CONCORD RIVER WATERSHED
SMART MONITORING PROGRAM 2000-2004
TECHNICAL MEMORANDUM TM-82-10

Concord River facing south towards the Rogers Street Bridge, Lowell

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LIST OF LATIN NAMES

Latin Name	Common name	Latin Name	Common name
Ceratophyllum demersum	coontail	*Myriophyllum sp.*	milfoil
Elodea sp.	waterweed	*Potamogeton* sp	pondweed
Graminae	grasses	*Scirpus* sp.	sedges
Lemna sp.	duckweed	*Wolffia* sp.	watermeal
Lythrum salicaria	purple loosestrife		

LIST OF ACRONYMS

7Q10	lowest 7-day average streamflow that occurs, on average, once every 10 years
BRP	Bureau of Resource Protection
ºC	degree Celsius
CERO	CEntral Regional Office
cfs	cubic feet per second
CSO	Combined Sewer Overflow
DO	Dissolved oxygen
DWM	Division of Watershed Management
ºF	degree Fahrenheit
m	meter
MassDEP	Massachusetts Department of Environmental Protection
mg/L	milligrams per liter
NH_3-N	Ammonia nitrogen
NO_3NO_2-N	Nitrate-nitrite nitrogen
NTU	Nephelometric Turbidity Unit
OAR	Organization for the Assabet River
POR	Point of Record
POTW	Privately Owned Treatment Works
ppm	parts per million
QAPP	Quality Assurance Project Plan
SMART	Strategic Monitoring and Assessment for River basin Teams
SOP	Standard Operating Procedure
SU	Standard Unit
T	Temperature
TDS	Total Dissolved Solids
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorus
uS/cm	microsiemen per centimeter
USGS	United States Geological Survey
WES	Wall Experiment Station
WWTP	Wastewater Treatment Plant
% sat	percent oxygen saturation

Cover photo by Therese Beaudoin, MassDEP. 20 August 2008.
All photos in document taken by Therese Beaudoin. MassDEP. CERO.

SMART monitoring logo designed by Robert Kimball and Barbara Kimball.

INTRODUCTION

The Concord River Watershed, with a total drainage area of 400 mi^2, is comprised largely of two subwatersheds, the Assabet and Sudbury Rivers. For this reason, the Concord is also referred to as the SuAsCo watershed. For a detailed description of the Concord watershed, see SuAsCo Watershed Water Quality Assessment Report 2001 (Clayton 2013).

The Assabet River, with a drainage area of 131 mi^2, begins at the outlet of the Assabet River Reservoir, or the "A1" site, in Westborough. From there, the river meanders approximately 31 miles through many dammed reaches until it joins the Sudbury River at Egg Rock in Concord, MA. The lower 4.4 miles were designated as Wild and Scenic by the U.S. Congress in 1999. Due to its highly impounded nature, and the nutrient input from four major wastewater treatment plant (WWTP) discharges, the Assabet River exhibits problems associated with eutrophication.

The Sudbury River, with a drainage area of 162 mi^2, flows approximately 28 miles from its headwaters at the outlet of Cedar Swamp Pond, Westborough to the Assabet confluence. The upper watershed includes numerous large water supply reservoirs in Hopkinton, Southborough, Ashland and Framingham, which serve as emergency drinking water supplies. The river then flows through a large urbanized area in Framingham. North of the Danforth Street Bridge, the final 14.9 miles of the Sudbury have been designated as Wild and Scenic.

The Concord River drains an additional 107 mi^2 and flows approximately 15 miles to its junction with the Merrimack River. The upper 8 miles are designated Wild and Scenic. This part of the watershed is moderately to densely developed, with large areas of impervious surfaces throughout. The river terminates in the City of Lowell.

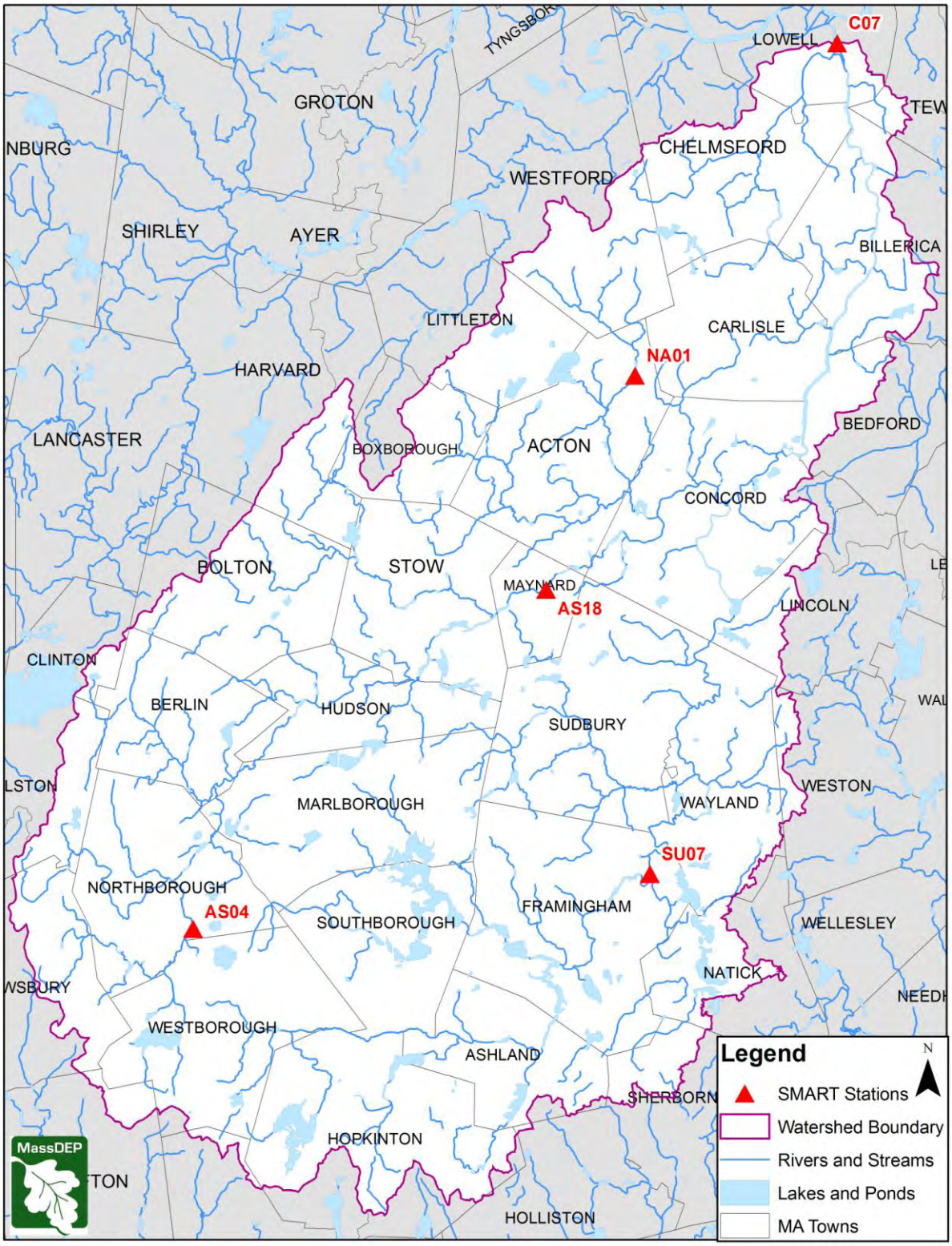
The purpose of this technical memo is to present observations and data collected under the SMART program conducted in the Concord watershed. Bimonthly water quality monitoring began in March 2000. The sampling plan matrix for the 2000-2004 SMART monitoring program is presented in Table 1. The location of sampling stations is presented in Figure 1. Sampling components at all stations included *in situ* measurements, physical/chemical and nutrient sampling, flow measurements (at existing gaging stations), and general field observations. Each sampling component is described in the sections that follow.

Table 1 SuAsCo Basin SMART Sampling Summary – 2000 through 2004

Location and Segment Numbers	Station Name	Dates Sampled[1]
Assabet River @ School Street, Northborough MA82B-02	AS04	2000: 3/8/00, 5/3/00, 7/12/00, 8/28/00, 11/15/00 2001: 2/21/01, 4/18/01, 6/20/01, 8/15/01, 10/24/01, 12/12/01 2002: 2/27/02, 4/17/02, 6/19/02, 8/21/02, 10/16/02 2003: 1/15/03, 3/19/03, 5/21/03, 7/16/03, 9/17/03, 11/12/03 2004: 2/25/04, 4/21/04, 6/16/04, 8/18/04, 10/20/04 [1]The SMART Monitoring program began in the Concord basin in March 2000.
Assabet River @ USGS flow gaging station, State Roads 27/62, Maynard MA82B-05	AS18	
Nashoba Brook @ USGS flow gaging station, Wheeler Road, Acton MA82B-14	NA01	
Sudbury River @ USGS flow gaging station, Danforth Road, Framingham MA82A-03	SU07	
Concord River @ USGS flow gaging station north of Rogers Street, Lowell MA82A-08	CO7	

The quality control/assurance plan (QAPP) for the SMART program is presented in CN 12.1: *Strategic Monitoring and Assessment for River basin Teams Quality Assurance Project Plan* (Beaudoin 2010). The QAPP presents data quality objectives, quality assurance procedures, and other program-specific information. This technical memorandum will report deviations from the procedures described in the QAPP.

Figure 1 MassDEP SMART Concord River Watershed Water Quality Station Locations



PROJECT OBJECTIVES

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

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

As stated in the Introduction, this document presents observations and data collected in the Concord Watershed under the SMART program from 2000-2004. An assessment of the data will be presented in future reports.

METHODS

Water quality samples were collected in the Concord basin on the dates shown in Table 1 and for the parameters described below; station locations are shown in Figure 1 above. The parameters encompassed in the sampling program include:

- *in situ* measurements: dissolved oxygen (DO), percent oxygen saturation, pH, specific conductivity, temperature (T), depth and total dissolved solids (TDS);
- physical/chemical constituents: total alkalinity, chlorides, hardness, total suspended solids, turbidity;
- nutrients: ammonia-nitrogen, nitrate-nitrite-nitrogen, total Kjeldahl nitrogen (which was changed to total nitrogen in 2004), and total phosphorus; and
- Microtox from July 12, 2000 through August 15, 2001.

Water quality sampling procedures are included in *Grab Collection Techniques for DWM Water Quality Sampling, Standard Operating Procedure* (MA DEP 1999b). Use of the *in situ* monitoring equipment followed procedures set forth in *CN 4.0 Water Quality Multi-probe Instrument Use, Standard Operating Procedure* (MA DEP 1999a). Physical/ chemical and nutrient samples were analyzed at the Wall Experiment Station (WES), the DEP analytical laboratory located in Lawrence, Massachusetts. All samples were collected, transported, analyzed, and discarded according to chain-of-custody procedures.

In addition to the measurements and analytes noted above, field observations were recorded at each station on standardized field sheets, photographs, and field notebooks. Field observations included date/time, location, crewmembers, snow cover, canopy cover, water odors, colors, sheens, foams, estimated water quantity and velocity, weather conditions, observed uses, wildlife, aquatic algae and macrophytes, potential pollution sources, and unusual conditions. Number and type of samples were recorded, as well as the last set of *in situ* data collected. A summary of field observations collected during this sampling period are presented in Table 2 after the station descriptions.

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

- Reference: a reference station is located in a stream segment that is minimally influenced by anthropogenic activities;
- Impact: an impact station is located where several sources of pollution come together and can be used to calibrate a mass balance model, or where critical reactions take place such as at an oxygen sag point; and

- Boundary: a boundary station is located at a pour point i.e., where water leaves a designated river basin, or at a state line.

Field sheets, raw data files, chain of custody forms, lab reports, and other metadata used in this report are managed and maintained by MassDEP Division of Watershed Management (DWM) in the Water Quality Access Database in Worcester, MA. The validation of the water quality data included data entry into DWM databases; data entry quality control checks; analysis for outliers, blank contamination, duplicates, precision and holding time violations; and project level review. The project coordinator, as identified in the QAPP for the SMART program, reviews the data for reasonableness, completeness and acceptability; see CN 83.0, CN149.0, CN202.0, CN211.0, and CN265.0 for the DWM data validation reports of 2000-2004 SMART SuAsCo data (MassDEP 2003, 2004b, 2005b, 2005a, 2006).

Due to resource limitations at the WES laboratory, nutrient samples that were collected during the period of October 2003 through June 2004 were frozen and later analyzed for total phosphorous only.

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

STATION OBSERVATIONS

Station AS04 – Assabet River at School Street, Northborough, MA (river mile 27.803)

Figure 2 Google Earth view of Station AS04 area

Figure 3 Station AS04 upstream

Station AS04 was accessed either from the School Street Bridge or from the western shore upstream. The abundance of poison ivy on the banks in this location prevented shoreline access for most of the first 6 years of the program, so samples were collected from the bridge, center stream, with a bucket drop. When the riparian zone was landscaped, poison ivy coverage was reduced, so sampling was conducted from a point upstream of the bridge, by wading in from the left bank. Both locations are representative of water quality conditions in this reach. Station AS04 serves as a trend station.

Land uses near this station included lawns, woodland, and a Christmas tree farm (Figure 2) (Google Earth 2011a). The Westborough WWTP discharge is located 2.25 miles upstream, as are major roads and a shopping district, with large expanses of impervious surfaces.

The river was approximately 30 feet wide at this site, typically less than 3 feet deep and roughly uniform across the channel throughout the year (Figure 3). Deciduous trees provided canopy cover over much of the channel upstream of the bridge. The bottom was sand and muck, with moderate to dense coverage with sedges (*Scirpus* sp.) and other emergent aquatic macrophytes during the growing season. Periphyton, when present, included filamentous green algae attached to plants and rocks.

The water column observations noted at this station ranged from clear to highly turbid with conditions clear on most dates sampled. Water colors included clear, light yellow/tan, light red, gray and brown. Light yellow was most often noted. Water odors observed included none, slight to strongly musty, and slight to heavy septic/effluent. The lack of odor was most common. In addition, there was a lack of foam and sheens.

The results of SMART monitoring conducted throughout 2000 indicated that the most degraded water quality conditions were noted here, so field duplicates were collected at Station AS04 from 2001 onward.

Station AS18 - Assabet River upstream from State Road 27 (Waltham Street), at the USGS gage, Maynard, MA (river mile 7.594)

Figure 4 Google Earth view of Station AS18

Figure 5 Station AS18 upstream

Station AS18 was accessed from shore near the USGS flow gaging station upstream of State Road 27, Waltham Street, adjacent to a convenience store. The land use surrounding this area is the town center of Maynard, with large areas of impervious surfaces (Figure 4) (Google Earth 2011b). Upstream, the river flows through several hypereutrophic impoundments, and receives the discharges of three major WWTPs, including Marlborough Westerly and Hudson (in addition to Westborough). Samples were collected by wading in or with a sampling pole (when access to flowing water was difficult). Station AS18 serves as a trend station.

The river at this location was approximately 45 feet wide, and heavily shaded (Figure 5). Although it was usually difficult to see through the water column due to turbulence and the angle of light on the surface, the bottom (when visible) consisted of gravel and cobble, with sand along the shallow shoreline areas. Periphyton, when visible, included filamentous and filmy green or mossy brown algae attached to rocks, as well as two occasions with a white lichen-like material (12 July 2000, 28 Aug 2000). A dense layer of moss covers all visible submerged rock surfaces. Aquatic macrophytes included *Lemna* sp. (duckweed) and *Wolffia* sp. (water meal), as well as occasional observations of *Ceratophyllum demersum* (coontail), *Myriophyllum* sp. (milfoil), *Potamogeton* sp. (pondweed), and *Elodea* sp. (waterweed).

The water column observations noted at this station ranged from clear to highly turbid; conditions were clear on most dates sampled. Water colors included clear, tannic, light (straw) to dark yellow, light red, and brown; light yellow and red were most often noted. A large amount of suspended materials was noted on numerous occasions. Water odors included none, musty, fishy, petroleum, “strong eutrophic pond”, and slight to strong septic/effluent, with a lack of odor most commonly noted. In addition, there was typically a sparse to moderate coverage with quarter- to half-dollar sized patches of foam.

When sampling commenced at this location in March, 2000, field duplicate samples were collected here, as this location historically exhibited the poorest water quality. However, the results of sampling collected throughout 2000 indicated that the most degraded conditions were noted at Station AS04, and field duplicates were collected there from 2001 onward.

Station NA01 – Nashoba Brook off Wheeler Lane, near the USGS gage, Acton, MA (river mile 4.305)

Figure 6 Google Earth view of NA01 area

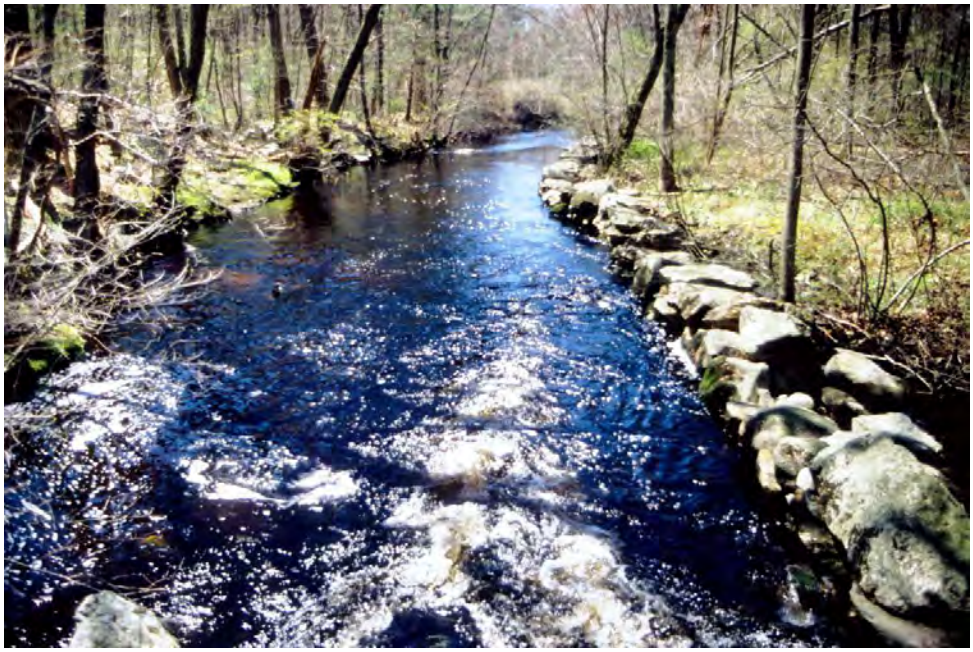


Figure 7 Station NA01 upstream

Station NA01 was accessed from the eastern shore at the USGS flow gaging station near a footbridge in the Nashoba Brook Conservation Area; samples were collected from center stream by wading in or with a sampling pole. The station is located in the upper area of the Nashoba Brook watershed, and nearby land uses include light residential and industrial/commercial development, a golf course, and woodland (Figure 6) (Google Earth 2011c). Robbins Mill Pond, with its historic saw mill, is located approximately 0.1 miles above the station. Although there are no surface water municipal discharges upstream, there are numerous groundwater discharges of sewage. The closest is the Acton Retirement Community (approximately 350 feet from Nashoba Brook, and 2,400 feet upstream of the station). Station NA01 represents reference conditions for the Concord watershed.

The river channel was approximately 15 feet wide in this reach and heavily shaded (Figure 7). Although it was usually difficult to see through the water column due to the angle of light on the surface and the deep tannic color, the bottom (when visible) consisted mainly of sand and cobble, with smaller quantity of gravel and boulder. Periphyton, when visible, was limited to moss on rock surfaces. Aquatic macrophytes included *Lemna* sp. (duckweed) and *Wolffia* sp. (water meal) that may have washed down from Robbins Mill Pond.

The water column observations noted at this station ranged from clear to highly turbid; conditions were clear on most dates sampled. The water color was red on all sampling events. Water odors included none, musty, petroleum, with a lack of odor most common. Although a petroleum odor was noted on numerous occasions, most of the time this appeared to be linked to a small area of sediments which, when disturbed, released the odor and an oily sheen. In addition, there was occasionally a sparse coverage with quarter- to half-dollar sized patches of foam; however, on most sampling dates, no foam was observed. On one occasion (10/24/2001), a non-petroleum sheen was observed on the water; at the time, the brook was impounded by a downstream beaver dam and no current was discernible.

Station SU07 - Sudbury River at Danforth Street, near the USGS gage, Framingham, MA (river mile 16.320)

Figure 8 Google Earth view of Station SU07 area

Figure 9 Station SU07 upstream

Station SU07 was accessed from the western shore upstream of the Danforth Street Bridge. When low flow conditions rendered the flowing portion of the channel inaccessible, the sampling site was relocated to the western shore just downstream of the historic bridge (pedestrian traffic only). Samples were collected from center stream. Both sites are considered to be representative of this area. SU07 serves as a reference station.

The upper Sudbury watershed includes pristine riverine areas and large impoundments managed as emergency water supplies (Figure 8) (Google Earth 2011d). The river flows through the urbanized towns of Framingham and Natick, with dense residential and industrial/commercial development, and a flood control project constructed by the U.S. Army Corps of Engineers in 1979 to alleviate flooding in the village of Saxonville.

Upstream of the modern Danforth Street Bridge, the river channel is approximately 70 feet wide, with an unknown depth (too deep to wade). The canopy is open to the sky (Figure 9). The bottom consisted of a mix of sand, gravel, cobble, and muck, with a layer of silt over all. Periphyton consisted of sparse to highly dense filamentous algae. Aquatic macrophytes included *Lythrum salicaria* (purple loosestrife), *Potamogeton* sp. (pondweed), and grasses; these provided a very dense cover of the bottom and riparian areas.

The stream channel consistently exhibited trash, including bicycles, furniture, hot water heaters, shopping carts, highway cone and barrels, a toilet, bridge railings, wires, pipes, broken glass, floatables and unidentifiable debris. A layer of silt covered the bottom on most events. Periodic river cleanups resulted in the removal of these objects, although debris continued to accumulate.

The water column observations noted at this station ranged from clear to highly turbid; conditions were slightly turbid on most dates sampled. Water colors included clear, tannic, light yellow, brown; typically, the water color was light yellow. Odors included none, slight septic, strong fishy, petroleum, with a lack of odor most common. In addition, there were occasional patches of foam noted, however, on most sampling dates, no foam was observed On one occasion, a strong petroleum sheen was observed to be flowing downstream along the western shore (May 15, 2003); the MassDEP Emergency Response team was notified, but the source was not identified.

At the downstream site, the river is also approximately 70 feet wide and of uniform depth, typically less than 2 feet, and moderately to densely canopied. Samples were collected by wading in or with a sampling pole. The stream bottom is mostly sand, gravel and cobble, with traces of silt. Periphyton noted here also included moderately to highly dense filamentous algae on submerged rocks. Trash here has included bicycles, broken glass, wooden planks, a storm drain cover, metals, bricks, pipes, and floatables, although not typically at the density observed upstream of the (modern) Danforth Street Bridge.

The water column at the downstream site was consistently clear (no visible turbidity). Colors observed include clear, light yellow/straw and reddish; light yellow was noted the most frequently. Observed odors included none and fishy with a lack of odor typical. Foam was absent on most occasions.

Station CO7 - Concord River downstream from Rogers Street, at USGS gage, Lowell, MA (river mile 0.843)

Figure 10 Google Earth view of Station CO7 area

Figure 11 Station CO7 upstream

Station CO7 was accessed from the eastern shore near the USGS flow gaging station approximately 250 feet downstream of the Rogers Street Bridge, via an electricity transmission corridor right of way adjacent to a pet food factory (razed in 2006). The land use surrounding this area is the urbanized center of Lowell, characterized by large areas of impervious surfaces (Figure 10) (Google Earth 2011e). Samples were collected by wading in or with a sampling pole. Station CO7 serves as a loading station.

The river at this location is approximately 125 feet wide. Although heavily shaded along both shores, most of the channel is open to the sky (Figure 11). The depth across the stream channel is unknown. Visibility was often limited to near the surface due to the angle of light, high turbidity, and deep color. When visible, the stream bottom consisted largely of boulders, with sand, gravel, and cobble, and a layer of silt over all. Again, when the entire water column was visible, periphyton consisted of a highly dense community of orange/brown flocculent or filamentous algae; moss was also noted. Aquatic macrophytes included *Lemna* sp. (duckweed). When visible, the stream bottom consistently exhibited a large quantity of trash, including shopping carts, a 55-gallon drum, and floatables.

The water column observations noted at this station ranged from clear to highly turbid; conditions were at least moderately turbid on most dates sampled. Water colors observed include tannic, light yellow, and chocolate/brown; typically, the water color was red or brown. Odors noted include none, musty, and strong fishy, with a musty odor most common. There were sparse patches of foam noted on most sampling dates, as well as an occasional petroleum-like sheen.

As the last station sampled on each of the SuAsCo SMART Monitoring events, field blank samples were collected here.

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. Precipitation data were obtained from the National Oceanic and Atmospheric Administration (NOAA). The presence/absence of precipitation during the five days prior to each sampling event was based on the National Weather Service data located on their website http://www.erh.noaa.gov/box/dailystns.shtml (NOAA 2010). Bedford, MA is the location of the weather station closest to the SuAsCo watershed sampling stations; hence data collected in Bedford were utilized in this report. On average, precipitation varies little across the watershed, approximately 44 to 46 inches/year. The northern area receives slightly less, with an average of 42 to 44 inches/year in Chelmsford and Lowell, and the northern sections of Westford and Billerica; while the southwest area, including portions of the towns of Bolton, Berlin, Northborough and Westborough, received 46 to 48 inches/year.

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

- Assabet River, Mill Road near Westborough, MA (USGS 2010d) http://waterdata.usgs.gov/ma/nwis/dv/?site_no=010965995&PARAmeter_cd=00060,00065,
- Assabet River at Maynard, MA (USGS 2010e) http://waterdata.usgs.gov/ma/nwis/dv/?site_no=01097000&PARAmeter_cd=00060,00065,
- Nashoba Brook near Acton, MA (USGS 2010f) http://waterdata.usgs.gov/ma/nwis/dv/?site_no=01097300&PARAmeter_cd=00060,00065,
- Sudbury River at Saxonville, MA (USGS 2010g) http://waterdata.usgs.gov/ma/nwis/dv/?site_no=01098530&PARAmeter_cd=00060,00065 and
- Concord River below River Meadow Brook at Lowell, MA (USGS 2010h) http://waterdata.usgs.gov/ma/nwis/dv/?site_no=01099500&PARAmeter_cd=00060,00065.

The mean streamflow values are based on 71 years of record at the USGS Concord River gage below River Meadow Brook, Lowell (USGS station number 01099500). The daily data are reported at http://waterdata.usgs.gov/nwis/dvstat/?referred_module=sw&site_no=01099500&por_01099500_1=1267274,00060,1,1936-12-16,2008-03-17&start_dt=1936-12-16&end_dt=2007-12-31&format=html_table&stat_cds=mean_va&date_format=YYYY-MM-DD&rdb_compression=file&submitted_form=parameter_selection_list (USGS 2010b). The monthly and annual mean discharges are found at http://waterdata.usgs.gov/nwis/monthly/?referred_module=sw&site_no=01099500&por_01099500_1=1267274,00060,1,1936-12,2008-03&format=html_table&date_format=YYYY-MM-DD&rdb_compression=file&submitted_form=parameter_selection_list (monthly)(USGS 2010c) and http://waterdata.usgs.gov/nwis/annual/?referred_module=sw&site_no=01099500&por_01099500_1=1267274,00060,1,1937,2008&year_type=W&format=html_table&date_format=YYYY-MM-DD&rdb_compression=file&submitted_form=parameter_selection_list (annual) (USGS 2010a).

Wet weather is defined as precipitation within a five-day antecedent period that leads to more than a slight increase in stream discharge at the five stations listed above (i.e., flow). Under dry weather conditions, trace amounts of precipitation may fall, but no measurable change in stream flow occurs. The discharge values were also examined relative to the 7Q10 low flow (the lowest 7-day average streamflow that occurs, on average, once every 10 years) which is 32.2 cfs at the USGS gaging station on the Concord River below River Meadow Brook in Lowell (Wandle and Fontaine 1984). At some of the SuAsCo flow gaging stations, precipitation-related stream fluctuations were difficult to distinguish from manipulated fluctuations on some events.

Table 2 through Table 6 present field observations at SMART stations from 2000-2004. Table 7 (precipitation) and Table 8 (stream discharge) contain information on survey conditions during each sampling event. Both the precipitation and the discharge data were used to estimate hydrological conditions during water quality sampling.

March 8, 2000 – The first survey of the SMART Monitoring Program in the SuAsCo watershed was conducted during a dry period, with no measurable precipitation recorded in the 5 days preceding the sampling event. Streamflow data show that discharge during the sampling event was near the mean value for that day at the Concord River gage (1,120 cfs). The samples collected during this event reflect dry weather conditions. Air temperature during the sampling event ranged from 60 to 63 degrees Fahrenheit (°F) and cloud cover from sunny to cloudy.

May 3, 2000 – This survey was conducted during a 7+-day dry period, with 0.14 inches of total precipitation recorded at Bedford on the previous day. No increase in river flow was noted during this period at any of the watershed gages. Discharge at the Concord River gage at the time of sample collection was approximately 2,000 cfs; the mean value for March over the point of record, or POR, (1936-2008) is 847 cfs. The samples collected during this event reflect dry weather conditions. Air temperature ranged from 60 to 70°F with no cloud cover throughout the event.

July 12, 2000 – This summer survey occurred during a relatively dry period. Although 0.64 inches of rain were recorded on July 9 and flows at the SuAsCo watershed gaging stations rose abruptly, discharge decreased from July 10th through the sampling event to pre-storm levels. Discharge at the Concord River gage averaged 150 cfs on this date, roughly 125 cfs below the POR mean (275 cfs). Data reflect dry weather conditions. Air temperature ranged from 74 to 80°F under sunny skies.

August 28, 2000 – Although only 0.01 inches of precipitation (as fog) were recorded at the Bedford gage during the 5 days prior to the sampling event, the streamflow gages indicate rising discharges on August 26th at the Assabet River, Maynard and Concord River, Lowell gages, and on August 27th at the Sudbury River, Saxonville gage. In the absence of precipitation, artificial manipulation is suspected to be the cause of the rising discharges. Releases from impoundments and wastewater discharges are known to occur in the Assabet River upstream of the Maynard gage, as well as reservoir manipulations along the Sudbury River. Stream discharge measured at the Concord River gage during sample collection was approximately 103 cfs, compared to a POR mean of 232 cfs. Due to the minimal precipitation, and the overall low flow, the data reflect dry weather conditions. Air temperature ranged from 77 to 83°F and skies from sunny to overcast.

November 15, 2000 – The late fall sampling event took place during a wet period, with a total precipitation during the previous 5 days of 2.93 inches (of which 0.86 inches fell on the day prior to sampling). Stream discharge at the Concord River gage at the time of sample collection was approximately 664 cfs (the POR mean for this date is 536 cfs), and rapid flow fluctuations during this 7-day period appear to indicate artificial manipulation of river flows. Data collected during this event reflect wet weather/runoff conditions. Air temperature ranged from 40 to 42°F, and cloud cover from 0 to 80%.

February 21, 2001 – The winter sampling event took place during a dry period, with only trace amounts of precipitation (as snow and fog) recorded in the preceding 5 days, and 1.75 inches of total precipitation during the entire month. The mean flow for this date was 577 cfs, while the POR mean flow is 870 cfs. Therefore, data reflect dry weather conditions. Air temperature ranged from 28 to 33°F and cloud cover from 0 to 25%.

April 18, 2001 – Approximately 0.12 inches of rain and snow were recorded at the Bedford station on April 18th, and field notes indicate that this occurred before and during the sampling event. However, this date was preceded by 5 days of only trace amounts of precipitation. Record flood levels characterized the SuAsCo watershed in late March, 2001 (Associated Press, March 27 2001); stream discharge measured at the Concord River gage show a decrease in flow from 2,650 cfs on April 12th to 1,890 cfs on April 18th, which is approximately 550 cfs above the POR mean value for this date (1340 cfs). These data indicate that the event occurred during receding floodwaters, and therefore data reflect wet weather/runoff conditions. Air temperature ranged from 38 to 42°F under overcast skies.

June 20, 2001 – This spring/summer sampling event took place during a period punctuated by heavy rain events, with 2.67 inches of rain falling on June 17th (remnants of Hurricane Allison). The 0.74 inches of rain reported on June 20th occurred after sample collection was completed. Stream discharge at the Concord River gage at the time of sample collection was approximately 1,120 cfs; the POR mean for this day is 566 cfs. Streamflow conditions indicate that these data reflect wet weather/runoff conditions. Air temperature ranged from 79 to 88°F under sunny skies.

August 15, 2001 – Summer sampling occurred during a relatively wet period, with a total of 2.36 inches of rain falling within the 5 days prior to the survey. In addition, streamflow data appear to reflect artificial manipulation of river flows, as well as precipitation-related fluctuations. Discharge at the Concord River gage on the date of sample collection averaged 298 cfs (POR daily mean streamflow is 232 cfs). Data collected during this event reflect wet weather/runoff conditions. Air temperature ranged from 72 to 85°F and cloud cover from 0 to 10%.

October 17, 2001 – Fall sampling fell within a dry period, with only trace precipitation recorded within the previous 5 days at the Bedford weather station. The POR daily mean streamflow at the Concord River gage is 338 cfs, while the mean streamflow on this date was 77 cfs. Data reflect dry weather conditions. Air temperature ranged from 69 to 74°F and cloud cover ranged from 40 to 90% during the survey.

December 12, 2001 – This late fall/early winter sampling event occurred within a wet period, with 0.67 inches of snow recorded at Bedford on December 8-9. The POR daily mean flow at the Concord River station is 720 cfs, although the

flow at the time of sampling was approximately 100 cfs. Due to rising discharge during the 3 days before the event and snowfall, data reflect wet weather/runoff conditions. Air temperature ranged from 36 to 39°F under overcast skies.

February 28, 2002 - Winter sampling in 2002 occurred during a storm event, with 0.46 inches rain/snowfall recorded within the 24 hours preceding monitoring activities. Mean discharge on the sampling date (340 cfs) was well below the POR average (870 cfs), and does not appear to reflect runoff conditions. However, based on the precipitation data, wet weather/runoff conditions are indicated. Air temperature ranged from 30 to 35ºF under clear skies.

April 17, 2002 – Light rainfall fell several days within the five days preceding this event, for a total of 0.29+ inches. Discharge decreased steadily during the same period, with an average flow of 570 cfs on the sampling date versus the POR average of 1,340 cfs. Based on precipitation and flow data, water quality reflected dry conditions. Air temperature ranged from 86 to 93ºF on this unseasonably warm spring day under clear to partly cloudy skies.

June 19, 2002 – Rain fell on each of the 5 days prior to this early summer sampling event. Flow data reflect surface runoff as well, with the average for this date (707 cfs) above the POR average (566 cfs). Based on precipitation and flow data, water quality reflects wet/runoff conditions. Air temperature ranged from 68 to 73ºF under overcast skies.

August 12, 2002 - Rainfall over the 5 days before this event totaled 0.31 inches. Although the flow at the Concord gage was well below the POR average for this day (232 cfs) for the entire month of August (mean August 2002 flow 47.9), the flow varied little over the 5 days preceding the sampling event. Based on the low precipitation and discharge during this period, water quality reflects dry conditions. Air temperature ranged from 72 to 84ºF and skies were sunny throughout the event.

October 16, 2002 – Rain fell on 4 of the 6 days before and including this sampling date, with a total rainfall of 1.90 inches in this period. Average daily discharge rose during that same time, from 219 to 412 cfs (POR mean is 338 cfs). Based on the precipitation and discharge data, water quality reflects wet weather/runoff conditions. Air temperature ranged from 49 to 52ºF with light to steady rain falling throughout this event.

January 15, 2003 – This winter event occurred within a dry period, with little rainfall in the 5 days prior to monitoring (0.16+ inches). During that time frame, stream discharge decreased steadily, with mean flow on the sampling date (771 cfs) near the POR mean value (747 cfs). Based on the above, data reflect dry conditions. Air temperature ranged from 13 to 27ºF under clear skies.

March 26, 2003 – This early spring event fell within a wet period, with 0.72 inches of rain falling within the 5 days before and including the sampling date. Streamflow rose during this time, with mean flows on the sampling date well over the POR mean. Precipitation and flow data indicate that conditions monitored reflect wet weather/runoff conditions. Air temperature ranged from 60 to 72ºF and cloud cover varied from clear to mostly cloudy.

May 14, 2003 – A moderate amount of precipitation fell within the 5 days before and the day of this spring sampling event (0.54 inches). Stream flow fluctuated slightly within this period; all flows were below the POR mean for this date. Precipitation and flow data reflect wet weather/runoff conditions. Air temperature ranged from 63 to 76ºF and cloud cover varied from mostly cloudy to overcast.

July 16, 2003 – Little rain fell early in the week preceding this monitoring event (0.0.43 inches) over several days. Although streamflow increased initially, it fell below pre-storm levels by the sampling date, and was slightly below the POR mean value for that day. Water quality data reflect dry conditions. Air temperature ranged from 70 to 82ºF and light rain gave way to overcast conditions.

September 17, 2003 – Approximately 0.13+ inches of rain fell in the days preceding this late summer event, and although nearly 0.5 inches fell on the sampling day, it began after monitoring efforts were completed. Flow data collected at the Assabet River, Maynard and Concord River, Lowell gages indicate rising streamflow, therefore water quality reflects wet weather/runoff conditions. Air temperature ranged from 67 to 79ºF under sunny skies.

November 12, 2003 - Approximately 0.2 inches of rainfall was recorded within the 24 hours preceding this mid-fall monitoring event. Stream discharge data, however, showed a generally decreasing flow throughout the 5 days preceding and including the sampling date. Data reflect dry conditions. Air temperature ranged from 50 to 54ºF and skies were overcast with an occasional drizzle during this event.

February 25, 2004 – This winter event occurred during a dry period, with only negligible precipitation recording within the preceding five days (0.02 inches). Streamflow varied little in this time frame, and was approximately half that of the POR

mean value. Therefore, water quality on this date reflects dry conditions. Air temperature ranged from 25 to 42ºC under sunny skies.

April 21, 2004 – The Spring 2004 monitoring occurred within a dry period; no precipitation was recorded within the 5 days preceding this event. Streamflow fell consistently within this time frame, and data collected on this date reflect dry conditions. Air temperature ranged from 51 to 62ºF; cloud cover ranged from 55 to 100%.

June 16, 2004 - This late spring event followed a dry period; 0.02 inches of rain fell within the previous 5 days. Streamflow fell consistently during this time. Data reflect dry conditions. Air temperature ranged from 73 to 81ºF and cloud cover from 40 to 65%.

August 18, 2004 – This mid-summer event was conducted during a wet period, with 1.27 inches of rainfall recorded during the preceding 5 days. Stream discharge measurements reflect the precipitation and runoff input. Data collected on this date reflect wet weather/runoff conditions. Air temperature ranged from 69 to 82ºF under mostly cloudy skies.

October 20, 2004 – Fall 2004 monitoring fell during a wet period, with 1.4 inches of rainfall recorded during the preceding 5 days. Streamflow gradually increased during this time, and data collected on this event reflect wet weather/runoff conditions. Air temperature ranged from 45 to 51ºF with 70 to 100% cloud cover.

Table 2 Summary of Observations at Station AS04 2000-2004

Survey Dates	Substrate	Trash	Periphyton	Color	Odor	Foam	Sheen	Turbidity	Wet/Dry Conditions
3/8/2000	--	--	--	--	--	--	--	--	Dry
5/3/2000	--	--	--	--	--	--	--	--	Dry
7/12/2000	--	--	--	--	--	None	--	--	Dry
8/28/2000	--	--	--	--	--	--	--	--	Dry
11/15/2000	--	--	--	--	--	--	--	--	Wet
2/21/2001	--	--	--	--	--	Foam	--	Clear	Dry
4/18/2001	--	--	--	--	--	--	--	--	Dry
6/20/2001	--	--	--	Very tannic	--	None	--	--	Wet
8/15/2001	--	None	Sparse: brownish mossy film	Brown	Musty	None	None	Slight	Wet
10/24/2001	--	None	Moderate: moss	Clear	Musty	None	None	Clear	Dry
12/12/2001	--	None	Sparse: mossy film	--	Strong septic	None	None	Slight	Wet
2/28/2002	--	Planks	Dense: green filamentous	Brown	None	None	None	Slight	Wet
4/17/2002	--	Sparse: floatables	Sparse: brown mossy film	Brown	None	None	None	Slight	Dry
6/19/2002	--	None	Moderate: black mossy	Light yellow	None	None	None	Slight	Wet
8/21/2002	--	None	Moderate: brown mossy film	Grey	None	None	None	Slight	Wet
10/16/2002	--	None	None	--	Musty	None	None	Slight	Wet
1/15/2003	--	None	None	Light yellow	None	None	None	Clear	Dry
3/26/2003	--	None	None	Clear	None	None	None	Clear	Dry
5/15/2003	--	None	Moderate: green filamentous	Clear	Septic	None	None	Clear	Wet
7/16/2003	--	Trash	None	Clear	Septic	None	None	Slight	Dry
9/17/2003	Cobble/sand/silt	None	None	Grey	Strong effluent	None	None	Slight	Wet
11/12/2003	Cobble/mud	None	Moderate: brown filamentous	Clear	Effluent	None	Sparse	Clear	Wet
2/25/2004	Boulder/cobble/sand/silt	Sparse	Dense: light brown filamentous	Clear	None	Foam	None	Slight	Dry
4/21/2004	Cobble/gravel/sand/silt	Sparse: sneaker, floatables	None	Slight red	None	None	None	Clear	Dry
6/16/2004	Cobble/gravel/sand/silt	Moderate	Green filamentous	Light yellow	Strong musty	None	None	Slight	Dry
8/18/2004	Cobble/gravel/sand/silt	Sparse: planks	Moderate: moss	Light yellow	Musty	None	None	Clear	Dry
10/20/2004	Boulder/cobble/gravel/sand/silt	Bricks, planks	None	Light yellow	Effluent	None	None	Slight	Wet
-- : Data not available									

Table 3 Summary of Observations at Station AS18 2000-2004

Survey Dates	Substrate	Trash	Periphyton	Color	Odor	Foam	Sheen	Turbidity	Wet/Dry Conditions
3/8/2000	--	--	--	--	--	--	--	--	Dry
5/3/2000	--	--	--	--	--	Traces	--	--	Dry
7/12/2000	--	--	Very dense	--	--	None	--	--	Dry
8/28/2000	--	--	Sparse	--	--	--	--	--	Dry
11/15/2000	--	--	--	--	--	--	--	--	Wet
2/21/2001	--	--	--	--	--	--	--	--	Dry
4/18/2001	Unobservable	--	Unobservable	--	Strong effluent	Sparse	--	Highly murky	Dry
6/20/2001	--	--	--	Tannic	--	Very dense	--	--	Wet
8/15/2001	--	None	Moderate: mossy brown film	Brown	Septic/musty	None	None	Slight	Wet
10/24/2001	--	None	Sparse: mossy brown film	Clear/grey	None	None	None	Clear	Dry
12/12/2001	--	Trash	Dense: brown filmy floc	--	Septic	Sparse	None	Slight	Wet
2/28/2002	--	Trash, woody debris	Dense: brown filamentous	Brown	None	Sparse	None	Slight	Wet
4/17/2002	Station not sampled on this date; inaccessible								
6/19/2002	--	Unobservable	Dense: white scaly and dark green/brown mossy	Red	None	Foam	None	Slight	Wet
8/21/2002	--	Trash	Moderate: white and mossy brown	Brown	None	None	None	Slight	Wet
10/16/2002	--	Paper	Unobservable	Light green	None	None	None	Slight	Wet
1/15/2003	--	None	None	Light yellow	None	Sparse	None	Clear	Dry
3/26/2003	--	Floatables	Sparse: moss	Brown/red	None	Dense	None	Slight	Dry
5/15/2003	Cobble/sand/silt	None	Dense: brown/green filamentous	Brown	Septic/musty	Foam	None	Slight	Wet
7/16/2003	Boulder/cobble	Floatables	None	Clear	None	Very sparse	None	Slight	Dry
9/17/2003	Cobble/gravel	None	Green moss	Clear	Musty, "clean pond"	None	None	Clear	Wet
11/12/2003	--	Trash	None	Clear	None	Foam	None	Clear	Wet
2/25/2004	Boulder/cobble/silt	Floatables	Dense: brown filamentous	Clear	None	None	None	Slight	Dry
4/21/2004	Cobble/gravel/sand/silt	Floatables, broken glass	Moderate: moss	Clear	Effluent	Very sparse	None	Clear	Dry
6/16/2004	Cobble/gravel/sand/mud	Floatables, metals	Moderate: brown moss	Brown	Fishy/septic	Sparse	None	Highly murky	Dry
8/18/2004	Boulder/cobble/gravel/sand	Floatables, cement chunks	Sparse: moss	Light yellow	Raw sewage/Musty	Very sparse	None	Clear	Dry
10/20/2004	Boulder/cobble/gravel/sand/silt	Floatables, cement chunks	None	Light yellow	Musty, effluent	Sparse	None	Slight	Wet
-- : Data not available									

Table 4 Summary of Observations at Station NA01 2000-2004

Survey Dates	Substrate	Trash	Periphyton	Color	Odor	Foam	Sheen	Turbidity	Wet/Dry Conditions
3/8/2000	--	--	--	Tannic	--	--	--	--	Dry
5/3/2000	--	--	--	Highly tannic	--	Trace	--	--	Dry
7/12/2000	--	--	--	Highly tannic	--	None	--	--	Dry
8/28/2000	--	--	--	Highly tannic	--	None	--	--	Dry
11/15/2000	--	--	--	Highly tannic	--	Trace	--	--	Wet
2/21/2001	--	--	--	Tannic	--	--	--	--	Dry
4/18/2001	--	--	--	--	--	--	--	--	Dry
6/20/2001	--	--	--	Highly tannic	--	Moderate	--	--	Wet
8/15/2001	--	None	Sparse: mossy brown film	Brown/red/tannic	Musty	None	None	Slight	Wet
10/24/2001	--	None	Moderate: mossy brown film	Brown/red	None	None	Anaerobic sheen	Suspended solids/murky	Dry
12/12/2001	--	None	Dense: mossy browngreen film	Brown/red	None	None	None	Slight	Wet
2/28/2002	--	None	Moderate: green mossy	Brown/red	None	None	None	Slight	Wet
4/17/2002	--	None	Sparse: mossy brown filamentous	Red	None	None	None	Slight	Dry
6/19/2002	--	None	Sparse: mossy brown/dark green	Red	Musty	Sparse	None	Slight	Wet
8/21/2002	--	None	Sparse: mossy brown	Red	Slight musty	None	None	Slight	Wet
10/16/2002	Unobservable	Unobservable	Unobservable	Green	None	None	None	Slight	Wet
1/15/2003	--	None	None	Red	None	None	None	Clear	Dry
3/26/2003	--	None	Moderate: brown moss	Brown/red	None	Sparse	None	Clear	Dry
5/15/2003	--	None	Moderate: green	Red	Street runoff	None	None	Slight	Wet
7/16/2003	Cobble/gravel/sand	None	Moderate: brown film	Red	None	None	None	Clear	Dry
9/17/2003	Boulder/cobble/gravel/silt	None	Moderate: brown/green mossy	Red	None	None	None	Clear	Wet
11/12/2003	Boulder/cobble/gravel/sand	None	None	Red	None	Foam	None	Clear	Wet
2/25/2004	--	None	Moderate: dark green moss	Red	None	None	None	Clear	Dry
4/21/2004	Boulder/cobble/gravel/sand	None	Moderate: moss	Red	None	"Swirls"	None	Clear	Dry
6/16/2004	Boulder/cobble/sand	None	Sparse: moss	Highly tannic	None	None	None	Clear	Dry
8/18/2004	Unobservable	None	Sparse: moss	Red	None	None	pollen	Clear	Dry
10/20/2004	Boulder/cobble/sand	Unobservable	Dense: green moss	Red	None	None	None	Clear	Wet
-- : Data not available									

Table 5 Summary of Observations at Station SU07 2000-2004

Survey Dates	Substrate	Trash	Periphyton	Color	Odor	Foam	Sheen	Turbidity	Wet/Dry Conditions
3/8/2000	--	--	Algae	--	--	--	--	--	Dry
5/3/2000	--	--	--	--	--	--	--	--	Dry
7/12/2000	--	2 bicycles, trash	--	--	--	None	--	--	Dry
8/28/2000	--	--	--	--	--	--	--	--	Dry
11/15/2000	--	--	--	--	--	--	--	--	Wet
2/21/2001	--	--	--	--	--	--	--	Clear	Dry
4/18/2001	--	--	--	--	--	None	--	--	Dry
6/20/2001	--	--	--	Brown	None	None	--	--	Wet
8/15/2001	--	None	Dense: brown slime	Clear/brown	None	Foam	None	Clear	Wet
10/24/2001	--	Very dense, rusted metal debris	Dense: mossy brown	Clear	None	None	None	Clear	Dry
12/12/2001	--	3 bicycles; floc	None	Brown	None	None	None	Slight	Wet
2/28/2002	--	2 bicycles, Christmas tree, metals, tires	Dense: brown filamentous	Brown	None	None	None	Slight	Wet
4/17/2002	--	Trash	Dense: mossy brown filamentous	Brown	None	None	None	Slight	Dry
6/19/2002	Unobservable	Unobservable	Unobservable	Light yellow	None	Foam	None	Slight	Wet
8/21/2002	Unobservable	Sunken trash	Dense: filamentous	Clear	Slight effluent	None	None	Slight	Wet
10/16/2002	--	Bicycles, bridge railings, paper, metals	Unobservable	Dark tan	None	None	None	Slight	Wet
1/15/2003	--	Metal, glass debris	None	Light yellow	None	None	None	Slight	Dry
3/26/2003	--	Trash	None	Brown/red	None	None	None	Slight	Dry
5/15/2003	Cobble/silt	Metals, bicycles, floatables	Dense: brown filamentous	Brown	Slight petroleum	None	Strong petroleum	Slight	Wet
7/16/2003	Boulder/silt	Bicycles, metals, water heater, floatables	Dense: green filamentous	Red	None	None	None	Slight	Dry
9/17/2003	Cobble/silt	Bicycles, metals	None	Light yellow	Slight fishy	None	None	Clear	Wet
11/12/2003	--	Bicycles, metals	Moderate	Clear	None	None	None	Clear	Wet
2/25/2004	Cobble/gravel/silt	Bicycles, metals, water heater, floatables, recliner, miscellaneous metals	Dense: orange/brown filamentous	Clear	None	None	None	Clear	Dry
4/21/2004	Cobble/gravel/sand/silt/mud	Very dense: bicycles, et cetera	Brown filamentous	Brown	Fishy	None	None	Moderate	Dry
6/16/2004	Cobble/sand/silt/mud	Very dense: bicycles, miscellaneous metals, bricks, floatables, chairs	Dense: filamentous	Brown	Fishy	None	None	Slight	Dry
8/18/2004	Cobble/gravel/silt/mud	Very dense; bicycles, furniture, floatables	Very dense: green film	Light yellow	None	None	None	Clear	Dry
10/20/2004	Cobble/sand/silt/mud	Very dense: bicycles, furniture, floatables, hot water heater	Dense: brown filamentous	Light brown	None	None	None	Slight	Wet

-- : Data not available

Table 6 Summary of Observations at Station CO7 2000-2004

Survey Dates	Substrate	Trash	Periphyton	Color	Odor	Foam	Sheen	Turbidity	Wet/Dry Conditions
3/8/2000	--	Dense: trash, shopping carts	--	--	--	--	--	--	Dry
5/3/2000	--	--	--	--	--	Foam	--	--	Dry
7/12/2000	--	Very dense	--	--	--	None	--	Highly	Dry
8/28/2000	--	--	--	--	--	--	--	--	Dry
11/15/2000	--	--	--	--	--	None	--	--	Wet
2/21/2001	--	--	--	--	--	--	--	--	Dry
4/18/2001	--	Very dense	--	--	--	Foam	--	--	Dry
6/20/2001	--	--	--	Tannic/brown	--	Sparse	--	--	Wet
8/15/2001	--	None	Sparse: mossy brown film	Brown/red	Musty	None	None	Highly cloudy	Wet
10/24/2001	--	None	Moderate: mossy brown film	Brown	Musty	None	None	Slight	Dry
12/12/2001	--	None	Dense: mossy brown film	Brown/green	None	None	None	Highly cloudy	Wet
2/28/2002	--	Trash	Dense: brown filamentous	Brown	None	None	None	Slight	Wet
4/17/2002	--	Floatables, sunken trash	Dense: mossy brown filamentous, slimes	Brown	Fishy	None	None	Suspended solids/murky	Dry
6/19/2002	--	Unobservable	Unobservable	Brown/red	Musty	None	None	Slight	Wet
8/21/2002	--	Boards, pipes, beer cans, bottles	Dense: mossy brown and rust floc	Brown/red	None	None	None	Suspended solids/murky	Wet
10/16/2002	Unobservable	Unobservable	Unobservable	Dark tan	None	Foam	None	Slight	Wet
1/15/2003	Station not sampled on this date; time constraint								
3/26/2003	Unobservable	Unobservable	Unobservable	Brown	None	Dense	None	Slight	Dry
5/15/2003	Cobble/silt	Unobservable	Dense: brown filamentous	Brown	Fishy/musty	None	Non-petroleum	Slight	Wet
7/16/2003	Boulder/cobble	Trash	Dense: rusty floc	Brown	None	None	None	Highly cloudy	Dry
9/17/2003	Boulder/cobble/silt	None	Dense: brown floc	Brown	Musty	None	None	Slight	Wet
11/12/2003	Unobservable	Unobservable	Dense: red floc	Brown/red	None	Sparse	None	Clear	Wet
2/25/2004	Boulder/cobble/sand	None	Very dense: orange/brown filamentous	Brown	None	None	None	Clear	Dry
4/21/2004	Boulder/cobble/gravel/sand	None	None	Clear	Musty	Sparse	None	Slight	Dry
6/16/2004	Boulder/cobble/sand	None	Dense: red/brown filamentous	Chocolate	Musty	None	None	Highly murky	Dry
8/18/2004	Cobble/gravel/sand/silt	Unobservable	Moderate: brown moss	Chocolate	None	None	None	Highly murky	Dry
10/20/2004	Unobservable	Unobservable	Unobservable	Light yellow	Musty	None	None	Clear	Wet
-- : Data not available									

Table 7 SuAsCo Basin Precipitation Data Summary 2000-2004 (inches of precipitation)

Survey Dates	5 Days Prior*	4 Days Prior	3 Days Prior	2 Days Prior	1 Day Prior**	Sample Date	Wet/Dry Conditions***
8 March 2000	0.00	0.00	0.00	0.00	T	0.00	Dry
3 May 2000	T	0.00	T	0.00	0.14	0.00	Dry
12 July 2000	T	0.00	0.64	0.00	0.00	0.00	Dry
28 Aug 2000	0.18	0.01	0.00	0.00	0.01	0.00	Dry
15 Nov 2000	1.93	0.13	0.00	0.01	0.86	0.00	Wet
21 Feb 2001	0.10	T	T	0.00	0.00	0.00	Dry
18 April 2001	0.01	0.00	0.00	0.00	T	0.12	Wet
20 June 2001	0.00	0.00	2.67	0.00	0.00	0.74	Wet
15 Aug 2001	0.03	0.00	1.73	0.60	0.00	T	Wet
24 Oct 2001	0.00	0.00	0.00	T	0.00	0.00	Dry
12 Dec 2001	0.00	0.23	0.44	0.00	0.00	0.00	Wet
28 Feb 2002	0.00	0.00	0.00	0.03	0.45	0.01	Wet
17 April 2002	0.00	0.01	T	0.28	0.00	0.00	Dry
19 June 2002	0.04	0.47	0.22	0.19	0.01	0.00	Wet
12 Aug 2002	0.09	0.00	0.00	0.00	0.22	0.00	Dry
16 Oct 2002	0.24	0.55	0.16	0.00	0.00	0.96	Wet
15 Jan 2003	0.16	T	0.00	T	0.00	0.00	Dry
26 Mar 2003	0.48	0.01	0.00	0.00	0.00	0.23	Wet
14 May 2003	0.04	0.00	0.35	0.10	0.01	0.04	Wet
16 July 2003	0.32	0.10	0.01	0.00	0.00	0.02	Dry
17 Sept 2003	0.00	0.00	T	T	0.13	0.46	Wet
12 Nov 2003	0.00	0.00	0.00	0.00	0.15	0.04	Dry
25 Feb 2004	0.00	0.02	0.00	0.00	0.00	0.00	Dry
21 April 2004	0.00	0.00	0.00	0.00	0.00	0.00	Dry
16 June 2004	0.00	0.00	0.00	0.02	0.00	0.00	Dry
18 Aug 2004	0.14	0.02	0.77	0.30	0.04	0.01	Wet
20 Oct 2004	0.76	0.21	0.00	0.05	0.38	0.00	Wet

*Unofficial data from the National Weather Service station in Bedford, MA and reported at http://tgsv5.nws.noaa.gov/er/box/clstns.htm (NOAA 2010).
**T= trace amount
***Based on streamflow and precipitation data.

Table 8 Concord River below River Meadow Brook, Lowell, MA

USGS Flow Data Summary Discharge (cfs) 2000-2004*								
Survey Dates	**5 Days Prior**	**4 Days Prior**	**3 Days Prior**	**2 Days Prior**	**1 Day Prior**	**Sample Date**	**Monthly Mean**	**POR** Mean**
8 March 2000	1,450	1,390	1,330	1,250	1,180	1,120	1,266	1,240
3 May 2000	2,650	2,580	2,460	2,310	2,150	2,000	1,171	847
12 July 2000	166	160	156	167	158	150	203.0	275
28 Aug 2000	192	166	158	123	147	103	272.4	232
15 Nov 2000	302	481	579	591	607	664	401.8	536
21 Feb 2001	613	630	618	606	585	577	517.4	870
18 April 2001	2,650	2,520	2,370	2,210	2,060	1,890	2,297	1,340
20 June 2001	454	424	578	984	1,030	1,120	754.6	566
15 Aug 2001	96	93	162	265	320	298	149.6	232
24 Oct 2001	78	75	77	73	74	77	67.5	338
12 Dec 2001	87	83	97	107	117	100	183.4	720
28 Feb 2002	413	396	379	356	344	340	335.7	870
17 April 2002	681	640	597	590	575	570	673.0	1,340
19 June 2002	740	707	704	726	718	707	657.6	566
12 Aug 2002	48	51	60	68	71	71	47.9	232
16 Oct 2002	219	260	277	314	394	412	283.1	338
15 Jan 2003	1,090	1,030	989	913	851	771	783.4	747
26 Mar 2003	1,520	1,720	1,910	2,070	2,170	2,180	1,430	1,240
14 May 2003	700	672	666	709	703	699	750.3	847
16 July 2003	319	347	331	304	280	259	381.9	275
17 Sept 2003	139	131	128	136	229	267	255.6	229
12 Nov 2003	972	919	883	826	775	732	740.2	536
25 Feb 2004	339	322	331	346	360	360	388.1	870
21 April 2004	2,560	2,650	2,590	2,470	2,300	2,140	1,220	1,340
16 June 2004	432	402	367	328	303	275	371.2	566
18 Aug 2004	361	364	402	439	453	447	383.4	232
20 Oct 2004	306	406	471	501	510	518	551.0	338

***Gage # 01099500 data found at Real-Time Data for USA: Build Custom Table**
****POR*-Period of Record, monthly mean value based on entire point of record (Jan 1, 1937-Feb 28, 2003)**

7Q10 = 32.2 cfs @ USGS gaging station, Concord River below River Meadow Brook at Lowell, MA (Wandle and Fontaine 1984).

RESULTS AND QUALITY ASSURANCE/QUALITY CONTROL

The results of SMART monitoring conducted in the SuAsCo watershed from 2000 through 2004 are included below. Table 9 through Table 13 present *in-situ* multiprobe readings, including temperature, pH, dissolved oxygen, percent oxygen saturation, depth, specific conductivity, and total dissolved solids. Table 14 through Table 18 contain nutrient (ammonia-nitrogen, nitrate-nitrite nitrogen, total nitrogen or total Kjeldahl nitrogen, and total phosphorus), chlorides, hardness, total alkalinity, total suspended solids and turbidity data. Ambient field blank and duplicate sample data are presented in Table 19 and Table 20, respectively. Most results are expressed as milligrams per liter (mg/L). Exceptions include: depth in meters (m); temperature in degrees Celsius (ºC); pH in Standard Units (SU); conductivity in microsiemens per centimeter (uS/cm); dissolved oxygen saturation in percent (%); and turbidity, in Nephelometric Turbidity Units (NTU).

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

Multiprobe data qualifiers:

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

Laboratory sample data qualifiers:

** = Missing data.
-- = No data.
= Censored data (data that have been discarded for some reason).
[ ] = A result reported inside brackets has been censored, but is shown for informational purposes.
b = Blank contamination in lab reagent blanks and/or field blank samples.
d = Precision of field duplicates (as RPD) did not meet project data quality objectives identified for program or in QAPP.
e = Not theoretically possible. Specifically, used for bacteria data where colonies per unit volume for *E. coli* bacteria 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 (e.g. sediment in sample, floc formation), lab error (e.g. cross-contamination between samples), additional steps taken by the lab to deal with matrix complications, lost/unanalyzed samples, and missing data.

Table 9 MassDEP SMART 2000-2004 SuAsCo Watershed In Situ Multiprobe Data. Station AS04

ASSABET RIVER (Saris: 8246775)

Unique_ID: 695 Station: AS04, Mile Point: 28

Description: approximately 20 meters upstream/south of School Street, Northborough

Date	OWMID	Time	Depth	Temp	pH	Cond@ 25C	TDS	DO	SAT
		(24hr)	(m)	(C)	(SU)	(uS/cm)	(mg/l)	(mg/l)	(%)
3/8/2000	SM-0001	9:18	0.1i	5.5	6.6	438	280	11.2	88
5/3/2000	SM-0041	9:32	0.2	10.7	6.4	381	244	9.4	82
7/12/2000	SM-0095	9:09	0.3	19.4	6.7	879c	562c	5.2	56
8/28/2000	SM-0142	9:30	0.6	20.0	6.4	872c	558c	4.4	48
11/15/2000	SM-0182	9:04	0.4	8.1	6.4	373	238	8.6	73
2/21/2001	SM-0220	9:26	0.5	2.7	6.3	625	400	11.3	82
4/18/2001	SM-0260	9:33	0.4	8.9	6.5	541	346	9.5	82
6/20/2001	SM-0300	9:09	0.8	21.6	6.4	381	244	5.5	61
8/15/2001	SM-0340	9:17	0.5	19.7	6.6	1,012c	648c	5.2	56
10/24/2001	SM-0380	9:16	0.1i	15.7	6.6u	885c	566c	4.9	49
12/12/2001	SM-0420	9:10	0.6	7.0	6.8	855c	547	8.2	65
2/28/2002	SM-0459	9:45	0.3	3.1	6.3	697	446	11.2 i	83 i
4/17/2002	SM-0499	9:04	0.3	16.7	6.7	645	413	6.7	67
6/19/2002	SM-0539	9:15	0.5	17.6	6.7	538	344	7.3	74
8/21/2002	SM-0579	9:11	0.2	20.3	6.7	1,020 c	652 c	5.9	63
10/16/2002	SM-0619	9:05	## i	11.9	6.8	668	427	8.4	76
1/15/2003	SM-0659	9:21	## i	1.0	6.7 u	560	358	11.3	81
3/26/2003	SM-0700	9:12	0.6	6.2	6.1	447	286	10.2	84
5/15/2003	SM-0741	9:30	0.1 i	13.0	6.8 u	528	338	8.6	83
7/16/2003	SM-0782	8:55	0.1 i	20.2	6.9 cu	783 c	501 c	6.0	68
9/17/2003	SM-0834	9:02	0.6	18.2	6.7	559	363	7.1	75
11/12/2003	SM-0877	9:04	0.6	7.2	6.8	479	311	10.8 ui	90 ui
2/25/2004	SM-5919	9:22	0.7 i	2.3	6.8	651	423	11.5	84
4/21/2004	SM-5960	9:05	0.6	12.9	6.8	466	303	9.3 i	89 i
6/16/2004	SM-6001	8:58	0.4	19.3	6.7	812 c	528 c	6.1	66
8/18/2004	SM-6043	9:18	0.3	19.3	6.7	915 c	595 c	6.2	67
10/20/2004	SM-6084	9:05	0.4	10.7	6.7	489	318	8.7	78

Table 10 MassDEP SMART 2000-2004 SuAsCo Watershed In Situ Multiprobe Data. Station AS18

ASSABET RIVER (Saris: 8246775)

Unique_ID: 697 Station: AS18, Mile Point: 7.6

Description: approximately 50 meters upstream/southwest of the Route 27/62 bridge, Maynard.

Date	OWMID	Time	Depth	Temp	pH	Cond@ 25C	TDS	DO	SAT
		(24hr)	(m)	(C)	(SU)	(uS/cm)	(mg/l)	(mg/l)	(%)
3/8/2000	SM-0004	11:09	0.1i	6.0	6.7u	324	207	12.9	102
5/3/2000	SM-0043	11:30	0.3	13.2	6.7	289	185	10.7	99
7/12/2000	SM-0097	10:54	0.6	23.5	7.4c	419	268	8.2	94
8/28/2000	SM-0144	11:41	0.7	23.0	7.2c	462	295	9.1	103
11/15/2000	SM-0184	10:40	0.5	8.6	6.7	319	204	10.8	92
2/21/2001	SM-0222	11:32	0.7	1.1	6.4	525	336	14.5	101
4/18/2001	SM-0262	11:34	0.2	10.1	6.7	365	234	11.4	101
6/20/2001	SM-0302	11:04	0.9	23.1	6.4	260	166	7.0	80
8/15/2001	SM-0342	11:18	0.7	23.6	7.0c	582	372	7.6	88
10/24/2001	SM-0382	11:08	##i	13.1	7.3c	707	453	10.5	99
12/12/2001	SM-0422	11:18	0.5	4.3	7.4c	611	391	14.0	104
2/28/2002	SM-0461	11:51	0.8	4.7	7.4 c	562	360	14.2 i	110 i
6/19/2002	SM-0541	11:06	0.4	19.2	6.9 c	415	266	8.9	94
8/21/2002	SM-0581	10:55	0.3	24.3	7.3 c	801 c	513 c	7.5	87
10/16/2002	SM-0621	10:54	0.2	12.7	7.0 c	750 c	480 c	9.8	90
1/15/2003	SM-0661	11:37	0.3	0.3	6.5	526	337	13.4	94
3/26/2003	SM-0702	10:56	0.8 i	8.0	6.2	342	219	11.1	96
5/15/2003	SM-0743	11:43	0.2	15.6	7.0 c	454	291	10.1	103
7/16/2003	SM-0784	10:45	0.2	23.3	7.2 c	541	346	7.9	94
9/17/2003	SM-0836	10:57	0.6 u	20.6	7.2 c	594	386	8.7	97
11/12/2003	SM-0879	11:09	0.6	5.0	7.0 c	422	274	13.4 ui	105 ui
2/25/2004	SM-5921	11:19	0.5 i	1.8	7.2 c	540	351	15.0	108
4/21/2004	SM-5962	11:15	1	15.8	7.0 c	379	246	10.3 i	104 i
6/16/2004	SM-6004	10:58	0.5	23.5	7.3	500	325	8.3	98
8/18/2004	SM-6046	11:16	0.5	22.1	7.4	648	421	8.7	99
10/20/2004	SM-6087	10:47	0.5	11.2	7.2	462	300	10.9	99

Table 11 MassDEP SMART 2000-2004 SuAsCo Watershed In Situ Multiprobe Data. Station NA01

NASHOBA BROOK (Saris: 8246875)

Unique_ID: 698 Station: NA01, Mile Point: 4.3

Description: upstream/north of footbridge in Nashoba Brook Conservation Area southeast of Wheeler Lane, Acton

Date	OWMID	Time	Depth	Temp	pH	Cond@ 25C	TDS	DO	SAT
		(24hr)	(m)	(C)	(SU)	(uS/cm)	(mg/l)	(mg/l)	(%)
3/8/2000	SM-0005	11:56	0.1i	5.6	6.4	297	190	11.5	90
5/3/2000	SM-0045	12:15	0.4	11.9	6.4	281	180	10.0	90
7/12/2000	SM-0099	11:42	0.5	19.6	6.6	341	219	6.0	64
8/28/2000	SM-0146	12:27	0.7	19.8	6.3	337	215	5.1	55
11/15/2000	SM-0186	11:26	0.7	7.9	6.3	249	159	8.8	74
2/21/2001	SM-0224	12:10	0.7	0.2	6.0	416	266	10.9	74
4/18/2001	SM-0264	12:09	0.6	8.1	6.4	313u	200u	9.7	82
6/20/2001	SM-0304	11:39	0.8	22.1	6.2	247	158	5.3u	59u
8/15/2001	SM-0344	12:06	0.7	20.6u	6.5	383	245	4.5	49
10/24/2001	SM-0384	11:47	##i	13.1u	6.7	322	206	7.5	70
12/12/2001	SM-0424	12:09	0.5	3.2	6.5	402	257	10.9	78
2/28/2002	SM-0463	12:40	0.7	2.8	6.4	383	245	12.0 i	88 i
4/17/2002	SM-0503	11:14	0.5	18.3	6.6	431	276	7.4	76
6/19/2002	SM-0543	11:41	0.4	17.4	6.5	373	239	7.5	76
8/21/2002	SM-0583	11:33	0.3	20.0 u	6.8	345	221	2.8	30
10/16/2002	SM-0623	11:30	0.2	9.6	6.4	460	295	8.5 u	73 u
1/15/2003	SM-0663	12:27	0.5	0.2	5.9 u	513	328	10.5	73
3/26/2003	SM-0704	11:32	0.8 i	8.0	6.1	325	208	10.4	90
5/15/2003	SM-0745	12:24	0.2	14.3	6.4	440	282	7.9	78
7/16/2003	SM-0786	11:22	0.4	19.8	6.6	487	312	3.9	44
9/17/2003	SM-0838	11:37	0.9	18.3	6.5	421	274	5.8	62
11/12/2003	SM-0881	11:45	1	3.3	6.7 u	423	275	12.1 i	91 i
2/25/2004	SM-5923	11:58	0.8 i	0.7	6.9 c	483	314	12.4	86
4/21/2004	SM-5964	11:53	0.9	12.9	6.6	358	233	8.6	81
6/16/2004	SM-6005	11:36	0.7	21.3	6.7	483	314	6.1	69
8/18/2004	SM-6047	12:05	0.6	19.2	6.7	365	237	6.5	71
10/20/2004	SM-6088	11:24	0.8	9.3	6.7	440	286	9.2	80

Table 12 MassDEP SMART 2000-2004 SuAsCo Watershed In Situ Multiprobe Data. Station SU07

SUDBURY RIVER (Saris: 8247650)

Unique_ID: 696 Station: SU07, Mile Point: 16.5

Description: just upstream/south of Danforth Street, Framingham

Date	OWMID	Time	Depth	Temp	pH	Cond@ 25C	TDS	DO	SAT
		(24hr)	(m)	(C)	(SU)	(uS/cm)	(mg/l)	(mg/l)	(%)
3/8/2000	SM-0003	10:16	0.2	5.6	6.8u	353	226	12.8	101
5/3/2000	SM-0042	10:46	0.3	11.8	6.9	313	200	11.2	101
7/12/2000	SM-0096	10:05	0.5	21.9	7.1c	410	262	8.0	90
8/28/2000	SM-0143	10:51	0.7	22.1	7.0u	422	270	9.5	107
11/15/2000	SM-0183	9:59	0.4	8.9	6.9	353	226	11.3	97
2/21/2001	SM-0221	10:44	1.1	2.5	6.5u	520	333	13.9	101
4/18/2001	SM-0261	10:48	0.4	9.6	6.9c	393	251	11.3	99
6/20/2001	SM-0301	10:19	0.9	23.8	6.8	393	251	7.4u	86u
8/15/2001	SM-0341	10:25	0.6	22.3	7.1c	405	259	8.6	97
10/24/2001	SM-0381	10:20	##i	13.4	6.8	566	362	9.4u	89u
12/12/2001	SM-0421	10:21	0.7	4.2	6.8u	533	341	12.4	92
2/28/2002	SM-0460	10:54	0.5	5.1	6.9 c	607	388	12.8 i	100 i
4/17/2002	SM-0500	10:10	0.6	18.1	7.2 c	540	346	9.8	102
6/19/2002	SM-0540	10:23	0.6	19.5	7.0 c	438	280	8.9	94
8/21/2002	SM-0580	10:16	0.2	22.8	7.0 c	563	361	8.0	90
10/16/2002	SM-0620	10:08	0.1 i	13.6	6.9 c	474	304	10.2	96
1/15/2003	SM-0660	10:46	0.2	0.4	6.6	462	295	13.6	96
3/26/2003	SM-0701	10:11	0.4	5.5	6.4	414	265	12.4	101
5/15/2003	SM-0742	10:45	0.4	15.6	6.9 c	488	312	9.9	101
7/16/2003	SM-0783	10:05	0.2	23.4	7.0 c	484	310	7.7	92
9/17/2003	SM-0835	10:12	0.9	21.3	7.1 c	408	265	8.7	99
11/12/2003	SM-0878	10:19	1.2	7.7	7.0 c	389	253	12.5 i	105 i
2/25/2004	SM-5920	10:29	1.0 i	3.0	7.0 cu	489	318	13.9	104
4/21/2004	SM-5961	10:29	1	13.0	7.1 c	361	234	11.0 i	105 i
6/16/2004	SM-6003	10:10	0.6	22.4	7.2	461	300	8.4	97
8/18/2004	SM-6045	10:34	0.9	22.4	7.3	394	256	8.7	100
10/20/2004	SM-6086	10:05	0.4	11.9	7.2	343	223	11.0	102

Table 13 MassDEP SMART 2000-2004 SuAsCo Watershed In Situ Multiprobe Data. Station CO7

CONCORD RIVER (Saris: 8246500)

Unique_ID: 679 Station: CO7, Mile Point: 0.8

Description: approximately 100 meters downstream/north from Rogers Street, Lowell

Date	OWMID	Time	Depth	Temp	pH	Cond@ 25C	TDS	DO	SAT
		(24hr)	(m)	(C)	(SU)	(uS/cm)	(mg/l)	(mg/l)	(%)
3/8/2000	SM-0006	12:53	0.6	6.0	6.7	308	197	12.7	100
5/3/2000	SM-0046	13:13	0.8	13.3	6.7	270	173	10.9	101
7/12/2000	SM-0100	12:44	0.7	24.1	7.4c	374	239	9.1	107
8/28/2000	SM-0147	13:26	1	23.8	6.8	412	264	8.5	98
11/15/2000	SM-0187	12:20	0.9	9.0	6.9	317	203	10.8	93
2/21/2001	SM-0225	13:07	1	0.5	6.2	456	292	15.1u	103u
4/18/2001	SM-0265	13:49	0.8	11.2	6.8	337	216	11.3	102
6/20/2001	SM-0305	12:29	1	24.7	6.7	267	171	7.7u	91u
8/15/2001	SM-0345	13:09	0.9	25.0	7.1c	433	277	7.6	90
10/24/2001	SM-0385	12:46	##i	14.1	7.4cu	560	359	10.6	102
12/12/2001	SM-0425	13:07	0.4	5.1	8.9c	537	344	16.4	124
2/28/2002	SM-0464	13:45	0.5	5.6	7.2 c	516	330	13.5 i	106 i
4/17/2002	SM-0504	12:08	0.3	18.8	7.5 c	481	308	10.7	113
6/19/2002	SM-0544	12:38	0.5	19.3	6.9 c	402	257	8.9	93
8/21/2002	SM-0584	12:25	0.4	26.6 u	7.6 c	633	405	7.7	93
10/16/2002	SM-0624	12:23	0.1 i	12.8	7.0 c	505 u	323 u	10.0	93
3/26/2003	SM-0705	12:22	0.9 i	7.4	6.2	332	213	11.6	99
5/15/2003	SM-0746	13:20	0.3	15.9	6.8	457	292	9.7	99
7/16/2003	SM-0787	12:13	0.3	23.9	7.0 c	477	305	7.7	92
9/17/2003	SM-0839	12:27	0.9	22.0	7.4 c	523	340	8.7	100
11/12/2003	SM-0882	12:41	0.8	5.9	6.8	375	244	12.8 i	103 i
2/25/2004	SM-5924	12:53	0.9 i	1.0	6.9 u	495	322	14.8	104
4/21/2004	SM-5966	12:50	1.4	15.2	7.0 c	323	210	10.6	105
6/16/2004	SM-6006	12:32	0.8	23.2	8.1	444	289	10.2	120
8/18/2004	SM-6048	12:59	0.8	23.2	7.2	388	252	8.3	97
10/20/2004	SM-6089	12:16	0.9	11.7	7.2	440	286	10.7 u	99 u

Table 14 MassDEP SMART 2000-2004 SuAsCo Watershed Nutrients, Chlorides, Hardness, Total Alkalinity, Total Suspended Solids and Turbidity Data. Station AS04

ASSABET RIVER (Saris: 8246775)

Unique ID W0695 Station AS04 Mile Point 28.0

Description: approximately 20 meters upstream/south of School Street, Northborough

Date	OWMID	QAQC	Time	Turb	Chloride	Alk	Hard	NH3-N	NO3-NO2-N	TKN	TN	TP	TSS
			24hr	NTU	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/L	mg/l	mg/l
3/8/2000	SM-0001	SM-0002	9:18	1	100	21	69	0.06	1.5	0.39		0.37	1.1
5/3/2000	SM-0041		**	2	87	17	62	<0.02	1.3	0.65		0.15	2.9
7/12/2000	SM-0095		9:09	1.2	210	33	135	0.03	3.6	0.95		0.56	1.1
8/28/2000	SM-0142		9:30	1.3	190	33	131	0.04	4.7	0.92		0.69	1
11/15/2000	SM-0182		9:00	3.2	82	18	64	0.02	1.2	0.6		0.38	3.1
2/21/2001	SM-0220	--	9:15	2.4m	160m	24m	84m	0.15m	1.9m	0.95m		0.47m	2.3m
4/18/2001	SM-0260	--	9:33	1.4	130	16	83	0.04	1.6	0.64		0.16	1.9
6/20/2001	SM-0300	--	9:09	2.6m	90m	19m	59m	<0.02m	1.2m	0.83m		0.20m	3.3m
8/15/2001	SM-0340	--	9:10	1.5m	260m	25m	160m	<0.02m	3.1m	0.87m		0.30m	2.9m
10/24/2001	SM-0380	--	9:10	1.1m	200m	37m	130m	<0.02m	6.6m	0.88m		0.76m	<1.0m
12/12/2001	SM-0420	--	9:10	1.5m	190m	55m	113m	<0.02m	5.1m	1.2m		2.3m	1.3m
2/28/2002	SM-0459	--	9:30	1.6 m	170 m	22 m	99 m	<0.02 m	2.8 bm	0.58 m		0.84 m	1.7 m
4/17/2002	SM-0499	--	8:50	2.3 m	150 m	25 m	98 m	<0.06 m	2.2 m	0.67 m		0.42 m	3.8 m
6/19/2002	SM-0539	--	9:10	1.7	130	20	82	0.06	1.8	0.56		0.1	2.7
8/21/2002	SM-0579	--	9:05	2.5 m	250 m	27 m	149 m	0.07 m	7.9 m	0.97 m		0.28 m	4.7 m
10/16/2002	SM-0619	--	9:00	2.5 m	160 m	29 m	102 m	0.08 bm	3.2 m	0.75 m		0.14 m	3.3 m
1/15/2003	SM-0659	--	9:10	1.4 m	140 m	22 m	80 m	0.54 hm	2.0 m	0.67 m	--	0.48 hm	3.8 m
3/26/2003	SM-0700	--	9:10	1.1 m	110 m	14 m	60 m	<0.06 m	1.3 m	0.48 m	--	0.17 m	1.4 m
5/15/2003	SM-0741	--	9:30	1.8 m	130 m	19 m	76 m	<0.06 m	2.0 m	0.65 m	--	0.16 jm	2.6 m
7/16/2003	SM-0782	--	8:55	2.8 m	180 m	27 m	110 m	<0.06 m	2.6 m	0.57 m	--	0.27 m	4.0 jm
9/17/2003	SM-0834	--	8:50	3.1 m	130 m	24 m	79 m	<0.06 m	2.0 m	--	2.7 bhm	0.18 m	3.4 m
11/12/2003	SM-0877	--	9:05	2.4* m	--	--	--	<0.03 hm	1.4 hm	--	1.8 hm	0.35 hm	--
2/25/2004	SM-0919	--	9:00	2.9* m	--	--	--	<0.01 jm	2.2 jm		2.8 jm	0.71 m	--
4/21/2004	SM-0960	--	9:00	2.3* m	--	--	--	<0.01 jm	1.2 djm		1.7 jm	0.049 hm	--
6/16/2004	SM-1001	SM-1002	8:45	3.1* m	--	--	--	<0.03 jm	2.9 djm		3.9 djm	0.39 m	--
8/18/2004	SM-1043	SM-1044	9:15	1.9 m	220 m	25 m	140 m	<0.03 m	6.5 m		7.0 m	0.39 m	2.4 m
10/20/2004	SM-1084	SM-1085	9:05	1.6 m	110 m	23 m	82 m	<0.06 hm	1.5 m		1.9 m	0.13 m	1.4 m
10/20/2004	SM-1085	SM-1084	9:05	1.6 m	110 m	23 m	79 m	--	1.5 m		1.9 m	0.13 m	1.7 m

Table 15 MassDEP SMART 2000-2004 SuAsCo Watershed Nutrients, Chlorides, Hardness, Total Alkalinity, Total Suspended Solids and Turbidity Data. Station AS18

ASSABET RIVER (Saris: 8246775)

Unique_ID: W0697 Station: AS18, Mile Point: 7.6

Description: approximately 50 meters upstream/southwest of the Route 27/62 bridge, Maynard.

Date	OWMID	QAQC	Time	Turb	Chloride	Alk	Hard	NH3-N	NO3-NO2-N	TKN	TN	TP	TSS
			24hr	NTU	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/L	mg/l	mg/l
3/8/2000	SM-0004		11:09	1.3	73	10	45	<0.02	0.8	0.3		0.12	4
5/3/2000	SM-0043	SM-0044	11:30	2.2	65	13	40	<0.02	0.44	0.43		0.1	7.3
7/12/2000	SM-0097	SM-0098	10:54	1.2	100	24	61	<0.02	0.75	0.56		0.15	2.1
8/28/2000	SM-0144	SM-0145	11:41	0.8	99	26	64	<0.02	0.86	0.38		0.09	1.3
11/15/2000	SM-0184	SM-0185	10:40	2.5	66	16	47	<0.02d	1	0.58		0.2	2.4
2/21/2001	SM-0222	SM-0223	11:32	1.9	130	16	59	0.08	1.2	0.7		0.18	1.3
4/18/2001	SM-0262	SM-0263	11:34	2	88	12	46	0.06	0.51	0.55		0.12	2.8
6/20/2001	SM-0302	SM-0303	11:04	2.7	58	##d	22d	<0.02	0.31	0.62		0.23	14d
8/15/2001	SM-0343	SM-0342	**	0.85	120	33	76	<0.02	1	0.67		0.11d	1.1
10/24/2001	SM-0383	SM-0382	**	1.9	150	35	94	<0.02	2.4	1.1		0.11	4.2
12/12/2001	SM-0423	SM-0422	**	2.6	130	33	70	0.11	2.9	0.92		0.7	5.0d
2/28/2002	SM-0461	SM-0462	11:50	2.4	140	18	68	<0.02	1.5 b	0.6		0.43	4.1
6/19/2002	SM-0541	SM-0542	10:55	2.1 d	100	19	52	<0.06	0.83	0.53		0.080 d	2.6
8/21/2002	SM-0581	SM-0582	10:55	0.75	180	45	96	<0.06	1.1	0.87		0.063 d	1.5
10/16/2002	SM-0621	SM-0622	10:50	1	160	40	89	0.17 b	3.8	0.87		0.083	1.3
1/15/2003	SM-0661	SM-0662	11:30	0.92	130	14	59	0.49 h	1.3	0.66	--	0.13	<1.0
3/26/2003	SM-0702	SM-0703	10:45	0.87	84	8	41	<0.06	0.64	0.41	--	0.057	1.5
5/15/2003	SM-0743	SM-0744	11:40	2.5	110	17	56	<0.02	0.88	0.65	--	0.092 j	3.9
7/16/2003	SM-0784	SM-0785	10:40	1.5	120	25	65	<0.06	1.3	0.6	--	0.11	1.9 j
9/17/2003	SM-0836	SM-0837	10:55	1.1	130	29	72	<0.02	1.8	--	2.4 bh	0.054	1.9
11/12/2003	SM-0879	SM-0880	11:05	3.4*	--	--	--	<0.03 h	0.74 h	--	1.0 h	0.10 h	--
2/25/2004	SM-0921	SM-0922	11:05	3.2*	--	--	--	0.46 j	1.4 dj		2.4 dj	0.22	--
4/21/2004	SM-0962	SM-0963	11:10	2.9*	--	--	--	<0.01 j	0.30 dj		0.86 j	0.058	--
6/16/2004	SM-1004	--	10:50	6.8*	--	--	--	0.03 j	0.78 j		1.4 j	0.1	--
8/18/2004	SM-1046	--	11:10	1.1	150	40	79	<0.03	1.6		2.1	0.085	2.4
10/20/2004	SM-1087	--	10:40	2.2	98	25	68	0.06 h	1.1		1.5	0.075	2.8

Table 16 MassDEP SMART 2000-2004 SuAsCo Watershed Nutrients, Chlorides, Hardness, Total Alkalinity, Total Suspended Solids and Turbidity Data. Station NA01

NASHOBA BROOK (Saris: 8246875)

Unique_ID: W0698 Station: NA01, Mile Point: 4.3

Description: upstream/north of footbridge in Nashoba Brook Conservation Area southeast of Wheeler Lane, Acton

Date	OWMID	QAQC	Time	Turb	Chloride	Alk	Hard	NH3-N	NO3-NO2-N	TKN	TN	TP	TSS
			24hr	NTU	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/L	mg/l	mg/l
3/8/2000	SM-0005		11:56	0.8	68	10	43	0.2	0.7	0.44		0.026	<1.0
5/3/2000	SM-0045		12:15	1	64	13	39	0.04	0.38	0.5		0.023	1.2
7/12/2000	SM-0099		11:42	2.5	75	26	55	<0.02	0.55	0.64		0.069	1.1
8/28/2000	SM-0146		12:27	0.85	70	30	54	<0.02	0.56	0.58		0.06	<1.0
11/15/2000	SM-0186		11:26	1.9	54	19	37	0.14	0.39	0.75		0.073	1.4
2/21/2001	SM-0224	--	12:10	1.3	100	18	52	0.85	0.73	1.3		0.037	<1.0
4/18/2001	SM-0264	--	12:09	0.95	73	13	43	0.3	0.47	0.65		0.024	2.3
6/20/2001	SM-0304	--	11:39	2.2	55	15	35	0.23	0.29	1.1		0.13	2
8/15/2001	SM-0344	--	11:55	1.9	93	26	54	0.25	0.44	1.1		0.14	1.9
10/24/2001	SM-0384	--	11:35	2.1	64	34	58	<0.02	0.76	0.66		0.06	3.7
12/12/2001	SM-0424	--	12:10	2.7	88	28	59	0.38	1.2	0.7		0.07	1
2/28/2002	SM-0463	--	12:40	1.2	89	17	59	0.43	0.59 b	0.8		0.057	1.1
4/17/2002	SM-0503	--	11:05	1.5	100	18	58	<0.06	0.27	0.68		0.049	1.4
6/19/2002	SM-0543	--	11:35	2	64	18	44	<0.02	0.26	0.67		0.076	1.7
8/21/2002	SM-0583	--	11:25	3.8	74	47	61	0.09	0.09	0.71		0.14	1.3
10/16/2002	SM-0623	--	11:30	2	110	25	71	0.37 b	0.48	0.77		0.098	1.3
1/15/2003	SM-0663	--	12:20	0.87 m	130 m	16 m	63 m	0.98 hm	0.98 m	1.1 m	--	0.027 m	<1.0 m
3/26/2003	SM-0704	--	11:30	0.53 m	80 m	10 m	40 m	0.42 m	0.55 m	0.78 m	--	0.027 m	<1.0 m
5/15/2003	SM-0745	--	12:20	1.6	110	17	55	0.09	0.52	0.79	--	0.054 j	1.5
7/16/2003	SM-0786	--	11:20	1.5	110	28	62	0.42	0.49	1.2	--	0.1	3.6 j
9/17/2003	SM-0838	--	11:30	3.9	98	15	56	0.38	0.44	--	1.7 bh	0.13	3.8
11/12/2003	SM-0881	--	11:45	1.9*	--	--	--	0.22 h	0.43 h	--	0.86 h	0.030 h	--
2/25/2004	SM-0923	--	11:55	2.3*	--	--	--	0.90 j	0.62 j		2.2 j	0.041	--
4/21/2004	SM-0964	--	11:45	1.2*	--	--	--	<0.04 j	0.47 dj		0.93 j	0.067	--
6/16/2004	SM-1005	--	11:30	4.1*	--	--	--	0.07 j	0.92 j		1.6 j	0.071	--
8/18/2004	SM-1047	--	11:55	2.5	93	27	59	0.2	0.62		1.7	0.13	2.7
10/20/2004	SM-1088	--	11:15	1.9	95	22	64	0.23 hj	0.57		1.3	0.054	3.7

Table 17 MassDEP SMART 2000-2004 SuAsCo Watershed Nutrients, Chlorides, Hardness, Total Alkalinity, Total Suspended Solids and Turbidity Data. Station SU07

SUDBURY RIVER (Saris: 8247650)

Unique_ID: W0696 Station: SU07, Mile Point: 16.5

Description: just upstream/south of Danforth Street, Framingham

Date	OWMID	QAQC	Time	Turb	Chloride	Alk	Hard	NH3-N	NO3-NO2-N	TKN	TN	TP	TSS
			24hr	NTU	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/L	mg/l	mg/l
3/8/2000	SM-0003		10:16	1.3	84	16	44	<0.02	0.3	0.26		0.017	1.6
5/3/2000	SM-0042		10:46	1.9	72	15	39	<0.02	0.31	0.39		0.021	2.2
7/12/2000	SM-0096		10:05	2.1	100	25	56	<0.02	0.3	0.42		0.04	2
8/28/2000	SM-0143		10:51	0.6	96	26	58	<0.02	0.24	0.24		0.02	<1.0
11/15/2000	SM-0183		9:59	2	82	19	45	<0.02	0.15	0.32		0.022	1.3
2/21/2001	SM-0221	--	10:44	2.3	140	15	52	<0.02	0.4	0.55		0.017	1
4/18/2001	SM-0261	--	10:48	1.6	99	12	43	<0.02	0.45	0.33		0.017	1.4
6/20/2001	SM-0301	--	10:19	2.7	95	17	43	<0.02	0.2	0.49		0.046	2
8/15/2001	SM-0341	--	10:15	1.1	100	22	49	<0.02	0.2	0.38		0.036	<1.0
10/24/2001	SM-0381	--	10:10	1.5	140	29	71	<0.02	0.14	0.4		0.02	<1.0
12/12/2001	SM-0421	--	10:15	2.2	140	27	60	<0.02	0.13	0.54		0.02	1.3
2/28/2002	SM-0460	--	10:45	1.6	150	17	71	0.08	0.20 b	0.3		0.014 hj	1.1
4/17/2002	SM-0500	--	10:05	1.3	130	16	65	<0.06	0.19	0.44		0.017	1.3
6/19/2002	SM-0540	--	10:15	1.6	100	17	49	<0.06	0.18	0.46		0.024	1.6
8/21/2002	SM-0580	--	10:10	0.8	140	28	72	<0.02	0.2	0.54		0.025	<1.0
10/16/2002	SM-0620	--	10:00	1.1	110	21	63	0.07 b	0.09	0.43		0.022	<1.0
1/15/2003	SM-0660	--	10:35	1.1	120	11	48	0.25 h	0.56	0.41	--	0.018	<1.0
3/26/2003	SM-0701	--	10:10	1.3	110	11	43	<0.02	0.65	0.44	--	0.025	1.2
5/15/2003	SM-0742	--	10:45	2.2	120	17	52	<0.02	0.33	0.51	--	0.036	24
7/16/2003	SM-0783	--	9:55	2.1	120	25	55	<0.02	0.31	0.56	--	0.045	1.5 j
9/17/2003	SM-0835	--	10:05	2	98	17	48	<0.02	0.16	--	0.70 bh	0.038	2.6
11/12/2003	SM-0878	--	9:55	2.2*	--	--	--	<0.01 h	0.20 h	--	0.48 h	0.023 h	--
2/25/2004	SM-0920	--	10:25	2.1*	--	--	--	<0.01 j	0.30 j		0.51 j	0.028	--
4/21/2004	SM-0961	--	10:20	2.1*	--	--	--	<0.01 j	0.40 dj		0.71 j	0.029	--
6/16/2004	SM-1003	--	10:05	3.3*	--	--	--	<0.03 j	0.33 j		0.67 j	0.031	--
8/18/2004	SM-1045	--	10:30	2	93	24	42	<0.01	0.11		0.53	0.029	4.2
10/20/2004	SM-1086	--	10:00	2.2	75	21	42	<0.06 h	0.2		0.48	0.019	<1.0

Table 18 MassDEP SMART 2000-2004 SuAsCo Watershed Nutrients, Chlorides, Hardness, Total Alkalinity, Total Suspended Solids and Turbidity Data. Station CO7

CONCORD RIVER (Saris: 8246500)

Unique_ID: W0679 Station: CO7, Mile Point: 0.8

Description: approximately 100 meters downstream/north from Rogers Street, Lowell

Date	OWMID	QAQC	Time	Turb	Chloride	Alk	Hard	NH3-N	NO3-NO2-N	TKN	TN	TP	TSS
			24hr	NTU	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/L	mg/l	mg/l
3/8/2000	SM-0006		12:53	2.1	69	13	41	0.02	0.52	0.37		0.082	4.1
5/3/2000	SM-0046		13:13	2.3	60	14	35	<0.02	0.28	0.5		0.067	4.9
7/12/2000	SM-0100		12:44	5.1	75	30	56	0.06	0.51	0.96		0.15	11
8/28/2000	SM-0147		13:26	0.2	85	28	60	<0.02	0.77	0.52		0.11	3.7
11/15/2000	SM-0187		12:20	4.4	63	21	47	0.06	0.99	0.61		0.18	7.1
2/21/2001	SM-0225	--	13:07	2	120	18	54	0.18	1	0.67		0.094	2.5
4/18/2001	SM-0265	--	13:49	2.2	80	13	42	<0.02	0.31	0.53		0.067	5.4
6/20/2001	SM-0305	--	12:29	4.5	58	17	36	<0.02	0.54	0.77		0.17	7
8/15/2001	SM-0345	--	12:55	5.7	93	33	62	<0.02	0.56	0.78		0.17	8
10/24/2001	SM-0385	--	12:30	3	110	44	81	<0.02	1.3	0.74		0.16	6.6
12/12/2001	SM-0425	--	13:05	6.6	110	38	72	<0.02	1.9	1.1		0.26	13
2/28/2002	SM-0464	--	13:30	5	120	20	69	<0.02	1.1 b	0.7		0.24	7.6
4/17/2002	SM-0502	SM-0504	12:05	7.4	110	21	62	<0.06	0.36	0.93		0.14	15
4/17/2002	SM-0504	SM-0502	12:05	6.9	110	21	63	<0.06	0.35	0.92		0.14	14
6/19/2002	SM-0544	--	12:30	4.3	86	22	51	0.07	0.58	0.75		0.14	9
8/21/2002	SM-0584	--	12:20	2.5	140	46	80	0.06	1.9	0.93		0.18	3.7
10/16/2002	SM-0624	--	12:20	5.8	100	36	74	0.09 b	0.94	0.87		0.19	12
3/26/2003	SM-0705	--	12:20	1.8	79	9	38	<0.02	0.58	0.46	--	0.065	4.7
5/15/2003	SM-0746	--	13:15	3.7	110	20	56	<0.02	0.73	0.66	--	0.092 j	7.8
7/16/2003	SM-0787	--	12:05	5.3	98	25	58	<0.02	0.97	0.95	--	0.16	11 j
9/17/2003	SM-0839	--	12:20	4.5	110	30	68	0.14	1.1	--	2.0 bh	0.11	8.9
11/12/2003	SM-0882	--	12:35	2.7*	--	--	--	<0.03 h	0.29 h	--	0.64 h	0.054 h	--
2/25/2004	SM-0924	--	12:50	2.9*	--	--	--	0.19 j	1.3 j		1.9 j	0.11	--
4/21/2004	SM-0965	--	12:40	3.4*	--	--	--	0.45 j	0.64 dj		1.8 j	0.042	--
6/16/2004	SM-1006	--	12:20	7.6*	--	--	--	<0.01 j	0.39 j		1.2 j	0.086	--
8/18/2004	SM-1048	--	12:55	3.4	84	28	51	<0.03	0.66		1.3	0.087	6.1
10/20/2004	SM-1089	--	12:15	2.5	93	25	60	<0.06 h	1.1		1.6	0.064	4.4

Table 19 MassDEP SMART 2000-2004 SuAsCo Watershed Ambient Field Blanks

Field Blank Data for SuAsCo samples collected in 2000													
Date	**OWMID**	**QAQC**	**Time**	**Turb**	**Chloride**	**Alk**	**Hard**	**NH3-N**	**NO3-NO2-N**	**TKN**	**TN**	**TP**	**TSS**
			24hr	**NTU**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/L**	**mg/l**	**mg/l**
3/8/2000	SM-0007	Blank	13:00	<0.1	<1.0	<2	<0.66	<0.02	<0.02	<0.10		<0.005	<1.0
5/3/2000	SM-0047	Blank	13:20	<0.1	<1.0	<2	<0.66	<0.02	<0.02	<0.10		<0.010	<1.0
7/12/2000	SM-0101	Blank	12:49	<0.1	<2.0	<2	<0.66	<0.02	<0.02	<0.10		<0.010	<1.0
8/28/2000	SM-0148	Blank	13:31	<0.1	<2.0	<2	<0.66	<0.02	<0.02	<0.10		<0.01	<1.0
11/15/2000	SM-0188	Blank	12:25	<0.1	<1.0	<2	<0.66	<0.02	<0.02	<0.10		<0.010	<1.0
2/21/2001	SM-0226	Blank	13:12	<0.10	<1	<2	<0.66	<0.02	<0.06	<0.10		<0.010	<1.0
4/18/2001	SM-0266	Blank	13:54	<0.10	<1	<2	<0.66	<0.02	<0.06	<0.10		<0.010	<1.0
6/20/2001	SM-0306	Blank	12:34	<0.10	<1	<2	<0.66	<0.02	<0.06	<0.10		<0.010	<1.0
8/15/2001	SM-0346	Blank	**	<0.10	<1	<2	<0.66	<0.02	<0.06	<0.10		<0.005	<1.0
10/24/2001	SM-0386	Blank	**	<0.10	<1	<2	<0.66	<0.02	<0.06	<0.10		<0.005	<1.0
12/12/2001	SM-0426	Blank	**	<0.10	1b	<2.0	<0.66	<0.02	<0.06	<0.10		<0.005	<1.0
2/28/2002	SM-0465	Blank	13:20j	<0.10	<1.0	<2.0	<0.66	<0.02	[0.10] b	<0.10		<0.005	<1.0
4/17/2002	SM-0505	Blank	11:55j	<0.10	<1.0	<2.0	<0.66	<0.02	<0.02	<0.10		<0.005	<1.0
6/19/2002	SM-0545	Blank	12:25j	<0.10	<1.0	<2.0	<0.66	<0.02	<0.02	<0.10		<0.005	<1.0
8/21/2002	SM-0585	Blank	12:10j	<0.10	<1.0	<2.0	<0.66	<0.02	<0.02	<0.10		<0.005	<1.0
10/16/2002	SM-0625	Blank	12:10j	<0.10	<1.0	<2.0	<0.66	0.07 b	<0.02	<0.10		<0.005	<1.0
1/15/2003	SM-0665	Blank	12:10j	<0.10	<1	<2	<0.66	<0.06 h	<0.02	<0.10	--	<0.005	<1.0
3/26/2003	SM-0706	Blank	12:10j	<0.10	<1	<2	<0.66	<0.06	<0.02	0.10 b	--	<0.005	<1.0
5/15/2003	SM-0747	Blank	13:10j	<0.10	<1	<2	<0.66	<0.02	<0.02	<0.10	--	<0.005 j	<1.0
7/16/2003	SM-0788	Blank	12:00j	<0.10	<1	<2	<0.66	<0.02	<0.02	0.10 b	--	<0.005	<1.0 j
9/17/2003	SM-0840	Blank	12:15j	0.15	<1	<2	<0.66	<0.01 h	<0.02	--	0.15 bh	<0.005	<1.0
11/12/2003	SM-0883	Blank	12:25j	<0.5*	--	--	--	--	<0.02 h	--	<0.040 h	<0.005 h	--
2/25/2004	SM-0925	Blank	12:55	<0.5*	--	--	--	<0.01 j	<0.02 j		0.064 bj	<0.005	--
4/21/2004	SM-0966	Blank	12:45	<0.5*	--	--	--	<0.01 j	<0.02 dj		0.075 bj	<0.005	--
6/16/2004	SM-1007	Blank	12:25	<0.5*	--	--	--	<0.01 j	<0.02 j		0.067 bj	<0.005	--
8/18/2004	SM-1049	Blank	13:00	<0.10	<1	<2	<0.66	<0.01	<0.02		<0.12	<0.005	<1.0
10/20/2004	SM-1090	Blank	12:20	<0.36	1	<2	<0.66	<0.02 h	<0.06		<0.040	<0.005	<1.0

Table 20 Mass DEP SMART 2000-2004 SuAsCo Watershed Field Duplicate Results

ASSABET RIVER (Saris: 8246775)

Unique_ID: 695 Station: AS04, Mile Point: 28

Description: approximately 20 meters upstream/south of School Street, Northborough

Date	OWMID	QAQC	Time	Turb	Chloride	Alk	Hard	NH3-N	NO3-NO2-N	TKN	TN	TP	TSS
			24hr	NTU	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
3/8/2000	SM-0001	SM-0002	9:18	1	100	21	69	0.06	1.5	0.39		0.37	1.1
3/8/2000	SM-0002	SM-0001	9:23	1	100	22	69	0.06	1.5	0.41		0.37	<1.0
Relative Percent Difference				0.00%	0.00%	4.70%	0.00%	0.00%	0.00%	5.00%		0.00%	9.50%
6/16/2004	SM-1001	SM-1002	8:45	3.1* m	--	--	--	<0.03 jm	2.9 djm		3.9 djm	0.39 m	--
6/16/2004	SM-1002	SM-1001	8:45	3.2* m	--	--	--	<0.03 jm	3.7 djm		4.7 djm	0.47 m	--
Relative Percent Difference				3.20%				0.00%	24.20%		18.60%	18.60%	
8/18/2004	SM-1043	SM-1044	9:15	1.9 m	220 m	25 m	140 m	<0.03 m	6.5 m		7.0 m	0.39 m	2.4 m
8/18/2004	SM-1044	SM-1043	9:15	1.9 m	220 m	26 m	140 m	<0.03 m	6.5 m		7.1 m	0.39 m	2.7 m
Relative Percent Difference				0.00%	0.00%	3.90%	0.00%	0.00%	0.00%		1.40%	0.00%	11.80%
10/20/2004	SM-1084	SM-1085	9:05	1.6 m	110 m	23 m	<0.66 m	<0.06 hm	1.5 m		1.9 m	0.13 m	1.4 m
10/20/2004	SM-1085	SM-1084	9:05	1.6 m	110 m	23 m	<0.66 m	<0.06 hm	1.5 m		1.9 m	0.13 m	1.7 m
Relative Percent Difference				0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		0.00%	0.00%	19.40%

Table 20 continued. DEP SMART 2000-2004 SuAsCo Watershed Field Duplicate Results

ASSABET RIVER (Saris: 8246775)

Unique_ID: 697 Station: AS18, Mile Point: 7.6

Description: approximately 50 meters upstream/southwest of the Route 27/62 bridge, Maynard.

Date	OWMID	QAQC	Time	Turb	Chloride	Alk	Hard	NH3-N	NO3-NO2-N	TKN	TN	TP	TSS
			24hr	NTU	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
5/3/2000	SM-0043	SM-0044	11:30	2.2	65	13	40	<0.02	0.44	0.43		0.1	7.3
5/3/2000	SM-0044	SM-0043	11:35	2.2	64	13	40	<0.02	0.44	0.44		0.1	6.6
Relative Percent Difference				0.00%	1.60%	0.00%	0.00%	0.00%	0.00%	2.30%		0.00%	10.10%
7/12/2000	SM-0097	SM-0098	10:54	1.2	100	24	61	<0.02	0.75	0.56		0.15	2.1
7/12/2000	SM-0098	SM-0097	10:59	1.2	100	24	61	<0.02	0.77	0.58		0.14	1.7
Relative Percent Difference				0.00%	0.00%	0.00%	0.00%	0.00%	2.60%	3.50%		6.90%	21.10%
8/28/2000	SM-0144	SM-0145	11:41	0.8	99	26	64	<0.02	0.86	0.38		0.09	1.3
8/28/2000	SM-0145	SM-0144	11:46	0.9	100	26	64	<0.02	0.86	0.47		0.09	1.2
Relative Percent Difference				11.80%	1.00%	0.00%	0.00%	0.00%	0.00%	21.20%		0.00%	8.00%

Table 20 continued. DEP SMART 2000-2004 SuAsCo Watershed Field Duplicate Results

	OWMID	QAQC	Time	Turb	Chloride	Alk	Hard	NH3-N	NO3-NO2-N	TKN	TN	TP	TSS
			24hr	NTU	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Relative Percent Difference				0.00%	0.00%	0.00%	0.00%	85.70%	0.00%	14.80%		0.00%	11.80%
2/21/2001	SM-0222	SM-0223	11:32	1.9	130	16	59	0.08	1.2	0.7		0.18	1.3
2/21/2001	SM-0223	SM-0222	11:37	1.9	130	15	60	0.08	1.2	0.71		0.18	1.5
Relative Percent Difference				0.00%	0.00%	6.50%	1.70%	0.00%	0.00%	1.40%		0.00%	14.30%
4/18/2001	SM-0262	SM-0263	11:34	2	88	12	46	0.06	0.51	0.55		0.12	2.8
4/18/2001	SM-0263	SM-0262	11:39	1.8	89	12	46	0.05	0.48	0.44		0.13	2.9
Relative Percent Difference				10.50%	1.10%	0.00%	0.00%	18.20%	6.10%	22.20%		8.00%	3.50%
6/20/2001	SM-0302	SM-0303	11:04	2.7	58	##d	22d	<0.02	0.31	0.62		0.23	14d
6/20/2001	SM-0303	SM-0302	11:09	3	60	##d	36d	<0.02	0.31	0.65		0.22	9.9d
Relative Percent Difference				10.50%	3.40%		48.30%	0.00%	0.00%	4.70%		4.40%	34.30%
8/15/2001	SM-0343	SM-0342	**	0.85	120	33	76	<0.02	1	0.67		0.11d	1.1
8/15/2001	SM-0342	SM-0343	11:25	1.1	130	33	76	<0.02	1	0.69		0.15d	1.6
Relative Percent Difference				25.60%	8.00%	0.00%	0.00%	0.00%	0.00%	2.90%		30.80%	37.00%
10/24/2001	SM-0383	SM-0382	**	1.9	150	35	94	<0.02	2.4	1.1		0.11	4.2
10/24/2001	SM-0382	SM-0383	11:05	1.9	160	35	94	<0.02	2.4	1.1		0.11	4.2
Relative Percent Difference				0.00%	6.50%	0.00%	0.00%	0.00%	0.00%	0.00%		0.00%	0.00%
12/12/2001	SM-0423	SM-0422	**	2.6	130	33	70	0.11	2.9	0.92		0.7	5.0d
12/12/2001	SM-0422	SM-0423	11:10	2.6	130	34	69	0.1	2.8	0.99		0.69	3.8d
Relative Percent Difference				0.00%	0.00%	3.00%	1.40%	9.50%	3.50%	7.30%		1.40%	27.30%
2/28/2002	SM-0461	SM-0462	11:50	2.4	140	18	68	<0.02	1.5 b	0.6		0.43	4.1
2/28/2002	SM-0462	SM-0461	11:50	2.4	130	19	69	0.06	1.5 b	0.7		0.46	4
Relative Percent Difference				0.00%	7.40%	5.40%	1.50%	100.00%	**Date**	15.40%		6.70%	2.50%
			24hr	NTU	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
6/19/2002	SM-0541	SM-0542	10:55	2.1 d	100	19	52	<0.06	0.83	0.53		0.080 d	2.6
6/19/2002	SM-0542	SM-0541	10:55	1.3 d	92	19	53	<0.06	0.82	0.51		0.099 d	2.8
Relative Percent Difference				47.10%	8.30%	0.00%	1.90%	0.00%	1.20%	3.80%		21.20%	7.40%
8/21/2002	SM-0581	SM-0582	10:55	0.75	180	45	96	<0.06	1.1	0.87		0.063 d	1.5
8/21/2002	SM-0582	SM-0581	10:55	0.75	180	44	96	<0.06	1.1	0.87		0.079 d	1.5
Relative Percent Difference				0.00%	0.00%	2.20%	0.00%	0.00%	0.00%	0.00%		22.50%	0.00%
10/16/2002	SM-0621	SM-0622	10:50	1	160	40	89	0.17 b	3.8	0.87		0.083	1.3
10/16/2002	SM-0622	SM-0621	10:50	0.95	160	40	92	0.16 b	3.8	0.83		0.078	1.4
Relative Percent Difference				5.10%	0.00%	0.00%	3.30%	6.10%	0.00%	4.70%		6.20%	7.40%

Table 20 continued. DEP SMART 2000-2004 SuAsCo Watershed Field Duplicate Results

	OWMID	QAQC	Time	Turb	Chloride	Alk	Hard	NH3-N	NO3-NO2-N	TKN	TN	TP	TSS
			24hr	NTU	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Relative Percent Difference				8.30%	0.00%	0.00%	0.00%	20.20%	0.00%	1.50%	--	0.00%	0.00%
3/26/2003	SM-0702	SM-0703	10:45	0.87	84	8	41	<0.06	0.64	0.41	--	0.057	1.5
3/26/2003	SM-0703	SM-0702	10:45	0.91	82	8	41	<0.06	0.69	0.38	--	0.059	1.6
Relative Percent Difference				4.50%	2.40%	0.00%	0.00%	0.00%	7.50%	7.60%	--	3.40%	6.50%
5/15/2003	SM-0743	SM-0744	11:40	2.5	110	17	56	<0.02	0.88	0.65	--	0.092 j	3.9
5/15/2003	SM-0744	SM-0743	11:40	2.3	110	18	57	<0.02	0.9	0.61	--	0.094 j	4
Relative Percent Difference				8.30%	0.00%	5.70%	1.80%	0.00%	2.20%	6.30%	--	2.20%	2.50%
7/16/2003	SM-0784	SM-0785	10:40	1.5	120	25	65	<0.06	1.3	0.6	--	0.11	1.9 j
7/16/2003	SM-0785	SM-0784	10:40	1.5	120	24	66	<0.02	1.3	0.59	--	0.11	1.8 j
Relative Percent Difference				0.00%	0.00%	4.10%	1.50%	100.00%	0.00%	1.70%	--	0.00%	5.40%
9/17/2003	SM-0836	SM-0837	10:55	1.1	130	29	72	<0.02	1.8	--	2.4 bh	0.054	1.9
9/17/2003	SM-0837	SM-0836	10:55	1.2	130	29	73	<0.02	1.7	--	2.4 bh	0.051	2.1
Relative Percent Difference				8.70%	0.00%	0.00%	1.40%	0.00%	5.70%	--	0.00%	5.70%	10.00%
11/12/2003	SM-0879	SM-0880	11:05	3.4*	--	--	--	<0.03 h	0.74 h	--	1.0 h	0.10 h	--
11/12/2003	SM-0880	SM-0879	11:05	3.9*	--	--	--	<0.03 h	0.78 h	--	1.0 h	0.11 h	--
Relative Percent Difference				13.70%	--	--	--	0.00%	5.30%	--	0.00%	9.50%	--
2/25/2004	SM-0921	SM-0922	11:05	3.2*	--	--	--	0.46 j	1.4 dj		2.4 dj	0.22	--
2/25/2004	SM-0922	SM-0921	11:05	2.4*	--	--	--	0.53 j	1.7 dj		2.9 dj	0.26	--
Relative Percent Difference				28.60%				14.10%	19.40%		18.90%	16.70%	
4/21/2004	SM-0962	SM-0963	11:10	2.9*	--	--	--	<0.01 j	0.30 dj		0.86 j	0.058	--
4/21/2004	SM-0963	SM-0962	11:10	3.4*	--	--	--	<0.04 j	0.50 dj		0.94 j	0.066	--
Relative Percent Difference				15.90%				120.00%	50.00%		8.90%	12.90%	

CONCORD RIVER (Saris: 8246500)

Unique_ID: W0679 Station: CO7, Mile Point: 0.845

Description: at USGS flow gauging station #01099500 downstream of Rogers Street, Lowell

Date	OWMID	QAQC	Time	Turb	Turb	Chloride	Alk	Hard	NH3-N	NO3-NO2-N	TKN	TP	TSS
			(24hr)	NTU	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
4/17/2002	SM-0502	SM-0504	12:05	--	7.4	110	21	62	<0.06	0.36	0.93	0.14	15
4/17/2002	SM-0504	SM-0502	12:05	--	6.9	110	21	63	<0.06	0.35	0.92	0.14	14
Relative Percent Difference					7.00%	0.00%	0.00%	1.60%	0.00%	2.80%	1.10%	0.00%	6.90%

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