CHICOPEE RIVER WATERSHED
SMART MONITORING PROGRAM 1998-2004
TECHNICAL MEMORANDUM TM-36-4

The Ware River, Ware

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December 2013

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Cover photo by Therese Beaudoin, MassDEP. July 30, 2003.
All photos in document taken by Therese Beaudoin. MassDEP. CERO.
SMART monitoring logo designed by Robert Kimball and Barbara Kimball.

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LIST OF LATIN NAMES

Latin Name	Common name	Latin Name	Common name
Callitriche sp.	water starwort	*Lobelia cardinalis*	cardinal flower
Cambaridae	crayfish	*Myriophyllum* sp.	milfoil
Carex sp.	sedge	*Odocoileus virginianus*	white-tailed deer
Castor canadensis	North American beaver	*Potamogeton* sp.	pondweed
Chara sp.	muskwort	*Procyon lotor*	raccoon
Clemmys guttata	spotted turtle	*Rana catesbeiana*	North American bullfrog
Elodea sp.	waterweed	*Thamnophis sirtalis*	common garter snake
Gerridae	water striders	*Vallisneria* sp.	eelgrass/tape grass
Gramineae	grasses		

LIST OF ACRONYMS

7Q10	lowest 7-day average streamflow that occurs, on average, once every 10 years
BRP	Bureau of Resource Protection
ºC	degree Celsius
CERO	Central Regional Office
CFR	Coldwater Fishery Resource
cfs	cubic feet per second
cond	specific conductivity
CSO	Combined Sewer Overflow
DO	dissolved oxygen
DWM	Division of Watershed Management
ºF	degree Fahrenheit
ft	feet
in	inch
m	meter
MassDEP	Massachusetts Department of Environmental Protection
MDL	method detection limit
MGD	million gallons per day
mg/L	milligrams per liter
mi	mile
mi^2	square mile
NH_3-N	ammonia nitrogen
NOAA	National Oceanic and Atmospheric Administration
NO_3NO_2-N	nitrate-nitrite nitrogen
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric Turbidity Unit
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RDL	reporting detection limit
RPD	relative percent difference
SMART	Strategic Monitoring and Assessment for River basin Teams
SOP	standard operating procedure
SR	state road
SSolids	suspended solids
SU	standard units
Temp	temperature
TDS	total dissolved solids
TKN	total Kjeldahl nitrogen
TMDL	Total Maximum Daily Load
TN	total nitrogen
TPhos	total phosphorus
Turb	turbidity
uS/cm	microsiemens per centimeter
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
WES	Wall Experiment Station
WWTP	Wastewater Treatment Plant
%sat	percent oxygen saturation

INTRODUCTION

The Chicopee watershed, part of the Connecticut River Basin, encompasses 721 square miles (mi^2) and part or all of 39 cities and towns in the central part of Massachusetts. The Chicopee River Basin is comprised of three watersheds, the Swift, Ware, and Quaboag Rivers; these form the mainstem Chicopee River in the village of Three Rivers, Palmer. From there, the Chicopee flows 17.9 miles (mi) westward to its terminus at the Connecticut River in Chicopee, MA. Annual precipitation ranges from 46 to 50 inches (in) over most of the watershed, with a section in the northwest area averaging 50 to 54 in, and a very small area in the southwest ranging from 44 to 46 in (Ostiguy et al 2010). Coldwater fisheries resources (CFR) have been identified on 97 streams within the Chicopee watershed, but not the mainstem itself (MassDFG 2011). For a detailed description of the Chicopee River Watershed, see Weinstein et al (2011) and EOEA (2012) at http://www.mass.gov/eea/agencies/massdep/water/watersheds/water-quality-assessments.html#2 .

The Swift watershed drains 215 mi^2 in the westernmost Chicopee basin. There are three northern branches that flow into the Quabbin Reservoir (39.4 mi^2), the primary water supply for the Boston area as well as some cities and towns near the reservoir itself (48 cities, towns and districts total). From the outlet of Quabbin Reservoir, the Swift River flows 9.8 mi in a southerly direction to its confluence with the Ware River in Palmer. The entire river system is dominated by reservoir operations at the Quabbin, which is managed for flood control and minimum flow release to the Swift River, in addition to water supply. For a detailed description of the Quabbin Reservoir, see http://www.mass.gov/eea/docs/dcr/watersupply/watershed/2010quabbinwqreport.pdf (Lee 2011). Among other streams, the Swift River mainstem, as well as the East, Main and West Branches of the Swift River, are CFRs (MADFG 2011).

The Ware River watershed drains 218 mi^2 in the central part of the Chicopee basin. The East and West branches converge in Barre, just above the U.S. Army Corps of Engineers (USACE) Barre Falls Dam flood control project. The Barre Falls Dam is operated as a dry bed reservoir (no recreational pool maintained) in a run-of-river mode most of the time; for more information on the Barre Falls Project see http://www.nae.usace.army.mil/Missions/Recreation/BarreFallsDam.aspx (USACE 2012). From the confluence of the East and West Ware Rivers, the Ware River flows in a generally southwest direction approximately 34 mi until joining the Quaboag River in Palmer. The West Branch of the Ware River and the Prince River are CFRs, in addition to numerous other streams (MADFG 2011).

The Quaboag watershed drains 212 mi^2 in the southernmost Chicopee watershed. The Quaboag River originates at the outlet of Quaboag Pond in Brookfield and flows southwest until it joins the Ware River. Major CFRs in the Quaboag watershed include the Sevenmile and Cranberry Rivers (MADFG 2011).

The purpose of this technical memo is to present observations and data collected from 1998-2004 as part of the Strategic Monitoring and Assessment for River basin Teams (SMART) program in the Chicopee watershed. Bimonthly water quality monitoring in the Chicopee Watershed began in June 1998. The sampling plan matrix for the SMART monitoring program years 1998-2004 is presented in Table 1; the location of sampling stations is presented in Figure 1. Sampling components at all stations included *in situ* measurements, physical/chemical and nutrient sampling, flow measurements (at existing United States Geological Survey, or USGS, gaging stations), and general field observations. Each sampling component is described in the sections that follow.

The quality assurance/control (QA/QC) plan for the SMART program is presented in CN 12.1*: Quality Assurance Project Plan* [QAPP] *Strategic Monitoring and Assessment for River basin Teams (SMART) (Blackstone, Chicopee, Concord, French/Quinebaug, Millers, and Nashua Watersheds) 2008-2012* (Beaudoin 2010). The QAPP presents data quality objectives, quality assurance procedures, and other program-specific information.

Some of the data collected in the Chicopee Watershed in 2003 were included in the report *Chicopee River Watershed: DWM Year 2003 Water Quality Monitoring Data, Technical Memorandum TM-36-3* (MassDEP 2006a).

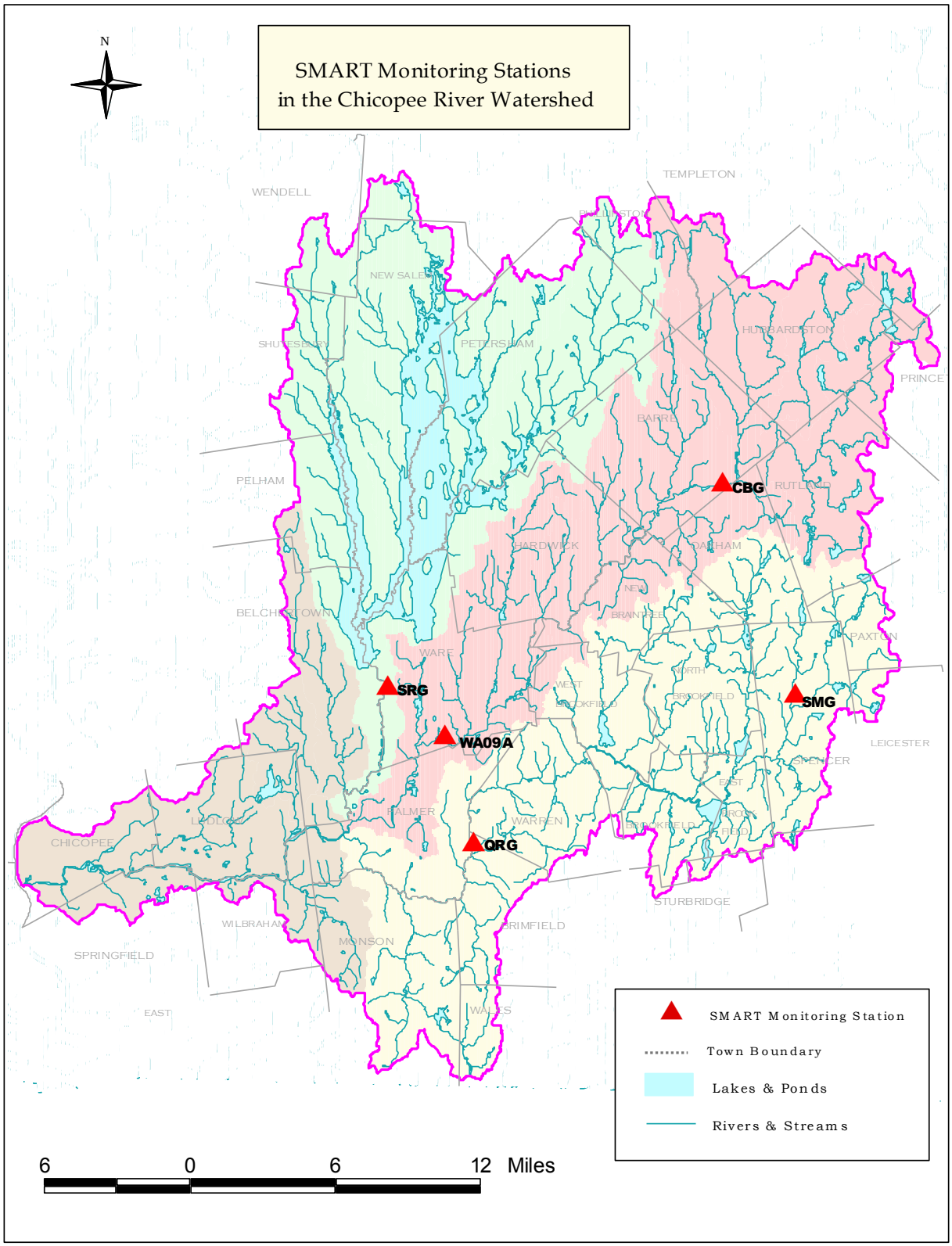
Aerial photos were obtained from Google Earth (2011a, 2011b, 2011c, 2011d, 2011e) at a height of approximately 4,000 feet (ft) with the exception of Station SRG; as the Quabbin Reservoir and Winsor Dam dominate conditions at this station, the height was extended to approximately 6,750 ft to include these features.

Quabbin Reservoir, north from the Visitor Center, Belchertown August 25, 2009 (photo: T. Beaudoin)

Table 1 Chicopee Basin SMART Sampling Summary – 1998 through 2004

Location and Segment Numbers	Station Name	Station Type	Dates Sampled[1,2]
Swift River @ USGS flow gaging station, River Road, Ware MA36-09	SRG	Reference	1998: 6/24, 7/15, 8/19, 9/16, 10/14 1999: 4/14, 5/12, 7/14, 8/11, 9/8, 11/9 2000: 4/12, 6/14, 8/9, 10/25, 12/13 2001: 3/28, 5/23, 7/25, 9/19, 11/19 2002: 1/23, 3/20, 5/15, 7/17, 9/18, 11/13, 2003: 2/12, 4/16, 5/14[2], 6/18, 7/30[2], 8/20, 10/22 2004: 2/5, 3/24, 5/19, 7/20, 9/22, 11/9 [1]The SMART Monitoring program began in the Chicopee basin in June 1998. [2]Two additional surveys were conducted in 2003 in partnership with the DWM Year 2 monitoring program.
Ware River @ USGS flow gaging station, Worcester Road (SR-122), Barre MA36-03	CBG	Reference	
Ware River @ Gibbs Crossing, Old Belchertown Road, Ware MA36-06	WA09A	Impact	
Sevenmile River @ USGS flow gaging station, Cooney Road, Spencer MA36-11	SMG	Reference	
Quaboag River @ USGS flow gaging station, Boston Road (SR-67), Palmer MA36-16	QRG	Impact	

Figure 1 MassDEP SMART Chicopee River Watershed Water Quality Station Locations



PROJECT OBJECTIVES

The primary water quality objectives of the SMART monitoring program are:

- Document baseline water quality by: providing information on low flow/event flow variation, seasonal variation and frequency of selected constituents; and establishing reference distributions of key constituents for ecoregion delineation and "clean water" sites;
- Estimate loads of detected water constituents at key locations by: quantifying nitrogen loadings to coastal waters; and calculating phosphorous loads upstream/downstream of representative land use areas;
- Define long term trends in water quality by: documenting improvements associated with major abatement projects; and identifying trends at least-impacted stations (that may result from factors such as acid precipitation);
- Assess attainment of water quality uses by: comparing existing water quality with water quality standards; and by assessing use support for the fishable/swimmable goal;
- Provide support for other programs by: determining reference distributions for ecoregion stations; conducting trend analysis for the 305(b) reports and basin plans; quantifying nutrient loadings for load allocations (TMDLs); obtaining data on nonpoint source loadings for more intensive Year 2 sampling; providing guidance for volunteer monitoring; collecting data for development of statistically-based water quality standards and for improvement of CSO and Stormwater policies; and developing a long-term database on conditions at key locations for the development of new programs and basic research.

As stated in the Introduction, this document presents observations and data collected in the Chicopee River Watershed under the SMART program from 1998 - 2004. An assessment of the data will be presented in future reports.

METHODS

Water quality samples were collected in the Chicopee basin on the dates shown in Table 1 for the parameters described below; station locations are shown in Figure 1. The parameters monitored in the SMART program include:

- *in situ* measurements: dissolved oxygen (DO), percent oxygen saturation (% sat), pH, specific conductivity (cond), temperature (Temp), depth and total dissolved solids (TDS);
- physico-chemical constituents: total alkalinity, chlorides, hardness, total suspended solids (SSolids), turbidity (turb);
- nutrients: ammonia-nitrogen (NH_3-N), nitrate-nitrite-nitrogen (NO_3NO_2-N), total Kjeldahl nitrogen (TKN, 1998-2003), total nitrogen (TN, 2004), and total phosphorus (TPhos); and
- Microtox® from July 12, 2000 through July 11, 2001.

Water quality sampling procedures are included in *Grab Collection Techniques for DWM Water Quality Sampling, Standard Operating Procedure* (MassDEP 1999b). Use of the *in situ* monitoring equipment followed procedures set forth in *CN 4.0 Water Quality Multi-probe Instrument Use, Standard Operating Procedure* [SOP] (MassDEP 1999a). Physical/chemical and nutrient samples were analyzed at the Wall Experiment Station (WES), the Massachusetts Department of Environmental Protection (MassDEP) analytical laboratory located in Lawrence, Massachusetts. All samples were collected, transported, analyzed, and discarded according to chain-of-custody procedures.
In addition to the measurements and analytes noted above, field observations were recorded at each station on standardized field sheets, field notebooks, and as photographs. Field observations included date/time, location, crewmembers, snow cover, canopy cover, water odors, colors, sheens, foams, estimated river height and velocity, weather conditions, observed uses, wildlife, aquatic algae and macrophytes, potential pollution sources, and unusual conditions. Number and type of samples were recorded, as well as the last set of *in situ* data collected. A summary of field observations by station collected during this sampling period are presented in

Table 2 through Table 6 following the station descriptions.

Each station selected for the SMART Monitoring program is described according to key characteristics associated with water quality at that location, as follows:

- Reference: a reference station is located in a stream segment that is minimally influenced by anthropogenic activities;
- Impact: an impact station is located where several sources of pollution come together and can be used to calibrate a mass balance model, or where critical reactions take place such as at an oxygen sag point; and
- Boundary: a boundary station is located at a pour point i.e., where water leaves a designated river basin, or at a state line.

Field sheets, raw data files, chain of custody forms, lab reports, and other metadata used in this report are managed and maintained by the MassDEP Division of Watershed Management (DWM) in the Water Quality Access Database in Worcester, MA. The validation of the water quality data included data entry into DWM databases, data entry quality control checks, analysis for outliers, blank contamination, duplicates, precision, and holding time violations, followed by project level review; see CN 56.0. The project coordinator, as identified in the QAPP for the SMART program, reviews the data for reasonableness, completeness and acceptability; see CN 83.0, CN149.0, CN202.0, CN211.0, and CN265.0 for the DWM data validation reports of 1999-2004 (MassDEP 2001, 2003, 2004b, 2005b, 2005a, 2006b).

Due to resource limitations at the WES laboratory, samples collected for nutrient analyses were frozen and later analyzed for total phosphorous only, from October 2003 through June 2004. During this time, total alkalinity, chlorides and hardness analyses were also unavailable; and turbidity analyses were performed at the DWM lab.

Although samples were collected for Microtox® analyses during the time period noted above, continuous manufacturer's product contamination issues with the assay's growth media produced invalid results and therefore, prevented use of the data.

STATION OBSERVATIONS

Station SRG – Swift River at the USGS flow gaging station, River Road, Ware, MA (river mile 8.155)

Figure 2 Google Earth view of Station SRG area

Figure 3 Station SRG upstream (7/17/2002)

Station SRG was accessed from the eastern shore of the Swift River at the USGS flow gaging station off River Road, Ware, MA. Samples were collected by wading to flowing water from 6/24/1998 through 11/9/2004. Station SRG serves as a reference station.

Land uses near this station included water supply watershed, forest, rural residential, and roadways (Figure 2; Google Earth 2011a). The water flowing at this station originates almost entirely from the hypolimnetic release from the 25,000-acre Quabbin Reservoir, located approximately 1.5 miles upstream. Completed in 1939, the Quabbin was created to meet water supply needs in the metropolitan Boston area. In 2010, water was directed from there to the Wachusett Reservoir for water supply on 217 days, with an average of approximately 224 million gallons per day (MGD); an additional 8.25 MGD (approximate) was directed to three local communities via the Chicopee Valley Aqueduct. No municipal National Pollutant Discharge Elimination System (NPDES) discharges are located upstream (design flow greater than 1 MGD). The Swift River corridor at and above Station SRG is designated as Natural Heritage and Endangered Species (NHESP) Priority Habitat of Rare Species (see http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/regulatory-review/regulatory-maps-priority-and-estimated-habitats/, EOEEA 2013).

The river is approximately 25 feet (ft) wide and typically 2 to 4 ft deep (Figure 3), with undercut banks at Station SRG. As this segment of the river reflects hypolimnetic conditions at the Quabbin, water temperature at the station was typically cooler than the other watershed stations in the summer and warmer in the winter. The water level at Station SRG was determined by releases at Winsor Dam, and was frequently out of sync with water levels in the rest of the watershed i.e., high water levels at SRG at the same time as low levels at the other four monitoring stations, and vice versa.

Deciduous and evergreen trees provided shade along the banks; although the canopy did not extend over the channel, the orientation of the river corridor relative to the sun resulted in a mostly shaded streambed during monitoring events; see

Table 2 for a summary of field observations at Station SRG. The bottom consisted mainly of cobble and gravel, with sand and a few small boulders also present. A beaver dam was located approximately 420 feet upstream; although it was active in 2000, it appeared to be abandoned later in the program. Aquatic macrophytes observed at Station SRG ranged from sparse to moderate coverage, and included year-round beds of *Callitriche* sp. (water starwort), as well as seasonal populations of *Vallisneria* sp. (eel grass, tape grass), *Chara* sp. (muskwort, 2 events) and narrow leaf *Potamogeton* sp. (pondweed, 1 event). Periphyton, when noted, consisted of sparse to dense moss (15 events) and infrequently, algae (4 events).

When noted, the water column was clear on all events, with slight turbidity noted on one date (11/19/2011). Station SRG was characterized by an absence of trash, color, odor and sheens, with foam noted on 2 dates. Minor quantities of trash were noted infrequently on stream banks (3 events) but not in the channel; items noted included beer [bottle] caps and paper waste.

Riverine and terrestrial wildlife observations noted at this station included the evidence of beaver (*Castor canadensis*) in the upstream dam, birds calling mosquitoes (sometimes dense) and fish jumping. This section of the river is open to catch-and-release fishing, and fishermen were often observed during this monitoring period.

Station CBG – Ware River at the USGS flow gaging station, Worcester Road (SR-122), Barre, MA (river mile 30.290)

Figure 4 Google Earth view of Station CBG area

Figure 5 Station CBG upstream (9/22/2004)

Station CBG was generally accessed from the northern shore of the Ware River upstream of the pedestrian bridge, the USGS flow gaging station, and the low head Gaging Station Pool Dam in Barre, MA. Samples were collected from shore manually or with a sampling pole from 6/24/1998 through 11/9/2004; a bucket drop from the foot bridge was utilized on 2/12/2003 when ice shelves along the river edges rendered the shoreline inaccessible. Station CBG serves as a reference station.

Upstream land uses include forest, rural residential, and roadways, with most of the upstream area protected for water supply (Figure 4; Google Earth 2011b). The Ware River Intake is located approximately 0.4 miles upstream; water is diverted from that point to the Quabbin Reservoir to supplement water levels there. There are no upstream NPDES discharges. The Ware River corridor at and above Station CBG is designated as NHESP Priority Habitat of Rare Species (see http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/regulatory-review/regulatory-maps-priority-and-estimated-habitats/, EOEEA 2013).

The river at this location is a run, approximately 20 ft wide; the depth was unknown, but generally greater than 3 feet (hip wader height); see Figure 5. Deciduous and evergreen trees provided shade along the banks, while most of the channel was open to the sky. However, the sun fell behind the hill south of the river by early afternoon on most sampling events, placing the river in its shadow throughout much of the day. Observations of conditions beneath the surface of the water column were typically limited due to deep color, foam, and surface light reflection at this location. When visible, the stream bed consisted of a cement bottom near the foot bridge, with boulder, cobble, gravel and sand upstream of the cement. Periphyton was typically visible only near the water surface, and consisted mainly of moss (12, n=21) and infrequently, filamentous algae (4). Cardinal flowers (*Lobelia cardinalis*) were frequently observed along the upstream channel periphery, but aquatic macrophytes were absent from the stream channel itself. Other than mosquitoes and bird calls, no animal observations were noted during this time period.

The water column ranged from clear (8 events) to slightly turbid (10) to murky (3) (n=21 observations). Water color was consistently described as tannic and/or brown (n=26). The river here typically lacked odor, with fishy noted twice and musty and pond odors once each. Foam was also consistently present (28, n= 29), ranging from sparse to very dense. Trash (when observable) was absent, with the exception of a single observation of coins (11/19/2001) and a “small quantity” of trash (7/17/2002).

Station WA09A – Ware River at Gibbs Crossing, Old Belchertown Road, Ware, MA (river mile 8.504)

Figure 6 Google Earth view of Station WA09A area

Figure 7 Station WA09A upstream (9/18/2002)

Station WA09A was accessed from the eastern shore of the Ware River off Old Belchertown Road, downstream (north) of the Old Belchertown Road (State Road SR-32) Bridge, Ware, MA. Samples were collected by wading to flowing water or, when the flow was too high and/or fast, from shore with a sampling pole from 6/24/1998 through 11/9/2004. Station WA09A serves as an impact station.

Upstream land uses included forest, town center, residential, industrial/commercial, and roadways (Figure 6; Google Earth 2011c). There are no large water withdrawals within 5 river miles upstream. The Ware Wastewater Treatment Plant (WWTP), a major municipal NPDES discharge, is located 2.6 mi upstream. The Ware River corridor at and above Station WA09A is designated as NHESP Priority Habitat of Rare Species.

The river is a run in this area; the channel is approximately 90 ft wide and 1 to 3+ feet deep. The streambed was typically shaded along the shores (Figure 7). Banks were undercut throughout the site area. The bottom consisted mainly of boulder, cobble, gravel and sand. Periphyton was often present, and included algal films, filamentous algae, and moss (12, n=22 events). Aquatic macrophytes included *Potamogeton* sp. (pondweed), *Elodea* sp. (waterweed), *Vallisneria* sp., (eel grass or tape grass), and *Myriophyllum* sp. (milfoil). Aquatic organisms observed at Station WA09A included crayfish (Cambaridae), white sucker (dead), pumpkinseed, dace, trout, and abundant small fish (2-3"). Occasional bird calls, (often dense) mosquitoes, water striders (Gerridae), adult caddisflies, dragonflies, gypsy moth nests (9/19/2001) were also observed.

The water column at this station ranged from clear (11, n=22 observations) to slightly turbid (8), to moderate or murky (2). Water color was red/tannic on approximately half of the sampling events (10, n=22); other colors noted included brown (7) and clear (5). The water column lacked odor on most events; "pondish", slight septic and musty odors were also noted (one event each). Foam was present on most events (17, n=24) and ranged from sparse to moderate; sheens were present twice, as pollen (n=21). Trash was noted on most events, and consisted mainly of metals, wood, broken glass and floatables.

Station SMG – Sevenmile River at the USGS flow gaging station, Cooney Road, Spencer, MA (river mile 5.835)

Figure 8 Google Earth view of Station SMG area

Figure 9 Station SMG upstream (9/22/2004)

Station SMG was accessed from the western shore of the Sevenmile River at the USGS flow gaging station, upstream of the Cooney Road Bridge, Spencer, and downstream of the small (approximately 1 ft height) granite slab dam. Samples were collected by wading to flowing water or manually from shore from 6/24/1998 through 11/9/2004. Station SMG serves as a reference station.

Land uses near and upstream of this station include forest, rural residential, agriculture, and sand/gravel operations (Figure 8; Google Earth 2011d). Station SMG is within the Zone II of (downstream) water supply wells for the town of Spencer. There are no upstream municipal NPDES discharges. The Sevenmile River corridor at and above Station SMG is designated as NHESP Priority Habitat of Rare Species and NHESP Estimated Habitat of Rare Wildlife.

The river is a run both above and below the small granite block "dam", approximately 20 ft wide and typically less than 1 foot in depth (Figure 9). Trees provide shade over most of the upstream corridor, but the section between the dam and the bridge is open to the sky. The bottom consisted mainly of large granite blocks, as well as cobble, gravel and sand. Although riparian vegetation was abundant, few aquatic macrophytes were observed at Station SMG; these included *Lobelia cardinalis* (cardinal flower), and small patches of sedges (*Carex* sp.) and grasses (Gramineae). Aquatic organisms noted included "sculpin-like" fishes, American bullfrog (*Rana catesbeiana*), crayfish (Cambaridae, 1 dead), yellow spotted turtle (*Clemmys guttata*), and small (unspecified) frogs and tadpoles. Other biota observations included domestic dogs, common garter snake *(Thamnophis sirtalis),* (sometimes "aggressive") mosquitoes, stoneflies, dragonflies, damselflies, gypsy moth nests (9/19/2001) and bird calls.

The water column noted at this station was typically clear (16, n=23 observations), with slight turbidity noted on 5 events and highly turbid/murky conditions on one (following a snow/rain storm). Water color was also typically clear (16, n=20); brown (2) and red/tannic (2) were also noted. Water odors were absent at this location, as were sheens, during this time period. Foam was present on most events (24 of 30), and sparse when noted. Trash was limited to the granite blocks comprising the upstream dam.

Station QRG – Quaboag River at the USGS flow gaging station, Boston Road (SR-67), Palmer, MA (river mile 10.855)

Figure 10 Google Earth view of Station QRG area

Figure 11 Station QRG upstream (9/22/2004)

Station QRG was accessed from the western shore of the Quaboag River upstream of the USGS flow gaging station near the West Brimfield/Palmer corporate boundary, MA. Samples were collected by wading to flowing water from 6/24/1998 through 11/9/2004. Station QRG serves as an impact station.

Land uses near and upstream of this station include forest, residential, commercial, sand and gravel operations, railways and roadways (Figure 10; Google Earth 2011e). The nearest upstream municipal NPDES discharge is approximately 2.5 mi. above this site in West Warren. There are no large water withdrawals near Station QRG.

The river is a run in this area, approximately 100 ft wide and 1 to 3+ feet deep (Figure 11). The railroad corridor is adjacent to the river upstream. Deciduous trees provide shade along the shoreline. Emergent plants were dense and diverse along the channel edges, but the streambed was usually devoid of vegetation. The bottom consisted mainly of sand, with boulder, cobble, gravel and silt also present. Biota observations included white-tailed deer tracks at the river edge (*Odocoileus virginianus),* dog tracks, raccoon tracks (*Procyon lotor*), North American bullfrog (*Rana catesbeiana*), unidentified snakes and frogs, mosquitoes, caddisflies, water striders (Gerridae), and bird calls. Fishermen were often present. On 7/17/2002, water users included people bathing in the river upstream of the sampling site and several canoeists.

The water column noted at this station was typically clear (11, n=21 observations) or slightly turbid (7), with moderate turbidity noted once (wet weather conditions). The water color was typically red (23, n=28), ranging from slight red to "Kool-Aid" to tannic to brown/red; additional colors included brown (2), clear (1), and light yellow (1). The station was characterized by a lack of water odors, with two observations of musty. Foam was present on most events (24 of 26). Trash was present on many sample dates, with observations of tires, appliances, metals, gears, bagged trash, and floatables.

Table 2 Summary of Observations at Station SRG, Swift River, Ware/Belchertown 1998-2004

Survey Dates	Substrate	Trash	Periphyton	Color	Odor	Foam	Sheen	Turbidity	Wet/Dry Conditions
6/24/1998	--	--	--	--	--	--	--	--	Wet
7/15/1998	--	--	--	--	--	--	--	--	Dry
8/19/1998	--	--	--	--	--	--	--	--	Wet
9/16/1998	--	--	--	--	--	--	--	--	Dry
10/14/1998	--	--	--	--	--	--	--	--	?
4/14/1999	Cobble/gravel	--	--	--	--	--	--	--	Dry
5/12/1999	--	--	--	--	--	--	--	--	Dry
7/14/1999	--	--	--	Clear	--	--	--	Clear	Dry
8/11/1999	--	--	--	--	--	--	--	--	Dry
9/8/1999	--	--	--	--	--	--	--	--	Wet
11/9/1999	--	--	--	--	--	--	--	--	Dry
4/12/2000	--	--	--	--	--	--	--	--	W/D
6/14/2000	--	--	--	Clear	--	Sparse	--	Clear	Wet
8/9/2000	--	--	--	--	--	None	--	--	Wet
10/25/2000	--	--	--	--	--	--	--	--	Dry
12/13/2000	--	--	--	Clear	--	--	--	Clear	Wet
3/28/2001	--	--	--	--	--	--	--	--	?
5/23/2001	--	--	--	--	--	--	--	--	Wet
7/25/2001	--	None	Sparse: brown moss film	Clear	None	None	None	Clear	Dry
9/19/2001	--	None	Sparse: green mossy filamentous	Clear	None	Foam	None	Clear	Dry
11/19/2001	--	None	Dense: mossy green	Clear	None	None	None	Slight	Dry
1/23/2002	--	None	Moderate: bright green filamentous, slime, moss	Clear	None	None	None	Clear	Wet
3/20/2002	--	None	Dense: green filamentous	Clear	None	None	None	Clear	Wet
5/15/2002	--	None	Dense: mossy bright green	Clear	None	None	None	Clear	Wet
7/17/2002	--	None	Sparse: mossy brown/green filamentous	Clear	None	None	None	Clear	Dry
9/18/2002	--	None	Sparse: mossy brown/green	Clear	None	None	None	Clear	Wet
11/13/2002	--	None	Moderate: mossy green	Clear	None	None	None	Clear	Wet
2/12/2003	--	None	Dense: bright green filamentous	Clear	None	None	None	Clear	Wet
4/16/2003	Silt along eastern side of channel	None	Moderate: green/brown moss	None	None	None	None	Clear	Dry
6/18/2003	Boulder/cobble/gravel/sand/silt	None	Dense: mossy green	Clear	None	None	None	Clear	Wet
7/30/2003	--	None	None	Clear	None	None	None	Clear	Dry
8/20/2003	Cobble/gravel/sand	None	None	Clear	None	None	None	Clear	Dry
10/22/2003	Boulder/cobble/gravel/sand/silt	None	None	Clear	None	None	None	Clear	Dry
2/5/2004	Cobble/gravel/sand/silt	None	None	Clear	None	None	None	Clear	Wet
3/24/2004	Boulder/cobble/gravel/sand/silt	None	Dense: green moss	Clear	None	None	None	Clear	Wet
5/19/2004	Boulder/cobble/gravel/sand	None	Sparse: green moss	Clear	None	None	None	Clear	Wet
7/20/2004	Boulder/cobble/gravel/sand/silt	None	Moderate: moss	Clear	None	None	None	Clear	Wet
9/22/2004	Boulder/cobble/gravel/sand/silt	None	Moss	Clear	None	None	None	Clear	Wet?
11/9/2004	Cobble/gravel/sand/silt	None	Moss	Clear	None	None	None	Clear	Wet?

-- : Data not available

Table 3 Summary of Observations at Station CBG, Ware River, Barre 1998-2004

Survey Dates	Substrate	Trash	Periphyton	Color	Odor	Foam	Sheen	Turbidity	Wet/Dry Conditions
6/24/1998	--	--	--	--	--	--	--	--	Wet
7/15/1998	--	--	--	--	--	--	--	--	Dry
8/19/1998	--	--	--	--	--	--	--	--	Wet
9/16/1998	--	--	--	--	--	--	--	--	Dry
10/14/1998	--	--	--	--	--	--	--	--	?
4/14/1999	Gravel/cobble	--	--	--	--	--	--	--	Dry
5/12/1999	--	--	--	--	--	--	--	--	Dry
7/14/1999	--	--	--	--	--	Sparse	--	--	Dry
8/11/1999	--	--	--	--	--	--	--	--	Dry
9/8/1999	--	--	--	--	--	--	--	--	Wet
11/9/1999	--	--	--	--	--	--	--	--	Dry
4/12/2000	--	--	--	--	--	Foam	--	--	W/D
6/14/2000	--	--	--	Strong tannic	--	Very dense	--	--	Wet
8/9/2000	--	--	--	Strong tannic	--	Very dense	--	--	Wet
10/25/2000	--	--	--	--	--	Very dense	--	--	Dry
12/13/2000	--	--	--	Strong tannic	--	Foam	--	--	Wet
3/28/2001	--	--	--	Tannic	--	Foam	--	--	?
5/23/2001	--	--	--	Strong tannic	--	Very dense	--	--	Wet
7/25/2001	--	None	Moderate: mossy brown film	Brown	None	Thin streamers	None	Slight	Dry
9/19/2001	--	None	Moderate: mossy brown film	Brown	None	Sparse	None	Highly cloudy	Dry
11/19/2001	--	Coins	Dense: green filamentous; mossy brown film	Brown	None	Moderate	None	Slight	Dry
1/23/2002	--	None	Sparse: brown mossy	Tannic	None	Foam	None	Slight	Wet
3/20/2002	--	None	Moderate: mossy brown filamentous	Red	None	Foam	None	Slight	Wet
5/15/2002	--	None	Dense: mossy brown	Red	None	Foam	None	Slight	Wet
7/17/2002	Unobservable	Sparse	Unobservable	Brown	None	Foam	None	Suspended solids/murky	Dry
9/18/2002	--	None	None	Brown	None	Foam	None	Slight	Wet
11/13/2002	Unobservable	Unobservable	Unobservable; mossy brown/green where visible on channel walls	Brown	None	Foam	None	Slight	Wet
2/12/2003	--	None	None	Brown	None	None	None	Slight	Wet
4/16/2003	--	None	Dense: brown moss	Brown/red	None	Foam	None	Clear	Dry
6/18/2003	Boulder/sand	None	Moderate: green/grey/brown film	Highly tannic, "Kool-Aid"	None	Dense	None	Slight	Wet
7/30/2003	--	Unobservable	Unobservable	Brown/red	None	Foam	None	Suspended solids/murky	Dry
8/20/2003	Unobservable	Unobservable	Unobservable	Red	None	Foam	None	Clear	Dry
10/22/2003	Boulder/sand	None	None	Red	None	Foam	None	Clear	Dry
2/5/2004	Boulder/cobble/gravel	None	Moderate: moss	Red	None	Sparse	None	Clear	Wet
3/24/2004	Unobservable	None	Sparse: green moss	Red	None	Sparse	None	Clear	Wet
5/19/2004	Unobservable	None	Very dense: brown filamentous	Red	Occasional fishy/pond odors	Moderate	None	Clear	Wet
7/20/2004	Boulder/cement	None	Sparse: green filamentous; dense: moss	Deep red	Slight fishy, musty	Foam	None	Slight	Wet
9/22/2004	Boulder/cobble/gravel	None	None	Deep red	None	Dense	None	Clear	Wet?
11/9/2004	Boulder/gravel/sand/silt	None	Dense: moss	Red	None	Moderate	None	Clear	Wet?

-- : Data not available

Table 4 Summary of Observations at Station WA09A, Ware River, Barre 1998-2004

Survey Dates	Substrate	Trash	Periphyton	Color	Odor	Foam	Sheen	Turbidity	Wet/Dry Conditions
6/24/1998	--	--	--	--	--	--	--	--	Wet
7/15/1998	--	--	--	--	--	--	--	--	Dry
8/19/1998	--	--	--	--	--	--	--	--	Wet
9/16/1998	--	--	--	--	--	--	--	--	Dry
10/14/1998	--	--	--	--	--	--	--	--	?
4/14/1999	--	--	--	--	--	--	--	--	Dry
5/12/1999	--	--	--	--	--	--	--	--	Dry
7/14/1999	--	--	Very dense: filamentous	--	--	--	--	--	Dry
8/11/1999	--	--	--	--	--	--	--	--	Dry
9/8/1999	--	--	--	--	--	--	--	--	Wet
11/9/1999	--	--	--	--	--	--	--	--	Dry
4/12/2000	--	--	--	--	--	--	--	--	W/D
6/14/2000	--	--	--	--	--	--	--	--	Wet
8/9/2000	--	--	--	Slight red	--	Sparse	--	--	Wet
10/25/2000	--	--	--	--	--	Sparse	--	--	Dry
12/13/2000	--	--	--	--	--	--	--	--	Wet
3/28/2001	--	--	--	Slight red	--	--	--	--	?
5/23/2001	--	--	--	--	--	Foam	--	Turbid	Wet
7/25/2001	--	None	Dense: mossy brown film	Brown	"Pondish"	None	Pollen	Slight	Dry
9/19/2001	--	None	Dense: thick brown floc	Brown	None	None	Pollen	Slight	Dry
11/19/2001	--	Metal and wooden debris	Moderate: mossy filamentous	Brown	Slight septic	Sparse	None	Slight	Dry
1/23/2002	--	Metal	None	Clear	None	None	None	Slight	Wet
3/20/2002	--	Trash, floatables	Moderate: green/brown filamentous	Clear	None	Sparse	None	Clear	Wet
5/15/2002	--	Trash	Unobservable	Brown	None	Foam	None	Slight	Wet
7/17/2002	--	None	Dense: brown filamentous; mossy brown floc	Slight red	None	Foam	None	Slight	Dry
9/18/2002	--	Metals	Brown	Brown	Musty	None	None	Clear	Wet
11/13/2002	Unobservable	Unobservable	Unobservable	Brown	None	Sparse	None	Suspended solids/murky	Wet
2/12/2003	--	None	Sparse: red/brown/grey filamentous	Clear	None	None	None	Clear	Wet
4/16/2003	Large recent deposits of road sand downstream of bridge	Metals, tires, broken glass	Moderate: green/light green moss and filamentous	Tannic	None	None	None	Clear	Dry
6/18/2003	Boulder/cobble/gravel/sand	Trash	Unobservable	Brown	None	Foam	None	Slight	Wet
7/30/2003	Boulder/cobble/gravel/sand/silt	Metals, broken glass	None	Red	None	Foam	None	Clear	Dry
8/20/2003	Boulder/cobble/gravel/sand	Metals, broken glass	None	Highly tannic	--	Foam	None	Clear	Dry
10/22/2003	Cobble/gravel/sand	Metals, wood	None	Clear	None	Foam	None	Clear	Dry
2/5/2004	Unobservable	Unobservable	Unobservable	Clear	None	None	None	Clear	Wet
3/24/2004	Boulder/cobble/gravel/sand	Broken glass, metals, floatables	None	Slight red	None	Sparse	None	Clear	Wet
5/19/2004	Boulder/cobble/gravel/sand/silt	Metals, wooden planks	Moderate: moss	Red	None	Sparse	None	Clear	Wet
7/20/2004	Boulder/cobble/gravel/sand/silt	Metlas, planks, bottles	Sparse: blue-green filamentous and orange/white film	Highly tannic	None	Moderate	None	Slight	Wet
9/22/2004	Cobble/gravel/sand/silt	Trash	None	Deep red	None	Moderate	None	Moderate	Wet?
11/9/2004	Cobble/gravel/sand/silt	Metals, floatables	Very dense: grey filamentous	Red	None	Moderate	None	Clear	Wet?

-- : Data not available

Table 5 Summary of Observations at Station SMG, Sevenmile River, Spencer 1998-2004

Survey Dates	Substrate	Trash	Periphyton	Color	Odor	Foam	Sheen	Turbidity	Wet/Dry Conditions
6/24/1998	--	--	--	--	--	--	--	--	Dry
7/15/1998	--	--	--	--	--	--	--	--	Dry
8/19/1998	--	--	--	--	--	--	--	--	Dry
9/16/1998	--	--	--	--	--	--	--	--	Dry
10/14/1998	--	--	--	--	--	--	--	--	Wet
4/14/1999	Cobble/gravel	--	--	--	--	--	--	--	Dry
5/12/1999	--	--	--	--	--	--	--	--	Dry
7/14/1999	--	--	--	--	--	Foam	--	--	Dry
8/11/1999	--	--	--	--	--	Foam	--	--	Dry
9/8/1999	--	--	--	--	--	Sparse	--	--	Dry
11/9/1999	--	--	--	--	--	--	--	--	Dry
4/12/2000	--	--	--	--	--	Sparse	--	--	Wet
6/14/2000	--	--	--	--	--	Foam	--	--	Wet
8/9/2000	--	--	--	--	--	Sparse	--	--	Dry
10/25/2000	--	--	--	--	--	Sparse	--	--	Dry
12/13/2000	--	--	--	--	--	--	--	Highly turbid	Dry
3/28/2001	--	--	--	--	--	None	--	Slight	Wet
5/23/2001	--	--	--	--	--	None	--	--	Wet
7/25/2001	--	Granite blocks	Dense: brown film; moss	Brown	None	Foam	None	Clear	Dry
9/19/2001	--	Granite blocks	Dense: browm mossy film	Brown	None	Foam	None	Slight	Dry
11/19/2001	--	Granite blocks	Sparse: brown slime	Clear	None	Sparse	None	Slight	Dry
1/23/2002	--	Granite blocks	Sparse: film	Clear	None	None	None	Slight	Dry
3/20/2002	--	Granite blocks	Moderate: brown slime	Clear	None	Sparse	None	Clear	Wet
5/15/2002	--	Granite blocks	--	Red/tannic	None	Sparse	None	Clear	Wet
7/17/2002	--	Granite blocks	Moderate: mossy brown	Clear	None	Foam	None	Clear	Dry
9/18/2002	--	Granite blocks	Sparse: brown mossy film	Clear	None	Foam	None	Clear	Wet
11/13/2002	Unobservable	Granite blocks	Unobservable	--	None	Foam	None	Suspended solids/murky	Wet
2/12/2003	Unobservable	Unobservable	Unobservable	Clear	None	Unobservable	Unobservable	Clear	Dry
4/16/2003	--	--	--	Clear	None	None	None	Clear	Dry
5/14/2003	Boulder/cobble/gravel/sand	Granite blocks	Moderate: brown filamentous, brown film	Light yellow	None	Sparse	None	Clear	Wet
6/18/2003	Boulder/cobble/gravel	Granite blocks	Sparse: brown filamentous; moss	Slight red	None	Foam	None	Slight	Dry
7/30/2003	Boulder/cobble/gravel/sand	Granite blocks	Moderate: green/brown filamentous	Clear	None	Foam	None	Clear	Dry
8/20/2003	Boulder/sand/silt	Granite blocks	Moderate: filamentous, thin film	Clear	None	Foam	None	Clear	Wet
10/22/2003	Boulder/cobble/sand/silt	Granite blocks	Sparse: brown thin film	Clear	None	Foam	None	Clear	Dry
2/5/2004	Unobservable	Unobservable	Unobservable	Clear	None	None	None	Clear	Wet
3/24/2004	Boulder/cobble/gravel/sand	Granite blocks	Dense: green moss	Clear	None	Foam	None	Clear	Dry
5/19/2004	Boulder/cobble/gravel/sand	Granite blocks	Sparse: green filamentous, film	Clear	None	Sparse	None	Clear	Wet
7/20/2004	Boulder/gravel/sand/silt	Granite blocks	Dense: green filamentous, moss	Clear	None	Foam	None	Clear	Wet
9/22/2004	Boulder/cobble/gravel/sand/silt	Granite blocks	Moderate: green film	Clear	None	Foam	None	Clear	Wet
11/9/2004	Boulder/cobble/gravel/sand/silt	Granite blocks	Sparse: brown filamentous	Clear	None	Sparse	None	Clear	Dry

-- : Data not available

Table 6 Summary of Observations at Station QRG, Quaboag River, West Brimfield/Palmer 1998-2004

Survey Dates	Substrate	Trash	Periphyton	Color	Odor	Foam	Sheen	Turbidity	Wet/Dry Conditions
6/24/1998	--	--	--	--	--	--	--	--	Dry
7/15/1998	--	--	--	--	--	--	--	--	Dry
8/19/1998	--	--	--	--	--	--	--	--	Dry
9/16/1998	--	--	--	--	--	--	--	--	Dry
10/14/1998	--	--	--	--	--	--	--	--	Wet
4/14/1999	--	--	--	--	--	--	--	--	Dry
5/12/1999	--	--	--	Red	--	None	--	Turbid	Dry
7/14/1999	--	--	--	Red	--	None	--	--	Dry
8/11/1999	--	--	--	"Kool-Aid"	--	None	--	--	Dry
9/8/1999	--	--	--	Slight red	--	None	--	--	Dry
11/9/1999	--	--	--	Clear	--	None	--	--	Dry
4/12/2000	--	--	--	--	--	--	--	--	Wet
6/14/2000	--	--	--	Red	--	Very dense	--	--	Wet
8/9/2000	--	--	--	Red	--	Sparse	--	--	Dry
10/25/2000	--	--	--	--	--	Sparse	--	--	Dry
12/13/2000	--	--	--	--	--	--	--	--	Dry
3/28/2001	--	--	--	Slight red	--	Sparse	--	--	Wet
5/23/2001	--	--	--	Tannic/red	--	Sparse	--	Turbid	Wet
7/25/2001	--	Tires	Moderate, mossy brown film	Brown/red	None	None	None	Slight	Dry
9/19/2001	--	Shopping cart, seine net	Spasre, brown/red floc	Red	Musty	None	Manganous	Slight	Dry
11/19/2001	--	Trash	None	Brown	None	None	None	Slight	Dry
1/23/2002	--	None	None	Brown/tannic	None	None	None	Slight	Dry
3/20/2002	--	Stove, trash	None	Red	None	Sparse	None	Clear	Wet
5/15/2002	--	Metal corrugated fencing, floatables	None	Red	None	Foam	None	Slight	Wet
7/17/2002	--	None	Sparse, mossy brown	Red	None	Foam	None	Clear	Dry
9/18/2002	--	None	None	Brown	--	None	None	Clear	Wet
11/13/2002	--	None	None	Light yellow	None	Foam	None	Slight	Wet
2/12/2003	Station not sampled on this date; not accessible due to snow/ice								
4/16/2003	--	Dense: tires, metals, miscellaneous	Dense, moss	Brown/tannic	None	None	None	Clear	Dry
5/14/2003	Boulder/sand/silt/mud	Old appliances, trash	Sparse: green filamentous	Brown/red	None	None	None	Slight	Wet
6/18/2003	Boulder/sand/silt	Floatables, tires	None	Red	None	Foam	None	Slight	Dry
7/30/2003	Cobble/gravel/sand/silt	Tires	None	Red	None	Foam	None	Clear	Dry
8/20/2003	Boulder/cobble/gravel/silt	Tire	None	Red	None	Moderate	None	Clear	Wet
10/22/2003	Bedrock/sand/silt/mut	None	None	Red	None	None	None	Clear	Dry
2/5/2004	Station not sampled on this date; not accessible due to snow/ice								
3/24/2004	Boulder/cobble/gravel/sand/silt	Metal gears, floatables	None	Slight red	None	None	None	Clear	Dry
5/19/2004	Boulder/cobble/gravel/sand/silt	Broken glass, floatables, tires	None	Slight red	None	Moderate	Moderate: pollen	Clear	Wet
7/20/2004	Boulder/cobble/gravel/sand/silt/mud	Tires	Sparse: green film	Clear	None	None	None	Clear	Wet
9/22/2004	Cobble/sand/silt	Tires, floatables	None	Slight red	Slight musty	Sparse	None	Moderate	Wet
11/9/2004	Boulder/cobble/gravel/sand/silt	None	Dense: filamentous	Red	None	Very sparse	None	Clear	Dry
-- : Data not available									

SURVEY CONDITIONS

Stream discharge and precipitation data are used to determine hydrologic conditions and, consequently, if water quality surveys should be described as dry- or wet weather-influenced events. Precipitation data for each monitoring event were obtained from the National Oceanic and Atmospheric Administration (NOAA). The presence/absence of precipitation during the five days prior to each sampling event was based on the National Weather Service data located on their website http://www7.ncdc.noaa.gov/IPS/cd/cd.html;jsessionid=ABE64BF7DDF02CF50177DF08D65C8E3B?_page=0&jsessionid=ABE64BF7DDF02CF50177DF08D65C8E3B&state=MA&_target1=Next+%3E (NCDC 2011). Precipitation records from the weather station at the Barre Falls Dam formed the basis of the wet/dry weather determination for all stations; although data were available for stations in Hardwick and Ware, those records were not complete for the period 1998-2004. Average precipitation ranges from 46 to 50 inches across most of the Chicopee watershed; a small area ranges from 50 to 54 inches in the mountainous northwest area (Ostiguy et al 2010).

During dry weather, trace amounts of precipitation may fall, but there is no measurable change in stream flow. The USGS operates five real time stream gaging stations in the Chicopee River Watershed that are applicable to this water quality data set, as shown below:

- Swift River at West Ware, MA Station 01175500 (USGS 2011a),
- Ware River near Barre, MA Station 01172500 (USGS 2011b),
- Ware River at Gibbs Crossing, MA Station 01173500 (USGS 2011c)
- Sevenmile River near Spencer, MA Station 01175670 (USGS 2010d) and
- Quaboag River at West Brimfield, MA Station 01176000 (USGS 2010e).

Data from these stations can be accessed from http://waterdata.usgs.gov/ma/nwis/current?type=dailystagedischarge&group_key=basin_cd&search_site_no_station_nm= (USGS 2011f).

The period of record mean streamflow values are the mean of daily mean values for each day for 79-80 years of record at the USGS gage on the Ware River at Gibbs Crossing, recorded in cubic feet per second (cfs). The daily mean data are reported at http://waterdata.usgs.gov/ma/nwis/dvstat/?referred_module=sw&site_no=01173500&por_01173500_1=1269242,00060,1,1912-08-20,2009-11-24&format=html_table&stat_cds=mean_va&date_format=YYYY-MM-DD&rdb_compression=file&submitted_form=parameter_selection_list(USGS 2011g). The monthly mean discharge values are found at http://waterdata.usgs.gov/ma/nwis/monthly/?referred_module=sw&site_no=01173500&por_01173500_1=1269242,00060,1,1912-08,2009-11&format=html_table&date_format=YYYY-MM-DD&rdb_compression=file&submitted_form=parameter_selection_list (USGS 2011h).

Wet weather is defined as precipitation within a five-day antecedent period that leads to more than a slight increase in stream discharge (i.e., flow) at the five stations listed above. Under dry weather conditions, trace amounts of precipitation may fall, but no measurable change in stream flow occurs. Several of the Chicopee Watershed gaging stations were affected by flow manipulation and it was difficult to distinguish man-made from climate fluctuations on some dates.

Table 7 (precipitation) and Table 8 (stream discharge) contain information on survey conditions during each sampling event. Both the precipitation and the stream discharge data were used to estimate hydrological conditions during water quality sampling. Low flows were compared to the 7Q10 flow (streamflow that spans 7 consecutive days and occurs once every 10 years) at the Ware River gage at Gibbs Crossing, Ware which is 22 cfs (USGS 2011i). When precipitation and discharge data were inconclusive, field observations were used to determine wet/dry conditions.

June 24, 1998 - In the 5-day period preceding the first SMART monitoring event in the Chicopee watershed, 0.64 inches of rain was recorded at the Barre Falls Dam, although none was measured in the 2 days immediately before and during the sampling event. Discharge data recorded at the Ware River at Gibbs Crossing station indicate flows had returned to levels below that when the rain began. Field observations indicate that the water column was clear at all watershed stations. Precipitation and discharge data, as well as field observations, indicate dry weather conditions. Air temperature and cloud cover observations were not recorded.

July 15, 1998 - Precipitation and discharge data indicate a lack of rainfall and consistently decreasing flow during the five days before this monitoring event, indicating dry weather conditions. Air temperature and cloud cover observations were not recorded.

August 19, 1998 - Minor levels of rain were recorded at the Barre Falls Dam in the five days preceding this event (Σ=0.29 in). Discharge on August 19 was lower than five days earlier. Precipitation and discharge indicate dry weather conditions. Air temperature and cloud cover observations were not recorded.

September 16, 1998 - Rain totaled 0.16 in at Barre Falls in the five days preceding this event, while discharge decreased slightly; dry weather conditions are indicated. Air temperature and cloud cover observations were not recorded.

October 14, 1998 – A large volume of rain fell in the 5 days preceding this event (Σ=3.57 inches); data collected on this date reflect wet weather/runoff conditions. Air temperature and cloud cover observations were not recorded.

April 14, 1999 –Precipitation during the 5-day period prior to this event was minimal (Σ=0.08 in); data collected on this date reflect dry weather conditions. Air temperature and cloud cover observations were not recorded.

May 12, 1999 – Precipitation measured at the Barre Falls Dam was approximately 0.43 inches spanning the 5 days before this monitoring event. Discharge fell steadily at the Ware River gage during the 5 days preceding this event. Water quality data collected on this date reflect dry weather conditions. Air temperature and cloud cover observations were not recorded.

July 14, 1999 – Rainfall totaled 0.45 in at Barre Falls on July 9-10, 1999 with little precipitation falling from July 11-14. Discharge fell fairly steadily at the Ware River during this period. Field observations indicate low water levels at most stations. Based on discharge data and field observations, water quality data collected on this date reflect dry conditions. Air temperature ranged from 80 to 85 degrees Fahrenheit (ºF) with clear skies becoming overcast/hazy during monitoring activities.

August 11, 1999 - Total precipitation at Barre Falls was 0.48 in from August 6-8, with none recorded from August 9-11. Discharge at the Ware River was well below the 7Q10 throughout this period. Water quality data reflect dry weather conditions on this date. Air temperature ranged from 65 to 74ºF with drizzle/light rain developing to partly cloudy skies.

September 8, 1999 – This late summer monitoring run fell within a dry period. Discharge during the 5 days preceding this event from 9.7 to 17 cfs, much lower than the daily and monthly means, and below the 7Q10 value. Rainfall at the Barre Falls Dam measured approximately 0.44 in from September 6-7, with trace precipitation on September 8th. Field observations noted slight to steady rain from approximately 10 am to noon. Based on precipitation data and field observations, water quality data collected on this date reflect wet weather/runoff conditions. Air temperature ranged from 78 to 80°F and overcast skies developing to rain, returning to overcast skies during monitoring activities.

November 9, 1999 – This mid-fall sampling event was conducted during a dry period, in which only trace precipitation was noted at the Barre Falls Dam in the preceding 5 days. Discharge decreased steadily at the Ware River at Gibbs Crossing gage during this time. Based on precipitation and discharge, the data collected on this event reflect dry weather conditions. Air temperature fell from 51 to 54°F and skies were overcast with periods of weak sun throughout.

April 12, 2000 – Spring sampling in the F/Q watershed was preceded by 1.57 inches of rainfall from April 7-10, with an additional 0.33 in on the sampling date; stream discharge rose concurrently. Water quality data on this date reflect wet weather/runoff conditions. During monitoring activities, air temperature fell from 44 to 40ºF under overcast skies.

June 14, 2000 – A late spring storm brought 1.35 inches to the area from June 12-13, with an additional 0.37 inches on the day of monitoring; discharge rose concurrently. Field observations indicated high water levels at all stations. Water quality on this date reflects wet weather/runoff conditions. Air temperature ranged from 60 to 65ºF under overcast skies.

August 9, 2000 – Approximately 1.30 inches of rain fell in the area from August 4-8. Discharge, however, decreased steadily during this 5-day period. Field notes record showers the evening before the monitoring event, with infrequent heavy downpours until 10 am on August 9th, becoming sparse drops. Based on precipitation and field observations, water quality data collected on this date reflect wet weather/runoff conditions. Air temperature was approximately 76ºF throughout monitoring activities; overcast skies with periodic rainfall developed to mostly cloudy conditions.

October 25, 2000 – This fall event fell within a dry period; discharge fell from October 22-25. Water quality data reflect dry weather conditions on this event. Air temperature ranged from 59 to 62ºF under sunny skies.

December 13, 2000 – Minimal precipitation fell in the 5 days preceding this event (0.19 in at the Ware gage). Snow on the ground was trace on December 11, rising to 6 inches on December 12. Discharge decreased steadily at the Ware River at Gibbs Crossing from December 8-11, then rose through December 13. All discharge values were considerably below the daily and monthly means, but above the 7Q10. Temperature values at the Worcester airport indicate maximum daily highs below freezing from December 8-10, rising to 42-49°F on December 11-12. This rise in air temperature coincided roughly with the rise in discharge; snowmelt is likely to have contributed to the increase in flow. Field observations indicate snow and rain on December 12; stream channels were partially covered in ice, with ice floes instream. Based on temperature and snowfall data, as well as field observations, water quality data collected on this date reflect wet weather/runoff conditions. Air temperature fell from 28 to 19ºF with 0% cloud cover during this event.

March 28, 2001 – Early spring monitoring was preceded by 0.87 inches of precipitation in the 5 days before this event. Discharge decreased steadily from March 23-28; levels were approximately twice the daily and monthly means. Field observations indicated snowfall on March 26, with snow remaining on the ground throughout the watershed, and high water levels. Water quality data collected on this date reflect wet weather/runoff weather conditions. The air temperature dropped from 39 to 34ºF with cloud cover varying from partly sunny to partly cloudy during monitoring activities.

May 23, 2001 – Little precipitation was noted in the five days prior to this spring sampling event (0.13 inches), while 0.32 inches fell on May 23; field notes indicate drizzle to steady rain during monitoring activities. Discharge fell from May 18-22, and rose on May 23. Overall flows were well below the daily and monthly mean values. Field observations indicate water levels were fairly low throughout the watershed, with average levels at the Barre sampling station. Turbid conditions were noted on the Quaboag River and the Ware River at Gibbs Crossing. Based on precipitation and discharge data, as well as field observations, water quality data collected on this date reflect wet weather/runoff conditions. Air temperature ranged from 57 to 65ºF; rainy skies were noted throughout this event. Trees were fully leafed out at all stations.

July 25, 2001 – This mid-summer sampling event fell within a dry period (0 in precipitation noted in the 5 preceding days). Discharge generally decreased at the Ware River at Gibbs Crossing. Precipitation and discharge indicate that data collected on this date reflect dry weather conditions. Air temperature ranged from 81 to 93ºF with sunny skies (cloud cover ≤5%) throughout.

September 19, 2001 – Precipitation recorded at the Barre Falls Dam weather station between September 14-15 totaled 0.62 inches, which was followed by a dry period (Sept. 16-19). Discharge decreased at the Ware River/Gibbs Crossing station concurrent with the lack of precipitation; overall flows were below the daily and monthly mean values. Water quality data reflect dry conditions for this event. Air temperature ranged from 68 to 74ºF with cloud cover varying from 75 to 90%.

November 19, 2001 – Little precipitation fell in the area during the 5 days before this late autumn event (0.05 in). Discharge varied little at Gibbs Crossing and was about the monthly mean value (well below the daily mean). Field observations indicate very light precipitation on the preceding evening, with “very little rain for months”. Water levels were low to very low at most stations (Swift River station near normal). Water quality data reflect dry conditions on this event. Air temperature ranged from 48 to 61ºF and cloud cover decreasing from 80% to sunny skies during this event.

January 23, 2002 - Precipitation in the 5 days preceding winter monitoring totaled 0.37 in, while discharge varied slightly but was low overall and below the daily and monthly means. Maximum daily temperatures measured at Barre Falls ranged from 32 to 42 degrees from January 18-23. Field observations noted ice shelves partially covering the channel throughout the watershed (except the Swift River); snow cover of 2-6+ inches was observed throughout the watershed. Turbid conditions were noted at the Sevenmile and Quaboag Rivers. Based on precipitation and temperature data, field observations, and the likelihood of snowmelt, data collected during this event reflect wet weather/runoff conditions. Air temperature ranged from 45 to 50ºF; cloud cover varied from 0 to 80% during this event.

March 20, 2002 – This late winter monitoring event fell within a wet period, with trace precipitation to 0.35 in recorded on each of the 4 days preceding this event (Σ=0.66 in), including snow on March 18. Discharge rose fairly steadily during this time. Snow cover remained in the upper watershed only (Ware River in Barre, Sevenmile River). Based on precipitation and discharge, water quality data collected on this event reflect wet weather/runoff conditions. Air temperature decreased from 39 to 32ºF; overcast skies changed to heavy wet snow during monitoring activities.

May 15, 2002 – Spring sampling fell within a wet period, with 2.24 inches recorded within 48 hours prior to monitoring activities; discharge fluctuations reflected precipitation. Data collected during this event reflect wet weather/runoff conditions. Air temperature ranged from 50 to 56ºF under mostly cloudy skies (95% cloud cover). Foliage on trees and shrubs had not emerged throughout the watershed.

July 17, 2002 – Summer sampling fell within a dry period, with no precipitation recorded in the 5 days preceding this event. Discharge fluctuated slightly, but remained below the daily and monthly means. Data collected on this date reflect dry weather conditions. Air temperature ranged from 77 to 83ºF; sunny skies developed to mostly hazy conditions.

September 18, 2002 – Late summer monitoring followed the remnants of Tropical Storm Hannah, which brought 1.01 inches to the area from September 16-17**.** Discharge fluctuated with precipitation, but overall discharge was well below daily and monthly mean values. Field observations indicate low to very low water levels at all stations (except the Swift River). Based on precipitation, data collected on this date reflect wet weather/runoff conditions. Air temperature ranged from 68 to 76ºF with sunny skies developing to 30% cloud cover.

November 13, 2002 – Fall monitoring was conducted during a storm event, with precipitation beginning on the previous day. Discharge more than doubled between November 11-13, while overall levels ranged from below to within the daily and monthly means throughout this period. Based on precipitation and discharge, water quality data collected on this event reflect wet weather/runoff conditions. Air temperature ranged from 48 to 54ºF with skies ranging from overcast to light rain. Foliage was mostly down (80-95% of leaves had fallen) throughout the watershed.

February 12, 2003 – Winter monitoring fell within a relatively wet period, with 0.52 inches of precipitation recorded during the preceding 5 days. Snow blanketed the ground and partially covered stream channels on ice shelves throughout the watershed. Snowfall recorded at the Barre Falls Dam totaled 8.1 inches (February 7-12), with 17 inches on the ground on the monitoring date. Daily maximum temperatures ranged from 21 to 35ºF throughout this time period. Discharge generally decreased within the five days preceding this event. Based on precipitation, snowfall and temperature, data collected on this event reflect wet weather/runoff conditions. Air temperature ranged from 21 to 31ºF, with heavy wet snowfall clearing to approximately 60% cloud cover during monitoring activities.

April 16, 2003 – Precipitation over the 5 days preceding this spring monitoring event totaled 1.01 inches at the Barre Falls weather station on April 12-13, and no precipitation from April 14-16. Discharge rose with precipitation, then fell to levels below pre-storm conditions. Based on precipitation and discharge, data collected on this event reflect dry weather conditions. Air temperature ranged from 81 to 87ºF under mostly cloudy/hazy skies. Foliage was just beginning to bud in the watershed.

May 14, 2003 – Spring monitoring was preceded by 5 days of wet weather (Σ=0.87 inches rainfall), with trace precipitation on the monitoring date. Discharge generally followed the pattern of precipitation at the Ware River at Gibbs Crossing gage, generally remaining between the daily and monthly mean values. Based on precipitation with the 48 hours preceding monitoring activities (Σ =0.76 inches), water quality on this event reflect wet weather/runoff conditions. Air temperature ranged from 62 to 80ºF with cloud cover varying from 10 to 80%.

June 18, 2003 – Rainfall during the 5 days before this event totaled 0.78 inches at Barre Falls. Although records here indicate only trace precipitation, field observations indicate “pouring rain” since approximately 07:00 on the sampling date, and light to heavy rains throughout most of the monitoring event. The flow pattern generally mirrored precipitation, rising from June 13-14, then falling to half the storm flow by the sampling date. Discharge ranged from within to above mean values at the Gibbs Crossing gage. Based on field observations, data collected on this event reflect wet weather/runoff conditions. Air temperature ranged from 63 to 68ºF.

July 30, 2003 – Mid-summer monitoring was preceded by 5 days with no recorded precipitation at Barre Falls. Discharge fell throughout this 5-day period, but rose on July 30; in the absence of precipitation, the flow increase is considered to be associated with anthropogenic flow manipulation. Based on flow and discharge, water quality on this date reflect dry weather conditions.

August 20, 2003 – Although most of the 5 days preceding this event were without rainfall, 0.38 inches was recorded at Barre Falls from August 19-20; 0.22 inches were noted at the Worcester gage. Field notes indicate “pouring rain” in the area on Monday, August 18th. Despite the rainfall, discharge decreased steadily at the Gibbs Crossing gage. Based on precipitation, data collected on this event reflect wet weather/runoff conditions. Air temperature ranged from 74 to 88ºF under clear skies.

October 22, 2003 – Fall 2004 monitoring fell within a relatively dry period, with 0.05 inches of precipitation recorded at the Barre Falls weather station during the preceding 5 days and an additional 0.05 inches on the monitoring date. Field observations indicate intermittent to light rain at most stations. Discharge generally fell steadily during this time period at the Gibbs Crossing gage. Overall flows were consistently below the daily and monthly means. Based on precipitation, discharge and field observations, data collected on this event reflect dry weather conditions. Air temperature ranged from

42 to 50ºF, with overcast to rainy skies throughout the monitoring effort. Approximately half or more of the foliage was down on bank trees i.e., minimal channel shading.

February 5, 2004 – This mid-winter monitoring event followed a storm event that brought approximately 4 inches of snowfall (recorded as half an inch of precipitation) to the area, with 7 inches of snow reported on the ground at the Barre Falls Dam. Maximum daily temperatures were above freezing on most of the preceding 5 days. Discharge varied little, and was generally just below the monthly mean, and approximately the daily mean at the Ware River Gibbs Crossing gage. Based on precipitation, temperature and snow pack observations, data collected on this event reflect wet weather/runoff conditions. Air temperature ranged from 28 to 38ºF with cloud cover ranging from 0 to <55% during monitoring activities. Ice over the stream channel prevented accessed to Stations QRG (Quaboag River) on this date. Snow, approximately 6-8 inches in depth, was noted throughout the watershed.

March 24, 2004 – Early spring monitoring was preceded by a 5-day period in which approximately 0.36 inches of precipitation were reported at Barre Falls Dam. Field observations note snowmelt conditions, with little snow remaining on the ground throughout the watershed. Streamflow rose on March 21-22, then fell slowly through March 24th, roughly mirroring the precipitation pattern. Discharge was generally between the daily and monthly means. Data collected on this event reflect wet weather/runoff conditions. Air temperature ranged from 47 to 54ºF with clear skies increasing to mostly cloudy conditions (65% cloud cover) by the conclusion of monitoring events. Only limited snow remained in the watershed on this date.

May 19, 2004 – Precipitation fell with 24 hours preceding this event; 0.32 inches were recorded at the Barre Falls Dam station. Discharge fell from May 14-18, rising on May 19th; daily flows were consistently below the daily and monthly means. Field notes indicate a "strong thunderstorm front moved through early this morning; ongoing intermittent showers." Based on precipitation, discharge and field observations, data collected on this event reflect wet weather/runoff conditions. Air temperature ranged from 62 to 68ºF, with intermittent showers at the first station developing to 95-100 % cloud cover during monitoring activities. Foliage had emerged throughout the watershed.

July 20, 2004 –Precipitation at Barre Falls totaled 0.25 inches from July 15-19, with an additional 0.32 inches recorded on July 20. Field notes indicate drizzle to rain through the early afternoon of July 19. Discharge was low throughout the 5 days preceding this event, and generally below both daily and monthly mean values for this station. Flows at the Gibbs Crossing gage rose on July 20th, roughly concurrent with rainfall. Data collected on this event reflect wet weather/runoff conditions. Air temperature ranged from 74 to 84ºF with cloud cover ranging from 55 to 100% during monitoring activities.

September 22, 2004 – The remnants of Hurricane Ivan dropped over 4 inches in the area from September 17-19; for more information on the impacts of this storm in New England, see http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~ShowEvent~539848. Discharge at area gages rose rapidly from September 18-19, fell by approximately half of peak flow on September 20, and then continued to fall through September 22. Data reflect wet weather/runoff conditions on this date. Air temperature ranged from 64 to 77ºF under sunny skies.

November 9, 2004 – A storm event brought nearly an inch of rain to the area on November 5-6. Discharge rose and fell in accordance with the precipitation, but had not reached pre-storm levels at area gages, including the Ware River at Barre and Gibbs Crossing, Sevenmile River and Quaboag River, by November 9. Data collected on this event reflect wet weather/runoff conditions. Air temperature ranged from 35 to 43ºF with cloud cover ranging from 15 to 55%. Few leaves remained on deciduous trees near area sampling sites.

Table 7 Chicopee Basin Precipitation Data Summary 1998-2004[1] (inches of precipitation)							
Survey Dates	**5 Days**	**4 Days**	**3 Days**	**2 Days**	**1 Day**	**Sample**	**Wet/Dry***
6/24/1998	0.02	0.17	0.45	0	0	0	Dry
7/15/1998	0	0.01	0	0	0	0	Dry
8/19/1998	0	0.11	0	T	0.13	0.06	Dry
9/16/1998	0	T	0	T	0.09	0.07	Dry
10/14/1998	2.01	0.26	1.27	0.02	0.01	0	Wet
4/14/1999	0	0.06	0	0.01	0.01	0	Dry
5/12/1999	0.01	T	0.23	0.19	0	0	Dry
7/14/1999	0.04	0.37	0	0	0.03	0.01	Dry
8/11/1999	0.43	0.01	0.04	0	0	0	Dry
9/8/1999	0	0	0	0.23	0.21	T	Wet
11/9/1999	T	0	0	0	0	0	Dry
4/12/2000	0.10	0	0.69	0.78	0	0.33	Wet
6/14/2000	0	T	0	1.29	0.06	0.37	Wet
8/9/2000	1.07	0	0	0.23	T	0	Wet
10/25/2000	0.01	0	0	0	0	0	Dry
12/13/2000**	0	0.07	0	0	0.12	0	Wet
3/28/2001	0.61	T	T	0	0.26	0	Wet
5/23/2001	0.02	0	0	0	0.11	0.32	Wet
7/25/2001	0	0	0	0	0	0	Dry
9/19/2001	0.27	0.35	0	0	0	0	Dry
11/19/2001	0	0.03	0.02	0	0	0	Dry
1/23/2002	0.01	T	0.30	0	0.06	0	Wet
3/20/2002	0	0.35	T	0.01	0.30	T	Wet
5/15/2002	0.06	T	0	0.48	1.70	0.06	Wet
7/17/2002	0	0	0	0	0	0	Dry
9/18/2002	0	0	0	0.78	0.23	0	Wet
11/13/2002	T	0	T	0.06	0.03	1.36	Wet
2/12/2003	0.11	0.22	0	0	0.19	0.04	Wet
4/16/2003	0	0.95	0.06	0	0	0	Dry
5/14/2003	0.10	0.01	0	0.59	0.17	T	Wet
6/18/2003	0.51	0.27	0	0	T	T	Wet
7/30/2003	0	0	0	0	0	0	Dry
8/20/2003	0	0	0	0	0.36	0.02	Wet
10/22/2003	0	0.01	0	0.04	T	0.05	Dry

Table 7 continued Chicopee Basin Precipitation Data Summary 1999-2004[1] (inches of precipitation)							
Survey Dates	**5 Days**	**4 Days**	**3 Days**	**2 Days**	**1 Day**	**Sample**	**Wet/Dry***
2/5/2004	T	0	0	0	0.52	0	Wet
3/24/2004	0.01	0.01	0.34	0	0	0.03	Wet
5/19/2004	0	0	0.23	0	0.01	0.31	Wet
7/20/2004	0.07	T	0	0	0.18	0.32	Wet
9/22/2004	0.06	2.57	1.45	0	0	0	Wet
11/9/2004	0	0.91	0.01	0	0	0	Wet

[1]Official data from the National Weather Service station at Barre Falls Dam available at http://www7.ncdc.noaa.gov/IPS/cd/cd.html;jsessionid=ABE64BF7DDF02CF50177DF08D65C8E3B?_page=0&jsessionid=ABE64BF7DDF02CF50177DF08D65C8E3B&state=MA&_target1=Next+%3E (NCDC 2011).
* = Based on streamflow and precipitation data.
**=when data were unavailable at Barre Falls, precipitation records from Ware were used (near Ware Center).
T = trace amount; an amount too small to measure

Table 8 USGS Flow Data Summary Discharge (cfs) 1998-2004* Ware River at Gibbs Crossing, MA								
Survey Dates	**5 Days**	**4 days**	**3 Days**	**2 Days**	**1 Day**	**Sample**	**Monthly****	**Daily*****
6/24/1998	691	620	951	600	494	561	522.1	222
7/15/1998	464	445	166	153	123	108	250.1	139
8/19/1998	55	54	50	47	60	46	46.0	227
9/16/1998	30	30	29	28	28	28	32.8	114
10/14/1998	183	260	409	336	246	271	136.2	153
4/14/1999	278	283	262	249	266	244	283.0	638
5/12/1999	237	210	209	206	176	153	186.3	400
7/14/1999	37	41	36	34[e]	28[e]	24	30.9	156
8/11/1999	14	13	13	15	12	11	16.0	135
9/8/1999	12	11	9.7	15	17	16	194.3	99
11/9/1999	535	387	335	286	252	258	268.8	243
4/12/2000	449	417	769	1,110	961	759	814.6	617
6/14/2000	880	690	572	882	775	856	548.0	266
8/9/2000	529	404	315	245	229	171	251.8	120
10/25/2000	108	129	142	117	102	98	110.4	215
12/13/2000	110[e]	105[e]	100[e]	99	123[e]	154[e]	284.6	346
3/28/2001	1,690	1,600	1,370	1,170	1,160	1,120	629.4	620
5/23/2001	157	161	150	136	132	172	207.9	327
7/25/2001	144	131	94	109	106	80	154.9	178
9/19/2001	60	58	36	33	35	35	59.5	153
11/19/2001	35	28	61	25	24	40	37.6	247
1/23/2002	55[e]	63	55[e]	43	46	78	77.7	343
3/20/2002	175	182	198	193	206	246	242.5	597
5/15/2002	212	195	191	291	921	654	339.1	381
7/17/2002	76	69	63	72	75	56	80.1	129
9/18/2002	11	10	9.7	22	15	14	28.8	152
11/13/2002	94	86	92	87	95	200	194.6	262
2/12/2003	173[e]	152[e]	153[e]	157[e]	138[e]	179[e]	218.6	299
4/16/2003	537	1,120	870	634	518	440	516.8	641
5/14/2003	349	314	318	387	364	335	344.2	394
6/18/2003	639	704	628	500	387	350	579.0	271
7/30/2003	110	108	66	69	54	68	136.5	156
8/20/2003	403	358	308	184	174	154	185.8	184
10/22/2003	207	175	142	138	115	122	251.5	209

Table 8 continued USGS Flow Data Summary Discharge (cfs) 1998-2004 Ware River at Gibbs Crossing, MA								
Survey Dates	**5 Days**	**4 days**	**3 Days**	**2 Days**	**1 Day**	**Sample**	**Monthly****	**Daily*****
2/5/2004	158	154	160	155	153	166	163.7	331
3/24/2004	277	254	336	379	358	355	377.3	575
5/19/2004	295	267	263	260	253	288	381.0	373
7/20/2004	35	71	53	66	44	67	62.8	138
9/22/2004	61	716	1,140	517	498	404	214.0	260
11/9/2004	132	244	290	253	252	223	227.8	243

***Daily Data for Station 01173500 Ware River at Gibbs Crossing, Ware, MA data found at http://waterdata.usgs.gov/ma/nwis/dv?cb_00060=on&format=html&begin_date=2004-11-04&end_date=2004-11-09&site_no=01173500&referred_module=sw (USGS 2011c); all data were approved for publication; processing and review completed.**

****Mean of monthly mean discharge (cfs) based on data collected at Station 01173500 Ware River at Gibbs Crossing, Ware, MA from 08/1912 to 11/2009 found at http://waterdata.usgs.gov/ma/nwis/monthly/?search_site_no=01173500&agency_cd=USGS&referred_module=sw&format=sites_selection_links (USGS 2011h)**

*****Mean of daily mean discharge based on data collected at Station 01173500 Ware River at Gibbs Crossing, Ware, MA from 8/20/1912 to 11/24/2009 found at http://waterdata.usgs.gov/ma/nwis/dvstat/?search_site_no=01173500&agency_cd=USGS&referred_module=sw&format=sites_selection_links (USGS 2011g)**

[e] = Estimated value

7Q10 = 22 cfs at Station 01173500 Ware River at Gibbs Crossing, Ware, MA (USGS 2011i)

RESULTS AND QUALITY ASSURANCE/QUALITY CONTROL

The results of SMART monitoring conducted in the Chicopee watershed from 1998 through 2004 are included below. *In situ* multiprobe readings, including temperature, pH, dissolved oxygen, percent oxygen saturation, depth, specific conductivity, and total dissolved solids, are presented for each station in Table 9 through Table 13. Nutrient and chemistry data are presented in

Table 14 through Table 18. Ambient field blank results are presented in Table 19; field duplicate results and relative percent difference calculations are found in
Table 20. Most results are expressed as milligrams per liter (mg/L). Exceptions include: depth in meters (m); temperature in degrees Celsius (ºC); pH in Standard Units (SU); specific conductance in microsiemens per centimeter (uS/cm); dissolved oxygen saturation in percent (%); and turbidity, in Nephelometric Turbidity Units (NTU).

Field sheets, field notebooks, chain of custody forms, raw data files, lab reports and other metadata are maintained by the Massachusetts Department of Environmental Protection (MassDEP) Bureau of Resource Protection (BRP) CEntral Regional Office (CERO) in Worcester, MA and data are stored electronically in the Division of Watershed Management's (DWM) water quality database. Detailed information regarding the data validation process is explained in the separate document, *Summary of Current Data Validation Procedures* (MassDEP 2004a). Specific validation criteria used for 2000-2004 data include, but are not limited to: conformance to the SMART Monitoring Quality Assurance Project Plan (Beaudoin 2010) and DWM standard operating procedures (SOPs), precision, accuracy, representativeness, holding times, sample preservation, frequency of field QC samples, contamination of field blanks, stability of multiprobe readings and documentation. The following data qualifiers were applied as needed:

Multiprobe data qualifiers:
** = Missing data.
-- = No data.
= Censored data (data that have been discarded for some reason).
c = Greater than calibration standard used for pre-calibration, or outside the acceptable range about the calibration standard.
i = Inaccurate readings from multiprobe likely.
m = Method not followed; one or more protocols contained in the DWM Multi-probe SOP not followed.
r = Data not representative of actual field conditions.
s = Field sheet recorded data were used to accept data, not data electronically recorded in the Multi-probe surveyor unit, due to operator error or equipment failure.
u = Unstable readings.

Laboratory sample data qualifiers:
** = Missing data.
-- = No data.
= Censored data (data that have been discarded for some reason).
[ ] = A result reported inside brackets has been censored, but is shown for informational purposes.
b = Blank contamination in lab reagent blanks and/or field blank samples.
d = Precision of field duplicates (as RPD) did not meet project data quality objectives identified for program or in QAPP.
e = Not theoretically possible. Specifically, used for bacteria data where colonies per unit volume for *E. coli* bacteria are greater than fecal coliform bacteria.
h = Holding time violation (usually indicating possible bias low).
j = 'Estimated' value; used for lab-related issues where certain lab QC criteria are not met and re-testing is not possible (as identified by the WES lab only). Also used to report sample data where the sample concentration is less than the reporting detection limit (RDL) and greater than the method detection limit (MDL) (RDL > x > MDL). Also used to note where values have been reported at levels less than the MDL.
m = Method SOP not followed, only partially implemented or not implemented at all, due to complications with sample matrix (e.g. sediment in sample, floc formation), lab error (e.g. cross-contamination between samples), additional steps taken by the lab to deal with matrix complications, lost/unanalyzed samples, and missing data.

Table 9 MassDEP SMART 1998-2004 Chicopee Watershed *In Situ* Multiprobe Data. Station SRG

Date	OWMID	Time	Depth	Temp	pH	Cond @ 25°C	TDS	DO	SAT
		(24hr)	(m)	(°C)	(SU)	(uS/cm)	(mg/L)	(mg/L)	(%)
6/10/1998	36-0003	14:22	0.5	14.60	**	39	20	10.5	101
6/24/1998	36-0010	11:52	0.5	17.00	6.8	35	20	9.8	100
7/15/1998	36-0017	11:01	<0.3	19.00	6.8	35	20	9.1	96
8/19/1998	36-0023	11:29	<0.3	14.30	6.7	37	20	10.3	99
9/16/1998	36-0030	11:07	0.4	14.60	6.5	34	20	9.9	96
10/14/1998	36-0037	11:25	<0.3	13.90	6.2	39	30	9.5	90
4/14/1999	36-0045	11:39	0.3	5.56	6.5	41.2	26.4	12.5	99
5/12/1999	36-0052	11:54	0.3	10.04	6.5	40.2	25.7	11.7	101.4
7/14/1999	36-0059	12:03 s	0.2 s	13.31 s	6.8 s	37.5 s	24.0	10.7 s	99.9 s
8/11/1999	36-0066	11:17	0.3	14.53	6.7	36.7	23.5	10.1	97.4
9/8/1999	36-0073	11:49	0.3	15.55	6.5	37.1	23.7	9.8	96.9
11/9/1999	36-0080	11:34	-8 iu	10.43	6.5	42.1	26.9	10.9	94.6
4/12/2000	SM-0033	11:28	0.8	5.60	6.3	47.1	30.1	12.4	97
6/14/2000	SM-0073	11:56	0.2	12.70	6.4	48.2	30.8	11.0	100
8/9/2000	SM-0120	11:34	0.3	13.70	6.3	41.4	26.5	10.1	96
10/25/2000	SM-0167	11:23	0.4	12.80	6.4	41.7	26.7	9.9	91
12/13/2000	SM-0207	11:15	0.5	4.50	6.3	39.8	25.5	12.5	93
3/28/2001	SM-0245	12:34	0.6	3.50 u	6.3	52.1	33.4	13.6 u	100 u
5/23/2001	SM-0285	11:58	0.8	11.10	6.5	40.7	26.0	10.9	97
7/25/2001	SM-0325	11:57	0.3	13.10 u	6.6 u	41.1	26.3	10.9 u	102 u
9/19/2001	SM-0365	12:02	0.6	14.10	6.7 i	37.2	23.8	11.2	106
11/19/2001	SM-0405	11:49	0.5	10.80	6.6	38.1	24.4	11.3	100
1/23/2002	SM-0444	12:38	0.4	4.10	6.7	39.6	25.3	13.2	98
3/20/2002	SM-0484	12:25	0.3	3.40	6.7	43.1	27.6	13.4	98
5/15/2002	SM-0524	11:23	0.3	9.70	6.6	47.8	30.6	11.2	98
7/17/2002	SM-0564	12:02	0.4	15.00	6.9 c	38.5	24.7	10.8	105
9/18/2002	SM-0604	12:07	0.5	20.80	6.5	41.0	26.2	9.2	100
11/13/2002	SM-0644	11:33	0.2	10.80	6.2	55.9	35.8	10.6	94
2/12/2003	SM-0684	11:43	0.3	1.60	6.2	44.6	28.6	12.8	95
4/16/2003	SM-0723	12:16	0.4	6.90	6.3	56.6	36.3	12.0	101
6/18/2003	SM-0764	11:34	0.3	10.00	6.3	57.0	36.5	10.9	97
7/30/2003	SM-0799	11:42	0.4	12.10	6.6	41.8	26.7	10.8	102
8/20/2003	SM-0815	10:31	0.3	11.80	7.0 cu	47.9	30.7	10.6	99
10/22/2003	SM-0858	11:45	0.5	13.00	6.5	49.0	32.0	10.8	103
2/5/2004	SM-5900	10:45	0.5	1.10	6.6	48.0	31.0	14.0	99
3/24/2004	SM-5942	11:01	0.6	3.70	6.6	53.0	35.0	14.1	106
5/19/2004	SM-5983	10:53	0.6	11.10	6.7	48.0	31.0	11.6	105
7/20/2004	SM-6025	10:47	0.5	12.30	6.7	51.0	33.0	11.4	107
9/22/2004	SM-6066	10:38	0.6	14.10	6.5	51.0	33.0	10.2	100
11/9/2004	SM-6107	11:17	0.6	10.30	6.7	51.0	33.0	11.7	104

Table 10 MassDEP SMART 1998-2004 Chicopee Watershed *In Situ* Multiprobe Data. Station CBG

Date	OWMID	Time	Depth	Temp	pH	Cond @ 25°C	TDS	DO	SAT
		(24hr)	(m)	(°C)	(SU)	(uS/cm	(mg/L)	(mg/L)	(%)
6/10/1998	36-0005	15:48	0.9	17.70	6.3	56	40.0	9.40	96.0
6/24/1998	36-0011	14:12	0.5	20.60	5.9	41	30.0	8.20	89.0
7/15/1998	--	--	--	--	--	--	--	--	--
8/19/1998	36-0026	13:31	<0.3	22.30	6.6	69	40.0	8.30	94.0
9/16/1998	36-0033	12:57	<0.3	20.30	6.6	73	50.0	8.80	96.0
10/14/1998	36-0040	12:59	<0.3	12.50	5.8	67	40.0	10.40	96.0
4/14/1999	36-0046	13:21	0.1 i	9.01	6.3	65.1	41.6	10.72	92.3
5/12/1999	36-0053	13:44	0.3	15.86	6.4	64.4	41.2		105.1
7/14/1999	36-0060	13:48 s	0.2 s	21.65 s	6.9 s	85.1 s	54.5 s	8.99 s	99.5 s
8/11/1999	36-0067	12:55	-8 i	20.25	6.9	99.6	63.8	8.67	94.4
9/8/1999	36-0074	13:42	0.1	21.40	6.8	94	60.2	9.07	101.0
11/9/1999	36-0081	13:31	-8 iu	4.37	5.9	72.7	46.6	13.08	98.2
4/12/2000	SM-0034	13:55	0.7	7.40	5.8	65.4	41.9	12.10	99.0
6/14/2000	SM-0074	13:38	0.5	15.00	5.9	57.7	36.9	10.00	97.0
8/9/2000	SM-0121	13:17	0.5	22.60	6.3	64	41.0	8.40	96.0
10/25/2000	SM-0168	13:34	0.4	8.20	6.2	62.3	39.9	11.90	98.0
12/13/2000	SM-0208	12:51	0.4	0.29	5.8	81.1	51.9	14.80	98.0
3/28/2001	SM-0246	14:53	0.5	0.30	5.3	81.1	51.9	13.80	93.0
5/23/2001	SM-0286	13:43	1	14.20	6.3	81.5	52.2	10.40	99.0
7/25/2001	SM-0326	13:44	0.5	25.00 u	6.5	103	65.8	7.90	93.0
9/19/2001	SM-0366	14:13	0.6	16.70	6.6	88.3	56.5	9.40	94.0
11/19/2001	SM-0406	13:44	0.2	4.70	6.3	81.5	52.2	12.40	94.0
1/23/2002	SM-0445	14:43	0.5	0.39	6.0	104	66.5	13.20	89.0
3/20/2002	SM-0485	14:33	0.6	2.40	6.1	92.1	58.9	13.10	93.0
5/15/2002	SM-0525	13:19	0.6	10.00	5.8	67.3	43.0	10.50	92.0
7/17/2002	SM-0565	13:05	0.3	21.90	6.6	94.5	60.5	8.90	100.0
9/18/2002	SM-0605	13:07	0.2	19.50	6.5	113	72.0	8.60	91.0
11/13/2002	SM-0645	12:36	0.6	9.20	5.7	113	72.0	11.20	96.0
2/12/2003	SM-0685	12:48	0.1 i	0.09	5.6	101	64.6	13.80 u	98.0 u
4/16/2003	SM-0722	10:25	0.6	11.50	5.6	88.9	56.9	9.50	90.0
6/18/2003	SM-0763	10:17	0.9	18.70	5.8	92.6	59.2	7.80	84.0
7/30/2003	SM-0797	10:14	0.4	21.30	6.4 i	133 i	84.9 i	## i	## i
8/20/2003	SM-0813	9:11	0.6	22.20	6.1	114	72.9	7.60	89.0
10/22/2003	SM-0856	10:17	1.1	8.20	6.3	87	56.0	11.60	98.0
2/5/2004	SM-5899	9:53	0.8	0.09	6.2	97	63.0	15.10	104.0
3/24/2004	SM-5941	10:04	1.1	0.92	6.3	93	60.0	14.00	98.0
5/19/2004	SM-5982	9:56	1	18.80	6.3	88	57.0	8.00	86.0
7/20/2004	SM-6024	9:55	1.3	22.30	6.5	96	62.0	8.70	100.0
9/22/2004	SM-6065	9:44	0.9	15.20	6.0	90	58.0	9.90	98.0
11/9/2004	SM-6106	10:20	1.4	5.80	6.3	143	93.0	13.00	104.0

Table 11 MassDEP SMART 1998-2004 Chicopee Watershed *In Situ* Multiprobe Data. Station WA09A

Date	OWMID	Time	Depth	Temp	pH	Cond @ 25°C	TDS	DO	SAT
		(24hr)	(m)	(°C)	(SU)	(uS/cm	(mg/L)	(mg/L)	(%)
6/10/1998	36-0004	14:56	0.5	21.00	6.8	73	50	9	99
6/24/1998	36-0009	11:09	0.7	20.60	6.6	50	30	8.7	95
7/15/1998	36-0016	10:23	<0.3	22.80	6.8	80	50	6.7	76
8/19/1998	36-0022	10:43	<0.3	21.00	7.0	103	70	8.7	96
9/16/1998	36-0029	10:35	0.3	21.20	6.8	118	80	7.9	88
10/14/1998	36-0036	10:48	<0.3	13.00	6.5	81	50	9.4	88
4/14/1999	36-0043	11:04	0.3	10.53	6.7	80.2	51.3	11.12	99.3
5/12/1999	36-0050	11:17	0.2	16.75	6.8	82.2	52.6	9.79	98.5
7/14/1999	36-0057	11:25	0.2 s	22.32 s	7.6 s	120.6 s	77.2 s	10.17 s	113.9 s
8/11/1999	36-0064	10:50	0.2	19.89	7.0	142.7	91.3	7.91	85.5
9/8/1999	36-0071	11:15	0.3	23.34	6.9	139.5	89.3	7.18	83
11/9/1999	36-0078	10:58	-8 iu	5.53	6.6	80.2	51.3	12.42	96.1
4/12/2000	SM-0031	10:50	0.9	7.80	6.3	65.9	42.2	11.9	98
6/14/2000	SM-0071	11:25	0.5	15.30	6.4	62.1	39.7	9.9	96
8/9/2000	SM-0118	11:04	0.4	22.80	6.6	79.8	51.1	7.8	90
10/25/2000	SM-0165	10:53	0.3	8.70	6.6	90.2	57.7	10.8	90
12/13/2000	SM-0205	10:46	0.5	0.01	6.4	96	61.4	13.9	91
3/28/2001	SM-0243	11:55	0.8	0.77	5.9	84.3 u	54 u	14.4	98
5/23/2001	SM-0283	11:20	0.9	15.70	6.7	109	69.8	9.1	89
7/25/2001	SM-0323	11:22	0.6	25.70 u	7.0 cu	130	83	8.3	100
9/19/2001	SM-0363	11:25	0.3	17.90 u	7.6 cu	142	90.7	11.3 u	116 u
11/19/2001	SM-0403	11:17	0.3	5.30	6.6 u	123	78.7	12.7	98
1/23/2002	SM-0442	11:53	0.3	0.25	6.4	159	102	12.9	86
3/20/2002	SM-0482	11:46	0.2	3.80	6.7	99.7	63.8	13.3	98
5/15/2002	SM-0522	10:46	0.5	10.50	6.5	80.4	51.5	10.7	95
7/17/2002	SM-0562	11:12	0.3	21.80	7.0 c	135	86.6	9.2	103
9/18/2002	SM-0602	11:29	0.3	20.10	7.0 c	150	96	9.4	101
11/13/2002	SM-0642	10:59	0.3	9.80	6.3	132	84.5	10.4	90
2/12/2003	SM-0682	11:03	0.1 i	0.06	6.2	122	78.3	13.1	93
4/16/2003	SM-0724	13:18	0.4	12.70	6.5	106	68.1	10	97
6/18/2003	SM-0765	12:33	0.3	18.30	6.2	104	66.7	8.4	90
7/30/2003	SM-0801	12:35	0.1 i	24.00 u	7.2 cu	142	90.5	8.9	107
8/20/2003	SM-0817	11:33	0.2	23.70	6.4	120	76.7	8.2	99
10/22/2003	SM-0860	12:35	0.5	9.40	6.7	113	73	11.4	100
2/5/2004	SM-5901	11:25	0.5	-0.01	6.5	132	86	14.2	97
3/24/2004	SM-5943	11:29	0.5	3.70	6.6	104	67	13.8	104
5/19/2004	SM-5984	11:24	0.4	20.10	6.8	108	70	8.8	97
7/20/2004	SM-6026	11:25	0.5	23.80	7.1	131	85	8.6	102
9/22/2004	SM-6067	11:08	0.6	15.70	6.6	87	57	9.7	98
11/9/2004	SM-6108	11:49	0.5	6.10	6.9	108	70	13.2	106

Table 12 MassDEP SMART 1998-2004 Chicopee Watershed *In Situ* Multiprobe Data. Station SMG

Date	OWMID	Time	Depth	Temp	pH	Cond @ 25°C	TDS	DO	SAT
		(24hr)	(m)	(°C)	(SU)	(uS/cm	(mg/L)	(mg/L)	(%)
6/10/1998	36-0001	10:05	0.3	17.40	6.7	58	40	8.7	89
6/24/1998	36-0006	9:11	0.3	21.40	6.6	58	40	7.5	83
7/15/1998	36-0013	8:59	<0.3	21.40	6.9	65	40	7.2	80
8/19/1998	36-0020	9:07	<0.3	18.00	6.9	86	50	8.7	90
9/16/1998	36-0027	9:05	<0.3	18.00	6.9	103	70	8.6	90
10/14/1998	36-0034	9:19	<0.3	12.50	6.3	66	40	9.3	85
4/14/1999	36-0041	9:20	-8i	8.43	6.5	64.8	41.5	10.8	91.7
5/12/1999	36-0048	9:30	0.1	14.54	6.6	68.4	43.8	9.5	91.2
7/14/1999	36-0055	9:30 s	-8 is	17.31 s	7.0 s	84.2 s	53.9 s	8.9 s	90.1 s
8/11/1999	36-0062	9:21	0.1	0.39	17.0	98.7	63.2	8.7	88.2
9/8/1999	36-0069	9:30	0.2	21.00	6.9	106.8	68.3	7.8	85.9
11/9/1999	36-0076	9:17	-8 iu	4.11	6.3	69.7	44.6	12.5	93.6
4/12/2000	SM-0029	9:05	0.5	7.60	6.2	61.1	39.1	11.5	94
6/14/2000	SM-0069	9:34	0.1 i	15.10	6.3	57.5	36.8	9.4	91
8/9/2000	SM-0116	9:12	** i	21.80	6.6	85.6	54.8	7.7	87
10/25/2000	SM-0163	9:15	0.1 i	7.50	6.5	79.6	51	10.9	88
12/13/2000	SM-0203	9:07	0.2	0.06	6.0	75.8	48.5	13.6	90
3/28/2001	SM-0241	9:57	0.4	0.77	5.7	64.1	41	13.6	93
5/23/2001	SM-0281	9:23	0.5	14.20	6.6	75.5	48.3	9.4	90
7/25/2001	SM-0321	9:28	0.1 i	24.30	6.8	88.3	56.5	7.2	85
9/19/2001	SM-0361	9:24	0.1 i	14.70	6.8	108	69	9.6	92
11/19/2001	SM-0401	9:34	0.1 i	3.30 u	6.4 u	98.3	62.9	13	95
1/23/2002	SM-0440	9:47	0.1 i	-0.10	6.2	87.8	56.2	12	80
3/20/2002	SM-0480	9:31	0.1 i	3.50	6.4	78.4	50.2	13	95
5/15/2002	SM-0520	8:59	0.1 i	9.60	6.3	69.5	44.5	10.7	93
7/17/2002	SM-0560	9:22	0.1 i	18.70	6.7	94.8	60.7	8.4	88
9/18/2002	SM-0600	9:36	## i	15.90	6.7	108	69.4	8.8	87
11/13/2002	SM-0640	9:16	## i	8.80	6.1	78.3	50.1	10.3	87
2/12/2003	SM-0680	9:29	## i	0.04	5.9	89.2 u	57.1 u	12.5 u	89 u
4/16/2003	SM-0721	9:41	## i	11.90	6.2	81	52	9.4	90
6/18/2003	SM-0762	9:32	## i	17.60	6.3	89.6	57.4	8.1	86
7/30/2003	SM-0796	9:29	0.1 i	21.10 u	6.8 i	101 i	64.5 i	## i	## i
8/20/2003	SM-0812	8:24	## i	20.70	6.7 u	94.2	60.3	7.7	87
10/22/2003	SM-0855	9:29	0.2	9.30	6.4	89	58	10.4	90
2/5/2004	SM-5898	9:06	0.2	-0.02	6.3	94	61	13.9	95
3/24/2004	SM-5940	9:23	0.3	2.40	6.4	77	50	13.3	97
5/19/2004	SM-5981	9:15	0.3	18.30	6.6	80	52	8.4	89
7/20/2004	SM-6023	9:12	0.2	21.20	6.8	105	68	8.1	91
9/22/2004	SM-6064	8:57	0.3	15.60	6.6	78	50	9.1	91
11/9/2004	SM-6105	9:41	0.3	4.50	6.5	87	56	12.6	98

Table 13 MassDEP SMART 1998-2004 Chicopee Watershed *In Situ* Multiprobe Data. Station QRG

Date	OWMID	Time	Depth	Temp	pH	Cond @ 25°C	TDS	DO	SAT
		(24hr)	(m)	(°C)	(SU)	(uS/cm	(mg/L)	(mg/L)	(%)
6/10/1998	36-0002	11:05	0.7	19.20	**	154	100	9.6	101
6/24/1998	36-0007	10:19	0.7	22.90	7.3	109	70	8.5	97
7/15/1998	36-0014	9:50	<0.3	24.30	7.7	138	90	8.1	95
8/19/1998	36-0021	10:04	<0.3	20.90	7.9	340	200	9.6	105
9/16/2012	--	--	--	--	--	--	--	--	--
10/14/1998	36-0035	10:10	<0.3	13.50	7.0	180	100	10.1	95
4/14/1999	36-0042	10:27	0.4	9.91	6.9	129.7	83	11.93	105
5/12/1999	36-0049	10:37	0.2	16.87	7.3	145.1	92.8	10.18	102.8
7/14/1999	36-0056	10:48 s	0.1 is	21.88 s	8.3 s	450 s	289 s	10.69 s	119 s
8/11/1999	36-0063	10:20	0.1	18.53	7.4	583	373	9.13	96.2
9/8/1999	36-0070	10:37	0.3	22.66	7.3	428	274	8.66	98.9
11/9/1999	36-0077	10:24	-8 iu	5.54	7.3	120.8	77.3	12.68	98.2
4/12/2000	SM-0030	10:16	1	8.40	6.8	98.4	63	12	100
6/14/2000	SM-0070	10:41	0.5	16.60	6.9	95.2	60.9	9.9	99
8/9/2000	SM-0117	10:28	0.3	23.30	7.3 c	166	106	8.5	99
10/25/2000	SM-0164	10:18	0.3	9.50	7.2 cu	164	105	11.7	100
12/13/2000	SM-0204	10:15	0.4	0.08	6.8	140	89.3	14.7	97
3/28/2001	SM-0242	11:14	0.9	1.40	6.1	102	65.5	14.6	101
5/23/2001	SM-0282	10:32	0.7	15.30	7.1 c	166	106	9.8	96
7/25/2001	SM-0322	10:46	0.4	26.40 u	7.8 cu	174	111	8.1	100
9/19/2001	SM-0362	10:43	0.3	16.50	8.1 cu	377 u	242 u	11.6	116
11/19/2001	SM-0402	10:40	0.3	5.50	7.4 cu	141	90	14.1 u	109 u
1/23/2002	SM-0441	11:09	0.4	-0.08	6.8	199	128	13	86
3/20/2002	SM-0481	10:50	0.5	4.10	7.2 c	165	105	13.6	101
5/15/2002	SM-0521	10:12	0.6	10.80	6.9 c	110	70.3	11.1	99
7/17/2002	SM-0561	10:33	0.3	21.90	7.8 c	197	126	9.7	108
9/18/2002	SM-0601	10:49	0.2	18.70	7.5 c	227 u	145 u	10.1	106
11/13/2002	SM-0641	10:20	0.3	9.70	6.8	133	84.9	11.2	97
2/12/2003	Ice Out	--	--	--	--	--	--	--	--
4/16/2003	SM-0726	13:55	0.8	13.40	6.9	114	73	10	98
6/18/2003	SM-0767	13:07	0.5	19.50	6.8	125	79.7	8.9	98
7/30/2003	SM-0803	13:06	0.2	25.80 u	7.7 cu	171	109	8.1	101
8/20/2003	SM-0819	12:07	0.4	25.20	7.4 c	179	114	8.4	104
10/22/2003	SM-0862	13:16	0.7	10.20	7.1 uc	133	87	12.1	108
2/5/2004	Ice Out	--	--	--	--	--	--	--	--
3/24/2004	SM-5945	11:59	0.8	5.10	6.9	126	82	13.5	106
5/19/2004	SM-5986	11:57	0.7	21.10	7.2	123	80	8.9	100
7/20/2004	SM-6028	11:58	0.4	25.60 u	8.2 u	147	96	9.3	114
9/22/2004	SM-6069	11:44	0.7	17.80	7.4	134	87	9.9	104
11/9/2004	SM-6110	12:31	0.7	6.20	7.5	128	83	13.8	112

Table 14 MassDEP SMART 1998-2004 Chicopee Watershed Chemistry Data. Station SRG

Date	OWMID	QAQC	Time 24hr	Alkalinity (mg/l)	Hardness (mg/l)	Chloride (mg/l)	SSolids (mg/l)	Turb (NTU)	TKN (mg/l)	TN (mg/l)	NH3-N (mg/l)
6/24/1998	36-0010		11:50	4	7.6	**	<1.0	0.5	--	--	<0.02
7/15/1998	36-0017		11:01	5	8	3	<1.0	0.35	--	--	<0.02
8/19/1998	36-0023	36-0024	11:30	6	8.8	4	<1.0	0.35	--	--	<0.02
8/19/1998	36-0024	36-0023	11:30	5	8.7	5	<1.0	0.3	--	--	<0.02
9/16/1998	36-0030	36-0031	11:05	4	7.5	4	<1.0	0.35	--	--	<0.02
9/16/1998	36-0031	36-0030	11:05	4	7.5	4	<1.0	0.35	--	--	<0.02
10/14/1998	36-0037	36-0038	11:25	5	9.2	5	<1.0	0.42	--	--	<0.02
10/14/1998	36-0038	36-0037	11:25	5	9.1	4	<1.0	0.4	--	--	<0.02
4/14/1999	36-0045		1139	5	9.6	5	<1.0	h	0.24	--	<0.02
5/12/1999	36-0052		1154	5	9	4	<1.0	0.3	<1.0	--	<0.02
7/14/1999	36-0059		1203	5	8.3	4	<2.5	0.3	0.1	--	<0.02
8/11/1999	36-0066		1117	--	--	--	--	--	--	--	-
9/8/1999	36-0073		1149	3	8	5 d	<1.0	0.4	0.16	--	<0.02
11/9/1999	36-0080		**	4	8.9 h	5	<1.0	0.3	0.13	--	<0.02
4/12/2000	SM-0033		11:28	4	9.6	7	<1.0	0.7	0.12	--	<0.02
6/14/2000	SM-0073		11:56	5	8.9	7	<1.0	0.5	0.1	--	<0.02
8/9/2000	SM-0120		11:34	4	7.9	4	<1.0	0.3	0.16	--	<0.02
10/25/2000	SM-0167		11:23	4	8.5	5	<1.0	0.4	0.16	--	<0.02
12/13/2000	SM-0207		11:15	4	8	4	<1.0	0.35	0.11	--	<0.02
3/28/2001	SM-0245		12:34	4	10	8	1.7	0.25	0.1 h	--	<0.02
5/23/2001	SM-0285		11:58	3	9	5	<1.0	0.4	<0.10	--	<0.02
7/25/2001	SM-0325		11:45	2	7.7	6	<1.0	0.3	0.16 h	--	<0.02
9/19/2001	SM-0365		12:00	3	6.3	8	<1.0	0.35	<0.10	--	<0.02
11/19/2001	SM-0405		11:35	4	8.9	5	<1.0	0.3	<0.10	--	<0.02
1/23/2002	SM-0444		12:40	4	7.6	5	<1.0	0.25	0.12 hj	--	<0.02
3/20/2002	SM-0484		12:25	6	7.9	7	<1.0	0.25 j	0.13 j	--	<0.02
5/15/2002	SM-0524		11:15	4	9	6	<1.0	0.37	0.18 j	--	<0.02
7/17/2002	SM-0564		11:55	3	6.6	7	<1.0	0.45	0.2 j	--	<0.02
9/18/2002	SM-0604		12:05	3	7.9	6	<1.0	0.32 j	0.14 j	--	<0.02
11/13/2002	SM-0644		11:30	4	9.8	9	<1.0	0.25 j	0.11 j	--	<0.06

** = missing/censored data;

-- = no data

Table 14 continued. MassDEP SMART 1998-2004 Chicopee Watershed Chemistry Data. Station SRG

2/12/2003	SM-0684		11:30	3	8.9	6	<1.0	0.21	0.17	--	<0.02	<0.06	0.007
4/16/2003	SM-0723		12:05	3	10	7	<1.0	0.34	0.16	--	<0.02	0.07	0.006
6/18/2003	SM-0764		11:35	3	12	**	1.5	0.59	0.2 b	--	<0.02	<0.06	0.011
7/30/2003	SM-0799		11:40	3	7.6	6	1.6	0.82	0.16 d	--	<0.02	<0.02	0.009
8/20/2003	SM-0815		10:30	4	9.1	6	<1.0	0.49	0.13	--	<0.02	<0.06	<0.005
10/22/2003	SM-0858		11:45	--	--	--	--	<0.5 *	--	<0.040 h	<0.01 h	<0.02 h	0.006 h
2/5/2004	SM-0900		10:40	--	--	--	--	<0.5 *	--	0.12 j	<0.01 j	0.07 j	<0.005
3/24/2004	SM-0942		10:55	--	--	--	--	0.5 *	--	0.18 j	<0.01 j	<0.02 j	<0.005
5/19/2004	SM-0983		10:45	--	--	--	--	0.5 *	--	0.13 j	<0.01 j	<0.02 j	<0.005
7/20/2004	SM-1025		10:45	4	8.1	7	<1.0 h	<0.36	--	0.17	<0.01	<0.02	<0.005
9/22/2004	SM-1066		10:30	3	8.9	7	2.6	0.38	--	0.15	<0.01	<0.02	0.006
11/9/2004	SM-1107		11:10	--	--	--	--	1.23 *	--	0.11	<0.02 h	<0.06	0.007

** = missing/censored data;

-- = no data

Table 15 MassDEP SMART 1998-2004 Chicopee Watershed Chemistry Data. Station CBG

Date	OWMID	QAQC	Time 24hr	Alkalinity (mg/l)	Hardness (mg/l)	Chloride (mg/l)	SSolids (mg/l)	Turb (NTU)	TKN (mg/l)	TN (mg/l)	NH3-N (mg/l)	NO3-NO2-N (mg/l)	TPhos (mg/l)
6/24/1998			14:12	4	7.4	**	3.2	1.7	--	--	<0.02	<0.02	0.04
7/15/1998			12:29	8	11	9	3.3	3.2	--	--	0.33	0.02	0.09
8/19/1998			13:30	7	12	10	5.7	3.5	--	--	<0.02	0.03	0.05
9/16/1998			12:57	7	11	13	1.4	2	--	--	<0.02	0.03	0.04
10/14/1998			12:59	4	13	8	1.6	1.7	--	--	<0.02	0.02	0.03
4/14/1999	36-0046		1321	4	10	12	<1.0	h	0.32	--	<0.02	<0.02	0.02
5/12/1999	36-0053		1344	5	11	10	3.9	2	0.32	--	<0.02	0.02	0.03
7/14/1999	36-0060		1348	7	13	15	<2.5	2.1	0.27	--	<0.02	0.03	0.04
8/11/1999	36-0067		1255	--	--	--	--	--	--	--	--	--	--
9/8/1999	36-0074		1342	7	14	17 d	1.8	1.1	0.28	--	<0.02	<0.02	0.021
11/9/1999	36-0081		1331	4	11 h	14	<1.0	0.9	0.3	--	<0.02	<0.02	0.016
4/12/2000	SM-0034		13:55	3	8.9	12	1.1	0.85	0.2	--	<0.02	<0.02	0.014
6/14/2000	SM-0074		13:38	2	7.8	10	2.6	1.5	0.4	--	<0.02	<0.02	0.029
8/9/2000	SM-0121		13:17	4	10	10	5.3	3.4	0.56	--	<0.02	0.05	0.05
10/25/2000	SM-0168		13:34	4	10	10	1.6	1.8	0.39	--	<0.02	<0.02	0.028
12/13/2000	SM-0208		12:51	3	11	16	<1.0	1.4	0.26	--	<0.02	0.06	0.022
3/28/2001	SM-0246		14:55	<2	10	17	1.5	0.95	0.2 h	--	<0.02	0.08	0.015
5/23/2001	SM-0286		13:43	4	11	16	2.6	3	0.41	--	<0.02	<0.06	0.033
7/25/2001	SM-0326		13:35	4	13	24	2.6	3.7	0.45 h	--	<0.02	<0.06	0.044
9/19/2001	SM-0366		14:05	6	11	18	5.3	3.3	0.3	--	<0.02	<0.06	0.041
11/19/2001	SM-0406		13:30	4	13	16	1	2.3	0.32	--	<0.02	<0.06	0.019
1/23/2002	SM-0445		14:35	4	13	22	1	1.7	0.31 hj	--	<0.02	0.08	0.018
3/20/2002	SM-0485		14:30	2	12	21	1.3	0.95	0.27 j	--	<0.02	<0.02	0.012 j
5/15/2002	SM-0525		13:15	2	9	12	2.6	1.4	0.39	--	<0.02	<0.02	0.023
7/17/2002	SM-0565		12:55	6	12	20	3.4	4.6	0.49	--	<0.02	<0.02 b	0.044
9/18/2002	SM-0605		12:58	6	14	24	3	1.5	0.49	--	<0.02	<0.06	0.034
11/13/2002	SM-0645		12:35	4	15	24	3.3	1.6	0.33	--	<0.02	<0.02	0.024
2/12/2003	SM-0685		12:35	3	14	22	<1.0	0.9	0.29	0.08	--	0.06	0.013
4/16/2003	SM-0722		10:25	<2	11	20	1.5	0.95	0.25	<0.02	<2 *	<0.06	0.013
6/18/2003	SM-0763		10:10	2	12	**	9.1	2.5	0.43 b	<0.02	--	<0.06	0.04
7/30/2003	SM-0797		10:15	5	14	28	6.3	6.2	0.49 d	<0.02	20 *	<0.06	0.045
8/20/2003	SM-0813		9:05	5	14	23	3.8	3.5	0.58	<0.02	40 *	<0.06	0.041
10/22/2003	SM-0856		10:15	--	--	--	--	1.8 *	--	<0.01 h	--	<0.02 h	0.02 h

** = missing/censored data;
-- = no data

Table 15 continued. MassDEP SMART 1998-2004 Chicopee Watershed Chemistry Data. Station CBG

Date	OWMID	QAQC	Time 24hr	Alkalinity (mg/l)	Hardness (mg/l)	Chloride (mg/l)	SSolids (mg/l)	Turb (NTU)	TKN (mg/l)	TN (mg/l)	NH3-N (mg/l)	NO3-NO2-N (mg/l)	TPhos (mg/l)
2/5/2004	SM-0899		9:50	--	--	--	--	1.7 *	--	0.34 j	0.09 j	0.12 j	0.019
3/24/2004	SM-0941		9:55	--	--	--	--	1.8 *	--	0.3 j	<0.04 j	0.09 j	0.021
5/19/2004	SM-0982		9:50	--	--	--	--	6.3 *	--	0.46 j	<0.01 j	<0.02 j	0.057
7/20/2004	SM-1024		9:45	6	12	19	3.7 h	3.8	--	0.5	<0.01	<0.06	0.04
9/22/2004	SM-1065		9:35	2	12	17	1.9	1.9	--	0.55	<0.01	<0.02	0.035
11/9/2004	SM-1106		10:15	--	--	--	--	1.81 *	--	0.21	<0.02 h	<0.06	0.018

** = missing/censored data;

-- = no data

Table 16. MassDEP SMART 1998-2004 Chicopee Watershed Chemistry Data. Station WA09A

Date	OWMID	QAQC	Time 24hr	Alkalinity (mg/l)	Hardness (mg/l)	Chloride (mg/l)	SSolids (mg/l)	Turb (NTU)	TKN (mg/l)	TN (mg/l)	NH3-N (mg/l)	NO3-NO2-N (mg/l)	TPhos (mg/l)
6/24/1998	36-0009		11:09	6	10	**	6.5	4.2	--	--	<0.02	0.1	0.06
7/15/1998	36-0016		10:23	12	20	11	1.6	2.4	--	--	<0.02	0.36	0.07
8/19/1998	36-0022		10:40	14	23	14	<1.0	2.3	--	--	<0.02	0.56	0.08
9/16/1998	36-0029		10:35	15	24	16	<1.0	1.5	--	--	<0.02	0.62	0.04
10/14/1998	36-0036		10:48	8	18	9	3.2	2.8	--	--	0.04	0.19	0.06
4/14/1999				--	--	--	--	--	--	--	--	--	--
4/14/1999	36-0043	36-0044	1104	7	15	13	1.9		0.24	--	<0.02	0.2	0.03
5/12/1999	36-0050	36-0051	1117	9	16	11	3	1.8	0.31	--	<0.02	0.23	0.05
5/12/1999				--	--	--	--	--	--	--	--	--	--
7/14/1999	36-0057	36-0058	1125	15	24	18	<2.5	1.4	0.31	--	<0.02	0.33	0.04
7/14/1999				--	--	--	--	--	--	--	--	--	--
8/11/1999	36-0064	36-0065	1056	--	--	--	--	--	--	--	--	--	--
8/11/1999				--	--	--	--	--	--	--	--	--	--
9/8/1999				--	--	--	--	--	--	--	--	--	--
9/8/1999	36-0071	36-0072	1115	21 d	29	d	2	0.9	0.42	--	<0.02	0.59	0.032
11/9/1999	36-0078	36-0079	1058	5	15 h	12	2.1	1.4	0.33	--	<0.02	0.12	0.03
11/9/1999				--	--	--	--	--	--	--	--	--	--
4/12/2000	SM-0031	SM-0032	10:50	3	12	11	2.4	1.9	0.24	--	<0.02	0.12	0.025
4/12/2000	SM-0032	SM-0031	10:55	4	11	11	2.6	1.4	0.25	--	<0.02	0.11	0.024
6/14/2000	SM-0071	SM-0072	11:25	5	11	9	5.5	2.7	0.32	--	<0.02	0.09	0.057
6/14/2000	SM-0072	SM-0071	11:30	6	11	9	4.8	2.8	0.4	--	<0.02	0.1	0.049
8/9/2000	SM-0118	SM-0119	11:04	8	15	10	1.6	2.2	0.4	--	<0.02	0.27	0.05
8/9/2000	SM-0119	SM-0118	11:09	9	16	11	1.7	2.2	0.39	--	<0.02	0.27	0.05
10/25/2000	SM-0165	SM-0166	10:53	10	18	13	1.5	2	0.35	--	<0.02	0.26	0.041
10/25/2000	SM-0166	SM-0165	10:58	10	18	14	1.4	2	0.34	--	<0.02	0.26	0.043
12/13/2000	SM-0205	SM-0206	10:46	8	17	15	1.6	2.3	0.38	--	0.14	0.28	0.045
12/13/2000	SM-0206	SM-0205	10:51	7	17	15	1.7	2.3	0.37	--	0.14	0.29	0.038

** = missing/censored data;

-- = no data

Table 16 continued. MassDEP SMART 1998-2004 Chicopee Watershed Chemistry Data. Station WA09A

Date	OWMID	QAQC	Time 24hr	Alkalinity (mg/l)	Hardness (mg/l)	Chloride (mg/l)	SSolids (mg/l)	Turb (NTU)	TKN (mg/l)	TN (mg/l)	NH3-N (mg/l)	NO3-NO2-N (mg/l)	TPhos (mg/l)
3/28/2001	SM-0243	SM-0244	11:55	4	12	16	2.7	1.5	0.22 h	--	<0.02	0.17	0.024
3/28/2001	SM-0244	SM-0243	12:00	3	12	16	2.8	1.5	0.22 h	--	<0.02	0.18	0.024
5/23/2001	SM-0283	SM-0284	11:20	8	19	19	4.9	3.4	0.43	--	<0.02	0.31	0.052
5/23/2001	SM-0284	SM-0283	11:25	9	19	21	4.7	3.5	0.36	--	<0.02	0.3	0.053
7/25/2001	SM-0324	SM-0323	**	10	20	26	<1.0	2.3	0.32 h	--	<0.02	0.21	0.048
7/25/2001	SM-0323	SM-0324	11:15	10	21	27	<1.0	2.3	0.32 h	--	<0.02	0.21	0.041
9/19/2001	SM-0364	SM-0363	**	15	25	27	1.1	1.3	0.2	--	<0.02	0.47	0.038
9/19/2001	SM-0363	SM-0364	11:20	15	25	24	1.1	1.3	0.23	--	<0.02	0.46	0.038
11/19/2001	SM-0404	SM-0403	**	10	24	22	1.7	2.6	0.35 d	--	<0.02	0.44	0.048
11/19/2001	SM-0403	SM-0404	11:10	10	24	22	1.6	2.7	0.27 d	--	<0.02	0.45	0.047
1/23/2002	SM-0442	SM-0443	12:00	11	24	31	2.7	2.5	0.48 hj	--	0.16 d	0.5	0.044
1/23/2002	SM-0443	SM-0442	12:00	10	24	32	2.8	2.4	0.44 hj	--	0.13 d	0.48	0.043
3/20/2002	SM-0482	SM-0483	11:40	5	16	18	2.9	1.6	0.32	--	<0.02	0.16	0.039 d
3/20/2002	SM-0483	SM-0482	11:40	6	15	18	2.9	1.6	0.29 j	--	<0.02	0.16	0.027 d
5/15/2002	SM-0522	SM-0523	10:45	4	14	13	5.9	3.1	0.4	--	<0.06	0.08	0.052
5/15/2002	SM-0523	SM-0522	10:45	5	14	13	5.8	3.1	0.4	--	<0.02	0.08	0.052
7/17/2002	SM-0562	SM-0563	11:05	14	25	24	1.1	1.5	0.48	--	<0.02	0.31 b	0.045
7/17/2002	SM-0563	SM-0562	11:05	14	25	25	<1.0	1.5	0.45	--	<0.02	0.31 b	0.045
9/18/2002	SM-0602	SM-0603	11:25	16	29	25	<1.0	0.78	0.36	--	<0.06	0.4	0.031
9/18/2002	SM-0603	SM-0602	11:25	16	29	26	1.1	0.8	0.37	--	<0.02	0.39	0.033
11/13/2002	SM-0642	SM-0643	11:00	8	21	25	19	3.1	0.77	--	0.08	0.23	0.13
11/13/2002	SM-0643	SM-0642	11:00	8	21	25	20	2.6	0.77	--	0.08	0.23	0.13

Table 16 continued. MassDEP SMART 1998-2004 Chicopee Watershed Chemistry Data. Station WA09A

Date	OWMID	QAQC	Time 24hr	Alkalinity (mg/l)	Hardness (mg/l)	Chloride (mg/l)	SSolids (mg/l)	Turb (NTU)	TKN (mg/l)	TN (mg/l)	NH3-N (mg/l)	NO3-NO2-N (mg/l)	TPhos (mg/l)
2/12/2003	SM-0682	SM-0683	10:55	7	19	25	1.4	1.4	0.42	--	0.19	0.34	0.025
2/12/2003	SM-0683	SM-0682	10:55	7	20	25	1.6	1.4	0.39	--	0.18	0.34	0.026
4/16/2003	SM-0724	SM-0725	13:10	5	16	19	2	1.4	0.29	--	<0.02	0.2	0.023
4/16/2003	SM-0725	SM-0724	13:10	5	16	18	2.1	1.2	0.27	--	<0.02	0.21	0.025
6/18/2003	SM-0765	SM-0766	12:30	7	17	**	5.8	4.6	0.52 b	--	<0.06	0.16	0.063
6/18/2003	SM-0766	SM-0765	12:30	7	18	**	6.4	4.2	0.49 b	--	<0.06	0.16	0.062
7/30/2003	SM-0801	SM-0802	12:35	11 d	23	25	<1.0	2.5	#d	--	<0.02	0.33	0.041
7/30/2003	SM-0802	SM-0801	12:35	18 d	24	25	<1.0	2.3	#d	--	<0.02	0.32	0.042
8/20/2003	SM-0817	SM-0818	11:30	7	19	21	1.4	2.4	0.56	--	<0.02	0.24	0.038
8/20/2003	SM-0818	SM-0817	11:30	6	19	22	1.4	2.5	0.53	--	<0.02	0.25	0.038
10/22/2003	SM-0860	SM-0861	12:35	--	--	--	--	2.3 *	--	0.38 h	<0.03 h	0.15 h	0.027 h
10/22/2003	SM-0861	SM-0860	12:35	--	--	--	--	2.3 *	--	0.33 h	<0.01 h	0.12 h	0.026 h
2/5/2004	SM-0901	SM-0902	11:15	--	--	--	--	2 *	--	0.72 j	0.22 j	0.34 j	0.032
2/5/2004	SM-0902	SM-0901	11:15	--	--	--	--	2.6 *	--	0.81 j	0.23 j	0.38 j	0.033
3/24/2004	SM-0943	SM-0944	11:20	--	--	--	--	2.7 *	--	0.54 j	0.09 j	0.28 dj	0.034
3/24/2004	SM-0944	SM-0943	11:20	--	--	--	--	2.8 *	--	0.5 j	0.08 j	0.22 dj	0.035
5/19/2004	SM-0984	SM-0985	11:10	--	--	--	--	3.6 *	--	0.57 j	0.06 j	0.22 j	0.044
5/19/2004	SM-0985	SM-0984	11:10	--	--	--	--	3.3 *	--	0.58 j	0.06 j	0.22 j	0.043
7/20/2004	SM-1026	SM-1027	11:20	12	20	23	1.4 h	2.3	--	0.72	<0.01	0.32	0.042
7/20/2004	SM-1027	SM-1026	11:20	10	20	24	<1.0 h	2.3	--	0.73	<0.01	0.33	0.04
9/22/2004	SM-1067	SM-1068	11:05	3	14	15	4.5	3.2	--	0.59	<0.01	0.09	0.047
9/22/2004	SM-1068	SM-1067	11:05	4	14	15	4.4	3	--	0.59	<0.03	0.09	0.046
11/9/2004	SM-1108	SM-1109	11:45	--	--	--	--	2.92 *	--	0.35	<0.02 h	0.17	0.027
11/9/2004	SM-1109	SM-1108	11:45	--	--	--	--	2.67 *	--	0.34	<0.02 h	0.16	0.026

** = missing/censored data;

-- = no data

Table 17 MassDEP SMART 1998-2004 Chicopee Watershed Chemistry Data. Station SMG

Date	OWMID	QAQC	Time 24hr	Alkalinity (mg/l)	Hardness (mg/l)	Chloride (mg/l)	SSolids (mg/l)	Turb (NTU)	TKN (mg/l)	TN (mg/l)	NH3-N (mg/l)	NO3-NO2-N (mg/l)	TPhos (mg/l)
6/24/1998	36-0006		9:11	10	14	**	1.9	3.2	--	--	<0.02	0.02	0.04
7/15/1998	36-0013		8:59	12	17	9	1.6	2.7	--	--	<0.02	0.09	0.04
8/19/1998	36-0020		9:00	11	23	8	<1.0	1.9	--	--	<0.02	0.13	0.02
9/16/1998	36-0027		9:05	15	28	9	<1.0	1.6	--	--	<0.02	0.35	0.02
10/14/1998	36-0034		9:18	8	16	7	<1.0	1.7	--	--	<0.02	0.04	0.02
4/14/1999	36-0041		923	7	15	9	<1.0	h	0.19		<0.02	0.07	0.02
5/12/1999	36-0048		930	7	15	8	3.8	2.3	0.26		<0.02	0.05	0.03
7/14/1999	36-0055		943	13	21	9	<2.5	2.3	0.24		0.03	0.2	0.03
8/11/1999	36-0062		921	--	--	--	--	--	--	--	--	--	--
9/8/1999	36-0069		930	11	27	10 d	<1.0	0.9	0.23		<0.02	0.27	0.016
11/9/1999	36-0076		917	5	15 h	10	1.8	0.9	0.19		<0.02	<0.02	0.014
4/12/2000	SM-0029		9:05	4	13	9	1.3	0.9	0.13	--	<0.02	0.13	0.012
6/14/2000	SM-0069		9:34	5	12	9	4.1	2.1	0.26	--	<0.02	<0.02	0.021
8/9/2000	SM-0116		9:12	9	21	8	1.5	2.1	0.34	--	<0.02	0.09	0.03
10/25/2000	SM-0163		9:15	8	19	9	<1.0	1.6	0.22	--	<0.02	0.04	0.016
12/13/2000	SM-0203		9:07	4	16	10	5.4	11	0.27	--	0.04	0.1	0.04
3/28/2001	SM-0241		9:57	3	12	10	4.3	0.65	0.14 h	--	<0.02	0.19	0.011
5/23/2001	SM-0281		9:23	9	17	10	2.6	2.1	0.35	--	<0.02	0.1	0.022
7/25/2001	SM-0321		9:20	11	19	13	<1.0	2	0.33 h	--	<0.02	0.13	0.024
9/19/2001	SM-0361		9:20	6	23	16	<1.0	1.7	0.18	--	<0.02	0.14	0.015
11/19/2001	SM-0401		9:30	8	26	14	<1.0	1.8	0.24	--	<0.02	0.19	0.016
1/23/2002	SM-0440		9:40	8	17	13	<1.0	1.2	0.26 hj	--	0.06	0.13	0.009
3/20/2002	SM-0480		9:25	4	14	14	<1.0	0.7	0.18 j	--	<0.02	<0.02	0.009 j
5/15/2002	SM-0520		8:50	4	13	12	2.6	1.3	0.26 j	--	<0.02	<0.02	0.017
7/17/2002	SM-0560		9:20	9	21	14	1.4	2.4	0.43	--	<0.02	0.13 b	0.026
9/18/2002	SM-0600		9:30	11	28	12	2.1	2	0.25 j	--	<0.06	0.18	0.021 j
11/13/2002	SM-0640		8:55	6	16	11	16	9	0.46	--	<0.06	0.06	0.069

** = missing/censored data;

-- = no data

Table 17 continued. MassDEP SMART 1998-2004 Chicopee Watershed Chemistry Data. Station SMG

Date	OWMID	QAQC	Time 24hr	Alkalinity (mg/l)	Hardness (mg/l)	Chloride (mg/l)	SSolids (mg/l)	Turb (NTU)	TKN (mg/l)	TN (mg/l)	NH3-N (mg/l)	NO3-NO2-N (mg/l)	TPhos (mg/l)
2/12/2003	SM-0680		9:20	6	17	16	1.1	0.85	0.23	--	<0.06	0.18	0.011
4/16/2003	SM-0721		9:30	4	14	14	2.2	0.75	0.25	--	<0.02	0.1	0.011
6/18/2003	SM-0762		9:10	6	17	**	2.3	2.8	0.34 b	--	<0.02	<0.06	0.032
7/30/2003	SM-0796		8:50	9	18	16	2	3.4	0.43 d	--	<0.02	0.1	0.029
8/20/2003	SM-0812		8:20	8	18	14	2.4	2.7	0.37	--	<0.02	0.07	0.019
10/22/2003	SM-0855		9:30	--	--	--	--	1.7 *	--	0.16 h	<0.01 h	<0.02 h	0.01 h
2/5/2004	SM-0898		8:55	--	--	--	--	1.7 *	--	0.37 j	0.08 j	0.2 j	0.013
3/24/2004	SM-0940		9:05	--	--	--	--	2 *	--	0.32 j	<0.04 j	0.14 j	0.021
5/19/2004	SM-0981		9:00	--	--	--	--	7.5 *	--	0.44 j	0.05 j	0.12 j	0.033
7/20/2004	SM-1023		8:55	8	21	14	3 h	3.4	--	0.5	<0.03	0.14	0.028
9/22/2004	SM-1064		8:45	7	16	22	1.6	2.2	--	0.33	<0.01	<0.06	0.02
11/9/2004	SM-1105		9:30	--	--	--	--	1.72 *	--	0.22	<0.02 h	0.07	0.011

** = missing/censored data;

-- = no data

Table 18 MassDEP SMART 1998-2004 Chicopee Watershed Chemistry Data. Station QRG

Date	OWMID	QAQC	Time 24hr	Alkalinity (mg/l)	Hardness (mg/l)	Chloride (mg/l)	SSolids (mg/l)	Turb (NTU)	TKN (mg/l)	TN (mg/l)	NH3-N (mg/l)	NO3-NO2-N (mg/l)	TPhos (mg/l)
6/24/1998	36-0007	36-0008	10:19	14	18	**	8.4	5.8	--	--	<0.02	<0.02	0.09
6/24/1998	36-0008	36-0007	10:19	14	18	**	8.3	5.4	--	--	<0.02	0.02	0.09
7/15/1998	36-0015	36-0014	**	14	19	25	2.7	3	--	--	<0.02	0.09	0.09
7/15/1998	36-0014	36-0015	9:50	14	19	24	3.2	3	--	--	<0.02	0.07	0.08
8/19/1998	36-0021		10:00	19	22	77	<1.0	1.5	--	--	<0.02	0.23	0.15
9/16/1998	36-0028		10:00	23	23	13	<1.0	1	--	--	<0.02	0.34	0.23
10/14/1998	36-0035		10:11	13	26	30	2.4	2.6	--	--	<0.02	0.12	0.07
4/14/1999	36-0042		1030	9	18	24	3.8	h	0.29	--	-0.02	0.07	0.05
5/12/1999	36-0049		1037	12	19	25	7	2.3	0.43	--	-0.02	0.04	0.08
7/14/1999	36-0056		1048	22	24	110	<2.5	2	0.5	--	-0.02	0.12	0.23
8/11/1999	36-0063		1017	--	--	--	--	--	--	--	--	--	--
9/8/1999	36-0070		1037	21	30	85 d	-1	0.6	0.6	--	<0.02	1.2	0.3
11/9/1999	36-0077		1024	9	21 h	20	1.9	1.7	0.34	--	<0.02	<0.02	0.037
4/12/2000	SM-0030		10:16	7	16	17	3.2	2.1	0.26	--	<0.02	0.08	0.035
6/14/2000	SM-0070		10:41	11	15	15	4.1	2.5	0.34	--	<0.02	0.02	0.052
8/9/2000	SM-0117		10:28	14	19	25	2.9	2.9	0.47	--	<0.02	0.07	0.08
10/25/2000	SM-0164		10:18	15	21	31	<1.0	1.4	0.37	--	<0.02	0.03	0.063
12/13/2000	SM-0204		10:15	12	20	25	2.5	2.4	0.33	--	<0.02	0.18	0.054
3/28/2001	SM-0242		11:14	4	16	20	3.2	2	0.22 h	--	<0.02	0.33	0.028
5/23/2001	SM-0282		10:32	10	20	33	3.3	3.2	0.35	--	0.17	0.13	0.064
7/25/2001	SM-0322		10:35	14	21	36	1.5	2.4	0.47 h	--	<0.02	0.1	0.087
9/19/2001	SM-0362		10:30	22	24	82	<1.0	1.9	0.19	--	<0.02	0.45	0.2
11/19/2001	SM-0402		10:35	10	24	26	<1.0	1.7	0.28	--	<0.02	0.17	0.063
1/23/2002	SM-0441		11:10	11	24	42	4.9	2.8	0.41 hj	--	<0.02	0.2	0.068
3/20/2002	SM-0481		10:50	8	21	33	3	2	0.47	--	<0.02	0.06	0.039
5/15/2002	SM-0521		10:10	7	18	19	7.3	3.5	0.43	--	<0.02	<0.06	0.059
7/17/2002	SM-0561		10:25	14	23	43	1.5	2.1	0.55	--	<0.02	0.12 b	0.084
9/18/2002	SM-0601		10:50	17	25	46	1.1	0.87	0.49	--	<0.06	0.27	0.15
11/13/2002	SM-0641		10:20	10	21	24	6.4	2.3	0.45	--	<0.02	0.07	0.056

** = missing/censored data;

-- = no data

Table 18 continued. MassDEP SMART 1998-2004 Chicopee Watershed Chemistry Data. Station QRG

Date	OWMID	QAQC	Time 24hr	Alkalinity (mg/l)	Hardness (mg/l)	Chloride (mg/l)	SSolids (mg/l)	Turb (NTU)	TKN (mg/l)	TN (mg/l)	NH3-N (mg/l)	NO3-NO2-N (mg/l)	TPhos (mg/l)
2/12/2003	Ice Out		**	--	--	--	--	--	--	--	--	--	--
4/16/2003	SM-0726		13:40	6	17	20	4.6	1.6	0.3	--	<0.02	0.13	0.028
6/18/2003	SM-0767		13:00	10	21	**	6.9	3.8	0.55 b	--	<0.02	<0.06	0.063
7/30/2003	SM-0803		13:05	12	22	34	2.1	3.5	0.51 c	--	<0.02	0.12	0.058
8/20/2003	SM-0819		12:00	16	24	34	2.2	2.6	0.53	--	<0.02	0.11	0.061
10/22/2003	SM-0862		13:10	--	--	--	--	1.9 *	--	0.28 h	<0.03 h	<0.02 h	0.026 h
2/5/2004	Ice Out		--	--	--	--	--	--	--	--	--	--	--
3/24/2004	SM-0945		11:50	--	--	--	--	3 *	--	0.57 j	<0.04	0.32 j	0.046
5/19/2004	SM-0986		11:45	--	--	--	--	4.7 *	--	0.59 j	0.06 j	0.14 j	0.062
7/20/2004	SM-1028		11:50	11	22	27	1.9 h	2	--	0.68	<0.01	0.23	0.096
9/22/2004	SM-1069		11:35	10	22	24	3.2	2.2	--	0.67	<0.01	0.14	0.05
11/9/2004	SM-1110		12:15	--	--	--	--	2.9 *	--	0.34	<0.02 h	0.1	0.042

** = missing/censored data;

-- = no data

Table 19 MassDEP SMART 1998-2004 Chicopee Watershed Ambient Field Blanks.

Date	OWMID	QAQC	Time	Alkalinity	Hardness	Chloride	SSolids	Turb	TKN	TN	NH3-N	NO3-NO2-N	TPhos
			24hr	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(NTU)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
6/24/1998	36-0012	Blank	**	2	<0.66	**	<1.0	<0.1	--	--	<0.02	<0.02	<0.01
7/15/1998	36-0018	Blank	**	3	<0.66	<1.0	<1.0	0.1	--	--	<0.02	<0.02	<0.01
8/19/1998	36-0025	Blank	11:30	3	<0.66	<1.0	<1.0	<0.1	--	--	<0.02	<0.02	<0.01
9/16/1998	36-0032	Blank	11:05	<1.0	<0.66	<1.0	<1.0	<0.1	--	--	<0.02	<0.02	<0.01
10/14/1998	36-0039	Blank	11:25	1	<0.66	<1.0	<1.0	<0.1	--	--	<0.02	<0.02	<0.01
4/14/1999	36-0047	BLANK	**	2	<0.60	<1.0	<1.0	**h	0.1	--	<0.02	<0.02	<0.01
5/12/1999	36-0054	BLANK	**	2	<0.66	<1.0	<1.0	<0.1	<0.10	--	<0.02	<0.02	<0.01
7/14/1999	36-0061	BLANK	13:53	2.5	<0.66	<1.0	<2.5	<0.1	<0.10	--	<0.02	<0.02	<0.01
8/11/1999	36-0068	BLANK	13:05	--	--	--	--	--	--	--	--	--	--
9/8/1999	36-0075	BLANK	13:47	<2.0	<0.66	<1.0d	<1.0	<0.1	<0.10	--	<0.02	<0.02	<0.005
11/9/1999	36-0082	BLANK	**	<2.0	<0.66h	<1.0	<1.0	<0.1	<0.10	--	<0.02	<0.02	<0.010
4/12/2000	SM-0035	Blank	14:00	<2	<0.66	<1.0	<1.0	<0.1	<0.10	--	<0.02	<0.02	<0.010
6/14/2000	SM-0075	Blank	13:43	<2	<0.66	<1.0	<1.0	<0.1	<0.10	--	<0.02	<0.02	<0.010
8/9/2000	SM-0122	Blank	13:23	<2	<0.66	<1.0	<1.0	<0.1	<0.10	--	<0.02	<0.02	<0.01
10/25/2000	SM-0169	Blank	13:39	<2	<0.66	<1.0	<1.0	<0.1	<0.10	--	<0.02	<0.02	<0.010
12/13/2000	SM-0209	Blank	12:56	<2	<0.66	<1.0	<1.0	<0.1	<0.10	--	<0.02	<0.02	<0.010
3/28/2001	SM-0247	Blank	15:00	<2	<0.66	<1	<1.0	<0.10	<0.10 hj	--	<0.02	<0.06	<0.010
5/23/2001	SM-0287	Blank	13:38	<2	<0.66	<1	<1.0	<0.10	<0.10	--	<0.02	<0.06	<0.010
7/25/2001	SM-0327	Blank	**	<2	<0.66	<1	<1.0	<0.10	<0.10 hj	--	<0.02	<0.06	<0.005
9/19/2001	SM-0367	Blank	**	<2	<0.66	<1	<1.0	<0.10	<0.10	--	<0.02	<0.06	<0.005
11/19/2001	SM-0407	Blank	**	<2.0	<0.66	<1	<1.0	<0.10	<0.10	--	<0.02	<0.06	<0.005
1/23/2002	SM-0446	Blank	14:20j	<2.0	<0.66	<1.0	<1.0	0.15 bj	<0.10 hj	--	<0.02	<0.02	<0.005
3/20/2002	SM-0486	Blank	14:30j	<2.0	<0.66	<1.0	<1.0	<0.10	<0.10	--	<0.02	<0.02	<0.005
5/15/2002	SM-0526	Blank	13:05j	<2.0	<0.66	<1.0	<1.0	<0.10	0.12 bj	--	<0.02	<0.02	<0.005
7/17/2002	SM-0566	Blank	12:50j	<2.0	<0.66	1 bj	<1.0	0.1 bj	<0.10	--	<0.02	0.07 b	<0.005
9/18/2002	SM-0606	Blank	12:55j	<2.0	<0.66	<1.0	<1.0	<0.10	<0.10	--	<0.02	<0.02	<0.005
11/13/2002	SM-0646	Blank	12:25j	<2.0	<0.66	<1.0	<1.0	<0.10	<0.10	--	<0.02	<0.02	<0.005

** = missing/censored data;

-- = no data

Table 19 MassDEP SMART 1998-2004 Chicopee Watershed Ambient Field Blanks.

Date	OWMID	QAQC	Time	Alkalinity	Hardness	Chloride	SSolids	Turb	TKN	TN	NH3-N	NO3-NO2-N	TPhos
			24hr	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(NTU)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
2/12/2003	SM-0686	Blank	12:25j	<2	<0.66	<1	<1.0	<0.10	0.14 b	--	<0.02	<0.02	<0.005
4/16/2003	SM-0727	Blank	13:35j	<2	<0.66	<1	<1.0	<0.10	0.11 b	--	<0.02	<0.06	<0.005
6/18/2003	SM-0768	Blank	12:55j	<2	<0.66	**	<1.0	<0.10	<0.10	--	<0.02	<0.02	<0.005
7/30/2003	SM-0804	Blank	13:00j	<2	<0.66	<1	<1.0	0.15 b	<0.10 d	--	<0.02	<0.02	<0.005
8/20/2003	SM-0820	Blank	11:55j	<2	<0.66	<1	<1.0	0.15 b	<0.10	--	<0.06	<0.02	<0.005
10/22/2003	SM-0863	Blank	13:05j	--	--	--	--	<0.5 *	--	--	<0.01 h	<0.02 h	<0.005 h
2/5/2004	SM-0905	Blank	12:45	--	--	--	--	<0.5 *	--	<0.040 j	<0.01 j	<0.02 j	<0.005
3/24/2004	SM-0946	Blank	11:55	--	--	--	--	<0.5 *	--	0.057 bj	<0.01 j	<0.02 j	<0.005
5/19/2004	SM-0987	Blank	11:50	--	--	--	--	<0.5 *	--	<0.040 j	<0.01 j	<0.02 j	<0.005
7/20/2004	SM-1029	Blank	11:55	<2	<0.66	<1	<1.0 h	<0.10	--	0.049 b	<0.01	<0.02	<0.005
9/22/2004	SM-1070	Blank	11:40	<2	<0.66	<1	<1.0	<0.10	--	<0.040	<0.01	<0.02	<0.005
11/9/2004	SM-1111	Blank	12:20	--	--	--	--	<0.5 *	--	<0.040	<0.02 h	<0.06	<0.005
2/5/2004	SM-0905	Blank	12:45	--	--	--	--	<0.5 *	--	<0.040 j	<0.01 j	<0.02 j	<0.005
3/24/2004	SM-0946	Blank	11:55	--	--	--	--	<0.5 *	--	0.057 bj	<0.01 j	<0.02 j	<0.005
5/19/2004	SM-0987	Blank	11:50	--	--	--	--	<0.5 *	--	<0.040 j	<0.01 j	<0.02 j	<0.005
7/20/2004	SM-1029	Blank	11:55	<2	<0.66	<1	<1.0 h	<0.10	--	0.049 b	<0.01	<0.02	<0.005
9/22/2004	SM-1070	Blank	11:40	<2	<0.66	<1	<1.0	<0.10	--	<0.040	<0.01	<0.02	<0.005
11/9/2004	SM-1111	Blank	12:20	--	--	--	--	<0.5 *	--	<0.040	<0.02 h	<0.06	<0.005

** = missing/censored data;

-- = no data

Table 20 MassDEP SMART 1998-2004 Chicopee Field Duplicate Results.

Date	OWMID	QAQC	Time	Alkalinity	Hardness	Chloride	SSolids	Turb	TKN	TN	NH3-N	NO3-NO2-N	TPhos
			(24hr)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(NTU)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
QUABOAG RIVER, Station: QRG													
6/24/1998	36-0007	36-0008	10:19	14	18	**	8.4	5.8	--	--	<0.02	<0.02	0.09
6/24/1998	36-0008	36-0007	10:19	14	18	**	8.3	5.4	--	--	<0.02	0.02	0.09
Relative Percent Difference (RPD):				*0.00%*	*0.00%*		*1.20%*	*7.10%*			*0.00%*	*0.00%*	*0.00%*
7/15/1998	36-0015	36-0014	**	14	19	25	2.7	3	--	--	<0.02	0.09	0.09
7/15/1998	36-0014	36-0015	9:50	14	19	24	3.2	3	--	--	<0.02	0.07	0.08
Relative Percent Difference (RPD):				*0.00%*	*0.00%*	*4.10%*	*16.90%*	*0.00%*			*0.00%*	*25.00%*	*11.80%*
SWIFT RIVER, Station: SRG													
8/19/1998	36-0023	36-0024	11:30	6	8.8	4	<1.0	0.35	--	--	<0.02	<0.02	<0.01
8/19/1998	36-0024	36-0023	11:30	5	8.7	5	<1.0	0.3	--	--	<0.02	<0.02	<0.01
Relative Percent Difference (RPD):				*18.20%*	*1.10%*	*22.20%*	*0.00%*	*15.40%*			*0.00%*	*0.00%*	*0.00%*
9/16/1998	36-0030	36-0031	11:05	4	7.5	4	<1.0	0.35	--	--	<0.02	<0.02	0.01
9/16/1998	36-0031	36-0030	11:05	4	7.5	4	<1.0	0.35	--	--	<0.02	0.02	<0.01
Relative Percent Difference (RPD):				*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*			*0.00%*	*0.00%*	*0.00%*
10/14/1998	36-0037	36-0038	11:25	5	9.2	5	<1.0	0.42	--	--	<0.02	0.03	0.01
10/14/1998	36-0038	36-0037	11:25	5	9.1	4	<1.0	0.4	--	--	<0.02	<0.02	0.01
Relative Percent Difference (RPD):				*0.00%*	*1.10%*	*22.20%*	*0.00%*	*4.90%*			*0.00%*	*40.00%*	*0.00%*

** = missing/censored data;

-- = no data

Table 20 MassDEP SMART 1998-2004 Chicopee Field Duplicate Results.

Date	OWMID	QAQC	Time	Alkalinity	Hardness	Chloride	SSolids	Turb	TKN	TN	NH3-N	NO3-NO2-N	TPhos
			(24hr)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(NTU)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
WARE RIVER, Station: WA09A													
4/14/1999	36-0044	36-0043	**	7	15	13	1.8	**h	0.21	--	0.02	0.200	0.030
4/14/1999	36-0043	36-0044	11:04	7	15	13	1.9	**h	0.24	--	<0.02	0.200	0.030
Relative Percent Difference (RPD):				*0.00%*	*0.00%*	*0.00%*	*5.40%*		*13.30%*		*0.00%*	*0.00%*	*0.00%*
5/12/1999	36-0051	36-0050	**	8	16	11	3.2	1.8	0.3	--	<0.02	0.220	0.050
5/12/1999	36-0050	36-0051	11:17	9	16	11	3	1.8	0.31	--	<0.02	0.230	0.050
Relative Percent Difference (RPD):				*11.80%*	*0.00%*	*0.00%*	*6.50%*	*0.00%*	*3.30%*		*0.00%*	*4.40%*	*0.00%*
7/14/1999	36-0057	36-0058	11:25	15	24	18	<2.5	1.4	0.31	--	<0.02	0.330	0.040
7/14/1999	36-0058	36-0057	11:26	15	24	18	<2.5	1.2	0.26	--	<0.02	0.340	0.050
Relative Percent Difference (RPD):				*0.00%*	*0.00%*	*0.00%*	*0.00%*	*15.40%*	*17.50%*		*0.00%*	*3.00%*	*22.20%*
9/8/1999	36-0071	36-0072	11:15	21d	29	**d	2	0.9	0.42	--	<0.02	0.590	0.032
9/8/1999	36-0072	36-0071	11:20	14d	29	**d	1.7	0.9	0.41	--	<0.02	0.590	0.032
Relative Percent Difference (RPD):				*40.00%*	*0.00%*		*16.20%*	*0.00%*	*2.40%*		*0.00%*	*0.00%*	*0.00%*
11/9/1999	36-0079	36-0078	**	4	15h	13	2.2	1.4	0.31	--	<0.02	0.120	0.030
11/9/1999	36-0078	36-0079	10:58	5	15h	12	2.1	1.4	0.33	--	<0.02	0.120	0.030
Relative Percent Difference (RPD):				*22.20%*	*0.00%*	*8.00%*	*4.70%*	*0.00%*	*6.30%*		*0.00%*	*0.00%*	*0.00%*
** = missing/censored data;													
-- = no data													

Table 20 MassDEP SMART 1998-2004 Chicopee Field Duplicate Results.

Date	OWMID	QAQC	Time	Alkalinity	Hardness	Chloride	SSolids	Turb	TKN	TN	NH3-N	NO3-NO2-N	TPhos
			(24hr)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(NTU)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
WARE RIVER, Station: WA09A													
4/12/2000	SM-0031	SM-0032	10:50	3	12	11	2.4	1.9	0.24		<0.02	0.12	0.025
4/12/2000	SM-0032	SM-0031	10:55	4	11	11	2.6	1.4	0.25		<0.02	0.11	0.024
Relative Percent Difference (RPD):				*15.40%*	*8.70%*	*0.00%*	*8.00%*	*30.30%*	*4.10%*		*0.00%*	*8.70%*	*4.10%*
6/14/2000	SM-0071	SM-0072	11:25	5	11	9	5.5	2.7	0.32		<0.02	0.09	0.057
6/14/2000	SM-0072	SM-0071	11:30	6	11	9	4.8	2.8	0.4		<0.02	0.1	0.049
Relative Percent Difference (RPD):				*18.20%*	*0.00%*	*0.00%*	*13.60%*	*3.60%*	*22.20%*		*0.00%*	*10.50%*	*15.10%*
8/9/2000	SM-0118	SM-0119	11:04	8	15	10	1.6	2.2	0.4		<0.02	0.27	0.05
8/9/2000	SM-0119	SM-0118	11:09	9	16	11	1.7	2.2	0.39		<0.02	0.27	0.05
Relative Percent Difference (RPD):				*11.80%*	*6.50%*	*9.50%*	*6.10%*	*0.00%*	*2.50%*		*0.00%*	*0.00%*	*8.00%*
10/25/2000	SM-0165	SM-0166	10:53	10	18	13	1.5	2	0.35		<0.02	0.26	0.041
10/25/2000	SM-0166	SM-0165	10:58	10	18	14	1.4	2	0.34		<0.02	0.26	0.043
Relative Percent Difference (RPD):				*0.00%*	*0.00%*	*7.40%*	*6.90%*	*0.00%*	*2.90%*		*0.00%*	*0.00%*	*4.80%*
12/13/2000	SM-0205	SM-0206	10:46	8	17	15	1.6	2.3	0.38		0.14	0.28	0.045
12/13/2000	SM-0206	SM-0205	10:51	7	17	15	1.7	2.3	0.37		0.14	0.29	0.038
Relative Percent Difference (RPD):				*13.30%*	*0.00%*	*0.00%*	*6.10%*	*0.00%*	*2.70%*		*0.00%*	*3.50%*	*16.90%*

** = missing/censored data

-- = no data

Table 20 MassDEP SMART 1998-2004 Chicopee Field Duplicate Results.

Date	OWMID	QAQC	Time	Alkalinity	Hardness	Chloride	SSolids	Turb	TKN	TN	NH3-N	NO3-NO2-N	TPhos
			(24hr)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(NTU)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
WARE RIVER, Station: WA09A													
3/28/2001	SM-0243	SM-0244	11:55	4	12	16	2.7	1.5	0.22h		<0.02	0.17	0.024
3/28/2001	SM-0244	SM-0243	12:00	3	12	16	2.8	1.5	0.22h		<0.02	0.18	0.024
Relative Percent Difference (RPD):				28.60%	0.00%	0.00%	3.60%	0.00%	0.00%		0.00%	5.70%	0.00%
5/23/2001	SM-0283	SM-0284	11:20	8	19	19	4.9	3.4	0.43		<0.02	0.31	0.052
5/23/2001	SM-0284	SM-0283	11:25	9	19	21	4.7	3.5	0.36		<0.02	0.3	0.053
Relative Percent Difference (RPD):				11.80%	0.00%	10.00%	4.20%	2.90%	17.70%		0.00%	3.30%	1.90%
7/25/2001	SM-0324	SM-0323	**	10	20	26	<1.0	2.3	0.32h		<0.02	0.21	0.048
7/25/2001	SM-0323	SM-0324	11:15	10	21	27	<1.0	2.3	0.32h		<0.02	0.21	0.041
Relative Percent Difference (RPD):				0.00%	4.90%	3.80%	0.00%	0.00%	0.00%		0.00%	0.00%	15.70%
9/19/2001	SM-0364	SM-0363	**	15	25	27	1.1	1.3	0.2		<0.02	0.47	0.038
9/19/2001	SM-0363	SM-0364	11:20	15	25	24	1.1	1.3	0.23		<0.02	0.46	0.038
Relative Percent Difference (RPD):				0.00%	0.00%	11.80%	0.00%	0.00%	14.00%		0.00%	2.20%	0.00%
11/19/2001	SM-0404	SM-0403	**	10	24	22	1.7	2.6	0.35d		<0.02	0.44	0.048
11/19/2001	SM-0403	SM-0404	11:10	10	24	22	1.6	2.7	0.27d		<0.02	0.45	0.047
Relative Percent Difference (RPD):				0.00%	0.00%	0.00%	6.10%	3.80%	25.80%		0.00%	2.20%	2.10%

** = missing/censored data

-- = no data

Table 20 MassDEP SMART 1998-2004 Chicopee Field Duplicate Results.

Date	OWMID	QAQC	Time	Alkalinity	Hardness	Chloride	SSolids	Turb	TKN	TN	NH3-N	NO3-NO2-N	TPhos
			(24hr)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(NTU)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
WARE RIVER, Station: WA09A													
1/23/2002	SM-0442	SM-0443	12:00	11	24	31	2.7	2.5	0.48 hj		0.16 d	0.5	0.044
1/23/2002	SM-0443	SM-0442	12:00	10	24	32	2.8	2.4	0.44 hj		0.13 d	0.48	0.043
Relative Percent Difference (RPD):				*9.50%*	*0.00%*	*3.20%*	*3.60%*	*4.10%*	*8.70%*		*20.70%*	*4.10%*	*2.30%*
3/20/2002	SM-0482	SM-0483	11:40	5	16	18	2.9	1.6	0.32		<0.02	0.16	0.039 d
3/20/2002	SM-0483	SM-0482	11:40	6	15	18	2.9	1.6	0.29 j		<0.02	0.16	0.027 d
Relative Percent Difference (RPD):				*18.20%*	*6.50%*	*0.00%*	*0.00%*	*0.00%*	*9.80%*		*0.00%*	*0.00%*	*36.40%*
5/15/2002	SM-0522	SM-0523	10:45	4	14	13	5.9	3.1	0.4		<0.06	0.08	0.052
5/15/2002	SM-0523	SM-0522	10:45	5	14	13	5.8	3.1	0.4		<0.02	0.08	0.052
Relative Percent Difference (RPD):				*22.20%*	*0.00%*	*0.00%*	*1.70%*	*0.00%*	*0.00%*		*100.00%*	*0.00%*	*0.00%*
7/17/2002	SM-0562	SM-0563	11:05	14	25	24	1.1	1.5	0.48		<0.02	0.31 b	0.045
7/17/2002	SM-0563	SM-0562	11:05	14	25	25	<1.0	1.5	0.45		<0.02	0.31 b	0.045
Relative Percent Difference (RPD):				*0.00%*	*0.00%*	*4.10%*	*9.50%*	*0.00%*	*6.50%*		*0.00%*	*0.00%*	*0.00%*
9/18/2002	SM-0602	SM-0603	11:25	16	29	25	<1.0	0.78	0.36		<0.06	0.4	0.031
9/18/2002	SM-0603	SM-0602	11:25	16	29	26	1.1	0.8	0.37		<0.02	0.39	0.033
Relative Percent Difference (RPD):				*0.00%*	*0.00%*	*3.90%*	*9.50%*	*2.50%*	*2.70%*		*100.00%*	*2.50%*	*6.30%*
11/13/2002	SM-0642	SM-0643	11:00	8	21	25	19	3.1	0.77		0.08	0.23	0.13
11/13/2002	SM-0643	SM-0642	11:00	8	21	25	20	2.6	0.77		0.08	0.23	0.13
Relative Percent Difference (RPD):				*0.00%*	*0.00%*	*0.00%*	*5.10%*	*17.50%*	*0.00%*		*0.00%*	*0.00%*	*0.00%*

** = missing/censored data

-- = no data

Table 20 MassDEP SMART 1998-2004 Chicopee Field Duplicate Results.

Date	OWMID	QAQC	Time	Alkalinity	Hardness	Chloride	SSolids	Turb	TKN	TN	NH3-N	NO3-NO2-N	TPhos
			(24hr)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(NTU)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
WARE RIVER, Station: WA09A													
2/12/2003	SM-0682	SM-0683	10:55	7	19	25	1.4	1.4	0.42	--	0.19	0.34	0.025
2/12/2003	SM-0683	SM-0682	10:55	7	20	25	1.6	1.4	0.39	--	0.18	0.34	0.026
Relative Percent Difference (RPD):				*0.00%*	*5.10%*	*0.00%*	*13.30%*	*0.00%*	*7.40%*	--	*5.40%*	*0.00%*	*3.90%*
4/16/2003	SM-0724	SM-0725	13:10	5	16	19	2	1.4	0.29	--	<0.02	0.2	0.023
4/16/2003	SM-0725	SM-0724	13:10	5	16	18	2.1	1.2	0.27	--	<0.02	0.21	0.025
Relative Percent Difference (RPD):				*0.00%*	*0.00%*	*5.40%*	*4.90%*	*15.40%*	*7.10%*	--	*0.00%*	*4.90%*	*8.30%*
6/18/2003	SM-0765	SM-0766	12:30	7	17	**	5.8	4.6	0.52 b	--	<0.06	0.16	0.063
6/18/2003	SM-0766	SM-0765	12:30	7	18	**	6.4	4.2	0.49 b	--	<0.06	0.16	0.062
Relative Percent Difference (RPD):				*0.00%*	*5.70%*	--	*9.80%*	*9.10%*	*5.90%*	--	*0.00%*	*0.00%*	*1.60%*
7/30/2003	SM-0801	SM-0802	12:35	11 d	23	25	<1.0	2.5	## d	--	<0.02	0.33	0.041
7/30/2003	SM-0802	SM-0801	12:35	18 d	24	25	<1.0	2.3	## d	--	<0.02	0.32	0.042
Relative Percent Difference (RPD):				*48.30%*	*4.30%*	*0.00%*	*0.00%*	*8.30%*	--	--	*0.00%*	*3.10%*	*2.40%*
8/20/2003	SM-0817	SM-0818	11:30	7	19	21	1.4	2.4	0.56	--	<0.02	0.24	0.038
8/20/2003	SM-0818	SM-0817	11:30	6	19	22	1.4	2.5	0.53	--	<0.02	0.25	0.038
Relative Percent Difference (RPD):				*15.40%*	*0.00%*	*4.70%*	*0.00%*	*4.10%*	*5.50%*	--	*0.00%*	*4.10%*	*0.00%*
10/22/2003	SM-0860	SM-0861	12:35	--	--	--	--	2.3*	--	0.38 h	<0.03 h	0.15 h	0.027 h
10/22/2003	SM-0861	SM-0860	12:35	--	--	--	--	2.3*	--	0.33 h	<0.01 h	0.12 h	0.026 h
Relative Percent Difference (RPD):				--	--	--	--	*0.00%*	--	*14.10%*	*100.00%*	*22.20%*	*3.80%*

** = missing/censored data

-- = no data

Table 20 MassDEP SMART 1998-2004 Chicopee Field Duplicate Results.

Date	OWMID	QAQC	Time	Alkalinity	Hardness	Chloride	SSolids	Turb	TKN	TN	NH3-N	NO3-NO2-N	TPhos
			(24hr)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(NTU)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
WARE RIVER, Station: WA09A													
2/5/2004	SM-0901	SM-0902	11:15	--	--	--	--	2.0*		0.72 j	0.22 j	0.34 j	0.032
2/5/2004	SM-0902	SM-0901	11:15	--	--	--	--	2.6*		0.81 j	0.23 j	0.38 j	0.033
Relative Percent Difference (RPD):								*26.10%*		*11.80%*	*4.40%*	*11.10%*	*3.10%*
3/24/2004	SM-0943	SM-0944	11:20	--	--	--	--	2.7*		0.54 j	0.09 j	0.28 dj	0.034
3/24/2004	SM-0944	SM-0943	11:20	--	--	--	--	2.8*		0.50 j	0.08 j	0.22 dj	0.035
Relative Percent Difference (RPD):								*3.60%*		*7.70%*	*11.80%*	*24.00%*	*2.90%*
5/19/2004	SM-0984	SM-0985	11:10	--	--	--	--	3.6*		0.57 j	0.06 j	0.22 j	0.044
5/19/2004	SM-0985	SM-0984	11:10	--	--	--	--	3.3*		0.58 j	0.06 j	0.22 j	0.043
Relative Percent Difference (RPD):								*8.70%*		*1.70%*	*0.00%*	*0.00%*	*2.30%*
7/20/2004	SM-1026	SM-1027	11:20	12	20	23	1.4 h	2.3		0.72	<0.01	0.32	0.042
7/20/2004	SM-1027	SM-1026	11:20	10	20	24	<1.0 h	2.3		0.73	<0.01	0.33	0.04
Relative Percent Difference (RPD):				*18.20%*	*0.00%*	*4.30%*	*33.30%*	*0.00%*		*1.40%*	*0.00%*	*3.10%*	*4.90%*
9/22/2004	SM-1067	SM-1068	11:05	3	14	15	4.5	3.2		0.59	<0.01	0.09	0.047
9/22/2004	SM-1068	SM-1067	11:05	4	14	15	4.4	3		0.59	<0.03	0.09	0.046
Relative Percent Difference (RPD):				*28.60%*	*0.00%*	*0.00%*	*2.20%*	*6.50%*		*0.00%*	*100.00%*	*0.00%*	*2.20%*
11/9/2004	SM-1108	SM-1109	11:45	--	--	--	--	2.92*		0.35	<0.02 h	0.17	0.027
11/9/2004	SM-1109	SM-1108	11:45	--	--	--	--	2.67*		0.34	<0.02 h	0.16	0.026
Relative Percent Difference (RPD):								*8.90%*		*2.90%*	*0.00%*	*6.10%*	*3.80%*

** = missing/censored data

-- = no data

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