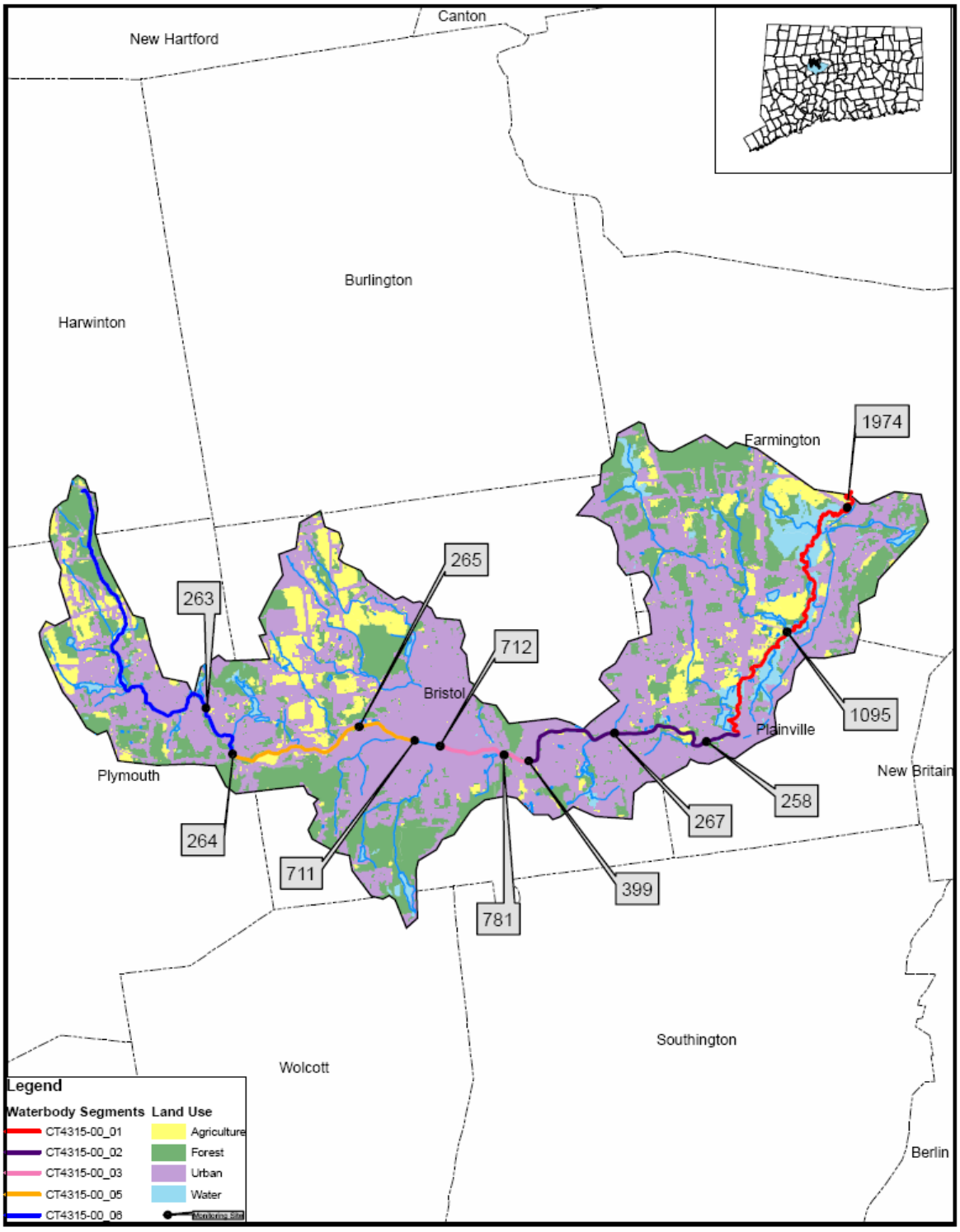


Figure 4: Pequabuck River Subregional Basin Land Use

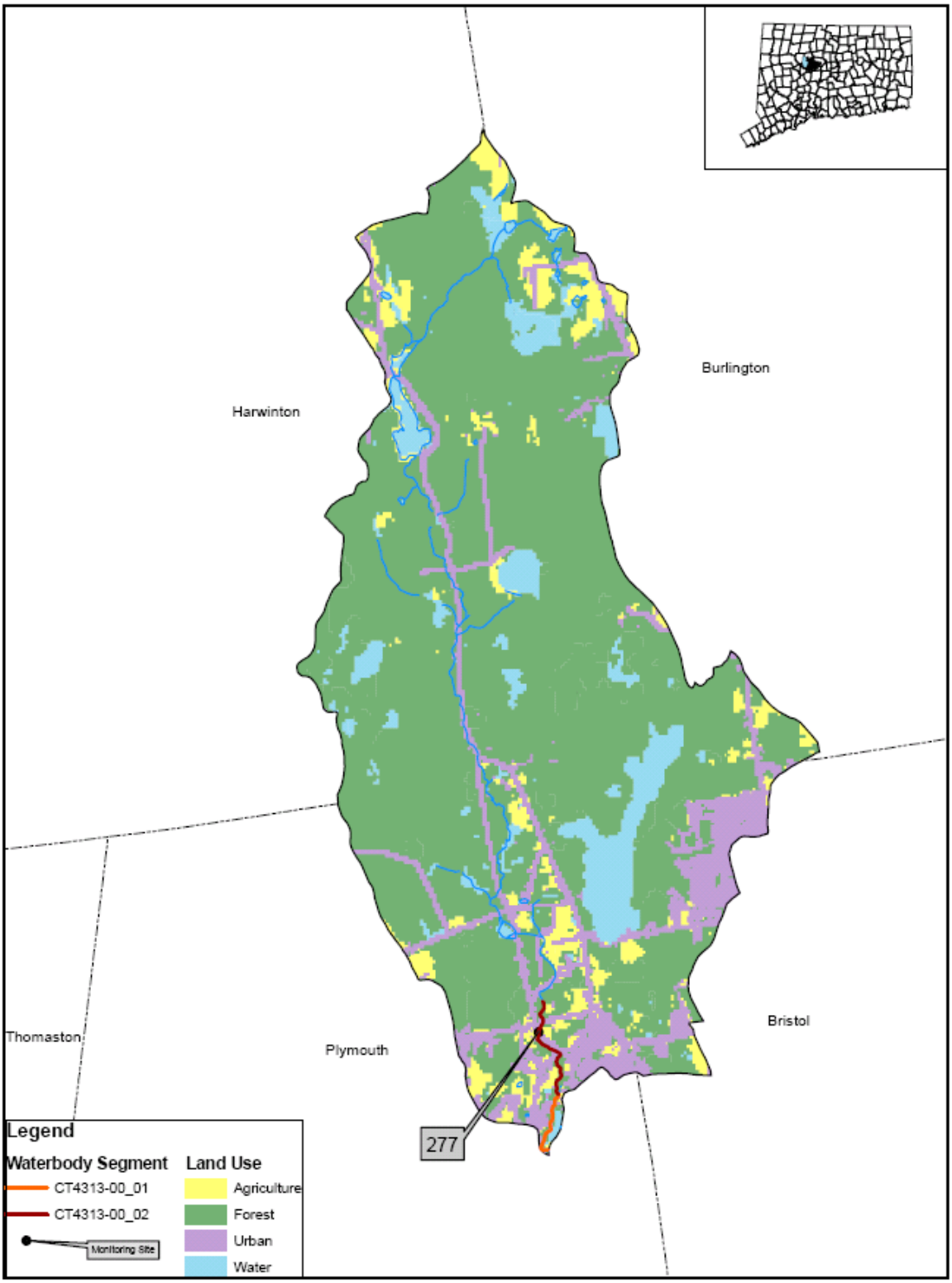


Figure 5: Poland River Land Use

Map Data: CTDEP
Map Created: August 2008

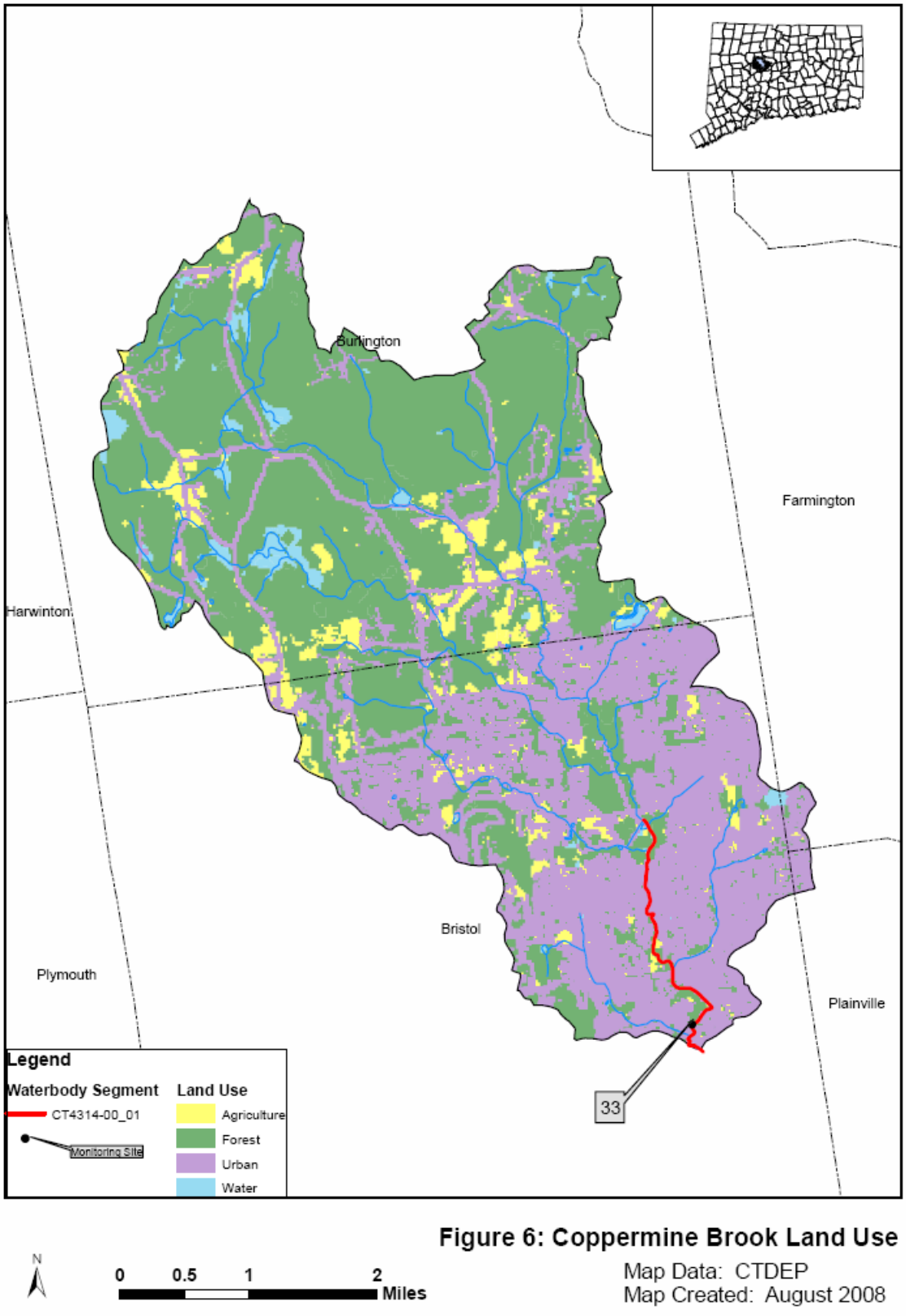


Figure 6: Coppermine Brook Land Use

Map Data: CTDEP
Map Created: August 2008

Appendix A

A-1 Site Specific Information for Pequabuck River
A-2 Site Specific Information for Coppermine Brook
A-3 Site Specific Information for Poland River

Appendix A-1
Pequabuck River
Waterbody Specific Information

Impaired Waterbody
Waterbody Name: Pequabuck River
Waterbody Segment ID: CT 4315-00_01, CT 4315-00_02, CT 4315-00_03, CT 4315-00_04, CT 4315-00_05, CT 4315-00_06
Waterbody Segment Description: From mouth at Farmington River, Plainville upstream to headwaters South of Rocky Road, Harwinton

Impairment Description:
Designated Use Impairment: Recreation
Size of Impaired Segment: 18.46 linear miles
Surface Water Classification: Class C/B, B

Watershed Description:
Total Regional Drainage Basin Area: 18576 acres
Tributary To: Farmington River
Subregional Basin Name & Code: Pequabuck River, 4315
Regional Basin: Farmington River
Major Basin: Connecticut
Watershed Towns: Bristol, Burlington, Farmington, Harwinton, New Britain, Plainville, Plymouth, Wolcott
Phase II GP applicable? : Bristol - Y, Burlington – Y, Farmington – Y, Harwinton - N, New Britain – Y, Plainville - Y, Plymouth – Y, Wolcott – Y
Applicable Season: Recreation Season (May 1 to September 30)

Landuse:

Land Cover Category	Percent Composition
Forested	34% (6375 acres)
Urban/Developed	51% (9290 acres)
Water/Wetland	4% (765 acres)
Agriculture	11% (1933 acres)

Data Source: Connecticut Land Use Land Cover Data Layer LANDSTAT (2002) Thematic Mapper Satellite Imagery.

Appendix A-1
Pequabuck River
TMDL Summary

The TMDL analysis for the Pequabuck River was conducted at eleven sites, which are representative of five of six waterbody segments. Current data is unavailable to conduct a TMDL analysis for segment CT4315-00_04 in the Pequabuck River. The section flows underground in downtown Bristol. However, this small segment (0.33 linear miles) is located in-between two segments that require reductions. There is also data generated from just upstream and just downstream of segment CT4315-00_04 at site numbers 711 and 712 respectively. Therefore, it is reasonable to presume that the same percent reduction applies to the unlisted segment as the downstream site 712.

The analysis indicates that the sites are influenced by sources of bacteria active under both wet weather and dry weather conditions. The Waste Load Allocation (WLA) is applicable to regulated stormwater. Reduction in the WLA can be achieved through the detection and elimination of illicit discharges to the storm sewers, as well as the installation of engineered controls to reduce the surge of stormwater to the river, promote groundwater recharge, and improve water quality. Nonpoint sources, such as domestic animal waste, and wildlife may contribute to the Load Allocation (LA).

It is important to note that the percent reductions required at the site 399 in segment CT4315-00_03 and site 265 in segment CT4315-00_05 are significantly lower than other locations in the basin. Site 399 is the outfall of the Bristol WWTP and therefore should produce negligible bacteria loading during the disinfection season. Site 265 is located in a town park and may receive less of a stormwater surge during precipitation events due to adequate buffer zones within the park boundary. The furthest downstream sites (1974 and 1095) require the most significant reductions and this is likely a result of the Pequabuck flowing through long stretches of urban developed landscape, exposing the river to more significant stormwater runoff during precipitation events.

Table of Pequabuck Site Photos. Upstream through downstream (left to right, top to bottom)

 Site 263 (furthest upstream location) Route 72 & route 6	 Site 264 (Downstream of Canal Street)
 Site 265 (Upper End of Rockwell Park Upstream of stone bridge)	 Site 711 (Start of box culvert adjacent to route 72 Bristol)

Site 712 End of box culvert adjacent to route 72

Site 781 (Upstream of dam at route 229 and Memorial Blvd

Site 399 (10m Downstream of Bristol WPCF outfall on Pine Street)

Site 267 (Adjacent to USGS gauge just upstream of Central Ave)

Site 258 (Downstream of route 177 in Plainville)

Site 1095 (Plainville @ Northwest Drive)

Site 1974 (Old USGS gauge location, @ Meadow Road, Land Trust walk)

Waterbody Name: Pequabuck River
Waterbody Segment ID: CT4315-00_01

Data Used in the Analysis

Monitoring Site: 1974, Site description: Meadow Road

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
8/8/06	0.00	0.07	0.07	DRY	370	6.0	0.2857	75	80
8/10/06	0.05	0.05	0.12	DRY	256.667	4.0	0.1905	56	78
8/16/06	0.00	0.80	0.80	WET	1200	16.0	0.7857	261	78
8/17/06	0.00	0.00	0.80	DRY	415	9.0	0.4286	107	74
8/21/06	0.00	0.82	1.14	WET	1200	16.0	0.7857	261	78
8/24/06	0.01	0.01	0.01	DRY	235	3.0	0.1429	47	80
9/7/06	0.00	0.00	0.07	DRY	510	11.0	0.5238	133	74
9/13/06	0.00	0.00	0.36	DRY	280	5.0	0.2381	65	77
9/18/06	0.00	0.00	1.14	DRY	390	7.0	0.3333	85	78
9/20/06	0.00	0.05	0.05	DRY	225	2.0	0.0952	38	83
9/21/06	0.00	0.00	0.05	DRY	205	1.0	0.0476	27	87
9/25/06	0.00	0.06	0.09	DRY	605	13.0	0.6190	167	72
9/28/06	0.00	0.00	0.00	DRY	400	8.0	0.3810	95	76
5/31/07	0.32	0.32	0.33	WET	570	12.0	0.5714	149	74
6/21/07	0.03	0.04	0.04	DRY	480	10.0	0.4762	119	75
6/26/07	0.00	0.00	0.00	DRY	740	14.0	0.6667	187	75
6/28/07	0.23	0.24	0.24	WET	815	15.0	0.7143	212	74
7/5/07	0.63	0.63	0.63	WET	5200	20.0	0.9524	576	89
7/12/07	0.00	0.69	0.69	WET	12000	21.0	1.0000	576	95
8/8/07	0.40	0.40	0.47	WET	1500	18.0	0.8571	337	78
8/15/07	0.56	0.56	0.58	WET	2300	19.0	0.9048	421	82

Statistics

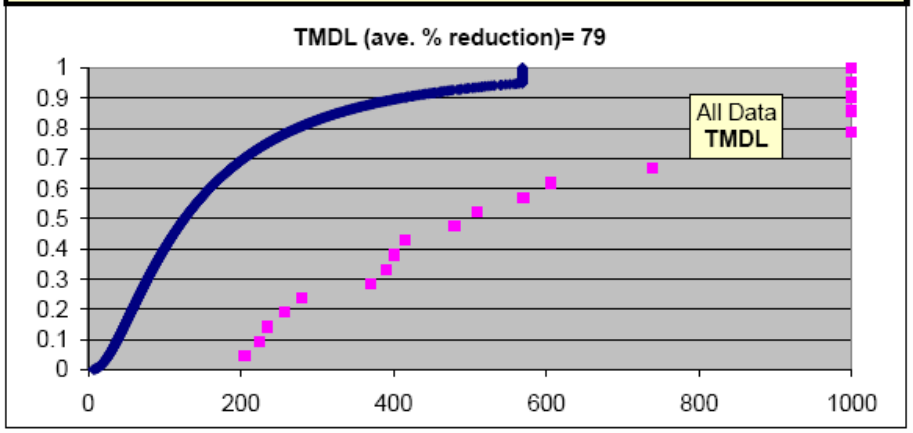
# Samples DRY	13
# Samples WET	8
# Samples Total	21
Geomean	679
Log std deviation	0.4571

Avg % Reduction

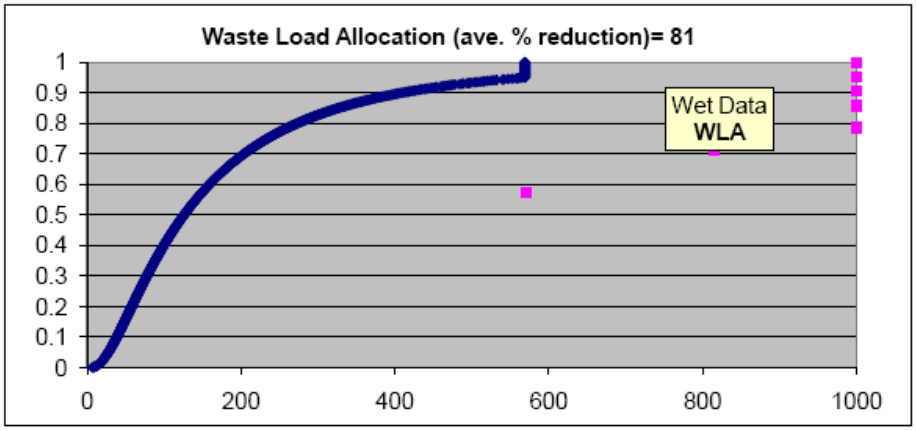
Wet (WLA)	81
Dry (LA)	78
Total (TMDL)	79

Precipitation and E. coli data provided by the Bristol Water Company & <www.wunderground.com> and CT DEP staff respectively.
WET Condition defined as greater than 0.1" precipitation in 24 hours or 0.25" precipitation in 48 hours, or 2.0" precipitation in 96 hours.

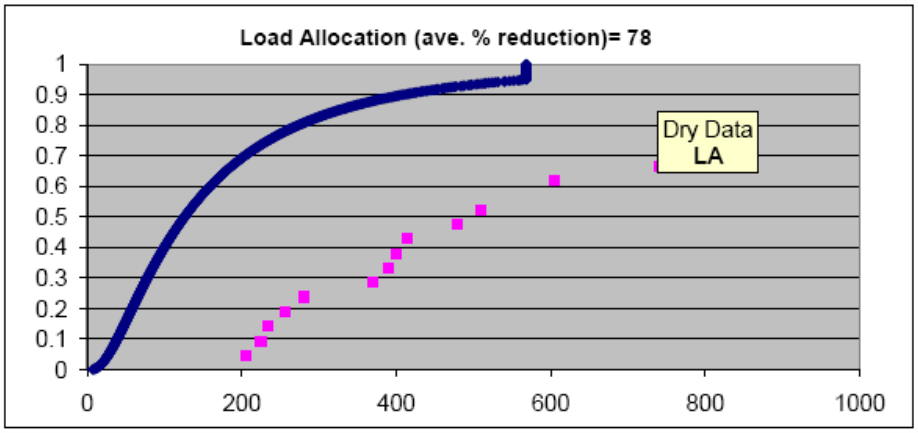
Waterbody Name: Pequabuck River Criteria Curve for Monitoring Site 1974
y axis = cumulative frequency; x axis = *E.coli* (col/100mL)



TMDL needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on dry and wet weather data.



Waste Load Allocation (WLA) needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on wet weather data.



Load Allocation (LA) needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on dry weather data.

Waterbody Name: Pequabuck River
Waterbody Segment ID: CT4315-00_01

Data Used in the Analysis

Monitoring Site: 1095, Site description:Northwest Drive

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
8/8/06	0.00	0.07	0.07	DRY	375	7.0	0.3333	85	77
8/10/06	0.05	0.05	0.12	DRY	380	8.0	0.3810	95	75
8/16/06	0.00	0.80	0.80	**WET**	1400	17.0	0.8095	282	80
8/17/06	0.00	0.00	0.80	DRY	545	12.0	0.5714	149	73
8/21/06	0.00	0.82	1.14	**WET**	735	14.0	0.6667	187	75
8/24/06	0.01	0.01	0.01	DRY	220	2.0	0.0952	38	83
9/7/06	0.00	0.00	0.07	DRY	500	11.0	0.5238	133	73
9/13/06	0.00	0.00	0.36	DRY	305	6.0	0.2857	75	75
9/18/06	0.00	0.00	1.14	DRY	300	5.0	0.2381	65	78
9/20/06	0.00	0.05	0.05	DRY	200	1.0	0.0476	27	86
9/21/06	0.00	0.00	0.05	DRY	295	4.0	0.1905	56	81
9/25/06	0.00	0.06	0.09	DRY	670	13.0	0.6190	167	75
9/28/06	0.00	0.00	0.00	DRY	475	10.0	0.4762	119	75
5/31/07	0.32	0.32	0.33	**WET**	2100	19.0	0.9048	421	80
6/21/07	0.03	0.04	0.04	DRY	230	3.0	0.1429	47	80
6/26/07	0.00	0.00	0.00	DRY	440	9.0	0.4286	107	76
6/28/07	0.23	0.24	0.24	**WET**	1300	16.0	0.7619	243	81
7/5/07	0.63	0.63	0.63	**WET**	4250	20.0	0.9524	576	86
7/12/07	0.00	0.69	0.69	**WET**	5500	21.0	1.0000	576	90
8/8/07	0.40	0.40	0.47	**WET**	2000	18.0	0.8571	337	83
8/15/07	0.55	0.55	0.58	**WET**	850	15.0	0.7143	212	75

Statistics

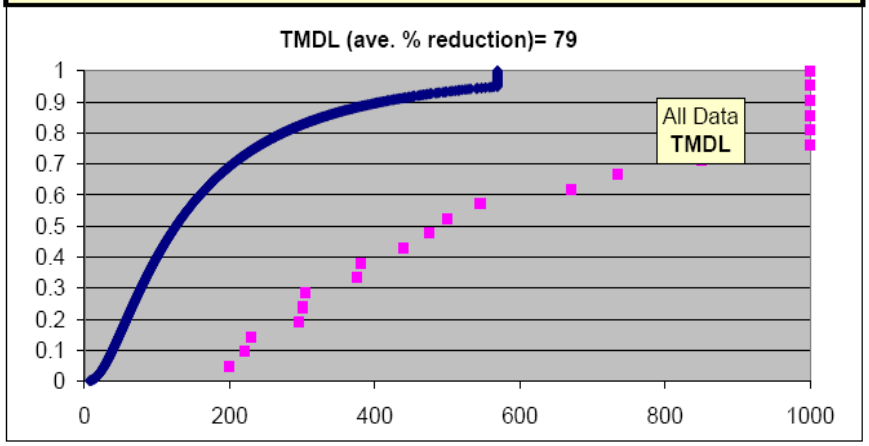
# Samples DRY	**13**
# Samples WET	**8**
# Samples Total	**21**
Geomean	**661**
Log std deviation	**0.4149**

Avg % Reduction

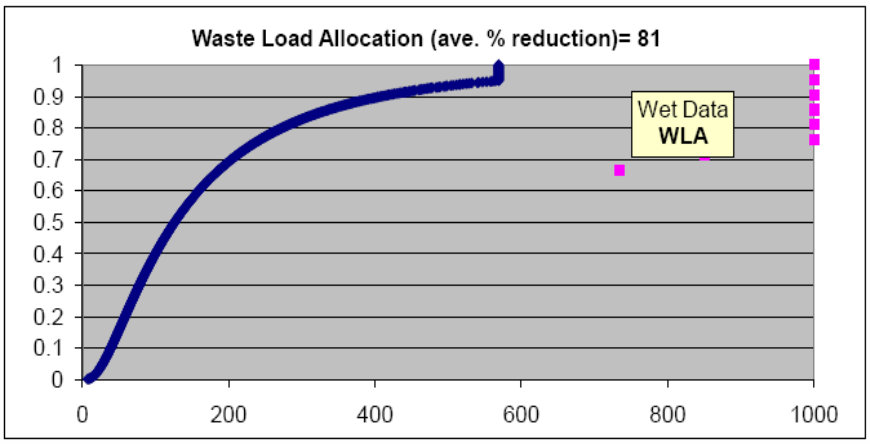
Wet (WLA)	**81**
Dry (LA)	**78**
Total (TMDL)	**79**

Precipitation and E. coli data provided by the Bristol Water Company and <www.wunderground.com> and CT DEP staff respectively.
WET Condition defined as greater than 0.1" precipitation in 24 hours or 0.25" precipitation in 48 hours, or 2.0" precipitation in 96 hours.

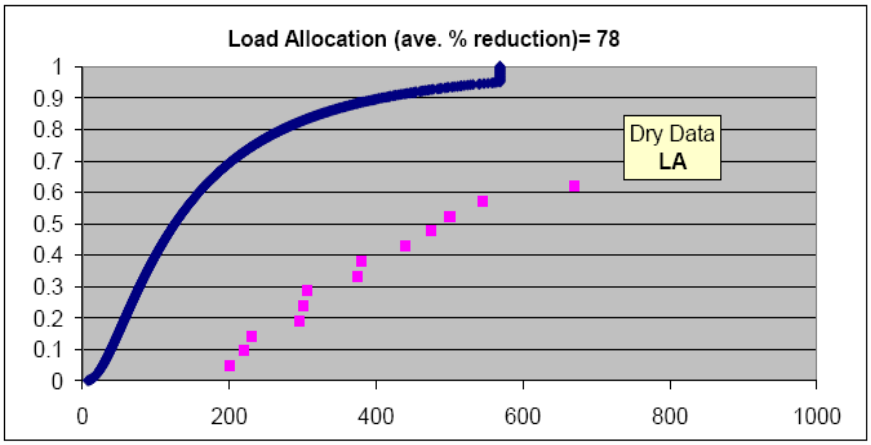
Waterbody Name: Pequabuck River Criteria Curve for Monitoring Site 1095
y axis = cumulative frequency; x axis = *E.coli* (col/100mL)



TMDL needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on dry and wet weather data.



Waste Load Allocation (WLA) needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on wet weather data.



Load Allocation (LA) needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on dry weather data.

Waterbody Name: Pequabuck River

Waterbody Segment ID: CT4315-00_02

Data Used in the Analysis

Monitoring Site: 258, Site description: Downstream of Route 177

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
8/8/06	0.00	0.07	0.07	DRY	575	10.0	0.4762	119	79
8/10/06	0.05	0.05	0.12	DRY	655	11.0	0.5238	133	80
8/16/06	0.00	0.80	0.80	**WET**	1850	18.0	0.8571	337	82
8/17/06	0.00	0.00	0.80	DRY	1633.333	17.0	0.8095	282	83
8/21/06	0.00	0.82	1.14	**WET**	675	12.0	0.5714	149	78
8/24/06	0.01	0.01	0.01	DRY	326.667	2.0	0.0952	38	88
9/7/06	0.00	0.00	0.07	DRY	773.333	13.0	0.6190	167	78
9/13/06	0.00	0.00	0.36	DRY	330	3.0	0.1429	47	86
9/18/06	0.00	0.00	1.14	DRY	460	7.0	0.3333	85	82
9/20/06	0.00	0.05	0.05	DRY	385	5.0	0.2381	65	83
9/21/06	0.00	0.00	0.05	DRY	370	4.0	0.1905	56	85
9/25/06	0.00	0.06	0.09	DRY	415	6.0	0.2857	75	82
9/28/06	0.00	0.00	0.00	DRY	470	8.0	0.3810	95	80
5/31/07	0.32	0.32	0.33	**WET**	320	1.0	0.0476	27	92
6/21/07	0.03	0.04	0.04	DRY	475	9.0	0.4286	107	78
6/26/07	0.00	0.00	0.00	DRY	830	14.0	0.6667	187	77
6/28/07	0.23	0.24	0.24	**WET**	860	15.0	0.7143	212	75
7/5/07	0.63	0.63	0.63	**WET**	3300	19.0	0.9048	421	87
7/12/07	0.00	0.69	0.69	**WET**	4600	20.0	0.9524	576	87
8/8/07	0.40	0.40	0.47	**WET**	11000	21.0	1.0000	576	95
8/15/07	0.55	0.55	0.58	**WET**	1600	16.0	0.7619	243	85

Statistics

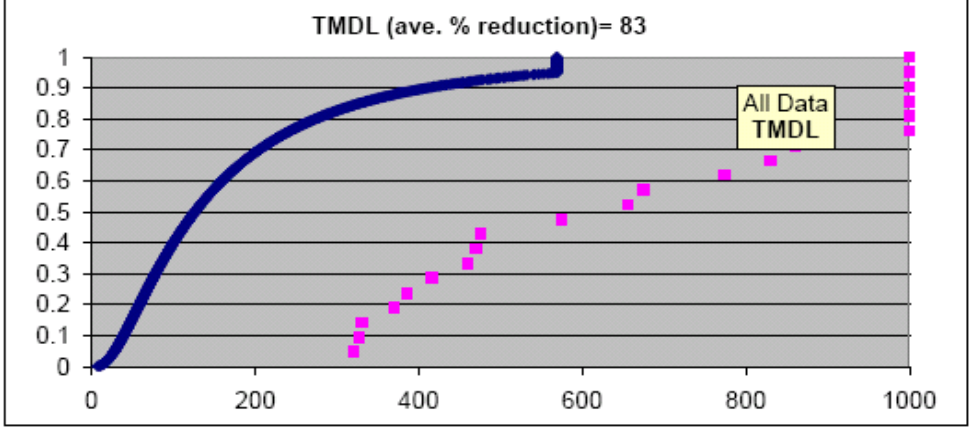
# Samples DRY	13
# Samples WET	8
# Samples Total	21
Geomean	837
Log std deviation	0.4191

Avg % Reduction

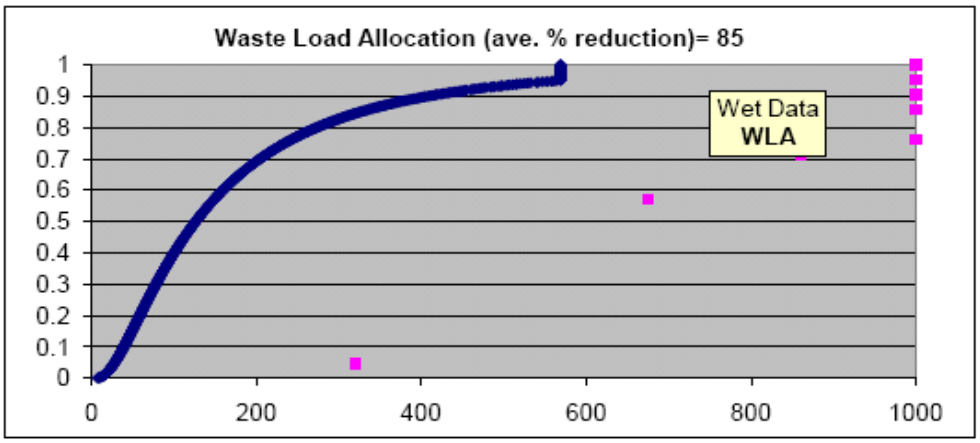
Wet (WLA)	85
Dry (LA)	82
Total (TMDL)	83

Precipitation and E. coli data provided by the Bristol Water COmpany and <www.wunderground.com> and CT DEP Staff respectively.
WET Condition defined as greater than 0.1" precipitation in 24 hours or 0.25" precipitation in 48 hours, or 2.0" precipitation in 96 hours.

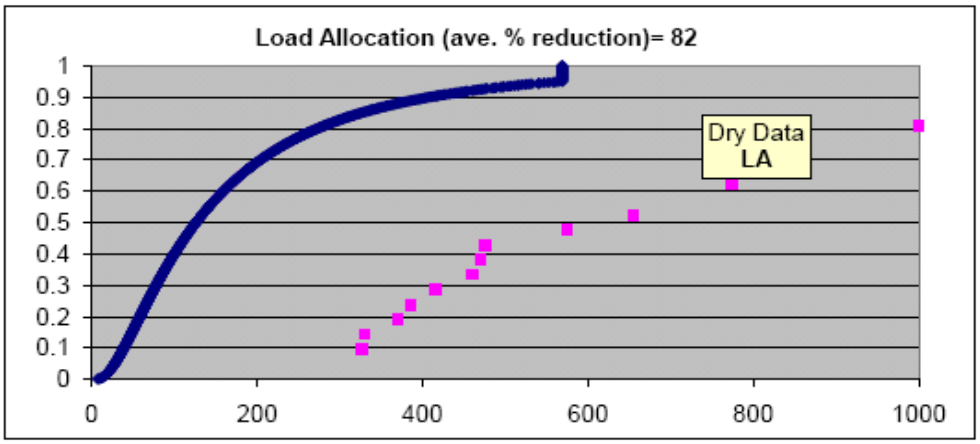
Waterbody Name: Pequabuck River Criteria Curve for Monitoring Site 258
y axis = cumulative frequency; x axis = *E.coli* (col/100mL)



TMDL needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on dry and wet weather data.



Waste Load Allocation (WLA) needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on wet weather data.



Load Allocation (LA) needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on dry weather data.

Waterbody Name: Pequabuck River
Waterbody Segment ID: CT4315-00_02

Data Used in the Analysis

Monitoring Site: 267, Site description: USGS Gauge Upstream of Central Avenue

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
8/8/06	0.00	0.07	0.07	DRY	503.333	12.0	0.5714	149	70
8/10/06	0.05	0.05	0.12	DRY	666.667	14.0	0.6667	187	72
8/16/06	0.00	0.80	0.80	WET	3300	19.0	0.9048	421	87
8/17/06	0.00	0.00	0.80	DRY	1300	16.0	0.7857	261	80
8/21/06	0.00	0.82	1.14	WET	660	13.0	0.6190	167	75
8/24/06	0.01	0.01	0.01	DRY	400	9.0	0.4286	107	73
9/7/06	0.00	0.00	0.07	DRY	903.333	15.0	0.7143	212	77
9/13/06	0.00	0.00	0.36	DRY	305	5.0	0.2381	65	79
9/18/06	0.00	0.00	1.14	DRY	463.333	10.0	0.4762	119	74
9/20/06	0.00	0.05	0.05	DRY	280	3.0	0.1429	47	83
9/21/06	0.00	0.00	0.05	DRY	390	8.0	0.3810	95	76
9/25/06	0.00	0.06	0.09	DRY	263.333	2.0	0.0952	38	86
9/28/06	0.00	0.00	0.00	DRY	345	7.0	0.3333	85	75
5/31/07	0.32	0.32	0.33	WET	140	1.0	0.0476	27	81
6/21/07	0.03	0.04	0.04	DRY	290	4.0	0.1905	56	81
6/26/07	0.00	0.00	0.00	DRY	310	6.0	0.2857	75	76
6/28/07	0.23	0.24	0.24	WET	500	11.0	0.5238	133	73
7/5/07	0.63	0.63	0.63	WET	1900	18.0	0.8571	337	82
7/12/07	0.00	0.69	0.69	WET	4400	20.0	0.9524	576	87
8/8/07	0.40	0.40	0.47	WET	24001	21.0	1.0000	576	98
8/15/07	0.55	0.55	0.58	WET	1300	16.0	0.7857	261	80

Statistics

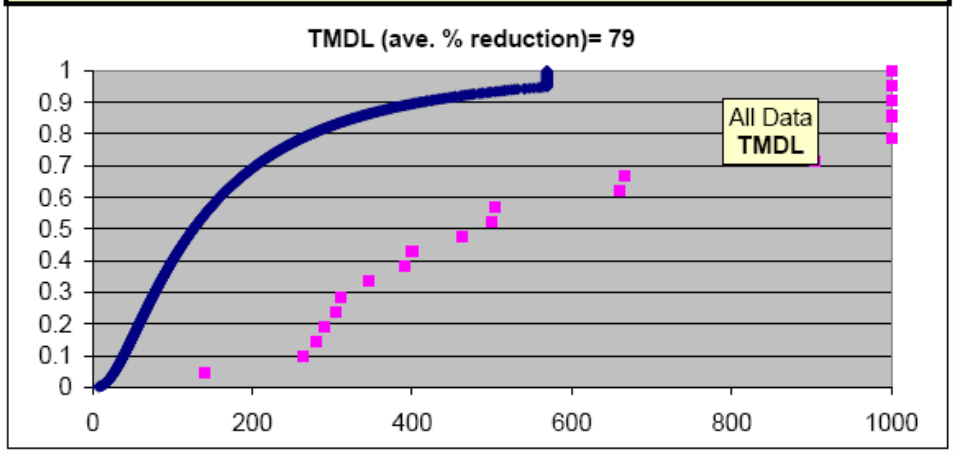
# Samples DRY	13
# Samples WET	8
# Samples Total	21
Geomean	712
Log std deviation	0.5154

Avg % Reduction

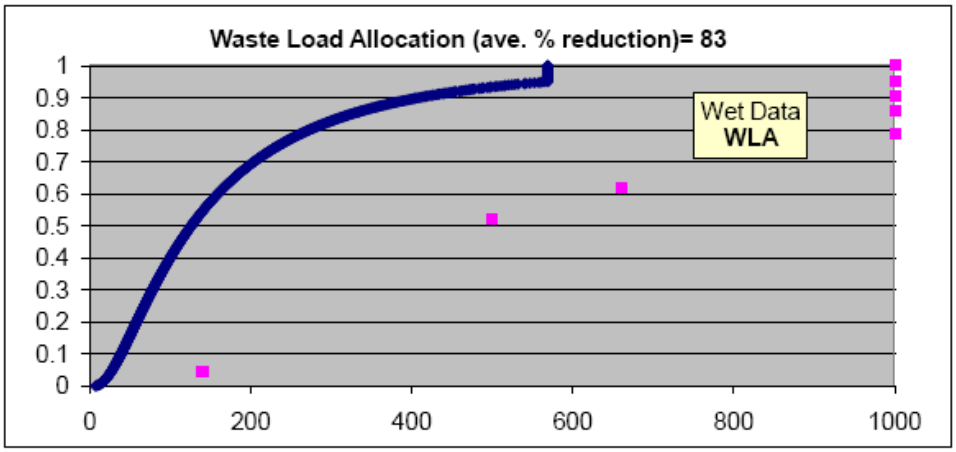
Wet (WLA)	83
Dry (LA)	77
Total (TMDL)	79

Precipitation and E. coli data provided by the Bristol Water Company and <www.wunderground.com> and CT DEP Staff respectively.
WET Condition defined as greater than 0.1" precipitation in 24 hours or 0.25" precipitation in 48 hours, or 2.0" precipitation in 96 hours.

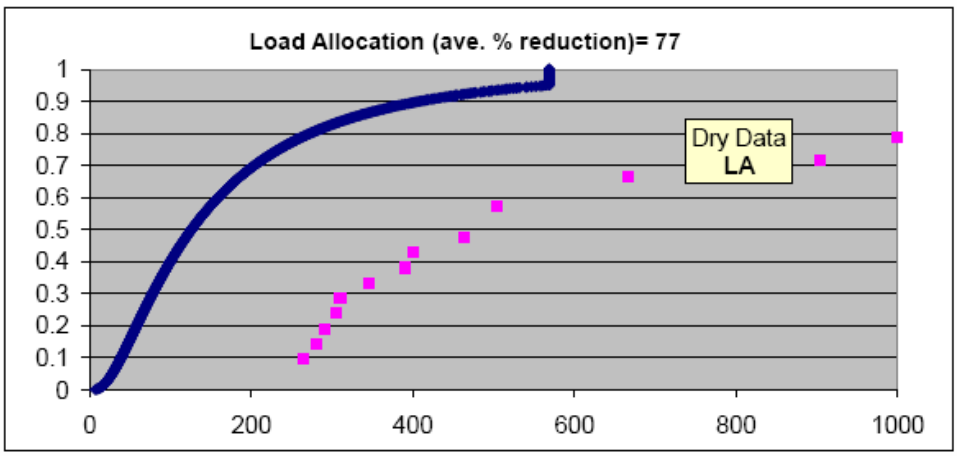
Waterbody Name: Pequabuck River Criteria Curve for Monitoring Site 267
y axis = cumulative frequency; x axis = *E.coli* (col/100mL)



TMDL needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on dry and wet weather data.



Waste Load Allocation (WLA) needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on wet weather data.



Load Allocation (LA) needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on dry weather data.

Waterbody Name: Pequabuck River
Waterbody Segment ID: CT4315-00_03

Data Used in the Analysis

Monitoring Site: 399, Site description: Bristol STP outfall

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
8/8/06	0.00	0.07	0.07	DRY	605	15.0	0.7143	212	65
8/10/06	0.05	0.05	0.12	DRY	1170	18.0	0.8571	337	71
8/16/06	0.00	0.80	0.80	**WET**	10100	21.0	1.0000	576	94
8/17/06	0.00	0.00	0.80	DRY	5300	20.0	0.9524	576	89
8/21/06	0.00	0.82	1.14	**WET**	435	14.0	0.6667	187	57
8/24/06	0.01	0.01	0.01	DRY	140	10.0	0.4762	119	15
9/7/06	0.00	0.00	0.07	DRY	1650	19.0	0.9048	421	75
9/13/06	0.00	0.00	0.36	DRY	130	9.0	0.4286	107	18
9/18/06	0.00	0.00	1.14	DRY	260	12.0	0.5714	149	43
9/20/06	0.00	0.05	0.05	DRY	750	17.0	0.8095	282	62
9/21/06	0.00	0.00	0.05	DRY	610	16.0	0.7619	243	60
9/25/06	0.00	0.06	0.09	DRY	250	11.0	0.5238	133	47
9/28/06	0.00	0.00	0.00	DRY	390	13.0	0.6190	167	57
5/31/07	0.32	0.32	0.33	**WET**	40	7.0	0.3333	85	0
6/21/07	0.03	0.04	0.04	DRY	10	1.0	0.1190	43	0
6/26/07	0.00	0.00	0.00	DRY	10	1.0	0.1190	43	0
6/28/07	0.23	0.24	0.24	**WET**	20	5.0	0.2381	65	0
7/5/07	0.63	0.63	0.63	**WET**	10	1.0	0.1190	43	0
7/12/07	0.00	0.69	0.69	**WET**	51	8.0	0.3810	95	0
8/8/07	0.40	0.40	0.47	**WET**	10	1.0	0.1190	43	0
8/15/07	0.55	0.55	0.58	**WET**	36.5	6.0	0.2857	75	0

Statistics

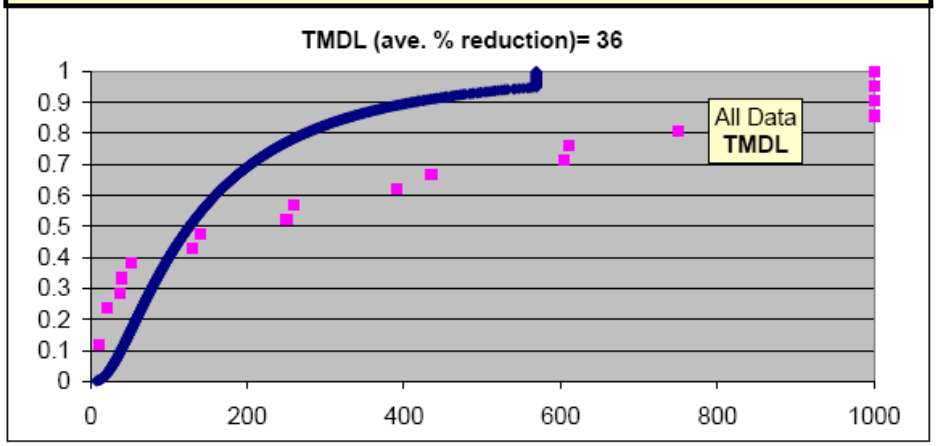
# Samples DRY	**13**
# Samples WET	**8**
# Samples Total	**21**
Geomean	**172**
Log std deviation	**0.9082**

Avg % Reduction

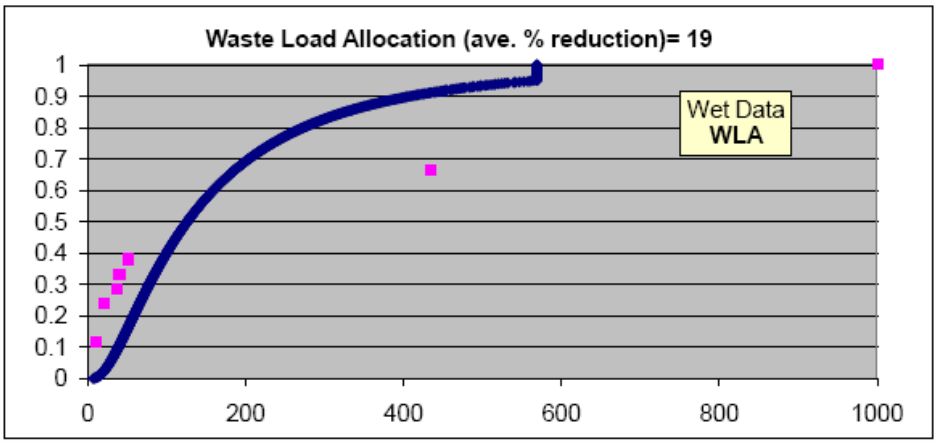
Wet (WLA)	**19**
Dry (LA)	**46**
Total (TMDL)	**36**

Precipitation and E. coli data provided by the Bristol Water Company and <www.wunderground.com> and CT DEP Staff respectively.
WET Condition defined as greater than 0.1" precipitation in 24 hours or 0.25" precipitation in 48 hours, or 2.0" precipitation in 96 hours.

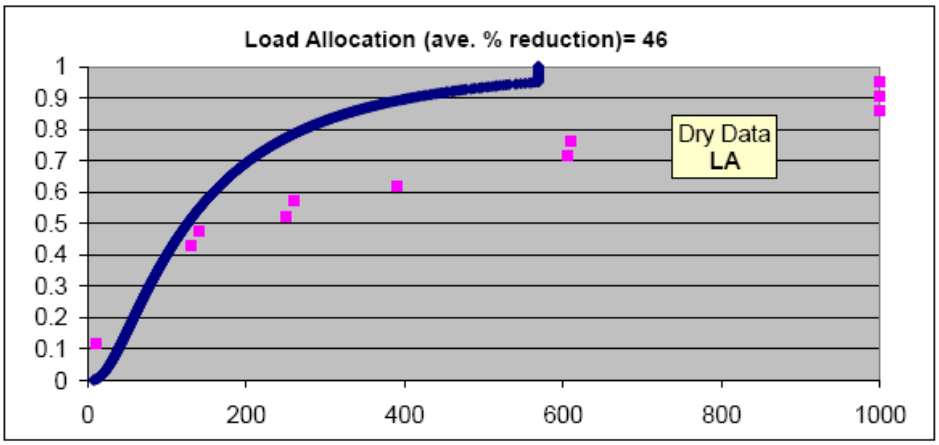
Waterbody Name: Pequabuck River Criteria Curve for Monitoring Site 399
y axis = cumulative frequency; x axis = *E.coli* (col/100mL)



TMDL needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on dry and wet weather data.



Waste Load Allocation (WLA) needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on wet weather data.



Load Allocation (LA) needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on dry weather data.

Waterbody Name: Pequabuck River

Waterbody Segment ID: CT4315-00_03

Data Used in the Analysis

Monitoring Site: 781, Site description: Dam at Route 229 and Memorial Boulevard

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
8/8/06	0.00	0.07	0.07	DRY	530	12.0	0.5714	149	72
8/10/06	0.05	0.05	0.12	DRY	1100	17.0	0.8095	282	74
8/16/06	0.00	0.80	0.80	**WET**	710	15.0	0.7143	212	70
8/17/06	0.00	0.00	0.80	DRY	355	8.0	0.3810	95	73
8/21/06	0.00	0.82	1.14	**WET**	1030	16.0	0.7619	243	76
8/24/06	0.01	0.01	0.01	DRY	310	7.0	0.3333	85	73
9/7/06	0.00	0.00	0.07	DRY	255	4.0	0.1905	56	78
9/13/06	0.00	0.00	0.36	DRY	415	10.0	0.4762	119	71
9/18/06	0.00	0.00	1.14	DRY	215	3.0	0.1429	47	78
9/20/06	0.00	0.05	0.05	DRY	306	6.0	0.2857	75	76
9/21/06	0.00	0.00	0.05	DRY	150	2.0	0.0952	38	75
9/25/06	0.00	0.06	0.09	DRY	8175	20.0	0.9524	576	93
9/28/06	0.00	0.00	0.00	DRY	453.333	11.0	0.5238	133	71
5/31/07	0.32	0.32	0.33	**WET**	105	1.0	0.0476	27	74
6/21/07	0.03	0.04	0.04	DRY	400	9.0	0.4286	107	73
6/26/07	0.00	0.00	0.00	DRY	660	14.0	0.6667	187	72
6/28/07	0.23	0.24	0.24	**WET**	540	13.0	0.6190	167	69
7/5/07	0.63	0.63	0.63	**WET**	1400	18.0	0.8571	337	76
7/12/07	0.00	0.69	0.69	**WET**	2900	19.0	0.9048	421	85
8/8/07	0.40	0.40	0.47	**WET**	24000	21.0	1.0000	576	98
8/15/07	0.55	0.55	0.58	**WET**	290	5.0	0.2381	65	77

Statistics

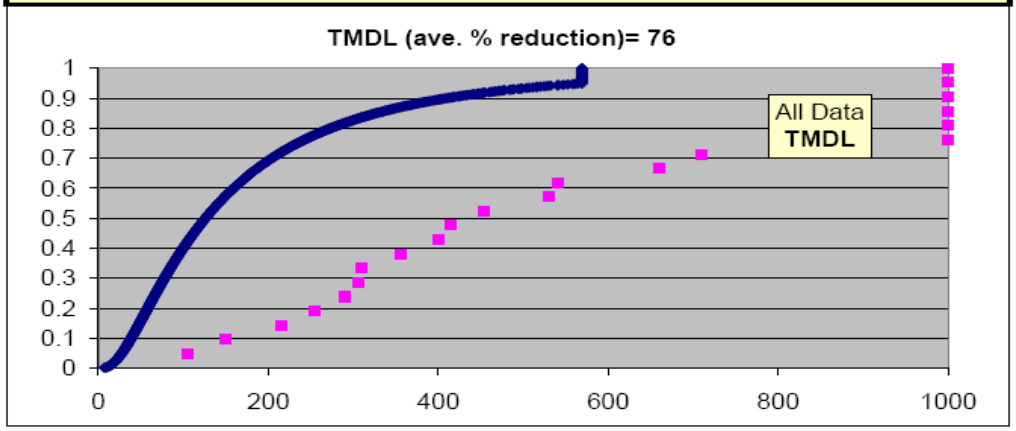
# Samples DRY	**13**
# Samples WET	**8**
# Samples Total	**21**
Geomean	**637**
Log std deviation	**0.5587**

Avg % Reduction

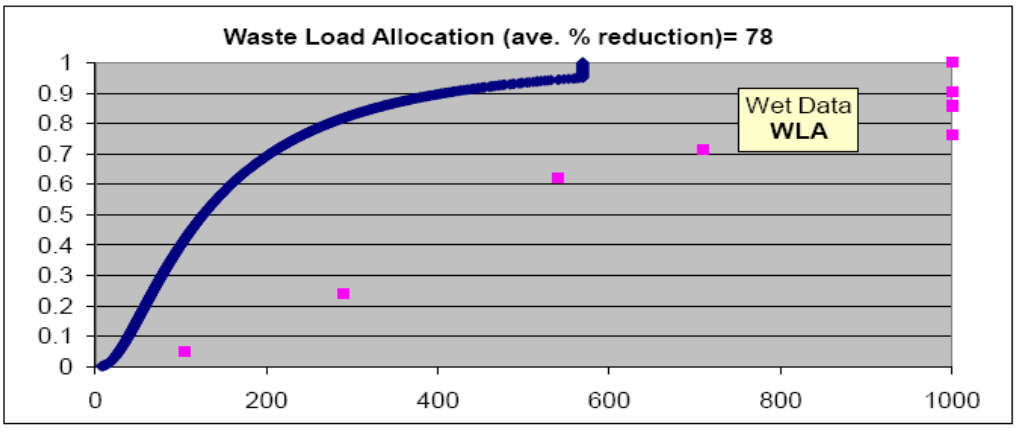
Wet (WLA)	**78**
Dry (LA)	**75**
Total (TMDL)	**76**

Precipitation and E. coli data provided by the Bristol Water Company and <www.wunderground.com> and CT DEP Staff respectively.
WET Condition defined as greater than 0.1" precipitation in 24 hours or 0.25" precipitation in 48 hours, or 2.0" precipitation in 96 hours.

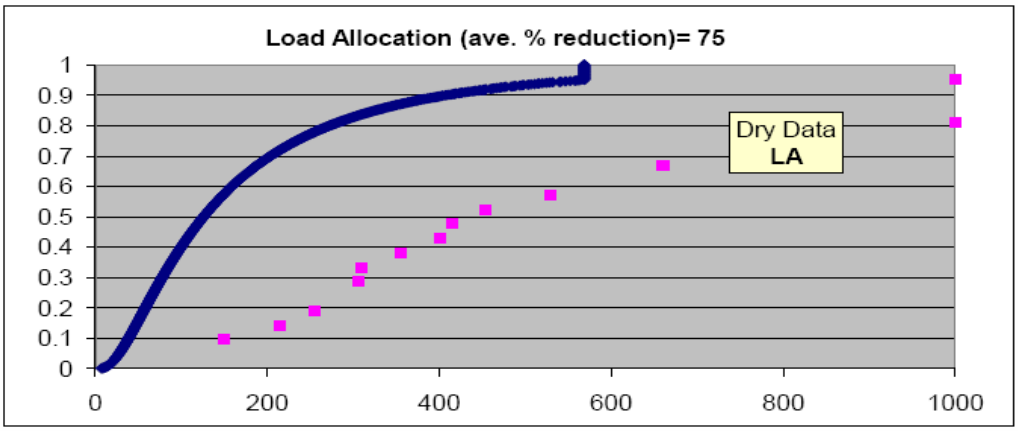
Waterbody Name: Pequabuck River Criteria Curve for Monitoring Site 781
y axis = cumulative frequency; x axis = *E.coli* (col/100mL)



TMDL needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on dry and wet weather data.



Waste Load Allocation (WLA) needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on wet weather data.



Load Allocation (LA) needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on dry weather data.

Waterbody Name: Pequabuck River
Waterbody Segment ID: CT4315-00_03

Data Used in the Analysis

Monitoring Site: 712, Site description: end of box culvert adjacent to Route 72

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
8/8/06	0.00	0.07	0.07	DRY	346.667	11.0	0.5238	133	62
8/10/06	0.05	0.05	0.12	DRY	290	9.0	0.4286	107	63
8/16/06	0.00	0.80	0.80	WET	370	13.0	0.6190	167	55
8/17/06	0.00	0.00	0.80	DRY	345	10.0	0.4762	119	65
8/21/06	0.00	0.82	1.14	WET	600	17.0	0.8095	282	53
8/24/06	0.01	0.01	0.01	DRY	215	6.0	0.2857	75	65
9/7/06	0.00	0.00	0.07	DRY	265	8.0	0.3810	95	64
9/13/06	0.00	0.00	0.36	DRY	355	12.0	0.5714	149	58
9/18/06	0.00	0.00	1.14	DRY	236.667	7.0	0.3333	85	64
9/20/06	0.00	0.05	0.05	DRY	2000	18.0	0.8810	373	81
9/21/06	0.00	0.00	0.05	DRY	195	4.0	0.1905	56	71
9/25/06	0.00	0.06	0.09	DRY	415	14.0	0.6667	187	55
9/28/06	0.00	0.00	0.00	DRY	85	2.0	0.0952	38	56
5/31/07	0.32	0.32	0.33	WET	20	1.0	0.0476	27	0
6/21/07	0.03	0.04	0.04	DRY	190	3.0	0.1429	47	75
6/26/07	0.00	0.00	0.00	DRY	450	16.0	0.7619	243	46
6/28/07	0.23	0.24	0.24	WET	440	15.0	0.7143	212	52
7/5/07	0.63	0.63	0.63	WET	2000	18.0	0.8810	373	81
7/12/07	0.00	0.69	0.69	WET	4400	20.0	0.9524	576	87
8/8/07	0.40	0.40	0.47	WET	9000	21.0	1.0000	576	94
8/15/07	0.55	0.55	0.58	WET	210	5.0	0.2381	65	69

Statistics

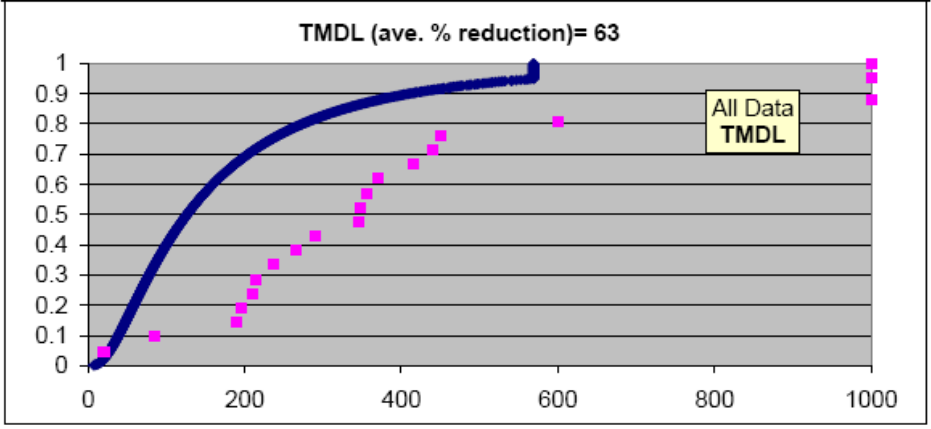
# Samples DRY	13
# Samples WET	8
# Samples Total	21
Geomean	407
Log std deviation	0.5717

Avg % Reduction

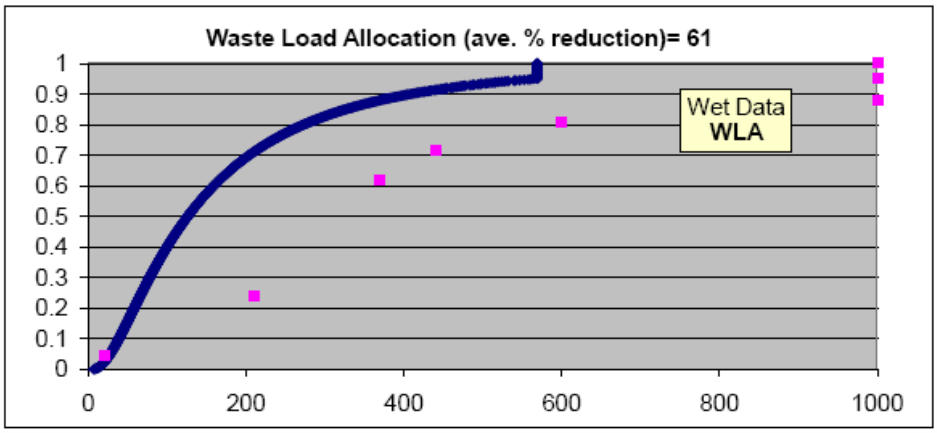
Wet (WLA)	61
Dry (LA)	64
Total (TMDL)	63

Precipitation and E. coli data provided by the Bristol Water Company and <www.wunderground.com> and CT DEP Staff respectively.
WET Condition defined as greater than 0.1" precipitation in 24 hours or 0.25" precipitation in 48 hours, or 2.0" precipitation in 96 hours.

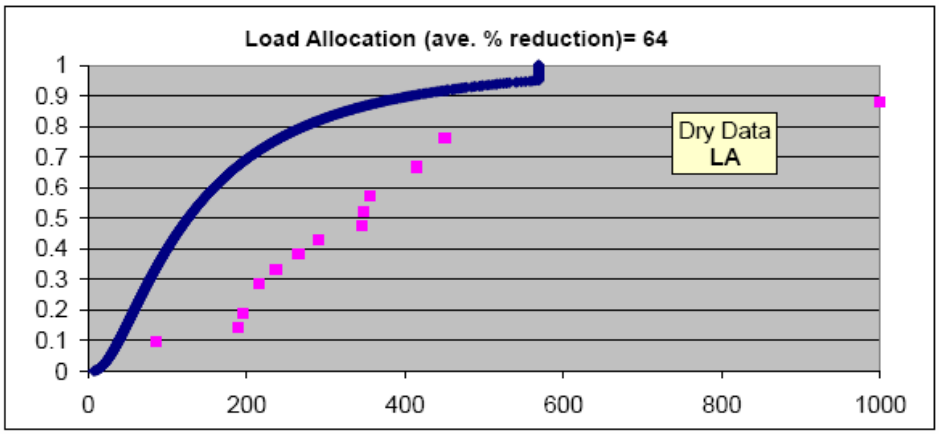
Waterbody Name: Pequabuck River Criteria Curve for Monitoring Site 712
y axis = cumulative frequency; x axis = *E.coli* (col/100mL)



TMDL needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on dry and wet weather data.



Waste Load Allocation (WLA) needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on wet weather data.



Load Allocation (LA) needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on dry weather data.

Waterbody Name: Pequabuck River
Waterbody Segment ID: CT4315-00_05

Data Used in the Analysis

Monitoring Site: 711, Site description: Top of box culvert at Route 72

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
8/8/06	0.00	0.07	0.07	DRY	370	14.0	0.6667	187	49
8/10/06	0.05	0.05	0.12	DRY	270	8.0	0.3810	95	65
8/16/06	0.00	0.80	0.80	WET	300	11.0	0.5238	133	56
8/17/06	0.00	0.00	0.80	DRY	345	13.0	0.6190	167	52
8/21/06	0.00	0.82	1.14	WET	635	16.0	0.7619	243	62
8/24/06	0.01	0.01	0.01	DRY	250	7.0	0.3333	85	66
9/7/06	0.00	0.00	0.07	DRY	335	12.0	0.5714	149	56
9/13/06	0.00	0.00	0.36	DRY	275	9.0	0.4286	107	61
9/18/06	0.00	0.00	1.14	DRY	205	6.0	0.2857	75	64
9/20/06	0.00	0.05	0.05	DRY	870	17.0	0.8095	282	68
9/21/06	0.00	0.00	0.05	DRY	82.333	4.0	0.1905	56	32
9/25/06	0.00	0.06	0.09	DRY	57.5	2.0	0.0952	38	34
9/28/06	0.00	0.00	0.00	DRY	78.667	3.0	0.1429	47	40
5/31/07	0.32	0.32	0.33	WET	20	1.0	0.0476	27	0
6/21/07	0.03	0.04	0.04	DRY	130	5.0	0.2381	65	50
6/26/07	0.00	0.00	0.00	DRY	990	18.0	0.8571	337	66
6/28/07	0.23	0.24	0.24	WET	380	15.0	0.7143	212	44
7/5/07	0.63	0.63	0.63	WET	1300	19.0	0.9048	421	68
7/12/07	0.00	0.69	0.69	WET	2800	20.0	0.9524	576	79
8/8/07	0.40	0.40	0.47	WET	4000	21.0	1.0000	576	86
8/15/07	0.55	0.55	0.58	WET	280	10.0	0.4762	119	57

Statistics

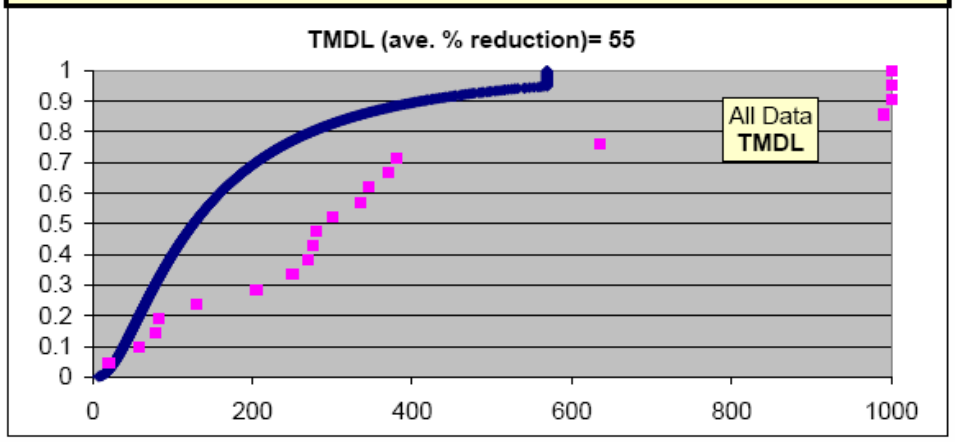
# Samples DRY	13
# Samples WET	8
# Samples Total	21
Geomean	320
Log std deviation	0.5445

Avg % Reduction

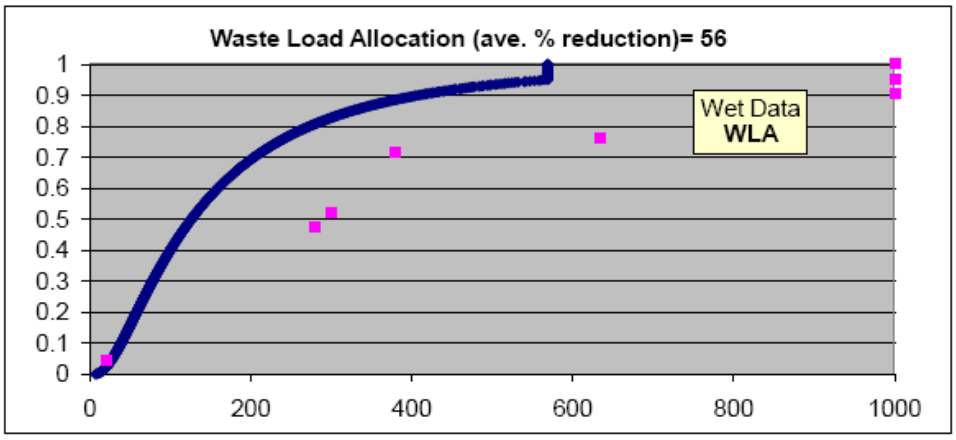
Wet (WLA)	56
Dry (LA)	54
Total (TMDL)	55

Precipitation and E. coli data provided by the Bristol Water Company and <www.wunderground.com> and CT DEP Staff respectively.
WET Condition defined as greater than 0.1" precipitation in 24 hours or 0.25" precipitation in 48 hours, or 2.0" precipitation in 96 hours.

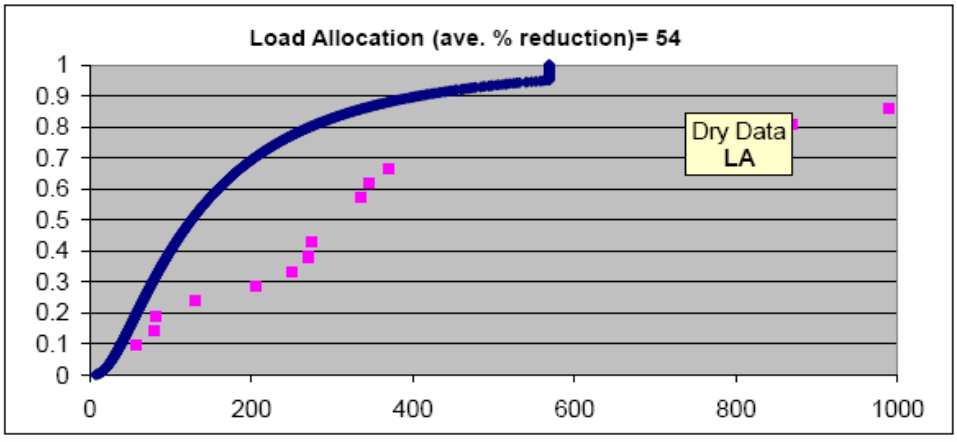
Waterbody Name: Pequabuck River Criteria Curve for Monitoring Site 711
y axis = cumulative frequency; x axis = *E.coli* (col/100mL)



TMDL needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on dry and wet weather data.



Waste Load Allocation (WLA) needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on wet weather data.



Load Allocation (LA) needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on dry weather data.

Waterbody Name: Pequabuck River
Waterbody Segment ID: CT4315-00_05

Data Used in the Analysis

Monitoring Site: 265, Site description: Rockwell Park

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
8/8/06	0.00	0.07	0.07	DRY	135	15.0	0.7143	212	0
8/10/06	0.05	0.05	0.12	DRY	67.5	5.0	0.2381	65	3
8/16/06	0.00	0.80	0.80	WET	235	16.0	0.7619	243	0
8/17/06	0.00	0.00	0.80	DRY	80.333	12.0	0.5714	149	0
8/21/06	0.00	0.82	1.14	WET	373.333	17.0	0.8095	282	24
8/24/06	0.01	0.01	0.01	DRY	74.5	11.0	0.5238	133	0
9/7/06	0.00	0.00	0.07	DRY	63	3.0	0.1667	52	18
9/13/06	0.00	0.00	0.36	DRY	68	7.0	0.3333	85	0
9/18/06	0.00	0.00	1.14	DRY	68.5	8.0	0.4048	101	0
9/20/06	0.00	0.05	0.05	DRY	67.667	6.0	0.2857	75	0
9/21/06	0.00	0.00	0.05	DRY	57.5	2.0	0.0952	38	34
9/25/06	0.00	0.08	0.09	DRY	68.5	8.0	0.4048	101	0
9/28/06	0.00	0.00	0.00	DRY	74	10.0	0.4762	119	0
5/31/07	0.32	0.32	0.33	WET	90	14.0	0.6667	187	0
6/21/07	0.03	0.04	0.04	DRY	20	1.0	0.0476	27	0
6/26/07	0.00	0.00	0.00	DRY	86	13.0	0.6190	167	0
6/28/07	0.23	0.24	0.24	WET	63	3.0	0.1667	52	18
7/5/07	0.63	0.63	0.63	WET	740	19.0	0.9048	421	43
7/12/07	0.00	0.69	0.69	WET	2700	20.0	0.9524	576	79
8/8/07	0.40	0.40	0.47	WET	11000	21.0	1.0000	576	95
8/15/07	0.55	0.55	0.58	WET	690	18.0	0.8571	337	51

Statistics

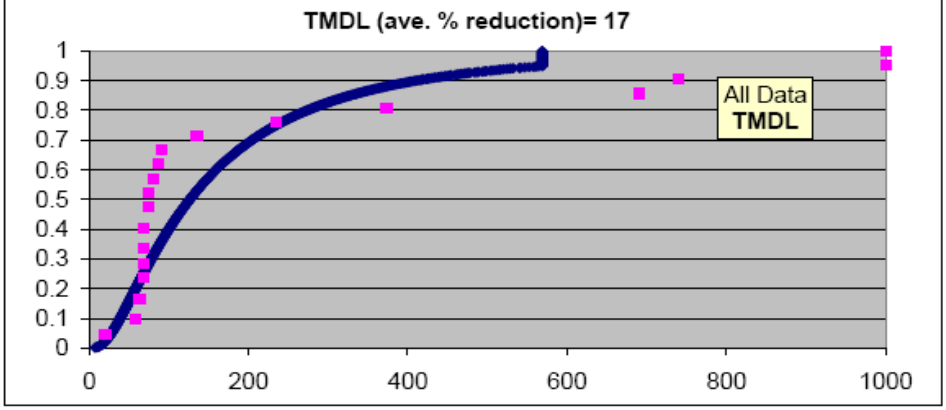
# Samples DRY	13
# Samples WET	8
# Samples Total	21
Geomean	149
Log std deviation	0.6462

Avg % Reduction

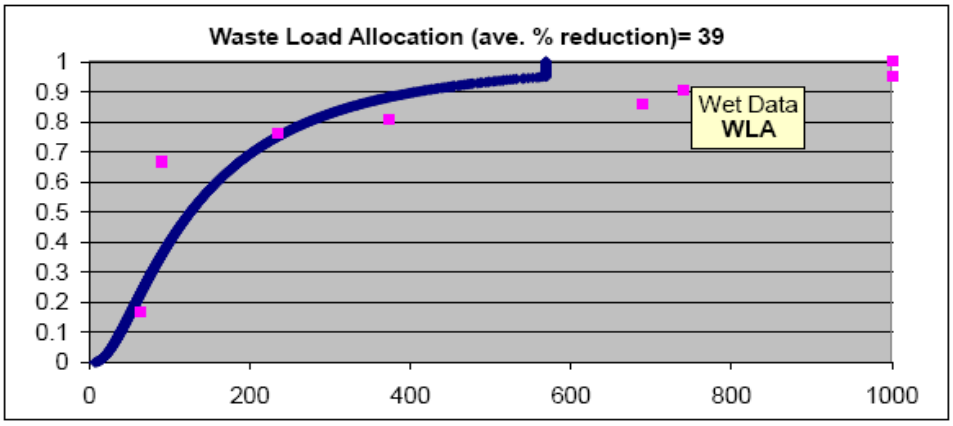
Wet (WLA)	39
Dry (LA)	4
Total (TMDL)	17

Precipitation and E. coli data provided by the Bristol Water Company and <www.wunderground.com> and CT DEP Staff respectively.
WET Condition defined as greater than 0.1" precipitation in 24 hours or 0.25" precipitation in 48 hours, or 2.0" precipitation in 96 hours.

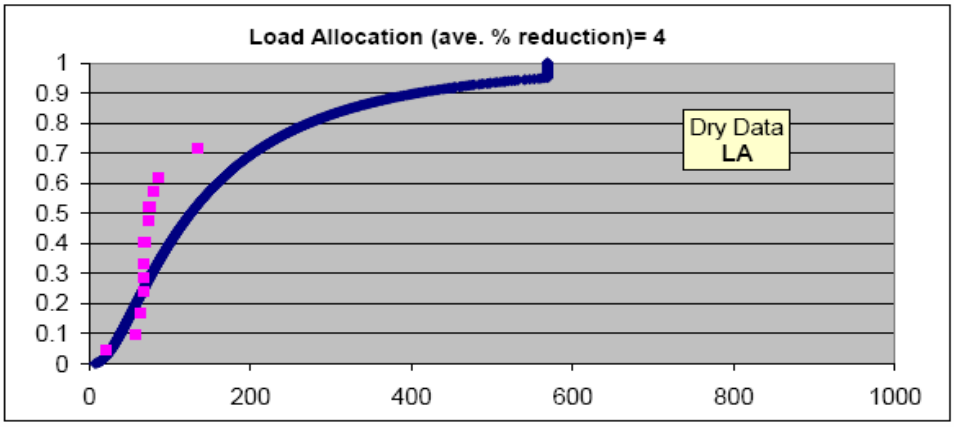
Waterbody Name: Pequabuck River Criteria Curve for Monitoring Site 265
y axis = cumulative frequency; x axis = *E.coli* (col/100mL)



TMDL needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on dry and wet weather data.



Waste Load Allocation (WLA) needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on wet weather data.



Load Allocation (LA) needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on dry weather data.

Waterbody Name: Pequabuck River
Waterbody Segment ID: CT4315-00_06

Data Used in the Analysis

Monitoring Site: 264, Site description: Canal Street

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
8/8/06	0.00	0.07	0.07	DRY	255	10.0	0.4762	119	53
8/10/06	0.05	0.05	0.12	DRY	160	6.0	0.2857	75	53
8/16/06	0.00	0.80	0.80	WET	1080	18.0	0.8571	337	69
8/17/06	0.00	0.00	0.80	DRY	260	11.0	0.5238	133	49
8/21/06	0.00	0.82	1.14	WET	850	15.0	0.7143	212	75
8/24/06	0.01	0.01	0.01	DRY	183.333	7.0	0.3333	85	54
9/7/06	0.00	0.00	0.07	DRY	200	9.0	0.4286	107	47
9/13/06	0.00	0.00	0.38	DRY	265	12.0	0.5714	149	44
9/18/06	0.00	0.00	1.14	DRY	650	14.0	0.6667	187	71
9/20/06	0.00	0.05	0.05	DRY	1015	17.0	0.8095	282	72
9/21/06	0.00	0.00	0.05	DRY	114.667	2.0	0.0952	38	67
9/25/06	0.00	0.06	0.09	DRY	315	13.0	0.6190	167	47
9/28/06	0.00	0.00	0.00	DRY	52	1.0	0.0476	27	48
5/31/07	0.32	0.32	0.33	WET	150	4.0	0.2143	61	59
6/21/07	0.03	0.04	0.04	DRY	120	3.0	0.1429	47	61
6/26/07	0.00	0.00	0.00	DRY	150	4.0	0.2143	61	59
6/28/07	0.23	0.24	0.24	WET	930	16.0	0.7619	243	74
7/5/07	0.63	0.63	0.63	WET	1200	19.0	0.9048	421	65
7/12/07	0.00	0.69	0.69	WET	2600	20.0	0.9524	576	78
8/8/07	0.40	0.40	0.47	WET	17000	21.0	1.0000	576	97
8/15/07	0.55	0.55	0.58	WET	190	8.0	0.3810	95	50

Statistics

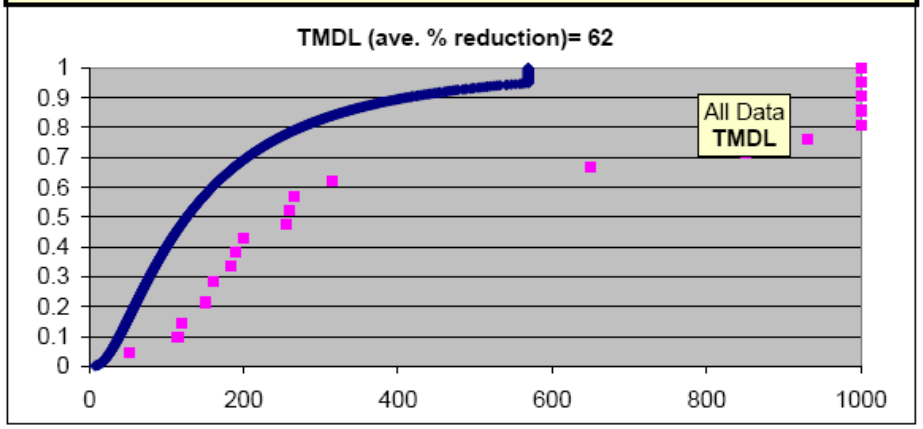
# Samples DRY	13
# Samples WET	8
# Samples Total	21
Geomean	393
Log std deviation	0.5690

Avg % Reduction

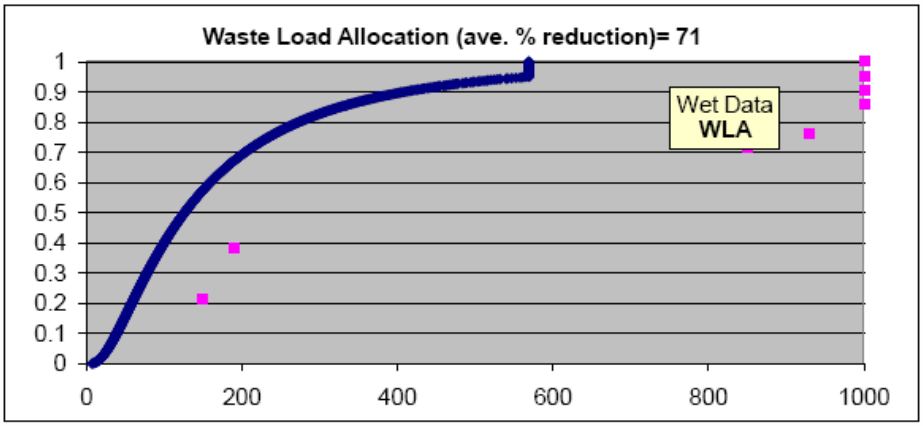
Wet (WLA)	71
Dry (LA)	56
Total (TMDL)	62

Precipitation and E. coli data provided by the Bristol Water Company and <www.wunderground.com> and CT DEP Staff respectively.
WET Condition defined as greater than 0.1" precipitation in 24 hours or 0.25" precipitation in 48 hours, or 2.0" precipitation in 96 hours.

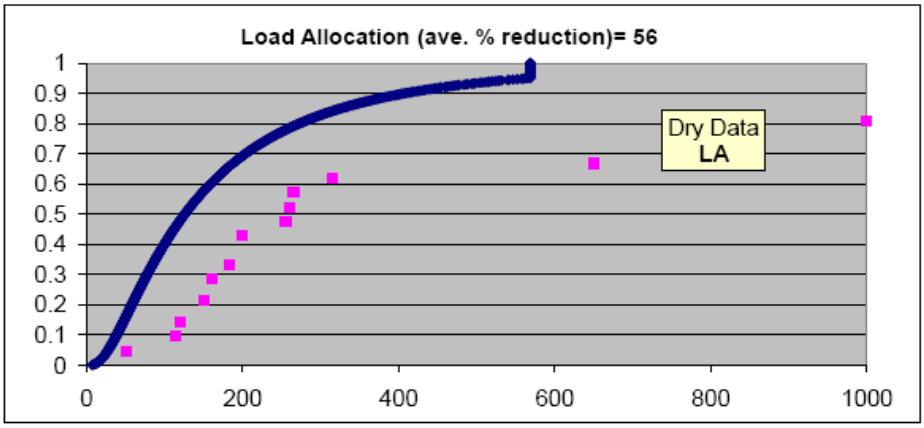
Waterbody Name: Pequabuck River Criteria Curve for Monitoring Site 264
y axis = cumulative frequency; x axis = *E.coli* (col/100mL)



TMDL needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on dry and wet weather data.



Waste Load Allocation (WLA) needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on wet weather data.



Load Allocation (LA) needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on dry weather data.

Waterbody Name: Pequabuck River
Waterbody Segment ID: CT4315-00_06

Data Used in the Analysis

Monitoring Site: 263, Site description: Route 72 and Route 6 intersection

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
8/8/06	0.00	0.07	0.07	DRY	345	14.0	0.6667	187	46
8/10/06	0.05	0.05	0.12	DRY	170	6.0	0.2857	75	56
8/16/06	0.00	0.80	0.80	WET	670	16.0	0.7619	243	64
8/17/06	0.00	0.00	0.80	DRY	235	8.0	0.3810	95	59
8/21/06	0.00	0.82	1.14	WET	1285	19.0	0.9048	421	67
8/24/06	0.01	0.01	0.01	DRY	107.5	3.0	0.1429	47	56
9/7/06	0.00	0.00	0.07	DRY	150	4.0	0.2143	61	59
9/13/06	0.00	0.00	0.36	DRY	255	9.0	0.4286	107	58
9/18/06	0.00	0.00	1.14	DRY	185	7.0	0.3333	85	54
9/20/06	0.00	0.05	0.05	DRY	305	12.0	0.5714	149	51
9/21/06	0.00	0.00	0.05	DRY	97	1.0	0.0476	27	72
9/25/06	0.00	0.06	0.09	DRY	575	15.0	0.7143	212	63
9/28/06	0.00	0.00	0.00	DRY	106.5	2.0	0.0952	38	65
5/31/07	0.32	0.32	0.33	WET	150	4.0	0.2143	61	59
6/21/07	0.03	0.04	0.04	DRY	330	13.0	0.6190	167	50
6/26/07	0.00	0.00	0.00	DRY	270	10.0	0.5000	126	53
6/28/07	0.23	0.24	0.24	WET	880	17.0	0.8095	282	68
7/5/07	0.63	0.63	0.63	WET	960	18.0	0.8571	337	65
7/12/07	0.00	0.69	0.69	WET	2050	20.0	0.9524	576	72
8/8/07	0.40	0.40	0.47	WET	11000	21.0	1.0000	576	95
8/15/07	0.55	0.55	0.58	WET	270	10.0	0.5000	126	53

Statistics

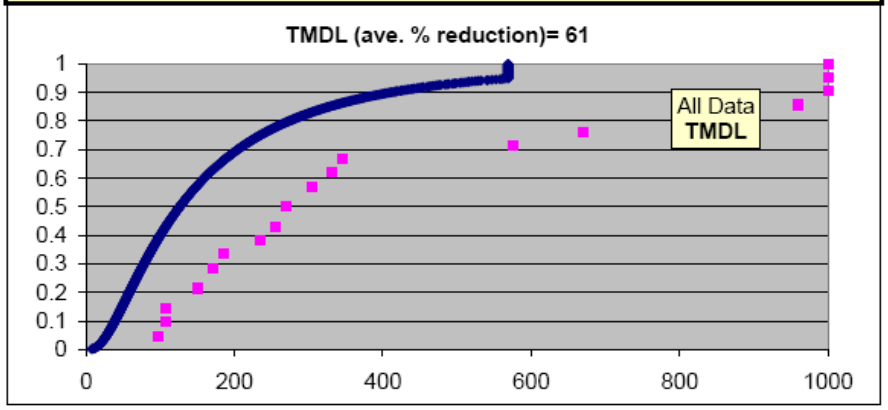
# Samples DRY	13
# Samples WET	8
# Samples Total	21
Geomean	375
Log std deviation	0.4987

Avg % Reduction

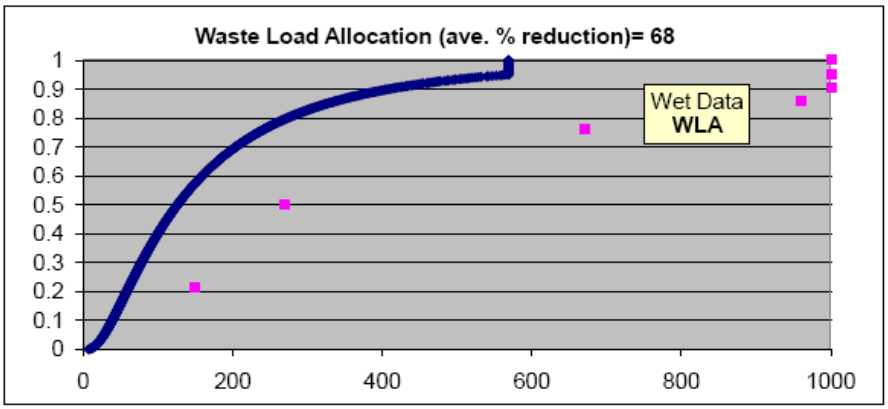
Wet (WLA)	68
Dry (LA)	57
Total (TMDL)	61

Precipitation and E. coli data provided by the Bristol Water Company and <www.wunderground.com> and CT DEP Staff respectively.
WET Condition defined as greater than 0.1" precipitation in 24 hours or 0.25" precipitation in 48 hours, or 2.0" precipitation in 96 hours.

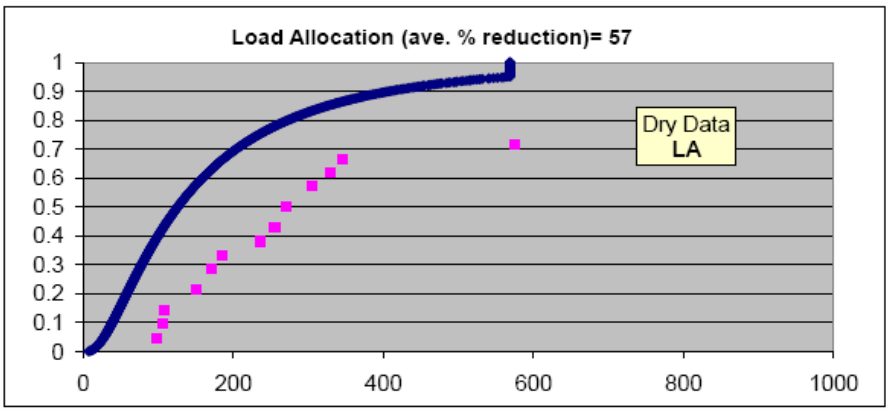
Waterbody Name: Pequabuck River Criteria Curve for Monitoring Site 263
y axis = cumulative frequency; x axis = *E.coli* (col/100mL)



TMDL needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on dry and wet weather data.



Waste Load Allocation (WLA) needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on wet weather data.



Load Allocation (LA) needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on dry weather data.

Appendix A-2
Coppermine Brook
Waterbody specific information

Impaired Waterbody
Waterbody Name: Coppermine Brook
Waterbody Segment IDs: CT 4314-00_01
Waterbody Segment Description: From mouth at Pequabuck River, upstream to New Britain drinking water watershed boundary and water diversion (just upstream of confluence with Polkville Brook), Bristol.

Impairment Description:
Designated Use Impairment: Recreation
Size of Impaired Segments: 2.43 linear miles
Surface Water Classification: Class A

Watershed Description:
Drainage Basin Area: 11916.16 acres
Tributary To: Pequabuck River
Subregional Basin Name & Code: Coppermine Brook, 4314
Regional Basin: Farmington River
Major Basin: Connecticut
Watershed Towns: Bristol, Burlington
Phase II GP applicable? Bristol- Y, Burlington-Y
Applicable Season: Recreation Season (May 1 to September 30)

Landuse:

Land Cover Category	Percent Composition
Forested	57% (6789 acres)
Urban/Developed	34% (4108 acres)
Water/Wetland	2% (283 acres)
Agriculture	6% (734 acres)

Data Source: Connecticut Land Use Land Cover Data Layer LANDSTAT (2002) Thematic Mapper Satellite Imagery.

Appendix A-2

Coppermine Brook
TMDL Summary

The TMDL analysis for Coppermine Brook was conducted at one site (33), which is within 250 meters of the confluence with the Pequabuck River. This site is located in segment CT4314-00_01 which is the furthest downstream and more urban stretch of the brook. The TMDL analysis indicates that the site is influenced by sources of bacteria active under both wet weather and dry weather conditions. The Waste Load Allocation (WLA) reduction (89%) is slightly higher than the Load Allocation (LA) reduction (87%) on this segment. The higher WLA value indicates that the stream is more influenced by point sources of *e.coli* and stormwater. Reductions in the WLA can be achieved through the detection and elimination of illicit discharges to the storm sewers or directly to the brook and the upgrade of failed sanitary infrastructure, as well as, the installation of engineered controls to reduce the surge of stormwater to the brook, promote groundwater recharge, and improve water quality. Since illicit discharges and failed sanitary collection systems may also be active under dry conditions, it is likely that corrective actions aimed at eliminating these sources will also reduce the Load Allocation (LA). Other contributors to the LA include as domestic animal waste, wildlife, and stormwater input as sheet flow.

Table of Coppermine Brook Images.

Site 33 (West Washington Street in Bristol)

Waterbody Name: Coppermine Brook

Waterbody Segment ID: CT4314-00_01

Data Used in the Analysis

Monitoring Site: 33, Site description: Upstream of West Washington Street

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
5/31/07	0.32	0.32	0.33	WET	310	1.0	0.0435	26	92
6/21/07	0.03	0.04	0.04	DRY	360	2.0	0.0870	36	90
6/26/07	0.00	0.00	0.00	DRY	560	4.0	0.3043	79	86
6/28/07	0.23	0.24	0.24	WET	570	5.0	0.3478	88	85
6/29/07	0.00	0.23	0.24	DRY	3100	16.0	0.8696	355	89
7/5/07	0.63	0.63	0.63	WET	2600	15.0	0.8261	299	88
7/6/07	0.54	1.17	1.17	WET	1600	14.0	0.7391	227	86
7/12/07	0.00	0.69	0.69	WET	5200	17.0	0.9130	441	92
7/16/07	0.00	0.55	0.58	WET	1300	12.0	0.6522	181	86
7/25/07	0.00	0.01	0.85	DRY	500	3.0	0.2174	61	88
7/27/07	0.00	0.00	0.01	DRY	1210	11.0	0.6087	162	87
8/3/07	0.08	0.08	0.08	DRY	770	8.0	0.4783	120	84
8/8/07	0.40	0.40	0.47	WET	24001	19.0	1.0000	576	98
8/15/07	0.55	0.55	0.58	WET	690	7.0	0.4348	108	84
8/17/07	0.00	0.00	0.55	DRY	7400	18.0	0.9565	576	92
9/14/07	0.00	0.00	0.83	DRY	590	6.0	0.3913	98	83
9/21/07	0.00	0.00	0.00	DRY	1450	13.0	0.6957	202	86
9/24/07	0.00	0.00	0.00	DRY	1033	10.0	0.5652	147	86
9/26/07	0.00	0.00	0.00	DRY	790	9.0	0.5217	132	83
6/5/08	0.00	0.62	0.62	WET	390	3.0	0.1304	45	89
6/13/08	0.00	0.00	0.29	DRY	480	4.0	0.1739	53	89
6/24/08	0.02	0.00	0.02	DRY	1900	18.0	0.7826	259	86
7/10/08	0.00	0.00	0.00	DRY	510	6.0	0.2609	70	86

Statistics

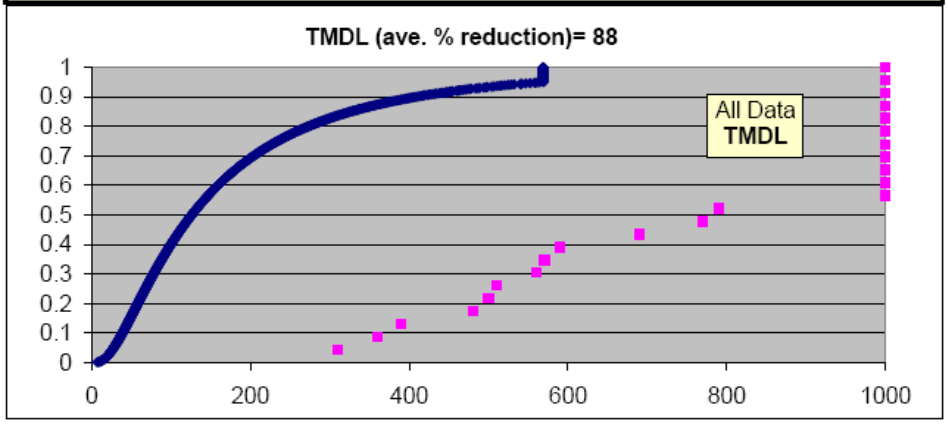
# Samples DRY	14
# Samples WET	9
# Samples Total	23
Geomean	1145
Log std deviation	0.4670

Avg % Reduction

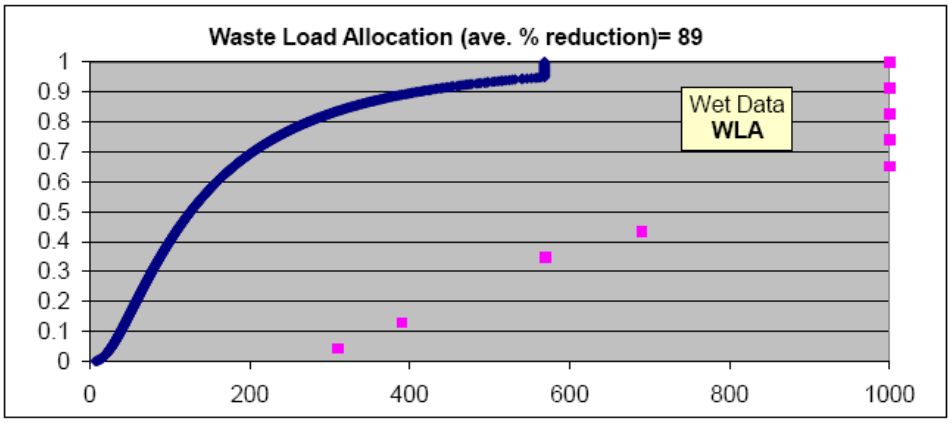
Wet (WLA)	89
Dry (LA)	87
Total (TMDL)	88

Precipitation and E. coli data provided by the Bristol Water Company and <www.wunderground.com> and CT DEP staff respectively.
WET Condition defined as greater than 0.1" precipitation in 24 hours or 0.25" precipitation in 48 hours, or 2.0" precipitation in 96 hours.

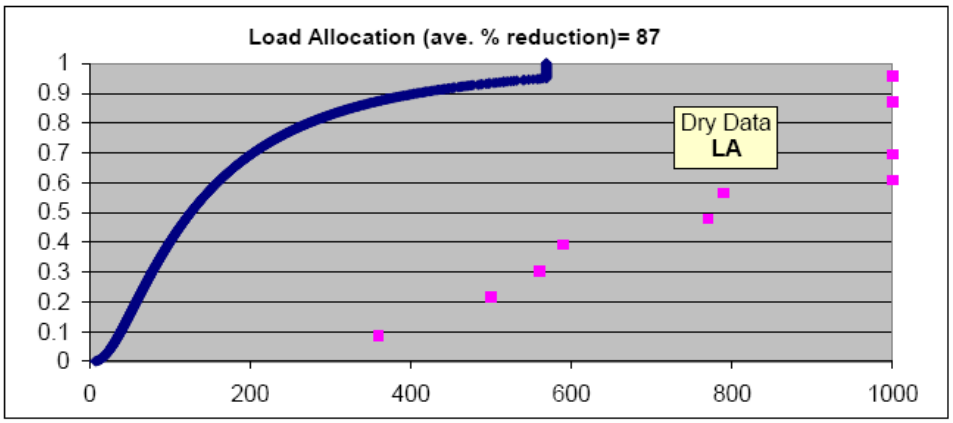
Waterbody Name: Coppermine Brook Criteria Curve for Monitoring Site 33
y axis = cumulative frequency; x axis = *E.coli* (col/100mL)



TMDL needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on dry and wet weather data.



Waste Load Allocation (WLA) needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on wet weather data.



Load Allocation (LA) needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on dry weather data.

Appendix A-3
Poland River
Waterbody specific information

Impaired Waterbody
Waterbody Name: Poland River
Waterbody Segment IDs: CT4313-00_01, CT4313-00_02
Waterbody Segment Description: From confluence with Pequabuck River to the confluence with Marsh Brook, upstream to confluence with unnamed Brook 4313-03_01, upstream of Judd Road crossing (parallel with route 72), Plymouth, CT.

Impairment Description:
Designated Use Impairment: Recreation
Size of Impaired Segments: 0.71 linear miles (CT4313-00_02)
0.47 linear miles (CT4313-00_01)
Surface Water Classification: Class A

Watershed Description:
Drainage Basin Area: 6482.559 acres
Tributary To: Pequabuck River
Subregional Basin Name & Code: Poland River, 4313
Regional Basin: Farmington River
Major Basin: Connecticut
Watershed Towns: Burlington, Harwinton, Plymouth
Phase II GP applicable? Burlington-Y, Harwinton-N, Plymouth-Y
Applicable Season: Recreation Season (May 1 to September 30)
Landuse:

Land Cover Category	Percent Composition
Forested	75% (4859 acres)
Urban/Developed	10% (668 acres)
Water/Wetland	8% (533 acres)
Agriculture	7% (421 acres)

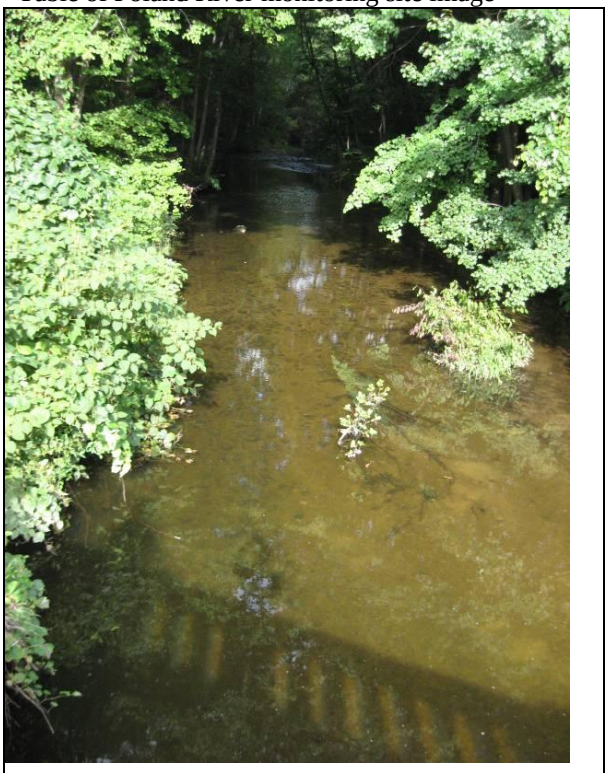
Data Source: Connecticut Land Use Land Cover Data Layer LANDSTAT (2002) Thematic Mapper Satellite Imagery.

Appendix A-3
Poland River
TMDL Summary

The TMDL analysis for Poland River was conducted at one site (277), which is representative of its waterbody segment. Current data is unavailable to conduct a TMDL analysis for segment CT4313-00_01 in the Poland River. This section flows directly downstream of monitored section CT4313-00_02, and to the confluence with the Pequabuck River. CT4313-00_01 is a small segment (0.42 linear miles) and is located downstream of a section that requires reductions. The landuse of both segments is similar; therefore, it is reasonable to presume that the same percent reductions apply to the unlisted segment as segment CT4313-00_02 at the upstream site 277.

The TMDL analysis indicates that the site is influenced by sources of bacteria active under both wet weather and dry weather conditions. The Waste Load Allocation (WLA) (17%) was higher than the Load Allocation (LA) (12%). This indicates that this waterbody segment is more strongly influenced by point source stormwater than nonpoint sources. Reduction in WLA can be achieved through the installation of engineered controls to reduce the surge of stormwater to the brook, promote groundwater recharge, and improve water quality, as well as, detection and elimination of illicit discharges to the storm sewers. Nonpoint sources, such as domestic animal waste and nuisance wildlife may contribute to the LA.

Table of Poland River monitoring site image



Site 277 (Near route 72in Plymouth)

Waterbody Name: Poland River

Waterbody Segment ID: CT4313-00_02

Data Used in the Analysis

Monitoring Site: 277, Site description: Upstream of Route 72

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
5/31/07	0.32	0.32	0.33	WET	20	1.0	0.0652	31	0
6/21/07	0.03	0.04	0.04	DRY	63	3.0	0.2609	70	0
6/26/07	0.00	0.00	0.00	DRY	63	3.0	0.2609	70	0
6/28/07	0.23	0.24	0.24	WET	380	15.0	0.8043	277	27
6/29/07	0.00	0.23	0.24	DRY	520	18.0	0.9130	441	15
7/5/07	0.63	0.63	0.63	WET	260	14.0	0.7391	227	13
7/6/07	0.54	1.17	1.17	WET	216	11.0	0.6087	162	25
7/12/07	0.00	0.69	0.69	WET	380	15.0	0.8043	277	27
7/16/07	0.00	0.55	0.58	WET	72	6.0	0.3478	88	0
7/25/07	0.00	0.01	0.85	DRY	63	3.0	0.2609	70	0
7/27/07	0.00	0.00	0.01	DRY	110	8.0	0.4348	108	2
8/3/07	0.08	0.08	0.08	DRY	184	10.0	0.5652	147	20
8/8/07	0.40	0.40	0.47	WET	1000	19.0	0.9565	576	42
8/15/07	0.55	0.55	0.58	WET	230	12.0	0.6739	191	17
8/17/07	0.00	0.00	0.55	DRY	170	9.0	0.5217	132	22
9/14/07	0.00	0.00	0.83	DRY	94	7.0	0.3913	98	0
9/21/07	0.00	0.00	0.00	DRY	20	1.0	0.0652	31	0
9/24/07	0.00	0.00	0.00	DRY	450	17.0	0.8696	355	21
9/26/07	0.00	0.00	0.00	DRY	230	12.0	0.6739	191	17
6/5/08	0.00	0.62	0.62	WET	31	3.5	0.1522	49	0
6/13/08	0.00	0.00	0.29	DRY	31	3.5	0.1522	49	0
6/24/08	0.02	0.00	0.02	DRY	1900	23.0	1.0000	576	70
7/10/08	0.00	0.00	0.00	DRY	120	11.0	0.4783	120	0

Statistics

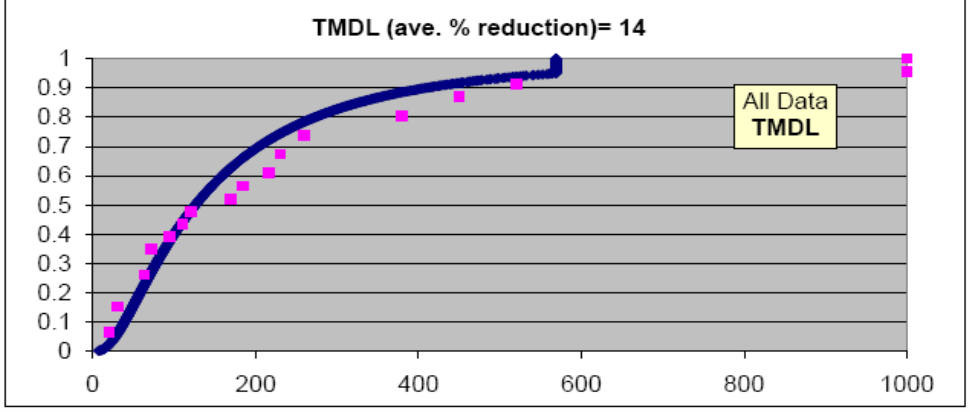
# Samples DRY	14
# Samples WET	9
# Samples Total	23
Geomean	145
Log std deviation	0.5206

Avg % Reduction

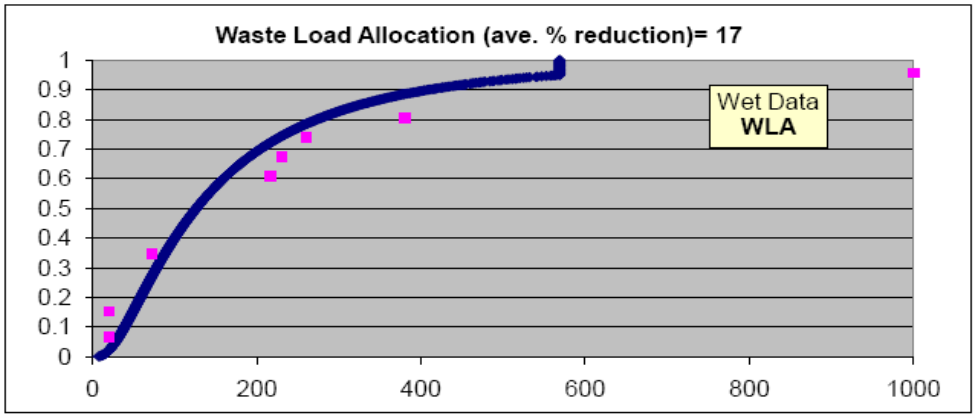
Wet (WLA)	17
Dry (LA)	12
Total (TMDL)	14

Precipitation and E. coli data provided by the Bristol Water Company and <www.wunderground.com> and CT DEP staff respectively.
WET Condition defined as greater than 0.1" precipitation in 24 hours or 0.25" precipitation in 48 hours, or 2.0" precipitation in 96 hours.

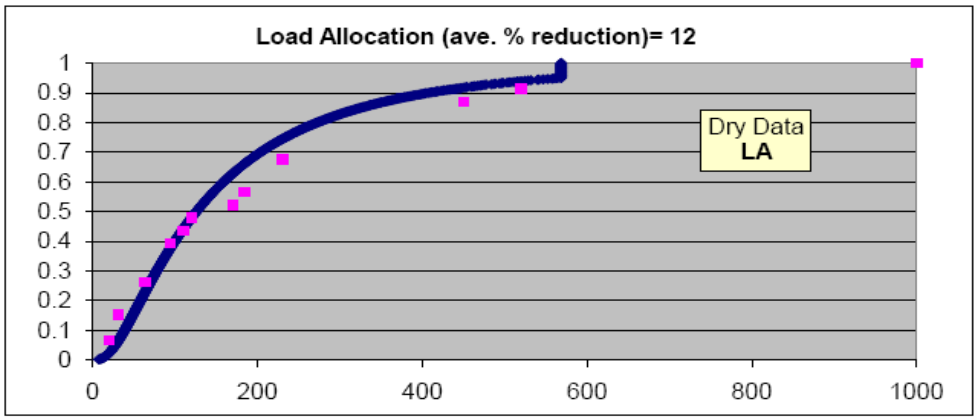
Waterbody Name: Poland River Criteria Curve for Monitoring Site 277
y axis = cumulative frequency; x axis = *E.coli* (col/100mL)



TMDL needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on dry and wet weather data.



Waste Load Allocation (WLA) needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on wet weather data.



Load Allocation (LA) needed from current condition (magenta squares) to meet criteria (blue line). Current condition based on dry weather data.

Appendix B. Municipal Stormwater Alternative Monitoring Guidance

Guidance for Implementing Bacteria-based TMDLs within the CTDEP Stormwater Permitting Program

CTDEP investigates impaired waterbodies to determine the major causes of impairment. This information is expressed as Total Maximum Daily Load (TMDL). TMDLs provide the framework for restoring impaired waters by establishing the maximum amount of a pollutant that a waterbody can take in without adverse impact to fish, wildlife, recreation, or other public uses. If a TMDL includes requirements for control of stormwater discharges it is the responsibility of the municipalities within the watershed to implement the recommendations of the TMDL (typically bacteria reduction). Management of stormwater quality within the municipality is governed by the General Permit for the Discharge of Stormwater from Small Municipal Separate Storm Sewer Systems (MS4 General Permit).

The MS4 General Permit is required for any municipality with urbanized areas that initiates, creates, originates or maintains any discharge of stormwater from a storm sewer system to waters of the state. The MS4 permit requires towns to design a Stormwater Management Plan (SMP) to reduce the discharge of pollutants in stormwater to improve water quality. The plan must address the following 6 minimum measures.

1. Public Education and Outreach.
2. Public Involvement/Participation.
3. Illicit discharge detection and elimination.
4. Construction site stormwater runoff control.
5. Post-construction stormwater management in the new development and redevelopment.
6. Pollution prevention/good housekeeping for municipal operations.

Section 6(k) of the MS4 General Permit requires a municipality to modify their Stormwater Management Plan to implement the TMDL within 4 months of TMDL approval by EPA if stormwater within the municipality contributes pollutant(s) in excess of the allocation established within the TMDL. For the discharges to the TMDL waterbody(ies), the municipality must assess the six minimum measures of its plan and modify the plan to implement additional, necessary controls for each appropriate measure. Particular focus should be placed on the following plan components: public education program, illicit discharge detection and elimination, stormwater structures cleaning, priority for the repair, upgrade, or retrofit of storm sewer structures. The goal of the modifications is to establish a program to improve water quality consistent with the requirements of the TMDL. Modifications to the Stormwater Management Plan in response to TMDL development should be submitted to the Stormwater Program of CTDEP for review and approval.

Also required under the MS4 General Permit is annual stormwater monitoring. The permit provides a general framework for monitoring stormwater quality within a municipality. At minimum, stormwater from six sample locations are to be collected annually: two outfalls from commercial areas, two from industrial areas, and two from residential areas. These six sample locations are point source discharges that drain areas with distinct characteristics. Each

stormwater sample is tested for 12 parameters using methods prescribed in Title 40, CFR, Part 136.

pH (SU)	Total Suspended Solids (mg/l)
Hardness (mg/l)	Total Phosphorous (mg/l)
Conductivity (umos)	Ammonia (mg/l)
Oil and grease (mg/l)	Total Kjeldahl Nitrogen (mg/l)
Chemical Oxygen Demand (mg/l)	Nitrate plus Nitrite Nitrogen (mg/l)
Turbidity (NTU)	E. coli (col/100ml)

However, CTDEP encourages municipalities affected by the establishment of a TMDL to develop an alternative stormwater monitoring plan to assess progress in meeting the goals of the TMDL. Alternate monitoring programs are established in accordance with Section 6(h)(1)(B) of the MS4 permit which allows towns to submit written requests to the Commissioner for the review and approval of alternate stormwater monitoring plans of equivalent or greater scope. This gives towns freedom to develop a plan that better assesses the stormwater quality in their watershed. The monitoring program should be designed to accomplish two objectives; source detection to identify specific sources of bacterial loading and direct BMP implementation efforts with fixed station monitoring to quantify progress in achieving TMDL established goals. Monitoring may be performed by municipal staff, citizen volunteers, or contracted to an environmental consulting firm. In order to secure DEP approval, the program must include sampling to address both objectives (source detection and progress quantification). Source detection monitoring may include such activities as visual inspection of storm sewer outfalls under dry weather conditions, event sampling of individual storm sewer outfalls, and monitoring of ambient (in-stream) conditions at closely spaced intervals to identify "hot spots" for more detailed investigations leading to specific sources of high bacteria loads.

DEP strongly recommends that stream monitoring be performed at the same locations DEP sampled during TMDL development. Samples should also be collected at other key locations within the watershed, such as above and below potential contributing sources or areas slated for BMP implementation. Since watershed borders and TMDLs do not follow town borders there is a possibility DEP did not sample locations in your town. If this is the case collecting a sample where the waterbody enters your town and another where the waterbody leaves your town maybe helpful to determine how stormwater from your town influences water quality. In all cases, sampling should be scheduled at regularly spaced intervals during the recreational season. In this way, the data set at the end of each season will include ambient values for both "wet" and "dry" conditions.