Farmington River Watershed Water Quality Report 2022

Farmington River Watershed Association
749 Hopmeadow Street
Simsbury, CT 06070

frwa.org

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About Farmington River Watershed Association

The Farmington River Watershed Association (FRWA) is a 501(c) (3) non-profit organization founded in 1953. Our mission is to preserve, protect, and restore the Farmington River and its watershed lands through research, water monitoring, habitat restoration projects, education about rivers and water issues, and advocacy.

Our water monitoring program informs our work and provides reliable data to CT DEEP and MassDEP. As opportunities arise, we work to restore streambanks and aquatic habitats for fish and wildlife, for example by removing dams or restoring native plant communities. We also help towns with river management, stormwater pollution reduction education and mapping projects. FRWA has been conducting water monitoring in the CT portion of the watershed since 2004, and in MA since 2019. More information can be found on our website, frwa.org.

In our education mode, we provide watershed curriculum, classroom visits, field trips, and student seasonal employment. We host presentations and workshops on organic lawn care, river history, water conservation, pollution prevention, and managing stormwater runoff. We organize river cleanups and other outreach events including canoe trips, paddling events, and watershed tours. As advocates, we speak up for watershed protection and river-friendly practices and policies at the local, state, and national level.

The Farmington River is the longest tributary to the Connecticut River, coursing 81 miles from Massachusetts headwaters to mouth. There are 33 towns in the watershed covering 609 square miles of land in Massachusetts and Connecticut. Approximately 100,000 acres of the watershed lies within MA, with the remaining 285,000 acres in CT.

FRWA uses monitoring data to:

1. Document high quality waters for protection and preservation;
2. Measure inputs from tributaries to the Farmington River;
3. Monitor changes in water quality and land use;
4. Identify impairments;
5. Locate potential preservation & restoration opportunities; and
6. Reveal trends relative to changing climate and precipitation patterns via long term monitoring.

FRWA's 2022 water quality monitoring statistics:

- 66 sites throughout MA and CT monitored for bacteria
- 404 bacteria samples analyzed
- 18 continuous temperature loggers deployed in CT
- 21 chloride sites monitored in CT
- 122 chloride samples analyzed
- 3 interns trained in sampling and lab analysis, for bacteria, temperature, and chloride.

Acknowledgements

The authors would like to thank the Town of Simsbury Water Pollution Control Authority for providing lab space. Organizations providing program support and funding: the Farmington River Coordinating Committee, the Lower Farmington River and Salmon Brook Wild & Scenic Committee, CT DEEP, Farmington Valley Trout Unlimited, and Izaak Walton League of America. Our volunteers, Alisa Phillips-Griggs, David and Carrie Sinish, Dave Cappello, and Susan Olson. Ensign-Bickford Company, Gifts of Love Farm, and Miss Porter's School for providing site access.

Contents

Terms and Information

Acronyms:

- FRCC: Farmington River Coordinating Committee, an advisory committee for Upper Farmington Wild & Scenic River designation farmingtonriver.org
- LFSWS: Lower Farmington River and Salmon Brook Wild & Scenic Committee, an advisory committee for Lower Farmington and Salmon Brook Wild & Scenic River designation lowerfarmingtonriver.org
- CT: Connecticut
- CT DEEP: Connecticut Department of Energy and Environmental Protection
- MA: Massachusetts
- MassDEP: Massachusetts Department of Environmental Protection
- MPN/100 mL: Most probable number per 100 milliliters. This is a unit of measurement for bacteria concentrations to statistically estimate counts by volume, rather than direct counts of specific colonies.
- mg/L: Milligrams per liter. This is a unit of measurement, used in this report to quantify chloride values.
- Geomean: A geometric mean averages a set of values and reduces the impact of infrequent outliers.
- Long-term: The same location monitored for 5 or more years to develop a baseline.
- TMDL: Total Maximum Daily Load.

Water Quality Criteria:

Bacteria (E. coli) in freshwater

- Geometric Mean of 126/100mL or greater for impaired.

Temperature

- A June-August mean of 18.3°C or colder for cold water fish.*

Chloride

- Chronic concentration criteria (CCC) for aquatic life is 230 mg/L or greater.
- Criterion maximum concentration (CMC) for aquatic life is 860 mg/L or greater.

Contact Us

FRWA has CT site data from 2004-present, and MA site data from 2019-present. If interested in our historic data and long-term trends, please contact us or visit our website: frwa.org.

FRWA's data has been quality assured and every effort has been made to ensure the information presented in this report is accurate. If you notice anything in this report that you believe may be an error, we welcome any feedback.

Please contact us at:

- Laura Hart - Conservation Director, 860-658-4442 ex202 lhart@frwa.org
- Paige Vichiola - Watershed Manager, 860-658-4442 ex206 pvichiola@frwa.org

If you are interested in other data we collect, visit frwa.org or contact us to learn more. Other parameters we collect on a project-based level, include nutrients (nitrogen and phosphorous), cyanobacteria, macroinvertebrates, dissolved oxygen, conductivity, turbidity, pH, and ammonia.

**This June-August temperature criteria is not an official Water Quality Criteria. Criteria is referenced from "Beauchene, et al., 2014. Summer Thermal Thresholds of Fish Community Transitions in Connecticut Streams. North American Journal of Fisheries Management. 34:1. 119-131."*

Summary

Weather plays an important role in water quality with precipitation affecting stormwater runoff, flows, and temperatures. The Farmington River Watershed experienced a severe extended drought in the summer of 2022; particularly severe in August.

The number one water quality issue facing the Farmington River and its tributaries is polluted stormwater runoff. With increased development contributing to a decrease in pervious surfaces and increase in impervious surfaces – such as roads, walkways, rooftops, parking lots, and lawns – water quality decreases and temperatures increase. The headwaters of the Farmington River are located in MA, where approximately 85% of the land in the watershed is forested. This is the main reason we see very high quality waterbodies and cold temperatures in that part of the watershed. As we progress down the river into more development, we see a decrease in water quality and nutrient, temperature, and bacteria levels climb. This can lead to other issues, including potentially toxic cyanobacteria blooms, as we saw on the Farmington River on Rainbow Reservoir in Windsor this summer. Our data can help inform us of locations of concern and areas that would benefit from green infrastructure solutions to reduce stormwater pollution.

The results in detail are listed in this report first by the Farmington River mainstem sites, then by towns beginning in the headwaters and ending with the confluence to the Connecticut River in Windsor. We show it in this manner to not only follow the flow of the river and tributary inputs, but to see we generally have higher levels of bacteria, warmer temperatures, and higher levels of chloride as we progress down river. This is due to a greater amount of watershed inputs, development pressures, and stormwater runoff at the bottom of the watershed, compared to mostly forest lands creating higher infiltration rates in the headwaters and high water quality.

The Farmington River fared well in 2022 for *E. coli* bacteria at all sites except one site in Otis, MA, which in the past three years remained low. Temperature is monitored in the Farmington River in Hartland, Barkhamsted and New Hartford. All temperature locations remained below the requirement for cold water fish, with the site in Hartland being the coldest at 8.9°C, largely due to Goodwin Dam releases of water from the bottom of the West Branch Reservoir. Chloride in the Farmington River remained low throughout the year even during winter months, with all values recorded considered excellent to good concentrations.

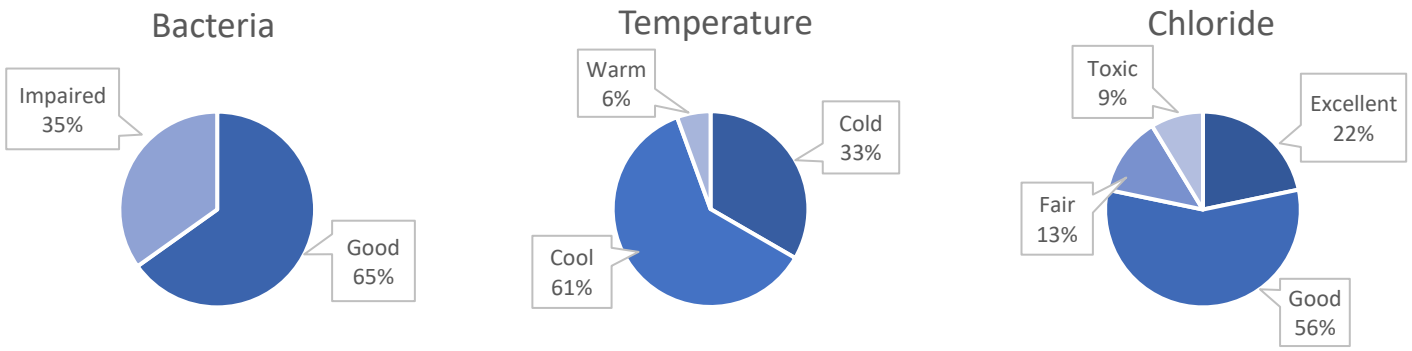
In Massachusetts, seventeen sites are monitored for *E. coli* bacteria, with five sites on the West Branch Farmington River and twelve tributaries. West Branch Farmington River sites in MA had low *E. coli* values except at one site in Otis. Tributaries in MA showed excellent water quality, with the exception of Miner Brook in 2022. In past years, all sites in MA including Miner Brook are considered pristine.

Fifteen sites are monitored in the Upper Farmington River Watershed. The West Branch Farmington River and Farmington River in New Hartford consistently have low *E. coli* values. The river remains clean and cold, especially downstream the Colebrook River Lake Reservoir and subsequent West Branch Reservior in Hartland and Barkhamsted where *E. coli* and temperatures remain very low during summer. Winsted, the center of Winchester, has a higher percentage of impervious surfaces leading to increases in *E. coli* values in the Mad River and Still River. Morgan Brook, another tributary monitored in the upper river watershed remained low in *E. coli.* FRWA monitors for temperature at thirteen sites in upper river watershed with three sites on the river and ten sites on tributaries. All tributary temperatures except one were considered cool/transitional. An unnamed tributary to the Farmington River is monitored for temperature on the FRWA property in New Hartford. This tributary is monitored due to no buffer and exposure. FRWA aims to restore a buffer to this tributary and is currently collecting temperature data to compare in the future after restoration. This unnamed tributary's temperature was warm this summer at 24.1°C. Six sites were monitored for chloride in the upper river watershed and are considered excellent to good conditions except at Jim Brook in Canton. Jim Brook had low chloride values in winter and spring, but as drought persisted though the summer, values increased. In both August and November, chloride values were above the Water Quality Criteria for chronic conditions. Two weeks after the November reading, chloride levels did decrease to below 100mg/L.

Cherry Brook is in the upper river watershed and was monitored separately this summer as an investigation of sources leading to impairment. Twelve sites including a long-term Cherry Brook site were monitored for bacteria, temperature, nutrients and macroinvertebrates. All sites on Cherry Brook in the impairment had elevated *E. coli* levels with a site on Meadow Rd. being the highest. Results indicate the source of the impairment for Cherry Brook is at the Meadow Rd. site and is most likely from agricultural activity. Other locations higher in *E. coli* values can be the result of drought or stormwater runoff. Barbour Brook also flows through agricultural activity and went dry during the summer, resulting in high *E. coli* values. Temperature was monitored in three locations on Cherry Brook and were considered cool/transitional temperatures. See the 2022 Cherry Brook Report at frwa.org/resources for more information.

In the Lower Farmington River Watershed, twenty-two sites are monitored for bacteria. The lower river watershed has a higher density of development along the river corridor with more impervious surfaces and higher *E. coli* values. Locations with increased *E. coli* values include tributaries Pequabuck River in Farmington, Nod Brook in Avon, Minister and Russell Brook in Simsbury along Rt. 10, Salmon Brook East Branch and mainstem in Granby and East Granby, and Phelps Brook and Mill River in Windsor. Temperature is monitored in the Salmon Brook Watershed at five locations since it is most probable to have cold waters in the lower river watershed. Tributaries leading to the West Branch Salmon Brook have average summer temperatures colder than the criteria for sensitive species such as trout. Temperatures on the West Branch Salmon Brook along Rt. 20 and in McLean Game Refuge were considered cool/transitional. Fifteen sites are monitored for chloride in the lower river watershed. Five locations were consistently considered fair for chloride, remaining over 100mg/L for the duration of the summer or for several months. Nod Brook was the only site to increase to toxic conditions after a winter storm. Increases during summer drought indicated chloride contamination in groundwater sources feeding streams. There is a correlation between locations with increased chloride values and urban areas with impervious surfaces.

Farmington River Watershed 2022 Snapshot:



Wild & Scenic Designations

The Farmington River has two Wild & Scenic designations. In 1994, the Upper Farmington River from Colebrook to Canton, was added to the National Wild and Scenic Rivers system with an act of Congress. The Farmington River Coordinating Committee (FRCC) works to implement the Management Plan for the Upper Farmington River Wild & Scenic designation. In 2019, 61.7 miles of the Lower Farmington River and Salmon Brook received its Wild & Scenic designation and 1.1 miles in Canton added to the Upper Farmington River. The Lower Farmington River and Salmon Brook Wild & Scenic Committee (LFSWS) works to implement the Management Plan for the Lower Farmington River Wild & Scenic Designation, from Burlington to Windsor.

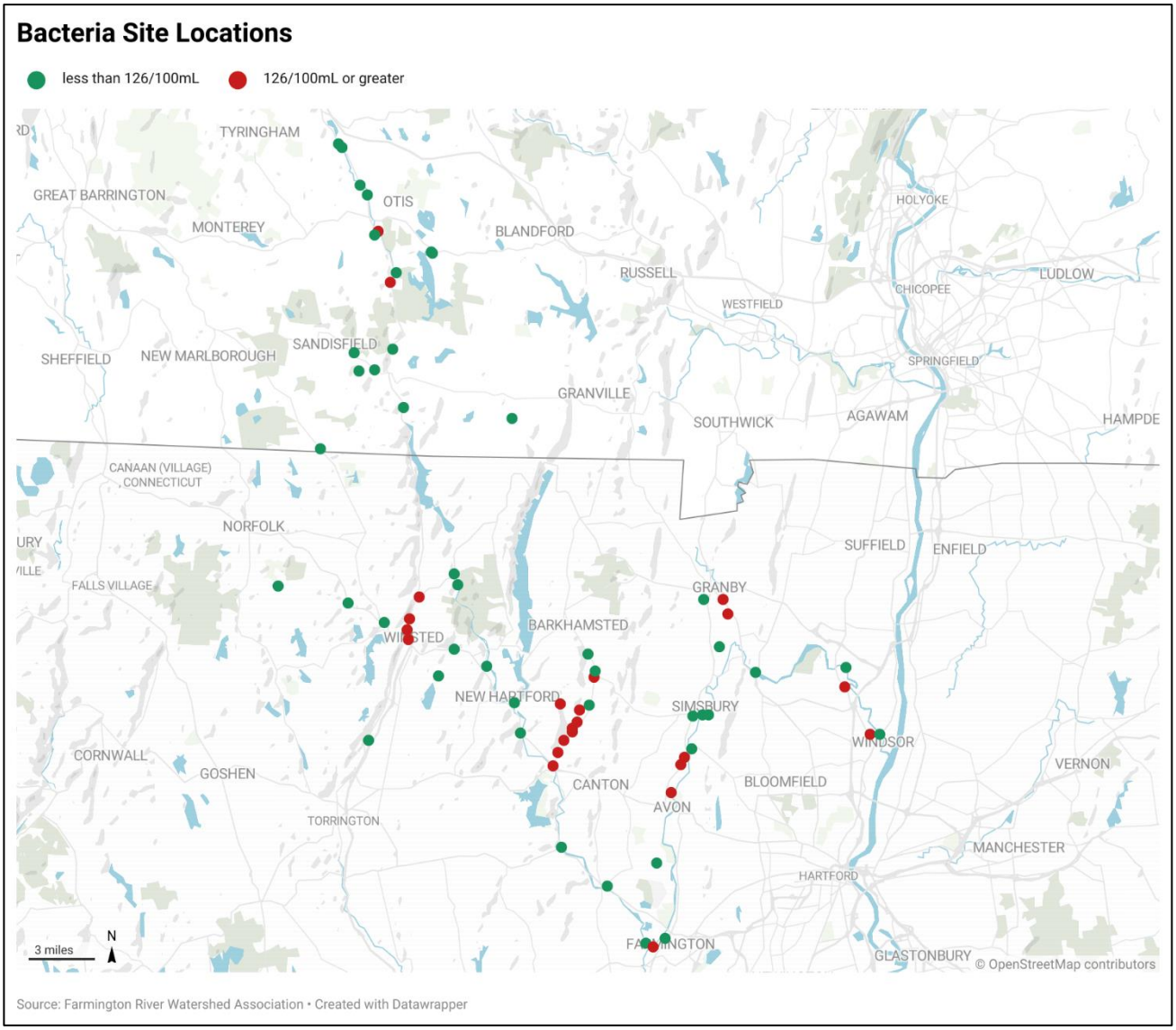
- Upper Farmington River – 15.1 miles
- Lower Farmington River – 35.3 miles
- Salmon Brook – 26.4 miles

Methods

Bacteria

FRWA staff and interns conducted routine bi-weekly monitoring for *E. coli* bacteria during the summer recreation season. Each site was sampled six times from June through September 2022. Geometric means were calculated at the end of the sampling season. In this report, bacteria data is represented as MPN/100mL and in the form of geometric mean which is being compared to the water quality criteria of 126/100mL or greater for *E. coli* bacteria in freshwater.

Our processes for bacteria monitoring in Connecticut has been in practice and shared with CT DEEP for eighteen years. In 2022, FRWA monitored a total of forty-nine locations for bacteria in the Farmington River Watershed in Connecticut and seventeen sites in the headwaters in Massachusetts. All analysis is done using IDEXX Colilert and Quanti-Tray. Our IDEXX laboratory is located in space allotted to us in the Simsbury Water Pollution Control Facility, Simsbury, CT. All of our data is shared with CT DEEP and MassDEP. CT DEEP has copies of our sampling and laboratory protocols for bacteria. Our data helps by increasing the availability of credible external bacteria data that can be utilized to support CT DEEP's and MassDEP's Clean Water Act Programs. FRWA's Quality Assurance Project Plan is on file at Massachusetts Department of Environmental Protection – Farmington River Watershed Association's Bacteria Monitoring Program: Massachusetts section – dated January 10, 2020 – January 9, 2023, signed by MassDEP QA Officer Suzanne Flint, Environmental Analysis.

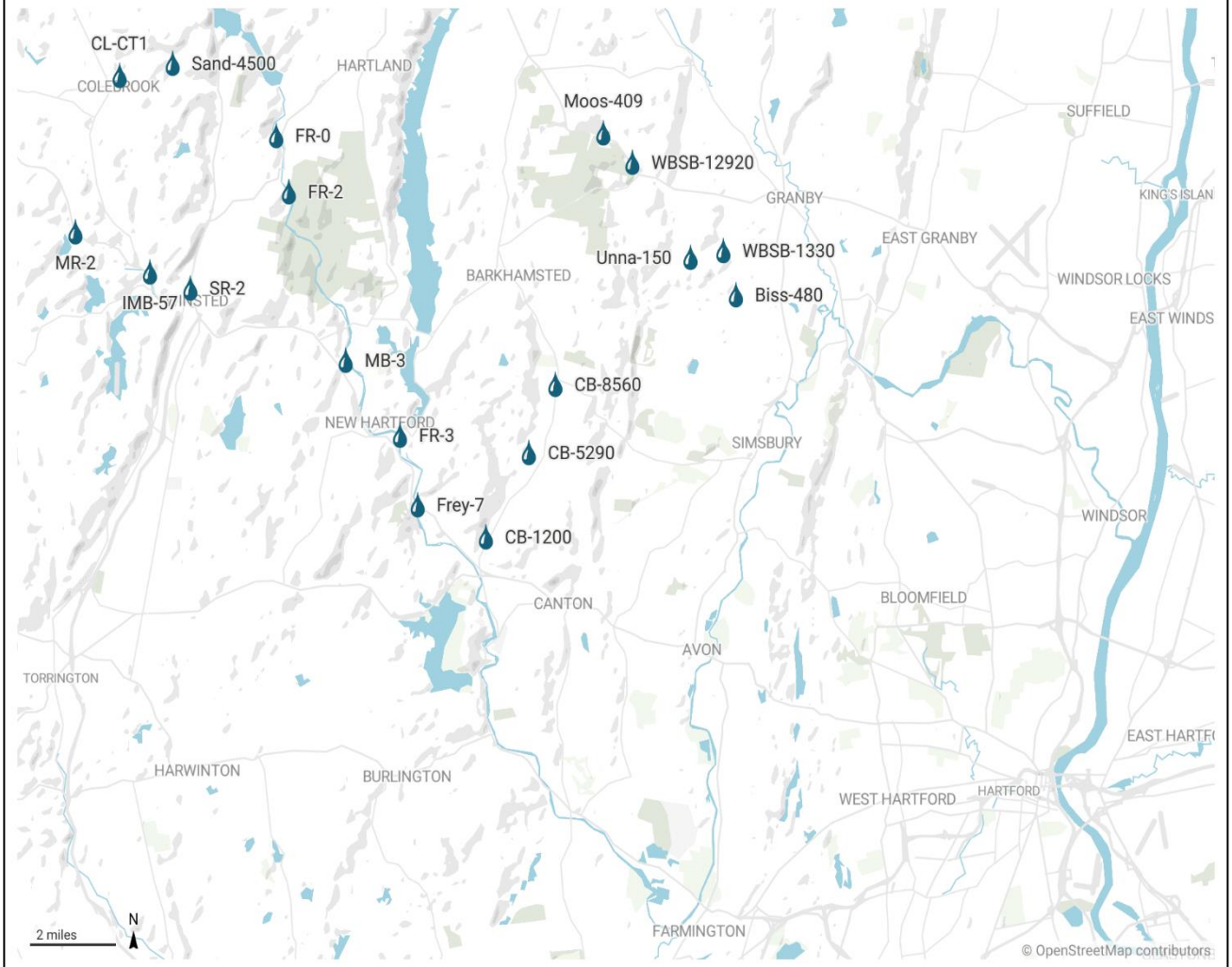


Temperature

In-stream temperature monitoring is conducted using Onset HOBO Pro v2 loggers at eighteen locations. We collect continuous water temperature data every hour, year-round, in Connecticut to identify cold water fish habitat, document thermal impairments, and monitor the impact of stormwater runoff. All data is shared with CT DEEP and uploaded to the Spatial Hydro-Ecological Decision System (SHEDS) Stream Temperature Database. FRWA follows the CT DEEP Bureau of Water Protection & Land Reuse Monitoring & Assessment Program Volunteer Stream Temperature Monitoring (V-STEM) Network, Version 1.2 Last Revised April 2017. Temperature criteria is referenced from Beauchene, et al. Summer Thermal Thresholds of Fish Community Transitions in Connecticut Streams. North American Journal of Fisheries Management. 2014. For this report, summer data is isolated from June to August and averaged since these months may see temperatures rise above 18.3°C for cold water fish. Temperature data is presented as Cold, Cool/Transition and Warm, per the table above (Beauchene et al., 2014).

Thermal Class	Average Water Temperature (°C) June-August
Cold	<18.29
Cool/Transition	18.29-21.70
Warm	>21.70

Temperature Site Locations



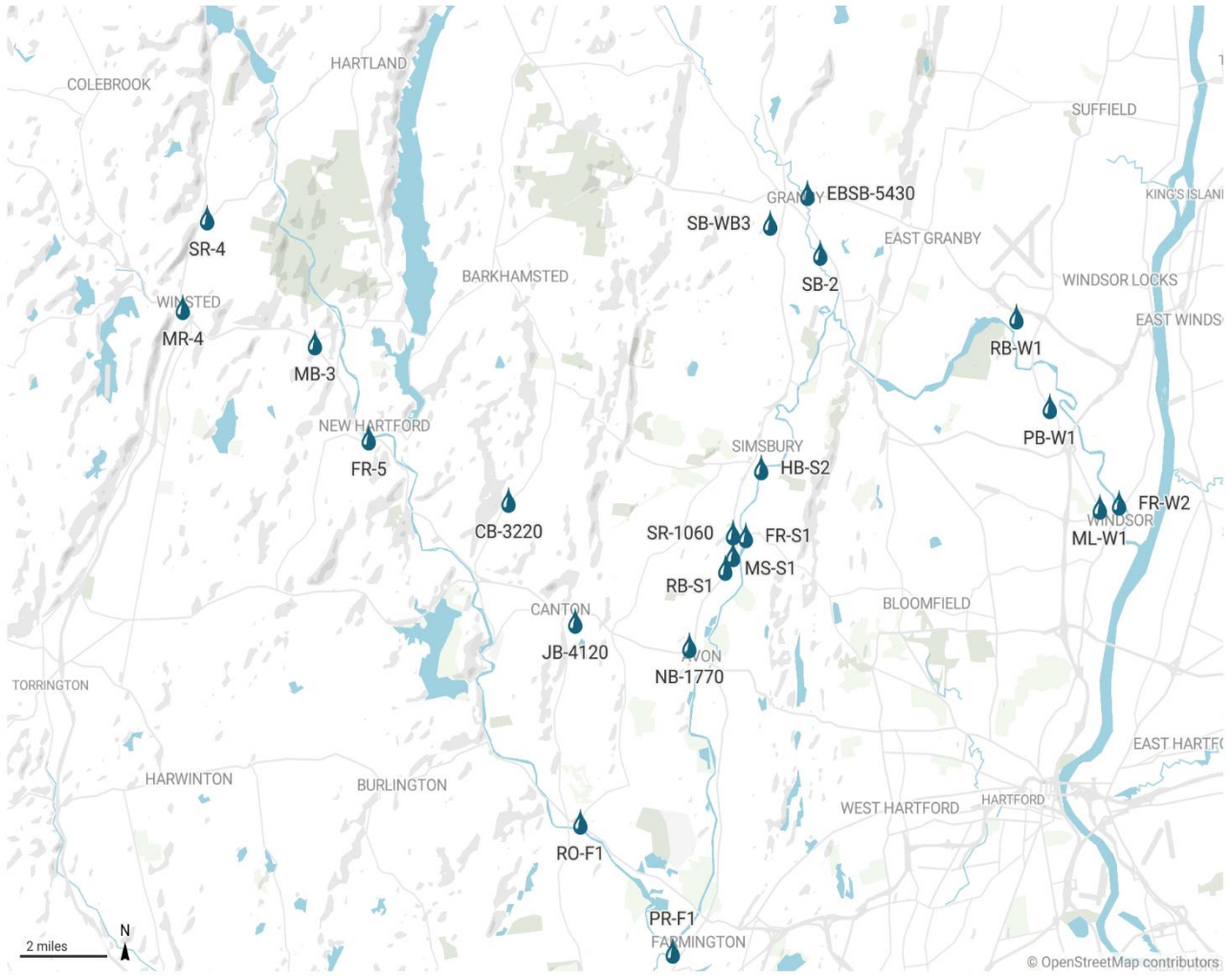
Source: Farmington River Watershed Association • Created with Datawrapper

Chloride

Chloride Conditions (mg/L)	
Excellent	0-30
Good	30-100
Fair	100-230
Toxic	Above 230

Chloride monitoring is in partnership with the Izaak Walton League of America (IWLA) Salt Watch program. Chloride is monitored in Connecticut at twenty-three locations. Monitoring is performed eight times per year, with two samplings in the winter, one sampling in the spring, four samplings in the summer, and one in the fall. Data was collected using IWLA Salt Watch kits which include QuanTab chloride strips for determining chloride and salt concentrations, and all sites were supported with the use of FRWA's YSI ProDSS multiparameter meter. FRWA is conducting year-round monitoring to understand how these locations fare during times of the year in which no road salt is applied. Chronic increases in chloride concentrations can result in impaired food webs and reduced fitness of aquatic plants and wildlife during times of high production, such as the spring and summer months. Data is shared with the IWLA, CT DEEP, FRCC and LFSWS. The data is used to identify impairments and make recommendations at specific locations, to see long-term trends, and to gather baseline data. Water quality criteria of chloride for aquatic life is impaired at 230 mg/L. Values above 230 mg/L for chloride can result in impaired food webs and reduced fitness of aquatic plants and wildlife during times of high production. For this report, chloride data is presented as Excellent, Good, Fair, and Toxic, per the table above.

Chloride Site Locations



Source: Farmington River Watershed Association • Created with Datawrapper

Results

All Farmington River Sites - Massachusetts and Connecticut

Eighteen sites are monitored on the mainstem of the Farmington River, from the headwaters in Massachusetts to the confluence with the Connecticut River in Windsor. Sites along the West Branch Farmington River in Massachusetts, the Upper Farmington Wild & Scenic designation, and the Lower Farmington River Wild & Scenic designation.

Bacteria:

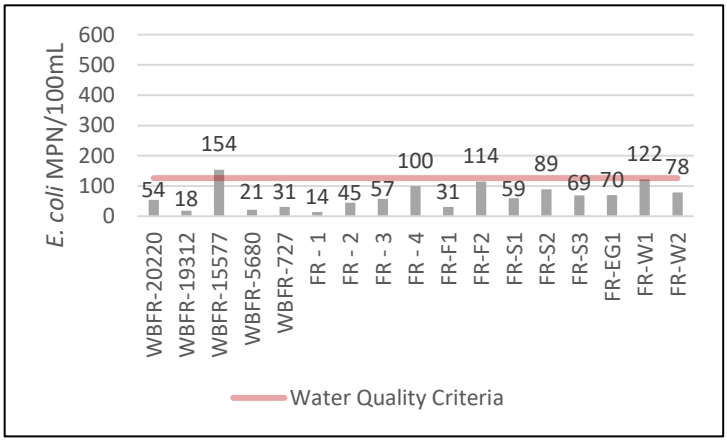
The West Branch Farmington River in MA has had pristine waters in the past three years since FRWA began monitoring MA. Drought in 2022 increased *E. coli* values at site WBFR-15577 to 154/100mL. All other Farmington River sites throughout MA and CT had *E. coli* values below 126/100mL.

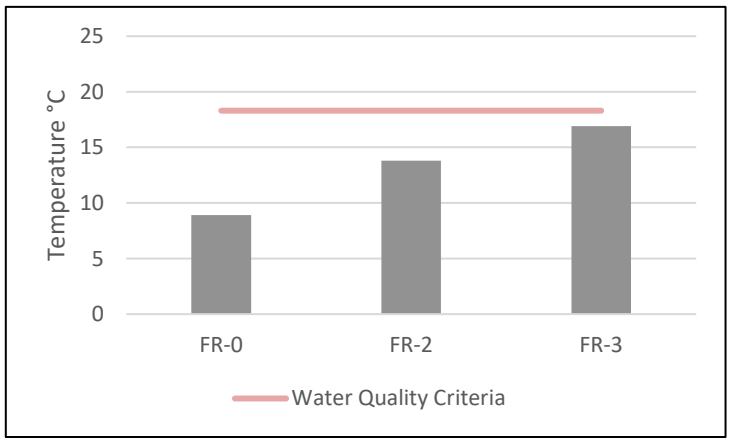
Temperature:

Three temperature sites are in the Upper Farmington Wild & Scenic designation at sites FR-0, FR-2 and FR-3. All three temperature locations had averages colder than the criteria for cold water fish, with FR-0 having an average of 8.9°C.

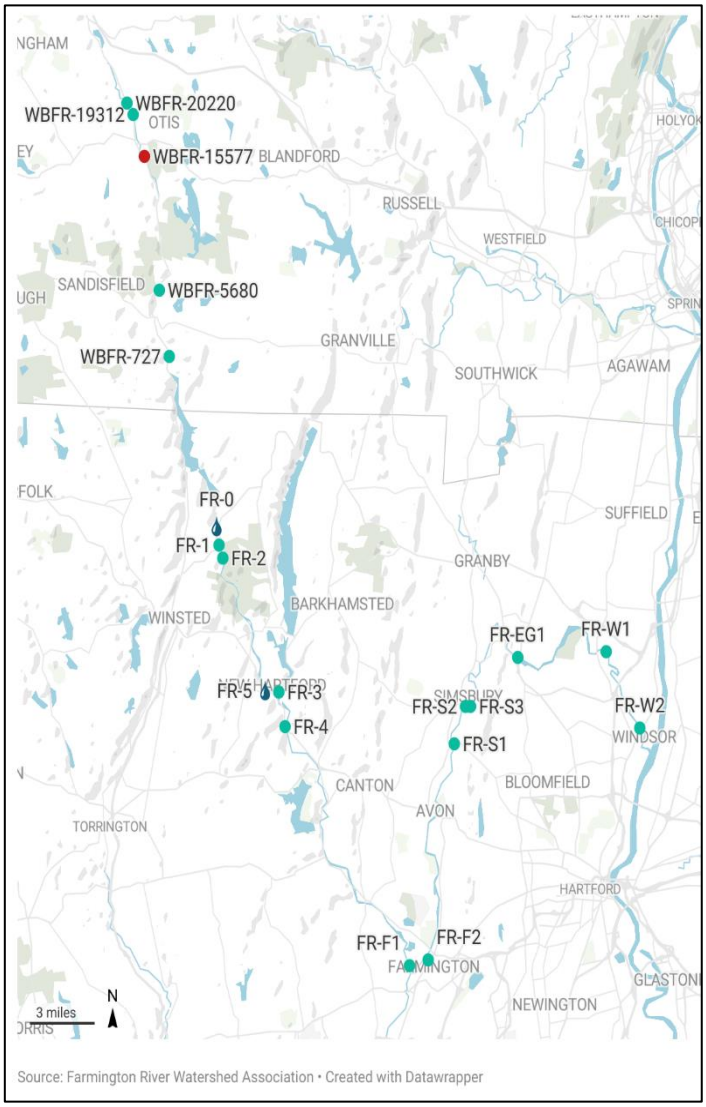
Chloride:

Chloride is monitored on the Farmington River in New Hartford at site FR-5, in Simsbury at site FR-S1, and in Windsor at site FR-W2 All Farmington River chloride sites were low throughout the year.





Chloride Ranges Throughout the Year			
Site ID	FR-5	FR-S1	FR-W2
Chloride mg/L	less than 25	25-59	36-59



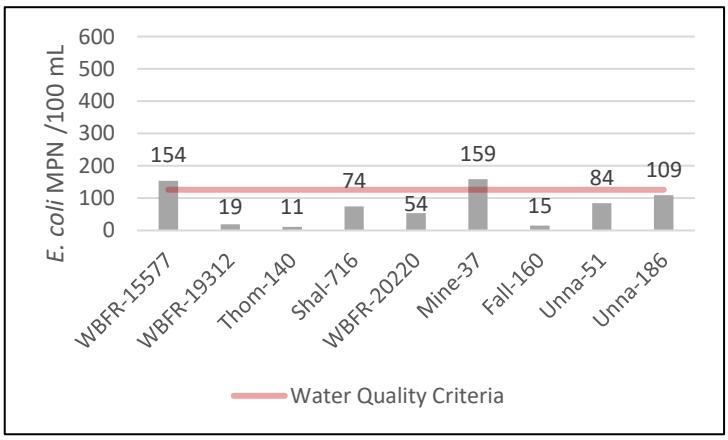
Otis - Massachusetts

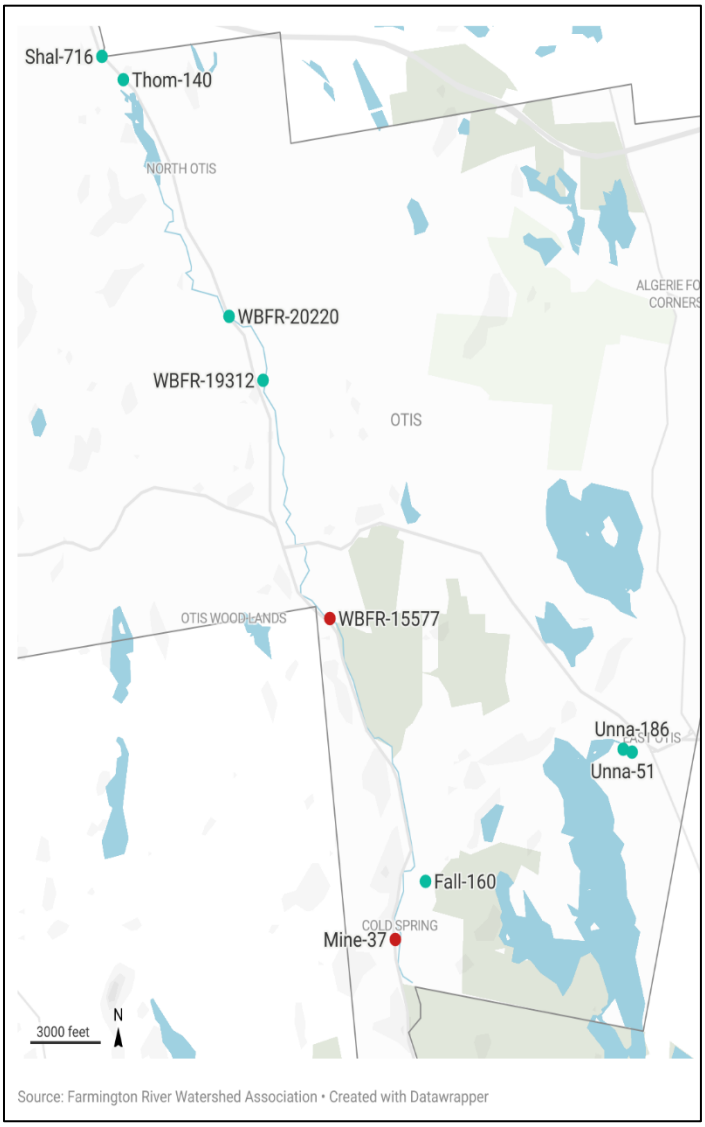
In Otis, three locations on the West Branch Farmington River are monitored at sites WBFR-20220, WBFR-19312, and WBFR-15577. Tributaries to the river include Shales Brook site Shal-716, Thomas Brook site Thom-140, Miner Brook site Mine-37, and two unnamed tributaries to Otis Reservoir: sites Unna-186, and Unna-51. Shales Brook flows out of Shaw Pond in Becket and into Hayden Pond. Thomas Brook is a tributary to Shales Brook before Hayden Pond. The West Branch Farmington River's headwaters originate from Hayden Pond. The West Branch Farmington River in MA travels through Sandisfield and Tolland, then flows into Colebrook River Lake Reservoir, CT, subsequent West Branch Reservoir, and into the Upper Farmington River Wild & Scenic River designation.

Bacteria:

All locations with the exception of Farmington River site WBFR-15577 and Mine-37, had values below 126/100mL. Drought in 2022 increased these two sites above Water Quality Criteria. Both these sites have been low in previous years. Other West Branch Farmington River sites had very low *E. coli* values. All tributaries remain very low in *E. coli*.

Figure 1: Thomas Brook (Thom-140)





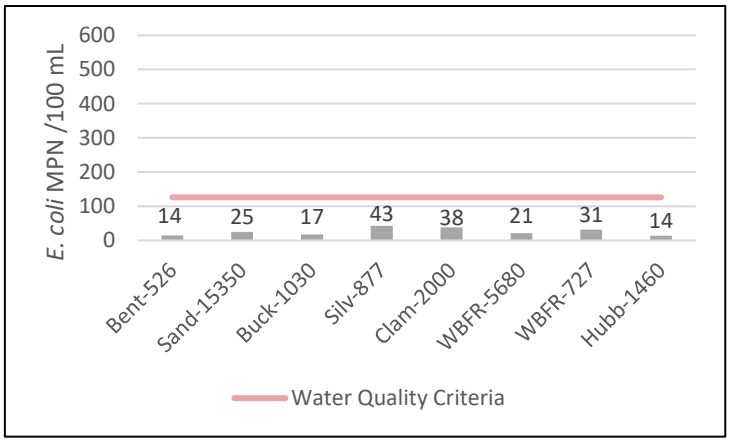
Sandisfield, Tolland, and Granville - Massachusetts

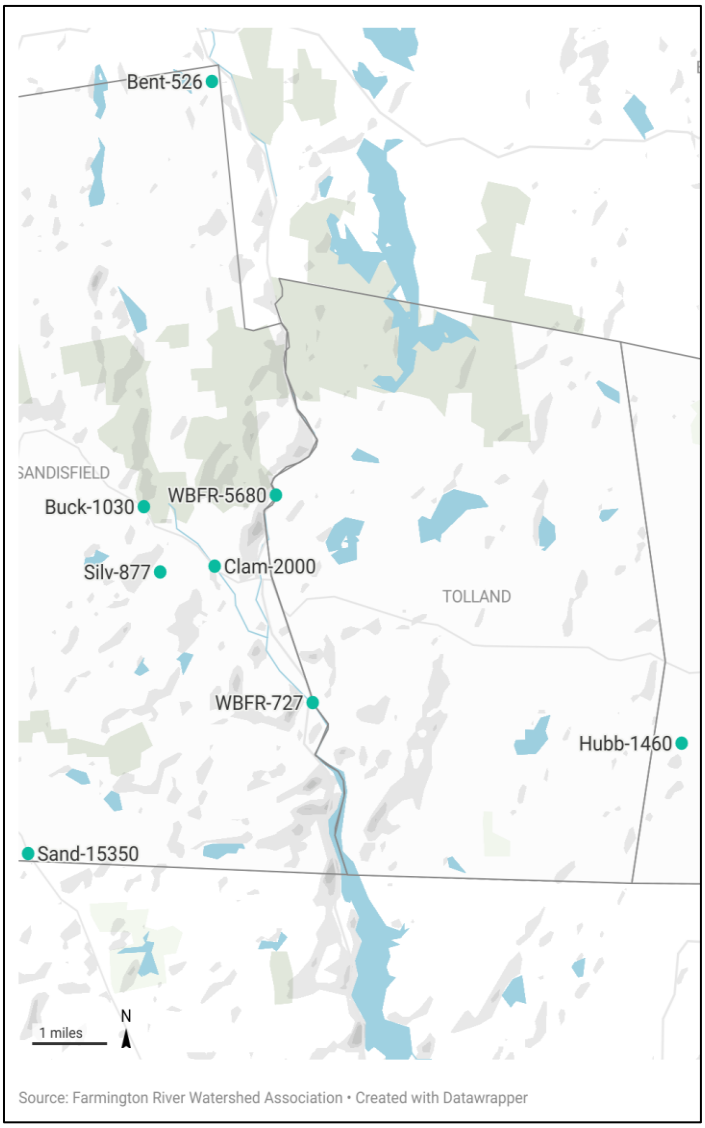
Six sites are within Sandisfield, with one Farmington River location WBFR-5680, and tributaries Sandy Brook site Sand-15350, Buck River site Buck-1030, Silver Brook site Silv-877, Clam River site Clam-2000, and Benton Brook site Bent-526. The site in Tolland includes the Farmington River site WBFR-727 before it enters Colebrook River Lake Reservoir. In Granville, the Hubbard River is monitored at site Hubb-1460, which flows into the East Branch Reservoir in CT. East Branch Reservoir in CT provides drinking water to more than 400,000 people in the Greater Hartford area. The Clam River is a major tributary to the Farmington River in Sandisfield. Silver Brook and Buck River have inputs into the Clam River. Sandy Brook flows south into CT and through Colebrook to the Still River, and into the Upper Farmington River Wild & Scenic designation.

Bacteria:

Drought in 2022 did not affect the West Branch Farmington River and tributaries in Sandisfield, Tolland and Granville as they all had very low *E. coli* geomeans, with some values as low as 14/100mL.

Figure 2: West Branch Farmington River (WBFR-5680)





Colebrook and Norfolk - Connecticut

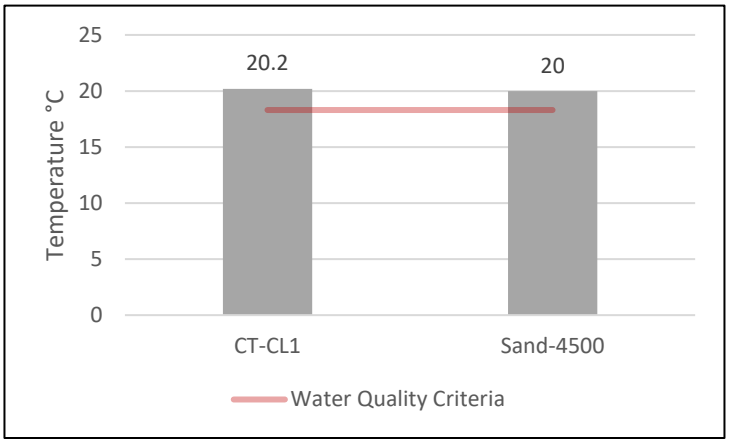
In Colebrook, FRWA monitors tempreature on tributaries Center Brook and Sandy Brook. Center Brook is a tributary to Sandy Brook. Sandy Brook flows to the Still River, and into the Upper Farmington River Wild & Scenic designation. In Norfolk the Mad River site MR-1 is monitored for *E. coli* bacteria just downstream Smith Pond, and is the farthest reach of Mad River monitored by FRWA. Other Mad River sites are monitored in Winchester, CT.

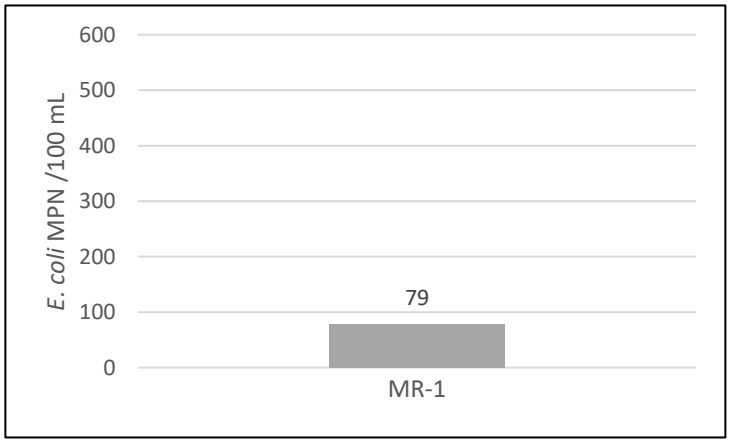
Bacteria:

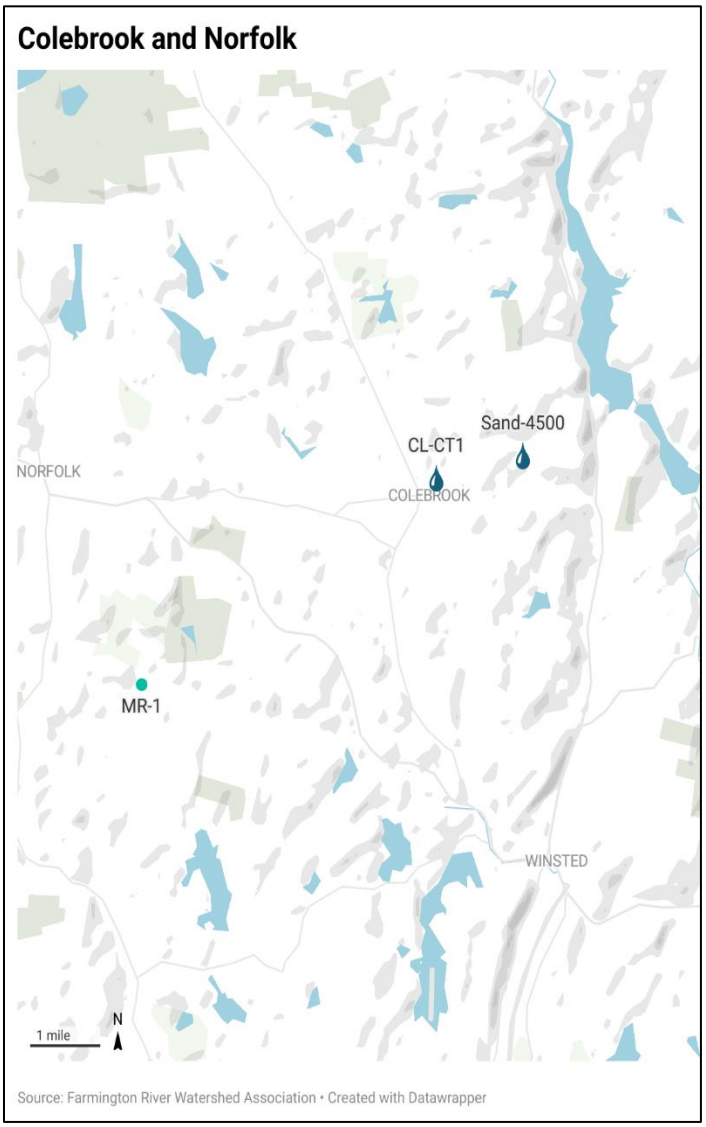
The Mad River is monitored just downstream Smith Pond in Norfolk. It typically has lower values. For summer 2022 it fared well during drought. This site is in the headwaters of the Mad River, with upstream being Smith Pond and is typically a good comparator for Mad River sites downstream in urban Winsted.

Temperature:

Center Brook site CL-CT1 is monitored for temperature on Pisgah Mountain Road near Town Hall in Colebrook, and Sandy Brook site Sand-4500 is monitored along Sandy Brook Road and the Algonquin State Forest in Colebrook. Both sites are considered cool/transitional temperatures for 2022.







Winchester and Torrington - Connecticut

Winsted, the center of Winchester, and Torrington are urban areas in the watershed. The Mad River flows from Norfolk to the Still River in Winsted. The Still River originates in Torrington and flows north though Winsted to its confluence with Sandy Brook, and then into the Farmington River in the Upper Farmington River Wild & Scenic designation. Site SR-3 is before the Winchester Water Pollution Control Authority (WPCA) discharge and SR-4 after.

Bacteria:

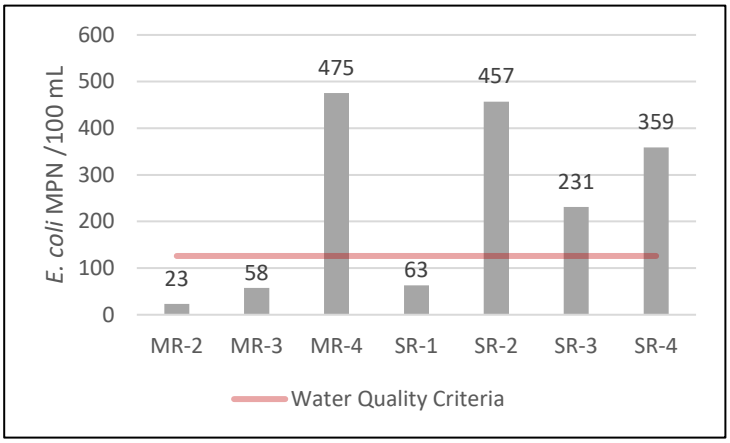
Still River and Mad River are impaired for recreation on three segments each. CT DEEP has a TMDL for the Still River and Mad River, for *E.coli* bacteria, and have been placed on the CT List of Waterbodies Not Meeting Water Quality Standards (aka CT 303(d) Impaired Waters List). Both the Mad and Still River remain low in *E. coli* until they enter downtown Winsted. Mad River site MR-4, and Still River sites SR-2, SR-3, and SR-4 in Winsted had elevated *E. coli* values.

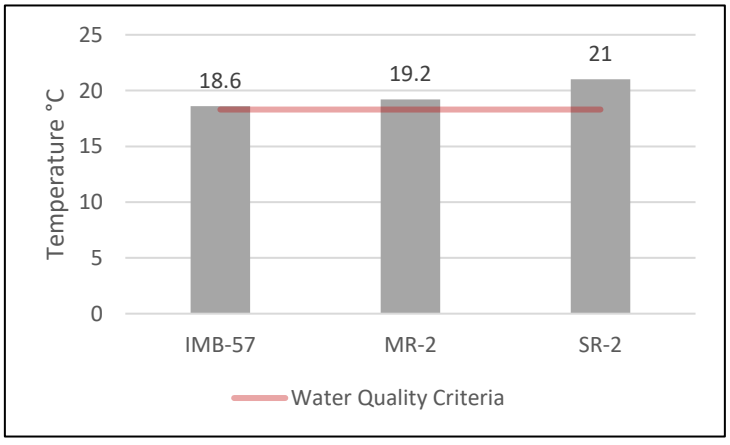
Temperature:

Three locations are monitored in Winsted for temperature on the Mad River at site MR-2, Still River site SR-2 and Indian Meadow Brook site IMB-57. All three sites are considered cool/transitional temperatures for 2022.

Chloride:

Mad River site MR-4 and Still River site SR-4 both had chloride levels considered good and remain low year-round.





Chloride Ranges Throughout the Year		
Site ID	MR-4	SR-4
Chloride mg/L	less than 25	30-60

Barkhamsted and Hartland - Connecticut

The West Branch Farmington River flows from West Branch Reservoir in Hartland, just after Colebrook River Lake Reservoir. The dam releases water from the bottom of the deep reservoir where the water remains cold. Farmington River sites FR-0, FR-1 and FR-2 are located in the Upper Farmington River Wild & Scenic designation. Morgan Brook is monitored at sites MB-1, MB-2, and MB-3 and flows into the West Branch Farmington River.

Bacteria:

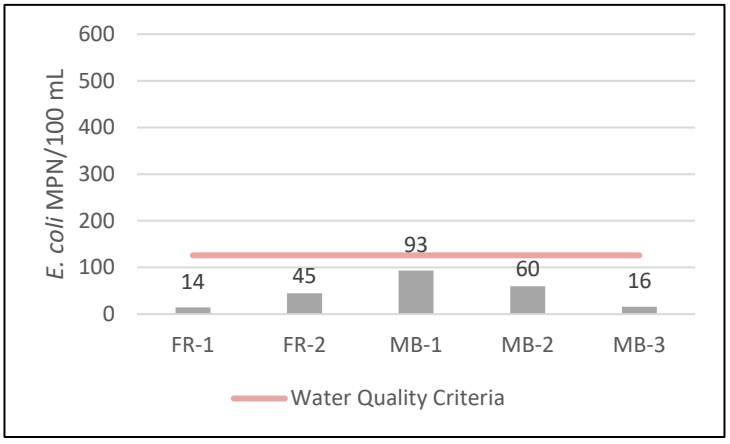
West Branch Farmington River and tributary Morgan Brook *E. coli* values remain low under 100/mL.

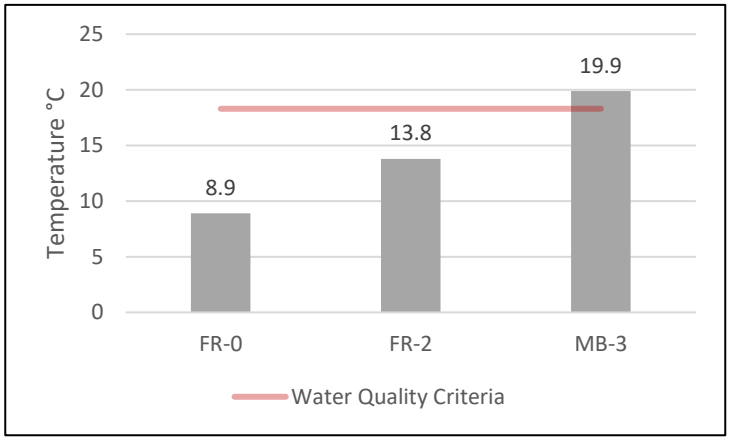
Temperature:

Both sites FR-0 and FR-2 remain cold due to releases from the bottom of the Goodwin Dam. Morgan Brook, a tributary to the Farmington River at site MB-3 was considered cool/transitional temperature.

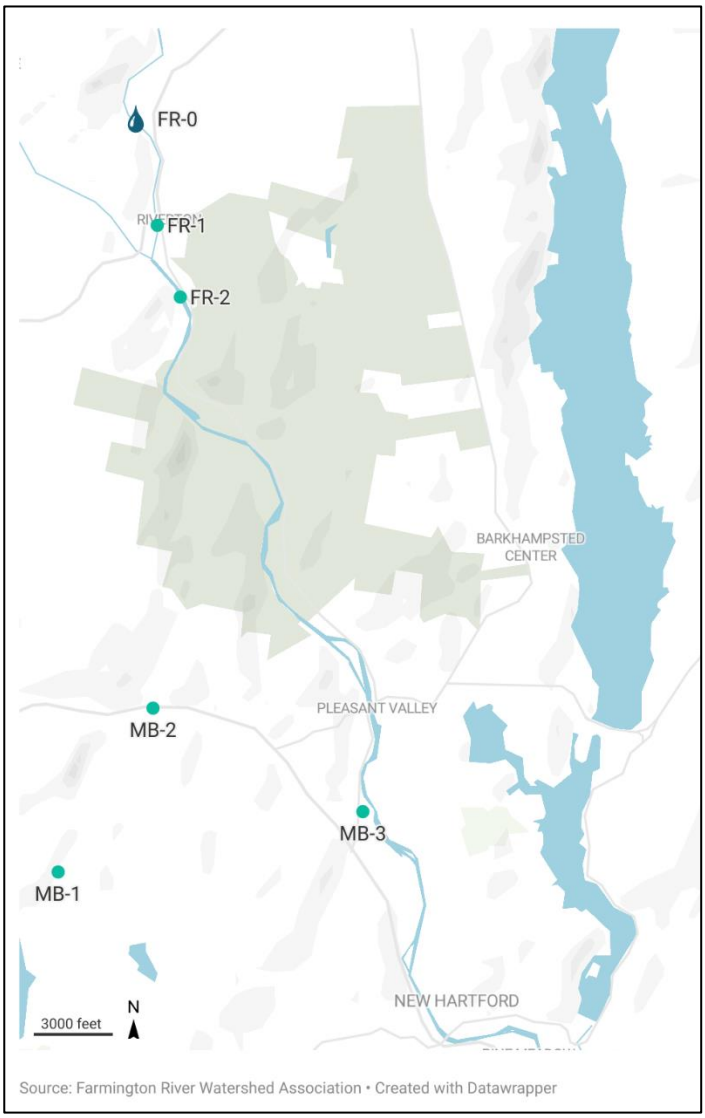
Chloride:

Morgan Brook is monitored at site MB-3 in Barkhamsted and had chloride levels considered good. An Unnamed Tributary to West Branch Salmon Brook was monitored in East Hartland during 2022 but was eliminated in September due to priority. The Unnamed Tributary was considered excellent for chloride.





Chloride Ranges Throughout the Year	
Site ID	MB-3
Chloride mg/L	25-51



New Hartford - Connecticut

Sites in New Hartford include three river sites along the Upper Farmington River Wild & Scenic designation. An Unnamed tributary to the Farmington River is monitored on property owned by FRWA. The property was donated to FRWA by the Estate of Lily Frey. This site is called Frey-7 and is monitored for temperature as the tributary is unshaded. FRWA aims to restore a natrual buffer to this tributary, and is monitoring temperature for future temperature reference after restoration.

Bacteria:

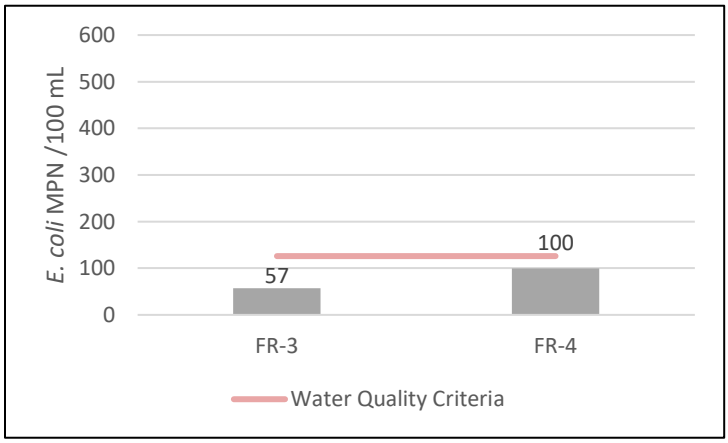
West Branch Farmington River site FR-3 and Farmington River site FR-4 remained low. FR-3 is located upstream the New Hartford Sewer Treatment Plant and FR-4 downstream it. FR-4 did have low increases in *E. coli* compared to FR-3.

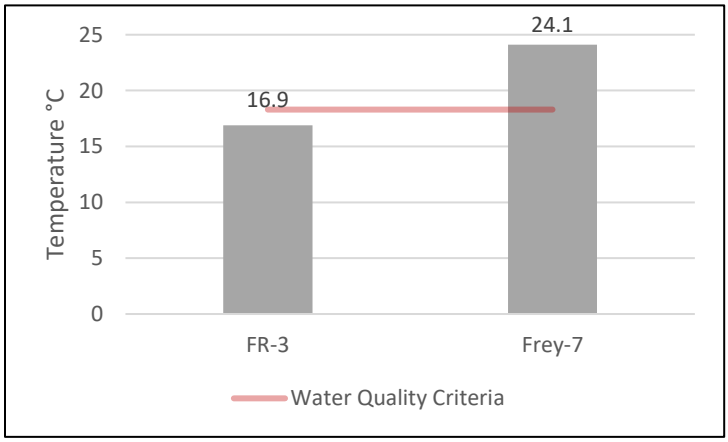
Temperature:

The Farmington River site FR-3 is considered cold. The unnamed tributary site Frey-7 was far above the requirements for cold water fish and is considered warm. For reference, 24.1°C is converted to 75.4°F.

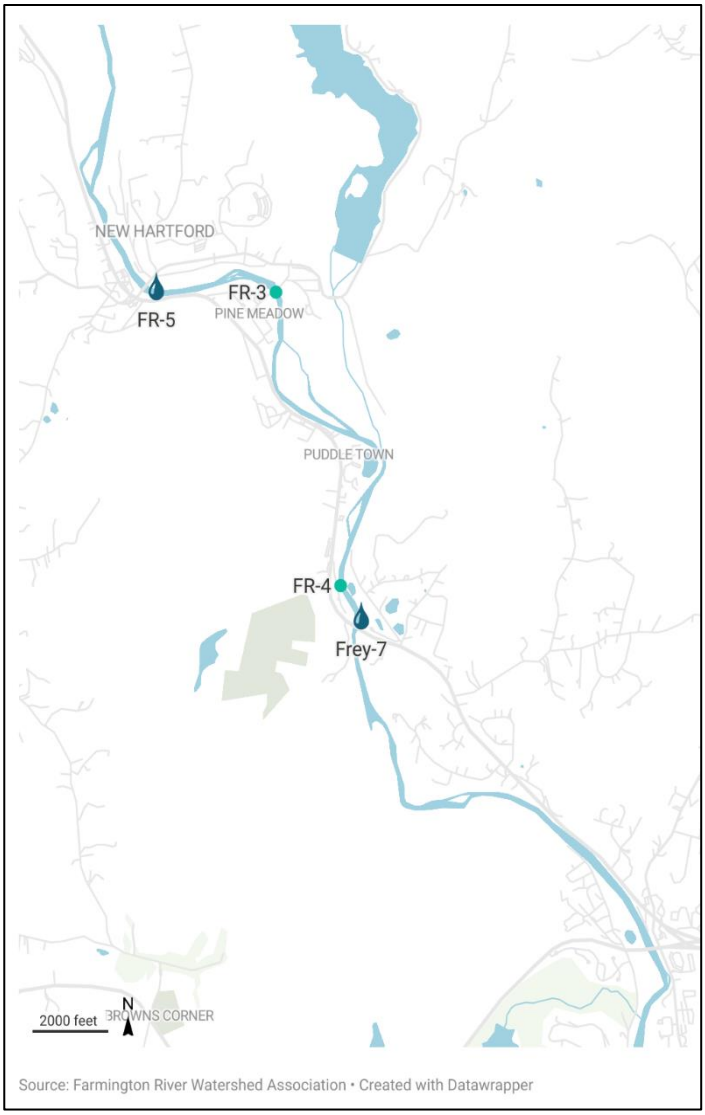
Chloride:

Chloride is monitored at Callahan Park on the West Branch Farmington River at site FR-5. This site is considered excellent and continuously has values less than 30 mg/L.





Chloride Ranges Throughout the Year	
Site ID	FR-5
Chloride mg/L	less than 30



Canton - Connecticut

In 2022, FRWA monitored more locations in Cherry Brook with the aim to identify locations with high *E. coli* values and determine sources of pollution resulting in the impaired segment. See the 2022 Cherry Brook Report at frwa.org/resources for more information on our findings. Jim Brook at site JB-4120 is located downstream The Shoppes at Farmington Valley and is monitored for chloride due to the large parking lots and Rt. 202.

Bacteria:

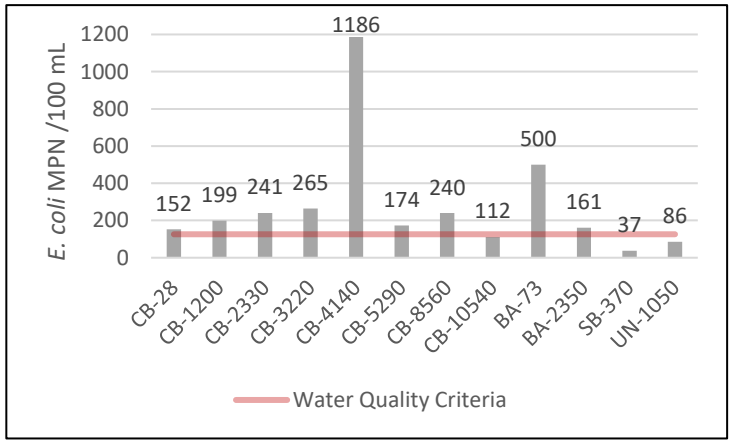
Cherry Brook watershed is impaired for recreation on two segments for *E. coli* bacteria. CT DEEP has a TMDL for Cherry Brook and is on the CT List of Waterbodies Not Meeting Water Quality Standards (aka CT 303(d) Impaired Waters List). Site CB-4140 on Meadow Rd. where the impaired segment starts had the highest *E. coli* values. This indicates agricultural activity may be the main contributor of *E. coli* in Cherry Brook and is likely the result of high values downstream.

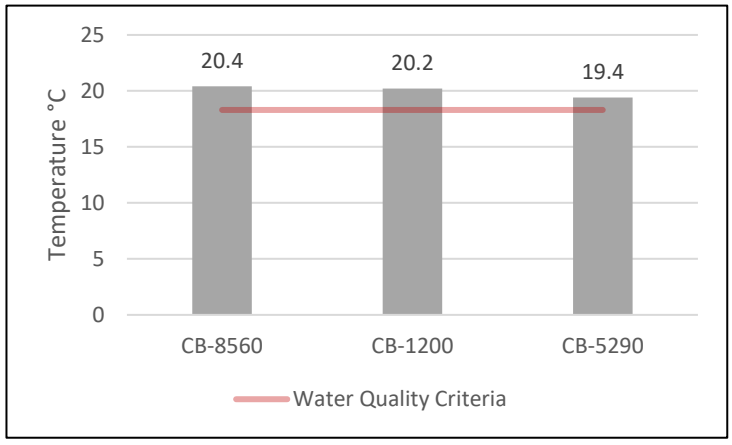
Temperature:

Sites CB-1200, CB-5290, and CB-8560 on Cherry Brook were monitored and were all considered cool/transitional.

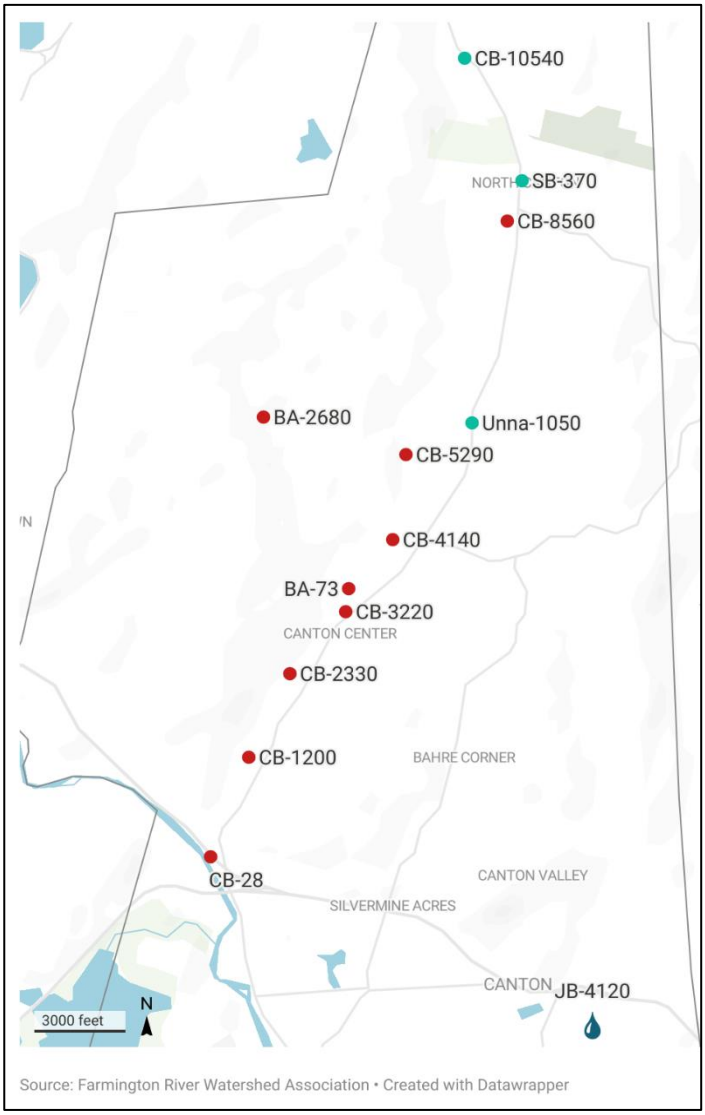
Chloride:

Cherry Brook site CB-3220 had concentrations good to excellent. Jim Brook typically has fair concentrations to borderline toxic depending on whether there was road salt application or drought.





Chloride Ranges Throughout the Year			
Site ID	BA-73	CB-3220	JB-4120
Chloride mg/L	less than 25	25-43	77-290



Burlington and Farmington - Connecticut

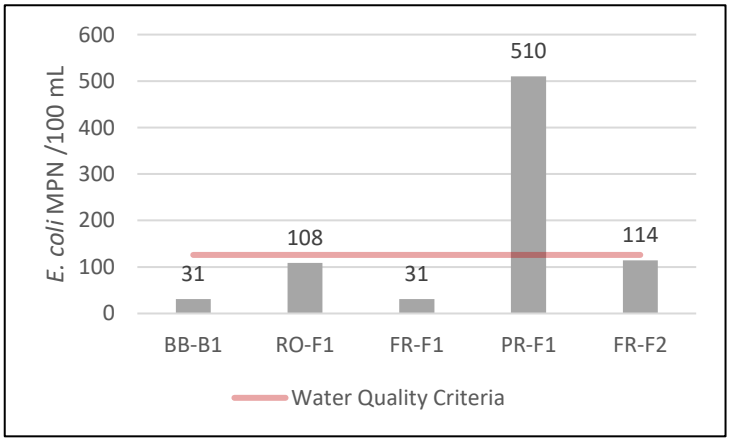
In Burlington, tributary Burlington Brook is monitored at site BB-B1. In Farmington, two locations on the Farmington River are monitored at sites FR-F1 and FR-F2 in the Lower Farmington River Wild & Scenic designation, and tributaries Roaring Brook at site RO-F1 and Pequabuck River at site PR-F1. Site FR-1 measures *E. coli* values before the input of the Pequabuck River, and site FR-2 after.

Bacteria:

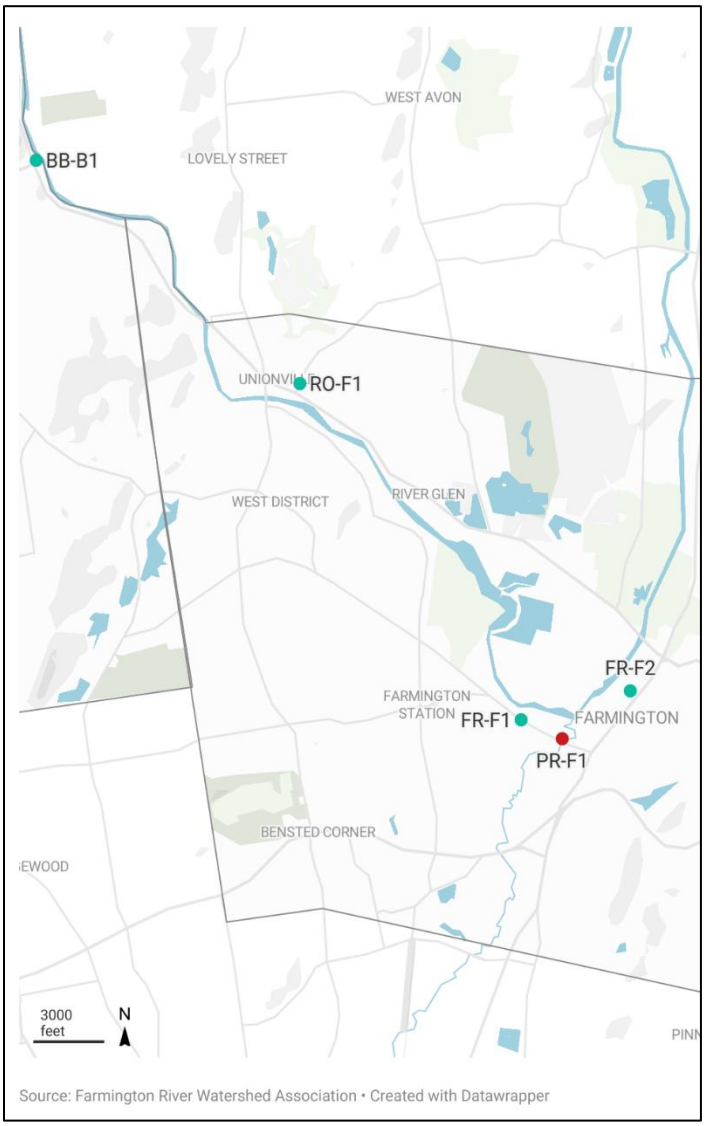
Burlington Brook at site BB-B1 remains lower in *E. coli*. Roaring Brook site RO-F1 has remained below the Water Quality Criteria for the last few years. Farmington River at site FR-F1 before Pequabuck River's input had a geomean of 31/100mL. CT DEEP has a TMDL for the Pequabuck River, for *E.coli* bacteria, and is on the CT List of Waterbodies Not Meeting Water Quality Standards (aka CT 303(d) Impaired Waters List). Site PR-F1 had a geomean of 510/100mL and continually has consistent high values of *E. coli* always exceeding the water quality criteria. This is due to the Pequabuck River's stretch though urban City of Bristol and increased impervious surface areas with greater amounts of stormwater runoff. Farmington River site FR-F2 after Pequabuck River's input had a geomean of 114/100mL. Comparing Farmington River sites FR-F1 and FR-F2 shows increases in bacteria levels from the Pequabuck River's input.

Chloride:

Roaring Brook site RO-F1 and Pequabuck River site PR-F1 both were higher in chloride, with most values being fair, and some values being close to toxic conditions. Pequabuck River's higher chloride values are most likely the result of impervious pavements from urban areas of Bristol upstream. It had the highest values during drought.



Chloride Ranges Throughout the Year		
Site ID	RO-F1	PR-F1
Chloride mg/L	88-131	144-181



Avon and Simsbury - Connecticut

Tributaries Thompson Brook site TB-A1 and Nod Brook sites NB-A1 and NB-1770 are located in Avon. Tributaries Minister Brook site MS-S1, Russell Brook site RB-S1, Hop Brook site HB-S1 and Munnisunk Brook site MB-S1 are located in Simsbury. Farmington River sites in Simsbury along the Lower River Wild & Scenic designation include FR-S1 at the Pinchot Sycamore, FR-S2 before the Simsbury Water Pollution Control Authority (WPCA) discharge and FR-S3 after.

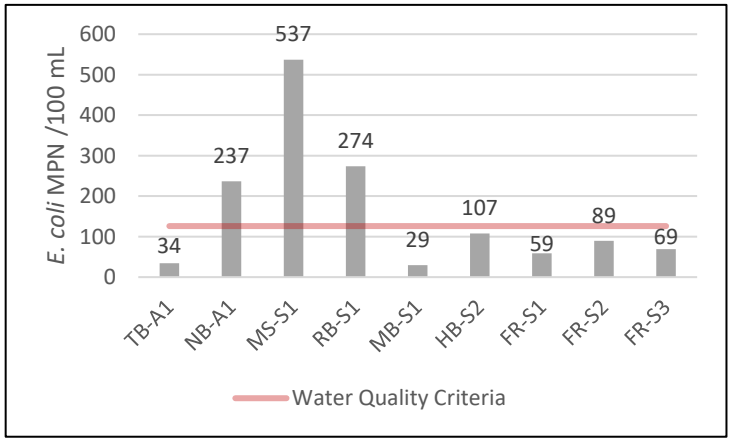
Bacteria:

Thompson Brook site is located in Fisher Meadows in Avon and had low *E. coli* values, and in previous years remained low. Nod Brook site is located at Nod Brook Wildlife Management Area and had higher *E. coli* values, most likely due increased stormwater runoff along Rt. 202. Minister and Russell Brook exceeded the Water Quality Criteria for *E. coli* with geomeans of 537/100mL and 247/100mL, while Munnisunk Brook remains low and Hop Brook slightly elevated. All Farmington River sites remain low though Simsbury.

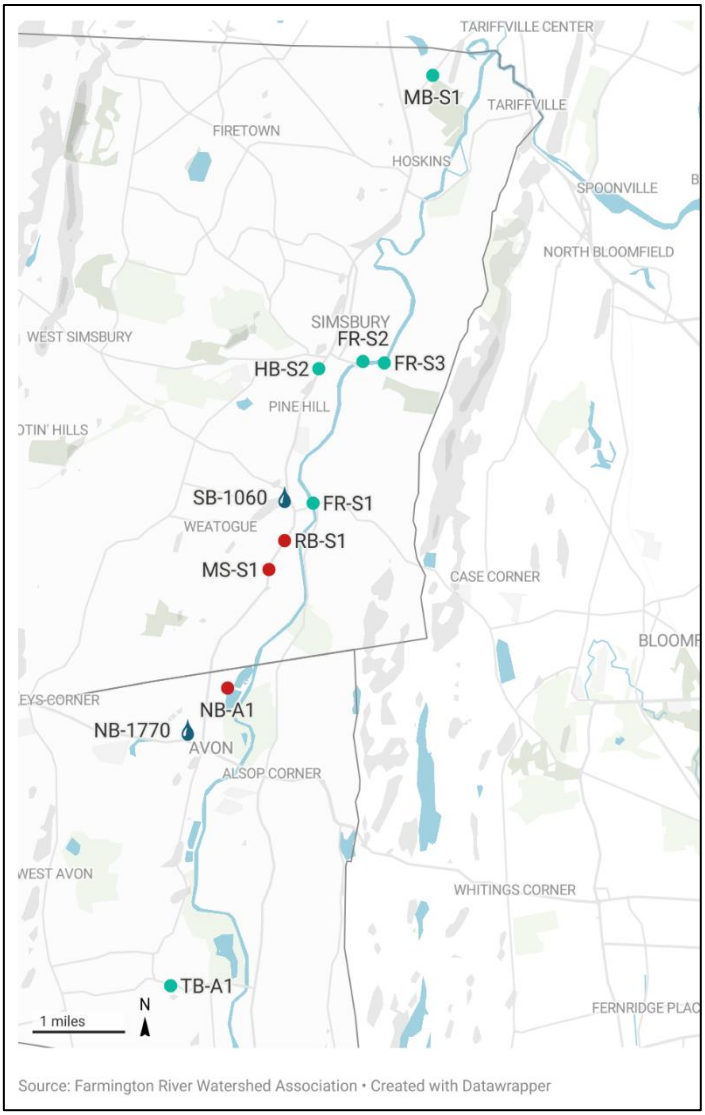
Chloride:

In Avon, Nod Brook site NB-1770 had values considered fair to toxic. In Simsbury, all tributaries monitored and the Farmington River were considered good. A new site was added in Simsbury at Still Brook, site SB-1060. It was only measured for chloride in November and had a value of 77 mg/L.

Figure 3: Farmington River (FR-S1)



Chloride Ranges Throughout the Year						
Site ID	NB-1770	MS-S1	RB-S1	SB-1060	FR-S1	HB-S2
Chloride mg/L	111-331	59-87	51-68	77	43-59	36-51



Salmon Brook Watershed - Hartland, Granby and East Granby - Connecticut

Salmon Brook, including West and East Branch, total 26.4 miles and are designated Wild & Scenic. West Branch Salmon Brook originates in Hartland and flows through Granby. East Branch Salmon Brook originates in Granville, MA and flows south through Granby. Salmon Brook mainstem starts in East Granby where West and East Branch meet, and flows into Wild & Scenic Lower Farmington River.

Bacteria:

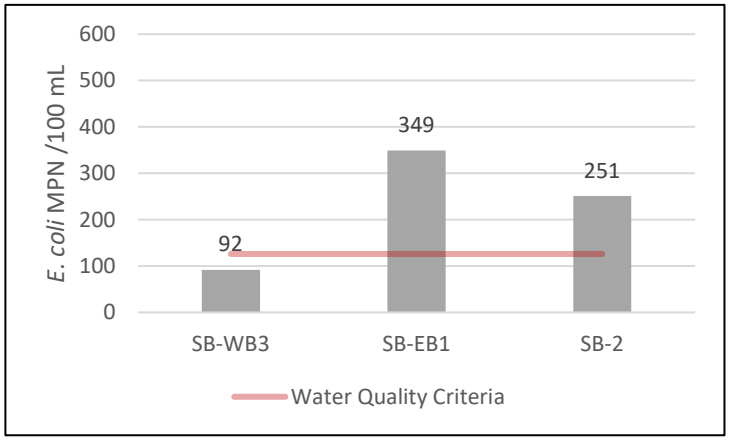
West Branch Salmon Brook site consistently has low bacteria levels. East Branch Salmon Brook and mainstem Salmon Brook typically have elevated levels of bactera.

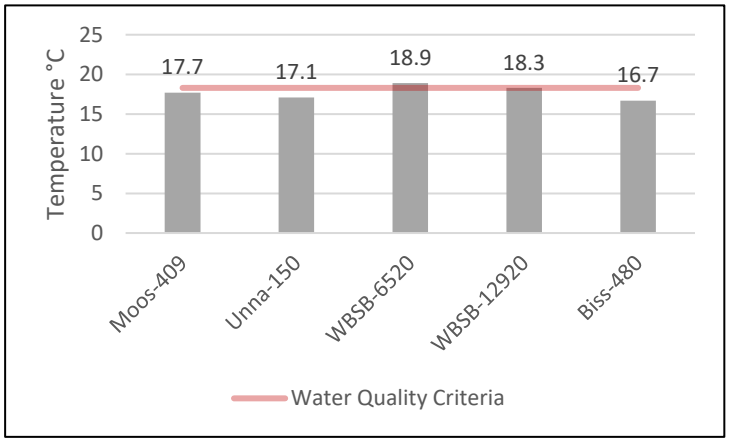
Temperature:

Temperature is monitored in the West Branch Salmon Brook and its tributaries. All tributary sites are considered cold and have temperatures around 17°C. West Branch Salmon Brook sites were considered cool/transitional temperatures but were just above the cold requirement.

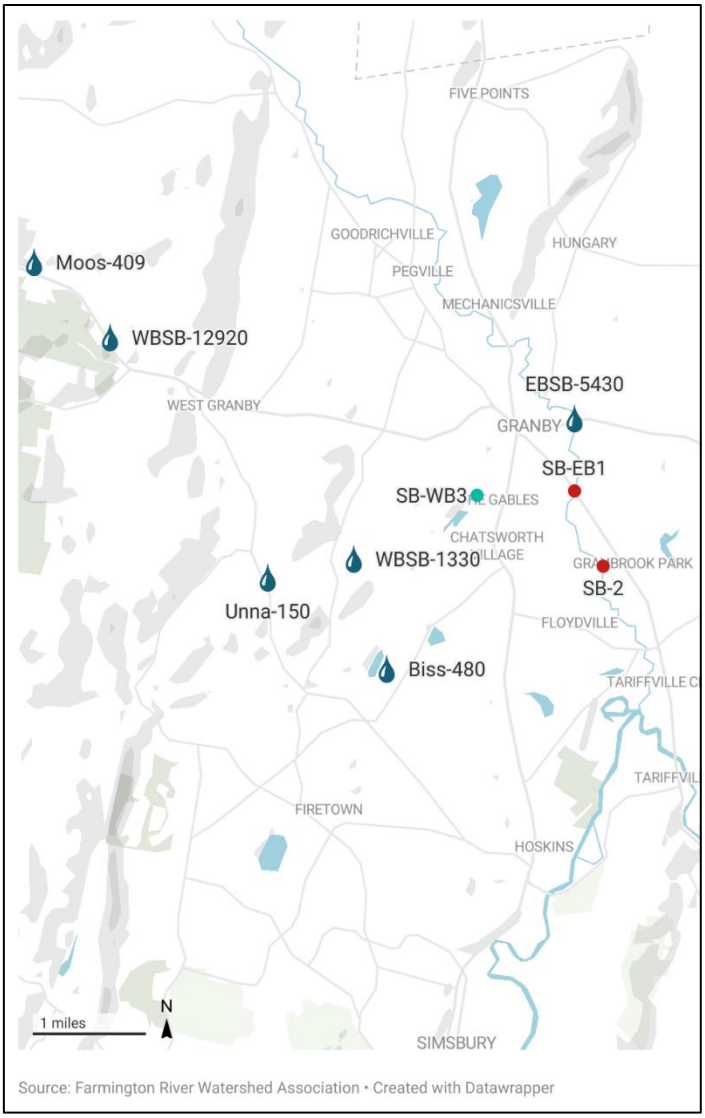
Chloride:

Salmon Brook, including West and East Branch are considered good to excellent for chloride levels, with all values remaining lower than 36 mg/L year-round.





Chloride Ranges Throughout the Year			
Site ID	SB-WB3	EBSB-5430	SB-2
Chloride mg/L	less than 25	less than 36	less than 36



Windsor - Connecticut

There are two sites along the Farmington River, site FR-W1 is upstream at Strawberry Hills Open Space and FR-W2 downstream the Metropolitan District Commission Waste Water Treatment Plant (WWTP) at the boat launch near Bart's Restaurant and the Farmington River Railroad Bridge. Tributaries monitored in Windsor include Phelps Brook along Rt. 75 at site PB-W1 and Mill Brook site ML-W1. Windsor has increased impervious surfaces, and therefore increased stormwater runoff. Rainbow Brook site RB-W1 is monitored for chloride as it flows from Bradley Airport.

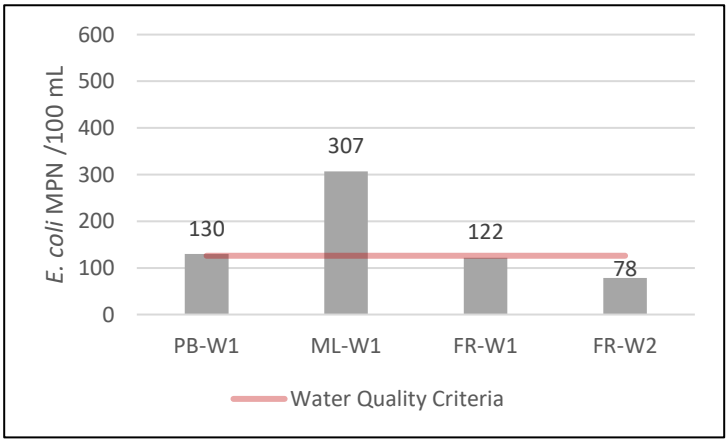
Bacteria:

Phelps Brook can have elevated bacteria levels depending on weather patterns, with drought this year it was elevated. Mill Brook consistently has had elevated *E. coli* values, with a geomean of 307/100mL for 2022. Farmington River site FR-W1 is before the WWTP was elevated, but downstream site FR-W2 was lower.

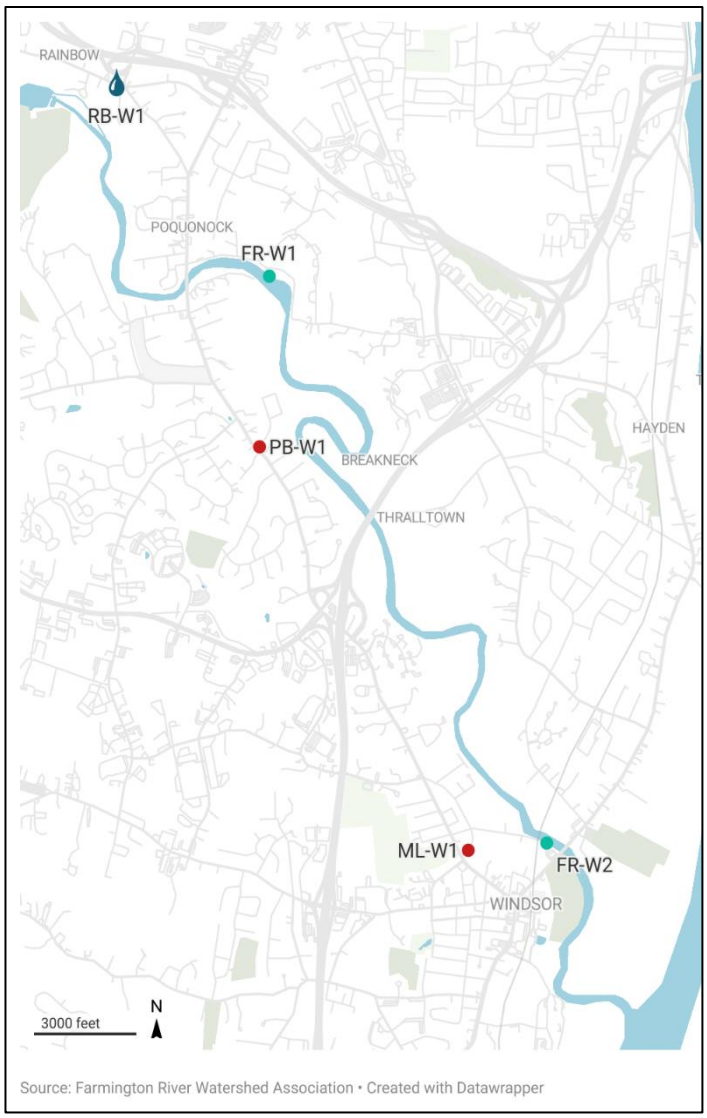
Chloride:

Rainbow and Mill Brook had chloride levels considered fair, with the highest results recorded during drought. Phelps Brook and the Farmington River at site FR-W2 were considered good for chloride levels.

Figure 4: Farmington River (FR-W2) at Windsor Railroad Bridge



Chloride Ranges Throughout the Year				
Site ID	RB-W1	PB-W1	MB-W1	FR-W2
Chloride mg/L	97-170	68-77	77-144	36-59



QAPP

FRWA follows all protocols in our Quality Assurance Project Plan (QAPP). FRWA's QAPP is on file at MassDEP – Farmington River Watershed Association's Bacteria Monitoring Program: Massachusetts section – dated January 10, 2020 – January 9, 2023, signed by MassDEP QA Officer Suzanne Flint, Environmental Analysis.

References

US EPA. n.d. National Recommended Water Quality Criteria Aquatic Life Criteria Table. US EPA. [https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-lifecriteria-table] (Date accessed: 22 August 2022)

Mike Beauchene , Mary Becker , Christopher J. Bellucci , Neal Hagstrom & Yoichiro Kanno. 2014. Summer Thermal Thresholds of Fish Community Transitions in Connecticut Streams. North American Journal of Fisheries Management. 34:1. 119-131. [http://dx.doi.org/10.1080/02755947.2013.855280]

Riffle Bioassessment by Volunteers for Macroinvertebrate Surveys

https://portal.ct.gov/DEEP/Water/Inland-Water-Monitoring/Riffle-Bioassessment-by-Volunteers-RBV

VSTeM Monitoring Network for Temperature Monitoring

https://portal.ct.gov/DEEP/Water/Inland-Water-Monitoring/Volunteer-Stream-Temperature-Monitoring-Network

NetworkEcoSHEDS by USGS

https://www.usgs.gov/apps/ecosheds/#/

Water Quality Standards and Classifications

https://portal.ct.gov/DEEP/Water/Water-Quality/Water-Quality-Standards-and-Classification

Connecticut River Conservancy's Is It Clean?

https://connecticutriver.us/it-clean

Izaak Walton League of America's Salt Watch

https://www.iwla.org/water/stream-monitoring/salt-watch