

4 Rivers

C4RWC Bacteria Monitoring Program

2015 Report: Chicopee & Quaboag Rivers



Monitoring for healthy rivers.

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

Executive Summary

In 2015 the Chicopee 4Rivers Watershed Council (C4RWC) successfully conducted its first bacteria monitoring season. A group of dedicated volunteers executed this program by monitoring a total of six sites on the Quaboag and Chicopee rivers. Five distinct sampling events were completed during the major recreational contact season.

This program marks the start of what is hoped will be an ongoing program. This sampling is 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 and PVPC. The data collected was determined to be of reliable quality and consistent with state standards for water quality monitoring.

First-year results indicate a generally healthy river system for a variety of types of recreation: though two sites seemed a bit higher than others and may warrant closer monitoring. Typically the one concern is with limiting primary contact after a heavy rainstorm; a typical finding in many watersheds. 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. 2015 sampling saw few rain events, so this situation did not present itself as clearly.

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. 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 6 people forward to help. All received training in proper sampling techniques, and bi-weekly sampling began on July 23, 2015 and ran through September 17th. In all we conducted five sampling events at six (6) sampling sites on the Quaboag and Chicopee 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 2015 sampling year was a strong success. Volunteer samplers did well and there were few complications. Reporting on line also worked well. This 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 Callahan, Tom Rouleau, Randy Weiss, Jim Emerson, Bailey Swan, Angela Pannaccione, 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.

Temperature was sampled using a conventional non-mercury stick 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.

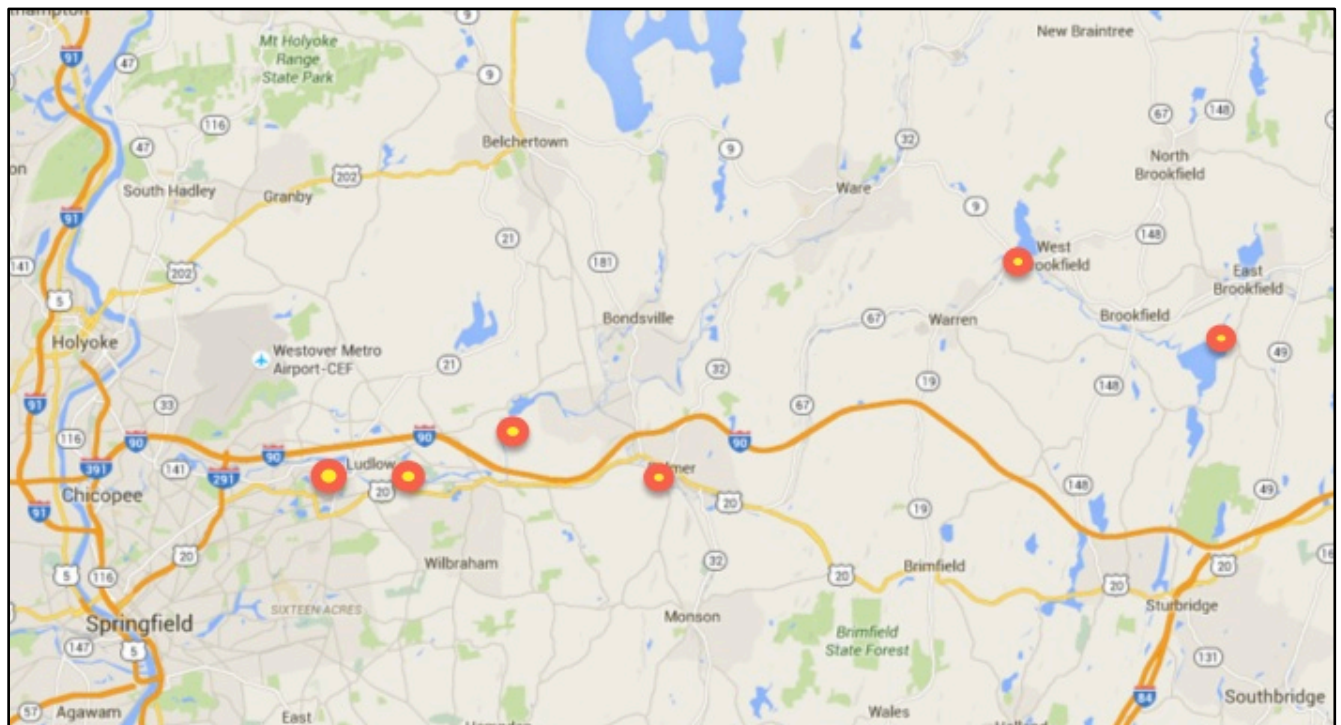
2015 Monitoring sites

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: 2015 Sampling Sites

Site Name/ID#	Location	Latitude	Longitude	Site ID	Notes
Chicopee-Indian Orchard access	Water St, Springfield	42.161	-72.50118	CIO1	Partial CSO nearby sample right
Chicopee-Putts Bridge access	River Rd, Wilbraham	42.153	-72.4102	CPB1	
Chicopee-lower Red Bridge access	Red Bridge Rd Wilbraham	42.17448	-72.4102	CRB1	Sample at point
Quaboag Pond access	Shore Rd Brookfield	42.20338	-72.0628	CQPd1	
Quaboag Rt 67/9 access	Rt 67 near Rt 9 W Brookfield	42.23485	-72.16203	CQ67-9	Sample towards bridge
Quaboag Water st-Palmer	Water St off Bridge St, Palmer	42.154689	-72.33146	CQWP1	

Sites Map



Results

Bacteria

The table below notes the bacteria levels for the 2015 sampling season. A discussion and interpretation of these results is presented in the Conclusions section.

C4RWC 2015 Bacteria Sampling Results summary

Site Name	ID#	Bacteria Counts					Geometric Mean count
		Date	Date	Date	Date	Date	
		23-Jul	6-Aug	20-Aug	3-Sep	17-Sep	
Quaboag Pond access	CQPd1	1	1	18.3	5.2	12	4.09
Quaboag 67/9 access	CQ67-9	260.3	290.9	248.9	117.8	517.2	258.23
Quaboag Water St/Palmer	CQWP1	275.5	325.5	461.1	275.5	146.7	278.36
Chicopee Red Bridge lower access	CRB1	47.3	38.8	49.5	32.3	179.3	55.49
Chicopee Putts Bridge access	CPB1	23.1	21.3	18.1	18.5	37.9	22.86
Chicopee Indian Orchard access	CIO1	26.5	26.2	19.9	54.6	27.2	29.00

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 2015 Bacteria Sampling Results summary

Site Name	Rain Data				
	Date	Date	Date	Date	Date
	23-Jul	6-Aug	20-Aug	3-Sep	17-Sep
Westover 24/48	0/0	0/0.33	0/0	0/0	0/0
Worcester 24/48	0/0.01	0/0.31	0/0.28	0/0	0/0
Determination	DRY	WET	DRY	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

local station in
 brookfield dry

Field sheets

The table below summarizes general field “Aesthetic” observations noted during sampling events. Presented below are visual color and “nose” odor observations.

C 2015 Bacteria Sampling Results summary						
Field Sheets		Observations	color, odor, other			
Site Name	ID#	Date	Date	Date	Date	Date
		23-Jul	6-Aug	20-Aug	3-Sep	17-Sep
Quaboag Pond access	CQPd1	greenish/cloudy/ algae, pond odor	greenish, pond odor	clear/brownish, no odor	cloudy/brownish, no odor	clear, no odor
Quaboag 67/9 access	CQ67-9	clear, musty pond odor	clear, slight musty	slight tint, mild pond odor	clear, no odor	clear, no odor, loose grasses in water
Quaboag Water St/Palmer	CQWP1	clear, no odor	clear, no odor	clear, no odor, algae	clear, no odor	clear, no odor
Chicopee Red Bridge lower access	CRB1	clear, no odor	clear, no odor	slight tea, no odor	clear, no odor, algae	clera, slight musty
Chicopee Putts Bridge access	CPB1	light tea color, clear, no odor	clear, no odor	clear, no odor	clear, no odor	clear, no odor
Chicopee Indian Orchard access	CIO1	clear, no odor	clear, no odor	clear, no odor	clear, no odor	clear, no odor

Table: 2012 River Temperatures

C4RWC 2015 Bacteria Sampling Results summary						
Site Name	ID#	River Temperatures F				
		Date	Date	Date	Date	Date
		23-Jul	6-Aug	20-Aug	3-Sep	17-Sep
Quaboag Pond access	CQPd1	76	74	79	72	68
Quaboag 67/9 access	CQ67-9	75	74	79	75.5	68
Quaboag Water St/Palmer	CQWP1	74	68	73	68	63
Chicopee Red Bridge lower access	CRB1	72	64	67	60	54
Chicopee Putts Bridge access	CPB1	64	70	76	64	63
Chicopee Indian Orchard access	CIO1	70	74	76	70	64

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.

Conclusions/Discussion

Four of the six sites met primary contact standards for the season, two met the secondary standard (CQ67-9, CQWP1). All were good for boating/paddling.

Values for the primary contact sites were low, a good indication of a healthy river. The two secondary sites were not too high, at least from a point of concern, but it may be warranted to investigate upriver conditions to see if a source of the higher bacteria can be determined. A random sample collected 1 mile upstream of CQ67-9 was much lower. It could be due to natural effects such as wildlife concentrations. If human, then action could be taken to remedy the cause. CQWP1 may also warrant investigation.

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 low 70s during July/August and began to cool in September. The Red Bridge site is below a hydro power station and likely takes water from a lower water level, thus at a cooler river level.

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 and on other rivers (new Blue Trails) if funding is available to broaden the public's ability to be aware of overall watershed health. Reserve funds could also be marshaled to help with investigating areas near sites of concern. Regular monitoring keeps the public engaged.

