

**Water Quality Data Report
For
Norwalk River Watershed
October 2011 through April 2012**



Nikki Cantatore takes dissolved oxygen readings at NR13

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Introduction:

Purpose of Study: The Earthplace Harbor Watch (HW) Program was funded by the Connecticut Department of Environmental Protection (CT DEP) to conduct water quality monitoring on the Norwalk River for six years, June 1998 through June 2005. HW initially collected and analyzed water samples for fecal coliform bacteria at 21 sites, eleven of them along the main stem of the Norwalk River and one on the Silvermine River (Figure 1, Figure 2).

Background: From June 1998 through May 1999, HW conducted a first-year water quality monitoring study in the Norwalk River Watershed. This study was funded by the CT DEP and was intended to provide water quality information in support of the Norwalk River Watershed Initiative. The purpose of the study was to obtain data on the levels of fecal coliform bacteria, dissolved oxygen, and conductivity at selected locations in the Norwalk River and in its major tributaries (Silvermine River, Comstock Brook and Cooper Brook). The study indicated that fecal coliform bacteria levels frequently exceeded the state's water quality criterion for Class B water at a number of sites along the Norwalk River. Most sites met the dissolved oxygen level CT DEP criterion for Class B waters. The first year study also showed that conductivity levels were consistently higher in the upper reaches of the watershed than in the lower watershed. Based upon the water quality data collected, HW determined that the water quality in the Norwalk River Watershed was moderately impaired.

The CT DEP and HW executed a contract for a second year funding in September 1999 (from September 1, 1999 through November 30, 2000). HW was authorized to begin testing for *E. coli* bacteria in November 1999. Sampling then took place at 12 of the 21 most impacted sites along the Norwalk River. Monthly reports were prepared and submitted to the CT DEP and disseminated to the seven towns comprising the Norwalk River Watershed as well as the Norwalk River Watershed Initiative Advisory Committee.

Funding was then made available by the CT DEP to continue testing on the Norwalk River for a third summer (April 1 to September 30, 2001) based on a continuing interest by Norwalk River Watershed Advisory Committees and the CT DEP. The same testing protocols, used in 2000 by HW, were again used under the original QAPP. This QAPP was extended on April 25, 2001 to September 30, 2001 by the EPA's Office of Environmental Measurement and Evaluation (Table 1).

During 2002, the CT DEP switched to *E. coli* bacteria as the "preferred" indicator species for freshwater, as it is a more specific indicator of fecal material arising from humans and other warm-blooded animals.

Presently the Norwalk River is monitored on a year round basis with weekly testing at 12 test sites from May 1st through September 30th and monthly testing from October through April.

Additional 319 funding was allocated to continue the HW testing regime on the Norwalk River for twenty-three months beginning July 2002 and ending June 30, 2004. The last contract with the CT DEP expired on 6/30/05. HW again renewed testing of the Norwalk River and its tributaries on May 1, 2005 thanks to the interest and generosity of the Town of Wilton, The Norwalk Mayor's Water Quality Committee, The Wilton Inland Wetlands Commission, King Industries, Norwalk River Watershed Association, Inc., NRG-Manresa, Town of Ridgefield, Norm Bloom, Leslie Bloom-Miklovich, and Trout Unlimited have collectively continued to provide additional funds to support the 2010/2011 monitoring season.

Although these monthly reports are submitted to the CT DEEP for review and comment, Harbor Watch is solely responsible for the collection, analysis and interpretation of the water quality data.

Figure 1 Location of 6 monitoring sites in the Upper Norwalk River Watershed

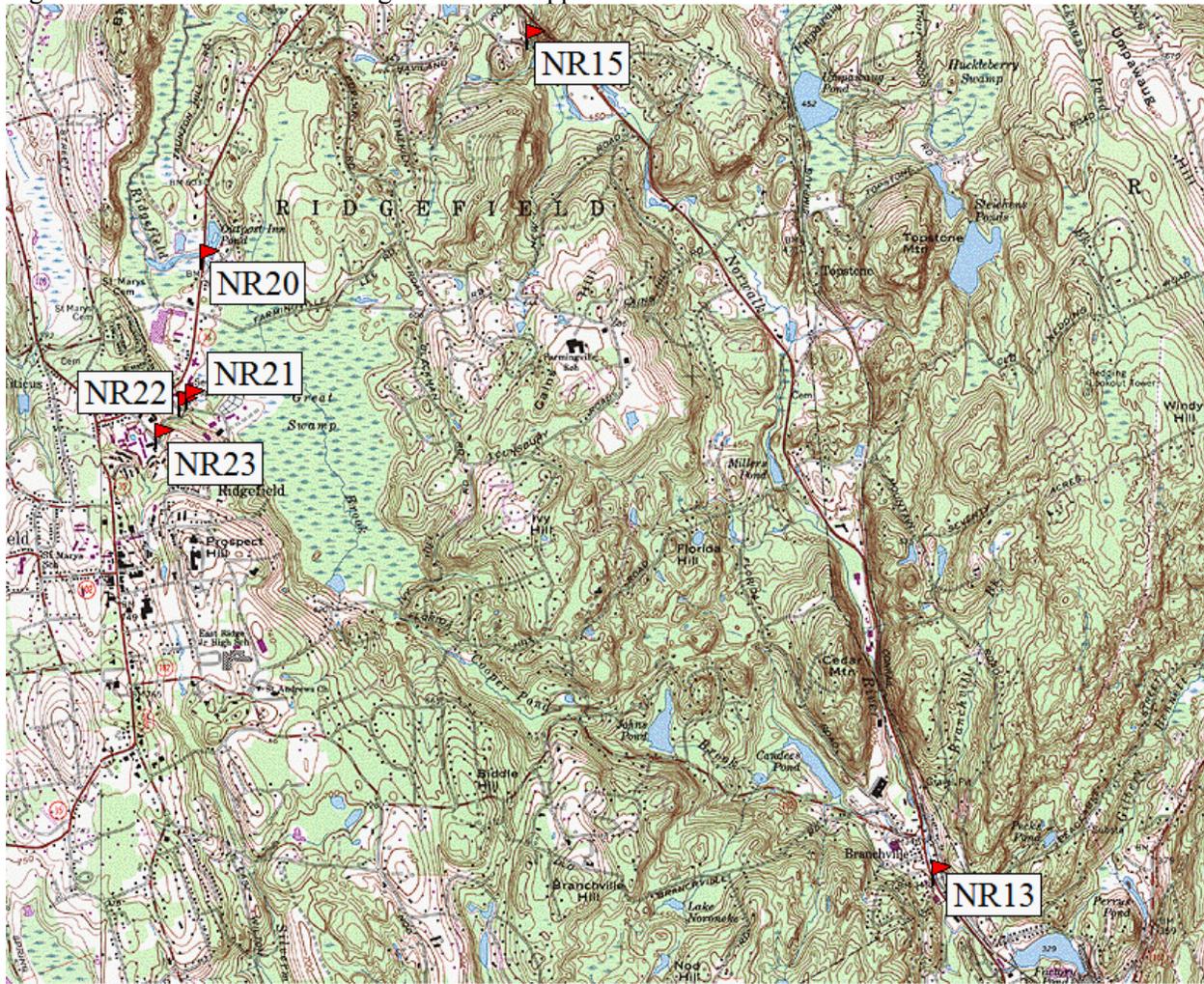
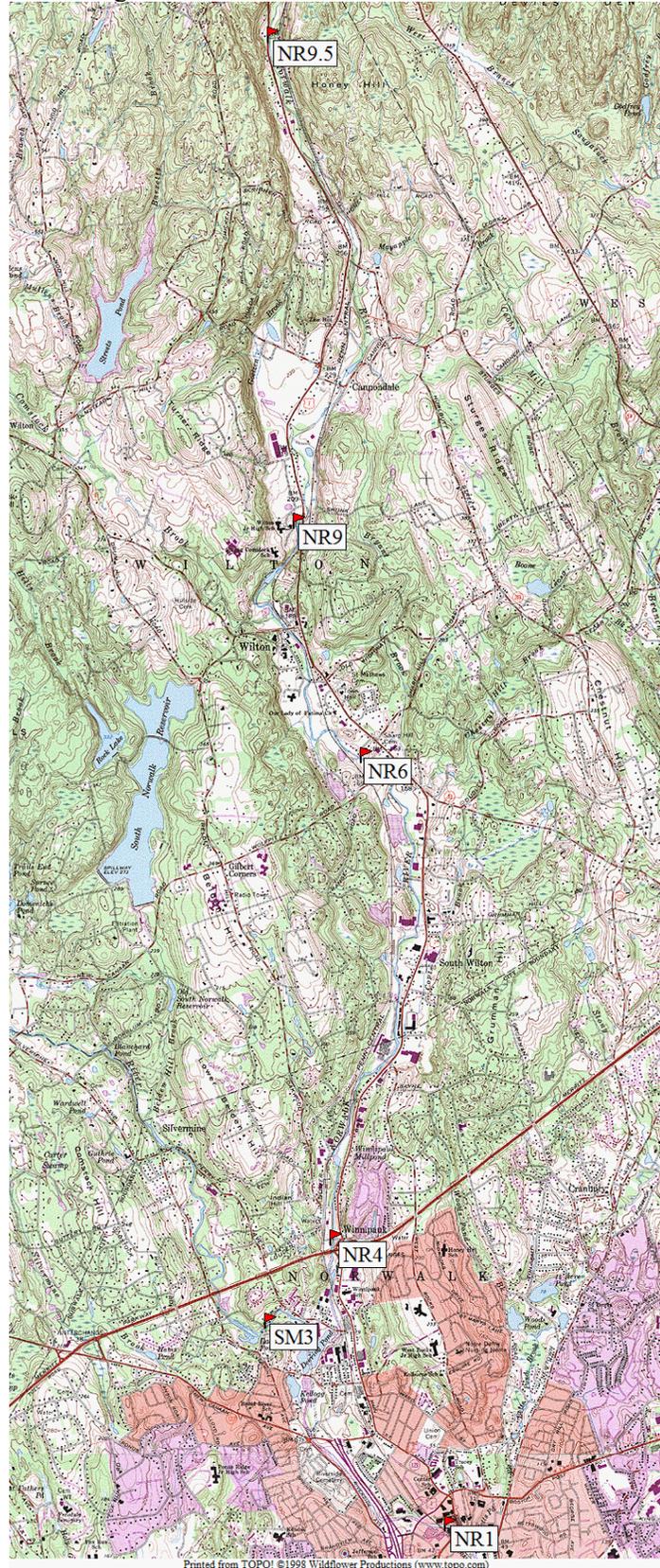


Figure 2 Location of 6 monitoring sites located in the Lower Norwalk River Watershed



Methods and Procedures: Water monitoring is carried out under Quality Assurance Project Plan (QAPP) RFA#10160 approved by CT DEEP and EPA on 9/10/10 for five years. Monitoring teams leave Earthplace in Westport at 9:30am and return at 11:00am. The team is comprised of a fully trained Harbor Watch employee and three volunteers. Water samples are collected at 12 (Figure 1) monitoring sites along the length of the river. These sites, which represent the more impacted sites and developed areas, were selected in concert with the CT DEEP, because results from the first year’s study consistently demonstrated elevated fecal coliform bacteria counts at these locations.

The following tests are run *in situ*: dissolved oxygen (QAPP Appendix A3.2) and conductivity (QAPP Appendix A3.3). Water and air temperatures, as well as general observations and storm events are also recorded at each site visit. Observations are recorded (QAPP Appendix 5) on the HW data sheet.

Upon return to the lab, fecal coliform bacteria membrane filtration tests (QAPP Appendix A3.5) are performed and *E. coli* testing is carried out according to Standard Methods, 21st edition (9222D & 9222G) and recorded (QAPP Appendix 5) on the HW bacteria log. During the monitoring period, sites were monitored once per month.

E. coli bacteria will be evaluated using the criteria published in the CT DEEP Surface Water Quality Standards, 2/25/11. The CT DEEP *E. coli* criterion for Class AA, A, and B water is established at three levels (Table 1).

The Norwalk River is classified for “all other recreational uses” because people do not bathe in or drink the river water and it is too shallow for swimming. The report will focus on *E. coli* bacteria levels, because it is the indicator bacteria of choice by the CT DEEP.

Table 1 CT DEEP criterion for *E. coli* bacteria levels as applied to recreational use, effective 2/25/11

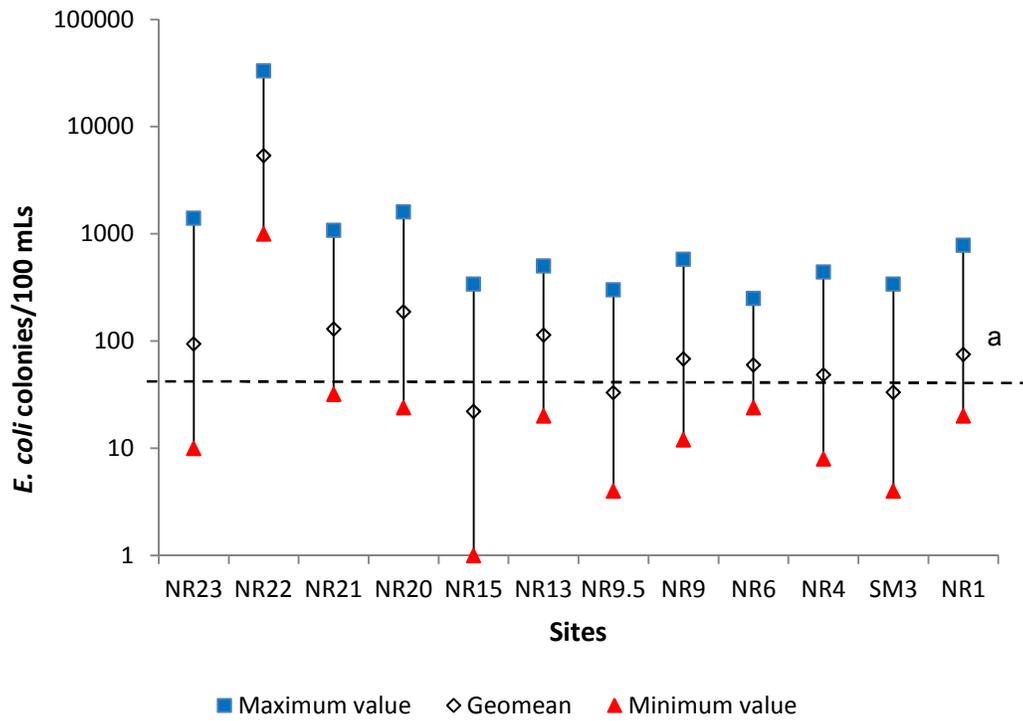
Designated Use	Class	Indicator	Criteria
Recreation			
Designated Swimming	AA, A, B	<i>Escherichia coli</i>	Geometric Mean less than 126/100; Single Sample Maximum 235/100
Non-designated Swimming	AA, A, B	<i>Escherichia coli</i>	Geometric Mean less than 126/100; Single Sample Maximum 410/100
All Other Recreational Uses	AA, A, B	<i>Escherichia coli</i>	Geometric Mean less than 126/100; Single Sample Maximum 576/100

Results: Observed *E. coli* geomeans exceeded the CT DEEP criterion for a class B river of <126CFUs/100mLs at three sites; NR22, NR21 and NR20 (Figure 3, Table 2). Five monitoring sites, NR23, NR 22, NR21, NR20, and NR9, exceeded the CT DEEP single sample maximum (SSM) of <10% over 576 CFU/100mL for a Class B river (Table 2).

All twelve sites passed the CT DEEP mean minimum of 5mg/L for dissolved oxygen. There were two individual sites that fell below 5mg/L on 10/20/12 (Figure 4). Site NR21 had an observed reading of 3.7mg/L and site NR20 had an observed reading of 4.6mg/L.

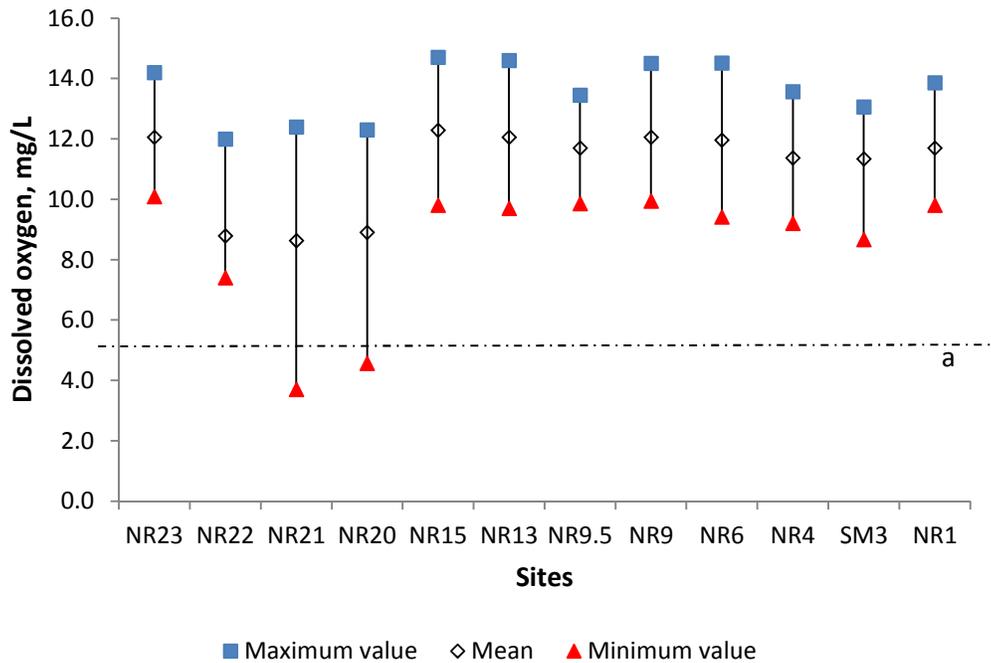
Conductivity means ranged from a maximum of 835µS at NR23 and a minimum of 225µS at SM3. The widest conductivity range was observed at NR23 with a range of 614µS and narrowest at SM3 with a range of 61µS (Figure 5, Table 3).

Figure 3 Maximum, geomean, and minimum *E. coli* values for twelve sites in the Norwalk River watershed from October 2011 through April 2012



a CT DEEP geomean maximum for a Class B river

Figure 4 Maximum, geomean, and minimum dissolved oxygen values for twelve sites in the Norwalk River watershed from October 2011 through April 2012



a CT DEEP minimum criterion for dissolved oxygen for Class B river

Figure 5 Maximum, geomean, and minimum conductivity values for twelve sites in the Norwalk River watershed from October 2011 through April 2012

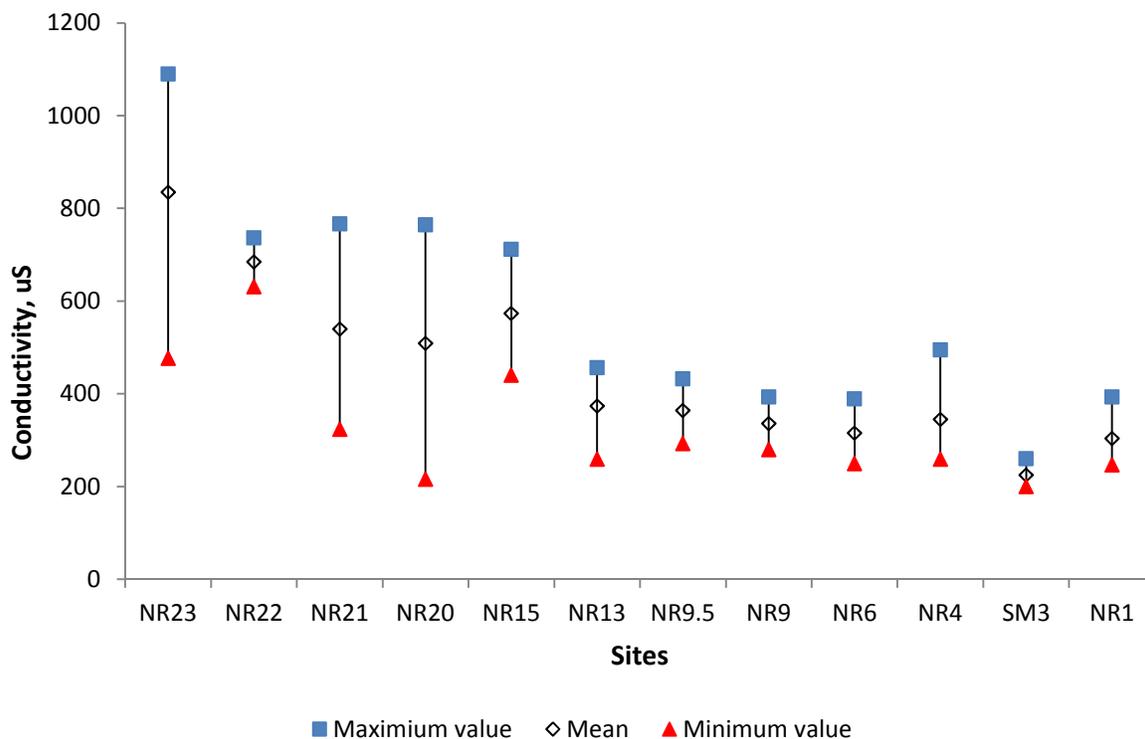


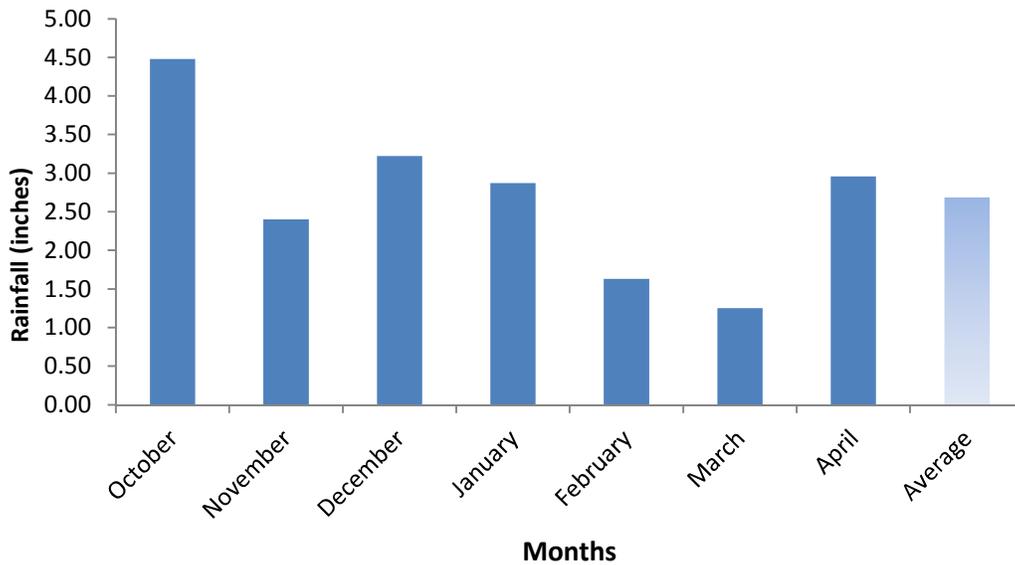
Table 2 Observed *E. coli* counts on each sampling date, geomeans, and % frequency exceeding 576 CFUs/100mLs for each site in the Norwalk River watershed during the October 2011 through April 2012 monitoring period

Sites	10/20/2011	11/17/2011	12/15/2011	1/26/2012	2/16/2012	3/15/2012	4/19/2012	Geomean	%frequency over 576 colonies/100mLs
NR23	330	1400	116	112	16	10	68	94	14.29%
NR22	4000	10000	7800	2100	33000	5900	1000	5363	100.00%
NR21	160	1080	52	32	480	78	56	129	14.29%
NR20	470	1600	100	60	600	124	24	187	28.57%
NR15	130	340	44	12	8	14	1	22	0.00%
NR13	120	440	20	24	40	490	500	114	0.00%
NR9.5	160	300	48	8	4	48	12	33	0.00%
NR9	260	260	12	12	44	28	580	68	14.29%
NR6	250	240	56	44	24	28	28	60	0.00%
NR4	350	440	44	8	8	52	28	49	0.00%
SM3	320	340	92	8	18	8	4	33	0.00%
NR1	340	780	64	20	34	26	44	75	0.00%
Rainfall (in.)	0.68	0.76	0.28	0.24	0.20	0.14	0.04		
Days prior	1	1	7	0	0	2	0		

Table 3 Conductivity ranges for twelve sites in the Norwalk River watershed from October 2011 through April 2012

	NR23	NR22	NR21	NR20	NR15	NR13	NR9.5	NR9	NR6	NR4	SM3	NR1
Max value	1090	737	767	765	712	457	433	393	389	495	261	394
Min value	476	631	324	216	440	259	293	280	250	259	200	247
Range	614	106	443	549	272	198	140	113	139	236	61	147
Mean	835	685	540	509	573	374	364	336	316	345	225	304

Figure 6 Rainfall for the monitoring period October 2011 through April 2012



Discussion: Monthly rainfall averaged at 2.69in/month which is below the normal average of 4.5in/month (Figure 6). Elevated *E. coli* counts were observed on days that received over 0.6 inches (Table 2).

E. coli bacteria levels at site NR22 had a geomean of 5363 CFU/100mLs (Figure 3, Table 2). These elevated counts are observed during winter months when based on NPDES permit requirements, the Ridgefield Wastewater Treatment Plant's ultraviolet lights for sanitizing the effluent stream can be turned off from September through May. The treatment plant extends the length of time they keep their lights on beyond permit regulations, turning them off in mid-October and turning them back on mid-April. During the months when the UV lights are on, Harbor Watch has observed regular *E. coli* counts of zero every week (Harbor Watch Records). The two immediate downstream sites, NR 21 and NR20, have observed elevated *E. coli* bacteria counts above the CT DEEP criterion for a class B river of <126CFUs/100mLs as well. It is possible that these counts are directly related to the impact from the wastewater treatment plant effluent.

The downstream sites, NR15 through NR1, all meet the CT DEEP criteria for *E. coli* bacteria (Figure 3, Table 2). A possible reason for this is that cold weather and lack of precipitation created conditions which bacteria could not live long and reduced runoff into the river. Only site NR9 exceeded the secondary CT DEEP single sample maximum (SSM) standard of <10% over 576 CFU/100mL when bacteria counts on 4/19/12 were observed at 580 CFU/100mLs. Site NR13 also saw an elevated *E. coli* count of 500 CFU/100mLs on 4/19/12, but not elevated enough to cause the site to fail the SSM. These counts may be affected by a tributary, Branchville Brook that enters the river just above NR13. During November 2011, Harbor Watch identified a cesspool leaking into Branchville Brook just upstream of where the brook enters the Norwalk River. Ridgefield Town authorities were informed of the cesspool and observed elevated bacteria counts, and remediation efforts are in effect. A more detailed report of the findings in Branchville Brook can be found in the 2011-2012 NR13 Watershed Report (Harbor Watch Records).

With the exception of two individual readings on October 20, 2011, all sites had observed dissolved oxygen readings above 5mg/L (Figure 4). This is to be expected during the cold months. The two readings that dip below 5mg/L at sites NR21 and NR 20 could be attributed to the wastewater treatment plant effluent and due to the water having to travel through a swamp which slows its movement (Figure 1).

Conductivity ranges are wide in the upper sites of the main river. This is expected because the headwaters are affected by the presence of limestone beds on the river banks in Ridgefield. As the river flows to the harbor, the conductivity is diluted by the low conductivity of the tributaries like Cooper Brook, Branchville Brook and Comstock Brook tributaries that begin entering the river just above site NR13. The Norwalk River monitoring sites become more stable, with less influence by storm water runoff as the water moves to Long Island Sound as can be seen in Figure 5.

Appendix A

Table A1 Site number identification, site location and town for sampling and testing (headwaters to mouth), *=tributary to the Norwalk River

Site No.	Site Area	Town	GPS Coordinates
NR23	Steep Brook next to South Street WTP	Ridgefield	Latitude: N 41° 17' 24.3" Longitude: W 73° 29' 35.6"
NR22	South Street WTP outfall	Ridgefield	Latitude: N 41° 17' 26.8" Longitude: W 73° 29' 29.6"
NR21	Farmingville Road at the Great Swamp outlet	Ridgefield	Latitude: N 41° 17' 40.2" Longitude: W 73° 29' 18.5"
NR15	Stonehenge Road at the top of the dam	Ridgefield	Latitude N 41° 18' 32.0" Longitude: W 73° 28' 8.3"
NR13	Branchville at the railroad station (Route 7)	Ridgefield/Wilton	Latitude: N 41° 15' 55.8" Longitude: W 73° 26' 27.2"
NR 9.5	Downstream of the Georgetown Wastewater Treatment Plant -- Old Mill Road	Wilton	Latitude: N 41° 14' 46.0" Longitude: W 73° 26' 2.5"
NR9	School Road	Wilton	Latitude: N 41° 12' 15.3" Longitude: W 73° 25' 51.6"
NR6	Near Wolfpit Road in back of the Wilton Corporate Office Complex	Wilton	Latitude: N 41° 11' 0.1" Longitude: W 73° 25' 18.4"
NR4	Upstream of Route 15 (Glover Avenue) and downstream of the Merritt 7 Office Complex	Norwalk	Latitude: N 41° 8' 3.5" Longitude: W 73° 25' 35.8"
SM3*	James Street (on the Silvermine River)	Norwalk	Latitude: N 41° 8' 10.3" Longitude: W 73° 26' 4.0"
NR1	Post Road (US Route 1) adjacent to the Ash Creek Grille Restaurant	Norwalk	Latitude: N 41° 7' 10.8" Longitude: W 73° 25' 1.3"