

Deerfield River Volunteer Monitoring Program

2001 Final Report



Marie-Françoise Walk

February 6, 2002

Deerfield River Volunteer 2001 Monitoring Final Report

February 6, 2002

Marie-Françoise Walk, Program Leader

Introduction

The Deerfield River Watershed Association (DRWA) has been monitoring the water quality of the Deerfield River and several tributaries in Massachusetts since 1990, as part of its mission to improve and protect water quality throughout the basin.

In 1998 we changed our focus somewhat, reducing the monitoring of chemical data (pH, alkalinity, and dissolved oxygen) to only once or twice a year (April and sometimes September), but adding a new parameter: fecal coliform bacteria to assess whether the river supports Massachusetts water quality standards for primary and secondary contact recreation.

After three years of relying on outside laboratories for bacterial analysis, we decided to establish our own laboratory to have better control on quality control as well as to have the flexibility of sampling whenever we wanted. In 2001 we received \$2,000 from PG&E and \$490 from the DRWA membership, as well as in-kind donations from Rugg Lumber, the Town of Greenfield Water Department, Stephen Walk, Konrad Scheltema, Fran Maynard and Mike Slowinski to build and equip a laboratory in space donated by Ted and Lisa Merrill of Shelburne Falls.

The lab was finished in time for our first collection in April and was used throughout the sampling season, after a visit/inspection by two members of our Technical Advisory Committee, Sandra Shields (Greenfield Water Department Superintendent) and Christine Duerring (EOEA Deerfield River Watershed Team Leader).

The 2001 DRWA water quality monitoring program had three goals, in addition to establishing our own lab:

- to build on our ten-year baseline of data for chemical and physical parameters in order to document any changes in the water quality of the mainstem and major tributaries
- to assess popular swimming holes for primary and secondary contact recreation
- and to give our association more visibility in the community.

Methods

New volunteers were recruited at the March Forum on the State of the Deerfield River Watershed, and through the local media. New and returning volunteers made up a volunteer force of 20 people. Most were sample collectors, while four were lab analysts. Volunteers were given a training binder including site location sheets to find their sites, and were instructed to make corrections to those directions as needed. All site location sheets were collected at the end of the project and corrections were noted. All volunteers were trained in sample collection methods by M.F. Walk, Project Leader, on either April 8 or April 14. All collection methods follow the Massachusetts Water Watch Partnership protocols.

Twelve sites (see Table 1) were monitored for pH, alkalinity, water temperature, and dissolved

program historically. Two more sites were added in Vermont thanks to a new volunteer from Readsboro. Ten sites were monitored in June, July, and August for water temperature and fecal

unofficial but popular swimming holes. Our lab capacity allows us to handle no more than 15 samples (10 field samples and 5 quality control samples), so we could not sample more than ten of

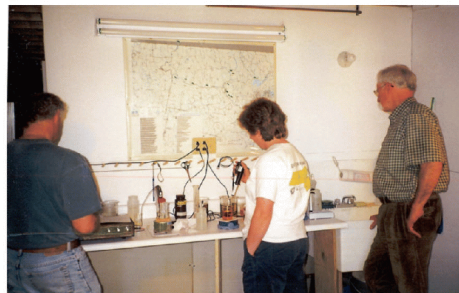
Samples were analyzed by DRWA volunteers at the DRWA lab in Shelburne Falls. Those volunteers and their qualifications

Dr. Robert Walker, microbiologist
Denise Pavao, microbiologist

William Kiendzior, science teacher.

All analyses followed Standard
Methods (APHA, 1995).

**Lab analysts Will Kiendzior, MF
Walk, and Bob Walker in the
DRWA lab, April 22, 2001**



On April 22, between 7 and 10 A.M., the monitors visited 12 sites (see Table 1) and samples were brought to the DRWA Lab for the analysis of dissolved oxygen (DO), pH, and alkalinity. A field duplicate was taken by one team of monitors. One team of monitors was observed by M.F. Walk for quality control (QC) purposes. QC samples (blind samples) were obtained from the UMass Environmental Analysis Lab (EAL).

June 3 and 17, July 1 and 15, and August 5 and 19, ten sites were visited and sampled for fecal coliform bacteria. In June, samples were taken between 7 and 10 A.M. Starting in July, we switched collection time to 10 A.M. - 1 P.M. for two reasons: 1) those times coincide better with actual swimming times 2) that allowed analysis of the samples later in the day which was more convenient for volunteer analysts to count colonies on Monday afternoons. Samples were brought to the DRWA lab and analyzed immediately. M.F. Walk observed a team of collectors each collection except August 5 for quality control purposes. A field duplicate, field blank, lab duplicate and lab blank were run as well as a positive sample collected from the Green River at a site historically known for bacteria pollution (Mead Street in Greenfield).

Data having passed preliminary quality control scrutiny were posted on the DRWA web site

(www.deerfieldriver.org) and faxed to local media.

Table 1: Deerfield River 1999 Monitoring Sites Assignments -(see appendix for site location descriptions)

Site Number	Site Name	Town	Samplers	Parameters
COR-010	Cold River	Charlemont	Weeks	pH ANC DO Bacteria
DER-010	Rtes 5&10 Bridge	Deerfield	Maynard	pH ANC DO
DER-012	Deerfield Academy	Deerfield	Friedman	Bacteria
DER-014	South River Confluence	Conway	Healy	Bacteria
DER-015	Stillwater	Deerfield	May	pH ANC DO Bacteria
DER-016	Gardner Falls	Buckland	Baker/Marmaras	pH ANC DO
DER-018	Potholes	Shelburne Falls	Baker/Marmaras	Bacteria
DER-019	Wilcox Hollow	Shelburne	Gopen/Benjamin	Bacteria
DER-020	Old Willow	Charlemont	Gopen/Benjamin	pH ANC DO
DER-021	Below Charlemont WWTP	Charlemont	Pavao/Merrill	pH ANC DO
DER-025	Deerfield River, Zoar Gap	Charlemont	Reid/Gorecki	pH ANC DO Bacteria
DER-100	Deerfield River Main Branch	Readsboro	Whitman	pH ANC DO
GRR-030	Green River Covered Bridge	Greenfield	Maynard	Bacteria
JGW-001	West Branch Swimming Hole	Readsboro	Whitman	Bacteria
NOR-002	Sunburn Beach	Colrain	Scheltema/Petrin	Bacteria
NOR-010	Above Veratec	Colrain	Slowinski	pH ANC DO Bacteria
NOR-015	Below Veratec	Colrain	Scheltema/Petrin	pH ANC DO
SOR	South River	Conway	Healy	pH ANC DO
WER-050	West Branch Deerfield River	Readsboro	Whitman	pH ANC DO

Quality Control

Quality control data for the whole monitoring season can be found in the Appendix.

Thermometers were calibrated against an NIST certified thermometer at EAL in April and were

found 100% reliable (measured temperatures within 0.5 °C of the standard thermometer) and were thus distributed to volunteers. They were checked again after the sampling season was over and were still found to be reliable.

Six field checks were performed by MF Walk on volunteer teams to ensure they followed proper sampling procedures. No problems were detected.

The lab passed the MassWWP quality control samples for pH, alkalinity, and dissolved oxygen, and duplicates passed a 10% precision objective.

Field duplicates and lab duplicates passed our data quality objectives for bacteria analyses. Field blanks and lab blanks always came out blank, except for one collection when one field blank came up with 1 colony per 100 ml. Positive samples came out positive, although it was low (10 colonies/100ml) on July 15th, when it was determined that the incubator had malfunctioned (temperature went outside the temperature limits of $44.5^{\circ}\text{C} \pm 0.2^{\circ}$). Data for July 15 were discarded and samples were not re-taken. Field and lab duplicates mostly passed our 20% data quality objective: one field duplicate and one lab duplicate were not within the 20% data quality objective, but when combined with other quality control results, those were judged minor problems and the data was kept.

Results

Table 2: Results for the April 22, 2001 Collection

Date Sampled:	4/22/01			
Site	pH	Alkalinity	DO	DO saturation
		(mg/l)	(mg/l)	(%)
Cold River	6.22	1.30	12.80	98
Deerfield R, 5&10	6.85	9.20	10.88	87
Stillwater	6.85	6.80	12.86	98
Gardner Falls	6.81	4.90	12.80	98
Old Willow	6.61	3.70	12.46	95
Below Cht. WWTP	6.65	3.80	12.52	96
Zoar Gap	6.74	3.70	12.22	93
Readsboro Main Stem	6.65	4.00	12.42	92
North R, below Veratec	6.75	6.60	12.56	96
North R, above Veratec	6.88	7.90	13.20	101
South River	7.33	17.90	12.06	94
West Branch Deerfield	5.93	0.00	12.88	93
NS=No Sample NA=No Analysis		fails QC	fails MA WQ Standards	

Dissolved Oxygen levels were high as always and exceeded the Massachusetts Water Quality Standards for cold water fishery of 6 mg/l. Percent saturation values also put the water above the

standard of 75%.

The site with lowest DO was Rte 5&10 bridge in Deerfield, with 10.88 mg/l and 87% saturation. This may be due to flooding conditions which prevented collecting a sample in the true river bed. Rather, the sample was collected in somewhat quiet back waters (see Figure 1).



Figure 1: Fran Maynard collects a DO sample in a very flooded Deerfield River at the 5&10 bridge April 22, 2001.

Figure 2: Dissolved Oxygen in the Deerfield River watershed, April 22, 2001

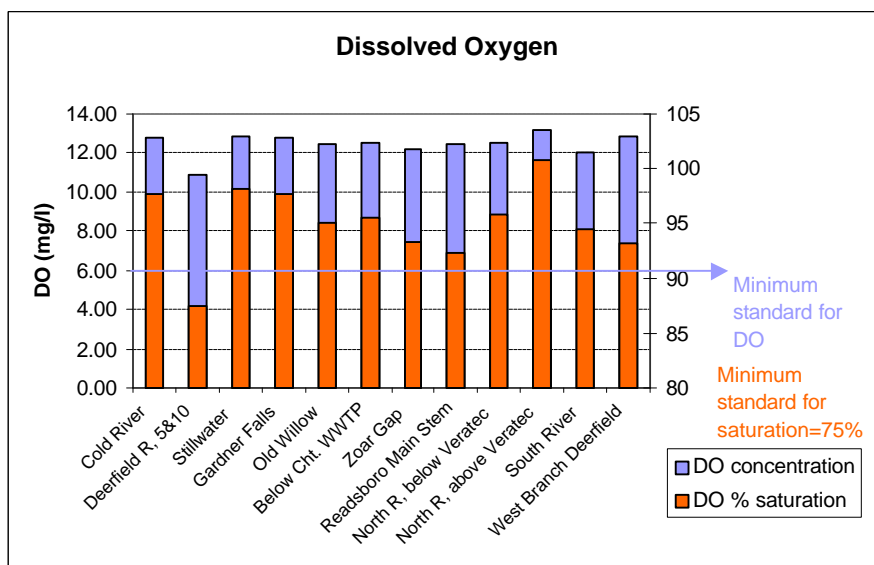
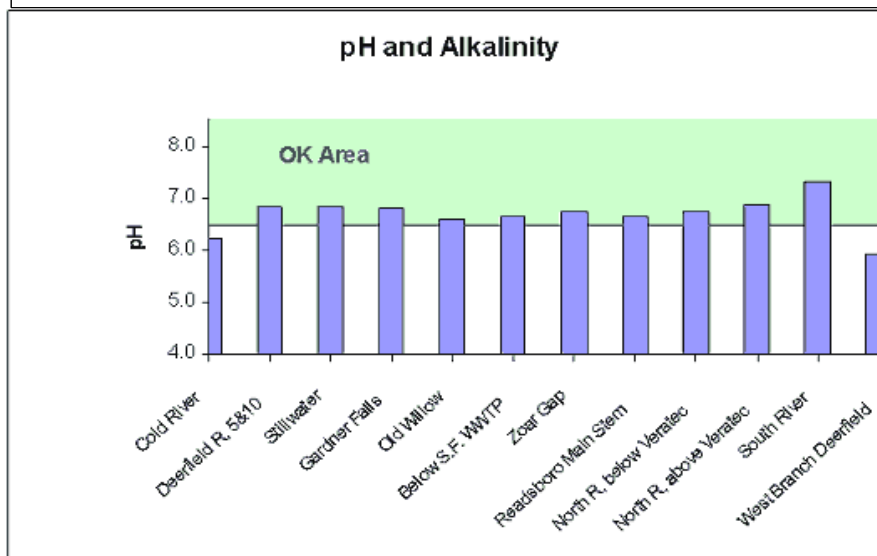


Figure 3. pH in the Deerfield River watershed, April 22, 2001.



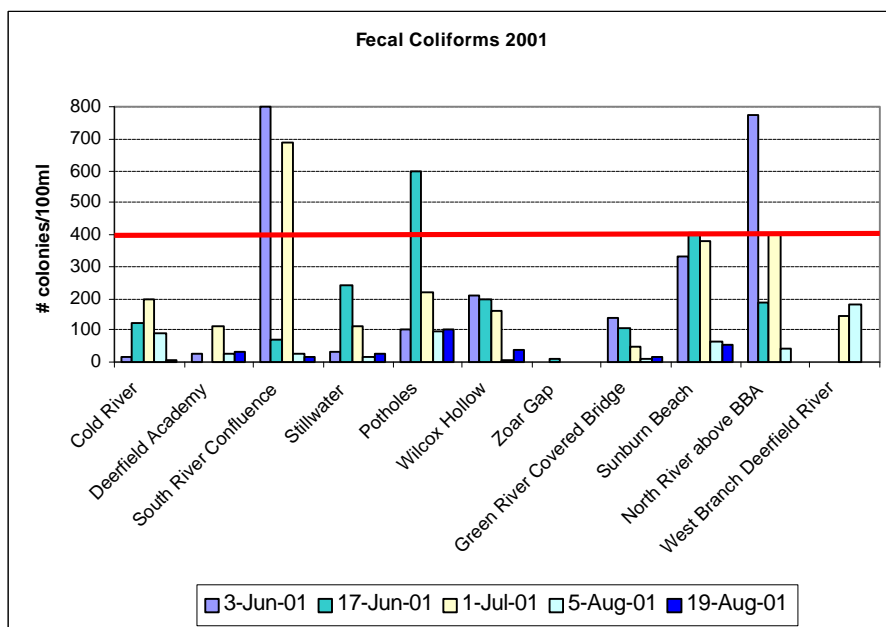
pHs were lower than in previous years, as were alkalinities. The West Branch of the Deerfield in Readsboro, a new site this year, even showed no alkalinity at all. Without buffering capacity, this site also had a low pH of 5.93, well below the State of Massachusetts water quality standards for recreation (acceptable range of 6.5-8.3) and for aquatic life (acceptable range of 6.5-9.0). Also below the standard was the Cold River with a pH of 6.22.

We can probably attribute these low values to the important snowpack this year, which was still actively melting on the 22nd of April. Many of our sites were flooded, and made collection more difficult for our volunteers.

Table 3: Bacteria Results, 2001

Deerfield River Fecal Coliforms						
(Number of colonies per 100 ml)						
Site	3-Jun-01	17-Jun-01	1-Jul-01	15-Jul-01	5-Aug-01	19-Aug-01
Cold River	17	123	200	LE	90	8
Deerfield Academy	25	NS	114	LE	26	31
South River Confluence	800	69	690	LE	25	18
Stillwater	32	240	110	LE	16	29
Potholes	104	600	220	LE	98	100
Wilcox Hollow	210	200	158	LE	6	40
Zoar Gap	0	12	NS	LE	NS	NS
Green River Covered Bridge	140	106	48	LE	12	17
Sunburn Beach	330	405	380	LE	66	51
North River above BBA	773	185	400	LE	42	NS
West Branch Deerfield River	NS	NS	142	LE	180	1
NS=Not Sampled LE=Lab Error						
Red: violates swimming standards						
Orange: violates swimming and boating standards						

Figure 4: Fecal coliform bacteria
(red line indicates swimming standard)



Our first bacteria sampling (June 3) occurred after a big storm and we found fecal coliforms at all sites except Zoar Gap. Most counts were within acceptable limits (below 400), but the North River above BBA in Colrain and the confluence of the South River violated State Standards for swimming.

The June 17 collection shows how conditions change with weather: A storm moved through the watershed during sampling, so that early collectors took their samples a few minutes after it started raining, and the late collectors were definitely sampling the “first flush” of the storm in the river. Note the high reading at the Potholes, probably the most popular swimming hole in the watershed: This peak likely results from surface runoff to the storm sewers in Shelburne Falls which empty into the river just upstream.

On July 1 we sampled 12 hours after a thunderstorm, and a few sites had high bacteria counts again. At this point it looks as if our marginal sites may be the North River above BBA and the South River confluence, while the cleanest spots are Zoar Gap and the Cold and Green Rivers.

Our incubator malfunctioned on July 15, so we can't report data for that date.

The August 5 collection followed some scattered thunderstorms in the evening of August 4. Those storms apparently did not constitute a “wet event” as the results all show low bacteria counts. Finally, the August 19 collection occurred during a dry spell and the fecal counts were accordingly low.

We can see that different weather patterns result in varying levels of bacteria throughout the watershed, pointing to the need to continue sampling until we have a respectable collection of data which will permit us to predict what size storm produces unacceptable levels of bacteria.

Conclusions

Our data indicate that alkalinity levels are low in the watershed, especially in the headwaters. Low pH levels may stress our native trout fishery. Dissolved oxygen levels continue to be high and very adequate for a cold water fishery.

Our fourth year of bacteria data confirms that during dry spells the Deerfield River and the tributaries we monitor are free of bacteria and safe for contact recreation. After storm events, however, some sites become contaminated with enough bacteria to make them unsafe for swimming.

One of our objectives was to increase our association's visibility in our community. From the email messages and the press coverage we received about the river's water quality, we conclude that posting our results is reaching a certain number of people. We also gained a half dozen new association members as a result of conducting this monitoring project.

Recommendations

We need to continue bacteria monitoring until we gather enough data to assess what type and size

storms cause bacterial pollution. We feel it is still too early to branch out and look for pollution causes, but that should be an ultimate goal of our monitoring program.

A recommendation for next year is to purchase a more sensitive incubator.

Another long-term goal and recommendation is to build up our volunteer corps in Vermont and ultimately establish a second laboratory in that state to allow expansion of sites there.

APPENDIX

Quality Control Results for 2001

4/22/01	<i>Chemistry QC tests</i>		
	pH	ANC	DO
DRWA	7.45/7.44/7.44	13.5/13.8/12.9	7.24/7.30
EAL QC	7.50	13.5	7.4
Accept. Range	7.20-7.80	10.5-16.5	6.66-8.14
Pass QC?	Yes	Yes	Yes
Field Sample	6.74	3.7	12.22
Field Duplicate	6.64	3.4	12.30
Pass DQO?	Yes	Yes	Yes

Bacteria Analysis QC

Date	Field Blank	Lab Blank	Field Dupl.	Lab Dupl.	Positive
6/3/01	0	0	23 - 27	55 - 9	1600
6/17/01	0	0	230 - 250	76 - 62	TNTC
7/1/01	0	1	660 - 720	108 - 112	TNTC
8/5/01	0	0	11 - 20	100 - 96	90
8/19/01	0	0	18 - 15	0 - 2	30

SITE LOCATION SHEET

Site Name: Cold River

Site Number: COR-010

Town: Charlemont

Nearest major highway: Rte 2

Road names and/or numbers connecting major highway to the site access road:

Coming from Shelburne on Rte 2, follow road through Charlemont Center, toward Mohawk State Forest.

There is a pullout on the right hand side, before the State Forest.

Specific directions from access road (named above) to exact location of sampling site:

Park in pullout.

Walk over guard rail, there is a trail that veers to the right, down to the river.

Follow trail. You'll see old pipes standing.

Take sample at bottom of trail.

SITE LOCATION SHEET

Site Name: Deerfield River -5&10 Bridge

Site Number: DER-010

Town: Deerfield

Nearest major highway: Rtes 5&10

Road names and/or numbers connecting major highway to the site access road:

From Deerfield, follow Rtes 5&10 north to Greenfield.

Just before bridge over Deerfield River, park on River Rd. on right.

Specific directions from access road (named above) to exact location of sampling site:

Cross River Rd., go over guard rail, walk down to river on worn path.

Walk under bridge, keep walking about 100 yards.

Take sample by large flat rocks.

SITE LOCATION SHEET

Site Name: Deerfield Academy

Site Number: DER-012

Town: Deerfield

Nearest major highway: Rtes 5 & 10

Road names and/or numbers connecting major highway to the site access road:

From Greenfield, travel south on Rtes 5 & 10.

Take right into Historic Deerfield.

Bear left into center of Historic Deerfield.

Pass Deerfield Inn, take a right onto Albany Rd.

Go to the end of Albany Rd.

Park by cemetery.

Specific directions from access road (named above) to exact location of sampling site:

Walk across playing fields (downhill and bear right).

Once you get to the edge of the woods, you will see a path and an opening to the river.

Take sample at river bank.

SITE LOCATION SHEET

Site Name: South River Confluence

Site Number: DER-014

Town: Conway

Nearest major highway: Rte 116

Road names and/or numbers connecting major highway to the site access road:

From Rte 116 in Conway, take Shelburne Falls Rd.

Take a right onto Bardswell Ferry Rd.

Take a right on Reeds Bridge Rd onto Bardswell Ferry Road and travel 0.8 miles to a right (dirt road).

Follow all the way to end.

Specific directions from access road (named above) to exact location of sampling site:

Look for steps going down to the river.

Take sample in the mix of the Deerfield and South Rivers

SITE LOCATION SHEET

Site Name: Deerfield River - Stillwater

Site Number: DER-015

Town: Deerfield

Nearest major highway: Rte 116

Road names and/or numbers connecting major highway to the site access road:

From Conway, travel south on Rte 116.

Near "Mill River" turn left onto Lee Rd.

Then turn left onto West Road.

Stop and park at intersection with Upper Rd (just before bridge above Deerfield River)

Specific directions from access road (named above) to exact location of sampling site:

Follow path from parking area to river, where you will take sample.

SITE LOCATION SHEET

Site Name: Deerfield River, Below Shelburne WWTP: Gardner Falls

Site Number: DER-016

Town: Buckland

Nearest major highway: Rte 2

Road names and/or numbers connecting major highway to the site access road:

From Rte 2 in Shelburne, take left at Sweetheart Restaurant (S. Maple St).

Cross iron bridge and take left onto Conway Rd.

Take road on left twd Gardner Falls hydroelectric station

Specific directions from access road (named above) to exact location of sampling site:

Take sample above dam.

SITE LOCATION SHEET

Site Name: Potholes

Site Number: DER-018

Town: Shelburne Falls

Nearest major highway: Rte 2

Road names and/or numbers connecting major highway to the site access road:

Traveling west from Greenfield on Rte 2, take a left at the Sweetheart Restaurant onto South Maple St.

Take a left onto Deerfield Rd (toward potholes)

Park at Mole Hollow Candles

Specific directions from access road (named above) to exact location of sampling site:

Walk down stairs.

Walk down through rocks where there is flow

SITE LOCATION SHEET

Site Name: Wilcox Hollow

Site Number: DER-019

Town: Shelburne

Nearest major highway: Rte 2

Road names and/or numbers connecting major highway to the site access road:

Traveling east on Rte 2 from Shelburne Falls, look for Wilcox Hollow sign on right past the State Police barracks. It is directly across the street from a road (blue Kingdom Hall mailbox).

Specific directions from access road (named above) to exact location of sampling site:

Drive all the way to end of dirt road. Park.

Walk to river's edge along "boat access".

SITE LOCATION SHEET

Site Name: Deerfield River, Old Willow

Site Number: DER-020

Town: Charlemont

Nearest major highway: Rte 2

Road names and/or numbers connecting major highway to the site access road:

Travel west on Rte 2 from Shelburne.

Pass Stillwater Restaurant. There is a large pullout on the left. Go to the next pullout 100 yards farther, directly across the road from a red house. Park.

Specific directions from access road (named above) to exact location of sampling site:

Walk to river.

Take sample from rocks at upstream end or area.

SITE LOCATION SHEET

Site Name: Deerfield River, Below Charlemont WWTP

Site Number: DER-021

Town: Charlemont

Nearest major highway: Rte 2

Road names and/or numbers connecting major highway to the site access road:

In Charlemont center, take the driveway to the waste water treatment plant.

Park at end of road.

Specific directions from access road (named above) to exact location of sampling site:

Walk around left of garage., through a field to woods on other side of field.

About 30 feet into the woods, turn right toward river bank.

Sample at large boulder.

Note: Call landowner ahead of time for permission to walk on his land.

SITE LOCATION SHEET

Site Name: Sunburn Beach

Site Number: NOR-002

Town: Colrain

Nearest major highway: Rte 2

Road names and/or numbers connecting major highway to the site access road:

From west of Shelburne Falls: Turn north off route 2 at the Big Indian Shop onto North River Road and go 1.0 miles to the iron bridge over the North River.

From Shelburne Falls: Follow signs to route 112 north (Main Street becomes 112 at the edge of town) and go 1.2 miles from the start of route 112 north to the left turn over the iron bridge.

Specific directions from access road (named above) to exact location of sampling site:

Park at the bridge and follow the path down to the Deerfield River and turn left. Sample the North River before it empties into the Deerfield. The North River flows under the iron bridge.

SITE LOCATION SHEET

Site Name: Green River - Meade Street (positive bacteria sample site)

Site Number: GRR-010

Town: Greenfield

Nearest major highway: Rtes 5&10

Road names and/or numbers connecting major highway to the site access road:

In Greenfield, from Rtes 5& 10 by Meadows golf course, travel north to second traffic light. Turn left onto Mills St.
Take first left onto Meade St.

Specific directions from access road (named above) to exact location of sampling site:

Park next to big willow tree across from Berkshire Gas
There is a path on left of tree
Take sample at river bank.

SITE LOCATION SHEET

Site Name: North River, Above BBA (ex-Veratec)

Site Number: NOR-010

Town: Colrain

Nearest major highway: Rte 112

Road names and/or numbers connecting major highway to the site access road:

From Rte 2 in Shelburne, take Rte. 112 N to Colrain (about 3-4 miles)

Pass BBA Nonwoven factory on left.

Take a left on to Adamsville Road.

Cross the steel bridge.

Specific directions from access road (named above) to exact location of sampling site:

Park past bridge.

Downstream of bridge there is a trail. Walk down path to river. (beware of POISON IVY!)

Take sample at beach with large rocks. Big rock in middle of river.

SITE LOCATION SHEET

Site Name: North River, Below BBA (ex Veratec)

Site Number: NOR-015

Town: Colrain

Nearest major highway: Rte 112

Road names and/or numbers connecting major highway to the site access road:

From Rte 2 in Shelburne, take Rte. 112 N to Colrain (about 3-4 miles)

Just before BBA Nonwoven factory and steel bridge, turn right down dirt road (private driveway for 3 families).

At end of driveway (Crossman residence), park.

Specific directions from access road (named above) to exact location of sampling site:

Take private path to river for sampling

SITE LOCATION SHEET

Site Name: South River

Site Number: SOR

Town: Conway

Nearest major highway: Rte 116

Road names and/or numbers connecting major highway to the site access road:

From Rte 116 in Conway, take Shelburne Falls Rd.

Take a right onto Bardswell Ferry Rd.

Take a right on Reeds Bridge Rd.

Specific directions from access road (named above) to exact location of sampling site:

Take sample at bridge on Reeds Bridge Rd. (take sample upstream of bridge)

SITE LOCATION SHEET

Site Name: West Branch Deerfield River

Site Number: WER-050

Town: Readsboro

Nearest major highway: Rte 100

Road names and/or numbers connecting major highway to the site access road:

From center of Readsboro, travel north on Rte 100. Pass Fuel Oil on right and sawmill on left.

The sample site is just upstream of the footbridge crossing the river on the left of the road.

Specific directions from access road (named above) to exact location of sampling site:

Walk down to footbridge. Sample site is just upstream, on east bank.

SITE LOCATION SHEET

Site Name: Main Branch Deerfield River

Site Number: DER-100

Town: Readsboro

Nearest major highway: Rte 100

Road names and/or numbers connecting major highway to the site access road:

From center of Readsboro, travel south on Rte 100. Park where road crosses river.

Specific directions from access road (named above) to exact location of sampling site:

Walk downstream on the west bank. Sample site is half-way between Rte 100 and confluence with West Branch.

SITE LOCATION SHEET

Site Name: West Branch Swimming Hole

Site Number: JGW-001

Town: Readsboro

Nearest major highway: Rte 100

Road names and/or numbers connecting major highway to the site access road:

From center of Readsboro, travel north on Rte 100 and around a slight curve to the right until you reach an intersection (Brooklyn St.). The Readsboro General Store is on the far side of that intersection. At this intersection, turn left and immediately park in the empty lot on your left.

Specific directions from access road (named above) to exact location of sampling site:

Just beyond where you parked is a vehicle bridge that crosses the West Branch. Walk across this bridge and on the far side walk down a steep bank following a stone-lined route that carries storm water off the road. At the foot of the steep part, follow a footpath through the woods that will take you to the bank of the West Branch at a point where the store sits on the opposite bank above a retaining wall. The sampling site is in the river at the point where swimmers have constructed a crude wall of stones to make a pool for swimming. You can stand on some of the larger stones making this wall and reaching upstream into the swimming pool.