Chicopee 4Rivers

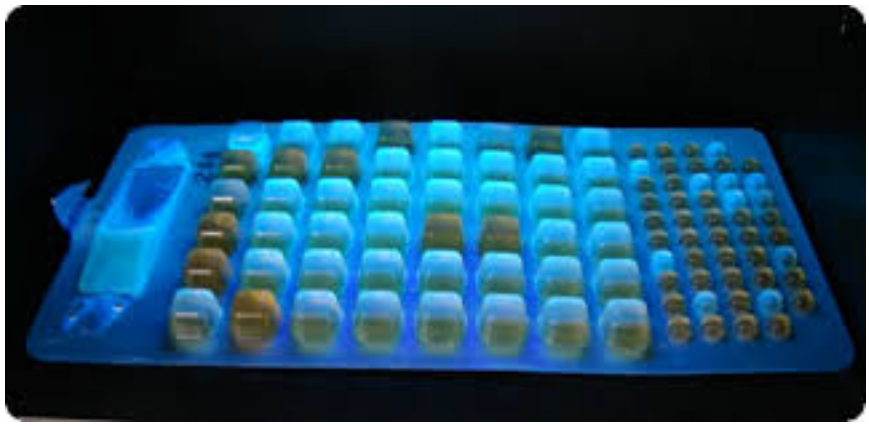
Chicopee-Ware-Quaboag-Swift

Watershed Council

One River System

C4RWC Bacteria Monitoring Program

2016 Report



Monitoring for healthy rivers.

Prepared by:
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10/19/16

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A digital version of this report can be found at www.chicopeewatershed.org

Executive Summary

In 2016 the Chicopee 4Rivers Watershed Council (C4RWC) successfully conducted its second bacteria monitoring season. A group of dedicated volunteers executed this program by monitoring a total of thirteen (13) sites on the Swift, Ware, Quaboag and Chicopee rivers. Six distinct sampling events were completed during the major recreational contact season.

C4R was able to grow this program in 2016 with broad based community support. This sampling is a key part of a larger effort to engage watershed residents in greater watershed awareness and stewardship. The other major component of this effort is Blue Trails: improved river access and exploration/recreation. Water-based recreational activities are determined to be appropriate based on the concentration of bacteria in the river or water body. A rivers general health can also relate to bacteria levels. MassDEP has developed guidelines for making such determinations.

By conducting a continuing annual program of volunteer monitoring, C4RWC aims to provide watershed residents and visitors with practical information concerning the safety of using and enjoying local rivers and ultimately presenting the health of the watershed. Bacteria results were posted regularly on www.connecticutriver.us through a partnership with CRWC. The data collected was determined to be of reliable quality.

Second-year results indicate a generally healthy river system for a variety of types of recreation: though one site tested in unhealthy condition and two sites were a bit high for primary contact, these warrant closer monitoring.

Typically, it is wise to limit primary contact after a heavy rainstorm. Often in areas located downstream of urban centers, which collect greater amounts of stormwater runoff, it is not unusual for bacterial concentrations to run high. 2016 sampling saw few rain events, low river flows, so this situation did not present itself.

The success of this monitoring program illustrates the value and importance of volunteer activities to monitoring public health. As C4RWC continues its efforts to promote public recreation and enjoyment of local rivers through a series of “Blue Trails,” this volunteer monitoring program should increase in importance and engage more residents to be “the eyes and ears” of the watershed. Such stewardship efforts are vital to maintaining the health and resiliency of our watershed and the many communities that call it home.

Introduction

As part of promoting a series of recreational "Blue Trails" within the watershed, C4RWC determined that it would be beneficial to manage a "complementary" bacteria monitoring program. This program serves several purposes: first, to gauge general water quality and river health; and second, to inform the public on the safety of recreational activities on/in the river. For people to enjoy our rivers with piece of mind, it is particularly important to determine if the Blue Trail and other segments meet the MassDEP water quality contact standards.

C4RWC relies on fundraising and grants to help support program costs, mainly laboratory analyses of samples and some monitoring equipment. C4RWC is grateful for support from NEGEF (New England Grass Roots Environmental Fund) and the Palmer Conservation Commission, Warren CC, Hardwick CC, Town of Ware, LWPA, QQLA and individual donors.

C4RWC used the CRWC lab in Greenfield for sample analysis. Sampling kits were organized for each sample site.

Another key step was to find volunteer samplers. Outreach brought 10 people forward to help. All received training in proper sampling techniques, and bi-weekly sampling began on June 30, 2016 and ran through September 8th. In all we conducted six sampling events at (13) sampling sites on the Ware, Swift, Quaboag and Chicopee Rivers – ALL 4 Rivers.

Volunteers also noted temperature and other site conditions observed during each sampling event. Weather conditions within 48 hours of sampling events were recorded.

The 2016 sampling year was a strong success. Volunteer samplers did well and there were few complications. Reporting on line also worked well. This second year experience illustrates C4RWC commitment to monitoring and will guide any enhancements to C4RWC's monitoring program as we look continually to optimize the choice of monitoring sites, and encourage more people to explore the Watershed and its rivers.

Special thanks to our volunteers!

Catherine Callaghan, Tom Rouleau, Randy Weiss, Linda Leehy, John Piechota, Sarah Brodeur, Ed Lopez, Tim & the Warren Con Comm, Keith Davies/coordinator.

Project Approach

Purpose

A 2003 Mass-EOEA comprehensive watershed assessment notes that "data gaps are most pronounced for certain ecological characteristics, including animal and habitat data, and water quality data. The latter is of particular concern since the quality of the water flowing through and out of the basin is often considered to be a reflection of its overall environmental condition or health. Water quality data is collected by a number of organizations and agencies in the Chicopee River basin, but not in a basin-wide coordinated way." C4RWC mission is to work towards a resolution to this deficiency.

The Chicopee River and its watershed offers many fine recreational and nature viewing opportunities. Unfortunately there is a lack of regular water quality data to determine if the river is consistently meeting the state's surface water quality standards (SWQS). Many years ago, the river struggled with point source pollution, such as sewage discharges, which in time have been largely dealt with. Recreational activities are related to either primary or secondary contact standards, which are closely tied to the bacterial condition of the waters. Bacterial data has been too sporadic to make clear/regular contact standard determinations. Having adequate bacteria data to make a clear determination would inform people whether water recreation is safe and healthy.

MassDEP-Division of Watershed Management, (DWM), samples the Chicopee River Watershed on a five-year rotating basin schedule. Very little sampling is done in between cycles. There is a need for more regular and consistent monitoring, a local group such as C4RWC can help to provide monitoring to fill this gap.

In order to provide a more adequate data set with which to determine whether standards are being attained, having ***more sites sampled at more regular intervals*****,** in season, offers the means to make a clear determination. Sampling at key access sites across the watershed, 6-8 times at each, during the prime contact months, May through September, should offer an adequate baseline. Funding may limit the ability to cover this broad range continually, so C4RWC will focus on key areas and target additional sites when possible.

An expanded data set will give a broad collection of locations and time periods, more wet/dry event information to review, and even a means to begin to consider source

issues. Additional new data will help C4RWC and MassDEP to make accurate water quality determinations for the Chicopee Basin.

Definitions: *(MassDEP)*

PRIMARY AND SECONDARY CONTACT RECREATIONAL USE (DEP)

The *Primary Contact Recreational Use* is supported when conditions are suitable (fecal coliform bacteria densities, turbidity and aesthetics meet the SWQS) for any recreational or other water related activity during which there is prolonged and intimate contact with the water and there exists a significant risk of ingestion. Activities include, but are not limited to, wading, swimming, diving, surfing and water skiing.

The *Secondary Contact Recreational Use* is supported when conditions are suitable for any recreational or other water use during which contact with the water is either incidental or accidental. These include, but are not limited to, fishing, boating and limited contact related to shoreline activities.

State limit for primary contact is 235 cfu/single date maximum and seasonal mean of 126 cfu. The secondary contact standard is 1240 cfu single day and 630 seasonal mean.

Stakeholders for this project include residents, visitors to, and recreational users of the Chicopee 4Rivers Watershed; municipalities, and state, regional and federal environmental agencies. The data produced in this study will be shared with all stakeholders, to aid them in making personal decisions on safe use of the river for recreational purposes; understanding causes and effects of weather, land use and other human activities on water quality; and developing management strategies for preservation/restoration of watershed health. All data that are reported will be compared with Massachusetts surface water quality standards.

Objectives:

Since key access sites across the basin have not been extensively nor annually monitored by MassDEP for bacteria loading, this project is meant to complement MassDEP's limited monitoring program by conducting bacteria sampling on waters not monitored by MassDEP in order to facilitate the ability to make water quality standard attainment determinations for primary and/or secondary contact on a regular annual basis.

This monitoring program is intended to:

- Advance improvement of the water quality of rivers and streams in the Chicopee 4Rivers Watershed that may be impaired due to bacterial contamination. Steps towards achieving this goal may entail locating sources of bacteria contamination within targeted sub-watersheds and recommending appropriate action to initiate remediation.
- Contribute to ongoing and future assessments of whether bacterial contamination impairs the river's ability to support primary and secondary contact recreation.
- Convey this information to local, state and federal agencies and to river users through 'rapid response' analysis and communication. 24 hour turnaround of sampling results enables quick public notice.

Methods

C4RWC's volunteer guide notes the procedures, reasonings, and details of the monitoring processes. How we conducted 2015 worked out as follows.

Once adequate funding was secured, C4RWC began to assemble needed equipment and select a qualified lab. Sampling kits were assembled for each volunteer and each site. Coolers and ice pack sets were acquired. A sampling pole, 42 inches long with a spring clamp attached to one end, was fabricated for each volunteer. This pole enabled the sampler to reach out into the current and grab a sample from a deeper point in the stream and lessen edge effects.

Each volunteer received training in sample collection, data form completion, appropriate sample care (keeping sample cold), hold time requirements, label completion, safety concerns/requirements, Quality Control (QC) requirements, and sample delivery logistics. Volunteers followed a preset sampling schedule and were reminded of sampling events 3-4 days ahead of time and regularly resupplied with sample bottles and forms if needed. Sampling was done, rain or shine, considering safety, and fortunately no events were cancelled.

Collection was done via a "grab" type sampling procedure using a sampling pole. Samples were collected in 100 ml sterile bottles prepared with thiosulfate – as a precaution against chlorine that could be present in the water sampled below a water treatment plant and which would affect sampling results. Bottles were labeled with date and time of collection and put on ice in a cooler immediately after collection. Volunteers also completed a field sheet and internal C4RWC Chain of Custody (CoC). Samples were then brought to a central meeting place where a C4RWC runner collected all samples into a single iced cooler and transported all samples to the lab for analysis. Once there, samples were checked in and temperature and time recorded. Samples were analyzed for bacteria using a Colilert system.

Typically only 24 hours elapsed until the lab report was issued. Data was then posted on line (www.ConnecticutRiver.us) through a partnership with CRWC and PVPC, then tabulated by event date and site.

River and air Temperature was sampled using a conventional non-mercury spirit type thermometer which was placed in the flow and permitted to equilibrate for two minutes before reading. Temperatures were recorded on a field sheet with other site observations.

Meanwhile, the project coordinator had downloaded weather/rain data from NOAA/NWS for sites at both the Westover and Worcester airports for both the 24 and 48 hours previous to the sampling event. These airports are closest to our monitoring sites. Rainfall was recorded and tabulated for analysis. Wet weather can elevate bacteria, so viewing this data is important. River flows were also downloaded from available USGS stations.

With all this information collected and tabulated, we are able to review the rivers' contact standards.

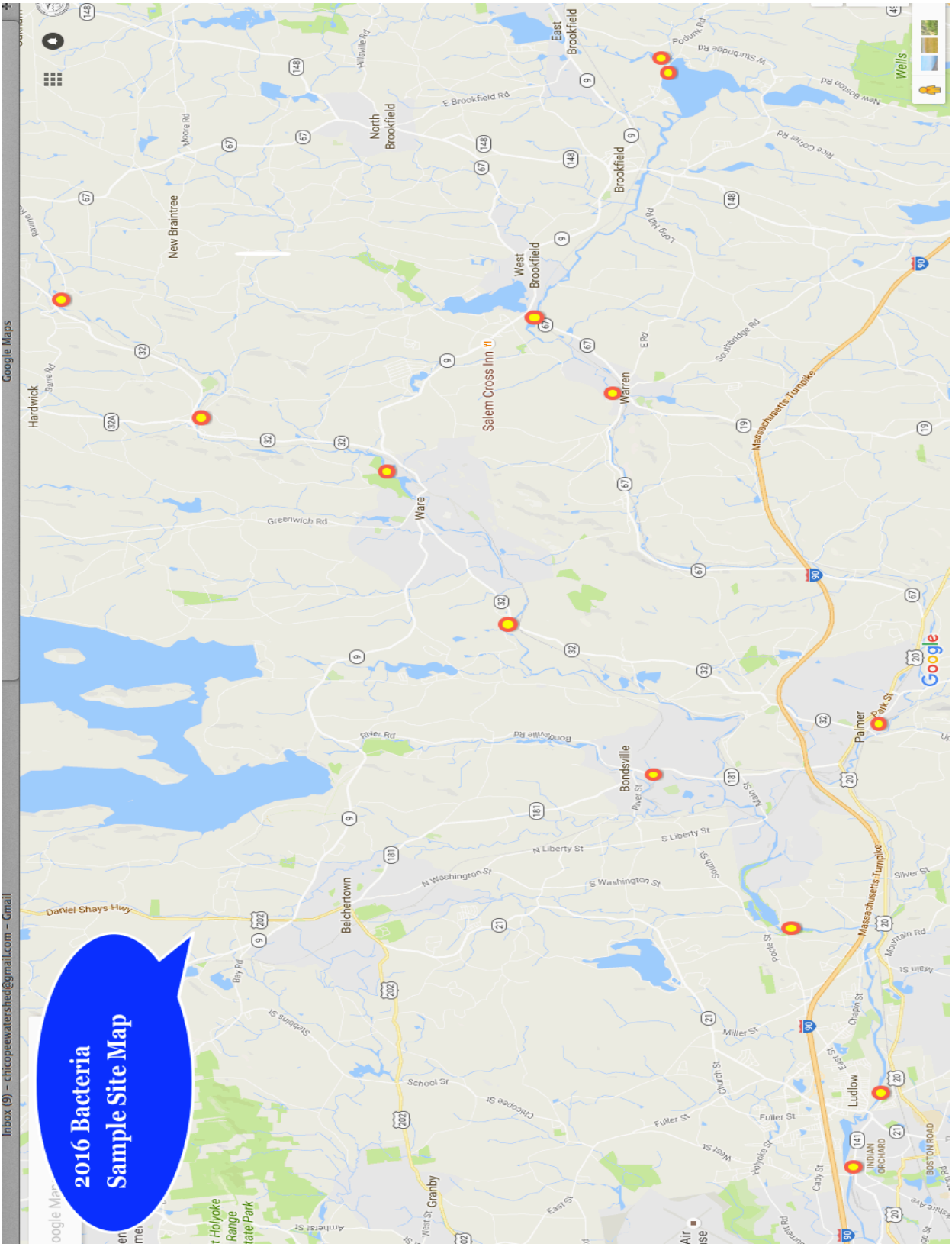
2016 Monitoring sites

The sites selected for monitoring have been chosen with the following factors in mind: geographic representation in reaches of recreational activity and ease of access.

Table 1: 2016 Sampling Sites

Site Name	Site ID	Location	Latitude	Longitude
Chicopee-Indian Orchard access	CIO1	Water St, Springfield	42.161	-72.50118
Chicopee-Putts Bridge access	CPB1	River Rd, Wilbraham	42.153	-72.4102
Chicopee-lower Red Bridge access	CRB1	Red Bridge Rd Wilbraham	42.17448	-72.4102
Quaboag Pond access	CQPd1	Quaboag St, Brookfield	42.20338	-72.0628
Quaboag-EBR	CQEBR1	Shore Rd, E Broofield (East Brookfield River)	42.2030	-72.0603
Quaboag Rt 67/9 access	CQ67-9	Rt 67 near Rt 9 W Brookfield	42.23485	-72.16203
Quaboag – Lucy Stone Park	CQLSP1	Lucy Stone Park, Old West Brookfield Rd, Warren	42.21743	-72.1841
Quaboag Water st-Palmer	CQWP1	Water St off Bridge St, Palmer	42.154689	-72.33146
Swift R – First Street access	CSFS1	First St cul-de-sac, Bondsville	42.209	-72.3495
Ware R – Old Furnace	CWOF1	Rt 32 where Lower Rd/Barre Rd/Hardwick Rd	42.34368	-72.15768
Ware R – New Furnace	CWNF1	Rt 32 just above river crossing in Gilbertville	42.31168	-72.20673
Ware R – Grenville Park	CWGP1	Off Church St in Ware	42.26672	-72.22755
Ware R – Gibbs Crossing	CWGC1	Rt 32/Old Belchertown Rd, Ware	42.23898	-72.28585

Sites Map


2016 Bacteria
Sample Site Map
Google Maps
Inbox (9) - chicopeewatershed@gmail.com - Gmail
Hardwick
New Braintree
North Brookfield
East Brookfield
Brookfield
West Brookfield
Salem Cross Inn
Warren
Ware
Bondsville
Palmer
Belchertown
Ludlow
Wells
Massachusetts Turnpike
Daniel Shays Hwy
Greenwich Rd
River Rd
N Liberty St
S Liberty St
N Washington St
S Washington St
School St
Miller St
Fuller St
Park St
Main St
Mountain Rd
Silver St
Google

Results

Bacteria

The table below notes the bacteria levels for the 2016 sampling season. A discussion and interpretation of these results is presented in the Conclusions section.

C4RWC 2016 Bacteria Sampling Results summary

		Bacteria Counts						Geometric Mean count
Site Name	**ID#**	**Date** 30-Jun	**Date** 14-Jul	**Date** 28-Jul	**Date** 11-Aug	**Date** 25-Aug	**Date** 8-Sep	
Quaboag EBR	CQEBR1	16.10	42.80	24.30	22.80	25.90	30.10	25.84
Quaboag Pond access	CQPd1	1	25.6	13.4	9.8	32.7	27.5	12.02
Quaboag 67/9 access	CQ67-9	770.1	2420	1986.3	1732.9	980.4	980.4	1354.14
Quaboag-Lucy Stone Park	CQLSP1	44.1	101.7	22.3	57.3	46.4	37.9	46.48
Quaboag Water St/Palmer	CQWP1	238.2	325.5	547.5	517.2	325.5	344.8	367.52
Swift - First St	CSFS1	18.3	67	35.5	74.9	29.2	24.6	36.44
Ware - Old Furnace	CWOF1	579.4	290.9	178.9	154.1	517.2	298.7	299.23
Ware - New Furnace	CWNF1	325.5	69.7	59.1	115.3	110.6	83.6	106.14
Ware - Grenville Park	CWGP1	45	21.8	18.7	4.1	14.8	2	11.43
Ware - Gibbs Crossing	CWGC1	44.8	344.8	48.7	151.5	81.3	1732.9	158.83*
Chicopee Red Bridge lower access	CRB1	31.3	30.9	74.4	52	33.6	52.1	43.26
Chicopee Putts Bridge access	CPB1	39.9	38.9	29.5	18.1	34.1	38.8	32.11
Chicopee Indian Orchard access	CIO1	27.2	11	16	35.5	27.9	14.4	20.22

Weather

Weather was recorded from the Westover and Worcester Airports for the 24 & 48 hour periods prior to the sampling event. During these time periods, streams are most greatly affected by stormwater runoff, which can illustrate runoff's impacts on water quality.

C4RWC 2016 Bacteria Sampling Resuts summary

	Rain Data					
Site Name	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**
	30-Jun	14-Jul	28-Jul	11-Aug	25-Aug	8-Sep
Westover 24/48	0/0.01	0.01/0	0/0	0.14/0	0/0	0.01/0
Worcester 24/48	NA	0/0	NA	0.36/0	0/0	NA
Determination	**DRY**	**DRY**	**DRY**	**WET**	**DRY**	**DRY**

rain in past 24 and 48 hours
if > 0.25 in 48 hr = wet weather
OR
if > 0.10 in past 24 hr = wet weather

It was a dry summer, river flows were very low.

Field sheets

Field sheets were used by volunteers to record any observations about water color or odor as well as water temperatures.

Odor and color are somewhat subjective. By and large there were no notable odor or color observations reported, nor any on going observations of concern. Color was often clear or a slight tea tint was noted. Occasionally a musty odor was observed, no significant or troubling odors were reported.

Below are water temperatures as recorded by the volunteers.

Table: 2012 River Temperatures

C4RWC 2015 Bacteria Sampling Resuts summary

		River Temperatures F					
Site Name	**ID#**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**
		30-Jun	14-Jul	28-Jul	11-Aug	25-Aug	8-Sep
Quaboag EBR	CQEBR1	76	75	78	75	72	na
Quaboag Pond access	CQPd1	77	75	80	78	75	na
Quaboag 67/9 access	CQ67-9	75.5	77.5	76	76	76	72
Quaboag-Lucy Stone Park	CQLSP1	76	78	78	78	75	73
Quaboag Water St/Palmer	CQWP1	66	78	74	74	71	72
Swift - First St	CSFS1	60	67	66	66	65	70
Ware - Old Furnace	CWOF1	73	71	75	74	70	69
Ware - New Furnace	CWNF1	74	75	75	75	71	70
Ware - Grenville Park	CWGP1	72	75	77	74	75	na
Ware - Gibbs Crossing	CWGC1	73	76.5	75.5	74	73	71
Chicopee Red Bridge lower access	CRB1	70	73	75	73	71	69
Chicopee Putts Bridge access	CPB1	71	na	75	73	74	71
Chicopee Indian Orchard access	CIO1	73	na	78	75	77	73

Source Tracking (ST)

A problem area was identified at the 67/9 sampling site, CQ67-9. C4R undertook a series of "bracketing" samples to narrow the possible source area of high bacteria readings. This process entails studying the area near a high bacteria hit site. The 67/9 access area had consistently high bacteria, well beyond acceptable limits. C4R reviewed the area and chose to sample a few upstream sites and the inflow from Lake Wickaboag. The map below shows these sites and the table shows the dates and results of the supplemental sampling.

Source Tracking Site Map

river flows right to left…

ST Sample Data

Source Track Sampling 2016 Site Name	ID	Date	count	main site
Lake Wickaboag outlet	CLWO1	28-Jul	88.4	1986.3
RR track bridge	CQRR1	28-Jul	19.5	1986.3
67 upstream	CQ67u	11-Aug	10.9	1732.9
67 downstream/WB water wells	CQ67d	11-Aug	360.9	1732.9
67 bridge in	CQ67Bi	25-Aug	18.7	980.4

The 67/9 rest area seems to be the HOT spot. Bacteria levels are not good for recreational uses.

This area had the highest readings last season as well, though lower. It is unclear if the much lower river flows this year made a problem more apparent, less flow would not mask a problem as higher flows would. Could there be groundwater-leachate inflows or an illicit pipe? Both the town board of health and MassDEP were advised of this data, follow up is strongly recommended to solve this issue.

Training:

All volunteers received training in sampling, sample handling, recording, labeling, and safety procedures.

Sample Handling/Hold Times:

All samples were transported on ice packs, in coolers, and were received amply chilled. All samples were delivered to the lab within the six hour maximum hold-time limit. A few samples were delivered so soon that they had little time to chill. There were a few writing legibility issues in noting sample IDs on forms and these were successfully sorted out.

All source tracking sampling was collected by the lead coordinator using consistent collection techniques.

Observations/Discussion

(10) of the (13) sites met primary contact standards for the season, (Gibbs Crossing had just 1 high reading) two met the secondary standard and (1) failed to meet standard. Most all were good for boating/paddling/fishing.

Values for the primary contact sites were low, a good indication of a healthy river. The two secondary sites (CQWP1, CWOF1) were not too high, at least from a point of serious concern, but it may be warranted to investigate upriver conditions to see if a source of the higher bacteria can be determined. The one failed site should be investigated thoroughly.

The source track sampling for CQ67-9 seemed to pin point the area of concern right at the sample site. Upstream sites were good, Lake outlet was good, a site downstream was a bit high, which may show the bacteria attenuating as it moved downstream. Both the Town of West Brookfield's board of health and MassDEP were alerted to this, C4R will follow up to see that it is further investigated.

The Indian Orchard site had good results. There is a partial CSO nearby which could spill sewage into the river at high rain events (which was not seen this summer). Continued sampling at CIO1 is strongly recommended.

Most river temperatures were in the mid 70s during July/August, a couple degrees warmer than last year, and began to cool slightly in September. The Swift River site is strongly influenced by the bottom draw off of flow from the Quabbin release, thus it is noticeably cooler.

General river observations did not present any particularly startling notes. Algae was seen at a site or two, which could indicate a nutrient rich condition. More detailed observations could inform the need for nutrient sampling.

Recommendations

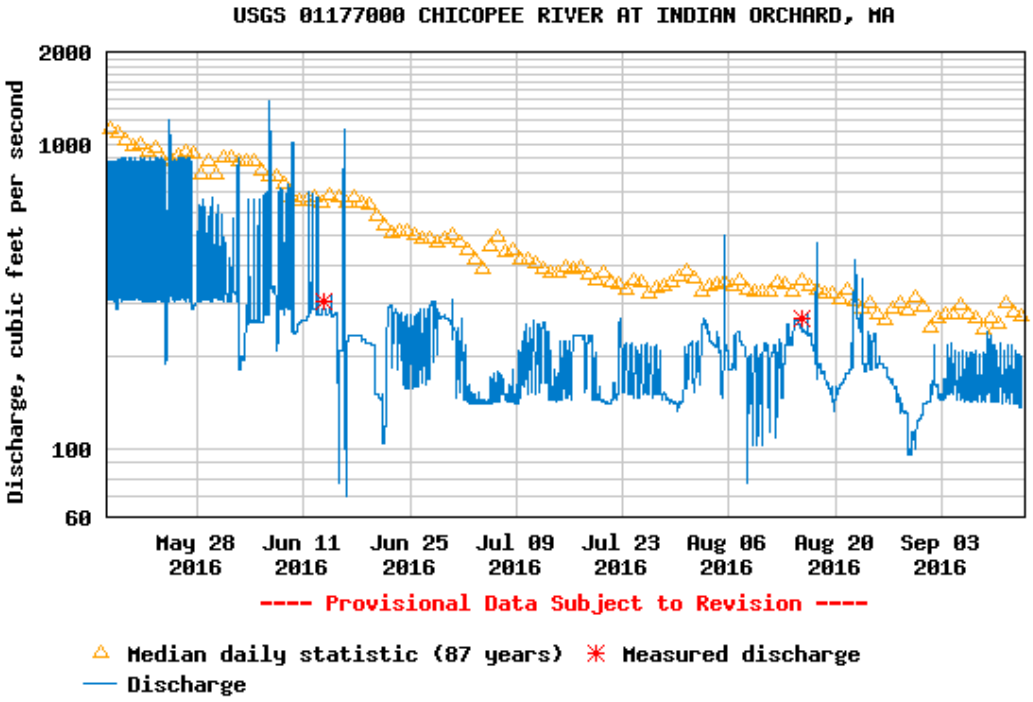
C4RWC should continue sampling at noted sites to build a data baseline. Additional sites could be added at other river sites (new Blue Trails) if funding is available to broaden the public's ability to be aware of overall watershed health. Reserve funds should also be marshaled to help strengthen the ability to investigate areas near sites of concern. Regular monitoring keeps the public informed and engaged.

Appendix
River Flows 2016

Chart for each of the 4 Rivers through the summer of 2016.
Small triangles show mean flow over 75+ years.
2016 flows well below normal.

Chicopee River

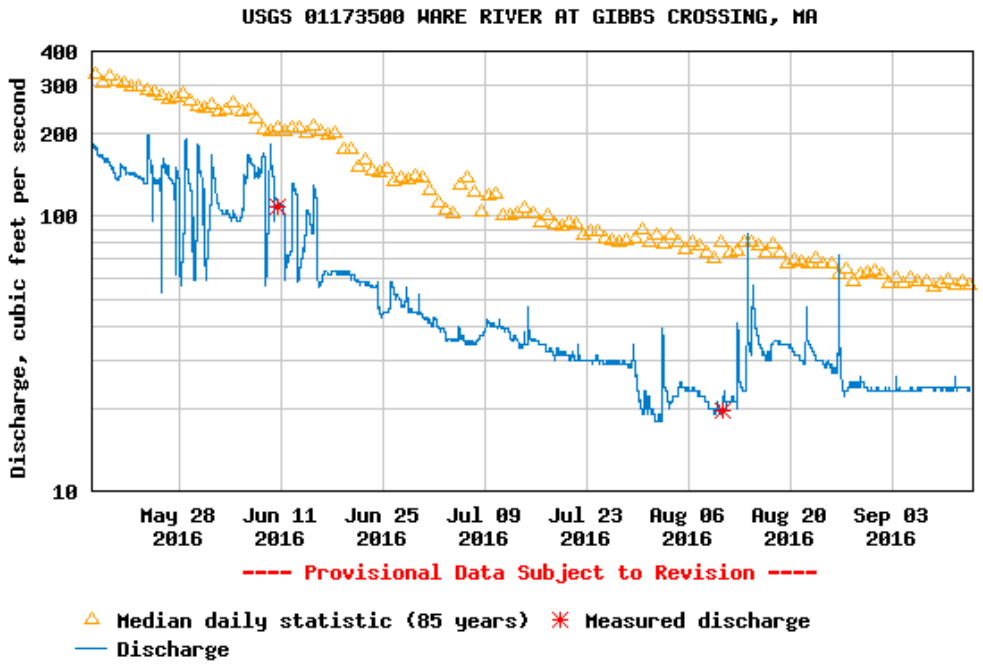
Chicopee River flow here is controlled by a small scale upstream hydro facility, thus the swings in flow.



Ware River

Discharge, cubic feet per second

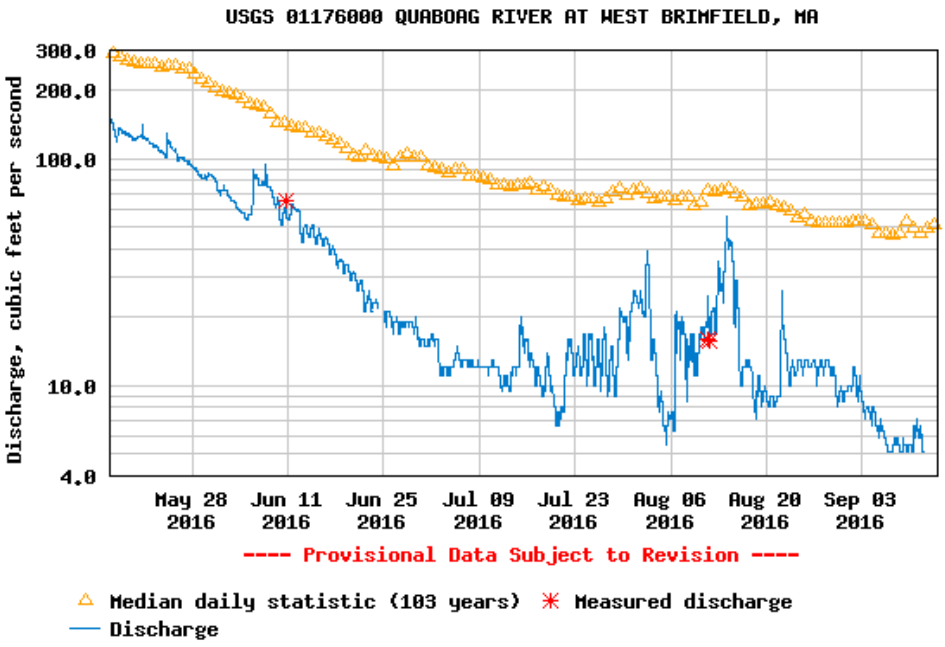
Most recent instantaneous value: 24 09-13-2016 13:30 EDT



Quaboag River

Discharge, cubic feet per second

Most recent instantaneous value: 5.1 09-11-2016 22:00 EDT



Swift River flow is controlled out of Quabbin Reservoir, so little change, nor a reflection of draught conditions seen on other rivers.

Discharge, cubic feet per second

Most recent instantaneous value: 119 09-13-2016 14:15 EDT