A Total Maximum Daily Load Analysis for the Mattabesset River Regional Basin

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

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INTRODUCTION

A Total Maximum Daily Load (TMDL) analysis was completed for indicator bacteria in the Mattabesset River Regional Basin (Figure 1). Included in the TMDL analysis are the subregional basins of the Mattabesset River, Coginchaug River, Sawmill Brook, Webster Brook, Willow Brook (Cromwell), Belcher Brook, Miner Brook, Coles Brook, Willow Brook (New Britain), Spruce Brook, Little Brook, and John Hall Brook. These waterbodies are included on the *2004 List of Connecticut Waterbodies Not Meeting Water Quality Standards*[1] (2004 *List*) due to exceedences of the indicator bacteria criteria contained within the State *Water Quality Standards* (WQS)[2]. Segments CT4600-00_01, CT4600-01_01, and CT4607-00_03 of Mattabesset River, John Hall Brook and Coginchaug River, respectively, were not included on the 2004 *List*, however were included in the TMDL analysis because available data indicated exceedences of indicator bacteria criteria. 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 2004 *List* for which technology-based controls are insufficient to achieve water quality standards. 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. 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 was also considered in these TMDL analyses.

The Mattabesset River Regional Basin is located within municipalities with urban areas, as defined by the US Census Bureau[3] (Figure 2). Such 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 contain designated urban areas (or MS4 communities) and discharge stormwater via a separate stormwater sewer system to surface waters of the state. The permit requires municipalities to develop a program aimed at reducing the discharge of pollutants, as well as to protect water quality. The permit includes a provision requiring towns to focus their stormwater plans on waterbodies for which TMDLs have been developed. Such a program must include the following six control measures: public education and outreach; public participation; illicit discharge detection and elimination; construction stormwater management (greater than 1 acre); post-construction stormwater management; and pollution prevention and good housekeeping. Specific requirements have been developed within each of these control measures. Additional information regarding the general permit can be obtained on the Department of Environmental Protection's (DEP) website at http://www.dep.state.ct.us/wtr/stormwater/ms4index.htm.

TMDLs that have been established by States are submitted to the Regional Office of the Federal Environmental Protection Agency (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 developing and implementing a Water Quality Management Plan or TMDL Implementation

Plan (Plan), which describes the control measures necessary to achieve acceptable water quality conditions. Therefore, Plans 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. Public participation during development of the TMDL analysis and subsequent preparation of the Plans is vital to the success of resolving water quality impairments.

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

PRIORITY RANKING

Bacteria impaired waterbodies located in MS4 communities were prioritized for TMDL analysis as part of DEP efforts to support the MS4 Permit. The Mattabesset River Regional Basin was prompted for immediate TMDL analysis because previous sampling indicated bacteria impairment in the subject waterbodies. The impairment status of each of the subject waterbodies is provided in the following table.

Table 1. The status of impairment for each of the subject waterbodies based on the 2004 *List*.

Waterbody Name	Waterbody Segment ID	Waterbody Segment Description	303(d) Listed (Yes/No)	Impaired Use Cause
Mattabesset River	CT4600-00_01 CT4600-00_02 CT4600-00_03 CT4600-00_04	From mouth at CT River to dam on Railroad Pond.	Yes * Segment 01 not on list	Contact Recreation Indicator Bacteria
	CT4600-00_06	From inlet to Paper Goods Pond upstream to Hart Pond dam.		
John Hall Brook	CT4600-01_01 CT4600-01_02	From mouth at Mattabesset River upstream to Hallmere Reservoir, Berlin.	Yes * Segment 01 not on list	Contact Recreation Indicator Bacteria
Little Brook	CT4600-07_01	From mouth at Mattabesset River upstream to source near Trinity Rd, Rocky Hill.	Yes	Contact Recreation Indicator Bacteria
Spruce Brook	CT4600-13_01	From mouth at Mattabesset River upstream to source at Lamentation Mountain.	Yes	Contact Recreation Indicator Bacteria
Coles Brook	CT4600-23_01	From mouth at Mattabesset upstream to source at Shunpike Rd, Cromwell.	Yes	Contact Recreation Indicator Bacteria
Miner Brook	CT4600-26_01	From mouth at Mattabesset upstream to source just south of Westfield St, Middletown.	Yes	Contact Recreation Indicator Bacteria
Willow Brook, Cromwell	CT4600-27_01	From mouth at Mattabesset River upstream to headwaters near junction of Coles Road and Willow brook Road, Cromwell.	Yes	Contact Recreation Indicator Bacteria
Belcher Brook	CT4601-00_01	From mouth at Mattabesset River upstream to source at Silver Lake, Berlin.	Yes	Contact Recreation Indicator Bacteria
Willow Brook, New Britain	CT4602-00_01	From mouth at Mattabesset River upstream to outlet of conduit east of Hart Park, New Britain.	Yes	Contact Recreation Indicator Bacteria
Webster Brook	CT4603-00_01	From mouth at Mattabesset River to source in Newington.	Yes	Contact Recreation Indicator Bacteria
Sawmill Brook	CT4604-00_01	From mouth at Mattabesset River upstream to Source at Atkin Street Pond (Highland Pond) Middletown.	Yes	Contact Recreation Indicator Bacteria
Coginchaug River	CT4607-00_02 CT4607-00_03 CT4607-00_04 CT4607-00_05 CT4607-00_06	From Rte 72 upstream to headwaters, near Bluff Head, north Guilford.	Yes * Segment 03 not on list	Contact Recreation Indicator Bacteria

DESCRIPTION OF THE WATERBODY

See "Site Specific Information" in Appendix A

POLLUTANT OF CONCERN AND POLLUTANT SOURCES

Sources of indicator bacteria include point and nonpoint sources, such as stormwater runoff, domestic animal waste (horses, farm animals), pet waste (dogs), natural sources (wildlife), illicit discharges, failed collection systems, and failed or inadequate septic systems. Potential sources that have been 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 of the subject waterbodies.

Waterbody Name	Nonpoint sources	Point Sources
Mattabesset River	Source Unknown, Agriculture, Waterfowl, Urban Runoff/Storm Sewers, Failed Collection system, Illicit Discharge	Regulated Urban Runoff/Storm Sewers
John Hall Brook	Agriculture, Source Unknown, Urban runoff/Storm sewers, Illicit Discharge	Regulated Urban Runoff/Storm Sewers
Little Brook	Failed Collection system, Source Unknown, Urban Runoff/Storm Sewers, Illicit Discharge	Regulated Urban Runoff/Storm Sewers
Spruce Brook	Failed Collection system, Source Unknown, Urban Runoff/Storm Sewers, Illicit Discharge	Regulated Urban Runoff/Storm Sewers
Coles Brook	Failed Collection system, Source Unknown, Urban Runoff/Storm Sewers, Illicit Discharge	Regulated Urban Runoff/Storm Sewers
Miner Brook	Failed Collection system, Source Unknown, Urban Runoff/Storm Sewers, Illicit Discharge	Regulated Urban Runoff/Storm Sewers
Willow Brook, Cromwell	Failed Collection system, Source Unknown, Urban Runoff/Storm Sewers, Illicit Discharge	Regulated Urban Runoff/Storm Sewers
Belcher Brook	Failed Collection system, Source Unknown, Urban Runoff/Storm Sewers, Illicit Discharge	Regulated Urban Runoff/Storm Sewers
Willow Brook, New Britain	Failed Collection system, Urban Runoff/Storm Sewers, Illicit Discharge	Regulated Urban Runoff/Storm Sewers
Webster Brook	Failed Collection system, Source Unknown, Urban runoff/Storm Sewers, Illicit Discharge	Regulated Urban Runoff/Storm Sewers
Sawmill Brook	Failed Collection system, Source Unknown, Urban Runoff/Storm Sewers, Illicit Discharge	Regulated Urban Runoff/Storm Sewers
Coginchaug River	Source Unknown, Waterfowl, Agriculture, Crop-related Sources, Intensive Animal Feeding Operations, Natural Sources, Illicit Discharge, Failed or Inadequate Septic Systems	Regulated Urban Runoff/Storm Sewers

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 (a distinction is made between designated and non-designated), 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[4] 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 for waters of the Mattabesset River Regional Basin are represented in Table 3. These criteria are applicable to all other recreational uses established for these waters. There are no designated swimming or non-designated swimming areas located in these waterbody segments.

Table 3. Applicable indicator bacteria criteria for the subject waterbodies.

Waterbody	Class	Bacterial Indicator	Criteria
Mattabesset River	A, B/A, C/B	*Escherichia coli* (*E. coli*)	Geometric Mean less than 126/100ml Single Sample Maximum 576/100ml
John Hall Brook	A		
Little Brook	A		
Spruce Brook	A		
Coles Brook	A, B/A		
Miner Brook	A		
Willow Brook, Cromwell	A		
Belcher Brook	B/A		
Willow Brook, New Britain	A, C/B		
Webster Brook	B/A		
Sawmill Brook	A		
Coginchaug River	A/AA, A, B		

NUMERIC WATER QUALITY TARGET

TMDL calculations were performed consistent with the analytical procedure presented in *Guidelines for Development of TMDLs for Indicator Bacteria Using the Cumulative Distribution Function Method* [5]. All data used in the analysis and the results of all calculations are presented in Appendix A and summarized in Table 4 below. Figure 3 shows the TMDL percent reduction for each monitoring site.

Table 4. Summary of TMDL analysis.

Waterbody	Waterbody Segment Description	Segment ID	Monitoring Site	Average Percent Reduction to Meet Water Quality Standards			
				TMDL	WLA	LA	MOS
Mattabesset River	From mouth at CT River US to dam on Railroad Pond.	CT4600-00_01	425	62	73	57	Implicit
		CT4600-00-02	163	82	89	79	Implicit
		CT4600-00-03	1167	74	77	73	Implicit
		CT4600-00-04	424	58	64	56	Implicit
	From inlet to Paper Goods Pond upstream to Hart Pond dam.	CT4600-00-06	161	62	72	57	Implicit
John Hall Brook	From mouth at Mattabesset upstream to Hallmere Reservoir, Berlin.	CT4600-01_01	450	21	39	14	Implicit
		CT4600-01_02	1269	8	13	6	Implicit
Little Brook	From mouth at Mattabasset River upstream to source near Trinity Rd, Rocky Hill.	CT4600-07_01	427	86	88	86	Implicit
Spruce Brook	From mouth at Mattabasset River upstream to source at Lamentation Mountain.	CT4600-13_01	451	59	78	52	Implicit
Coles Brook	From mouth at Mattabasset upstream to source at Shunpike Rd, Cromwell.	CT4600-23_01	455	87	89	86	Implicit
Miner Brook	From mouth at Mattabasset upstream to source just south of Westfield St, Middletown.	CT4600-26_01	452	58	65	55	Implicit
Willow Brook, Cromwell	From mouth at Mattabesset River upstream to headwaters near junction of Coles Road and Willow brook Road, Cromwell.	CT4600-27_01	456	86	90	84	Implicit
Belcher Brook	From mouth at Mattabasset River upstream to source at Silver Lake, Berlin.	CT4601-00_01	426	80	82	80	Implicit
Willow Brook, New Britain	From mouth at Mattabesset River upstream to outlet of conduit east of Hart Park, New Britain.	CT4602-00_01	376	86	91	85	Implicit
Webster Brook	From mouth at Mattabasset River to source in Newington.	CT4603-00_01	454	77	82	75	Implicit
Sawmill Brook	From mouth at Mattabasset River upstream to Source at Atkin Street Pond (Highland Pond) Middletown.	CT4604-00_01	453	82	88	80	Implicit
Coginchaug River	From Rte 72 upstream to headwaters, near Bluff Head, north Guilford.	CT4607-00_02	429	68	72	67	Implicit
		CT4607-00_03	28	79	78	79	Implicit
		CT4607-00_04	414	69	73	67	Implicit
		CT4607-00_05	419	62	66	60	Implicit
		CT4607-00_06	428	84	87	83	Implicit

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 at high use public bathing areas (EPA 1986)[4]. Therefore, the criteria provide an additional level of protection when applied to water not designated for high use bathing. As a result, achieving the criteria results in an "implicit MOS". Additional explanation concerning the implicit MOS incorporated into the analysis is provided in *Guidelines for Development of TMDLs for Indicator Bacteria Using the Cumulative Distribution Function Method* [(5)] included as 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 impacted solely by non-point sources indicates that the summer months typically exhibit the highest densities of any season (*Water Quality* Summary)[6]. This phenomena 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 during the summer months will likely result in achieving full support of recreational uses throughout the year.

TMDL IMPLEMENTATION PLAN

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

Point Sources of *E. coli* to the Mattabesset River Regional Basin include regulated stormwater. 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.dep.state.ct.us/pao/download.htm#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.

Section 6 (K) of the MS4 Permit requires the municipality to modify their Stormwater Management Plan to implement the TMDL (achieve reductions) within four months of TMDL approval by EPA. It is recommended that municipalities focus their revised Stormwater Management Plans on the TMDL waterbodies for Section 6(a)(1)(A)(i) - implement public education program, Section 6(a)(3)(A)(i, ii, iii) and 6(a)(3)(A)(i, ii, iii, iv) - illicit discharge detection, Section 6(a)(6)(A)(iv) - stormwater structures cleaning, and Section 6(a)(6)(A)(v) - prioritize stormwater structures for repair or upgrade, of the MS4 permit.

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. Nonpoint sources of *E.coli* in the Mattabesset River Regional Basin include failed collection systems, urban runoff/storm sewers, waterfowl, agriculture, and failed or inadequate septic systems. BMPs for the management of nonpoint sources include nuisance wildlife control plans, pet waste ordinances, septic system testing and maintenance, and farm animal waste management systems. As progress is made implementing BMPs, the “percent reduction” needed to meet criteria will decrease.

Guidance to local municipalities for the management of septic systems can be found on the EPA's website at http://cfpub.epa.gov/owm/septic/guidelines.cfm#7478. Additional general information regarding septic systems can be found at http://cfpub.epa.gov/owm/septic/home.cfm. Nuisance wildlife information can be found on the DEP's website at http://www.dep.state.ct.us/burnatr/wildlife/problem.htm. Guidance for the management of agricultural activities can be found on EPA’s website http://www.epa.gov/owow/nps/agriculture.html.

In addition, the DEP's watershed coordinator will continue to provide technical and educational assistance to the local municipalities and other stakeholders, as well as identify funding sources for implementation of the TMDL and monitoring plan.

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 direct BMP implementation efforts with fixed station monitoring to quantify progress in achieving TMDL established goals. The MS4 permit that is the basis of TMDL implementation efforts in MS4 communities includes 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."*
>
> Section 6(h)(A) MS4 Permit

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, the municipality may request written approval from the DEP for an alternative monitoring program:

> *"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.*
>
> Section 6(h)(B) MS4 Permit

The DEP encourages municipalities faced with implementing a TMDL to request approval for an alternative monitoring program. 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.

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. 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.

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 will provide reasonable assurance that the municipalities will take steps towards achieving the target TMDLs and reducing nonpoint sources of stormwater containing bacteria.

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

The Mattabesset River Regional Basin TMDL document was noticed for public comment in the Hartford Courant on April 18. 2005. In addition, the Towns of Berlin, Cromwell, Durham, Guilford, Middlefield, Rocky Hill and Southington, the Cities of New Britain and Middletown, as well as several interested parties were notified by mail of the comment period. As of the end of the public review period (May 18, 2005), one comment letter was received by the DEP. The final TMDL document was modified and reflects changes pertaining to the comment letter.

REFERENCES

(1) Connecticut Department of Environmental Protection, 2004. *List of Connecticut Water bodies Not Meeting Water Quality Standards*. Bureau of Water Management, 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) U.S. Census Bureau, March 2002. http://www.census.gov/geo/www/ua/ua_2k.html.

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

(5) Connecticut Department of Environmental Protection, 2004. *Guidelines for Development of TMDLs for Indicator Bacteria Using the Cumulative Distribution Function Method*. Bureau of Water Management, 79 Elm Street, Hartford, CT 06106-5127.

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

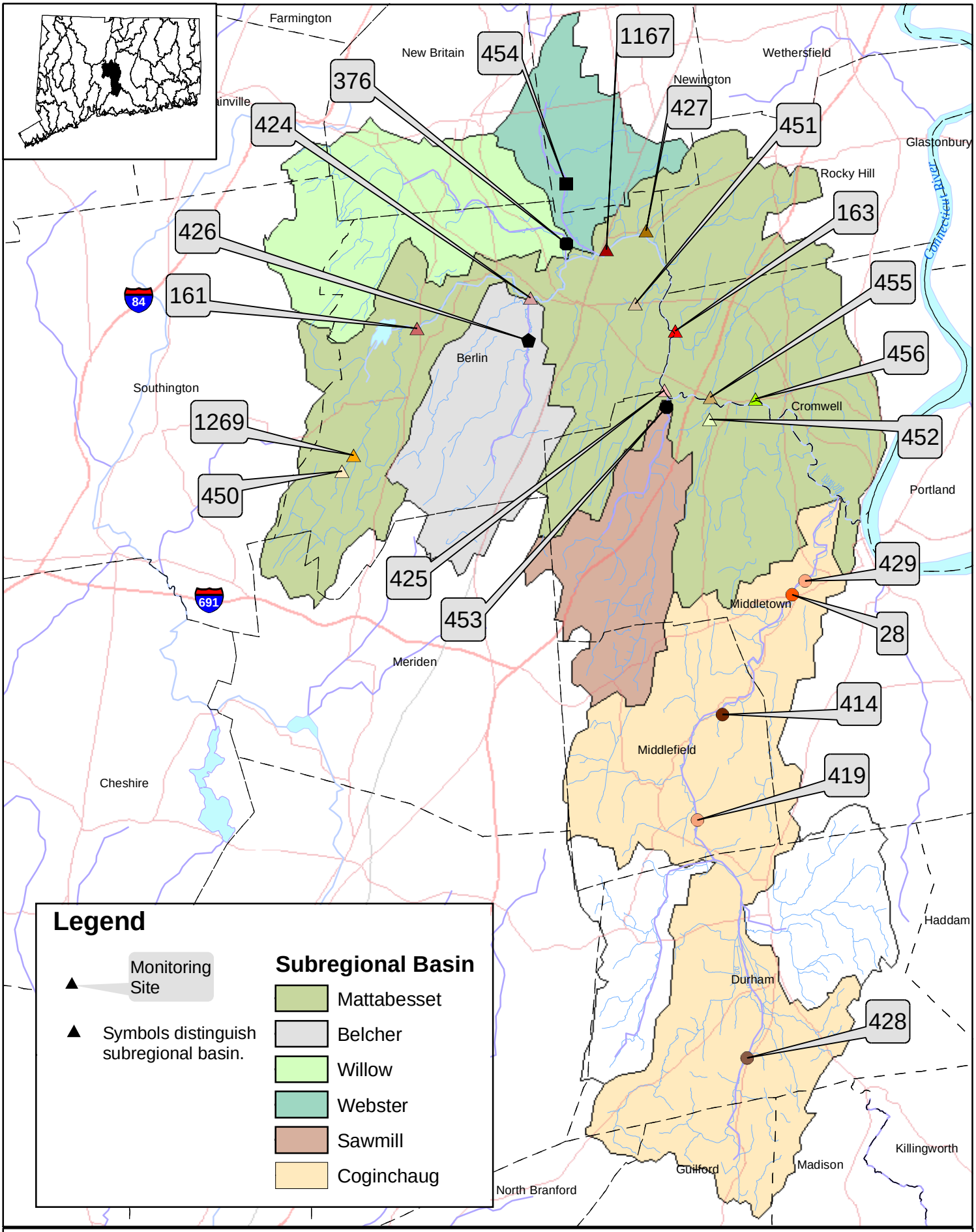


Figure 1: Basin Location Map

Map Data: CT DEP
Map Created: Dec. 2004

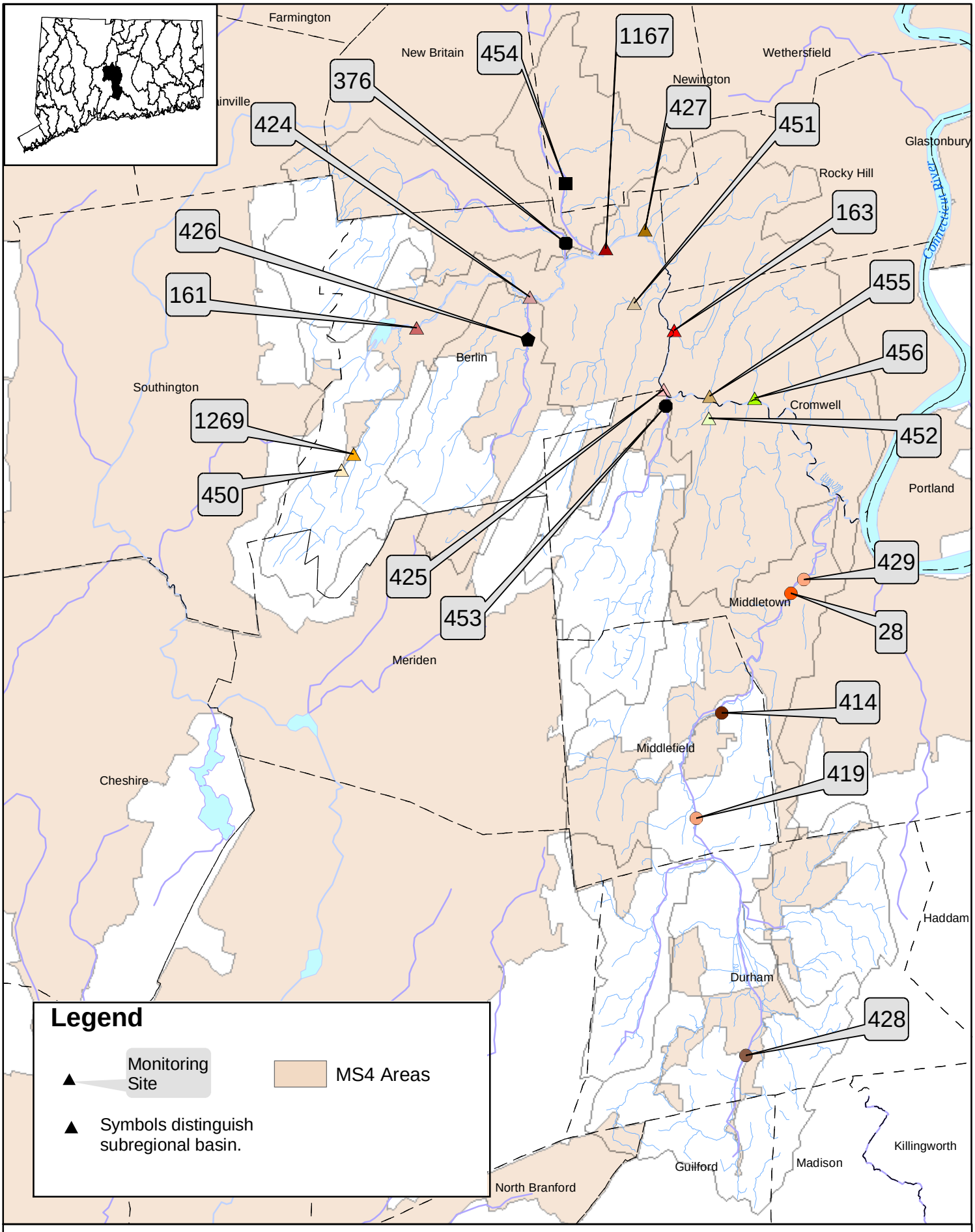


Figure 2: Designated MS4 Areas Map

Map Data: CT DEP
Map Created: Dec. 2004

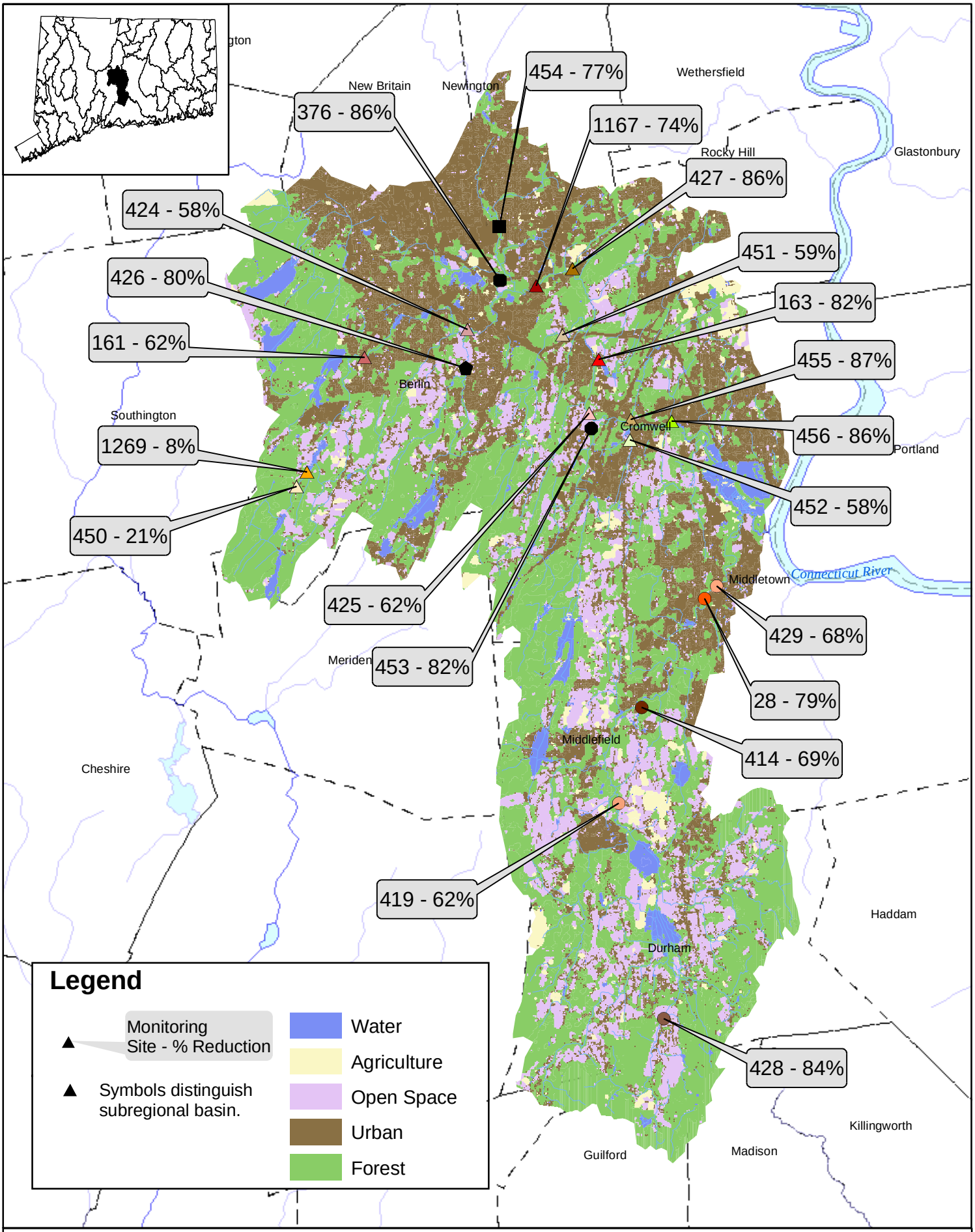


Figure 3: Basin Land Use Map and TMDL Percent Reductions

Map Data: CT DEP
Map Created: Dec. 2004

Appendix A

Appendix A-1
Mattabesset River Regional Basin
TMDL Summary

The TMDL analysis for the Mattabesset River Regional Basin was conducted at 21 sites, which are representative of 21 river segments. The analysis indicates that the sites are influenced by sources of bacteria active under both wet weather and dry weather conditions. The Waste Load Allocations (WLA) are applicable to regulated stormwater. This type of reduction can be achieved through the installation of engineered controls to improve water quality and reduce the surge of stormwater to the river. The Load Allocations (LA) indicate that illegal sanitary discharges to the storm sewer may be present in the specified areas. Other nonpoint sources (improperly functional septic systems, agriculture/farm activities and/or wildlife) also contribute to the LA. It is important to note that WLAs are greater than LAs at all sites, but many segments require a percent reduction in LA that almost equals the WLA. This indicates that efforts to reduce impacts from stormwater, as well as, illicit discharges and other nonpoint sources are equally important in order to meet water quality standards. It is also important to note that the percent reduction required for both the WLA and LA are significantly lower at sites 450 and 1269 in John Hall Brook. This may be attributed to the fact that sites 450 and 1269 are located in an area with less urban/developed land use than other sites in the upper Mattabesset River Regional Basin. The percent reductions required at sites 428, 419, and 414 in the central and southern Coginchaug River subregional basin are higher than sites 450 and 1269 even though they are also located in less developed areas. This may be attributed to nonpoint sources including agriculture and wildlife.

Appendix A-2
Mattabesset River Subregional Basin
Waterbody Specific Information

Impaired Waterbody

Waterbody Name (Segment ID): Mattabesset River (CT 4600-00_01, CT 4600-00_02, CT 4600-00_03, CT 4600-00_04, and CT 4600-00_06), John Hall Brook (CT 4600-01_01, CT 4600-01_02), Little Brook (CT 4600-07_01), Spruce Brook (CT 4600-13_01), Coles Brook (CT 4600-23_01), Miner Brook (CT 4600-26_01), & Willow Brook, Cromwell (CT 4600-27_01)

Waterbody Segment Description:

Mattabesset River (CT 4600-00_01 to CT 4600-00_04) - From mouth at CT River to dam on Railroad Pond

Mattabesset River (CT 4600-00_06) - From inlet to Paper Goods Pond upstream to Hart Pond dam *John Hall Brook* - From mouth at Mattabesset River upstream to Hallmere Reservoir, Berlin

Little Brook - From mouth at Mattabesset River upstream to source near Trinity Rd, Rocky Hill

Spruce Brook - From mouth at Mattabesset River upstream to source at Lamentation Mountain

Coles Brook - From mouth at Mattabesset upstream to source at Shunpike Rd, Cromwell

Miner Brook - From mouth at Mattabesset upstream to source just south of Westfield St, Middletown

Willow Brook, Cromwell - From mouth at Mattabesset River upstream to headwaters near junction of Coles Road and Willow brook Road, Cromwell

Impairment Description:

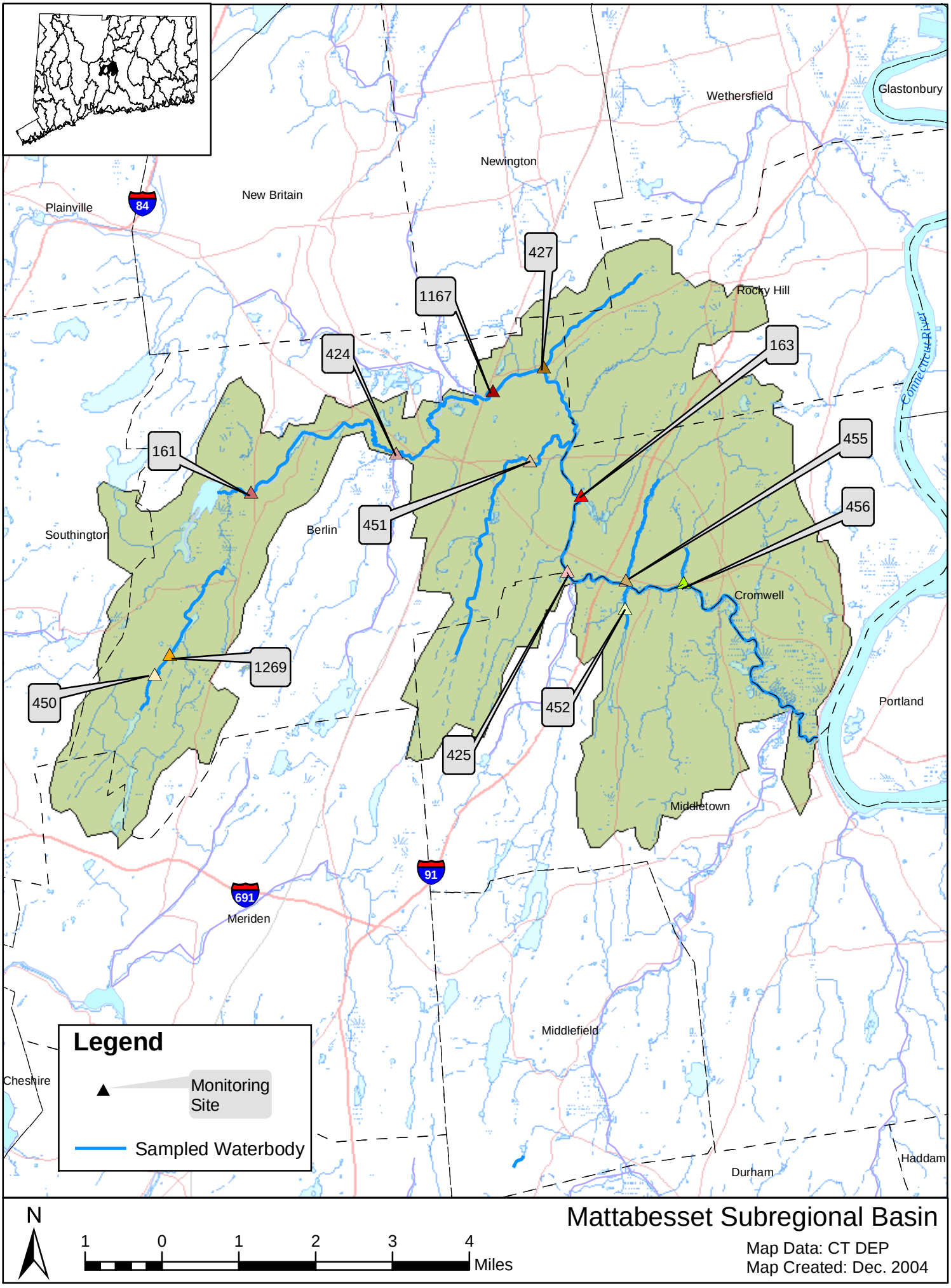
Designated Use Impairment: Contact Recreation
Size of Impaired Water Segments: 26.5
Surface Water Classification: Class A, B/A, & C/B

Watershed Description:

Total Regional Drainage Basin Area: 108.911 square miles
Tributary To: Connecticut River
Subregional Basin Name & Code: Mattabesset River 4600
Regional Basin: Mattabesset River
Major Basin: Connecticut River
Watershed Towns: Southington, Newington, Rocky Hill, Meriden, Cromwell, Berlin, Middletown
Phase II GP applicable? Southington (Yes), Newington (Yes), Rocky Hill (Yes), Meriden (Yes), Cromwell (Yes), Berlin (Yes), Middletown (Yes)
Applicable Season: Recreation Season (May 1 to September 30)
Landuse:

Land Use Category	Percent Composition
Forested	43.06%
Urban/Developed	37.40%
Open Space	12.53%
Water/Wetland	3.81%
Agriculture	3.19%

Data Source: Connecticut Land Use Land Cover Data Layer LANDSTAT (1995) Thematic Mapper Satellite Imagery.


Wethersfield
Glastonbury
Newington
New Britain
Plainville
84
427
1167
Rocky Hill
424
163
Connecticut River
161
455
451
456
Southington
Berlin
Cromwell
1269
450
452
425
Portland
Middletown
91
691
Meriden
Middlefield
Cheshire
Haddam
Durham
Legend
Monitoring Site
Sampled Waterbody
N
1 0 1 2 3 4
Miles
Mattabesset Subregional Basin
Map Data: CT DEP
Map Created: Dec. 2004

Mattabesset River

CT 4600-00_01

Data Used in the Analysis

Monitoring Site: 425, East Bank End of Kirby Road

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
7/11/01	0.04	0.04	0.19	DRY	320	13.0	0.6190	167	48
7/25/01	0.00	0.00	0.00	DRY	180	7.0	0.3333	85	53
8/8/01	0.00	0.00	0.00	DRY	290	11.0	0.5238	133	54
8/22/01	0.00	0.00	0.71	DRY	130	4.0	0.1905	56	57
7/10/02	0.00	0.00	0.00	DRY	1500	18.0	0.8571	337	78
7/24/02	0.00	0.87	0.87	**WET**	4600	19.5	0.9286	486	89
8/7/02	0.00	0.00	0.00	DRY	53	1.0	0.0476	27	49
8/21/02	0.00	0.33	0.33	**WET**	110	3.0	0.1429	47	57
7/9/03	0.42	0.42	0.47	**WET**	150	5.0	0.2381	65	56
7/23/03	0.20	0.63	0.84	**WET**	1200	17.0	0.8095	282	76
8/6/03	0.00	0.16	1.03	DRY	4600	19.5	0.9286	486	89
8/20/03	0.00	0.00	0.14	DRY	160	6.0	0.2857	75	53
6/9/04	0.02	0.02	0.18	DRY	190	8.0	0.3810	95	50
6/23/04	0.00	0.01	0.01	DRY	200	9.0	0.4286	107	47
7/7/04	0.00	0.01	1.21	DRY	890	16.0	0.7619	243	73
7/21/04	0.00	0.00	0.52	DRY	230	10.0	0.4762	119	48
8/4/04	0.00	0.00	1.21	DRY	380	14.0	0.6667	187	51
8/18/04	0.00	0.00	1.03	DRY	310	12.0	0.5714	149	52
9/1/04	0.00	0.00	0.03	DRY	490	15.0	0.7143	212	57
9/15/04	0.34	0.34	0.34	**WET**	97	2.0	0.0952	38	61
9/29/04	0.69	1.94	1.94	**WET**	11000	21.0	1.0000	576	95

Statistics

# Samples DRY	**15**
# Samples WET	**6**
# Samples Total	**21**
Geomean	**404**
Log std deviation	**0.6109**

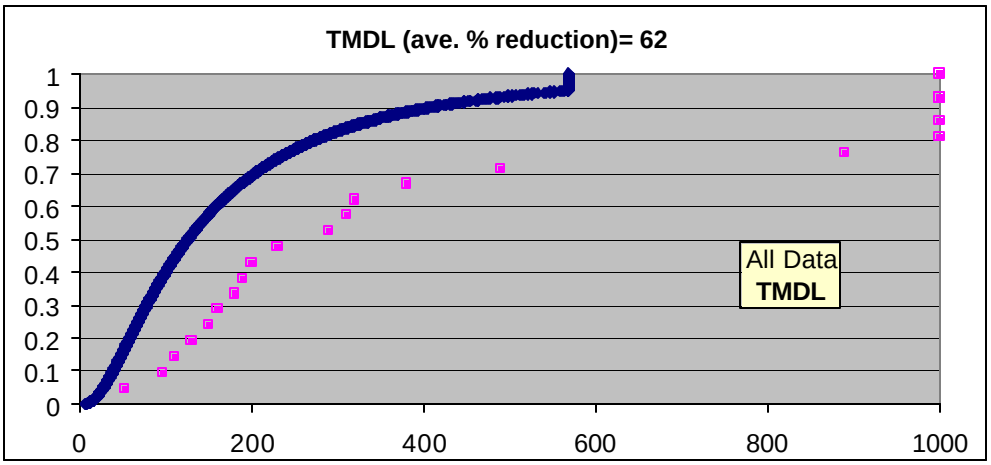
Avg % Reduction

Wet (WLA)	**73**
Dry (LA)	**57**
Total (TMDL)	**62**

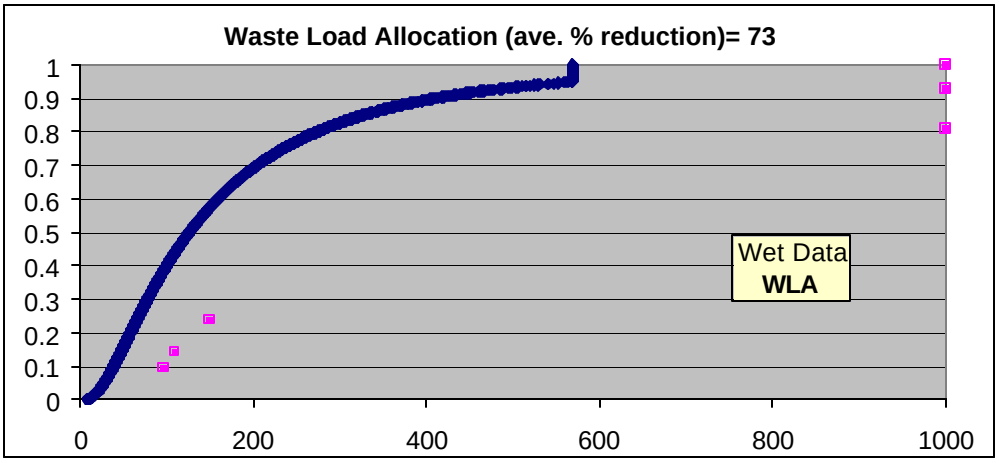
Precipitation and E. coli data provided by the Mattabasset District and Connecticut River Watch Program, respectively. E. coli data for 9/15/04 represents an average of 2 duplicate samples.

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.

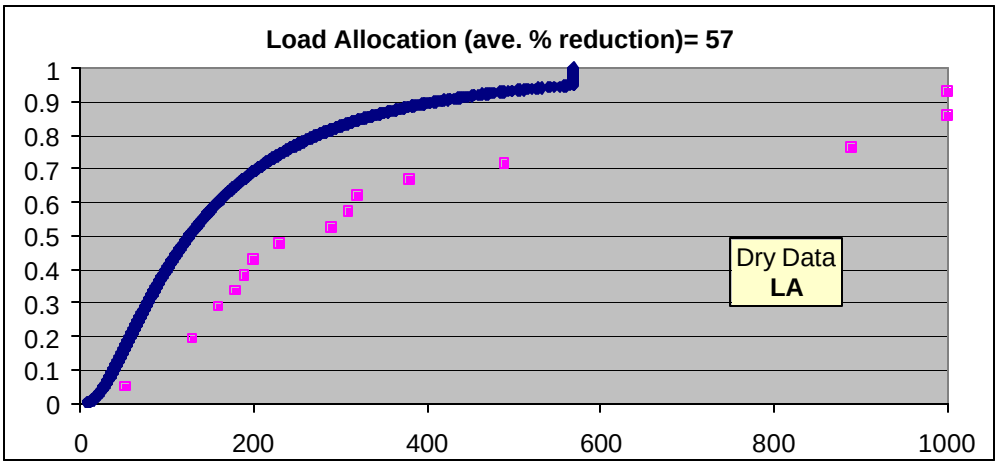
Mattabesset River Criteria Curve for Monitoring Site 425



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.

Mattabesset River

CT 4600-00_02

Data Used in the Analysis

Monitoring Site: 163, Downstream Berlin Street

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
7/11/01	0.04	0.04	0.19	DRY	540	12.0	0.5714	149	72
7/25/01	0.00	0.00	0.00	DRY	500	10.5	0.5000	126	75
8/8/01	0.00	0.00	0.00	DRY	63	1.0	0.0476	27	57
8/22/01	0.00	0.00	0.71	DRY	180	3.0	0.1429	47	74
7/10/02	0.00	0.00	0.00	DRY	2300	14.0	0.6667	187	92
7/24/02	0.00	0.87	0.87	**WET**	7300	19.5	0.9286	486	93
8/7/02	0.00	0.00	0.00	DRY	160	2.0	0.0952	38	76
8/21/02	0.00	0.33	0.33	**WET**	5500	18.0	0.8571	337	94
7/9/03	0.42	0.42	0.47	**WET**	290	4.0	0.1905	56	81
7/23/03	0.20	0.63	0.84	**WET**	7300	19.5	0.9286	486	93
8/6/03	0.00	0.16	1.03	DRY	3000	17.0	0.8095	282	91
8/20/03	0.00	0.00	0.14	DRY	430	9.0	0.4286	107	75
6/9/04	0.02	0.02	0.18	DRY	500	10.5	0.5000	126	75
6/23/04	0.00	0.01	0.01	DRY	380	6.5	0.3095	80	79
7/7/04	0.00	0.01	1.21	DRY	2500	15.0	0.7143	212	92
7/21/04	0.00	0.00	0.52	DRY	380	6.5	0.3095	80	79
8/4/04	0.00	0.00	1.21	DRY	1500	13.0	0.6190	167	89
8/18/04	0.00	0.00	1.03	DRY	395	8.0	0.3810	95	76
9/1/04	0.00	0.00	0.03	DRY	2600	16.0	0.7619	243	91
9/15/04	0.34	0.34	0.34	**WET**	320	5.0	0.2381	65	80
9/29/04	0.69	1.94	1.94	**WET**	10000	21.0	1.0000	576	94

Statistics

# Samples DRY	**15**
# Samples WET	**6**
# Samples Total	**21**
Geomean	**900**
Log std deviation	**0.6238**

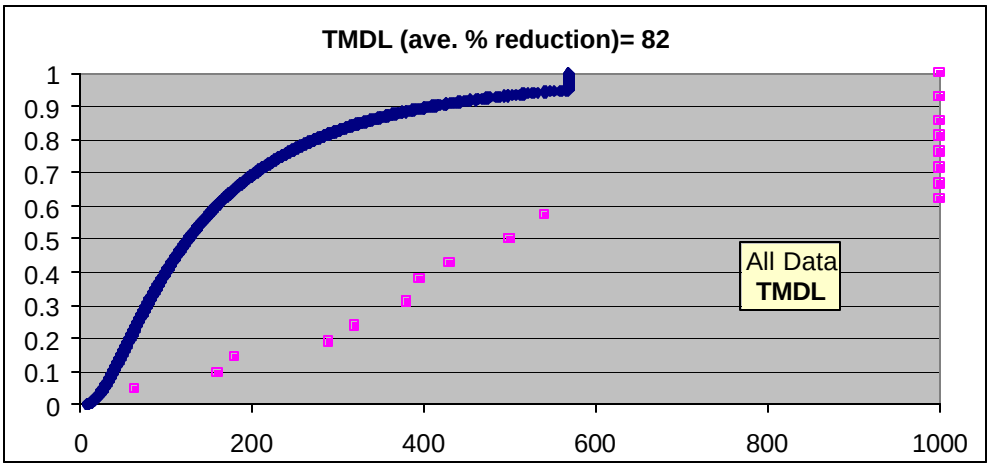
Avg % Reduction

Wet (WLA)	**89**
Dry (LA)	**79**
Total (TMDL)	**82**

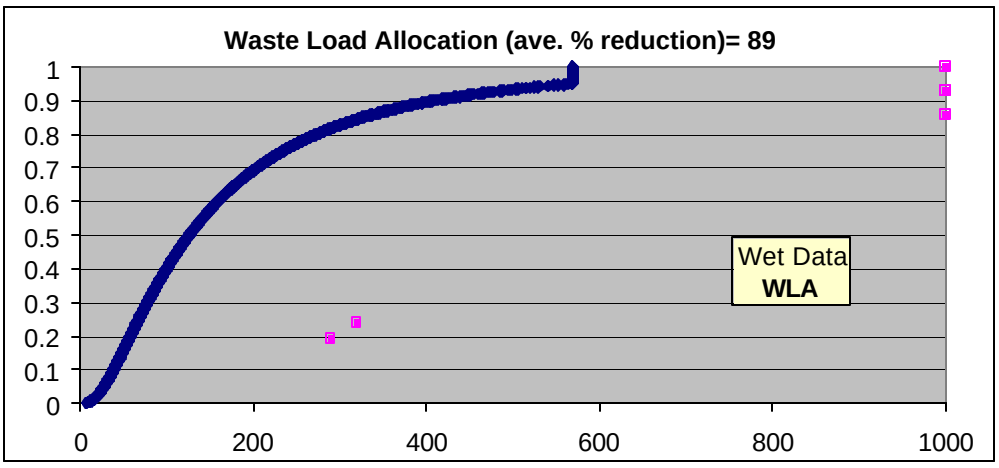
Precipitation and E. coli data provided by the Mattabasset District and Connecticut River Watch Program, respectively. E. coli data for 8/18/04 represents an average of 2 duplicate samples.

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.

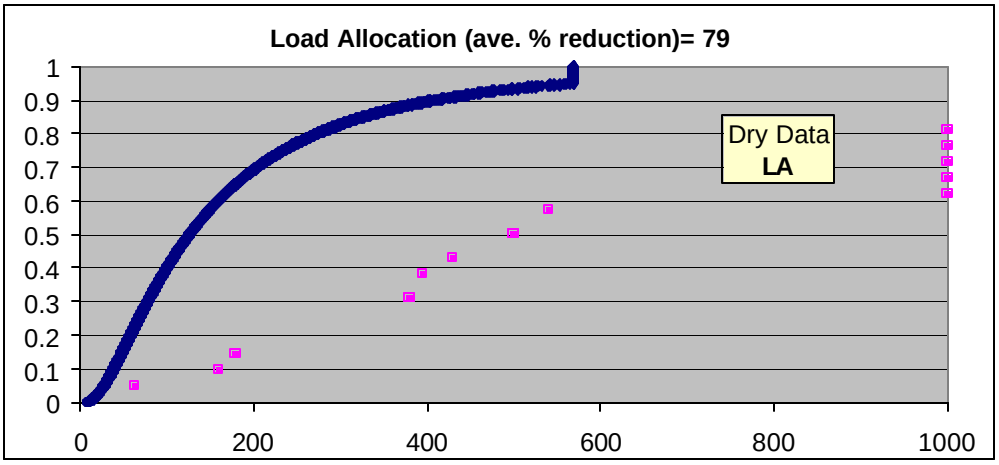
Mattabesset River Criteria Curve for Monitoring Site 163



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.

Mattabesset River

CT 4600-00_03

Data Used in the Analysis

Monitoring Site: 1167, Downstream Worthington Ridge

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
5/26/04	0.01	0.02	1.61	DRY	540	13.0	0.6190	167	69
6/3/04	0.02	0.07	0.57	DRY	350	6.0	0.2857	75	79
6/9/04	0.02	0.02	0.18	DRY	290	3.5	0.1667	52	82
6/16/04	0.00	0.00	0.05	DRY	460	9.5	0.4524	113	75
6/23/04	0.00	0.01	0.01	DRY	430	8.0	0.3810	95	78
6/30/04	0.07	0.31	0.31	**WET**	660	15.5	0.7381	227	66
7/7/04	0.00	0.01	1.21	DRY	1800	20.0	0.9524	576	68
7/8/04	0.00	0.00	1.21	DRY	400	7.0	0.3333	85	79
7/21/04	0.00	0.00	0.52	DRY	460	9.5	0.4524	113	75
7/29/04	0.01	0.41	0.77	**WET**	930	18.5	0.8810	373	60
8/4/04	0.00	0.00	1.21	DRY	730	17.0	0.8095	282	61
8/11/04	0.11	0.11	0.13	**WET**	200	1.0	0.0476	27	86
8/18/04	0.00	0.00	1.03	DRY	465	11.0	0.5238	133	71
8/23/04	0.00	0.00	1.30	DRY	930	18.5	0.8810	373	60
9/1/04	0.00	0.00	0.03	DRY	520	12.0	0.5714	149	71
9/2/04	0.00	0.00	0.03	DRY	260	2.0	0.0952	38	85
9/15/04	0.34	0.34	0.34	**WET**	340	5.0	0.2381	65	81
9/16/04	0.01	0.35	0.35	**WET**	290	3.5	0.1667	52	82
9/21/04	0.00	0.00	3.38	**WET**	660	15.5	0.7381	227	66
9/23/04	0.00	0.00	0.00	DRY	590	14.0	0.6667	187	68
9/29/04	0.69	1.94	1.94	**WET**	20000	21.0	1.0000	576	97

Statistics

# Samples DRY	**14**
# Samples WET	**7**
# Samples Total	**21**
Geomean	**588**
Log std deviation	**0.4123**

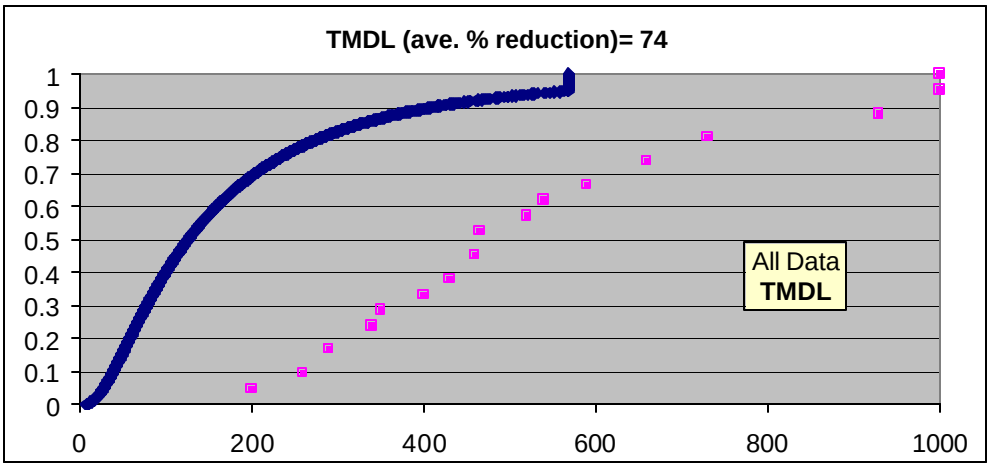
Avg % Reduction

Wet (WLA)	**77**
Dry (LA)	**73**
Total (TMDL)	**74**

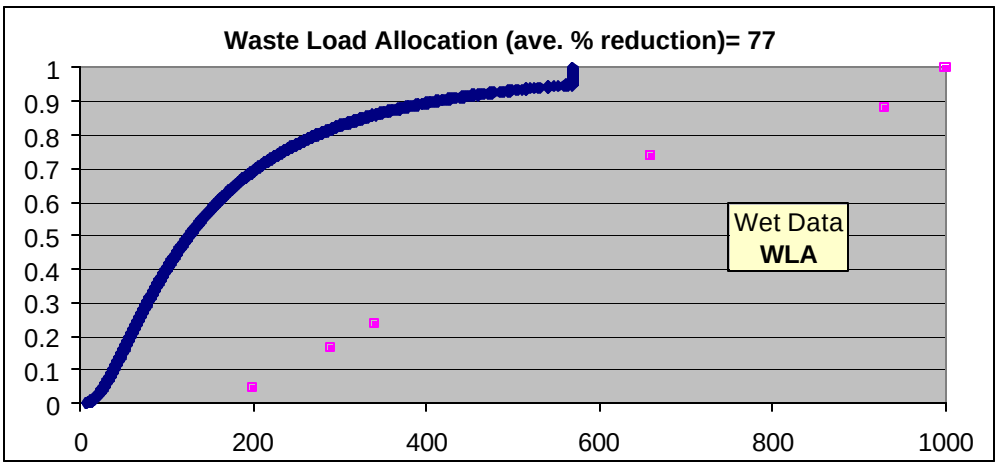
Precipitation and E. coli data provided by the Mattabasset District and Connecticut River Watch Program, respectively. E. coli data for 8/18/04 represents an average of 2 duplicate samples.

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.

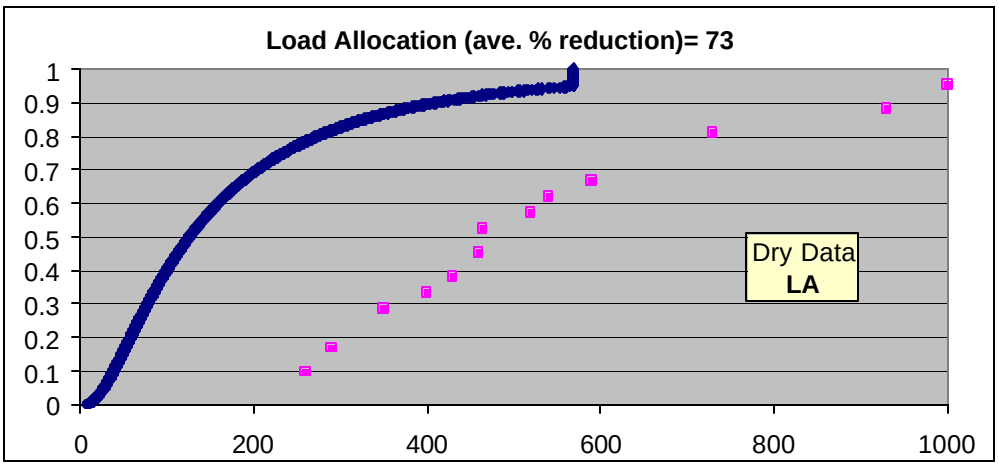
Mattabesset River Criteria Curve for Monitoring Site 1167



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.

Mattabesset River

CT 4600-00_04

Data Used in the Analysis

Monitoring Site: 424, Upstream Lower Lane and Belcher Brook

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
7/11/01	0.04	0.04	0.19	DRY	290	10.0	0.5000	126	57
7/25/01	0.00	0.00	0.00	DRY	510	14.0	0.7000	204	60
8/8/01	0.00	0.00	0.00	DRY	300	11.5	0.5750	150	50
7/10/02	0.00	0.00	0.00	DRY	2000	19.0	0.9500	573	71
7/24/02	0.00	0.87	0.87	**WET**	660	15.0	0.7500	235	64
8/7/02	0.00	0.00	0.00	DRY	160	6.5	0.3250	83	48
8/21/02	0.00	0.33	0.33	**WET**	98	3.0	0.1500	49	51
7/9/03	0.42	0.42	0.47	**WET**	300	11.5	0.5750	150	50
7/23/03	0.20	0.63	0.84	**WET**	1300	16.5	0.8250	298	77
8/6/03	0.00	0.16	1.03	DRY	1500	18.0	0.9000	410	73
8/20/03	0.00	0.00	0.14	DRY	120	4.0	0.2000	58	52
6/9/04	0.02	0.02	0.18	DRY	97	2.0	0.1000	39	60
6/23/04	0.00	0.01	0.01	DRY	1300	16.5	0.8250	298	77
7/7/04	0.00	0.01	1.21	DRY	160	6.5	0.3250	83	48
7/21/04	0.00	0.00	0.52	DRY	52	1.0	0.0500	28	47
8/4/04	0.00	0.00	1.21	DRY	310	13.0	0.6500	180	42
8/18/04	0.00	0.00	1.03	DRY	250	9.0	0.4500	112	55
9/1/04	0.00	0.00	0.03	DRY	170	8.0	0.4000	100	41
9/15/04	0.34	0.34	0.34	**WET**	150	5.0	0.2500	68	55
9/29/04	0.69	1.94	1.94	**WET**	5200	20.0	1.0000	576	89

Statistics

# Samples DRY	**14**
# Samples WET	**6**
# Samples Total	**20**
Geomean	**348**
Log std deviation	**0.5191**

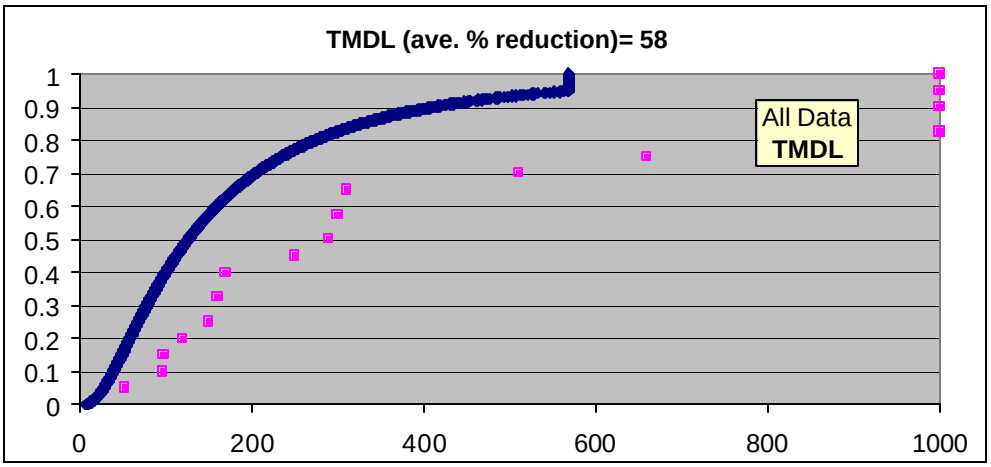
Avg % Reduction

Wet (WLA)	**64**
Dry (LA)	**56**
Total (TMDL)	**58**

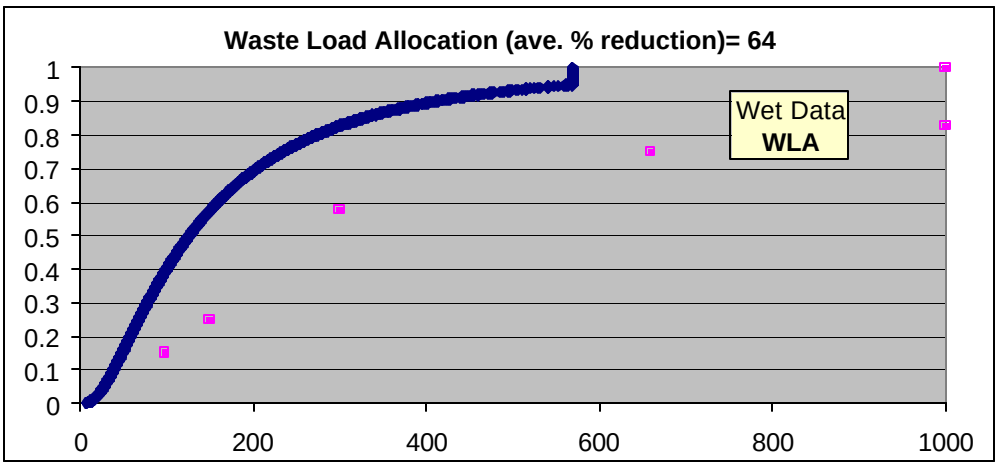
Precipitation and E. coli data provided by the Mattabasset District and Connecticut River Watch Program, respectively. E. coli data for 9/15/04 represents an average of 2 duplicate samples.

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.

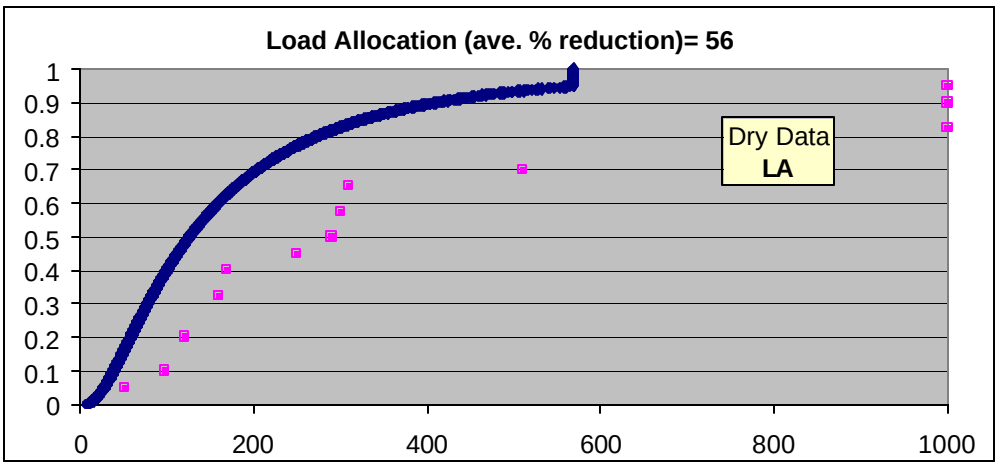
Mattabesset River Criteria Curve for Monitoring Site 424



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.

Mattabesset River

CT 4600-00_06

Data Used in the Analysis

Monitoring Site: 161, Upstream Route 71A

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
7/11/01	0.04	0.04	0.19	DRY	200	8.0	0.3810	95	52
7/25/01	0.00	0.00	0.00	DRY	41	1.0	0.0476	27	34
8/8/01	0.00	0.00	0.00	DRY	110	3.0	0.1429	47	57
8/22/01	0.00	0.00	0.71	DRY	160	5.5	0.2619	70	56
7/10/02	0.00	0.00	0.00	DRY	1600	18.0	0.8571	337	79
7/24/02	0.00	0.87	0.87	**WET**	3300	20.0	0.9524	576	83
8/7/02	0.00	0.00	0.00	DRY	99	2.0	0.0952	38	62
8/21/02	0.00	0.33	0.33	**WET**	470	14.0	0.6667	187	60
7/9/03	0.42	0.42	0.47	**WET**	450	13.0	0.6190	167	63
7/23/03	0.20	0.63	0.84	**WET**	1700	19.0	0.9048	421	75
8/6/03	0.00	0.16	1.03	DRY	1100	17.0	0.8095	282	74
8/20/03	0.00	0.00	0.14	DRY	130	4.0	0.1905	56	57
6/9/04	0.02	0.02	0.18	DRY	610	16.0	0.7619	243	60
6/23/04	0.00	0.01	0.01	DRY	245	10.0	0.4762	119	51
7/7/04	0.00	0.01	1.21	DRY	550	15.0	0.7143	212	61
7/21/04	0.00	0.00	0.52	DRY	280	11.0	0.5238	133	52
8/4/04	0.00	0.00	1.21	DRY	320	12.0	0.5714	149	54
8/18/04	0.00	0.00	1.03	DRY	160	5.5	0.2619	70	56
9/1/04	0.00	0.00	0.03	DRY	220	9.0	0.4286	107	51
9/15/04	0.34	0.34	0.34	**WET**	190	7.0	0.3333	85	55
9/29/04	0.69	1.94	1.94	**WET**	20000	21.0	1.0000	576	97

Statistics

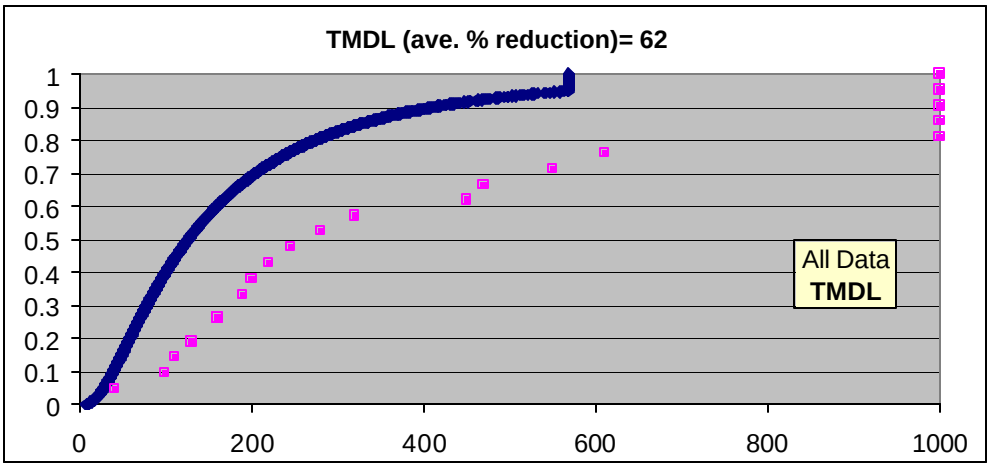
# Samples DRY	**15**
# Samples WET	**6**
# Samples Total	**21**
Geomean	**397**
Log std deviation	**0.6039**

Avg % Reduction

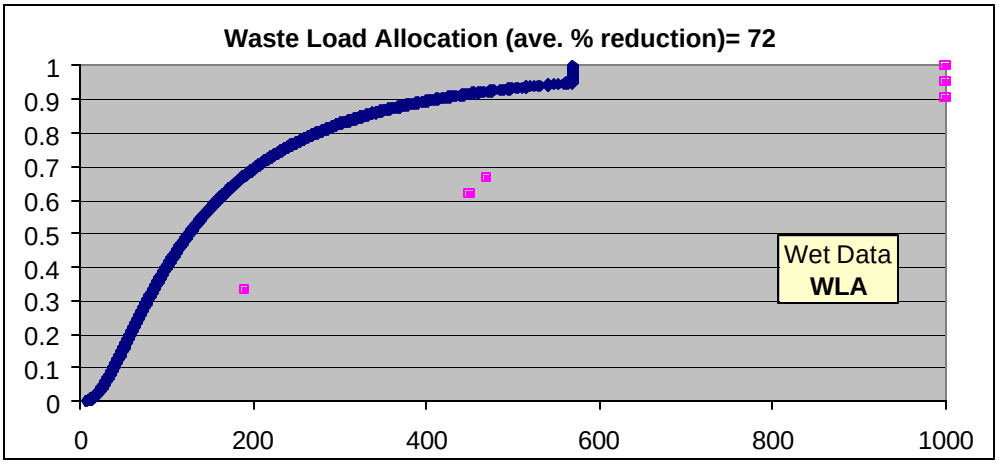
Wet (WLA)	**72**
Dry (LA)	**57**
Total (TMDL)	**62**

Precipitation and E. coli data provided by the Mattabasset District and Connecticut River Watch Program, respectively. E.coli data on 6/23/04 & 9/29/04 represents an average of 2 duplicate samples. **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.

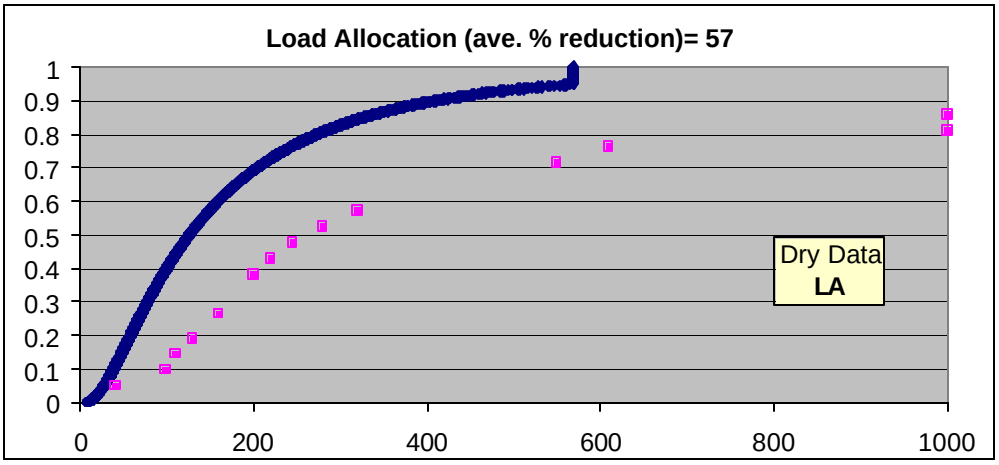
Mattabesset River Criteria Curve for Monitoring Site 161



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.

John Hall Brook

CT 4600-01_01

Data Used in the Analysis

Monitoring Site: 450, Downstream Edgewood Road

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
7/11/01	0.04	0.04	0.19	DRY	150	9.0	0.4286	107	29
7/25/01	0.00	0.00	0.00	DRY	41	3.0	0.1429	47	0
8/8/01	0.00	0.00	0.00	DRY	10	1.0	0.0476	27	0
8/22/01	0.00	0.00	0.71	DRY	20	2.0	0.0952	38	0
7/10/02	0.00	0.00	0.00	DRY	190	13.5	0.6429	177	7
7/24/02	0.00	0.87	0.87	**WET**	600	18.0	0.8571	337	44
8/7/02	0.00	0.00	0.00	DRY	87	6.0	0.2857	75	14
8/21/02	0.00	0.33	0.33	**WET**	190	13.5	0.6429	177	7
7/9/03	0.42	0.42	0.47	**WET**	190	13.5	0.6429	177	7
7/23/03	0.20	0.63	0.84	**WET**	2000	20.0	0.9524	576	71
8/6/03	0.00	0.16	1.03	DRY	1100	19.0	0.9048	421	62
8/20/03	0.00	0.00	0.14	DRY	170	11.0	0.5238	133	22
6/9/04	0.02	0.02	0.18	DRY	98	7.5	0.3571	90	8
6/23/04	0.00	0.01	0.01	DRY	98	7.5	0.3571	90	8
7/7/04	0.00	0.01	1.21	DRY	200	16.5	0.7857	261	0
7/21/04	0.00	0.00	0.52	DRY	200	16.5	0.7857	261	0
8/4/04	0.00	0.00	1.21	DRY	86	5.0	0.2381	65	24
8/18/04	0.00	0.00	1.03	DRY	190	13.5	0.6429	177	7
9/1/04	0.00	0.00	0.03	DRY	165	10.0	0.4762	119	28
9/15/04	0.34	0.34	0.34	**WET**	63	4.0	0.1905	56	11
9/29/04	0.69	1.94	1.94	**WET**	6500	21.0	1.0000	576	91

Statistics

# Samples DRY	**15**
# Samples WET	**6**
# Samples Total	**21**
Geomean	**170**
Log std deviation	**0.6270**

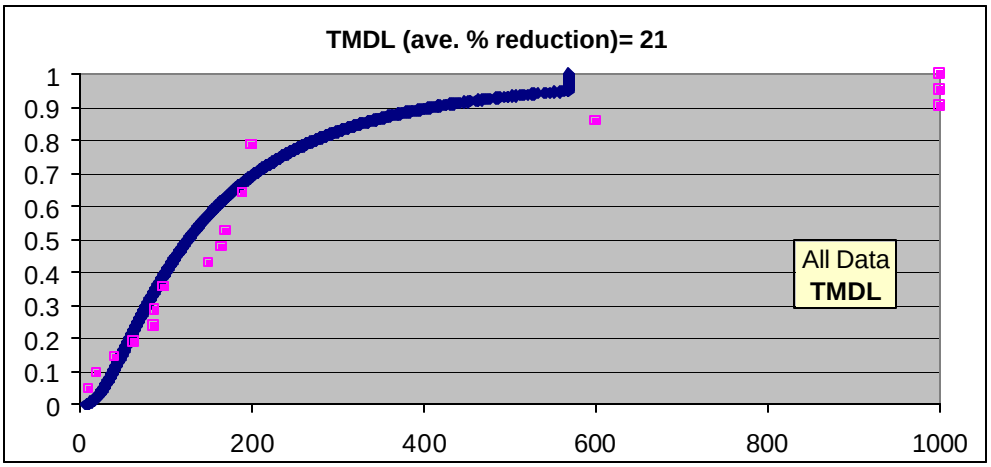
Avg % Reduction

Wet (WLA)	**39**
Dry (LA)	**14**
Total (TMDL)	**21**

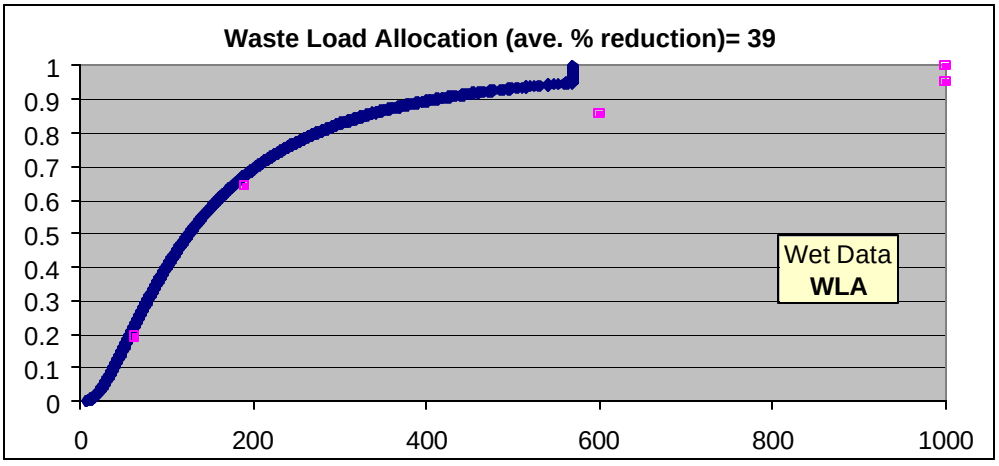
Precipitation and E. coli data provided by the Mattabasset District and Connecticut River Watch Program, respectively.

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.

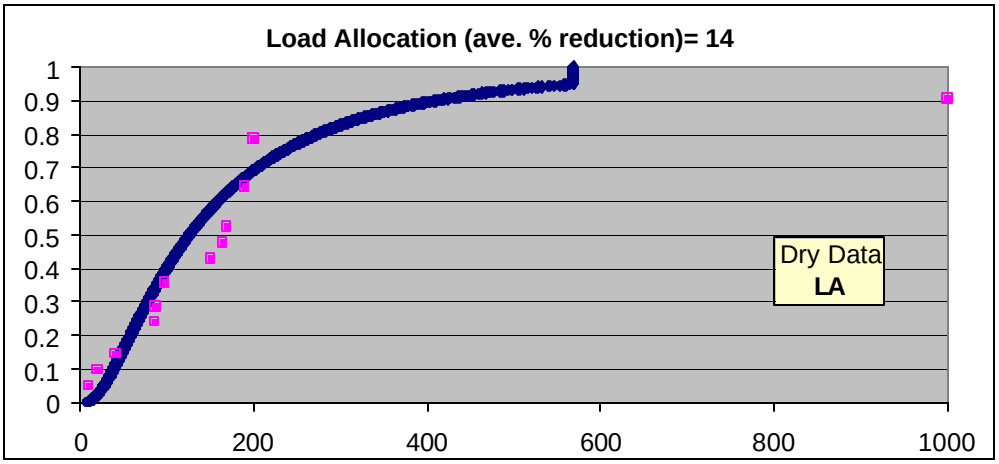
John Hall Brook Criteria Curve for Monitoring Site 450



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.

John Hall Brook

CT 4600-01_02

Data Used in the Analysis

Monitoring Site: 1269, At Orchard Road

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
5/26/04	0.01	0.02	1.61	DRY	98	11.0	0.5238	133	0
6/3/04	0.02	0.07	0.57	DRY	74	9.0	0.4286	107	0
6/9/04	0.02	0.02	0.18	DRY	31	2.0	0.0952	38	0
6/16/04	0.00	0.00	0.05	DRY	63	7.0	0.3333	85	0
6/23/04	0.00	0.01	0.01	DRY	86	10.0	0.4762	119	0
6/30/04	0.07	0.31	0.31	**WET**	20	1.0	0.0476	27	0
7/7/04	0.00	0.01	1.21	DRY	170	17.0	0.8095	282	0
7/8/04	0.00	0.00	1.21	DRY	1400	20.0	0.9524	576	59
7/21/04	0.00	0.00	0.52	DRY	106.5	12.0	0.5714	149	0
7/29/04	0.01	0.41	0.77	**WET**	120	13.5	0.6429	177	0
8/4/04	0.00	0.00	1.21	DRY	180	18.0	0.8571	337	0
8/11/04	0.11	0.11	0.13	**WET**	63	7.0	0.3333	85	0
8/18/04	0.00	0.00	1.03	DRY	120	13.5	0.6429	177	0
8/23/04	0.00	0.00	1.30	DRY	160	16.0	0.7619	243	0
9/1/04	0.00	0.00	0.03	DRY	63	7.0	0.3333	85	0
9/2/04	0.00	0.00	0.03	DRY	41	3.5	0.1667	52	0
9/15/04	0.34	0.34	0.34	**WET**	41	3.5	0.1667	52	0
9/16/04	0.01	0.35	0.35	**WET**	52	5.0	0.2381	65	0
9/21/04	0.00	0.00	3.38	**WET**	150	15.0	0.7143	212	0
9/23/04	0.00	0.00	0.00	DRY	530	19.0	0.9048	421	21
9/29/04	0.69	1.94	1.94	**WET**	7300	21.0	1.0000	576	92

Statistics

# Samples DRY	**14**
# Samples WET	**7**
# Samples Total	**21**
Geomean	**121**
Log std deviation	**0.5764**

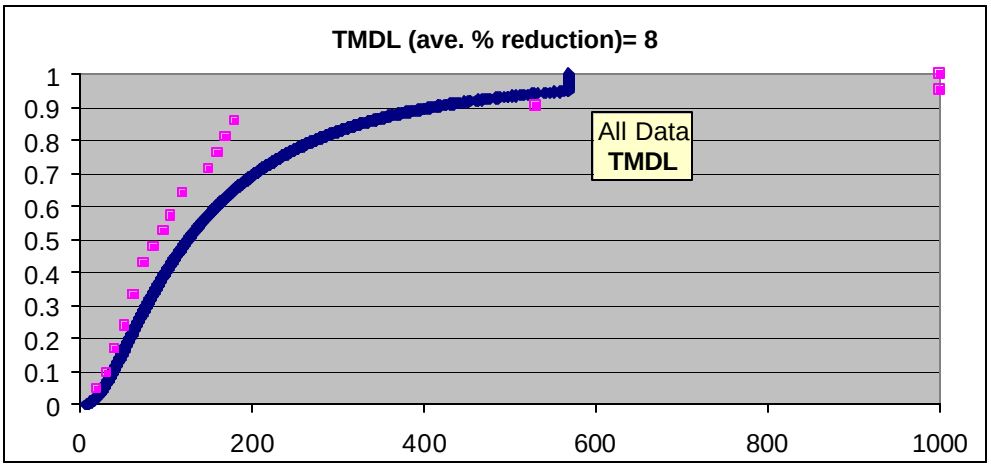
Avg % Reduction

Wet (WLA)	**13**
Dry (LA)	**6**
Total (TMDL)	**8**

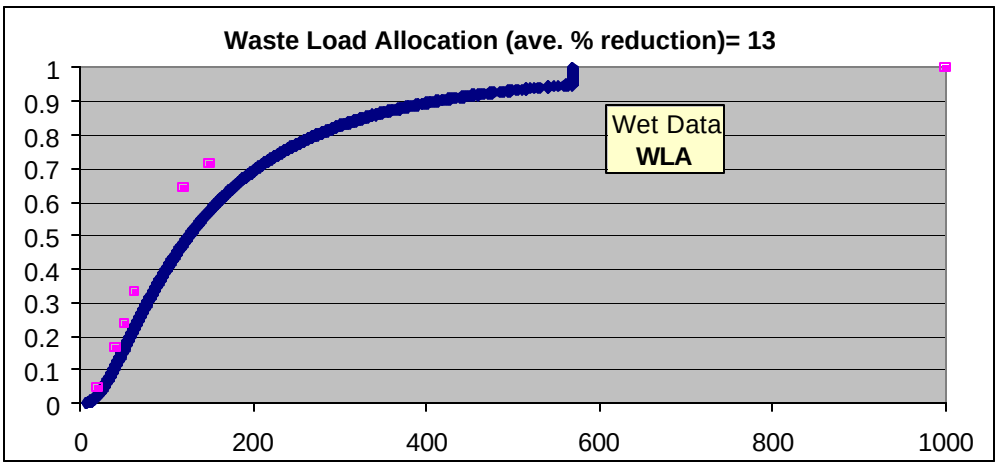
Precipitation and E. coli data provided by the Mattabasset District and Connecticut River Watch Program, respectively. E.coli data for 7/21/2004 represents an average of 2 duplicate samples.

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.

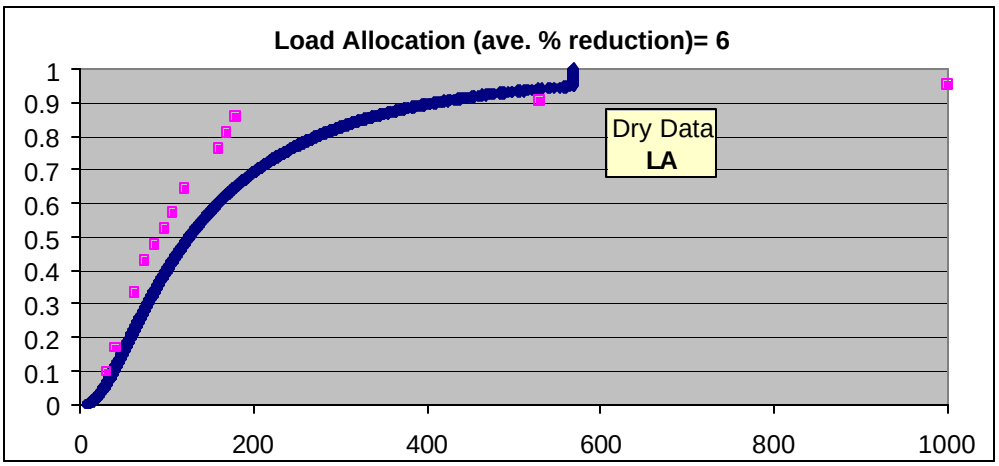
John Hall Brook Criteria Curve for Monitoring Site 1269



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.

Little Brook

CT 4600-07_01

Data Used in the Analysis

Monitoring Site: 427, At Beacon Lane

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
7/11/01	0.04	0.04	0.19	DRY	880	12.5	0.5682	148	83
7/24/01	0.00	0.00	0.00	DRY	120	1.0	0.0455	27	78
7/25/01	0.00	0.00	0.00	DRY	430	4.0	0.1818	55	87
8/8/01	0.00	0.00	0.00	DRY	11000	21.0	0.9545	576	95
8/22/01	0.00	0.00	0.71	DRY	1300	16.5	0.7500	235	82
7/10/02	0.00	0.00	0.00	DRY	1000	14.0	0.6364	174	83
7/24/02	0.00	0.87	0.87	**WET**	2100	18.0	0.8182	291	86
8/7/02	0.00	0.00	0.00	DRY	780	10.0	0.4545	113	85
8/21/02	0.00	0.33	0.33	**WET**	1100	15.0	0.6818	195	82
7/9/03	0.42	0.42	0.47	**WET**	590	6.0	0.2727	72	88
7/23/03	0.20	0.63	0.84	**WET**	4900	20.0	0.9091	431	91
8/6/03	0.00	0.16	1.03	DRY	4600	19.0	0.8636	346	92
8/20/03	0.00	0.00	0.14	DRY	280	2.0	0.0909	37	87
6/9/04	0.02	0.02	0.18	DRY	540	5.0	0.2273	63	88
6/23/04	0.00	0.01	0.01	DRY	1300	16.5	0.7500	235	82
7/7/04	0.00	0.01	1.21	DRY	790	11.0	0.5000	126	84
7/21/04	0.00	0.00	0.52	DRY	880	12.5	0.5682	148	83
8/4/04	0.00	0.00	1.21	DRY	700	8.0	0.3636	91	87
8/18/04	0.00	0.00	1.03	DRY	360	3.0	0.1364	46	87
9/1/04	0.00	0.00	0.03	DRY	710	9.0	0.4091	102	86
9/15/04	0.34	0.34	0.34	**WET**	680	7.0	0.3182	82	88
9/29/04	0.69	1.94	1.94	**WET**	13000	22.0	1.0000	576	96

Statistics

# Samples DRY	**16**
# Samples WET	**6**
# Samples Total	**22**
Geomean	**1057**
Log std deviation	**0.4914**

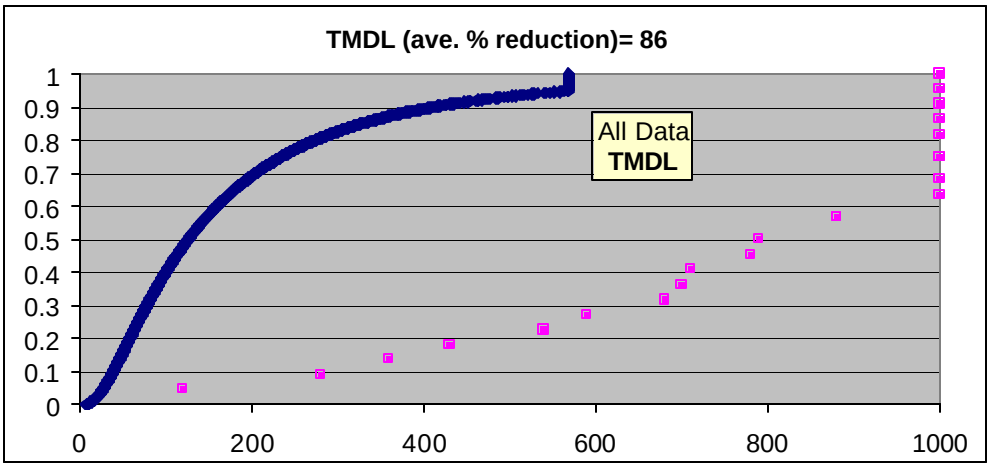
Avg % Reduction

Wet (WLA)	**88**
Dry (LA)	**86**
Total (TMDL)	**86**

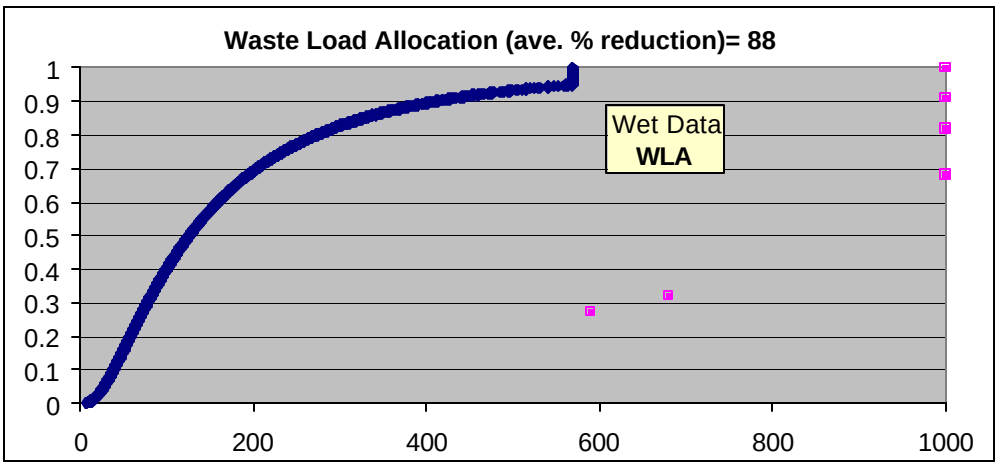
Precipitation and E. coli data provided by the Mattabasset District and Connecticut River Watch Program, respectively.

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.

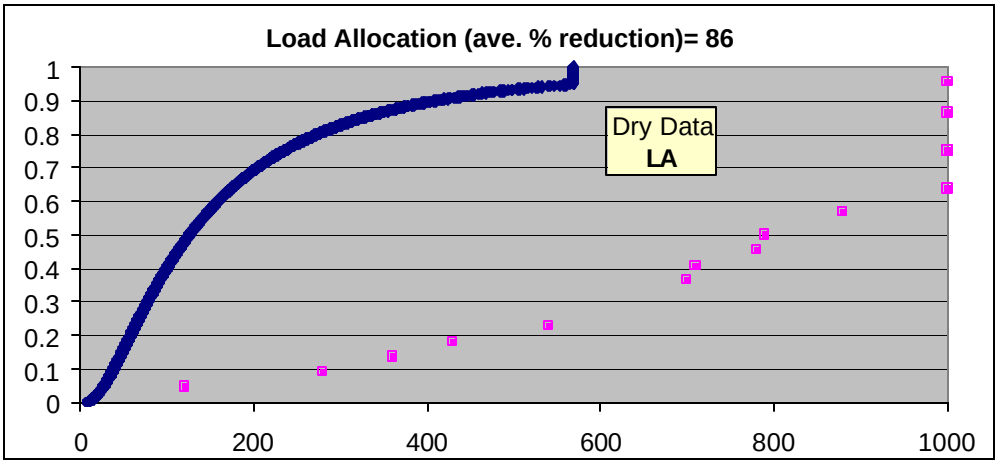
Little Brook Criteria Curve for Monitoring Site 427



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.

Spruce Brook

CT 4600-13_01

Data Used in the Analysis

Monitoring Site: 451, At Beckly Road

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
7/11/01	0.04	0.04	0.19	DRY	140	6.0	0.2727	72	48
7/24/01	0.00	0.00	0.00	DRY	130	4.5	0.2045	59	55
7/25/01	0.00	0.00	0.00	DRY	110	1.5	0.0682	32	71
8/8/01	0.00	0.00	0.00	DRY	130	4.5	0.2045	59	55
8/22/01	0.00	0.00	0.71	DRY	280	12.0	0.5455	140	50
7/10/02	0.00	0.00	0.00	DRY	1800	17.5	0.7955	269	85
7/24/02	0.00	0.87	0.87	**WET**	3100	20.0	0.9091	431	86
8/7/02	0.00	0.00	0.00	DRY	160	8.5	0.3864	97	40
8/21/02	0.00	0.33	0.33	**WET**	2200	19.0	0.8636	346	84
7/9/03	0.42	0.42	0.47	**WET**	330	15.0	0.6818	195	41
7/23/03	0.20	0.63	0.84	**WET**	13000	22.0	1.0000	576	96
8/6/03	0.00	0.16	1.03	DRY	1800	17.5	0.7955	269	85
8/20/03	0.00	0.00	0.14	DRY	290	13.0	0.5909	156	46
6/9/04	0.02	0.02	0.18	DRY	120	3.0	0.1364	46	62
6/23/04	0.00	0.01	0.01	DRY	160	8.5	0.3864	97	40
7/7/04	0.00	0.01	1.21	DRY	370	16.0	0.7273	220	41
7/21/04	0.00	0.00	0.52	DRY	170	10.0	0.4545	113	33
8/4/04	0.00	0.00	1.21	DRY	190	11.0	0.5000	126	34
8/18/04	0.00	0.00	1.03	DRY	150	7.0	0.3182	82	46
9/1/04	0.00	0.00	0.03	DRY	300	14.0	0.6364	174	42
9/15/04	0.34	0.34	0.34	**WET**	110	1.5	0.0682	32	71
9/29/04	0.69	1.94	1.94	**WET**	6900	21.0	0.9545	576	92

Statistics

# Samples DRY	**16**
# Samples WET	**6**
# Samples Total	**22**
Geomean	**407**
Log std deviation	**0.6325**

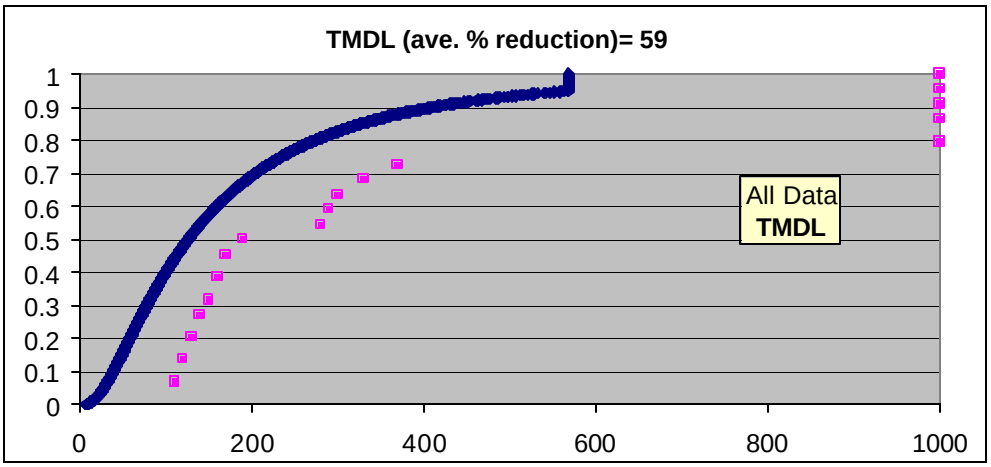
Avg % Reduction

Wet (WLA)	**78**
Dry (LA)	**52**
Total (TMDL)	**59**

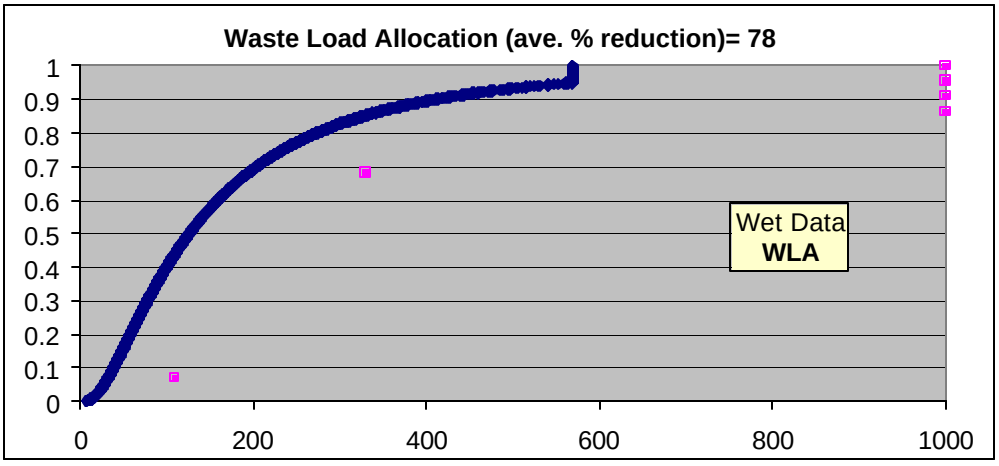
Precipitation and E. coli data provided by the Mattabasset District and Connecticut River Watch Program, respectively. E. coli data on 9/1/04 represents an average of 2 duplicate samples.

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.

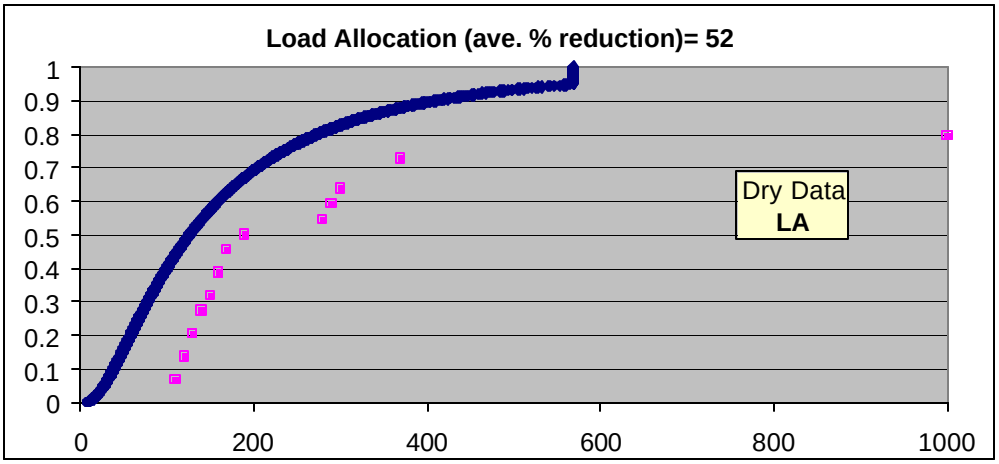
Spruce Brook Criteria Curve for Monitoring Site 451



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.

Coles Brook

CT 4600-23_01

Data Used in the Analysis

Monitoring Site: 455, At Route 72

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
7/11/01	0.04	0.04	0.19	DRY	390	6.0	0.2857	75	81
7/25/01	0.00	0.00	0.00	DRY	240	3.0	0.1429	47	80
8/8/01	0.00	0.00	0.00	DRY	480	8.0	0.3810	95	80
8/22/01	0.00	0.00	0.71	DRY	270	5.0	0.2381	65	76
7/10/02	0.00	0.00	0.00	DRY	2900	16.0	0.7619	243	92
7/24/02	0.00	0.87	0.87	**WET**	5200	17.5	0.8333	307	94
8/7/02	0.00	0.00	0.00	DRY	160	1.0	0.0476	27	83
8/21/02	0.00	0.33	0.33	**WET**	1400	12.5	0.5952	157	89
7/9/03	0.42	0.42	0.47	**WET**	260	4.0	0.1905	56	78
7/23/03	0.20	0.63	0.84	**WET**	24000	21.0	1.0000	576	98
8/6/03	0.00	0.16	1.03	DRY	5200	17.5	0.8333	307	94
8/20/03	0.00	0.00	0.14	DRY	230	2.0	0.0952	38	84
6/9/04	0.02	0.02	0.18	DRY	1400	12.5	0.5952	157	89
6/23/04	0.00	0.01	0.01	DRY	1100	11.0	0.5238	133	88
7/7/04	0.00	0.01	1.21	DRY	9200	19.0	0.9048	421	95
7/21/04	0.00	0.00	0.52	DRY	2300	15.0	0.7143	212	91
8/4/04	0.00	0.00	1.21	DRY	1700	14.0	0.6667	187	89
8/18/04	0.00	0.00	1.03	DRY	710	10.0	0.4762	119	83
9/1/04	0.00	0.00	0.03	DRY	440	7.0	0.3333	85	81
9/15/04	0.34	0.34	0.34	**WET**	560	9.0	0.4286	107	81
9/29/04	0.69	1.94	1.94	**WET**	20000	20.0	0.9524	576	97

Statistics

# Samples DRY	**15**
# Samples WET	**6**
# Samples Total	**21**
Geomean	**1215**
Log std deviation	**0.6487**

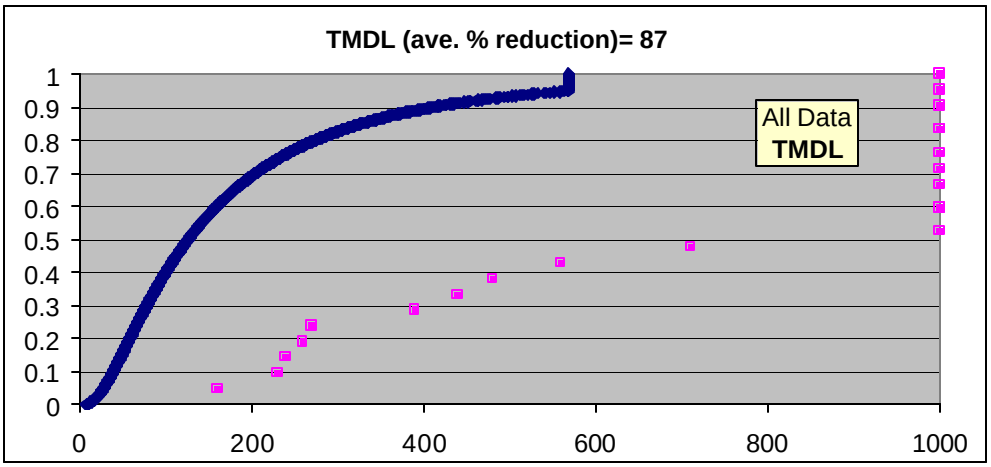
Avg % Reduction

Wet (WLA)	**89**
Dry (LA)	**86**
Total (TMDL)	**87**

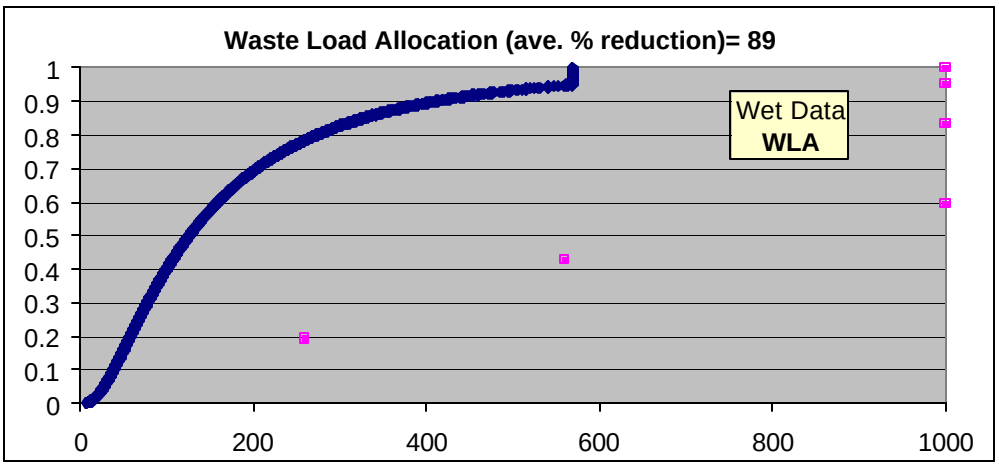
Precipitation and E. coli data provided by the Mattabasset District and Connecticut River Watch Program, respectively.

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.

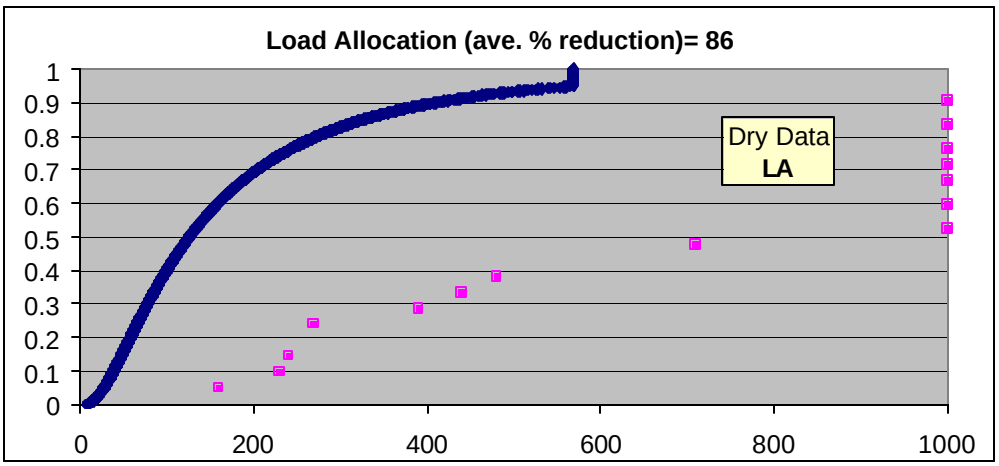
Coles Brook Criteria Curve for Monitoring Site 455



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.

Miner Brook

CT 4600-26_01

Data Used in the Analysis

Monitoring Site: 452, At Westlake Drive

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
7/11/01	0.04	0.04	0.19	DRY	72	3.0	0.1429	47	35
7/25/01	0.00	0.00	0.00	DRY	97	5.0	0.2381	65	33
8/8/01	0.00	0.00	0.00	DRY	230	7.5	0.3571	90	61
8/22/01	0.00	0.00	0.71	DRY	350	11.0	0.5238	133	62
7/10/02	0.00	0.00	0.00	DRY	1200	17.0	0.8095	282	76
7/24/02	0.00	0.87	0.87	**WET**	590	15.0	0.7143	212	64
8/7/02	0.00	0.00	0.00	DRY	42	2.0	0.0952	38	10
8/21/02	0.00	0.33	0.33	**WET**	510	14.0	0.6667	187	63
7/9/03	0.42	0.42	0.47	**WET**	4100	20.0	0.9524	576	86
7/23/03	0.20	0.63	0.84	**WET**	2800	19.0	0.9048	421	85
8/6/03	0.00	0.16	1.03	DRY	2400	18.0	0.8571	337	86
8/20/03	0.00	0.00	0.14	DRY	230	7.5	0.3571	90	61
6/9/04	0.02	0.02	0.18	DRY	455	13.0	0.6190	167	63
6/23/04	0.00	0.01	0.01	DRY	390	12.0	0.5714	149	62
7/7/04	0.00	0.01	1.21	DRY	1100	16.0	0.7619	243	78
7/21/04	0.00	0.00	0.52	DRY	190	6.0	0.2857	75	61
8/4/04	0.00	0.00	1.21	DRY	290	10.0	0.4762	119	59
8/18/04	0.00	0.00	1.03	DRY	280	9.0	0.4286	107	62
9/1/04	0.00	0.00	0.03	DRY	74	4.0	0.1905	56	24
9/15/04	0.34	0.34	0.34	**WET**	20	1.0	0.0476	27	0
9/29/04	0.69	1.94	1.94	**WET**	10000	21.0	1.0000	576	94

Statistics

# Samples DRY	**15**
# Samples WET	**6**
# Samples Total	**21**
Geomean	**389**
Log std deviation	**0.6762**

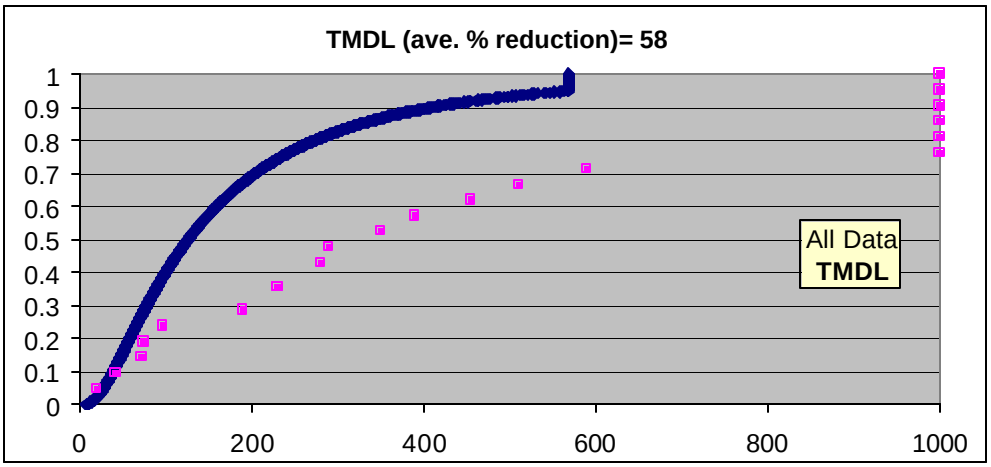
Avg % Reduction

Wet (WLA)	**65**
Dry (LA)	**55**
Total (TMDL)	**58**

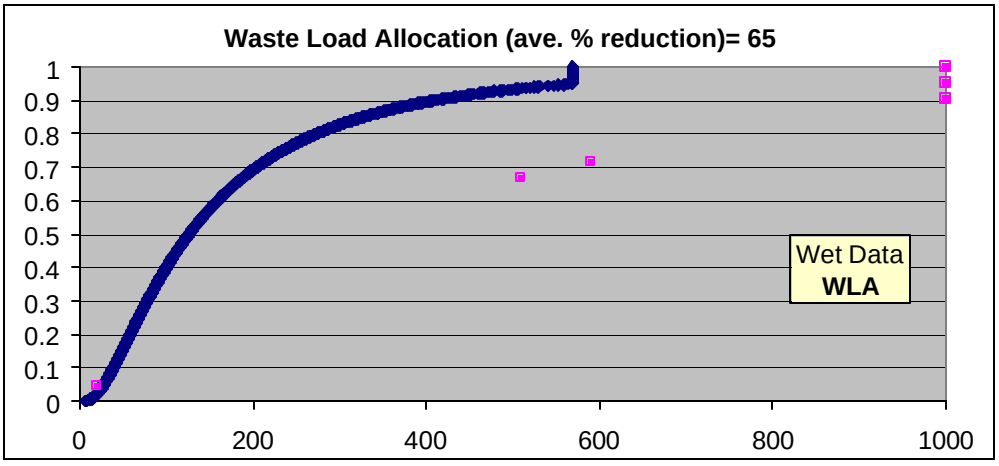
Precipitation and E. coli data provided by the Mattabasset District and Connecticut River Watch Program, respectively. E. coli data for 6/9/2004 represents an average of 2 duplicate samples.

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.

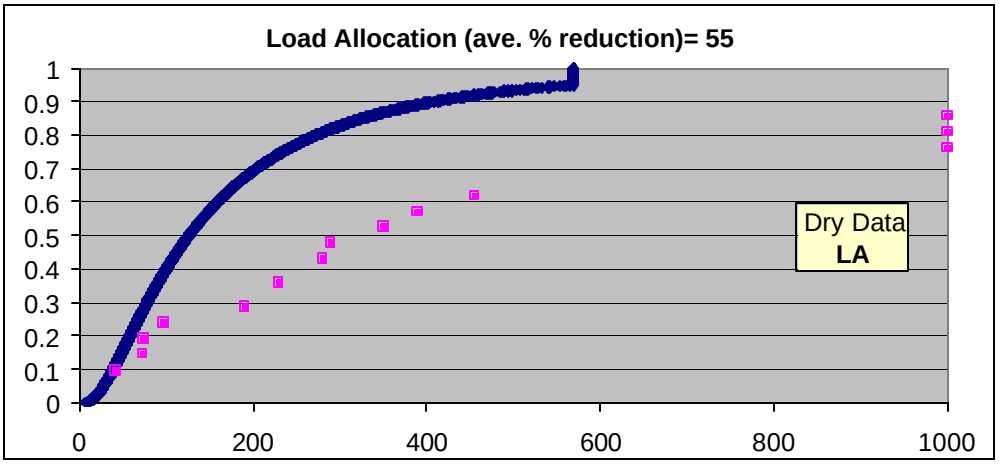
Miner Brook Criteria Curve for Monitoring Site 452



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.

Willow Brook, Cromwell

CT 4600-27_01

Data Used in the Analysis

Monitoring Site: 456, At Route 372

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
7/11/01	0.04	0.04	0.19	DRY	580	9.0	0.4091	102	82
7/25/01	0.00	0.00	0.00	DRY	1800	17.0	0.7727	251	86
8/8/01	0.00	0.00	0.00	DRY	1100	14.0	0.6364	174	84
8/22/01	0.00	0.00	0.71	DRY	290	2.0	0.0909	37	87
7/10/02	0.00	0.00	0.00	DRY	2000	18.0	0.8182	291	85
7/24/02	0.00	0.87	0.87	**WET**	2900	19.0	0.8636	346	88
8/1/02	0.05	0.05	0.05	DRY	470	7.0	0.3182	82	83
8/7/02	0.00	0.00	0.00	DRY	1400	15.0	0.6818	195	86
8/21/02	0.00	0.33	0.33	**WET**	1700	16.0	0.7273	220	87
7/9/03	0.42	0.42	0.47	**WET**	260	1.0	0.0455	27	90
7/23/03	0.20	0.63	0.84	**WET**	7300	20.0	0.9091	431	94
8/6/03	0.00	0.16	1.03	DRY	11000	21.0	0.9545	576	95
8/20/03	0.00	0.00	0.14	DRY	700	12.0	0.5455	140	80
6/9/04	0.02	0.02	0.18	DRY	610	10.0	0.4545	113	81
6/23/04	0.00	0.01	0.01	DRY	650	11.0	0.5000	126	81
7/7/04	0.00	0.01	1.21	DRY	440	5.0	0.2273	63	86
7/21/04	0.00	0.00	0.52	DRY	460	6.0	0.2727	72	84
8/4/04	0.00	0.00	1.21	DRY	500	8.0	0.3636	91	82
8/18/04	0.00	0.00	1.03	DRY	430	4.0	0.1818	55	87
9/1/04	0.00	0.00	0.03	DRY	800	13.0	0.5909	156	81
9/15/04	0.34	0.34	0.34	**WET**	300	3.0	0.1364	46	85
9/29/04	0.69	1.94	1.94	**WET**	17000	22.0	1.0000	576	97

Statistics

# Samples DRY	**16**
# Samples WET	**6**
# Samples Total	**22**
Geomean	**1037**
Log std deviation	**0.5086**

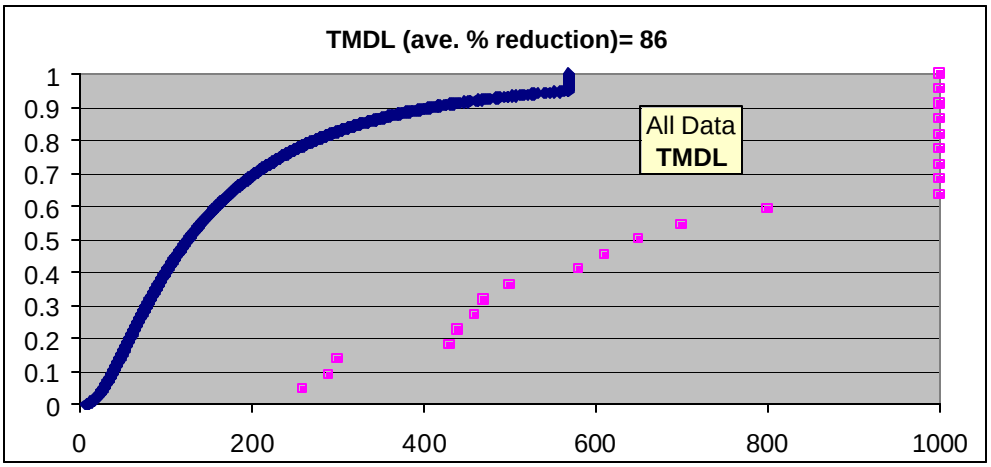
Avg % Reduction

Wet (WLA)	**90**
Dry (LA)	**84**
Total (TMDL)	**86**

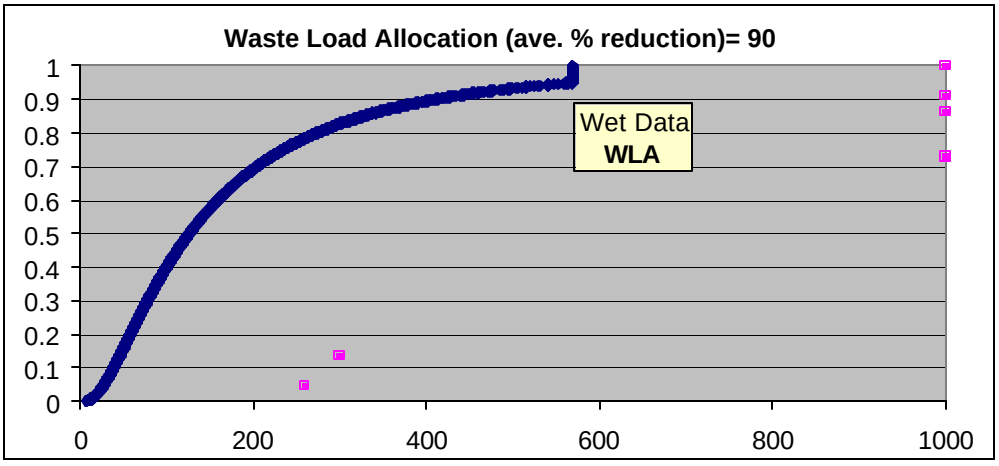
Precipitation and E. coli data provided by the Mattabasset District and Connecticut River Watch Program, respectively.

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.

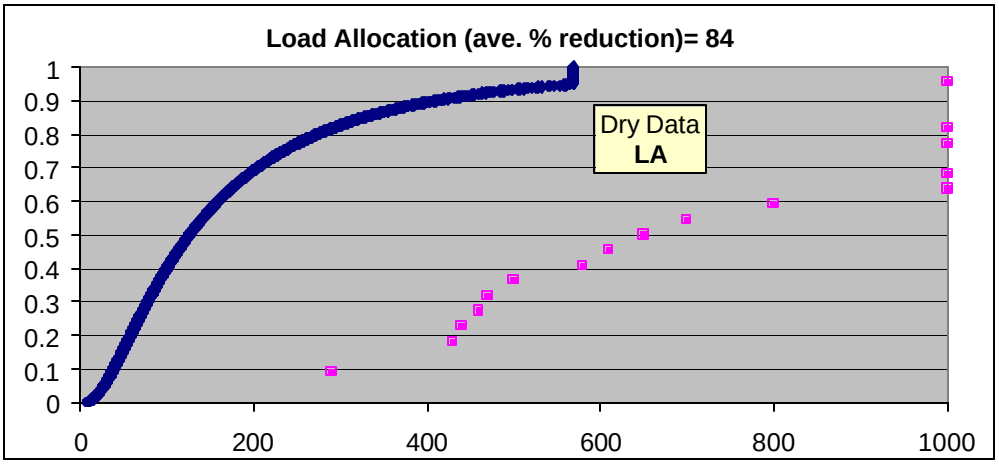
Willow Brook, Cromwell Criteria Curve for Monitoring Site 456



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
Belcher Brook Subregional Basin
Waterbody Specific Information

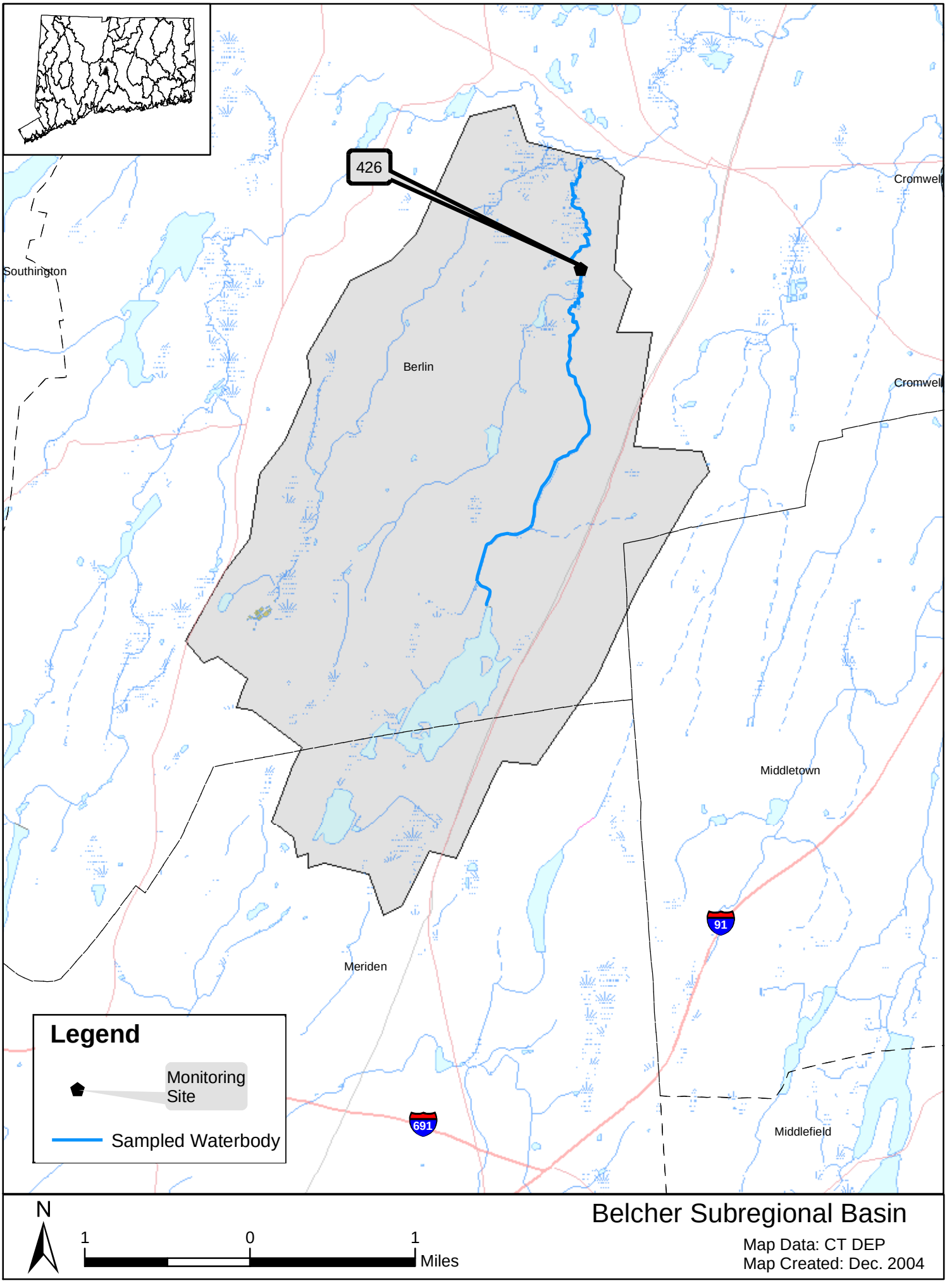
Impaired Waterbody
Waterbody Name (Segment ID): Belcher Brook (CT 4601-00_01)
Waterbody Segment Description:
Belcher Brook - From mouth at Mattabesset River upstream to source at Silver Lake, Berlin.

Impairment Description:
Designated Use Impairment: Contact Recreation
Size of Impaired Water Segment: 3.6
Surface Water Classification: Class B/A

Watershed Description:
Total Drainage Basin Area: 8.288 square miles
Tributary To: Mattabesset River
Subregional Basin Name & Code: Belcher Brook 4601
Regional Basin: Mattabesset River
Major Basin: Connecticut River
Watershed Towns: Berlin, Meriden, Middletown
Phase II GP applicable? Berlin (Yes), Meriden (Yes), Middletown (Yes)
Applicable Season: Recreation Season (May 1 to September 30)
Landuse:

Land Use Category	Percent Composition
Forested	49.18%
Urban/Developed	27.44%
Open Space	18.12%
Water/Wetland	4.26%
Agriculture	1.00%

Data Source: Connecticut Land Use Land Cover Data Layer LANDSTAT (1995) Thematic Mapper Satellite Imagery.


426
Southington
Berlin
Cromwell
Cromwell
Middletown
Meriden
91
691
Middlefield
Legend
Monitoring Site
Sampled Waterbody
N
1
0
1
Miles
Belcher Subregional Basin
Map Data: CT DEP
Map Created: Dec. 2004

Belcher Brook

CT 4601-00_01

Data Used in the Analysis

Monitoring Site: 426, At Norton Road

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
7/11/01	0.04	0.04	0.19	DRY	640	13.0	0.5909	156	76
7/24/01	0.00	0.00	0.00	DRY	360	5.5	0.2500	68	81
7/25/01	0.00	0.00	0.00	DRY	930	16.0	0.7273	220	76
8/8/01	0.00	0.00	0.00	DRY	760	14.0	0.6364	174	77
8/22/01	0.00	0.00	0.71	DRY	610	12.0	0.5455	140	77
7/10/02	0.00	0.00	0.00	DRY	2000	20.0	0.9091	431	78
7/24/02	0.00	0.87	0.87	**WET**	1300	18.0	0.8182	291	78
8/7/02	0.00	0.00	0.00	DRY	310	3.0	0.1364	46	85
8/21/02	0.00	0.33	0.33	**WET**	820	15.0	0.6818	195	76
7/9/03	0.42	0.42	0.47	**WET**	1100	17.0	0.7727	251	77
7/23/03	0.20	0.63	0.84	**WET**	5500	22.0	1.0000	576	90
8/6/03	0.00	0.16	1.03	DRY	1900	19.0	0.8636	346	82
8/20/03	0.00	0.00	0.14	DRY	470	9.0	0.4091	102	78
6/9/04	0.02	0.02	0.18	DRY	460	8.0	0.3636	91	80
6/23/04	0.00	0.01	0.01	DRY	360	5.5	0.2500	68	81
7/7/04	0.00	0.01	1.21	DRY	520	10.0	0.4545	113	78
7/21/04	0.00	0.00	0.52	DRY	420	7.0	0.3182	82	81
8/4/04	0.00	0.00	1.21	DRY	530	11.0	0.5000	126	76
8/18/04	0.00	0.00	1.03	DRY	160	1.0	0.0455	27	83
9/1/04	0.00	0.00	0.03	DRY	250	2.0	0.0909	37	85
9/15/04	0.34	0.34	0.34	**WET**	340	4.0	0.1818	55	84
9/29/04	0.69	1.94	1.94	**WET**	4600	21.0	0.9545	576	87

Statistics

# Samples DRY	**16**
# Samples WET	**6**
# Samples Total	**22**
Geomean	**703**
Log std deviation	**0.3872**

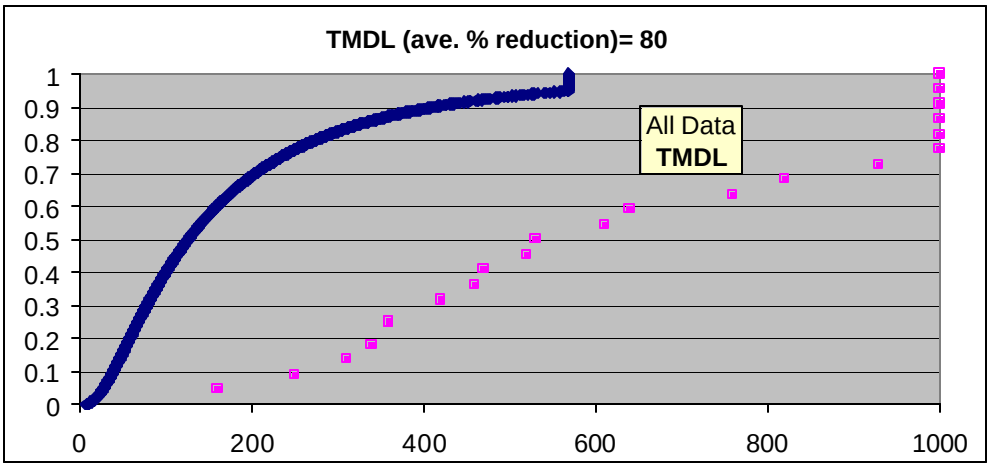
Avg % Reduction

Wet (WLA)	**82**
Dry (LA)	**80**
Total (TMDL)	**80**

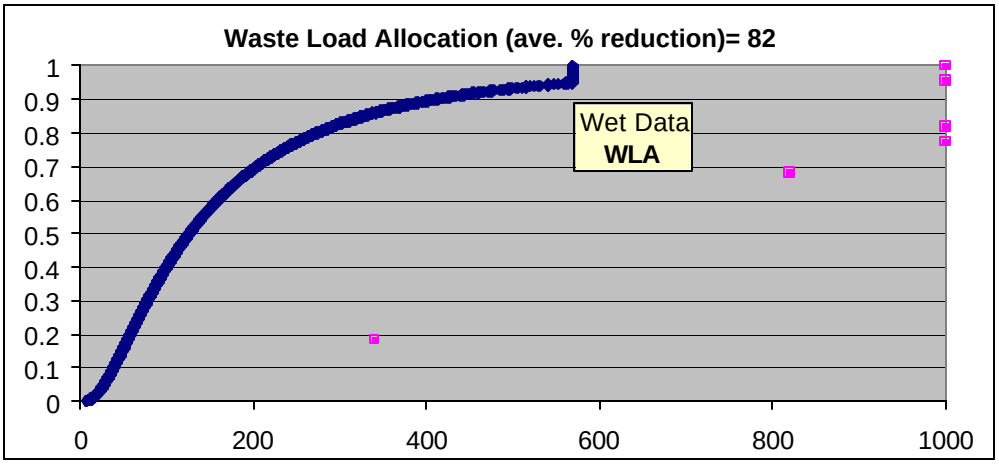
Precipitation and E. coli data provided by the Mattabasset District and Connecticut River Watch Program, respectively. E. coli data for 8/4/2004 represents an average of 2 duplicate samples.

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.

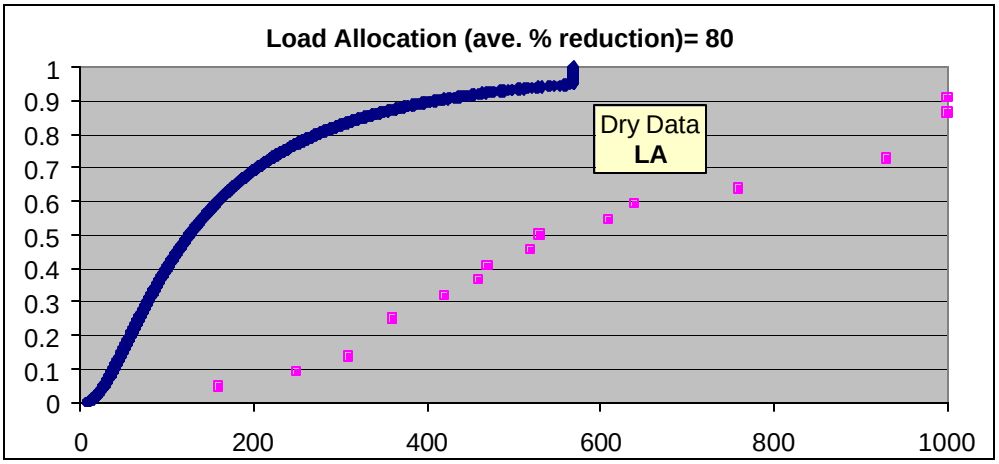
Belcher Brook Criteria Curve for Monitoring Site 426



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-4
Willow Brook Subregional Basin
Waterbody Specific Information

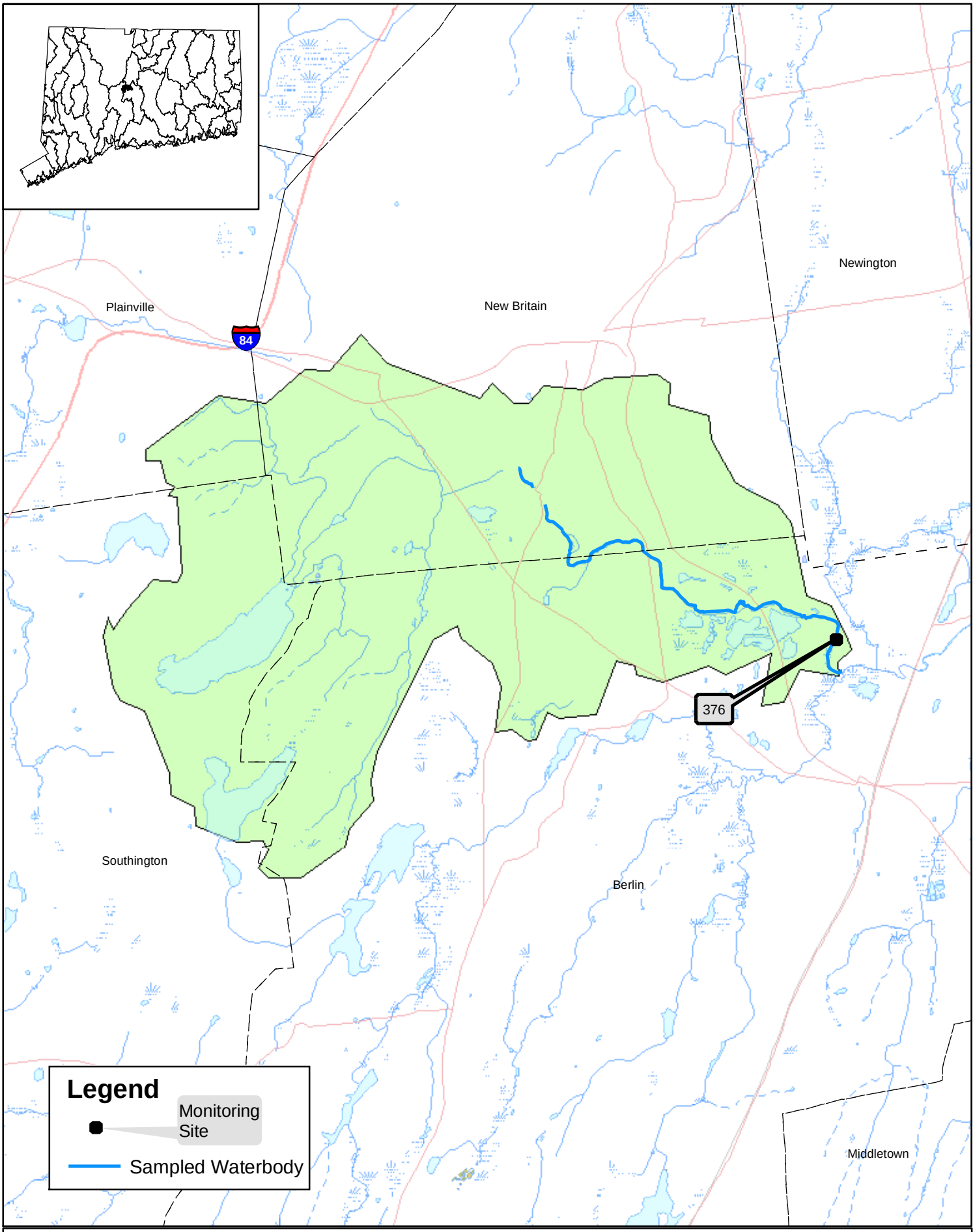
Impaired Waterbody
Waterbody Name (Segment ID): Willow Brook, New Britain (CT 4602-00_01)
Waterbody Segment Description:
Willow Brook, New Britain - From mouth at Mattabesset River upstream to outlet of conduit east of Hart Park, New Britain.

Impairment Description:
Designated Use Impairment: Contact Recreation
Size of Impaired Water Segment: 3.6
Surface Water Classification: Class A, C/B

Watershed Description:
Drainage Basin Area: 10.505 square miles
Tributary To: Mattabesset River
Subregional Basin Name & Code: Willow Brook 4602
Regional Basin: Mattabesset River
Major Basin: Connecticut River
Watershed Towns: New Britain, Southington, Berlin, Plainville
Phase II GP applicable? New Britain (Yes), Southington (Yes), Berlin (Yes), Plainville (Yes)
Applicable Season: Recreation Season (May 1 to September 30)
Landuse:

Land Use Category	Percent Composition
Forested	39.82%
Urban/Developed	47.39%
Open Space	4.18%
Water/Wetland	6.52%
Agriculture	2.09%

Data Source: Connecticut Land Use Land Cover Data Layer LANDSTAT (1995) Thematic Mapper Satellite Imagery.



Willow Subregional Basin

Map Data: CT DEP
Map Created: Dec. 2004

Willow Brook, New Britain

CT 4602-00_01

Data Used in the Analysis

Monitoring Site: 376, Downstream Christian Lane

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
7/11/01	0.04	0.04	0.19	DRY	640	10.0	0.4762	119	81
7/25/01	0.00	0.00	0.00	DRY	510	7.5	0.3571	90	82
8/8/01	0.00	0.00	0.00	DRY	210	1.0	0.0476	27	87
8/22/01	0.00	0.00	0.71	DRY	410	4.0	0.1905	56	86
7/10/02	0.00	0.00	0.00	DRY	2900	17.0	0.8095	282	90
7/24/02	0.00	0.87	0.87	**WET**	7300	19.5	0.9286	486	93
8/7/02	0.00	0.00	0.00	DRY	320	3.0	0.1429	47	85
8/21/02	0.00	0.33	0.33	**WET**	3700	18.0	0.8571	337	91
7/9/03	0.42	0.42	0.47	**WET**	1700	15.0	0.7143	212	88
7/23/03	0.20	0.63	0.84	**WET**	10000	21.0	1.0000	576	94
8/6/03	0.00	0.16	1.03	DRY	2000	16.0	0.7619	243	88
8/20/03	0.00	0.00	0.14	DRY	430	5.0	0.2381	65	85
6/9/04	0.02	0.02	0.18	DRY	510	7.5	0.3571	90	82
6/23/04	0.00	0.01	0.01	DRY	490	6.0	0.2857	75	85
7/7/04	0.00	0.01	1.21	DRY	1500	14.0	0.6667	187	88
7/21/04	0.00	0.00	0.52	DRY	550	9.0	0.4286	107	81
8/4/04	0.00	0.00	1.21	DRY	990	13.0	0.6190	167	83
8/18/04	0.00	0.00	1.03	DRY	720	11.0	0.5238	133	82
9/1/04	0.00	0.00	0.03	DRY	910	12.0	0.5714	149	84
9/15/04	0.34	0.34	0.34	**WET**	280	2.0	0.0952	38	87
9/29/04	0.69	1.94	1.94	**WET**	7300	19.5	0.9286	486	93

Statistics

# Samples DRY	**15**
# Samples WET	**6**
# Samples Total	**21**
Geomean	**1051**
Log std deviation	**0.4940**

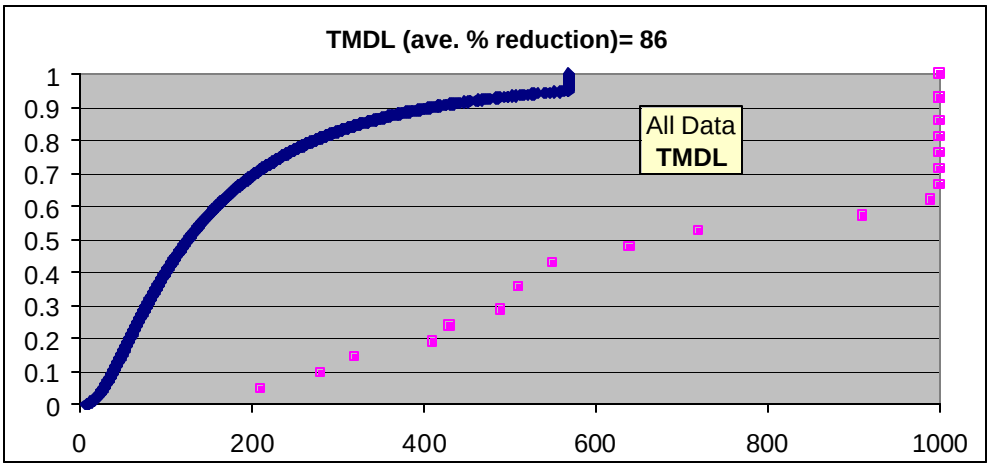
Avg % Reduction

Wet (WLA)	**91**
Dry (LA)	**85**
Total (TMDL)	**86**

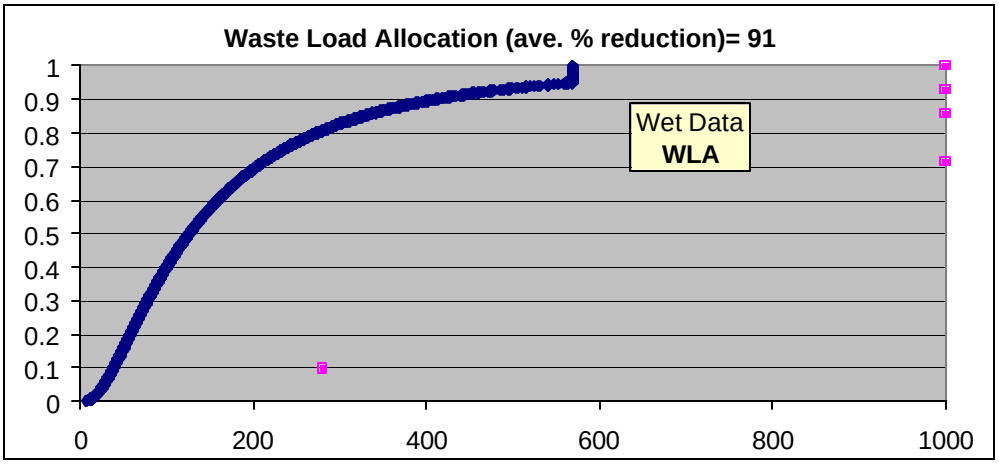
Precipitation and E. coli data provided by the Mattabasset District and Connecticut River Watch Program, respectively. E. coli data for 7/7/2004 represents an average of 2 duplicate samples.

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.

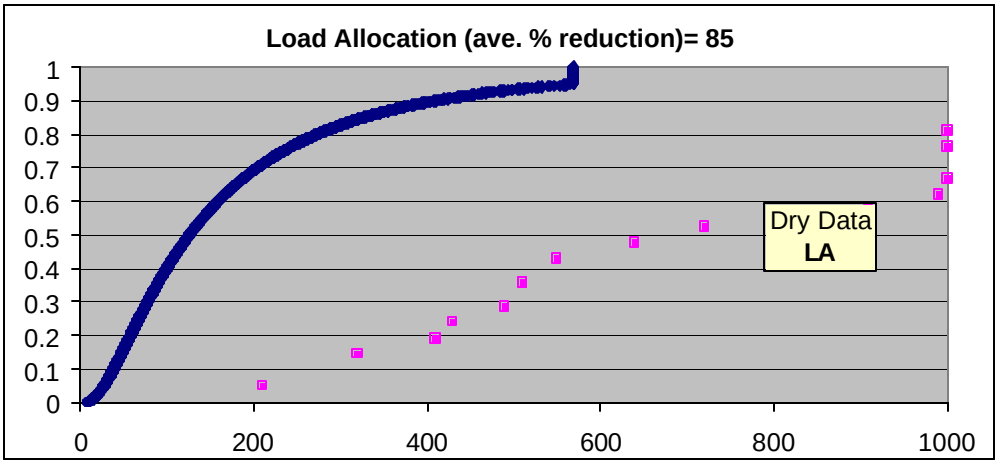
Willow Brook, New Britain Criteria Curve for Monitoring Site 376



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-5
Webster Brook Subregional Basin
Waterbody Specific Information

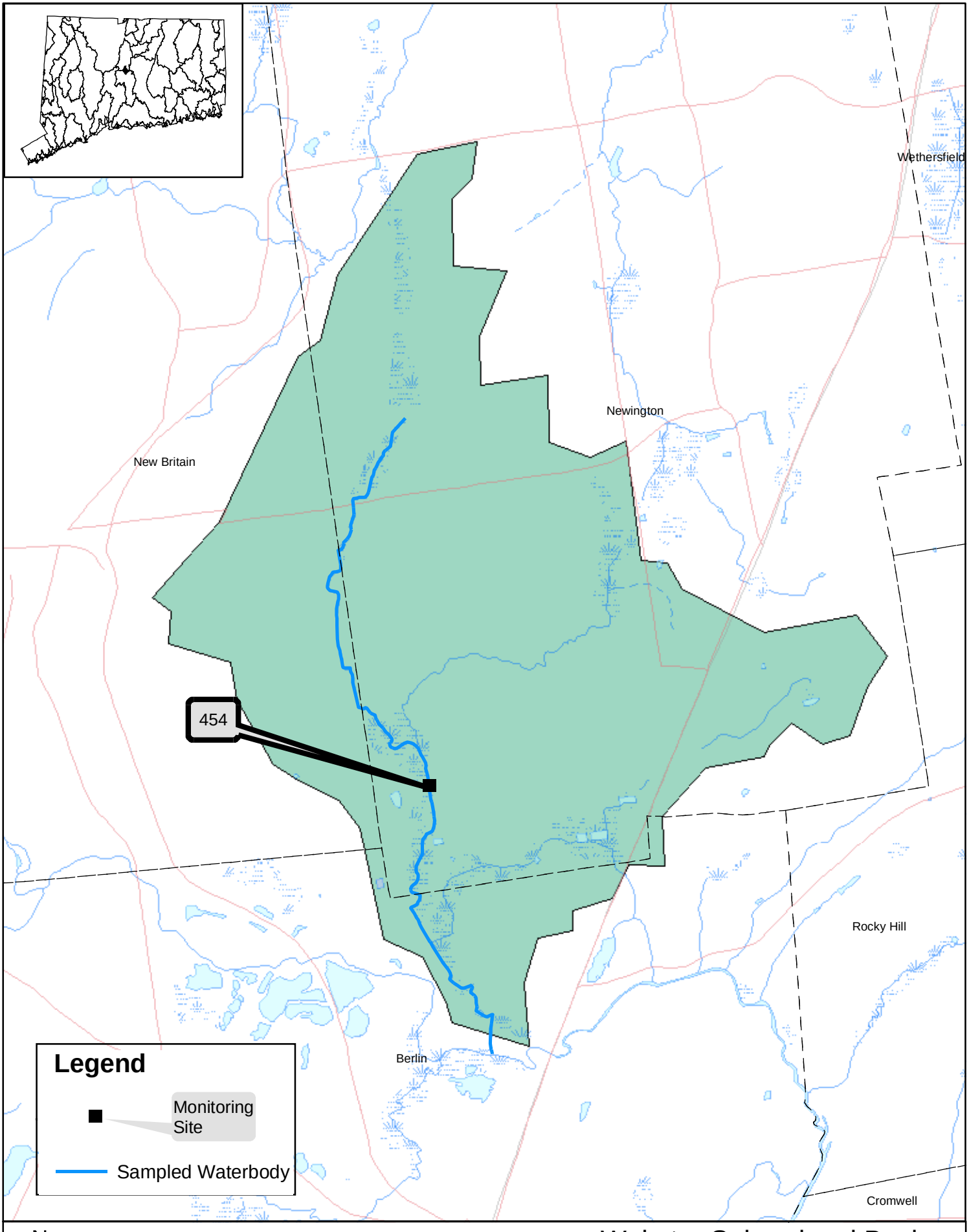
Impaired Waterbody
Waterbody Name (Segment ID): Webster Brook (CT 4603-00_01)
Waterbody Segment Description:
Webster Brook - From mouth at Mattabesset River to source in Newington.

Impairment Description:
Designated Use Impairment: Contact Recreation
Size of Impaired Water Segment: 3.40
Surface Water Classification: Class B/A

Watershed Description:
Total Drainage Basin Area: 5.383 square miles
Tributary To: Mattabesset River
Subregional Basin Name & Code: Webster Brook 4603
Regional Basin: Mattabesset River
Major Basin: Connecticut River
Watershed Towns: New Britain, Newington, Berlin
Phase II GP applicable? New Britain (Yes), Newington (Yes), Berlin (Yes)
Applicable Season: Recreation Season (May 1 to September 30)
Landuse:

Land Use Category	Percent Composition
Forested	15.82%
Urban/Developed	80.29%
Open Space	2.23%
Water/Wetland	0.92%
Agriculture	0.74%

Data Source: Connecticut Land Use Land Cover Data Layer LANDSTAT (1995) Thematic Mapper Satellite Imagery.



Webster Subregional Basin

Map Data: CT DEP
Map Created: Dec. 2004

Webster Brook

CT 4603-00_01

Data Used in the Analysis

Monitoring Site: 454, At Kelsey Street

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
7/25/01	0.00	0.00	0.00	DRY	360	7.0	0.3333	85	76
8/8/01	0.00	0.00	0.00	DRY	170	2.0	0.0952	38	78
8/22/01	0.00	0.00	0.71	DRY	200	3.0	0.1429	47	76
7/10/02	0.00	0.00	0.00	DRY	2300	19.0	0.9048	421	82
7/24/02	0.00	0.87	0.87	**WET**	4400	20.0	0.9524	576	87
8/1/02	0.05	0.05	0.05	DRY	250	4.0	0.1905	56	78
8/7/02	0.00	0.00	0.00	DRY	290	5.5	0.2619	70	76
8/21/02	0.00	0.33	0.33	**WET**	1200	16.0	0.7619	243	80
7/9/03	0.42	0.42	0.47	**WET**	460	10.0	0.4762	119	74
7/23/03	0.20	0.63	0.84	**WET**	2000	18.0	0.8571	337	83
8/6/03	0.00	0.16	1.03	DRY	690	15.0	0.7143	212	69
8/20/03	0.00	0.00	0.14	DRY	150	1.0	0.0476	27	82
6/9/04	0.02	0.02	0.18	DRY	420	8.0	0.3810	95	77
6/23/04	0.00	0.01	0.01	DRY	590	14.0	0.6667	187	68
7/7/04	0.00	0.01	1.21	DRY	1300	17.0	0.8095	282	78
7/21/04	0.00	0.00	0.52	DRY	480	11.0	0.5238	133	72
8/4/04	0.00	0.00	1.21	DRY	540	13.0	0.6190	167	69
8/18/04	0.00	0.00	1.03	DRY	440	9.0	0.4286	107	76
9/1/04	0.00	0.00	0.03	DRY	530	12.0	0.5714	149	72
9/15/04	0.34	0.34	0.34	**WET**	290	5.5	0.2619	70	76
9/29/04	0.69	1.94	1.94	**WET**	9800	21.0	1.0000	576	94

Statistics

# Samples DRY	**15**
# Samples WET	**6**
# Samples Total	**21**
Geomean	**628**
Log std deviation	**0.4683**

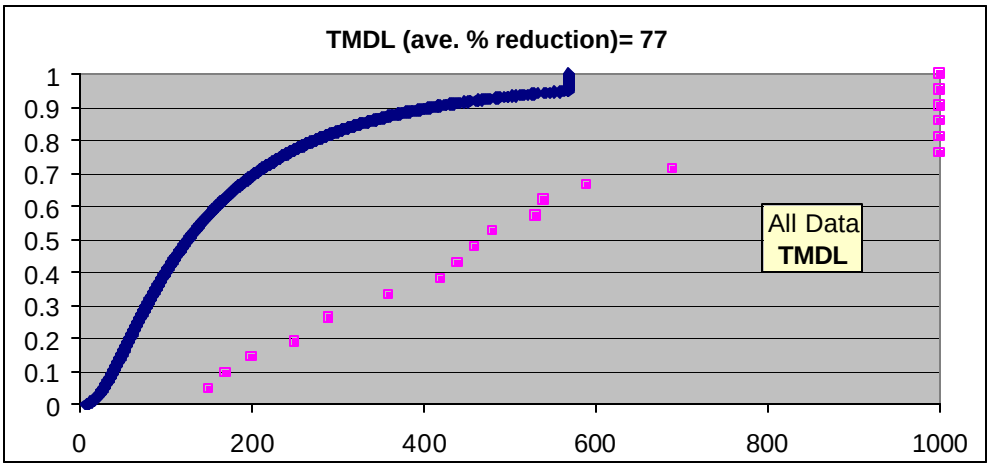
Avg % Reduction

Wet (WLA)	**82**
Dry (LA)	**75**
Total (TMDL)	**77**

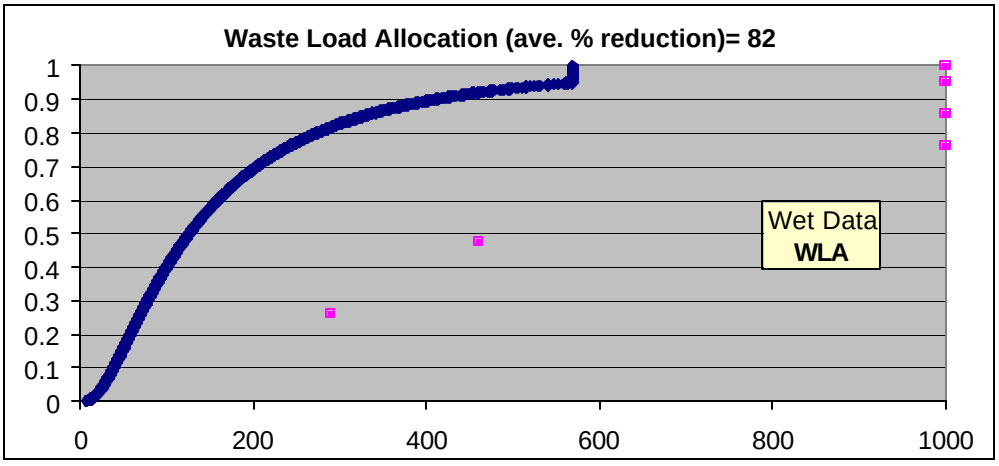
Precipitation and E. coli data provided by the Mattabasset District and Connecticut River Watch Program, respectively. E. coli data for 6/23/04 represents an average of 2 duplicate samples.

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.

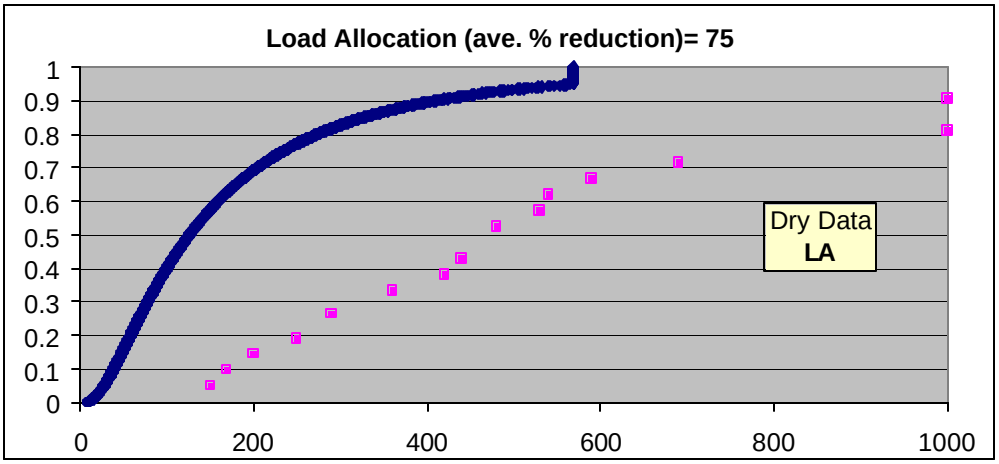
Webster Brook Criteria Curve for Monitoring Site 454



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-6
Sawmill Brook Subregional Basin
Waterbody Specific Information

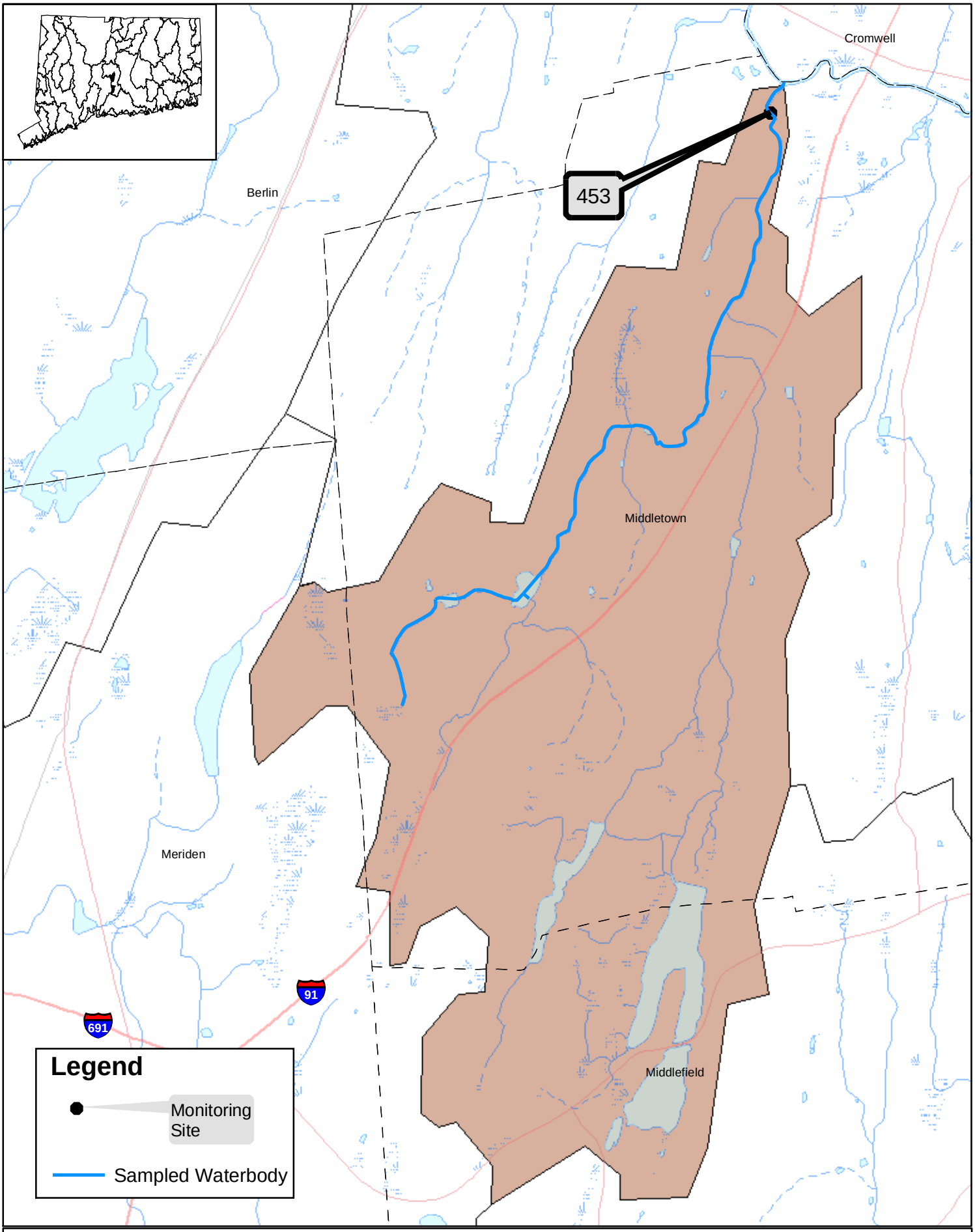
Impaired Waterbody
Waterbody Name (Segment ID): Sawmill Brook (CT 4604-00_01)
Waterbody Segment Description:
Sawmill Brook - From mouth at Mattabesset River upstream to Source at Atkin Street Pond (Highland Pond) Middletown.

Impairment Description:
Designated Use Impairment: Contact Recreation
Size of Impaired Water Segment: 3.00
Surface Water Classification: Class A

Watershed Description:
Total Drainage Basin Area: 6.980 square miles
Tributary To: Mattabesset River
Subregional Basin Name & Code: Sawmill Brook 4604
Regional Basin: Mattabesset River
Major Basin: Connecticut River
Watershed Towns: Middletown, Meriden, Middlefield
Phase II GP applicable? Middletown (Yes), Meriden (Yes), Middlefield (Yes)
Applicable Season: Recreation Season (May 1 to September 30)
Landuse:

Land Use Category	Percent Composition
Forested	66.31%
Urban/Developed	14.26%
Open Space	11.92%
Water/Wetland	4.97%
Agriculture	2.54%

Data Source: Connecticut Land Use Land Cover Data Layer LANDSTAT (1995) Thematic Mapper Satellite Imagery.



Sawmill Subregional Basin

Map Data: CT DEP
Map Created: Dec. 2004

Sawmill Brook

CT 4604-00_01

Data Used in the Analysis

Monitoring Site: 453, At Aetna Fitness Trail

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
7/11/01	0.04	0.04	0.19	DRY	840	14.0	0.6364	174	79
7/25/01	0.00	0.00	0.00	DRY	1200	15.5	0.7045	207	83
8/8/01	0.00	0.00	0.00	DRY	500	9.0	0.4091	102	80
8/22/01	0.00	0.00	0.71	DRY	270	4.0	0.1818	55	80
7/10/02	0.00	0.00	0.00	DRY	2900	18.5	0.8409	316	89
7/24/02	0.00	0.87	0.87	**WET**	2100	17.0	0.7727	251	88
8/1/02	0.05	0.05	0.05	DRY	310	6.0	0.2727	72	77
8/7/02	0.00	0.00	0.00	DRY	290	5.0	0.2273	63	78
8/21/02	0.00	0.33	0.33	**WET**	13000	21.0	0.9545	576	96
7/9/03	0.42	0.42	0.47	**WET**	160	2.0	0.0909	37	77
7/23/03	0.20	0.63	0.84	**WET**	2900	18.5	0.8409	316	89
8/6/03	0.00	0.16	1.03	DRY	3100	20.0	0.9091	431	86
8/20/03	0.00	0.00	0.14	DRY	220	3.0	0.1364	46	79
6/9/04	0.02	0.02	0.18	DRY	625	11.0	0.5000	126	80
6/23/04	0.00	0.01	0.01	DRY	380	8.0	0.3636	91	76
7/7/04	0.00	0.01	1.21	DRY	760	13.0	0.5909	156	80
7/21/04	0.00	0.00	0.52	DRY	640	12.0	0.5455	140	78
8/4/04	0.00	0.00	1.21	DRY	320	7.0	0.3182	82	75
8/18/04	0.00	0.00	1.03	DRY	120	1.0	0.0455	27	78
9/1/04	0.00	0.00	0.03	DRY	1200	15.5	0.7045	207	83
9/15/04	0.34	0.34	0.34	**WET**	550	10.0	0.4545	113	79
9/29/04	0.69	1.94	1.94	**WET**	24001	22.0	1.0000	576	98

Statistics

# Samples DRY	**16**
# Samples WET	**6**
# Samples Total	**22**
Geomean	**840**
Log std deviation	**0.5883**

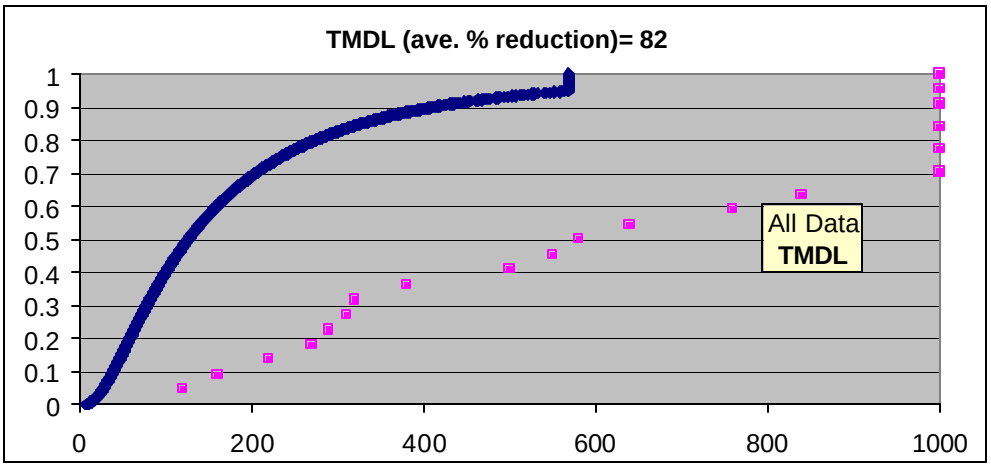
Avg % Reduction

Wet (WLA)	**88**
Dry (LA)	**80**
Total (TMDL)	**82**

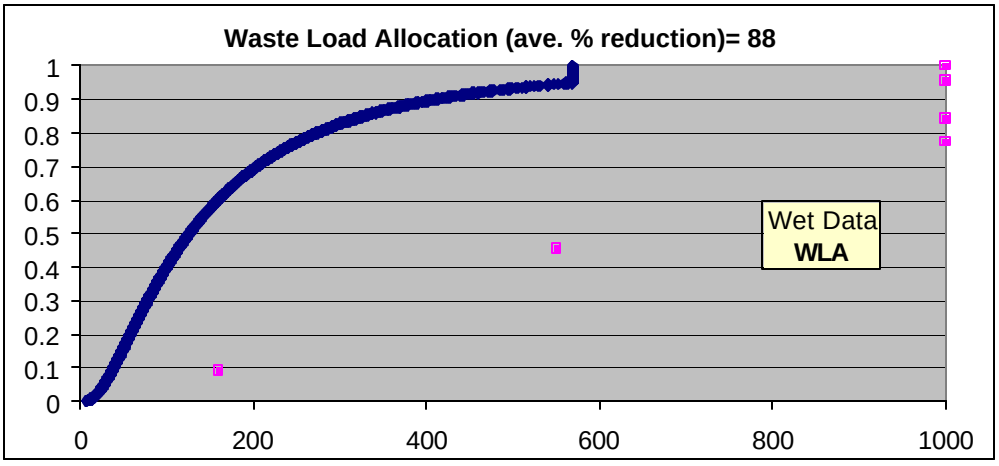
Precipitation and E. coli data provided by the Mattabasset District and Connecticut River Watch Program, respectively.

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.

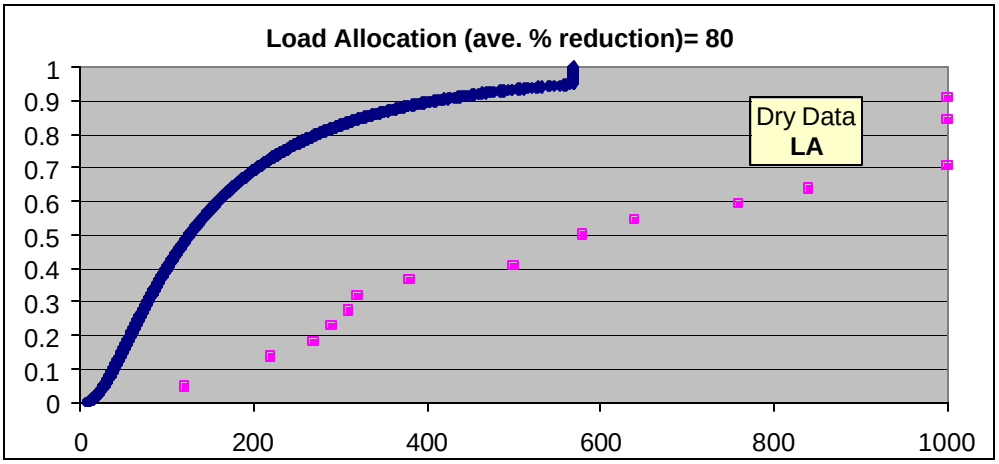
Sawmill Brook Criteria Curve for Monitoring Site 453



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-7
Coginchaug River Subregional Basin
Waterbody Specific Information

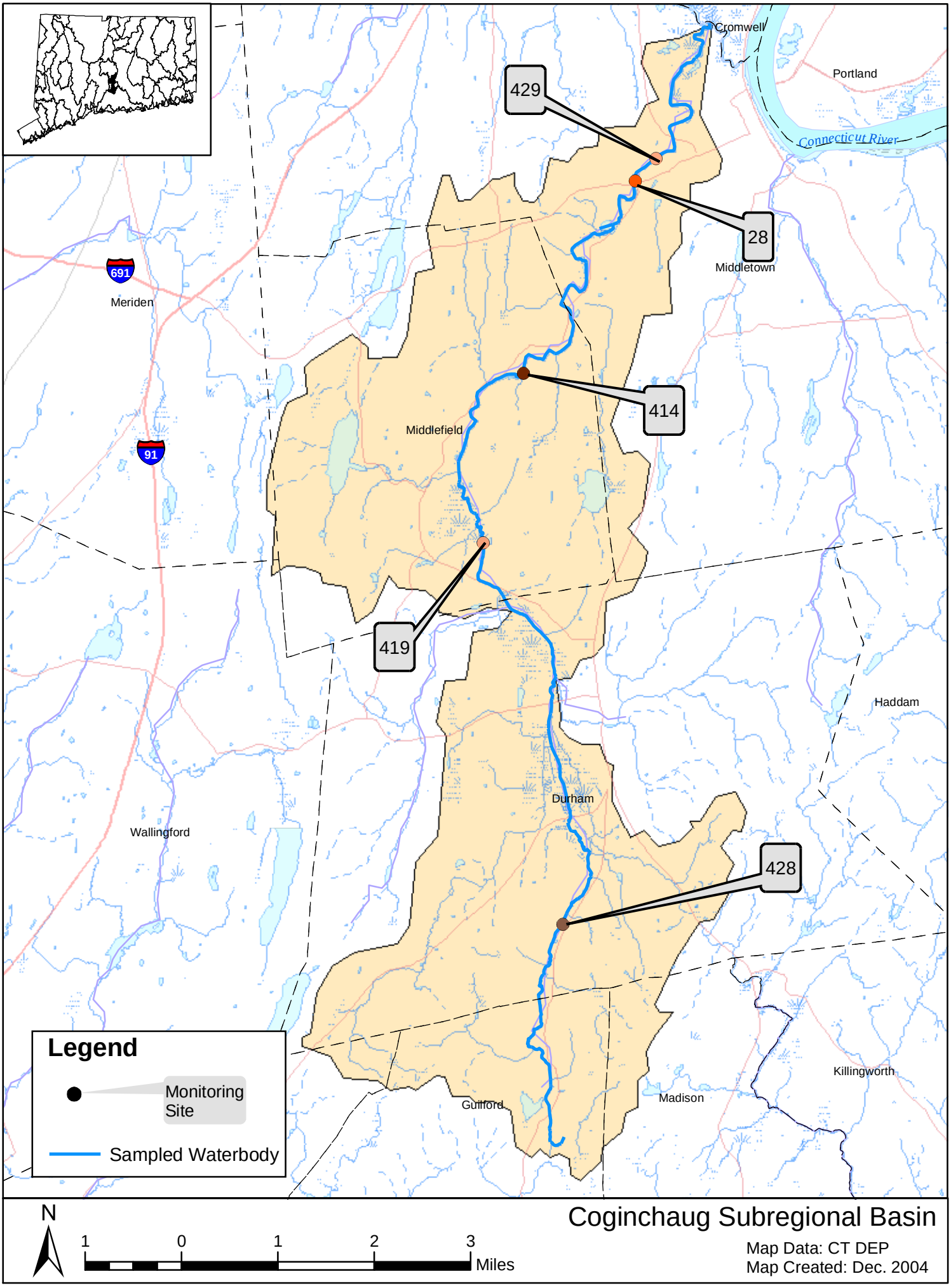
Impaired Waterbody
Waterbody Name (Segment ID): Coginchaug River (CT 4607-00_02, CT 4607-00_03, CT 4607-00_04, CT 4607-00_05, and CT 4607-00_06)
Waterbody Segment Description:
Coginchaug River - From Rte 72 upstream to headwaters, near Bluff Head, north Guilford.

Impairment Description:
Designated Use Impairment: Contact Recreation
Size of Impaired Segments: 12.3
Surface Water Classification: Class A/AA, A, B

Watershed Description:
Drainage Basin Area: 38.937 square miles
Tributary To: Mattabesset River
Subregional Basin Name & Code: Coginchaug River 4607
Regional Basin: Mattabesset River
Major Basin: Connecticut River
Watershed Towns: Guilford, Durham, Middlefield, Middletown, Meriden, Wallingford, Madison, and North Branford
Phase II GP applicable? Guilford (Yes), Durham (Yes), Middlefield (Yes), Middletown (Yes), Meriden (Yes), Wallingford (Yes), Madison (Yes), North Branford (Yes)
Applicable Season: Recreation Season (May 1 to September 30)
Landuse:

Land Use Category	Percent Composition
Forested	50.47%
Urban/Developed	20.62%
Open Space	21.44%
Water/Wetland	4.07%
Agriculture	3.40%

Data Source: Connecticut Land Use Land Cover Data Layer LANDSTAT (1995) Thematic Mapper Satellite Imagery.


Cromwell
Portland
Connecticut River
429
28
Middletown
691
Meriden
414
Middlefield
91
419
Haddam
Durham
Wallingford
428
Killingworth
Madison
Guilford
Legend
Monitoring Site
Sampled Waterbody
N
1 0 1 2 3
Miles
Coginchaug Subregional Basin
Map Data: CT DEP
Map Created: Dec. 2004

Coginchaug River

CT 4607-00_02

Data Used in the Analysis

Monitoring Site: 429, At Veteran's Park

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
7/11/01	0.04	0.04	0.19	DRY	300	7.0	0.3333	85	72
7/25/01	0.00	0.00	0.00	DRY	410	13.0	0.6190	167	59
8/8/01	0.00	0.00	0.00	DRY	370	11.0	0.5238	133	64
8/22/01	0.00	0.00	0.71	DRY	350	10.0	0.4762	119	66
7/10/02	0.00	0.00	0.00	DRY	740	17.5	0.8333	307	58
7/24/02	0.00	0.87	0.87	**WET**	870	19.0	0.9048	421	52
8/7/02	0.00	0.00	0.00	DRY	620	16.0	0.7619	243	61
8/21/02	0.00	0.33	0.33	**WET**	270	4.5	0.2143	61	77
7/9/03	0.42	0.42	0.47	**WET**	270	4.5	0.2143	61	77
7/23/03	0.20	0.63	0.84	**WET**	1100	20.0	0.9524	576	48
8/6/03	0.00	0.16	1.03	DRY	290	6.0	0.2857	75	74
8/20/03	0.00	0.00	0.14	DRY	740	17.5	0.8333	307	58
6/9/04	0.02	0.02	0.18	DRY	320	8.0	0.3810	95	70
6/23/04	0.00	0.01	0.01	DRY	430	14.0	0.6667	187	56
7/7/04	0.00	0.01	1.21	DRY	500	15.0	0.7143	212	58
7/21/04	0.00	0.00	0.52	DRY	395	12.0	0.5714	149	62
8/4/04	0.00	0.00	1.21	DRY	340	9.0	0.4286	107	69
8/18/04	0.00	0.00	1.03	DRY	200	1.0	0.0476	27	86
9/1/04	0.00	0.00	0.03	DRY	250	2.0	0.0952	38	85
9/15/04	0.34	0.34	0.34	**WET**	260	3.0	0.1429	47	82
9/29/04	0.69	1.94	1.94	**WET**	24000	21.0	1.0000	576	98

Statistics

# Samples DRY	**15**
# Samples WET	**6**
# Samples Total	**21**
Geomean	**490**
Log std deviation	**0.4344**

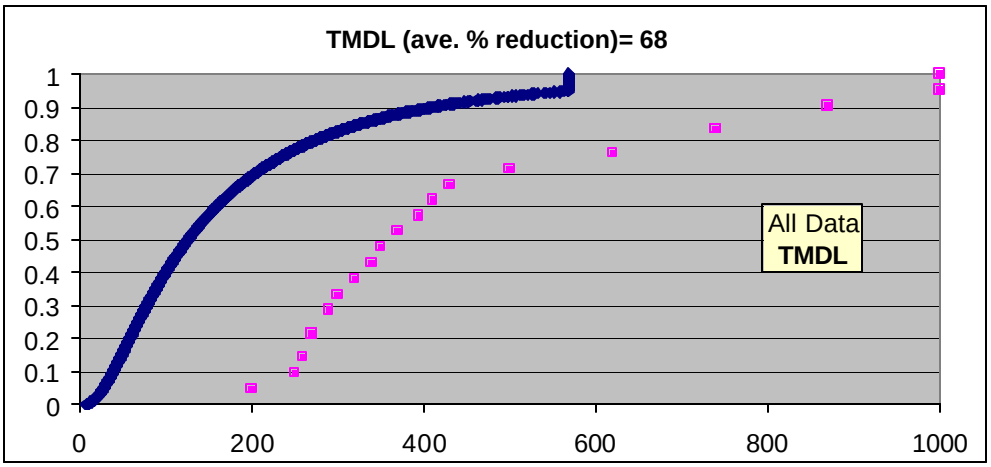
Avg % Reduction

Wet (WLA)	**72**
Dry (LA)	**67**
Total (TMDL)	**68**

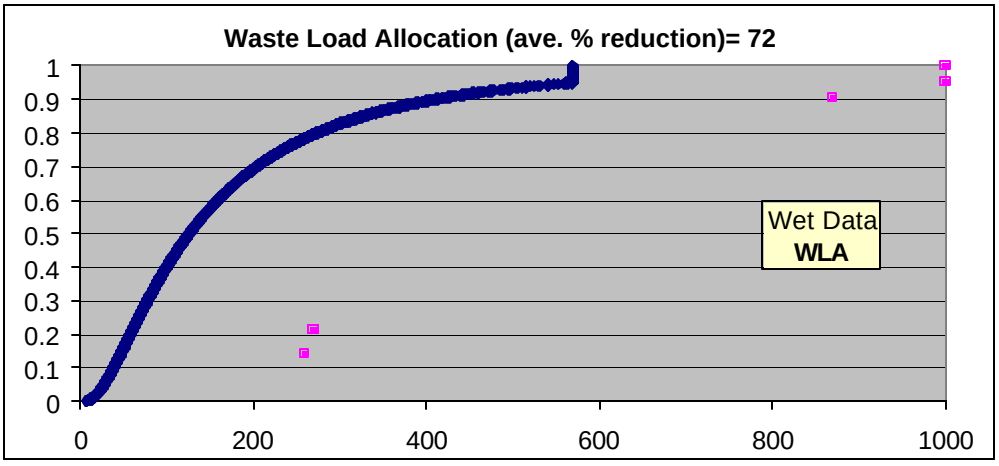
Precipitation and E. coli data provided by the Mattabasset District and Connecticut River Watch Program, respectively. E. coli data for 7/21/2004 represents an average of 2 duplicate samples.

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.

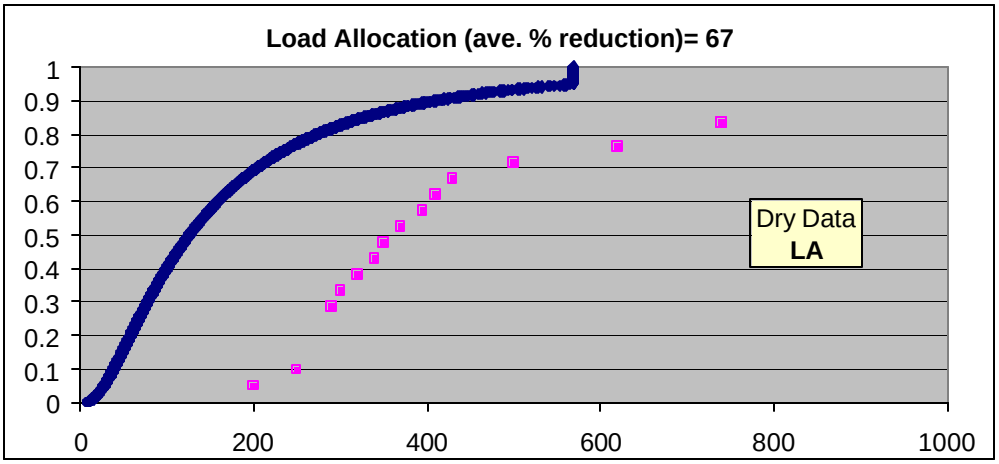
Coginchaug River Criteria Curve for Monitoring Site 429



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.

Coginchaug River

CT 4607-00_03

Data Used in the Analysis

Monitoring Site: 28, Downstream Route 66 Middletown

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
5/27/04	0.49	0.50	0.81	**WET**	1300	23.0	0.8519	330	75
6/3/04	0.02	0.07	0.57	DRY	2100	24.0	0.8889	388	82
6/9/04	0.02	0.02	0.18	DRY	390	7.0	0.2593	70	82
6/16/04	0.00	0.00	0.05	DRY	440	10.0	0.3704	93	79
6/21/04	0.00	0.00	0.07	DRY	560	14.5	0.5370	137	75
6/23/04	0.00	0.01	0.01	DRY	420	8.0	0.2963	77	82
6/28/04	0.00	0.00	0.00	DRY	700	20.0	0.7407	228	67
7/6/04	0.01	1.21	1.21	**WET**	2500	25.0	0.9259	477	81
7/7/04	0.00	0.01	1.21	DRY	640	19.0	0.7037	206	68
7/8/04	0.00	0.00	1.21	DRY	480	12.0	0.4444	111	77
7/12/04	0.60	0.60	0.60	**WET**	560	14.5	0.5370	137	75
7/19/04	0.05	0.52	0.95	**WET**	570	16.0	0.5926	156	73
7/21/04	0.00	0.00	0.52	DRY	590	17.0	0.6296	171	71
7/26/04	0.00	0.00	0.36	DRY	370	6.0	0.2222	62	83
8/2/04	0.00	1.21	1.21	**WET**	790	22.0	0.8148	288	64
8/4/04	0.00	0.00	1.21	DRY	435	9.0	0.3333	85	81
8/9/04	0.00	0.02	0.02	DRY	230	1.0	0.0370	24	89
8/16/04	0.21	1.03	1.09	**WET**	780	21.0	0.7778	255	67
8/18/04	0.00	0.00	1.03	DRY	320	5.0	0.1852	55	83
8/23/04	0.00	0.00	1.30	DRY	470	11.0	0.4074	102	78
8/30/04	0.03	0.03	0.03	DRY	550	13.0	0.4815	121	78
9/1/04	0.00	0.00	0.03	DRY	250	2.5	0.0926	37	85
9/15/04	0.34	0.34	0.34	**WET**	290	4.0	0.1481	48	83
9/20/04	0.00	0.00	3.55	**WET**	6500	26.0	0.9630	576	91
9/22/04	0.00	0.00	0.00	DRY	250	2.5	0.0926	37	85
9/27/04	0.00	0.00	0.00	DRY	610	18.0	0.6667	187	69
9/29/04	0.69	1.94	1.94	**WET**	16000	27.0	1.0000	576	96

Statistics

# Samples DRY	**18**
# Samples WET	**9**
# Samples Total	**27**
Geomean	**675**
Log std deviation	**0.4234**

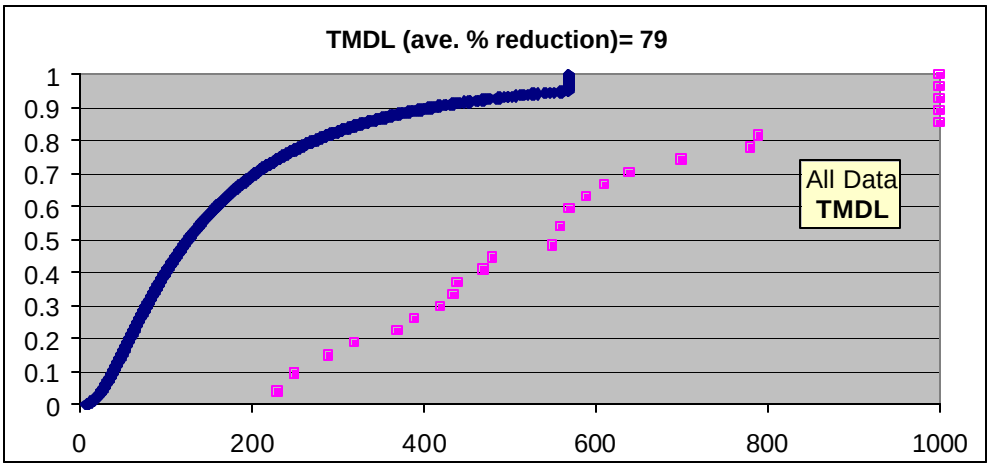
Avg % Reduction

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

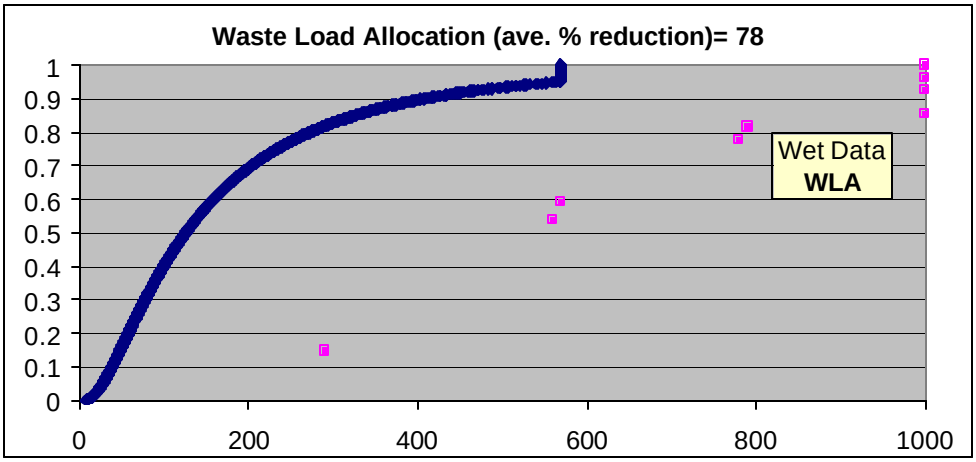
Precipitation and E. coli data provided by the Mattabasset District and Connecticut River Watch Program, respectively. E. coli data for 8/4/2004 represents an average of 2 duplicate samples.

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.

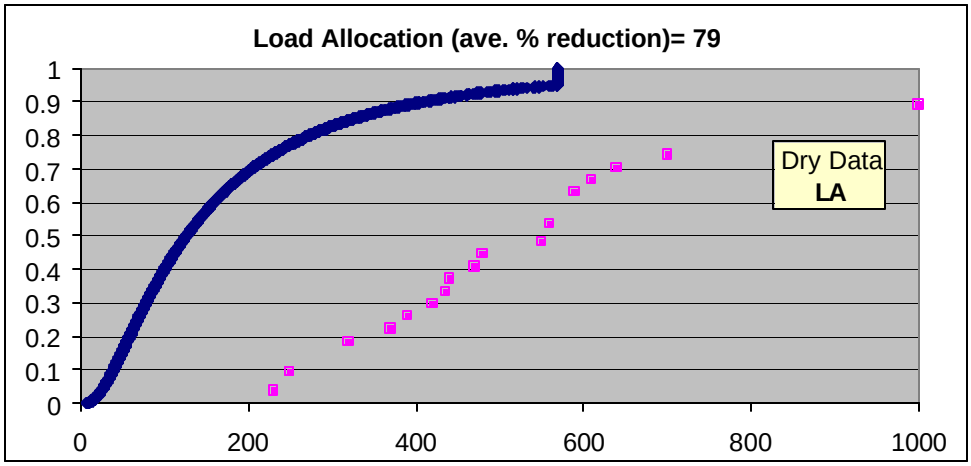
Coginchaug River Criteria Curve for Monitoring Site 28



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.

Coginchaug River

CT 4607-00_04

Data Used in the Analysis

Monitoring Site: 414, Above Wadsworth Falls

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
7/11/01	0.04	0.04	0.19	DRY	270	6.0	0.2857	75	72
7/25/01	0.00	0.00	0.00	DRY	220	5.0	0.2381	65	70
8/8/01	0.00	0.00	0.00	DRY	130	2.0	0.0952	38	71
8/22/01	0.00	0.00	0.71	DRY	350	9.5	0.4524	113	68
7/10/02	0.00	0.00	0.00	DRY	700	17.5	0.8333	307	56
7/24/02	0.00	0.87	0.87	**WET**	1100	19.0	0.9048	421	62
8/7/02	0.00	0.00	0.00	DRY	660	16.0	0.7619	243	63
8/21/02	0.00	0.33	0.33	**WET**	420	11.0	0.5238	133	68
7/9/03	0.42	0.42	0.47	**WET**	120	1.0	0.0476	27	77
7/23/03	0.20	0.63	0.84	**WET**	1400	20.0	0.9524	576	59
8/6/03	0.00	0.16	1.03	DRY	520	14.0	0.6667	187	64
8/20/03	0.00	0.00	0.14	DRY	350	9.5	0.4524	113	68
6/9/04	0.02	0.02	0.18	DRY	190	3.0	0.1429	47	75
6/23/04	0.00	0.01	0.01	DRY	610	15.0	0.7143	212	65
7/7/04	0.00	0.01	1.21	DRY	430	12.0	0.5714	149	65
7/21/04	0.00	0.00	0.52	DRY	700	17.5	0.8333	307	56
8/4/04	0.00	0.00	1.21	DRY	460	13.0	0.6190	167	64
8/18/04	0.00	0.00	1.03	DRY	200	4.0	0.1905	56	72
9/1/04	0.00	0.00	0.03	DRY	330	7.5	0.3571	90	73
9/15/04	0.34	0.34	0.34	**WET**	330	7.5	0.3571	90	73
9/29/04	0.69	1.94	1.94	**WET**	24001	21.0	1.0000	576	98

Statistics

# Samples DRY	**15**
# Samples WET	**6**
# Samples Total	**21**
Geomean	**473**
Log std deviation	**0.4786**

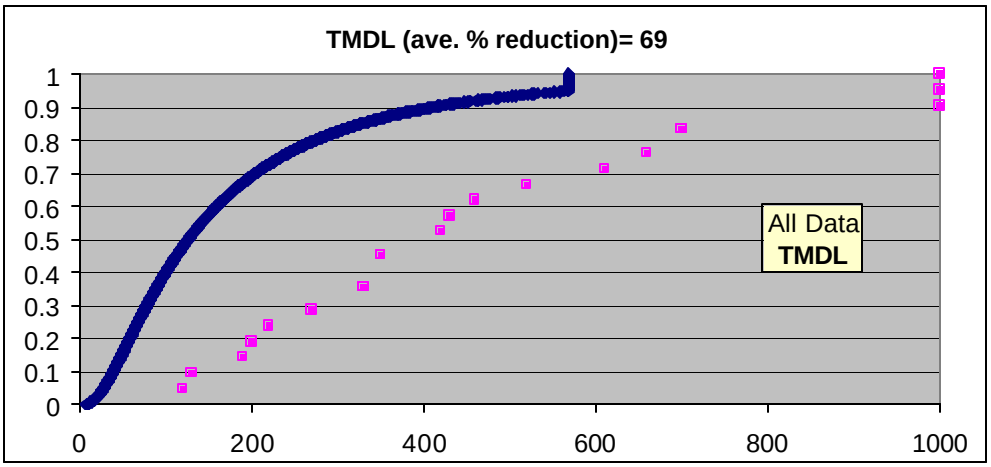
Avg % Reduction

Wet (WLA)	**73**
Dry (LA)	**67**
Total (TMDL)	**69**

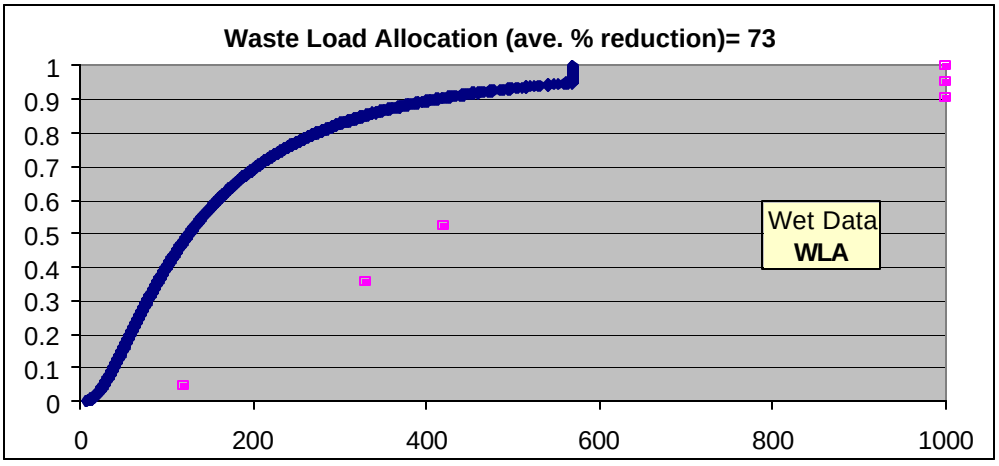
Precipitation and E. coli data provided by the Mattabasset District and Connecticut River Watch Program, respectively. E. coli data on 7/21/2004 represents an average of 2 duplicate samples.

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.

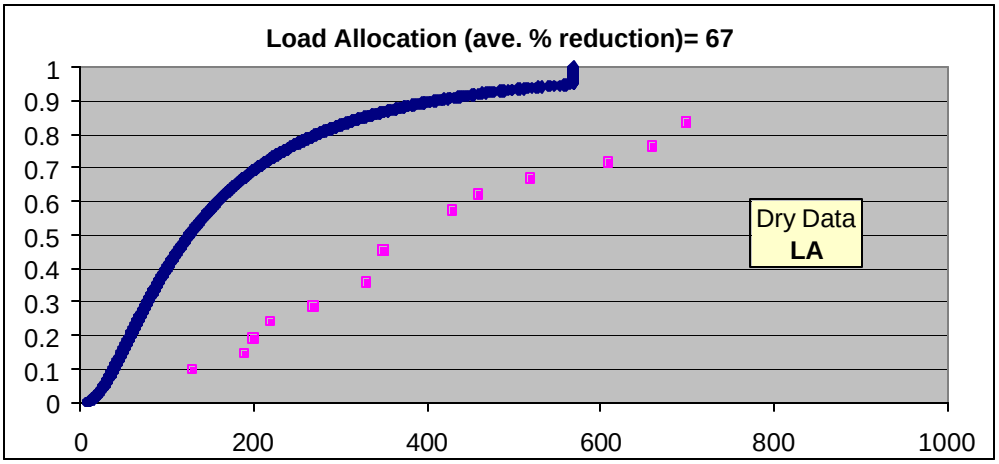
Coginchaug River Criteria Curve for Monitoring Site 414



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.

Coginchaug River

CT 4607-00_05

Data Used in the Analysis

Monitoring Site: 419, Downstream, Miller Road

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
5/27/04	0.49	0.50	0.81	**WET**	670	23.0	0.8519	330	51
6/3/04	0.02	0.07	0.57	DRY	540	21.0	0.7778	255	53
6/9/04	0.02	0.02	0.18	DRY	340	17.0	0.6296	171	50
6/16/04	0.00	0.00	0.05	DRY	230	8.5	0.3148	81	65
6/21/04	0.00	0.00	0.07	DRY	120	4.0	0.1481	48	60
6/23/04	0.00	0.01	0.01	DRY	660	22.0	0.8148	288	56
6/28/04	0.00	0.00	0.00	DRY	230	8.5	0.3148	81	65
7/6/04	0.01	1.21	1.21	**WET**	2400	25.0	0.9259	477	80
7/7/04	0.00	0.01	1.21	DRY	380	18.0	0.6667	187	51
7/8/04	0.00	0.00	1.21	DRY	200	6.0	0.2222	62	69
7/12/04	0.60	0.60	0.60	**WET**	280	12.0	0.4444	111	60
7/19/04	0.05	0.52	0.95	**WET**	490	20.0	0.7407	228	53
7/21/04	0.00	0.00	0.52	DRY	210	7.0	0.2593	70	67
7/26/04	0.00	0.00	0.36	DRY	310	15.0	0.5556	143	54
8/2/04	0.00	1.21	1.21	**WET**	290	13.5	0.5000	126	57
8/4/04	0.00	0.00	1.21	DRY	290	13.5	0.5000	126	57
8/9/04	0.00	0.02	0.02	DRY	63	1.0	0.0370	24	61
8/16/04	0.21	1.03	1.09	**WET**	450	19.0	0.7037	206	54
8/18/04	0.00	0.00	1.03	DRY	96	2.0	0.0741	33	65
8/23/04	0.00	0.00	1.30	DRY	160	5.0	0.1852	55	65
8/30/04	0.03	0.03	0.03	DRY	240	10.0	0.3704	93	61
9/1/04	0.00	0.00	0.03	DRY	260	11.0	0.4074	102	61
9/15/04	0.34	0.34	0.34	**WET**	960	24.0	0.8889	388	60
9/20/04	0.00	0.00	3.55	**WET**	4100	26.0	0.9630	576	86
9/22/04	0.00	0.00	0.00	DRY	110	3.0	0.1111	41	63
9/27/04	0.00	0.00	0.00	DRY	330	16.0	0.5926	156	53
9/29/04	0.69	1.94	1.94	**WET**	6500	27.0	1.0000	576	91

Statistics

# Samples DRY	**18**
# Samples WET	**9**
# Samples Total	**27**
Geomean	**367**
Log std deviation	**0.4623**

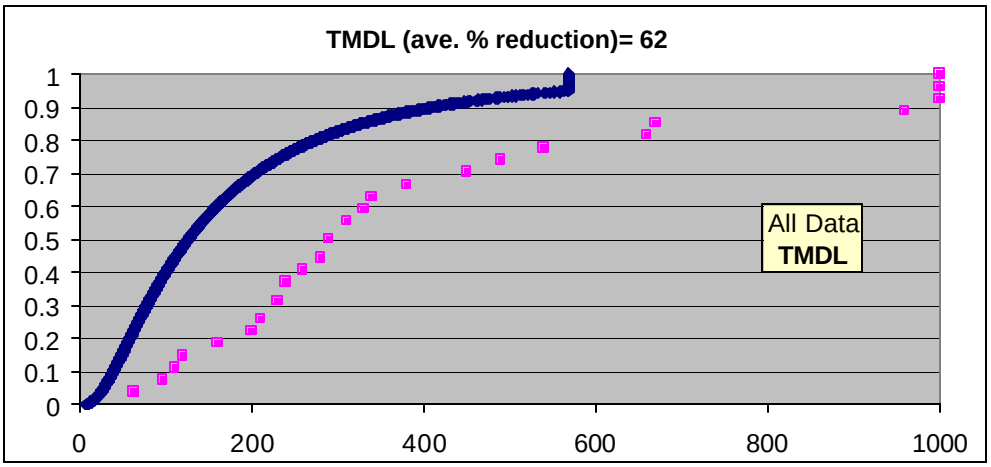
Avg % Reduction

Wet (WLA)	**66**
Dry (LA)	**60**
Total (TMDL)	**62**

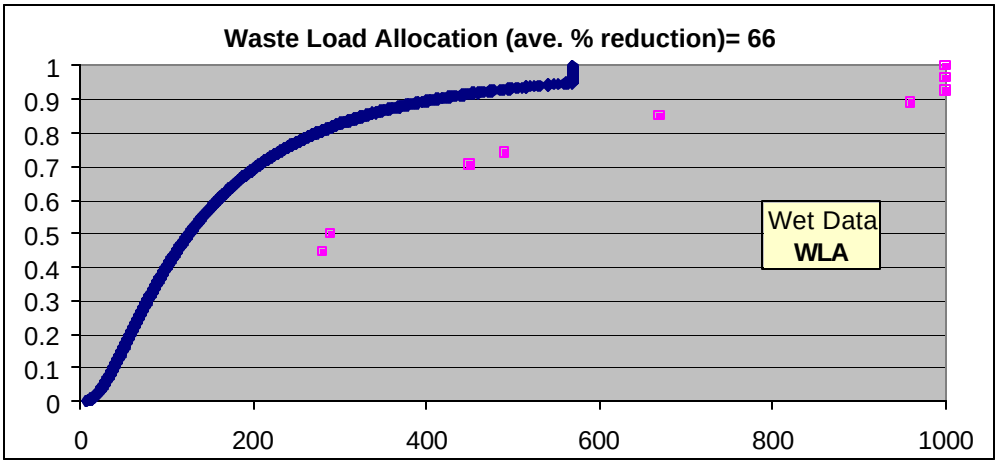
Precipitation and E. coli data provided by the Mattabasset District and Connecticut River Watch Program, respectively.

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.

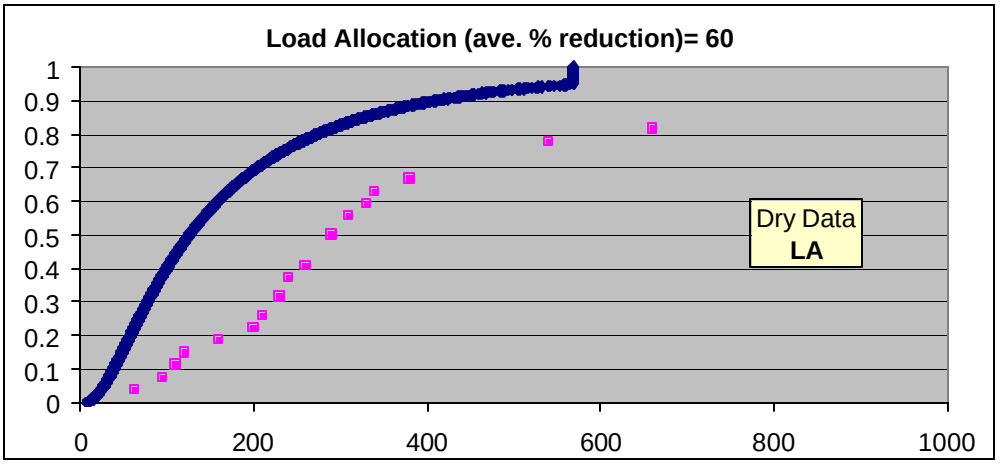
Coginchaug River Criteria Curve for Monitoring Site 419



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.

Coginchaug River

CT 4607-00_06

Data Used in the Analysis

Monitoring Site: 428, At Creamery Road Durham

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
7/11/01	0.04	0.04	0.19	DRY	990	16.0	0.7619	243	75
7/25/01	0.00	0.00	0.00	DRY	1900	18.5	0.8810	373	80
8/8/01	0.00	0.00	0.00	DRY	930	14.5	0.6905	199	79
8/22/01	0.00	0.00	0.71	DRY	580	8.0	0.3810	95	84
7/10/02	0.00	0.00	0.00	DRY	530	6.0	0.2857	75	86
7/24/02	0.00	0.87	0.87	**WET**	510	5.0	0.2381	65	87
8/7/02	0.00	0.00	0.00	DRY	360	1.0	0.0476	27	92
8/21/02	0.00	0.33	0.33	**WET**	770	10.0	0.4762	119	85
7/9/03	0.42	0.42	0.47	**WET**	1200	17.0	0.8095	282	76
7/23/03	0.20	0.63	0.84	**WET**	5000	20.0	0.9524	576	88
8/6/03	0.00	0.16	1.03	DRY	1900	18.5	0.8810	373	80
8/20/03	0.00	0.00	0.14	DRY	480	4.0	0.1905	56	88
6/9/04	0.02	0.02	0.18	DRY	930	14.5	0.6905	199	79
6/23/04	0.00	0.01	0.01	DRY	410	2.0	0.0952	38	91
7/7/04	0.00	0.01	1.21	DRY	790	12.0	0.5714	149	81
7/21/04	0.00	0.00	0.52	DRY	780	11.0	0.5238	133	83
8/4/04	0.00	0.00	1.21	DRY	880	13.0	0.6190	167	81
8/18/04	0.00	0.00	1.03	DRY	610	9.0	0.4286	107	83
9/1/04	0.00	0.00	0.03	DRY	540	7.0	0.3333	85	84
9/15/04	0.34	0.34	0.34	**WET**	420	3.0	0.1429	47	89
9/29/04	0.69	1.94	1.94	**WET**	17000	21.0	1.0000	576	97

Statistics

# Samples DRY	**15**
# Samples WET	**6**
# Samples Total	**21**
Geomean	**927**
Log std deviation	**0.3941**

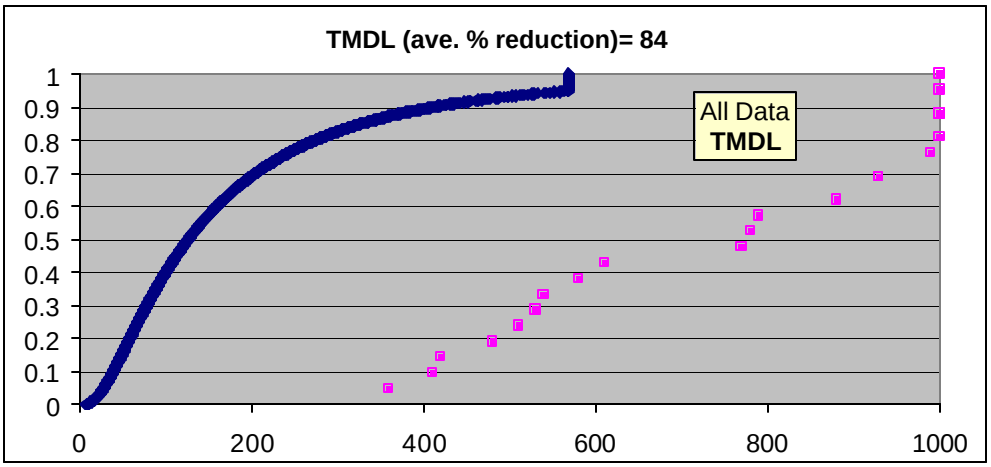
Avg % Reduction

Wet (WLA)	**87**
Dry (LA)	**83**
Total (TMDL)	**84**

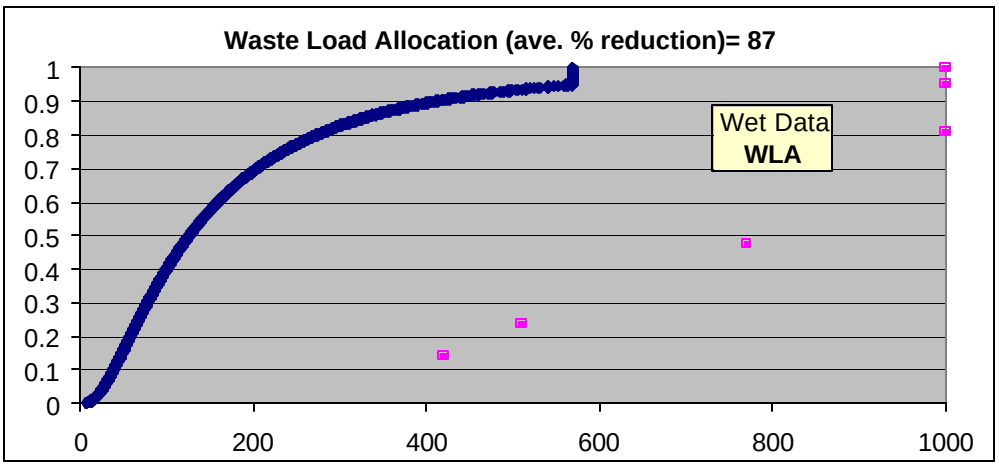
Precipitation and E. coli data provided by the Mattabasset District and Connecticut River Watch Program, respectively.

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.

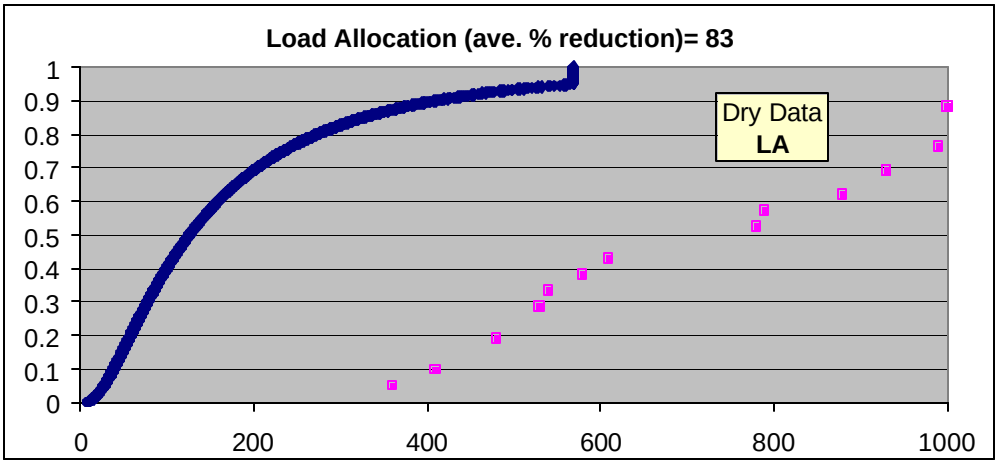
Coginchaug River Criteria Curve for Monitoring Site 428



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

Technical Support Document for the Cumulative Distribution Function Method

DEVELOPMENT OF TMDLS FOR INDICATOR BACTERIA USING THE CUMULATIVE DISTRIBUTION FUNCTION METHOD

Lee E. Dunbar
Supervising Environmental Analyst
Total Maximum Daily Load Program

9 ages with 1 table and 2 figures
Last revised: July 21, 2004

Overview of approach

The analytical methodology presented in this document provides a defensible scientific and technical basis for establishing TMDLs to address recreational use impairments in urban watersheds. Representative ambient water quality monitoring data for a minimum of 21 sampling dates during the recreational season (May 1 – September 31) is required for the analysis. The reduction in bacteria density from current levels needed to achieve consistency with the criteria is quantified by calculating the difference between the cumulative relative frequency of the sample data set and the criteria adopted by Connecticut to support recreational use. Connecticut's adopted water quality criteria for the indicator bacteria *E. coli* (geometric mean 126 col/100ml, single sample maximum 576 col/100ml) is represented by a statistical distribution of geometric mean 126 and log standard deviation 0.4 for purposes of TMDL calculations.

TMDLs developed using this approach are expressed as the average percentage reduction from current conditions required to achieve consistency with criteria. The procedure partitions the TMDL into regulated point source wasteload allocation (WLA) and non-point source load allocation (LA) components by quantifying the contribution of ambient monitoring data collected during periods of high stormwater influence and minimal stormwater influence to the current condition. TMDLs developed using this analytical approach provide an ambient monitoring benchmark ideally suited for quantifying progress in achieving water quality goals as a result of TMDL implementation.

Applicability

The methodology is intended solely for use in developing TMDLs for urban waters that are identified (listed) as impaired on the *2004 List of Connecticut Water Bodies Not Meeting Water Quality Standards*[(1)]. It is expected that implementation of these TMDLs will be accomplished principally through implementing the provisions of the Small Municipal Separate Storm Sewer System general permit (MS4 permit)[(2)]. The method as described here is not proposed for use in developing TMDLs for waterbody segments that include designated bathing areas. Further, the method is not intended for use as an assessment tool for purposes of identifying use attainment status relative to listing or delisting of waterbody segments pursuant to Section 303(d) of the federal Clean Water Act. Assessment of use support is performed in accordance with the Department's guidance document, *Connecticut Consolidated Assessment and Listing Methodology (CT-CALM)*[(3)].

Background

TMDLs are established by the State in accordance with the requirements established in the federal Clean Water Act. Section 303(d) of the Act requires the State to perform an assessment of waters within the State relative to their ability to support designated uses including recreational use. The procedure used by the Department to assess use attainment is described in the guidance document, *Connecticut Consolidated Assessment and Listing Methodology (CT-CALM)*[3]. The list of waterbody segments in Connecticut that do not currently support recreational use is updated to incorporate the most recent monitoring information by the Department every two years. As a result of this process, waterbodies may be added to or deleted from the list of impaired waters in accordance with the CT-*CALM* guidance. Once complete, the list is submitted to the Regional office of the federal EPA for approval. Section 303(d) of the Act requires the State to establish TMDLs for each pollutant contributing to the impairment of each waterbody segment identified on the list.

Water Quality Criteria for Indicator Bacteria (*E. coli*)

Connecticut's water quality criteria for the support of "all other recreational use" established in the State's Water Quality Standards[4] is a geometric mean density of 126 col/100 and a single sample maximum density of 576 col/100ml. The indicator bacteria, *E. coli*, is not pathogenic, rather its presence in water is an indicator of contamination with fecal material that may also contribute pathogenic organisms. Connecticut's criteria are based on federal guidance[5]. In this guidance, the basis for the criteria and the relationship between the geometric mean criterion and the single sample maximum criterion is explained in detail.

The geometric mean criterion was derived by EPA scientists from epidemiological studies at beaches where the incidence of swimming related health effects (gastrointestinal illness rate) could be correlated with indicator bacteria densities. EPA's recommended criteria reflect an average illness rate of 8 illnesses per 1000 swimmers exposed. This condition was predicted to exist based on studies cited in the federal guidance when the steady-state geometric mean density of *E. coli* was 126 col/100ml. The distribution of individual sample results around the geometric mean is such that approximately half of all individual samples are expected to exceed the geometric mean and half will be below the geometric mean.

EPA also derived a single sample maximum criterion from this same database to support decisions by public health officials regarding the closure of beaches when an elevated risk of illness exists. Because approximately half of all individual sample results for a beach where the risk of illness is considered "acceptable" are expected to exceed the geometric mean criteria of 126 col./100ml, an upper boundary to the range of individual sample results was statistically derived that will be exceeded at frequencies less than 50% based on the variability of sample data. The mean log standard deviation for *E. coli* densities at the freshwater beach sites studied by EPA was 0.4. The single sample maximum criterion of 576 col./100 adopted by Connecticut represents the 95^{th} percentile upper confidence limit (5% exceedance frequency) for a statistical distribution of data with a geometric mean of 126 and a log standard deviation of 0.4 as recommended by EPA for waters not heavily used for swimming.

Consistent with the State's disinfection policy (Water Quality Standard #23), the critical period for application of the indicator bacteria criteria is the recreational season, defined as May 1 through September 30. For waters that do not receive point discharges of treated sewage subject to the disinfection policy, a review of ambient monitoring data contained in the State's Ambient Monitoring Database[(6)] confirms that bacteria densities are typically highest during the summer months. Consistency with criteria during the summer is indicative of consistency at all times of the year. Lower densities reported during other portions of the year are most likely a result of several environmental factors including more rapid die-off of enteric bacteria in colder temperatures and reduced loadings from wildlife and domestic animal populations. Further, human exposure to potentially contaminated water is greatly reduced during the colder months, particularly exposure that results from immersion in the water since cold temperatures discourage participation in recreational activities that typically involve immersion.

As noted above, Connecticut's adopted criteria to support "all other recreational use" is expressed in the Water Quality Standards as a geometric mean *E. coli* density of 126 col/100 ml and a single sample maximum of 576 col/100ml. These values are based on federal guidance and reflect an idealized distribution of bacteria monitoring data for sites studied by EPA that can be represented by statistical distribution with a geometric mean of 126 col.100ml and a log standard deviation of 0.4. The criteria can therefore be expressed as a cumulative frequency distribution or "criteria curve" as shown in figure 1.

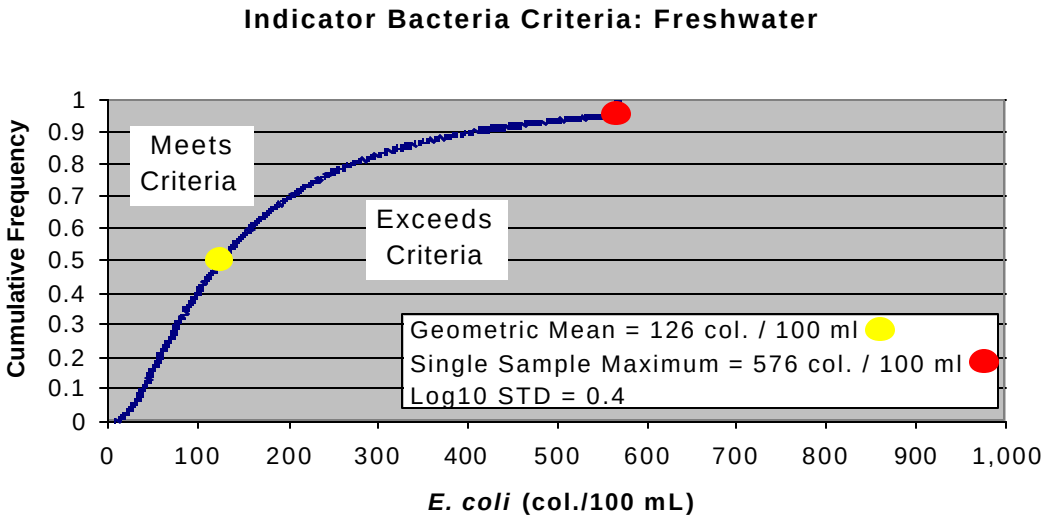


Figure 1—Cumulative Relative Frequency Distribution representing water quality criteria to support recreational use.

TMDL

As with the cumulative relative frequency curve representing the criteria shown in Figure 1, a cumulative relative frequency curve can be prepared using site-specific sample data to represent current conditions at the TMDL monitoring site. The TMDL for the monitored segment is derived by quantifying the difference between these two distributions as shown conceptually in Figure 2. This is accomplished by calculating the reduction required at representative points on the sample data cumulative frequency distribution curve and then averaging the reduction needed across the entire range of sampling data. This procedure allows the contribution of each individual sampling result to be considered when estimating the percent reduction needed to meet a criterion that is expressed as a geometric mean.

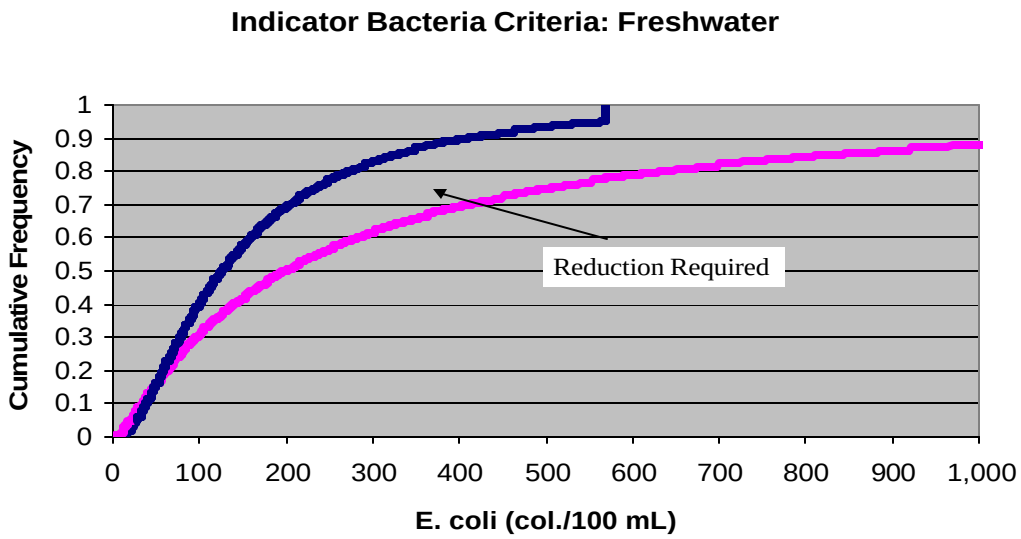


Figure 2. Reduction in indicator bacteria density needed from current condition (red line) to meet criteria (blue line) based on cumul ative relative frequency distribution.

WLA and LA

Stormwater runoff in an urbanized area is considered a point source subject to regulation under the NPDES permitting program. TMDLs for indicator bacteria in waters draining urbanized areas must therefore be partitioned into a WLA to accommodate point source stormwater loadings of indicator bacteria and a LA to accommodate non-point loadings from unregulated sources. This is accomplished using the same ambient monitoring data used to establish the TMDL.

One common characteristic of urbanized areas is the high percentage of impervious surface. Much of the impervious surface is directly connected to nearby surface waters through stormwater drainage systems. As a result, runoff is rapid following rain events and flow in urban streams is typically dominated by stormwater runoff during these periods. Monitoring results for samples collected under these conditions are strongly influenced by stormwater quality. During dry conditions, urban streams contain little stormwater since urban watersheds drain quickly and

baseflows are reduced due to lower infiltration rates and reduced recharge of groundwater. At baseflow, urban stream water quality is dominated by non-point sources of indicator bacteria since stormwater outfalls are inactive.

The relative contribution of indicator bacteria loadings occurring during periods of high or low stormwater influence to the geometric mean indicator density is estimated by calculating separate averages of the reduction needed to achieve consistency with criteria under "wet" and "dry" conditions. The reduction needed under "wet" conditions is assigned to the WLA and the reduction needed under "dry" conditions is assigned to the LA. Separate reduction goals are established for baseflow and stormwater dominated periods that can assist local communities in selection of best management practices to improve water quality. The technique also facilitates the use of ambient stream monitoring data to track future progress in meeting water quality goals.

The sources contributing to the WLA and LA can be further subdivided depending on knowledge of sources present in the watershed (Table 1). Some existing sources such as dry weather flows from stormwater collections systems, illegal connections to stormwater systems, and combined sewer overflows are allocated "zero" or "100% reduction" since the management goal for these sources is elimination. Permitted discharges of treated and disinfected domestic wastewater (sewage treatment plants) are allocated "zero percent reduction" since disinfection required by the NPDES permit is sufficient to reduce indicator bacteria levels to below levels of concern. Natural sources such as wildlife are also allocated a "zero percent reduction" since the management goal is to foster a sustainable natural habitat and stream corridor to the extent practicable. Management measures to control nuisance populations of some wildlife species that can result in elevated indicator bacteria densities such as Canadian geese however should be considered in developing an overall watershed management plan.

Table 1. Establishing WLA and LA Pollutant Sources

Source	Critical Conditions	Assigned To
On-Site Septic	Baseflow (DRY)	LA
Domestic Animal	Baseflow (DRY)	LA
Natural (Wildlife)	Baseflow (DRY)	LA
POTW	Baseflow (DRY)	WLA
Stormwater	Wet Weather Flow	WLA
Dry Weather Overflow	Baseflow (DRY)	None
Illegal Connection	Baseflow (DRY)	None
Combined Sewer Overflow	Wet Weather Flow	None

MOS

Federal regulations require that all TMDL analyses include either an implicit or explicit margin of safety (MOS). The analytical approach described here incorporates an implicit MOS. Factors contributing to the MOS include assigning a percent reduction of "zero" to sampling results that indicate quality better than necessary to achieve consistency with the criteria. The increase in loadings on those dates that could be assimilated by the stream without exceeding criteria is not quantified (as a negative percent reduction) and averaged with the load reductions needed on other sampling dates. Rather, this excess capacity is averaged as a zero value thereby contributing to the implicit MOS.

The means of implementing the TMDL also contributes to the MOS. The loading reductions specified in the TMDL for regulated stormwater discharges and non-point sources must be sufficient to achieve water quality standards since confirmation that these reductions have been achieved will be based on ambient monitoring data documenting that water quality standards are met. Further, achieving compliance with the requirements of the MS4 permit includes elimination of high loading sources such as illegal connections and dry weather overflows from storm sewer systems. Eliminating loads from these sources, as opposed to allocating a percent reduction equal to that given other sources, contributes to the implicit MOS. Further assurance that implementing the TMDL will meet water quality standards is provided by the iterative implementation required for compliance with the MS4 permit. This approach mandates that additional management efforts must be implemented until ambient monitoring data confirms that standards are met.

Many of the best management practices that are implemented to address either wet or dry weather sources (WLA or LA components of the TMDL) will have some degree of effectiveness in reducing loads under all conditions. For example, the TMDL allocates all the percent reduction needed to meet standards under wet weather conditions to the WLA. However, reductions resulting from best management practices implemented to reduce dry weather loads (LA) will provide some benefit during wet weather conditions as well. These reductions also contribute to the implicit MOS.

Data requirements

Ambient monitoring data for a minimum of 21 sampling dates during the recreational season (May 1 – September 30) is required. Data collected at other times during the year are excluded from the analysis. In addition to data on indicator bacteria density, precipitation data for each sampling date and the week prior to the sampling is necessary. Sampling dates should be selected to insure that representative data is available for both wet and dry conditions. This may be accomplished most easily by selecting sampling dates without prior knowledge of the meteorological conditions likely to be encountered on that date.

Data must reflect current conditions in the TMDL segment. The monitoring location where data is collected must therefore be sited in an area that can be considered representative of water quality throughout the TMDL segment. Data obtained under unusual circumstances may be excluded from the analysis provided the reason for excluding that data is provided in the TMDL. Potential reasons for excluding data may include such things as evidence that a spill, upset in wastewater treatment, or sewer line breakage occurred that resulted in a short-term excursion

from normal conditions. Data that represent conditions during an extreme storm event that resulted in widespread failure of wastewater treatment or stormwater best management practices may also be excluded. However, data for periods following typical rainfall events must be retained. Reasons for excluding any data must be provided in the TMDL Analysis.

All data must be less than 5 years old. If circumstances in any watershed suggest that conditions have changed during the most recent five-year period, the analysis may be restricted to more recent data in order to be representative of the current status provided the minimum data requirements are met.

Assurance of acceptable data quality must be provided. Typically, all data should be collected and results analyzed and reported pursuant to an EPA approved Quality Assurance Project Plan (QAPP). Data collected in the absence of a QAPP may be acceptable provided there is evidence that confirms acceptable data quality.

Analytical Procedure - TMDL

1. The *E. coli* monitoring data is ranked from lowest to highest. In the event of ties, monitoring results are assigned consecutive ranks in chronological order of sampling date. The sample proportion (p) is calculated for each monitoring result by dividing the assigned rank (r) for each sample by the total number of sample results (n):

$$p = r / n$$

2. Next, a single sample criteria reference value is calculated for each monitoring result from the statistical distribution used to represent the criteria following the procedure described in steps 3-6 below:

3. If the sample proportion is equal to or greater than .95, the single sample criteria reference value is equivalent to the single sample criterion adopted into the Water Quality Standards (576 col/100ml).

4. If the sample proportion is less than .95, and greater than .50, the single sample criteria reference value is calculated as:

$$\text{criteria reference value} = \text{antilog}_{10} [\log_{10} 126 \text{ col/100ml} + \{F \times 0.4\}]$$

NB 126 col/100ml is the geometric mean indicator bacteria criterion adopted into Connecticut's Water Quality Standards, F is a factor determined from areas under the Normal probability curve for a probability level equivalent to the sample proportion, 0.4 is the $\log_{10}$ standard deviation used by EPA in deriving the national guidance criteria recommendations (Table 4, reference 5).

5. If the sample proportion is equal to .50, the single sample reference criteria value is equal to the geometric mean criterion adopted into the Water Quality Standards (126 col/100ml).

6. If the sample proportion is less than .50, the single sample reference criteria value is calculated as:

$$\text{criteria reference value} = \text{antilog}_{10} [\log_{10} 126 \text{ col/100ml} - \{F \times 0.4\}]$$

7. The percent reduction necessary to achieve consistency with the criteria is then calculated following the procedure described in steps 8-9 below:

8. If the monitoring result is less than the single sample reference criteria value, the percent reduction is zero.

9. If the monitoring result exceeds the single sample criteria reference value, the percent reduction necessary to meet criteria on that sampling date is calculated as:

percent reduction = ((monitoring result – criteria reference value)/monitoring result)x100

10. The TMDL, expressed as the average percent reduction to meet criteria, is then calculated as the arithmetic average of the percent reduction calculated for each sampling date.

Analytical Procedure – WLA and LA

Precipitation data is reviewed and each sampling date is designated as a "dry" or "wet" sampling event. Although a site-specific protocol may be specified in an individual TMDL analysis, typically samples collected within 48 hours of a precipitation event of 0.25 inches or greater are designated as "wet".

The average percent reduction for all sampling events used to derive the TMDL that are designated as "wet" is computed and established as the WLA.

The average percent reduction for all sampling events used to derive the TMDL that are designated as "dry" is computed and established as the LA.

Analytical Procedure – Spreadsheet model

An Excel(tm) spreadsheet has been developed that performs all calculations necessary to derive a TMDL using this procedure. Documentation regarding the spreadsheet and example calculations is provided in Attachment A. Copies of the spreadsheet in electronic form may be obtained from DEP by contacting Mr. Thom Haze at (860) 424-3734 or by email at thomas.haze@po.state.ct.us.

References

1. 2004 List of Connecticut Water Bodies Not Meeting Water Quality Standards, Connecticut Department of Environmental Protection, Adopted April 28, 2004, approved June 24, 2004.

2. General Permit for the Discharge of Stormwater from Small Municipal Separate Storm Sewer Systems. Connecticut Department of Environmental Protection. Issued January 9, 2004.

3. Connecticut Consolidated Assessment and Listing Methodology for 305(b) and 303(d) Reporting. Connecticut Department of Environmental Protection, April 2004.

4. Water Quality Standards. Connecticut Department of Environmental Protection. Effective December 17, 2002.

5. Ambient Water Quality Criteria for Bacteria – 1986. U.S. Environmental Protection Agency, Office of Water, January 1986. (EPA440/5-84-002).

6. Water Quality Database. Connecticut Department of Environmental Protection, Monitoring and Assessment Program.