FRENCH AND QUINEBAUG RIVERS WATERSHED
SMART MONITORING PROGRAM 1999-2004
TECHNICAL MEMORANDUM TM-41/42-8

The Quinebaug River, Sturbridge

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TABLE OF CONTENTS

LIST OF TABLES

Cover photo by Therese Beaudoin, MassDEP. 28 July 2004.
All photos in document taken by Therese Beaudoin. MassDEP. CERO.
SMART monitoring logo designed by Robert Kimball and Barbara Kimball.

LIST OF FIGURES

LIST OF LATIN NAMES

Latin Name	Common name	Latin Name	Common name
Branta canadensis	Canada goose	*Myriophyllum* sp.	milfoil
Cambaridae	crayfish	*Peltandra virginica*	arrow arum
Carex sp.	sedge	*Podostemum ceratophyllum*	threadfoot
Castor canadensis	North American beaver	*Polygonum* sp.	smartweed
Chara sp.	muskwort	*Pontedaria cordata*	pickerelweed
Elodea sp.	waterweed	*Potamogeton* sp.	pondweed
Lobelia cardinalis	cardinal flower	*Wolffia* sp.	watermeal

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
CT	Connecticut
DO	dissolved oxygen
DWM	Division of Watershed Management
ºF	degree Fahrenheit
ft	feet
F/Q	French/Quinebaug
GPD	gallons per day
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
POR	Period of Record
ppm	parts per million
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RDL	reporting detection limit
RI	Rhode Island
RPD	relative percent difference
SMART	Strategic Monitoring and Assessment for River basin Teams
SOP	standard operating procedure
SR	state road
SU	Standard Unit
SSolids	suspended solids
Temp	temperature
TDS	total dissolved solids
TKN	total Kjeldahl nitrogen
TMDL	Total Maximum Daily Load
TN	total nitrogen
TPhos	total phosphorus
Turb	turbidity
USACE	United States Army Corps of Engineers
µS/cm	microsiemen per centimeter
USGS	United States Geological Survey
WES	Wall Experiment Station
WWTP	Wastewater Treatment Plant
% sat	percent oxygen saturation

INTRODUCTION

The French/Quinebaug (F/Q) watershed, part of the Thames River Basin, lies in the south-central part of Massachusetts (MA). The Thames has a total drainage area of 1,474 square miles (mi^2), of which 251 mi^2 are in MA, 61 mi^2 in Rhode Island (RI) and 1,162 mi^2 in Connecticut (CT, USACE 2011). In Massachusetts, the Thames Basin is comprised mostly of the Quinebaug River and its major tributary, the French River.

The Quinebaug River flows approximately 76 miles (mi) from its beginning at the outlet of Goodall's Pond (also known as Little Massapoag Pond) or Mashapaug Lake, (which normally drains south to Bigelow Brook and the Shetucket Watershed) when it is flowing to the north. The 28-mi segment of the Quinebaug River and its associated watershed within MA encompasses all or part of 14 towns. For a detailed description of the Quinebaug River Watershed, see French and Quinebaug River Watershed Water Quality Assessment Report (Kennedy et al 2001). The river is characterized by long runs and three large impoundments (Hamilton Reservoir, East Brimfield Lake, West Dudley Pond) as well as several smaller ones. Numerous dams remain on the mainstem, including two flood control projects that operate in a run-of-river mode under normal conditions, East Brimfield and Westville. There are also two hydropower projects: the Old Sturbridge Village Project, Sturbridge; and the West Dudley Project, Dudley. Annual precipitation ranges from 48 to 50 inches (in) over most of the watershed, with a section in the south-central to southeast area along the CT border averaging 50 to 52 inches (Ostiguy et al 2010).

Massachusetts tributaries of the Quinebaug River include the Mill, Hobbs, McKinstry, Cady, Breakneck, Hamant, Hatchet, Cohasse, Lebanon and McIntyre Pond brooks. Coldwater fisheries resources (CFR) have been identified on twenty-three tributaries to the Quinebaug River (including Hamant, Hatchet, and McKinstry Brooks), but not the mainstem itself (MassDFG 2011).

The French River flows approximately 26 mi from its beginning at the outlet of Greenville Pond, Leicester to its junction with the Quinebaug in CT. The French River watershed within MA encompasses all or part of 10 towns. The river is characterized by long runs and numerous impoundments (Rochdale, Texas, and Perryville ponds, as well as a large, unnamed impoundment above North Village, Webster). The Hodges Village flood control project is a dry bed reservoir on the mainstem, and typically operates in a run-of-river mode. The Buffumville Lake project on the Little River maintains a large recreational pool (186 acres); it is operated in a run-of-river mode under most conditions. Annual precipitation ranges from 48 to 50 inches over most of the watershed, with a small area averaging 50 to 52 inches located on the CT border in Webster and Dudley (Ostiguy et al 2010).

The French River is the largest tributary to the Quinebaug River in MA, joining the mainstem in Thompson, CT. Tributaries of the French River in MA include the Little River, Lowes and Mill Brooks, and a number of smaller streams. The French River from the North Oxford Dam upstream of Clara Barton Road, Oxford, to the dam at North Village, Webster/Dudley is designated as a coldwater fishery; Wellington Brook and an unnamed tributary have also been identified as CFRs (MassDFG 2011).

The purpose of this technical memorandum is to present observations and data collected from 1999-2004 as part of the Strategic Monitoring and Assessment for River basin Teams (SMART) program in the French/Quinebaug (F/Q) watershed. Bimonthly water quality monitoring began in March 1999. The sampling plan matrix for the SMART monitoring program Years 1999-2004 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 gaging stations), and general field observations. Each sampling component is described in the sections that follow.

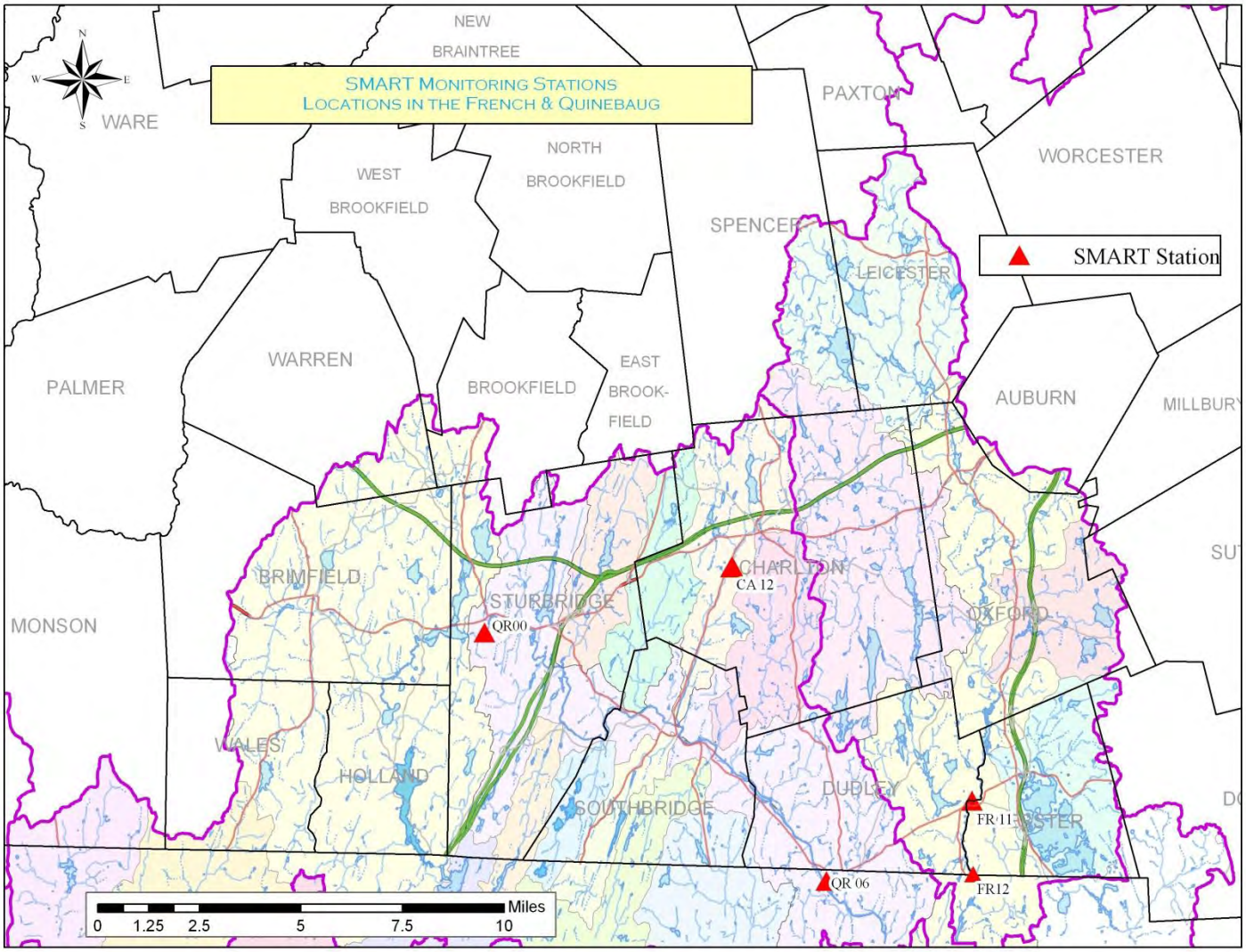
The quality assurance/control (QA/QC) plan for the SMART program is presented in CN 12.1*: Quality Assurance Project Plan* [QAPP] *Strategic Monitoring and Assessment for River basin Teams (SMART) (Blackstone, Chicopee, Concord,*

French/Quinebaug, Millers, and Nashua Watersheds) 2008-2012 (Beaudoin 2010). The QAPP presents data quality objectives, quality assurance procedures, and other program-specific information.

Table 1 French/Quinebaug Basin SMART Sampling Summary – 1999 through 2004

Location and Segment Numbers	Station Name	Station Type	Dates Sampled[1]
Quinebaug River @ Holland Road, Sturbridge MA41-01	QR00	Reference	1999: 4/21, 5/19, 7/21, 9/15, 11/22 2000: 4/19, 6/21, 8/16, 11/1, 12/18 2001: 4/4, 5/30, 8/1, 10/1, 11/28 2002: 1/30, 3/27, 5/22, 7/24, 9/25, 11/20 2003: 2/26, 4/23, 6/25, 8/27, 10/30 2004: 2/11, 3/31, 5/27, 7/28, 9/29, 11/17 [1]The SMART Monitoring program began in the F/Q basin in March 1999. [2]Sampling began in Cady Brook in 2003.
Cady Brook at gas pipeline above upper Cady Brook crossing @ Rte. 169, Charlton MA41-06	CA12[2]	Impact	
Quinebaug River @ SR-197, Thompson, CT below MA41-04	QR06	Boundary	
French River @ Oxford Ave, Dudley MA42-05	FR11	Impact	

Figure 1 MassDEP SMART French/Quinebaug Rivers 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 French and Quinebaug Rivers Watershed under the SMART program from 1999-2004. An assessment of the data will be presented in future reports.

METHODS

Water quality samples were collected in the French/Quinebaug 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, 1999-2003), 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* (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 5 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. The project coordinator, as identified in the QAPP for the SMART program, reviews the data for reasonableness, completeness and acceptability; see CN 56.0 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, 2006).

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. Total alkalinity, chlorides and hardness analyses were also unavailable during this time. 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 QR00 – Quinebaug River at Holland Road, Sturbridge, MA (river mile 15.202)

Figure 2 Google Earth view of Station QR00 area

Figure 3 Station QR00 upstream (7/24/2002)

Station QR00 was accessed from the southern shore upstream of the Holland Road Bridge, Sturbridge. Samples were collected by wading to flowing water from 4/21/1999 through 11/17/2004. Station QR00 serves as a reference station.

Land uses near this station included forest, rural residential, and roadways (Figure 2; Google Earth 2011a). The large recreational pool at the relatively shallow East Brimfield flood control project (420 acres at typical pool height) is also influences water quality at this station. No municipal National Pollutant Discharge Elimination System (NPDES) discharges are located upstream (design flow greater than 1 million gallons per day, or MGD), nor are there any large water withdrawals (greater than 100,000 gallons per day, or GPD).

The river is a riffle in this area, approximately 55 feet (ft) wide and typically 1 to 4 ft deep (Figure 3). A small midstream island populated with woody and herbaceous vegetation is located immediately upstream. Deciduous and evergreen trees provided shade along the banks, and the canopy extended over the channel upstream of the island, but not downstream. The bottom was mostly boulder, cobble and gravel, with sand also present. Aquatic macrophytes observed at Station QR00 were limited to sparse milfoil (*Myriophyllum* sp.) and water cress (not identified to genus/species) on one event (11/17/2004). Cardinal flowers (*Lobelia cardinalis)* were seen annually (late July-August) off the downstream point of the island. Periphyton, ranging from sparse to very dense, was noted on 16 sampling dates (n=21). Periphyton typically consisted of moss, with 5 observations of an algal film/slime and 2 of blue-green filamentous algae.

Riverine and terrestrial wildlife observations were infrequent at this station. Freshwater mussels (unidentified genus/species) were noted on one event (10/1/2001), as was evidence of beaver (*Castor canadensis*) activity (severed trunks, 3/31/2004). Canada geese scat (*Branta canadensis*) was noted on the shore edge on 9/15/1999. Evidence of fishing was observed throughout this monitoring period.

Clear water column conditions were noted on most sampling events (64%, n=22), with slight turbidity observed on 36% of events. Water color was typically clear, with less than half with red, brown or grey color. An absence of odor was characteristic of this station, with a musty scent noted on 5 events (n=20). No sheens were noted during this time period. Foam was noted on 21 of 26 sampling dates. Minor quantities of trash were noted in the stream bed on most events; items noted included floatables, broken glass and beer bottles/cans, and miscellaneous metal objects. Leafy and woody debris caught in branches of shoreline trees and shrubs attest to occasional flood levels.

Station CA12 – Cady Brook at the gas pipeline corridor upstream of the northern Southbridge Road (State Road/SR-169) Bridge, Charlton, MA (river mile 3.268)

Figure 4 Google Earth view of Station CA12 area

Figure 5 Station CA12 upstream (7/28/2004)

Station CA12 was accessed from the western shore at the downstream edge of the gas pipeline transmission corridor north of the upstream-most of the two Cady Brook bridges on Southbridge Road (SR-169), Charlton. 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 2/26/2003 through 11/17/1999. Station CA12 serves as an impact station.

Upstream land uses include forest, residential, commercial, and roadways (Figure 4; Google Earth 2011b). The Charlton Wastewater Treatment Plant (WWTP), a major municipal NPDES discharge, is located approximately 4.8 mi upstream; there are no large water withdrawals.

The river at this location is a run, approximately 12 ft wide and 1 to 3 ft deep. The shoreline is shaded by complete canopy cover up- and downstream of the gas pipeline transmission corridor, which is maintained to minimize woody vegetation (Figure 5). The stream bottom consisted of a mixture of boulder, cobble, gravel, sand and silt. Periphyton was absent on 4 events (n=11), with sparse to very dense coverage on 6 monitoring events as green/blue-green filamentous algae, green film, or moss. Although riparian vegetation was typically lush during the growing season, aquatic macrophytes were absent from the stream channel. No animal observations were made during this time period.

The water column was turbid on most dates sampled, ranging from slightly turbid to murky (7, n=11); clear conditions were noted on 4 events. The water column was described as clear on 4 dates; colors noted included light yellow, red, brown and grey. The river here typically lacked odor, with “effluent” noted once. The presence of foam was common (7, n=11), and sheens were never observed. A minor level of trash was noted on one date, and included golf balls (upstream driving range), a toy soldier, and floatables.

Station QR06 – Quinebaug River at Old Turnpike Road (SR-197), Thompson, CT (river mile -0.373[1])

Figure 6 Google Earth view of Station QR06 area

Figure 7 Station QR06 upstream (7/24/2002)

[1] River mile calculation begins at the Massachusetts state boundary; as this station is below the state boundary, the river mile is a negative value.

Station QR06 was accessed from the western shore upstream (north) of the Old Turnpike Road (SR-197) Bridge, Thompson, CT. 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 4/21/1999 through 11/17/2004. On 2/11/2004, the station was not accessible due to ice and snow covering the river. Station QR06 serves as a boundary station.

Upstream land uses include forest, residential, industrial, commercial, and roadways (Figure 6; Google Earth 2011c). An upstream hydropower project at West Dudley Pond impacts this reach. The Southbridge WWTP, a major municipal NPDES discharge, is located 4.7 mi upstream. A large water withdrawal is located upstream at the American Optical facility, and includes the permitted withdrawal for the Millennium power plant (Charlton).

The river is a run in this area; the channel is approximately 65 ft wide and shaded along the stream edges (Figure 7). Banks were undercut throughout the site area. The bottom consisted mainly of cobble, gravel and sand, with a single large midstream boulder near the bridge, and occasional observations of silt (3, n=10). Periphyton was typically present and included algal films, filamentous algae, and moss. Macrophytes were noted on only two dates. On 9/25/2002, a large area of the stream bottom was covered in threadfoot (*Podostemum ceratophyllum*); it was entirely absent from the area by the next sampling event (11/20/2002). Sparse populations of muskwort (*Chara* sp.), waterweed (*Elodea* sp.) and milfoil (*Myriophyllum* sp.) species were also present on this date. Milfoil and arrow arum (*Peltandra virginica)* were present in sparse quantities on 8/27/2003 as well. Other than occasional bird calls, animal life noted at this station was limited to unidentified barnacle-like structures on the sides of the mid-stream boulder.

The water column at this station ranged from clear (8, n=22) to slightly turbid (8), to murky (6). Water color observations included brown (9), clear (6), red (2) and tan (1). The water column lacked odor on most events; effluent odors were noted on 5 dates, and musty on two. Foam was present on all but one event; sheens were consistently absent. Trash was noted on 12 of 19 events, and included wallets, a checkbook, garbage, trash, floatables, broken glass and plastics.

Station FR11 – French River near Oxford Ave, Webster, MA (river mile 2.106)

Figure 8 Google Earth view of Station FR11 area

Figure 9 Station FR11 upstream (6/25/2003)

Station FR11 was accessed from the northern shore upstream of the Oxford Ave Bridge, Dudley. 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 4/21/1999 through 11/17/2004. Station FR11 serves as an impact station.

Land uses near and upstream of this station include forest, residential, commercial and industrial; an upstream hydropower project impacts the river in this reach (Figure 8; Google Earth 2011d). The nearest upstream municipal NPDES discharge is approximately 13.5 mi. above this site. Station FR11 is within the Zone II of four large water supply wells for the town of Dudley.

The river is a run in this area, approximately 40 ft wide, and the channel is typically too deep to wade (Figure 9). Trees provide shade over most of the stream corridor. The bottom consisted mainly of aquatic plant beds (mostly *Myriophyllum* sp.), as well as cobble, gravel and sand. Aquatic macrophytes observed in this location included dense patches of milfoil, sparse water meal (*Wolffia* sp.), pondweed (*Potamogeton* sp.), pickerelweed (*Pontedaria cordata)*, sedges (*Carex* sp.), arrow arum (*Peltandra virginica*), and smartweed (*Polygonum* sp.). A crayfish (Cambaridae) observed on 6/25/2003 was the only wildlife activity noted at this station during this time frame.

The water column noted at this station was typically turbid, with slight turbidity noted on 9 events (n=23), moderate on 2, highly turbid/murky on 7, and clear on 5. Water color varied; observations included brown (7), clear (5), grey (5), red/tannic color (3), dark tan (1), and green (1). The station was characterized by a lack of water odors, with infrequent observations of musty, “organic”, septic and “natural”. Foam was present on most events (24 of 26). Trash was present on many sample dates, and ranged from sparse to dense. Observations included bicycles, tires, shopping cart, broken glass, metals, beverage cans, clothing, a tool box, construction debris, condoms, scratch tickets, cigarette butts and other floatables. The construction of a new span at this location coincided with a period in which an absence of trash was noticeable (5/30/2001).

Table 2 Summary of Observations at Station QR00, Quinebaug River, Sturbridge 1999-2004

Survey Dates	Substrate	Trash	Periphyton	Color	Odor	Foam	Sheen	Turbidity	Wet/Dry Conditions
4/21/1999	--	--	--	--	--	--	--	--	Dry
5/19/1999	--	--	--	--	--	--	--	--	Wet
7/21/1999	--	--	--	--	--	--	--	--	Dry
9/15/1999	--	--	Bluegreen filamentous	--	--	--	--	--	Wet
11/22/1999	--	--	--	--	--	Foam	--	--	Dry
4/19/2000	--	--	--	--	--	Foam	--	--	Wet
6/21/2000	--	--	--	--	--	Foam	--	--	Dry
8/16/2000	--	--	--	--	--	--	--	--	Wet
11/1/2000	--	--	--	--	--	Foam	--	Clear	Wet
12/18/2000	--	--	--	--	--	Foam	--	--	Wet
4/4/2001	--	--	--	--	--	--	--	--	Dry
5/30/2001	--	--	--	--	--	Foam	--	Slight	Wet
8/1/2001	--	Minor: trash	None	Brown	Musty	Foam	None	Slight	Dry
10/1/2001	--	Floatables	None	Gray	None	Foam	None	Slight	Dry
11/28/2001	--	Garbage/trash	Sparse: blue-green filamentous	Brown	Musty	Sparse	None	Slight	Wet
1/30/2002	--	Minor: broken bottles	Sparse: mossy brown slime	Brown	None	Sparse	None	Slight	Wet
3/27/2002	--	Floatables, broken glass, metals	None	Clear	None	Sparse	None	Slight	Wet
5/22/2002	--	Minor: trash, broken bottles	Moderate: brown/green moss	Clear	Musty	None	None	Clear	Dry
7/24/2002	--	None	Dense: mossy green	Clear	None	None	None	Clear	Wet
9/25/2002	--	None	Moderate: mossy brown film	Clear	None	Foam	None	Clear	Wet
11/20/2002	--	Minor: broken glass, cans	Moderate: mossy brown	Clear	None	None	None	Slight	Wet
2/26/2003	--	Broken glass, metals	Sparse: film	Clear	None	Foam	None	Clear	Dry
4/23/2003	Cobble/gravel	None	Dense: green moss	Clear	None	Foam	None	Clear	Wet
6/25/2003	--	Trace	Sparse: green film	Clear	None	None	None	Clear	Dry
8/27/2003	Boulder/cobble/gravel	None	None	Red	Musty	Foam	None	Clear	Dry
10/30/2003	Boulder/cobble/gravel	Broken glass, floatables	None	Red	None	Foam	None	Clear	Wet
2/11/2004	Boulder/cobble/gravel	None	Dense: moss	Clear	None	None	None	Clear	?
3/31/2004	Boulder/cobble/gravel/sand	Minor: broken glass, metals	Moderate: green moss	Clear	None	Foam	None	Clear	Wet
5/27/2004	Boulder/cobble/gravel/sand	Broken glass, metals	Sparse: green film; dense: moss	Red	Musty	Very sparse	None	Clear	Wet
7/28/2004	Boulder/cobble/gravel/sand	Minor: broken glass, metals	Dense: moss	Brown/red	None	Foam	None	Clear	Wet
9/29/2004	Boulder/cobble/gravel/sand/silt	Minor	Moderate: moss	Red	None	Foam	None	Slight	Wet
11/17/2004	Boulder/cobble/gravel/sand	Minor: broken glass, metals	Very dense: green moss	Clear	None	Foam	None	Clear	Dry

-- : Data not available

Table 3 Summary of Observations at Station CA12, Cady Brook, Charlton 2003-2004

Survey Dates	Substrate	Trash	Periphyton	Color	Odor	Foam	Sheen	Turbidity	Wet/Dry Conditions
2/26/2003	--	None	None	Light yellow	None	None	None	Slight	Dry
4/23/2003	--	None	Sparse: green filamentous	Grey	None	Foam	None	Slight	Wet
6/25/2003	--	None	None	Red	None	None	None	Clear	Dry
8/27/2003	Boulder/cobble/sand/silt	None	Very dense: green filamentous	Clear	None	Very sparse	None	Slight	Dry
10/30/2003	Boulder/gravel/sand/silt	None	None	Grey/red	Effluent/musty	None	None	Highly cloudy	Wet
2/11/2004	Cobble/gravel/sand/silt	None	None	Clear	None	None	None	Clear	?
3/31/2004	Boulder/cobble/gravel/sand	None	Moderate: green filamentous, moss	Clear	None	Foam	None	Clear	Wet
5/27/2004	Boulder/cobble/gravel/sand	None	Moderate: green film, grey moss	Grey	None	Very sparse	None	Moderate	Wet
7/28/2004	Boulder/cobble/gravel/sand/silt	None	Moderate, blue-green filamentous	Grey	None	Foam	None	Moderate	Wet
9/29/2004	Unobservable	Unobservable	Unobservable	Brown	None	Foam	None	Highly turbid/murky	Wet
11/17/2004	Boulder/cobble/gravel/sand/silt	Minor	Moderate: green filamentous, green film, moss	Clear	None	Foam	None	Clear	Dry

-- : Data not available

Table 4 Summary of Observations at Station QR06, Quinebaug River, Thompson, CT 1999-2004

Survey Dates	Substrate	Trash	Periphyton	Color	Odor	Foam	Sheen	Turbidity	Wet/Dry Conditions
4/21/1999	--	--	--	--	--	--	--	--	Dry
5/19/1999	--	--	--	--	--	--	--	--	Wet
7/21/1999	--	--	--	--	--	--	--	--	Dry
9/15/1999	--	--	--	--	--	--	--	--	Wet
11/22/1999	--	--	--	--	--	--	--	--	Dry
4/19/2000	--	--	Very dense: filamentous	--	--	Foam	--	--	Wet
6/21/2000	--	--	--	--	--	--	--	--	Dry
8/16/2000	--	--	--	--	--	Foam	--	--	Wet
11/1/2000	--	--	--	--	--	Foam	--	Clear	Wet
12/18/2000	--	--	--	--	--	--	--	Highly turbid	Wet
4/4/2001	--	--	--	--	--	--	--	--	Dry
5/30/2001	--	--	--	--	Slight effluent	Foam	--	Turbid	Wet
8/1/2001	--	Minor: wallets, checkbook	Sparse: brown/black film	Brown	None	Very sparse	None	Clear	Dry
10/1/2001	Silt	Floatables, garbage/trash	Sparse: bright green mossy film	Clear	None	Foam	None	Slight	Dry
11/28/2001	--	Garbage/trash	Dense: brown filamentous	Brown	Effluent	Foam	None	Slight	Wet
1/30/2002	--	Garbage/trash	Sparse: bright green filamentous	Brown	Effluent	Sparse	None	Slight	Wet
3/27/2002	--	None	Unobservable	Dark tan	Slight musty, effluent	Sparse	None	Highly cloudy	Wet
5/22/2002	--	Minor	Sparse: mossy brown	Brown/red	None	None	None	Slight	Dry
7/24/2002	--	None	Moderate: mossy green/brown film	Clear	None	Sparse	None	Clear	Wet
9/25/2002	--	Broken glass	Sparse: bright green slime	Light grey	Effluent	Foam	None	Slight	Wet
11/20/2002	--	None	Moderate: filamentous, brown moss	Brown	None	Foam	None	Slight	Wet
2/26/2003	Unobservable	Garbage/trash	Unobservable	Brown	None	Foam	None	Slight	Dry
4/23/2003	Boulder/cobble/gravel/silt	Garbage/trash	Sparse: green filamentous	Clear	None	Foam	None	Clear	Wet
6/25/2003	--	Garbage/trash	Unobservable	Brown/red	None	Foam	None	Highly cloudy	Dry
8/27/2003	Boulder/cobble/gravel; highly embedded	None	Moderate: moss	Clear	None	Sparse	None	Clear	Dry
10/30/2003	Boulder/cobble/gravel	Floatables, garbage/trash	Unobservable	Brown	None	Foam	None	Highly cloudy	Wet
2/11/2004	Station not sampled on this date; not accessible due to snow/ice								
3/31/2004	Boulder/cobble/gravel/sand/silt	Plastics, floatables	None	Clear	None	Foam	None	Clear	Wet
5/27/2004	Boulder/cobble/gravel/sand; highly embedded	Broken glass, floatables	None	Red	Musty	Foam	None	Clear	Wet
7/28/2004	Cobble/gravel/sand	None	None	Red	None	Foam	None	Slight	Wet
9/29/2004	Unobservable	Unobservable	Unobservable	Brown	None	Moderate	None	Highly turbid/murky	Wet
11/17/2004	Boulder/cobble/gravel/sand; highly embedded	None	Sparse: moss	Clear	None	Foam	None	Clear	Dry

-- : Data not available

Table 5 Summary of Observations at Station FR11, French River, Dudley 1999-2004

Survey Dates	Substrate	Trash	Periphyton	Color	Odor	Foam	Sheen	Turbidity	Wet/Dry Conditions
4/21/1999	--	--	--	--	--	--	--	--	Dry
5/19/1999	--	--	--	--	--	--	--	--	Wet
7/21/1999	--	--	--	--	--	--	--	--	Dry
9/15/1999	--	Dense	--	--	--	--	--	--	Wet
11/22/1999	--	--	--	--	--	Foam	--	--	Dry
4/19/2000	--	--	--	--	--	Foam	--	--	Wet
6/21/2000	--	--	--	--	--	Foam	--	--	Dry
8/16/2000	--	--	--	Grey	--	--	--	Highly turbid	Wet
11/1/2000	--	Dense: construction debris	--	--	--	--	--	--	Wet
12/18/2000	--	--	--	--	--	Sparse	--	Highly turbid	Wet
4/4/2001	--	--	--	Tannic	--	Foam	--	--	Dry
5/30/2001	--	--	--	--	"Natural"	Foam	--	Moderate	Wet
8/1/2001	--	Dense: shopping cart, broken glass	Moderate: blue-green algae, brown slime scum	Grey/brown	Musty	Foam	None	Slight	Dry
10/1/2001	--	Garbage/trash	None	Grey	None	Foam	None	Slight	Dry
11/28/2001	--	Garbage/trash	Dense: brown mossy filamentous	Brown/black	Septic, musty	Foam	None	Slight	Wet
1/30/2002	--	Garbage/trash, metals	Sparse: brown mossy film	Brown	None	Sparse	None	Slight	Wet
3/27/2002	--	Unobservable; rip rap eroding into stream	Unobservable	Dark tan	None	Sparse	None	Highly cloudy	Wet
5/22/2002	--	Dense	None	Clear	None	None	None	Clear	Dry
7/24/2002	--	Tires, metal debris	Sparse: fuzzy brown algal? layer	Brown	Organic	Foam	None	Slight	Wet
9/25/2002	--	Bicycle, metals, floatables	None	Grey	None	Foam	Oily	Slight	Wet
11/20/2002	--	Garbage/trash	None	Brown	None	Foam	None	Slight	Wet
2/26/2003	--	None	None	Clear	None	Foam	None	Clear	Dry
4/23/2003	--	Garbage/trash	None	Clear	None	Foam	None	Slight	Wet
6/25/2003	--	Garbage/trash	None	Red	None	Foam	None	Clear	Dry
8/27/2003	Boulder/cobble/gravel/sand	Bicycle, tires	Moderate: bright blue/green filamentous	Green	None	Foam	None	Slight to highly cloudy	Dry
10/30/2003	Cobble/sand/mud	Garbage/trash	None	Red	None	None	None	Slight	Wet
2/11/2004	Boulder/cobble/gravel/sand	Floatables	None	Clear	None	Very sparse	None	Clear	?
3/31/2004	Unobservable	Metals, shopping cart, tires, floatables	Dense: green filamentous	Unobservable	Musty	Foam	None	Highly turbid/murky	Wet
5/27/2004	Cobble/gravel/sand	Shopping cart, floatables	None	Brown	None	Dense	None	Moderate	Wet
7/28/2004	Unobservable	Floatables, cigarette butts, shopping cart, miscellaneous	Unobservable	Grey	None	Foam	None	Highly turbid/murky	Wet
9/29/2004	Unobservable	Floatables	Unobservable	Brown	None	Sparse	None	Highly turbid/murky	Wet
11/17/2004	Unobservable	Floatables	None	Clear	None	Foam	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). The weather station closest to the French/Quinebaug watershed sampling stations is located in Southbridge, MA; data collected here were utilized in this report. Precipitation ranges from 48 to 50 inches throughout most of the basin in Massachusetts; a small area ranges from 50 to 52 inches in the south-central area along the CT border (Ostiguy et al 2010).

During dry weather, trace amounts of precipitation may fall, but there is no measurable change in stream flow. The United States Geological Survey (USGS) operates three real time stream gaging stations in the French/ Quinebaug Watershed that are applicable to this water quality data set, as shown below:

- Quinebaug River below East Brimfield Dam at Fiskdale, MA (USGS 2011a)
- Quinebaug River at Quinebaug, CT (USGS 2011b) and
- French River at Webster, MA (USGS 2011c).

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 2011d).

The period of record (POR) mean streamflow values are the mean of daily mean values for each day for 78 years of record at the USGS Quinebaug River gage at Quinebaug, CT (USGS station number 01124000), recorded in cubic feet per second (cfs). The daily mean data are reported at http://waterdata.usgs.gov/ct/nwis/dvstat/?search_site_no=01124000&agency_cd=USGS&referred_module=sw&format=sites_selection_links (USGS 2011e). The monthly mean discharges are found at http://waterdata.usgs.gov/ct/nwis/monthly/?search_site_no=01124000&agency_cd=USGS&referred_module=sw&format=sites_selection_links (monthly, USGS 2011f).

Wet weather is defined as precipitation within a five-day antecedent period that leads to more than a slight increase in stream discharge at the four stations listed above. Under dry weather conditions, trace amounts of precipitation may fall, but no measurable change in stream flow occurs. All of the French/Quinebaug Watershed gaging stations were affected by flow manipulation and were difficult to distinguish from precipitation-related fluctuations on some dates.

Table 6 (precipitation) and Table 7 (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. There is a USGS gaging station approximately 0.5 mi above the SMART reference station QR00 (Quinebaug River below East Brimfield Dam at Fiskdale, MA); however, publication of discharge records at this station were discontinued from October 1, 1991 to September 30, 2002. Therefore discharge data from the Quinebaug River in Quinebaug, CT were utilized primarily in this report. Low flows were compared to the 7Q10 flow (the lowest 7-day average streamflow that occurs, on average, once every 10 years) which is 16.64 cfs (USGS 2011h); low flow at the French River just upstream of the Webster-Dudley WWTP is 16.0 cfs. When precipitation and discharge data were inconclusive, field observations were used to determine wet/dry conditions.

April 21, 1999 – Although a small volume of precipitation fell on 3 of the 5 days prior to this event, discharge fell steadily at the Quinebaug River gage and flows were well below the daily and monthly mean values. Water quality data collected on this date reflect dry weather conditions. Air temperature ranged from 60 to 65 degrees Fahrenheit (ºF) and cloud cover from 40 to 80%.

May 19, 1999 –This mid-spring event followed 5 days without measurable precipitation. Discharge fell steadily at the Quinebaug River gage during the 5 days preceding this event, but rose on the sampling date; overall flows were well below the daily and monthly mean values. Water quality data collected on this date reflect dry weather conditions. Air temperature was 65ºF throughout monitoring activities; cloud cover was complete with intermittent rainfall.

July 21, 1999 – This summer event followed a storm which dropped 1.48 inches (in) of rain at Southbridge. Discharge fell slowly at the Quinebaug River gage until the day prior to monitoring activities, when a slight increase was noted; discharge fell again on the event date. Discharge on this date was low overall, and was the closest to the 7Q10 value of all dates sampled from 1999-2004. Field observations indicate low water levels. Based on precipitation data, water quality data collected on this date reflect dry conditions. Air temperature ranged from 69 to 78ºF with clear skies becoming partly cloudy by the end of monitoring activities.

September 15, 1999 – Rain was recorded at the Southbridge gage on September 11 (1.70 in), followed by 3 days of dry weather. Discharge decreased steadily at the Quinebaug gage in the preceding 5-day period, with a slight rise on the sampling date. However, discharge spikes were observed on September 11th at both of the French River gages (Hodges Village, Webster), after which discharge fell steadily before rising on the sampling date. Overall flows were close to the 7Q10 value and half/less than half of the daily and monthly mean values. Based on precipitation and discharge, water quality data collected on this date reflect dry weather conditions. Air temperature decreased from 70 to 68°F and overcast skies gave way to rain by mid-morning with the approach of Hurricane Floyd.

November 22, 1999 – This late fall sampling event was conducted within a relatively dry period, with only 0.02 in precipitation recorded at Buffumville Lake in the previous 5 days. Discharge at the Quinebaug gage reflected flow manipulation in the week preceding this fall event, with sometimes multiple daily fluctuations ranging from 21 to 130 cfs; overall flows were below the daily and monthly mean values. Discharge at other area gages reflected dry conditions (Quinebaug River below East Brimfield Dam and below Westville Dam, Little River near Oxford, French River at Webster). Based on precipitation and discharge, the data collected on this event reflect dry weather conditions. Air temperature fell from 40 to 38°F and foggy skies with weak sun gave way to overcast conditions by mid-morning.

April 19, 2000 – Spring sampling in the F/Q watershed was preceded by 0.34 in of rainfall on April 18-19. Stream discharge fell steadily at area gages throughout the preceding week (a slight increase in the morning of the sampling date at the Quinebaug CT gage only); overall flows were below the daily and monthly mean values. Based on precipitation and discharge, water quality data on this date reflect dry weather conditions. Air temperature was 50ºF and a light drizzle fell during monitoring activities.

June 21, 2000 – In the 5 days preceding this early summer event, 0.34 in of rain were recorded at the Southbridge weather station. Discharge fell steadily at watershed gages throughout the previous week, with numerous rapid flow fluctuations evident at the gages on the Quinebaug River below Westville Dam and at Quinebaug, CT, as well as the French River at Webster. Overall flows were between the daily and monthly mean values. Water quality data on this date reflect dry weather conditions. Air temperature ranged from 72 to 80ºF, and <20% cloud cover gave way to sunny/hazy skies.

August 16, 2000 – This mid-summer monitoring event followed a mildly wet period, with 0.93 in of rain recorded in the preceding 5 days. Discharge patterns varied at watershed gates. At the Quinebaug River, CT gage discharge rose over the preceding four days. Numerous rapid flow fluctuations at the gages on the Quinebaug River below Westville Dam, Southbridge and at Quinebaug, CT masked any precipitation-related impacts. Based on precipitation and discharge, water quality data collected on this date reflect wet weather/runoff conditions. Air temperature ranged from 70 to 73ºF with overcast skies throughout.

November 1, 2000 - Rain falling the day before into the morning of monitoring activities totaled 0.27 in at the Southbridge gage. Discharge patterns were inconsistent at watershed gages. Flow manipulation was seen at the Quinebaug River at East Brimfield gage in the 3 days preceding this event. Rapid flow fluctuations were evident again at the Quinebaug River, Quinebaug, CT gage. Discharge at the French River, Webster gage decreased from 5 days to 3 days before monitoring; remained steady for 2 days, rose the previous morning, and remained steady throughout monitoring activities. Overall flows were below the daily and monthly mean values. Based on precipitation, discharge and field observations, water quality data reflect wet weather/runoff conditions. Air temperature ranged from 48 to 49ºF with overcast skies.

December 18, 2000 – This late winter event fell within a wet period, with 1.58 in falling in the 5 preceding days, and an addition 2.56 in recorded on this date. Discharge rose steadily at area gages in the 48 hours preceding this event, with flow fluctuations present at the French River, Webster gage. Overall flows were considerably below the daily and monthly mean values. Based on precipitation and discharge, water quality data collected on this date reflect wet weather/runoff conditions. Air temperature fell from 30 to 26ºF with overall cloud cover less than 5%.

April 4, 2001 – A storm brought 2.16 in precipitation to the area on March 30-April 1 (as recorded at Buffumville Lake). Although 0-9 in of snow remained on the ground at Station QR00, snow was absent in the vicinity of Stations QR06 and

FR11. Discharge at 3 area gages (Quinebaug River at East Brimfield and Quinebaug, CT, and French River at Webster) was generally high although affected by manipulation, with fluctuations ranging from approximately 500 to 1,000 cfs in periods of 24 hours or less. Overall flows were high, and on same dates twice as high as the daily and monthly mean values. Field notes indicated water levels throughout the watershed were elevated above all previous observations, most likely from the melting snowpack. Based on precipitation, discharge and field observations, water quality data collected on this date reflect wet weather/runoff weather conditions. The air temperature was 43ºF with cloud cover ranging from 65 to 100%.

May 30, 2001 – In the five days prior to this spring sampling event, daily rainfall dropped a total of 1.19 in on the area. Streamflow patterns show fluctuations that reflect manipulation at 2 area gages (Quinebaug River at East Brimfield and French River at Webster). Overall flows were above the daily and monthly mean values. Field observations indicate water levels were much lower than the previous event (4/4/2001) throughout the watershed, and conditions were turbid at Stations QR06 and FR11. Based on precipitation, water quality data collected on this date reflect wet weather/runoff conditions. Air temperature ranged from 58 to 61ºF; skies ranged from 50 to 100% overcast. Leaves had fully developed on trees and shrubs throughout the watershed.

August 1, 2001 – Precipitation within the 5 days prior to this spring sampling event was limited to 0.46 in on July 27, followed by a dry period. Discharge was notably below mean values and generally decreased at area gages, with manipulated fluctuations evident at the Quinebaug River at Quinebaug, CT and the French River at Webster. Overall flows were about the monthly mean value. Field observations indicate very low water levels throughout the watershed. Precipitation, discharge and field data generally reflect dry weather conditions. Air temperature ranged from 73 to 84ºF with sunny skies throughout.

October 1, 2001 – A storm brought 1.65 in of precipitation to the area 5 days before this fall sampling event. Discharge was low at area gages, and field notes indicated very low water levels at all stations; overall flows were between the daily and monthly mean values. Based on discharge and field notes, water quality data reflect dry conditions for this event. Air temperature ranged from 51 to 54ºF with overcast skies.

November 28, 2001 – Approximately 0.63 in of rain were recorded at Southbridge on November 25-27. Discharge varied little at watershed gages and was about the monthly mean value. Water levels were described as very low at all stations, with exposed substrates at noted at Station QR00. Based on precipitation, water quality data reflect wet weather/runoff conditions on this event. Air temperature ranged from 51 to 59ºF and cloud cover from 0 to 15% during this event.

January 30, 2002 - Minimal precipitation was recorded in the 5 days preceding this winter monitoring event (0.07 in). Snow on the ground recorded at Buffumville Lake totaled 3 inches on January 23, with no measured snow noted after that. Maximum daily temperatures in the preceding 5 days ranged from 44 to 68°F. Minor flow manipulation was seen at the gage below East Brimfield Dam (25 cfs), while discharge rose slowly over the 5 preceding days at the French River at Webster. Discharge was low overall and fell between the daily and monthly means. Field observations indicated very low water levels throughout the watershed. Large patches of snow were observed in the upper Quinebaug watershed, with little snow in the lower Quinebaug and French. Based on snowfall, snow cover and air temperature, data collected during this event reflect wet weather/runoff conditions. Air temperature ranged from 42 to 48ºF; overcast skies progressed to light rain by the last station. Isolated patches of snow remained throughout the watershed.

March 27, 2002 – This early spring sampling event followed a storm that dropped 1.36 in of precipitation to the area on March 26-27. Flow patterns indicate manipulation at the Fiskdale, Quinebaug, CT and Webster gages. Discharge was below the daily and monthly mean values in the 5 days preceding this event, but rose on the sampling date at the Quinebaug, CT gage. Based on precipitation and discharge, water quality data collected on this event reflect wet weather/runoff conditions. Air temperature ranged from 47 to 50ºF with overcast skies. Patches of snow remained in the upper watershed only.

May 22, 2002 – From May 17-20, 1.34 in of rainfall were recorded at the Buffumville gage. Discharge was above daily and monthly means throughout the watershed during this period. Based on precipitation and discharge, data collected during this event reflect wet weather/runoff conditions. Air temperature ranged from 58 to 64ºF and sunny. Foliage on trees and shrubs was fully emerged throughout the watershed.

July 24, 2002 – Within the five days preceding this summer event, 1.12 inches of rain were recorded at Southbridge. Discharge was near the monthly mean value; overall discharge patterns were inconsistent at 3 area gages (Fiskdale, Quinebaug, CT and Webster). Field observations noted strong thunderstorm activity in the area the previous night. Low

water levels were noted at all stations. Based on precipitation and field observations, data collected on this date reflect wet weather/runoff conditions. Air temperature ranged from 66 to 74ºF; cloud cover ranged from <5 to 20%.

September 25, 2002 – Precipitation in the 5 days preceding this early fall event included 0.35 in. recorded at Southbridge**.** Discharge was considerably below the daily and monthly means; overall discharge was low and relatively steady at area gages. Field observations indicate low to very low water levels at all stations. Based on precipitation, discharge and field observations, data collected on this date reflect dry weather conditions. Air temperature ranged from 61 to 71ºF with overcast skies.

November 20, 2002 – Fall monitoring followed a storm that brought 1.92 in. precipitation to the area on November 16-17. Flow manipulation was evident at the Fiskdale, Quinebaug, CT and Webster gages. Discharge levels ranged from below to above the daily and monthly means throughout this period. Field observations indicated that water levels were above expected levels throughout the watershed. Based on precipitation, discharge and field observations, water quality data collected on this event reflect wet weather/runoff conditions. Air temperature was 40ºF under sunny skies. Foliage was down throughout the watershed.

February 26, 2003 – Winter monitoring followed a storm that brought 1.75 in. of precipitation on February 23-24. Daily maximum temperatures were above freezing throughout the 5-day period preceding this event. Snowfall on the ground at Buffumville Lake totaled 10 inches on the sampling date, fallen from 21 in. on February 19. Discharge rose from below to considerably above mean values in the five days preceding this event, most likely from melting snowpack. Numerous flow manipulations were observed at the Quinebaug, CT gage. Based on precipitation, discharge, snow and air temperature, data collected on this event reflect wet weather/runoff conditions. Air temperature ranged from 10 to 26ºF, with sunny skies turning to 80% cloud cover during monitoring activities. Snow was approximately 1-2 ft thick throughout the watershed.

April 23, 2003 – A storm system brought 0.29 in. precipitation to the area on April 21-23. Discharge ranged both below and above daily and monthly mean values. Manipulation of flow was evident at the East Brimfield and Quinebaug, CT gages, while discharge decreased steadily at the Webster site. Based on precipitation, data collected on this event reflect wet weather/runoff conditions. Air temperature ranged from 48 to 55ºF under overcast skies. Foliage was just beginning to bud in the watershed.

June 25, 2003 – Rainfall from a June 22-23 storm dropped a total of 2.97 in. on the area. Discharge was considerably above mean values at watershed gages. Field observations noted higher than usual water levels at the Quinebaug watershed stations. Based on precipitation, discharge and field observations, data collected on this event reflect wet weather/runoff conditions. Air temperature ranged from 73 to 90ºF under hazy/sunny skies.

August 27, 2003 – Scant precipitation fell in the 5 days preceding this summer monitoring event (0.07 in.). Overall discharge levels were notably below daily and monthly means. Large flow fluctuations were noted at the Quinebaug, CT gage from August 20-22. Field notes indicate low water levels. Based on precipitation, discharge and field observations, data collected on this event reflect dry weather conditions. Air temperature ranged from 77 to 84ºF, with cloud cover ranging from 0 to <10%.

October 30, 2003 – This fall monitoring fell within a wet period, with 3.81 in. of precipitation recorded at Southbridge from October 26-30. Discharge rose steadily from Oct 27 through the sampling event at area gages. Overall flows were consistently below the daily and monthly means. Field notes indicate high water levels at all stations. Based on precipitation, discharge and field observations, data collected on this event reflect wet weather/runoff conditions. Air temperature ranged from 48 to 54ºF, with sunny skies throughout the monitoring effort. Most foliage was down on bank trees i.e., minimal channel shading.

February 11, 2004 – A winter storm dropped 1.38 in. of precipitation on the area on February 7. Snowfall on February 7 totaled 3.5 in. at East Brimfield Lake (date are not available for Buffumville Lake); of the twelve in of snow on the ground on that date, eight inches remained on February 11. Average and maximum daily temperatures were above freezing on most of the preceding 5 days. Discharge generally rose on February 6-8 then remained steady through the sampling date. Flows were above the daily means at the Quinebaug, CT gage, but below at the Fiskdale and Webster gages in this time period. Based on precipitation, discharge and field observations, data from this event reflect wet weather/runoff conditions. Air temperature ranged from 32 to 34ºF with cloud cover ranging from 30 to 95% and snow flurries falling at the last station (FR11). Ice over the stream channel prevented accessed to Stations QR06 (Quinebaug River) on this date. Snow was present throughout the watershed.

March 31, 2004 – In the 5 days preceding this event, a dry period was followed by a system that brought 2.02 inprecipitation on March 30-31. Streamflow followed no consistent pattern at area gages; on the sampling date, discharge began to rise at the E. Brimfield gage after approximately 9 am, but fell steadily throughout the day at the Quinebaug River at Quinebaug, CT and the French River, at Hodges Village gages. Discharge was generally between the daily and monthly means. Average daily temperatures were above freezing in the five days preceding this event. Data from this event reflect wet weather/runoff conditions. Air temperature fell from 48 to 41ºF with overcast skies yielding pouring rain at the last stations (QR00 and FR11). No snow was observed in the watershed on this date.

May 27, 2004 – This spring event fell within a mildly wet period, with 0.29 in falling in the previous 4 days and 0.36 in on the sampling date. Discharge ranged from below to above both the daily and monthly means. Flow manipulation was evidenced by 130 cfs fluctuations at the Webster gage. Flow began to increase after midnight on May 27th; field notes indicate overnight thunderstorms before this event. Based on precipitation, discharge and field observations, data collected on this event reflect wet weather/runoff conditions. Air temperature ranged from 60 to 74ºF, with 55-100 % cloud cover. Foliage had emerged throughout the watershed.

July 28, 2004 – Storm events brought 1.92 in of rain to the area on July 24-25 and an additional 1.05 in on July 28. Area gages indicate rising discharge from July 24-26, remaining high through July 27-28. Flows remained above the daily and monthly means after July 23rd. Data collected on this event reflect wet weather/runoff conditions. Air temperature ranged from 62 to 64ºF, with overcast/drizzly skies throughout.

September 29, 2004 – The remnants of Hurricane Jeanne dropped 3.51 in of precipitation in the area on September 28-29; discharge at area gages rose concurrently. Field observations note elevated water levels with moderate to high turbidity at all stations. Data reflect wet weather/runoff conditions on this date. Air temperature ranged from 51 to 54ºF, with rainy skies becoming overcast by Station QR06.

November 17, 2004 – Little precipitation fell in the area during the 5 days preceding this fall event; 0.42 in were recorded at East Brimfield Lake on November 13, with no further precipitation observed until after the sampling date. Discharge was generally stable throughout this time frame. Data collected on this event reflect dry weather conditions. Air temperature ranged from 38 to 58ºF with cloud cover ranging from 35 to 75%.

Table 6 French/Quinebaug Basin Precipitation Data Summary 1999-2004* (inches of precipitation)							
Survey Dates	5 Days	4 Days	3 Days	2 Days	1 Day	Sample	Wet/Dry**
April 21, 1999	0.00	0.26	0.00	T	0.09	0.03	Dry
May 19, 1999	0.00	0.00	0.00	0.00	0.00	0.08	Dry
July 21, 1999	0.00	0.00	0.00	0.00	1.48	0.00	Wet
Sept 15, 1999	0.10	1.70	0.00	0.00	0.00	0.00	Dry
Nov 22, 1999***	0.00	0.00	0.00	0.00	0.20	0.00	Dry
April 19, 2000	0.00	0.00	0.05	0.00	0.12	0.23	Dry
June 21, 2000	0.00	0.00	0.08	0.26	0.00	0.00	Dry
Aug 16, 2000	0.00	0.62	0.00	0.28	0.03	0.00	Wet
Nov 1, 2000	0.00	0.00	0.00	+	0.24	0.03	Wet
Dec 18, 2000	0.02	0.40	0.00	0.00	1.16	2.56	Wet
April 4, 2001***	0.54	1.61	0.01	0.00	0.00	0.00	Wet
May 30, 2001	0.15	0.01	0.42	0.01	0.03	0.57	Wet
Aug 1, 2001	0.46	0.00	0.00	0.00	0.00	0.00	Dry
Oct 1, 2001	1.65	0.00	0.00	0.00	0.00	-	Dry
Nov 28, 2001	0.00	0.00	0.14	0.48	0.01	0.00	Wet
Jan 30, 2002	0.04	.000	0.00	0.00	0.00	0.03	Wet
Mar 27, 2002	0.03	+	+	0.03	0.07	1.29	Wet
May 22, 2002***	0.10	0.67	0.56	0.01	0.00	0.00	Wet
July 24, 2002	0.45	0.01	0.00	0.00	0.66	0.00	Wet
Sept 25, 2002	0.00	0.00	0.35	0.00	0.00	0.00	Dry
Nov 20, 2002	0.00	1.25	0.67	0.00	0.00	0.00	Wet
Feb 26, 2003	0.00	0.00	1.67	0.08	0.00	0.00	Wet
April 23, 2003	0.00	0.00	0.00	0.01	0.27	0.01	Wet
June 25, 2003	0.00	0.00	0.85	2.12	0.00	0.00	Wet
Aug 27, 2003	0.00	0.07	0.00	0.00	0.00	0.00	Dry
Oct 30, 2003	0.00	0.01	0.75	0.94	1.23	0.88	Wet

Table 6 continued French/Quinebaug Basin Precipitation Data Summary 1999-2004* (inches of precipitation)							
Survey Dates	**5 Days**	**4 Days**	**3 Days**	**2 Days**	**1 Day**	**Sample**	**Wet/Dry**
Feb 11, 2004***	0.00	1.38	0.00	0.00	0.00	0.00	Wet
Mar 31, 2004	0.00	0.00	0.00	0.00	0.07	1.95	Wet
May 27, 2004	0.00	0.02	0.11	0.15	0.01	0.36	Wet
July 28, 2004	0.00	1.80	0.12	0.00	0.00	1.05	Wet
Sept 29, 2004	0.00	0.00	0.00	0.00	0.01	3.50	Wet
Nov 17, 2004***	0.00	0.48	0.00	0.00	0.00	0.00	Dry

*Official data from the National Weather Service station in Southbridge, MA 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
*** In the absence of qualified data at the Southbridge station, data are reported from Brimfield, MA
+ Rain gage not read
T = trace amount; an amount too small to measure
– = No record. Data not recorded, determined unreliable by quality control check, or not received in time for publication

Table 7 USGS Flow Data Summary Discharge (cfs) 1999-2004 Quinebaug River at Quinebaug, CT*								
Survey Dates	**5 Days**	**4 days**	**3 Days**	**2 Days**	**1 Day**	**Sample**	**Monthly****	**Daily*****
April 21, 1999	116	140	128	119	113	108	193.2	471
May 19, 1999	86	78	76	64	66	80	143.8	304
July 21, 1999	29	20	17	18	30	23	26.1	93
Sept 15, 1999	48	48	30	22	22	28	91.1	99
Nov 22, 1999	101	87	105	121	142	132	198.8	248
April 19, 2000	465	402	365	337	323	335	634.8	507
June 21, 2000	461	413	373	336	300	259	367.0	179
Aug 16, 2000	75	76	71	95	82	89	83.8	94
Nov 1, 2000	78	75	79	88	110	122	121.7	173
Dec 18, 2000	66[e]	64[e]	62[e]	60[e]	374	661	170.6	351
April 4, 2001	1,340	1,280	1,410	1,350	1,220	1,180	696.3	677
May 30, 2001	251	260	303	301	266	314	167.7	250
Aug 1, 2001	49	40	38	42	28	34	37.6	92
Oct 1, 2001	96	86	80	83	79	78	58.7	140
Nov 28, 2001	22	23	24	39	30	27	29.2	280
Jan 30, 2002	62	61	59	58	59	72	51.9	390
Mar 27, 2002	225	195	193	192	202	483	211.2	602
May 22, 2002	603	693	728	636	562	465	405.9	283
July 24, 2002	66	61	52	49	58	65	51.4	154
Sept 25, 2002	19	19	19	21	20	20	28.5	119
Nov 20, 2002	117	115	234	363	420	402	178.0	235
Feb 26, 2003	145[e]	154[e]	789[e]	756	558	528	262.6	374
April 23, 2003	427	308	298	292	285	291	532.6	452
June 25, 2003	330	296	599	1,010	871	749	473.5	164
Aug 27, 2003	62	65	58	51	51	50	145.9	79
Oct 30, 2003	142	150	261	384	771	839	200.2	177

Table 7 continued USGS Flow Data Summary Discharge (cfs) 1999-2004 Quinebaug River at Quinebaug, CT								
Survey Dates	**5 Days**	**4 days**	**3 Days**	**2 Days**	**1 Day**	**Sample**	**Monthly****	**Daily*****
Feb 11, 2004	217[e]	297[e]	268[e]	250[e]	227[e]	206[e]	157.2	305
Mar 31, 2004	255	291	315	301	268	389	275.5	635
May 27, 2004	249	219	222	234	235	282	333.4	260
July 28, 2004	48	202	220	202	169	187	93.5	104
Sept 29, 2004	174	141	127	106	278	725	202.5	141
Nov 17, 2004	146	170	169	166	168	178	211.8	240

***Gage # 0112400 data found at Daily data at Quinebaug River, Quinebaug, CT (USGS 2011b); all data were approved for publication; processing and review completed.**
****Mean of monthly mean discharge (cfs) based on data collected from 10/1/1931 to 9/30/2009 found at Monthly mean discharge at Quinebaug River, Quinebaug, CT (USGS 2011f)**
*****POR= Period of Record, mean of daily mean discharge based on data collected from 10/1/1931 to 9/30/2009 found at Mean of daily mean values at Quinebaug River, Quinebaug, CT (USGS 2011e)**
[e] = Estimated value
7Q10 = 16.640 cfs @ USGS gaging station, Quinebaug River near Quinebaug, CT (USGS 2011h)

RESULTS AND QUALITY ASSURANCE/QUALITY CONTROL

The results of SMART monitoring conducted in the French/Quinebaug watershed from 1999 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 8 through Table 11. Nutrient and chemistry data are presented in Table 12 through Table 15. Ambient field blank results are presented in Table 16; field duplicate results and relative percent difference calculations are found in Table 17. 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); conductivity in microsiemens per centimeter (µS/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 8 MassDEP SMART 1999-2004 F/Q Watershed *In Situ* Multiprobe Data. Station QR00

Date	OWMID	Time	Depth	Temp	pH	Cond@ 25°C	TDS	DO	SAT
		(24hr)	(m)	(°C)	(SU)	(uS/cm)	(mg/L)	(mg/L)	(%)
4/21/1999	41-0024	9:48	0.4	11.9	6.8	92.5	59.2	10.7	98
5/19/1999	41-0029	11:30	0.2	18.4	6.8	101	64.9	9.0	93
7/21/1999	41-0096	9:25	0.2	24.2	6.8	116	74.3	7.5	87
9/15/1999	41-0126	10:20	0.3	21.5	6.9	131	84.1	8.8	98
11/22/1999	41-0131	9:46	0.5	6.7	6.3	99.8	63.9	12.2	97
4/19/2000	SM-0036	9:29	0.8	10.0	6.5	89.3	57.1	11.3	98
6/21/2000	SM-0076	9:49	0.4	21.2	6.4	84.0	53.8	8.5	94
8/16/2000	SM-0123	9:32	0.5	21.0	6.7	93.6	59.9	8.1	89
11/1/2000	SM-0170	9:17	0.3	7.5	6.7u	103	65.7	11.4	94
12/18/2000	SM-0210	9:33	0.3	2.7	6	103	66.2	12.6	93
4/4/2001	SM-0248	9:48	0.6	2.8	5.7	94.9	60.7	12.3i	88i
5/30/2001	SM-0288	9:47	0.7	16.9	6.5	105	67.2	9.0	92
8/1/2001	SM-0328	9:40	0.9	23.0u	6.7	125	79.7	7.4	83
10/1/2001	SM-0368	9:20	0.3	14.7	6.9u	141	90.2	9.6	93
11/28/2001	SM-0408	9:28	0.3	7.9	6.7	136	87.1	11.8	97
1/30/2002	SM-0447	9:46	0.1 i	4.0	6.4	145	92.5	12.2	92
3/27/2002	SM-0487	9:17	0.2	4.4	6.7	128	81.9	12.9	98
5/22/2002	SM-0527	9:53	0.3	13.2	6.4 c	100	64.1	10.6	98
7/24/2002	SM-0567	9:16	0.1 i	24.8	7.0 c	131	83.9	7.7	91
9/25/2002	SM-0607	9:32	0.1 i	20.0	6.9	136	86.9	8.2	88
11/20/2002	SM-0647	9:18	0.1 i	5.0	6.4	117	74.9	11.9	91
2/26/2003	SM-0687	9:37	0.1 i	0.5	5.7	127	81.6	11.4	79
4/23/2003	SM-0728	9:10	## i	12.4	6.1	115	73.3	9.9	95
6/25/2003	SM-0769	9:16	0.2	20.3	6.2 u	102	65.4	7.3	82
8/27/2003	SM-0821	9:20	## i	23.2	6.7	132	84.5	7.0	84
10/30/2003	SM-0864	9:21	0.5	10.4	6.6	118	77	11.4	102
2/11/2004	SM-5906	9:16	0.3	0.7	6.3	153	99	13.7	96
3/31/2004	SM-5947	9:44	0.4	6.4	6.6	117	76	12.3	100
5/27/2004	SM-5988	9:18	0.4	17.4	6.7	115	75	9.2	96
7/28/2004	SM-6030	8:52	0.4	22.2	6.6	119	78	8.0	92
9/29/2004	SM-6071	9:00	0.5	17.8	6.5	102	67	8.7	91
11/17/2004	SM-6112	9:36	0.4	3.0	6.7	114	74	14.3	106

** = missing/censored data

-- = no data

See Section **RESULTS AND QUALITY ASSURANCE/QUALITY CONTROL for** full description of qualifiers.

Table 9 MassDEP SMART 1999-2004 F/Q Watershed *In Situ* Multiprobe Data. Station CA12

Date	OWMID	Time	Depth	Temp	pH	Cond@ 25°C	TDS	DO	SAT
		(24hr)	(m)	(°C)	(SU)	(uS/cm)	(mg/L)	(mg/L)	(%)
2/26/2003	SM-0688	10:30	0.3	0	6.5 u	468	299	13.6	94
4/23/2003	SM-0729	9:50	0.1 i	9.8	6.9 c	537	344	11.0	100
6/25/2003	SM-0770	9:51	0.1 i	20.2	7.0 c	311	199	8.3	93
8/27/2003	SM-0822	10:03	## i	18.9	7.7 cu	730 c	467 c	8.6	95
10/30/2003	SM-0865	10:05	0.5	10	7.1 c	300	195	11.6	103
2/11/2004	SM-5907	10:17	0.3	0.31	7.1 c	735 c	478 c	14.6	101
3/31/2004	SM-5948	10:26	0.4	5.2	6.9 cu	424	275	12.8	101
5/27/2004	SM-5989	10:06	0.4	14.5	7.1	344	224	10.0	98
7/28/2004	SM-6031	9:38	0.4	18.4	7.3 u	456	296	9.1	97
9/29/2004	SM-6072	9:40	0.5	16.2	7.1	288	187	9.3	95
11/17/2004	SM-6113	10:52	0.4	4.3	7.2	265	172	14.1	109

** = missing/censored data

-- = no data

See Section **RESULTS AND QUALITY ASSURANCE/QUALITY CONTROL for** full description of qualifiers.

Table 10 MassDEP SMART 1999-2004 F/Q Watershed *In Situ* Multiprobe Data. Station QR06

Date	OWMID	Time	Depth	Temp	pH	Cond@ 25°C	TDS	DO	SAT
		(24hr)	(m)	(°C)	(SU)	(uS/cm)	(mg/L)	(mg/L)	(%)
4/21/1999	41-0026	11:14	0.4	13.2	7.2	175	112	11.5	108.1
5/19/1999	41-0030	12:36	0.2	19.1	7.2	186	119	9.4	99
7/21/1999	41-0097	10:35	0	23.3	7.4	238	152	8.8	101.1
9/15/1999	41-0127	11:32	0.1	21.0	7.2	223	142	9.0	98.9
11/22/1999	41-0132	10:48	0.3	7.7	7.1	153	98	13.4	108.7
4/19/2000	SM-0037	10:29	0.8	8.9	6.8	138	88	11.8	99
6/21/2000	SM-0077	10:40	0.2u	20.6	6.9	128	81.9	8.9	97
8/16/2000	SM-0124	10:21	0.2	20.8	7	179	115	8.4	93
11/1/2000	SM-0171	10:19	0.2	7.5	7.3c	183	117	12.4	101
12/18/2000	SM-0211	10:23	0.5	1.7	6.6	197	126	13.6	97
4/4/2001	SM-0249	11:09	0.5	2.8	6.2	124	79.5	13.7i	99i
5/30/2001	SM-0289	10:40	0.8	16.5	6.9	168	107	9.2	93
8/1/2001	SM-0329	10:42	0.5	22.6u	7.3c	278u	178	8.9	100
10/1/2001	SM-0369	10:29	0.1i	13.6	7.2cu	222	142	10.2	97
11/28/2001	SM-0409	10:30	0.1i	8	7.4cu	247	158	13.2	109
1/30/2002	SM-0448	10:45	0.1 i	3.4	6.8	358	229	13.3	98
3/27/2002	SM-0488	10:14	0.5	4.4	6.7	210	134	12.7	96
5/22/2002	SM-0528	10:43	0.5	12.4	6.7 c	154	99	10.9	99
7/24/2002	SM-0568	10:15	0.2	24.2	7.3 c	276	177	8.5	99
9/25/2002	Sm-0608	10:30	## i	18	7.3 c	345 u	221 u	9.3	96
11/20/2002	SM-0648	10:08	0.3	5	6.7	209	134	13.0	99
2/26/2003	SM-0689	11:15	0.5	0.02	6.4 u	211 u	135 u	14.0	96
4/23/2003	SM-0730	10:25	0.2	11	6.7	200	128	11.0	103
6/25/2003	SM-0771	10:27	0.4	21.1	6.7	151	97	8.3	95
8/27/2003	SM-0823	10:41	## i	22.6	7.2 c	260 ui	166 ui	8.6	101
10/30/2003	SM-0866	10:37	0.9	10.4	6.9 c	162	106	11.7	105
2/11/2004	(Ice Out)								
3/31/2004	SM-5949	11:04	0.5	5.8	7.1 c	174	113	12.6	101
5/27/2004	SM-5990	10:43	0.5	15.6	7.1	180	117	9.7	98
7/28/2004	SM-6032	10:19	0.4	21	7.2	192	125	8.3	94
9/29/2004	SM-6073	10:13	1	16.5	7.1	153	100	9.6	98
11/17/2004	SM-6114	11:27	0.4	4.2	7.3	194	126	14.6	112

** = missing/censored data

-- = no data

See Section **RESULTS AND QUALITY ASSURANCE/QUALITY CONTROL for** full description of qualifiers.

Table 11 MassDEP SMART 1999-2004 F/Q Watershed *In Situ* Multiprobe Data. Station FR11

Date	OWMID	Time	Depth	Temp	pH	Cond@ 25°C	TDS	DO	SAT
		(24hr)	(m)	(°C)	(SU)	(uS/cm)	(mg/L)	(mg/L)	(%)
4/21/1999	41-0027	12:09	0.5	13.2	7.0	180	115	10.9	102
5/19/1999	41-0031	13:21	0.9	18.6	6.8	193	123	8.8	92
7/21/1999	41-0098	11:10	0.4	23.8	7.0	197	126	7.9	91
9/15/1999	41-0128	12:30	0.6	20.7	6.8	193	124	8.2	90
11/22/1999	41-0133	11:35	0.2	8.3	6.6	177	114	11.7	97
4/19/2000	SM-0038	11:11	0.9	9.3	6.7	152	97	11.2	95
6/21/2000	SM-0078	11:34	0.3	21.1	6.5	136	86.7	8.2	90
8/16/2000	SM-0125	11:11	0.4	20.3	6.8	168	108	8.2	89
11/1/2000	SM-0172	11:09	0.5	6.7	7	135	86.7	12.0	96
12/18/2000	SM-0212	11:03	0.2	2.5	6.4	183	117	13.1	96
4/4/2001	SM-0250	11:52	0.6	3.1	6	166	106	13.2i	96i
5/30/2001	SM-0290	11:26	0.7	17.6	7.0c	198	127	9.2	95
8/1/2001	SM-0330	11:44	0.8	22.5	7.0c	220	141	8.9u	100u
10/1/2001	SM-0370	11:08	0.6	13.8	7.0c	217	139	9.5	91
11/28/2001	SM-0410	11:10	0.3	8.2	6.9c	191	122	11.7u	97
1/30/2002	SM-0449	11:21	0.6	3	6.6	346	221	12.9	94
3/27/2002	SM-0489	10:46	0.3	5.4	6.7	286	183	12.3	96
5/22/2002	SM-0529	11:14	0.5	13.6	6.6 c	167	107	10.5	98
7/24/2002	SM-0569	10:51	0.5	23.3	6.9 c	231	148	7.5	86
9/25/2002	SM-0609	11:17	0.3	18.6	6.8	251	161	6.7	70
11/20/2002	SM-0649	10:49	0.1 i	4.7	6.5	211	135	12.4	94
2/26/2003	SM-0690	11:56	0.4	0.4	6.2	285	182	13.3	92
4/23/2003	SM-0731	11:00	0.3	11.6	6.4	208	133	10.1	96
6/25/2003	SM-0772	11:00	0.4	21.5	6.4	161	103	8.0	92
8/27/2003	SM-0824	11:15	0.3 i	22.5	6.8	222	142	7.9	93
10/30/2003	SM-0867	11:05	0.9	10.8	6.8	173	113	11.2	102
2/11/2004	SM-5909	11:21	0.5	0.52	6.9 c	343	223	14.2 u	99 u
3/31/2004	SM-5950	11:41	1.1	6.9	6.9 c	230	149	12.1	99
5/27/2004	SM-5991	11:18	0.6	15.6	7	179	116	9.7	98
7/28/2004	SM-6033	11:00	0.9	21.7	7.1	194	126	8.4	95
9/29/2004	SM-6074	10:45	1.3	17.2	7	160	104	9.2	96
11/17/2004	SM-6115	12:05	0.9	3.9	7	204	133	15.6	118

** = missing/censored data

-- = no data

See Section **RESULTS AND QUALITY ASSURANCE/QUALITY CONTROL for** full description of qualifiers.

Table 12 MassDEP SMART 1999-2004 F/Q Watershed Chemistry Data. Station QR00

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)
4/21/1999	41-0024	--	9:48	7	15	17	1.5	0.74	0.2	--	<0.02	<0.02	0.01
5/19/1999	41-0029	--	11:30	11	16	18	2.2	1.3	0.28	--	<0.02	<0.02	0.02
7/21/1999	41-0096	--	9:25	17	22	20	2.9	1.7	0.29	--	<0.02	0.04	0.03
9/15/1999	41-0126	--	10:20	15	21	34	2.5	0.50h	0.39	--	<0.02	<0.02	0.028
11/22/1999	41-0131	--	9:46	6	19h	18	1.4	1.1	0.24	--	<0.02	<0.02	0.014
4/19/2000	SM-0036	--	9:29	6	15	17	1.4	0.8	0.2	--	<0.02	0.04	0.012
6/21/2000	SM-0076	--	9:49	8	17	14	1.3	1.8	0.35	--	<0.02	<0.02	0.027
8/16/2000	SM-0123	--	9:32	12	17	15	2.7	2.7	0.4	--	<0.02	0.02	0.039
11/1/2000	SM-0170	--	9:17	10	19	19	1.7	2	0.31	--	0.02	<0.02	0.019
12/18/2000	SM-0210	--	9:33	10	17	18	1.7	2.3	0.33	--	0.04	0.11	0.019
4/4/2001	SM-0248	--	9:48	4	14	22	<1.0	1.3	0.13	--	0.05	0.25	0.013
5/30/2001	SM-0288	--	9:48	7	16	22	11	1.7	0.38	--	<0.02	0.06	0.025
8/1/2001	SM-0328	--	9:25	12	19	27	1.9	2.3	0.34	--	0.08	<0.06	0.026
10/1/2001	SM-0368	--	9:15	13	22	30	3.8	2.2	0.32	--	<0.02	<0.06	0.028
11/28/2001	SM-0408	--	9:40	10	23	29	3	3.5	0.32	--	<0.02	<0.06	0.015
1/30/2002	SM-0447	--	9:40	11	24	29	3.0 h	1.6	0.27	--	<0.02	<0.02	0.017
3/27/2002	SM-0487	--	9:15	6	18	27	2.7	2	0.29 j	--	<0.02	<0.02	0.017
5/22/2002	SM-0527	--	9:45	6	16	18	1.6	1.2	0.33	--	<0.02	<0.02	0.019
7/24/2002	SM-0567	--	9:10	14	20	26	2	2	0.46	--	<0.02	<0.02	0.027
9/25/2002	SM-0607	--	9:25	14	23	26	4.2 d	1.1	0.37	--	<0.06	<0.02	0.018 d
11/20/2002	SM-0647	--	9:10	8	18	24	1.6	1.4	0.33	--	<0.02	<0.06	0.017

** = missing/censored data;

-- = no data

See Section **RESULTS AND QUALITY ASSURANCE/QUALITY CONTROL for** full description of qualifiers.

Table 12 continued. MassDEP SMART 1999-2004 F/Q Watershed Chemistry Data. Station QR00

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)
2/26/2003	SM-0687	--	9:30	5	19	27	<1.0	1.5	0.29	--	0.13 j	0.32 j	0.015
4/23/2003	SM-0728	--	8:55	4	15	20	<1.0	0.88	0.24	--	<0.02 d	<0.06	0.025
6/25/2003	SM-0769	--	9:10	8	17	20	2.2 j	2	0.30 b	--	<0.02	<0.06	0.025
8/27/2003	SM-0821	--	9:15	13 h	22	23 h	1.6	2.4	0.45	--	<0.06	<0.06 d	0.02
10/30/2003	SM-0864	--	9:25	--	--	--	--	2.7*	--	0.31 h	<0.03 h	0.06 h	0.027 h
2/11/2004	SM-0906	--	8:55	--	--	--	--	1.7*		0.25 dj	0.04 j	0.16 dj	0.01
3/31/2004	SM-0947	--	9:35	--	--	--	--	1.4*		0.37 j	<0.04 j	0.19 j	0.021
5/27/2004	SM-0988	--	9:05	--	--	--	--	2.7*		0.37 j	<0.03 j	<0.06 j	0.023
7/28/2004	SM-1030	--	8:35	11	18	23	## d	2.9		0.46	<0.03	<0.02	0.03
9/29/2004	SM-1071	--	8:50	**	17	19	2.7	2.9		0.37	<0.01	<0.02	0.027
11/17/2004	SM-1112	--	9:25	9	19	24	1.7	2		0.25	<0.06 h	0.09	0.019

** = missing/censored data;

-- = no data

See Section **RESULTS AND QUALITY ASSURANCE/QUALITY CONTROL for** full description of qualifiers.

Table 13 MassDEP SMART 1999-2004 F/Q Watershed Chemistry Data. Station CA12

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)
2/26/2003	SM-0688	--	10:23	11	47	120	5.4	2.2	0.42	--	0.16 j	0.67 j	0.042
4/23/2003	SM-0729	--	9:45	10	47	140	1.2	1.3	0.38	--	0.12 d	0.72	0.033
6/25/2003	SM-0770	--	9:45	15	36	70	4.4 j	2	0.37 b	--	<0.02	0.32	0.044
8/27/2003	SM-0822	--	10:00	42 h	67	140 h	1.1	1.5	0.79	--	<0.02	5.9 d	0.088
10/30/2003	SM-0865	--	10:00	--	--	--	--	5.3*	--	0.53 h	0.04 h	0.18 h	0.040 h
2/11/2004	SM-0907	--	9:50	--	--	--	--	2.4*	--	0.65 dj	0.06 j	0.43 dj	0.054
3/31/2004	SM-0948	--	10:15	--	--	--	--	2.5*	--	1.0 j	<0.01 j	0.75 j	0.069
5/27/2004	SM-0989	--	9:55	--	--	--	--	10.2*	--	0.76 j	<0.03 j	0.37 j	0.048
7/28/2004	SM-1031	--	9:25	25	47	95	## d	4.7	--	1.2	<0.03	0.67	0.063
9/29/2004	SM-1072	--	9:30	16	34	64	23	9.8	--	0.82	<0.01	0.29	0.077
11/17/2004	SM-1113	--	10:40	15	37	55	2.1	1.4	--	0.64	<0.06 h	0.4	0.023

** = missing/censored data;

-- = no data

See Section **RESULTS AND QUALITY ASSURANCE/QUALITY CONTROL for** full description of qualifiers.

Table 14 MassDEP SMART 1999-2004 F/Q Watershed Chemistry Data. Station QR06

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)
4/21/1999	41-0026	41-0025	**	12	28	35	2	1	0.28	--	<0.02	0.28	0.04
4/21/1999	41-0025	41-0026	11:14	12	28	35	2.1	1	0.29	--	<0.02	0.28	0.03
5/19/1999	41-0030	--	12:36	16	28	36	6.4	1.5	0.41	--	<0.02	0.34	0.06
7/21/1999	41-0097	--	10:35	25	40	42	<2.5	1.4	0.37	--	0.02	0.65	0.05
9/15/1999	41-0127	--	11:32	24	36	38	3.6	0.50h	0.4	--	<0.02	0.66	0.043
11/22/1999	41-0132	--	10:48	11	27h	28	2	1.3	0.28	--	<0.02	<0.02	0.038
4/19/2000	SM-0037	--	10:29	8	21	27	2.4	0.93	0.19	--	<0.02	0.17	0.023
6/21/2000	SM-0077	--	10:40	11	22	23	4.3	2.7	0.35	--	<0.02	0.24	0.049
8/16/2000	SM-0124	--	10:21	16	28	34	2.6	2.6	0.36	--	<0.02	0.48	0.056
11/1/2000	SM-0171	--	10:19	16	29	35	2.8	2.5	0.32	--	0.02	0.25	0.047
12/18/2000	SM-0211	--	10:23	9	23	44	12	8.8	0.59	--	0.06	0.32	0.091
4/4/2001	SM-0249	--	11:09	5	17	27	2.5	1.7	0.17	--	0.07	0.3	0.02
5/30/2001	SM-0289	--	10:40	9	24	34	9.4	6.2	0.49	--	0.06	0.2	0.07
8/1/2001	SM-0329	--	10:35	18	40	57	1.4	2.2	0.37	--	<0.02	0.38	0.042
10/1/2001	SM-0369	--	10:25	16	33	47	1.8	2	0.24	--	<0.02	0.36	0.037
11/28/2001	SM-0409	--	10:40	19	44	51	<1.0	1.9	0.25	--	<0.02	0.4	0.038
1/30/2002	SM-0448	--	10:40	16	46	84	1.1 h	1.8	0.34	--	<0.02	0.43	0.06
3/27/2002	SM-0488	--	10:10	8	26	46	19	8	0.47	--	<0.02	0.3	0.09
5/22/2002	SM-0528	--	10:35	7	21	32	4.6	2.4	0.36	--	<0.02	0.09	0.039
7/24/2002	SM-0568	--	10:10	17	37	59	2.5	2.5	0.49	--	<0.02	0.39	0.061
9/25/2002	Sm-0608	--	10:20	24	56	68	1.4 d	1.8	0.43	--	<0.02	0.69	0.042 d
11/20/2002	SM-0648	--	10:05	8	26	48	2.9	2.3	0.46	--	<0.02	0.14	0.039

** = missing/censored data;

-- = no data

See Section **RESULTS AND QUALITY ASSURANCE/QUALITY CONTROL for** full description of qualifiers.

Table 14 continued. MassDEP SMART 1999-2004 F/Q Watershed Chemistry Data. Station QR06

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)
2/26/2003	SM-0689	--	11:05	8	28	51	3.1	2	0.39	--	0.15 j	0.33 j	0.037
4/23/2003	SM-0730	--	10:25	8	26	41	2.1	1.3	0.32	--	<0.02 d	0.21	0.022
6/25/2003	SM-0771	--	10:25	9	21	31	10 j	2.6	0.40 b	--	<0.02	0.06	0.053
8/27/2003	SM-0823	--	10:40	18 h	34	44 h	2.7	1.8	0.46	--	<0.02	0.19 d	0.023
10/30/2003	SM-0866	--	10:35	--	--	--	--	4.6*	--	0.54 h	<0.01 h	0.14 h	0.065 h
2/11/2004	**Ice Out**												
3/31/2004	SM-0949	--	10:55	--	--	--	--	1.6*	--	0.43 j	<0.04 j	0.22 j	0.029
5/27/2004	SM-0990	--	10:40	--	--	--	--	5.5*	--	0.58 j	0.03 j	0.22 j	0.041
7/28/2004	SM-1032	--	10:05	15	28	40	## d	3.9	--	0.73	<0.03	0.29	0.058
9/29/2004	SM-1073	--	10:10	10	25	30	13	6	--	0.72	<0.01	0.23	0.077
11/17/2004	SM-1114	--	11:25	12	30	40	1.5	1.8	--	0.5	<0.02 h	0.28	0.038

** = missing/censored data;

-- = no data

See Section **RESULTS AND QUALITY ASSURANCE/QUALITY CONTROL for** full description of qualifiers.

Table 15 MassDEP SMART 1999-2004 F/Q Watershed Chemistry Data. Station FR11

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)
4/21/1999	41-0027	--	12:09	14	28	36	<1.0	0.96	0.25	--	<0.02	0.26	0.02
5/19/1999	41-0031	41-0032	13:21	18	29	37	1.9	1.4	0.37	--	0.03	0.29	0.03
5/19/1999	41-0032	41-0031	13:23	18	29	37	2.8	1.5	0.41	--	0.03	0.29	0.03
7/21/1999	41-0098	41-0099	11:10	24	36	36	<2.5	1.1	0.31	--	0.04	0.13	0.04
7/21/1999	41-0099	41-0098	11:11	25	36	36	<2.5	1.2	0.37	--	0.02	0.12	0.05
9/15/1999	41-0129	41-0128	**	27	38	37	1.1	0.30h	0.4	--	<0.02	0.29	0.026
9/15/1999	41-0128	41-0129	12:30	25	38	34	1.2	0.40h	0.42	--	0.02	0.29	0.027
11/22/1999	41-0134	41-0133	**	13	30h	34	<1.0	0.85	0.29	--	<0.02	0.27	0.016
11/22/1999	41-0133	41-0134	11:35	13	30h	35	<1.0	0.85	0.29	--	<0.02	0.27	0.016
4/19/2000	SM-0038	SM-0039	11:11	8	24	32	1	1	0.28	--	<0.02	0.16	0.02
4/19/2000	SM-0039	SM-0038	11:16	9	24	32	1.1	1	0.34	--	<0.02	0.18	0.022
6/21/2000	SM-0078	SM-0079	11:34	11	22	26	1.3	1.7	0.36	--	<0.02	0.15	0.037
6/21/2000	SM-0079	SM-0078	11:39	10	22	26	1.1	1.7	0.37	--	<0.02	0.15	0.036
8/16/2000	SM-0125	SM-0126	11:11	17	29	32	4.1	2.3	0.36	--	<0.02	0.38	0.049
8/16/2000	SM-0126	SM-0125	11:16	17	29	31	4	2.3	0.33	--	<0.02	0.38	0.048
11/1/2000	SM-0172	SM-0173	11:09	14	25	25	1.8	1.6	0.3	--	<0.02	0.12	0.022
11/1/2000	SM-0173	SM-0172	11:14	14	24	25	1.4	1.7	0.27	--	<0.02	0.12	0.022
12/18/2000	SM-0212	SM-0213	11:03	10	22	40	8.1	3.8	0.48	--	0.06d	0.29	0.046
12/18/2000	SM-0213	SM-0212	11:08	9	22	40	8.4	4	0.4	--	0.04d	0.28	0.051

** = missing/censored data;

-- = no data

See Section **RESULTS AND QUALITY ASSURANCE/QUALITY CONTROL for** full description of qualifiers.

Table 15 MassDEP SMART 1999-2004 F/Q Watershed Chemistry Data. Station FR11

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)
4/4/2001	SM-0250	SM-0251	11:52	4	20	39	2.3	1.4	0.21	--	<0.02	0.4	0.02
4/4/2001	SM-0251	SM-0250	11:57	4	20	39	2.3	1.4	0.21	--	<0.02	0.41	0.019
5/30/2001	SM-0290	SM-0291	11:26	13	30	45	1.5	1.4	0.38	--	<0.02	0.22d	0.026
5/30/2001	SM-0291	SM-0290	11:31	12	30	45	1.3	1.4	0.42	--	<0.02	0.28d	0.028
8/1/2001	SM-0331	SM-0330	**	18	34	48	<1.0	1.2	0.34	--	<0.02	0.18	0.021
8/1/2001	SM-0330	SM-0331	11:30	18	35	54	<1.0	1.2	0.37	--	<0.02	0.17	0.022
10/1/2001	SM-0371	SM-0370	**	18	34	48	<1.0	1	0.26	--	<0.02	0.18	0.022
10/1/2001	SM-0370	SM-0371	11:05	18	34	46	<1.0	0.95	0.31	--	<0.02	0.2	0.024
11/28/2001	SM-0411	SM-0410	**	17	38	40	<1.0	1.1	0.24d	--	<0.02	0.35	0.015
11/28/2001	SM-0410	SM-0411	11:20	16	38	40	<1.0	1.1	0.36d	--	<0.02	0.35	0.016
1/30/2002	SM-0449	SM-0450	11:15	14	41	85	1.8 h	1.7	0.32	--	0.07 d	0.44	0.024
1/30/2002	SM-0450	SM-0449	11:15	13	40	84	1.7 h	1.7	0.34	--	0.09 d	0.43	0.024
3/27/2002	SM-0489	SM-0490	10:40	10	31	70	2.3	1.7	0.3	--	<0.02	0.22	0.019
3/27/2002	SM-0490	SM-0489	10:40	10	30	69	2.8	1.7	0.32	--	<0.02	0.23	0.022
5/22/2002	SM-0529	SM-0530	11:10	8	23	35	<1.0	0.95	0.35	--	<0.02	0.09 d	0.022
5/22/2002	SM-0530	SM-0529	11:10	8	23	34	1	1	0.34	--	<0.02	0.07 d	0.024
7/24/2002	SM-0569	SM-0570	10:50	21	36	48	1.2	1.3	0.47	--	<0.02	0.34	0.031
7/24/2002	SM-0570	SM-0569	10:50	22	36	48	1.1	1.3	0.45	--	<0.02	0.34	0.029
9/25/2002	SM-0609	SM-0610	11:10	27	47	49	79 d	1.2	0.38 d	--	<0.06	0.15	0.032 d
9/25/2002	SM-0610	SM-0609	11:10	28	48	49	24 d	1.1	0.55 d	--	0.06	0.16	0.063 d
11/20/2002	SM-0649	SM-0650	10:40	9	26	49	<1.0	0.95	0.35	--	<0.02	0.14	0.018
11/20/2002	SM-0650	SM-0649	10:40	9	27	49	<1.0	0.95	0.36	--	<0.02	0.13	0.016

** = missing/censored data;

-- = no data

See Section **RESULTS AND QUALITY ASSURANCE/QUALITY CONTROL for** full description of qualifiers.

Table 15 MassDEP SMART 1999-2004 F/Q Watershed Chemistry Data. Station FR11

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)
2/26/2003	SM-0690	SM-0691	11:50	8	33	72	1.1	1.4	0.35	--	0.16 j	0.43 j	0.021
2/26/2003	SM-0691	SM-0690	11:50	9	33	72	1.1	1.4	0.4	--	0.16 j	0.42 j	0.021
4/23/2003	SM-0731	SM-0732	10:55	9	27	45	<1.0	1	0.28	--	## d	0.25	0.02
4/23/2003	SM-0732	SM-0731	10:55	9	27	45	<1.0	1	0.3	--	## d	0.24	0.019
6/25/2003	SM-0772	SM-0773	10:55	8	22	34	3.3 j	1.6	0.39 b	--	<0.02	0.08	0.034
6/25/2003	SM-0773	SM-0772	10:55	8	22	34	2.3 j	1.5	0.41 b	--	<0.02	0.08	0.032
8/27/2003	SM-0824	SM-0825	11:10	17 h	38	54 h	<1.0	1.6	0.37	--	<0.02	## d	0.037 d
8/27/2003	SM-0825	SM-0824	11:10	16 h	33	45 h	2.2	1.7	0.4	--	<0.02	## d	0.023 d
10/30/2003	SM-0867	SM-0868	11:05	--	--	--	--	3.6*	--	0.43 dh	<0.01 h	0.10 h	0.038 h
10/30/2003	SM-0868	SM-0867	11:05	--	--	--	--	3.9*	--	0.34 dh	<0.01 h	0.08 h	0.035 h
2/11/2004	SM-0909	SM-0910	11:10	2.5*	--	--	--	0.08 j	--	0.52 dj	0.86 dj	0.024	--
2/11/2004	SM-0910	SM-0909	11:10	2.2*	--	--	--	0.09 j	--	0.26 dj	0.51 dj	0.023	--
3/31/2004	SM-0950	SM-0951	11:30	7.0*	--	--	--	<0.04 j	--	0.34 j	0.61 j	0.043	--
3/31/2004	SM-0951	SM-0950	11:30	8.2*	--	--	--	<0.04 j	--	0.32 j	0.60 j	0.041	--
5/27/2004	SM-0991	SM-0992	11:10	2.8*	--	--	--	0.06 j	--	0.22 j	0.60 j	0.028	--
5/27/2004	SM-0992	SM-0991	11:10	3.2*	--	--	--	0.06 j	--	0.21 j	0.58 j	0.027	--
7/28/2004	SM-1033	SM-1034	10:45	4.3	41	14	26	<0.01	--	0.08	0.61	0.049	## d
7/28/2004	SM-1034	SM-1033	10:45	4.1	41	16	27	<0.03	--	0.08	0.61	0.041	## d
9/29/2004	SM-1074	SM-1075	10:39	2.3	31	12	25	<0.01	--	0.19	0.58	0.036	4.7
9/29/2004	SM-1075	SM-1074	10:39	2.3	31	13	25	<0.03	--	0.18	0.59	0.036	3.8
11/17/2004	SM-1115	SM-1116	11:58	2.5	43	12	30	--	<0.06 h	0.27	0.49	0.019	3.9
11/17/2004	SM-1116	SM-1115	11:58	2	44	13	30	--	<0.06 h	0.28	0.49	0.02	3.3

** = missing/censored data;

-- = no data

See Section **RESULTS AND QUALITY ASSURANCE/QUALITY CONTROL for** full description of qualifiers.

Table 16 MassDEP SMART 1999-2004 F/Q 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)
4/21/1999	41-0028	Blank	**	<2.0	<0.60	<1.0	<1.0	<0.1	<0.10	--	<0.02	<0.02	<0.01
5/19/1999	41-0033	Blank	13:30	2	<0.66	<1.0	<1.0	<0.1	<0.10	--	<0.02	<0.02	<0.01
7/21/1999	41-0100	Blank	11:15	3	<0.66	<1.0	<2.5	<0.1	<0.10	--	<0.02	<0.02	<0.01
9/15/1999	41-0130	Blank	**	<2.0	<0.66	<1.0	<1.0	<0.1h	<0.10	--	<0.02	<0.02	<0.005
11/22/1999	41-0135	Blank	**	<2.0	<0.66h	<1.0	<1.0	<0.1	0.1	--	<0.02	<0.02	<0.005
4/19/2000	SM-0040	Blank	11:21	<2	<0.66	<1.0	<1.0	0.26b	<0.10	--	<0.02	<0.02	<0.010
6/21/2000	SM-0080	Blank	11:44	<2	<0.66	<1.0	<1.0	<0.1	<0.10	--	<0.02	<0.02	<0.010
8/16/2000	SM-0127	Blank	11:21	<2	<0.66	<2.0	<1.0	<0.1	<0.10	--	<0.02	<0.02	<0.010
11/1/2000	SM-0174	Blank	11:19	<2	<0.66	<1.0	<1.0	<0.1	<0.10	--	<0.02	<0.02	<0.010
12/18/2000	SM-0214	Blank	11:13	<2	<0.66	<1.0	<1.0	<0.1	<0.10	--	<0.02	<0.02	<0.010
4/4/2001	SM-0252	Blank	12:02	<2	<0.66	<1	<1.0	<0.10	<0.10	--	<0.02	<0.06	<0.010
5/30/2001	SM-0292	Blank	11:36	<2	<0.66	<1	<1.0	<0.10	<0.10	--	<0.02	<0.06	<0.010
8/1/2001	SM-0332	Blank	**	<2	<0.66	<1	<1.0	<0.10	<0.10	--	<0.02	<0.06	<0.005
10/1/2001	SM-0372	Blank	**	<2	<0.66	<1	<1.0	<0.10	<0.10	--	<0.02	<0.06	<0.005
11/28/2001	SM-0412	Blank	**	<2.0	<0.66	<1.0	<1.0	<0.10	<0.10	--	<0.02	<0.06	<0.005
1/30/2002	SM-0451	Blank	11:00j	<2.0	<0.66	<1.0	<1.0 h	<0.10	<0.10	--	<0.02	<0.02	<0.005
3/27/2002	SM-0491	Blank	10:30j	<2.0	<0.66	<1.0	<1.0	<0.10	<0.10	--	<0.02	<0.02	<0.005
5/22/2002	SM-0531	Blank	11:00j	<2.0	<0.66	<1.0	<1.0	<0.10	<0.10	--	<0.02	<0.02	<0.005
7/24/2002	SM-0571	Blank	10:35j	<2.0	<0.66	2 bj	<1.0	<0.10	0.10 bj	--	<0.02	<0.02	0.005 bj
9/25/2002	SM-0611	Blank	11:00j	<2.0	<0.66	<1.0	<1.0 d	<0.10	<0.10	--	<0.02	<0.02	<0.005 d
11/20/2002	SM-0651	Blank	10:35j	<2.0	<0.66	<1.0	<1.0	<0.10	<0.10	--	<0.02	<0.02	<0.005

** = missing/censored data;

-- = no data

% = Analyte exceeds MDL

See Section **RESULTS AND QUALITY ASSURANCE/QUALITY CONTROL for** full description of qualifiers.

Table 16 MassDEP SMART 1999-2004 F/Q 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)
2/26/2003	SM-0692	Blank	11:40j	<2	<0.66	<1	<1.0	<0.10	<0.10	--	<0.02 j	<0.02 j	<0.005
4/23/2003	SM-0733	Blank	10:55j	<2	<0.66	<1	<1.0	<0.10	<0.10	--	<0.02 d	<0.02	<0.005
6/25/2003	SM-0774	Blank	10:50j	<2	<0.66	<1	<1.0 j	0.11 b	<0.10	--	<0.02	<0.02	<0.005
8/27/2003	SM-0826	Blank	11:05j	<2 h	<0.66	<1 h	<1.0	0.12 b	<0.10	--	<0.02	<0.02 d	<0.005
10/30/2003	SM-0869	Blank	11:00j	--	--	--	--	<0.5*	--	<0.040 h	<0.01 h	<0.02 h	<0.005 h
2/11/2004	SM-0911	Blank	11:15	--	--	--	--	<0.5*	--	<0.040 dj	<0.01 j	<0.02 dj	<0.005
3/31/2004	SM-0952	Blank	11:35	--	--	--	--	<0.5*	--	0.072 bj	<0.01 j	<0.02 j	<0.005
5/27/2004	SM-0993	Blank	11:15	--	--	--	--	<0.5*	--	0.043 bj	<0.01 j	<0.02 j	<0.005
7/28/2004	SM-1035	Blank	10:50	<2	<0.66	2 b	<1.0 d	<0.10	--	<0.12	<0.01	<0.02	<0.005
9/29/2004	SM-1076	Blank	10:45	<2	<0.66	<1	<1.0	<0.10	--	<0.040	<0.01	<0.02	<0.005
11/17/2004	SM-1117	Blank	12:01	<2	<0.66	<1	<1.0	<0.10	--	<0.040	<0.02 h	<0.06	<0.005

** = missing/censored data

-- = no data

% = Analyte exceeds MDL

See Section **RESULTS AND QUALITY ASSURANCE/QUALITY CONTROL for** full description of qualifiers.

Table 17 MassDEP SMART 1999-2004 F/Q 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)
QUINEBAUG RIVER, Station QR06													
4/21/1999	41-0026	41-0025	**	12	28	35	2	1	0.28	--	<0.02	0.28	0.04
4/21/1999	41-0025	41-0026	11:14	12	28	35	2.1	1	0.29	--	<0.02	0.28	0.03
Relative Percent Difference (RPD):				***0.00%***	***0.00%***	***0.00%***	***4.90%***	***0.00%***	***3.50%***	***--***	***0.00%***	***0.00%***	***28.60%***
FRENCH RIVER, Station FR11													
5/19/1999	41-0031	41-0032	13:21	18	29	37	1.9	1.4	0.37	--	0.03	0.29	0.03
5/19/1999	41-0032	41-0031	13:23	18	29	37	2.8	1.5	0.41	--	0.03	0.29	0.03
Relative Percent Difference (RPD):				***0.00%***	***0.00%***	***0.00%***	***38.30%***	***6.90%***	***10.30%***	***--***	***0.00%***	***0.00%***	***0.00%***
7/21/1999	41-0098	41-0099	11:10	24	36	36	<2.5	1.1	0.31	--	0.04	0.13	0.04
7/21/1999	41-0099	41-0098	11:11	25	36	36	<2.5	1.2	0.37	--	0.02	0.12	0.05
Relative Percent Difference (RPD):				***4.10%***	***0.00%***	***0.00%***	***0.00%***	***8.70%***	***17.60%***	***--***	***66.70%***	***8.00%***	***22.20%***
9/15/1999	41-0129	41-0128	**	27	38	37	1.1	0.30h	0.4	--	<0.02	0.29	0.026
9/15/1999	41-0128	41-0129	12:30	25	38	34	1.2	0.40h	0.42	--	0.02	0.29	0.027
Relative Percent Difference (RPD):				***7.70%***	***0.00%***	***8.50%***	***8.70%***	***28.60%***	***4.90%***	***--***	***0.00%***	***0.00%***	***3.80%***
11/22/1999	41-0134	41-0133	**	13	30h	34	<1.0	0.85	0.29	--	<0.02	0.27	0.016
11/22/1999	41-0133	41-0134	11:35	13	30h	35	<1.0	0.85	0.29	--	<0.02	0.27	0.016
Relative Percent Difference (RPD):				***0.00%***	***0.00%***	***2.90%***	***0.00%***	***0.00%***	***0.00%***	***--***	***0.00%***	***0.00%***	***0.00%***

** = missing/censored data;

-- = no data

% = RPD exceeds acceptable range

See Section **RESULTS AND QUALITY ASSURANCE/QUALITY CONTROL for** full description of qualifiers.

Table 17 MassDEP SMART 1999-2004 F/Q 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)
FRENCH RIVER, Station FR11													
4/19/2000	SM-0038	SM-0039	11:11	8	24	32	1	1	0.28	--	<0.02	0.16	0.02
4/19/2000	SM-0039	SM-0038	11:16	9	24	32	1.1	1	0.34	--	<0.02	0.18	0.022
Relative Percent Difference (RPD):				***11.80%***	***0.00%***	***0.00%***	***9.50%***	***0.00%***	***19.40%***	***--***	***0.00%***	***11.80%***	***9.50%***
6/21/2000	SM-0078	SM-0079	11:34	11	22	26	1.3	1.7	0.36	--	<0.02	0.15	0.037
6/21/2000	SM-0079	SM-0078	11:39	10	22	26	1.1	1.7	0.37	--	<0.02	0.15	0.036
Relative Percent Difference (RPD):				***9.50%***	***0.00%***	***0.00%***	***16.70%***	***0.00%***	***2.70%***	***--***	***0.00%***	***0.00%***	***2.70%***
8/16/2000	SM-0125	SM-0126	11:11	17	29	32	4.1	2.3	0.36	--	<0.02	0.38	0.049
8/16/2000	SM-0126	SM-0125	11:16	17	29	31	4	2.3	0.33	--	<0.02	0.38	0.048
Relative Percent Difference (RPD):				***0.00%***	***0.00%***	***3.20%***	***2.50%***	***0.00%***	***8.70%***	***--***	***0.00%***	***0.00%***	***2.10%***
11/1/2000	SM-0172	SM-0173	11:09	14	25	25	1.8	1.6	0.3	--	<0.02	0.12	0.022
11/1/2000	SM-0173	SM-0172	11:14	14	24	25	1.4	1.7	0.27	--	<0.02	0.12	0.022
Relative Percent Difference (RPD):				***0.00%***	***4.10%***	***0.00%***	***25.00%***	***6.10%***	***10.50%***	***--***	***0.00%***	***0.00%***	***0.00%***
12/18/2000	SM-0212	SM-0213	11:03	10	22	40	8.1	3.8	0.48	--	0.06d	0.29	0.046
12/18/2000	SM-0213	SM-0212	11:08	9	22	40	8.4	4	0.4	--	0.04d	0.28	0.051
Relative Percent Difference (RPD):				***10.50%***	***0.00%***	***0.00%***	***3.60%***	***5.10%***	***18.20%***	***--***	***40.00%***	***3.50%***	***10.30%***

** = missing/censored data;

-- = no data

% = RPD exceeds acceptable range

See Section **RESULTS AND QUALITY ASSURANCE/QUALITY CONTROL for** full description of qualifiers.

Table 17 MassDEP SMART 1999-2004 F/Q 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)
FRENCH RIVER, Station FR11													
4/4/2001	SM-0250	SM-0251	11:52	4	20	39	2.3	1.4	0.21	--	<0.02	0.4	0.02
4/4/2001	SM-0251	SM-0250	11:57	4	20	39	2.3	1.4	0.21	--	<0.02	0.41	0.019
Relative Percent Difference (RPD):				***0.00%***	***0.00%***	***0.00%***	***0.00%***	***0.00%***	***0.00%***	***--***	***0.00%***	***2.50%***	***5.10%***
5/30/2001	SM-0290	SM-0291	11:26	13	30	45	1.5	1.4	0.38	--	<0.02	0.22d	0.026
5/30/2001	SM-0291	SM-0290	11:31	12	30	45	1.3	1.4	0.42	--	<0.02	0.28d	0.028
Relative Percent Difference (RPD):				***8.00%***	***0.00%***	***0.00%***	***14.30%***	***0.00%***	***10.00%***	***--***	***0.00%***	***24.00%***	***7.40%***
8/1/2001	SM-0331	SM-0330	**	18	34	48	<1.0	1.2	0.34	--	<0.02	0.18	0.021
8/1/2001	SM-0330	SM-0331	11:30	18	35	54	<1.0	1.2	0.37	--	<0.02	0.17	0.022
Relative Percent Difference (RPD):				***0.00%***	***2.90%***	***11.80%***	***0.00%***	***0.00%***	***8.50%***	***--***	***0.00%***	***5.70%***	***4.70%***
10/1/2001	SM-0371	SM-0370	**	18	34	48	<1.0	1	0.26	--	<0.02	0.18	0.022
10/1/2001	SM-0370	SM-0371	11:05	18	34	46	<1.0	0.95	0.31	--	<0.02	0.2	0.024
Relative Percent Difference (RPD):				***0.00%***	***0.00%***	***4.30%***	***0.00%***	***5.10%***	***17.50%***	***--***	***0.00%***	***10.50%***	***8.70%***
11/28/2001	SM-0411	SM-0410	**	17	38	40	<1.0	1.1	0.24d	--	<0.02	0.35	0.015
11/28/2001	SM-0410	SM-0411	11:20	16	38	40	<1.0	1.1	0.36d	--	<0.02	0.35	0.016
Relative Percent Difference (RPD):				***6.10%***	***0.00%***	***0.00%***	***0.00%***	***0.00%***	***40.00%***	***--***	***0.00%***	***0.00%***	***6.50%***

** = missing/censored data;

-- = no data

% = RPD exceeds acceptable range

See Section **RESULTS AND QUALITY ASSURANCE/QUALITY CONTROL for** full description of qualifiers.

Table 17 MassDEP SMART 1999-2004 F/Q 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)
FRENCH RIVER, Station FR11													
1/30/2002	SM-0449	SM-0450	11:15	14	41	85	1.8 h	1.7	0.32	--	0.07 d	0.44	0.024
1/30/2002	SM-0450	SM-0449	11:15	13	40	84	1.7 h	1.7	0.34	--	0.09 d	0.43	0.024
Relative Percent Difference (RPD):			--	***7.40%***	***2.50%***	***1.20%***	***5.70%***	***0.00%***	***6.10%***	**--**	***25.00%***	***2.30%***	***0.00%***
3/27/2002	SM-0489	SM-0490	10:40	10	31	70	2.3	1.7	0.3	--	<0.02	0.22	0.019
3/27/2002	SM-0490	SM-0489	10:40	10	30	69	2.8	1.7	0.32	--	<0.02	0.23	0.022
Relative Percent Difference (RPD):			--	***0.00%***	***3.30%***	***1.40%***	***19.60%***	***0.00%***	***6.50%***	**--**	***0.00%***	***4.40%***	***14.60%***
5/22/2002	SM-0529	SM-0530	11:10	8	23	35	<1.0	0.95	0.35	--	<0.02	0.09 d	0.022
5/22/2002	SM-0530	SM-0529	11:10	8	23	34	1	1	0.34	--	<0.02	0.07 d	0.024
Relative Percent Difference (RPD):			--	***0.00%***	***0.00%***	***2.90%***	***0.00%***	***5.10%***	***2.90%***	**--**	***0.00%***	***25.00%***	***8.70%***
7/24/2002	SM-0569	SM-0570	10:50	21	36	48	1.2	1.3	0.47	--	<0.02	0.34	0.031
7/24/2002	SM-0570	SM-0569	10:50	22	36	48	1.1	1.3	0.45	--	<0.02	0.34	0.029
Relative Percent Difference (RPD):			--	***4.70%***	***0.00%***	***0.00%***	***8.70%***	***0.00%***	***4.30%***	**--**	***0.00%***	***0.00%***	***6.70%***
9/25/2002	SM-0609	SM-0610	11:10	27	47	49	79 d	1.2	0.38 d	--	<0.06	0.15	0.032 d
9/25/2002	SM-0610	SM-0609	11:10	28	48	49	24 d	1.1	0.55 d	--	0.06	0.16	0.063 d
Relative Percent Difference (RPD):			--	***3.60%***	***2.10%***	***0.00%***	***106.80%***	***8.70%***	***36.60%***	**--**	***0.00%***	***6.50%***	***65.30%***
11/20/2002	SM-0649	SM-0650	10:40	9	26	49	<1.0	0.95	0.35	--	<0.02	0.14	0.018
11/20/2002	SM-0650	SM-0649	10:40	9	27	49	<1.0	0.95	0.36	--	<0.02	0.13	0.016
Relative Percent Difference (RPD):			--	***0.00%***	***3.80%***	***0.00%***	***0.00%***	***0.00%***	***2.80%***	**--**	***0.00%***	***7.40%***	***11.80%***

** = missing/censored data;

-- = no data

% = RPD exceeds acceptable range

See Section **RESULTS AND QUALITY ASSURANCE/QUALITY CONTROL for** full description of qualifiers.

Table 17 MassDEP SMART 1999-2004 F/Q 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)
FRENCH RIVER, Station FR11													
2/26/2003	SM-0690	SM-0691	11:50	8	33	72	1.1	1.4	0.35	--	0.16 j	0.43 j	0.021
2/26/2003	SM-0691	SM-0690	11:50	9	33	72	1.1	1.4	0.4	--	0.16 j	0.42 j	0.021
Relative Percent Difference (RPD):				***11.80%***	***0.00%***	***0.00%***	***0.00%***	***0.00%***	***13.30%***	***--***	***0.00%***	***2.40%***	***0.00%***
4/23/2003	SM-0731	SM-0732	10:55	9	27	45	<1.0	1	0.28	--	## d	0.25	0.02
4/23/2003	SM-0732	SM-0731	10:55	9	27	45	<1.0	1	0.3	--	## d	0.24	0.019
Relative Percent Difference (RPD):				***0.00%***	***0.00%***	***0.00%***	***0.00%***	***0.00%***	***6.90%***	***--***	***--***	***4.10%***	***5.10%***
6/25/2003	SM-0772	SM-0773	10:55	8	22	34	3.3 j	1.6	0.39 b	--	<0.02	0.08	0.034
6/25/2003	SM-0773	SM-0772	10:55	8	22	34	2.3 j	1.5	0.41 b	--	<0.02	0.08	0.032
Relative Percent Difference (RPD):				***0.00%***	***0.00%***	***0.00%***	***35.70%***	***6.50%***	***5.00%***	***--***	***0.00%***	***0.00%***	***6.10%***
8/27/2003	SM-0824	SM-0825	11:10	17 h	38	54 h	<1.0	1.6	0.37	--	<0.02	## d	0.037 d
8/27/2003	SM-0825	SM-0824	11:10	16 h	33	45 h	2.2	1.7	0.4	--	<0.02	## d	0.023 d
Relative Percent Difference (RPD):				***6.10%***	***14.10%***	***18.20%***	***75.00%***	***6.10%***	***7.80%***	***--***	***0.00%***	***--***	***46.70%***
10/30/2003	SM-0867	SM-0868	11:05	--	--	--	--	3.6*	--	0.43 dh	<0.01 h	0.10 h	0.038 h
10/30/2003	SM-0868	SM-0867	11:05	--	--	--	--	3.9*	--	0.34 dh	<0.01 h	0.08 h	0.035 h
Relative Percent Difference (RPD):				***--***	***--***	***--***	***--***	***8.00%***	***--***	***23.40%***	***0.00%***	***22.20%***	***8.20%***

** = missing/censored data;

-- = no data

% = RPD exceeds acceptable range

See Section **RESULTS AND QUALITY ASSURANCE/QUALITY CONTROL for** full description of qualifiers.

Table 17 MassDEP SMART 1999-2004 F/Q 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)
FRENCH RIVER, Station FR11													
2/11/2004	SM-0909	SM-0910	11:10	--	--	--	--	2.5*	--	0.86 dj	0.08 j	0.52 dj	0.024
2/11/2004	SM-0910	SM-0909	11:10	--	--	--	--	2.2*	--	0.51 dj	0.09 j	0.26 dj	0.023
Relative Percent Difference (RPD):				**--**	**--**	**--**	**--**	***12.80%***	**--**	***51.10%***	***11.80%***	***66.70%***	***4.30%***
3/31/2004	SM-0950	SM-0951	11:30	--	--	--	--	7.0*	--	0.61 j	<0.04 j	0.34 j	0.043
3/31/2004	SM-0951	SM-0950	11:30	--	--	--	--	8.2*	--	0.60 j	<0.04 j	0.32 j	0.041
Relative Percent Difference (RPD):				**--**	**--**	**--**	**--**	***15.80%***	**--**	***1.70%***	***0.00%***	***6.10%***	***4.80%***
5/27/2004	SM-0991	SM-0992	11:10	--	--	--	--	2.8*	--	0.60 j	0.06 j	0.22 j	0.028
5/27/2004	SM-0992	SM-0991	11:10	--	--	--	--	3.2*	--	0.58 j	0.06 j	0.21 j	0.027
Relative Percent Difference (RPD):				**--**	**--**	**--**	**--**	***13.30%***	**--**	***3.40%***	***0.00%***	***4.70%***	***3.60%***
7/28/2004	SM-1033	SM-1034	10:45	14	26	41	## d	4.3	--	0.61	<0.01	0.08	0.049
7/28/2004	SM-1034	SM-1033	10:45	16	27	41	## d	4.1	--	0.61	<0.03	0.08	0.041
Relative Percent Difference (RPD):				***13.30%***	***3.80%***	***0.00%***	**--**	***4.80%***	**--**	***0.00%***	***100.00%***	***0.00%***	***17.80%***
9/29/2004	SM-1074	SM-1075	10:39	12	25	31	4.7	2.3	--	0.58	<0.01	0.19	0.036
9/29/2004	SM-1075	SM-1074	10:39	13	25	31	3.8	2.3	--	0.59	<0.03	0.18	0.036
Relative Percent Difference (RPD):				***8.00%***	***0.00%***	***0.00%***	***21.20%***	***0.00%***	**--**	***1.70%***	***100.00%***	***5.40%***	***0.00%***
11/17/2004	SM-1115	SM-1116	11:58	12	30	43	3.9	2.5	--	0.49	<0.06 h	0.27	0.019
11/17/2004	SM-1116	SM-1115	11:58	13	30	44	3.3	2	--	0.49	<0.06 h	0.28	0.02
Relative Percent Difference (RPD):				***8.00%***	***0.00%***	***2.30%***	***16.70%***	***22.20%***	**--**	***0.00%***	***0.00%***	***3.60%***	***5.10%***

** = missing/censored data;

-- = no data

% = RPD exceeds acceptable range

See Section **RESULTS AND QUALITY ASSURANCE/QUALITY CONTROL for** full description of qualifiers.

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