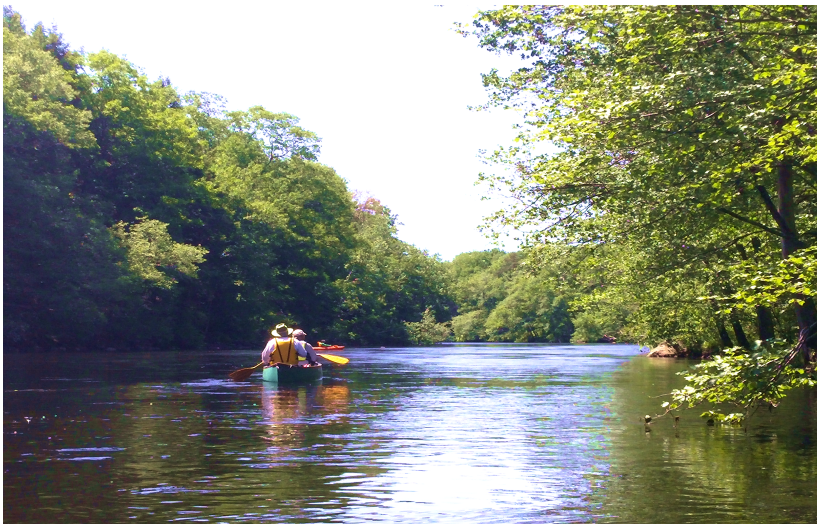
Chicopee = Ware + Swift + Quaboag

Chicopee 4Rivers Watershed Council
PO Box 126 Three Rivers, MA 01080

C4RWC Bacteria Monitoring Program

2019 Season Report



Monitoring for healthy rivers.

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

www.C4Rivers.org

Executive Summary

In 2019 the Chicopee 4Rivers Watershed Council (C4RWC) successfully conducted its fifth bacteria monitoring season. A group of dedicated volunteers executed this program by monitoring a total of fifteen (15) sites on the Swift, Ware, Quaboag and Chicopee rivers. Seven distinct sampling events were completed during the major recreational contact season. C4R was also able, through a DEP grant in partnership with CRC (Connecticut River Conservancy), to institute formal QC procedures to further confirm the quality of our sampling results.

C4R was able to maintain this program in 2019 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. Another component of this effort is Blue Trails: improved river access for exploration/recreation. Water-based recreational activities are determined to be appropriate based in part on the concentration of bacteria in the river or water body. A rivers general health can also relate to bacteria levels.

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 https://connecticutriver.us/content/sites-list through a partnership with CRC. The data collected was determined to be of reliable quality.

2019 year results indicate a river system with most segments suitable for a variety of recreation: though there are a few river segments that warrant further study as their use standard seem poorer than desired. Also rain events and storm run off that preceded samplings likely caused some of the high bacteria conditions recorded, limiting some recreational uses.

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. 2019 sampling saw a number of rain events, high river flows, which contributed to higher bacteria levels.

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, monitoring equipment/supplies and some technical services. C4RWC is grateful for support from:

- *Country Bank*
- *Palmer Conservation Commission,*
- *Warren Conservation Commission,*
- *Wilbraham Conservation Commission,*
- *Springfield Conservation Commission,*
- *Town of Ware Parks & Community Development,*
- *LWPA, (Lake Wickaboag)*
- *QQLA, (Quaboag & Quacumquasit Lakes)*
- *individual donors.*
- *CRC partnership on a DEP Grant*

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

Another key step was to find volunteer samplers. Outreach brought 16 people forward to help. All received training in proper sampling techniques, and bi-weekly sampling began on June 13, 2019 and ran through September 5th. In all we conducted seven sampling events at (15) sampling sites on the Ware, Swift, Quaboag and Chicopee Rivers – ALL 4 Rivers.

2019 also saw the introduction of QC measures. This comprised of following a QAPP that called for a blind duplicate sample to be collected at a random site each event. A duplicate is collected simultaneously with the base sample. Results should be statistically similar as an

illustration of acceptable quality. Two random blank samples were also sent to the lab as a quality check.

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

The 2019 sampling year was a strong success. Volunteer samplers did well and there were few complications. Reporting on line also worked well. This fifth 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, Sue Johnson, Rich Goodell, Carol Devine, Tim Simon, Tina Pike, Nicole Croteau, Rebekah DeCourcey, Randy Weiss, Don Taft, John Piechota, Angela Pannaccione, Dave Cotter, Nick Zeo, Tim O'Brien, Jim Emerson, 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 cfu 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 and 2019 QAPP note the procedures, reasonings, and details of the monitoring processes. These procedures have been used since 2015 and again in 2019 with new QC protocols.

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 CRC (CRWC), 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.

2019 Monitoring sites

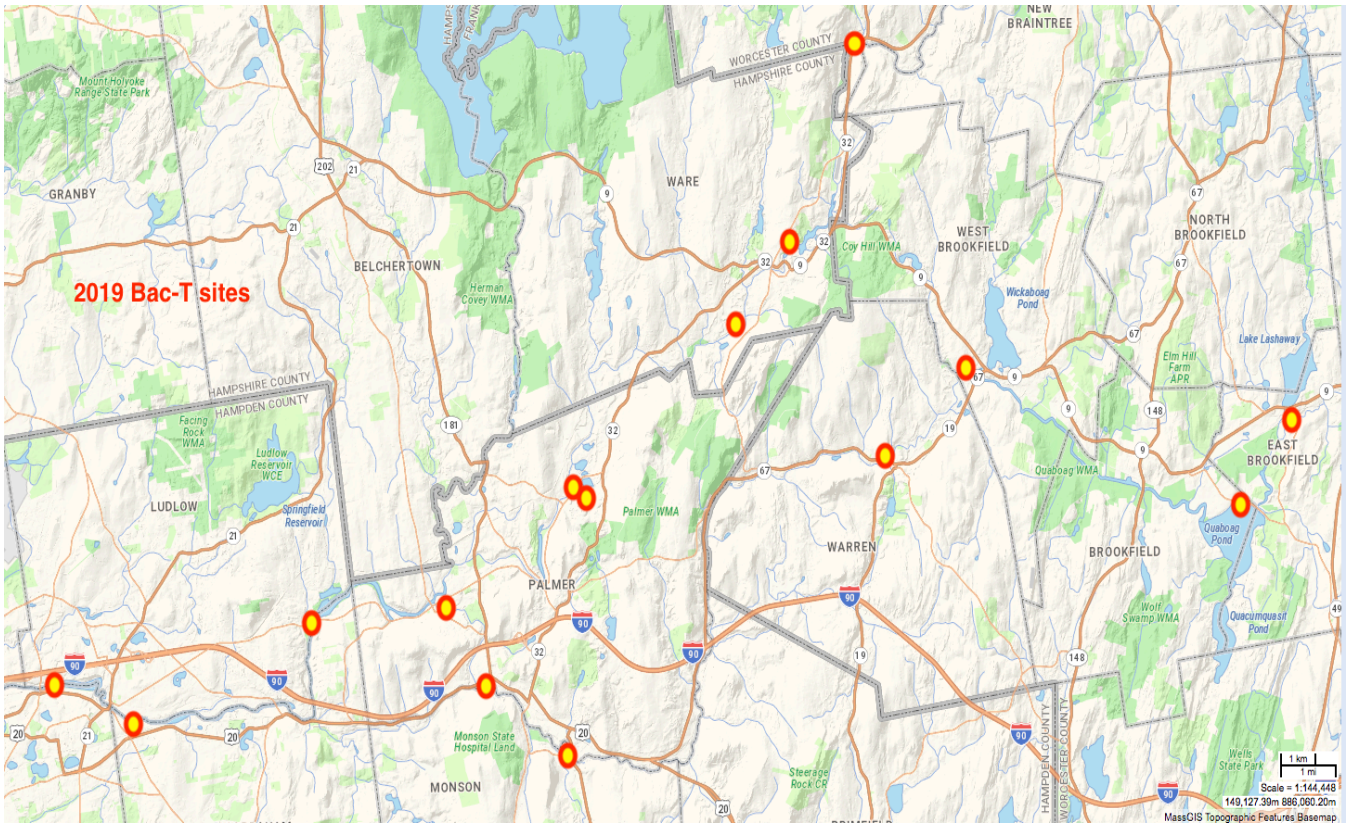
The sites selected for monitoring have been chosen with the following factors in mind: geographic representation in reaches of recreational activity and ease of access. Some sites were sampled to review standards for DEP in areas of concern (lower Quaboag).

Table 1: 2019 Sampling Sites

Site Name	Site ID	Location	Lat	Long	Notes
CHICOPEE					
Chicopee-Indian Orchard access	ClO1	Water St, Springfield	42.161	-72.5012	Partial CSO near sample site, paddling launch
Chicopee-Putts Bridge access	CPB1	River Rd, Wilbraham	42.153	-72.4102	Paddling launch
Chicopee-lower Red Bridge	CRB1	Red Bridge Rd Wilbraham-below	42.1745	-72.4102	Paddling launch
QUABOAG					
Stevens Rd-E Brookfield access	CQ7S1	At launch, below Bridge St bridge	42.2237	-72.0456	Paddling launch Below Spencer WWTP
Quaboag Pond access	CQPd1	Quaboag St, Brookfield	42.2034	-72.0628	Main Paddling launch
Quaboag Rt 67/9 access	CQ67-9	Rt 67 near Rt 9 W Brookfield	42.2348	-72.1620	Paddling launch, fishing
Quaboag – Lucy Stone Park	CQLSP1	Lucy Stone Park, West Brookfield Rd, Warren	42.2174	-72.1841	Paddling take out
Quaboag-Rt 32 crossing	CQ32-1	Below Rt 32 bridge	42.1445	-72.3145	Near driving range
Quaboag-Rt 20-Palmer	CQ20-1	Rt 20 in Palmer near where river closest to road	42.162	-72.346	Paddling area
Quaboag-Laviolette Field	CQLF1	In park, above confluence	42.1789	-72.362	mid way in pack, possible future take out
SWIFT					
Swift R – First Street access	CSFS1	First St cul-de-sac, Bondsville	42.209	-72.3495	Fishing area, paddling area
WARE					
Ware R – New Furnace	CWNF1	Rt 32 @ river crossing in Gilbertville	42.3117	-72.2067	Paddling launch
Ware R – Grenville Park	CWGP1	Off Church St in Ware in park @ launch	42.2667	-72.2275	Boating, paddling, fishing area
Ware-Banas Farm-Robbins Rd	CWBF1	Below WWTP, old farm site along river	42.2442	-72.2544	Paddling launch
Ware-Bennett St access	CWB1	Old bridge abutment	42.2084	-72.3148	Paddling launch

The three lower Quaboag sites (Rt 32, Rt 20, Laviolette) were sampled to review concerns that this stretch has been noted for poor bacteria levels in past DEP samplings. It was determined to study this stretch to see if any particular identifiers might emerge to pinpoint an area of concern.

2019 Sampling Sites Map



Results

Bacteria

The table below notes the bacteria levels for the 2019 sampling season. A discussion and interpretation of these results is presented in the Conclusions section.

2019 Bacteria

Site Name	ID#	Bacteria Counts Date 6/13	Date 6/27	Date 7/11	Date 7/25	Date 8/8	Date 8/22	Date 9/5	Geo Mean	Use Note
Quaboag										
Steven Rd -7 Mile River	CQ7S1	178.9	214.3	150.0	218.7	2420.0	307.6	159.7	284.14	secondary
Quaboag Pond access	CQPd1	7.5	2	6.3		137.4	8.6	53	13.45	primary
Quaboag 67/9 access	CQ67-9	31.3	35.9	25.9	54.6	86.2	22.8	172.2	47.40	primary
Quaboag-Lucy Stone Park	CQLSP1	66.3	83.9	95.9	108.1	119.1	74.4	68.9	86.15	primary
Quaboag-Rt32 crossing	CQ32-1	88.2	629.4	228.2	236.2	1119.9	344.8	154.1	291.32	secondary
Quaboag-Rt 20 crossing	CQ20-1	344.8	476.6	307.6	325.5	1119.9	1203.3	866.4	568.58	secondary
Quaboag-Laviolette Field	CQLF1	224.7	1046.2	261.3	435.2	1986.3	727.0	579.4	581.07	secondary
Swift - First St	CSFS1	26.6		71.7	25.6	98.5	33.6	25.9	40.14	primary
Ware										
Ware - New Furnace	CWNF1	96	290.9	139.6	328.2	2420	214.3	387.3	307.00	secondary
Ware - Grenville Park	CWGP1	72.3	770.1	55.7	117.8	360.9	24.9	75.4	113.82	primary
Ware - Banas Farm	CWBF1	77.1	410.6	80.9	143.9	240	146.7	218.7	161.28	secondary
Ware - Bennett	CWB1	59.1	387.7	41	133.3	1119.9	148.3	235.9	174.40	secondary
Forest Lake beach	CWFL1	4.1	58.6	4.1	11	11	8.5	2	7.96	primary
Chicopee										
Chicopee Red Bridge	CRB1	48	98.7	37.3	235.9	78.5	93.3	150	89.44	primary
Chicopee Putts Bridge	CPB1	14.8	39.5	38.4	160.7	648.8	517.2	56.3	94.67	primary
Chicopee Indian Orchard	CIO1	25.9	105	12.1	142.1	461.1	110.6	41.7	71.91	primary
Exceeds primary limit										
Weather Determination		dry	wet	dry	dry	wet	wet	wet		

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 cfu seasonal mean.

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 2019 Bacteria Sampling Resuts summary							
Rain Data	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**
	6/13	**6/27**	**7/11**	**7/25**	**8/8**	**8/22**	**9/5**
Rain Data within 24 hr	**0"**	**0"**	**0"**	**0"**	**0.54"**	**0.5"**	**0.22"**
Within 48 hr	**<0.25**	**0.5"**	**0"**	**<0.25**			
Determination	**dry**	**wet**	**dry**	**dry**	**wet**	**wet**	**wet**

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

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 or dramatic 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 conditions were reported. The table below notes water temperatures as recorded by volunteers. 2019 stream temperatures seem a bit lower than 2018 values and similar to 2017 values.

Table: 2018 River Temperatures - F

2019 Stream Temperatures				Deg F				
Site Name	ID#	Date 6/13	Date 6/27	Date 7/11	Date 7/25	Date 8/8	Date 8/22	Date 9/5
Steven Rd -7 Mile River	CQ7S1	62.0	68.0	72.0	64.0	69.0	69.0	64.0
Quaboag Pond access	CQPd1	70	76	80		77	77	
Quaboag 67/9 access	CQ67-9	69	73	76.5	72	75	75	
Quaboag-Lucy Stone Park	CQLSP1	67	73	74	72	73	72	63
Quaboag-Rt32 crossing	CQ32-1		67.0	68.0	57.0	70.0	68.0	60.0
Quaboag-Rt 20 crossing	CQ20-1	62.0	71.0	71.0	68.0	71.0	70.0	65.0
Quaboag-Laviolette Field	CQLF1	64.0	72.0	74.0	69.0	71.0	70.0	65.0
Swift - First St	CSFS1	58		74	65	66	65	58
Ware - New Furnace	CWNF1	63		71	68	70	71	65
Ware - Grenville Park	CWGP1	65	70	75	69	75	75	67
Ware - Banas Farm	CWBF1	68	64	63				
Ware - Bennett	CWB1	68	70	75	70	75		68
Forest Lake beach	CWFL1	71	74	74	78	76	76	64
Chicopee Red Bridge	CRB1	66	70	72	69	72	73	66
Chicopee Putts Bridge	CPB1	65	70	74		73	73	65
Chicopee Indian Orchard	CIO1	67	71	76	72	74	75	67

Darker shaded data uncertain.

Source Tracking (ST)

There was no source tracking performed in 2019.

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.

Quality Control:

Field Duplicate analysis indicates that our sampling work by volunteers was acceptable. FD Values for each event fell within goals (<30% RPD-log10) as noted in QAPP. Blanks all came in at acceptable levels (<1) as well. C4R planned 120 samples and 118 were collected, a 98% completion ratio. C4R QC officer made visits to volunteers to observe collection techniques.

Observations/Discussion

2019 started as a wet year and saw lower precipitation later in the season. Rainfall was high in the spring and tapered off by August. River temperatures were lower than 2018 by a degree or two at most sites. There were 3 Dry events and 4 wet events as dictated by precipitation amounts and determination criteria within 24/48 hours of sampling. Run off from rainfall can effect bacteria levels.

(9) of the (15) sites met primary contact standards for the season, the Ware River and lower Quaboag sites were mostly secondary contact. All sites though were good for boating/paddling/fishing.

Chicopee River Sites:

The 3 Chicopee River sites all had good results and had a seasonal mean that met a Primary water quality standard. The Putts Bridge site improved from high 2018 readings, perhaps a fluke seasonal condition in 2018? C4R will continue to monitor these sites.

Quaboag River Sites:

The Quaboag River sites can be best divided into 2 segments: the upper through the Brookfields, and the lower in Palmer/Monson/Palmer.

2019 was the first year that the Seven Mile River access in East Brookfield was sampled. It tested a bit high (for Primary use) all season and higher in wet events. It met secondary use standards. C4R feels more data from continued sampling here will help to guide better interpretation of the water quality conditions here and what further upstream sampling may be needed.

The longer term upper Quaboag River sites all met a Primary use mean. This has often been the case in this area, but the 67/9 site had a poor year in 2016, but the past few have been good. This section is a prime recreational area.

The lower Quaboag River sites present a more complicated set of data. A number of years ago, C4R sampled at Water St (2015 & 16), which was found to be a Secondary use area. In 2019, C4R broadened our sampling in this stretch of river to investigate conditions further. Results of the wider stretch of river, still reveal a poor Secondary rating. The site above Water St was better than the 2 sites below by a good margin. MaDEP had flagged this stretch for further investigation. If grant funding is made available, C4R will work to see what further investigation can be done to see if a particular water quality stressor can be isolated.

Swift River Site:

First St on the Swift continues to meet a Primary use standard, well within the limit. C4R will likely look to create a Blue Trail on the Swift, so sites above and below First St will hopefully be funded and added to our program in the future.

Ware River Sites:

Ware River sites have often been found to be in the low Secondary use standard mean, occasionally Primary, usually Grenville Park. 2019 results show this again. In 2019, we resumed sampling in Gilbertville, and as before this area was a bit high. It is C4R's understanding that there may be WWTP issues in the area as noted in a news report about EPA concerns. We are unsure if this is a cause, broader sampling would be needed to look into this more carefully. Most sites through Ware and into Palmer are just above the Primary use standard. Forest Lake beach was quite good, well within the Primary standard.

Hopefully, funding and volunteer support will help C4R conduct a broader sampling effort in Gilbertville and further upstream on the Ware River.

General river observations did not present any particularly startling notes.

Recommendations

C4RWC should continue sampling at noted sites to continue to build a data baseline and maintain awareness of river health for river users.

Sampling at sites in Hardwick and perhaps South Barre, upstream of Gilbertville along the Ware River should be sampled, if funding and volunteers are provided. A wider profile of the segment could perhaps isolate a given water quality stressor.

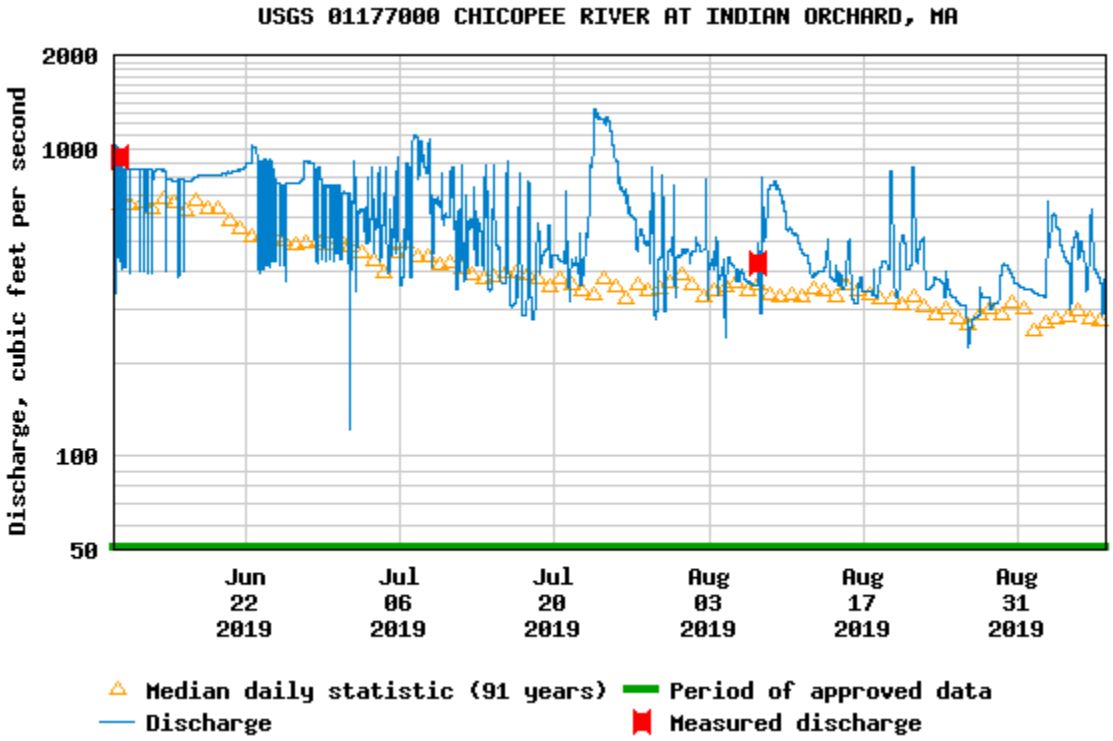
Again, if funded, sites along the lower Quaboag River should be sampled and perhaps a carefully targeted placement of sites can be developed to see why this segment has its poorer Secondary rating.

Reserve funds should be marshaled to help strengthen the ability to investigate areas near sites of concern, ie: source tracking. Regular monitoring keeps the public informed and engaged.

Appendix
River Flows 2019

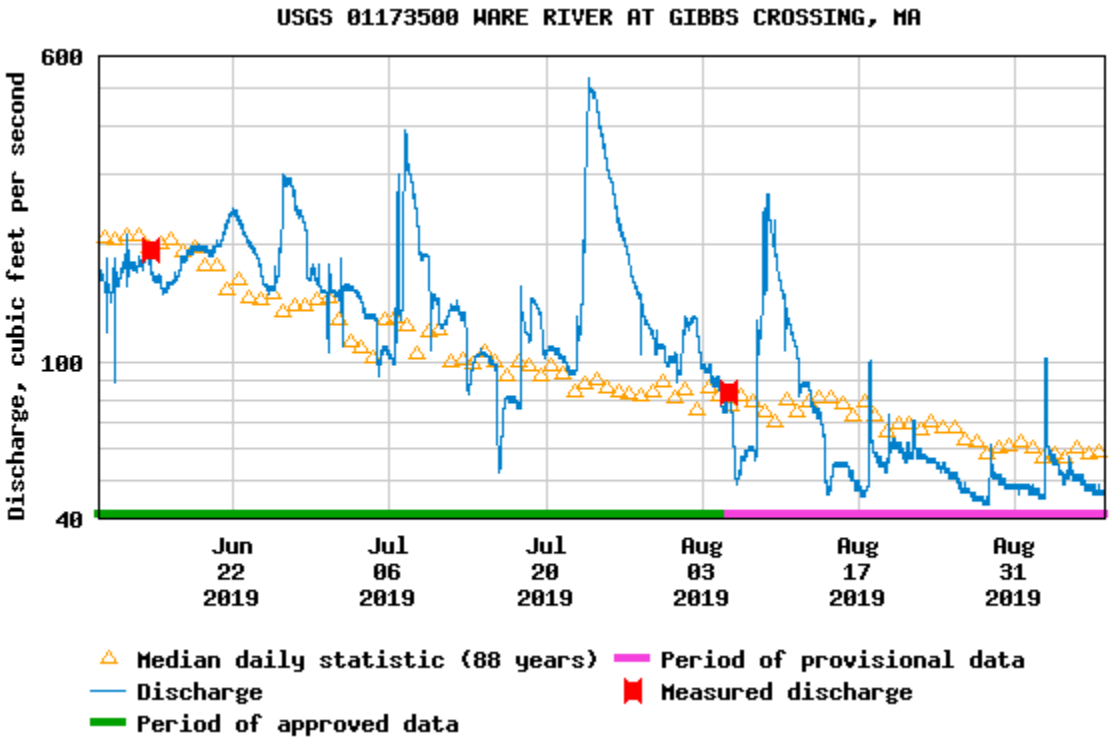
Charts for each of the 4 Rivers through the summer of 2019.
Small triangles show median flow over 75+ years.
2019 flows were above the median.

Chicopee River

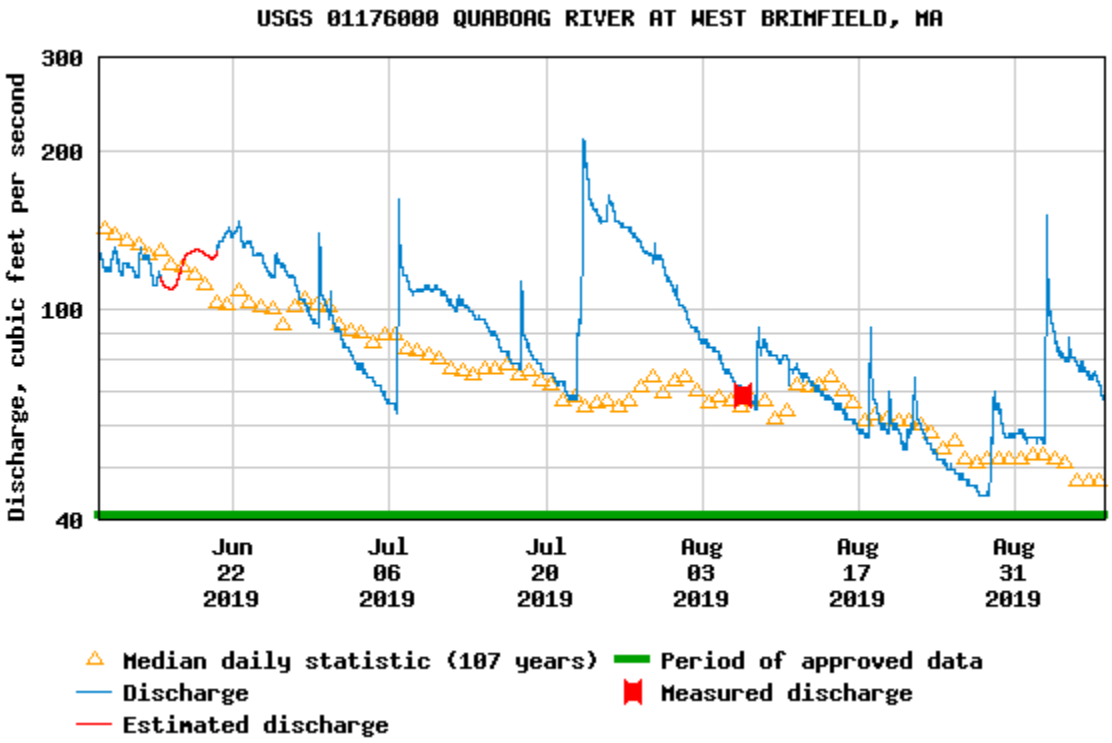


Chicopee River flow here is controlled by a small scale upstream hydro facility, thus the swings in flow. Best to interpret by looking at the mid range of the swing.

Ware River



Quaboag River



Swift River flow is controlled out of Quabbin Reservoir, but it was a very wet spring and the reservoir spilled over at very high levels till July, thus the Swift ran at high levels (as high as 1500 cfs!). After mid July, normal release flows returned so little natural variation.