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

Final – November 29, 2005

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

Jane Stahl 12/1/05

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INTRODUCTION

A Total Maximum Daily Load (TMDL) analysis was completed for indicator bacteria in the Norwalk River Regional Basin. The waterbodies included in the TMDL analysis are the Norwalk River, Ridgefield Brook, and Silvermine River (Figure 1). 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]. 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. Please refer to the 2004 *List* for more information on impaired waterbodies throughout the State, and the *2004 Water Quality Report to Congress*[3] for information regarding all assessed waterbodies in the State. In general, the TMDL represents the maximum loading that a waterbody can receive without exceeding the water quality criteria, which have been adopted into the WQS for that parameter. In this TMDL, loadings are expressed as the average percent reduction from current loadings that must be achieved to meet water quality standards. 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 Norwalk River Regional Basin extends into the Connecticut municipalities of Norwalk, Wilton, Weston, Redding, Ridgefield, and New Canaan. Within these municipalities are designated urban areas, as defined by the US Census Bureau[4] (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 storm 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 (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 local stakeholders to develop and implement Watershed Based Management Plans (Plan),

which describe 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 where technically and economically feasible. 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 Norwalk 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 TMDL Implementation.

PRIORITY RANKING

Table 1. The status of impairment for each of the subject waterbodies as well as the TMDL development priority based on the 2004 *List*.

Waterbody Name	Waterbody Segment ID	Waterbody Segment Description	303(d) Listed (Yes/No)	Impaired Use Cause	Priority
Norwalk River	CT7300-00_01 CT7300-00_02 CT7300-00_03 CT7300-00_04 CT7300-00_05	From Rt. 1 (Norwalk) upstream to outlet of Little Pond and Ridgefield Brook (Ridgefield).	Yes	Contact Recreation Indicator Bacteria	T
Ridgefield Brook	CT7300-02_01 CT7300-02_02	From confluence with outlet of Little Pond and head of Norwalk River (Ridgefield) upstream to Great Swamp (Ridgefield).	Yes	Contact Recreation Indicator Bacteria	T
Silvermine River	CT7302-00_01	From mouth at Deering Pond (Norwalk) upstream to Rt. 15 (Norwalk).	Yes	Contact Recreation Indicator Bacteria	H

"T" indicates that the waterbody was under study during the preparation of the *2004 List* and a TMDL may be developed within two years if warranted. "H" indicates that the waterbody was a high priority because assessment information suggested a TMDL may be needed to restore the water quality impairment and a TMDL was planned for development within 3-5 years.

DESCRIPTION OF THE WATERBODY

See "Site Specific Information" in Appendix A

POLLUTANT OF CONCERN AND POLLUTANT SOURCES

Potential sources of indicator bacteria include point and nonpoint sources, such as stormwater runoff, horse/pet farms, wildlife, illicit discharges, surface water base flow, and improperly functioning 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
Norwalk River	Wildlife, Improperly Functioning Septic Systems, Surface Water Base Flow (Cooper Pond Brook and Gilbert and Bennett Brook)	Regulated Urban Runoff/Storm Sewers, Wastewater Treatment Plants, Illicit Discharges
Ridgefield Brook	Wildlife, Surface Water Base Flow (Steep Brook)	Regulated Urban Runoff/Storm Sewers, Wastewater Treatment Plant
Silvermine River	Horse/Pet Farms, Wildlife, Improperly Functioning Septic Systems	Regulated Urban Runoff/Storm Sewers

Two municipal wastewater treatment plants discharge to the Norwalk River (Ridgefield Route 7 WPCF and Redding – Georgetown WPCF) and one municipal wastewater treatment plant discharges to Ridgefield Brook (Ridgefield Main WPCF). Disinfection required under the National Pollutant Discharge Elimination System (NPDES) Permit is sufficient to reduce indicator bacteria densities to below levels of concern in the treatment plant effluent when in use and functioning properly (See Numeric Water Quality Target for further explanation).

Two industrial wastewater discharges are also present in the Norwalk River and include an active clean groundwater discharge from the PE Corp, Ridgefield and one groundwater remediation emergency authorization discharge: Elinco – Kellogg Deering Wellfield, Norwalk. However, these discharges are not anticipated to contribute significant levels of bacteria to the River. A limit for indicator bacteria was not included when the initial NPDES Permits because both discharges are clean groundwater and were determined not to contain significant levels of bacteria. Therefore, these discharges will not be considered potential point sources of indicator bacteria to the Norwalk River unless monitoring data suggests otherwise.

APPLICABLE SURFACE WATER QUALITY STANDARDS

Connecticut's WQS establish criteria for bacterial indicators of sanitary water quality that are based on protecting recreational uses such as swimming (both designated and non-designated swimming areas), kayaking, wading, water skiing, fishing, boating, aesthetic enjoyment and others. Indicator bacteria criteria are used as general indicators of sanitary quality based on the results of EPA research[5] conducted in areas with known human fecal material contamination. The EPA established a statistical correlation between levels of indicator bacteria and human illness rates, and set forth guidance for States to establish numerical criteria for indicator bacteria organisms so that recreational use of the water can occur with minimal health risks. However, it should be noted that the correlation between indicator bacteria densities and human illness rates

varies greatly between sites and the presence of indicator bacteria does not necessarily indicate that human fecal material is present since indicator bacteria occur in all warm-blooded animals.

The applicable water quality criteria for indicator bacteria to the Norwalk River Regional Basin are presented in Table 3. These criteria are applicable to all recreational uses established for these waters. During the public comment period for the Draft Norwalk River Regional Basin TMDL, the DEP received documentation from a number of stakeholders identifying three TMDL waterbody segments in the Norwalk River where the non-designating swimming *E.coli* criteria applies. However, it should be noted that the water quality classification and target criteria should not be considered as a certification of quality by the State or an approval to engage in certain activities such as swimming. Full body contact should be avoided immediately downstream of wastewater treatment plants, in areas known to have high levels *E.coli*, and during times when *E.coli* levels are expected to be particularly high, such as during and following storm events.

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

Waterbody	Waterbody Segment ID	Class	Bacterial Indicator	Criteria
Norwalk River	CT7300-00_01 CT7300-00_04 CT7300-00_05	B	*Escherichia coli* (*E. coli*)	Geometric Mean less than 126/100ml Single Sample Maximum 410/100ml
Norwalk River	CT7300-00_02 CT7300-00_03	B	*Escherichia coli* (*E. coli*)	Geometric Mean less than 126/100ml Single Sample Maximum 576/100ml
Ridgefield Brook	CT7300-02_01 CT7300-02_02	B		
Silvermine River	CT7302-00_01	B/A		

NUMERIC WATER QUALITY TARGET

TMDL calculations were performed consistent with the analytical procedures presented in the *Guidelines for Development of TMDLs for Indicator Bacteria in Contact Recreation Areas Using the Cumulative Distribution Function Method* (Guidelines)[6] included as Appendix B. All data used in the analysis and the results of all calculations are presented in Appendix A. The results are summarized in Table 4 below.

Table 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
Norwalk River	From Rt. 1 (Norwalk) upstream to outlet of Little Pond and Ridgefield Brook (Ridgefield).	CT7300-00_01	435	72	74	70	Implicit
		CT7300-00_01	704	76	76	76	Implicit
		CT7300-00_01	990	58	60	56	Implicit
		CT7300-00_02	244	38	38	38	Implicit
		CT7300-00_03	241	5	9	3	Implicit
		CT7300-00_04	1359	54	53	55	Implicit
		CT7300-00_05	238	39	42	37	Implicit
Ridgefield Brook	From confluence with outlet of Little Pond and head of Norwalk River (Ridgefield) upstream to Great Swamp (Ridgefield).	CT7300-02_01*	1214	51	60	45	Implicit
		CT7300-02_02					
Silvermine River	From mouth at Deering Pond (Norwalk) upstream to Rt. 15 (Norwalk).	CT7302-00_01	433	66	67	65	Implicit

*Current data is unavailable to conduct a TMDL analysis for the Ridgefield Brook segment, segment, CT7300-02_01. However, this small segment (1 linear mile) is located between two segments (CT7300-00_05 and CT7300-02_02) that require percent reductions. Therefore, it is reasonable to presume that the same percent reduction applies throughout Ridgefield Brook.

The numeric target allocated to NPDES permitted discharges of treated and disinfected domestic wastewater is "0% reduction" because disinfection reduces bacteria densities to below levels of concern as stated in the Guidelines[6]. The current NPDES permits for the three municipal wastewater treatment plants (WWTPs) requires disinfection from May 1 - September 30 (See Seasonal Analysis below). Under the NPDES Permits, indicator bacteria (fecal coliform) cannot exceed a geometric mean of 200 col/100mLs over a 30-day period or a single sample maximum of 400 col/100mLs. The indicator bacteria used in this TMDL is *E.coli*, which is one of several species that make up the fecal coliform group. Therefore, only a portion of fecal coliform densities account for *E.coli* in the sample and *E.coli* densities are always lower than total fecal coliform densities. Based on this information, NPDES Permit limits for the WWTPs are sufficient to reduce *E.coli* to below levels of concern and do not need to be reduced further as part of the waste load allocation. Also, WWTPs are required to sample effluent weekly through the disinfection period and submit monitoring reports to DEP. DEP reviews the monitoring reports and takes action to mitigate any problems when there are consistent violations of the Permit. Based on monitoring reports submitted to DEP during the past year, there were no consistent violations of the indicator bacteria permit limits for WWTPs in the Norwalk River Regional Basin.

MARGIN OF SAFETY

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

The indicator bacteria criteria used in this TMDL analysis were developed exclusively from data derived from studies conducted by EPA at high use designated public bathing areas with known human fecal contamination[5]. Therefore, the criteria provide an additional level of protection when applied to waters not used as designated swimming areas or contaminated by human fecal material. As a result, achieving the criteria results in an "implicit MOS". Additional explanation concerning the implicit MOS incorporated into the analysis is provided in the Guidelines[6].

SEASONAL ANALYSIS

Previous investigations by the DEP into seasonal trends of indicator bacteria densities in surface waters indicates that the summer months typically exhibit the highest densities of any season (*Water Quality* Summary)[7]. 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.

During the public comment period, the DEP received several requests to extend the current disinfection period (May 1 to September 30). Based on this request, the TMDLs presented in this document are applicable from April 1 to October 31 to account for recreational uses that occur during those months. A 1990 survey[8] indicated fishing occurs throughout the Norwalk River and the River is currently considered a heavily stocked stream by the DEP Fisheries Division[9]. In 2002 the upper portion of the Norwalk River in Wilton and Ridgefield was designated a Class 3 Wild Trout Management Area (WTMA). A Class 3 WTMA supplements hatchery-stocked trout to wild trout streams to provide greater fishing opportunities for anglers. Fishing pressure is most intense during the start of the season (April) and continues at a moderate level through October. This TMDL is applicable from April 1 to October 31 to provide a level of protection for fishing and wading activities that occur during these months. Achieving consistency with the TMDLs from April 1 to October 31 will result in achieving full support of recreational uses throughout the remainder of the year.

TMDL IMPLEMENTATION

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

It is important to note that the TMDLs are effective for the entire watershed because they are a measurement of compounded impacts at a single point. As such, corrective actions must be undertaken at the source(s) whether it is a tributary or illicit discharge pipe, in order to achieve the required percent reductions. Also, the approach to TMDL Implementation is anticipated to

be on a watershed wide scale, which will require that all sources within the regional basin that are contributing to the in-stream impairment be addressed. The DEP advocates that a watershed based plan for the Norwalk River Regional Basin be developed to implement the TMDLs. The plan should follow guidelines provided by the EPA and include participation for all watershed towns. The following guidance offers suggestions regarding BMP implementation, however the goal is to allow responsible parties flexibility in developing a TMDL implementation plan (watershed based plan). The DEP supports an adaptive and iterative management approach where reasonable controls are implemented and water quality is monitored in order to evaluate for achievement of the TMDL goals and modification of controls as necessary.

The numeric target allocated to NPDES permitted discharges of treated and disinfected domestic wastewater is "0% reduction" because disinfection reduces bacteria densities to below levels of concern as stated in the Guidelines[6]. The current NPDES permits for the three municipal wastewater treatment plants requires disinfection from May 1 - September 30. The DEP has received a number of requests from stakeholders during the development of the TMDL to extend the period of disinfection due to the volume of fishing and wading use the Norwalk River experiences during April and October. As such, implementation of the TMDL will require extending the current disinfection period to include the months of April and October in the NPDES permits for the three municipal wastewater treatment plants. Extending the disinfection season will be required when the permits are renewed. All three permits, Redding-Georgetown WPCF, Ridgefield Main WPCF, and Ridgefield Route 7 WPCF expire on January 27, 2008, September 29, 2009, and October 4, 2009, respectively. This is proposed in addition to the percent reductions to other sources to provide a level of protection during the fishing season, where wading occurs and the potential for full body immersion exists.

Point sources of *E. coli* to the Norwalk River Regional Basin also 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.

It should be noted that the Norwalk River Watershed Initiative (NRWI) formulated the Norwalk River Watershed Action Plan[10] in 1998. The Plan was signed by numerous stakeholders, including elected officials from the watershed municipalities, chairpersons from NRWI, and officials from federal and state agencies including DEP. The Watershed Plan addresses action items in four categories (Habitat Restoration, Land Use/Flood Protection/Open Space, Water Quality, and Stewardship and Education) designed to protect and restore the Norwalk River watershed. Action items have been assigned to appropriate stakeholders, such as local municipalities, federal, state, and regional agencies, watershed coordinators, Nonpoint Education for Municipality Officials, private conservation and civic community organizations, public and private water companies, advisory committee, and Norwalk River Watershed Association, for implementation of the Plan. This Action Plan provides direction for implementation of the TMDL, as well as fulfills some of the minimum control measures required in the MS4 permit. A status of action items in the Norwalk River Watershed from the 'Initiative Accomplishments' section of the 2004 Supplement to the Action Plan[11] is included in Appendix C. More recently (winter 2005), the NRWI began working with local officials to prepare nuisance wildlife control plans and septic system maintenance guidance.

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

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 include wildlife, improperly functioning septic systems, surface water base flow, and horse/pet farms. BMPs for the management of nonpoint sources include septic system testing and maintenance, nuisance wildlife control plans, and pet waste ordinances. The contribution of bacteria from surface water base flow should be addressed by implementing nonpoint source BMPs in tributaries with known high levels of *E.coli* densities, such as Steep

Brook, Cooper Pond Brook, and Gilbert and Bennett Brook. 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 at 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 potential funding sources, when available, 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. 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 provides reasonable assurance that the municipalities will take steps towards achieving the target TMDLs and reducing point sources of stormwater containing bacteria.

In addition, the Norwalk River Watershed Action Plan was signed by numerous stakeholders, including elected officials from watershed towns, chairpersons from the NRWI, and officials from federal and state agencies. This represents a commitment on the local level to watershed restoration and protection. Effectiveness of the Plan is further demonstrated through the development of a watershed committee (NRWI) that focuses on the watershed and is not limited by town boundaries. Recent efforts by NRWI have focused on reducing *E.coli* levels in the Norwalk River by working with watershed towns to identify nonpoint sources of bacteria, such as improperly functioning septic systems and nuisance wildlife. The recent actions by the NRWI exemplify their commitment to improving water quality and provide reasonable assurance that future efforts will continue towards achieving target TMDLs.

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

PROVISIONS FOR REVISING THE TMDLs

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

PUBLIC PARTICIPATION

The Norwalk River Regional Basin TMDL document was noticed for public comment in the Connecticut Post on July 11, 2005. In addition, the municipalities of Norwalk, Wilton, Weston, Redding, Ridgefield, and New Canaan, as well as several interested parties were notified by mail of the comment period. As of the end of the public review period (August 10, 2005), eight comment letters were received by the DEP. The final TMDL document was modified to reflect any reasonable requests submitted in the comment letters. A response to comments document was also prepared by the DEP.

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.

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

(6) Connecticut Department of Environmental Protection, 2004. *Guidelines for Development of TMDLs for Indicator Bacteria in Contact Recreation Areas Designated for All Other Uses Using the Cumulative Distribution Function Method*. Bureau of Water Management, 79 Elm Street, Hartford, CT 06106-5127.

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

(8) Connecticut Department of Environmental Protection, 1991. *A Survey of Connecticut Streams and Rivers – Central Coastal and Western Coastal Drainages*. Bureau of Recreation, 79 Elm Street, Hartford, CT 06106-5127.

(9) Connecticut Department of Environmental Protection, 2005. *2005 Connecticut Angler's Guide*. Bureau of Natural Resources, 79 Elm Street, Hartford, CT 06106-5127.

(10) Norwalk River Watershed Initiative Committee, 1998. *The Norwalk River Watershed Action Plan*.

(11) Norwalk River Watershed Initiative Committee, 2004. *Supplement to the 1998 Norwalk River Watershed Action Plan*.

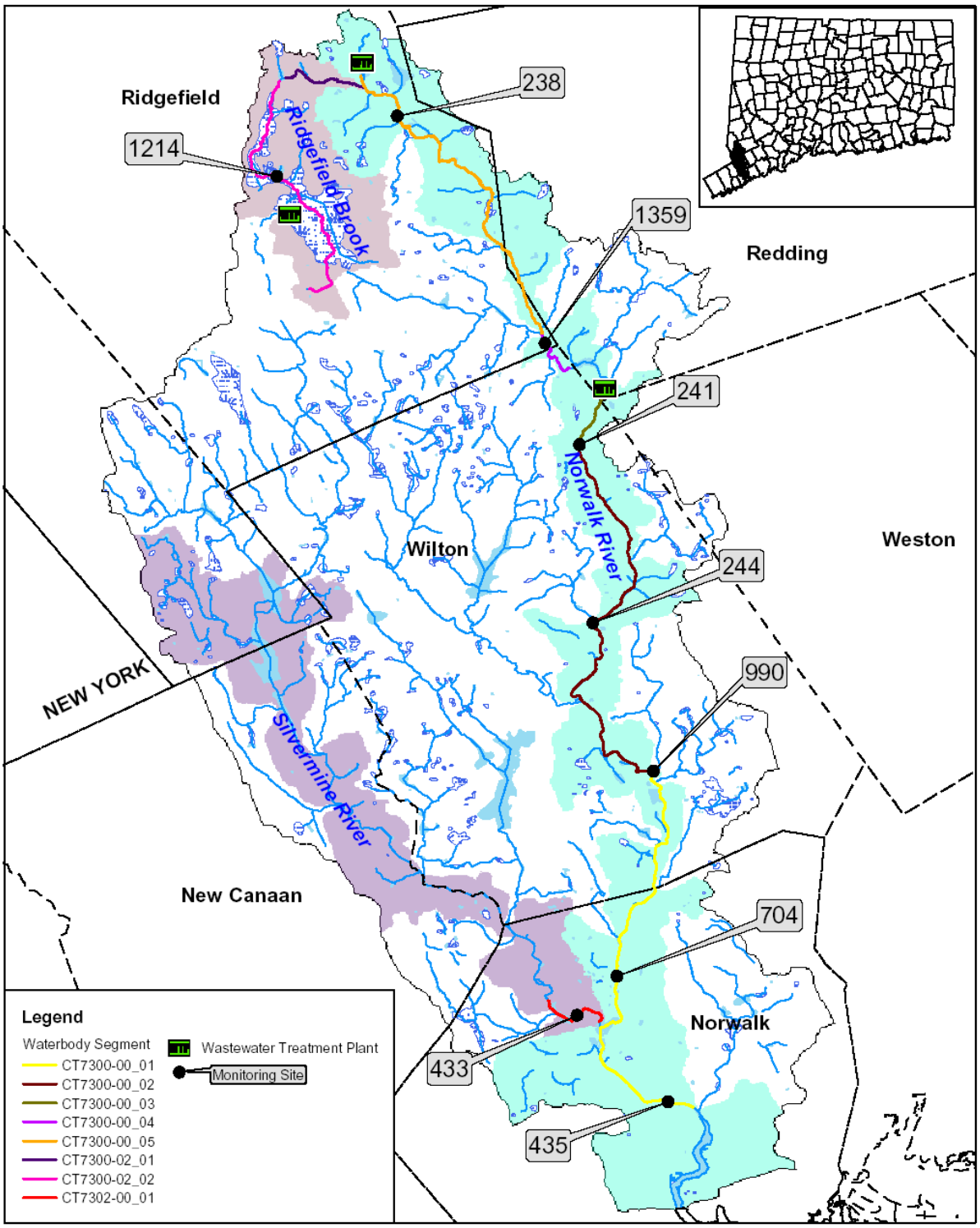


Figure 1: Basin Location Map

Map Data: CTDEP
Map Created: April 2005

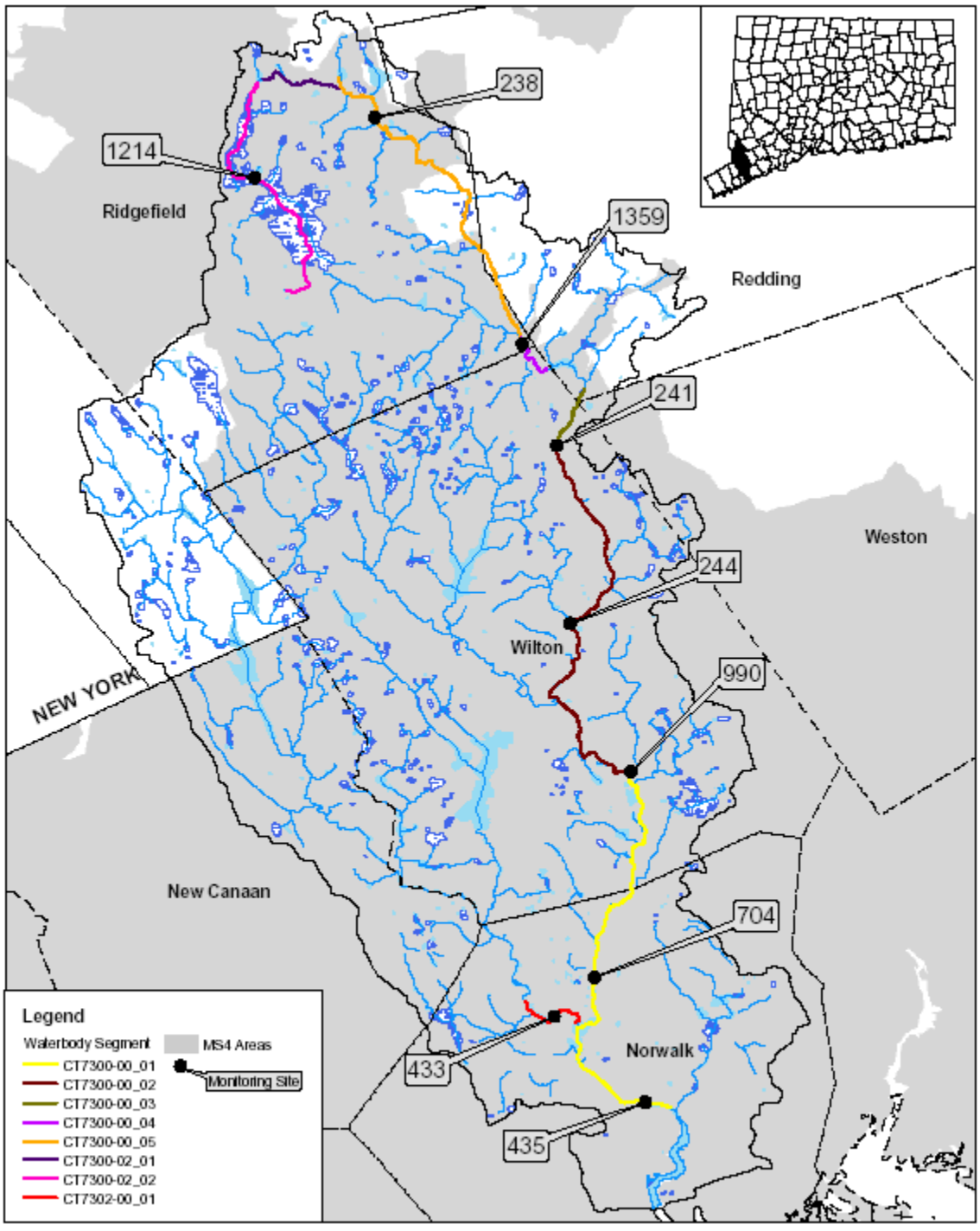


Figure 2: Designated MS4 Areas Map

Map Data: CTDEP
Map Created: April 2005

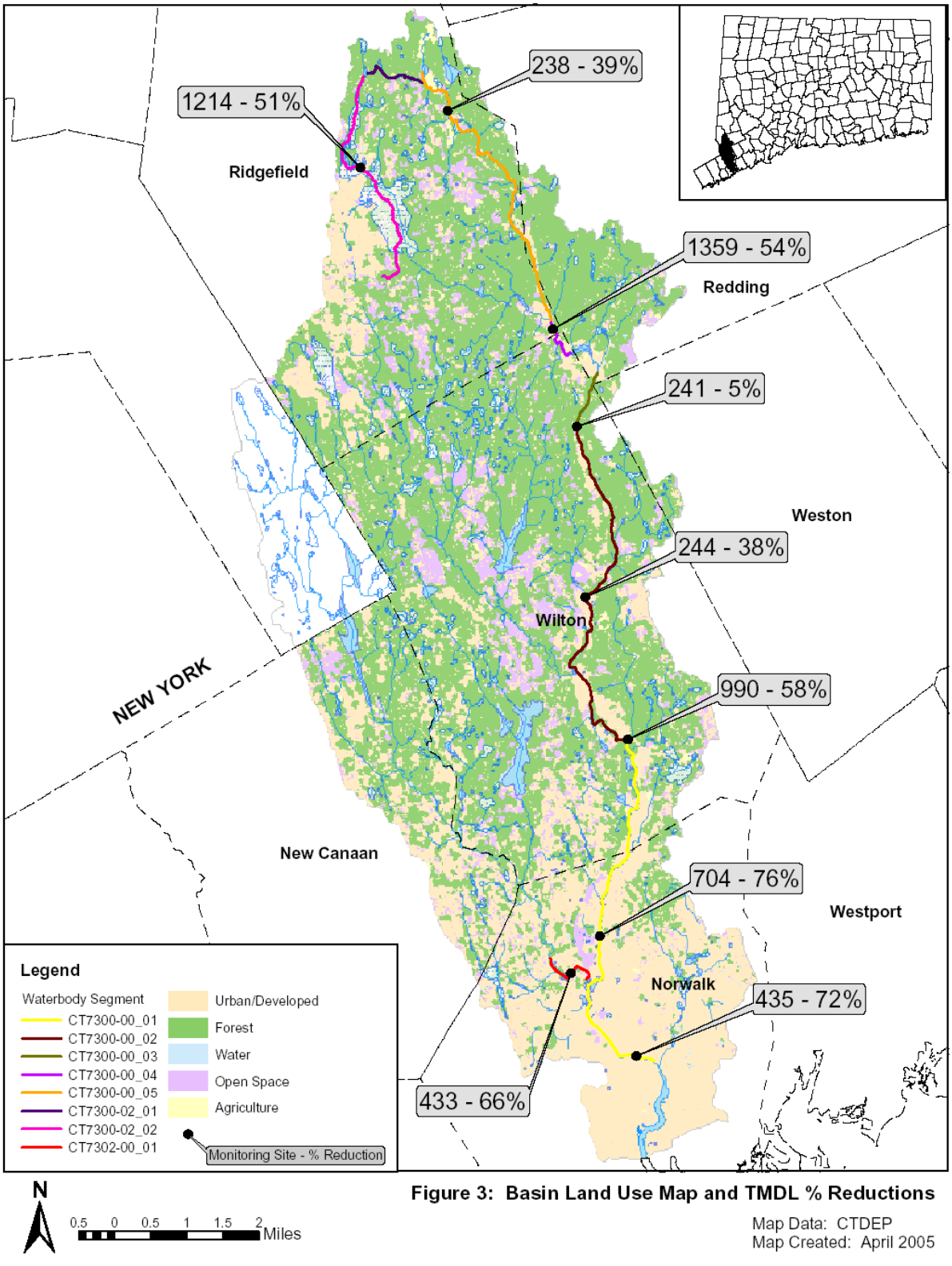


Figure 3: Basin Land Use Map and TMDL % Reductions

Map Data: CTDEP
Map Created: April 2005

Appendix A

Appendix A-1
Norwalk River
Waterbody specific information

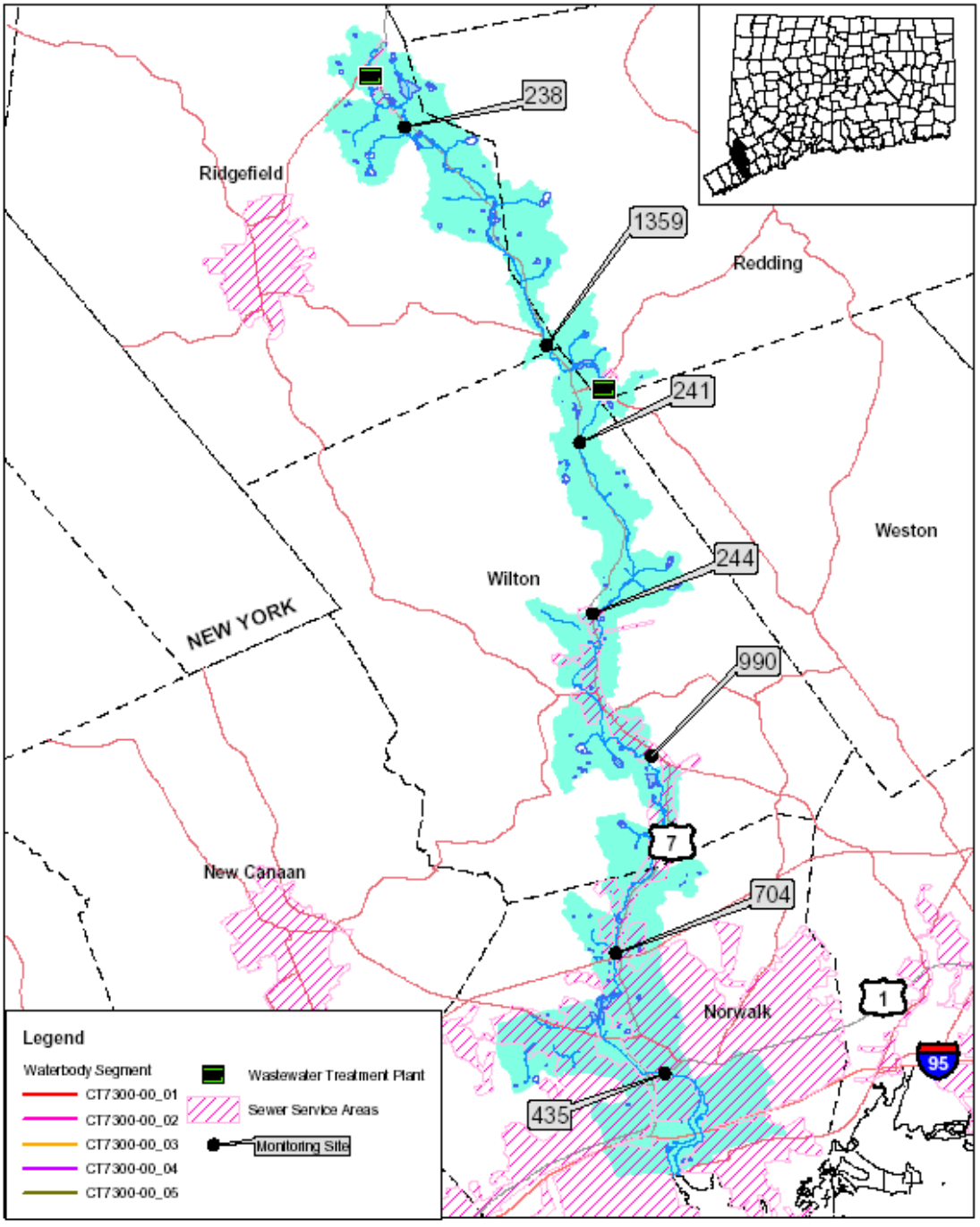
Impaired Waterbody
Waterbody Name: Norwalk River
Waterbody Segment IDs: CT7300-00_01, CT7300-00_02, CT7300-00_03, CT7300-00_04, CT7300-00_05
Waterbody Segment Description: From Route 1 (Norwalk) upstream to outlet of Little Pond and Ridgefield Brook (Ridgefield)

Impairment Description:
Designated Use Impairment: Contact Recreation
Size of Impaired Segments: 17 linear miles
Surface Water Classification: Class B

Watershed Description:
Total Regional Drainage Basin Area: 62.412 square miles
Tributary To: Norwalk Harbor
Subregional Basin Name & Code: Norwalk River, 7300
Regional Basin: Norwalk River
Major Basin: Southwest Coast
Watershed Towns: Norwalk, Wilton, Redding, Ridgefield
Phase II GP applicable? Norwalk-yes, Wilton-yes, Redding-yes, Ridgefield-yes
Applicable Season: Recreation Season (May 1 to September 30)
Landuse:

Land Use Category	Percent Composition
Forested	53.32%
Urban/Developed	37.31%
Open Space	6.93%
Water/Wetland	1.46%
Agriculture	0.97%

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


238
Ridgefield
1359
Redding
241
Weston
244
Wilton
NEW YORK
990
7
New Canaan
704
Norwalk
1
95
435
Legend
Waterbody Segment
CT7300-00_01
CT7300-00_02
CT7300-00_03
CT7300-00_04
CT7300-00_05
Wastewater Treatment Plant
Sewer Service Areas
Monitoring Site
N
0.5 0 0.5 1 1.5 2 Miles
Norwalk River
Map Data: CTDEP
Map Created: April 2005

Norwalk River

CT7300-00_01

Data Used in the Analysis

Monitoring Site: 435, upstream Route 1

Date	Precip.(in)[1]			Condition[2]	E. coli	Rank	Proportion	Criteria	%
	24h	48h	96h	(WET/DRY)	(col./100 ml)			Value	Reduction
5/4/00	0.00	0.00	0.12	DRY	80	2.0	0.0230	20	75
5/11/00	0.03	0.32	0.36	**WET**	440	43.5	0.5000	126	71
5/18/00	0.54	0.54	0.54	**WET**	360	36.5	0.4195	105	71
5/25/00	0.04	1.17	1.32	**WET**	340	35.0	0.4023	100	70
6/1/00	0.00	0.00	0.00	DRY	121	6.0	0.0690	32	73
6/8/00	0.00	0.40	3.23	**WET**	860	66.0	0.7586	240	72
6/15/00	0.00	0.01	0.08	DRY	130	10.5	0.1207	43	67
6/22/00	0.05	0.05	0.06	DRY	300	33.5	0.3851	96	68
6/29/00	0.01	0.03	0.36	DRY	360	36.5	0.4195	105	71
7/6/00	0.00	0.00	0.10	DRY	380	40.0	0.4598	115	70
7/13/00	0.00	0.00	0.07	DRY	164	18.0	0.2069	59	64
7/20/00	0.00	0.06	0.06	DRY	220	24.5	0.2816	74	66
7/27/00	0.64	3.32	3.32	**WET**	4500	85.0	0.9770	410	91
8/1/00	0.73	0.78	1.79	**WET**	1000	71.0	0.8161	289	71
8/3/00	0.70	1.01	1.69	**WET**	1800	79.5	0.9138	410	77
8/17/00	0.00	0.11	0.86	DRY	280	30.5	0.3506	88	68
8/24/00	0.00	0.21	0.21	DRY	200	22.5	0.2586	69	65
8/31/00	0.00	0.00	0.00	DRY	100	3.5	0.0402	25	75
9/7/00	0.00	0.00	0.01	DRY	148	15.0	0.1724	53	64
9/14/00	0.00	0.78	0.78	**WET**	920	68.5	0.7874	263	71
9/21/00	0.00	0.00	2.21	**WET**	780	63.0	0.7241	218	72
9/28/00	0.00	0.00	0.49	DRY	128	8.5	0.0977	38	70
5/10/01	0.00	0.00	0.00	DRY	100	3.5	0.0402	25	75
5/24/01	0.06	0.51	1.86	**WET**	510	49.0	0.5632	146	71
6/5/01	0.00	0.00	1.04	DRY	70	1.0	0.0115	16	78
6/21/01	0.28	0.29	0.29	**WET**	240	26.0	0.2989	77	68
7/5/01	0.33	0.51	0.51	**WET**	840	65.0	0.7471	233	72
7/19/01	0.00	0.13	0.29	DRY	220	24.5	0.2816	74	66
8/2/01	0.00	0.00	0.00	DRY	120	5.0	0.0575	29	75
8/23/01	0.69	0.69	1.36	**WET**	130	10.5	0.1207	43	67
9/13/01	0.00	0.00	0.06	DRY	280	30.5	0.3506	88	68
9/27/01	0.00	0.00	0.44	DRY	150	16.0	0.1839	55	63
6/6/02	1.42	1.64	1.64	**WET**	1750	78.0	0.8966	403	77
6/13/02	0.00	1.07	1.07	**WET**	650	59.0	0.6782	193	70
6/20/02	0.00	0.00	0.01	DRY	400	42.0	0.4828	121	70
6/27/02	0.46	0.70	0.70	**WET**	900	67.0	0.7701	249	72
7/2/02	0.00	0.00	0.00	DRY	1800	79.5	0.9138	410	77
7/11/02	0.00	0.00	0.39	DRY	390	41.0	0.4713	118	70
7/18/02	0.00	0.00	0.00	DRY	370	38.5	0.4425	110	70
7/25/02	0.00	0.00	0.45	DRY	370	38.5	0.4425	110	70
8/1/02	0.00	0.00	0.00	DRY	190	20.5	0.2356	65	66
8/8/02	0.00	0.00	0.00	DRY	3000	83.0	0.9540	410	86
8/15/02	0.00	0.00	0.00	DRY	190	20.5	0.2356	65	66
8/22/02	0.01	0.01	0.32	DRY	540	52.5	0.6034	160	70
9/5/02	0.00	1.10	5.64	**WET**	460	45.0	0.5172	131	71
9/12/02	0.00	0.00	0.00	DRY	132	12.5	0.1437	47	64
9/19/02	0.02	0.02	1.26	DRY	200	22.5	0.2586	69	65
9/26/02	0.23	0.23	0.23	**WET**	244	27.0	0.3103	80	67
5/1/03	0.07	0.07	0.11	DRY	128	8.5	0.0977	38	70
5/8/03	0.65	0.65	0.68	**WET**	1180	74.0	0.8506	328	72
5/15/03	0.00	0.00	0.00	DRY	132	12.5	0.1437	47	64
5/22/03	0.16	0.30	0.30	**WET**	180	19.0	0.2184	62	66
6/5/03	0.00	2.66	2.71	**WET**	640	58.0	0.6667	187	71
6/12/03	0.53	0.54	0.54	**WET**	440	43.5	0.5000	126	71
6/19/03	0.00	0.82	0.82	**WET**	480	47.0	0.5402	138	71
6/26/03	0.00	0.00	0.00	DRY	160	17.0	0.1954	57	64

Statistics

# Samples DRY	**52**
# Samples WET	**35**
# Samples Total	**87**
Geomean	**448**
Log std deviation	**0.4364**

Avg % Reduction

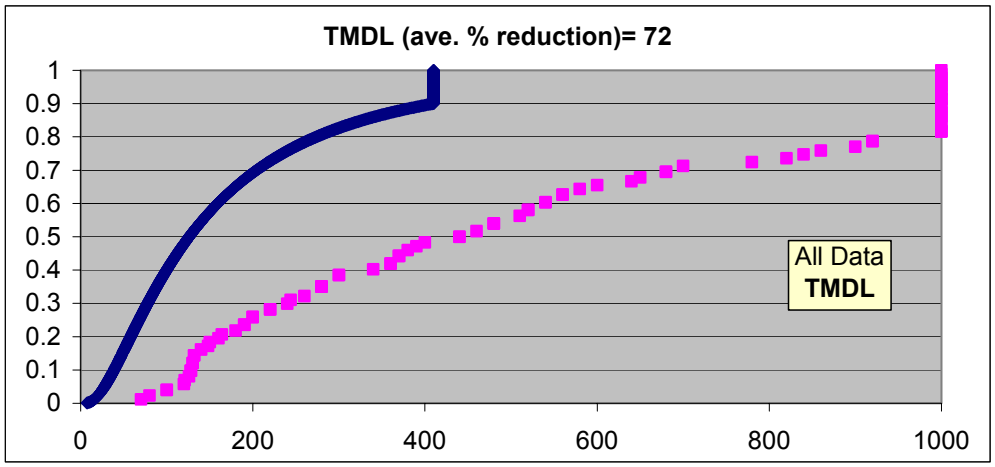
Wet (WLA)	**74**
Dry (LA)	**70**
Total (TMDL)	**72**

7/10/03	0.06	0.25	0.33	**WET**	560	54.5	0.6264	170	70
7/17/03	0.00	0.02	0.02	DRY	1000	71.0	0.8161	289	71
7/24/03	0.00	0.19	0.82	DRY	1140	73.0	0.8391	314	72
7/31/03	0.00	0.00	0.07	DRY	140	14.0	0.1609	51	64
8/7/03	0.22	0.26	1.71	**WET**	540	52.5	0.6034	160	70
8/14/03	0.00	0.00	0.44	DRY	1260	75.0	0.8621	344	73
8/28/03	0.00	0.00	0.00	DRY	280	30.5	0.3506	88	68
9/4/03	0.09	0.42	2.16	**WET**	2000	81.0	0.9310	410	80
9/11/03	0.00	0.00	0.00	DRY	520	50.5	0.5805	152	71
9/18/03	0.00	0.00	0.68	DRY	5300	86.0	0.9885	410	92
9/25/03	0.00	0.00	1.76	DRY	560	54.5	0.6264	170	70
5/6/04	0.00	0.13	0.51	DRY	126	7.0	0.0805	35	73
5/13/04	0.00	0.06	0.33	DRY	280	30.5	0.3506	88	68
5/20/04	0.00	0.01	0.02	DRY	300	33.5	0.3851	96	68
5/27/04	1.03	1.07	1.09	**WET**	2840	82.0	0.9425	410	86
6/3/04	0.00	0.48	1.06	**WET**	820	64.0	0.7356	225	73
6/10/04	0.27	0.27	0.27	**WET**	680	60.5	0.6954	202	70
6/17/04	0.31	0.31	0.40	**WET**	520	50.5	0.5805	152	71
6/24/04	0.00	0.00	0.15	DRY	600	57.0	0.6552	182	70
7/8/04	0.00	0.00	1.10	DRY	580	56.0	0.6437	177	70
7/15/04	0.00	0.05	2.77	**WET**	920	68.5	0.7874	263	71
7/22/04	0.00	0.00	0.00	DRY	700	62.0	0.7126	211	70
7/29/04	0.00	0.21	1.40	DRY	480	47.0	0.5402	138	71
8/5/04	0.87	0.93	0.93	**WET**	5700	87.0	1.0000	410	93
8/12/04	0.01	0.50	0.50	**WET**	1360	76.0	0.8736	361	73
8/19/04	0.00	0.00	1.58	DRY	260	28.0	0.3218	82	68
8/26/04	0.00	0.00	0.00	DRY	480	47.0	0.5402	138	71
9/9/04	0.19	4.09	4.09	**WET**	3200	84.0	0.9655	410	87
9/16/04	0.00	0.08	0.08	DRY	1000	71.0	0.8161	289	71
9/23/04	0.00	0.00	0.00	DRY	680	60.5	0.6954	202	70
9/30/04	0.04	1.13	3.05	**WET**	1600	77.0	0.8851	381	76

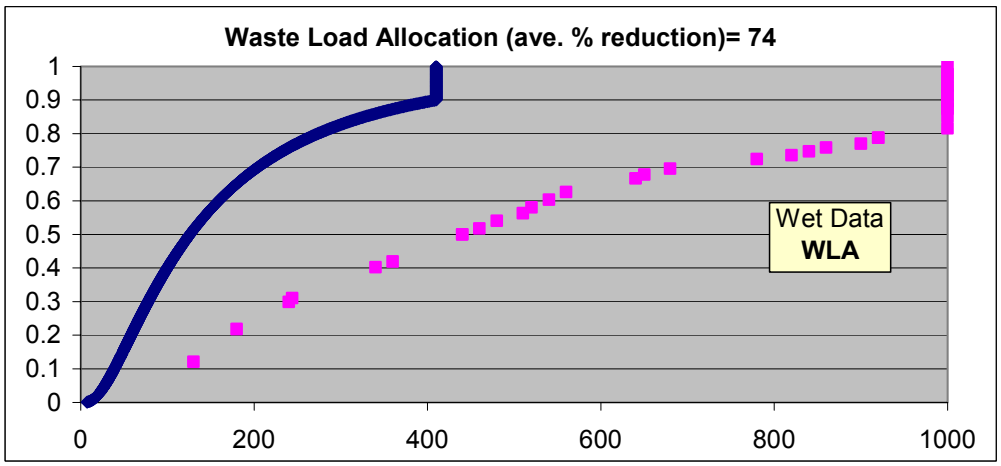
Precipitation and E. coli data provided by the Norwalk Department of Health and Haborwatch/Riverwatch, respectively.
WET Condition defined as greater than 0.1" precipitation in 24 hours or 0.25" precipitation in 48 hours, or 2.0" precipitation in 96 hours.

Norwalk River Criteria Curve for Monitoring Site 435

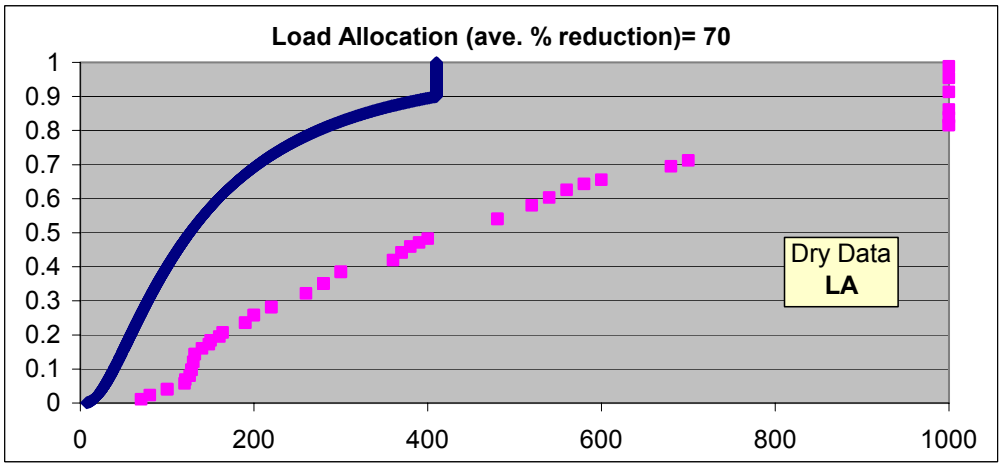
y axis = cumulative frequency; x axis = E.coli (col/100mL)



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



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



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

Norwalk River

CT7300-00_01

Data Used in the Analysis

Monitoring Site: 704, upstream Glover Avenue

Date	Precip.(in)[1]			Condition[2]	E. coli	Rank	Proportion	Criteria	%
	24h	48h	96h	(WET/DRY)	(col./100 ml)			Value	Reduction
5/4/00	0.00	0.00	0.12	DRY	80	1.0	0.0116	16	81
5/11/00	0.03	0.32	0.36	**WET**	390	34.0	0.3953	99	75
5/18/00	0.54	0.54	0.54	**WET**	2080	82.0	0.9535	410	80
5/25/00	0.04	1.17	1.32	**WET**	400	35.0	0.4070	101	75
6/1/00	0.00	0.00	0.00	DRY	150	5.0	0.0581	30	80
6/8/00	0.00	0.40	3.23	**WET**	600	52.0	0.6047	161	73
6/15/00	0.00	0.01	0.08	DRY	110	2.0	0.0233	20	82
6/22/00	0.05	0.05	0.06	DRY	220	11.5	0.1337	45	79
6/29/00	0.01	0.03	0.36	DRY	340	28.5	0.3314	84	75
7/6/00	0.00	0.00	0.10	DRY	440	38.5	0.4477	112	75
7/13/00	0.00	0.00	0.07	DRY	184	8.0	0.0930	37	80
7/20/00	0.00	0.06	0.06	DRY	760	60.0	0.6977	203	73
7/27/00	0.64	3.32	3.32	**WET**	4700	84.0	0.9767	410	91
8/1/00	0.70	1.01	1.69	**WET**	1400	78.0	0.9070	410	71
8/3/00	0.73	0.78	1.79	**WET**	1200	74.5	0.8663	350	71
8/17/00	0.00	0.11	0.86	DRY	310	23.0	0.2674	71	77
8/24/00	0.00	0.21	0.21	DRY	370	31.5	0.3663	92	75
8/31/00	0.00	0.00	0.00	DRY	500	45.5	0.5291	135	73
9/7/00	0.00	0.00	0.01	DRY	440	38.5	0.4477	112	75
9/14/00	0.00	0.78	0.78	**WET**	1140	73.0	0.8488	326	71
9/21/00	0.00	0.00	2.21	**WET**	640	53.0	0.6163	165	74
9/28/00	0.00	0.00	0.49	DRY	112	3.0	0.0349	24	79
5/10/01	0.00	0.00	0.00	DRY	500	45.5	0.5291	135	73
5/24/01	0.06	0.51	1.86	**WET**	700	57.0	0.6628	186	73
6/5/01	0.00	0.00	1.04	DRY	260	15.0	0.1744	53	80
6/21/01	0.28	0.29	0.29	**WET**	320	25.0	0.2907	76	76
7/5/01	0.33	0.51	0.51	**WET**	1500	79.0	0.9186	410	73
7/19/01	0.00	0.13	0.29	DRY	580	51.0	0.5930	156	73
8/2/01	0.00	0.00	0.00	DRY	1300	76.0	0.8837	378	71
8/23/01	0.69	0.69	1.36	**WET**	330	27.0	0.3140	81	76
9/13/01	0.00	0.00	0.06	DRY	500	45.5	0.5291	135	73
9/27/01	0.00	0.00	0.44	DRY	270	17.0	0.1977	58	79
6/6/02	1.42	1.64	1.64	**WET**	800	62.5	0.7267	220	73
6/13/02	0.00	1.07	1.07	**WET**	1200	74.5	0.8663	350	71
6/20/02	0.00	0.00	0.01	DRY	170	7.0	0.0814	35	80
6/27/02	0.46	0.70	0.70	**WET**	510	48.0	0.5581	144	72
7/2/02	0.00	0.00	0.00	DRY	270	17.0	0.1977	58	79
7/11/02	0.00	0.00	0.39	DRY	270	17.0	0.1977	58	79
7/18/02	0.00	0.00	0.00	DRY	230	13.0	0.1512	49	79
7/25/02	0.00	0.00	0.45	DRY	370	31.5	0.3663	92	75
8/1/02	0.00	0.00	0.00	DRY	380	33.0	0.3837	96	75
8/8/02	0.00	0.00	0.00	DRY	320	25.0	0.2907	76	76
8/15/02	0.00	0.00	0.00	DRY	940	69.5	0.8081	281	70
8/22/02	0.01	0.01	0.32	DRY	800	62.5	0.7267	220	73
9/5/02	0.00	1.10	5.64	**WET**	320	25.0	0.2907	76	76
9/12/02	0.00	0.00	0.00	DRY	700	57.0	0.6628	186	73
9/19/02	0.02	0.02	1.26	DRY	280	20.0	0.2326	64	77
9/26/02	0.23	0.23	0.23	**WET**	440	38.5	0.4477	112	75
5/1/03	0.07	0.07	0.11	DRY	520	49.5	0.5756	150	71
5/8/03	0.65	0.65	0.68	**WET**	820	64.5	0.7500	235	71
5/15/03	0.00	0.00	0.00	DRY	200	10.0	0.1163	42	79
5/22/03	0.16	0.30	0.30	**WET**	480	42.5	0.4942	124	74
6/5/03	0.00	2.66	2.71	**WET**	300	22.0	0.2558	69	77
6/12/03	0.53	0.54	0.54	**WET**	280	20.0	0.2326	64	77
6/19/03	0.00	0.82	0.82	**WET**	220	11.5	0.1337	45	79
6/26/03	0.00	0.00	0.00	DRY	192	9.0	0.1047	40	79

Statistics

# Samples DRY	**51**
# Samples WET	**35**
# Samples Total	**86**
Geomean	**518**
Log std deviation	**0.3635**

Avg % Reduction

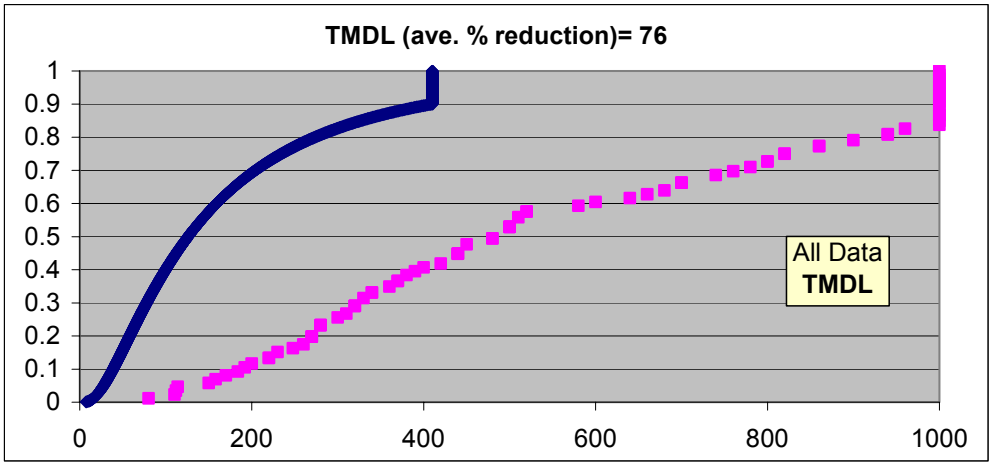
Wet (WLA)	**76**
Dry (LA)	**76**
Total (TMDL)	**76**

7/10/03	0.06	0.25	0.33	**WET**	1920	81.0	0.9419	410	79
7/17/03	0.00	0.02	0.02	DRY	1700	80.0	0.9302	410	76
7/31/03	0.00	0.00	0.07	DRY	360	30.0	0.3488	88	76
8/7/03	0.22	0.26	1.71	**WET**	450	41.0	0.4767	119	73
8/14/03	0.00	0.00	0.44	DRY	860	66.5	0.7733	251	71
8/28/03	0.00	0.00	0.00	DRY	520	49.5	0.5756	150	71
9/4/03	0.09	0.42	2.16	**WET**	2200	83.0	0.9651	410	81
9/11/03	0.00	0.00	0.00	DRY	660	54.0	0.6279	170	74
9/18/03	0.00	0.00	0.68	DRY	440	38.5	0.4477	112	75
9/25/03	0.00	0.00	1.76	DRY	280	20.0	0.2326	64	77
5/6/04	0.00	0.13	0.51	DRY	114	4.0	0.0465	27	76
5/13/04	0.00	0.06	0.33	DRY	158	6.0	0.0698	32	80
5/20/04	0.00	0.01	0.02	DRY	340	28.5	0.3314	84	75
5/27/04	1.03	1.07	1.09	**WET**	960	71.0	0.8256	299	69
6/3/04	0.00	0.48	1.06	**WET**	680	55.0	0.6395	175	74
6/10/04	0.27	0.27	0.27	**WET**	740	59.0	0.6860	197	73
6/17/04	0.31	0.31	0.40	**WET**	780	61.0	0.7093	209	73
6/24/04	0.00	0.00	0.15	DRY	480	42.5	0.4942	124	74
7/8/04	0.00	0.00	1.10	DRY	860	66.5	0.7733	251	71
7/15/04	0.00	0.05	2.77	**WET**	1320	77.0	0.8953	400	70
7/22/04	0.00	0.00	0.00	DRY	940	69.5	0.8081	281	70
7/29/04	0.00	0.21	1.40	DRY	700	57.0	0.6628	186	73
8/5/04	0.87	0.93	0.93	**WET**	5600	85.0	0.9884	410	93
8/12/04	0.01	0.50	0.50	**WET**	900	68.0	0.7907	265	71
8/19/04	0.00	0.00	1.58	DRY	820	64.5	0.7500	235	71
8/26/04	0.00	0.00	0.00	DRY	500	45.5	0.5291	135	73
9/9/04	0.19	4.09	4.09	**WET**	6000	86.0	1.0000	410	93
9/16/04	0.00	0.08	0.08	DRY	420	36.0	0.4186	104	75
9/23/04	0.00	0.00	0.00	DRY	248	14.0	0.1628	51	79
9/30/04	0.04	1.13	3.05	**WET**	1060	72.0	0.8372	312	71

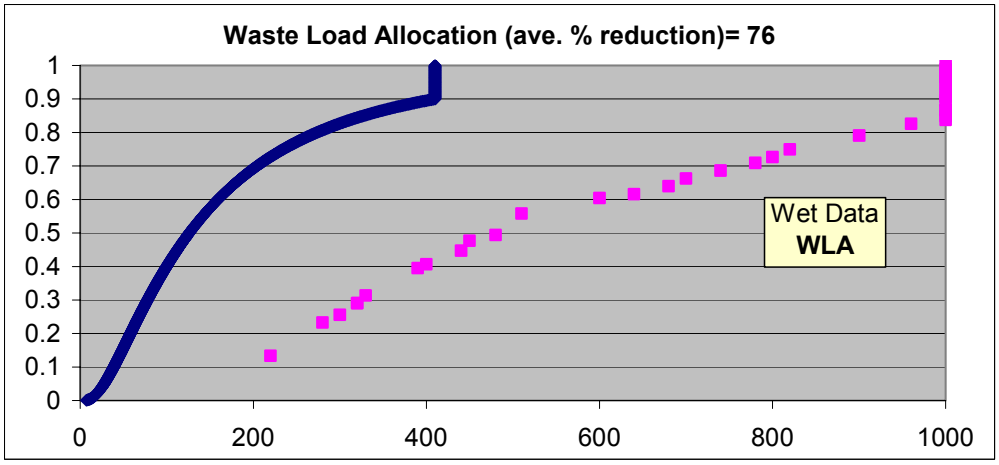
Precipitation and E. coli data provided by the Norwalk Department of Health and Haborwatch/Riverwatch, respectively.
WET Condition defined as greater than 0.1" precipitation in 24 hours or 0.25" precipitation in 48 hours, or 2.0" precipitation in 96 hours.

Norwalk River Criteria Curve for Monitoring Site 704

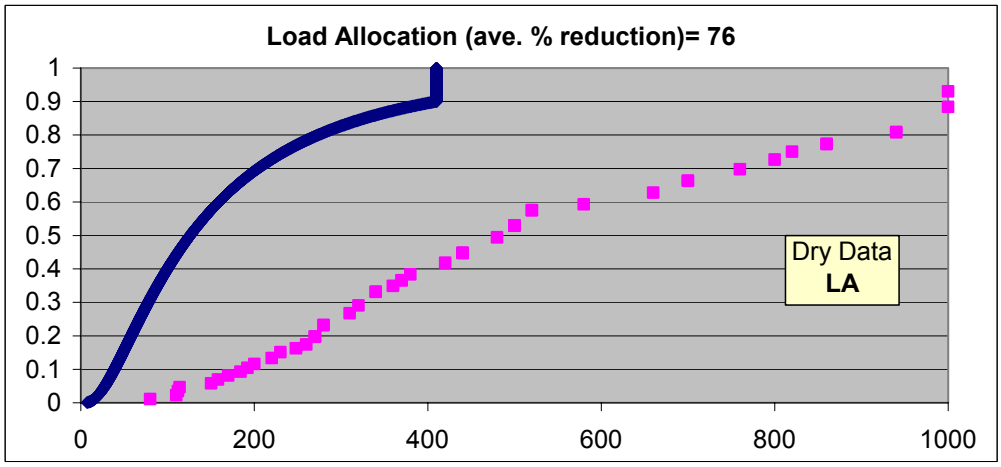
y axis = cumulative frequency; x axis = E.coli (col/100mL)



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



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



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

Norwalk River

CT7300-00_01

Data Used in the Analysis

Monitoring Site: 990, upstream Wolfpit Road at Wilton Corporate Office Park

Date	Precip.(in)[1]			Condition[2]	E. coli	Rank	Proportion	Criteria	%
	24h	48h	96h	(WET/DRY)	(col./100 ml)			Value	Reduction
5/4/00	0.00	0.00	0.12	DRY	23	1.0	0.0115	16	33
5/11/00	0.03	0.32	0.36	**WET**	320	50.0	0.5747	150	53
5/18/00	0.54	0.54	0.54	**WET**	1300	81.0	0.9310	410	68
5/25/00	0.04	1.17	1.32	**WET**	160	19.0	0.2184	62	62
6/1/00	0.00	0.00	0.00	DRY	400	58.0	0.6667	187	53
6/8/00	0.00	0.40	3.23	**WET**	800	74.5	0.8563	336	58
6/15/00	0.00	0.01	0.08	DRY	132	14.0	0.1609	51	62
6/22/00	0.05	0.05	0.06	DRY	204	33.5	0.3851	96	53
6/29/00	0.01	0.03	0.36	DRY	240	40.0	0.4598	115	52
7/6/00	0.00	0.00	0.10	DRY	160	19.0	0.2184	62	62
7/13/00	0.00	0.00	0.07	DRY	200	30.0	0.3448	87	56
7/20/00	0.00	0.06	0.06	DRY	176	24.5	0.2816	74	58
7/27/00	0.64	3.32	3.32	**WET**	1600	84.0	0.9655	410	74
8/1/00	0.73	0.78	1.79	**WET**	576	71.0	0.8161	289	50
8/3/00	0.70	1.01	1.69	**WET**	100000	87.0	1.0000	410	100
8/17/00	0.00	0.11	0.86	DRY	260	44.0	0.5057	128	51
8/24/00	0.00	0.21	0.21	DRY	220	36.5	0.4195	105	52
8/31/00	0.00	0.00	0.00	DRY	192	27.0	0.3103	80	58
9/7/00	0.00	0.00	0.01	DRY	224	38.0	0.4368	109	51
9/14/00	0.00	0.78	0.78	**WET**	300	48.5	0.5575	144	52
9/21/00	0.00	0.00	2.21	**WET**	460	62.5	0.7184	215	53
9/28/00	0.00	0.00	0.49	DRY	104	11.0	0.1264	44	58
5/10/01	0.00	0.00	0.00	DRY	240	40.0	0.4598	115	52
5/24/01	0.06	0.51	1.86	**WET**	560	70.0	0.8046	278	50
6/5/01	0.00	0.00	1.04	DRY	240	40.0	0.4598	115	52
6/21/01	0.28	0.29	0.29	**WET**	290	47.0	0.5402	138	52
7/5/01	0.33	0.51	0.51	**WET**	370	53.0	0.6092	163	56
7/19/01	0.00	0.13	0.29	DRY	250	42.0	0.4828	121	52
8/2/01	0.00	0.00	0.00	DRY	260	44.0	0.5057	128	51
8/23/01	0.69	0.69	1.36	**WET**	260	44.0	0.5057	128	51
9/13/01	0.00	0.00	0.06	DRY	200	30.0	0.3448	87	56
9/27/01	0.00	0.00	0.44	DRY	180	26.0	0.2989	77	57
6/6/02	1.42	1.64	1.64	**WET**	470	64.0	0.7356	225	52
6/13/02	0.00	1.07	1.07	**WET**	920	79.0	0.9080	410	55
6/20/02	0.00	0.00	0.01	DRY	100	10.0	0.1149	42	58
6/27/02	0.46	0.70	0.70	**WET**	380	54.5	0.6264	170	55
7/2/02	0.00	0.00	0.00	DRY	500	66.0	0.7586	240	52
7/11/02	0.00	0.00	0.39	DRY	380	54.5	0.6264	170	55
7/18/02	0.00	0.00	0.00	DRY	216	35.0	0.4023	100	54
7/25/02	0.00	0.00	0.45	DRY	176	24.5	0.2816	74	58
8/1/02	0.00	0.00	0.00	DRY	400	58.0	0.6667	187	53
8/8/02	0.00	0.00	0.00	DRY	640	73.0	0.8391	314	51
8/15/02	0.00	0.00	0.00	DRY	96	9.0	0.1034	39	59
8/22/02	0.01	0.01	0.32	DRY	400	58.0	0.6667	187	53
9/5/02	0.00	1.10	5.64	**WET**	142	15.0	0.1724	53	63
9/12/02	0.00	0.00	0.00	DRY	108	12.0	0.1379	46	57
9/19/02	0.02	0.02	1.26	DRY	88	7.5	0.0862	36	59
9/26/02	0.23	0.23	0.23	**WET**	60	2.0	0.0230	20	67
5/1/03	0.07	0.07	0.11	DRY	76	5.0	0.0575	29	61
5/8/03	0.65	0.65	0.68	**WET**	480	65.0	0.7471	233	52
5/15/03	0.00	0.00	0.00	DRY	88	7.5	0.0862	36	59
5/22/03	0.16	0.30	0.30	**WET**	166	22.0	0.2529	68	59
6/5/03	0.00	2.66	2.71	**WET**	200	30.0	0.3448	87	56
6/12/03	0.53	0.54	0.54	**WET**	82	6.0	0.0690	32	61
6/19/03	0.00	0.82	0.82	**WET**	300	48.5	0.5575	144	52
6/26/03	0.00	0.00	0.00	DRY	64	3.0	0.0345	24	63

Statistics

# Samples DRY	**52**
# Samples WET	**35**
# Samples Total	**87**
Geomean	**311**
Log std deviation	**0.4768**

Avg % Reduction

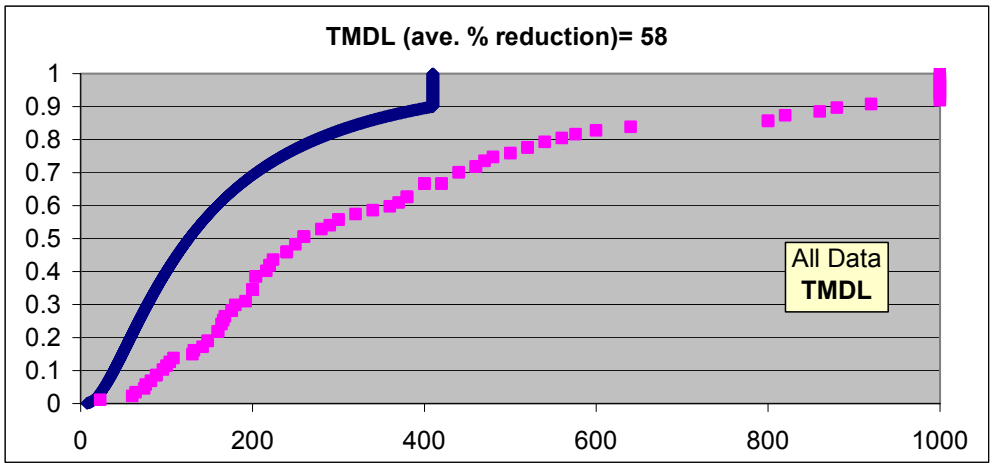
Wet (WLA)	**60**
Dry (LA)	**56**
Total (TMDL)	**58**

7/10/03	0.06	0.25	0.33	**WET**	280	46.0	0.5287	135	52
7/17/03	0.00	0.02	0.02	DRY	1500	82.0	0.9425	410	73
7/24/03	0.00	0.19	0.82	DRY	540	69.0	0.7931	267	50
7/31/03	0.00	0.00	0.07	DRY	164	21.0	0.2414	66	60
8/7/03	0.22	0.26	1.71	**WET**	160	19.0	0.2184	62	62
8/14/03	0.00	0.00	0.44	DRY	880	78.0	0.8966	403	54
8/28/03	0.00	0.00	0.00	DRY	148	16.5	0.1897	56	62
9/4/03	0.09	0.42	2.16	**WET**	800	74.5	0.8563	336	58
9/11/03	0.00	0.00	0.00	DRY	148	16.5	0.1897	56	62
9/18/03	0.00	0.00	0.68	DRY	220	36.5	0.4195	105	52
9/25/03	0.00	0.00	1.76	DRY	200	30.0	0.3448	87	56
5/6/04	0.00	0.13	0.51	DRY	74	4.0	0.0460	27	64
5/13/04	0.00	0.06	0.33	DRY	130	13.0	0.1494	48	63
5/20/04	0.00	0.01	0.02	DRY	340	51.0	0.5862	154	55
5/27/04	1.03	1.07	1.09	**WET**	860	77.0	0.8851	381	56
6/3/04	0.00	0.48	1.06	**WET**	520	67.5	0.7759	253	51
6/10/04	0.27	0.27	0.27	**WET**	420	58.0	0.6667	187	55
6/17/04	0.31	0.31	0.40	**WET**	460	62.5	0.7184	215	53
6/24/04	0.00	0.00	0.15	DRY	600	72.0	0.8276	301	50
7/8/04	0.00	0.00	1.10	DRY	440	61.0	0.7011	205	53
7/15/04	0.00	0.05	2.77	**WET**	520	67.5	0.7759	253	51
7/22/04	0.00	0.00	0.00	DRY	820	76.0	0.8736	361	56
7/29/04	0.00	0.21	1.40	DRY	360	52.0	0.5977	158	56
8/5/04	0.87	0.93	0.93	**WET**	3100	85.0	0.9770	410	87
8/12/04	0.01	0.50	0.50	**WET**	1580	83.0	0.9540	410	74
8/19/04	0.00	0.00	1.58	DRY	200	30.0	0.3448	87	56
8/26/04	0.00	0.00	0.00	DRY	168	23.0	0.2644	71	58
9/9/04	0.19	4.09	4.09	**WET**	5800	86.0	0.9885	410	93
9/16/04	0.00	0.08	0.08	DRY	420	58.0	0.6667	187	55
9/23/04	0.00	0.00	0.00	DRY	204	33.5	0.3851	96	53
9/30/04	0.04	1.13	3.05	**WET**	1060	80.0	0.9195	410	61

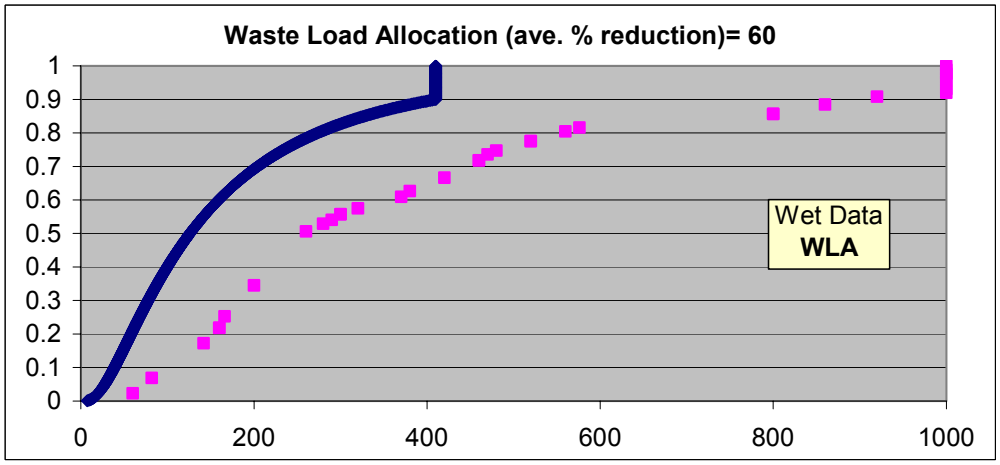
Precipitation and E. coli data provided by the Norwalk Department of Health and Haborwatch/Riverwatch, respectively.
WET Condition defined as greater than 0.1" precipitation in 24 hours or 0.25" precipitation in 48 hours, or 2.0" precipitation in 96 hours.

Norwalk River Criteria Curve for Monitoring Site 990

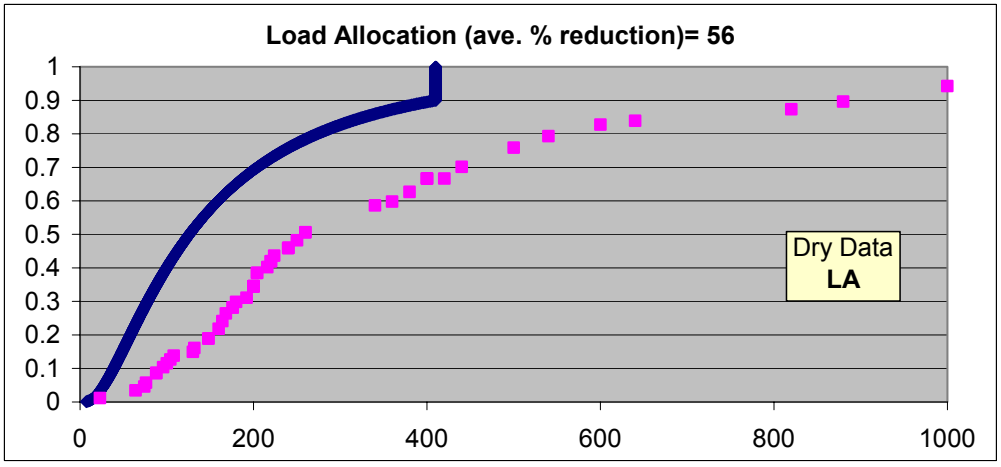
y axis = cumulative frequency; x axis = E.coli (col/100mL)



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



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



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

Norwalk River

CT7300-00_02

Data Used in the Analysis

Monitoring Site: 244, downstream School Road at YMCA

Date	Precip.(in)[1]			Condition[2]	E. coli	Rank	Proportion	Criteria	%
	24h	48h	96h	(WET/DRY)	(col./100 ml)			Value	Reduction
5/4/00	0.00	0.00	0.12	DRY	250	57.0	0.6552	182	27
5/11/00	0.03	0.32	0.36	**WET**	470	74.0	0.8506	328	30
5/18/00	0.54	0.54	0.54	**WET**	640	78.5	0.9023	415	35
5/25/00	0.04	1.17	1.32	**WET**	106	20.0	0.2299	64	40
6/1/00	0.00	0.00	0.00	DRY	74	10.0	0.1149	42	44
6/8/00	0.00	0.40	3.23	**WET**	980	81.0	0.9310	494	50
6/15/00	0.00	0.01	0.08	DRY	76	11.0	0.1264	44	42
6/22/00	0.05	0.05	0.06	DRY	236	54.0	0.6207	167	29
6/29/00	0.01	0.03	0.36	DRY	1460	84.0	0.9655	576	61
7/6/00	0.00	0.00	0.10	DRY	156	35.0	0.4023	100	36
7/13/00	0.00	0.00	0.07	DRY	60	6.5	0.0747	33	44
7/20/00	0.00	0.06	0.06	DRY	108	21.0	0.2414	66	39
7/27/00	0.64	3.32	3.32	**WET**	1480	85.0	0.9770	576	61
8/1/00	0.73	0.78	1.79	**WET**	900	80.0	0.9195	458	49
8/3/00	0.70	1.01	1.69	**WET**	210	48.0	0.5517	142	32
8/17/00	0.00	0.11	0.86	DRY	160	36.0	0.4138	103	36
8/24/00	0.00	0.21	0.21	DRY	360	67.5	0.7759	253	30
8/31/00	0.00	0.00	0.00	DRY	300	63.0	0.7241	218	27
9/7/00	0.00	0.00	0.01	DRY	92	14.0	0.1609	51	45
9/14/00	0.00	0.78	0.78	**WET**	540	77.0	0.8851	381	29
9/21/00	0.00	0.00	2.21	**WET**	420	71.0	0.8161	289	31
9/28/00	0.00	0.00	0.49	DRY	90	12.0	0.1379	46	49
5/10/01	0.00	0.00	0.00	DRY	56	5.0	0.0575	29	47
5/24/01	0.06	0.51	1.86	**WET**	280	60.0	0.6897	199	29
6/5/01	0.00	0.00	1.04	DRY	164	38.0	0.4368	109	34
6/21/01	0.28	0.29	0.29	**WET**	168	40.5	0.4655	116	31
7/5/01	0.33	0.51	0.51	**WET**	440	72.5	0.8333	307	30
7/19/01	0.00	0.13	0.29	DRY	164	38.0	0.4368	109	34
8/2/01	0.00	0.00	0.00	DRY	128	27.0	0.3103	80	38
8/23/01	0.69	0.69	1.36	**WET**	330	66.0	0.7586	240	27
9/13/01	0.00	0.00	0.06	DRY	150	34.0	0.3908	98	35
9/27/01	0.00	0.00	0.44	DRY	220	51.0	0.5862	154	30
6/6/02	1.42	1.64	1.64	**WET**	380	69.0	0.7931	267	30
6/13/02	0.00	1.07	1.07	**WET**	480	75.0	0.8621	344	28
6/20/02	0.00	0.00	0.01	DRY	100	18.0	0.2069	59	41
6/27/02	0.46	0.70	0.70	**WET**	224	52.0	0.5977	158	29
7/2/02	0.00	0.00	0.00	DRY	96	16.0	0.1839	55	43
7/11/02	0.00	0.00	0.39	DRY	168	40.5	0.4655	116	31
7/18/02	0.00	0.00	0.00	DRY	120	23.5	0.2701	72	40
7/25/02	0.00	0.00	0.45	DRY	232	53.0	0.6092	163	30
8/1/02	0.00	0.00	0.00	DRY	40	2.0	0.0230	20	50
8/8/02	0.00	0.00	0.00	DRY	72	9.0	0.1034	39	45
8/15/02	0.00	0.00	0.00	DRY	92	14.0	0.1609	51	45
8/22/02	0.01	0.01	0.32	DRY	164	38.0	0.4368	109	34
9/5/02	0.00	1.10	5.64	**WET**	144	30.0	0.3448	87	39
9/12/02	0.00	0.00	0.00	DRY	280	60.0	0.6897	199	29
9/19/02	0.02	0.02	1.26	DRY	144	30.0	0.3448	87	39
9/26/02	0.23	0.23	0.23	**WET**	92	14.0	0.1609	51	45
5/1/03	0.07	0.07	0.11	DRY	60	6.5	0.0747	33	44
5/8/03	0.65	0.65	0.68	**WET**	440	72.5	0.8333	307	30
5/15/03	0.00	0.00	0.00	DRY	54	4.0	0.0460	27	51
5/22/03	0.16	0.30	0.30	**WET**	126	26.0	0.2989	77	38
6/5/03	0.00	2.66	2.71	**WET**	280	60.0	0.6897	199	29
6/12/03	0.53	0.54	0.54	**WET**	100	18.0	0.2069	59	41
6/19/03	0.00	0.82	0.82	**WET**	200	45.5	0.5230	133	34
6/26/03	0.00	0.00	0.00	DRY	46	3.0	0.0345	24	49
7/10/03	0.06	0.25	0.33	**WET**	100	18.0	0.2069	59	41
7/17/03	0.00	0.02	0.02	DRY	640	78.5	0.9023	415	35

Statistics

# Samples DRY	**52**
# Samples WET	**35**
# Samples Total	**87**
Geomean	**210**
Log std deviation	**0.4055**

Avg % Reduction

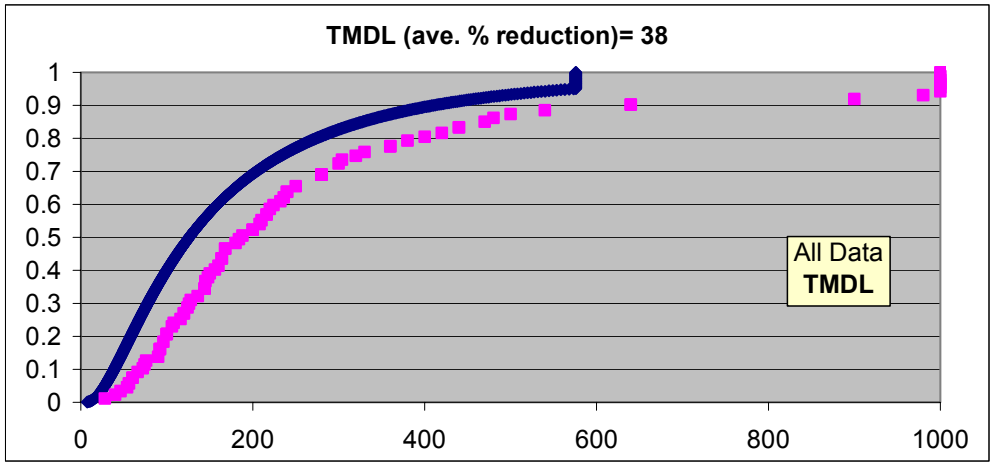
Wet (WLA)	**38**
Dry (LA)	**38**
Total (TMDL)	**38**

7/24/03	0.00	0.19	0.82	DRY	180	42.0	0.4828	121	33
7/31/03	0.00	0.00	0.07	DRY	116	22.0	0.2529	68	41
8/7/03	0.22	0.26	1.71	**WET**	144	30.0	0.3448	87	39
8/14/03	0.00	0.00	0.44	DRY	280	60.0	0.6897	199	29
8/28/03	0.00	0.00	0.00	DRY	200	45.5	0.5230	133	34
9/4/03	0.09	0.42	2.16	**WET**	500	76.0	0.8736	361	28
9/11/03	0.00	0.00	0.00	DRY	208	47.0	0.5402	138	34
9/18/03	0.00	0.00	0.68	DRY	184	43.0	0.4943	124	32
9/25/03	0.00	0.00	1.76	DRY	188	44.0	0.5057	128	32
5/6/04	0.00	0.13	0.51	DRY	28	1.0	0.0115	16	45
5/13/04	0.00	0.06	0.33	DRY	66	8.0	0.0920	37	44
5/20/04	0.00	0.01	0.02	DRY	136	28.0	0.3218	82	39
5/27/04	1.03	1.07	1.09	**WET**	360	67.5	0.7759	253	30
6/3/04	0.00	0.48	1.06	**WET**	304	64.0	0.7356	225	26
6/10/04	0.27	0.27	0.27	**WET**	216	49.5	0.5690	148	32
6/17/04	0.31	0.31	0.40	**WET**	240	55.5	0.6379	174	27
6/24/04	0.00	0.00	0.15	DRY	216	49.5	0.5690	148	32
7/8/04	0.00	0.00	1.10	DRY	240	55.5	0.6379	174	27
7/15/04	0.00	0.05	2.77	**WET**	400	70.0	0.8046	278	31
7/22/04	0.00	0.00	0.00	DRY	124	25.0	0.2874	75	39
7/29/04	0.00	0.21	1.40	DRY	320	65.0	0.7471	233	27
8/5/04	0.87	0.93	0.93	**WET**	3500	86.0	0.9885	576	84
8/12/04	0.01	0.50	0.50	**WET**	1260	83.0	0.9540	576	54
8/19/04	0.00	0.00	1.58	DRY	280	60.0	0.6897	199	29
8/26/04	0.00	0.00	0.00	DRY	120	23.5	0.2701	72	40
9/9/04	0.19	4.09	4.09	**WET**	5100	87.0	1.0000	576	89
9/16/04	0.00	0.08	0.08	DRY	145	32.0	0.3678	92	36
9/23/04	0.00	0.00	0.00	DRY	148	33.0	0.3793	95	36
9/30/04	0.04	1.13	3.05	**WET**	1000	82.0	0.9425	538	46

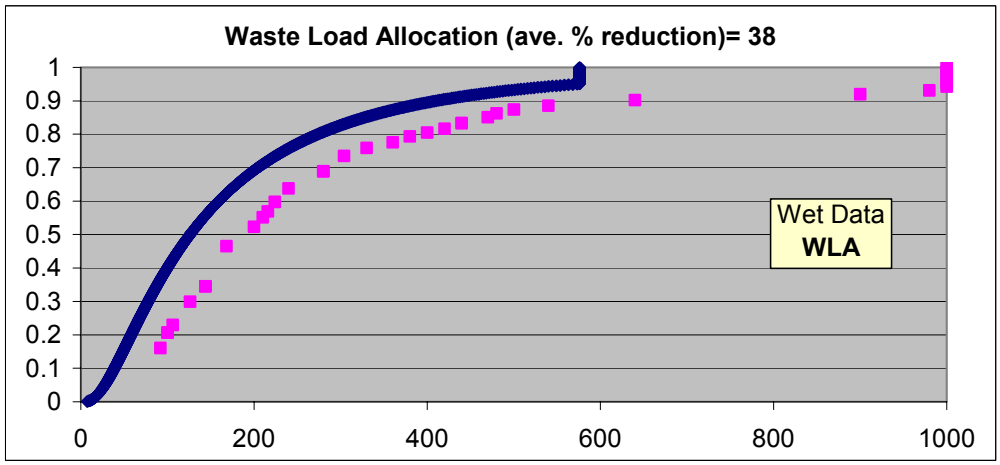
Precipitation and E. coli data provided by the Norwalk Department of Health and Haborwatch/Riverwatch, respectively.
WET Condition defined as greater than 0.1" precipitation in 24 hours or 0.25" precipitation in 48 hours, or 2.0" precipitation in 96 hours.

Norwalk River Criteria Curve for Monitoring Site 244

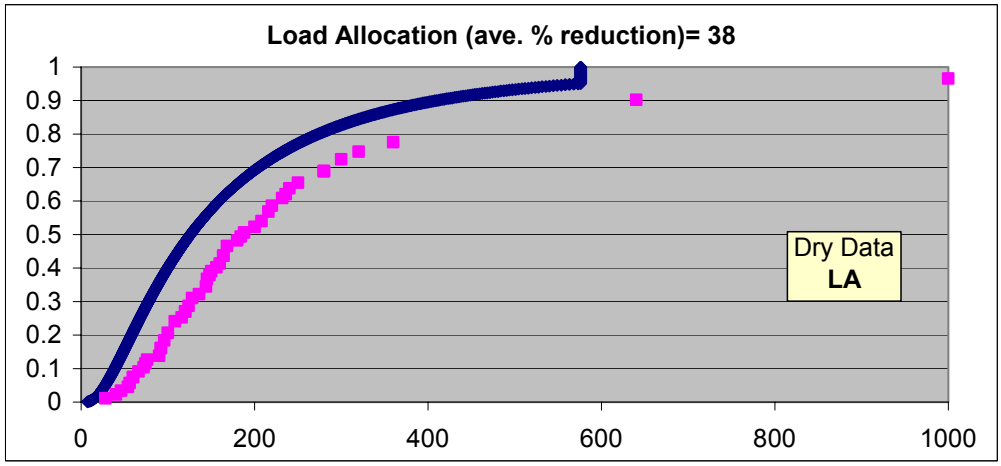
y axis = cumulative frequency; x axis = *E.coli* (col/100mL)



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



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



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

Norwalk River

CT7300-00_03

Data Used in the Analysis

Monitoring Site: 241, downstream of the Georgetown Wastewater Treatment Plant, upstream Old Mill Rd

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
5/4/00	0.00	0.00	0.12	DRY	39	7.0	0.0805	35	11
5/11/00	0.03	0.32	0.36	**WET**	270	72.5	0.8333	307	0
5/18/00	0.54	0.54	0.54	**WET**	80	30.5	0.3506	88	0
5/25/00	0.04	1.17	1.32	**WET**	112	47.0	0.5402	138	0
6/1/00	0.00	0.00	0.00	DRY	44	8.0	0.0920	37	16
6/8/00	0.00	0.40	3.23	**WET**	1980	86.0	0.9885	576	71
6/15/00	0.00	0.01	0.08	DRY	90	38.0	0.4368	109	0
6/22/00	0.05	0.05	0.06	DRY	172	66.0	0.7586	240	0
6/29/00	0.01	0.03	0.36	DRY	220	68.5	0.7874	263	0
7/6/00	0.00	0.00	0.10	DRY	60	19.5	0.2241	63	0
7/13/00	0.00	0.00	0.07	DRY	68	22.0	0.2529	68	0
7/20/00	0.00	0.06	0.06	DRY	76	27.5	0.3161	81	0
7/27/00	0.64	3.32	3.32	**WET**	1320	85.0	0.9770	576	56
8/1/00	0.73	0.78	1.79	**WET**	270	72.5	0.8333	307	0
8/3/00	0.70	1.01	1.69	**WET**	160	63.0	0.7241	218	0
8/17/00	0.00	0.11	0.86	DRY	160	63.0	0.7241	218	0
8/24/00	0.00	0.21	0.21	DRY	130	55.0	0.6322	172	0
8/31/00	0.00	0.00	0.00	DRY	116	49.0	0.5632	146	0
9/7/00	0.00	0.00	0.01	DRY	52	14.0	0.1609	51	3
9/14/00	0.00	0.78	0.78	**WET**	160	63.0	0.7241	218	0
9/21/00	0.00	0.00	2.21	**WET**	460	81.0	0.9310	494	0
9/28/00	0.00	0.00	0.49	DRY	56	18.0	0.2069	59	0
5/10/01	0.00	0.00	0.00	DRY	72	23.5	0.2701	72	0
5/24/01	0.06	0.51	1.86	**WET**	380	79.0	0.9080	428	0
6/5/01	0.00	0.00	1.04	DRY	84	33.5	0.3851	96	0
6/21/01	0.28	0.29	0.29	**WET**	120	51.5	0.5920	156	0
7/5/01	0.33	0.51	0.51	**WET**	240	70.0	0.8046	278	0
7/19/01	0.00	0.13	0.29	DRY	88	36.5	0.4195	105	0
8/2/01	0.00	0.00	0.00	DRY	108	46.0	0.5287	135	0
8/23/01	0.69	0.69	1.36	**WET**	300	76.0	0.8736	361	0
9/13/01	0.00	0.00	0.06	DRY	72	23.5	0.2701	72	0
9/27/01	0.00	0.00	0.44	DRY	80	30.5	0.3506	88	0
6/6/02	1.42	1.64	1.64	**WET**	120	51.5	0.5920	156	0
6/13/02	0.00	1.07	1.07	**WET**	340	78.0	0.8966	403	0
6/20/02	0.00	0.00	0.01	DRY	84	33.5	0.3851	96	0
6/27/02	0.46	0.70	0.70	**WET**	148	59.5	0.6839	196	0
7/2/02	0.00	0.00	0.00	DRY	84	33.5	0.3851	96	0
7/11/02	0.00	0.00	0.39	DRY	52	14.0	0.1609	51	3
7/18/02	0.00	0.00	0.00	DRY	52	14.0	0.1609	51	3
7/25/02	0.00	0.00	0.45	DRY	132	56.0	0.6437	177	0
8/1/02	0.00	0.00	0.00	DRY	32	3.5	0.0402	25	21
8/8/02	0.00	0.00	0.00	DRY	148	59.5	0.6839	196	0
8/15/02	0.00	0.00	0.00	DRY	32	3.5	0.0402	25	21
8/22/02	0.01	0.01	0.32	DRY	100	43.0	0.4943	124	0
9/5/02	0.00	1.10	5.64	**WET**	128	54.0	0.6207	167	0
9/12/02	0.00	0.00	0.00	DRY	52	14.0	0.1609	51	3
9/19/02	0.02	0.02	1.26	DRY	48	10.0	0.1149	42	13
9/26/02	0.23	0.23	0.23	**WET**	27	2.0	0.0230	20	26
5/1/03	0.07	0.07	0.11	DRY	12	1.0	0.0115	16	0
5/8/03	0.65	0.65	0.68	**WET**	300	76.0	0.8736	361	0
5/15/03	0.00	0.00	0.00	DRY	34	5.0	0.0575	29	13
5/22/03	0.16	0.30	0.30	**WET**	54	17.0	0.1954	57	0
6/5/03	0.00	2.66	2.71	**WET**	430	80.0	0.9195	458	0
6/12/03	0.53	0.54	0.54	**WET**	96	41.5	0.4770	119	0
6/19/03	0.00	0.82	0.82	**WET**	260	71.0	0.8161	289	0
6/26/03	0.00	0.00	0.00	DRY	104	44.5	0.5115	129	0
7/10/03	0.06	0.25	0.33	**WET**	74	25.0	0.2874	75	0
7/17/03	0.00	0.02	0.02	DRY	300	76.0	0.8736	361	0

Statistics

# Samples DRY	**52**
# Samples WET	**35**
# Samples Total	**87**
Geomean	**121**
Log std deviation	**0.4201**

Avg % Reduction

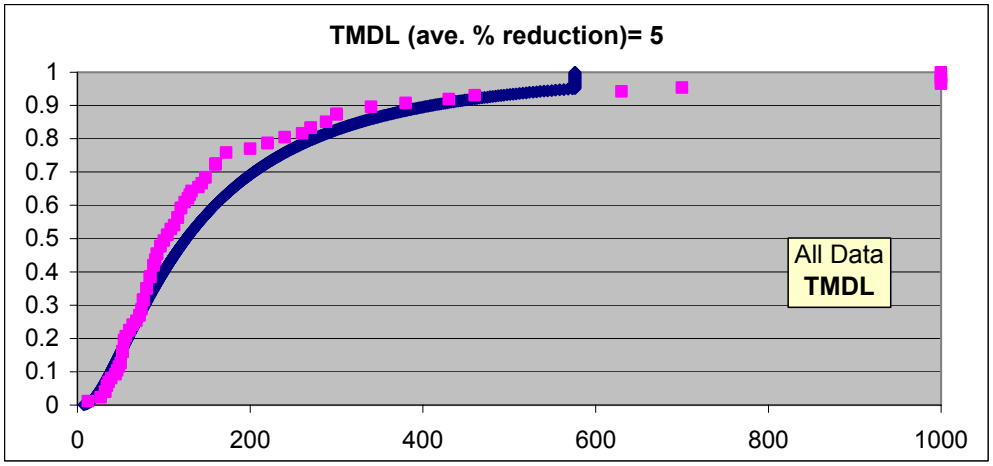
Wet (WLA)	**9**
Dry (LA)	**3**
Total (TMDL)	**5**

7/24/03	0.00	0.19	0.82	DRY	160	63.0	0.7241	218	0
7/31/03	0.00	0.00	0.07	DRY	144	58.0	0.6667	187	0
8/7/03	0.22	0.26	1.71	**WET**	140	57.0	0.6552	182	0
8/14/03	0.00	0.00	0.44	DRY	116	49.0	0.5632	146	0
8/28/03	0.00	0.00	0.00	DRY	76	27.5	0.3161	81	0
9/4/03	0.09	0.42	2.16	**WET**	630	82.0	0.9425	538	15
9/11/03	0.00	0.00	0.00	DRY	92	39.5	0.4540	113	0
9/18/03	0.00	0.00	0.68	DRY	76	27.5	0.3161	81	0
9/25/03	0.00	0.00	1.76	DRY	200	67.0	0.7701	249	0
5/6/04	0.00	0.13	0.51	DRY	46	9.0	0.1034	39	14
5/13/04	0.00	0.06	0.33	DRY	36	6.0	0.0690	32	11
5/20/04	0.00	0.01	0.02	DRY	52	14.0	0.1609	51	3
5/27/04	1.03	1.07	1.09	**WET**	220	68.5	0.7874	263	0
6/3/04	0.00	0.48	1.06	**WET**	116	49.0	0.5632	146	0
6/10/04	0.27	0.27	0.27	**WET**	76	27.5	0.3161	81	0
6/17/04	0.31	0.31	0.40	**WET**	92	39.5	0.4540	113	0
6/24/04	0.00	0.00	0.15	DRY	96	41.5	0.4770	119	0
7/8/04	0.00	0.00	1.10	DRY	104	44.5	0.5115	129	0
7/15/04	0.00	0.05	2.77	**WET**	88	36.5	0.4195	105	0
7/22/04	0.00	0.00	0.00	DRY	64	21.0	0.2414	66	0
7/29/04	0.00	0.21	1.40	DRY	160	63.0	0.7241	218	0
8/5/04	0.87	0.93	0.93	**WET**	700	83.0	0.9540	576	18
8/12/04	0.01	0.50	0.50	**WET**	288	74.0	0.8506	328	0
8/19/04	0.00	0.00	1.58	DRY	84	33.5	0.3851	96	0
8/26/04	0.00	0.00	0.00	DRY	60	19.5	0.2241	63	0
9/9/04	0.19	4.09	4.09	**WET**	5700	87.0	1.0000	576	90
9/16/04	0.00	0.08	0.08	DRY	50	11.0	0.1264	44	12
9/23/04	0.00	0.00	0.00	DRY	124	53.0	0.6092	163	0
9/30/04	0.04	1.13	3.05	**WET**	1020	84.0	0.9655	576	44

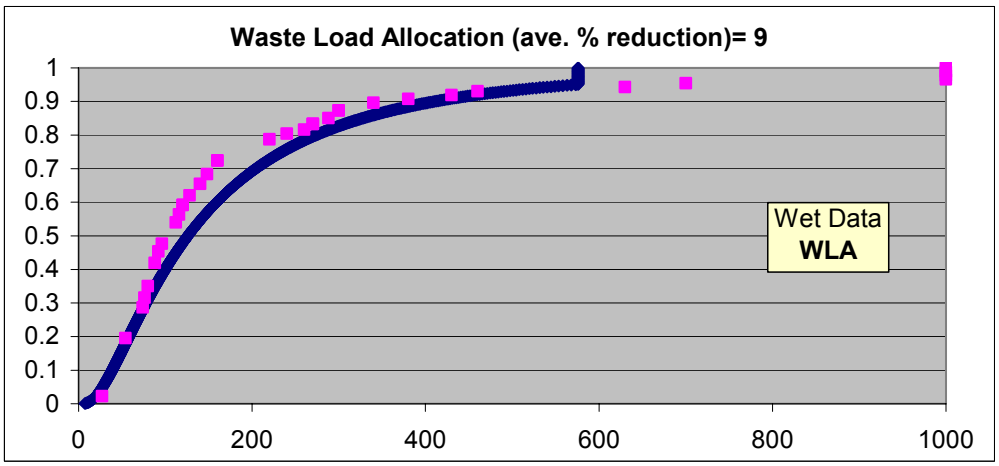
Precipitation and E. coli data provided by the Norwalk Department of Health and Haborwatch/Riverwatch, respectively.
WET Condition defined as greater than 0.1" precipitation in 24 hours or 0.25" precipitation in 48 hours, or 2.0" precipitation in 96 hours.

Norwalk River Criteria Curve for Monitoring Site 241

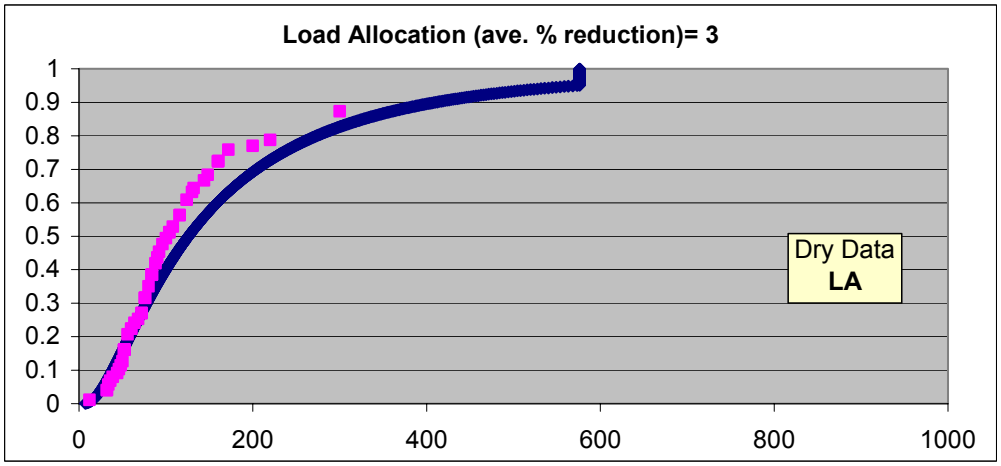
y axis = cumulative frequency; x axis = *E.coli* (col/100mL)



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



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



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

Norwalk River

CT7300-00_04

Data Used in the Analysis

Monitoring Site: 1359, downstream Cooper Pond Brook at lower Branchville RR crossing

Date	Precip.(in)[1] 24h	48h	96h	Condition[2] (WET/DRY)	E. coli (col./100 ml)	Rank	Proportion	Criteria Value	% Reduction
5/4/00	0.00	0.00	0.12	DRY	60	2.0	0.0230	20	67
5/11/00	0.03	0.32	0.36	**WET**	400	65.0	0.7471	233	42
5/18/00	0.54	0.54	0.54	**WET**	440	69.0	0.7931	267	39
5/25/00	0.04	1.17	1.32	**WET**	260	44.0	0.5057	128	51
6/1/00	0.00	0.00	0.00	DRY	240	39.0	0.4483	112	53
6/8/00	0.00	0.40	3.23	**WET**	1820	84.0	0.9655	410	77
6/15/00	0.00	0.01	0.08	DRY	130	17.5	0.2011	58	55
6/22/00	0.05	0.05	0.06	DRY	300	52.5	0.6034	160	47
6/29/00	0.01	0.03	0.36	DRY	380	62.5	0.7184	215	44
7/6/00	0.00	0.00	0.10	DRY	272	46.5	0.5345	136	50
7/13/00	0.00	0.00	0.07	DRY	260	44.0	0.5057	128	51
7/20/00	0.00	0.06	0.06	DRY	600	73.0	0.8391	314	48
7/27/00	0.64	3.32	3.32	**WET**	2000	85.0	0.9770	410	80
8/1/00	0.73	0.78	1.79	**WET**	400	65.0	0.7471	233	42
8/3/00	0.70	1.01	1.69	**WET**	330	56.0	0.6437	177	46
8/17/00	0.00	0.11	0.86	DRY	190	30.5	0.3506	88	53
8/24/00	0.00	0.21	0.21	DRY	340	57.5	0.6609	185	46
8/31/00	0.00	0.00	0.00	DRY	210	36.0	0.4138	103	51
9/7/00	0.00	0.00	0.01	DRY	192	32.0	0.3678	92	52
9/14/00	0.00	0.78	0.78	**WET**	320	55.0	0.6322	172	46
9/21/00	0.00	0.00	2.21	**WET**	240	39.0	0.4483	112	53
9/28/00	0.00	0.00	0.49	DRY	128	15.5	0.1782	54	58
5/10/01	0.00	0.00	0.00	DRY	146	21.5	0.2471	67	54
5/24/01	0.06	0.51	1.86	**WET**	360	60.5	0.6954	202	44
6/5/01	0.00	0.00	1.04	DRY	240	39.0	0.4483	112	53
6/21/01	0.28	0.29	0.29	**WET**	244	41.0	0.4713	118	52
7/5/01	0.33	0.51	0.51	**WET**	1260	81.0	0.9310	410	67
7/19/01	0.00	0.13	0.29	DRY	290	50.0	0.5747	150	48
8/2/01	0.00	0.00	0.00	DRY	160	24.0	0.2759	73	54
8/23/01	0.69	0.69	1.36	**WET**	160	24.0	0.2759	73	54
9/13/01	0.00	0.00	0.06	DRY	200	34.0	0.3908	98	51
9/27/01	0.00	0.00	0.44	DRY	108	10.5	0.1207	43	60
6/6/02	1.42	1.64	1.64	**WET**	256	42.0	0.4828	121	53
6/13/02	0.00	1.07	1.07	**WET**	260	44.0	0.5057	128	51
6/20/02	0.00	0.00	0.01	DRY	272	46.5	0.5345	136	50
6/27/02	0.46	0.70	0.70	**WET**	760	76.0	0.8736	361	52
7/2/02	0.00	0.00	0.00	DRY	340	57.5	0.6609	185	46
7/11/02	0.00	0.00	0.39	DRY	100	8.0	0.0920	37	63
7/18/02	0.00	0.00	0.00	DRY	80	4.0	0.0460	27	67
7/25/02	0.00	0.00	0.45	DRY	96	6.0	0.0690	32	67
8/1/02	0.00	0.00	0.00	DRY	130	17.5	0.2011	58	55
8/8/02	0.00	0.00	0.00	DRY	1750	83.0	0.9540	410	77
8/15/02	0.00	0.00	0.00	DRY	126	14.0	0.1609	51	60
8/22/02	0.01	0.01	0.32	DRY	76	3.0	0.0345	24	69
9/5/02	0.00	1.10	5.64	**WET**	164	26.5	0.3046	79	52
9/12/02	0.00	0.00	0.00	DRY	164	26.5	0.3046	79	52
9/19/02	0.02	0.02	1.26	DRY	216	37.0	0.4253	106	51
9/26/02	0.23	0.23	0.23	**WET**	128	15.5	0.1782	54	58
5/1/03	0.07	0.07	0.11	DRY	36	1.0	0.0115	16	57
5/8/03	0.65	0.65	0.68	**WET**	620	74.0	0.8506	328	47
5/15/03	0.00	0.00	0.00	DRY	100	8.0	0.0920	37	63
5/22/03	0.16	0.30	0.30	**WET**	110	12.0	0.1379	46	58
6/5/03	0.00	2.66	2.71	**WET**	300	52.5	0.6034	160	47
6/12/03	0.53	0.54	0.54	**WET**	300	52.5	0.6034	160	47
6/19/03	0.00	0.82	0.82	**WET**	190	30.5	0.3506	88	53
6/26/03	0.00	0.00	0.00	DRY	140	20.0	0.2299	64	54

Statistics

# Samples DRY	**52**
# Samples WET	**35**
# Samples Total	**87**
Geomean	**280**
Log std deviation	**0.3843**

Avg % Reduction

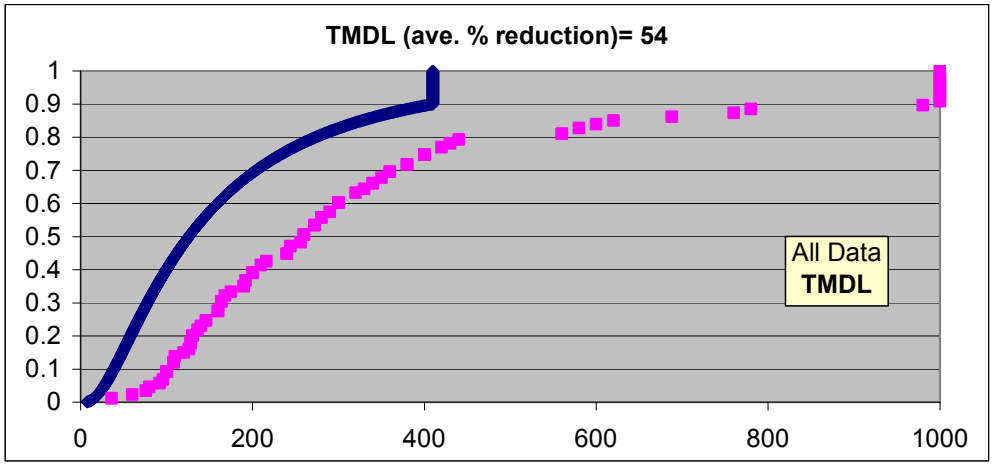
Wet (WLA)	**53**
Dry (LA)	**55**
Total (TMDL)	**54**

7/10/03	0.06	0.25	0.33	**WET**	350	59.0	0.6782	193	45
7/17/03	0.00	0.02	0.02	DRY	1500	82.0	0.9425	410	73
7/24/03	0.00	0.19	0.82	DRY	280	48.5	0.5575	144	49
7/31/03	0.00	0.00	0.07	DRY	360	60.5	0.6954	202	44
8/7/03	0.22	0.26	1.71	**WET**	160	24.0	0.2759	73	54
8/14/03	0.00	0.00	0.44	DRY	1080	79.0	0.9080	410	62
8/28/03	0.00	0.00	0.00	DRY	280	48.5	0.5575	144	49
9/4/03	0.09	0.42	2.16	**WET**	430	68.0	0.7816	258	40
9/11/03	0.00	0.00	0.00	DRY	300	52.5	0.6034	160	47
9/18/03	0.00	0.00	0.68	DRY	100	8.0	0.0920	37	63
9/25/03	0.00	0.00	1.76	DRY	200	34.0	0.3908	98	51
5/6/04	0.00	0.13	0.51	DRY	92	5.0	0.0575	29	68
5/13/04	0.00	0.06	0.33	DRY	146	21.5	0.2471	67	54
5/20/04	0.00	0.01	0.02	DRY	560	70.5	0.8103	283	49
5/27/04	1.03	1.07	1.09	**WET**	580	72.0	0.8276	301	48
6/3/04	0.00	0.48	1.06	**WET**	168	28.0	0.3218	82	51
6/10/04	0.27	0.27	0.27	**WET**	380	62.5	0.7184	215	44
6/17/04	0.31	0.31	0.40	**WET**	780	77.0	0.8851	381	51
6/24/04	0.00	0.00	0.15	DRY	560	70.5	0.8103	283	49
7/8/04	0.00	0.00	1.10	DRY	1220	80.0	0.9195	410	66
7/15/04	0.00	0.05	2.77	**WET**	400	65.0	0.7471	233	42
7/22/04	0.00	0.00	0.00	DRY	420	67.0	0.7701	249	41
7/29/04	0.00	0.21	1.40	DRY	200	34.0	0.3908	98	51
8/5/04	0.87	0.93	0.93	**WET**	2700	86.0	0.9885	410	85
8/12/04	0.01	0.50	0.50	**WET**	688	75.0	0.8621	344	50
8/19/04	0.00	0.00	1.58	DRY	136	19.0	0.2184	62	55
8/26/04	0.00	0.00	0.00	DRY	108	10.5	0.1207	43	60
9/9/04	0.19	4.09	4.09	**WET**	4000	87.0	1.0000	410	90
9/16/04	0.00	0.08	0.08	DRY	175	29.0	0.3333	85	52
9/23/04	0.00	0.00	0.00	DRY	120	13.0	0.1494	48	60
9/30/04	0.04	1.13	3.05	**WET**	980	78.0	0.8966	403	59

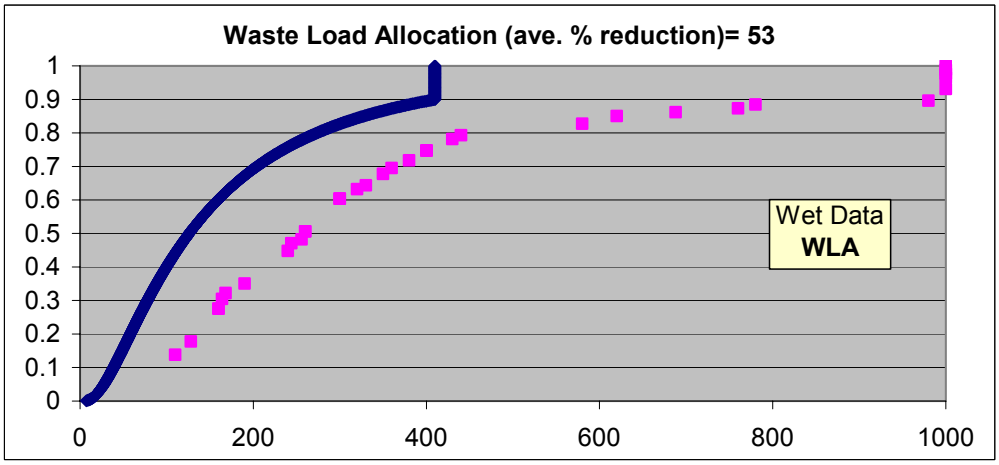
Precipitation and E. coli data provided by the Norwalk Department of Health and Haborwatch/Riverwatch, respectively.
WET Condition defined as greater than 0.1" precipitation in 24 hours or 0.25" precipitation in 48 hours, or 2.0" precipitation in 96 hours.

Norwalk River Criteria Curve for Monitoring Site 1359

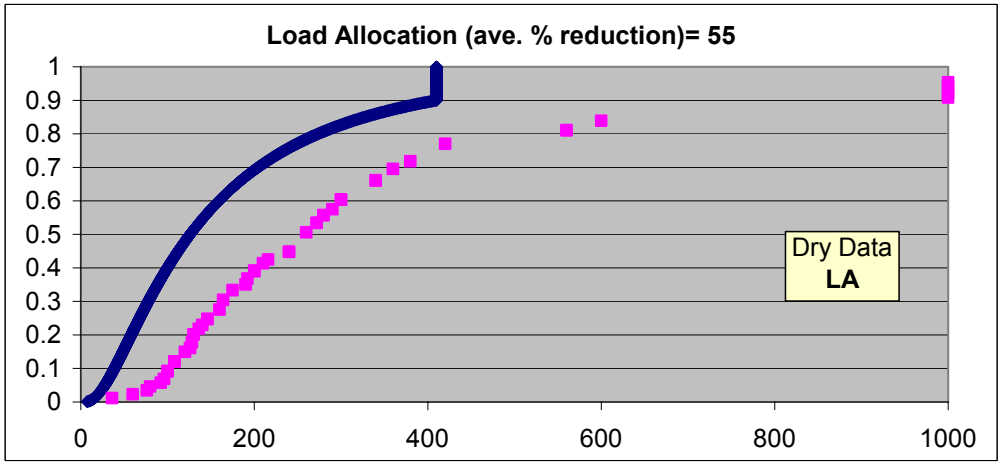
y axis = cumulative frequency; x axis = E.coli (col/100mL)



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



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



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

Norwalk River

CT7300-00_05

Data Used in the Analysis

Monitoring Site: 238, downstream Route 7 and South Stonehenge Road

Date	Precip.(in)[1]			Condition[2]	E. coli	Rank	Proportion	Criteria	%
	24h	48h	96h	(WET/DRY)	(col./100 ml)			Value	Reduction
5/4/00	0.00	0.00	0.12	DRY	26	2.0	0.0230	20	23
5/11/00	0.03	0.32	0.36	**WET**	520	73.0	0.8391	314	40
5/18/00	0.54	0.54	0.54	**WET**	660	78.0	0.8966	403	39
5/25/00	0.04	1.17	1.32	**WET**	320	58.0	0.6667	187	41
6/1/00	0.00	0.00	0.00	DRY	82	17.0	0.1954	57	30
6/8/00	0.00	0.40	3.23	**WET**	1000	80.5	0.9253	410	59
6/15/00	0.00	0.01	0.08	DRY	150	34.0	0.3908	98	35
6/22/00	0.05	0.05	0.06	DRY	112	24.5	0.2816	74	34
6/29/00	0.01	0.03	0.36	DRY	112	24.5	0.2816	74	34
7/6/00	0.00	0.00	0.10	DRY	108	22.5	0.2586	69	36
7/13/00	0.00	0.00	0.07	DRY	172	41.0	0.4713	118	31
7/20/00	0.00	0.06	0.06	DRY	260	51.0	0.5862	154	41
7/27/00	0.64	3.32	3.32	**WET**	1000	80.5	0.9253	410	59
8/1/00	0.73	0.78	1.79	**WET**	140	31.0	0.3563	90	36
8/3/00	0.70	1.01	1.69	**WET**	130	28.5	0.3276	84	36
8/17/00	0.00	0.11	0.86	DRY	170	40.0	0.4598	115	32
8/24/00	0.00	0.21	0.21	DRY	190	45.0	0.5172	131	31
8/31/00	0.00	0.00	0.00	DRY	124	26.0	0.2989	77	38
9/7/00	0.00	0.00	0.01	DRY	108	22.5	0.2586	69	36
9/14/00	0.00	0.78	0.78	**WET**	156	36.0	0.4138	103	34
9/21/00	0.00	0.00	2.21	**WET**	340	60.0	0.6897	199	42
9/28/00	0.00	0.00	0.49	DRY	60	9.0	0.1034	39	34
5/10/01	0.00	0.00	0.00	DRY	46	6.5	0.0747	33	27
5/24/01	0.06	0.51	1.86	**WET**	540	75.5	0.8678	352	35
6/5/01	0.00	0.00	1.04	DRY	152	35.0	0.4023	100	34
6/21/01	0.28	0.29	0.29	**WET**	148	33.0	0.3793	95	36
7/5/01	0.33	0.51	0.51	**WET**	480	70.5	0.8103	283	41
7/19/01	0.00	0.13	0.29	DRY	240	49.5	0.5690	148	38
8/2/01	0.00	0.00	0.00	DRY	72	14.5	0.1667	52	28
8/23/01	0.69	0.69	1.36	**WET**	70	13.0	0.1494	48	31
9/13/01	0.00	0.00	0.06	DRY	40	4.0	0.0460	27	33
9/27/01	0.00	0.00	0.44	DRY	98	18.0	0.2069	59	39
6/6/02	1.42	1.64	1.64	**WET**	168	39.0	0.4483	112	33
6/13/02	0.00	1.07	1.07	**WET**	160	37.5	0.4310	107	33
6/20/02	0.00	0.00	0.01	DRY	100	19.0	0.2184	62	38
6/27/02	0.46	0.70	0.70	**WET**	176	42.0	0.4828	121	31
7/2/02	0.00	0.00	0.00	DRY	76	16.0	0.1839	55	28
7/11/02	0.00	0.00	0.39	DRY	136	30.0	0.3448	87	36
7/18/02	0.00	0.00	0.00	DRY	18	1.0	0.0115	16	14
7/25/02	0.00	0.00	0.45	DRY	104	20.5	0.2356	65	38
8/1/02	0.00	0.00	0.00	DRY	68	12.0	0.1379	46	32
8/8/02	0.00	0.00	0.00	DRY	72	14.5	0.1667	52	28
8/15/02	0.00	0.00	0.00	DRY	56	8.0	0.0920	37	34
8/22/02	0.01	0.01	0.32	DRY	36	3.0	0.0345	24	34
9/5/02	0.00	1.10	5.64	**WET**	104	20.5	0.2356	65	38
9/12/02	0.00	0.00	0.00	DRY	144	32.0	0.3678	92	36
9/19/02	0.02	0.02	1.26	DRY	264	52.0	0.5977	158	40
9/26/02	0.23	0.23	0.23	**WET**	66	10.5	0.1207	43	35
5/1/03	0.07	0.07	0.11	DRY	46	6.5	0.0747	33	27
5/8/03	0.65	0.65	0.68	**WET**	280	54.5	0.6264	170	39
5/15/03	0.00	0.00	0.00	DRY	44	5.0	0.0575	29	33
5/22/03	0.16	0.30	0.30	**WET**	360	61.5	0.7069	208	42
6/5/03	0.00	2.66	2.71	**WET**	280	54.5	0.6264	170	39
6/12/03	0.53	0.54	0.54	**WET**	130	28.5	0.3276	84	36
6/19/03	0.00	0.82	0.82	**WET**	200	46.0	0.5287	135	33
6/26/03	0.00	0.00	0.00	DRY	270	53.0	0.6092	163	40

Statistics

Samples DRY
Samples WET
Samples Total

Geomean
Log std deviation

Avg % Reduction

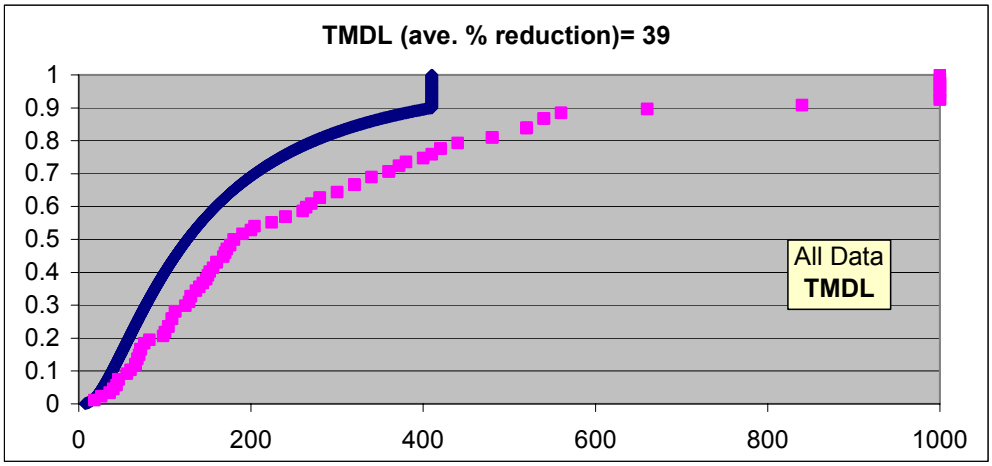
Wet (WLA)
Dry (LA)
Total (TMDL)

7/10/03	0.06	0.25	0.33	**WET**	180	43.5	0.5000	126	30
7/17/03	0.00	0.02	0.02	DRY	1600	84.0	0.9655	410	74
7/24/03	0.00	0.19	0.82	DRY	180	43.5	0.5000	126	30
7/31/03	0.00	0.00	0.07	DRY	204	47.0	0.5402	138	32
8/7/03	0.22	0.26	1.71	**WET**	160	37.5	0.4310	107	33
8/14/03	0.00	0.00	0.44	DRY	1040	82.0	0.9425	410	61
8/28/03	0.00	0.00	0.00	DRY	320	58.0	0.6667	187	41
9/4/03	0.09	0.42	2.16	**WET**	410	66.0	0.7586	240	41
9/11/03	0.00	0.00	0.00	DRY	300	56.0	0.6437	177	41
9/18/03	0.00	0.00	0.68	DRY	240	49.5	0.5690	148	38
9/25/03	0.00	0.00	1.76	DRY	224	48.0	0.5517	142	37
5/6/04	0.00	0.13	0.51	DRY	66	10.5	0.1207	43	35
5/13/04	0.00	0.06	0.33	DRY	320	58.0	0.6667	187	41
5/20/04	0.00	0.01	0.02	DRY	440	69.0	0.7931	267	39
5/27/04	1.03	1.07	1.09	**WET**	540	75.5	0.8678	352	35
6/3/04	0.00	0.48	1.06	**WET**	400	65.0	0.7471	233	42
6/10/04	0.27	0.27	0.27	**WET**	560	77.0	0.8851	381	32
6/17/04	0.31	0.31	0.40	**WET**	520	73.0	0.8391	314	40
6/24/04	0.00	0.00	0.15	DRY	520	73.0	0.8391	314	40
7/8/04	0.00	0.00	1.10	DRY	380	64.0	0.7356	225	41
7/15/04	0.00	0.05	2.77	**WET**	420	67.5	0.7759	253	40
7/22/04	0.00	0.00	0.00	DRY	1700	85.0	0.9770	410	76
7/29/04	0.00	0.21	1.40	DRY	372	63.0	0.7241	218	41
8/5/04	0.87	0.93	0.93	**WET**	2700	86.0	0.9885	410	85
8/12/04	0.01	0.50	0.50	**WET**	1500	83.0	0.9540	410	73
8/19/04	0.00	0.00	1.58	DRY	420	67.5	0.7759	253	40
8/26/04	0.00	0.00	0.00	DRY	360	61.5	0.7069	208	42
9/9/04	0.19	4.09	4.09	**WET**	5100	87.0	1.0000	410	92
9/16/04	0.00	0.08	0.08	DRY	480	70.5	0.8103	283	41
9/23/04	0.00	0.00	0.00	DRY	128	27.0	0.3103	80	38
9/30/04	0.04	1.13	3.05	**WET**	840	79.0	0.9080	410	51

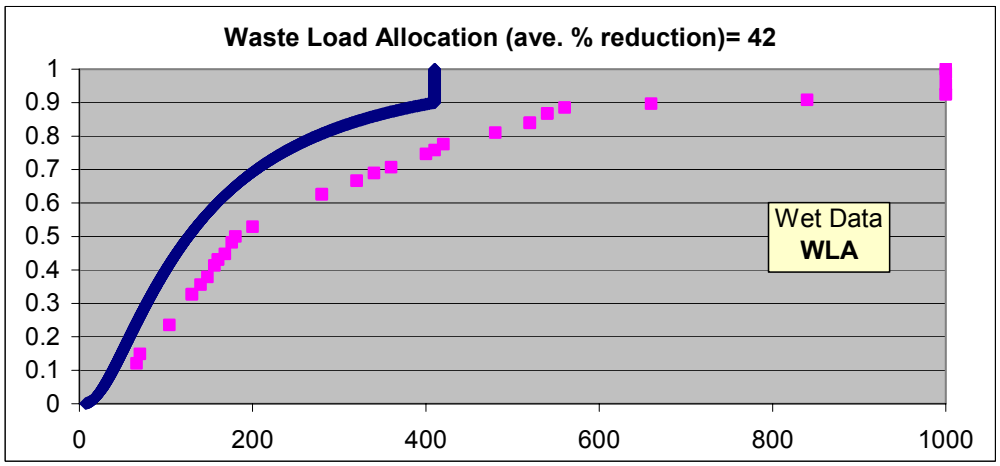
Precipitation and E. coli data provided by the Norwalk Department of Health and Haborwatch/Riverwatch, respectively.
WET Condition defined as greater than 0.1" precipitation in 24 hours or 0.25" precipitation in 48 hours, or 2.0" precipitation in 96 hours.

Norwalk River Criteria Curve for Monitoring Site 238

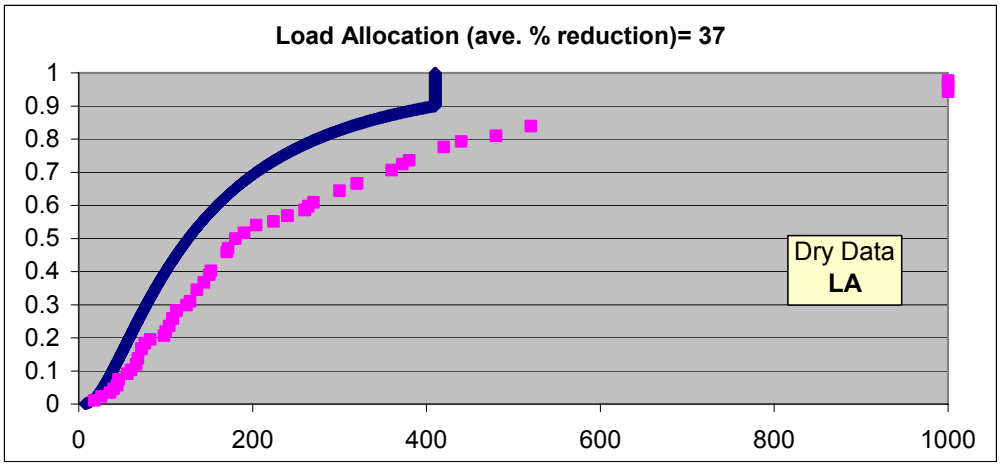
y axis = cumulative frequency; x axis = E.coli (col/100mL)



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



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



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

Appendix A-1
Norwalk River
TMDL Summary

The TMDL analysis for the Norwalk River was conducted at seven sites, which are representative of five river segments. The analysis indicates that the sites are influenced equally by sources of bacteria active under both wet weather and dry weather conditions. The Waste Load Allocation (WLA) is applicable to regulated stormwater. Reduction in the WLA can be achieved through the detection and elimination of illicit discharges to the storm sewers, as well as, the installation of engineered controls to reduce the surge of stormwater to the river, promote groundwater recharge, and improve water quality. Nonpoint sources, such as, improperly functioning septic systems, domestic animal waste, and wildlife may contribute to the Load Allocation. It is important to note that the percent reductions required at the sites (435, 704, 990) in segment CT7300-00_01 are higher than in the other four segments. This may be attributed to the fact that segment CT7300-00_01 is in an area with more urban/developed land use than the other four segments. It is also important to note that a significantly lower percent reduction is required in segment CT7300-00_03 at site 241 than the other four segments. This may be attributed to the fact that Factory Pond is located just upstream of site 241, which may act as a retention and settling basin for bacteria associated with particulate material. Lastly, the Georgetown Wastewater Treatment Plant may potentially provide dilution of in-stream bacteria concentrations.

Appendix A-2
Ridgefield Brook
Waterbody specific information

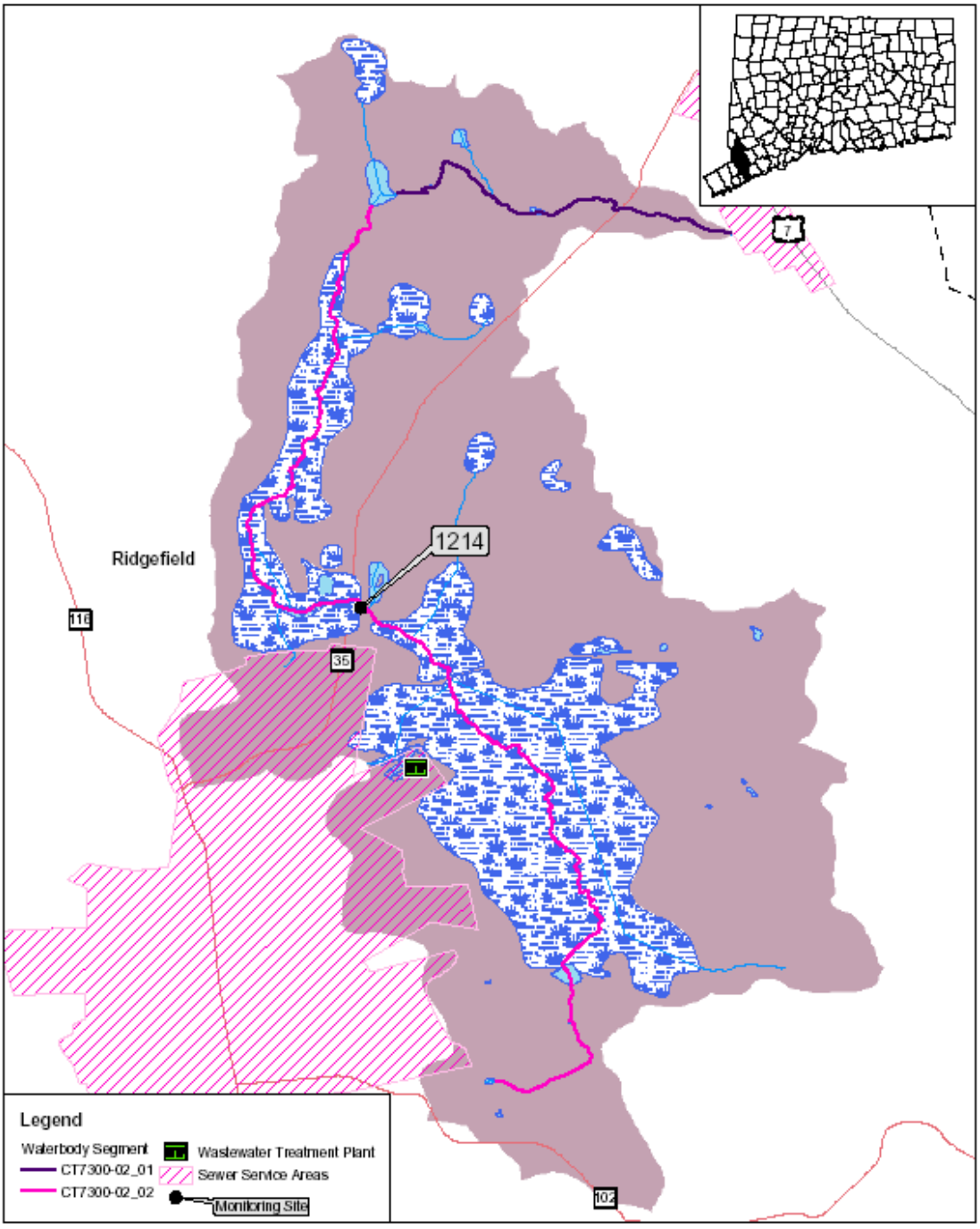
Impaired Waterbody
Waterbody Name: Ridgefield Brook
Waterbody Segment IDs: CT7300-02_01, CT7300-02_02
Waterbody Segment Description: From confluence with outlet of Little Pond and head of Norwalk River (Ridgefield) upstream to Great Swamp (Ridgefield).

Impairment Description:
Designated Use Impairment: Contact Recreation
Size of Impaired Segments: 4.6 linear miles
Surface Water Classification: Class B

Watershed Description:
Drainage Basin Area: 3.182 square miles
Tributary To: Norwalk River
Subregional Basin Name & Code: Norwalk River, 7300
Regional Basin: Norwalk River
Major Basin: Southwest Coast
Watershed Towns: Ridgefield
Phase II GP applicable? Ridgefield-yes
Applicable Season: Recreation Season (May 1 to September 30)
Landuse:

Land Use Category	Percent Composition
Forested	68.36%
Urban/Developed	17.63%
Open Space	10.03%
Water/Wetland	2.59%
Agriculture	1.39%

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



Ridgefield Brook

Map Data: CTDEP
Map Created: April 2005

Ridgefield Brook

CT7300-02_02

Data Used in the Analysis

Monitoring Site: 1214, at Route 35 Fox Hill Condos

Date	Precip.(in)[1]			Condition[2]	E. coli	Rank	Proportion	Criteria	%
	24h	48h	96h	(WET/DRY)	(col./100 ml)			Value	Reduction
5/4/00	0.00	0.00	0.12	DRY	32	1.0	0.0115	16	52
5/11/00	0.03	0.32	0.36	**WET**	1990	84.0	0.9655	576	71
5/18/00	0.54	0.54	0.54	**WET**	580	65.5	0.7529	236	59
5/25/00	0.04	1.17	1.32	**WET**	460	61.5	0.7069	208	55
6/1/00	0.00	0.00	0.00	DRY	360	49.5	0.5690	148	59
6/8/00	0.00	0.40	3.23	**WET**	1680	82.0	0.9425	538	68
6/15/00	0.00	0.01	0.08	DRY	170	33.5	0.3851	96	43
6/22/00	0.05	0.05	0.06	DRY	430	59.0	0.6782	193	55
6/29/00	0.01	0.03	0.36	DRY	140	26.5	0.3046	79	44
7/6/00	0.00	0.00	0.10	DRY	128	22.0	0.2529	68	47
7/13/00	0.00	0.00	0.07	DRY	140	26.5	0.3046	79	44
7/20/00	0.00	0.06	0.06	DRY	176	35.5	0.4080	102	42
7/27/00	0.64	3.32	3.32	**WET**	2900	85.0	0.9770	576	80
8/1/00	0.70	1.01	1.69	**WET**	370	52.0	0.5977	158	57
8/3/00	0.73	0.78	1.79	**WET**	190	40.0	0.4598	115	40
8/17/00	0.00	0.11	0.86	DRY	60	11.0	0.1264	44	27
8/24/00	0.00	0.21	0.21	DRY	60	11.0	0.1264	44	27
8/31/00	0.00	0.00	0.00	DRY	56	8.0	0.0920	37	34
9/7/00	0.00	0.00	0.01	DRY	160	31.0	0.3563	90	44
9/14/00	0.00	0.78	0.78	**WET**	360	49.5	0.5690	148	59
9/21/00	0.00	0.00	2.21	**WET**	520	63.0	0.7241	218	58
9/28/00	0.00	0.00	0.49	DRY	540	64.0	0.7356	225	58
5/10/01	0.00	0.00	0.00	DRY	182	38.0	0.4368	109	40
5/24/01	0.06	0.51	1.86	**WET**	1400	79.0	0.9080	428	69
6/5/01	0.00	0.00	1.04	DRY	580	65.5	0.7529	236	59
6/21/01	0.28	0.29	0.29	**WET**	420	57.5	0.6609	185	56
7/5/01	0.33	0.51	0.51	**WET**	1900	83.0	0.9540	576	70
7/19/01	0.00	0.13	0.29	DRY	80	16.0	0.1839	55	31
8/2/01	0.00	0.00	0.00	DRY	50	5.0	0.0575	29	41
8/23/01	0.69	0.69	1.36	**WET**	210	42.0	0.4828	121	42
9/13/01	0.00	0.00	0.06	DRY	34	2.5	0.0287	22	36
9/27/01	0.00	0.00	0.44	DRY	280	44.5	0.5115	129	54
6/6/02	1.42	1.64	1.64	**WET**	700	70.5	0.8103	283	60
6/13/02	0.00	1.07	1.07	**WET**	1280	78.0	0.8966	403	69
6/20/02	0.00	0.00	0.01	DRY	220	43.0	0.4943	124	43
6/27/02	0.46	0.70	0.70	**WET**	1260	77.0	0.8851	381	70
7/2/02	0.00	0.00	0.00	DRY	460	61.5	0.7069	208	55
7/11/02	0.00	0.00	0.39	DRY	360	49.5	0.5690	148	59
7/18/02	0.00	0.00	0.00	DRY	74	14.0	0.1609	51	32
7/25/02	0.00	0.00	0.45	DRY	92	18.0	0.2069	59	35
8/1/02	0.00	0.00	0.00	DRY	110	21.0	0.2414	66	40
8/8/02	0.00	0.00	0.00	DRY	620	67.5	0.7759	253	59
8/15/02	0.00	0.00	0.00	DRY	80	16.0	0.1839	55	31
8/22/02	0.01	0.01	0.32	DRY	52	6.5	0.0747	33	36
9/5/02	0.00	1.10	5.64	**WET**	96	19.0	0.2184	62	36
9/12/02	0.00	0.00	0.00	DRY	100	20.0	0.2299	64	36
9/19/02	0.02	0.02	1.26	DRY	60	11.0	0.1264	44	27
9/26/02	0.23	0.23	0.23	**WET**	64	13.0	0.1494	48	24
5/1/03	0.07	0.07	0.11	DRY	44	4.0	0.0460	27	39
5/8/03	0.65	0.65	0.68	**WET**	1660	81.0	0.9310	494	70
5/15/03	0.00	0.00	0.00	DRY	58	9.0	0.1034	39	32
5/22/03	0.16	0.30	0.30	**WET**	700	70.5	0.8103	283	60
6/5/03	0.00	2.66	2.71	**WET**	380	54.0	0.6207	167	56
6/12/03	0.53	0.54	0.54	**WET**	320	47.0	0.5402	138	57
6/19/03	0.00	0.82	0.82	**WET**	380	54.0	0.6207	167	56
6/26/03	0.00	0.00	0.00	DRY	170	33.5	0.3851	96	43
7/10/03	0.06	0.25	0.33	**WET**	144	28.0	0.3218	82	43
7/17/03	0.00	0.02	0.02	DRY	1200	76.0	0.8736	361	70

Statistics

# Samples DRY	**52**
# Samples WET	**35**
# Samples Total	**87**
Geomean	**272**
Log std deviation	**0.5162**

Avg % Reduction

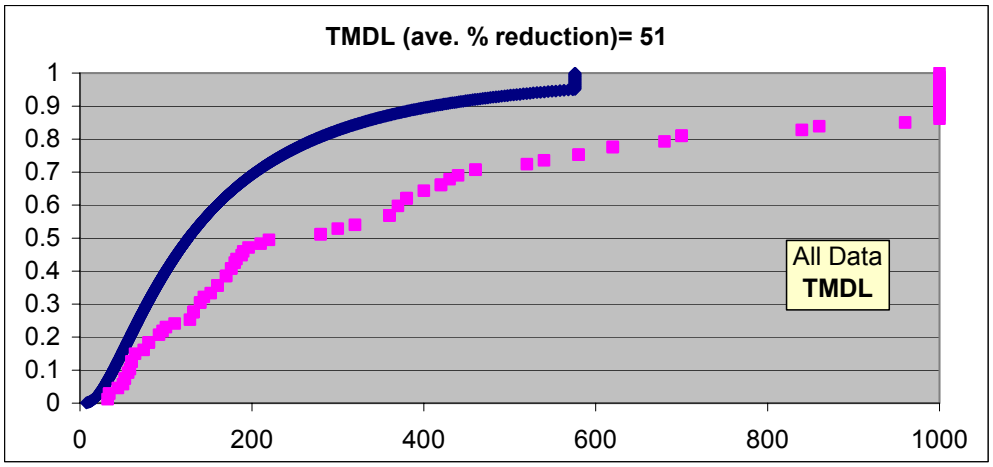
Wet (WLA)	**60**
Dry (LA)	**45**
Total (TMDL)	**51**

7/24/03	0.00	0.19	0.82	DRY	180	37.0	0.4253	106	41
7/31/03	0.00	0.00	0.07	DRY	80	16.0	0.1839	55	31
8/7/03	0.22	0.26	1.71	**WET**	160	31.0	0.3563	90	44
8/14/03	0.00	0.00	0.44	DRY	840	72.0	0.8276	301	64
8/28/03	0.00	0.00	0.00	DRY	132	24.0	0.2759	73	45
9/4/03	0.09	0.42	2.16	**WET**	400	56.0	0.6437	177	56
9/11/03	0.00	0.00	0.00	DRY	188	39.0	0.4483	112	41
9/18/03	0.00	0.00	0.68	DRY	176	35.5	0.4080	102	42
9/25/03	0.00	0.00	1.76	DRY	132	24.0	0.2759	73	45
5/6/04	0.00	0.13	0.51	DRY	34	2.5	0.0287	22	36
5/13/04	0.00	0.06	0.33	DRY	360	49.5	0.5690	148	59
5/20/04	0.00	0.01	0.02	DRY	380	54.0	0.6207	167	56
5/27/04	1.03	1.07	1.09	**WET**	860	73.0	0.8391	314	64
6/3/04	0.00	0.48	1.06	**WET**	620	67.5	0.7759	253	59
6/10/04	0.27	0.27	0.27	**WET**	680	69.0	0.7931	267	61
6/17/04	0.31	0.31	0.40	**WET**	300	46.0	0.5287	135	55
6/24/04	0.00	0.00	0.15	DRY	160	31.0	0.3563	90	44
7/8/04	0.00	0.00	1.10	DRY	52	6.5	0.0747	33	36
7/15/04	0.00	0.05	2.77	**WET**	440	60.0	0.6897	199	55
7/22/04	0.00	0.00	0.00	DRY	1630	80.0	0.9195	458	72
7/29/04	0.00	0.21	1.40	DRY	132	24.0	0.2759	73	45
8/5/04	0.87	0.93	0.93	**WET**	4100	86.0	0.9885	576	86
8/12/04	0.01	0.50	0.50	**WET**	960	74.0	0.8506	328	66
8/19/04	0.00	0.00	1.58	DRY	280	44.5	0.5115	129	54
8/26/04	0.00	0.00	0.00	DRY	152	29.0	0.3333	85	44
9/9/04	0.19	4.09	4.09	**WET**	8300	87.0	1.0000	576	93
9/16/04	0.00	0.08	0.08	DRY	420	57.5	0.6609	185	56
9/23/04	0.00	0.00	0.00	DRY	196	41.0	0.4713	118	40
9/30/04	0.04	1.13	3.05	**WET**	1100	75.0	0.8621	344	69

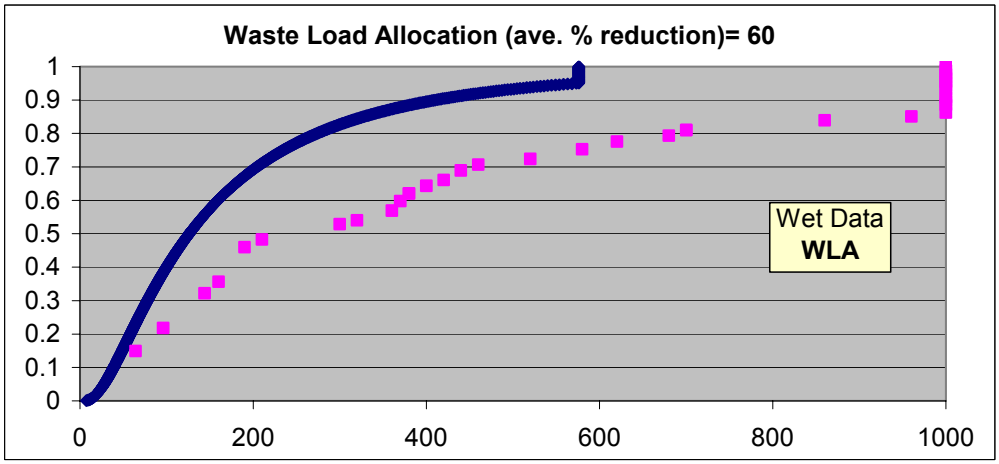
Precipitation and E. coli data provided by the Norwalk Department of Health and Haborwatch/Riverwatch, respectively.
WET Condition defined as greater than 0.1" precipitation in 24 hours or 0.25" precipitation in 48 hours, or 2.0" precipitation in 96 hours.

Ridgefield Brook Criteria Curve for Monitoring Site 1214

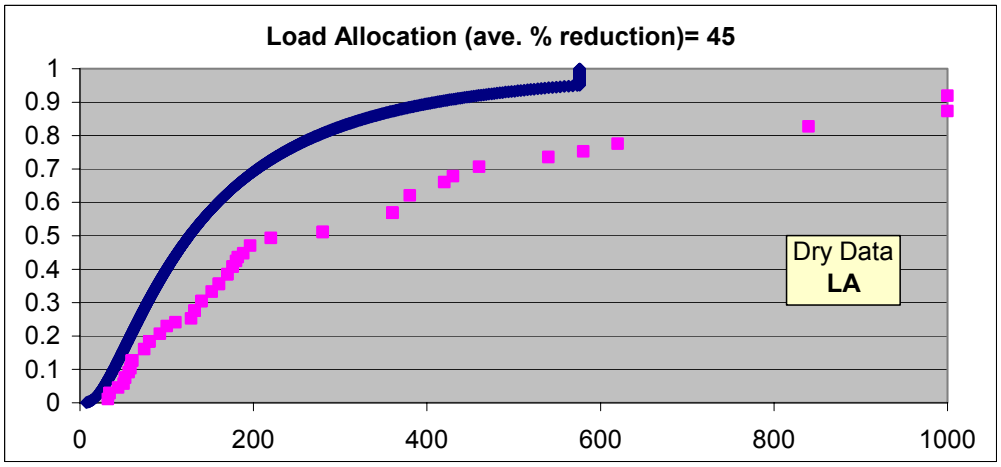
y axis = cumulative frequency; x axis = *E.coli* (col/100mL)



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



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



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

Appendix A-2
Ridgefield Brook
TMDL Summary

The TMDL analysis for Ridgefield Brook was conducted at site 1214, which is representative of one river segment (CT7300-02_02). Current data is unavailable to conduct a TMDL analysis for the Ridgefield Brook segment, segment, CT7300-02_01. However, this small segment (1 linear mile) is located between two segments (CT7300-00_05 and CT7300-02_02) that require percent reductions. Therefore, it is reasonable to presume that the same percent reduction applies throughout Ridgefield Brook. The analysis indicates that the site is influenced by sources of bacteria active under both wet weather and dry weather conditions. The WLA (60% reduction) was significantly higher than the LA (44% reduction). This indicates that water quality at site 1214 is more strongly influenced by point source stormwater than non-point sources. Reduction in the WLA can be achieved through the installation of engineered controls to reduce the surge of stormwater to the river, promote groundwater recharge, and improve water quality, as well as, detection and elimination of illicit discharges to the storm sewers. Non-point sources such as improperly functioning septic systems, domestic animal waste, and nuisance wildlife may contribute to the LA.

Appendix A-3
Silvermine River
Waterbody specific information

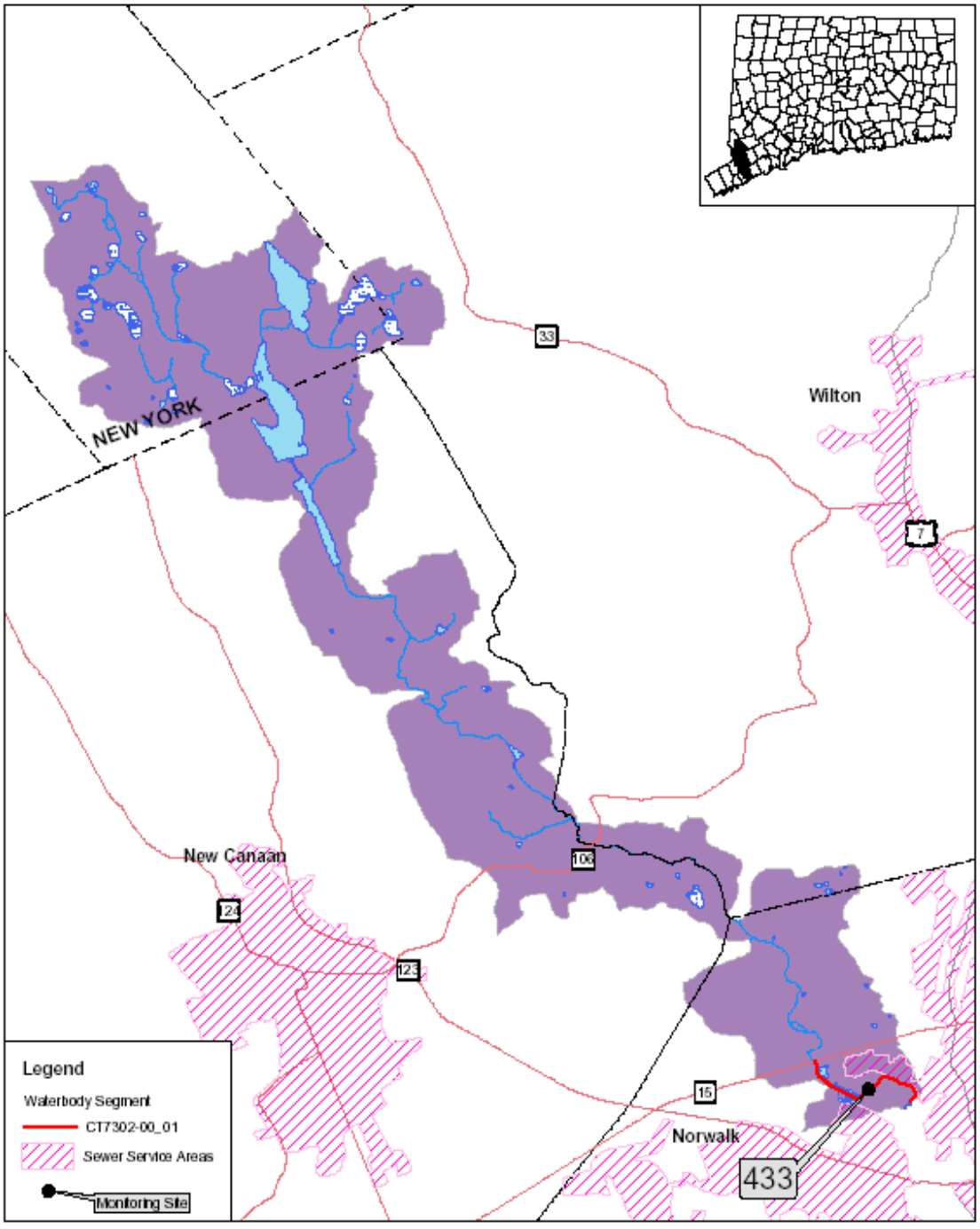
Impaired Waterbody
Waterbody Name: Silvermine River
Waterbody Segment ID: CT7302-00_01
Waterbody Segment Description: From mouth at Deering Pond (Norwalk) upstream to Route 15 (Norwalk).

Impairment Description:
Designated Use Impairment: Contact Recreation
Size of Impaired Segment: 1.1 linear miles
Surface Water Classification: Class B

Watershed Description:
Drainage Basin Area: 22.530 square miles
Tributary To: Norwalk River
Subregional Basin Name & Code: Silvermine River, 7302
Regional Basin: Norwalk River
Major Basin: Southwest Coast
Watershed Towns: Norwalk, New Canaan, Wilton, Ridgefield, Lewisboro NY
Phase II GP applicable? Norwalk-yes, New Canaan-yes, Wilton-yes, Ridgefield-yes
Applicable Season: Recreation Season (May 1 to September 30)
Landuse:

Land Use Category	Percent Composition
Forested	60.32%
Urban/Developed	28.11%
Open Space	7.62%
Water/Wetland	3.24%
Agriculture	0.72%

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


NEW YORK
Wilton
New Canaan
Norwalk
33
7
106
124
123
15
433
Legend
Waterbody Segment
CT7302-00_01
Sewer Service Areas
Monitoring Site
N
0.5 0 0.5 1 1.5 2 Miles
Silvermine River
Map Data: CTDEP
Map Created: April 2005

Silvermine River

CT7302-00_01

Data Used in the Analysis

Monitoring Site: 433, upstream James Street

Date	Precip.(in)[1]			Condition[2]	E. coli	Rank	Proportion	Criteria	%
	24h	48h	96h	(WET/DRY)	(col./100 ml)			Value	Reduction
6/6/02	1.42	1.64	1.64	**WET**	1750	52.0	0.9455	551	69
6/13/02	0.00	1.07	1.07	**WET**	540	40.0	0.7273	220	59
6/20/02	0.00	0.00	0.01	DRY	400	31.0	0.5636	146	63
6/27/02	0.46	0.70	0.70	**WET**	1300	50.0	0.9091	431	67
7/2/02	0.00	0.00	0.00	DRY	320	24.0	0.4364	109	66
7/11/02	0.00	0.00	0.39	DRY	410	33.0	0.6000	159	61
7/18/02	0.00	0.00	0.00	DRY	340	26.0	0.4727	118	65
7/25/02	0.00	0.00	0.45	DRY	390	29.0	0.5273	134	66
8/1/02	0.00	0.00	0.00	DRY	50	1.0	0.0182	18	63
8/8/02	0.00	0.00	0.00	DRY	90	4.0	0.0727	33	63
8/15/02	0.00	0.00	0.00	DRY	68	2.0	0.0364	24	65
8/22/02	0.01	0.01	0.32	DRY	76	3.0	0.0545	29	62
9/5/02	0.00	1.10	5.64	**WET**	1100	47.0	0.8545	333	70
9/12/02	0.00	0.00	0.00	DRY	520	38.0	0.6909	199	62
9/19/02	0.02	0.02	1.26	DRY	192	15.0	0.2727	72	62
9/26/02	0.23	0.23	0.23	**WET**	380	27.5	0.5000	126	67
5/1/03	0.07	0.07	0.11	DRY	160	10.0	0.1818	55	66
5/8/03	0.65	0.65	0.68	**WET**	660	43.0	0.7818	258	61
5/15/03	0.00	0.00	0.00	DRY	520	38.0	0.6909	199	62
5/22/03	0.16	0.30	0.30	**WET**	252	18.0	0.3273	83	67
6/5/03	0.00	2.66	2.71	**WET**	580	41.5	0.7545	238	59
6/12/03	0.53	0.54	0.54	**WET**	280	19.5	0.3545	89	68
6/19/03	0.00	0.82	0.82	**WET**	168	12.0	0.2182	62	63
6/26/03	0.00	0.00	0.00	DRY	800	44.0	0.8000	274	66
7/10/03	0.06	0.25	0.33	**WET**	520	38.0	0.6909	199	62
7/17/03	0.00	0.02	0.02	DRY	2800	53.0	0.9636	576	79
7/24/03	0.00	0.19	0.82	DRY	420	34.5	0.6273	170	60
7/31/03	0.00	0.00	0.07	DRY	380	27.5	0.5000	126	67
8/7/03	0.22	0.26	1.71	**WET**	310	22.0	0.4000	100	68
8/14/03	0.00	0.00	0.44	DRY	180	14.0	0.2545	69	62
8/28/03	0.00	0.00	0.00	DRY	128	6.0	0.1091	41	68
9/4/03	0.09	0.42	2.16	**WET**	1200	48.0	0.8727	360	70
9/11/03	0.00	0.00	0.00	DRY	148	7.0	0.1273	44	70
9/18/03	0.00	0.00	0.68	DRY	155	8.0	0.1455	48	69
9/25/03	0.00	0.00	1.76	DRY	320	24.0	0.4364	109	66
5/6/04	0.00	0.13	0.51	DRY	102	5.0	0.0909	37	64
5/13/04	0.00	0.06	0.33	DRY	400	31.0	0.5636	146	63
5/20/04	0.00	0.01	0.02	DRY	196	16.0	0.2909	76	61
5/27/04	1.03	1.07	1.09	**WET**	1560	51.0	0.9273	482	69
6/3/04	0.00	0.48	1.06	**WET**	400	31.0	0.5636	146	63
6/10/04	0.27	0.27	0.27	**WET**	580	41.5	0.7545	238	59
6/17/04	0.31	0.31	0.40	**WET**	320	24.0	0.4364	109	66
6/24/04	0.00	0.00	0.15	DRY	300	21.0	0.3818	96	68
7/8/04	0.00	0.00	1.10	DRY	168	12.0	0.2182	62	63
7/15/04	0.00	0.05	2.77	**WET**	420	34.5	0.6273	170	60
7/22/04	0.00	0.00	0.00	DRY	168	12.0	0.2182	62	63
7/29/04	0.00	0.21	1.40	DRY	440	36.0	0.6545	182	59
8/5/04	0.87	0.93	0.93	**WET**	4600	55.0	1.0000	576	87
8/12/04	0.01	0.50	0.50	**WET**	1280	49.0	0.8909	392	69
8/19/04	0.00	0.00	1.58	DRY	280	19.5	0.3545	89	68
8/26/04	0.00	0.00	0.00	DRY	208	17.0	0.3091	80	62
9/9/04	0.19	4.09	4.09	**WET**	3200	54.0	0.9818	576	82
9/16/04	0.00	0.08	0.08	DRY	900	46.0	0.8364	311	65
9/23/04	0.00	0.00	0.00	DRY	156	9.0	0.1636	51	67
9/30/04	0.04	1.13	3.05	**WET**	820	45.0	0.8182	291	65

Statistics

# Samples DRY	**33**
# Samples WET	**22**
# Samples Total	**55**
Geomean	**379**
Log std deviation	**0.4171**

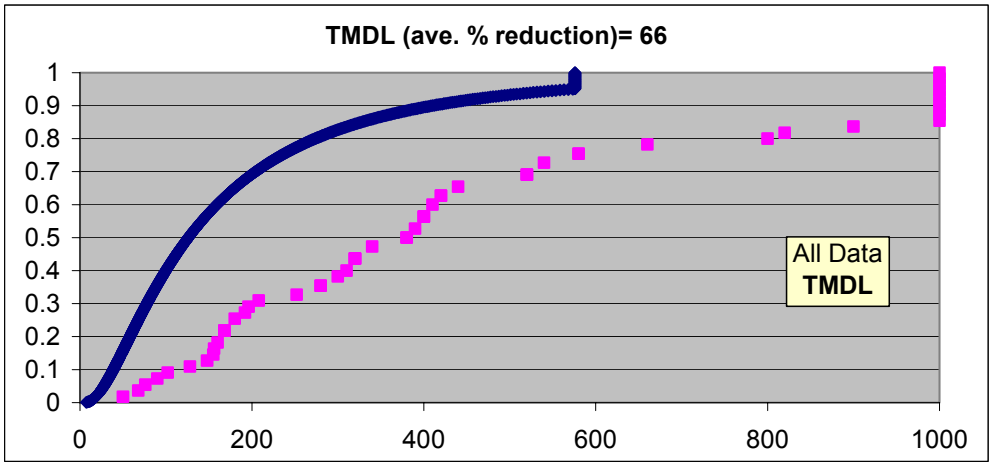
Avg % Reduction

Wet (WLA)	**67**
Dry (LA)	**65**
Total (TMDL)	**66**

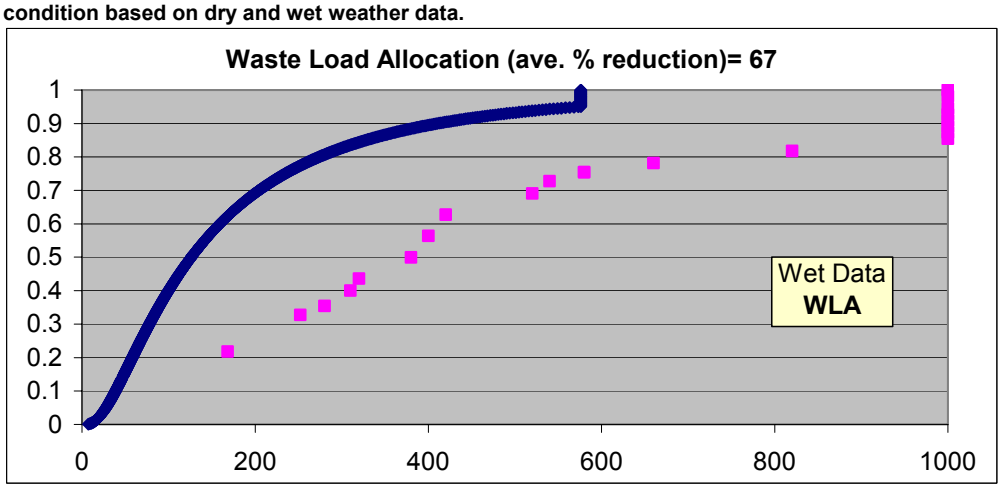
Precipitation and E. coli data provided by the Norwalk Department of Health and Haborwatch/Riverwatch, respectively.
WET Condition defined as greater than 0.1" precipitation in 24 hours or 0.25" precipitation in 48 hours, or 2.0" precipitation in 96 hours.

Silvermine River Criteria Curve for Monitoring Site 433

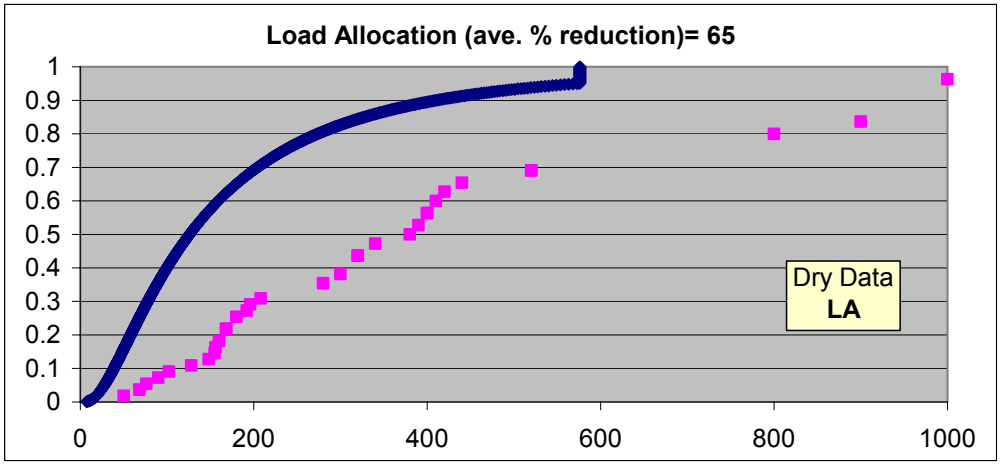
y axis = cumulative frequency; x axis = *E.coli* (col/100mL)



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



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



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

Appendix A-3
Silvermine River
TMDL Summary

The TMDL analysis for Silvermine River was conducted at one site (433), which is representative of one river segment (CT7302-00_01). The Waste Load Allocation (WLA) and Load Allocation (LA) percent reduction are 65 and 61, respectively. In this case both point stormwater and nonpoint sources are contributing to the bacteria load. It is likely that nonpoint sources include improperly functioning septic systems, pet/horse farms, domestic animal waste, and nuisance wildlife. Reduction in the WLA can be achieved through the installation of engineered controls to reduce the surge of stormwater to the river, promote groundwater recharge, and improve water quality.

Appendix B

Technical Support Document for the Cumulative Distribution Function Method

DEVELOPMENT OF TOTAL MAXIMUM DAILY LOADS (TMDLs) FOR INDICATOR BACTERIA IN CONTACT RECREATION AREAS USING THE CUMULATIVE DISTRIBUTION FUNCTION METHOD

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CT Department of Environmental Protection
Total Maximum Daily Load Program

Last revised: November 8, 2005

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 surface waters. 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 indicator bacteria (*Escherichia coli*) are represented by a statistical distribution of the geometric mean 126 and log standard deviation 0.4 for purposes of the 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 wet weather allocation and dry weather allocation components by quantifying the contribution of ambient monitoring data collected during periods of high stormwater influence and minimal stormwater influence to the current condition. The partition is used to determine the effect of high stormwater influence on the contribution of sources to the waterbody. 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 waters that are identified as impaired on the *List of Connecticut Water Bodies Not Meeting Water Quality Standards* [1]. It is expected that implementation of these TMDLs will be accomplished through implementing the provisions of the Small Municipal Separate Storm Sewer System general permit (MS4 permit) [2] in designated urban areas, as well as through measures that address non-point sources. The method as described here 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, *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

Connecticut's adopted water quality criteria for the indicator bacteria *Escherichia coli (E.coli)* in the CT Water Quality Standards [4] include a geometric mean and upper confidence limit (i.e. single sample maximum), which are based on three recreational use categories. The categories include designated swimming, non-designated swimming, and all other recreational uses. 'Designated swimming' includes areas that have been designated by State or Local authorities. 'Non-designated swimming' includes waters suitable for swimming but have not been designated by State or Local authorities, as well as water that support recreational activities where full body contact is likely, such as tubing or water skiing. 'All other recreational uses' include waters that support recreational activities where full body contact is infrequent, such as fishing, boating, kayaking, and wading. The recreational uses and applicable criteria are provided in the following table.

Recreational Use Category	Indicator Bacteria	Geometric Mean	Single Sample Maximum Upper Confidence Limit
Designated Swimming	***E.coli***	**126col/100mls**	**256col/100mls 75th Percentile**
Non-designated Swimming			**410col/100mls 90th Percentile**
All Other Recreational Uses			**576col/100mls 95th Percentile**

Table 1. Applicable indicator bacteria (*E.coli*) water quality criteria for recreational uses

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 235 col/100mls, 410 col/100mls, and 576 col/100mls adopted by Connecticut represents the 75^{th}, 90^{th}, and 95^{th} percentile upper confidence limit, respectively, for a statistical distribution of data with a geometric mean of 126 and a log standard deviation of 0.4 as recommended by EPA [5].

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.

Connecticut's adopted criteria 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 figures 1a through1c for each of the specified recreational uses in Connecticut's bacteria criteria.

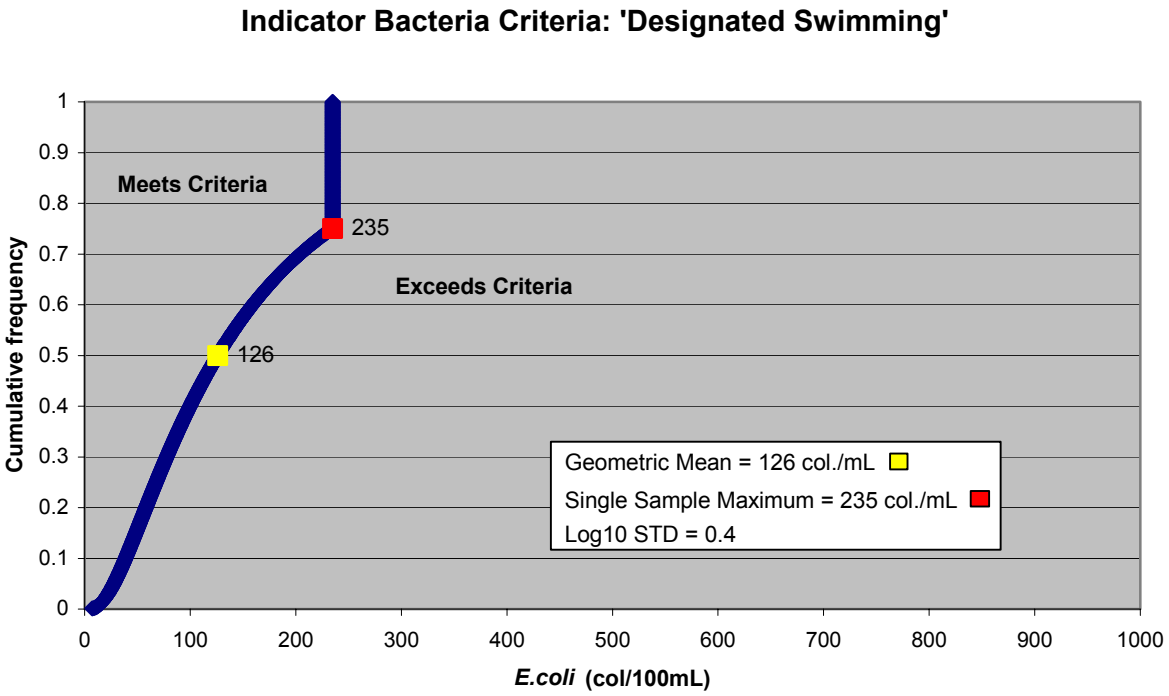

Figure 1a. Cumulative Relative Frequency Distribution representing water quality to support designated swimming use.

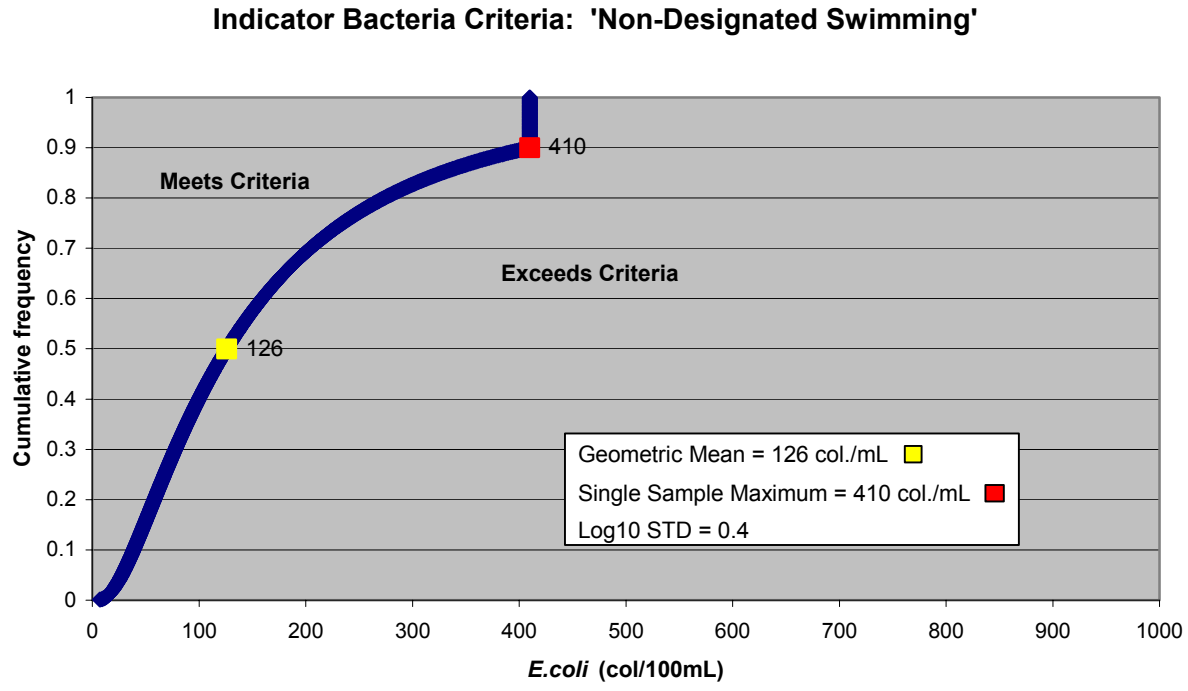

Figure 1b. Cumulative Relative Frequency Distribution representing water quality to support non-designated swimming use.

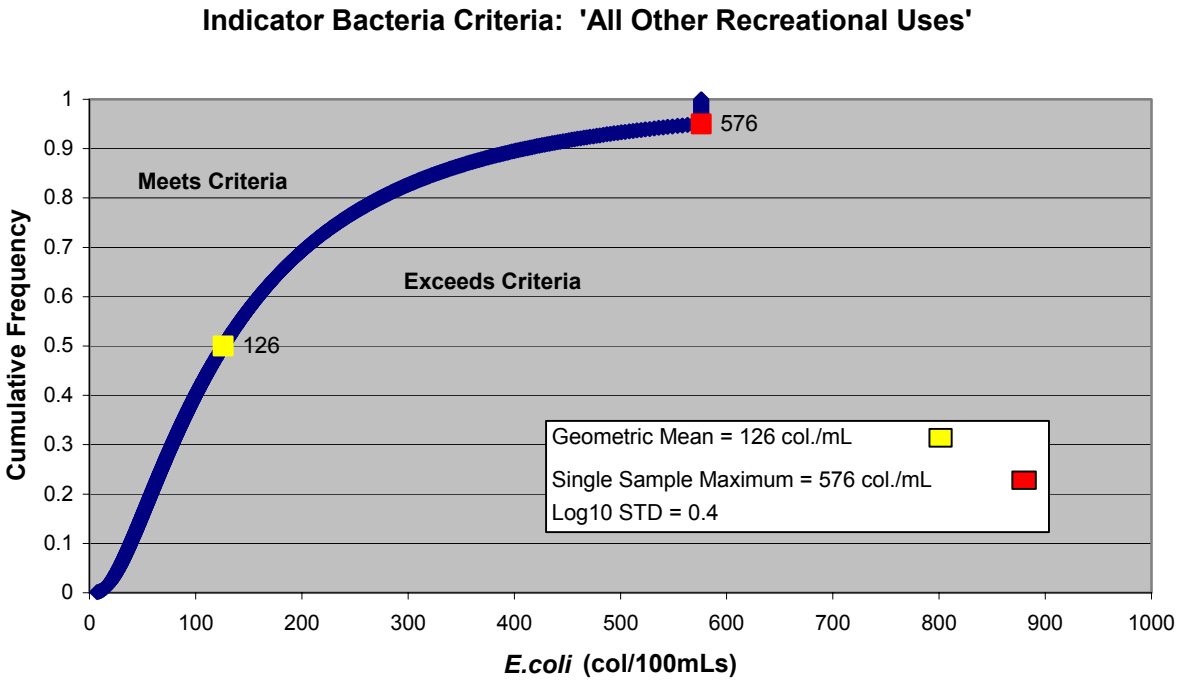

Figure 1c. Cumulative Relative Frequency Distribution representing water quality criteria to support all other recreational uses.

TMDL

As with the cumulative relative frequency curves representing the criteria shown in Figure 1a through 1c, 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 Figures 2a through 2c. 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.

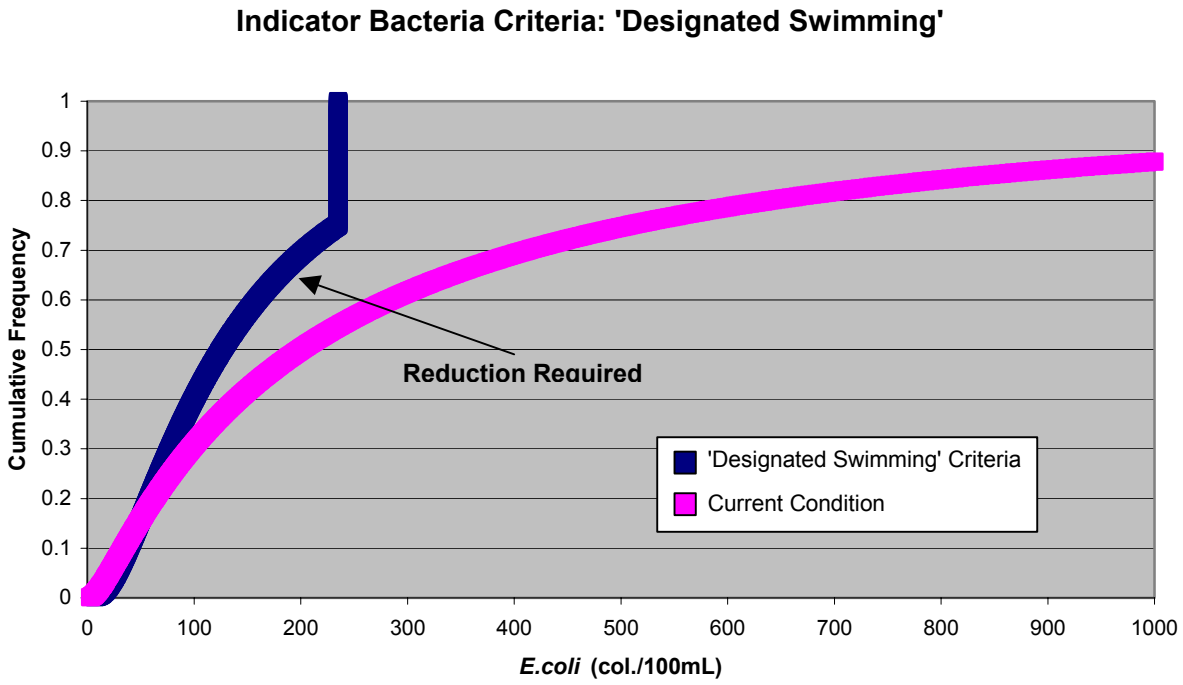

Figure 2a. Reduction indicator bacteria density needed from current condition to meet 'designated swimming' criteria based on cumulative relative frequency distribution.

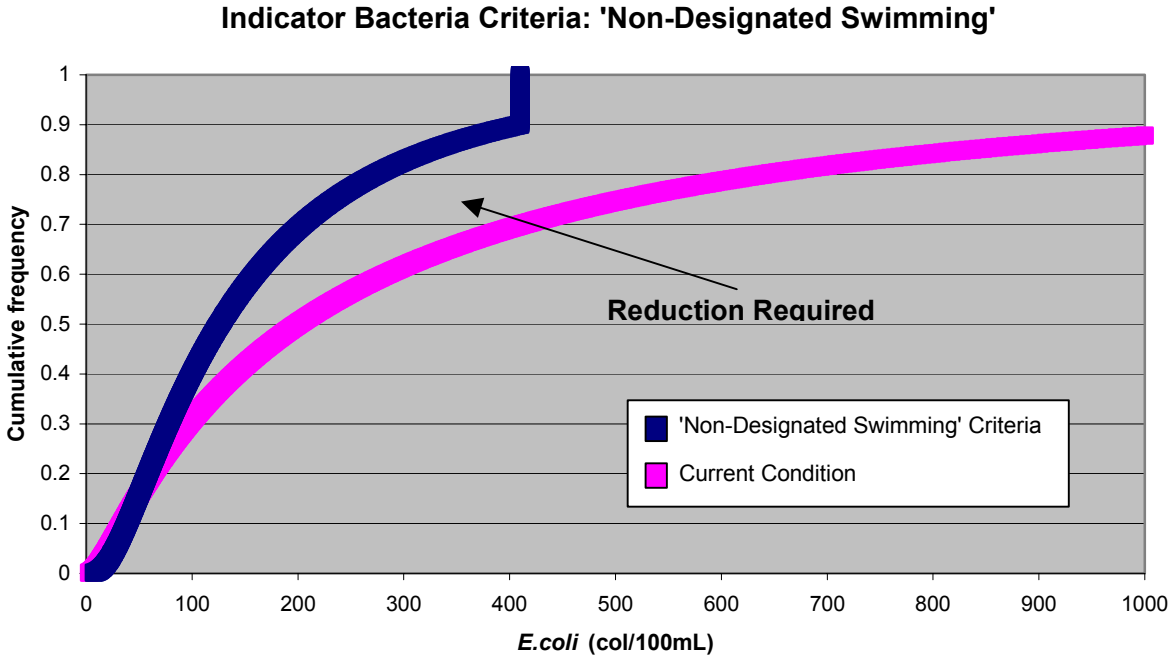

Figure 2b. Reduction indicator bacteria density needed from current condition to meet 'non-designated swimming' criteria based on cumulative relative frequency distribution.

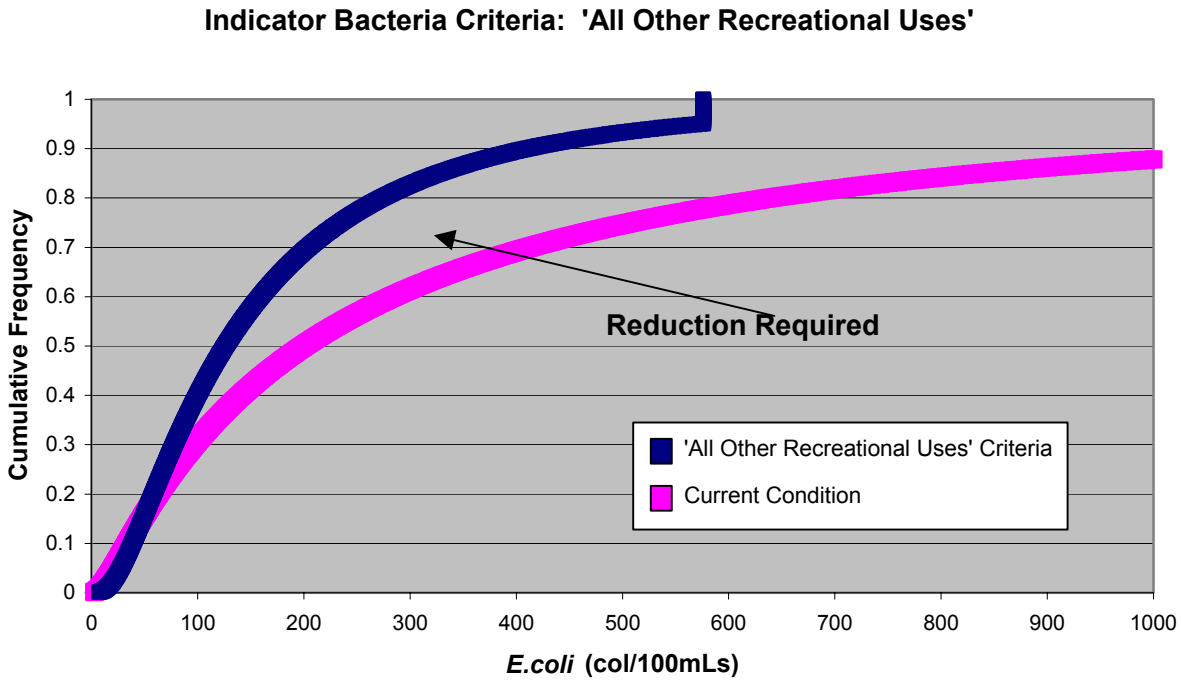

Figure 2c. Reduction indicator bacteria density needed from current condition to meet 'all other recreational uses' criteria based on cumulative relative frequency distribution.

TMDL ALLOCATIONS

Federal regulations require that the TMDL analysis identify the portion of the total loading which is allocated to point source discharges and the portion attributed to non-point sources, which contribute that pollutant to the waterbody. Stormwater runoff is considered a point source subject to regulation under the NPDES permitting program in designated urbanized areas. Designated urban areas, as defined by the US Census Bureau [7], 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 storm sewer system to surface waters of the State. 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. 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.

A WLA for stormwater discharges is not warranted in non-designated urbanized areas and in waterbody segments where there are no stormwater outfalls. As such, sources of bacteria in these waterbodies segments are attributed solely to nonpoint sources. However, wet weather and

dry weather percent reductions are partitioned in the LA analysis to demonstrate the effect of stormwater events on the contribution of nonpoint sources of bacteria to the waterbody.

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. In urbanized areas, the reduction needed under "wet" conditions is assigned to the WLA and the reduction needed under "dry" conditions is assigned to the LA. In non-designated urbanized areas, the LA is comprised of "wet" and "dry" conditions, which are partitioned into separate reduction goals. 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 2). Some existing sources such as dry weather flows from stormwater collections systems, illicit discharges to stormwater systems, and combined sewer overflows are allocated "100 percent 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. The management goal for point sources in designated swimming areas is elimination when the source is determined to be the main contributor of bacteria to the swimming area. This is consistent with the United States Environmental Protection Agency's (EPA) advisory for swimmers to avoid areas with discharge pipes [8] and a recent study indicating an increased potential for health risk to people swimming in areas near storm drains [9].

Source	Critical Conditions	Assigned To
On-Site Septic	Baseflow (DRY)	LA
Domestic Animal	Baseflow (DRY)	LA
Natural (Wildlife)	Baseflow (DRY)	LA
Wastewater Treatment Plants	Baseflow (DRY)	WLA
Regulated Urban Runoff/Storm Sewers	Wet Weather Flow (WET)	WLA
Dry Weather Overflow	Baseflow (DRY)	None
Illicit Discharges	Baseflow (DRY)	None
Combined Sewer Overflow	Wet Weather Flow (WET)	None

Table 2: Establishing WLA and LA Pollutant Sources

MARGIN OF SAFETY

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 nonpoint 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 illicit discharges 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 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 five 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 according to the specified recreational use (designated swimming, non-designated swimming, or all other) in a waterbody segment from the statistical distribution used to represent the criteria following the procedure described in steps **3 - 6** below:

3.

Designated Swimming	**Non-Designated Swimming**	**All Other Recreational Uses**
If the sample proportion is ≥ 0.75, the single sample criteria reference value is equivalent to the single sample criterion adopted into the Water Quality Standards (235 col/100ml)	If the sample proportion is ≥ 0.90, the single sample criteria reference value is equivalent to the single sample criterion adopted into the Water Quality Standards (410 col/100ml)	If the sample proportion is ≥ 0.95, the single sample criteria reference value is equivalent to the single sample criterion adopted into the Water Quality Standards (576 col/100ml)

4.

Designated Swimming	Non-Designated Swimming	All Other Recreational Uses
If the sample proportion is less than 0.75, and greater than 0.50, the single sample criteria reference value is calculated as:	If the sample proportion is less than 0.90, and greater than 0.50, the single sample criteria reference value is calculated as:	If the sample proportion is less than 0.95, and greater than 0.50, the single sample criteria reference value is calculated as:

$$\textit{criteria reference value} = \text{antilog}_{10}\,[\log_{10} 126 \text{ col/100ml} + (F * 0.4)]$$

N.B. 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).

5.

Designated Swimming	Non-Designated Swimming	All Other Recreational Uses
If the sample proportion is equal to 0.50, the single sample reference criteria value is equal to the geometric mean criterion adopted into the Water Quality Standards (126 col/100 ml)		

6.

Designated Swimming	Non-Designated Swimming	All Other Recreational Uses
If the sample proportion is less than 0.50, the single sample reference criteria value is calculated as:		

$$\textit{criteria reference value} = \text{antilog}_{10}\,[\log_{10} 126 \text{ col/100ml} - (F * 0.4)]$$

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:

$$\textit{percent reduction} = [(\textit{monitoring result} - \textit{criteria reference value})/\textit{monitoring result}]*100$$

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 – WET AND DRY WEATHER EVENTS

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, "wet" conditions are typically defined as greater than 0.1 inches precipitation in 24 hours or 0.25 inches precipitation in 48 hours, or 2.0 inches precipitation in 96 hours.

In designated urbanized areas 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.

In areas that do not have point sources, the average percent reduction for all sampling events used to derive the TMDL that are designated "wet" is computed as the wet weather LA, and the average percent reduction for all sampling events used to derive the TMDL that are designated as "dry" is computed as the dry weather LA.

ANALYTICAL PROCEDURE – SPREADSHEET MODEL

An Excel$^{(tm)}$ spreadsheet has been developed that performs all calculations necessary to derive a TMDL using this procedure. Copies of the spreadsheet in electronic form may be obtained from DEP by contacting Thomas 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.

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

8. Environmental Protection Agency, 2004. http://www.epa.gov/beaches/.

9. Haile, RW et al, 1999. *The Health Effects of Swimming in Ocean Water Contaminated by Storm Drain Runoff***.** Epidemiology. 10 (4) 355-363.

Appendix C

Status of Action Items included in the Norwalk River Watershed Action Plan
(*Pgs. 4-11, Supplement to the 1998 Norwalk River Watershed Action Plan, 2004*)

Initiative Accomplishments

Since the Action Plan's adoption in October 1998, the Norwalk River Watershed Initiative has been implementing "specific actions that focus on restoring and preserving this watershed" (***The Norwalk River Watershed Action Plan***, p. 43). Brief summaries of selected actions appear below, organized by the four subcommittees that originally developed these recommendations. Partners working on each action appear in parentheses at the summary's end.

Habitat Restoration

Invasives Removal. Under the NRCS/USDA Wildlife Habitat Incentives Program (WHIP), 14.4 acres of invasive species have been controlled in Ridgefield and Wilton. Old field management, riparian buffer management, and enhancing butterfly habitat in Ridgefield are included. (*Norwalk River Watershed Association, NRCS/USDA, and Trout Unlimited Mianus Chapter.*)

Dam Removals and River Restoration. The Initiative has targeted three old dams along the Norwalk River – Cannondale, Merwin Meadows, and Flock Process – for action. All three dams are "run-of-river" dams, which do not offer any flood control or protection in the watershed; all three are abandoned and no longer serve industry or agriculture. By the end of 2004, a 120-foot long fish bypass channel will be built at the Cannondale Dam in Wilton, allowing fish to swim around the dam and move up the river to spawn. Plans are also being developed for the dam at Strong Pond in Merwin Meadows Park (also in Wilton), originally built as a swimming pool for the owner's children. Two options are being considered, either breaching the dam or installing a fish bypass. Sediments behind the dam that would need to be removed if the dam is breached have been sampled and analyzed. The level of contamination found in the sediments will affect the project's cost. The Flock Process Dam (also know as the Winnipauk Dam), just south of the Merritt 7 office complex and the Merritt Parkway in Norwalk, is 22 feet, the highest dam along the river. The Initiative hopes to remove this dam completely. However, other options are being studied, including partially removing it and installing a fish ladder. Work at the Merwin Meadows Dam and the Flock Process Dam will involve restoring the stream corridor and planting native vegetation to stabilize the banks. The ultimate goal of these

three projects is to restore the river to its free flowing state and to promote a healthy environment for the resident fish population as well as anadromous and diadromous fish. (*American Rivers, Connecticut DEP, NRCS/USDA, National Fish and Wildlife Service, Save the Sound, Town of Wilton, Trout Unlimited Mianus Chapter, and EPA.*)

Stream Corridor Restoration. To date, the Initiative has restored more than 6,000 linear feet of stream corridor in the watershed, including work under Trout Unlimited's Embrace-A-Stream program and NRCS/USDA's WHIP as well as the habitat restoration demonstration projects in New Canaan, Ridgefield, and Norwalk (*described below under Water Quality*).

Using four consecutive grants from TU's national organization (1998-2001) and WHIP funding, instream and streamside improvements were made to the Norwalk River in Wilton at Schenck's Island Park, Merwin Meadows Park, near Old Mill Road, in Ridgefield at Walpole Pond, and along Topstone Road. A variety of structural habitat enhancements were installed, including conifer tree revetments, streambank soil bioengineering with coir fiber rolls, instream and bank-placed boulders and large woody debris, and single wing and saw tooth rock deflectors.

NRCS/USDA and DEP have monitored yearly, using electrofishing equipment, to assess the trout population's viability. In electrofishing, an electric current is passed through the water, temporarily paralyzing the trout and allowing a researcher to count them and take measurements. Monitoring results are very positive. At the first site where work was done in Merwin Meadows Park, the wild trout population increased by about 130 percent after 9 months. Similarly impressive results were seen around Schenck's Island. In recognition of these improvements, the state has declared 12 miles of the Norwalk River to be a Class III wild trout management area.

However, immediately downstream of the Strong Pond Dam in Merwin Meadows, several years of electrofishing data document depressed fish abundance. Despite substantial physical habitat enhancements making the area conducive to coldwater fisheries, this section continues to exhibit depressed fish abundance until the coldwater influence of Comstock Brook. Water quality impacts associated with the impoundment created by the Strong Pond Dam and habitat fragmentation are suspected to contribute to this situation.

Within the next year, an eroded streambank section located behind the Silvermine School (on the Silvermine River) in Norwalk will also

be restored. Coldwater fisheries will be enhanced, a pedestrian bridge will be rebuilt, and riparian plantings along the eastern streambank (school property) will be installed. Timber steps to the river are also being considered. This project provides an opportunity to educate students, faculty, and parents about habitat and stream restoration. (*CT DEP, City of Norwalk, NRCS/USDA, Trout Unlimited Mianus Chapter, and Town of Wilton.*)

Road Sand/Salt Study. A recently completed report analyzed the use of road sand and salt (including related road operations, maintenance, and cleanup) by watershed towns and made recommendations to reduce sand deposition. The project surveyed municipal public works directors about their current practices and researched alternatives, such as using brines for anti-icing and alternatives to sodium chloride. A workshop was held in November 2002 to share information. (*Southwest Conservation District.*)

Land Use/Flood Protection/Open Space

Public Access/Trails. To encourage first-hand enjoyment of the Norwalk and Silvermine Rivers, the Initiative prepared in September 2001 a public access guide that identified five sites. This guide will be expanded in the near future. In addition, efforts are underway to prepare a map of existing trails in the watershed and to encourage the development of the Norwalk River Valley Linear Park. (*Norwalk River Watershed Association and Watershed Coordinator.*)

Municipalities Pursue Action Plan's Objectives. Four of the seven watershed towns have designated a municipal employee who is responsible for pursuing the Action Plan's objectives. These towns are New Canaan, Norwalk, Wilton, and Weston.

ALERT System. An automated early flood warning system, the ALERT system, has been in place in the watershed since early 2001. The system, designed and installed by CT DEP, benefits four watershed towns (Norwalk, Redding, Ridgefield, and Wilton) by providing advance notice before flooding begins. The ALERT system uses a combination of computers, automated rain gauges, and river gauges to collect rainfall and river level information automatically and in real time. In the Norwalk River Watershed, there are four rainfall gauges and three river gauges along the Norwalk and Silvermine Rivers. Information is passed through a system of radio repeaters to a central base station at Redding's 911 center where specialized computer software analyzes the river stage and precipitation data. The other three watershed towns can dial into the Redding computer

to receive this information. The system's total cost was just under $100,000, of which the state paid two-thirds and municipalities one-third. (*CT DEP, City of Norwalk, and Towns of Redding, Ridgefield, and Wilton.*)

Water Quality

Streamside Buffers Brochures. The Initiative published two brochures about the importance of streamside vegetation and with guidelines for maintaining, improving and restoring buffers. One brochure is aimed at the private property owner; the other focuses on buffers in developed urban areas. (*CT DEP, NRCS/USDA, and Southwest Conservation District.*)

Habitat Restoration Projects. The Initiative has undertaken three habitat restoration demonstration projects in the watershed: 1) at the old Perkin-Elmer facility, Norwalk (July 1998); 2) at Fox Hill Condominiums, Ridgefield (May 2000); and 3) at two adjacent residential properties on the Silvermine River, New Canaan (May 2004). The goals of these restoration projects are similar: to restore habitat, to improve water quality, and to demonstrate to the community how landscaping can effect these changes. At the first two sites, another goal was to dissuade the Canada goose. At each site, volunteers created a buffer next to the river by planting native shrubs and trees to replace existing lawn. (*CT DEP, City of Norwalk, King's Mark Resource Conservation and Development, NRCS/USDA, Norwalk River Watershed Association, Ridgefield and Caudatowa Garden Clubs, Southwest Conservation District, Towns of New Canaan, Ridgefield and Wilton, Trout Unlimited Mianus Chapter, and Watershed Coordinator.*)

Water Quality Monitoring. The Initiative has sponsored water quality monitoring of the Norwalk River for five years and of the Silvermine River for two years. From May-November, trained volunteers collect and analyze water samples for indicator bacteria, nutrients, dissolved oxygen, and conductivity, from 10 sites along the Norwalk River and 8 sites along the Silvermine River. Results show that there are stressed areas along the Norwalk River and water quality is moderately impaired.

Over the past three years, this monitoring has identified three "hot spots" or instances of problem discharges, two of which were successfully resolved. In the first case, in August 2001, analyses of discharges from the Ridgefield South Street wastewater treatment plant showed extremely high levels of bacteria and ammonia.

Prompted by these results, the town launched an investigation, which revealed that the plant manager had unilaterally decided to try biological phosphorous removal, a treatment operation not appropriate for the plant and which caused operational problems and violations of the plant's discharge permit. The plant manager was subsequently reassigned. For the past two summers (2002 and 2003), the treatment plant has met its permit limits.

The second "hot spot" was discovered in the summer of 2003, when monitoring revealed high fecal counts at a site on the Silvermine River in Wilton, just north of the Silvermine Tavern. This site is a small farm where the property owner has large animals and waterfowl. At the time of this monitoring, the owner was not using any best management practices to prevent animal waste runoff from reaching the water. Both the town and the property owner were informed of the problem, and the property owner is implementing several procedures, including removing some waterfowl and removing animal waste more regularly.

The third problem discharge is in Ridgefield, on the Norwalk River near Cooper Brook and the Route 102 bridge. At this site, monitoring has shown elevated bacteria levels exceeding CT DEP standards for the past four years; the source (or sources) has not as yet been identified. The Ridgefield health department has been notified. (*Harbor Watch/ River Watch, Towns of Ridgefield and Wilton, and Wilton High School.*)

Septic System Study. Septic system ordinances from municipalities in the region were collected and local officials were interviewed about how better to manage septic system requirements. A draft model septic system ordinance was also developed. Project conclusions include recommending pump-outs every three years, providing better education for sanitarians and the public, and implementing systems to track municipal inspections of private septic systems. A workshop was held in October 2001, with presentations by towns in the region that have active septic inspection programs, a discussion of the draft model ordinance, and an overview of appropriate communication strategies. (*Norwalk River Watershed Association.*)

Stewardship and Education

Advisory Committee. The 20-person Advisory Committee for the Norwalk River Watershed Initiative was established in November 1999. It continues to meet regularly to provide ongoing leadership for the Action Plan's implementation. A list of current representatives appears on page 16.

The Advisory Committee can be characterized by continuity of involvement and commitment by the seven municipalities and other partners. With the exception of the U.S. Environmental Protection Agency, which is no longer actively represented on the committee, all of the partners present at the first meeting continue to participate – after more than five years. Meetings are also consistently well attended. At least two-thirds of all members attended the 9 meetings in 2003; at the July 2003 meeting, 16 members (80 percent) of the entire committee were present. The Advisory Committee generally meets the third Thursday of each month at the Wilton Town Hall Annex from 3:00 – 4:30 p.m.

Watershed Coordinator. The Watershed Coordinator provides technical and administrative support to the Initiative's Advisory Committee and directs the Initiative's public outreach efforts. Jessica Kaplan, a Wilton resident, has served as Watershed Coordinator since February 2000. She is now in her fifth year in this position.

The Watershed Coordinator concentrates her efforts in the following four areas:

- Developing outreach materials, such as press releases and news articles, to deliver the message of responsible watershed management to all inhabitants of the Norwalk River Watershed and to help each resident understand that he/she personally has a stake in taking care of the river. A complete list of the outreach materials Ms. Kaplan has prepared is available upon request.
- Increasing public awareness by making presentations to service groups, such as local Rotary Clubs and the League of Women Voters, and at other venues such as the Oyster Festival in Norwalk where the Initiative had a booth in September 2000 and 2001.
- Institutionalizing the Initiative by increasing its visibility. In 2003, due to the Watershed Coordinator's efforts, the Initiative's work was recognized in several ways. In February, the Initiative was selected by the U.S. Environmental Protection Agency as a *Clean Water Partner for the 21st Century*. Based on that selection, EPA Region 1 honored the Initiative with a "Special Recognition Award" for its work in April 2003. Finally, in October 2003, the Southwest Conservation District recognized Ms. Kaplan, on behalf of the Initiative, as the Outstanding Cooperating Agency of the Year.
- Supporting the Advisory Committee both administratively and technically. For each meeting, the Coordinator identifies an appropriate speaker, prepares the agenda and other handouts, and drafts and distributes meeting minutes. The Coordinator also

assists in implementing technical projects and serves as a liaison among the partners to accomplish project work.

Total funding for the Coordinator's position is $50,000, a figure that has remained constant since the position was filled in 2000. For the past five years, the Dibner Fund in Wilton has provided $25,000 for the position. For three years (2000-2003), a matching $25,000 was provided by a federal Clean Water Action Section 319 grant through DEP. For FY 2004, the 319 funds were cut in half. Because of cuts in federal funding, DEP has informed the Initiative that no further 319 funds will be available for the Coordinator's position. The table below shows funding for this position for the two most recent fiscal years.

Funding Sources	**FY 2002-2003**	**FY 2003-2004**
Dibner Fund	$25,000	$25,000
DEP 319	$25,00	$12,500
Watershed Municipalities	- 0 -	$6,250
Total	$50,000	$43,750

In 2003, confronted by a shortfall of $12,500, the Initiative requested that the seven watershed municipalities contribute a portion of the unfounded balance. A formula was determined to allocate the shortfall across the localities based on three factors: 1) whether the municipality owned (or shared) treatment capability; 2) the percent of each town's area in the watershed; and 3) the total population of each town and the percent that this represents in the watershed. Unfortunately, because of the tough economic situations faced by all watershed municipalities, only six of the seven contributed for a total of only $6,250.

For FY 2005, the Initiative has again requested from each watershed municipality the full pro-rated contribution amount for a total of $12,500. To date, only one municipality, Lewisboro, NY, has furnished its contribution ($500). It is anticipated that the other six municipalities have included funding for the Initiative in their FY 05 budgets.

Watershed Video. ***Life in a Watershed: The Story of Nonpoint Source Pollution*** is the title of a video, on permanent exhibit at The Maritime Aquarium in Norwalk since October 2002, that illustrates the problem of nonpoint source pollution. This 15-minute video shows the effects of nonpoint source pollution, describes local activities to eliminate these

effects, and underscores how each watershed resident can help solve the problem. (*CT DEP, NRCS/USDA, The Maritime Aquarium at Norwalk, Town of Wilton, and Watershed Coordinator.*)

Meetings of Chief Elected Officials. The Initiative has held two meetings for chief elected officials of the watershed towns, one in October 2000 and the other in January 2003. Both were held at The Maritime Aquarium in Norwalk. At each meeting, Advisory Committee members updated officials on implementing the Action Plan and asked for their priorities for future work. A report on each meeting was prepared. (*Advisory Committee members and Watershed Coordinator.*)

Initiative Website. The Initiative has developed a website, www.norwalkriverwatershed.org, which provides information about the watershed and the Initiative's activities, and includes the Action Plan in PDF format. The website is in the process of being updated. (*Watershed Coordinator.*)