

FAIRFIELD COUNTY WATER QUALITY REPORT



2024

NEW CREEK

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2024

Fairfield County Water Quality Report

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This report includes data on:

Ash Creek Watershed (Ash Creek, Rooster River, Londons Brook, Horse Tavern Brook), Bruce Brook, Comstock Brook, Fivemile River, New Creek, Noroton River, Norwalk River Watershed (Norwalk Harbor, Norwalk River, Ridgefield Brook), Pequonnock River Watershed (Pequonnock River, Island Brook), Rippowam River Watershed (Stamford Harbor, Rippowam River), Sasco Brook Watershed (Sasco Brook, Great Brook), and Silvermine River.

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1. About Harbor Watch and This Report

Harbor Watch is one of the many program offerings at Earthplace, Inc. The mission of Earthplace is to build a passion in our community for nature and the environment through education, experience, and action. The Harbor Watch program is the cornerstone of environmental action at Earthplace. Our mission is to improve water quality and ecosystem health in Connecticut. Each day we strive to achieve this goal through the collection of actionable data, collaboration with our partners to address pollution threats to Long Island Sound, and hands-on education programs for high school and college students.

Since its inception in 1986, Harbor Watch has collected physical, chemical, and biological data in our local waterways and ecosystems. Key projects include dissolved oxygen profile surveys and participation in the Unified Water Study, an embayment biological study, instream monitoring and pollution track-down using indicator bacteria, salt marsh restoration research, and marine debris removal. This report will focus on our indicator bacteria monitoring, as well as riverine dissolved oxygen and water temperature. *E. coli* and enterococci were selected for study because they are the indicator bacteria of choice for the Environmental Protection Agency (EPA) and Connecticut Department of Energy and Environmental Protection (CT DEEP) for sewage pollution in freshwater systems and saltwater systems respectively. Their presence in high concentrations suggests that there are likely also more harmful pathogens present. Dissolved oxygen is an important water quality indicator because many aquatic species rely on it for survival, similarly to how land animals rely on oxygen in the air. When dissolved oxygen is not available, species like fish and macroinvertebrates will relocate to higher quality waters or die due to the lack of oxygen. Temperature is also an important parameter for aquatic species, which can be excluded from a given location if the temperature is too high or too low. Dissolved oxygen and water temperature can be negatively impacted if sewage is present.

For more information about our other projects and for previously published reports and journal articles, please visit our website (www.harborwatch.org).

Every effort has been made to ensure the accuracy of the information presented in this report. If you notice anything in this report that you believe may be an error, we welcome that or any other feedback. Please contact us by email at harborwatch@earthplace.org.

2. Acknowledgements

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3. Methods Summary

Each river was visited approximately twice per month from May through September for a goal of 10 sampling days per river. Sites were selected based on access and representativeness of the river, with effort made to space sites evenly throughout the length of the river being studied. Monitoring was carried out under a Quality Assurance Project Plan approved by the EPA and CT DEEP in March 2023 and updated March 2024 (QA Tracking #23066) and the Pathogen Monitoring Network Quality Assurance Project Plan (QA Tracking #23091) approved addendum in May 2024.

Monitoring teams left Earthplace in Westport, CT in the morning to begin sampling and would return within 2-4 hours. Each team was comprised of fully trained Harbor Watch staff or student interns, sometimes accompanied by volunteers. At each site, a water sample was collected and kept on ice. Water temperature, dissolved oxygen, and conductivity were measured at each site using a YSI Pro2030 meter.

Upon return to the Harbor Watch laboratory, the water samples were analyzed for total coliform and *E. coli* or enterococci using enzyme substrate methods set forth in Standard Methods (SM9223B). Indicator bacteria concentrations were evaluated using the criteria published in the CT DEEP Surface Water Quality Standards on 10/10/13 (Table 1). The monitoring conducted here is for general understanding of waterway health, therefore the “all other recreational uses” criteria will apply for analyses in this report. For additional information on methodology, please refer to the approved QAPP. A summary of deviations from the QAPP can be found on page 56 of this report.

Table 1. CT DEEP criteria for *E. coli* and enterococci levels as applied to recreational use, effective 10/10/13. Highlighted cells represent criteria used by Harbor Watch in this report.

Designated Use	Class	Indicator	Criteria
Designated Swimming	AA, A, B	<i>Escherichia coli</i>	Geomean less than 126/100 mL; Single Sample Maximum 235/100 mL
Non-designated Swimming	AA, A, B	<i>Escherichia coli</i>	Geomean less than 126/100 mL; Single Sample Maximum 410/100 mL
All Other Recreational Uses	AA, A, B	<i>Escherichia coli</i>	Geomean less than 126/100 mL; Single Sample Maximum 576/100 mL
Designated Swimming	SA, SB	Enterococci	Geomean less than 35/100 mL; Single Sample Maximum 104/100 mL
All Other Recreational Uses	SA, SB	Enterococci	Geomean less than 35/100 mL; Single Sample Maximum 500/100 mL

4. Results and Discussion

From May through September 2024, 20 waterways (categorized into 11 watersheds) were monitored by Harbor Watch across 11 towns in Fairfield County, CT (Table 2). There were 110 unique sampling locations that were monitored a minimum of 8 times each (unless otherwise stated in each section). Many of these rivers did not meet the state criteria for acceptable bacteria concentrations (Table 3) and are likely acting as conduits for sewage pollution to Long Island Sound. The Silvermine River had the fewest sites that exceeded the CT DEEP geomean criteria for bacteria. There was a 5-way tie for the most exceedances, with 100% of the sites studied in the Ash Creek Watershed, Bruce Brook, New Creek, Pequonnock River, and Rippowam River Watershed failing the CT DEEP geomean criteria for bacteria (Table 3).

Table 2. Percentage of study sites in each municipality that exceeded the CT DEEP geomean criteria for indicator bacteria. *Sites that are located at the border of two towns have been included in the count for each town.

Town	Number of Sites*	% Failing Bacteria Criteria	Rivers
Bridgeport	14	100%	Ash Creek Watershed, Bruce Brook, Pequonnock River Watershed
Darien	7	100%	Fivemile River, Noroton River
Fairfield	18	94%	Ash Creek Watershed, Sasco Brook Watershed
New Canaan	16	63%	Fivemile River, Noroton River, Silvermine River
Norwalk	19	79%	Fivemile River, Norwalk River Watershed, Silvermine River
Ridgefield	5	80%	Norwalk River Watershed
Stamford	15	100%	Noroton River, Rippowam River, Stamford Harbor
Stratford	9	100%	Bruce Brook
Trumbull	3	100%	Ash Creek Watershed, Pequonnock River Watershed
Westport	14	93%	New Creek, Sasco Brook Watershed
Wilton	10	80%	Comstock Brook, Norwalk River Watershed, Silvermine River

Table 3. Percentage of study sites in each watershed that exceeded the CT DEEP geomean criteria for indicator bacteria.

Watershed	Number of Sites	% Failing Geomean Criteria	Towns
Ash Creek Watershed	12	100%	Bridgeport, Fairfield, Trumbull
Bruce Brook	9	100%	Bridgeport, Stratford
Comstock Brook	5	60%	Wilton
Fivemile River	10	90%	Darien, New Canaan, Norwalk
New Creek	5	100%	Westport
Noroton River	8	75%	Darien, New Canaan, Stamford
Norwalk River Watershed	20	85%	Norwalk, Ridgefield, Wilton
Pequonnock River	8	100%	Bridgeport, Trumbull
Rippowam River Watershed	10	100%	Stamford
Sasco Brook Watershed	13	92%	Fairfield, Westport
Silvermine River	10	50%	New Canaan, Norwalk, Wilton

In the 20 waterways studied, 88% of sites exceeded (i.e., had concentrations indicative of fecal contamination) the CT DEEP geomean criterion (< 126 MPN/100 mL for freshwater sites or < 35 MPN/100 mL for estuarine sites) (Figure 1), and 89% of sites exceeded the secondary single sample maximum criterion of 576 MPN/100 mL for freshwater sites or 500 MPN/100 mL for estuarine sites at least once during the sampling season (Figure 2). Thirty-four percent of sampling locations exceeded the CT DEEP single sample maximum 1-25% of the time, indicating that only one or two sampling events exceeded the maximum during the monitoring season (assuming that 8-10 samples were taken per site). This is likely correlated to wet weather events when fecal matter enters our waterways untreated. Sources may include but are not limited to animal and pet waste runoff, failing septic systems, and combined sewer systems having to use their overflow discharge point.

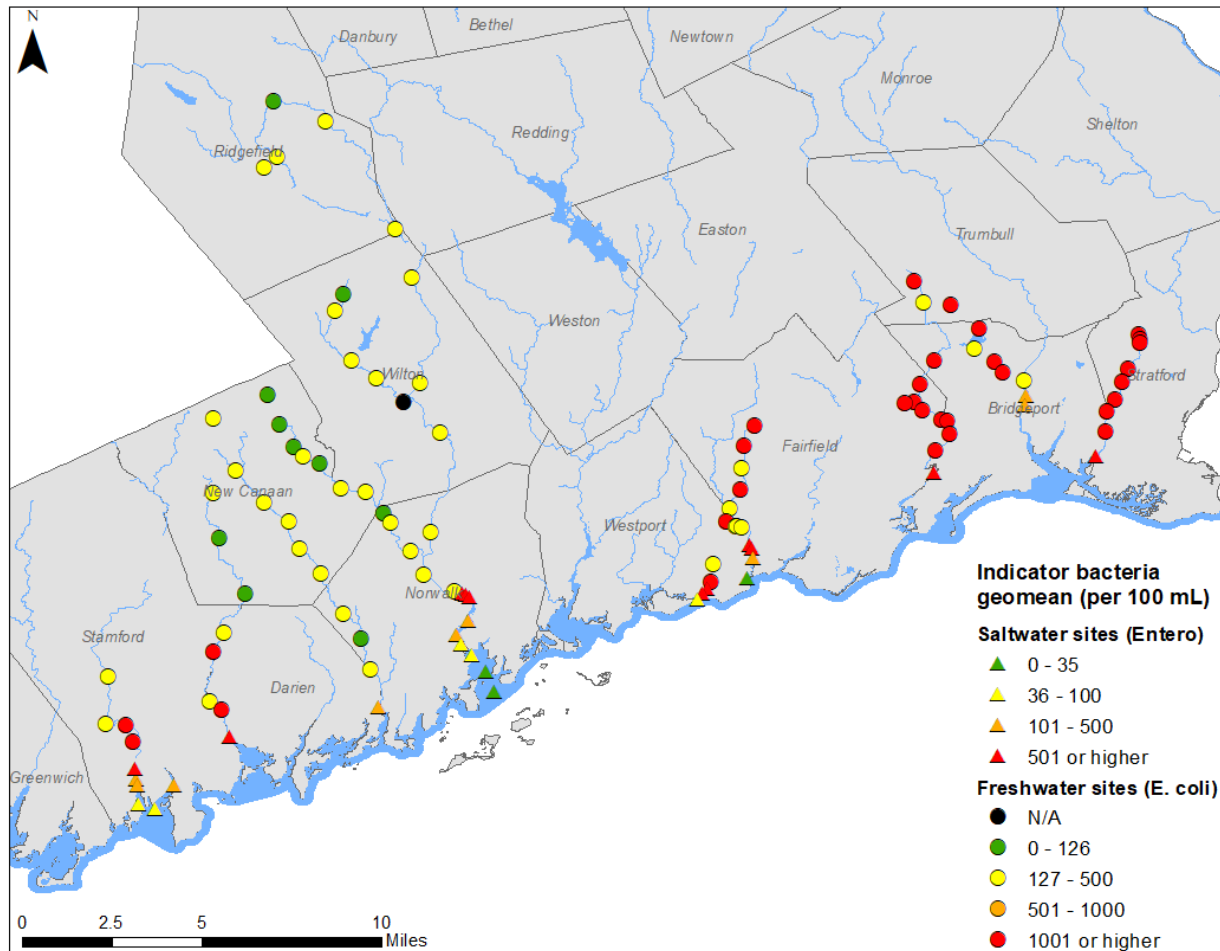


Figure 1. Map of 2024 sampling locations showing *E. coli* or enterococci geomean concentrations for each site. The bacteria concentrations for each site were compared to the state criteria for recreational waters (Table 1). Sites in green had a geomean that met CT DEEP criteria (less than 126 MPN/100 mL for *E. coli* or less than 35 MPN/100 mL for enterococci). The sites in black did not have enough data to generate a geomean.

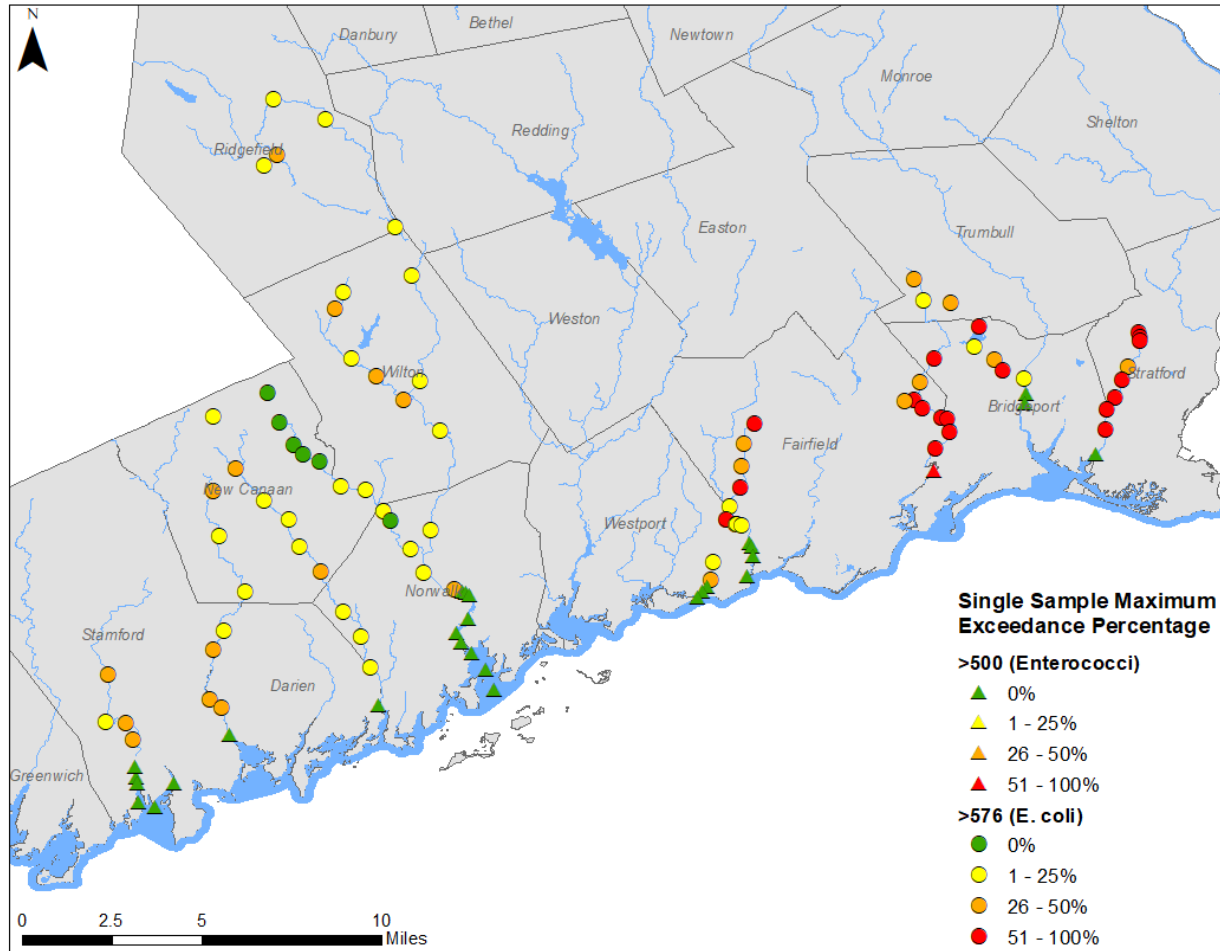


Figure 2. Map of 2024 sampling locations showing the percentage of *E. coli* and enterococci samples failing the CT DEEP single sample maximum criterion for recreational waters at each site. Sites in green had none of their samples exceeding 576 MPN/100 mL for *E. coli* and 500 MPN/100 mL for enterococci.

The CT DEEP criterion for dissolved oxygen is set at a minimum of 5 mg/L anytime for freshwater and 3 mg/L acutely for saltwater (State of Connecticut Department of Energy and Environmental Protection [CT DEEP], 2015a). Ten percent of all observed dissolved oxygen readings did not meet the CT DEEP minimum criteria in 2024. The Great Brook had the highest frequency of low dissolved oxygen readings with 24% of observed readings below 5 mg/L. Prolonged periods of low dissolved oxygen can be harmful to marine and aquatic organisms. Low dissolved oxygen can be the result of low flow (which was observed at many sampling locations due to the nature of the site), periods of low rainfall during the monitoring season, and/or the decomposition of organic matter. Additionally, cold water can hold more dissolved oxygen than warm water, therefore it is common to see a decrease in dissolved oxygen concentrations as the monitoring season progresses into the heat of the summer where water temperatures increase.

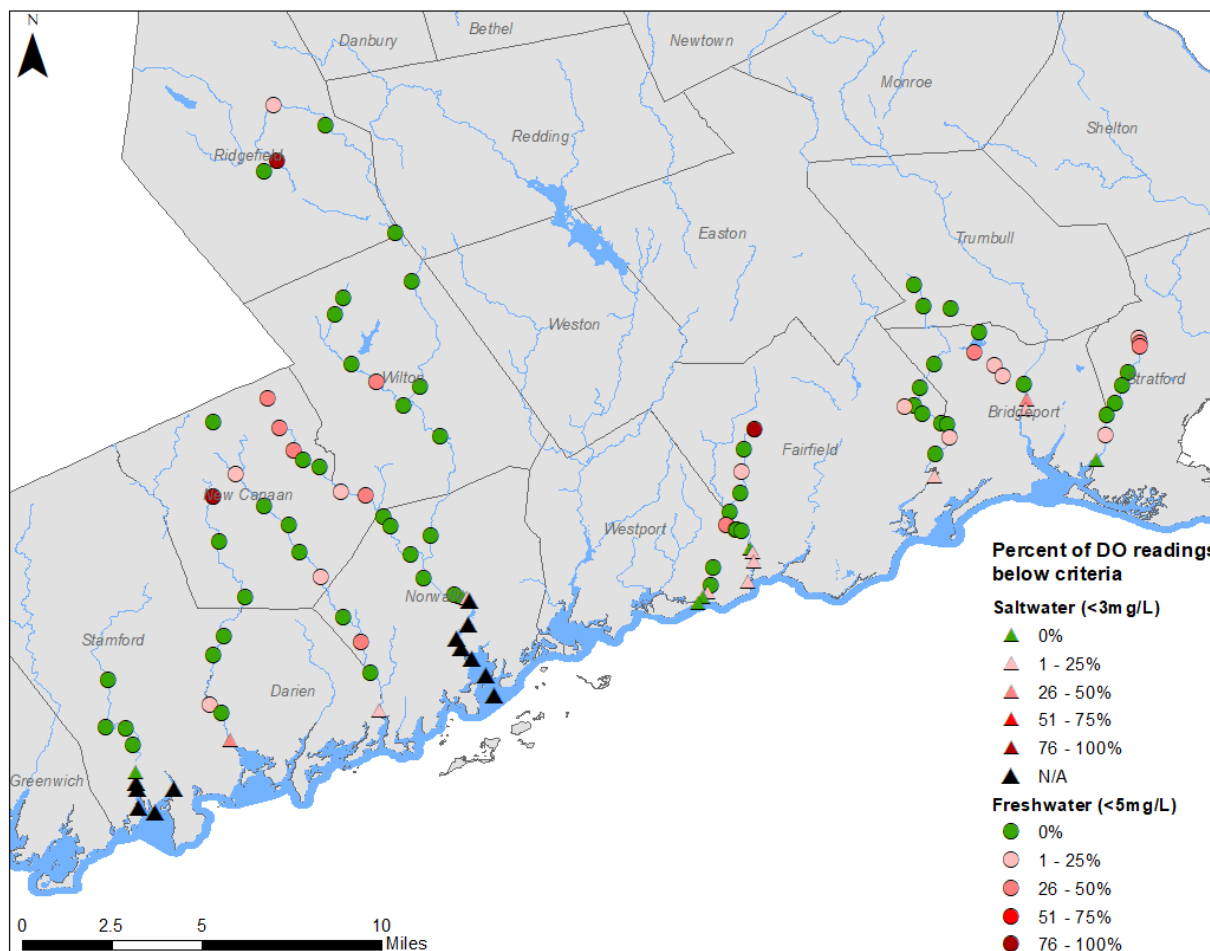


Figure 3. Map of 2024 river sampling locations showing percentage of individual dissolved oxygen readings less than the CT DEEP minimum criterion of 5 mg/L anytime for freshwater and 3 mg/L acutely for saltwater sites.

Harbor Watch aims to better understand the ecological health of our watersheds by monitoring dissolved oxygen, conductivity, water temperature, and indicator bacteria concentrations (*E. coli* in freshwater and enterococci in brackish or saltwater), and to make these data available for use by interested stakeholders. A secondary objective is to use the data collected to assess where sewage pollution sources may be located so that we can conduct further investigation. Once sources of sewage pollution are identified, Harbor Watch works with our municipal partners in Conservation, Public Works, and Water Pollution Control Authorities to ensure that the issue is fixed. Track-down surveys were conducted on projects in Bridgeport, Darien, New Canaan, Norwalk, Stamford, and Westport in 2024. Track-down surveys are ongoing and will continue year-round as field conditions allow. Our process of repetitive bacteria testing has a history of success in identifying point sources of pollution such as leaking sanitary sewer lines, broken sewer laterals, and pipes illegally hooked into the storm water system. In 2024, we conducted eight pollution track-down projects and our municipal partners are working alongside us to isolate and remove any sources that are uncovered as testing continues. The frequent incidence of failing bacteria concentrations observed over this monitoring season (Figure 1, Table 1) indicates that there is still much work to be done to improve the overall water quality of the Long Island Sound Watershed. We look forward to tackling these issues head on with our partners!

In the following sections, we present a data summary of each of the 11 watersheds monitored by Harbor Watch during 2024.

A. Ash Creek Watershed (Ash Creek, Rooster River, Horse Tavern Brook, and Londons Brook)

The Ash Creek watershed encompasses portions of Fairfield, Bridgeport, Trumbull, and Easton, CT. The watershed is approximately 9,800 acres or 15.3 square miles (CT DEEP, 2013). Land use within the

watershed is a mix of medium density residential lots, and commercial properties (Fuss and O'Neill, 2013). There are multiple tributaries that discharge to Ash Creek including Rooster River, Horse Tavern Brook, Londons Brook, and Ox Brook. Harbor Watch started monitoring the Ash Creek watershed in 2016 due to its status on the impaired waters list. Data has been collected annually since then with the exception of 2019.

Indicator bacteria: In 2024, data were collected on ten days. All of the sites studied exceeded the CT DEEP geomean criteria for indicator bacteria (Figure A1). Additionally, 76% of all samples processed in the Ash Creek watershed exceeded the CT DEEP single sample maximum criteria (Table A1). Bacteria concentrations in the watershed have historically exceeded CT DEEP criteria but mean concentrations in 2024 were observed to be slightly lower than years prior (Figure A2). Harbor Watch continues to partner with the City of Bridgeport and Town of Fairfield on pollution track-down work to locate sources of elevated concentrations. Prior track-down testing and removal of a directly connected sanitary lateral to the stormwater sewer system in late 2023 resulted in a 45% reduction in bacteria concentrations at the first downstream sampling location!

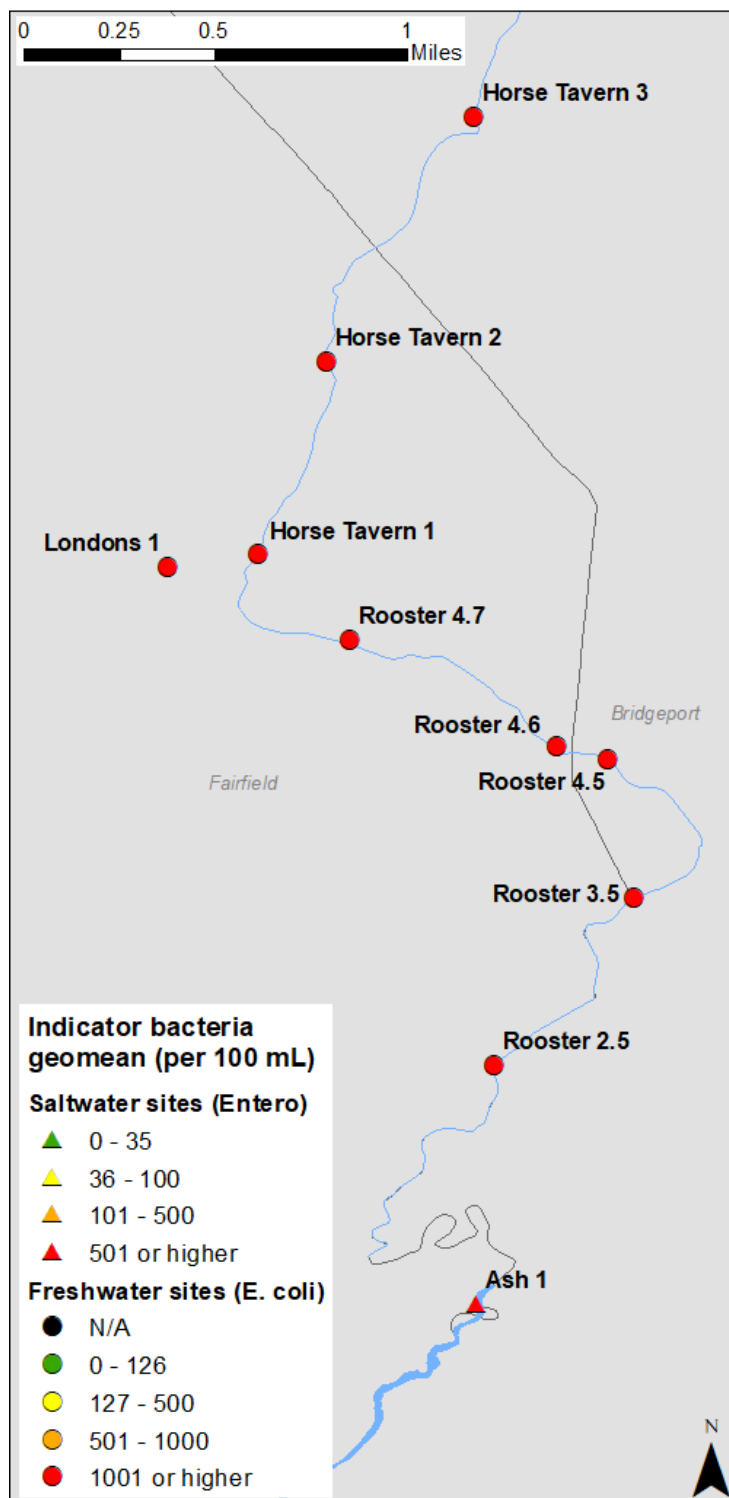


Figure A1. Map of indicator bacteria, *E. coli* or enterococci, geomean concentrations at each site in the Ash Creek Watershed in 2024.

Table A1. Ash Creek watershed *E. coli* and enterococci concentrations (MPN/100mL), geomeans, and percentage of samples exceeding the CT DEEP single sample maximum. Rainfall data gathered from the Norwalk Health Department website (Norwalk Health Department, n.d.).

Site	Indicator Bacteria	5/7/2024	5/21/2024	6/3/2024	6/27/2024	7/2/2024	7/18/2024	8/6/2024	8/21/2024	8/26/2024	9/10/2024	Geomean	Exceed SSM
Horse Tavern 5	<i>E. coli</i>	276	44	161	2420	496	1376	2069	1046	411	1733	588	50%
Horse Tavern 4	<i>E. coli</i>	68	82	205	>2420	472	7945	289	548	365	461	441	20%
Horse Tavern 3	<i>E. coli</i>	326	548	579	>2420	1540	>9678	1164	1986	1733	1002	1311	80%
Horse Tavern 2	<i>E. coli</i>	228	411	488	>2420	1159	6212	542	1553	1553	651	962	60%
Horse Tavern 1	<i>E. coli</i>	255	731	613	>4839	1034	7945	1741	690	420	690	1047	80%
Londons 1	<i>E. coli</i>	651	159	345	>2420	1540	5199	500	649	3106	1379	996	70%
Rooster 4.7	<i>E. coli</i>	232	582	615	>4839	2827	6867	1076	521	794	1095	1143	80%
Rooster 4.6	<i>E. coli</i>	409	1298	870	>4839	615	5654	1642	523	774	1733	1245	80%
Rooster 4.5	<i>E. coli</i>	1642	6212	882	7270	2481	6260	5475	6867	6131	6867	4175	100%
Rooster 3.5	<i>E. coli</i>	7945	1008	>9678	19863	2143	8703	1956	738	3922	3080	3715	100%
Rooster 2.5	<i>E. coli</i>	2453	1164	2908	7945	2318	14136	2310	1041	3683	3922	3073	100%
Ash 1	Enterococci	3873	6867	3255	8164	1553	>24196	2035	852	2098	1529	3288	100%
Accumulation 48 hours prior		Wet	Dry	Dry	Wet	Wet	Wet	Wet	Wet	Dry	Dry		

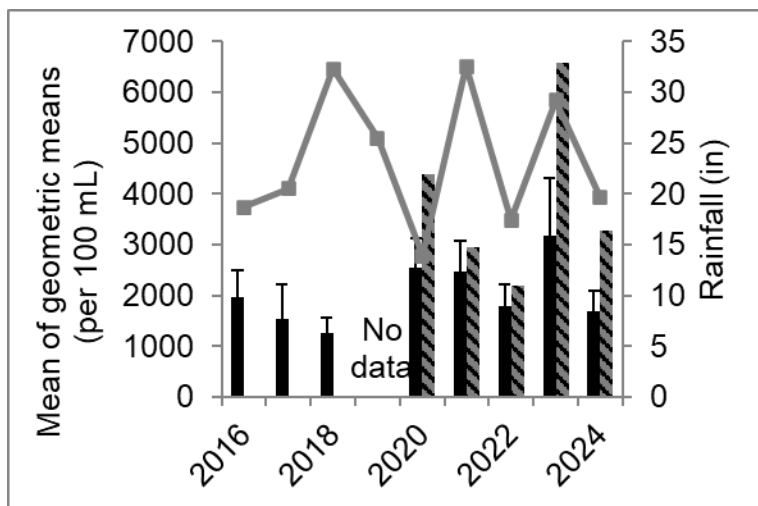


Figure A2. (Above) Mean of freshwater site geomeans (black bars; *E. coli*) and saltwater site geomeans (striped bars; enterococci) from 2016-2024 in the Ash Creek watershed and total rainfall from May through September each year (grey squares and line).

Table A2. GPS coordinates and site locations for the Ash Creek watershed.

Site Name	Latitude	Longitude	Site location notes	River Name
Horse Tavern 5	41.24438	-73.23205	Revere Lane	Horse Tavern Brook
Horse Tavern 4	41.23572	-73.22811	Chestnut Hill Road	Horse Tavern Brook
Horse Tavern 3	41.21243	-73.22382	Vincellette Street	Horse Tavern Brook
Horse Tavern 2	41.20316	-73.22940	Wilson Street	Horse Tavern Brook
Horse Tavern 1	41.19585	-73.23199	Stratfield Road	Horse Tavern Brook
Londons 1	41.19538	-73.23540	Montauk Street	Londons Brook
Rooster 4.7	41.19260	-73.22850	Cornell Road	Rooster River
Rooster 4.6	41.18858	-73.22064	Brooklawn Avenue	Rooster River
Rooster 4.5	41.18807	-73.21872	Capitol Avenue	Rooster River
Rooster 3.5	41.18283	-73.21771	Brooklawn Avenue	Rooster River
Rooster 2.5	41.17648	-73.22304	North Avenue (Route 1)	Rooster River
Ash 1	41.16745	-73.22369	Commerce Drive/State Street Ext	Ash Creek

Dissolved oxygen and water temperature: Dissolved oxygen readings in the watershed varied by site (Figure A3). While the majority of readings met the CT DEEP minimum criteria, two individual dissolved oxygen readings were observed below 5 mg/L at freshwater sites Londons 1 and Rooster 3.5, and 1 individual reading was observed below 3 mg/L at saltwater site Ash 1. The low readings were observed during the middle of the summer when average water temperature was highest (Figure A4).

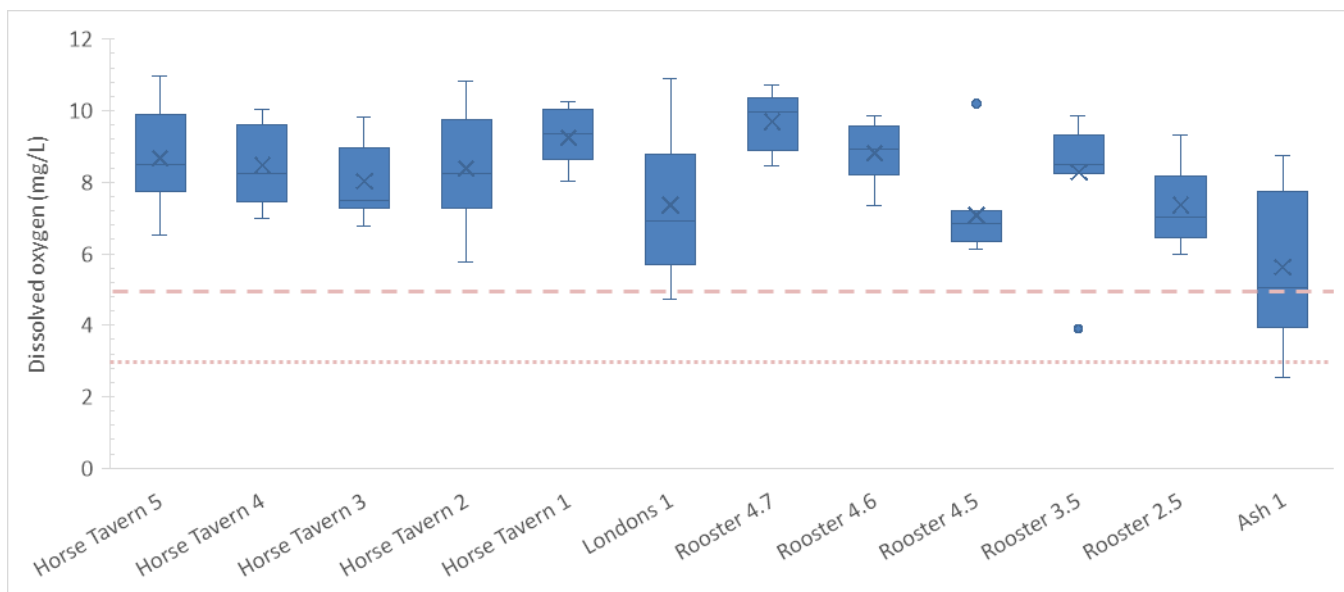


Figure A3. Box plot of dissolved oxygen concentrations at each sampling site in the Ash Creek watershed. The dashed red line represents the CT DEEP minimum criteria for dissolved oxygen in freshwater, which is 5mg/L. The dotted red line represents the CT DEEP minimum criteria for dissolved oxygen in saltwater, which is 3mg/L. The only saltwater sampling site in this watershed is Ash 1.

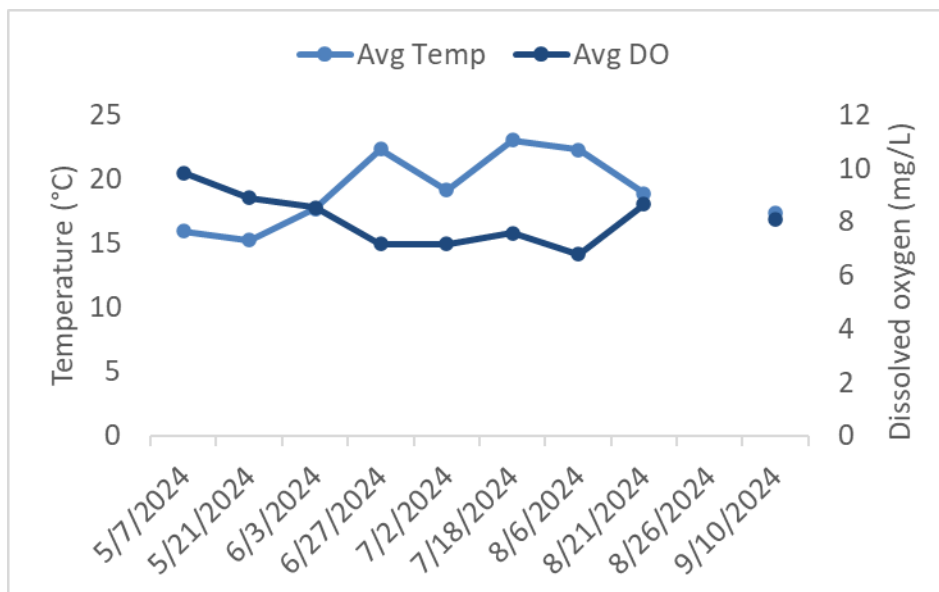
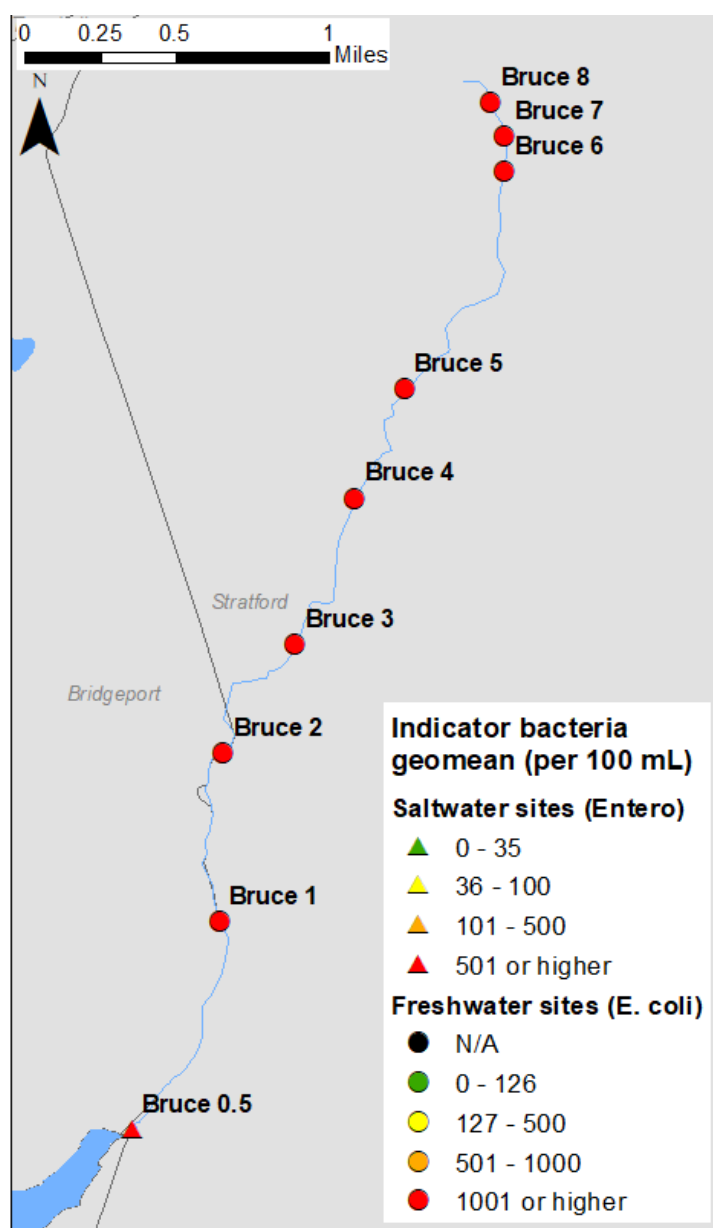


Figure A4. Mean water temperature and mean dissolved oxygen of all sites on each sampling date in the Ash Creek Watershed. No data were collected on 8/26/24 due to equipment failure.

B. Bruce Brook

The Bruce Brook watershed includes the Town of Stratford and the City of Bridgeport. It spans approximately 2,199 acres or 3.4 square miles (CT DEEP, 2012a) and discharges into Bridgeport Harbor. The land use within the watershed is divided into 94% urban area, 5% forests, 1% water, and less than 1% agriculture (CT DEEP, 2012a). The brook itself is channelized within man-made structures through a large portion of its length. Bruce Brook acts as a boundary between the two municipalities from the Route 1 corridor south to the coastline. Harbor Watch began monitoring Bruce Brook in 2017 and has continued annually, with the exception of 2020. The City of Stratford is leading the charge on creating a watershed based plan (supported by CT DEEP 319 funds) and is working with a stakeholder committee to ensure that all aspects of the watershed are represented. Harbor Watch has been providing data to be used in the existing conditions report. This watershed based plan will assist in highlighting issues and prioritizing improvements within the watershed. The plan is projected to be completed shortly.



Indicator bacteria: In 2024, data were collected on ten days. All of the Bruce Brook sites studied exceeded the CT DEEP geomean criteria for indicator bacteria (Figure B1). Additionally, 90% of all samples processed in Bruce Brook exceeded the CT DEEP single sample maximum criteria (Table B1). Bacteria concentrations in 2024 were some of the lowest observed in the last seven years. Improvements made within the watershed through the years, thanks to the municipalities removing five sewage pollution sources to the brook in the same time period, are likely a contributing factor to the reduction in concentrations. Despite these improvements, Bruce Brook continues to have poor water quality and is in need of additional track-down projects to isolate sources (Figure B2).

Figure B1. Map of indicator bacteria, *E. coli* or enterococci, geomean concentrations at each site in Bruce Brook in 2024.

Table B1. Bruce Brook *E. coli* and enterococci concentrations (MPN/100mL), geomeans, and percentage of samples exceeding the CT DEEP single sample maximum. Rainfall data gathered from the Norwalk Health Department website (Norwalk Health Department, n.d.).

Site	Indicator Bacteria	5/6/2024	5/22/2024	6/11/2024	6/27/2024	7/1/2024	7/17/2024	8/1/2024	8/13/2024	8/28/2024	9/11/2024	Geomean	Exceed SSM
Bruce 8	<i>E. coli</i>	2599	1733	2599	9678	6131	1145	5794	1187	2595	6932	3157	100%
Bruce 7	<i>E. coli</i>	2092	1034	2240	9678	3255	2481	5475	1086	1664	2453	2491	100%
Bruce 6	<i>E. coli</i>	2453	2190	1089	9678	3654	1935	2187	1024	913	1296	2007	100%
Bruce 5	<i>E. coli</i>	1034	1226	146	2240	1549	9678	560	364	255	1102	902	60%
Bruce 4	<i>E. coli</i>	1314	1379	516	7945	4360	4884	1301	5172	2359	1935	2337	90%
Bruce 3	<i>E. coli</i>	1920	1483	2143	6867	2802	6152	2581	7308	1632	1340	2802	100%
Bruce 2	<i>E. coli</i>	2471	1076	3654	12997	7217	6896	3057	6511	1339	7569	4077	100%
Bruce 1	<i>E. coli</i>	7746	8703	1466	24067	6766	3089	3214	1508	860	3255	3827	100%
Bruce 0.5	Enterococci	3076	171	No Data	12033	4884	2613	106	1314	368	350	1042	56%
Accumulation 48 hours prior		Wet	Dry	Dry	Wet	Wet	Wet	Wet	Dry	Dry	Dry		

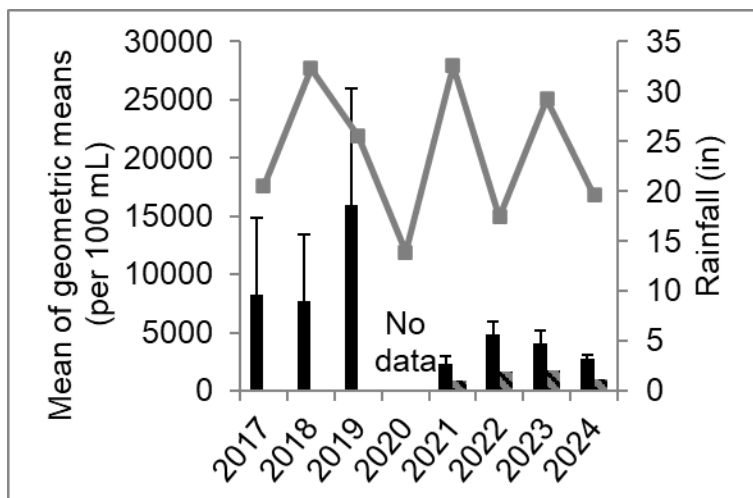


Figure B2. Mean of freshwater site geomeans (black bars; *E. coli*) and saltwater site geomeans (striped bars; enterococci) from 2017-2024 in Bruce Brook and total rainfall from May through September each year (grey squares and line).

Table B2. GPS coordinates and site locations for Bruce Brook.

Site Name	Latitude	Longitude	Site location notes	River Name
Bruce 8	41.22278	-73.1416	Bunnell Avenue	Bruce Brook
Bruce 7	41.22118	-73.1409	Connors Lane	Bruce Brook
Bruce 6	41.21949	-73.1409	Old Spring Road	Bruce Brook
Bruce 5	41.20915	-73.1457	Albright Avenue	Bruce Brook
Bruce 4	41.20397	-73.148	2340 Broadbridge Avenue	Bruce Brook
Bruce 3	41.19699	-73.1509	380 Canaan Road	Bruce Brook
Bruce 2	41.19188	-73.1543	102 Bowe Avenue	Bruce Brook
Bruce 1	41.18386	-73.1545	Connecticut Avenue	Bruce Brook
Bruce 0.5	41.173956	-73.1586	Hollister Avenue	Bruce Brook

Dissolved oxygen and water temperature: Dissolved oxygen readings in the watershed varied widely (Figure B3). While the majority of readings met the CT DEEP minimum criteria, ten individual dissolved oxygen readings were observed below 5mg/L at freshwater sites Bruce 8, Bruce 7, Bruce 6, and Bruce 1. The majority of these low readings were observed in late July and early August when water temperatures were highest (Figure B4). Flow in August at Bruce 5 and Bruce 4 was so low the field meter could not be used. It is unclear if low dissolved oxygen readings would have been recorded at these sites if the meter could be used.

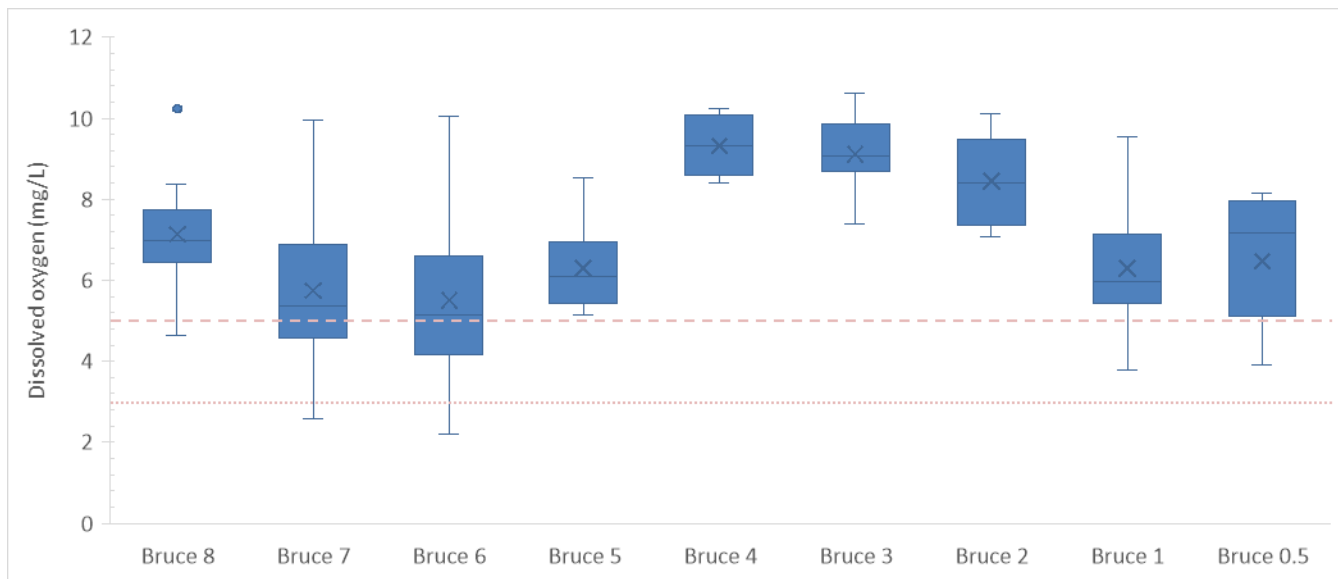


Figure B3. Box plot of dissolved oxygen concentrations at each sampling site in Bruce Brook. The dashed red line represents the CT DEEP minimum criteria for dissolved oxygen in freshwater, which is 5mg/L. The dotted red line represents the CT DEEP minimum criteria for dissolved oxygen in saltwater, which is 3mg/L. The only saltwater sampling site in this watershed is Bruce 0.5.

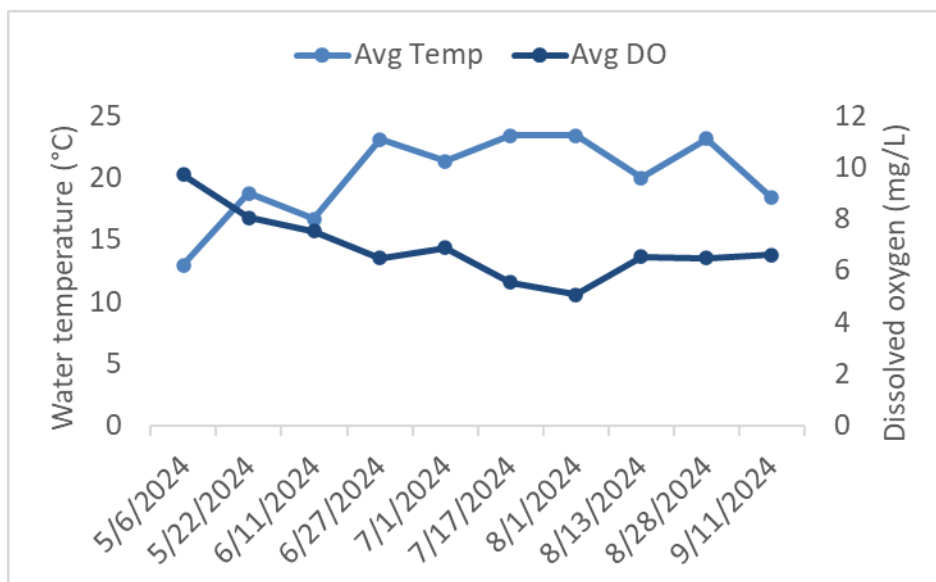


Figure B4. Mean water temperature and mean dissolved oxygen of all sites on each sampling date in Bruce Brook.

C. Comstock Brook

Comstock Brook is a tributary within the Norwalk River Watershed located in Wilton, CT. It discharges to the Norwalk River at Merwin Meadows Park, between Harbor Watch monitoring sites Norwalk 9 and Norwalk 6 (see sub-section G). Harbor Watch has monitored Comstock Brook periodically through the years, with the last time being in 2020.

Indicator bacteria: In 2024, data were collected on ten days. Comstock 1 had construction through most of the monitoring season and less than 8 samples were collected. Three sites exceeded the CT DEEP geomean criteria for indicator bacteria (Figure C1). Additionally, 29% of all samples processed in Comstock Brook exceeded the CT DEEP single sample maximum (Table C1).

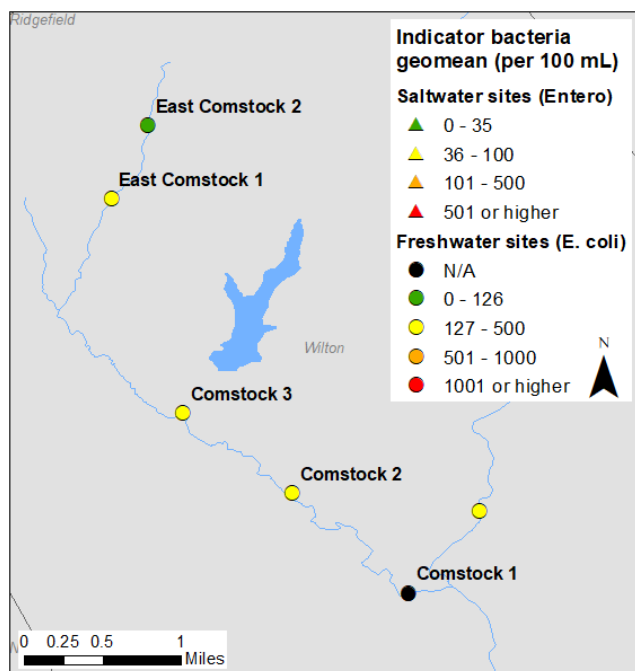


Figure C1. Map of *E. coli* geomean concentrations at each site in Comstock Brook in 2024. Unlabeled site is located on the Norwalk River (see sub-section G).

Table C1. Comstock Brook *E. coli* concentrations (MPN/100mL), geomeans, and percentage of samples exceeding the CT DEEP single sample maximum. Rainfall data gathered from the Norwalk Health Department website (Norwalk Health Department, n.d.). Geomean was not calculated for Comstock 1 because fewer than 8 samples were collected during the monitoring period.

Site	Indicator Bacteria	5/8/2024	5/30/2024	6/12/2024	6/20/2024	7/8/2024	7/16/2024	8/7/2024	8/12/2024	8/29/2024	9/17/2024	Geomean	Exceed SSM
East Comstock 2	<i>E. coli</i>	43	411	7	7	649	26	2092	79	99	308	98	20%
East Comstock 1	<i>E. coli</i>	71	727	46	99	229	>4839	2282	210	69	62	236	30%
Comstock 3	<i>E. coli</i>	344	1733	91	65	206	158	>4839	186	111	14	210	20%
Comstock 2	<i>E. coli</i>	101	>2420	58	238	326	1120	2092	249	193	>2420	445	40%
Comstock 1	<i>E. coli</i>	No Data	No Data	No Data	No Data	219	No Data	1633	99	91	1986	-	40%
Accumulation 48 hours prior		Dry	Wet	Dry	Dry	Wet	Wet	Wet	Dry	Dry	Dry		

Table C2. GPS coordinates and site locations for the Deadman’s Brook.

Site Name	Latitude	Longitude	Site location notes	River Name
East Comstock 2	41.23927	-73.46164	Whipstick Road	East Comstock Brook
East Comstock 1	41.23247	-73.46502	Millstone Road	East Comstock Brook
Comstock 3	41.21262	-73.45841	Nod Hill Road	Comstock Brook
Comstock 2	41.20518	-73.44822	Middlebrook Farm Road	Comstock Brook
Comstock 1	41.19597	-73.43747	Lovers Lane	Comstock Brook

Dissolved oxygen and water temperature: Dissolved oxygen readings in the watershed varied by site (Figure C3). While the majority of readings met the CT DEEP minimum criteria, five individual dissolved oxygen readings were observed below 5 mg/L at site Comstock 2. Low readings were observed from June through August. This site can have low flow and stagnant water which likely contribute to the low dissolved oxygen concentrations in conjunction with warmer water temperatures (Figure C4).

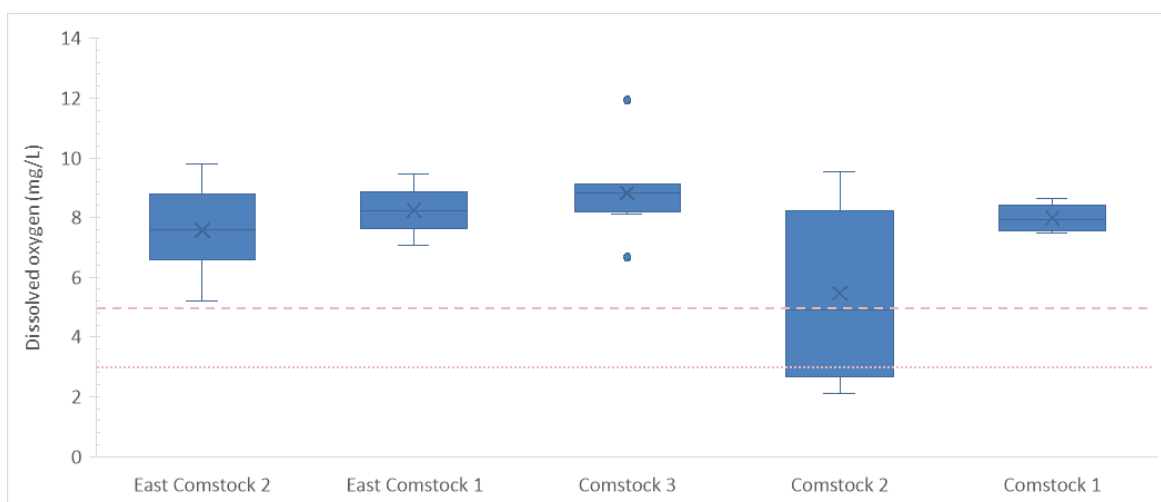


Figure C3. Box plot of dissolved oxygen concentrations at each sampling site in Comstock Brook. The dashed red line represents the CT DEEP minimum criteria for dissolved oxygen in freshwater, which is 5mg/L.

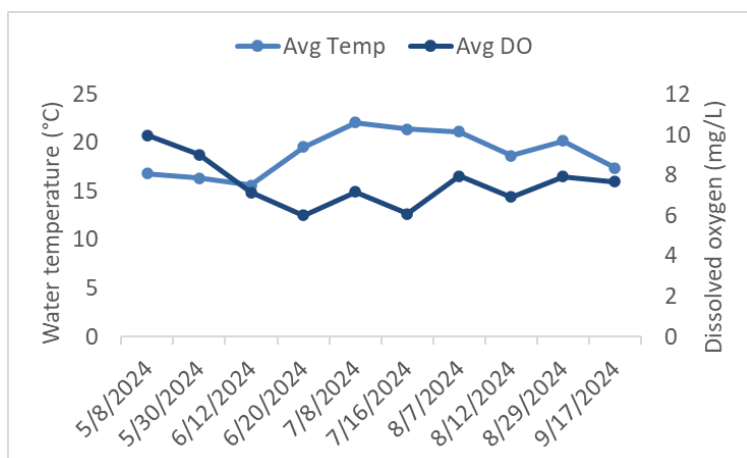
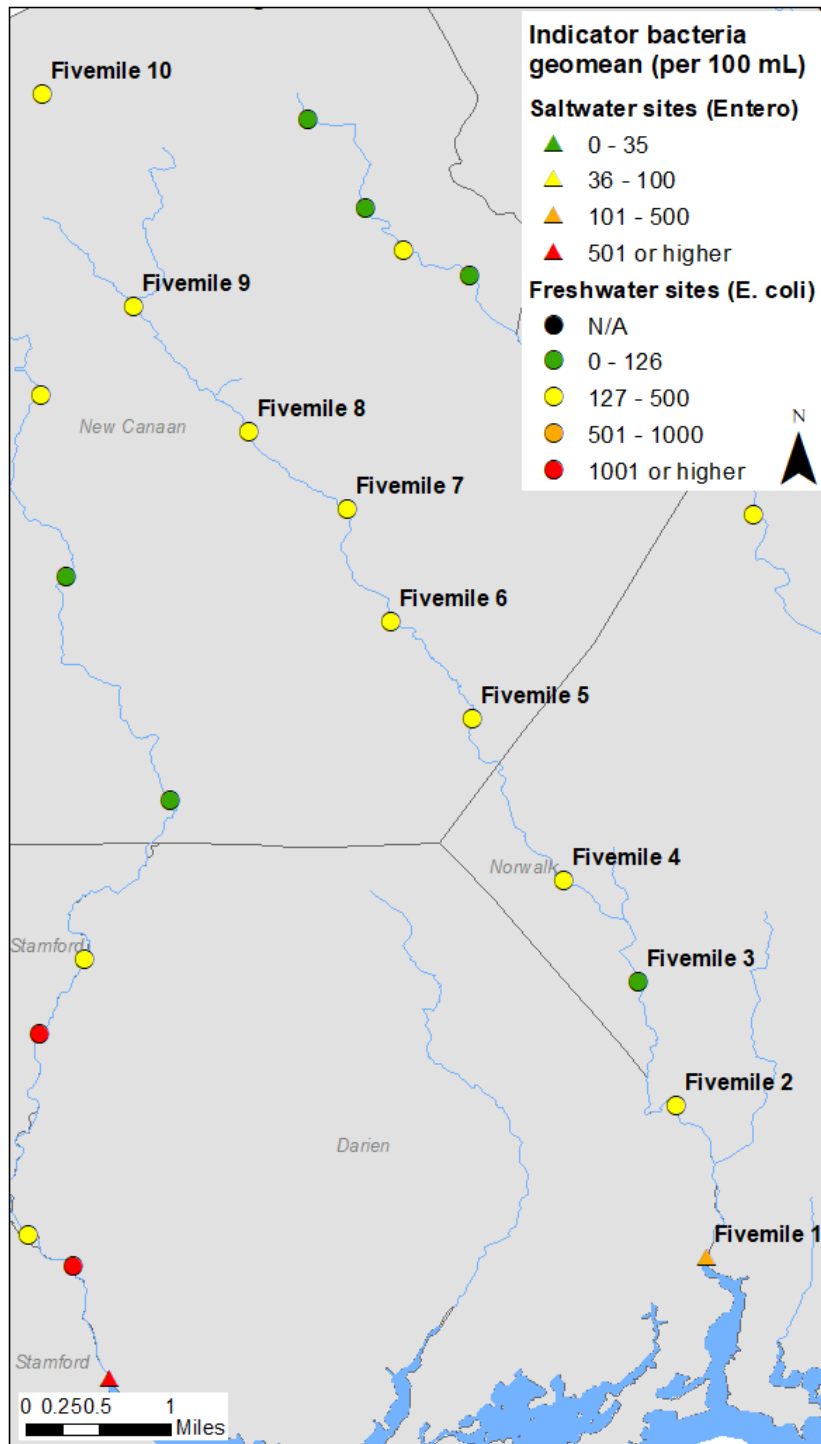


Figure C4. Mean water temperature and mean dissolved oxygen of all sites on each sampling date in Comstock Brook.

D. Fivemile River



The Fivemile River watershed includes approximately 7,995 acres of land and extends from Pound Ridge, NY through New Canaan, Norwalk, and Darien, CT before ending at Fivemile River Harbor. Land use in the watershed consists of 81% residential areas, with the upper watershed more suburban and the lower watershed more densely populated, 13% open space, and 6% commercial and institutional areas (The South Western Regional Planning Agency, 2012a). Harbor Watch has monitored the sites within the watershed periodically since 2009.

Indicator bacteria: In 2024, data were collected on ten days. This year, nine of the ten sampling sites exceeded the CT DEEP geomean criteria for indicator bacteria (Figure D1). Despite this, only 20% of all individual samples processed exceeded the CT DEEP single sample maximum criteria (Table D1). Bacteria concentrations observed in 2024 were similar to concentrations observed in years prior in freshwater sites and much higher at the only saltwater site, Fivemile 1 (Figure D2). Harbor Watch continues to work with the Town of New Canaan on isolating elevated concentrations observed upstream of Fivemile 7.

Figure D1. Map of indicator bacteria, *E. coli* or enterococci, geomean concentrations at each site in the Fivemile River in 2024. Unlabeled sites are Noroton River (see sub-section F) and Silvermine River (see sub-section K).

Table D1. Fivemile River *E. coli* and enterococci concentrations (MPN/100mL), geomeans, and percentage of samples exceeding the CT DEEP single sample maximum. Rainfall data gathered from the Norwalk Health Department website (Norwalk Health Department, n.d.).

Site	Indicator Bacteria	5/16/2024	5/20/2024	6/13/2024	6/25/2024	7/9/2024	7/23/2024	8/8/2024	8/21/2024	9/5/2024	9/18/2024	Geomean	Exceed SSM
Fivemile 10	<i>E. coli</i>	68	111	488	276	219	>2420	1302	345	236	219	323	20%
Fivemile 9	<i>E. coli</i>	42	39	1046	921	147	>2420	273	179	99	31	196	30%
Fivemile 8	<i>E. coli</i>	238	172	102	113	248	>2420	445	291	>2420	435	362	20%
Fivemile 7	<i>E. coli</i>	172	308	276	435	387	>2420	1230	548	276	23	348	20%
Fivemile 6	<i>E. coli</i>	365	93	145	260	272	2420	180	276	308	214	278	10%
Fivemile 5	<i>E. coli</i>	435	261	687	488	649	1120	149	206	124	219	344	30%
Fivemile 4	<i>E. coli</i>	548	248	86	63	83	>2420	144	192	46	36	153	10%
Fivemile 3	<i>E. coli</i>	326	61	15	20	40	>2420	271	488	68	111	119	10%
Fivemile 2	<i>E. coli</i>	517	687	336	365	308	649	192	345	122	162	320	20%
Fivemile 1	Enterococci	3654	256	223	246	209	8164	1339	457	74	209	492	30%
Accumulation 48 hours prior		Wet	Dry	Dry	Dry	Dry	Wet	Wet	Wet	Dry	Dry		

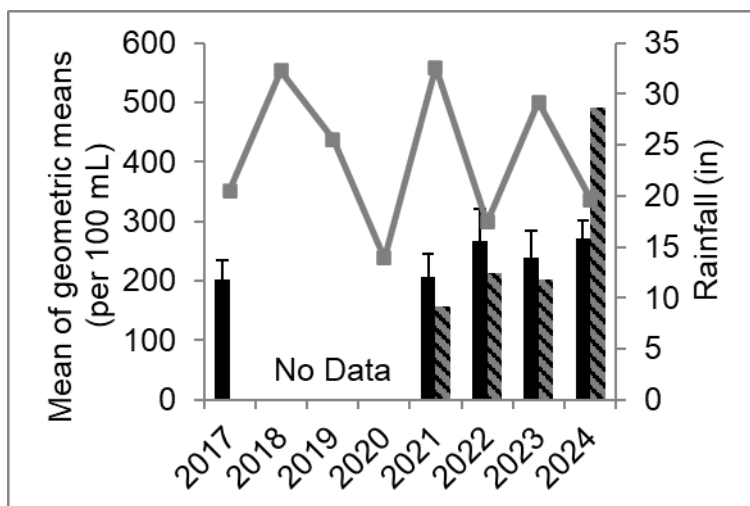


Figure D2. Mean of freshwater site geomeans (black bars; *E. coli*) and saltwater site geomeans (striped bars; enterococci) from 2017-2024 in the Fivemile River and total rainfall from May through September each year (grey squares and line).

Table D2. GPS coordinates and site locations for the Fivemile River.

Site Name	Latitude	Longitude	Site location notes	River Name
Fivemile 10	41.189323	-73.514135	Michigan Road	Fivemile River
Fivemile 9	41.168110	-73.504929	Country Club Road	Fivemile River
Fivemile 8	41.155580	-73.493453	Smith Ridge Road	Fivemile River
Fivemile 7	41.147827	-73.483529	East Avenue	Fivemile River
Fivemile 6	41.136623	-73.479169	Old Norwalk Road	Fivemile River
Fivemile 5	41.126902	-73.471024	Nursery Road	Fivemile River
Fivemile 4	41.110687	-73.461955	Fallow Street	Fivemile River
Fivemile 3	41.100584	-73.454406	W. Cedar Street	Fivemile River
Fivemile 2	41.088194	-73.450708	Flax Hill Road	Fivemile River
Fivemile 1	41.073023	-73.447620	Cudlipp Street	Fivemile River

Dissolved oxygen and water temperature: Dissolved oxygen readings in the watershed varied by site (Figure D3). While the majority of readings met the CT DEEP minimum criteria, six individual dissolved oxygen readings were observed below 5 mg/L at freshwater sites Fivemile 9, Fivemile 5, and Fivemile 3, while two individual dissolved oxygen readings were observed below 3 mg/L at saltwater site Fivemile 1. Low readings were predominantly observed in June and July when water temperatures were highest (Figure D4).

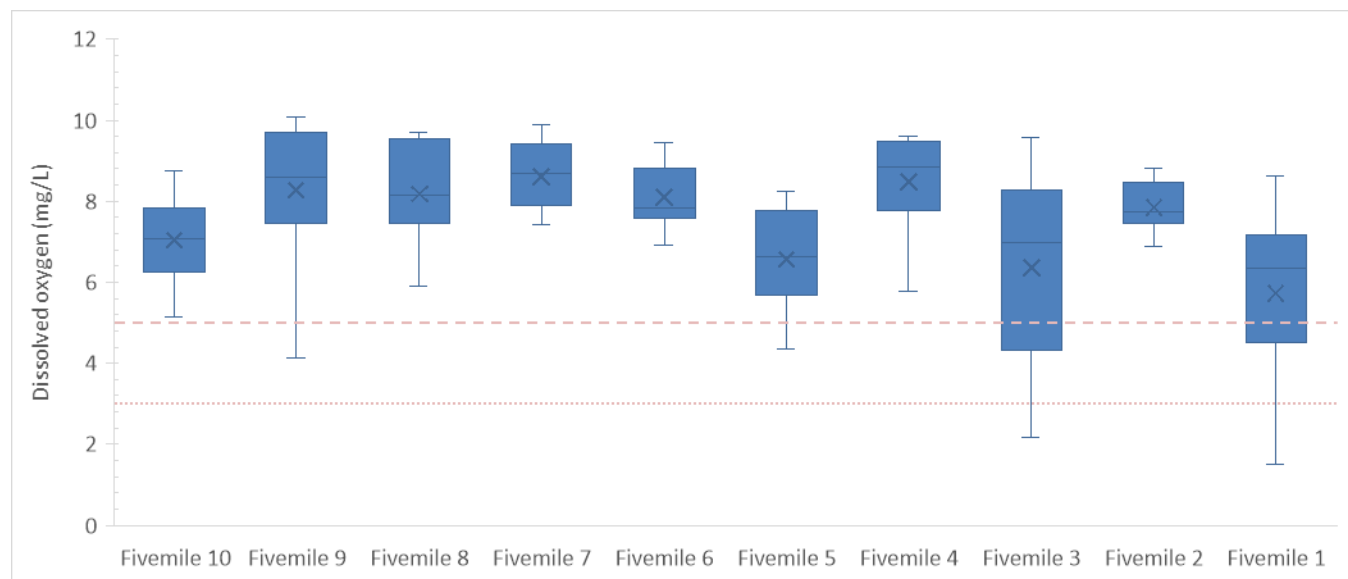


Figure D3. Box plot of dissolved oxygen concentrations at each sampling site in the Fivemile River. The dashed red line represents the CT DEEP minimum criteria for dissolved oxygen in freshwater, which is 5mg/L. The dotted red line represents the CT DEEP minimum criteria for dissolved oxygen in saltwater, which is 3mg/L. The only saltwater sampling site in this watershed is Fivemile 1.

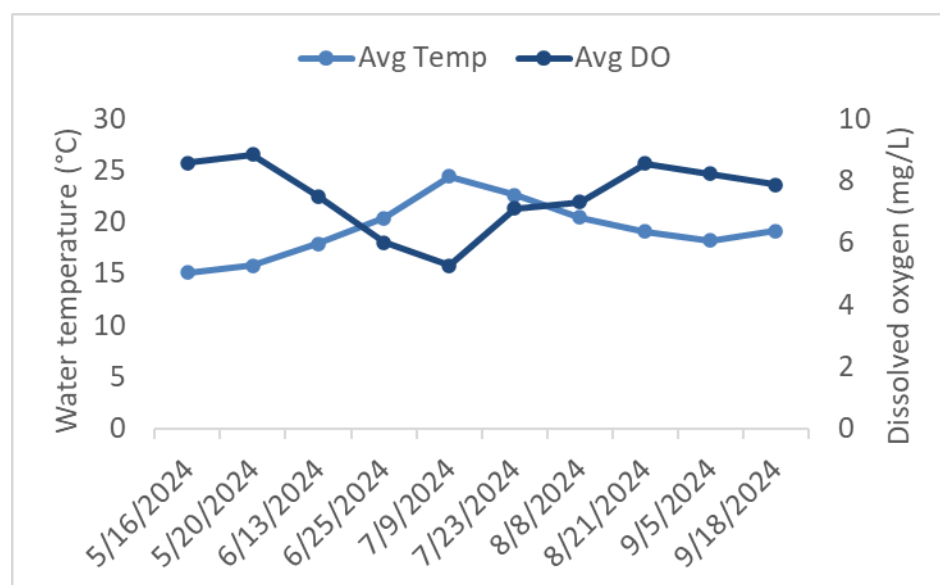


Figure D4. Mean water temperature and mean dissolved oxygen of all sites on each sampling date in the Fivemile River.

E. New Creek

New Creek is a small waterway in Westport that discharges to Long Island Sound at Burying Hill Beach. The land use within the small watershed is predominantly residential, with the lower portion of the creek passing through a salt marsh. Additionally, a tidally influenced side channel connects the creek to the Sherwood Island Millpond. In the past, Harbor Watch periodically monitored New Creek as part of student projects in the fall and winter months, but in 2023 and 2024 data were collected during the summer monitoring season. Harbor Watch added this sampling at the request of the Westport Shellfish Commission to better understand the water quality in the creek and possibly identify pollution sources.

Indicator bacteria: In 2024, data were collected on ten days. All five sites exceeded CT DEEP geomean criteria (Figure E1). Additionally, 45% of all samples processed exceeded the CT DEEP single sample maximum criteria (Table E1). A special project to target sampling around all tides was conducted in July to see if any patterns of bacteria concentrations emerged. The bacteria concentrations observed one and a half hours around high tide (three sampling points) were higher than concentrations observed at other points in the tidal cycle (Figure E2). One hypothesis could be that the creek is being impacted by septic systems in the vicinity of the creek along the marsh when the marsh is flooded at high tide, especially near Maple Lane (New 1.5, blue bar in Figure E2). Additional testing would be needed to test this hypothesis.

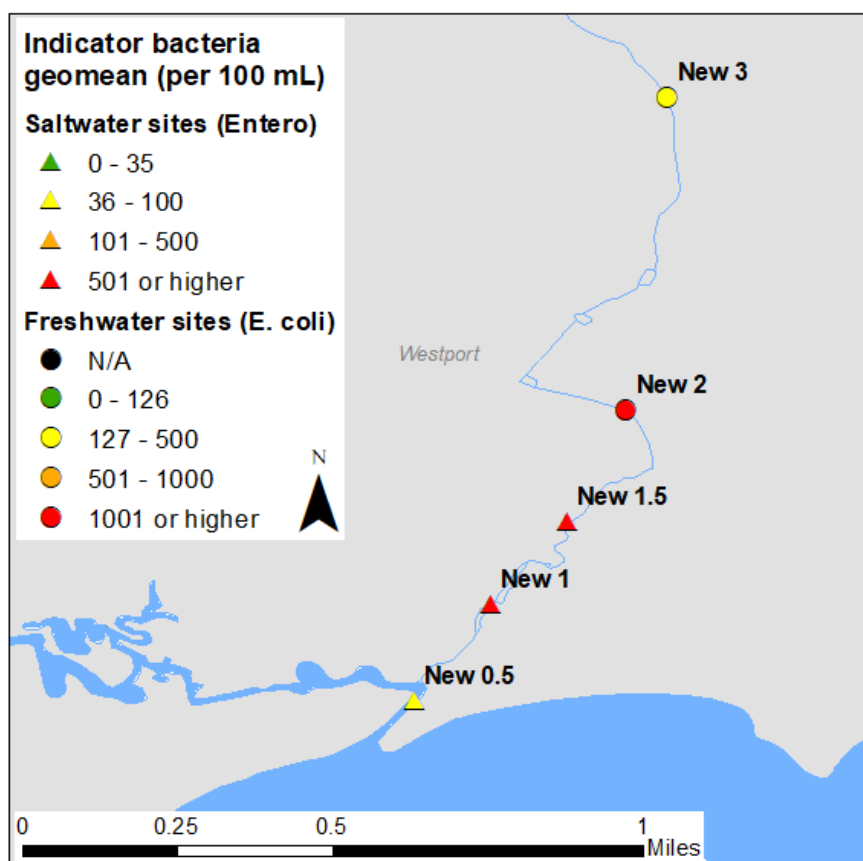


Figure E1. Map of indicator bacteria, *E. coli* or enterococci, geomean concentrations at each site in New Creek in 2024.

Table E1. New Creek *E. coli* and enterococci concentrations (MPN/100mL), geomeans, and percentage of samples exceeding the CT DEEP single sample maximum. Rainfall data gathered from the Norwalk Health Department website (Norwalk Health Department, n.d.).

Site	Indicator Bacteria	5/13/2024	5/21/2024	6/6/2024	6/26/2024	7/1/2024	7/24/2024	7/30/2024	8/20/2024	8/26/2024	9/24/2024	Geomean	Exceed SSM
New 3	<i>E. coli</i>	308	261	>2419	517	1540	525	408	525	434	104	489	20%
New 2	<i>E. coli</i>	816	345	1011	517	821	262	690	No Data	420	328	525	44%
New 1.5	Enterococci	121	1376	10462	3448	9804	3873	3448	3076	763	884	2096	90%
New 1	Enterococci	120	31	7270	2755	8664	4884	1785	1236	677	487	1085	70%
New 0.5	Enterococci	41	20	422	75	20	341	31	74	74	20	60	0%
Accumulation 48 hours prior		Dry	Dry	Wet	Wet	Wet	Wet	Wet	Wet	Dry	Dry		

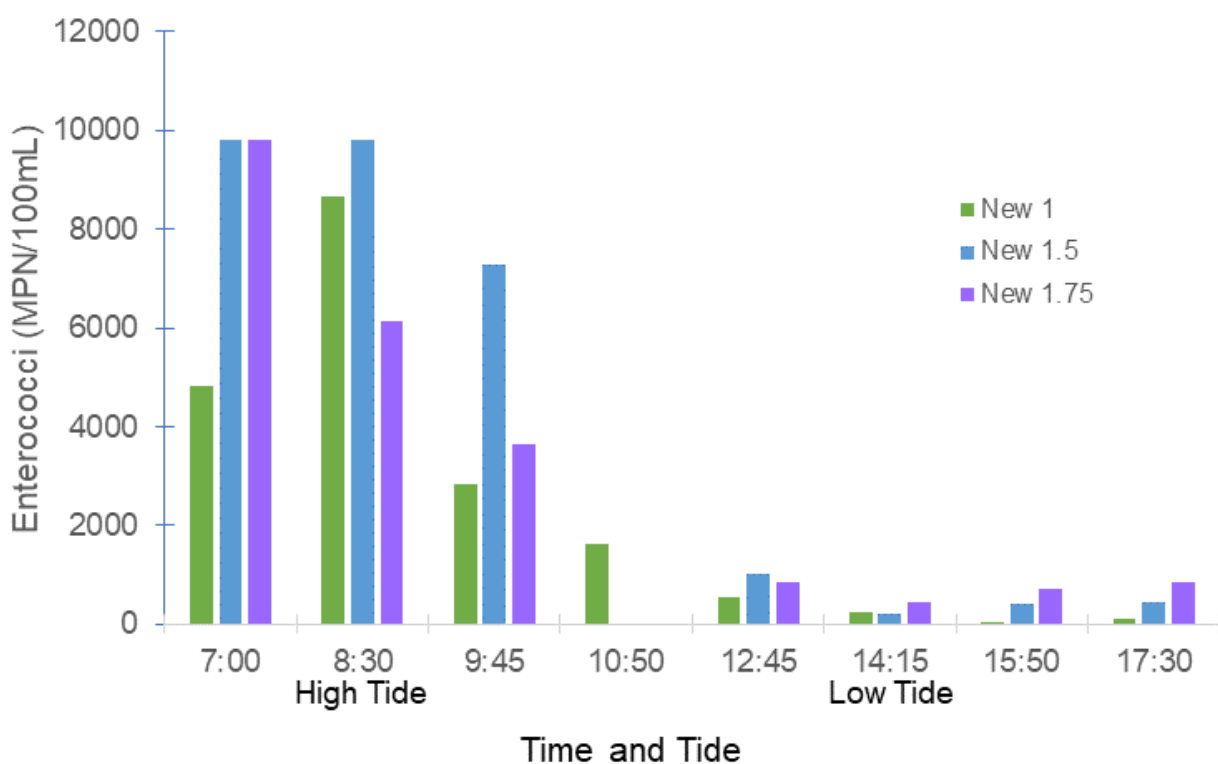


Figure E2. Bacteria concentrations observed at three sites in New Creek at different points in the tidal cycle.

Table E2. GPS coordinates and site locations for New Creek.

Site Name	Latitude	Longitude	Site location notes	River Name
New 3	41.130641	-73.31282	Clapboard Hill Road	New Creek
New 2	41.123344	-73.313794	Post Office Lane	New Creek
New 1.5	41.120757	-73.31513	Maple Lane	New Creek
New 1	41.118839	-73.316926	Beachside Avenue	New Creek
New 0.5	41.11657	-73.3187	Burying Hill Road	New Creek

Dissolved oxygen and water temperature: Dissolved oxygen readings varied at each site throughout the watershed (Figure E3). While the majority of individual dissolved oxygen readings met the CT DEEP minimum criteria, two individual readings were observed below 3 mg/L at site New 1.5 in July. High water temperatures were likely a contributing factor to the observed low dissolved oxygen readings during this time (Figure E4).

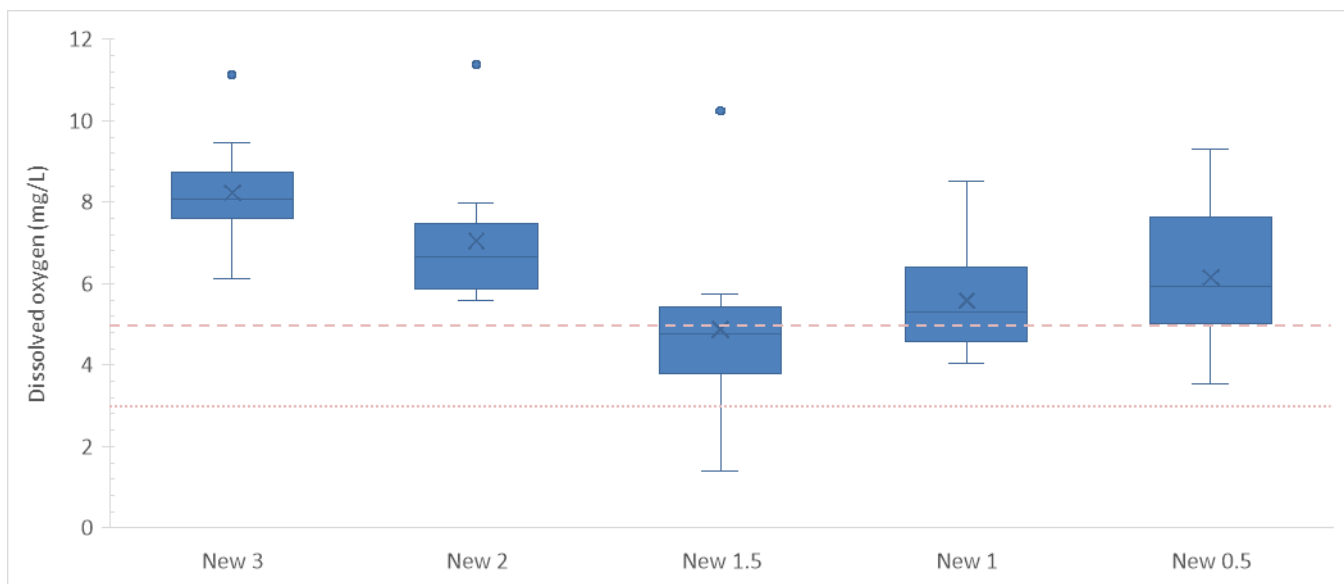


Figure E3. Box plot of dissolved oxygen concentrations at each sampling site in New Creek. The dashed red line represents the CT DEEP minimum criteria for dissolved oxygen in freshwater, which is 5mg/L. The dotted red line represents the CT DEEP minimum criteria for dissolved oxygen in saltwater, which is 3mg/L. The saltwater sampling sites in this watershed are New 1.5, New 1, and New 0.5.

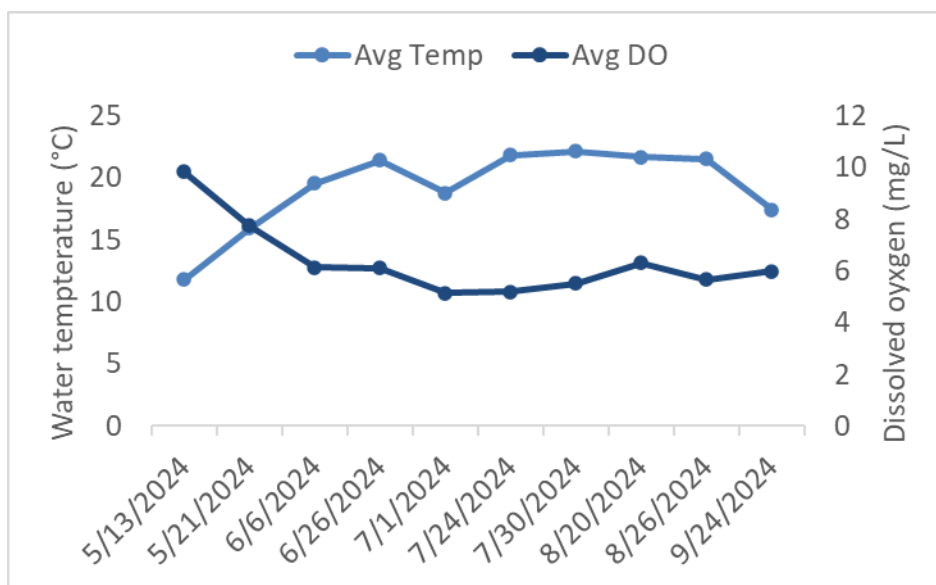
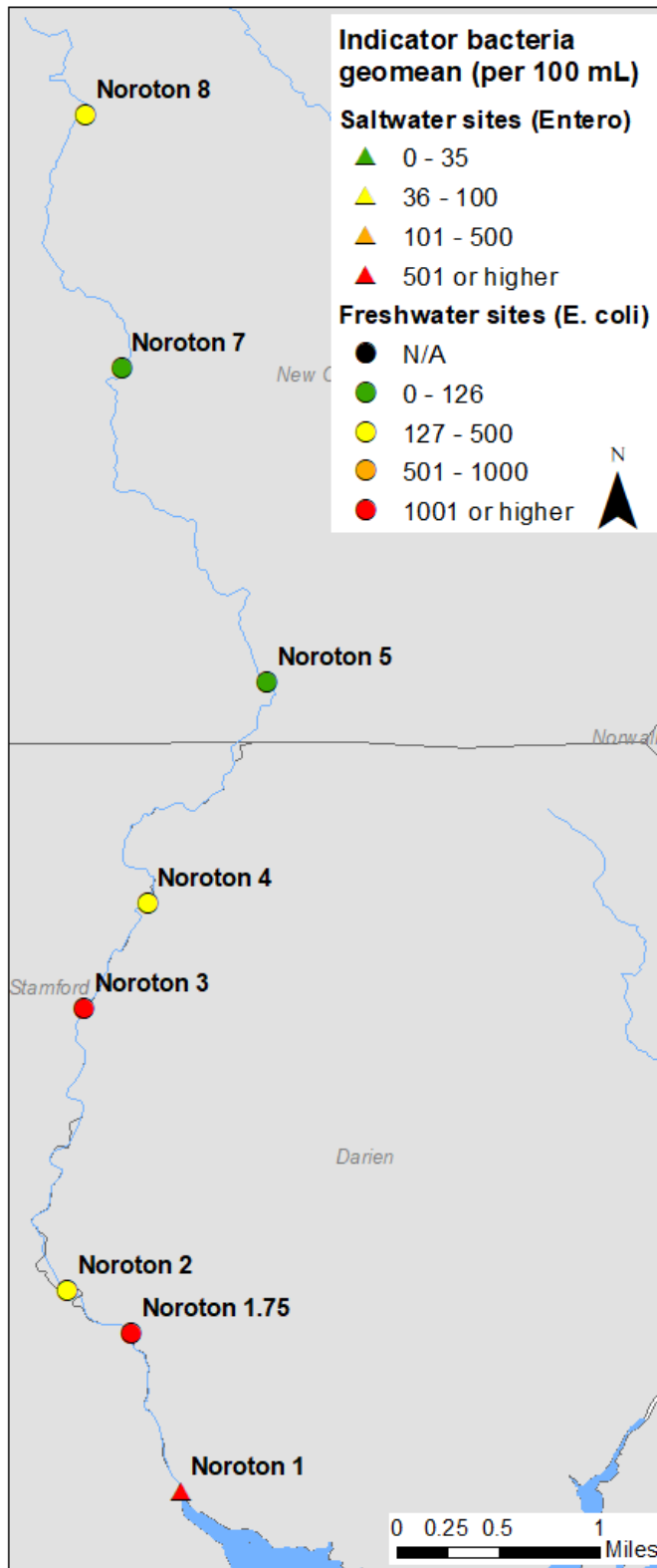


Figure E4. Mean water temperature and mean dissolved oxygen of all sites on each sampling date in New Creek.

F. Noroton River



The Noroton River watershed encompasses portions of Stamford, Darien, and New Canaan, CT. The watershed is approximately 7,000 acres or 11 square miles (CT DEEP, 2022). The river begins in New Canaan and flows south, forming the border of Stamford and Darien, until it discharges into Holly Pond. The land use along the river is a mixture of residential and light commercial. Harbor Watch has monitored the Noroton River annually since 2016.

Indicator bacteria: In 2024, data were collected on ten days. Bacteria concentrations at six of the eight sites in Noroton River exceeded the CT DEEP geomean criteria (Figure F1). Additionally, 34% of all samples processed exceeded the CT DEEP single sample maximum criteria (Table F1). Harbor Watch continues to work with both the City of Stamford and Town of Darien on track-down projects to identify sources of sewage pollution to the river, but at this time no sources have been identified. Observed annual mean *E. coli* concentrations were slightly elevated above historic levels (Figure F2).

Figure F1. Map of indicator bacteria, *E. coli* or enterococci, geomean concentrations at each site in the Noroton River in 2024.

Table F1. Noroton River *E. coli* and enterococci concentrations (MPN/100mL), geomeans, and percentage of samples exceeding the CT DEEP single sample maximum. Rainfall data gathered from the Norwalk Health Department website (Norwalk Health Department, n.d.).

Site	Indicator Bacteria	5/16/2024	5/22/2024	6/6/2024	6/24/2024	7/1/2024	7/25/2024	7/31/2024	8/14/2024	9/3/2024	9/16/2024	Geomean	Exceed SSM
Noroton 8	<i>E. coli</i>	276	1203	921	272	582	142	111	214	548	105	314	30%
Noroton 7	<i>E. coli</i>	326	17	1046	34	582	55	11	33	63	11	66	20%
Noroton 5	<i>E. coli</i>	>2420	23	130	31	30	102	14	12	30	10	45	10%
Noroton 4	<i>E. coli</i>	135	261	1011	238	384	91	52	58	61	122	152	10%
Noroton 3	<i>E. coli</i>	517	727	>2420	1300	1842	866	>2420	445	1095	166	905	70%
Noroton 2	<i>E. coli</i>	>2420	160	>2420	81	2599	204	83	14	308	No Data	290	33%
Noroton 1.75	<i>E. coli</i>	1986	326	>2420	770	2827	279	1373	167	216	328	659	50%
Noroton 1	Enterococci	1019	121	12033	629	4352	410	960	496	185	369	747	50%
Accumulation 48 hours prior		Wet	Dry	Wet	Dry	Wet	Dry	Wet	Wet	Dry	Dry		

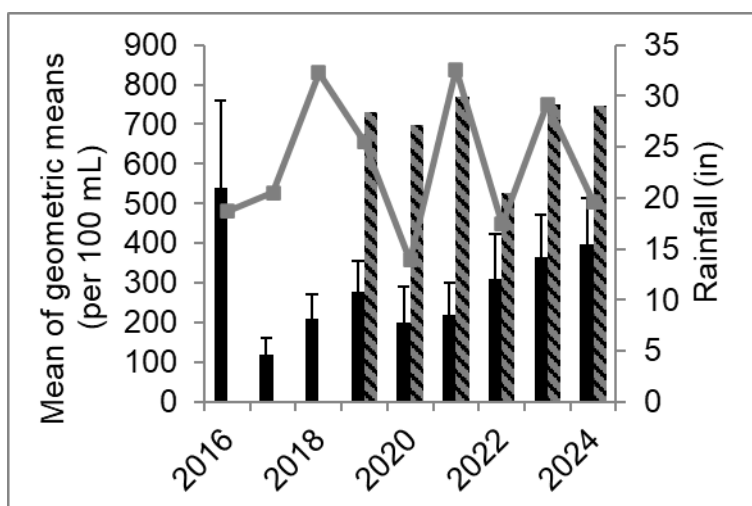


Figure F2. Mean of freshwater site geomeans (black bars; *E. coli*) and saltwater site geomeans (striped bars; enterococci) from 2016–2024 in Noroton River and total rainfall from May through September each year (grey squares and line).

Table F2. GPS coordinates and site locations for the Noroton River.

Site Name	Latitude	Longitude	Site location notes	River Name
Noroton 8	41.15925	-73.51421	West Road and Greenley Road intersection	Noroton River
Noroton 7	41.14108	-73.51167	209 Frogtown Road	Noroton River
Noroton 5	41.11868	-73.50130	47 Jelliff Mill Road	Noroton River
Noroton 4	41.10290	-73.50982	137 Woodway Road	Noroton River
Noroton 3	41.09540	-73.51430	Camp Avenue	Noroton River
Noroton 2	41.07530	-73.51550	668 Connecticut 106	Noroton River
Noroton 1.75	41.072178	-73.51099	West Avenue	Noroton River
Noroton 1	41.06093	-73.50735	1308 E. Main Street	Noroton River

Dissolved oxygen and water temperature: Dissolved oxygen readings varied at each site throughout the watershed (Figure F3). While the majority of individual dissolved oxygen readings met the CT DEEP minimum criteria, ten readings were observed below 5 mg/L at Noroton 8 and Noroton 2, and four readings were observed below 3 mg/L at saltwater site Noroton 1. Low flow was the primary reason for low dissolved oxygen concentrations at Noroton 8. Higher water temperatures may be contributing to lower concentrations at Noroton 2 and Noroton 1 (Figure F4).

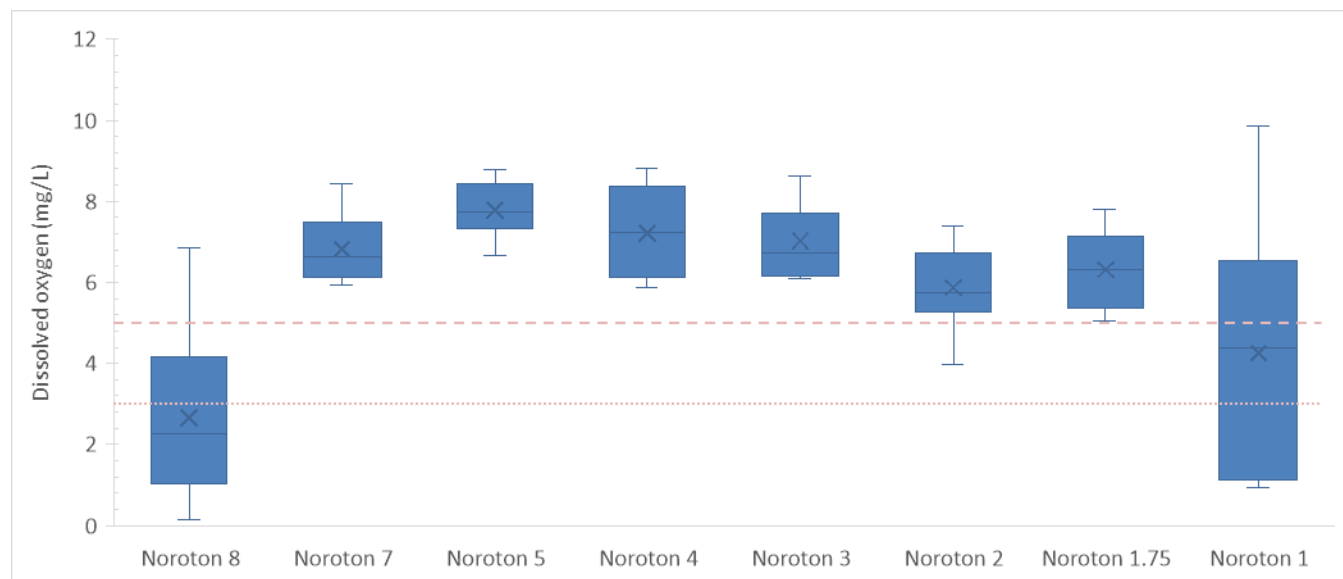


Figure F3. Box plot of dissolved oxygen concentrations at each sampling site in the Noroton River. The dashed red line represents the CT DEEP minimum criteria for dissolved oxygen in freshwater, which is 5mg/L. The dotted red line represents the CT DEEP minimum criteria for dissolved oxygen in saltwater, which is 3mg/L. The only saltwater sampling site in this watershed is Noroton 1.

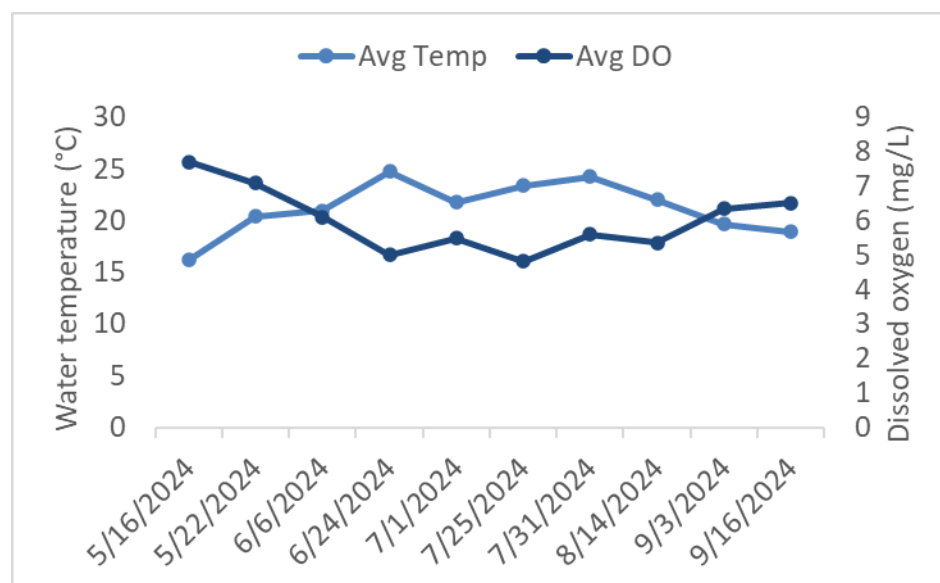
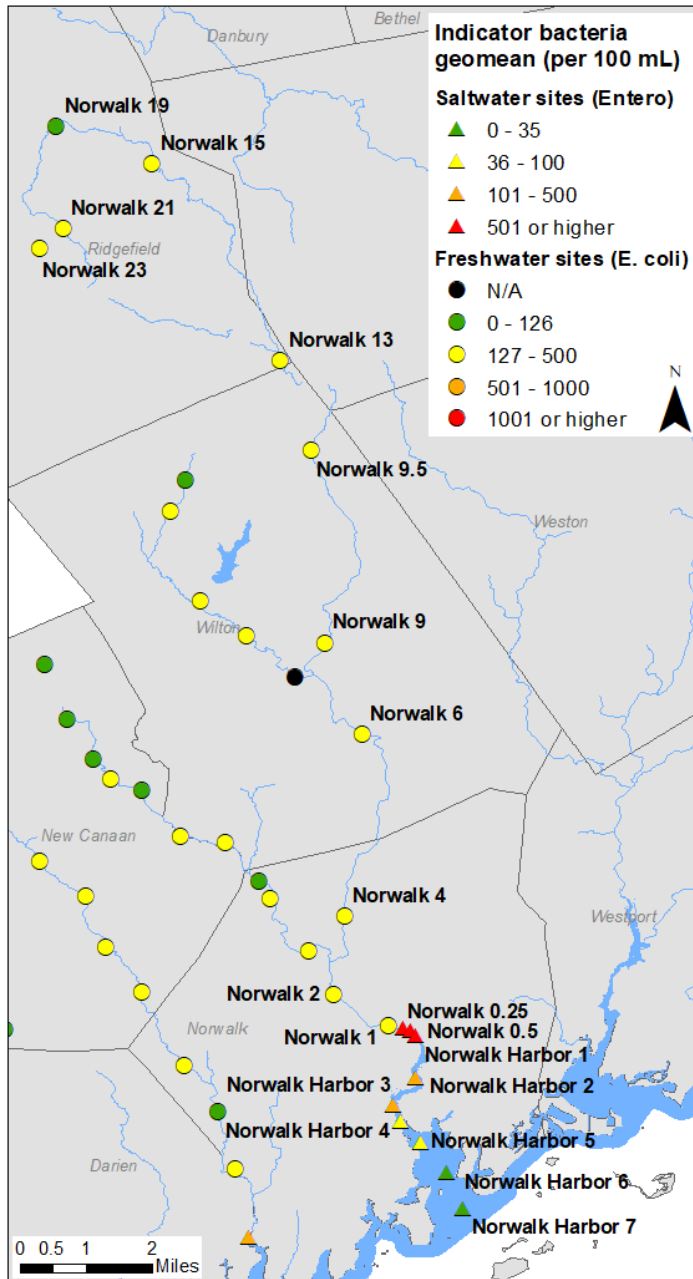


Figure F4. Mean water temperature and mean dissolved oxygen of all sites on each sampling date in the Noroton River.

G. Norwalk River Watershed (Norwalk Harbor, Norwalk River, Ridgefield Brook)

The Norwalk River watershed includes New Canaan, Norwalk, Redding, Ridgefield, Weston, and Wilton, CT, as well as Lewisboro, NY. The watershed is roughly 40,000 acres (64.1 square miles), which is developed by commercial/light industry uses and residential neighborhoods (Norwalk River Watershed Initiative [NRWI], 1998). The main stem of the Norwalk River is approximately 20 miles in length, beginning in the Great Swamp in Ridgefield, ultimately discharging in Norwalk Harbor which is an approximately 3-mile-long tidal estuary (NRWI, 1998). Harbor Watch has monitored the Norwalk River

for over 25 years. This year marks the second monitoring season where Harbor Watch collected indicator bacteria data in Norwalk Harbor as part of the Pathogen Monitoring Network. The harbor and surrounding areas are regularly used for recreational and commercial shellfishing as well as other recreational activities. The river sites and harbor sites were monitored on different days due to scheduling and weather conditions. Because harbor samples had to be collected via boat, samples were never collected during rainfall events for safety reasons which may have biased the data slightly.



Indicator bacteria: In 2024, data were collected in the Norwalk River Watershed on ten days. In the watershed, 17 of the 20 sites exceeded the CT DEEP geomean criteria for indicator bacteria (Figure G1). Additionally, 22% of all samples processed exceeded the CT DEEP single sample maximum criteria (Table G1.A and G1.B). Pollution track-down was conducted in conjunction with the City of Norwalk to address elevated bacteria concentrations observed in the upper harbor. Bacteria concentrations in the main stem of the river are higher than those that have been observed over the last five years (Figure G2).

Figure G1. Map of indicator bacteria, *E. coli* or enterococci, geomean concentrations at each site in the Norwalk River Watershed in 2024. Unlabeled sites are part of the

Comstock Brook (subsection C), Fivemile River (subsection D), and Silvermine River (subsection K).

Table G1. Norwalk River watershed *E. coli* and enterococci concentrations (MPN/100mL), geomeans, and percentage of samples exceeding the CT DEEP single sample maximum. Rainfall data gathered from the Norwalk Health Department website (Norwalk Health Department, n.d.).

(A)

Site	Indicator Bacteria	5/8/2024	5/30/2024	6/12/2024	6/20/2024	7/8/2024	7/16/2024	8/7/2024	8/12/2024	8/29/2024	9/17/2024	Geomean	Exceed SSM
Norwalk 23	<i>E. coli</i>	411	4839	58	345	114	114	3466	86	133	27	237	20%
Norwalk 21	<i>E. coli</i>	62	>2420	261	365	727	345	4839	326	261	308	463	30%
Norwalk 19	<i>E. coli</i>	153	1986	16	17	219	30	1540	73	25	548	124	20%
Norwalk 15	<i>E. coli</i>	47	2420	172	276	214	199	821	210	73	51	208	20%
Norwalk 13	<i>E. coli</i>	104	>2420	238	454	488	291	2827	365	65	102	348	20%
Norwalk 9.5	<i>E. coli</i>	64	435	89	1203	114	46	1842	387	548	135	246	20%
Norwalk 9	<i>E. coli</i>	50	921	249	435	192	260	1159	122	99	93	224	20%
Norwalk 6	<i>E. coli</i>	116	>2420	156	161	260	225	1540	124	122	308	280	20%
Norwalk 4	<i>E. coli</i>	387	980	118	76	162	133	2407	131	93	119	219	20%
Norwalk 2	<i>E. coli</i>	435	727	276	166	261	249	1842	186	88	99	279	20%
Norwalk 1	<i>E. coli</i>	236	1300	1553	365	435	272	1733	517	135	285	485	30%
Norwalk 0.5	Enterococci	265	1153	156	211	1670	2382	7701	465	132	637	643	50%
Norwalk 0.25	Enterococci	345	1281	158	185	2224	1989	7270	638	185	110	593	50%
Accumulation 48 hours prior		Wet	Wet	Dry	Dry	Wet	Wet	Wet	Dry	Dry	Dry		

(B)

Site	Indicator bacteria	5/8/2024	5/22/2024	6/5/2024	6/20/2024	7/2/2024	7/17/2024	8/14/2024	8/28/2024	9/11/2024	9/25/2024	Geomean	Exceed SSM
Norwalk Harbor 1	Enterococci	1989	185	379	728	2098	4611	645	323	74	185	555	50%
Norwalk Harbor 2	Enterococci	2254	134	373	241	1076	1679	602	435	41	86	368	40%
Norwalk Harbor 3	Enterococci	110	109	243	41	657	287	288	168	75	63	148	10%
Norwalk Harbor 4	Enterococci	132	41	259	10	20	96	120	74	73	10	53	0%
Norwalk Harbor 5	Enterococci	73	85	181	31	41	20	41	73	10	20	42	0%
Norwalk Harbor 6	Enterococci	20	20	41	10	52	10	10	31	10	10	17	0%
Norwalk Harbor 7	Enterococci	20	<10	10	<10	<10	<10	<10	10	<10	<10	11	0%
Accumultion 48 hours prior		Wet	Dry	Dry	Dry	Wet	Wet	Wet	Dry	Dry	Dry		

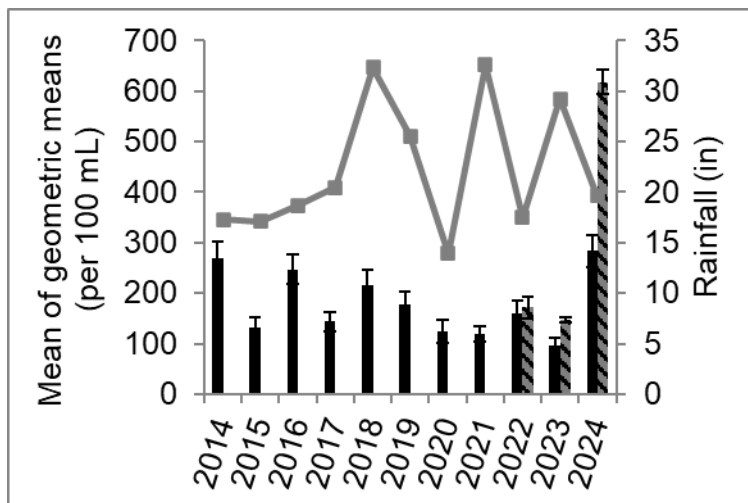


Figure G2. Mean of freshwater site geomeans (black bars; *E. coli*) and saltwater site geomeans (striped bars; enterococci) from 2014-2024 in the Norwalk River and total rainfall from May through September each year (grey squares and line).

Table G2. GPS coordinates and site locations for the Norwalk River Watershed.

Site Name	Latitude	Longitude	Site location notes	River Name
Norwalk 23	41.29005	-73.49349	22 South Street	Unnamed Tributary
Norwalk 21	41.29444	-73.48843	68 Farmingville Road	Ridgefield Brook
Norwalk 19	41.31672	-73.49001	Limestone Road	Ridgefield Brook
Norwalk 15	41.30870	-73.46884	Stonehenge Road	Norwalk River
Norwalk 13	41.26550	-73.44079	787 Branchville Road	Norwalk River
Norwalk 9.5	41.24590	-73.43409	Old Mill Road	Norwalk River
Norwalk 9	41.20354	-73.43094	School Road	Norwalk River
Norwalk 6	41.18341	-73.42276	187 Danbury Road	Norwalk River
Norwalk 4	41.14349	-73.42669	10 Glover Avenue	Norwalk River
Norwalk 2	41.12632	-73.42916	New Canaan Avenue	Norwalk River
Norwalk 1	41.11947	-73.41701	40 Cross Street	Norwalk River
Norwalk 0.5	41.11893	-73.41381	Burnell Boulevard	Norwalk River
Norwalk 0.25	41.11841	-73.41201	Wall Street	Norwalk Harbor
Norwalk Harbor 1	41.11738	-73.41105	Off marina at Wall Street	Norwalk Harbor
Norwalk Harbor 2	41.10799	-73.41117	At the I-95 Bridge	Norwalk Harbor
Norwalk Harbor 3	41.10205	-73.416	At the TMA dock across from WTP effluent discharge	Norwalk Harbor
Norwalk Harbor 4	41.09846	-73.41419	Transient dock at Vets Park	Norwalk Harbor
Norwalk Harbor 5	41.09385	-73.41003	Moorings across from Ischoda Yacht Club	Norwalk Harbor
Norwalk Harbor 6	41.08727	-73.40425	Buoy 19	Norwalk Harbor
Norwalk Harbor 7	41.07939	-73.40073	Buoy 15	Norwalk Harbor

Dissolved oxygen and water temperature: Dissolved oxygen readings within the river were relatively consistent with the exception of site Norwalk 21 which is located at the outlet of the Great Swamp and has very slow water movement (Figure G3). While the majority of individual dissolved oxygen readings met the CT DEEP minimum criteria, eleven readings were observed below 5 mg/L at freshwater sites Norwalk 21 and Norwalk 19 and one reading was observed below 3 mg/L at saltwater site Norwalk 0.25 throughout the season. Mean water temperatures steadily increased starting in May, peaking mid-July before dropping slightly during the second half of the monitoring season (Figure G4). The field meter could not reach the river at site Norwalk 0.5 due to the height of the bridge, therefore no physical or chemical data were collected for the site. Physical and chemical data were collected in Norwalk Harbor during profile surveys as reported in the Harbor Watch *Harbor Health Study 2024* as well as the Unified Water Study project which is reported in the Long Island Sound bi-annual report card released by Save the Sound.

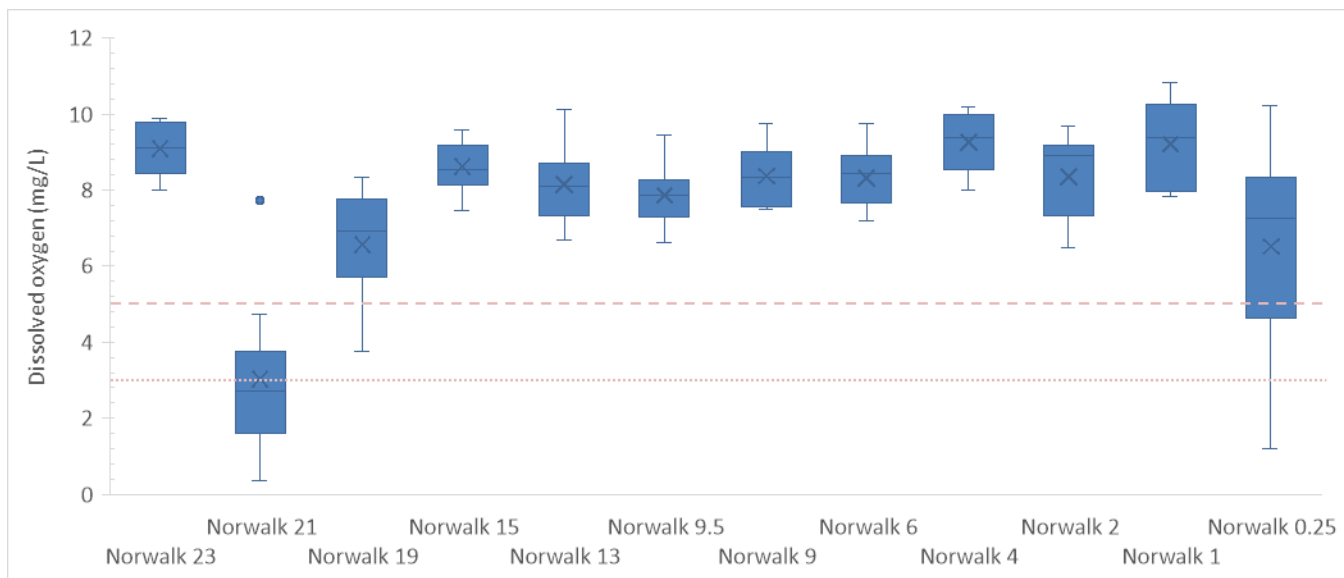


Figure G3. Box plot of dissolved oxygen concentrations at each sampling site in the Norwalk River. The dashed red line represents the CT DEEP minimum criteria for dissolved oxygen in freshwater, which is 5mg/L. The dotted red line represents the CT DEEP minimum criteria for dissolved oxygen in saltwater, which is 3mg/L. The saltwater sampling sites in this waterway are Norwalk 0.5 and Norwalk 0.25, but no physical and chemical data were collected at Norwalk 0.5.

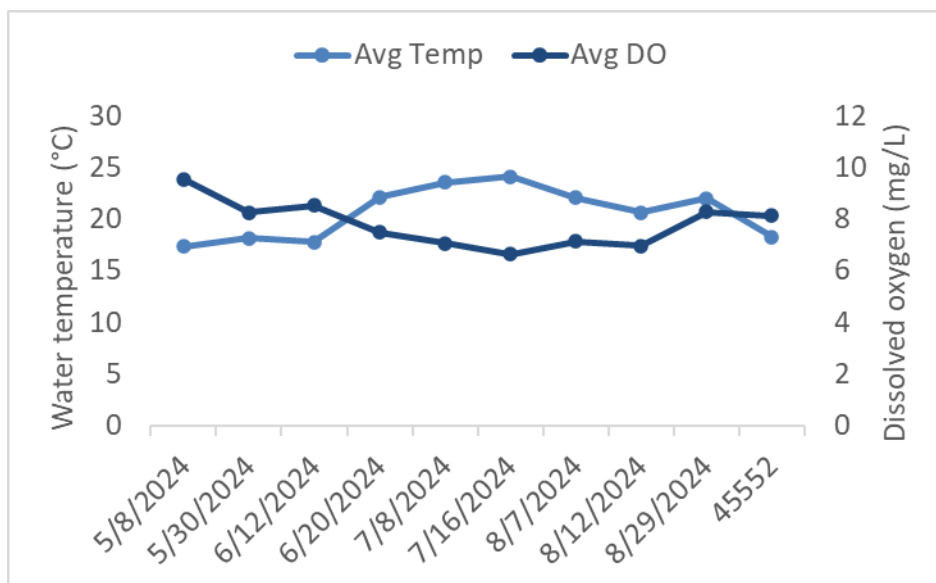


Figure G4. Mean water temperature and mean dissolved oxygen of all sites on each sampling date in the Norwalk River.

H. Pequonnock River Watershed (Pequonnock River and Island Brook)

The Pequonnock River watershed is located primarily in Monroe, Trumbull, and Bridgeport, with small portions in Shelton and Newtown, CT. The watershed is roughly 29 square miles. Land use within the watershed transitions from lightly developed in Monroe to residential in Trumbull and northern Bridgeport, then into commercial and old industrial uses near the mouth at Bridgeport Harbor (Pequonnock River Initiative, 2011). Harbor Watch first monitored the River in 2009 and since then has monitored different portions of the Pequonnock River each year. Island Brook is a tributary to the Pequonnock River that starts in Trumbull and flows south through Bridgeport before discharging to the Pequonnock River in between Harbor Watch sites Pequonnock 0.75 and Pequonnock 0.5. Since 2022, Harbor Watch has monitored the lower Pequonnock River sites and Island Brook.

Indicator bacteria: In 2024, data were collected on ten days. Bacteria data on 6/17 were excluded from analysis because quality control protocols were not met. All sites exceeded the CT DEEP geomean criteria for indicator bacteria (Figure H1). Additionally, 51% of all samples processed exceeded the CT DEEP single sample maximum criteria (Table H1). Harbor Watch continues to work with the City of Bridgeport on pollution track-down projects in the vicinity of Island 1 and Island 4 to improve water quality to the brook. Results indicate that multiple sources likely exist within the watershed. Bacteria concentrations in the lower Pequonnock River Watershed remain elevated, consistent with findings since 2022 (Figure H2).

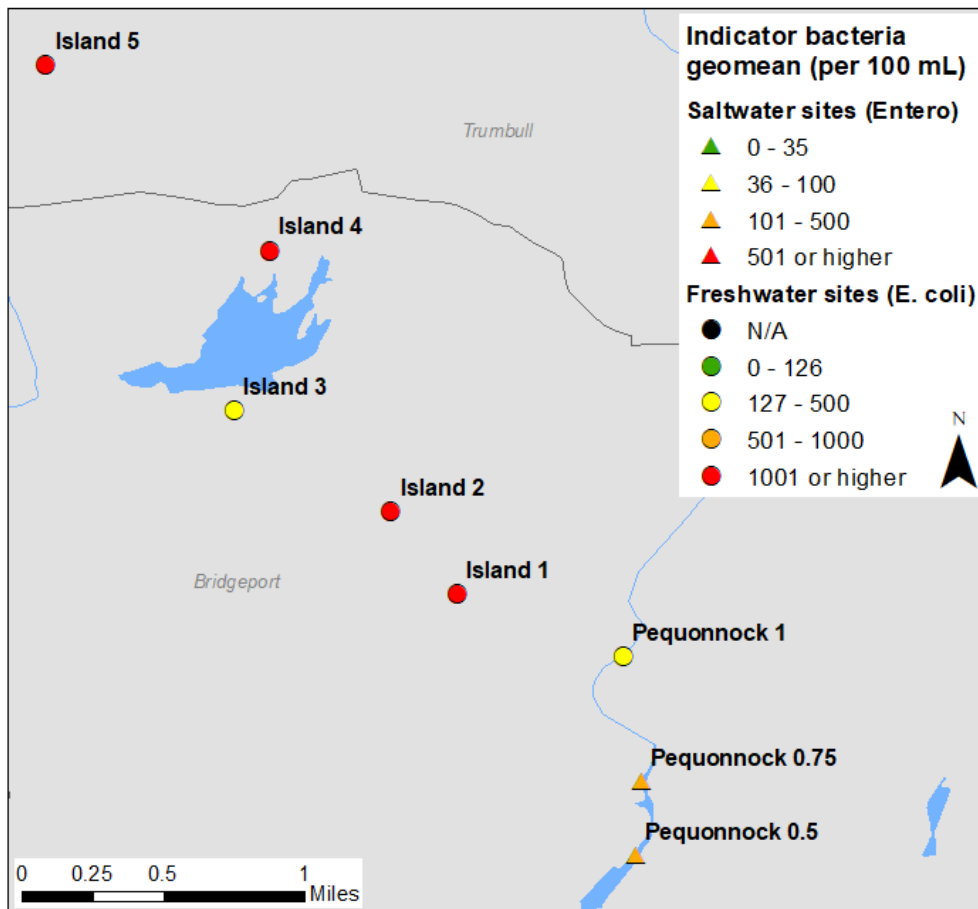


Figure H1. Map of indicator bacteria, *E. coli* or enterococci, geomean concentrations at each site in the Pequonnock River Watershed in 2024.

Table H1. Pequonnock River watershed *E. coli* and enterococci concentrations (MPN/100mL), geomeans, and percentage of samples exceeding the CT DEEP single sample maximum. Rainfall data gathered from the Norwalk Health Department website (Norwalk Health Department, n.d.).

Site	Indicator Bacteria	5/15/2024	5/20/2024	6/4/2024	6/17/2024	7/2/2024	7/23/2024	8/1/2024	8/13/2024	9/5/2024	9/12/2024	Geomean	Exceed SSM
Island 5	<i>E. coli</i>	1120	193	411	No Data	>2420	3106	504	510	282	237	609	33%
Island 4	<i>E. coli</i>	>9678	2420	>4839		5199	4884	>24196	2355	1725	6131	4934	100%
Island 3	<i>E. coli</i>	496	167	1095		615	79	271	62	204	41	204	22%
Island 2	<i>E. coli</i>	1414	345	214		579	1095	3466	519	255	333	600	44%
Island 1	<i>E. coli</i>	4185	787	626		587	2190	6212	988	1421	833	1389	100%
Pequonnock 1	<i>E. coli</i>	551	922	1961		568	118	257	80	537	123	355	22%
Pequonnock 0.75	Enterococci	631	97	259		826	857	1376	496	108	109	355	44%
Pequonnock 0.5	Enterococci	663	85	437		537	2142	959	457	122	243	416	44%
Accumulation 48 hours prior		Wet	Dry	Dry	-	Wet	Wet	Wet	Dry	Dry	Dry		

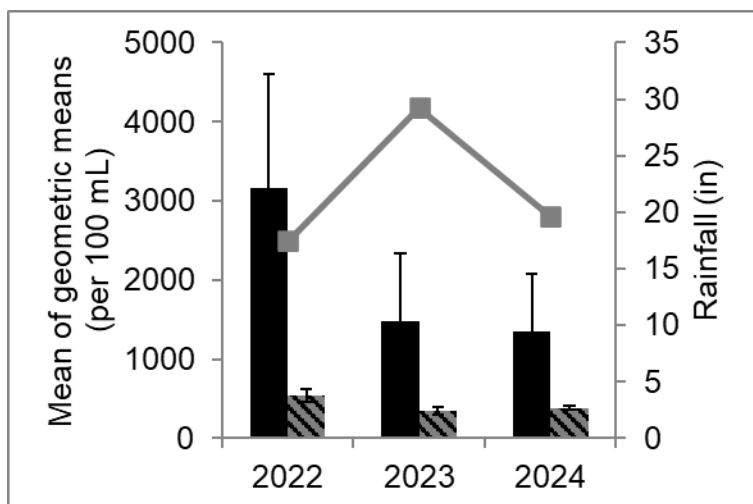


Figure H2. Mean of freshwater site geomeans (black bars; *E. coli*) and saltwater site geomeans (striped bars; enterococci) from 2022-2024 in the Pequonnock River watershed and total rainfall from May through September each year (grey squares and line).

Table H2. GPS coordinates and site locations for the Pequonnock River Watershed.

Site Name	Latitude	Longitude	Site location notes	River Name
Pequonnock 1	41.20460	-73.18765	Glenwood Park	Pequonnock River
Pequonnock 0.75	41.198176	-73.18669	Island Brook Road	Bridgeport Harbor
Pequonnock 0.5	41.194435	-73.18699	River Street	Bridgeport Harbor
Island 5	41.234895	-73.21723	Williams Road	Island Brook
Island 4	41.225396	-73.20574	Lakeside Drive	Island Brook
Island 3	41.217179	-73.20757	Griffin Avenue	Island Brook
Island 2	41.212059	-73.19954	Chopsey Hill Road	Island Brook
Island 1	41.207835	-73.19613	Chopsey Hill Road/Pond Street	Island Brook

Dissolved oxygen and water temperature: Dissolved oxygen readings varied at each site throughout the watershed (Figure H3). While the majority of individual dissolved oxygen readings met the CT DEEP criteria minimums, five readings were observed below 5 mg/L at site Island 3, Island 2, and Island 1, and four readings were observed below 3 mg/L at sites Pequonnock 0.75 and Pequonnock 0.5. Higher water temperatures and lower flow are likely contributing factors to the low dissolved oxygen readings observed (Figure H4).

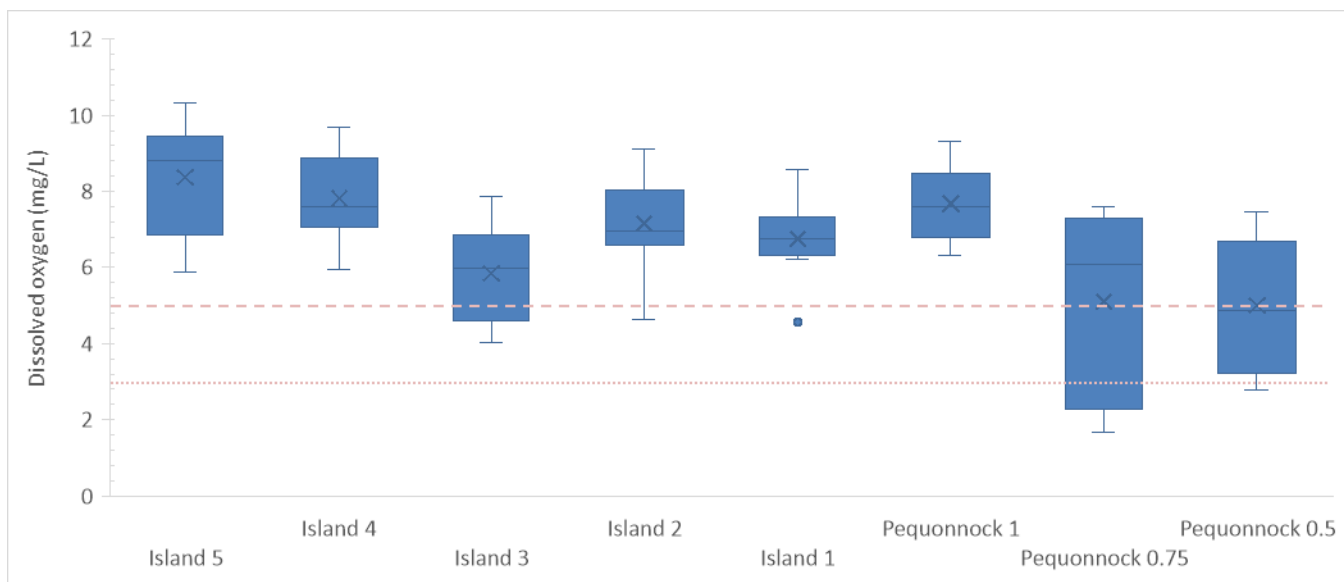


Figure H3. Box plot of dissolved oxygen concentrations at each sampling site in the Pequonnock River Watershed. The dashed red line represents the CT DEEP minimum criteria for dissolved oxygen in freshwater, which is 5mg/L. The dotted red line represents the CT DEEP minimum criteria for dissolved oxygen in saltwater, which is 3mg/L. The saltwater sampling sites in this watershed are sites Pequonnock 0.75 and Pequonnock 0.5.

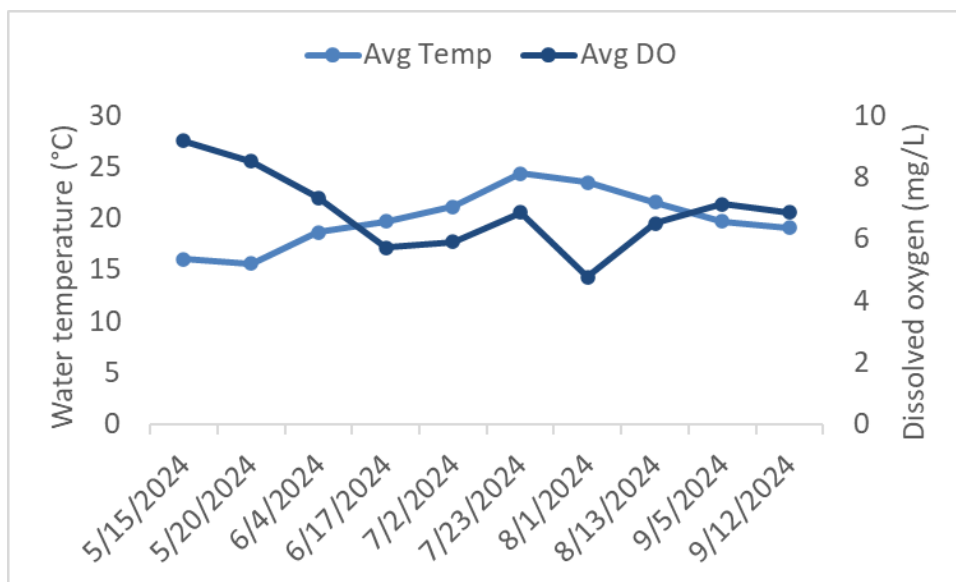
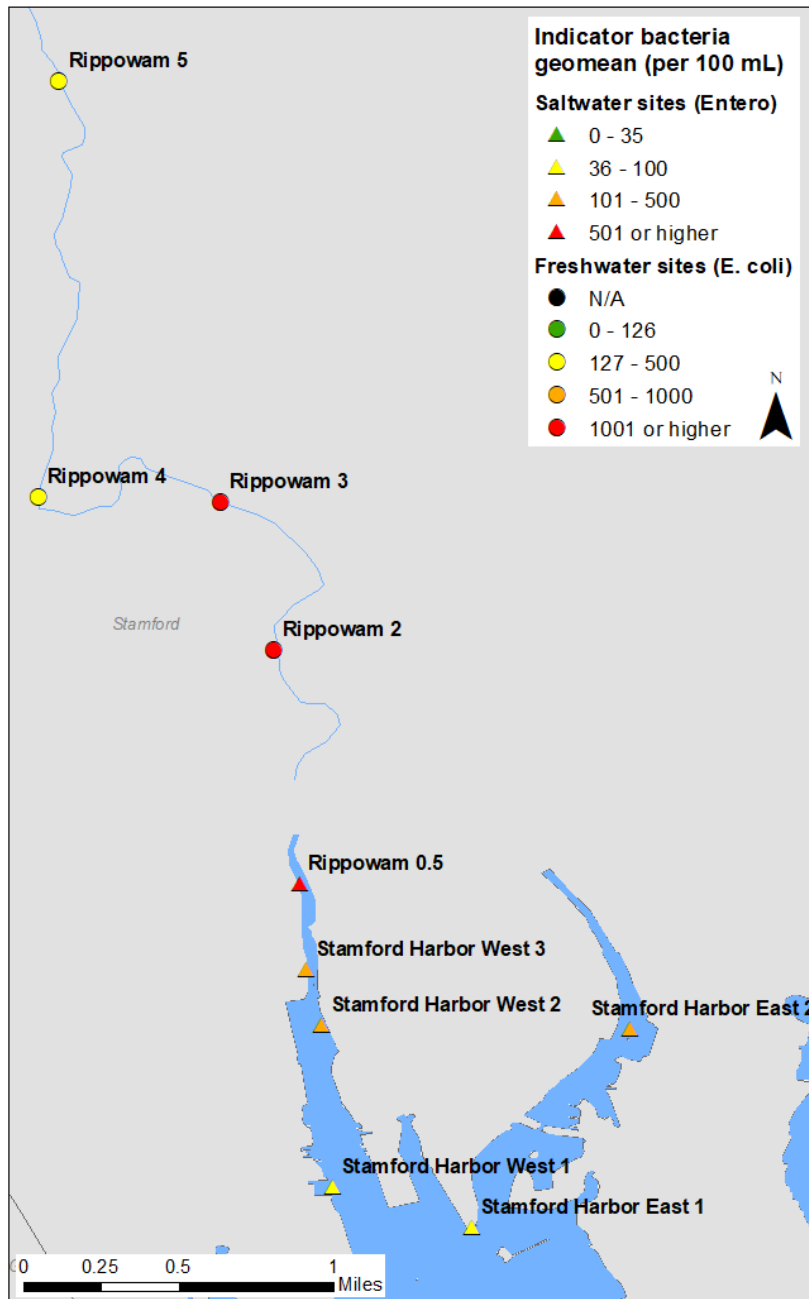


Figure H4. Mean water temperature and mean dissolved oxygen of all sites on each sampling date in the Pequonnock River Watershed.

I. Rippowam River Watershed (Rippowam River and Stamford Harbor)

The Rippowam River watershed covers 37.5 square miles from the New York State border, through parts of New Canaan, Ridgefield, and Stamford, CT, where it discharges into Stamford Harbor. The southern portion of the basin is commercial, industrial, and urban and the northern portion is largely suburban, and forested (CT DEEP, 2011). This river is also known locally as the Mill River. Harbor Watch has



monitored the Rippowam River annually since 2017, but recent years have focused monitoring on only the lower portion of the watershed in Stamford. Due to construction, no data were collected at site Rippowam 7 (located at Cedar Heights Road). This year marks the first monitoring season where Harbor Watch collected indicator bacteria data in Stamford Harbor at the prioritization of CT DEEP who had insufficient data to conduct assessments. Data was collected as part of the Pathogen Monitoring Network.

Indicator bacteria: In 2024, data were collected on ten days. All ten sites in the Rippowam River watershed exceeded the CT DEEP geomean criteria for indicator bacteria in 2024 (Figure I1). Additionally, 38% of all samples processed in the Rippowam River watershed exceeded the CT DEEP single sample maximum criteria (Table I1). Harbor Watch has been monitoring the Rippowam River since 2017, and concentrations in 2023 were observed to be similar to what has been observed historically (Figure I2).

Figure I1. Map of indicator bacteria, *E. coli* or enterococci, geomean concentrations at each site in the Rippowam River Watershed in 2024.

Table I1. Rippowam River watershed *E. coli* and enterococci concentrations (MPN/100mL), geomeans, and percentage of samples exceeding the CT DEEP single sample maximum. Rainfall data gathered from the Norwalk Health Department website (Norwalk Health Department, n.d.).

Site	Indicator Bacteria	5/9/2024	5/29/2024	6/13/2024	6/17/2024	7/10/2024	7/15/2024	7/29/2024	8/22/2024	8/27/2024	9/18/2024	Geomean	Exceed SSM
Rippowam 5	<i>E. coli</i>	108	249	248	261	179	167	687	238	727	770	294	30%
Rippowam 4	<i>E. coli</i>	387	488	488	411	172	687	326	291	225	109	317	10%
Rippowam 3	<i>E. coli</i>	472	276	687	980	387	613	2420	222	344	461	531	40%
Rippowam 2	<i>E. coli</i>	370	651	613	866	328	387	649	411	488	727	523	50%
Rippowam 0.5	Enterococci	173	576	836	1106	609	820	3282	272	479	487	628	60%
Stamford Harbor West 3	Enterococci	52	473	364	1223	1019	1500	512	487	305	31	362	40%
Stamford Harbor West 2	Enterococci	10	487	85	573	455	857	4833	399	213	<10	228	30%
Stamford Harbor West 1	Enterococci	10	204	10	245	41	31	2584	132	62	No Data	80	11%
Stamford Harbor East 2	Enterococci	496	142	84	74	63	73	4611	132	41	No Data	154	11%
Stamford Harbor East 1	Enterococci	10	272	41	10	<10	820	>24196	62	20	52	82	20%
Accumulation 48 hours prior		Wet	Wet	Dry	Dry	Dry	Wet	Wet	Dry	Dry	Dry		

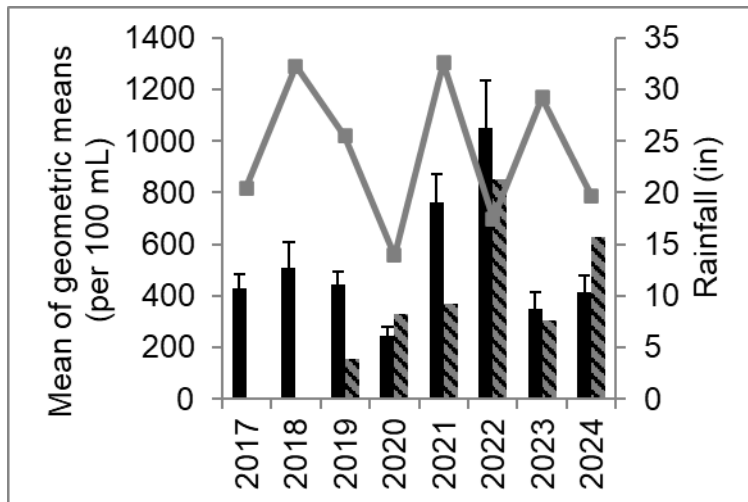


Figure I2. Mean of freshwater site geomeans (black bars; *E. coli*) and saltwater site geomeans (striped bars; enterococci) from 2017-2024 in the Rippowam River and total rainfall from May through September each year (grey squares and line).

Table 12. GPS coordinates and site locations for the Rippowam River.

Site Name	Latitude	Longitude	Site location notes	River Name
Rippowam 7	41.10559	-73.5586	Cedar Heights Road	Rippowam River
Rippowam 5	41.08559	-73.55664	Long Ridge Road	Rippowam River
Rippowam 4	41.06617	-73.55763	Cold Spring Road	Rippowam River
Rippowam 3	41.06593	-73.54912	Bridge Street	Rippowam River
Rippowam 2	41.05904	-73.54664	W North Street	Rippowam River
Rippowam 0.5	41.04813	-73.54542	Richmond Hill Avenue	Rippowam River
Stamford Harbor West 3	41.04414	-73.5451	Pulaski Street	Stamford Harbor
Stamford Harbor West 2	41.04156	-73.5444	Atlantic Street Dock	Stamford Harbor
Stamford Harbor West 1	41.034	-73.5439	Soundwaters Dock	Stamford Harbor
Stamford Harbor East 2	41.04136	-73.53	Czescik Marina	Stamford Harbor
Stamford Harbor East 1	41.03211	-73.5374	Kosciuszko Park	Stamford Harbor

Dissolved oxygen and water temperature: Dissolved oxygen readings were fairly consistent throughout the river (Figure I3). All individual dissolved oxygen readings met the CT DEEP minimum criteria of 5 mg/L at freshwater sites and 3 mg/L at saltwater sites. Mean water temperatures and dissolved oxygen were correlated as expected, with water temperatures highest in July (Figure I4).

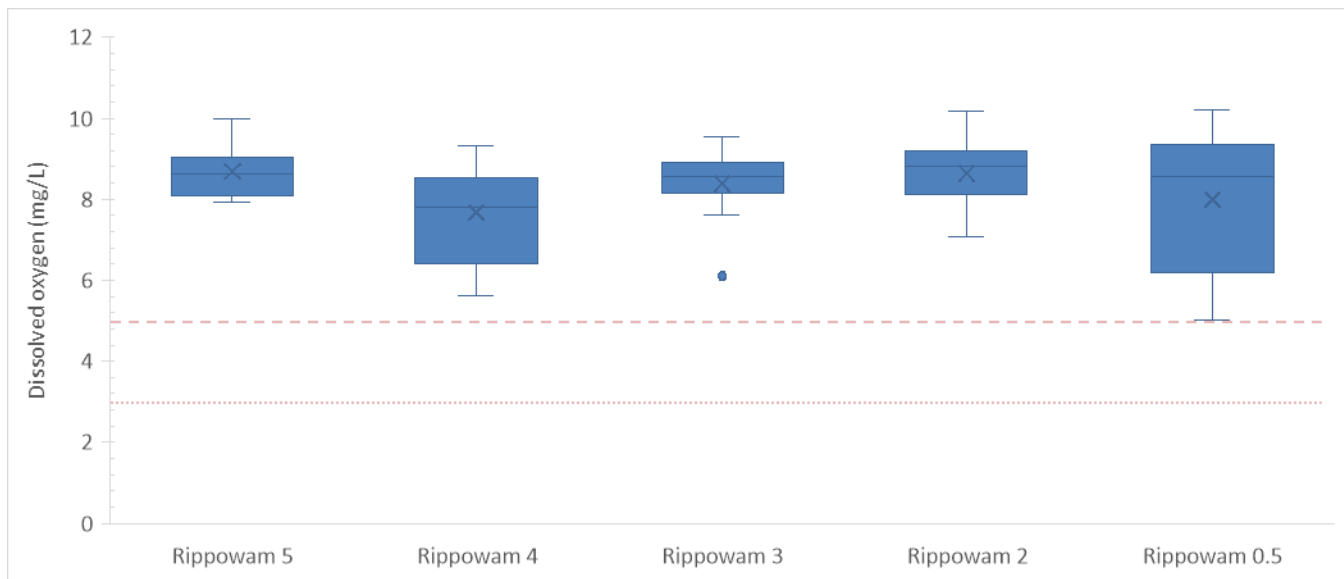


Figure I3. Box plot of dissolved oxygen concentrations at each sampling site in the Rippowam River Watershed. The dashed red line represents the CT DEEP minimum criteria for dissolved oxygen in freshwater, which is 5mg/L. The dotted red line represents the CT DEEP minimum criteria for dissolved oxygen in saltwater, which is 3mg/L. The only saltwater sampling site in the Rippowam River is Rippowam 0.5.

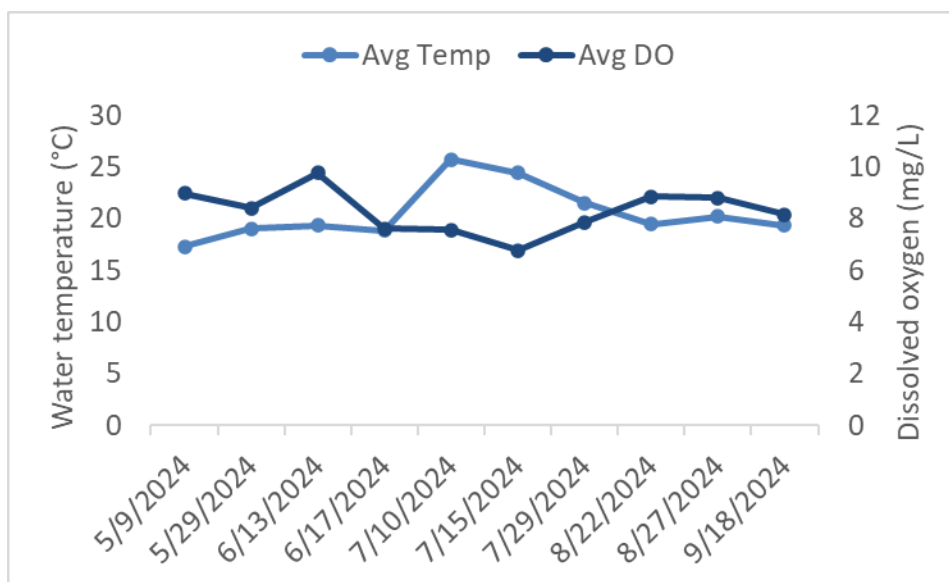
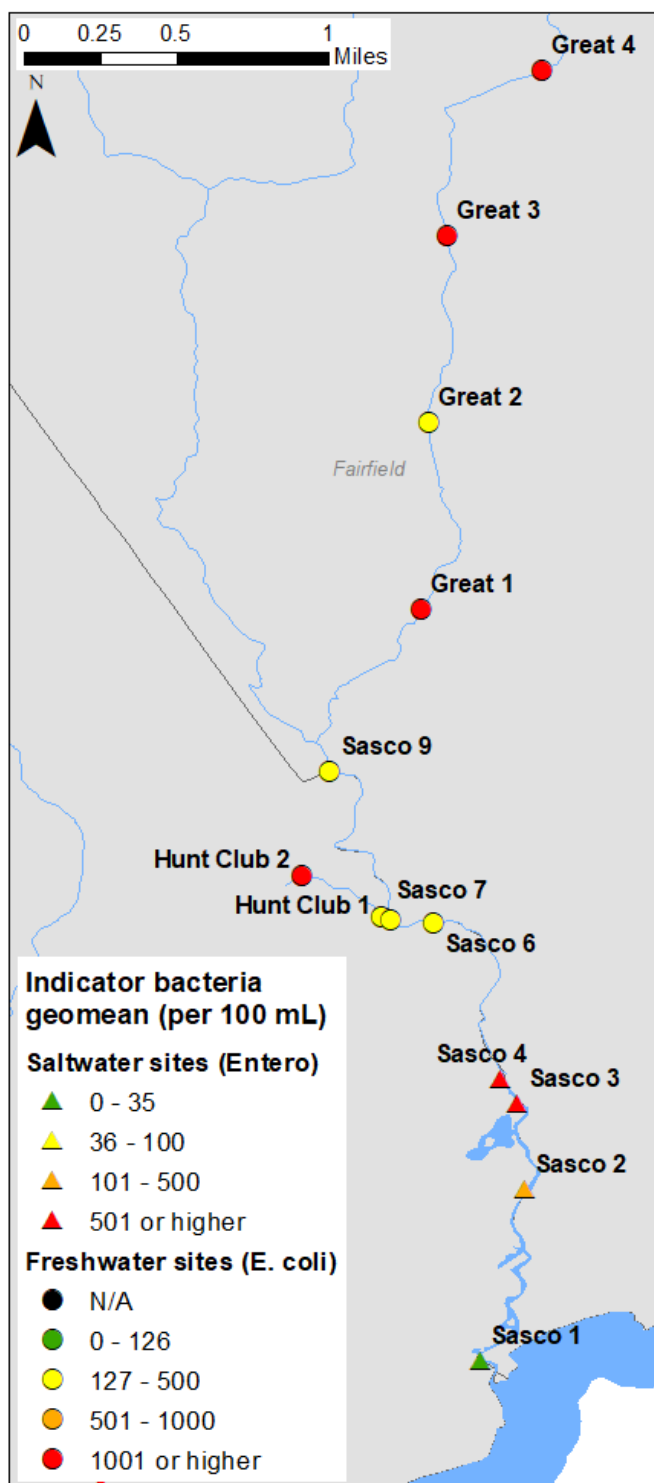


Figure I4. Mean water temperature and mean dissolved oxygen of all sites on each sampling date in the Rippowam River.

J. Sasco Brook Watershed (Sasco Brook, Great Brook, Unnamed tributary Off Ulbrick Lane)

The Sasco Brook watershed falls within Westport, Fairfield, and Easton, CT. The watershed is approximately 6,600 acres or about 10 square miles. The watershed consists of 55% woods, wetlands, and water surfaces, 32% of low density residential areas and open recreational spaces, 7% urban areas, and 6% agricultural lands (Sasco Brook Pollution Abatement Committee, 2011). Sasco Brook discharges into Long Island Sound at Southport Beach. Harbor Watch has conducted monitoring in various portions of the watershed throughout the years with most recent efforts focused on the lower portion of the watershed where the brook forms the border between Fairfield and Westport and the small unnamed tributary (denoted as Hunt Club in this report) which branches off to the west between Sasco 9 and Sasco 6. In 2023, Harbor Watch began monitoring sites along Great Brook, a tributary to Sasco Brook that enters the brook upstream of Sasco 9.



Indicator bacteria: In 2024, data were collected on ten days. Twelve of the thirteen sites within the watershed exceeded the CT DEEP geomean criteria for indicator bacteria (Figure J1). Additionally, 43% of all samples processed in the watershed exceeded the CT DEEP single sample maximum criteria (Table J1). Bacteria concentrations in the lower portion of the watershed over the last five years have remained relatively consistent (Figure J2). This monitoring season, Harbor Watch piloted a study using microbial source tracking to help identify the cause of elevated bacteria concentrations in the watershed as usual methods have been unsuccessful recently. A separate formal report will be available when the data are analyzed.

Figure J1. (Left) Map of indicator bacteria, *E. coli* or enterococci, geomean concentrations at each site in the Sasco Brook Watershed in 2024.

Table J1. Sasco Brook watershed *E. coli* and enterococci concentrations (MPN/100mL), geomeans, and percentage of samples exceeding the CT DEEP single sample maximum. Rainfall data gathered from the Norwalk Health Department website (Norwalk Health Department, n.d.).

Site	Indicator Bacteria	5/6/2024	5/23/2024	6/5/2024	6/26/2024	7/11/2024	7/17/2024	8/6/2024	8/15/2024	9/3/2024	9/19/2024	Geomean	Exceed SSM
Great 4	<i>E. coli</i>	1733	154	248	770	1553	1120	>2420	1159	1373	No Data	888	78%
Great 3	<i>E. coli</i>	922	113	517	201	>2420	4839	3922	4106	354	No Data	964	56%
Great 2	<i>E. coli</i>	690	150	192	326	579	816	1553	471	461	548	473	40%
Great 1	<i>E. coli</i>	1961	523	517	>2420	1011	1961	1454	1961	731	2420	1291	80%
Sasco 9	<i>E. coli</i>	977	357	435	261	238	238	238	193	155	109	266	10%
Hunt Club 2	<i>E. coli</i>	2240	1102	775	922	>4839	9678	703	534	132	870	1136	80%
Hunt Club 1	<i>E. coli</i>	3466	No Data	437	215	615	626	456	90	80	62	309	33%
Sasco 7	<i>E. coli</i>	1961	236	No Data	219	276	219	291	96	156	210	261	11%
Sasco 6	<i>E. coli</i>	821	181	248	160	172	308	248	84	204	114	208	10%
Sasco 4	Enterococci	908	426	512	1467	1153	1246	789	309	309	145	583	60%
Sasco 3	Enterococci	1012	2909	638	1054	1169	1333	1039	373	109	448	753	70%
Sasco 2	Enterococci	759	96	75	426	259	657	546	52	20	285	191	30%
Sasco 1	Enterococci	20	<10	20	96	75	86	98	74	<10	10	34	0%
Accumulation 48 hours prior		Wet	Dry	Dry	Dry	Dry	Wet	Wet	Wet	Dry	Dry		

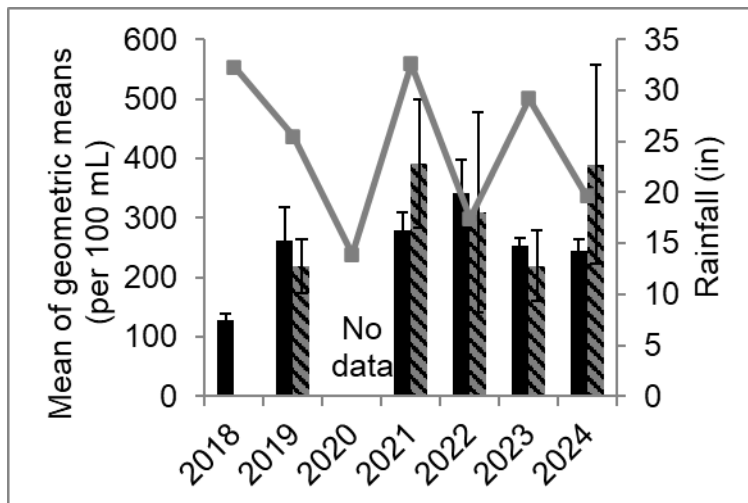


Figure J2. (Right) Mean of freshwater site geomeans (black bars; *E. coli*) and saltwater site geomeans (striped bars; enterococci) from 2017-2024 in the mainstem of Sasco Brook and total rainfall from May through September each year (grey squares and line).

Table J2. GPS coordinates and site locations for the Sasco Brook watershed.

Site Name	Latitude	Longitude	Site location notes	River Name
Great 4	41.186111	-73.295942	Congress Street	Great Brook
Great 3	41.178274	-73.300464	Dunham Road	Great Brook
Great 2	41.169402	-73.301349	Merwins Lane	Great Brook
Great 1	41.160474	-73.301709	Morehouse Lane	Great Brook
Sasco 9	41.15280	-73.30605	210 Hulls Farm Road	Sasco Brook
Hunt Club 2	41.14786	-73.30736	Bulkley Avenue N	Unnamed Tributary
Hunt Club 1	41.14587	-73.30357	Ulbrick Lane	Unnamed Tributary
Sasco 7	41.14573	-73.30314	8 Ulbrick Lane	Sasco Brook
Sasco 6	41.14556	-73.30111	Old Road	Sasco Brook
Sasco 4	41.13813	-73.29793	Route 1	Sasco Brook
Sasco 3	41.13702	-73.29708	408 Greens Farm Road	Sasco Brook
Sasco 2	41.13293	-73.29675	32 Westway Road	Sasco Brook
Sasco 1	41.12478	-73.29888	Pequot Avenue	Sasco Brook

Dissolved oxygen and water temperature: Dissolved oxygen readings in the watershed varied by site (Figure J3). While the majority of readings met the CT DEEP minimum criteria, twelve individual dissolved oxygen readings were observed below 5 mg/L at site Great 4 and Hunt Club 2 and three individual readings were observed below 3mg/L at Sasco 3, Sasco 2, and Sasco 1. Low readings were observed throughout the monitoring season as water temperatures increased (Figure J4).

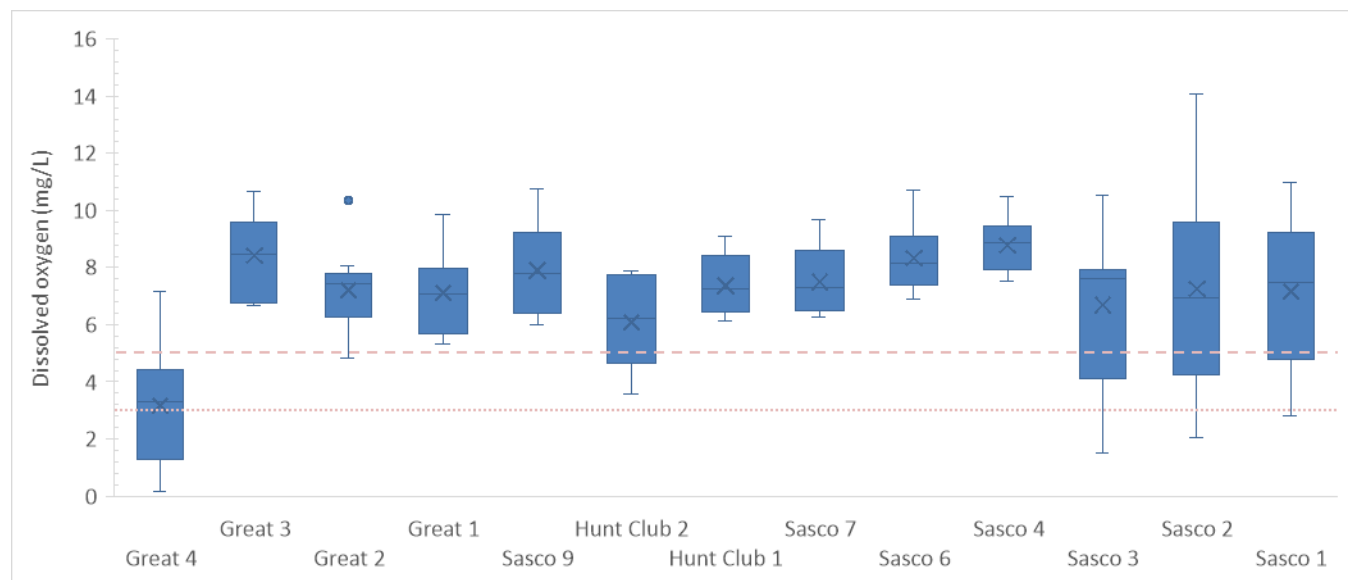


Figure J3. Box plot of dissolved oxygen concentrations at each sampling site in the Sasco Brook watershed. The dashed red line represents the CT DEEP minimum criteria for dissolved oxygen in freshwater, which is 5mg/L. The dotted red line represents the CT DEEP minimum criteria for dissolved oxygen in saltwater, which is 3mg/L. The saltwater sampling sites in this watershed are Sasco 4, Sasco 3, Sasco 2, and Sasco 1.

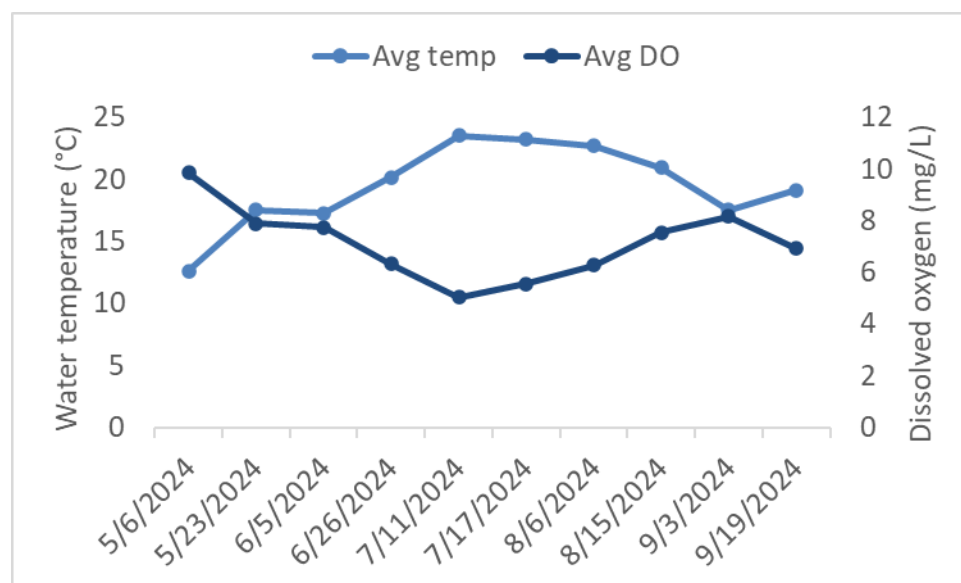


Figure J4. Mean water temperature and mean dissolved oxygen of all sites on each sampling date in the Sasco Brook Watershed.

K. Silvermine River

The Silvermine River is a tributary to the Norwalk River and flows from Lewisboro, NY into New Canaan, CT, through Wilton and into Norwalk. It meets the Norwalk River between Harbor Watch monitoring sites Norwalk 4 and Norwalk 2 (see subsection G). The watershed is primarily residential with a few reservoirs located in the upper reaches of the watershed. Harbor Watch has monitored the Silvermine River, in portions or its entirety, periodically since 1995.

Indicator bacteria: In 2024, data were collected on ten days. Five sites exceeded the CT DEEP geomean criteria for indicator bacteria (Figure K1). Despite this, only 4% of all individual samples processed in the Silvermine River exceeded the CT DEEP single sample maximum criteria (Table K1). Bacteria concentrations are relatively consistent throughout the years sampled despite varying trends in rainfall (Figure K2).

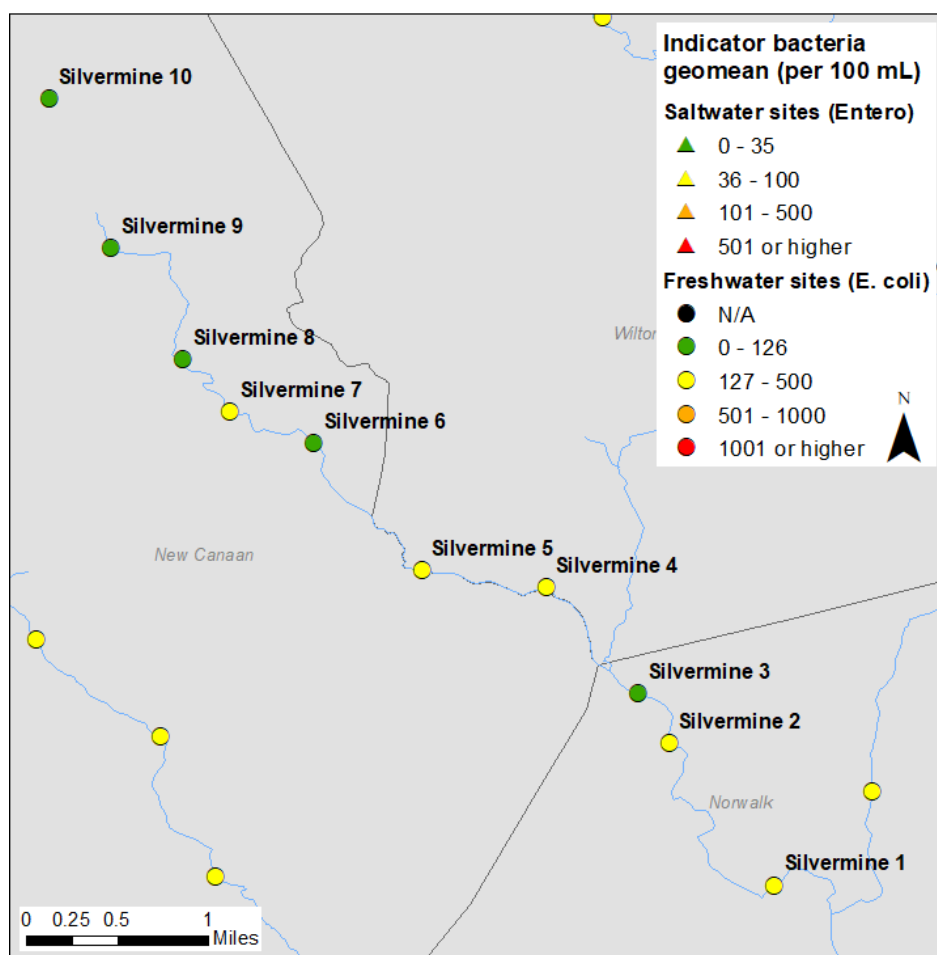


Figure K1. Map of indicator bacteria, *E. coli* or enterococci, geomean concentrations at each site in the Silvermine River in 2024. Unlabeled sites are the Norwalk River (see sub-section G) and Fivemile River (see sub-section D).

Table K1. Silvermine River *E. coli* concentrations (MPN/100mL), geomeans, and percentage of samples exceeding the CT DEEP single sample maximum. Rainfall data gathered from the Norwalk Health Department website (Norwalk Health Department, n.d.).

Site	Indicator Bacteria	5/7/2024	5/28/2024	6/4/2024	6/24/2024	7/9/2024	7/24/2024	7/30/2024	8/21/2024	8/26/2024	9/12/2024	Geomean	Exceed SSM
Silvermine 10	<i>E. coli</i>	2	42	91	49	10	37	3	193	49	4	21	0%
Silvermine 9	<i>E. coli</i>	3	26	10	140	70	140	118	86	10	228	43	0%
Silvermine 8	<i>E. coli</i>	18	308	68	129	63	249	78	124	44	78	87	0%
Silvermine 7	<i>E. coli</i>	96	365	104	488	110	411	86	167	66	125	158	0%
Silvermine 6	<i>E. coli</i>	50	461	26	27	41	186	51	101	41	6	53	0%
Silvermine 5	<i>E. coli</i>	31	1046	115	228	119	328	193	147	114	32	143	10%
Silvermine 4	<i>E. coli</i>	81	727	113	127	236	197	172	187	74	42	144	10%
Silvermine 3	<i>E. coli</i>	62	613	99	79	99	219	135	150	58	32	109	10%
Silvermine 2	<i>E. coli</i>	49	411	183	211	457	345	345	365	166	345	248	0%
Silvermine 1	<i>E. coli</i>	67	816	308	147	96	152	50	228	111	77	143	10%
Accumulation 48 hours prior		Wet	Wet	Dry	Dry	Dry	Wet	Wet	Wet	Dry	Dry		

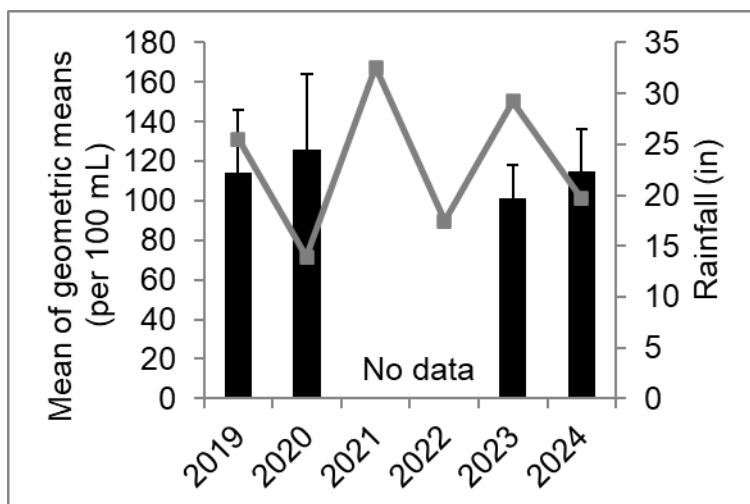


Figure K2. Mean of freshwater site geomeans (black bars; *E. coli*) from 2019-2024 in the Silvermine River and total rainfall from May through September each year (grey squares and line).

Table K2. GPS coordinates and site locations for the Silvermine River.

Site Name	Latitude	Longitude	Site location notes	River Name
Silvermine 10	41.19871	-73.49241	North Wilton Road	Silvermine River
Silvermine 9	41.18679	-73.48749	Valley Road	Silvermine River
Silvermine 8	41.17791	-73.48174	Hickok Road	Silvermine River
Silvermine 7	41.17371	-73.47799	Mariomi Road	Silvermine River
Silvermine 6	41.17121	-73.47128	Huckleberry Hill Road	Silvermine River
Silvermine 5	41.16107	-73.46265	New Canaan Road	Silvermine River
Silvermine 4	41.15971	-73.45277	Borglum Road	Silvermine River
Silvermine 3	41.15126	-73.44539	Perry Avenue	Silvermine River
Silvermine 2	41.14726	-73.44293	Walking path from Silvermine Avenue to Silvermine Elementary	Silvermine River
Silvermine 1	41.135973	-73.434546	James Street	Silvermine River

Dissolved oxygen and water temperature: Dissolved oxygen readings in the river varied by site throughout the season (Figure K3). While the majority of readings met the CT DEEP minimum criteria, sixteen individual dissolved oxygen readings were observed below 5 mg/L. Low readings were observed during June and July when water temperatures increased (Figure K4).

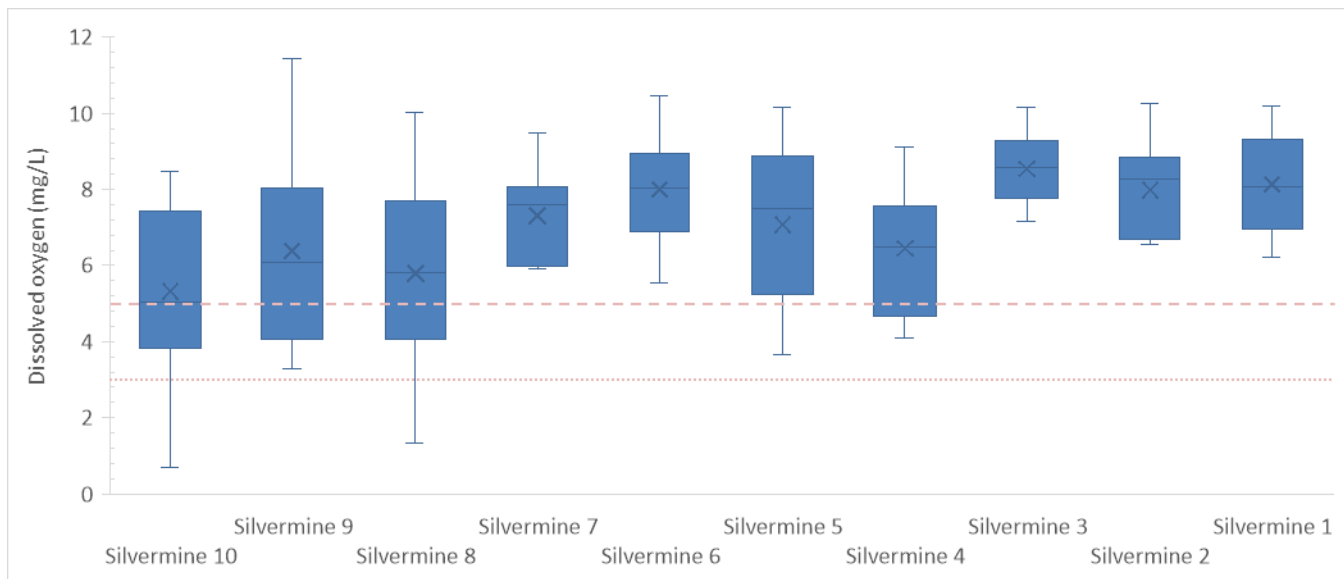


Figure K3. Box plot of dissolved oxygen concentrations at each sampling site in the Silvermine River. The dashed red line represents the CT DEEP minimum criteria for dissolved oxygen in freshwater, which is 5mg/L.

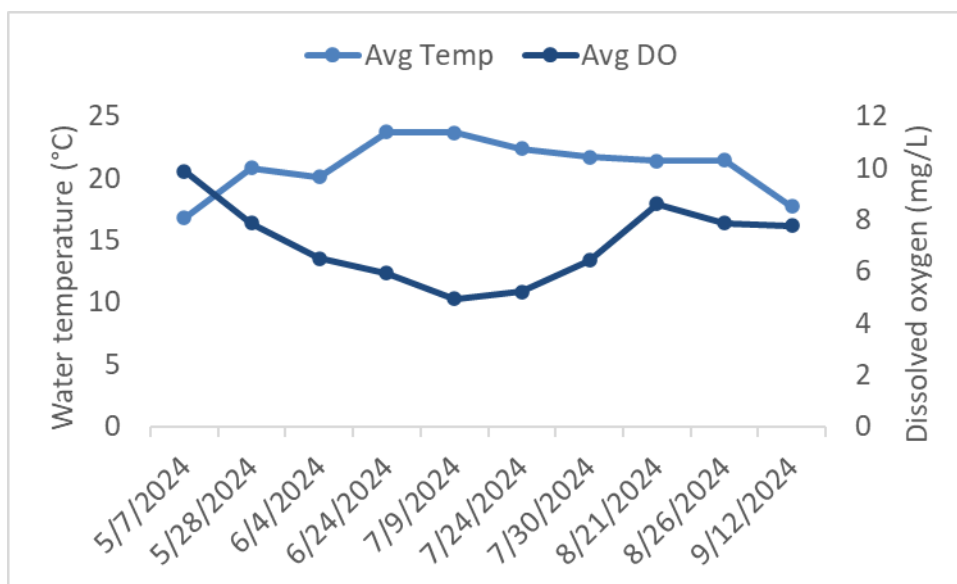


Figure K4. Mean water temperature and mean dissolved oxygen of all sites on each sampling date in the Silvermine River.

5. How Can You Help?

Water quality is determined by a number of different factors, some beyond our control. However, there are small things you can do at home to make sure you are not contributing to poor water quality.

Pick up after animals:

Pick up animal waste (even in your own yard) and dispose of it properly. We each live in a watershed, and when it rains the animal waste as well as the bacteria it contains is carried into your local storm drain or watercourse.



Don't pour these:

Do not pour grease, oils, paints, or other chemicals down the drain. These items may corrode the pipes, cause backups, and prevent proper septic system function. Clogged sewer systems can lead to nasty backups and property damage.



Maintain your septic:

If you are on a septic system, be sure to have it pumped out and maintained regularly. Also, ensure that you do not put heavy weight (like cars) on top of the tank or the leaching field. Damage to either can cause leaks and function issues.



Don't flush this:

If you are on the public sewer system, do not send "flushable wipes" into the system. These wipes get stuck in pipes, can cause backups, and may result in sewage finding alternate routes like through loose joints and into stormwater and groundwater systems.



6. Citations

- DeCicco, L. (2022). Exploring ggplot2 boxplots – Defining limits and adjusting style. *USGS*.
<https://waterdata.usgs.gov/blog/boxplots/>
- Fuss & O'Neill. (2013). Rooster River Watershed Based Plan. https://portal.ct.gov/-/media/DEEP/water/watershed_management/wm_plans/rooster/roosterriverwbptm1pdf.pdf
- Grey, B., & Steck, T. R. (2001). Concentrations of Copper Thought To Be Toxic to *Escherichia coli* Can Induce the Viable but Nonculturable Condition. *APPLIED AND ENVIRONMENTAL MICROBIOLOGY*, 67(11), 5325–5327.
- Norwalk Health Department. (n.d.). Rain Gauge. <https://nwlk.norwalkct.org/raingauge/>
- Norwalk River Watershed Initiative. (1998). The Norwalk River Watershed Action Plan.
https://portal.ct.gov/-/media/DEEP/water/watershed_management/wm_plans/norwalkrwisupppdf.pdf
- Pequonnock River Initiative. (2011). Pequonnock River Watershed Based Plan. https://portal.ct.gov/-/media/DEEP/water/watershed_management/wm_plans/pequonnock/pequonnockwbpfinalpdf.pdf
- Sasco Brook Pollution Abatement Committee. (2011). https://portal.ct.gov/-/media/DEEP/water/watershed_management/wm_plans/sascobrookwbpabridgedpdf.pdf
- State of Connecticut Department of Energy and Environmental Protection. (2011). Comprehensive Characterization Report Rippowam/Mill River Watershed Management and Infrastructure Program. https://portal.ct.gov/-/media/DEEP/water/watershed_management/wm_plans/rippowammill2010pdf.pdf
- State of Connecticut Department of Energy and Environmental Protection. (2012a). Bruce Brook Watershed Summary. <https://portal.ct.gov/-/media/DEEP/water/tmdl/CTFinalTMDL/brucebrook7102>
- State of Connecticut Department of Energy and Environmental Protection. (2013). Technical Memorandum #1: State of the Rooster River Watershed. https://portal.ct.gov/-/media/DEEP/water/watershed_management/wm_plans/rooster/roosterriverwbptm1pdf.pdf
- State of Connecticut Department of Energy and Environmental Protection. (2015a). Connecticut Water Quality Standards. https://portal.ct.gov/-/media/DEEP/water/water_quality_standards/wqsfinaladopted22511pdf.pdf
- State of Connecticut Department of Energy and Environmental Protection. (2022). Subregional Drainage Basin Set [GIS Map].
<https://deepmaps.ct.gov/maps/66de3e3bf63e456ba32c12643f0d8bdc/about>
- The South Western Regional Planning Agency. (2012a). Five Mile River Watershed Based Plan.
https://portal.ct.gov/-/media/DEEP/water/watershed_management/wm_plans/fivemilewatershedplanfinalpdf.pdf

7. Key Terms and Information

Acronyms and jargon:

- CT DEEP: Connecticut Department of Energy and Environmental Protection
- MPN/100 mL: Most probable number per 100 mL. This is a unit of measurement for bacteria concentrations based on statistics rather than direct counts of specific colonies.
- mg/L: Milligrams per liter. This is a unit of measurement used in this report to quantify dissolved oxygen concentrations.
- Geomean: A geometric mean is a way to average a set of values but reduce the impact of outliers which occur infrequently.
- Entero: Shorthand for enterococci, an indicator bacteria monitored in salt and brackish water.
- *E. coli*: Abbreviation for *Escherichia coli*, an indicator bacteria monitored in freshwater.

Study Site Naming:

Sites are numbered with the lowest number being closest to the mouth of the river where it meets a larger body of water (e.g., Long Island Sound). Sites with the highest numbers are located furthest upstream. The only exception to this is Norwalk Harbor where the lowest numbers are more inland and the highest numbers move out towards Long Island Sound.

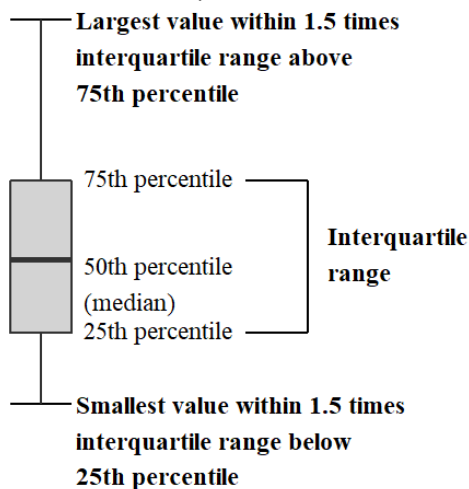
Terms/Symbols in Tables:

“N/A” - Indicates that a sample was not taken at that time for reasons including issues with incubation, or no sample was collected.

“>” – Indicates that the results exceeded the reporting limit.

“<” – Indicated that the results were less than the reporting limit.

How to Read a Boxplot:



- **Outside value**-Value is >1.5 times and <3 times the interquartile range beyond either end of the box

Graphic above adapted from DeCicco, 2022. In each of the plots in this report, the numbers above each site name are the number of samples taken at each site. The “X” in the box represents the mean.

8. QAPP Deviation Summary

Quality Assurance Project Plan (QAPP) Report (11/06/2024)

This report includes any deviations from the approved QAPP (RFA #23066). These deviations are listed by the section of the QAPP where the deviation occurred. Any notes from this report that would result in a process change will be updated in future QAPP submissions.

Project Name: Fairfield County Water Quality Monitoring

Monitoring Organization: Harbor Watch, a program of Earthplace, Inc.
10 Woodside Lane, Westport, CT 06880

Approved for: Monitoring Season 2024

1.6 Project/Task Description

- Table 2. Sample location Adjustments: Rippowam 7 was dropped due to construction.
- Table 2a. Sample location Adjustments: Sasco Brook was substituted for a subsection of the Saugatuck River/Aspetuck River for education programs.
- The summer education program was hosted not only in June but in July as well.

2.1 Sampling Design

- On some occasions, when there were staffing restraints occurred, a team of one would collect samples as opposed to a team of two or more.
- Sampling teams began arriving at 8 AM each day as opposed to 9 AM,
- The summer education program was hosted not only in June but in July as well.
- Table 5. Not every site was collected a minimum of 8 times for indicator bacteria: Comstock 1 was only collected 5 times due to construction.
- Table 5. Not every site was collected at least 8 times for dissolved oxygen, temperature, and conductivity: Comstock 1 was only collected 5 times due to construction, Norwalk 0.5 was only collected 2 times because the meter could not reach, and Bruce 5, Bruce 4, and Bruce 2 were only collected 6 times due to insufficient water levels.

4.2 Verification and Validation Methods Summary

- There was 1 sampling event where samples were collected and processed but not included in the analysis due to failing quality control tests. It is as follows:
 - Field trip blank failure: Island and Pequonnock (sampled together) had an FTB failure on 6/17/24