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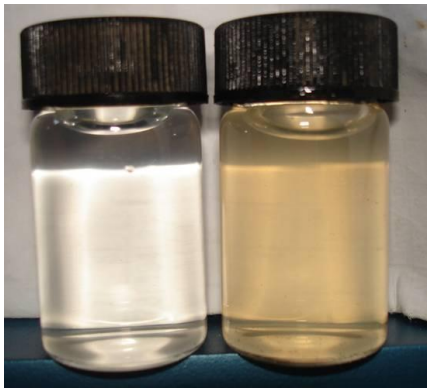
MRWC Bacteria Monitoring Program

2011Report: Millers & Otter Rivers



Monitoring for healthy rivers.

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1/17/12

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Table of Contents

Executive Summary

In 2011 the Millers River Watershed Council (MRWC) successfully conducted its first bacteria monitoring program. A group of nine volunteers and two staff executed this program by monitoring a total of nine sites on the Millers and Otter rivers. Seven distinct sampling events were completed during the major recreational contact season.

This new program was meant to address a lack of water quality data about bacteria concentrations in the rivers of the Millers Basin. Water-based recreational activities (and physical contact or exposure levels) are determined to be appropriate based on the concentration of bacteria in the river or water body. The Massachusetts Department of Environmental Protection (MassDEP) has developed guidelines for making such determinations.

By conducting an annual program of volunteer monitoring, MRWC aims to provide watershed residents and visitors with practical information concerning the safety of using and enjoying the rivers. The data collected was determined to be of reliable quality and consistent with all state standards for water quality monitoring.

First-year results indicate a generally healthy river for all types of recreation: the main concern is with limiting primary contact after a rainstorm--a typical finding in most watersheds. Especially in areas located downstream of urban centers, which collect greater amounts of stormwater runoff, it is not unusual for bacterial concentrations to run high. More rural stretches of river were generally appropriate for all recreational water uses in any weather.

The success of this initial monitoring year illustrates the value and importance of volunteer activities to protecting public health. As MRWC expands 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.

Copies of this report can be found at www.millerswatershed.org

Introduction

After initiating plans in fall 2010 for a series of recreational "Blue Trails" within the watershed, MRWC determined that it would be beneficial to design a "complimentary" bacteria monitoring program. This program would serve 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. With the development of "Blue Trails" it was particularly important to determine if the trail segments met the MassDEP water quality contact standards.

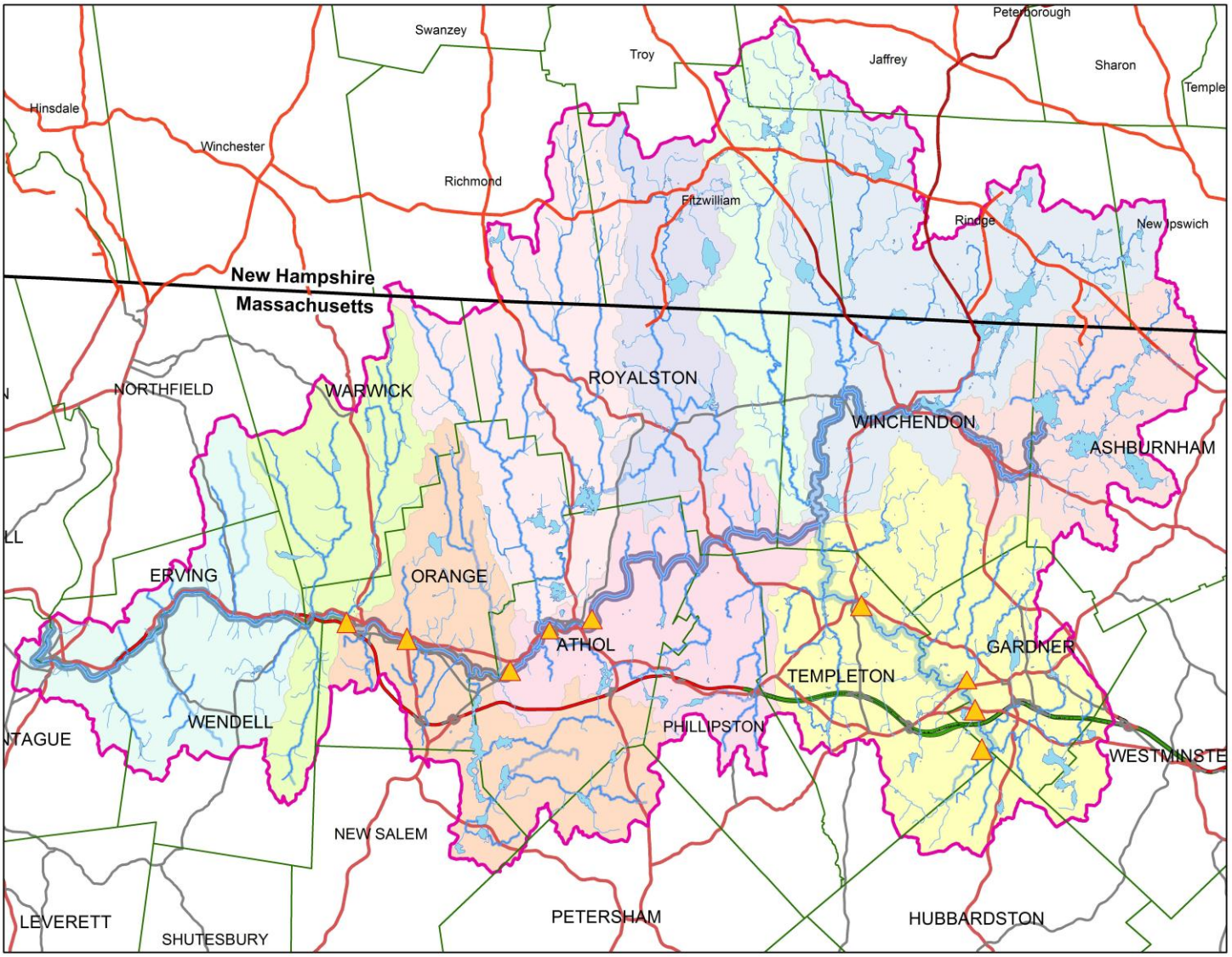
MRWC's next step was to create a formal QAPP (Quality Assurance Project Plan) from which to conduct such a program. A QAPP is a formal monitoring plan with ample quality control that is approved by the Massachusetts Department of Environmental Protection (MassDEP). The data from such a program, if followed carefully, is accepted and trusted by the state, and thus provides reliable information which can be used to foster river protection and inform the public. In the spring of 2011, MassDEP approved MRWC's biomonitoring QAPP.

MRWC also embarked on fundraising to help support program costs, mainly laboratory analyses of samples and some monitoring equipment. We obtained donations through our "Adopt a Sample" effort and a small grant from the New England Grassroots Environment Fund. The Coleman Co. donated funds to purchase a half dozen small coolers. MRWC solicited quotes from 4 state-certified labs, and selected Spectrum Analytical in Agawam, MA. Some sampling poles were fabricated to make sample collection easier. Sampling kits were organized for each sample site.

Another key step was to find volunteer samplers. Outreach brought nine people forward to help. All received training in proper sampling techniques, and bi-weekly sampling began on June 14, 2011 and ran through September 6. In all we conducted seven sampling events at nine sampling sites on the Millers and Otter Rivers. Volunteers also noted temperature and other site conditions observed during the sampling event. Weather conditions within 48 hours of sampling events were recorded.

This first (pilot) sampling year was a strong success. Volunteer samplers did well and there were few complications. This experience will inform and guide the enhancement of MRWC's monitoring program as we look to expand the number of monitoring sites, and encourage more people to explore the Watershed and its rivers.

2011 Bacteria sample sites in the Millers Basin.



Dark blue river = Millers River

Light Blue river = Otter River

Special thanks to our volunteers!

David Runyan, Paul Goyetche, Scott Griffin, Kirby Lecy, Diane Nassif, Jim Karan, Sandra Kozlowski, Eric Klatt, Guy Corbosiero

Project Approach

Purpose (taken from MRWC QAPP)

Quote from MassDEP's 2000 Millers River Water Quality Assessment Report:

"***There is a lack of bacteria data throughout the watershed limiting the assessment of recreational uses***."

***"Primary and Secondary Contact Recreational Summary - Rivers*:**
The majority of the river miles (92%) are currently not assessed for the *Primary* and *Secondary Contact Recreational Uses* because of the lack of current bacteria data."

The Millers River and its watershed offers many fine recreational and nature viewing opportunities. Unfortunately there is a lack of water quality data to determine if the river is 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 for the Millers and Otter Rivers has been too limited to make a clear contact standard determination. 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), sampled the Millers River Watershed in 2005 as part of a five-year rotating basin schedule. DWM sampled selected sites in the Millers in 2011 but this data is not yet available. Only five sites in the Millers basin have received periodic sampling on a regular basis. These are the MassDEP CERO SMART (Strategic Monitoring and Assessment for River basin Teams) sites and are typically sampled every 10 weeks.

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, would offer the means to make a clear determination. Sampling at 4-7 sites on the Otter River and 8-12 sites on the Millers, 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 to start, so MRWC will focus on key areas first and grow into the full site list. *(Due to funding, 5 sites were sampled on the Millers and 4 sites on the Otter River in 2011).*

This expanded full plan 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. This additional new data will help MRWC and MassDEP to make accurate water quality determinations for the Millers 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.

Stakeholders for this project include residents, visitors to, and recreational users of the Millers River 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 the main stem of the Millers River and one of its major tributaries, the Otter River, have not been extensively 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.

This monitoring program is intended to:

- Advance improvement of the water quality of rivers and streams in the Millers River 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.

Methods

The formal QAPP document describes the various considerations, procedures, reasonings, and details of the monitoring processes. How we conducted 2011 worked out as follows.

Once funding was secured, MRWC began to assemble the equipment and select a qualified lab. Sampling kits in accordance with our bacteria SOP (MWWP R-3) 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 concern, label completion, safety concerns, Quality Control (QC), concerns, 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. 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 MRWC Chain of Custody (CoC). Samples were then brought to a central meeting place where a MRWC 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 EPA method 1604.

Typically a few days to a week elapsed until the lab report was issued. Data was 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 Orange and Fitchburg airports for the 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.

QC samples were also collected and sent to the lab: a duplicate at each sampling event and a total of two blanks (blind pure water samples) during the sampling season. Comparing these results gives a sense of the quality of our sampling and the lab's analysis.

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

2011 Monitoring sites

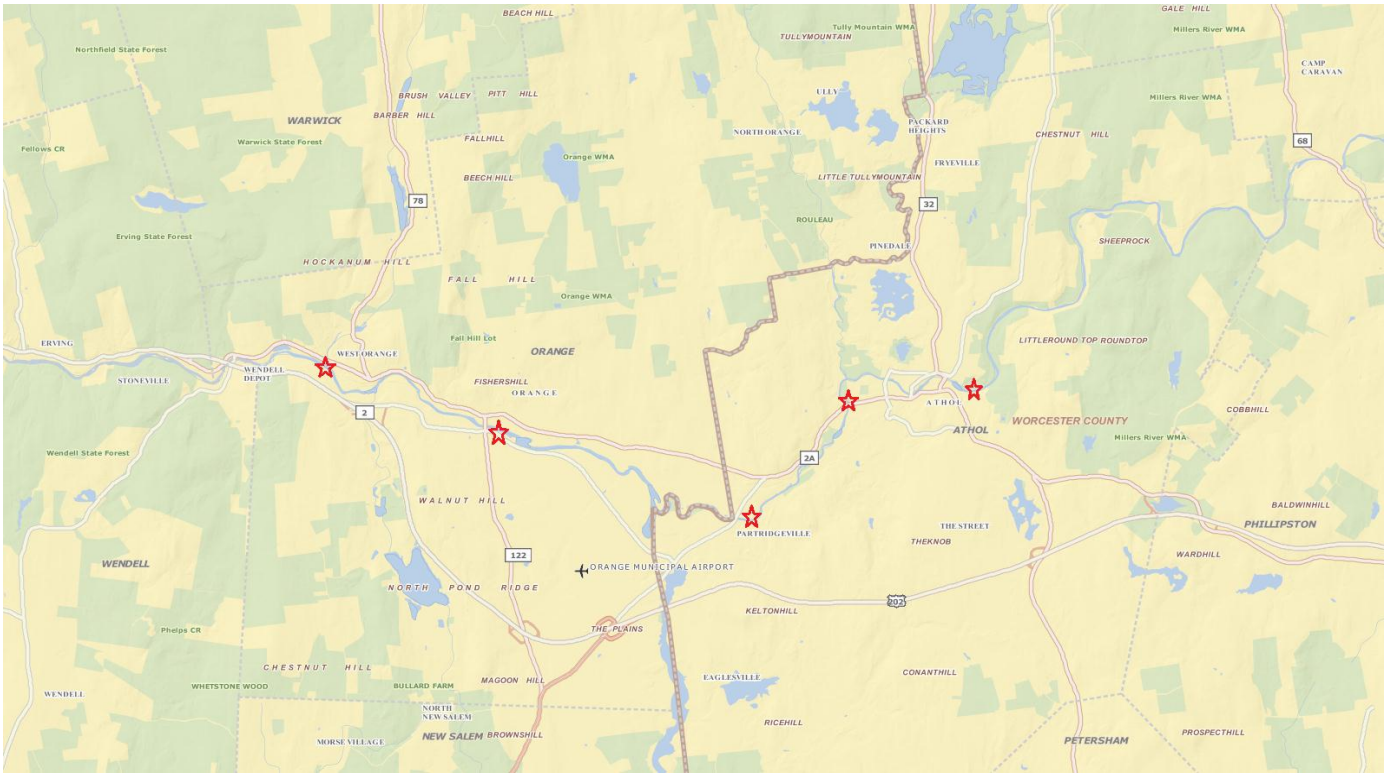
The 2011 sites were chosen to overlap the initial effort to establish "BlueTrails" on two river sections within the Millers River Watershed; one on the Millers River and one on the Otter River. Since MRWC encourages river discovery/recreation, it was deemed prudent to investigate how well these segments met "contact standards."

***2011 Sampling Sites** (prefix; M=Millers, O=Otter)*

Site Name/ID#	Location	Latitude	Longitude	Notes
MUA1	Upper Athol	42°35'42.56"N	72°12'57.03"W	Sample above dam, access off Crescent St. above power line crossing
MCM1	Cass Meadow Athol	42°35'36.71"N	72°14'20.95"W	Park at Rich Env Park, sample at boat launch, in current, not eddy
MFW1	Fielding Way Athol	42°34'33.33"N	72°15'33.18"W	Park near cemetery, walk down old road to site. Site is upstream of Daniel Shays Highway.
MORF1	Orange Riverfront park	42°35'19.52"N	72°18'29.33"W	Sample from boat ramp
MWO1	West Orange	42°35'54.23"N	72°20'29.28"W	Park along 2A, walk under RR bridge, sample downstream side of north bank
OHWW1	Whitney St Templeton	42°32'54.85"N	72° 0'33.16"W	Park at end of Whitney St., walk down path, sample at upstream side of pour point
OR2A1	Rt 2A crossing Templeton	42°33'52.10"N	72° 0'42.32"W	Sample upstream side, west bank
OR101	Rt 101 Crossing Templeton	42°34'25.97"N	72° 0'58.43"W	Sample on west bank, downstream side of bridge, park in lot of repair shop
OBW1	Baldwinville	42°36'23.51"N	72° 4'30.34"W	Park behind Legion Hall, sample upstream, east bank of Rt. 202 bridge

The table above lists the 2011 sites. The Millers River sites straddle the newly created "Millers River Blue Trail" and bracket areas both above and below the communities of Athol and Orange. The Otter River sites mostly bracket the headwaters section of the Otter River where MRWC is forming a headwaters blue trail. The Baldwinville site is downstream at the second phase of the Otter Blue Trail. The Rt 2A, 101, and 202 sites all offer some degree of urban runoff influence. The location of these sites offers a good balance of data from both urban and non-urban conditions.

Millers River Bacteria Monitoring Sites 2011



Results

Bacteria

The table below notes the bacteria levels for the 2011 sampling season. A detailed discussion and interpretation of these results will be presented in the Conclusions section.

Areas highlighted in yellow exceeded state primary contact standard limits. As noted these exceedences occurred solely in wet weather. Secondary contact standards were not exceeded except for one site on 9/6.

Millers & Otter Rivers: Bacteria Sampling for healthy contact.

Site Date:	6/14/11	6/28/11	7/12/11	7/26/11	8/9/11	8/23/11	9/6/11	geomean	geoMN dry
e coli count: cfu									
Millers-M									
Upper Athol-MUA1	88	68	12	100	170	90	72	69.60	
Cass Meadow/Rich Env Park-MCM1	90	52	90	320	160	160	168	128.54	110.41
Fielding Way-MFW1	142	64	110	TNTC	210	140	400	150.79	124.06
Orange River Front park-MORF1	154	80	46	72	240	80	102	96.85	
West Orange-MWO1	120	108	70	420	150	100	420	157.47	106.36
Otter-O									
Whitney St - headwaters-OHWW1	114	28	40	34	150	10	NA	43.21	
Rt 2A crossing-OR2A1	34	70	76	580	290	50	180	115.48	68.55
Rt 101 Crossing-OR101	72	88	116	590	670	70	580	197.68	84.69
Baldwinville, Rt 202-OBW1	92	88	64	280	800	150	1400	219.27	93.89
Weather notes (wet/dry period)	dry/wet "	dry	dry	wet	wet	wet/dry*	wet^		
Rain - M/O- inches-48 hr	0.07/0.28	0.04/0.06	0/0	0.52/0.62	0.85/0.77	0.39/0.14	0.66/0.46		

State limit for primary contact = 235 cfu single date maximum (seasonal geometric mean of 126 cfu)
Secondary contact is acceptable up to a geometric mean of 630 cfu / 1240 cfu single date
TNTC > 2000 (not included in mean calculation) (geo mean dry excludes wet exceedance events)
" dry/wet = low rain @ Orange Airport, but wet weather @ Fitchburg Airport Weather Station.
*wet/dry = rain @ Orange Airport met wet criteria, but not @ Fitchburg Airport.
^major rain event the week before
high value- exceeds primary contact standard

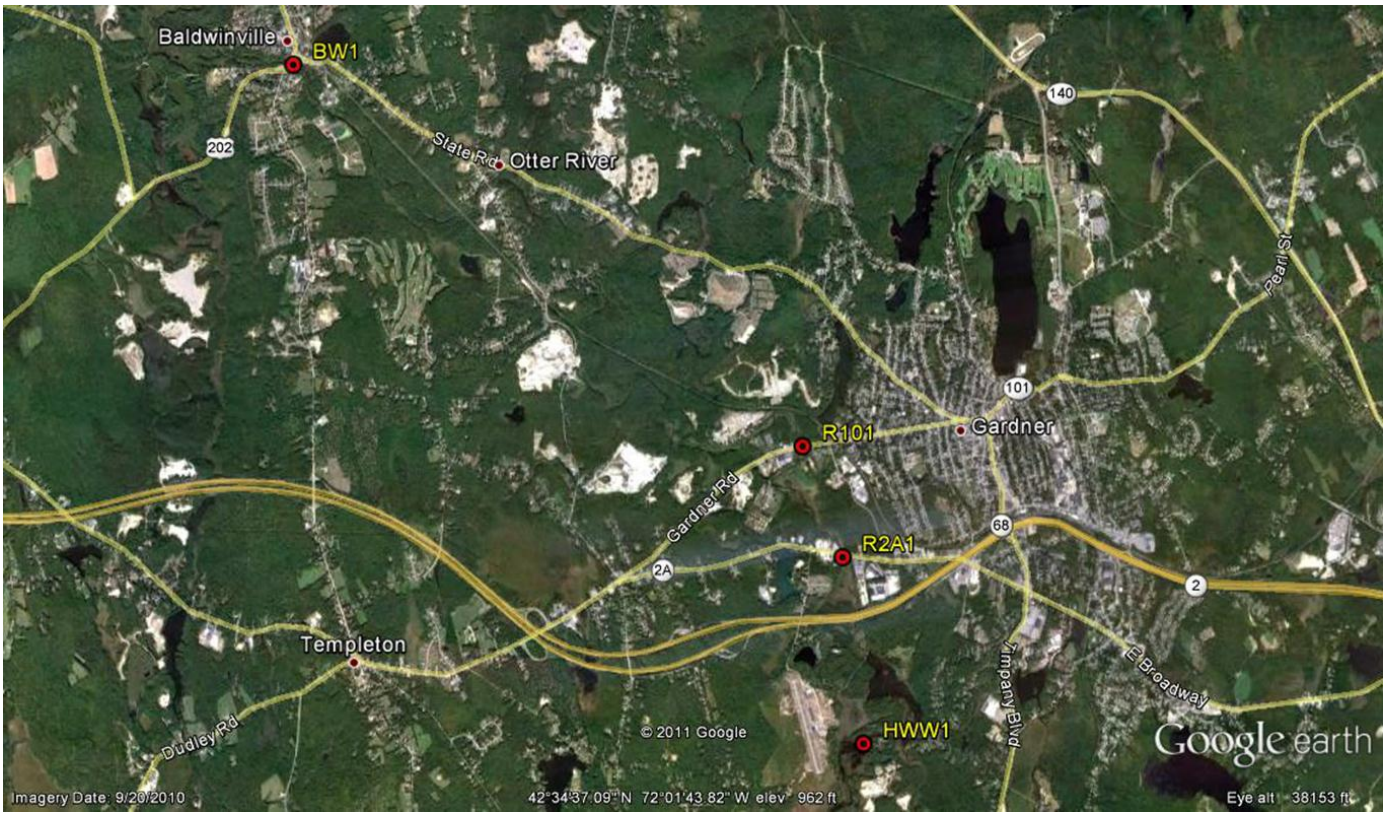
Primary Contact Recreation. Any recreation or other water use in which there is prolonged and intimate contact with the water with a significant risk of ingestion of water. These include, but are not limited to, wading, swimming, diving, surfing and water skiing.

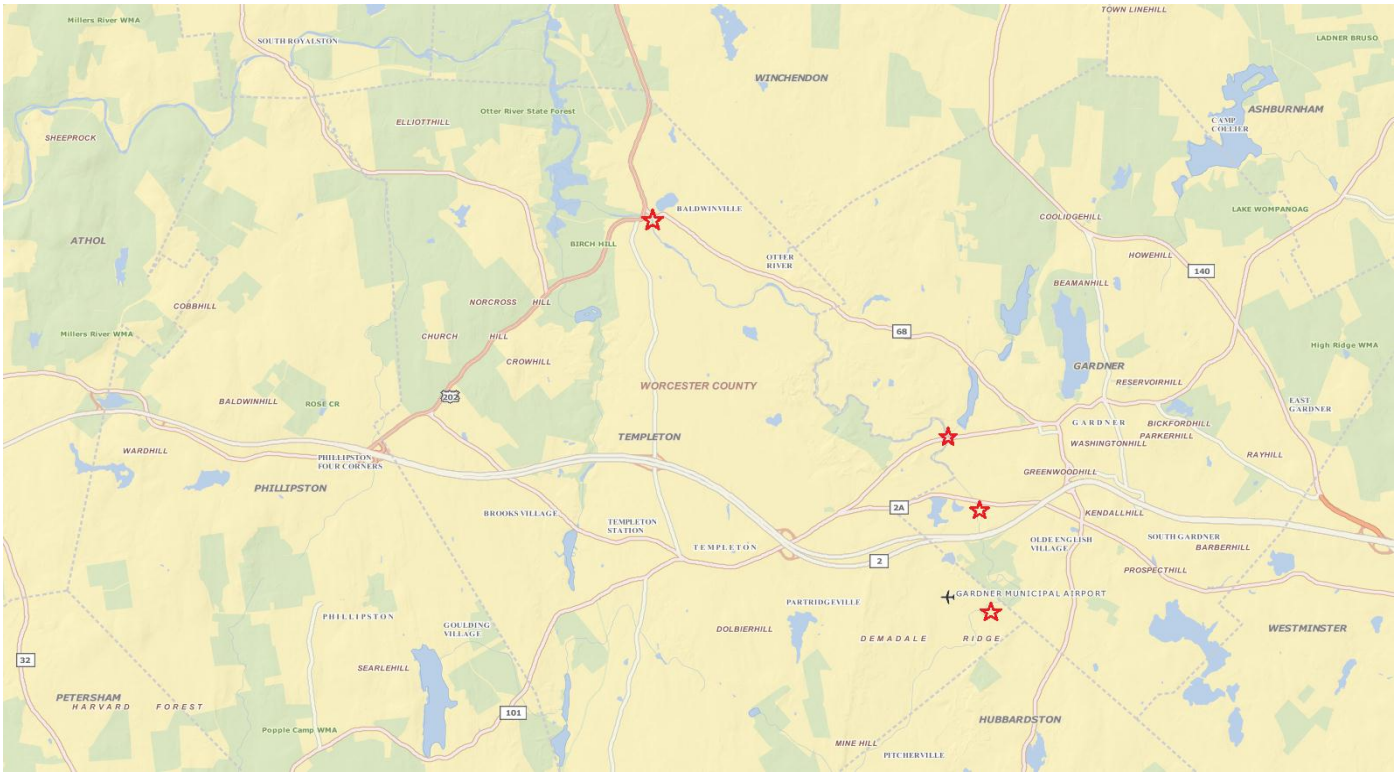
Secondary Contact Recreation. Any recreation or other water use in which contact with the water is either incidental or accidental. These include but are not limited to fishing, including human consumption of fish, boating and limited contact incident to shoreline activities. Where designated, secondary contact recreation also includes

cfu is measure of e. coli colonies per 100 ml sample.

Most dry weather sampling events met mean primary contact standards, though a few events and sites that had too small an amount of rain to qualify as a wet event had some runoff that caused a slight standard exceedence of the mean primary contact limit. Secondary standards were met in all dry events. Single day results were good.

Otter River Bacteria Monitoring Sites 2011





Weather

Weather was recorded from the Orange and Fitchburg Airports for the 48 hour period prior to the sampling event. During this time period, streams are most greatly affected by stormwater runoff, which can illustrate runoff's impacts on water quality.

MRWC 2011 Bacteria Monitoring program Weather Data.								
Date		**6/14/2011**	**6/26/2011**	**7/12/2011**	**7/26/2011**	**8/9/2011**	**8/23/2011**	**9/6/2011**
Station	Orange Airport							
precip/24 hr		0.016	0.003	0	0.62	0.17	0.05	0.66
precip/48 hr		0.071	0.044	0	0	0.68	0.39	0
Station	Fitchburg Airport							
precip/24 hr		0.047	0	0	0.53	0.32	0	0.46
precip/48 hr		0.282	0.067	0	0	0.45	0.14	0
USGS flow								
	Otter	35 cfs/steady	70 cfs/high	16 cfs low	15 cfs	40 cfs high	25 cfs-high	57 cfs-high
	Millers-S Royaston	250 cfs/high	500 cfs/high	95cfs=ave	58cfs	130 cfs high	140 cfs-HI	357 cfs high
determination		dry/wet	dry	dry	wet	wet	wet/dry	wet
	WET EVENT	M/O					M/O	
	CRITERIA:							
	if rain 2 days(48 hrs) or less prior to sampling event exceeds 0.25 inches, then sampling considered wet.							
	If rain within 24 hours is 0.10 inches or more, then wet sampling event.							
	If >0.25 inches within 3 days and stream flow has not returned to pre-rain level, wet event.							
	IF NONE OF THE ABOVE: THEN DRY EVENT.							

On a few occasions, it rained more in one sampling area than another, so one sampling segment may have qualified as a wet weather event whereas the other was dry. Late July and August turned out to be wet periods.

Field sheets

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

Date	***14-Jun***	***28-Jun***	***12-Jul***	***26-Jul***	***9-Aug***	***23-Aug***	***6-Sep***
Site/color-odor							
MUA1	brown-none	light tea-none	light tea-none	light tea-none	v light tea-none	light tea-none	tea-none
MCM1	light tea-none	v light tea-none	light tea-none	slight tea-none	tea-none	tea-none	tea-
MFW1	clear-none	light tea-none	clear-none	clear-none	cloudy slight-none	slight murky-none	none-none
MORF1	light tea-none	clear-none	light tea-none	light tea-none	light tea-none	light tea-none	light tea-none
MWO1	clear-none	clear-none	light tea-none	light tea-none	light tea-none	light tea-none	light tea-none
OHWW1	tea-none	clear/cloudy-none	slight tea-none	tea-none	tea-none	tea-none	na
OR2A1	weak tea-none	weak tea-none	weak tea-none	weaw tea-none	clear-none	clear-none	weak tea-none
OR101	weak tea-none	weak tea-none	weak tea-none	weaw tea-none	clear-none	clear-none	weak tea-none
OBW1	tea-slight effluent	tea-none	weak tea-none	tea-none	v weak tea-none	tea-none	weak tea-none

In general, both the Millers and Otter Rivers appear to have a tint, often described as a weak tea color. This is common in many New England rivers and relates to the presence of natural tannins from plant decay. ***It is also heartening that there were very little or NO water ODORS observed throughout the summer season.***

These general observations are useful as they can be compared from person to person, year to year and give some continuity to the monitoring. A long term record can help clarify if any changes occur.

Table: 2011 River Temperatures

Date	*14-Jun*	*28-Jun*	*12-Jul*	*26-Jul*	*9-Aug*	*23-Aug*	*6-Sep*
Site/tempH2O-degree F							
MUA1	59	70	77	70	72	65	68
MCM1	59	70	76	75	76	72	70
MFW1	61	70	73	64	70	70	68
MORF1	61	70	76	76	78	70	70
MWO1	60	68	72	70	72	68	70
OHWW1	62	62	78	70	70	na	na
OR2A1	60	64	74	66	70	64	68
OR101	na	64	74	66	70	64	68
OBW1	na	64	78	70	70	64	64

na = no data

The river temperatures appear to straddle the boundary of cold/warm water fisheries, which is considered 68 degree F. Most dates have consistent readings, but there are a few outliers, so it may be worth doing more QC on this in 2012. This could be done by site duplicates with two people and/or two thermometers at least once per season, per site. Again, it will be useful to develop a long term record of river temperatures. A future option would be to invest in and deploy temperature probes.

QC Objectives

MRWC set a number of QC objectives for the sampling program. A review of these objectives, presented below, will determine how well the program performed this season.

Completeness:

MRWC completed 69 out of 70 planned bacteria samplings; 98.6% achieved. This met our goal of 80+%.

Precision:

MRWC's goal for precision was <30% deviation on duplicates when analyzing log10 of the values. Log10 smoothing of values considers the randomness of bacteria concentrations in waters. The 2011 deviations did not exceed 13% on the worst day and was typically less that 10%. Good precision!

QC samples 2011								
	6/14/2011	6/28/2011	7/12/2011	7/26/2011	8/9/2011	8/23/2011	9/6/2011	9/6/2011
Count							2A	CM
site	88	52	110	72	150	10	180	168
duplicate	102	62	82	66	130	<10	330	116
Log 10	1.9444827	1.7160033	2.0413927	1.8573325	2.176091	1	2.255273	2.225309
Log 10 Dup	2.0086002	1.7923917	1.9138139	1.8195439	2.113943	1	2.518514	2.064458
Ave dev	0.0320587	0.0381942	0.0637894	0.0188943	0.031074	0	0.131621	0.080426
RPD	3	3.5	6.5	2	3	0	13	8
blank		<2					<2	

Two blanks were collected using bottled spring water. Both were analyzed and were less than 2 cfu, the lab's lower limit. This verifies the lab's precision as well.

Thermometers were checked against a NIST certified thermometer at CRWC lab on June 8, 2011. All thermometers used in our program met our goal of +/- 1 deg C.

Representativeness:

All samples were collected in the same manner at locations within recreational areas; many sites were boat launch areas. Samples were collected in the morning and on a consistent schedule during the prime recreation season. Seven events took place to cover 3-1/2 months of the recreational season. All sites had flow.

Comparability

The comparability of the data collected by MRWC to others (e.g., DEP) will be good since known protocols and documenting methods were used. Sampling sites and procedures are well documented so that future surveys can produce comparable data by following similar procedures and using same sites.

Training:

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

Volunteer practices sample collection during training.

Sample Handling/Hold Times:

All samples were transported on ice and were received amply chilled. All samples were delivered to the lab within the six hour maximum hold-time limit. The lab had an auto trigger to note if a sample hit a six hour limit before being analyzed--this happened twice, but analyses took place within the lab's permitted two hour limit, so no true time limits were exceeded. There were a few writing legibility issues in noting sample IDs on forms and these were successfully sorted out.

These results indicate that the QC objectives for 2011 were met.

Conclusions/Discussion

2011 discussion

The data from the 2011 sampling season offers a number of clear interpretations:

- Dry weather events met both primary and secondary contact standards for all single date events.
- Wet weather events met only secondary contact standards for single day event at all sites. (except 9/6 @ OBW1)
- Sites away from urban centers met both standards wet or dry, considering geometric mean data (Upper Athol, Whitney St)
- Sites near urban centers (all others) did not meet primary contact standards in most wet conditions. Nor did these sites meet the geometric mean primary standard for the season, largely due to rain events. (all but Orange Riverfront Park).

The state has established the use of the geometric mean to review bacteria data sets for determination of standard attainment. Use of the geometric mean is generally advised for bacteria data to attain a log normal distribution by reducing skew effects.

MassDEP sampled on the Millers River main stem in 2011 as part of its five-year rotation program. Preliminary results on dates near one another appear to correlate with MRWC data, though MRWC has not yet been able to compare wet/dry conditions of the DEP data as DEP data is presently unofficial. It would be useful to see if weather affected DEP results. MassDEP used the Colilert analysis procedure in 2011, which is comparable to the EPA 1604 process used by MRWC's lab service. The trend of wet/high v. dry/low bacteria counts found in the MRWC data appears to match the draft 2007-09 sampling data conducted by the MassDEP SMART program. This illustrates the comparability of MRWC data with other water quality data sources.

Sites away from urban areas such as Whitney Street and Upper Athol have very little nearby urban development or road runoff. These sites met both contact standards during both wet and dry conditions.

Sites with some urban influences--uptown areas, such as Cass Meadow (Athol) and Orange Riverfront Park-- faired well in general on the single sample events, and exceeded a limit in the wettest conditions. The Riverfront Park met the geometric mean primary standard, whereas Cass Meadow did not.

The sites near or downstream of the most urban areas had the highest readings in wet weather. The Otter River sites below Rt 2 fit this situation and to a lesser extent, Fielding Way and West Orange on the Millers. Most of Gardner drains towards the Otter River, so stormwater runoff could be an issue.

Rt 2A, Fielding Way, and West Orange are below lower density unbanization and their geometric mean data was above the primary standard, yet well below the secondary standard.

Rt 101 and Baldwinville sites are influenced by more unbanization and had much higher geometric mean averages, likely due to stormwater runoff and the wet weather events. They failed primary standards, but met secondary contact standards.

2011 Conclusions

It appears very likely that stormwater runoff from urban areas does affect water quality in the Millers and Otter Rivers. Immediately following a rain storm, river areas in and immediately below urban areas may not be suitable for primary contact, but secondary contact may be acceptable. In dry weather conditions, these rivers appear acceptable for full river recreation.

Communities wishing to meet primary contact standards should consider implementing (and maintaining) a comprehensive stormwater management program. Mitigating runoff and/or having it treated could improve water quality, particularly in less urban areas, where stormwater is more manageable. Protecting the non-urban areas from careless development should also be a focus. MRWC is currently implementing a joint Stormwater Reduction Outreach Program (Section 319) with the Montachusett Regional Planning Commission (MRPC) for the ten towns in the Worcester County portion of the watershed. MassDEP, the Mass Watershed Coalition, and the Mass Association of Conservation Commissions can offer information on other programs. Such programs would offer improvements in water quality that would benefit both people and river health.

2012 efforts

This first year was a good start for the program. At a minimum, MRWC will sample the same sites again in 2012, 6-8 times using the same procedures. Regular and consistent monitoring will enable MRWC to keep the public well-informed, while developing a clearer water quality history from which to determine trends and identify problems and remedial actions. MRWC intends to add additional monitoring sites to cover any expansion of existing Blue Trails. There are 2 possible additions to the Otter list of sites and 3-5 sites on the Millers as noted in the full QAPP design. Funding will determine the final sampling program in 2012; between grants and another "Adopt a Sample" campaign we hope to add many of these sites. Recruiting additional volunteers will begin in the late winter of 2011-12 and these new recruits will be trained in the late spring. MRWC will likely begin 2012 sampling in June of 2012.

MRWC sees this program as an important resource in advancing watershed protection and community engagement.