



Technical Memorandum - TM-81-4
NASHUA RIVER WATERSHED
DWM YEAR 2003 WATER QUALITY MONITORING DATA - RIVERS

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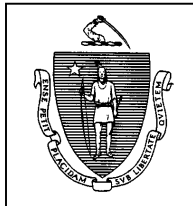


Table of Contents

Introduction.....	3
Table 1. MassDEP DWM 2003 Nashua River Watershed Water Quality Station Locations and Parameters.....	3
Figure 1. MassDEP DWM 2003 Nashua River Watershed Water Quality Station Locations.....	5
Objectives.....	6
Methods.....	6
Station Observations.....	7
Survey Conditions.....	17
Table 2. Total Daily Precipitation and Daily Mean Discharge at Four USGS gages in the Nashua River Watershed (North Nashua River Gages 01094400 in Fitchburg, and 01094500 in Leominster, Squannacook River Gage 01096000 in West Groton, and Nashua River Gage 01096500 in Pepperell) for Survey and 5 Antecedent Dates.....	18
Figure 2. Daily mean discharge (cfs) at USGS gage 01094400, Fitchburg, MA.....	20
Figure 3. Daily mean discharge (cfs) at USGS gage 01094500, Leominster, MA.....	21
Figure 4. Daily mean discharge (cfs) at USGS gage 01096000, West Groton, MA.....	22
Quality Assurance/Quality Control.....	23
Results.....	24
Table 3. MassDEP DWM 2003 Flow Discharge Measurements.....	24
Table 4. MassDEP DWM and SMART 2003 Nashua River Watershed <i>in-situ</i> Multiprobe Data.....	25
Table 5. MassDEP DWM and SMART 2003 Nashua River Watershed Water Quality Data.....	31
Table 6. MassDEP DWM 2003 Nashua River Watershed Field Blank Results.....	39
Table 7. MassDEP DWM 2003 Nashua River Watershed Field Duplicate Results.....	40
Table 8. MassDEP SMART 2003 Nashua River Watershed Field Blank Results.....	44
Table 9. MassDEP SMART 2003 Nashua River Watershed Field Duplicate Results.....	44
References.....	45

INTRODUCTION

The Nashua River flows in a northerly direction from the outlet of Lancaster Millpond in Clinton, MA for approximately 31 miles until it reaches the Massachusetts/New Hampshire state line. The river then flows for a little over 9 miles to its confluence with the Merrimack River in New Hampshire. In Lancaster, MA the Nashua River receives the stream discharge from the North Nashua River. The Nashua River Watershed is 530 square miles including the area in New Hampshire. The Massachusetts portion (445 square miles) encompasses all or part of 23 Massachusetts towns and 3 cities.

In 2003 the Massachusetts Department of Environmental Protection's (MassDEP) Division of Watershed Management (DWM) performed water quality monitoring in the Nashua River Watershed (Table 1 and Figure 1). Twelve total sampling rounds (including three multiprobe-only pre-dawn events, one multiprobe-only late afternoon event and eight nutrient and/or bacteria grab sampling events) were conducted April through October throughout the watershed. The overall monitoring strategy for the Nashua River Watershed was to collect data for support of the Nashua River Nutrient TMDL in a variety of flow regimes and secondarily to collect data to be used for assessment purposes. In order to maximize sampling with limited resources, each sampling round was comprised of any number of a subset of stations and/or a subset of parameters. For more information regarding the 2003 Nashua River Watershed survey, including sampling plan design and rationale, data quality objectives, and quality assurance, see the separate document, *Quality Assurance Project Plan 2003 MADEP-DWM Monitoring in the Blackstone, Chicopee, Connecticut and Nashua Watersheds* (MassDEP 2003a).

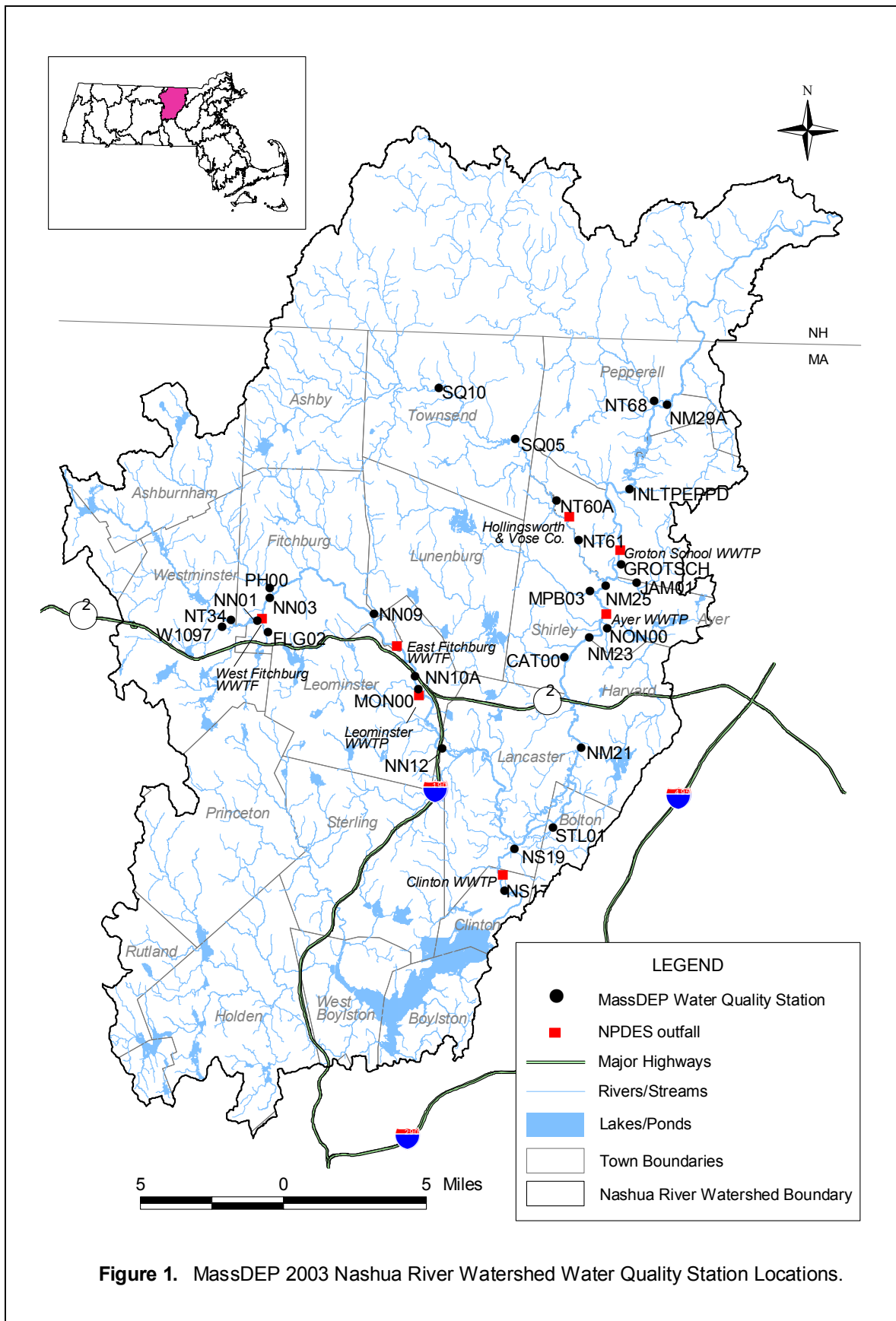
Table 1. MassDEP DWM 2003 Nashua River Watershed Water Quality Station Locations and Parameters.

River	Station ID	Site Description	Parameters
North Nashua River subwatershed			
North Nashua River	NN01	Downstream from Route 31 (upstream from the West Fitchburg WWTF), Fitchburg.	TP and DRP
	NN03	Downstream from the Mill # 9 bridge (downstream from the West Fitchburg WWTF), Fitchburg.	Multiprobe, TP, DRP, NH ₃ -N, TSS, fecal coliform and <i>E. coli</i> bacteria.
	NN09	At Airport Road (upstream from the East Fitchburg WWTF), Fitchburg.	Multiprobe, TP, DRP, NH ₃ -N, TSS, turbidity, fecal coliform and <i>E. coli</i> bacteria.
	NN10A	Adjacent to Searstown Mall (downstream from East Fitchburg WWTP and upstream from the Leominster WWTP), Leominster.	Multiprobe, TP, DRP, NH ₃ -N, TSS, turbidity, fecal coliform and <i>E. coli</i> bacteria.
	NN12	Downstream from the I-190 bridge, Lancaster and downstream from the Leominster WWTP discharge.	Multiprobe, TP, NH ₃ -N, TSS, turbidity, fecal coliform and <i>E. coli</i> bacteria.
Unnamed tributary out of Round Meadow Pond	W1097	Upstream from Depot Road, Westminister.	TP, DRP and flow.
Whitman River	NT34	Upstream from Route 2A, Westminister.	Multiprobe, TP, DRP, NH ₃ -N, TSS, fecal coliform and <i>E. coli</i> bacteria and flow.
Flag Brook	FLG02	At footbridge downstream from Fifth Street Pond, Fitchburg.	TP and DRP
Unnamed Tributary (considered extension of Phillips Brook)	PH00	Downstream from Westminister Hill Road, off Baltic Lane, Fitchburg.	Multiprobe, TP, NH ₃ -N, fecal coliform and <i>E. coli</i> bacteria
Monoosnuc Brook	MON00	Upstream from Commercial Road, Leominster.	Multiprobe, TP, DRP, NH ₃ -N, TSS, turbidity, fecal coliform and <i>E. coli</i> bacteria and flow.

Table 1 continued. MassDEP DWM 2003 Nashua River Watershed Water Quality Station Locations and Parameters.

River	Station ID	Site Description	Parameters
Nashua River "South Branch" subwatershed			
Nashua River "South Branch"	NS17	East of Route 110 (approximately 10 meters upstream from the MWRA Clinton WWTP), Clinton.	Multiprobe, TP, DRP, NH ₃ -N, TSS, fecal coliform and <i>E. coli</i> bacteria.
Nashua River "South Branch"	NS19	Downstream from Bolton Road, Lancaster and downstream from the MWRA Clinton WWTP.	Multiprobe, TP, DRP, NH ₃ -N, TSS, turbidity, fecal coliform and <i>E. coli</i> bacteria.
Nashua River subwatershed			
Nashua River	NM21	At the boat ramp in Oxbow Wildlife Refuge, Harvard.	Multiprobe, TP, DRP, NH ₃ -N, TSS, turbidity, fecal coliform and <i>E. coli</i> bacteria.
Nashua River	NM23	Upstream from Ayer Road/West Main Street and upstream from Ayer WWTP, Shirley/Harvard.	Multiprobe, TP, DRP, NH ₃ -N, TSS, turbidity, and Chlorophyll α .
Nashua River	NM25	Downstream from Route 2A and downstream from Ayer WWTP, Shirley/Ayer.	Multiprobe, TP, DRP, NH ₃ -N, TSS, turbidity, fecal coliform and <i>E. coli</i> bacteria and flow.
Nashua River	GROTSCH	Off the floating wharf at Groton School boat house, east of Route 111, Groton.	TP, DRP and Chlorophyll α .
Nashua River	INLTPEPPD	At the inlet to Pepperell Pond, downstream from Routes 111/199, Groton/Pepperell.	Multiprobe, TP, DRP, NH ₃ -N, TSS, turbidity, fecal coliform and <i>E. coli</i> bacteria and Chlorophyll α .
Nashua River	NM29A	Approximately 0.5 miles downstream from covered bridge at Groton Street, Pepperell.	Multiprobe, TP, DRP, NH ₃ -N, TSS, turbidity, fecal coliform and <i>E. coli</i> bacteria.
Still River	STL01	At Route 117, Bolton.	Multiprobe, TP, DRP, NH ₃ -N, TSS, fecal coliform and <i>E. coli</i> bacteria.
Catacoonamug Brook	CAT00	Upstream from Lovell Road, Shirley.	Multiprobe, TP, DRP, NH ₃ -N, TSS, fecal coliform and <i>E. coli</i> bacteria and flow.
Nonacoicus Brook	NON00	Upstream from MacPherson Road, Ayer.	Multiprobe, TP, DRP, NH ₃ -N, TSS, fecal coliform and <i>E. coli</i> bacteria and flow.
Mulpus Brook	MPB03	Downstream from trailer park road directly across from Kittredge Road, Shirley.	Multiprobe, TP, DRP, NH ₃ -N, TSS, fecal coliform and <i>E. coli</i> bacteria and flow.
James Brook	JAM01	Downstream from Route 111, Ayer.	Multiprobe, TP, DRP, NH ₃ -N, TSS, fecal coliform and <i>E. coli</i> bacteria and flow.
Squannacook River	SQ10	Upstream from Old Turnpike Road, Townsend.	TP, DRP
Squannacook River	SQ05	Downstream from South Street, Townsend.	TP, DRP
Squannacook River	NT60A	Off the west side of Townsend Road (directly across from Candice Lane), Groton.	Multiprobe, TP, DRP, NH ₃ -N, TSS, fecal coliform and <i>E. coli</i> bacteria.
Squannacook River	NT61	Downstream from Route 225, Shirley/Groton.	Multiprobe, TP, DRP, NH ₃ -N, TSS, fecal coliform and <i>E. coli</i> bacteria.
Nissitissit River	NT68	Downstream from Canal Street, Pepperell.	Multiprobe, TP, NH ₃ -N, fecal coliform and <i>E. coli</i> bacteria.

TP = total phosphorus; DRP = Dissolved Reactive Phosphorus; NH₃-N = ammonia-nitrogen; TSS = total suspended solids; Multiprobe = dissolved oxygen, percent saturation, temperature, pH, conductivity and total dissolved solids.



OBJECTIVES

The watershed assessment process in Massachusetts is carried out on a 5-year cycle. In Year One, DWM coordinates with watershed groups, gathers background information and begins to formulate sampling needs for surface waters in pre-determined watersheds. During Year Two of the cycle, sampling sites and parameters are finalized and monitoring is conducted. In Year Three, the finalized data are used for assessment reporting to comply with Section 305(b) of the Clean Water Act (CWA). Implementation of specific projects or programs to address water quality problems, and post-project evaluation are conducted in Year Four and Year Five, respectively.

The goal of the Nashua River Watershed Year 2 survey was to obtain information that meets the following DWM programmatic objectives and watershed-specific sub-objectives.

Objective 1: Evaluate specific water bodies for support of designated uses (using Section 305(b) of the CWA), determine if Massachusetts water quality standards are being met, and evaluate the level of impairment of CWA Section 303(d)-listed waterbodies.

- Evaluate water quality and aquatic habitat around selected point source discharges.

Objective 2: Provide quality-assured data for use by DWM in developing Total Maximum Daily Loads (TMDLs) for State 303(d) listed waterbodies.

- Gather data for TMDL development for Fort Pond, Lancaster; Partridge Pond, Westminster; Pepperell Pond, Pepperell/Groton; and Lake Shirley, Lunenburg; and data in support of the Nashua River Phosphorus TMDL.

Objective 3: Screen fish to provide data to the Massachusetts Department of Public Health (MDPH) for public health risk assessment due to fish tissue contaminants.

- Assess screening-level fish toxicity at two lake stations (Lake Shirley, Lunenburg and East Washacum Pond, Sterling) in the Nashua River Watershed for potential public health concerns.

Objective 4: Provide quality-assured *E. coli* data for the purpose of assessing primary and secondary contact recreational uses in rivers/streams.

Data collected to meet Objectives 1, 2 (Nashua River TMDL only) and 4 are presented in this report. Additional data to meet Objective 1 are available in *Continuous Temperature Data at Three Locations on the Squannacook River, Nashua River Watershed* (MassDEP 2003b) and in a benthic macroinvertebrate technical memorandum, to be presented under separate cover. See the separate document *Baseline Lake Survey 2003 Technical Memo* for presentation of lakes data to meet Objective 2 (MassDEP 2003c). Fish toxics sampling did not take place in 2003 in the Nashua River Watershed, therefore Objective 3 was not met.

METHODS

Field water quality monitoring procedures used during the 2003 Nashua River Watershed survey are described in the standard operating procedures (SOPs), *Sample Collection Techniques for DWM Surface Water Quality Monitoring* and *Water Quality Multi-probe Instrument Use Standard Operating Procedure* (MassDEP 2003d and 2003e). Additional information regarding field and laboratory methods, method and reporting detection limits, data quality objectives, and data validation can be found in the separate documents, *Quality Assurance Project Plan 2003 MADEP-DWM Monitoring in the Blackstone, Chicopee, Connecticut and Nashua Watersheds* (MassDEP 2003a) and *Data Validation Report for Year 2003 Project Data* (MassDEP 2002f)

Monitoring was conducted by MassDEP DWM personnel and samples were labeled, preserved/acidified (when applicable) in the field and stored on ice. Station observations (clarity, odors, aquatic plant and periphyton growth, and other objectionable conditions) were recorded on field sheets at the time of sample collection. Samples were delivered from the field to the Wall Experiment Station (WES), the Department's analytical laboratory in Lawrence, MA.

STATION OBSERVATIONS

Station NN01 - North Nashua River downstream from Route 31 (upstream from the West Fitchburg WWTF outfall), Fitchburg, MA.

The North Nashua River begins at the outlet of Snows Millpond in Fitchburg. This station was located in the river channel just upstream from the impoundment that receives the treated wastewater discharge from the West Fitchburg WWTP and the confluence with Flag Brook. The length of the river between Snows Millpond and the impoundment is only two-tenths of a mile and the substrate is mostly bedrock.

Station NN01 was sampled on two occasions (08/13/03 and 10/08/03) for total phosphorus and dissolved reactive phosphorus. This station was added at the end of the sampling season in order to give more spatial coverage for phosphorus data on the North Nashua River for the Nashua River Nutrient TMDL project. River water levels were normal for August and October with good velocities. The water column was relatively clear in-stream with no odor, scum, or other objectionable conditions observed.

Station NN03 - North Nashua River downstream from the Mill # 9 bridge (downstream from the West Fitchburg WWTF outfall), Fitchburg, MA.

The North Nashua River flows north after the impoundment downstream from station NN01 through an area that has multi-family, high-density and medium-density residential areas in the immediate subwatershed, is industrialized on the left bank, and has railroad tracks on the right bank. Station NN03 is less than 1 mile downstream from station NN01 and the West Fitchburg WWTF outfall. The site was accessed from the right bank on the downstream side of the Mill # 9 bridge and on most surveys sampled in the center of the stream. The river flow at this station is well mixed throughout the channel; therefore all sampling locations are representative of water quality conditions at this station. The river channel at this station is approximately 40 to 50 feet wide. Depths ranged from 1 to 3 feet and velocities from approximately 1 to 2 fps on the survey dates.

The water column was relatively clear in-stream with no odor on the survey dates. However, on three occasions an odor of treated wastewater was observed in the air. There were no scums or other objectionable conditions observed, with the exception of some white foam during the April survey. There were no aquatic plants, however, sparse coverage of green algae was attached to the river bottom during the May survey and persisted through September when it began to decay and turn brown. Brown thin film periphyton was present on substrates on most of the survey dates in moderate amounts.

Station NN09 - North Nashua River at Airport Road, Fitchburg, MA.

From Station NN03, the North Nashua River flows northeast, confluences with Phillips Brook, continues northeast and then turns southeast until station NN09 for approximately 5 miles. The land use surrounding the river through this section of Fitchburg is composed of industrial and commercial properties and multi-family and high-density residential areas. Station NN09 is slightly over 2 miles upstream from the East Fitchburg WWTF outfall. The site was accessed from the right bank of the downstream side of Airport Road. Survey crews walked under the road to collect bottle samples on the upstream side and on most surveys sampled in the center of the stream. The multiprobe was deployed center stream over the railing at the road. The river flow at this station is well mixed throughout the channel; therefore samples collected towards the banks are considered representative. The river channel at this station is approximately 40 to 50 feet wide. Depths ranged from 1 to 2 feet and velocities from approximately 1 to 2 fps on the survey dates.

The water column was relatively clear in-stream with no odor, scum, or other objectionable conditions on the survey dates. There were no aquatic plants, however, dense coverage of green filamentous algae attached to substrates was observed in May. Periphyton coverage was not observed again until September when it was noted as moderate coverage and was only described as brown.

Station NN10A - North Nashua River adjacent to Searstown Mall, downstream from Route 2 (downstream from East Fitchburg WWTP and upstream from the Leominster WWTP), Leominster, MA.

From station NN09 the North Nashua River continues southeast, confluences with Falulah Brook, passes the Fitchburg airport, receives the treated wastewater discharge from the East Fitchburg WWTP and continues into the City of Leominster for a total of three miles to station NN10A. The land use surrounding the river continues to be industrial and commercial properties and high-density residential areas. Station NN10A is approximately three-quarters of a mile upstream from the Leominster WWTP outfall. The site was accessed via a path through the tree line near the Sears Auto Body Center in Searstown Mall and on most surveys was sampled in the center of the stream. The river flow at this station is well mixed throughout the channel; therefore all sampling locations are representative of water quality conditions at this station. The river channel at this station is approximately 40 to 50 feet wide. Depths ranged from 1 to 2 feet and velocities from approximately 1 to 2 fps on the survey dates.

The water column was slightly turbid in-stream early in the sampling season with more turbidity noted during the August surveys. Sporadically during the survey dates an odor of treated wastewater was observed in the air, but no water odors were noted. There were no scums or other objectionable conditions in the river, except for the occasional piece of trash or naturally occurring organic foam. There were no aquatic plants; however moderate coverage of green filamentous algae attached to the river bottom was observed in May and June, but was not noted again until September when it began to decay and turn brown. Additionally brown thin film periphyton was present throughout most of the season causing the rocks to be slippery.

Station NN12 - North Nashua River downstream from I-190 (downstream from the Leominster WWTP), Leominster, MA.

The North Nashua River continues south from station NN10A, confluences with Monoosnuc Brook, receives the treated wastewater discharge from the Leominster WWTP, flows past the Route 2 and I-190 interchange, through the Leominster State Forest and under I-190 for 3.5 miles to station NN12. This station was sampled as a cooperative effort with MassDEP's SMART monitoring program in the Central Regional Office. The site was accessed via a walking path at the end of a cul-de-sac (Old Main Street) and on most surveys was sampled in the center of the stream. The river flow at this station is well mixed throughout the channel; therefore all sampling locations and techniques are representative of water quality at this station. The river channel is 75 to 100 feet wide in this reach. Depths ranged from 1 to 2 feet and velocity was approximately 1 fps on the survey dates.

The water column was slightly turbid in-stream on the survey dates with the exception of one sampling date (14 August 2003) where a highly cloudy water column was noted, most likely due to heavy antecedent rain. A slight odor of treated wastewater was observed in the air on two surveys, but there was no water odor. There were no scums or other objectionable conditions, except for silt deposits in-stream. Only sparse coverage of aquatic plants was noted and was limited to a patch of coontail (*Ceratophyllum* sp.) in the center of the river. Approximately 25% coverage of green filamentous algae attached to the river bottom was observed in May, but was not noted again until September when it began to decay and turn brown.

Station W1097 - Unnamed tributary out of Round Meadow Pond upstream from Depot Road, Westminister, MA.

This unnamed tributary in Westminister confluences with the Whitman River near the inlet to Snows Millpond. The majority of this tributary's headwaters are formed out of Burnt Millpond (adjacent to a golf course) and Tophet Swamp. The tributary then flows past medium-density residential and light industrial areas, under Route 2, and then into Round Meadow Pond. Station W1097 was sampled on two occasions (08/13/03 and 10/08/03) for total phosphorus and dissolved reactive phosphorus. This station was added at the end of the sampling season in order to give more spatial coverage for phosphorus data on the North Nashua River for the Nashua River Nutrient TMDL project. The channel is approximately 10 feet wide and the flow was strong with velocity approximated at 2 fps for both surveys.

The water column was relatively clear in-stream with no odor, scum, or other objectionable conditions. There were no aquatic plants, but the bottom substrates (cobble, gravel and sand) were slippery suggesting the presence of periphyton.

Station NT34 - Whitman River upstream from Route 2A, Westminster, MA.

The Whitman River begins at the outlet of Lake Wampanoag in Ashburnham and flows for a little over 8 miles before it ends at the inlet to Snows Millpond in Fitchburg. The subwatershed is mostly forest with some small low-density and medium-density residential areas. The river also flows through two impoundments, the Whitmanville Reservoir and Crocker Pond. Station NT34 was accessed off the right bank upstream from Route 2A in Westminster for water sample collection, but the multiprobe was deployed center stream from the road crossing. Grab water samples were collected towards the right bank, but in the main flow of the river. The river is approximately 30 feet wide at this station and is at least 4 feet deep in the center of the channel. The water level remained relatively constant throughout the survey dates. From April to June, the flow was strong with an average water velocity approximately 2 to 3 fps. In July, when the water level began to drop slightly, the velocity slowed to less than 1 fps and the river was a very slow run. This condition remained through the October sampling date. Dissolved oxygen readings from the multiprobe were unstable in response to the lack of velocity in July and August.

Water clarity in stream was difficult to determine because of the depth and dark water color, but slight turbidity was noted. There was no water odor, but sulfide odor was released from the soft sediment bottom when disturbed. Naturally occurring organic foam was observed at this station along with the occasional piece of trash, both of which would get caught around downed trees in the water. A sand bar formed on the right bank under the bridge, but no other objectionable conditions were noted. The density of aquatic plant coverage was difficult to determine due to the depth and water color, but in September a sparse amount (<1% coverage) of coontail (*Ceratophyllum* sp.) was noted. In May green algae attached to the river bottom was observed (approximately 25% coverage along the shoreline) and persisted through September. During the October survey, the algae coverage was unobservable.

Station FLG02 - Flag Brook north of Fifth Massachusetts Turnpike at footbridge approximately 230 feet below Fifth Street Pond outlet, Fitchburg, MA.

Flag Brook begins at the outlet of Crocker Pond in Westminster (not the Crocker Pond impoundment of the Whitman River) and flows for just under 3 miles, north through Sawmill Pond until its confluence with an unnamed impounded area of the North Nashua River. The immediate surrounding land use is mostly forest until the last half of a mile where it flows through a small low-density residential area and under and past some industrial properties. The subwatershed for Flag Brook includes an unnamed tributary that also enters Sawmill Pond and whose subwatershed accounts for roughly 75% of the Flag Brook subwatershed. Three impoundments (Wachusett Lake, Meetinghouse Pond and Wyman Pond) are included in this additional area as well as the majority of the residential housing in the entire Flag Brook subwatershed. The brook is channelized in this reach from the outlet of Fifth Street Pond and flows under the industrial property downstream from this station. Station FLG02 was sampled on two occasions (08/13/03 and 10/08/03) for total phosphorus and dissolved reactive phosphorus. This station was added at the end of the sampling season in order to give more spatial coverage for phosphorus data on the North Nashua River for the Nashua River TMDL project. The brook was sampled from a footbridge behind an industrial property at the corner of Old Princeton Road and Fifth Massachusetts Turnpike. The flow and velocity were high and the width of the channel was approximately 5 to 10 feet.

The water column was relatively clear in-stream with no odor, scum or other objectionable conditions on both survey dates. Presence of aquatic plants and periphyton could not be determined from the footbridge due to the fast moving colored water, but believed to be low coverage if at all.

Station PH00 - Unnamed Tributary, locally known as Phillips Brook, downstream from Westminster Hill Road, off Baltic Lane, Fitchburg, MA.

This unnamed tributary flows for half of a mile from the outlet of McTaggarts Pond to the confluence with the North Nashua River in Fitchburg. The immediate surrounding land use is composed of high-density

residential and industrial properties. Upstream from McTaggarts Pond is the 7.5-mile long Phillips Brook. The subwatershed for Phillips Brook is 14 to 15 square miles and mostly forest. However, medium and low-density residential areas abut the brook for the majority of its length. Station PH00 was accessed from the left bank behind the Mill #5 building on Baltic Lane and sampled in the center of the stream. The channel is approximately 20 to 30 feet wide and 1 to 2 feet deep. The velocity was strong (approximately 2 to 3 fps) from April through August. During the September survey the water level had dropped approximately 1 foot from the previous survey and the velocity decreased to approximately 1 fps, but riffle areas were still present and the only substrates exposed were large cobbles. The water level and velocity returned to pre-September conditions for the October survey.

The water column was relatively clear in-stream with no odor, scum or other objectionable conditions on the survey dates, with the exception of the occasional piece of trash. A small amount of naturally occurring organic foam was observed on occasion. There were no aquatic plants other than moss. In May, sparse coverage of green algae attached to the substrates was observed and remained through October when the percent of algae coverage was unobservable, but slippery rocks were evident of periphyton presence.

Station MON00 - Monoosnuc Brook at Commercial Road, Leominster, MA.

Monoosnuc Brook begins at the outlet of Simonds Pond in Leominster and flows generally in a southeast direction for a little over 6 miles until its confluence with the North Nashua River. The subwatershed is approximately 11 square miles and the upper 75% is mostly forested. However, after only half of a mile from its source, the riparian zone of the brook is highly developed and comprised of residential, commercial and industrial properties for the rest of its length. Station MON00 was accessed via the right bank on the upstream side of the road for water quality grab samples. Samples were collected either towards the right bank or in the center of the stream by either manual grab techniques or by use of an extension pole. All sampling locations and techniques are representative of water quality at this station. The multiprobe was deployed center stream from the road crossing. The river channel is typically 25 to 30 feet wide the reach of the river upstream from Commercial Road, but widens to 40 to 45 feet at this station. There is very little gradient in the stream channel and the velocity on the survey dates was less than 1 fps.

The water column was relatively clear in-stream with no scum, but noted as slightly turbid on a couple of survey dates. A sulfide water odor was observed on two of the twelve surveys. A small amount of trash was present in-stream throughout the sampling season. Stems of emergent aquatic plants were observed during the first survey in April and estimated as sparse density. By May, aquatic plant coverage was approximately 25% and included emergent and submerged species. By June the total aquatic plant coverage was dense (75 to 100% coverage) and remained through October. Soft silt deposits were approximately 1 foot deep on the stream bottom and covered the aquatic plant growth. The bottom substrate at this station was sand, silt and mud with some large cobble. In September, attached algae were present, but the percent coverage could not be determined due to the dense aquatic plant coverage.

Station NS17 - "South Branch" Nashua River east of Route 110 (approximately 10 yards upstream from the MWRA Clinton WWTP), Clinton, MA.

The "South Branch" Nashua River begins at the outlet of Wachusett Reservoir in Clinton, flows through Lancaster Millpond, and continues northeast through a highly developed area of industrial and residential properties. The river turns west and then north to the sampling station. The site was accessed via a paved path along the perimeter of the Clinton WWTP. Samples were collected either towards the left bank or in the center of the stream by either manual grab techniques or by use of an extension pole. All sampling locations and techniques are representative of water quality at this station. The width of the river channel was approximately 30 feet. The water depth was variable and was noted as high or flooding onto the banks during three surveys (9 April, 11 June and 16 July 2003) and low during three surveys (12 June, 15 July and 8 October 2003). Manipulation at the Wachusett Reservoir outlet could account for water levels increasing from low to high during the July surveys in less than 24 hours with no precipitation recorded. Precipitation on June 11th could account for the high levels observed on that date. The velocity on the survey dates was approximately 1 fps.

The water column was slightly to moderately turbid on the survey dates and generally with no water odor, except for the first survey when a sulfide odor was noted. Odor of treated wastewater was noticeable in the air due to the sampling site's proximity to the treatment plant. There were no scums or objectionable conditions in the river, except for an occasional piece of trash. Naturally occurring organic foam was noted on a few of the survey dates. The density of aquatic plants was difficult to determine at this station, but sparse coverage of submerged macrophytes were observed sporadically throughout the survey season. In May, sparse coverage of filamentous green algae was attached to the substrates, but was not noted during any other surveys.

Station NS19 - "South Branch" Nashua River downstream from Bolton Road (downstream from the MWRA Clinton WWTP) Lancaster, MA.

From station NS17 the river flows generally in a northern direction, receives the treated wastewater discharge from the MWRA Clinton WWTP, confluences with Goodridge Brook, and continues northeasterly until station NS19 for a total of approximately 1.7 miles. Station NS19 was accessed from the left bank of the downstream side of Bolton Road during the day. During the pre-dawn surveys, the multiprobe was deployed center stream from the road crossing. This station was sampled as a cooperative effort with MassDEP's SMART monitoring program in the Central Regional Office. The station was accessed via the left bank of the downstream side of the road and upstream of the old railroad trestle. Samples were collected either towards the left bank or in the center of the stream by either manual grab techniques or by use of an extension pole. All sampling locations and techniques are representative of water quality at this station. The river channel was approximately 40 feet wide and 3 to 4 feet deep at this station on the survey dates. The water levels were constant and velocity ranged from approximately 1 to 2 fps on the survey dates.

The water column was relatively clear in-stream with slight turbidity in the deeper pools. There were no odors, scums or other objectionable conditions observed on the survey dates with the exception of an odor of treated wastewater noted in the air on one occasion (May 7th). Aquatic plant coverage was minimal. On one survey (July 15th) the plant density was recorded as sparse (approximately 1%). Sparse to moderate coverage (approximately 25%) of green filamentous algae was observed in May, but was not recorded on any of the subsequent survey field sheets. However, slippery substrates, representative of the presence of periphyton, were noted during the October survey.

Station NM21 - Nashua River at the boat ramp in Oxbow Wildlife Refuge, Harvard, MA.

From Station NS19 the Nashua River flows northeasterly, confluences with the North Nashua River and the Still River, passes the Bolton Flats State Wildlife Management Area to Station NM21 in the Oxbow National Wildlife Refuge for a total of approximately 6 miles. Station NM21 was accessed from a boat ramp at the end of Still Water Road. Grab samples were collected and multiprobe measurements were recorded towards the right bank from center stream. The river channel is 80 to 100 feet wide in this reach. The water levels were constant and velocity ranged from approximately 1 to 2 fps on the survey dates.

The water column was slightly turbid in-stream with no odor, scum or other objectionable conditions. Sparse coverage of emergent and submerged grasses and brown thin-film periphyton were identified along shoreline areas during the May survey, but conditions were recorded as "unobservable" on subsequent survey dates.

Station NM23 - Nashua River upstream from Ayer Road/West Main Street (upstream from Ayer WWTP), Shirley/Harvard, MA.

From Station NM21 the Nashua River continues north passing the Oxbow National Wildlife Refuge, a few small tributaries, and Fort Devens to Station NM23 for a total of approximately 5 miles. The Ice House Dam is located approximately 600 feet downstream from the road crossing. Station NM23 was sampled via a basket drop in the center of the stream on the upstream side of Ayer Road/West Main Street and the multiprobe was deployed in the same location. The river channel in this reach is approximately 150

feet wide. The water levels were constant and velocity ranged from approximately 1 to 2 fps on the survey dates.

The water column was turbid in-stream with no odor, scum or other objectionable conditions, except for some pollen floating along the shoreline. The presence of aquatic plants and periphyton could not be determined at this location due to the depth, although a sparse amount of duckweed was observed on all survey dates except April.

Station NM25 - Nashua River upstream from Route 2A, Shirley/Ayer, MA.

From Station NM23 the Nashua River flows generally in a northern direction, confluences with Morse, Walker and Nonacoicus brooks, receives the treated wastewater discharge from the Ayer WWTP, confluences with Mulpus Brook and passes Moore Airfield to Station NM25 for a total of approximately 2.7 miles. Station NM25 was accessed from the left bank on the downstream side of the road and sampled towards the left bank from center stream for the April, May, June, and September surveys. July, August and October surveys were sampled via a basket drop in the center of the stream from the road crossing and the multiprobe was deployed in the same location. The river flow at this station is well mixed throughout the channel; therefore all sampling locations and techniques are representative of water quality at this station. The river channel is approximately 90 feet wide in this reach. Depths ranged from 7 to 8 feet and velocities from 1 to 2 fps on the survey dates.

The water column was turbid in-stream with no odor, scum or other objectionable conditions. However, a slight oily sheen was observed on one survey (16 July 2003). The presence of aquatic plants and periphyton could not be determined due to the depth of the water. However, sparse coverage of emergent and submerged grasses along the shoreline was observed during the May and July surveys. In August, a small amount of duckweed was observed floating downstream.

Station GROTSCH - Nashua River at Groton School boathouse, east of Route 111, Groton, MA.

From Station NM25 the Nashua River flows in a generally northern direction, confluences with the Squannacook River and the Dead River, and reaches this station in 1.7 miles. The Groton School has a small wastewater discharge to the Nashua River. This station is located upstream from the discharge. The site was accessed via a dirt road to the Groton School boathouse and samples were collected from the wharf. The river channel is approximately 100 wide in this reach. The water levels and velocities (1 to 2 fps) were constant throughout the survey dates.

The water column was slightly turbid in-stream with no odor, scum or other objectionable conditions. The presence of aquatic plants and periphyton could not be determined due to the depth of the water. However, on the June survey a small amount of duckweed was present around the dock.

Station INLTPEPPD - Nashua River at the inlet to Pepperell Pond, downstream from Routes 111/199, Groton/Pepperell, MA.

From Station GROTSCH the Nashua River flows north, passing a few small tributaries, to the Groton/Pepperell town boundaries where the river then turns east to the water quality station for a total of approximately 3.6 miles. Station INLTPEPPD was sampled via a basket drop in the center of the stream on the downstream side of Routes 111/119 and the multiprobe was deployed in the same location. The river channel in this reach is approximately 150 feet wide. The water levels were constant and velocity ranged from approximately 1 to 2 fps on the survey dates.

The water column was slightly turbid in-stream with no odor. A pollen/dust blanket was observed on the June survey and in September a small oily sheen near mid channel was noted. The presence of aquatic plants and periphyton could not be determined due to the depth of the water. However, floating green algal mats in the coves on the shoreline were observed during the May survey along with brown filamentous attached algae and a brown floc of unknown origin.

Station NM29A - Nashua River approximately 0.5 miles downstream from covered bridge at Groton Street, Pepperell, MA.

From the inlet to Pepperell Pond, the Nashua River flows north to Station NM29A, approximately 0.6 miles downstream from the outlet of Pepperell Pond. This station was sampled as a cooperative effort with MassDEP's SMART monitoring program in the Central Regional Office. The station was accessed through the tree line on the right bank. Grab samples and multiprobe measurements were collected towards the right bank from center stream, but in the main flow of the river. The river channel is approximately 80 to 100 feet in this reach and the average depth is 1 to 2 feet. The water levels were constant and velocity ranged from approximately 1 to 2 fps on the survey dates.

The water column was slightly turbid in-stream with no odor, scum or other objectionable conditions. Sparse coverage of submerged and floating aquatic plants was observed including moss, burreed (*Sparganium* sp.) and duckweed (*Lemna* sp.). Moderate coverage of green and brown filamentous and thin-film algae was observed attached to substrates and to the plants on the May, September and October survey dates.

Station STL01 - Still River at Route 117, Bolton, MA.

The Still River is approximately 3.2 miles long and is located within the Bolton Flats Wildlife Management Area. Bolton Flats is part of the Central Nashua River Valley Area of Critical Environmental Concern. Station STL01 was sampled with a variety of techniques (manual grab, extension pole, basket drop) and in a variety of locations (upstream/downstream, right bank/left bank/center stream). All locations are representative of water quality conditions at this station. The stream channel width is variable in the Still River, but is approximately 75 feet wide at the Route 117 crossing and over 6 feet deep. The water levels were constant and the velocity ranged from 0 to 1 fps on the survey dates.

The water column was turbid in-stream with suspended solids and had no odor. On the August survey a plume of turbidity of unknown origin was visible on the upstream side of the road. In September a blanket of pollen scum and duckweed covered the surface. There were no scums identified on any of the other surveys. Density of aquatic plants and periphyton could not be determined due to the depth of the water. However, duckweed (*Lemna* sp.) was estimated at approximately 25% coverage. Duckweed was also observed in the snow and ice covered river during the March 2003 reconnaissance. Additionally, sparse density of floating clumps of algae was noted during the October survey.

Station CAT00 - Catacoonamug Brook upstream from Lovell Road, Shirley, MA.

Catacoonamug Brook (approximately 8.8 miles) originates out of a small-unnamed impoundment in Lunenburg, MA. The brook flows southeast through forested and light residential areas and through the large impoundment, Lake Shirley. At the outlet of Lake Shirley the brook crosses the town boundary from Lunenburg into Shirley. The surrounding land use through Shirley is more urbanized with residential and commercial properties to its confluence with the Nashua River. Station CAT00 was sampled by wade-in manual grabs (center stream or towards the left or right bank) or basket drops in the center of the stream from the road crossing. All sampling locations and techniques are representative of water quality at this station. The river channel is 50 feet wide in this reach with a maximum depth of four feet in the center channel during the April survey. Water level dropped approximately 6 inches between the May and April surveys and remained at that level for the remainder of the survey dates. The river velocity was less than 1 fps for all survey dates.

The water column was relatively clear with no odor, but colored with tannins. In May pollen began to collect on the surface and in June was observed as a pollen scum. A very light oily sheen was also noted on two survey dates (7 May and 16 July). No other objectionable conditions were recorded. Sparse coverage of moss and brown thin-film periphyton on substrates was observed in May, but densities were not recorded for the remainder of the survey dates.

Station NON00 - Nonacoicus Brook upstream from MacPherson Road, Ayer, MA.

Nonacoicus Brook flows for approximately 1.4 miles in a westerly direction from the outlet of Plow Shop Pond to its confluence with the Nashua River. From the outlet of the pond, the brook flows through some light residential and commercial properties and past the Ayer WWTP facility (discharge is to the Nashua River). The immediate surrounding land use for the remainder of the brook is forest and wetland. The river channel is 20 to 25 feet wide in this reach and ranged from two to four feet deep in the center of the channel on the survey dates. The fluctuation in water level exposed the shoreline and some mid-channel substrates farther upstream from the station. The station was accessed via the left bank of the upstream side of the road on most surveys and sampled towards the left bank from center stream. The survey on August 13th was sampled center stream via a basket drop from the road. The multiprobe was deployed on the upstream side of the road in the center of stream for most surveys, except for the July 17th survey when the probe was deployed on the downstream side of the road in order to avoid brush debris caught at the bridge. All sampling locations and techniques are representative of water quality at this station. The velocity was low (0 to 1 fps) on the survey dates and described as stagnant during the September surveys.

The water column was clear during the April, May and June survey dates. In July, in-stream clarity was described as slightly turbid and during the August, September and October surveys the brook was turbid in-stream. There were no water odors on the survey dates. A logjam at the road crossing in July resulted in reduced flow and a build up of pollen and dust around the brush debris in the brook. The bottom substrates were sand, silt and mud with some coarse gravel with no aquatic plants or periphyton observed.

On 18 September 2003, multiprobe readings were taken on Nonacoicus Brook downstream from Shirley Street in Ayer in order to compare dissolved oxygen readings in a more riverine and less wetland habitat than Station NON00. These data are presented in Table 3 as Station NON02. This site had slightly more gradient than Station NON00, as evidenced by the presence of riffle habitat, but the velocity was still less than 1 fps. The water column was mostly clear with no odor, scum or other objectionable deposits. Aquatic plant and periphyton coverage was unobservable.

Station MPB03 - Mulpus Brook downstream from trailer park road directly across from Kittredge Road, Shirley, MA.

The 11-mile long Mulpus Brook flows generally in a southeasterly direction from its headwaters in Lunenburg to its confluence with the Nashua River in Shirley. From the outlet of this pond, the brook flows through mostly forested area to the inlet of Hickory Hills Lake, whose shoreline is fully developed residential. From the outlet of the lake to its confluence with the Nashua River, the immediate surrounding land use for Mulpus Brook is more developed and includes wetlands, residential and commercial properties and cropland. Station MPB03 is less than 0.4 miles upstream from the confluence with the Nashua River. The station was accessed from the left bank and sampled in the center of the stream. The river channel in this reach is 10 to 15 feet wide. Maximum depth during the April survey was slightly less than 3 feet and velocity was 2 to 3 fps. By the May surveys, maximum depth dropped to less than 1.5 feet and the velocity slowed to 1 to 2 fps, but only substrates on the shoreline were exposed. In June the depth and velocity increased slightly from the May surveys. Slight fluctuations in depth and velocity continued during the remainder of the survey dates.

The water column was relatively clear with no odor, scum or other objectionable conditions for all surveys. There were no aquatic plants, but moderate coverage of brown periphyton on substrates was observed on the September survey. Shoreline erosion was severe on the right bank with undercut banks and exposed tree roots, however the substrates appear to be a good mix of cobble, gravel and sand. The left bank is more stable with large cobble rip rap.

Station JAM01 - James Brook downstream from Route 111, Ayer, MA.

James Brook originates out of a wetland in Groton where it flows for approximately 4.2 miles, first south through residential and cropland areas. Near the town boundary between Groton and Ayer, the brook

turns west and flows to its confluence with the Nashua River. Station JAM01 was accessed from either bank downstream of a wooden footbridge on the downstream side of Route 111 and sampled in the center of the stream. The river channel is 6 to 7 feet wide and 1 to 3 feet deep in this reach. The velocity during the April survey was 1 to 2 fps, but slowed to less than 1 fps during the remainder of the surveys.

The water column was relatively clear with no odor, scum, or other objectionable conditions on all survey dates. There were no aquatic plants, but sparse density of terrestrial grasses inundated the streambed. Sparse to moderate coverage of brown thin-film periphyton attached to substrates was observed on the June and September surveys, respectively.

Station SQ10 - Squannacook River upstream from Turnpike Road, Townsend, MA.

The Squannacook River is the second largest tributary to the Nashua River at approximately 16 miles long. It originates in Townsend at the confluence of Mason and Willard Brooks. The river flows for 2 miles easterly through the Squannacook River State Wildlife Management Area, and past light residential and farming properties to Station SQ10. The station was accessed from the left bank on the upstream side of the road. Samples were collected towards the left bank by manual grab techniques for the first four surveys; the October survey was sampled via a center stream basket drop from Turnpike Road. The river flow at this station is well mixed throughout the channel; therefore all samples are representative of water quality at this station. The river channel is approximately 60 feet wide in this reach and the water levels and velocities (approximately 1 fps) were constant throughout the survey dates.

Turbidity in the water column increased on the survey dates from slightly turbid in April to moderately turbid by September (during a habitat survey). On the April survey, a slight organic odor was noted in the water in addition to a hay and farm odor in the air. Shoreline erosion was evident on both banks with exposed tree roots and the stream bottom was very silty. Sparse coverage of submerged aquatic plants was noted on the August and October surveys, but periphyton density was not recorded.

Station SQ05 - Squannacook River downstream from South Street, Townsend, MA.

From Station SQ10, the Squannacook River flows in a southeasterly direction through some agriculture, forest, and light-residential areas to Harbor Pond for approximately 5 miles. Station SQ05 (approximately 200 feet downstream from the outlet of Harbor Pond) was accessed on the downstream side of South Street from the left bank behind the historic Grist Mill. Samples were collected in the center of the stream on the April and May surveys and towards the left bank on the June, August and October surveys. The river flow at this station is well mixed throughout the channel; therefore all samples are representative of water quality at this station. The river channel is approximately 40 to 50 feet wide in this reach. The water levels were constant and velocity ranged from approximately 1 to 2 fps on the survey dates. The river was wadeable at this station (less than 1 to 2 feet deep) and can be further described as a large riffle area composed of cobble, gravel and sand substrates. The only substrates exposed during the surveys were larger cobbles on the margins.

The water column was mostly clear on the survey dates with no odor, scum or other objectionable conditions. Some naturally occurring organic foam was noted on the May survey as collecting in the slow water on the margins. Sparse coverage of aquatic plants and moss on the substrates was observed on the survey dates. On the May and June surveys green filamentous algae was attached to the substrates in sparse (approximately 1%) and moderate (25 to 50%) amounts, respectively. Periphyton coverage was not recorded for the September survey and in October moderate density of brown thin film periphyton was observed on the substrates along with some green colored freshwater sponges.

Station NT60A - Squannacook River off the west side of Townsend Road (directly across from Candice Lane), Groton, MA.

From Station SQ05, the Squannacook River flows in a southeasterly direction through the Squannacook River State Wildlife Management area for approximately 3.9 miles to Station NT60A. This station was sampled as a cooperative effort with MassDEP's SMART monitoring program in the Central Regional Office. The site was accessed through the tree line from the left bank. Samples were collected towards

the left bank from center stream, but in the main flow of the river. The river channel is approximately 60 feet wide in this reach and deep. Average depth was not measured, but on the August 14th survey, the multiprobe was deployed in 3.5 feet of water off the left bank. The water levels were constant and velocity was approximately 1 fps on the survey dates in this deep run.

The water column was slightly turbid in-stream with no odor, scum or other objectionable conditions, except for one survey (July 16th) an oily sheen was observed on the water. The presence of aquatic plants could not be determined due to the depth of the river. A sparse amount of brown thin-film periphyton was observed on the sand and mud substrates along the shoreline.

Station NT61 - Squannacook River downstream from Route 225, Shirley/Groton, MA.

From Station NT60A the Squannacook River continues southeasterly through wetlands and an impoundment and receives the treated wastewater discharge from the Hollingsworth and Vose Company. The river then meanders through another small impoundment upstream from Route 225 and flows over a dam on the downstream side of Route 225 to the station approximately 500 feet downstream from the dam. The total distance between Station NT60A and NT61 is approximately 2.2 miles. The site was accessed from the parking lot of a nursing home on the left bank. Sampling crews walked across a wooden footbridge to an island, and sampled off the western edge of the island. Samples were collected either towards the left bank or in the center of the stream depending on stream flow. The river flow at this station is well mixed throughout the channel; therefore both sampling locations are representative of water quality at this station. The river channel is approximately 40 feet wide in this reach and velocity was 2 to 3 fps during the April survey. The velocity slowed to 1 to 2 fps for the remainder of the surveys. Average water depth was approximately 2 feet during the April survey and dropped 1 to 1.5 feet throughout the survey season. However, substrates were not exposed and riffle habitat was still abundant.

The water column was slightly turbid in-stream with no odor, scum or other objectionable conditions. Sparse coverage of moss on substrates and the submerged aquatic plants false loosestrife (*Ludwigia* sp.) and water starwort (*Callitriche* sp.) were observed. Sparse coverage of green and brown thin film algae was observed on substrates during the April survey. Periphyton density was not estimated again until the September and October surveys when moderate coverage of brown algae was noted on the substrates. Additionally during a September habitat survey, the small river channel flowing on the eastern side of the island and under the footbridge, had almost 100% coverage of bright green filamentous algae growth.

Station NT68 - Nissitissit River downstream from Mill Street, Pepperell, MA.

The Nissitissit River has its headwaters in New Hampshire and flows in a southeasterly direction for approximately 9 miles to its confluence with the Nashua River. Half of the river is located in Massachusetts. The riparian zone is mostly forested in the upper two miles of the Massachusetts portion of the river. Agricultural and residential areas become more prominent in the lower portion. The station was accessed from the parking lot behind an oil company at the corner of Mill and Groton Streets. The river channel is 50 to 60 feet wide in this reach. The average depth was 1 to 2 feet during the April, May, and June survey dates and dropped to approximately one half of a foot for the remainder of the surveys. The only substrates exposed during the reduced water level were a few larger cobbles in-stream and on the banks. Velocity was approximately 1 to 2 fps on the survey dates and the river can further be described as a large riffle habitat.

The water column was slightly turbid in-stream with no odor, scum or other objectionable deposits on the survey dates, except for an occasional piece of trash. There were no aquatic plants observed on the survey dates. In September moderate density of green filamentous algae was observed on the upstream side of Mill Street and at the survey station moderate coverage of brown thin film periphyton was observed during the September and October surveys.

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 events. During dry weather, trace amounts of precipitation may fall, but there is no measurable change in stream flow. The USGS operates four stream gaging stations in the Nashua River Watershed applicable to this water quality data set: two on the North Nashua River in Fitchburg and in Leominster, one on the Nashua River in East Pepperell and one on the Squannacook River in West Groton. There is considerable impact on stream discharge due to water diversions and powerplant flow regulation at the gage on the Nashua River in East Pepperell. Therefore this gage is not used for the precipitation vs. discharge comparison, but is presented in Table 2 for informational purposes only because one station (NM29A) is located downstream from the manipulation. Additional data are available from USGS gages on the Quinapoxet and Stillwater rivers, but these gages are geographically distant from the water quality monitoring stations and not presented in this report.

Daily mean stream discharge for the survey dates at all four gages is presented in Table 2 along with 7Q10 (the lowest 7-day average flow that occurs once every 10 years) and August median flow values, calculated using USGS Streamstats (USGS 2004 and 2005). Daily mean discharge recorded at each gage (except the Nashua River gage in East Pepperell) is presented in graphic format for 01 April 2003 through 15 October 2003 in Figures 2, 3 and 4 (dates were chosen arbitrarily in order to bracket the survey season). Arrows on the graphs indicate the seven sampling rounds (April, May, June, July, August, September and October). Precipitation data are available from the National Weather Service from airports in Worcester and Fitchburg (NOAA 2005). Weather and hydrologic conditions in the Nashua River Watershed were analyzed based on a station's proximity to the Worcester or Fitchburg airports and to one of the USGS gages. Total daily precipitation for the two airports is presented in Table 2.

April 9, 2003 - This survey was conducted during light snowfall with antecedent days of freezing rain and snow. Due to daily air temperatures averaging at or below freezing, there was a lack of runoff as compared to a rainstorm, consequently the daily mean discharge at all four gages decreased from April 4th to the 9th. Therefore, the April survey is characterized as a **dry weather** sampling event. Stream discharge daily means at the gages were 43 to 48 times higher than the 7Q10 at those gages.

May 6 and 7, 2003 - Prior to these surveys, the last significant amount of rain in Worcester (0.20 inches) and Fitchburg (0.66 inches) was recorded on May 2nd. As a result of the rain, daily mean stream discharge at the gages increased on May 3rd. Stream discharge then decreased at the gages from May 4th through the May surveys to the same levels as prior to the rain. Although trace to small amounts of rain were recorded on May 6th and 7th, there were no measurable increases in stream discharge. Therefore, the May surveys are characterized as **dry weather** sampling events. Stream discharge daily means at the gages were 30 to 36 times higher than the 7Q10 at those gages.

June 11 and 12, 2003 - Prior to these surveys, the last significant amount of rain in Worcester (0.89 inches) and Fitchburg (0.48 inches) was recorded on June 7th. As a result of the rain, stream discharge at the gages increased on June 8th. Stream discharge then decreased at the gages on June 9th and 10th to the same levels as prior to the rain. Therefore the June 11th survey is characterized as a dry weather event. After the completion of the survey on June 11th, the Worcester and Fitchburg airports recorded rain totals of 0.80 and 0.27 inches, respectively, for a storm that occurred on June 11th and 12th. Therefore the June 12th survey was representative of **wet weather** conditions. Stream discharge daily means at the gages during the June surveys were comparable to the May surveys. Daily means were 25 to 42 times higher than the 7Q10 at the gages.

July 15/16/17, 2003 - Prior to these surveys, the last significant amount of rain in Worcester (0.89 inches) and Fitchburg (0.52 inches) was recorded on July 11th. Daily means for stream discharge increased at the gages in response to the rain, but returned to the same levels as prior to the rain on July 15th and 16th. Therefore these two surveys are characterized as **dry weather** events. After the completion of the survey on July 16th, the Worcester and Fitchburg airports recorded rain totals of 0.29 and 0.07 inches, respectively, but there was no increase in stream discharge daily means (except for an increase of 1 cfs at the Squannacook River gage). The weather system in Worcester was localized and it is likely that the

Fitchburg airport rain total is a more accurate representation of precipitation in the Nashua River Watershed. Therefore, the small amount of rain that fell likely had very little impact on water quality for the July 17 survey. Stream discharge daily means decreased approximately 80% between the June and July survey dates and were only 6 to 9 times higher than the 7Q10 at those gages.

August 13 and 14, 2003 - Significant rain was recorded at both the Worcester and Fitchburg airports for 3 of the 5 antecedent days, corresponding with increases in stream discharge daily means. As a result, these surveys are considered **wet weather** events. Stream discharge daily means at the two gages on the North Nashua River increased to conditions comparable to the June surveys, but only increased two-fold at the Squannacook River gage. Daily means for stream discharge were 27 to 40 times the 7Q10 at the North Nashua River gages, but only 11 to 13 times higher at the Squannacook River gage.

September 11, 2003 - This survey was conducted during a dry period, with no rain recorded at the Worcester and Fitchburg airports for at least 5 antecedent days. Stream discharge daily means decreased 80 to 90% between the August and September surveys and were only 4 to 6 times higher than the 7Q10 at the gages.

October 8, 2003 - This survey was conducted during a dry period, with no rain recorded at the Worcester and Fitchburg airports for 3 antecedent days. A small amount of rain was recorded on October 4th, but daily mean stream discharge had returned to levels lower than those preceding the rain. Stream discharge daily means increased slightly between the September and October surveys and were 6 to 11 times higher than the 7Q10 at the gages.

Table 2. Total Daily Precipitation and Daily Mean Discharge at Four USGS gages in the Nashua River Watershed (North Nashua River Gages 01094400 in Fitchburg, and 01094500 in Leominster, Squannacook River Gage 01096000 in Groton, and Nashua River Gage 01096500 in Pepperell) for Survey and 5 Antecedent Dates. Survey dates are in bold text.

Date	Precipitation (inches) from ORH	Precipitation (inches) from FIT	Discharge (cfs) 01094400	Discharge (cfs) 01094500	Discharge (cfs) 01096000	Discharge (cfs) 01096500
04-04-03	0.28	0.40	294	669	338	1820
04-05-03	0.24	0.35	261	589	317	1830
04-06-03	0.00	0.00	232	524	274	1740
04-07-03	0.12	0.14	206	454	244	1620
04-08-03	0.20	0.07	195	420	219	1510
04-09-03	0.09	Trace	186	378	203	1390
05-01-03	0.04	0.02	131	247	150	823
05-02-03	0.20	0.66	158	301	141	762
05-03-03	Trace	0.00	261	511	245	852
05-04-03	0.00	0.00	196	372	260	994
05-05-03	Trace	0.00	161	299	187	877
05-06-03	0.02	0.01	138	255	151	768
05-07-03	Trace	0.02	133	243	137	693
06-06-03	0.00	0.00	128	245	159	832
06-07-03	0.89	0.48	127	258	137	802
06-08-03	0.00	0.00	147	278	145	821
06-09-03	0.01	Trace	130	242	143	845
06-10-03	0.00	0.00	125	229	123	833
06-11-03	0.61	0.22	140	229	105	826
06-12-03	0.19	0.05	180	306	116	791

Table 2 continued. Total Daily Precipitation and Daily Mean Discharge at Four USGS gages in the Nashua River Watershed.

Date	Precipitation (inches) from ORH	Precipitation (inches) from FIT	Discharge (cfs) 01094400	Discharge (cfs) 01094500	Discharge (cfs) 01096000	Discharge (cfs) 01096500
07-10-03	0.00	0.01	27	71	26	275
07-11-03	0.89	0.52	46	132	31	374
07-12-03	0.00	0.00	45	122	35	457
07-13-03	0.00	0.00	42	95	31	500
07-14-03	0.00	0.00	30	80	28	475
07-15-03	0.00	0.00	26	71	26	453
07-16-03	0.29	0.07	26	64	24	441
07-17-03	0.00	0.00	26	65	24	433
08-08-03	0.54	0.48	73	232	55	636
08-09-03	0.01	Trace	58	127	59	707
08-10-03	0.44	0.23	48	110	54	623
08-11-03	0.01	0.02	43	94	47	597
08-12-03	1.29	0.73	97	218	41	646
08-13-03	0.03	0.43	163	332	46	792
08-14-03	0.00	0.00	116	218	54	753
09-06-03	0.00	0.00	28	61	23	290
09-07-03	0.00	Trace	24	53	21	260
09-08-03	0.00	0.00	20	50	20	229
09-09-03	0.00	0.00	24	50	18	199
09-10-03	0.00	0.00	22	49	17	184
09-11-03	0.00	0.00	19	47	15	187
10-03-03	0.00	0.00	54	90	34	1690
10-04-03	0.14	0.17	52	85	32	1670
10-05-03	Trace	0.00	54	88	32	1670
10-06-03	0.00	0.00	45	75	31	1700
10-07-03	0.00	0.00	40	68	29	1720
10-08-03	0.00	0.00	47	73	27	1660
			7Q10 = 4.29	7Q10 = 8.03	7Q10 = 4.24	7Q10 = 44.1
			AMF = 16.5	AMF = 29.4	AMF = 16.6	AMF = 142.9

ORH = Worcester Airport, FIT = Fitchburg Airport, AMF = August Median Flow

Figure 2. Daily Mean Discharge (cfs) at USGS Gage 01094400 Fitchburg, MA

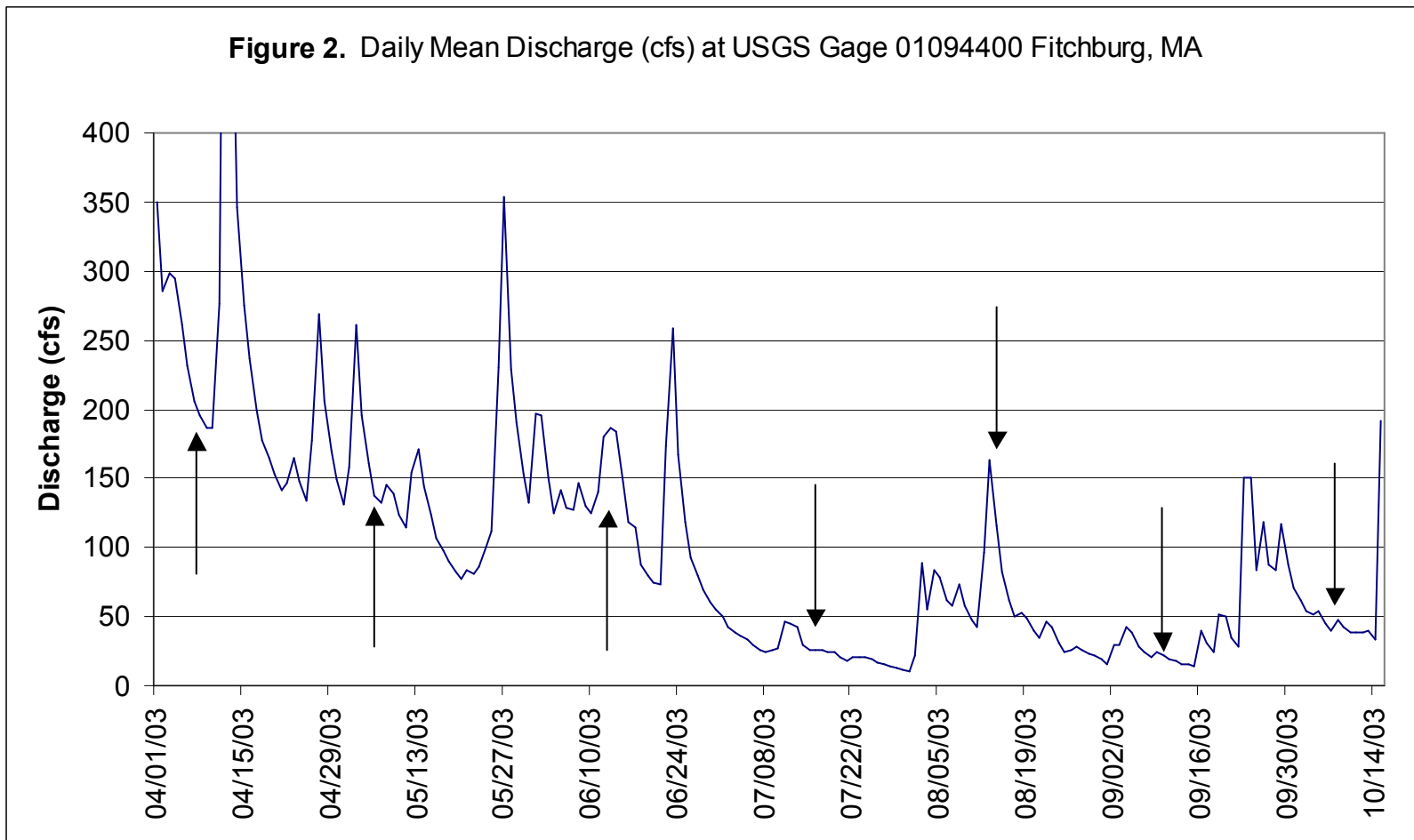


Figure 3. Daily Mean Discharge (cfs) at USGS Gage 01094500 Leominster, MA

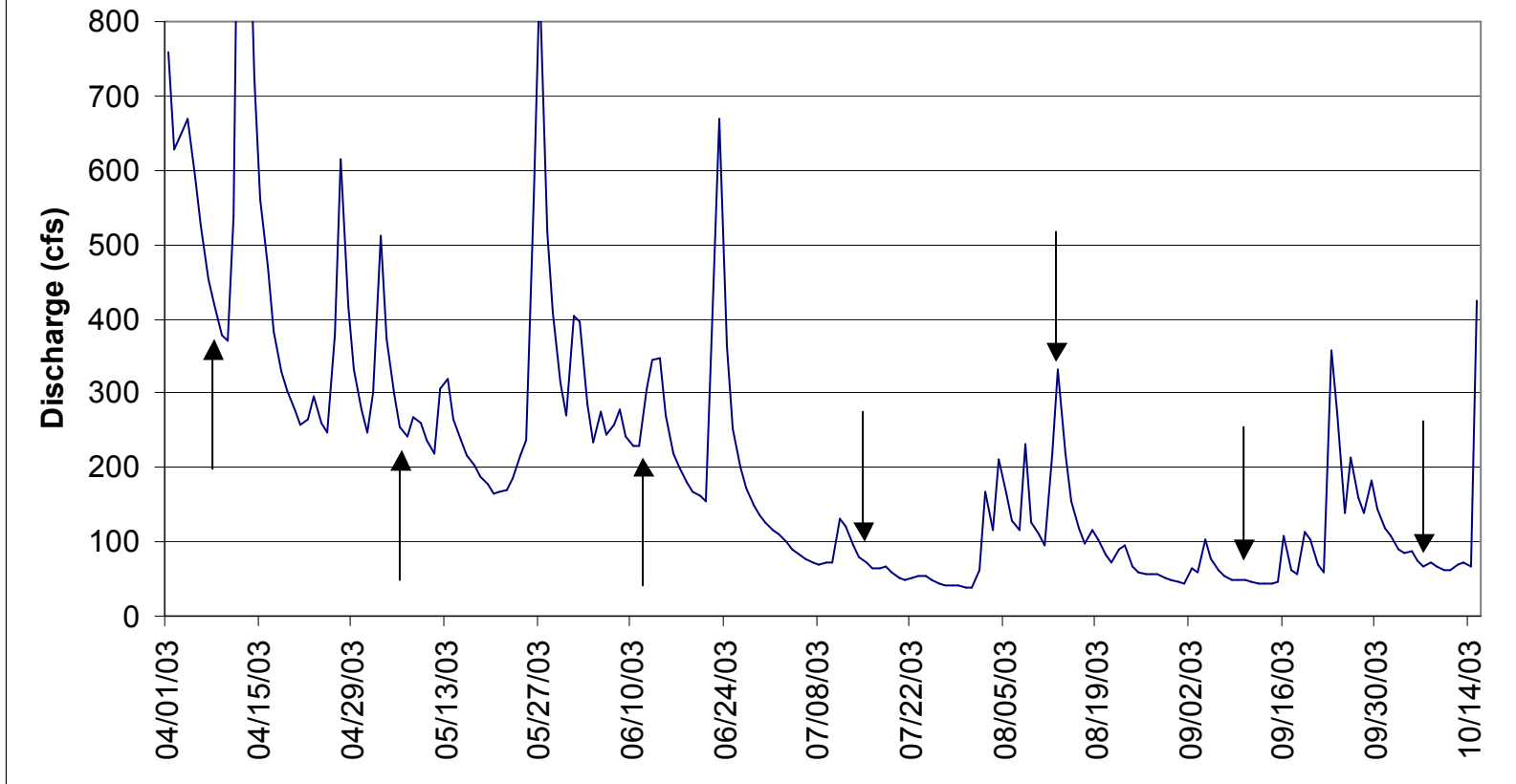
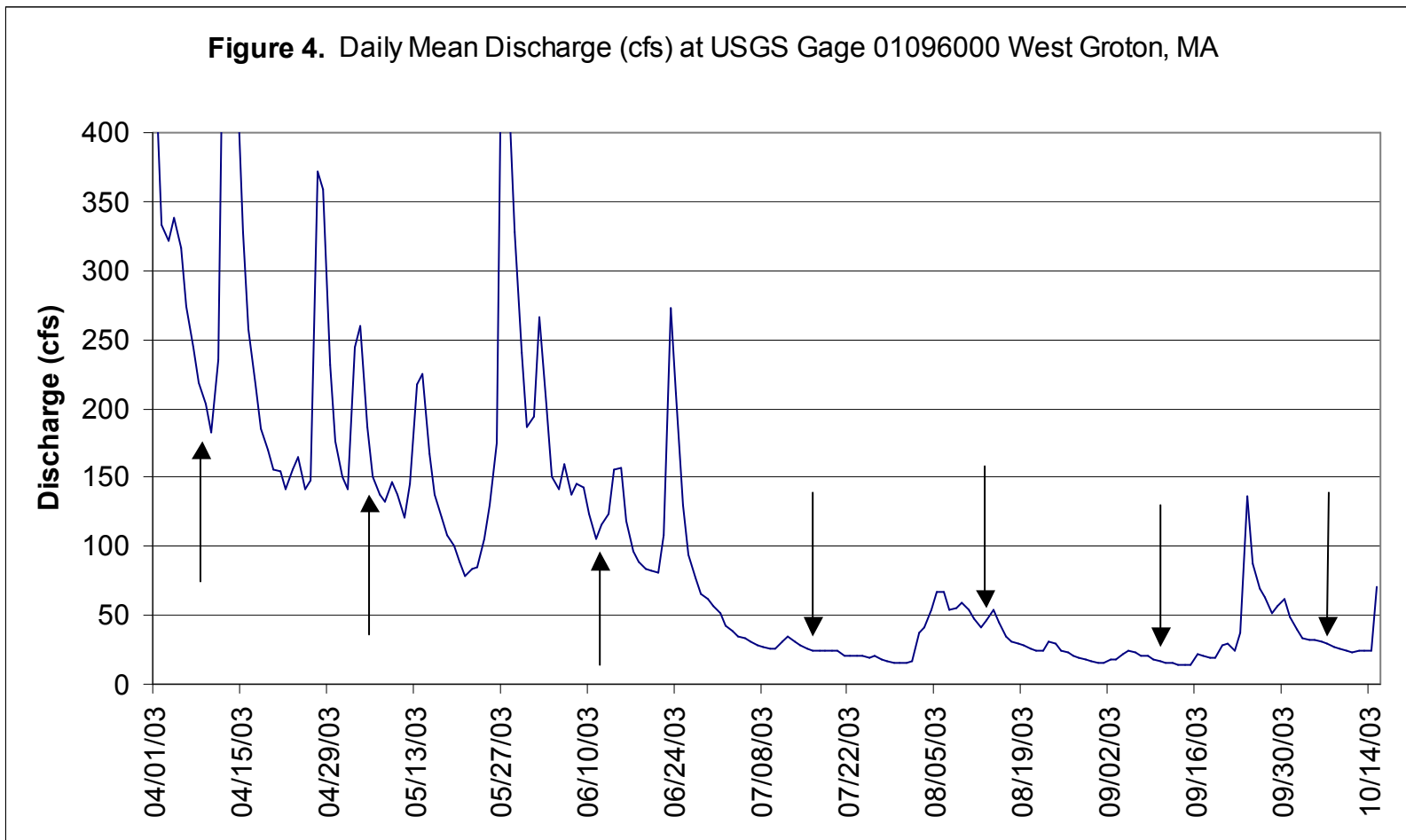


Figure 4. Daily Mean Discharge (cfs) at USGS Gage 01096000 West Groton, MA



QUALITY ASSURANCE/QUALITY CONTROL

Field sheets, chain of custody forms, raw data files, lab reports and other metadata are maintained by DWM in Worcester, MA and data are stored electronically in DWM's water quality database. Detailed information regarding the data validation process is explained in the separate document, *Data Validation Report for Year 2003 Project Data* (MassDEP 2003f). Specific validation criteria used for 2003 data include, but are not limited to: conformance to DWM's Quality Assurance Project Plan (MassDEP 2003a) and standard operating procedures, 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.
- i = Inaccurate readings from multiprobe likely.
- j = 'Estimated' value.
- c = Greater than calibration standard used for pre-calibration, or outside the acceptable range about the calibration standard.
- u = Unstable readings.

Laboratory sample data qualifiers:

- * = Analysis performed by Laboratory OTHER than MassDEP's Wall Experiment Station (WES).
- ** = Missing data.
- = No data.
- ## = Censored data (data that has 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 is 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, lab error, additional steps taken by the lab to deal with matrix complications, lost/unanalyzed samples, and missing data.

RESULTS

Table 3 presents flow data, Table 4 presents *in-situ* multiprobe readings and Table 5 contains bacteria (fecal coliform and *E. coli*), nutrient (ammonia-nitrogen, total phosphorus and dissolved reactive phosphorus), solids (turbidity and total suspended solids) and chlorophyll data. Ambient field blank and duplicate sample data from DWM monitoring are presented in Tables 6 and 7, respectively. Additionally, results from field duplicates are presented in Table 5 as different sample ids (OWMIDs), but with matching sample dates and times.

In 2003 DWM surveys in the Nashua River Watershed were conducted as a cooperative effort with the SMART monitoring program in MassDEP's Central Regional Office. Although the SMART program has been collecting data since 1998, only the 2003 data are presented in this report. In-situ multiprobe data collected by SMART from five stations (NN12, NS19, NM21, NM29A and NT60A) are presented along with DWM data from those stations in Table 4 and are identified with OWMIDs starting with "SM". The SMART program collects river samples for laboratory analysis for water quality parameters in excess of the DWM monitoring plan. The SMART laboratory data are presented for those same five stations in Table 4 just below the DWM data for the respective station. Because of the extra parameters collected by SMART it was not possible to present the data in time sequence as in Table 3. Field blank and duplicate sample data from SMART monitoring are presented in Tables 8 and 9. Additionally, results from field duplicates are presented in Table 5 in the same manner as DWM data described above.

Table 3. MassDEP DWM 2003 Flow Discharge Measurements.

River Name (Station ID)	Date	cfs
Unnamed Tributary to Whitman River (W1097)	08/13/03	17.94
Whitman River - left channel (NT34)	08/13/03	16.73
Whitman River - right channel (NT34)	08/13/03	22.73
Monoosnuc Brook (MON00)	04/09/03	27.66
	05/07/03	19.32
	06/11/03	12.46
Catacoonamug Brook (CAT00)	04/09/03	61.69
	05/07/03	31.45
	06/11/03	30.45
	08/13/03	37.45
	10/08/03	6.88
Nonacoicus Brook (NON00)	05/07/03	31.21
	06/11/03	32.56
	07/15/03	4.38*
	10/08/03	34.92
Mulpus Brook (MPB03)	04/09/03	50.99
	05/07/03	14.24
	06/11/03	22.96
	07/15/03	5.62
Nashua River (NM25)	04/09/03	1174.54
	05/07/03	476.53
	06/11/03	591.37
	07/15/03	358.32
	08/13/03	747.61
James Brook (JAM01)	10/08/03	186.48
	04/09/03	12.93
	05/07/03	7.32
	06/11/03	6.17

*Flow was measured 100 feet upstream from road crossing.

Table 4. MassDEP DWM and SMART 2003 Nashua River Watershed *in-situ* Multiprobe Data.**NORTH NASHUA RIVER (SARIS: 8144650)****Unique ID: W0990 Station: NN03, Mile Point: 19.591**

Description: [Mill #9 bridge, Fitchburg (approximately 0.8 miles downstream from West Fitchburg WWTF (MA0101281) discharge)]

Date	OWMID	Time (24hr)	Depth (m)	Temp (°C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/L)	DO (mg/L)	DO Saturation (%)
06/12/03	81-0250	02:21	0.8	19.0	7.0 uc	244	159	9.3	101
07/15/03	81-0308	11:35	0.5	23.5	7.4 uc	434	282	8.3 u	97 u
07/17/03	81-0325	02:09	0.4	23.3	7.4 uc	524	341	7.7	91
08/14/03	81-0386	02:37	0.8	25.0	7.2 uc	298	194	8.1	98

NORTH NASHUA RIVER (SARIS: 8144650)**Unique ID: W0480 Station: NN09, Mile Point: 14.147**

Description: [Airport Road (Falulah Road on USGS quads), Fitchburg. (approximately 2.2 miles upstream of East Fitchburg WWTF (MA0100986) discharge)]

Date	OWMID	Time (24hr)	Depth (m)	Temp (°C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/L)	DO (mg/L)	DO Saturation (%)
06/12/03	81-0252	02:58	0.1 i	18.2	7.0 c	223	145	9.4	100
07/15/03	81-0310	12:15	0.5	23.4	7.0 c	378	245	8.8 u	104 u
07/17/03	81-0327	02:44	0.4	20.9	6.9 c	422	274	7.5	84
08/14/03	81-0388	03:15	0.4	23.9	7.0 c	282	183	8.1	96

NORTH NASHUA RIVER (SARIS: 8144650)**Unique ID: W0993 Station: NN10A, Mile Point: 11.056**

Description: [approximately 600 feet downstream Route 2, Leominster (approximately 0.9 miles downstream of East Fitchburg WWTF (MA0100986) discharge and 0.7 miles upstream of Leominster WWTP (MA0100617))

Date	OWMID	Time (24hr)	Depth (m)	Temp (°C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/L)	DO (mg/L)	DO Saturation (%)
06/12/03	81-0253	03:18	0.5	18.2	6.9 c	277	180	9.1	97
07/15/03	81-0311	12:38	0.5	23.4	7.4 uc	437	284	9.1 u	107 u
07/17/03	81-0328	03:07	0.4	21.2	7.1 c	513	333	7.5	85
08/14/03	81-0389	03:43	0.7	23.5	7.0 c	309	201	8.0	94

NORTH NASHUA RIVER (SARIS: 8144650)**Unique ID: W0481 Station: NN12, Mile Point: 7.416**

Description: [approximately 200 feet downstream of Route 190 bridge, Lancaster]

Date	OWMID	Time (24hr)	Depth (m)	Temp (°C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/L)	DO (mg/L)	DO Saturation (%)
02/05/03	SM-0673	09:18	0.1 i	0.64	6.5	586	375	13.0 u	93 u
04/09/03	SM-0714	09:11	0.5	3.4	6.3	453	290	12.5	95
06/11/03	SM-0755	09:01	0.3	17.4	6.9 cu	379	243	8.5	90
06/12/03	81-0255	03:54	0.4	18.2	6.9	308	201	8.8	93
07/17/03	81-0330	03:38	0.4	21.2	7.2 c	560	364	7.1	80
08/13/03	SM-0805	09:24	0.4	23.3	6.9 c	303 u	194 u	7.5	89
08/14/03	81-0391	04:16	0.6	23.4	6.9 c	325	211	7.4	86
10/08/03	SM-0848	09:02	0.6	11.9	6.9 c	490	319	10.0	93

Table 4 cont. MassDEP DWM and SMART 2003 Nashua River Watershed *in-situ* Multiprobe Data.

WHITMAN RIVER (SARIS: 8145075)

Unique ID: W0992 Station: NT34, Mile Point: 0.405

Description: [Route 2A, Westminster]

Date	OWMID	Time (24hr)	Depth (m)	Temp (°C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/L)	DO (mg/L)	DO Saturation (%)
06/12/03	81-0249	02:00	0.8 u	18.6	6.3	192	125	8.9	95
07/15/03	81-0307	11:19	1.1	19.7 u	6.1 u	212 u	138 u	7.7 u	84 u
07/17/03	81-0324	01:55	1.2	19.8	6.3	196	128	7.5 u	82 u
08/14/03	81-0385	02:23	1.2	25.1 u	6.4	222 u	144 u	5.3 u	65 u

Unnamed Tributary

Unique ID: W0991 Station: PH00, Mile Point: 0.189

Description: [unnamed tributary to North Nashua River, approximately 1000 feet downstream from Westminster Hill Road, Fitchburg (locally considered extension of Phillips Brook)]

Date	OWMID	Time (24hr)	Depth (m)	Temp (°C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/L)	DO (mg/L)	DO Saturation (%)
06/12/03	81-0251	02:36	0.2	15.8	6.9 c	136	88.0	10.0 u	101 u
07/15/03	81-0309	11:49	0.4	21.2	7.2 uc	205	133	8.5 u	96 u
07/17/03	81-0326	02:23	0.3	20.8	7.2 uc	212	138	8.5	95
08/14/03	81-0387	02:53	0.6	21.7	7.1 uc	159	103	8.7	99

MONOOSNUC BROOK (SARIS: 8144825)

Unique ID: W0994 Station: MONOO, Mile Point: 0.034

Description: [Commercial Road, Leominster]

Date	OWMID	Time (24hr)	Depth (m)	Temp (°C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/L)	DO (mg/L)	DO Saturation (%)
06/12/03	81-0254	03:31	0.1 ui	18.5	6.7	195	127	8.9	95
07/15/03	81-0312	12:53	0.2	21.2	6.8 u	122 u	80.0 u	8.5	96
07/17/03	81-0329	03:18	0.4	19.8	6.7 u	310	201	6.9	76
08/14/03	81-0390	03:55	0.5	23.5	6.7 u	205	133	7.3	86

NASHUA RIVER (SARIS: 8143500)

Unique ID: W0482 Station: NS17, Mile Point: 29.434

Description: [east of Route 110, Clinton (upstream of Clinton WWTP outfall)]

Date	OWMID	Time (24hr)	Depth (m)	Temp (°C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/L)	DO (mg/L)	DO Saturation (%)
06/12/03	81-0256	04:26	0.5	14.0	6.6	158	103	8.2	80
07/15/03	81-0313	13:29	1.0	15.7	7.0 uc	137	89.0	10.1 u	102 u
07/17/03	81-0331	04:07	0.9	15.2	6.9 uc	127	83.0	9.6	96
08/13/03	81-0379	08:32	1.1	15.0	6.5 u	122	79.0	10.0	99
08/14/03	81-0392	04:46	1.0	15.5	6.7 u	119	77.0	9.6	96

Table 4 cont. MassDEP DWM and SMART 2003 Nashua River Watershed *in-situ* Multiprobe Data.

NASHUA RIVER (SARIS: 8143500)

Unique ID: W0681 Station: NS19, Mile Point: 27.597

Description: ["abandoned bridge" (Atherton Bridge) near current Bolton Road bridge, Lancaster.]

Date	OWMID	Time (24hr)	Depth (m)	Temp (°C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/L)	DO (mg/L)	DO Saturation (%)
02/05/03	SM-0674	09:58	0.6	1.3	6.5	254	162	12.4	90
04/09/03	SM-0715	09:59	0.1 i	3.5	6.4	142	90.9	12.6	96
06/11/03	SM-0756	09:44	0.1 i	13.4	6.6 u	157	100	9.7	94
06/12/03	81-0257	04:44	0.6	16.2	6.9	216	141	8.3	85
07/15/03	81-0314	13:42	1.1	16.1	7.0 c	154	100	10.1 u	102 u
07/17/03	81-0332	04:22	1.0 u	15.6	6.9 c	152	99.0	9.6	96
08/13/03	SM-0806	10:07	0.8	16.3	6.7	137	87.6	9.1 u	93 u
08/14/03	81-0393	05:05	1.0	16.6	6.7	135	88.0	9.5	97
10/08/03	SM-0849	09:34	0.6	11.2	7.1 c	237	154	10.1	92

NASHUA RIVER (SARIS: 8143500)

Unique ID: W0484 Station: NM21, Mile Point: 21.441

Description: [near tank bridge at Still River Depot Road canoe launch, Harvard.]

Date	OWMID	Time (24hr)	Depth (m)	Temp (°C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/L)	DO (mg/L)	DO Saturation (%)
02/05/03	Ice Out	10:30j	--	--	--	--	--	--	--
04/09/03	SM-0716	10:51	0.9	3.4	6.3	376	241	11.5	87
06/11/03	SM-0757	10:18	0.6	16.4	6.5	256	164	8.0	83
06/12/03	81-0268	04:48	0.8	17.5	6.8 u	328	213	7.9	83
07/17/03	81-0343	04:59	0.5	17.7	7.0 c	242	157	8.4	88
08/13/03	SM-0807	10:55	0.7	21.5	6.7	240	154	6.5	74
08/14/03	81-0403	05:17	1.0	21.9	6.9 u	240	156	7.2 u	82 u
10/08/03	SM-0850	10:18	1.1	10.6	6.9 c	376	245	8.0 ui	72 ui

NASHUA RIVER (SARIS: 8143500)

Unique ID: W0488 Station: NM25, Mile Point: 13.328

Description: [Route 2A, Shirley/Ayer.]

Date	OWMID	Time (24hr)	Depth (m)	Temp (°C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/L)	DO (mg/L)	DO Saturation (%)
06/12/03	81-0264	03:42	1.3 u	17.3	6.8 u	259	168	8.7 u	91 u
07/15/03	81-0319	15:26	0.6	20.2	7.1 c	248	161	9.5 u	105 u
07/17/03	81-0339	03:45	1.1 u	18.9	7.1 uc	254	165	8.4	90
08/13/03	81-0383	10:33	0.9 u	21.5	6.9 uc	272	177	8.4 u	95 u
08/14/03	81-0399	04:03	1.0 u	22.1	6.9 u	225	146	7.7	88

NASHUA RIVER (SARIS: 8143500)

Unique ID: W0496 Station: INLTPEPPD, Mile Point: 7.836

Description: [Route 111/119, Pepperell/Groton.]

Date	OWMID	Time (24hr)	Depth (m)	Temp (°C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/L)	DO (mg/L)	DO Saturation (%)
07/15/03	81-0322	16:42	0.9	21.3 u	7.0 c	253	164	7.9	89

Table 4 cont. MassDEP DWM and SMART 2003 Nashua River Watershed *in-situ* Multiprobe Data.

NASHUA RIVER (SARIS: 8143500)

Unique ID: W0485 Station: NM29A, Mile Point: 2.917

Description: [approximately 1/2 mile downstream/east from covered bridge at Groton Street near abandoned railroad trestle supports, Pepperell.]

Date	OWMID	Time (24hr)	Depth (m)	Temp (°C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/L)	DO (mg/L)	DO Saturation (%)
02/05/03	SM-0678	11:54	0.6	0.26	6.4	315 u	202 u	11.9	85
04/09/03	SM-0719	12:20	0.6	3.3	6.4	265	170	12.4 u	93 u
06/11/03	SM-0760	11:56	0.7	18.0	6.5	255	163	7.8	83
06/12/03	81-0260	02:26	0.3	18.4	6.8 u	243	158	8.8	93
07/17/03	81-0335	02:26	0.3	21.4	6.9 c	255	166	7.2	82
08/13/03	SM-0810	12:28	0.7	23.5	6.7	245	157	6.7	80
08/14/03	81-0395	02:53	0.5	23.7	6.9 uc	238	155	7.7	91
10/08/03	SM-0853	11:34	0.6	12.1	6.9 uc	300	195	9.8	91

STILL RIVER (SARIS: 8144625)

Unique ID: W0995 Station: STL01, Mile Point: 2.706

Description: [Route 117, Bolton]

Date	OWMID	Time (24hr)	Depth (m)	Temp (°C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/L)	DO (mg/L)	DO Saturation (%)
06/12/03	81-0258	05:09	0.7	17.6	6.5	280	182	0.8 u	8 u
07/15/03	81-0315	14:17	1.3	18.5 u	6.6	269	175	0.4 u	4 u
07/17/03	81-0333	04:41	1.5	17.5	6.6	281	183	1.0	10
08/13/03	81-0380	09:00	0.8	21.9	6.4	197	128	0.7 u	8 u
09/18/03	81-0470	10:57	1.0	15.9	6.5	242	157	0.3 u	3 u

CATACONAMUG BROOK (SARIS: 8144525)

Unique ID: W0996 Station: CAT00, Mile Point: 0.062

Description: [Lovell Road, Shirley]

Date	OWMID	Time (24hr)	Depth (m)	Temp (°C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/L)	DO (mg/L)	DO Saturation (%)
06/12/03	81-0267	04:21	0.9	18.6	7.0 c	253	165	8.6 u	92 u
07/15/03	81-0316	14:49	0.7	19.7 u	6.6	273	178	6.4	70
07/17/03	81-0342	04:30	0.7	20.2	7.0 c	272	177	7.3	81
08/13/03	81-0381	09:31	1.1	24.0	6.9 c	233	151	7.3	87
08/14/03	81-0402	04:43	1.1	24.2	7.0 uc	233	151	7.3	87

NONACOICUS BROOK (SARIS: 8144325)

Unique ID: W1276 Station: NON02, Mile Point: 1.231

Description: [Shirley Street, Ayer]

Date	OWMID	Time (24hr)	Depth (m)	Temp (°C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/L)	DO (mg/L)	DO Saturation (%)
09/18/03	81-0469	10:25	0.5	20.1	7.1 c	280	182	7.4	82

Table 4 cont. MassDEP DWM and SMART 2003 Nashua River Watershed *in-situ* Multiprobe Data.

NONACOICUS BROOK (SARIS: 8144325)

Unique ID: W0997 Station: NON00, Mile Point: 0.022

Description: [MacPherson Road, Ayer]

Date	OWMID	Time (24hr)	Depth (m)	Temp (°C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/L)	DO (mg/L)	DO Saturation (%)
06/12/03	81-0266	04:06	0.6	19.7	6.6 u	272	177	4.6 u	50 u
07/15/03	81-0317	15:11	0.7	23.7	6.9	318	206	5.2	61
07/17/03	81-0341	04:13	0.6	22.1	6.9	329	214	4.5	52
08/13/03	81-0382	10:03	0.7	24.6	6.6	268	174	2.2	26
08/14/03	81-0401	04:29	1.2	25.4	6.7 u	288	187	1.9 u	23 u
09/18/03	81-0468	10:06	0.8	17.6	6.7	338	220	4.3	45

MULPUS BROOK (SARIS: 8144275)

Unique ID: W0998 Station: MPB03, Mile Point: 0.369

Description: [trailer park road directly across from Kittredge Road, Shirley]

Date	OWMID	Time (24hr)	Depth (m)	Temp (°C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/L)	DO (mg/L)	DO Saturation (%)
06/12/03	81-0265	03:52	0.7	19.3	6.9 uc	216	141	8.7	95
07/15/03	81-0318	15:37	0.6	22.6	7.4 uc	257	167	8.5	98
07/17/03	81-0340	03:56	0.3	20.0	7.3 uc	260	169	8.7	95
08/13/03	81-0384	10:47	0.7	23.7	7.2 uc	223	145	8.5 u	101 u
08/14/03	81-0400	04:13	0.5	23.1	7.2 uc	224	145	8.1	95

JAMES BROOK (SARIS: 8143925)

Unique ID: W1000 Station: JAM01, Mile Point: 0.731

Description: [Route 111, Ayer]

Date	OWMID	Time (24hr)	Depth (m)	Temp (°C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/L)	DO (mg/L)	DO Saturation (%)
06/12/03	81-0263	03:28	0.1 i	17.6	7.0 c	303	197	7.5	78
07/15/03	81-0320	15:52	0.2	23.4	7.3 c	359	233	7.4	87
07/17/03	81-0338	03:32	0.1 i	19.3	7.3 c	387	251	7.5	82
08/14/03	81-0398	03:51	0.3	22.2	7.0 uc	294	191	6.1	71

SQUANNACOOK RIVER (SARIS: 8143950)

Unique ID: W0487 Station: NT60A, Mile Point: 4.716

Description: [west of Townsend Road (directly across from Candice Lane), Groton]

Date	OWMID	Time (24hr)	Depth (m)	Temp (°C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/L)	DO (mg/L)	DO Saturation (%)
02/05/03	Ice Out	11:10j	--	--	--	--	--	--	--
04/09/03	SM-0718	11:40	0.4	2.5	5.8	188	120	12.0 u	89 u
06/11/03	SM-0759	11:07	0.7	17.6	6.1	155	99.0	8.0	86
06/12/03	81-0261	02:53	0.1 i	17.2	6.4 u	146	95.0	8.5	88
07/17/03	81-0336	02:54	0.6	20.4	6.5 u	223	145	6.4 u	71 u
08/13/03	SM-0809	11:47	0.6	23.1	6.4	192 u	123 u	6.1	72
08/14/03	81-0396	03:19	1.0	23.2	6.6 u	198	129	6.5	77
10/08/03	SM-0852	11:03	0.9	9.3	6.6 u	205	133	9.8	85

Table 4 cont. MassDEP DWM and SMART 2003 Nashua River Watershed *in-situ* Multiprobe Data.

SQUANNACOOK RIVER (SARIS: 8143950)

Unique ID: W0999 Station: NT61, Mile Point: 2.476

Description: [Route 225, downstream of dam and just upstream of canal confluence, Shirley/Groton]

Date	OWMID	Time (24hr)	Depth (m)	Temp (°C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/L)	DO (mg/L)	DO Saturation (%)
06/12/03	81-0262	03:09	0.1 ui	18.1	6.8	161	105	9.4	100
07/15/03	81-0321	16:12	0.2	23.1	7.0 uc	238	154	8.2 u	95 u
07/17/03	81-0337	03:08	0.1 i	22.0	7.0 c	245	159	8.1	92
08/14/03	81-0397	03:32	0.1 i	24.5	6.9 uc	208	135	7.8	94

NISSITISSIT RIVER (SARIS: 8143575)

Unique ID: W0486 Station: NT68, Mile Point: 0.912

Description: [Mill Street, Pepperell]

Date	OWMID	Time (24hr)	Depth (m)	Temp (°C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/L)	DO (mg/L)	DO Saturation (%)
06/12/03	81-0259	02:11	0.4	18.4	6.9 c	95.0	61.0	9.1	97
07/15/03	81-0323	17:25	0.2	22.7	7.3 c	150	98.0	8.4 u	97 u
07/17/03	81-0334	02:11	0.1 i	20.6	7.2 uc	142	92.0	8.3	93
08/14/03	81-0394	02:41	0.1 i	24.7	6.9 u	135	88.0	7.7	92

Table 5. MassDEP DWM and SMART 2003 Nashua River Watershed Water Quality Data.**NORTH NASHUA RIVER (SARIS: 8144650)**

Unique ID: W0479 Station: NN01, Mile Point: 20.391

Description: [Route 31 bridge, Fitchburg. (slightly upstream of impoundment receiving West Fitchburg WWTF (MA0101281) discharge)]

Date	OWMID	Time 24hr	Fecal Coliform cfu/100mL	<i>E. Coli</i> cfu/100mL	Turbidity NTU	Chlorophyll mg/m3	NH3-N mg/L	TP mg/L	DRP mg/L	TSS mg/L
08/13/03	81-0345	08:30	--	--	--	--	--	0.015	<0.010	--
10/08/03	81-0430	08:07	--	--	--	--	--	0.014	<0.010	--

NORTH NASHUA RIVER (SARIS: 8144650)

Unique ID: W0990 Station: NN03, Mile Point: 19.591

Description: [Mill #9 bridge, Fitchburg (approximately 0.8 miles downstream from West Fitchburg WWTF (MA0101281) discharge)]

Date	OWMID	Time 24hr	Fecal Coliform cfu/100mL	<i>E. Coli</i> cfu/100mL	Turbidity NTU	Chlorophyll mg/m3	NH3-N mg/L	TP mg/L	DRP mg/L	TSS mg/L
04/09/03	81-0141	08:39	--	--	--	--	0.17 b	0.009	--	<1.0
05/06/03	81-0172	08:50	13	<6	--	--	--	--	--	--
05/07/03	81-0197	08:38	--	--	--	--	0.33 b	0.014	--	1.0
06/11/03	81-0224	08:55	77	58	--	--	0.22	0.016	--	1.6 dj
07/16/03	81-0283	08:46	39	6	--	--	1.5	0.015	--	--
07/16/03	81-0284	08:46	26	19	--	--	1.5	0.012	--	--
08/13/03	81-0348	09:11	1800	1400	--	--	0.12	0.019	<0.010	2.8
09/11/03	81-0466	08:37	84	32	--	--	--	--	--	--
10/08/03	81-0433	08:39	--	--	--	--	--	0.015	<0.010	--

NORTH NASHUA RIVER (SARIS: 8144650)

Unique ID: W0480 Station: NN09, Mile Point: 14.147

Description: [Airport Road (Falulah Road on USGS quads), Fitchburg. (approximately 2.2 miles upstream of East Fitchburg WWTF (MA0100986) discharge)]

Date	OWMID	Time 24hr	Fecal Coliform cfu/100mL	<i>E. Coli</i> cfu/100mL	Turbidity NTU	Chlorophyll mg/m3	NH3-N mg/L	TP mg/L	DRP mg/L	TSS mg/L
04/09/03	81-0143	09:46	--	--	0.85	--	0.11 b	0.012	--	<1.0
04/09/03	81-0144	09:46	--	--	0.84	--	0.12 b	0.011	--	<1.0
05/06/03	81-0176	09:28	4800	4000	--	--	--	--	--	--
05/07/03	81-0199	09:06	--	--	1.1	--	0.17 b	0.017	--	1.0
06/11/03	81-0226	09:23	630	570	1.3	--	0.14	0.024	--	3.0 dj
07/16/03	81-0287	09:37	560	500	--	--	0.38	0.022	--	--
08/13/03	81-0350	09:51	9200	5200	6.2	--	0.09	0.065	0.010	13
09/11/03	81-0462	09:11	9200	3600	--	--	--	--	--	--
10/08/03	81-0435	09:11	--	--	--	--	--	0.022	<0.010	--

NORTH NASHUA RIVER (SARIS: 8144650)

Unique ID: W0993 Station: NN10A, Mile Point: 11.056

Description: [approximately 600 feet downstream of Route 2, Leominster (approximately 0.9 miles downstream of East Fitchburg WWTF (MA0100986) discharge and 0.7 miles upstream of Leominster WWTP (MA0100617) discharge)]

Date	OWMID	Time 24hr	Fecal Coliform cfu/100mL	<i>E. Coli</i> cfu/100mL	Turbidity NTU	Chlorophyll mg/m3	NH3-N mg/L	TP mg/L	DRP mg/L	TSS mg/L
04/09/03	81-0146	10:21	--	--	2.9	--	0.32 b	0.097	--	4.0
05/06/03	81-0177	09:45	140	100	--	--	--	--	--	--
05/07/03	81-0200	09:24	--	--	1.4	--	0.38 b	0.036	--	2.6
06/11/03	81-0227	09:40	280	200	1.5	--	0.12	0.048	--	## dj
06/11/03	81-0243	09:40	270	210	1.5	--	0.12	0.048	--	## dj
07/16/03	81-0288	10:06	470	350	--	--	0.10	0.14	--	--
08/13/03	81-0351	10:15	7600	4000	7.0	--	0.07	0.12	0.044	16
08/13/03	81-0352	10:15	9800	2800	6.8	--	0.06	0.12	0.044	15
09/11/03	81-0461	09:25	4400	3000	--	--	--	--	--	--
10/08/03	81-0436	09:42	--	--	--	--	--	0.052	0.015	--
10/08/03	81-0442	09:42	--	--	--	--	--	0.053	0.015	--

Table 5 continued. MassDEP DWM and SMART 2003 Nashua River Watershed Water Quality Data.

NORTH NASHUA RIVER (SARIS: 8144650)

Unique ID: W0481 Station: NN12, Mile Point: 7.416

Description: [approximately 200 feet downstream of Route 190 bridge, Lancaster]

Date	OWMID	Time 24hr	Fecal Coliform cfu/100mL	<i>E. Coli</i> cfu/100mL	Turbidity NTU	Chlorophyll mg/m3	NH3-N mg/L	TP mg/L	DRP mg/L	TSS mg/L
05/06/03	81-0179	10:20	210	140	--	--	--	--	--	--
06/11/03	81-0269	09:00	350	250	--	1.2*	--	--	--	--
07/16/03	81-0290	10:40	380	230	--	--	<0.06	0.11	--	--
08/13/03	81-0404	09:20	5200	2800	--	6.5*	--	--	**	--
09/11/03	81-0412	09:50	690	630	--	--	--	--	--	--

Date	OWMID	Time 24hr	Turbidity NTU	Chloride mg/L	Alkalinity mg/L	Hardness mg/L	NH3-N mg/L	NO3-NO2-N mg/L	TKN mg/L	TN mg/L	TP mg/L	TSS mg/L
02/05/03	SM-0673	09:00	9.0	150	14	40	0.54	1.2	0.92 h	--	0.12	7.2
04/09/03	SM-0714	09:00	1.4	110	10	33	0.33	0.82	0.75	--	0.059	2.1
06/11/03	SM-0755	09:00	1.4	82	16	37	0.15	1.0	0.66 b	--	0.054	5.9 j
08/13/03	SM-0805	09:20	7.3 d	48 d	16	29	0.08	0.56	0.68	--	0.14	19
10/08/03	SM-0848	09:00	2.0	96	30	53	## bdh	3.2 h	--	3.9 bh	0.091	120

Unnamed Tributary

Unique ID: W1097 Station: W1097, Mile Point: 0.651

Description: [unnamed tributary to the Whitman River at Depot Road, Westminster]

Date	OWMID	Time 24hr	Fecal Coliform cfu/100mL	<i>E. Coli</i> cfu/100mL	Turbidity NTU	Chlorophyll mg/m3	NH3-N mg/L	TP mg/L	DRP mg/L	TSS mg/L
08/13/03	81-0347	08:59	--	--	--	--	--	--	0.031	<0.010
10/08/03	81-0432	08:27	--	--	--	--	--	--	0.017	<0.010

WHITMAN RIVER (SARIS: 8145075)

Unique ID: W0992 Station: NT34, Mile Point: 0.405

Description: [Route 2A, Westminster]

Date	OWMID	Time 24hr	Fecal Coliform cfu/100mL	<i>E. Coli</i> cfu/100mL	Turbidity NTU	Chlorophyll mg/m3	NH3-N mg/L	TP mg/L	DRP mg/L	TSS mg/L
04/09/03	81-0140	08:24	--	--	--	--	<0.06b	0.024	--	<1.0
05/06/03	81-0171	08:37	<6	<6	--	--	--	--	--	--
05/07/03	81-0196	08:25	--	--	--	--	0.09 b	0.012	--	<1.0
06/11/03	81-0223	08:45	26	6	--	--	<0.02	0.017	--	1.2 dj
07/16/03	81-0282	08:17	19 e	32 e	--	--	--	--	--	--
08/13/03	81-0346	08:46	110	52	--	--	<0.02	0.016	<0.010	2.1
09/11/03	81-0467	08:27	39	13	--	--	--	--	--	--
10/08/03	81-0431	08:22	--	--	--	--	--	0.015	<0.010	--

FLAG BROOK (SARIS: 8145025)

Unique ID: W1096 Station: FLG02, Mile Point: 0.651

Description: [north of Fifth Massachusetts Turnpike at footbridge approximately 230 feet below Fifth Street Pond outlet, Fitchburg]

Date	OWMID	Time 24hr	Fecal Coliform cfu/100mL	<i>E. Coli</i> cfu/100mL	Turbidity NTU	Chlorophyll mg/m3	NH3-N mg/L	TP mg/L	DRP mg/L	TSS mg/L
08/13/03	81-0344	08:15	--	--	--	--	--	--	0.022	<0.010
10/08/03	81-0429	07:57	--	--	--	--	--	--	0.017	<0.010

Table 5 continued. MassDEP DWM and SMART 2003 Nashua River Watershed Water Quality Data.

Unnamed Tributary

Unique ID: W0991 Station: PH00, Mile Point: 0.189

Description: [unnamed tributary to North Nashua River, approximately 1000 feet downstream from Westminster Hill Road, Fitchburg (locally considered extension of Phillips Brook)]

Date	OWMID	Time 24hr	Fecal Coliform cfu/100mL	<i>E. Coli</i> cfu/100mL	Turbidity NTU	Chlorophyll mg/m3	NH3-N mg/L	TP mg/L	DRP mg/L	TSS mg/L
04/09/03	81-0142	08:51	--	--	--	--	0.09 b	0.008	--	--
05/06/03	81-0173	09:05	13 e	19 e	--	--	--	--	--	--
05/06/03	81-0174	09:05	20	<6	--	--	--	--	--	--
05/07/03	81-0198	08:48	--	--	--	--	0.15 b	0.014	--	--
06/11/03	81-0225	09:05	26 e	32 e	--	--	<0.02	0.023	--	--
07/16/03	81-0286	09:05	190 e	210 e	--	--	--	--	--	--
08/13/03	81-0349	09:26	15000	7400	--	--	<0.02	0.082	--	--
09/11/03	81-0463	08:48	65	32	--	--	--	--	--	--
09/11/03	81-0464	08:48	100	33	--	--	--	--	--	--
10/08/03	81-0434	08:46	--	--	--	--	--	0.023	--	--

MONOOSNUC BROOK (SARIS: 8144825)

Unique ID: W0994 Station: MONOO, Mile Point: 0.034

Description: [Commercial Road, Leominster]

Date	OWMID	Time 24hr	Fecal Coliform cfu/100mL	<i>E. Coli</i> cfu/100mL	Turbidity NTU	Chlorophyll mg/m3	NH3-N mg/L	TP mg/L	DRP mg/L	TSS mg/L
04/09/03	81-0147	10:40	--	--	--	--	<0.02 b	0.008	<0.010	<1.0
04/09/03	81-0148	10:40	--	--	--	--	--	--	<0.010	--
05/06/03	81-0178	09:55	170	130	--	--	--	--	--	--
05/07/03	81-0201	09:35	--	--	1.5	--	0.22bd	0.016	<0.010	5.6
05/07/03	81-0202	09:35	--	--	1.3	--	0.11bd	0.016	<0.010	5.2
06/11/03	81-0228	09:55	920 e	1200 e	--	--	<0.06	0.018	<0.010	1.4 dj
06/11/03	81-0245	09:55	--	--	--	--	--	--	<0.010	--
07/16/03	81-0289	10:17	410 e	510 e	--	--	--	--	--	--
08/13/03	81-0354	10:25	380	280	--	--	0.10	0.028	--	3.2
09/11/03	81-0411	09:34	200	140	--	--	--	--	--	--
10/08/03	81-0437	09:51	--	--	--	--	--	0.013	--	--

NASHUA RIVER (SARIS: 8143500)

Unique ID: W0482 Station: NS17, Mile Point: 29.434

Description: [east of Route 110, Clinton (upstream of Clinton WWTP outfall)]

Date	OWMID	Time 24hr	Fecal Coliform cfu/100mL	<i>E. Coli</i> cfu/100mL	Turbidity NTU	Chlorophyll mg/m3	NH3-N mg/L	TP mg/L	DRP mg/L	TSS mg/L
04/09/03	81-0150	11:00	--	--	--	--	0.08 b	0.011	<0.010	3.5
05/06/03	81-0180	10:45	19	6	--	--	--	--	--	--
05/07/03	81-0204	10:14	--	--	--	--	<0.02 b	0.017	<0.010	1.6
06/11/03	81-0229	10:20	100	84	--	--	<0.02	0.012	<0.010	2.2 dj
07/16/03	81-0291	11:21	52	6	--	--	<0.02	0.012	--	--
08/13/03	81-0355	08:30	220	220	--	--	<0.02	0.012	<0.010	2.7
08/13/03	81-0356	08:30	--	--	--	--	--	--	<0.010	--
09/11/03	81-0413	10:16	130	90	--	--	--	--	--	--
10/08/03	81-0438	10:17	--	--	--	--	--	0.009	<0.010	--

Table 5 continued. MassDEP DWM and SMART 2003 Nashua River Watershed Water Quality Data.

NASHUA RIVER (SARIS: 8143500)

Unique ID: W0681 Station: NS19, Mile Point: 27.597

Description: ["abandoned bridge" (Atherton Bridge) near current Bolton Road bridge, Lancaster.]

Date	OWMID	Time 24hr	Fecal Coliform cfu/100mL	E. Coli cfu/100mL	Turbidity NTU	Chlorophyll mg/m3	NH3-N mg/L	TP mg/L	DRP mg/L	TSS mg/L
04/09/03	81-0166	09:45	--	--	--	--	--	--	0.025m	--
04/09/03	81-0167	09:45	--	--	--	--	--	--	0.025m	--
05/06/03	81-0181	10:55	240	190	--	--	--	--	--	--
05/07/03	81-0205	10:27	--	--	--	--	--	0.064 j	0.012	--
06/11/03	81-0270	09:40	130 e	210 e	--	--	--	--	<0.010	--
06/11/03	81-0271	09:40	180 e	190 e	--	--	--	--	<0.010	--
07/16/03	81-0292	11:40	200	170	--	--	<0.02	0.032	--	--
08/13/03	81-0405	10:00	560 m	300 m	--	--	--	--	<0.010m	--
09/11/03	81-0414	10:24	120	120	--	--	--	--	--	--
10/08/03	81-0439	10:27	--	--	--	--	--	--	0.011	--

Date	OWMID	Time 24hr	Turbidity NTU	Chloride mg/L	Alkalinity mg/L	Hardness mg/L	NH3-N mg/L	NO3-NO2-N mg/L	TKN mg/L	TN mg/L	TP mg/L	TSS mg/L
02/05/03	SM-0674	09:50	2.6	48	18	37	0.08	2.3	0.36 h	--	0.25	4.0
04/09/03	SM-0715	09:45	1.6 m	28 m	8 m	20 m	<0.02 m	0.39 m	0.38 m	--	0.053 m	5.9 m
06/11/03	SM-0756	09:40	0.60	32	8	22	0.07	0.54	0.36 b	--	0.044	9.3 j
08/13/03	SM-0806	10:00	7.4 dm	47 dm	16 m	29 m	<0.02 m	0.38 m	0.30 m	--	0.033 m	3.0 m
10/08/03	SM-0849	09:35	1.6 m	34 m	35 m	34 m	## bdhm	1.7 hm	--	2.2 bhm	0.037 hm	4.2 m

NASHUA RIVER (SARIS: 8143500)

Unique ID: W0484 Station: NM21, Mile Point: 21.441

Description: [near tank bridge at Still River Depot Road canoe launch, Harvard.]

Date	OWMID	Time 24hr	Fecal Coliform cfu/100mL	E. Coli cfu/100mL	Turbidity NTU	Chlorophyll mg/m3	NH3-N mg/L	TP mg/L	DRP mg/L	TSS mg/L
05/06/03	81-0195	11:25	160	45	--	--	--	--	--	--
06/11/03	81-0273	10:25	150	58	--	--	--	--	--	--
07/16/03	81-0306	11:36	190	160	--	--	<0.02	0.053	--	--
08/13/03	81-0406	10:55	23000	12000	--	--	--	--	0.048	--
09/11/03	81-0428	11:05	340	230	--	--	--	--	--	--

Date	OWMID	Time 24hr	Turbidity NTU	Chloride mg/L	Alkalinity mg/L	Hardness mg/L	NH3-N mg/L	NO3-NO2-N mg/L	TKN mg/L	TN mg/L	TP mg/L	TSS mg/L
02/05/03	Ice Out	10:30]	--	--	--	--	--	--	--	--	--	--
04/09/03	SM-0716	10:45	2.5	94	10	29	0.24	0.65	0.67	--	0.065	9.1
04/09/03	SM-0717	10:45	2.5	95	10	30	0.22	0.63	0.70	--	0.064	8.4
06/11/03	SM-0757	10:25	1.4	56	14	31	<0.06 d	0.73	0.55 b	--	0.077	11 j
06/11/03	SM-0758	10:25	1.4	55	14	30	0.10 d	0.73	0.52 b	--	0.079	11 j
08/13/03	SM-0807	10:55	## d	## d	7 d	19 d	0.07 d	0.66	0.63 d	--	0.18	26
08/13/03	SM-0808	10:55	## d	## d	17 d	28 d	0.10 d	0.68	0.78 d	--	0.18	25
10/08/03	SM-0850	10:15	1.8	74	30	46	## bdh	2.4 h	--	3.2 bh	0.057 h	3.2
10/08/03	SM-0851	10:15	2.0	76	29	46	## bdh	2.5 h	--	3.7 bh	0.062 h	2.8

NASHUA RIVER (SARIS: 8143500)

Unique ID: W1001 Station: NM23, Mile Point: 16.118

Description: [Ayer Road/West Main Street, Shirley/Harvard]

Date	OWMID	Time 24hr	Fecal Coliform cfu/100mL	E. Coli cfu/100mL	Turbidity NTU	Chlorophyll mg/m3	NH3-N mg/L	TP mg/L	DRP mg/L	TSS mg/L
04/09/03	81-0153	12:15	--	--	1.9	--	0.18 b	0.049	0.018	2.2
05/07/03	81-0208	11:45	--	--	1.9	--	0.28 b	0.046 j	<0.010	3.2
06/11/03	81-0232	11:33	--	--	2.1	2.0*	0.07	0.070	0.021	6.5 dj
06/11/03	81-0276	11:33	--	--	--	2.0*	--	--	--	--
08/13/03	81-0360	09:45	--	--	--	2.7*	<0.06	0.094	0.044	9.4
08/13/03	81-0361	09:45	--	--	--	2.7*	--	--	--	--
10/08/03	81-0458	11:06	--	--	--	--	--	0.061	0.018	--

Table 5 continued. MassDEP DWM and SMART 2003 Nashua River Watershed Water Quality Data.

NASHUA RIVER (SARIS: 8143500)

Unique ID: W0488 Station: NM25, Mile Point: 13.328

Description: [Route 2A , Shirley/Ayer.]

Date	OWMID	Time 24hr	Fecal Coliform cfu/100mL	<i>E. Coli</i> cfu/100mL	Turbidity NTU	Chlorophyll mg/m3	NH3-N mg/L	TP mg/L	DRP mg/L	TSS mg/L
04/09/03	81-0163	10:42	--	--	1.7	--	0.08 b	0.043	0.012	2.5
05/06/03	81-0191	10:30	110	26	--	--	--	--	--	--
05/07/03	81-0218	10:51	--	--	1.7	--	0.23 b	0.051	0.012	3.8
05/07/03	81-0219	10:51	--	--	1.8	--	0.18 b	0.050	0.013	3.4
06/11/03	81-0240	11:15	170	150	1.7	--	0.08	0.084 h	0.022	7.1 j
06/11/03	81-0247	11:15	170	130	1.7	--	<0.06	0.080 h	0.016	6.8 j
07/16/03	81-0302	10:25	140	110	--	--	<0.02	0.068	--	--
08/13/03	81-0367	10:28	2800	640	4.9	--	0.07	0.13	0.045	13
09/11/03	81-0422	10:20	77	71	--	--	--	--	--	--
10/08/03	81-0455	10:32	--	--	--	--	--	0.080	0.036	--

NASHUA RIVER (SARIS: 8143500)

Unique ID: W0497 Station: GROTSCH, Mile Point: 11.556

Description: [Groton School boat house floating wharf, east of Route 111, Groton.]

Date	OWMID	Time 24hr	Fecal Coliform cfu/100mL	<i>E. Coli</i> cfu/100mL	Turbidity NTU	Chlorophyll mg/m3	NH3-N mg/L	TP mg/L	DRP mg/L	TSS mg/L
04/09/03	81-0161	10:11	--	--	--	--	--	0.030	<0.010	--
05/07/03	81-0216	10:30	--	--	--	--	--	0.042	0.011	--
06/11/03	81-0238	10:57	--	--	--	1.8*	--	0.059	0.018	--
06/11/03	81-0278	10:57	--	--	--	1.9*	--	--	--	--
08/13/03	81-0373	10:21	--	--	--	2.2*	--	0.087	0.032	--
08/13/03	81-0374	10:21	--	--	--	2.7*	--	--	0.030	--
10/08/03	81-0453	10:08	--	--	--	--	--	0.059	0.022	--

NASHUA RIVER (SARIS: 8143500)

Unique ID: W0496 Station: INLTPEPPD, Mile Point: 7.836

Description: [Route 111/119, Pepperell/Groton.]

Date	OWMID	Time 24hr	Fecal Coliform cfu/100mL	<i>E. Coli</i> cfu/100mL	Turbidity NTU	Chlorophyll mg/m3	NH3-N mg/L	TP mg/L	DRP mg/L	TSS mg/L
04/09/03	81-0157	09:25	--	--	1.3	--	<0.06 b	0.030	0.011	1.9
04/09/03	81-0158	09:25	--	--	1.5	--	0.07 b	0.031	0.010	1.9
05/06/03	81-0187	09:30	65	52	--	--	--	--	--	--
05/07/03	81-0213	09:35	--	--	1.6	--	<0.06 b	0.044	0.020	2.9
06/11/03	81-0460	09:50j	--	--	--	2.1*	--	--	--	--
06/11/03	81-0236	10:07	100	97	2.3	1.8*	<0.06	0.060	0.020	4.9 j
07/16/03	81-0298	09:25	100	71	--	--	<0.02	0.059	--	--
08/13/03	81-0371	09:39	260	150	2.4	1.5*	<0.06	0.080	0.033	4.8
09/11/03	81-0418	09:32	45	13	--	--	--	--	--	--
10/08/03	81-0448	09:15	--	--	--	--	--	0.055	0.017	--

NASHUA RIVER (SARIS: 8143500)

Unique ID: W0485 Station: NM29A, Mile Point: 2.917

Description: [approximately 1/2 mile downstream/east from covered bridge at Groton Street near abandoned railroad trestle supports, Pepperell.]

Date	OWMID	Time 24hr	Fecal Coliform cfu/100mL	<i>E. Coli</i> cfu/100mL	Turbidity NTU	Chlorophyll mg/m3	NH3-N mg/L	TP mg/L	DRP mg/L	TSS mg/L
04/09/03	81-0170	12:15	--	--	--	--	--	--	0.011	--
05/06/03	81-0186	09:10	84	19	--	--	--	--	--	--
05/07/03	81-0212	09:17	--	--	--	--	--	0.046	0.012	--
06/11/03	81-0275	11:50	65	39	--	2.4*	--	--	0.021	--
06/11/03	81-0280	11:50	--	--	--	1.9*	--	--	--	--
07/16/03	81-0297	09:05	45	39	--	--	<0.02	0.056	--	--
08/13/03	81-0408	12:25	2800 d	880	--	4.4*	--	--	0.033	--
08/13/03	81-0409	12:25	1300 d	920	--	3.8*	--	--	0.028	--
09/11/03	81-0417	09:12	32	32	--	--	--	--	--	--
10/08/03	81-0447	08:57	--	--	--	--	--	--	0.019	--

Table 5 continued. MassDEP DWM and SMART 2003 Nashua River Watershed Water Quality Data.

Station continued from previous page.

NASHUA RIVER (SARIS: 8143500)

Unique ID: W0485 Station: NM29A, Mile Point: 2.917

Date	OWMID	Time 24hr	Turbidity NTU	Chloride mg/L	Alkalinity mg/L	Hardness mg/L	NH3-N mg/L	NO3-NO2-N mg/L	TKN mg/L	TN mg/L	TP mg/L	TSS mg/L
02/05/03	SM-0676	11:45	1.5	70	18	40	0.27	1.2	0.50 h	--	0.080	1.6
02/05/03	SM-0678	11:45	1.7	68	18	40	0.24	1.3	0.52 h	--	0.080	1.7
04/09/03	SM-0719	12:15	1.6	61	10	28	<0.06	0.50	0.37	--	0.045	3.4
06/11/03	SM-0760	11:50	1.6	56	18	33	<0.02	0.51	0.56 b	--	0.064	3.3 j
08/13/03	SM-0810	12:25	2.4 d	46 d	19	31	<0.02	0.54	0.48	--	0.098	19
10/08/03	SM-0853	11:30	1.9	60	25	41	## bdh	0.96 h	--	1.6 bh	0.054 h	1.1

STILL RIVER (SARIS: 8144625)

Unique ID: W0995 Station: STL01, Mile Point: 2.706

Description: [Route 117, Bolton]

Date	OWMID	Time 24hr	Fecal Coliform cfu/100mL	E. Coli cfu/100mL	Turbidity NTU	Chlorophyll mg/m3	NH3-N mg/L	TP mg/L	DRP mg/L	TSS mg/L
04/09/03	81-0151	11:20	--	--	--	--	<0.02 b	0.018	<0.010	<1.0
05/06/03	81-0182	11:28	90	71	--	--	--	--	--	--
05/07/03	81-0206	11:50	--	--	--	--	0.09 b	0.041 j	<0.010	1.6
06/11/03	81-0230	10:45	390	330	--	--	<0.02	0.11	0.047	3.8 dj
07/16/03	81-0293	11:59	130 em	160 em	--	--	--	--	--	--
08/13/03	81-0358	08:58	3800	3800	--	--	<0.06	0.18	--	12
09/11/03	81-0415	10:41	830	460	--	--	--	--	--	--
10/08/03	81-0440	10:43	--	--	--	--	--	0.051	--	--

CATACONAMUG BROOK (SARIS: 8144525)

Unique ID: W0996 Station: CAT00, Mile Point: 0.062

Description: [Lovell Road, Shirley]

Date	OWMID	Time 24hr	Fecal Coliform cfu/100mL	E. Coli cfu/100mL	Turbidity NTU	Chlorophyll mg/m3	NH3-N mg/L	TP mg/L	DRP mg/L	TSS mg/L
04/09/03	81-0152	11:55	--	--	--	--	<0.02 b	0.010	<0.010	<1.0
05/06/03	81-0194	11:05	84 e	90 e	--	--	--	--	--	--
05/07/03	81-0207	11:18	--	--	--	--	0.10 b	0.020 j	<0.010	1.6
06/11/03	81-0231	11:16	97 e	180 e	--	--	<0.06	0.022	<0.010	3.6 dj
07/16/03	81-0305	11:07	90	6	--	--	--	--	--	--
08/13/03	81-0359	09:26	140	71	--	--	0.07	0.026	--	6.1
09/11/03	81-0427	10:58	150	90	--	--	--	--	--	--
10/08/03	81-0441	11:13j	--	--	--	--	--	0.016	--	--

NONACOICUS BROOK (SARIS: 8144325)

Unique ID: W0997 Station: NON00, Mile Point: 0.022

Description: [MacPherson Road, Ayer]

Date	OWMID	Time 24hr	Fecal Coliform cfu/100mL	E. Coli cfu/100mL	Turbidity NTU	Chlorophyll mg/m3	NH3-N mg/L	TP mg/L	DRP mg/L	TSS mg/L
04/09/03	81-0165	11:10	--	--	--	--	<0.06 b	0.011	<0.010	3.5
05/06/03	81-0193	10:51	20 e	40 e	--	--	--	--	--	--
05/07/03	81-0222	11:14	--	--	--	--	0.11 b	0.024	<0.010	3.4
06/11/03	81-0241	11:30	52	52	--	--	<0.02	0.032	<0.010	3.5 j
07/16/03	81-0304	10:53	160	130	--	--	<0.02	0.051	--	--
08/13/03	81-0363	10:00	65	32	--	--	<0.02	0.044	--	2.8
09/11/03	81-0426	10:43	440	320	--	--	--	--	--	--
10/08/03	81-0457	10:53	--	--	--	--	--	0.022	--	--

Table 5 continued. MassDEP DWM and SMART 2003 Nashua River Watershed Water Quality Data.

MULPUS BROOK (SARIS: 8144275)

Unique ID: W0998 Station: MPB03, Mile Point: 0.369

Description: [trailer park road directly across from Kittredge Road, Shirley]

Date	OWMID	Time 24hr	Fecal Coliform cfu/100mL	<i>E. Coli</i> cfu/100mL	Turbidity NTU	Chlorophyll mg/m3	NH3-N mg/L	TP mg/L	DRP mg/L	TSS mg/L
04/09/03	81-0164	10:52	--	--	--	--	0.07 b	0.010	<0.010	<1.0
05/06/03	81-0192	10:38	19	13	--	--	--	--	--	--
05/07/03	81-0221	11:02	--	--	--	--	0.23 b	0.018	<0.010	1.5
06/11/03	81-0242	11:45	87	80	--	--	<0.02	0.026	<0.010	2.1 j
07/16/03	81-0303	10:36	120	80	--	--	<0.02	0.023	--	--
08/13/03	81-0364	10:45	60	53	--	--	0.06	0.032	--	2.5
08/13/03	81-0365	10:45	52	32	--	--	<0.02	0.032	--	2.2
09/11/03	81-0423	10:32	19	19	--	--	--	--	--	--
09/11/03	81-0424	10:32	40	13	--	--	--	--	--	--
10/08/03	81-0456	10:43	--	--	--	--	--	0.015	--	--

JAMES BROOK (SARIS: 8143925)

Unique ID: W1000 Station: JAM01, Mile Point: 0.731

Description: [Route 111, Ayer]

Date	OWMID	Time 24hr	Fecal Coliform cfu/100mL	<i>E. Coli</i> cfu/100mL	Turbidity NTU	Chlorophyll mg/m3	NH3-N mg/L	TP mg/L	DRP mg/L	TSS mg/L
04/09/03	81-0162	10:27	--	--	--	--	<0.02 b	0.011	<0.010	1.2
05/06/03	81-0190	10:20	65 e	77 e	--	--	--	--	--	--
05/07/03	81-0217	10:42	--	--	--	--	<0.02 b	0.023	<0.010	2.5
06/11/03	81-0239	11:00	58	52	--	--	<0.02	0.035	<0.010	4.2 j
07/16/03	81-0301	10:10	130	130	--	--	--	--	--	--
08/13/03	81-0376	10:42	250	130	--	--	<0.02	0.060	--	6.7
08/13/03	81-0377	10:42	290	97	--	--	<0.06	0.064	--	6.2
09/11/03	81-0421	10:10	65	58	--	--	--	--	--	--
10/08/03	81-0454	10:21	--	--	--	--	--	0.021	--	--

SQUANNACOOK RIVER (SARIS: 8143950)

Unique ID: W1002 Station: SQ10, Mile Point: 14.286

Description: [Turnpike Road, Townsend]

Date	OWMID	Time 24hr	Fecal Coliform cfu/100mL	<i>E. Coli</i> cfu/100mL	Turbidity NTU	Chlorophyll mg/m3	NH3-N mg/L	TP mg/L	DRP mg/L	TSS mg/L
04/09/03	81-0154	08:23	--	--	--	--	--	0.010	<0.010	--
05/07/03	81-0209	08:39	--	--	--	--	--	0.019	<0.010	--
06/11/03	81-0233	08:58	--	--	--	--	--	0.017	<0.010	--
08/13/03	81-0368	08:39	--	--	--	--	--	0.035	<0.010	--
10/08/03	81-0444	08:10	--	--	--	--	--	0.018	<0.010	--

SQUANNACOOK RIVER (SARIS: 8143950)

Unique ID: W1003 Station: SQ05, Mile Point: 8.737

Description: [South Street, Townsend]

Date	OWMID	Time 24hr	Fecal Coliform cfu/100mL	<i>E. Coli</i> cfu/100mL	Turbidity NTU	Chlorophyll mg/m3	NH3-N mg/L	TP mg/L	DRP mg/L	TSS mg/L
04/09/03	81-0155	08:40	--	--	--	--	--	0.011	<0.010	--
05/07/03	81-0210	08:53	--	--	--	--	--	0.023	<0.010	--
06/11/03	81-0234	09:11	--	--	--	--	--	0.024	<0.010	--
08/13/03	81-0369	08:57	--	--	--	--	--	0.033	<0.010	--
10/08/03	81-0445	08:30	--	--	--	--	--	0.022	<0.010	--

Table 5 continued. MassDEP DWM and SMART 2003 Nashua River Watershed Water Quality Data.

SQUANNACOOK RIVER (SARIS: 8143950)

Unique ID: W0487 Station: NT60A, Mile Point: 4.716

Description: [west of Townsend Road (directly across from Candice Lane), Groton]

Date	OWMID	Time 24hr	Fecal Coliform cfu/100mL	<i>E. Coli</i> cfu/100mL	Turbidity NTU	Chlorophyll mg/m3	NH3-N mg/L	TP mg/L	DRP mg/L	TSS mg/L
04/09/03	81-0169	11:30	--	--	--	--	--	--	<0.010	--
05/06/03	81-0188	09:50	13 e	26 e	--	--	--	--	--	--
05/07/03	81-0214	09:51	--	--	--	--	--	0.022	<0.010	--
06/11/03	81-0274	11:05	58 e	71 e	--	--	--	--	<0.010	--
07/16/03	81-0299	09:41	120 e	130 e	--	--	<0.02	0.027	--	--
08/13/03	81-0407	11:45	130	90	--	--	--	--	<0.010	--
09/11/03	81-0419	09:47	100	100	--	--	--	--	--	--
10/08/03	81-0449	09:32	--	--	--	--	--	--	<0.010	--

Date	OWMID	Time 24hr	Turbidity NTU	Chloride mg/L	Alkalinity mg/L	Hardness mg/L	NH3-N mg/L	NO3-NO2-N mg/L	TKN mg/L	TN mg/L	TP mg/L	TSS mg/L
02/05/03	Ice Out	11:10j	--	--	--	--	--	--	--	--	--	--
04/09/03	SM-0718	11:30	0.57	46	3	15	<0.02	0.38	0.22	--	0.014	1.2
06/11/03	SM-0759	11:05	1.4	36	5	15	<0.02	0.25	0.35 b	--	0.021	2.4 j
08/13/03	SM-0809	11:45	2.1 d	43 d	9	18	<0.02	0.33	0.37	--	0.038	9.7
10/08/03	SM-0852	11:05	1.7	47	9	21	## bdh	0.52 h	--	1.0 bh	0.043 h	2.8

SQUANNACOOK RIVER (SARIS: 8143950)

Unique ID: W0999 Station: NT61, Mile Point: 2.476

Description: [Route 225, downstream of dam and just upstream of canal confluence, Shirley/Groton]

Date	OWMID	Time 24hr	Fecal Coliform cfu/100mL	<i>E. Coli</i> cfu/100mL	Turbidity NTU	Chlorophyll mg/m3	NH3-N mg/L	TP mg/L	DRP mg/L	TSS mg/L
04/09/03	81-0160	09:47	--	--	--	--	0.08 b	0.008	<0.010	<1.0
05/06/03	81-0189	10:00	26 e	52 e	--	--	--	--	--	--
05/07/03	81-0215	10:10	--	--	--	--	<0.02 b	0.020	<0.010	2.0
06/11/03	81-0237	10:24	60	33	--	--	<0.02	0.021	<0.010	1.8 j
07/16/03	81-0300	09:54	19	13	--	--	<0.02	0.016	--	--
08/13/03	81-0372	09:59	58	32	--	--	0.09	0.027	<0.010	1.5
09/11/03	81-0420	09:50	26	26	--	--	--	--	--	--
10/08/03	81-0450	09:43	--	--	--	--	--	0.031	<0.010	--
10/08/03	81-0451	09:43	--	--	--	--	--	0.033	<0.010	--

NISSITISSIT RIVER (SARIS: 8143575)

Unique ID: W0486 Station: NT68, Mile Point: 0.912

Description: [Mill Street, Pepperell]

Date	OWMID	Time 24hr	Fecal Coliform cfu/100mL	<i>E. Coli</i> cfu/100mL	Turbidity NTU	Chlorophyll mg/m3	NH3-N mg/L	TP mg/L	DRP mg/L	TSS mg/L
04/09/03	81-0156	09:00	--	--	--	--	0.09 b	0.008	--	--
05/06/03	81-0183	09:00	26 e	39 e	--	--	--	--	--	--
05/06/03	81-0184	09:00	47	40	--	--	--	--	--	--
05/07/03	81-0211	09:07	--	--	--	--	0.20 b	0.011	--	--
06/11/03	81-0235	09:32	90	84	--	--	<0.02	0.016	--	--
07/16/03	81-0294	08:50	71	26	--	--	<0.02	0.018	--	--
07/16/03	81-0295	08:50	77	32	--	--	<0.02	0.017	--	--
08/13/03	81-0370	09:15	190	110	--	--	<0.02	0.029	--	--
09/11/03	81-0416	09:05	71	39	--	--	--	--	--	--
10/08/03	81-0446	08:50	--	--	--	--	--	0.013	--	--

Table 6. MassDEP DWM 2003 Nashua River Watershed Field Blank Results.

Date	OWMID	QAQC	Time (24hr)	Fecal (cfu/100mL)	E. Coli (cfu/100mL)	Turbidity (NTU)	Chlorophyll (mg/m ³)	NH3-N (mg/L)	TP (mg/L)	DRP (mg/L)	TSS (mg/L)
04/09/03	81-0145	Blank	09:46j	--	--	<0.10	--	0.07 b	<0.005	--	<1.0
04/09/03	81-0149	Blank	10:40j	--	--	--	--	--	--	<0.010	--
04/09/03	81-0159	Blank	09:25j	--	--	<0.10	--	0.08 b	<0.005	<0.010	<1.0
04/09/03	81-0168	Blank	09:35j	--	--	--	--	--	--	<0.010	--
05/06/03	81-0175	Blank	09:00j	<6	<6	--	--	--	--	--	--
05/06/03	81-0185	Blank	09:00j	<6	<6	--	--	--	--	--	--
05/07/03	81-0203	Blank	09:38j	--	--	<0.10	--	0.09 b	<0.005	<0.010	<1.0
05/07/03	81-0220	Blank	10:50j	--	--	<0.10	--	0.11 b	<0.005	<0.010	<1.0
06/11/03	81-0244	Blank	09:38j	<6	<6	<0.10	--	<0.02	<0.005	--	<1.0 dj
06/11/03	81-0246	Blank	09:50j	--	--	--	--	--	--	<0.010	--
06/11/03	81-0248	Blank	11:15j	<6	<6	<0.10	--	<0.02	<0.005	<0.010	<1.0 j
06/11/03	81-0272	Blank	09:30j	<6	<6	--	--	--	--	<0.010	--
06/11/03	81-0277	Blank	11:30j	--	--	--	<1.0*	--	--	--	--
06/11/03	81-0279	Blank	10:40j	--	--	--	<1.0*	--	--	--	--
06/11/03	81-0281	Blank	11:40j	--	--	--	<1.0*	--	--	--	--
07/16/03	81-0285	Blank	08:39j	<6	<6	--	--	<0.02	<0.005	--	--
07/16/03	81-0296	Blank	08:50j	<6	<6	--	--	<0.02	<0.005	--	--
08/13/03	81-0353	Blank	10:15j	<6	<6	0.11 b	--	<0.02	<0.005	<0.010	<1.0
08/13/03	81-0357	Blank	08:32j	--	--	--	--	--	--	<0.010	--
08/13/03	81-0362	Blank	09:45j	--	--	--	<1.0*	--	--	--	--
08/13/03	81-0366	Blank	10:49j	<6	<6	--	--	<0.02	<0.005	--	<1.0
08/13/03	81-0375	Blank	10:19j	--	--	--	<1.0*	--	--	<0.010	--
08/13/03	81-0378	Blank	10:40j	<6	<6	--	--	<0.02	<0.005	--	<1.0
08/13/03	81-0410	Blank	12:15j	<6	<6	--	<1.0*	--	--	<0.010	--
09/11/03	81-0425	Blank	10:30j	<6	<6	--	--	--	--	--	--
09/11/03	81-0465	Blank	08:48j	<6	<6	--	--	--	--	--	--
10/08/03	81-0443	Blank	09:42j	--	--	--	--	--	<0.005	<0.010	--
10/08/03	81-0452	Blank	09:40j	--	--	--	--	--	<0.005	<0.010	--

Table 7. MassDEP DWM 2003 Nashua River Watershed Field Duplicate Results.

Unnamed Tributary

Unique ID: W0991 Station: PH00, Mile Point: 0.189

Description: [unnamed tributary to North Nashua River, approximately 1000 feet downstream from Westminster Hill Road, Fitchburg (locally considered extension of Phillips Brook)]

Date	OWMID	QAQC	Time (24hr)	Log 10 Fecal Coliform (cfu/100mL)	Log 10 E. coli (cfu/100mL)	Turbidity (NTU)	Chlorophyll (mg/m3)	NH3-N (mg/L)	TP (mg/L)	DRP (mg/L)	TSS (mg/L)
05/06/03	81-0173	81-0174	09:05	1.114 e	1.279 e	--	--	--	--	--	--
05/06/03	81-0174	81-0173	09:05	1.301	0.778	--	--	--	--	--	--
<i>Relative Percent Difference</i>				15.5%	48.7%	--	--	--	--	--	--
09/11/03	81-0463	81-0464	08:48	1.813	1.505	--	--	--	--	--	--
09/11/03	81-0464	81-0463	08:48	2.000	1.519	--	--	--	--	--	--
<i>Relative Percent Difference</i>				9.8%	0.9%	--	--	--	--	--	--

NASHUA RIVER (SARIS: 8143500)

Unique ID: W0482 Station: NS17, Mile Point: 29.434

Description: [east of Route 110, Clinton (upstream of Clinton WWTP outfall)]

Date	OWMID	QAQC	Time (24hr)	Log 10 Fecal Coliform (cfu/100mL)	Log 10 E. coli (cfu/100mL)	Turbidity (NTU)	Chlorophyll (mg/m3)	NH3-N (mg/L)	TP (mg/L)	DRP (mg/L)	TSS (mg/L)
08/13/03	81-0355	81-0356	08:30	2.342	2.342	--	--	<0.02	0.012	<0.010	2.7
08/13/03	81-0356	81-0355	08:30	--	--	--	--	--	--	<0.010	--
<i>Relative Percent Difference</i>				--	--	--	--	--	--	0.0%	--

NASHUA RIVER (SARIS: 8143500)

Unique ID: W0681 Station: NS19, Mile Point: 27.597

Description: ["abandoned bridge" (Atherton Bridge) near current Bolton Road bridge, Lancaster.]

Date	OWMID	QAQC	Time (24hr)	Log 10 Fecal Coliform (cfu/100mL)	Log 10 E. coli (cfu/100mL)	Turbidity (NTU)	Chlorophyll (mg/m3)	NH3-N (mg/L)	TP (mg/L)	DRP (mg/L)	TSS (mg/L)
04/09/03	81-0166	81-0167	09:45	--	--	--	--	--	--	0.025 m	--
04/09/03	81-0167	81-0166	09:45	--	--	--	--	--	--	0.025 m	--
<i>Relative Percent Difference</i>				--	--	--	--	--	--	0.0%	--
06/11/03	81-0270	81-0271	09:40	2.114 e	2.322 e	--	--	--	--	<0.010	--
06/11/03	81-0271	81-0270	09:40	2.255 e	2.279 e	--	--	--	--	<0.010	--
<i>Relative Percent Difference</i>				6.5%	1.9%	--	--	--	--	0.0%	--

NASHUA RIVER (SARIS: 8143500)

Unique ID: W1001 Station: NM23, Mile Point: 16.118

Description: [Ayer Road/West Main Street, Shirley/Harvard]

Date	OWMID	QAQC	Time (24hr)	Log 10 Fecal Coliform (cfu/100mL)	Log 10 E. coli (cfu/100mL)	Turbidity (NTU)	Chlorophyll (mg/m3)	NH3-N (mg/L)	TP (mg/L)	DRP (mg/L)	TSS (mg/L)
06/11/03	81-0232	81-0276	11:33	--	--	2.1	2.0*	0.07	0.070	0.021	6.5 dj
06/11/03	81-0276	81-0232	11:33	--	--	--	2.0*	--	--	--	--
<i>Relative Percent Difference</i>				--	--	--	0.0%	--	--	--	--
08/13/03	81-0360	81-0361	09:45	--	--	--	2.7*	<0.06	0.094	0.044	9.4
08/13/03	81-0361	81-0360	09:45	--	--	--	2.7*	--	--	--	--
<i>Relative Percent Difference</i>				--	--	--	0.0%	--	--	--	--

Table 7 continued. MassDEP DWM 2003 Nashua River Watershed Field Duplicate Results.

NASHUA RIVER (SARIS: 8143500)

Unique ID: W0488 Station: NM25, Mile Point: 13.328

Description: [Route 2A , Shirley/Ayer.]

Date	OWMID	QAQC	Time (24hr)	Log 10 Fecal Coliform (cfu/100mL)	Log 10 E. coli (cfu/100mL)	Turbidity (NTU)	Chlorophyll (mg/m3)	NH3-N (mg/L)	TP (mg/L)	DRP (mg/L)	TSS (mg/L)
05/07/03	81-0218	81-0219	10:51	--	--	1.7	--	0.23 b	0.051	0.012	3.8
05/07/03	81-0219	81-0218	10:51	--	--	1.8	--	0.18 b	0.050	0.013	3.4
<i>Relative Percent Difference</i>						5.7%	--	24.4%	2.0%	8.0%	11.1%
06/11/03	81-0240	81-0247	11:15	2.230	2.176	1.7	--	0.08	0.084 h	0.022	7.1 j
06/11/03	81-0247	81-0240	11:15	2.230	2.114	1.7	--	<0.06	0.080 h	0.016	6.8 j
<i>Relative Percent Difference</i>				0.0%	2.9%	0.0%	--	28.6%	4.9%	31.6%	4.3%

NASHUA RIVER (SARIS: 8143500)

Unique ID: W0497 Station: GROTSCH, Mile Point: 11.556

Description: [Groton School boat house floating warf, east of Route 111, Groton.]

Date	OWMID	QAQC	Time (24hr)	Log 10 Fecal Coliform (cfu/100mL)	Log 10 E. coli (cfu/100mL)	Turbidity (NTU)	Chlorophyll (mg/m3)	NH3-N (mg/L)	TP (mg/L)	DRP (mg/L)	TSS (mg/L)
06/11/03	81-0238	81-0278	10:57	--	--	--	1.8*	--	0.059	0.018	--
06/11/03	81-0278	81-0238	10:57	--	--	--	1.9*	--	--	--	--
<i>Relative Percent Difference</i>							5.4%	--	--	--	--
08/13/03	81-0373	81-0374	10:21	--	--	--	2.2*	--	0.087	0.032	--
08/13/03	81-0374	81-0373	10:21	--	--	--	2.7*	--	--	0.030	--
<i>Relative Percent Difference</i>							20.4%	--	--	6.5%	--

NASHUA RIVER (SARIS: 8143500)

Unique ID: W0496 Station: INLTPEPPD, Mile Point: 7.836

Description: [Route 111/119, Pepperell/Groton.]

Date	OWMID	QAQC	Time (24hr)	Log 10 Fecal Coliform (cfu/100mL)	Log 10 E. coli (cfu/100mL)	Turbidity (NTU)	Chlorophyll (mg/m3)	NH3-N (mg/L)	TP (mg/L)	DRP (mg/L)	TSS (mg/L)
04/09/03	81-0157	81-0158	09:25	--	--	1.3	--	<0.06 b	0.030	0.011	1.9
04/09/03	81-0158	81-0157	09:25	--	--	1.5	--	0.07 b	0.031	0.010	1.9
<i>Relative Percent Difference</i>						14.3%	--	15.4%	3.3%	9.5%	0.0%

NASHUA RIVER (SARIS: 8143500)

Unique ID: W0485 Station: NM29A, Mile Point: 2.917

Description: [approximately 1/2 mile downstream/east from covered bridge at Groton Street near abandoned railroad trestle supports, Pepperell.]

Date	OWMID	QAQC	Time (24hr)	Log 10 Fecal Coliform (cfu/100mL)	Log 10 E. coli (cfu/100mL)	Turbidity (NTU)	Chlorophyll (mg/m3)	NH3-N (mg/L)	TP (mg/L)	DRP (mg/L)	TSS (mg/L)
08/13/03	81-0408	81-0409	12:25	3.447 d	2.944	--	4.4*	--	--	0.033	--
08/13/03	81-0409	81-0408	12:25	3.114 d	2.964	--	3.8*	--	--	0.028	--
<i>Relative Percent Difference</i>				10.2%	0.7%	--	14.6%	--	--	16.4%	--
06/11/03	81-0275	81-0280	11:50	1.813	1.591	--	2.4*	--	--	0.021	--
06/11/03	81-0280	81-0275	11:50	--	--	--	1.9*	--	--	--	--
<i>Relative Percent Difference</i>				--	--	--	23.3%	--	--	--	--

Table 7 continued. MassDEP DWM 2003 Nashua River Watershed Field Duplicate Results.

NISSITISSIT RIVER (SARIS: 8143575)
Unique ID: W0486 Station: NT68, Mile Point: 0.912
 Description: [Mill Street, Pepperell]

Date	OWMID	QAQC	Time (24hr)	Log 10 Fecal Coliform (cfu/100mL)	Log 10 <i>E. coli</i> (cfu/100mL)	Turbidity (NTU)	Chlorophyll (mg/m3)	NH3-N (mg/L)	TP (mg/L)	DRP (mg/L)	TSS (mg/L)
05/06/03	81-0183	81-0184	09:00	1.415 e	1.591 e	--	--	--	--	--	--
05/06/03	81-0184	81-0183	09:00	1.672	1.602	--	--	--	--	--	--
<i>Relative Percent Difference</i>				16.7%	0.7%	--	--	--	--	--	--
07/16/03	81-0294	81-0295	08:50	1.851	1.415	--	--	<0.02	0.018	--	--
07/16/03	81-0295	81-0294	08:50	1.886	1.505	--	--	<0.02	0.017	--	--
<i>Relative Percent Difference</i>				1.9%	6.2%	--	--	0.0%	5.7%	--	--

JAMES BROOK (SARIS: 8143925)
Unique ID: W1000 Station: JAM01, Mile Point: 0.731
 Description: [Route 111, Ayer]

Date	OWMID	QAQC	Time (24hr)	Log 10 Fecal Coliform (cfu/100mL)	Log 10 <i>E. coli</i> (cfu/100mL)	Turbidity (NTU)	Chlorophyll (mg/m3)	NH3-N (mg/L)	TP (mg/L)	DRP (mg/L)	TSS (mg/L)
08/13/03	81-0376	81-0377	10:42	2.398	2.114	--	--	<0.02	0.060	--	6.7
08/13/03	81-0377	81-0376	10:42	2.462	1.987	--	--	<0.06	0.064	--	6.2
<i>Relative Percent Difference</i>				2.7%	6.2%	--	--	100.0%	6.5%	--	7.8%

SQUANNACOOK RIVER (SARIS: 8143950)
Unique ID: W0999 Station: NT61, Mile Point: 2.476
 Description: [Route 225, downstream of dam and just upstream of canal confluence, Shirley/Groton]

Date	OWMID	QAQC	Time (24hr)	Log 10 Fecal Coliform (cfu/100mL)	Log 10 <i>E. coli</i> (cfu/100mL)	Turbidity (NTU)	Chlorophyll (mg/m3)	NH3-N (mg/L)	TP (mg/L)	DRP (mg/L)	TSS (mg/L)
10/08/03	81-0450	81-0451	09:43	--	--	--	--	--	0.031	<0.010	--
10/08/03	81-0451	81-0450	09:43	--	--	--	--	--	0.033	<0.010	--
<i>Relative Percent Difference</i>				--	--	--	--	--	6.3%	0.0%	--

MULPUS BROOK (SARIS: 8144275)
Unique ID: W0998 Station: MPB03, Mile Point: 0.369
 Description: [trailer park road directly across from Kittredge Road, Shirley]

Date	OWMID	QAQC	Time (24hr)	Log 10 Fecal Coliform (cfu/100mL)	Log 10 <i>E. coli</i> (cfu/100mL)	Turbidity (NTU)	Chlorophyll (mg/m3)	NH3-N (mg/L)	TP (mg/L)	DRP (mg/L)	TSS (mg/L)
08/13/03	81-0364	81-0365	10:45	1.778	1.724	--	--	0.06	0.032	--	2.5
08/13/03	81-0365	81-0364	10:45	1.716	1.505	--	--	<0.02	0.032	--	2.2
<i>Relative Percent Difference</i>				3.6%	13.6%	--	--	100.0%	0.0%	--	12.8%
09/11/03	81-0423	81-0424	10:32	1.279	1.279	--	--	--	--	--	--
09/11/03	81-0424	81-0423	10:32	1.602	1.114	--	--	--	--	--	--
<i>Relative Percent Difference</i>				22.4%	13.8%	--	--	--	--	--	--

Table 7 continued. MassDEP DWM 2003 Nashua River Watershed Field Duplicate Results.

NORTH NASHUA RIVER (SARIS: 8144650)

Unique ID: W0990 Station: NN03, Mile Point: 19.591

Description: [Mill #9 bridge, Fitchburg (approximately 0.8 miles downstream from West Fitchburg WWTF (MA0101281) discharge)]

Date	OWMID	QAQC	Time (24hr)	Log 10 Fecal Coliform (cfu/100mL)	Log 10 E. coli (cfu/100mL)	Turbidity (NTU)	Chlorophyll (mg/m3)	NH3-N (mg/L)	TP (mg/L)	DRP (mg/L)	TSS (mg/L)
07/16/03	81-0283	81-0284	08:46	1.591	0.778	--	--	1.5	0.015	--	--
07/16/03	81-0284	81-0283	08:46	1.415	1.279	--	--	1.5	0.012	--	--
<i>Relative Percent Difference</i>				11.7%	48.7%	--	--	0.0%	22.2%	--	--

NORTH NASHUA RIVER (SARIS: 8144650)

Unique ID: W0480 Station: NN09, Mile Point: 14.147

Description: [Airport Road (Falulah Road on USGS quads), Fitchburg. (approximately 2.2 miles upstream of East Fitchburg WWTF (MA0100986) discharge)]

Date	OWMID	QAQC	Time (24hr)	Log 10 Fecal Coliform (cfu/100mL)	Log 10 E. coli (cfu/100mL)	Turbidity (NTU)	Chlorophyll (mg/m3)	NH3-N (mg/L)	TP (mg/L)	DRP (mg/L)	TSS (mg/L)
04/09/03	81-0143	81-0144	09:46	--	--	0.85	--	0.11 b	0.012	--	<1.0
04/09/03	81-0144	81-0143	09:46	--	--	0.84	--	0.12 b	0.011	--	<1.0
<i>Relative Percent Difference</i>				--	--	1.2%	--	8.7%	8.7%	--	0.0%

NORTH NASHUA RIVER (SARIS: 8144650)

Unique ID: W0993 Station: NN10A, Mile Point: 11.056

Description: [approximately 600 feet downstream Route 2, Leominster (approximately 0.9 miles downstream of East Fitchburg WWTF (MA0100986) discharge and 0.7 miles upstream of Leominster WWTP (MA0100617) discharge)]

Date	OWMID	QAQC	Time (24hr)	Log 10 Fecal Coliform (cfu/100mL)	Log 10 E. coli (cfu/100mL)	Turbidity (NTU)	Chlorophyll (mg/m3)	NH3-N (mg/L)	TP (mg/L)	DRP (mg/L)	TSS (mg/L)
06/11/03	81-0227	81-0243	09:40	2.447	2.301	1.5	--	0.12	0.048	--	## dj
06/11/03	81-0243	81-0227	09:40	2.431	2.322	1.5	--	0.12	0.048	--	## dj
<i>Relative Percent Difference</i>				0.6%	0.9%	0.0%	--	0.0%	0.0%	--	--
08/13/03	81-0351	81-0352	10:15	3.881	3.602	7.0	--	0.07	0.12	0.044	16
08/13/03	81-0352	81-0351	10:15	3.991	3.447	6.8	--	0.06	0.12	0.044	15
<i>Relative Percent Difference</i>				2.8%	4.4%	2.9%	--	15.4%	0.0%	0.0%	6.5%
10/08/03	81-0436	81-0442	09:42	--	--	--	--	--	0.052	0.015	--
10/08/03	81-0442	81-0436	09:42	--	--	--	--	--	0.053	0.015	--
<i>Relative Percent Difference</i>				--	--	--	--	--	1.9%	0.0%	--

MONOOSNUC BROOK (SARIS: 8144825)

Unique ID: W0994 Station: MONOO, Mile Point: 0.034

Description: [Commercial Road, Leominster]

Date	OWMID	QAQC	Time (24hr)	Log 10 Fecal Coliform (cfu/100mL)	Log 10 E. coli (cfu/100mL)	Turbidity (NTU)	Chlorophyll (mg/m3)	NH3-N (mg/L)	TP (mg/L)	DRP (mg/L)	TSS (mg/L)
04/09/03	81-0147	81-0148	10:40	--	--	--	--	<0.02 b	0.008	<0.010	<1.0
04/09/03	81-0148	81-0147	10:40	--	--	--	--	--	--	<0.010	--
<i>Relative Percent Difference</i>				--	--	--	--	--	--	0.0%	--
05/07/03	81-0201	81-0202	09:35	--	--	1.5	--	0.22 bd	0.016	<0.010	5.6
05/07/03	81-0202	81-0201	09:35	--	--	1.3	--	0.11 bd	0.016	<0.010	5.2
<i>Relative Percent Difference</i>				--	--	14.3%	--	66.7%	0.0%	0.0%	7.4%
06/11/03	81-0228	81-0245	09:55	2.964 e	3.079 e	--	--	<0.06	0.018	<0.010	1.4 dj
06/11/03	81-0245	81-0228	09:55	--	--	--	--	--	--	<0.010	--
<i>Relative Percent Difference</i>				--	--	--	--	--	--	0.0%	--

Table 8. MassDEP SMART 2003 Nashua River Watershed Field Blank Results

Date	OWMID	QAQC	Time (24hr)	Turbidity (NTU)	Chloride (mg/L)	Alkalinity (mg/L)	Hardness (mg/L)	NH3-N (mg/L)	NO3-NO2-N (mg/L)	TKN (mg/L)	TN (mg/L)	TP (mg/L)	TSS (mg/L)
02/05/03	SM-0679	Blank	11:30j	<0.10	<1	<2	<0.66	<0.02	<0.02	0.10 bh	--	<0.005	<1.0
04/09/03	SM-0720	Blank	12:00j	<0.10	<1	<2	<0.66	<0.02	<0.02	0.10 b	--	<0.005	<1.0
06/11/03	SM-0761	Blank	11:40j	<0.10	<1	<2	<0.66	<0.02	<0.06	0.13 b	--	<0.005	<1.0 j
08/13/03	SM-0811	Blank	12:15j	0.34 bd	<1 d	<2	<0.66	<0.02	<0.02	0.10 b	--	<0.005	<1.0
10/08/03	SM-0854	Blank	11:30j	<0.10	<1	<2	<0.66	[0.12] bdh	<0.02 h	--	0.22 bh	<0.005 h	<1.0

Table 9. MassDEP SMART 2003 Nashua River Watershed Field Duplicate Results

NASHUA RIVER (SARIS: 8143500)

Unique ID: W0484 Station: NM21, Mile Point: 21.441

Description: [near tank bridge at Still River Depot Road canoe launch, Harvard.]

Date	OWMID	QAQC	Time (24hr)	Turbidity (NTU)	Chloride (mg/L)	Alkalinity (mg/L)	Hardness (mg/L)	NH3-N (mg/L)	NO3-NO2-N (mg/L)	TKN (mg/L)	TN (mg/L)	TP (mg/L)	TSS (mg/L)	
04/09/03	SM-0716	SM-0717	10:45	2.5	94	10	29	0.24	0.65	0.67	--	0.065	9.1	
04/09/03	SM-0717	SM-0716	10:45	2.5	95	10	30	0.22	0.63	0.70	--	0.064	8.4	
				<i>Relative Percent Difference</i>	0.0%	1.1%	0.0%	3.4%	8.7%	3.1%	4.4%	--	1.6%	8.0%
06/11/03	SM-0757	SM-0758	10:25	1.4	56	14	31	<0.06 d	0.73	0.55 b	--	0.077	11 j	
06/11/03	SM-0758	SM-0757	10:25	1.4	55	14	30	0.10 d	0.73	0.52 b	--	0.079	11 j	
				<i>Relative Percent Difference</i>	0.0%	1.8%	0.0%	3.3%	50.0%	0.0%	5.6%	--	2.6%	0.0%
08/13/03	SM-0807	SM-0808	10:55	## d	## d	7 d	19 d	0.07 d	0.66	0.63 d	--	0.18	26	
08/13/03	SM-0808	SM-0807	10:55	## d	## d	17 d	28 d	0.10 d	0.68	0.78 d	--	0.18	25	
				<i>Relative Percent Difference</i>	--	--	83.3%	38.3%	35.3%	3.0%	21.3%	--	0.0%	3.9%
10/08/03	SM-0850	SM-0851	10:15	1.8	74	30	46	## bdh	2.4 h	--	3.2 bh	0.057 h	3.2	
10/08/03	SM-0851	SM-0850	10:15	2.0	76	29	46	## bdh	2.5 h	--	3.7 bh	0.062 h	2.8	
				<i>Relative Percent Difference</i>	10.5%	2.7%	3.4%	0.0%	--	4.1%	--	14.5%	8.4%	13.3%

NASHUA RIVER (SARIS: 8143500)

Unique ID: W0485 Station: NM29A, Mile Point: 2.917

Description: [approximately 1/2 mile downstream/east from covered bridge at Groton Street near abandoned railroad trestle supports, Pepperell.]

Date	OWMID	QAQC	Time (24hr)	Turbidity (NTU)	Chloride (mg/L)	Alkalinity (mg/L)	Hardness (mg/L)	NH3-N (mg/L)	NO3-NO2-N (mg/L)	TKN (mg/L)	TN (mg/L)	TP (mg/L)	TSS (mg/L)	
02/05/03	SM-0676	SM-0678	11:45	1.5	70	18	40	0.27	1.2	0.50 h	--	0.080	1.6	
02/05/03	SM-0678	SM-0676	11:45	1.7	68	18	40	0.24	1.3	0.52 h	--	0.080	1.7	
				<i>Relative Percent Difference</i>	12.5%	2.9%	0.0%	0.0%	11.8%	8.0%	3.9%	--	0.0%	6.1%

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