

*Technical Memorandum*

**IPSWICH WATERSHED 2005  
DWM WATER QUALITY MONITORING DATA**

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**Prepared by Matthew Reardon  
Massachusetts Department of Environmental Protection  
Division of Watershed Management  
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**COMMONWEALTH OF MASSACHUSETTS  
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS  
Richard K. Sullivan Jr., Secretary  
MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION  
Kenneth L. Kimmell, Commissioner  
BUREAU OF RESOURCE PROTECTION  
Bethany Card, Assistant Commissioner  
DIVISION OF WATERSHED MANAGEMENT**

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## Introduction

The Ipswich River Watershed water quality survey was conducted in 2005, as part of the Division of Watershed Management (DWM) monitoring. Consistent with the DWM's general approach to watershed monitoring to meet defined programmatic objectives, water quality surveys were conducted during the months of May, June, July, August, and September. This technical memorandum is designed to present final DWM-generated water quality monitoring data for use in watershed assessment reports and for reporting data to outside groups.

## Project Objectives

The goals of the DWM 2005 Ipswich River Watershed monitoring were to gather biological, physical and chemical data to assess designated uses, evaluate the impacts of National Pollution Discharge Elimination System (NPDES) discharges and non-point pollution on aquatic health, and to provide quality-assured data for pollution abatement programs. The specific objectives of the 2005 Ipswich Watershed monitoring were to:

- Provide biological, habitat, and dissolved oxygen, temperature, and chemical data to be used in making *Aquatic Life* and *Aesthetics* use assessments required by Section 305(b) of the Clean Water Act and provide data for other informational needs of Massachusetts regulatory agencies.
- Provide quality-assured fecal coliform and *E. coli* bacteria data for the purpose of assessing the *Primary* and *Secondary Contact Recreation* uses.
- Screen fish to provide data to the Massachusetts Department of Public Health (MDPH) for public health risk assessment due to fish tissue contaminants (metals, polychlorinated biphenyls (PCBs) and pesticides). The results of 2005 fish toxics monitoring are detailed in a separate technical memorandum (Maietta *et. al* 2009).
- Collect benthic macroinvertebrate data to assess the *Aquatic Life Use*. The results of the 2005 benthic macroinvertebrate monitoring are detailed in a separate technical memorandum (Johnson and Fiorentino 2011).
- Conduct fish population monitoring to assess the *Aquatic Life Use* and determine the presence, if any, of cold-water fisheries within sampled streams. The results of the 2005 fish population monitoring are detailed in a separate technical memorandum (Maietta 2006).
- Gather stream temperature data to determine whether a cold-water fishery exists in segments sampled.

## Sampling Plan

Information pertaining to station location, rationale, and objectives is available in the *Sampling Plan for Year 2005: Surface Water Monitoring in the Ipswich River Watershed* (CN 220.2, MassDEP 2005a). For a description of the DWM's general approach to watershed monitoring, see the *MADEP, DWM QAPP for Surface Water Monitoring and Assessment, 2005-2009* (MassDEP 2005b). Table 1 and Figure 1 provide details and locations of the 2005 sampling sites.

Samples for total phosphorus, total nitrogen, ammonia-nitrogen, total suspended solids, color, turbidity, bacteria counts (fecal coliform and *E. coli*), dissolved oxygen and other field measurements were obtained from a total of six stations. Bacteria counts only (fecal coliform and *E. coli*) were collected at five stations while dissolved oxygen and other field measurements and bacteria counts (fecal coliform and *E. coli*) were obtained from three stations. Water quality surveys (grab samples and in-situ measurements) were conducted on the following dates: May 24<sup>th</sup>, June 21<sup>st</sup>, July 27<sup>th</sup>, August 24<sup>th</sup> and September 27<sup>th</sup>. Additionally, continuous temperature and dissolved oxygen monitoring with unattended metered probes were carried out for a minimum duration of 24 hours at nine sites. Continuous temperature monitoring was conducted at three sites to determine whether water quality meets the coldwater criterion.

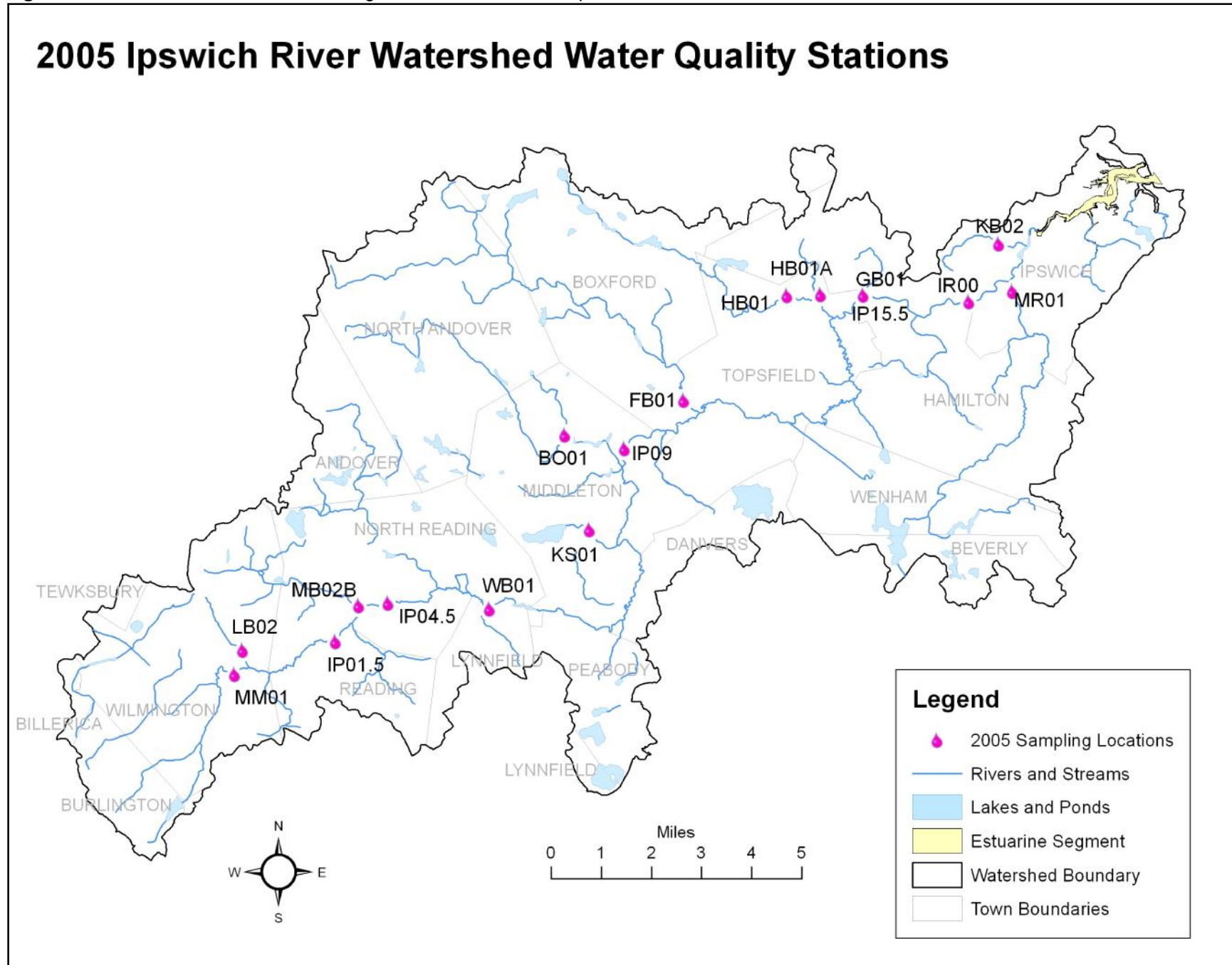
**Table 1.** Sampling sites, descriptions, parameters frequency for Ipswich River Watershed monitoring

Sampling Site Name	Unique ID# (Station ID)	Site Description	Parameters	Frequency
<b>River/Stream Water Quality Surveys</b>				
Maple Meadow Brook	W0143 (MM01)	Federal Street, Wilmington	Color, turbidity, TP, NH <sub>3</sub> -N, fecal coliform and <i>E. coli</i> bacteria  Attended ,multi-probe (DO; % saturation ; temperature; pH; depth; specific conductivity),	Single grab samples and Multi-probe for a total of 5 surveys
Lubbers Brook	W0139 (LB02)	Concord Street, Wilmington	Color, turbidity, TP, NH <sub>3</sub> -N, fecal coliform and <i>E. coli</i> bacteria  Attended multi-probe (DO; % saturation ; temperature; pH; depth; specific conductivity), unattended multi-probe	Single grab samples and attended multi-probe for a total of 5 surveys, 5 unattended deployments
Ipswich River	W0113 (IP01.5)	Mill Street, Reading/North Reading	Color, turbidity, hardness, TP, NH <sub>3</sub> -N, fecal coliform and <i>E. coli</i> bacteria  Multi-probe (DO; % saturation ; temperature; pH; depth; specific conductivity), unattended multi-probe	Single grab samples and attended multi-probe for a total of 5 surveys, 4 unattended deployments
	W0112 (IP04.5)	Central Street, North Reading	Same as above	Same as above
	W0110 (IP09)	Peabody Street, Middleton	Same as above	Same as above
Martins Brook	W0136 (MB02)	Park Street, North Reading	Same as above	Same as above
Wills Brook	W0135 (WB01)	near old railroad bed just upstream of confluence with Ipswich River, Lynnfield	fecal coliform and <i>E. coli</i> bacteria	Single grab samples
Unnamed Tributary	W0105 (KS01)	unnamed tributary to Ipswich River at Mt. Vernon Street, Middleton	Same as above	Same as above
Boston Brook	W0130 (BO01)	Liberty Street, Middleton	Color, turbidity, hardness, TP, NH <sub>3</sub> -N, fecal coliform and <i>E. coli</i> bacteria  Multi-probe (DO; % saturation ; temperature; pH; depth; specific conductivity), unattended multi-probe	Single grab samples and attended multi-probe for a total of 5 surveys, 4 unattended deployments

**Table 1 (cont.).** Sampling sites, descriptions, parameters frequency for Ipswich River Watershed monitoring

Sampling Site Name	Unique ID# (Station ID)	Site Description	Parameters	Frequency
River/Stream Water Quality Surveys				
Fish Brook	W0128 (FB01)	Washington Street/Endicott Road, Topsfield/Boxford	fecal coliform and <i>E. coli</i> bacteria, temperature monitoring	Single grab samples, one deployment
Howlett Brook	W0126 (HB01)	North Street, Topsfield	fecal coliform and <i>E. coli</i> bacteria,	Single grab samples
	W1410 (HB01A)	East Street, Topsfield	temperature monitoring	One deployment
Ipswich River	W0107 (IP15.5)	off Topsfield Road, Ipswich (upstream from confluence of Gravelly Brook)	Color, turbidity, TP, NH <sub>3</sub> -N, fecal coliform and <i>E. coli</i> bacteria Multi-probe (DO; % saturation ; temperature; pH; depth; specific conductivity), unattended multi-probe	Single grab samples and attended multi-probe for a total of 5 surveys, 4 unattended deployments
	W1394 (IR00)	Mill Road/Highland Street, Ipswich/Hamilton	Same as above as well as hardness	Same as above
Miles River	W0121 (MR01)	driveway of #187 County Road, (across from intersection with Lakeman Lane), Ipswich	Color, turbidity, hardness, TP, NH <sub>3</sub> -N, fecal coliform and <i>E. coli</i> bacteria Multi-probe (DO; % saturation ; temperature; pH; depth; specific conductivity), unattended multi-probe	Single grab samples and attended multi-probe for a total of 4 surveys
Kimball Brook	W0120 (KB02)	Heard Drive, Ipswich	fecal coliform and <i>E. coli</i> bacteria	Single grab samples
Gravelly Brook	W0124 (GB01)	Topsfield Road, Ipswich	temperature monitoring	One deployment

Figure 1: MassDEP DWM 2005 monitoring station locations in the Ipswich Watershed



## Field and Analytical Methods

Procedures used for water sampling and sample handling are described in the *Sample Collection Techniques for DWM Surface Water Quality Monitoring* (MassDEP 2004a). The Wall Experiment Station (WES) in Lawrence, MA supplied all sample bottles and field preservatives, which were prepared according to the WES *Laboratory Quality Assurance Plan and Standard Operating Procedures* (MassDEP 2001). Procedures for multi-probe calibration and deployment are described in *Water Quality Multi-probe Instrument Use* (MassDEP 2004b) and *Multi-probe Deployments for Unattended Logging* (MassDEP 2004c). Continuous temperature monitoring was conducted at three sites according to *Standard Operating Procedures: Continuous Temperature Monitoring* (MassDEP 2005c).

*In-situ* parameters (dissolved oxygen, percent saturation, pH, conductivity, temperature, and total dissolved solids) were measured using a multi-probe. Wade-in grab samples were collected and sent to the WES where they were analyzed for low-level total phosphorus (TP), total suspended solids (TSS), ammonia as nitrogen (NH<sub>3</sub>-N) and *E. coli* and fecal coliform bacteria.

Concurrent with the collection of water quality samples, site characteristics and sampling conditions were recorded on the DWM field sheets. Riparian vegetation, observed uses, potential pollution sources, the presence/absence of objectionable deposits (trash, debris and scum), the extent of periphyton/algae/aquatic plant growth within the sampling reach, and sampling conditions were all noted at each station.

## Quality Assurance and Quality Control

Procedures used were consistent with the prevailing DWM sampling protocols that are described in the *Sample Collection Techniques for DWM Surface Water Quality Monitoring* (MA DEP 2004a). For all water quality surveys, quality control samples (field blanks and duplicates) were taken at a minimum of one each per analyte per crew per survey.

The DWM quality assurance and database management staff reviewed lab data reports and all multi-probe data. The data were validated and finalized per appropriate data validation procedures as outlined in *DWM Water Quality Data Validation Process (Summary)* (MassDEP 2012a). Detailed data validation procedures for laboratory data, attended multi-probe data and unattended multi-probe data were conducted using appropriate procedures (MassDEP 2012b, MassDEP 2012c, MassDEP 2012d). A complete summary of the review process for all 2005 DWM data is provided in the *DWM Data Validation Report for Year 2005 Project Data* (MassDEP 2007). Appendix 1 of this technical memorandum contains definitions for all data qualifiers.

## Station Observations

Station observations were recorded on field sheets for each survey by a DWM investigator. Station observations are described below in Table 2 for each DWM water quality sampling event (MassDEP 2008). Note: If multiple types of periphyton were observed, the highest observed density is used in this table. If periphyton was selected and no density indicated, it was listed as sparse. Only field observations from water quality sampling field sheets are included in Table 2.

**Table 2.** 2005 Field observations from MA DEP DWM surveys

Waterbody	UniqueID	Station ID	Date	Flow Status	Odor	Water Clarity	Floating Scum	Obj. Deposits	Aquatic Plants	Periphyton	Summary of Comments
Boston Brook/Upper Boston Brook Pond	W0130	BO01	5/24/2005	Flowing	None	Slightly Turbid	No	No	None	Unobservable	
			6/21/2005	Flowing	Musty (basement)	Slightly Turbid	No	No	None	Moderate	Periphyton: Brown film on plants, rocks and bottom
			7/27/2005	Flowing	None	Slightly Turbid	No	No	None	Dense	Periphyton: Moss, Brown film on rocks and bottom in riffle, run and pool
			8/24/2005	Flowing	None	Clear	No	No	None	Dense	Periphyton: Moss, moderate brown filamentous on rocks
			9/27/2005	Flowing	None	Clear	No	No	None	Very Dense	Periphyton: Moss
Fish Brook	W0128	FB01	5/24/2005	Flowing	None	Moderately Turbid	No	Unobservable	Unobservable	Unobservable	
			6/21/2005	Flowing	None	Slightly Turbid	Yes	No	Unobservable	Unobservable	Scum: Oil sheens
			7/27/2005	Not Recorded	Not Recorded	Moderately Turbid	Yes	Unobservable	None	Unobservable	Scum: Oil sheens, pollen/dust blankets
			8/24/2005	Pooled	Musty (basement)	Highly turbid/murky	No	No	None	Sparse	Periphyton: Brown film on rocks
			9/27/2005	Pooled	None	Highly turbid/murky	Yes	No	None	Unobservable	Scum: Oil sheens



Waterbody	UniqueID	Station ID	Date	Flow Status	Odor	Water Clarity	Floating Scum	Obj. Deposits	Aquatic Plants	Periphyton	Summary of Comments
Howlett Brook	W0126	HB01	5/24/2005	Flowing	None	Moderately Turbid	No	No	Unobservable	Unobservable	
			6/21/2005	Flowing	None	Moderately Turbid	Yes	No	None	None	Scum: Oil sheens
			7/27/2005	Pooled	None	Highly turbid/murky	No	No	Unobservable	Unobservable	
			8/24/2005	Pooled	None	Highly turbid/murky	No	No	None	Unobservable	
			9/27/2005	Flowing	None	Slightly Turbid	No	No	None	Dense	Periphyton: Film on rocks and bottom
Ipswich River	W0107	IP15.5	5/24/2005	Flowing	None	Slightly Turbid	No	No	Unobservable	Unobservable	
			6/21/2005	Flowing	None	Moderately Turbid	No	No	None	Unobservable	
			7/27/2005	Flowing	None	Slightly Turbid	No	No	None	Sparse	Periphyton: Green film on rocks and woody debris, Moss
			8/24/2005	Flowing	Musty (basement)	Clear	No	No	Sparse	Moderate	Plants: Grass sp., Pickerelweed Periphyton: brown film on rocks
			9/27/2005	Flowing	None	Slightly Turbid	No	No	Sparse	Sparse	Plants: Vallisneria Periphyton: Moss, Brown film on rocks and bottom
	W0110	IP09	5/24/2005	Flowing	None	Slightly Turbid	No	No	Unobservable	Unobservable	
			6/21/2005	Flowing	None	Moderately Turbid	No	No	None	Sparse	
			7/27/2005	Not Recorded	Chlorine	Slightly Turbid	No	No	Dense	Dense	Plants: Grasslike Periphyton: brown filamentous on plants, rocks, bottom and on woody debris
			8/24/2005	Flowing	Musty (basement)	Clear	No	No	Dense	Dense	Plants: Duckweed, Pondweed Periphyton: Moss, Moderate brown film on plants, rocks and on woody debris
			9/27/2005	Flowing	None	Clear	No	No	None	Moderate	(blank)

Waterbody	UniqueID	Station ID	Date	Flow Status	Odor	Water Clarity	Floating Scum	Obj. Deposits	Aquatic Plants	Periphyton	Summary of Comments	
Ipswich River	W0112	IP04.5	5/24/2005	Flowing	None	Slightly Turbid	No	No	Unobservable	Unobservable		
			6/21/2005	Flowing	Musty (basement)	Clear	No	No	None	Sparse	Periphyton: Film	
			7/27/2005	Flowing	None	Clear	No	No	Moderate	Sparse	Plants: Pondweed Periphyton: Brown film on woody debris	
			8/24/2005	Flowing	None	Slightly Turbid	No	No	Dense	Sparse	Plants: Pondweed Periphyton: Green film on plants	
			9/27/2005	Pooled	None	Moderately Turbid	No	No	Sparse	Moderate	Plants: Pondweed, Unknown Grasslike, Unknown Periphyton: Brown film on plants	
	W0113	IP01.5	5/24/2005	Flowing	None	Clear	No	No	No	Not Recorded	Not Recorded	
			6/21/2005	Flowing	None	Not Recorded	No	No	Sparse	Moderate	Periphyton: Moss, Sparse greenish brown film on plants, rocks, bottom and woody debris	
			7/27/2005	Flowing	None	Slightly Turbid	No	No	Sparse	Very Dense	Plants: Duckweed Periphyton: Moss, Moderate brown film on plants, rocks, bottom and woody debris	
			8/24/2005	No Water, Pooled	Musty (basement)	Highly turbid/murky	Yes	No	Sparse	Not Recorded	Plants: Pickerelweed, Purple Loosestrife; Scum: Algal mat, algae, decomposing macrophytes (sparse)	
			9/27/2005	Pooled	Musty (basement)	Highly turbid/murky	No	No	Sparse	Sparse	Plants: Pickerelweed, Lemna Periphyton: Filamentous on rocks	
	W1394	IR00	5/24/2005	Flowing	None	Slightly Turbid	No	No	Sparse	Sparse	Periphyton: Green filamentous, Moss	
			6/21/2005	Flowing	None	Slightly Turbid	No	No	Sparse	Moderate	Periphyton: Moss, Sparse green film on plants, rocks, bottom and woody debris	
			7/27/2005	Not Recorded	None	Slightly Turbid	No	No	Sparse	Dense	Plants: Grasslike Periphyton: Moss, Brown filamentous on plants and rocks in run	

Waterbody	UniqueID	Station ID	Date	Flow Status	Odor	Water Clarity	Floating Scum	Obj. Deposits	Aquatic Plants	Periphyton	Summary of Comments
Ipswich River	W1394	IR00	8/24/2005	Flowing	Musty (basement)	Clear	No	No	Sparse	Dense	Plants: Grass sp., Cattail Periphyton: Moss, Moderate brown film on rocks and woody debris
			9/27/2005	Flowing	Musty (basement)	Slightly Turbid	No	No	Very Dense	Very Dense	Plants: Unknown Moss Periphyton: Moss, Green filamentous on plants, bottom and woody debris
Kimball Brook	W0120	KB02	5/24/2005	Flowing	None	Highly turbid/murky	No	No	Unobservable	Unobservable	
			6/21/2005	Flowing	None	Slightly Turbid	No	No	Sparse	None	Plants: Grasses
			7/27/2005	Flowing	None	Slightly Turbid	No	No	None	Sparse	Periphyton: Brown film on plants, rocks, bottom and woody debris in riffle, run and pool
			8/24/2005	Flowing	None	Clear	No	No	None	Sparse	Periphyton: Brown film on rocks
			9/27/2005	Pooled	None	Highly turbid/murky	No	No	Unobservable	Unobservable	
Lubbers Brook	W0139	LB02	5/24/2005	Flowing	None	Clear	Yes	Unobservable	Sparse	Unobservable	Plants: Duckweed Scum: Oil sheens, pollen/dust blankets, oil sheen and pollen near culvert sparse
			6/21/2005	Flowing	None	Moderately Turbid	Yes	Yes	Moderate	Unobservable	Plants: Milfoil?, Pickerweed, Duckweed Scum: Oil sheens Obj. deposits: Trash
			7/27/2005	Pooled	None	Moderately Turbid	Yes	Unobservable	Moderate	Unobservable	Scum: Pollen/dust blankets, algal mat
			8/24/2005	Not Recorded	Rotting Vegetables	Highly turbid/murky	Yes	No	Very Dense	Unobservable	Plants: Ragweed, Pickerelweed, Purple Loosestrife, Smartweed, Red maple; Scum: Algal mat, decomposing macrophytes
			9/27/2005	Flowing	None	Moderately Turbid	No	No	Dense	Unobservable	Plants: Lemna, Smartweed, Pickerelweed

Waterbody	UniqueID	Station ID	Date	Flow Status	Odor	Water Clarity	Floating Scum	Obj. Deposits	Aquatic Plants	Periphyton	Summary of Comments	
Maple Meadow Brook	W0143	MM01	5/24/2005	Flowing	None	Clear	No	Yes	Moderate	Sparse	Plants: Pondweed, Duckweed Obj. deposits: Sand; Periphyton: Green filamentous on bottom in pool	
			6/21/2005	Flowing	None	Clear	No	No	No	Moderate	Moderate	Plants: Arrowhead, Pondweed, Cattail Periphyton: Brown film on plants, rocks and bottom
			7/27/2005	Pooled	None	Moderately Turbid	Yes	Yes	Yes	Dense	Unobservable	Plants: Pickerweed, Duckweed Scum: Algal mat Obj. deposits: Flocculent mass Other: Nasty- almost no flow visible where samples taken
Maple Meadow Brook (continued)	W0143	MM01	8/24/2005	Pooled	Rotting Vegetables	Highly turbid/murky	Yes	Unobservable	Very Dense	Unobservable	Plants: Purple Loosestrife, Pickerelweed, Pondweed, floating duckweed, Milfoil, Type unknown, Buttonbush, Buckthorn Scum: Algal mat, other: weed fragments, macrophytes- decomposing fragments Obj. deposits: Unobservable	
			9/27/2005	Pooled	Musty (basement)	Highly turbid/murky	No	No	No	Dense	Unobservable	Plants: Pondweed, Duckweed, Pickerelweed
Martins Brook	W0136	MB02	5/24/2005	Flowing	None	Clear	No	No	Moderate	Moderate	Plants: Grass-flat, mosses Periphyton: Moss	
			6/21/2005	Flowing	Musty (basement)	Slightly Turbid	No	No	No	None	Moderate	Periphyton: Moss, Brown film on plants, rocks, bottom and woody debris
			7/27/2005	Flowing	None	Slightly Turbid	No	No	No	None	Moderate	Periphyton: Moss, Brown film on woody debris
			8/24/2005	Flowing	None	Slightly Turbid	No	No	No	None	Dense	Periphyton: Moss, Filamentous on rocks
			9/27/2005	Flowing	Musty (basement)	Clear	No	No	No	None	Moderate	Periphyton: Moss

Waterbody	UniqueID	Station ID	Date	Flow Status	Odor	Water Clarity	Floating Scum	Obj. Deposits	Aquatic Plants	Periphyton	Summary of Comments
Miles River	W0121	MR01	5/24/2005	Flowing	None	Highly turbid/murky	No	No	Unobservable	Unobservable	
			6/21/2005	Flowing	None	Clear	No	No	Not Recorded	Sparse	Periphyton: Sparse brown/green film on plants and woody debris
			7/27/2005	Flowing	Other (grass)	Slightly Turbid	No	No	Sparse	Dense	Plants: Grasslike Periphyton: Brown film on plants, rocks and bottom
			8/24/2005	Flowing	None	Slightly Turbid	No	No	Sparse	Dense	Plants: Grass sp., Smartweed, Sedge sp., Pickerelweed Periphyton: Brown film on rocks in pool, Moss
			9/27/2005	Flowing	None	Slightly Turbid	No	No	Very Dense	Moderate	Plants: Unknown, Grasslike Sedge, Smartweed, Pickerelweed Periphyton: Brown film on rocks and woody debris, Moss
Unnamed Tributary	W0105	KS01	5/24/2005	Flowing	None	Moderately Turbid	No	No	Unobservable	Unobservable	
			6/21/2005	Flowing	None	Slightly Turbid	No	Yes	Not Recorded	Unobservable	Obj. deposits: Flocculent mass (bottom had fine desposits)
			7/27/2005	Flowing	None	Moderately Turbid	No	No	Very Dense	Unobservable	Plants: Loosestrife, Cattails
			8/24/2005	Flowing	None	Slightly Turbid	Unobservable	No	Very Dense	Unobservable	Plants: Purple Loosestrife, Cattail
			9/27/2005	Flowing	None	Clear	No	No	Very Dense	Unobservable	Plants: Loosestrife, Cattails
Wills Brook	W0135	WB01	5/24/2005	Flowing	None	Clear	No	No	Unobservable	Unobservable	
			6/21/2005	Flowing	None	Clear	No	No	None	None	
			7/27/2005	Flowing	None	Not Recorded	No	No	None	Unobservable	
			8/24/2005	Pooled	Musty (basement)	Slightly Turbid	Yes	No	None	Sparse	Scum: Oil sheens Periphyton: Brown film on rocks and woody debris
			9/27/2005	Pooled	None	Moderately Turbid	No	No	None	Dense	Periphyton: Brown film on woody debris

## Sampling Issues and Coordinator Notes

Some field sheet observations are qualitative and subject to the interpretation of individual sampling crew members; particularly observations of light trash and foam noted on many field sheets. Aquatic plants observations are also subjective as different crews had different plant identification abilities.

Flow status was listed in the field sheet observations table (Table 2) since the Ipswich River Watershed is known to have low flow issues due to municipal groundwater withdrawals.

## Survey Conditions

Stream discharge and precipitation information were collected and analyzed to determine hydrologic conditions leading up to and during the water quality sampling events. Precipitation data were collected from the National Weather Service's website (<http://www.erh.noaa.gov/box/dailystns.shtml>) (NOAA 2008). The Lawrence, MA weather station precipitation gage was used to determine precipitation and weather conditions for five days prior to and on the sampling dates (Table 3). It is the practice of DWM to define a "wet-weather" sample as one that was collected at a location that received at least 0.5 inches of rainfall within the 72-hours antecedent to sample collection. Stream flow data were obtained from two continuous USGS stream gages in the watershed (Table 4). The flow duration curves and flow corresponding to 2005 Ipswich sampling dates for two USGS gages in the Ipswich River Watershed are presented in Figures 2 and 3.

**Table 3:** 2005 Precipitation data summaries for MassDEP DWM survey dates and wet or dry weather determination for sampling dates

Precipitation Data Summary Report- Lawrence Municipal Airport (reported in inches of rain)									
Survey Date	Type of Survey	5 Days Prior	4 Days Prior	3 Days Prior	2 Days Prior	1 Day Prior	Sample Date	72 hour sum	Wet or Dry
5/24/2005	Water Quality	0.01	0.00	0.44	0.64	0.44	1.30	2.38	<b>WET</b>
6/21/2005	Water Quality	0.40	0.10	0.00	0.00	0.01	0.00	0.01	DRY
7/27/2005	Water Quality	T	0.00	0.00	0.00	0.00	0.52	0.52	<b>WET</b>
8/24/2005	Water Quality	0.00	0.00	0.03	0.00	0.00	0.24	0.24	DRY
9/27/2005	Water Quality	0.00	T	0.00	0.00	0.10	0.00	0.10	DRY
" T " = trace amount of precipitation measured									
Note: Wet weather days are defined as sample days when the previous 48 hours plus the sample day had 0.5 in. of rain or more.									

**Table 4.** USGS gage data summaries in the Ipswich River Basin for the 2005 MassDEP DWM surveys (USGS 2008).

Ipswich River Basin Survey USGS Flow Data Summary (reported in cfs)						
Survey Dates	5 Days Prior	4 Days Prior	3 Days Prior	2 Days Prior	1 Day Prior	Sample Date
<u>Ipswich River at South Middleton</u> (7Q10 = 0.421 cfs (Ries 1998))						
Gage #01101500						
5/24/2005	87.00	79.00	72.00	85.00	85.00	107.00
6/21/2005	57.00	67.00	68.00	63.00	58.00	54.00
7/27/2005	10.00	8.50	6.80	5.80	5.20	4.60
8/24/2005	0.87	0.84	0.86	0.72	0.60	0.69
9/27/2005	0.32	0.32	0.32	0.32	0.33	0.33
<u>Ipswich River at Ipswich</u> (7Q10 = 2.067 cfs (Ries 1998))						
Gage #01102000						
5/24/2005	226.0	218.0	212.0	247.0	272.0	321.0
6/21/2005	322.0	316.0	296.0	276.0	259.0	239.0
7/27/2005	59.0	51.0	43.0	33.0	30.0	28.0
8/24/2005	5.2	4.7	4.9	4.9	4.6	4.6
9/27/2005	1.6	1.4	1.1	0.9	1.1	1.1

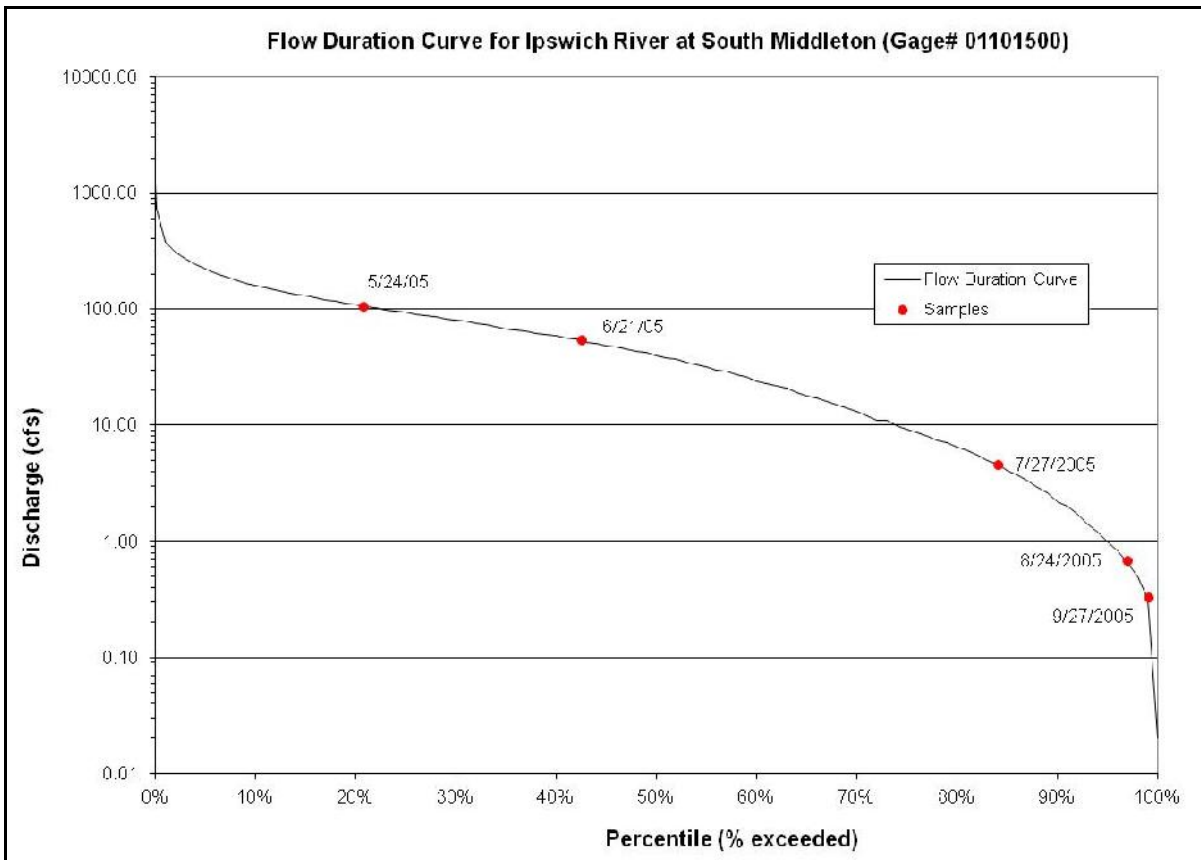


Figure 2: Mean daily flow values and flow duration curve for Ipswich River at South Middleton with sampling dates

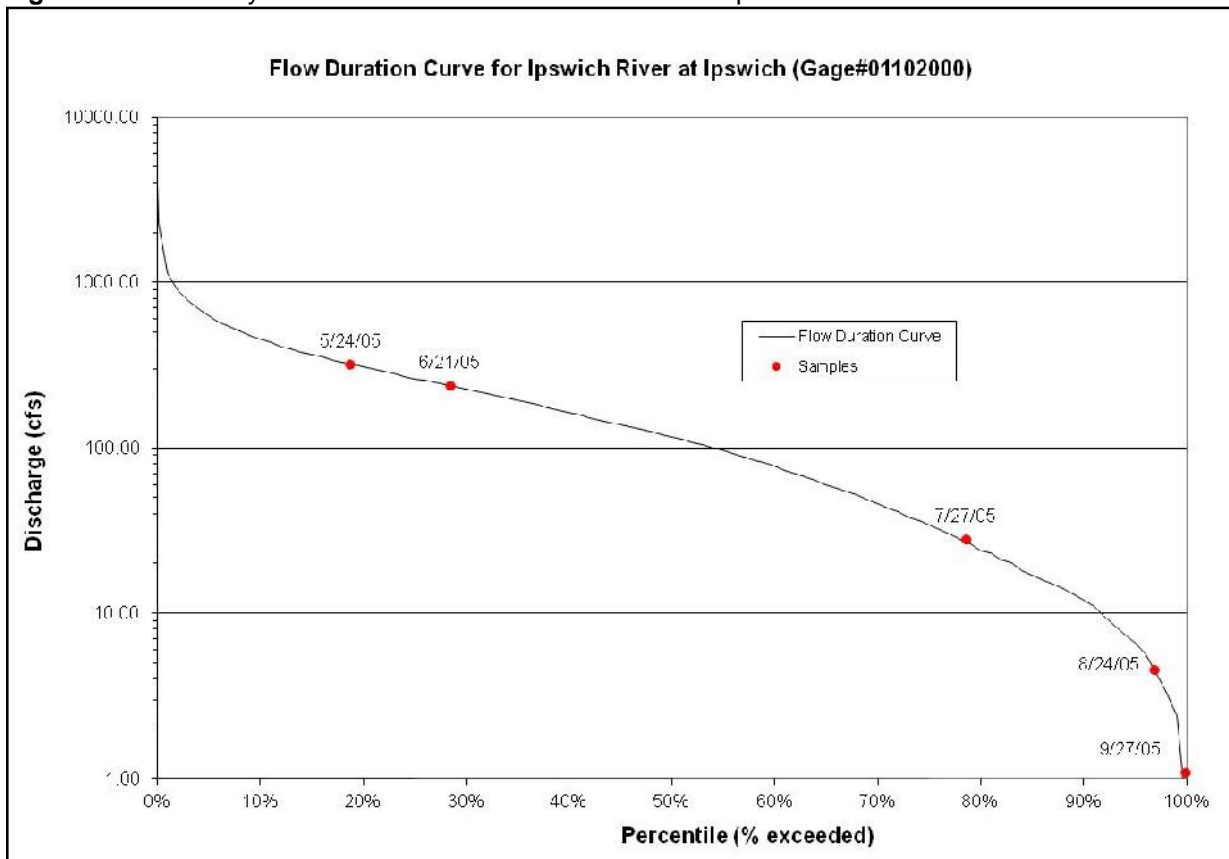


Figure 3: Mean daily flow values and flow duration curve for Ipswich River at Ipswich with sampling dates



## Water Quality Data

All MassDEP DWM water quality data are managed and maintained in the Water Quality Data Access Database. Tables 5, 7, 8 and 9 below are 2005 data for the Ipswich River Watershed. Table 6 presents the geometric mean of the *E. coli* samples. The procedures used to accept, accept with qualification or censor data are based on the DWM SOP for data validation and usability (MassDEP 2012a), and are in addition to separate quality assurance activities and laboratory validation steps undertaken by the WES. Data qualifiers are listed in Appendix 1.

**Table 5.** 2005 MassDEP Ipswich Watershed water quality data

Unique ID	Station ID	Date	Time (24hr)	OWMID	QA/QC	Analyte	Units	Result	Qualifier*
W0130	BO01	5/24/2005	1126	92-2328		Ammonia-N	mg/L	<0.02	--
W0130	BO01	6/21/2005	1205	92-2355		Ammonia-N	mg/L	0.09	--
W0130	BO01	7/27/2005	1145	92-2416		Ammonia-N	mg/L	0.04	--
W0130	BO01	8/24/2005	1123	92-2440		Ammonia-N	mg/L	<0.02	--
W0130	BO01	9/27/2005	1100	92-2639		Ammonia-N	mg/L	<0.02	--
W0130	BO01	5/24/2005	1126	92-2328		Apparent color	PCU	65	--
W0130	BO01	6/21/2005	1205	92-2355		Apparent color	PCU	80	d
W0130	BO01	7/27/2005	1145	92-2416		Apparent color	PCU	120	--
W0130	BO01	8/24/2005	1123	92-2440		Apparent color	PCU	90	--
W0130	BO01	9/27/2005	1100	92-2639		Apparent color	PCU	55	--
W0130	BO01	5/24/2005	1126	92-2328		<i>E. coli</i>	CFU/100 mL	71	--
W0130	BO01	6/21/2005	1205	92-2355		<i>E. coli</i>	CFU/100 mL	26	--
W0130	BO01	7/27/2005	1145	92-2416		<i>E. coli</i>	CFU/100 mL	19	--
W0130	BO01	8/24/2005	1123	92-2440		<i>E. coli</i>	CFU/100 mL	<6	--
W0130	BO01	9/27/2005	1100	92-2639		<i>E. coli</i>	CFU/100 mL	6	d,e
W0130	BO01	5/24/2005	1126	92-2328		Fecal coliforms	CFU/100 mL	170	--
W0130	BO01	6/21/2005	1205	92-2355		Fecal coliforms	CFU/100 mL	39	--
W0130	BO01	7/27/2005	1145	92-2416		Fecal coliforms	CFU/100 mL	32	--
W0130	BO01	8/24/2005	1123	92-2440		Fecal coliforms	CFU/100 mL	<6	--
W0130	BO01	9/27/2005	1100	92-2639		Fecal coliforms	CFU/100 mL	<6	d,e
W0130	BO01	5/24/2005	1126	92-2328		Hardness	mg/L	44	--
W0130	BO01	6/21/2005	1205	92-2355		Hardness	mg/L	38	--
W0130	BO01	7/27/2005	1145	92-2416		Hardness	mg/L	54	--
W0130	BO01	8/24/2005	1123	92-2440		Hardness	mg/L	58	--
W0130	BO01	9/27/2005	1100	92-2639		Hardness	mg/L	60	--
W0130	BO01	5/24/2005	1126	92-2328		Total Nitrogen	mg/L	0.65	h
W0130	BO01	6/21/2005	1205	92-2355		Total Nitrogen	mg/L	0.78	--
W0130	BO01	7/27/2005	1145	92-2416		Total Nitrogen	mg/L	##	b
W0130	BO01	8/24/2005	1123	92-2440		Total Nitrogen	mg/L	0.88	--
W0130	BO01	9/27/2005	1100	92-2639		Total Nitrogen	mg/L	0.77	--
W0130	BO01	5/24/2005	1126	92-2328		Total Phosphorus	mg/L	0.042	--
W0130	BO01	6/21/2005	1205	92-2355		Total Phosphorus	mg/L	0.048	--
W0130	BO01	7/27/2005	1145	92-2416		Total Phosphorus	mg/L	0.049	--
W0130	BO01	8/24/2005	1123	92-2440		Total Phosphorus	mg/L	0.031	--
W0130	BO01	9/27/2005	1100	92-2639		Total Phosphorus	mg/L	0.015	--
W0130	BO01	5/24/2005	1126	92-2328		True Color	PCU	47	--
W0130	BO01	6/21/2005	1205	92-2355		True Color	PCU	65	d
W0130	BO01	7/27/2005	1145	92-2416		True Color	PCU	120	--
W0130	BO01	8/24/2005	1123	92-2440		True Color	PCU	65	--
W0130	BO01	9/27/2005	1100	92-2639		True Color	PCU	33	--
W0130	BO01	5/24/2005	1126	92-2328		Turbidity	NTU	3.5	--
W0130	BO01	6/21/2005	1205	92-2355		Turbidity	NTU	2.6	--
W0130	BO01	7/27/2005	1145	92-2416		Turbidity	NTU	2.9	b

**Table 5 (continued):** 2005 MassDEP Ipswich River Watershed water quality data

Unique ID	Station ID	Date	Time (24hr)	OWMID	QA/QC	Analyte	Units	Result	Qualifier*
W0130	BO01	8/24/2005	1123	92-2440		Turbidity	NTU	11.5	d
W0130	BO01	9/27/2005	1100	92-2639		Turbidity	NTU	4.7	--
W0128	FB01	5/24/2005	1158	92-2330		<i>E. coli</i>	CFU/100 mL	250	e
W0128	FB01	6/21/2005	1245	92-2357		<i>E. coli</i>	CFU/100 mL	100	--
W0128	FB01	7/27/2005	1217	92-2418		<i>E. coli</i>	CFU/100 mL	530	--
W0128	FB01	8/24/2005	1149	92-2442		<i>E. coli</i>	CFU/100 mL	150	e
W0128	FB01	9/27/2005	1130	92-2641		<i>E. coli</i>	CFU/100 mL	240	d
W0128	FB01	5/24/2005	1158	92-2330		Fecal coliforms	CFU/100 mL	220	e
W0128	FB01	6/21/2005	1245	92-2357		Fecal coliforms	CFU/100 mL	110	--
W0128	FB01	7/27/2005	1217	92-2418		Fecal coliforms	CFU/100 mL	630	--
W0128	FB01	8/24/2005	1149	92-2442		Fecal coliforms	CFU/100 mL	120	e
W0128	FB01	9/27/2005	1130	92-2641		Fecal coliforms	CFU/100 mL	260	d
W0126	HB01	5/24/2005	1217	92-2331		<i>E. coli</i>	CFU/100 mL	360	--
W0126	HB01	6/21/2005	1256	92-2358		<i>E. coli</i>	CFU/100 mL	84	--
W0126	HB01	7/27/2005	1229	92-2419		<i>E. coli</i>	CFU/100 mL	410	e
W0126	HB01	8/24/2005	1203	92-2443		<i>E. coli</i>	CFU/100 mL	110	--
W0126	HB01	9/27/2005	1140	92-2642		<i>E. coli</i>	CFU/100 mL	150	d
W0126	HB01	5/24/2005	1217	92-2331		Fecal coliforms	CFU/100 mL	1000	--
W0126	HB01	6/21/2005	1256	92-2358		Fecal coliforms	CFU/100 mL	97	--
W0126	HB01	7/27/2005	1229	92-2419		Fecal coliforms	CFU/100 mL	390	e
W0126	HB01	8/24/2005	1203	92-2443		Fecal coliforms	CFU/100 mL	130	--
W0126	HB01	9/27/2005	1140	92-2642		Fecal coliforms	CFU/100 mL	150	d
W0113	IP01.5	5/24/2005	935	92-2321	92-2322	Ammonia-N	mg/L	0.02	--
W0113	IP01.5	5/24/2005	935	92-2322	92-2321	Ammonia-N	mg/L	0.02	--
W0113	IP01.5	6/21/2005	1018	92-2348	92-2349	Ammonia-N	mg/L	0.02	--
W0113	IP01.5	6/21/2005	1018	92-2349	92-2348	Ammonia-N	mg/L	0.03	--
W0113	IP01.5	7/27/2005	1004	92-2409	92-2410	Ammonia-N	mg/L	0.06	d
W0113	IP01.5	7/27/2005	1004	92-2410	92-2409	Ammonia-N	mg/L	0.04	d
W0113	IP01.5	8/24/2005	932	92-2433	92-2434	Ammonia-N	mg/L	<0.02	--
W0113	IP01.5	8/24/2005	932	92-2434	92-2433	Ammonia-N	mg/L	<0.02	--
W0113	IP01.5	9/27/2005	935	92-2632	92-2633	Ammonia-N	mg/L	<0.02	--
W0113	IP01.5	9/27/2005	935	92-2633	92-2632	Ammonia-N	mg/L	0.02	--
W0113	IP01.5	5/24/2005	935	92-2321	92-2322	Apparent color	PCU	70	d
W0113	IP01.5	5/24/2005	935	92-2322	92-2321	Apparent color	PCU	90	d
W0113	IP01.5	6/21/2005	1018	92-2348	92-2349	Apparent color	PCU	110	d
W0113	IP01.5	6/21/2005	1018	92-2349	92-2348	Apparent color	PCU	70	d
W0113	IP01.5	7/27/2005	1004	92-2409	92-2410	Apparent color	PCU	90	--
W0113	IP01.5	7/27/2005	1004	92-2410	92-2409	Apparent color	PCU	80	--
W0113	IP01.5	8/24/2005	932	92-2433	92-2434	Apparent color	PCU	220	d
W0113	IP01.5	8/24/2005	932	92-2434	92-2433	Apparent color	PCU	170	d
W0113	IP01.5	9/27/2005	935	92-2632	92-2633	Apparent color	PCU	300	--
W0113	IP01.5	9/27/2005	935	92-2633	92-2632	Apparent color	PCU	340	--
W0113	IP01.5	5/24/2005	935	92-2321	92-2322	<i>E. coli</i>	CFU/100 mL	250	--
W0113	IP01.5	5/24/2005	935	92-2322	92-2321	<i>E. coli</i>	CFU/100 mL	270	e
W0113	IP01.5	6/21/2005	1018	92-2348	92-2349	<i>E. coli</i>	CFU/100 mL	77	--
W0113	IP01.5	6/21/2005	1018	92-2349	92-2348	<i>E. coli</i>	CFU/100 mL	130	e
W0113	IP01.5	7/27/2005	1004	92-2409	92-2410	<i>E. coli</i>	CFU/100 mL	100	--
W0113	IP01.5	7/27/2005	1004	92-2410	92-2409	<i>E. coli</i>	CFU/100 mL	120	e
W0113	IP01.5	8/24/2005	932	92-2433	92-2434	<i>E. coli</i>	CFU/100 mL	32	--
W0113	IP01.5	8/24/2005	932	92-2434	92-2433	<i>E. coli</i>	CFU/100 mL	52	e
W0113	IP01.5	9/27/2005	935	92-2632	92-2633	<i>E. coli</i>	CFU/100 mL	<6	d

**Table 5 (continued):** 2005 MassDEP Ipswich River Watershed water quality data

Unique ID	Station ID	Date	Time (24hr)	OWMID	QA/QC	Analyte	Units	Result	Qualifier*
W0113	IP01.5	9/27/2005	935	92-2633	92-2632	<i>E. coli</i>	CFU/100 mL	33	d,e
W0113	IP01.5	5/24/2005	935	92-2321	92-2322	Fecal coliforms	CFU/100 mL	290	--
W0113	IP01.5	5/24/2005	935	92-2322	92-2321	Fecal coliforms	CFU/100 mL	170	e
W0113	IP01.5	6/21/2005	1018	92-2348	92-2349	Fecal coliforms	CFU/100 mL	110	--
W0113	IP01.5	6/21/2005	1018	92-2349	92-2348	Fecal coliforms	CFU/100 mL	77	e
W0113	IP01.5	7/27/2005	1004	92-2409	92-2410	Fecal coliforms	CFU/100 mL	170	--
W0113	IP01.5	7/27/2005	1004	92-2410	92-2409	Fecal coliforms	CFU/100 mL	84	e
W0113	IP01.5	8/24/2005	932	92-2433	92-2434	Fecal coliforms	CFU/100 mL	58	--
W0113	IP01.5	8/24/2005	932	92-2434	92-2433	Fecal coliforms	CFU/100 mL	45	e
W0113	IP01.5	9/27/2005	935	92-2632	92-2633	Fecal coliforms	CFU/100 mL	<6	d
W0113	IP01.5	9/27/2005	935	92-2633	92-2632	Fecal coliforms	CFU/100 mL	27	d,e
W0113	IP01.5	5/24/2005	935	92-2321	92-2322	Hardness	mg/L	61	--
W0113	IP01.5	5/24/2005	935	92-2322	92-2321	Hardness	mg/L	61	--
W0113	IP01.5	6/21/2005	1018	92-2348	92-2349	Hardness	mg/L	60	--
W0113	IP01.5	6/21/2005	1018	92-2349	92-2348	Hardness	mg/L	59	--
W0113	IP01.5	7/27/2005	1004	92-2409	92-2410	Hardness	mg/L	75	--
W0113	IP01.5	7/27/2005	1004	92-2410	92-2409	Hardness	mg/L	75	--
W0113	IP01.5	8/24/2005	932	92-2433	92-2434	Hardness	mg/L	79	--
W0113	IP01.5	8/24/2005	932	92-2434	92-2433	Hardness	mg/L	79	--
W0113	IP01.5	9/27/2005	935	92-2632	92-2633	Hardness	mg/L	83	--
W0113	IP01.5	9/27/2005	935	92-2633	92-2632	Hardness	mg/L	84	--
W0113	IP01.5	5/24/2005	935	92-2321	92-2322	Total Nitrogen	mg/L	0.54	--
W0113	IP01.5	5/24/2005	935	92-2322	92-2321	Total Nitrogen	mg/L	0.49	--
W0113	IP01.5	6/21/2005	1018	92-2348	92-2349	Total Nitrogen	mg/L	0.53	--
W0113	IP01.5	6/21/2005	1018	92-2349	92-2348	Total Nitrogen	mg/L	0.52	--
W0113	IP01.5	7/27/2005	1004	92-2409	92-2410	Total Nitrogen	mg/L	##	b
W0113	IP01.5	7/27/2005	1004	92-2410	92-2409	Total Nitrogen	mg/L	##	b
W0113	IP01.5	8/24/2005	932	92-2433	92-2434	Total Nitrogen	mg/L	1.0	--
W0113	IP01.5	8/24/2005	932	92-2434	92-2433	Total Nitrogen	mg/L	0.94	--
W0113	IP01.5	9/27/2005	935	92-2632	92-2633	Total Nitrogen	mg/L	1.2	--
W0113	IP01.5	9/27/2005	935	92-2633	92-2632	Total Nitrogen	mg/L	1.1	--
W0113	IP01.5	5/24/2005	935	92-2321	92-2322	Total Phosphorus	mg/L	0.039	--
W0113	IP01.5	5/24/2005	935	92-2322	92-2321	Total Phosphorus	mg/L	0.035	--
W0113	IP01.5	6/21/2005	1018	92-2348	92-2349	Total Phosphorus	mg/L	0.039	--
W0113	IP01.5	6/21/2005	1018	92-2349	92-2348	Total Phosphorus	mg/L	0.039	--
W0113	IP01.5	7/27/2005	1004	92-2409	92-2410	Total Phosphorus	mg/L	0.044	--
W0113	IP01.5	7/27/2005	1004	92-2410	92-2409	Total Phosphorus	mg/L	0.040	--
W0113	IP01.5	8/24/2005	932	92-2433	92-2434	Total Phosphorus	mg/L	0.11	--
W0113	IP01.5	8/24/2005	932	92-2434	92-2433	Total Phosphorus	mg/L	0.10	--
W0113	IP01.5	9/27/2005	935	92-2632	92-2633	Total Phosphorus	mg/L	0.13	--
W0113	IP01.5	9/27/2005	935	92-2633	92-2632	Total Phosphorus	mg/L	0.12	--
W0113	IP01.5	5/24/2005	935	92-2321	92-2322	True Color	PCU	65	--
W0113	IP01.5	5/24/2005	935	92-2322	92-2321	True Color	PCU	60	--
W0113	IP01.5	6/21/2005	1018	92-2348	92-2349	True Color	PCU	##	d
W0113	IP01.5	6/21/2005	1018	92-2349	92-2348	True Color	PCU	##	d
W0113	IP01.5	7/27/2005	1004	92-2409	92-2410	True Color	PCU	70	--
W0113	IP01.5	7/27/2005	1004	92-2410	92-2409	True Color	PCU	70	--
W0113	IP01.5	8/24/2005	932	92-2433	92-2434	True Color	PCU	150	--
W0113	IP01.5	8/24/2005	932	92-2434	92-2433	True Color	PCU	140	--
W0113	IP01.5	9/27/2005	935	92-2632	92-2633	True Color	PCU	240	--
W0113	IP01.5	9/27/2005	935	92-2633	92-2632	True Color	PCU	250	--
W0113	IP01.5	5/24/2005	935	92-2321	92-2322	Turbidity	NTU	2.2	--

**Table 5 (continued):** 2005 MassDEP Ipswich River Watershed water quality data

Unique ID	Station ID	Date	Time (24hr)	OWMID	QA/QC	Analyte	Units	Result	Qualifier*
W0113	IP01.5	5/24/2005	935	92-2322	92-2321	Turbidity	NTU	2.8	--
W0113	IP01.5	6/21/2005	1018	92-2348	92-2349	Turbidity	NTU	1.8	--
W0113	IP01.5	6/21/2005	1018	92-2349	92-2348	Turbidity	NTU	1.6	--
W0113	IP01.5	7/27/2005	1004	92-2409	92-2410	Turbidity	NTU	2.0	b
W0113	IP01.5	7/27/2005	1004	92-2410	92-2409	Turbidity	NTU	1.8	b
W0113	IP01.5	8/24/2005	932	92-2433	92-2434	Turbidity	NTU	##	d
W0113	IP01.5	8/24/2005	932	92-2434	92-2433	Turbidity	NTU	##	d
W0113	IP01.5	9/27/2005	935	92-2632	92-2633	Turbidity	NTU	23.5	--
W0113	IP01.5	9/27/2005	935	92-2633	92-2632	Turbidity	NTU	22.5	--
W0112	IP04.5	5/24/2005	1035	92-2325		Ammonia-N	mg/L	0.03	--
W0112	IP04.5	6/21/2005	1112	92-2352		Ammonia-N	mg/L	0.05	--
W0112	IP04.5	7/27/2005	1044	92-2413		Ammonia-N	mg/L	0.10	--
W0112	IP04.5	8/24/2005	1022	92-2437		Ammonia-N	mg/L	<0.02	--
W0112	IP04.5	9/27/2005	1015	92-2636		Ammonia-N	mg/L	0.04	--
W0112	IP04.5	5/24/2005	1035	92-2325		Apparent color	PCU	80	--
W0112	IP04.5	6/21/2005	1112	92-2352		Apparent color	PCU	70	d
W0112	IP04.5	7/27/2005	1044	92-2413		Apparent color	PCU	110	--
W0112	IP04.5	8/24/2005	1022	92-2437		Apparent color	PCU	60	--
W0112	IP04.5	9/27/2005	1015	92-2636		Apparent color	PCU	90	--
W0112	IP04.5	5/24/2005	1035	92-2325		<i>E. coli</i>	CFU/100 mL	220	--
W0112	IP04.5	6/21/2005	1112	92-2352		<i>E. coli</i>	CFU/100 mL	52	--
W0112	IP04.5	7/27/2005	1044	92-2413		<i>E. coli</i>	CFU/100 mL	330	e
W0112	IP04.5	8/24/2005	1022	92-2437		<i>E. coli</i>	CFU/100 mL	26	--
W0112	IP04.5	9/27/2005	1015	92-2636		<i>E. coli</i>	CFU/100 mL	220	d,e
W0112	IP04.5	5/24/2005	1035	92-2325		Fecal coliforms	CFU/100 mL	270	--
W0112	IP04.5	6/21/2005	1112	92-2352		Fecal coliforms	CFU/100 mL	52	--
W0112	IP04.5	7/27/2005	1044	92-2413		Fecal coliforms	CFU/100 mL	290	e
W0112	IP04.5	8/24/2005	1022	92-2437		Fecal coliforms	CFU/100 mL	26	--
W0112	IP04.5	9/27/2005	1015	92-2636		Fecal coliforms	CFU/100 mL	190	d,e
W0112	IP04.5	5/24/2005	1035	92-2325		Hardness	mg/L	49	--
W0112	IP04.5	6/21/2005	1112	92-2352		Hardness	mg/L	51	--
W0112	IP04.5	7/27/2005	1044	92-2413		Hardness	mg/L	64	--
W0112	IP04.5	8/24/2005	1022	92-2437		Hardness	mg/L	77	--
W0112	IP04.5	9/27/2005	1015	92-2636		Hardness	mg/L	78	--
W0112	IP04.5	5/24/2005	1035	92-2325		Total Nitrogen	mg/L	0.67	--
W0112	IP04.5	6/21/2005	1112	92-2352		Total Nitrogen	mg/L	0.69	--
W0112	IP04.5	7/27/2005	1044	92-2413		Total Nitrogen	mg/L	##	b
W0112	IP04.5	8/24/2005	1022	92-2437		Total Nitrogen	mg/L	0.57	--
W0112	IP04.5	9/27/2005	1015	92-2636		Total Nitrogen	mg/L	0.56	--
W0112	IP04.5	5/24/2005	1035	92-2325		Total Phosphorus	mg/L	0.045	--
W0112	IP04.5	6/21/2005	1112	92-2352		Total Phosphorus	mg/L	0.055	--
W0112	IP04.5	7/27/2005	1044	92-2413		Total Phosphorus	mg/L	0.066	--
W0112	IP04.5	8/24/2005	1022	92-2437		Total Phosphorus	mg/L	0.043	--
W0112	IP04.5	9/27/2005	1015	92-2636		Total Phosphorus	mg/L	0.034	--
W0112	IP04.5	5/24/2005	1035	92-2325		True Color	PCU	70	--
W0112	IP04.5	6/21/2005	1112	92-2352		True Color	PCU	70	d
W0112	IP04.5	7/27/2005	1044	92-2413		True Color	PCU	90	--
W0112	IP04.5	8/24/2005	1022	92-2437		True Color	PCU	38	--
W0112	IP04.5	9/27/2005	1015	92-2636		True Color	PCU	90	--
W0112	IP04.5	5/24/2005	1035	92-2325		Turbidity	NTU	2.8	--
W0112	IP04.5	6/21/2005	1112	92-2352		Turbidity	NTU	2.2	--
W0112	IP04.5	7/27/2005	1044	92-2413		Turbidity	NTU	3.4	b

**Table 5 (continued):** 2005 MassDEP Ipswich River Watershed water quality data

Unique ID	Station ID	Date	Time (24hr)	OWMID	QA/QC	Analyte	Units	Result	Qualifier*
W0112	IP04.5	8/24/2005	1022	92-2437		Turbidity	NTU	4.0	d
W0112	IP04.5	9/27/2005	1015	92-2636		Turbidity	NTU	6.8	--
W0110	IP09	5/24/2005	1145	92-2329		Ammonia-N	mg/L	<0.02	--
W0110	IP09	6/21/2005	1225	92-2356		Ammonia-N	mg/L	0.04	--
W0110	IP09	7/27/2005	1204	92-2417		Ammonia-N	mg/L	0.03	--
W0110	IP09	8/24/2005	1131	92-2441		Ammonia-N	mg/L	0.02	--
W0110	IP09	9/27/2005	1117	92-2640		Ammonia-N	mg/L	<0.02	--
W0110	IP09	5/24/2005	1145	92-2329		Apparent color	PCU	60	--
W0110	IP09	6/21/2005	1225	92-2356		Apparent color	PCU	90	d
W0110	IP09	7/27/2005	1204	92-2417		Apparent color	PCU	80	--
W0110	IP09	8/24/2005	1131	92-2441		Apparent color	PCU	30	--
W0110	IP09	9/27/2005	1117	92-2640		Apparent color	PCU	49	--
W0110	IP09	5/24/2005	1145	92-2329		<i>E. coli</i>	CFU/100 mL	140	--
W0110	IP09	6/21/2005	1225	92-2356		<i>E. coli</i>	CFU/100 mL	45	--
W0110	IP09	7/27/2005	1204	92-2417		<i>E. coli</i>	CFU/100 mL	27	e
W0110	IP09	8/24/2005	1131	92-2441		<i>E. coli</i>	CFU/100 mL	32	--
W0110	IP09	9/27/2005	1117	92-2640		<i>E. coli</i>	CFU/100 mL	310	d,e
W0110	IP09	5/24/2005	1145	92-2329		Fecal coliforms	CFU/100 mL	170	--
W0110	IP09	6/21/2005	1225	92-2356		Fecal coliforms	CFU/100 mL	58	--
W0110	IP09	7/27/2005	1204	92-2417		Fecal coliforms	CFU/100 mL	20	e
W0110	IP09	8/24/2005	1131	92-2441		Fecal coliforms	CFU/100 mL	45	--
W0110	IP09	9/27/2005	1117	92-2640		Fecal coliforms	CFU/100 mL	230	d,e
W0110	IP09	5/24/2005	1145	92-2329		Hardness	mg/L	56	--
W0110	IP09	6/21/2005	1225	92-2356		Hardness	mg/L	56	--
W0110	IP09	7/27/2005	1204	92-2417		Hardness	mg/L	78	--
W0110	IP09	8/24/2005	1131	92-2441		Hardness	mg/L	110	--
W0110	IP09	9/27/2005	1117	92-2640		Hardness	mg/L	110	--
W0110	IP09	5/24/2005	1145	92-2329		Total Nitrogen	mg/L	0.59	h
W0110	IP09	6/21/2005	1225	92-2356		Total Nitrogen	mg/L	0.79	--
W0110	IP09	7/27/2005	1204	92-2417		Total Nitrogen	mg/L	##	b
W0110	IP09	8/24/2005	1131	92-2441		Total Nitrogen	mg/L	0.50	--
W0110	IP09	9/27/2005	1117	92-2640		Total Nitrogen	mg/L	0.57	--
W0110	IP09	5/24/2005	1145	92-2329		Total Phosphorus	mg/L	0.032	--
W0110	IP09	6/21/2005	1225	92-2356		Total Phosphorus	mg/L	0.072	--
W0110	IP09	7/27/2005	1204	92-2417		Total Phosphorus	mg/L	0.034	--
W0110	IP09	8/24/2005	1131	92-2441		Total Phosphorus	mg/L	0.021	--
W0110	IP09	9/27/2005	1117	92-2640		Total Phosphorus	mg/L	0.037	--
W0110	IP09	5/24/2005	1145	92-2329		True Color	PCU	48	--
W0110	IP09	6/21/2005	1225	92-2356		True Color	PCU	70	d
W0110	IP09	7/27/2005	1204	92-2417		True Color	PCU	70	--
W0110	IP09	8/24/2005	1131	92-2441		True Color	PCU	30	--
W0110	IP09	9/27/2005	1117	92-2640		True Color	PCU	40	--
W0110	IP09	5/24/2005	1145	92-2329		Turbidity	NTU	2.6	--
W0110	IP09	6/21/2005	1225	92-2356		Turbidity	NTU	9.8	--
W0110	IP09	7/27/2005	1204	92-2417		Turbidity	NTU	2.8	b
W0110	IP09	8/24/2005	1131	92-2441		Turbidity	NTU	0.9	d
W0110	IP09	9/27/2005	1117	92-2640		Turbidity	NTU	2.4	--
W0107	IP15.5	5/24/2005	1225	92-2332		Ammonia-N	mg/L	<0.02	--
W0107	IP15.5	6/21/2005	1308	92-2359		Ammonia-N	mg/L	0.04	--
W0107	IP15.5	7/27/2005	1240	92-2420		Ammonia-N	mg/L	0.08	--
W0107	IP15.5	8/24/2005	1214	92-2444		Ammonia-N	mg/L	<0.02	--
W0107	IP15.5	9/27/2005	1153	92-2643		Ammonia-N	mg/L	<0.02	--

**Table 5 (continued):** 2005 MassDEP Ipswich River Watershed water quality data

Unique ID	Station ID	Date	Time (24hr)	OWMID	QA/QC	Analyte	Units	Result	Qualifier*
W0107	IP15.5	5/24/2005	1225	92-2332		Apparent color	PCU	45	--
W0107	IP15.5	6/21/2005	1308	92-2359		Apparent color	PCU	65	d
W0107	IP15.5	7/27/2005	1240	92-2420		Apparent color	PCU	100	--
W0107	IP15.5	8/24/2005	1214	92-2444		Apparent color	PCU	45	--
W0107	IP15.5	9/27/2005	1153	92-2643		Apparent color	PCU	50	--
W0107	IP15.5	5/24/2005	1225	92-2332		<i>E. coli</i>	CFU/100 mL	90	--
W0107	IP15.5	6/21/2005	1308	92-2359		<i>E. coli</i>	CFU/100 mL	39	e
W0107	IP15.5	7/27/2005	1240	92-2420		<i>E. coli</i>	CFU/100 mL	19	e
W0107	IP15.5	8/24/2005	1214	92-2444		<i>E. coli</i>	CFU/100 mL	6	--
W0107	IP15.5	9/27/2005	1153	92-2643		<i>E. coli</i>	CFU/100 mL	13	d
W0107	IP15.5	5/24/2005	1225	92-2332		Fecal coliforms	CFU/100 mL	180	--
W0107	IP15.5	6/21/2005	1308	92-2359		Fecal coliforms	CFU/100 mL	26	e
W0107	IP15.5	7/27/2005	1240	92-2420		Fecal coliforms	CFU/100 mL	6	e
W0107	IP15.5	8/24/2005	1214	92-2444		Fecal coliforms	CFU/100 mL	6	--
W0107	IP15.5	9/27/2005	1153	92-2643		Fecal coliforms	CFU/100 mL	20	d
W0107	IP15.5	5/24/2005	1225	92-2332		Total Nitrogen	mg/L	0.47	h
W0107	IP15.5	6/21/2005	1308	92-2359		Total Nitrogen	mg/L	0.66	--
W0107	IP15.5	7/27/2005	1240	92-2420		Total Nitrogen	mg/L	##	b
W0107	IP15.5	8/24/2005	1214	92-2444		Total Nitrogen	mg/L	0.50	--
W0107	IP15.5	9/27/2005	1153	92-2643		Total Nitrogen	mg/L	0.52	--
W0107	IP15.5	5/24/2005	1225	92-2332		Total Phosphorus	mg/L	0.025	--
W0107	IP15.5	6/21/2005	1308	92-2359		Total Phosphorus	mg/L	0.041	--
W0107	IP15.5	7/27/2005	1240	92-2420		Total Phosphorus	mg/L	0.044	--
W0107	IP15.5	8/24/2005	1214	92-2444		Total Phosphorus	mg/L	0.026	--
W0107	IP15.5	9/27/2005	1153	92-2643		Total Phosphorus	mg/L	0.042	--
W0107	IP15.5	5/24/2005	1225	92-2332		True Color	PCU	43	--
W0107	IP15.5	6/21/2005	1308	92-2359		True Color	PCU	60	d
W0107	IP15.5	7/27/2005	1240	92-2420		True Color	PCU	80	--
W0107	IP15.5	8/24/2005	1214	92-2444		True Color	PCU	40	--
W0107	IP15.5	9/27/2005	1153	92-2643		True Color	PCU	34	--
W0107	IP15.5	5/24/2005	1225	92-2332		Turbidity	NTU	1.8	--
W0107	IP15.5	6/21/2005	1308	92-2359		Turbidity	NTU	2.8	--
W0107	IP15.5	7/27/2005	1240	92-2420		Turbidity	NTU	2.1	b
W0107	IP15.5	8/24/2005	1214	92-2444		Turbidity	NTU	0.6	d
W0107	IP15.5	9/27/2005	1153	92-2643		Turbidity	NTU	1.9	--
W1394	IR00	5/24/2005	1247	92-2333		Ammonia-N	mg/L	0.02	--
W1394	IR00	6/21/2005	1325	92-2360		Ammonia-N	mg/L	0.03	--
W1394	IR00	7/27/2005	1255	92-2421		Ammonia-N	mg/L	0.03	--
W1394	IR00	8/24/2005	1233	92-2445		Ammonia-N	mg/L	<0.02	--
W1394	IR00	9/27/2005	1212	92-2644		Ammonia-N	mg/L	<0.02	--
W1394	IR00	5/24/2005	1247	92-2333		Apparent color	PCU	60	--
W1394	IR00	6/21/2005	1325	92-2360		Apparent color	PCU	70	d
W1394	IR00	7/27/2005	1255	92-2421		Apparent color	PCU	95	--
W1394	IR00	8/24/2005	1233	92-2445		Apparent color	PCU	43	--
W1394	IR00	9/27/2005	1212	92-2644		Apparent color	PCU	35	--
W1394	IR00	5/24/2005	1247	92-2333		<i>E. coli</i>	CFU/100 mL	190	--
W1394	IR00	6/21/2005	1325	92-2360		<i>E. coli</i>	CFU/100 mL	13	--
W1394	IR00	7/27/2005	1255	92-2421		<i>E. coli</i>	CFU/100 mL	52	--
W1394	IR00	8/24/2005	1233	92-2445		<i>E. coli</i>	CFU/100 mL	26	--
W1394	IR00	9/27/2005	1212	92-2644		<i>E. coli</i>	CFU/100 mL	84	d,e
W1394	IR00	5/24/2005	1247	92-2333		Fecal coliforms	CFU/100 mL	210	--
W1394	IR00	6/21/2005	1325	92-2360		Fecal coliforms	CFU/100 mL	39	--

**Table 5 (continued):** 2005 MassDEP Ipswich River Watershed water quality data

Unique ID	Station ID	Date	Time (24hr)	OWMID	QA/QC	Analyte	Units	Result	Qualifier*
W1394	IR00	7/27/2005	1255	92-2421		Fecal coliforms	CFU/100 mL	84	--
W1394	IR00	8/24/2005	1233	92-2445		Fecal coliforms	CFU/100 mL	64	--
W1394	IR00	9/27/2005	1212	92-2644		Fecal coliforms	CFU/100 mL	32	d,e
W1394	IR00	5/24/2005	1247	92-2333		Hardness	mg/L	54	--
W1394	IR00	6/21/2005	1325	92-2360		Hardness	mg/L	53	--
W1394	IR00	7/27/2005	1255	92-2421		Hardness	mg/L	76	--
W1394	IR00	8/24/2005	1233	92-2445		Hardness	mg/L	82	--
W1394	IR00	9/27/2005	1212	92-2644		Hardness	mg/L	74	--
W1394	IR00	5/24/2005	1247	92-2333		Total Nitrogen	mg/L	0.60	--
W1394	IR00	6/21/2005	1325	92-2360		Total Nitrogen	mg/L	0.72	--
W1394	IR00	7/27/2005	1255	92-2421		Total Nitrogen	mg/L	##	b
W1394	IR00	8/24/2005	1233	92-2445		Total Nitrogen	mg/L	0.49	--
W1394	IR00	9/27/2005	1212	92-2644		Total Nitrogen	mg/L	0.43	--
W1394	IR00	5/24/2005	1247	92-2333		Total Phosphorus	mg/L	0.027	--
W1394	IR00	6/21/2005	1325	92-2360		Total Phosphorus	mg/L	0.042	--
W1394	IR00	7/27/2005	1255	92-2421		Total Phosphorus	mg/L	0.037	--
W1394	IR00	8/24/2005	1233	92-2445		Total Phosphorus	mg/L	0.019	--
W1394	IR00	9/27/2005	1212	92-2644		Total Phosphorus	mg/L	0.021	--
W1394	IR00	5/24/2005	1247	92-2333		True Color	PCU	46	--
W1394	IR00	6/21/2005	1325	92-2360		True Color	PCU	55	d
W1394	IR00	7/27/2005	1255	92-2421		True Color	PCU	85	--
W1394	IR00	8/24/2005	1233	92-2445		True Color	PCU	39	--
W1394	IR00	9/27/2005	1212	92-2644		True Color	PCU	32	--
W1394	IR00	5/24/2005	1247	92-2333		Turbidity	NTU	2.1	--
W1394	IR00	6/21/2005	1325	92-2360		Turbidity	NTU	3.0	--
W1394	IR00	7/27/2005	1255	92-2421		Turbidity	NTU	1.6	b
W1394	IR00	8/24/2005	1233	92-2445		Turbidity	NTU	1.8	d
W1394	IR00	9/27/2005	1212	92-2644		Turbidity	NTU	2.0	--
W0120	KB02	5/24/2005	1330	92-2335		<i>E. coli</i>	CFU/100 mL	990	--
W0120	KB02	6/21/2005	1400	92-2362		<i>E. coli</i>	CFU/100 mL	400	--
W0120	KB02	7/27/2005	1335	92-2423		<i>E. coli</i>	CFU/100 mL	71	e
W0120	KB02	8/24/2005	1307	92-2447		<i>E. coli</i>	CFU/100 mL	120	--
W0120	KB02	9/27/2005	1246	92-2646		<i>E. coli</i>	CFU/100 mL	450	d
W0120	KB02	5/24/2005	1330	92-2335		Fecal coliforms	CFU/100 mL	4000	--
W0120	KB02	6/21/2005	1400	92-2362		Fecal coliforms	CFU/100 mL	540	--
W0120	KB02	7/27/2005	1335	92-2423		Fecal coliforms	CFU/100 mL	65	e
W0120	KB02	8/24/2005	1307	92-2447		Fecal coliforms	CFU/100 mL	210	--
W0120	KB02	9/27/2005	1246	92-2646		Fecal coliforms	CFU/100 mL	700	d
W0105	KS01	5/24/2005	1114	92-2327		<i>E. coli</i>	CFU/100 mL	1200	--
W0105	KS01	6/21/2005	1155	92-2354		<i>E. coli</i>	CFU/100 mL	210	--
W0105	KS01	7/27/2005	1125	92-2415		<i>E. coli</i>	CFU/100 mL	160	--
W0105	KS01	8/24/2005	1105	92-2439		<i>E. coli</i>	CFU/100 mL	970	e
W0105	KS01	9/27/2005	1050	92-2638		<i>E. coli</i>	CFU/100 mL	1200	d,e
W0105	KS01	5/24/2005	1114	92-2327		Fecal coliforms	CFU/100 mL	3000	--
W0105	KS01	6/21/2005	1155	92-2354		Fecal coliforms	CFU/100 mL	210	--
W0105	KS01	7/27/2005	1125	92-2415		Fecal coliforms	CFU/100 mL	180	--
W0105	KS01	8/24/2005	1105	92-2439		Fecal coliforms	CFU/100 mL	570	e
W0105	KS01	9/27/2005	1050	92-2638		Fecal coliforms	CFU/100 mL	800	d,e
W0139	LB02	5/24/2005	920	92-2320		Ammonia-N	mg/L	<0.02	--
W0139	LB02	6/21/2005	955	92-2347		Ammonia-N	mg/L	0.03	--
W0139	LB02	7/27/2005	922	92-2408		Ammonia-N	mg/L	0.19	--
W0139	LB02	8/24/2005	919	92-2432		Ammonia-N	mg/L	0.19	--

**Table 5 (continued):** 2005 MassDEP Ipswich River Watershed water quality data

Unique ID	Station ID	Date	Time (24hr)	OWMID	QA/QC	Analyte	Units	Result	Qualifier*
W0139	LB02	9/27/2005	920	92-2631		Ammonia-N	mg/L	0.18	--
W0139	LB02	5/24/2005	920	92-2320		Apparent color	PCU	65	--
W0139	LB02	6/21/2005	955	92-2347		Apparent color	PCU	120	d
W0139	LB02	7/27/2005	922	92-2408		Apparent color	PCU	180	--
W0139	LB02	8/24/2005	919	92-2432		Apparent color	PCU	90	--
W0139	LB02	9/27/2005	920	92-2631		Apparent color	PCU	70	--
W0139	LB02	5/24/2005	920	92-2320		<i>E. coli</i>	CFU/100 mL	160	--
W0139	LB02	6/21/2005	955	92-2347		<i>E. coli</i>	CFU/100 mL	32	e
W0139	LB02	7/27/2005	922	92-2408		<i>E. coli</i>	CFU/100 mL	97	e
W0139	LB02	8/24/2005	919	92-2432		<i>E. coli</i>	CFU/100 mL	210	e
W0139	LB02	9/27/2005	920	92-2631		<i>E. coli</i>	CFU/100 mL	340	d,e
W0139	LB02	5/24/2005	920	92-2320		Fecal coliforms	CFU/100 mL	210	--
W0139	LB02	6/21/2005	955	92-2347		Fecal coliforms	CFU/100 mL	26	e
W0139	LB02	7/27/2005	922	92-2408		Fecal coliforms	CFU/100 mL	71	e
W0139	LB02	8/24/2005	919	92-2432		Fecal coliforms	CFU/100 mL	150	e
W0139	LB02	9/27/2005	920	92-2631		Fecal coliforms	CFU/100 mL	190	d,e
W0139	LB02	5/24/2005	920	92-2320		Total Nitrogen	mg/L	0.52	--
W0139	LB02	6/21/2005	955	92-2347		Total Nitrogen	mg/L	0.50	--
W0139	LB02	7/27/2005	922	92-2408		Total Nitrogen	mg/L	##	b
W0139	LB02	8/24/2005	919	92-2432		Total Nitrogen	mg/L	0.57	--
W0139	LB02	9/27/2005	920	92-2631		Total Nitrogen	mg/L	0.72	--
W0139	LB02	5/24/2005	920	92-2320		Total Phosphorus	mg/L	0.028	--
W0139	LB02	6/21/2005	955	92-2347		Total Phosphorus	mg/L	0.037	--
W0139	LB02	7/27/2005	922	92-2408		Total Phosphorus	mg/L	0.074	--
W0139	LB02	8/24/2005	919	92-2432		Total Phosphorus	mg/L	0.047	--
W0139	LB02	9/27/2005	920	92-2631		Total Phosphorus	mg/L	0.056	--
W0139	LB02	5/24/2005	920	92-2320		True Color	PCU	50	--
W0139	LB02	6/21/2005	955	92-2347		True Color	PCU	100	d
W0139	LB02	7/27/2005	922	92-2408		True Color	PCU	110	--
W0139	LB02	8/24/2005	919	92-2432		True Color	PCU	55	--
W0139	LB02	9/27/2005	920	92-2631		True Color	PCU	44	--
W0139	LB02	5/24/2005	920	92-2320		Turbidity	NTU	1.7	--
W0139	LB02	6/21/2005	955	92-2347		Turbidity	NTU	3.8	--
W0139	LB02	7/27/2005	922	92-2408		Turbidity	NTU	19.0	b
W0139	LB02	8/24/2005	919	92-2432		Turbidity	NTU	4.4	d
W0139	LB02	9/27/2005	920	92-2631		Turbidity	NTU	6.1	--
W0136	MB02	5/24/2005	1007	92-2324		Ammonia-N	mg/L	0.03	--
W0136	MB02	6/21/2005	1054	92-2351		Ammonia-N	mg/L	0.05	--
W0136	MB02	7/27/2005	1025	92-2412		Ammonia-N	mg/L	0.25	--
W0136	MB02	8/24/2005	1008	92-2436		Ammonia-N	mg/L	0.05	--
W0136	MB02	9/27/2005	959	92-2635		Ammonia-N	mg/L	0.16	--
W0136	MB02	5/24/2005	1007	92-2324		Apparent color	PCU	60	--
W0136	MB02	6/21/2005	1054	92-2351		Apparent color	PCU	65	d
W0136	MB02	7/27/2005	1025	92-2412		Apparent color	PCU	130	--
W0136	MB02	8/24/2005	1008	92-2436		Apparent color	PCU	110	--
W0136	MB02	9/27/2005	959	92-2635		Apparent color	PCU	140	--
W0136	MB02	5/24/2005	1007	92-2324		<i>E. coli</i>	CFU/100 mL	220	--
W0136	MB02	6/21/2005	1054	92-2351		<i>E. coli</i>	CFU/100 mL	120	--
W0136	MB02	7/27/2005	1025	92-2412		<i>E. coli</i>	CFU/100 mL	2000	e
W0136	MB02	8/24/2005	1008	92-2436		<i>E. coli</i>	CFU/100 mL	190	--
W0136	MB02	9/27/2005	959	92-2635		<i>E. coli</i>	CFU/100 mL	58	d
W0136	MB02	5/24/2005	1007	92-2324		Fecal coliforms	CFU/100 mL	260	--



**Table 5 (continued):** 2005 MassDEP Ipswich River Watershed water quality data

Unique ID	Station ID	Date	Time (24hr)	OWMID	QA/QC	Analyte	Units	Result	Qualifier*
W0136	MB02	6/21/2005	1054	92-2351		Fecal coliforms	CFU/100 mL	130	--
W0136	MB02	7/27/2005	1025	92-2412		Fecal coliforms	CFU/100 mL	1200	e
W0136	MB02	8/24/2005	1008	92-2436		Fecal coliforms	CFU/100 mL	190	--
W0136	MB02	9/27/2005	959	92-2635		Fecal coliforms	CFU/100 mL	65	d
W0136	MB02	5/24/2005	1007	92-2324		Hardness	mg/L	47	--
W0136	MB02	6/21/2005	1054	92-2351		Hardness	mg/L	44	--
W0136	MB02	7/27/2005	1025	92-2412		Hardness	mg/L	62	--
W0136	MB02	8/24/2005	1008	92-2436		Hardness	mg/L	80	--
W0136	MB02	9/27/2005	959	92-2635		Hardness	mg/L	86	--
W0136	MB02	5/24/2005	1007	92-2324		Total Nitrogen	mg/L	0.60	--
W0136	MB02	6/21/2005	1054	92-2351		Total Nitrogen	mg/L	0.65	--
W0136	MB02	7/27/2005	1025	92-2412		Total Nitrogen	mg/L	##	b
W0136	MB02	8/24/2005	1008	92-2436		Total Nitrogen	mg/L	0.75	--
W0136	MB02	9/27/2005	959	92-2635		Total Nitrogen	mg/L	1.0	--
W0136	MB02	5/24/2005	1007	92-2324		Total Phosphorus	mg/L	0.042	--
W0136	MB02	6/21/2005	1054	92-2351		Total Phosphorus	mg/L	0.065	--
W0136	MB02	7/27/2005	1025	92-2412		Total Phosphorus	mg/L	0.12	--
W0136	MB02	8/24/2005	1008	92-2436		Total Phosphorus	mg/L	0.070	--
W0136	MB02	9/27/2005	959	92-2635		Total Phosphorus	mg/L	0.078	--
W0136	MB02	5/24/2005	1007	92-2324		True Color	PCU	55	--
W0136	MB02	6/21/2005	1054	92-2351		True Color	PCU	55	d
W0136	MB02	7/27/2005	1025	92-2412		True Color	PCU	85	--
W0136	MB02	8/24/2005	1008	92-2436		True Color	PCU	70	--
W0136	MB02	9/27/2005	959	92-2635		True Color	PCU	75	--
W0136	MB02	5/24/2005	1007	92-2324		Turbidity	NTU	4.9	--
W0136	MB02	6/21/2005	1054	92-2351		Turbidity	NTU	2.5	--
W0136	MB02	7/27/2005	1025	92-2412		Turbidity	NTU	6.2	b
W0136	MB02	8/24/2005	1008	92-2436		Turbidity	NTU	4.9	d
W0136	MB02	9/27/2005	959	92-2635		Turbidity	NTU	9.4	--
W0143	MM01	5/24/2005	900	92-2319		Ammonia-N	mg/L	<0.02	--
W0143	MM01	6/21/2005	925	92-2346		Ammonia-N	mg/L	0.07	--
W0143	MM01	7/27/2005	905	92-2407		Ammonia-N	mg/L	0.31	--
W0143	MM01	8/24/2005	853	92-2378		Ammonia-N	mg/L	0.10	--
W0143	MM01	9/27/2005	905	92-2630		Ammonia-N	mg/L	0.08	--
W0143	MM01	5/24/2005	900	92-2319		Apparent color	PCU	60	--
W0143	MM01	6/21/2005	925	92-2346		Apparent color	PCU	80	d
W0143	MM01	7/27/2005	905	92-2407		Apparent color	PCU	280	--
W0143	MM01	8/24/2005	853	92-2378		Apparent color	PCU	200	--
W0143	MM01	9/27/2005	905	92-2630		Apparent color	PCU	190	--
W0143	MM01	5/24/2005	900	92-2319		<i>E. coli</i>	CFU/100 mL	97	e
W0143	MM01	6/21/2005	925	92-2346		<i>E. coli</i>	CFU/100 mL	110	e
W0143	MM01	7/27/2005	905	92-2407		<i>E. coli</i>	CFU/100 mL	240	e
W0143	MM01	8/24/2005	853	92-2378		<i>E. coli</i>	CFU/100 mL	71	--
W0143	MM01	9/27/2005	905	92-2630		<i>E. coli</i>	CFU/100 mL	140	d,e
W0143	MM01	5/24/2005	900	92-2319		Fecal coliforms	CFU/100 mL	77	e
W0143	MM01	6/21/2005	925	92-2346		Fecal coliforms	CFU/100 mL	73	e
W0143	MM01	7/27/2005	905	92-2407		Fecal coliforms	CFU/100 mL	130	e
W0143	MM01	8/24/2005	853	92-2378		Fecal coliforms	CFU/100 mL	84	--
W0143	MM01	9/27/2005	905	92-2630		Fecal coliforms	CFU/100 mL	120	d,e
W0143	MM01	5/24/2005	900	92-2319		Total Nitrogen	mg/L	0.51	--
W0143	MM01	6/21/2005	925	92-2346		Total Nitrogen	mg/L	0.59	--
W0143	MM01	7/27/2005	905	92-2407		Total Nitrogen	mg/L	##	b

**Table 5 (continued):** 2005 MassDEP Ipswich River Watershed water quality data

Unique ID	Station ID	Date	Time (24hr)	OWMID	QA/QC	Analyte	Units	Result	Qualifier*
W0143	MM01	8/24/2005	853	92-2378		Total Nitrogen	mg/L	0.68	--
W0143	MM01	9/27/2005	905	92-2630		Total Nitrogen	mg/L	0.83	--
W0143	MM01	5/24/2005	900	92-2319		Total Phosphorus	mg/L	0.025	--
W0143	MM01	6/21/2005	925	92-2346		Total Phosphorus	mg/L	0.037	--
W0143	MM01	7/27/2005	905	92-2407		Total Phosphorus	mg/L	0.24	--
W0143	MM01	8/24/2005	853	92-2378		Total Phosphorus	mg/L	0.15	--
W0143	MM01	9/27/2005	905	92-2630		Total Phosphorus	mg/L	0.16	--
W0143	MM01	5/24/2005	900	92-2319		True Color	PCU	50	--
W0143	MM01	6/21/2005	925	92-2346		True Color	PCU	55	d
W0143	MM01	7/27/2005	905	92-2407		True Color	PCU	80	--
W0143	MM01	8/24/2005	853	92-2378		True Color	PCU	85	--
W0143	MM01	9/27/2005	905	92-2630		True Color	PCU	100	--
W0143	MM01	5/24/2005	900	92-2319		Turbidity	NTU	1.4	--
W0143	MM01	6/21/2005	925	92-2346		Turbidity	NTU	1.8	--
W0143	MM01	7/27/2005	905	92-2407		Turbidity	NTU	37.0	b
W0143	MM01	8/24/2005	853	92-2378		Turbidity	NTU	17.0	--
W0143	MM01	9/27/2005	905	92-2630		Turbidity	NTU	30.0	--
W0121	MR01	5/24/2005	1305	92-2334		Ammonia-N	mg/L	0.06	--
W0121	MR01	6/21/2005	1343	92-2361		Ammonia-N	mg/L	<0.02	--
W0121	MR01	7/27/2005	1315	92-2422		Ammonia-N	mg/L	0.19	--
W0121	MR01	8/24/2005	1248	92-2446		Ammonia-N	mg/L	0.04	--
W0121	MR01	9/27/2005	1227	92-2645		Ammonia-N	mg/L	0.02	--
W0121	MR01	5/24/2005	1305	92-2334		Apparent color	PCU	65	--
W0121	MR01	6/21/2005	1343	92-2361		Apparent color	PCU	50	d
W0121	MR01	7/27/2005	1315	92-2422		Apparent color	PCU	150	--
W0121	MR01	8/24/2005	1248	92-2446		Apparent color	PCU	100	--
W0121	MR01	9/27/2005	1227	92-2645		Apparent color	PCU	70	--
W0121	MR01	5/24/2005	1305	92-2334		<i>E. coli</i>	CFU/100 mL	5600	e
W0121	MR01	6/21/2005	1343	92-2361		<i>E. coli</i>	CFU/100 mL	65	e
W0121	MR01	7/27/2005	1315	92-2422		<i>E. coli</i>	CFU/100 mL	52	e
W0121	MR01	8/24/2005	1248	92-2446		<i>E. coli</i>	CFU/100 mL	26	--
W0121	MR01	9/27/2005	1227	92-2645		<i>E. coli</i>	CFU/100 mL	39	d,e
W0121	MR01	5/24/2005	1305	92-2334		Fecal coliforms	CFU/100 mL	5400	e
W0121	MR01	6/21/2005	1343	92-2361		Fecal coliforms	CFU/100 mL	13	e
W0121	MR01	7/27/2005	1315	92-2422		Fecal coliforms	CFU/100 mL	32	e
W0121	MR01	8/24/2005	1248	92-2446		Fecal coliforms	CFU/100 mL	32	--
W0121	MR01	9/27/2005	1227	92-2645		Fecal coliforms	CFU/100 mL	<6	d,e
W0121	MR01	5/24/2005	1305	92-2334		Hardness	mg/L	48	--
W0121	MR01	6/21/2005	1343	92-2361		Hardness	mg/L	53	--
W0121	MR01	7/27/2005	1315	92-2422		Hardness	mg/L	64	--
W0121	MR01	8/24/2005	1248	92-2446		Hardness	mg/L	72	--
W0121	MR01	9/27/2005	1227	92-2645		Hardness	mg/L	79	--
W0121	MR01	5/24/2005	1305	92-2334		Total Nitrogen	mg/L	0.87	--
W0121	MR01	6/21/2005	1343	92-2361		Total Nitrogen	mg/L	0.52	--
W0121	MR01	7/27/2005	1315	92-2422		Total Nitrogen	mg/L	##	b
W0121	MR01	8/24/2005	1248	92-2446		Total Nitrogen	mg/L	0.77	--
W0121	MR01	9/27/2005	1227	92-2645		Total Nitrogen	mg/L	0.67	--
W0121	MR01	5/24/2005	1305	92-2334		Total Phosphorus	mg/L	0.081	--
W0121	MR01	6/21/2005	1343	92-2361		Total Phosphorus	mg/L	0.044	--
W0121	MR01	7/27/2005	1315	92-2422		Total Phosphorus	mg/L	0.072	--
W0121	MR01	8/24/2005	1248	92-2446		Total Phosphorus	mg/L	0.060	--
W0121	MR01	9/27/2005	1227	92-2645		Total Phosphorus	mg/L	0.048	--

**Table 5 (continued):** 2005 MassDEP Ipswich River Watershed water quality data

Unique ID	Station ID	Date	Time (24hr)	OWMID	QA/QC	Analyte	Units	Result	Qualifier*
W0121	MR01	5/24/2005	1305	92-2334		True Color	PCU	55	--
W0121	MR01	6/21/2005	1343	92-2361		True Color	PCU	45	d
W0121	MR01	7/27/2005	1315	92-2422		True Color	PCU	95	--
W0121	MR01	8/24/2005	1248	92-2446		True Color	PCU	80	--
W0121	MR01	9/27/2005	1227	92-2645		True Color	PCU	60	--
W0121	MR01	5/24/2005	1305	92-2334		Turbidity	NTU	10.5	--
W0121	MR01	6/21/2005	1343	92-2361		Turbidity	NTU	2.4	--
W0121	MR01	7/27/2005	1315	92-2422		Turbidity	NTU	9.4	b
W0121	MR01	8/24/2005	1248	92-2446		Turbidity	NTU	3.5	d
W0121	MR01	9/27/2005	1227	92-2645		Turbidity	NTU	2.2	--
W0135	WB01	5/24/2005	1059	92-2326		<i>E. coli</i>	CFU/100 mL	13	--
W0135	WB01	6/21/2005	1132	92-2353		<i>E. coli</i>	CFU/100 mL	7	--
W0135	WB01	7/27/2005	1105	92-2414		<i>E. coli</i>	CFU/100 mL	<6	--
W0135	WB01	8/24/2005	1042	92-2438		<i>E. coli</i>	CFU/100 mL	130	--
W0135	WB01	9/27/2005	1035	92-2637		<i>E. coli</i>	CFU/100 mL	52	d
W0135	WB01	5/24/2005	1059	92-2326		Fecal coliforms	CFU/100 mL	13	--
W0135	WB01	6/21/2005	1132	92-2353		Fecal coliforms	CFU/100 mL	7	--
W0135	WB01	7/27/2005	1105	92-2414		Fecal coliforms	CFU/100 mL	<6	--
W0135	WB01	8/24/2005	1042	92-2438		Fecal coliforms	CFU/100 mL	130	--
W0135	WB01	9/27/2005	1035	92-2637		Fecal coliforms	CFU/100 mL	71	d

\*see Appendix 1 for a complete list of data qualifiers

**Table 6.** 2005 MassDEP Ipswich Watershed *E. coli* geometric means of samples

Unique ID	Station	Waterbody	Geomean (CFU/100 mL)
W0130	BO01	Boston Brook/Upper Boston Brook Pond	17
W0128	FB01	Fish Brook	217
W0126	HB01	Howlett Brook	183
W0113	IP01.5	Ipswich River	52
W0112	IP04.5	Ipswich River	117
W0110	IP09	Ipswich River	70
W0107	IP15.5	Ipswich River	22
W1394	IR00	Ipswich River	49
W0120	KB02	Kimball Brook	273
W0105	KS01	Unnamed Tributary	542
W0139	LB02	Lubbers Brook	129
W0136	MB02	Martins Brook	225
W0143	MM01	Maple Meadow Brook	121
W0121	MR01	Miles River	114
W0135	WB01	Wills Brook	21

**Table 7:** 2005 MassDEP Ipswich Watershed *in-situ* attended multi-probe data

Station ID	Unique ID	Waterbody	Date	OWMID	Sample Depth (m)	Temperature (deg. C)	Temperature Qualifiers*	pH (SU)	pH Qualifiers*	Specific Conductivity (uS/cm)	Specific Conductivity Qualifiers*	Total Dissolved Solids (mg/l)	Total Dissolved Solids Qualifiers*	Dissolved Oxygen (mg/l)	Dissolved Oxygen Qualifiers*	Saturation (%)	Saturation Qualifiers*
IP15.5	W0107	Ipswich River	5/24/05	92-2316	0.8	10.6	--	6.7	--	306	--	199	--	6.9	--	62	--
IP15.5	W0107	Ipswich River	6/21/05	92-2343	0.7	18.6	--	6.6	--	317	--	206	--	4.0	--	43	--
IP15.5	W0107	Ipswich River	7/25/05	92-2479	0.9	24.8	--	7.0	--	385	--	247	--	2.7	u,i	34	u,i
IP15.5	W0107	Ipswich River	7/27/05	92-2370	0.6	27.0	--	6.9	--	392	--	255	--	2.9	i	36	i
IP15.5	W0107	Ipswich River	7/27/05	92-2480	1.0	26.2	u	7.0	--	--	--	--	--	2.3	u,i	29	u,i
IP15.5	W0107	Ipswich River	8/22/05	92-2506	1.2	23.2	--	7.1	--	408	--	261	--	2.7	u	32	u
IP15.5	W0107	Ipswich River	8/24/05	92-2429	0.5	22.5	--	7.1	--	410	--	267	--	5.1	--	59	--
IP15.5	W0107	Ipswich River	8/24/05	92-2507	1.0	21.9	--	7.0	--	404	--	259	--	4.7	--	55	--
IP15.5	W0107	Ipswich River	9/19/05	92-2547	1.3	19.5	--	7.1	--	372	--	239	--	5.2	--	57	--
IP15.5	W0107	Ipswich River	9/21/05	92-2548	0.9	19.1	--	7.1	--	380	--	243	--	5.0	--	54	--
IP15.5	W0107	Ipswich River	9/27/05	92-2627	1.4	17.5	--	7.3	--	375	--	240	--	6.0	--	64	--
IP09	W0110	Ipswich River	5/24/05	92-2315	0.3	10.8	--	6.8	--	335	--	218	--	8.8	--	79	--
IP09	W0110	Ipswich River	6/20/05	92-2390	0.4	18.5	--	6.7	--	352	--	225	--	5.6	--	60	--
IP09	W0110	Ipswich River	6/21/05	92-2342	0.4	19.0	--	6.7	--	355	--	230	--	5.4	--	58	--
IP09	W0110	Ipswich River	6/22/05	92-2391	0.3	19.5	--	6.8	--	350	--	224	--	4.1	--	45	--
IP09	W0110	Ipswich River	7/25/05	92-2476	0.2	24.8	--	7.1	--	425	--	272	--	5.3	i	65	i
IP09	W0110	Ipswich River	7/27/05	92-2369	0.3	26.4	--	7.0	--	424	--	275	--	4.8	i	59	i
IP09	W0110	Ipswich River	7/27/05	92-2477	0.2	25.9	--	7.0	--	--	--	--	--	3.9	i	49	i
IP09	W0110	Ipswich River	8/22/05	92-2503	0.1	23.7	--	7.3	--	533	--	341	--	5.3	--	64	--
IP09	W0110	Ipswich River	8/24/05	92-2428	0.1	21.4	--	7.2	--	457	--	297	--	5.3	--	60	--
IP09	W0110	Ipswich River	8/24/05	92-2504	**	22.0	--	7.1	--	537	--	344	--	5.1	--	59	--
IP09	W0110	Ipswich River	9/19/05	92-2544	**	20.4	--	7.0	--	539	--	345	--	5.2	--	58	--
IP09	W0110	Ipswich River	9/21/05	92-2545	0.2	19.2	--	7.0	--	539	--	345	--	4.6	--	50	--
IP09	W0110	Ipswich River	9/27/05	92-2626	0.4	17.4	--	7.1	--	525	--	336	--	5.5	--	58	--

**Table 7 (continued):** 2005 MA DEP Ipswich Watershed *in-situ* attended multi-probe data

Station ID	Unique ID	Waterbody	Date	OWMID	Sample Depth (m)	Temperature (deg. C)	Temperature Qualifiers*	pH (SU)	pH Qualifiers*	Specific Conductivity (uS/cm)	Specific Conductivity Qualifiers*	Total Dissolved Solids (mg/l)	Total Dissolved Solids Qualifiers*	Dissolved Oxygen (mg/l)	Dissolved Oxygen Qualifiers*	Saturation (%)	Saturation Qualifiers*
IP04.5	W0112	Ipswich River	5/24/05	92-2313	0.7	10.4	--	6.5	--	376	--	244	--	7.1	--	64	--
IP04.5	W0112	Ipswich River	6/20/05	92-2396	0.4	18.3	--	6.6	--	397	--	254	--	5.4	--	58	--
IP04.5	W0112	Ipswich River	6/21/05	92-2340	0.4	18.3	--	6.5	--	407	--	264	--	4.9	--	52	--
IP04.5	W0112	Ipswich River	6/22/05	92-2397	0.4	19.6	--	6.6	--	403	--	258	--	4.1	--	45	--
IP04.5	W0112	Ipswich River	7/25/05	92-2470	0.3	20.5	--	6.5	--	467	--	299	--	3.7	i	42	i
IP04.5	W0112	Ipswich River	7/27/05	92-2367	0.2	22.5	--	6.5	--	470	--	306	--	3.8	i	44	i
IP04.5	W0112	Ipswich River	7/27/05	92-2471	0.3	22.4	--	6.5	--	--	--	--	--	2.9	i	34	i
IP04.5	W0112	Ipswich River	8/22/05	92-2497	0.2	20.4	--	6.6	--	549	--	351	--	1.9	--	21	--
IP04.5	W0112	Ipswich River	8/24/05	92-2426	0.2	21.0	--	6.7	--	557	--	362	--	5.9	u	66	u
IP04.5	W0112	Ipswich River	8/24/05	92-2498	0.2	19.5	--	6.6	--	543	--	348	--	2.8	--	31	--
IP04.5	W0112	Ipswich River	9/19/05	92-2458	0.1	18.6	--	6.5	--	535	--	343	--	3.0	--	32	--
IP04.5	W0112	Ipswich River	9/21/05	92-2459	0.2	17.3	--	6.5	--	532	--	340	--	1.9	--	20	--
IP04.5	W0112	Ipswich River	9/27/05	92-2624	0.4	17.4	--	6.8	--	529	--	338	--	6.0	--	64	--
IP01.5	W0113	Ipswich River	5/16/05	92-2304	0.4	13.2	--	6.7	--	490	--	314	--	5.7	i	55	i
IP01.5	W0113	Ipswich River	5/18/05	92-2307	0.5	13.6	--	6.6	--	496	--	317	--	4.9	u	48	u
IP01.5	W0113	Ipswich River	5/24/05	92-2311	1.0	10.6	--	6.5	--	464	--	302	--	5.7	--	51	--
IP01.5	W0113	Ipswich River	6/20/05	92-2402	0.1	21.4	--	6.7	--	466	--	298	--	6.1	--	69	--
IP01.5	W0113	Ipswich River	6/21/05	92-2338	0.3	19.2	--	6.6	--	468	--	304	--	4.1	--	44	--
IP01.5	W0113	Ipswich River	6/22/05	92-2403	0.1	20.1	--	6.5	--	464	--	297	--	2.3	--	26	--
IP01.5	W0113	Ipswich River	7/25/05	92-2464	0.1	24.2	--	6.8	--	509	--	326	--	3.4	i	41	i
IP01.5	W0113	Ipswich River	7/27/05	92-2365	0.1	25.6	--	6.8	--	510	--	331	--	2.7	i	33	i
IP01.5	W0113	Ipswich River	7/27/05	92-2465	0.1	25.4	--	6.7	--	--	--	--	--	2.3	i	29	i
IP01.5	W0113	Ipswich River	8/24/05	92-2424	0.5	22.2	--	6.8	--	584	--	380	--	3.4	u	39	u
IP01.5	W0113	Ipswich River	9/27/05	92-2622	0.4	17.7	--	6.7	--	590	--	378	--	1.1	--	11	--

**Table 7 (continued):** 2005 MA DEP Ipswich Watershed *in-situ* attended multi-probe data

Station ID	Unique ID	Waterbody	Date	OWMID	Sample Depth (m)	Temperature (deg. C)	Temperature Qualifiers*	pH (SU)	pH Qualifiers*	Specific Conductivity (uS/cm)	Specific Conductivity Qualifiers*	Total Dissolved Solids (mg/l)	Total Dissolved Solids Qualifiers*	Dissolved Oxygen (mg/l)	Dissolved Oxygen Qualifiers*	Saturation (%)	Saturation Qualifiers*
MR01	W0121	Miles River	5/24/05	92-2318	0.3	9.9	--	6.7	--	265	--	172	--	8.1	--	72	--
MR01	W0121	Miles River	6/20/05	92-2381	0.3	17.5	--	6.5	--	298	--	191	--	3.8	--	39	--
MR01	W0121	Miles River	6/21/05	92-2345	0.6	18.9	--	6.5	--	300	--	195	--	3.9	--	42	--
MR01	W0121	Miles River	6/22/05	92-2382	0.4	18.8	--	6.7	--	289	--	185	--	3.0	--	33	--
MR01	W0121	Miles River	7/25/05	92-2485	0.4	23.7	--	6.7	--	332	--	213	--	2.7	i	33	i
MR01	W0121	Miles River	7/27/05	92-2372	0.2	26.2	--	6.6	--	335	--	218	--	2.3	i	29	i
MR01	W0121	Miles River	7/27/05	92-2486	0.3	25.7	--	6.7	--	--	--	--	--	1.9	i	23	i
MR01	W0121	Miles River	8/22/05	92-2512	0.3	23.1	--	6.8	--	358	--	229	--	3.2	--	38	--
MR01	W0121	Miles River	8/24/05	92-2431	0.1	20.8	--	6.9	--	358	--	233	--	5.0	--	56	--
MR01	W0121	Miles River	8/24/05	92-2513	0.2	19.7	--	6.6	--	356	--	228	--	4.1	--	46	--
MR01	W0121	Miles River	9/19/05	92-2553	0.2	20.2	--	6.9	--	394	--	252	--	5.3	--	59	--
MR01	W0121	Miles River	9/21/05	92-2554	0.4	18.2	--	6.9	--	387	--	248	--	5.2	--	56	--
MR01	W0121	Miles River	9/27/05	92-2629	0.3	17.2	--	7.0	--	385	--	247	--	5.9	--	63	--
GB01	W0124	Gravelly Brook	8/9/05	92-2782	--	19.3	s	--	--	--	--	--	--	--	--	--	--
GB01	W0124	Gravelly Brook	8/19/05	92-2785	--	16.1	s	--	--	--	--	--	--	--	--	--	--
GB01	W0124	Gravelly Brook	9/13/05	92-2788	--	17.5	s	--	--	--	--	--	--	--	--	--	--
FB01	W0128	Fish Brook	8/9/05	92-2780	--	21.6	s	--	--	--	--	--	--	--	--	--	--
FB01	W0128	Fish Brook	8/19/05	92-2783	--	18.6	s	--	--	--	--	--	--	--	--	--	--
FB01	W0128	Fish Brook	9/13/05	92-2786	--	17.7	s	--	--	--	--	--	--	--	--	--	--
BO01	W0130	Boston Brook/ Upper Boston Brook Pond	5/24/05	92-2314	0.3	10.8	--	6.8	--	246	--	160	--	9.2	--	83	--
BO01	W0130	Boston Brook/ Upper Boston Brook Pond	6/20/05	92-2393	0.1	17.9	--	6.7	--	222	--	142	--	6.9	--	73	--

**Table 7 (continued):** 2005 MA DEP Ipswich Watershed *in-situ* attended multi-probe data

Station ID	Unique ID	Waterbody	Date	OWMID	Sample Depth (m)	Temperature (deg. C)	Temperature Qualifiers*	pH (SU)	pH Qualifiers*	Specific Conductivity (uS/cm)	Specific Conductivity Qualifiers*	Total Dissolved Solids (mg/l)	Total Dissolved Solids Qualifiers*	Dissolved Oxygen (mg/l)	Dissolved Oxygen Qualifiers*	Saturation (%)	Saturation Qualifiers*
BO01	W0130	Boston Brook/ Upper Boston Brook Pond	6/21/05	92-2341	0.4	17.7	--	6.7	--	226	--	147	--	7.0	--	74	--
BO01	W0130	Boston Brook/ Upper Boston Brook Pond	6/22/05	92-2394	**	19.2	--	6.8	--	--	--	--	--	6.3	--	70	--
BO01	W0130	Boston Brook/ Upper Boston Brook Pond	7/25/05	92-2473	0.1	23.2	--	7.1	--	281	--	180	--	5.5	i	65	i
BO01	W0130	Boston Brook/ Upper Boston Brook Pond	7/27/05	92-2368	0.5	25.7	--	7.0	--	285	--	185	--	5.2	i	64	i
BO01	W0130	Boston Brook/ Upper Boston Brook Pond	7/27/05	92-2474	0.1	25.5	--	7.0	--	--	--	--	--	4.2	i	52	i
BO01	W0130	Boston Brook/ Upper Boston Brook Pond	8/22/05	92-2500	0.1	21.2	u	7.2	--	310	--	198	--	4.1	--	47	--
BO01	W0130	Boston Brook/ Upper Boston Brook Pond	8/24/05	92-2427	0.1	18.7	--	7.2	--	307	--	200	--	6.6	--	71	--
BO01	W0130	Boston Brook/ Upper Boston Brook Pond	8/24/05	92-2501	0.1	18.8	--	7.0	--	310	--	199	--	6.2	--	68	--

**Table 7 (continued):** 2005 MA DEP Ipswich Watershed *in-situ* attended multi-probe data

Station ID	Unique ID	Waterbody	Date	OWMID	Sample Depth (m)	Temperature (deg. C)	Temperature Qualifiers*	pH (SU)	pH Qualifiers*	Specific Conductivity (uS/cm)	Specific Conductivity Qualifiers*	Total Dissolved Solids (mg/l)	Total Dissolved Solids Qualifiers*	Dissolved Oxygen (mg/l)	Dissolved Oxygen Qualifiers*	Saturation (%)	Saturation Qualifiers*
BO01	W0130	Boston Brook/ Upper Boston Brook Pond	9/19/05	92-2541	**	18.5	--	7.0	--	306	--	196	--	6.3	--	69	--
BO01	W0130	Boston Brook/ Upper Boston Brook Pond	9/21/05	92-2542	0.1	16.8	--	7.0	--	307	--	196	--	6.3	--	65	--
BO01	W0130	Boston Brook/ Upper Boston Brook Pond	9/27/05	92-2625	0.1	16.0	--	7.1	--	302	--	194	--	6.1	--	63	--
MB02	W0136	Martins Brook	5/16/05	92-2305	0.4	13.4	--	6.5	--	436	--	279	--	5.8	--	57	--
MB02	W0136	Martins Brook	5/18/05	92-2308	0.1	14.1	--	6.5	--	413	--	264	--	4.8	u	47	u
MB02	W0136	Martins Brook	5/24/05	92-2312	0.3	10.7	--	6.5	--	383	--	249	--	6.0	--	54	--
MB02	W0136	Martins Brook	6/20/05	92-2399	0.1	19.7	--	6.5	--	345	--	221	--	4.9	--	54	--
MB02	W0136	Martins Brook	6/21/05	92-2339	0.3	18.5	--	6.5	--	359	--	233	--	3.7	--	39	--
MB02	W0136	Martins Brook	6/22/05	92-2400	**	19.7	--	6.5	--	354	--	227	--	2.6	--	29	--
MB02	W0136	Martins Brook	7/25/05	92-2467	**	23.0	--	6.6	--	471	--	301	--	1.6	i	19	i
MB02	W0136	Martins Brook	7/27/05	92-2366	0.1	24.7	--	6.7	--	467	--	303	--	2.5	i	30	i
MB02	W0136	Martins Brook	7/27/05	92-2468	0.2	24.4	--	6.6	--	--	--	--	--	1.3	i	16	i
MB02	W0136	Martins Brook	8/22/05	92-2494	0.1	21.4	--	6.8	--	642	--	411	--	2.4	--	28	--
MB02	W0136	Martins Brook	8/24/05	92-2425	0.1	19.4	--	6.8	--	645	--	419	--	2.9	--	32	--
MB02	W0136	Martins Brook	8/24/05	92-2495	0.1	20.7	--	6.8	--	636	--	407	--	1.8	--	20	--
MB02	W0136	Martins Brook	9/19/05	92-2455	0.1	19.7	--	6.7	--	647	--	414	--	1.7	--	19	--
MB02	W0136	Martins Brook	9/21/05	92-2456	0.1	17.6	--	6.8	--	659	--	422	--	1.2	--	13	--
MB02	W0136	Martins Brook	9/27/05	92-2623	0.1	16.3	--	6.8	--	627	--	401	--	4.0	--	42	--



**Table 7 (continued):** 2005 MA DEP Ipswich Watershed *in-situ* attended multi-probe data

Station ID	Unique ID	Waterbody	Date	OWMID	Sample Depth (m)	Temperature (deg. C)	Temperature Qualifiers*	pH (SU)	pH Qualifiers*	Specific Conductivity (uS/cm)	Specific Conductivity Qualifiers*	Total Dissolved Solids (mg/l)	Total Dissolved Solids Qualifiers*	Dissolved Oxygen (mg/l)	Dissolved Oxygen Qualifiers*	Saturation (%)	Saturation Qualifiers*
LB02	W0139	Lubbers Brook	5/16/05	92-2303	0.9	12.3	--	6.7	--	458	--	293	--	7.4	--	71	--
LB02	W0139	Lubbers Brook	5/18/05	92-2306	0.9	12.7	--	6.4	--	463	--	296	--	5.1	u	48	u
LB02	W0139	Lubbers Brook	5/24/05	92-2310	0.9	10.0	--	6.4	--	416	--	271	--	5.8	--	52	--
LB02	W0139	Lubbers Brook	6/20/05	92-2405	0.3	18.6	--	6.4	--	437	--	280	--	2.7	--	29	--
LB02	W0139	Lubbers Brook	6/21/05	92-2337	0.6	16.7	--	6.3	--	447	--	290	--	2.6	u	26	u
LB02	W0139	Lubbers Brook	6/22/05	92-2406	0.5	18.1	--	6.2	--	444	--	284	--	1.9	u	20	u
LB02	W0139	Lubbers Brook	7/25/05	92-2461	0.6	21.0	u	6.5	--	498	--	319	--	1.1	u,i	13	u,i
LB02	W0139	Lubbers Brook	7/27/05	92-2364	0.3	23.5	--	6.5	--	513	--	333	--	0.6	i	7	i
LB02	W0139	Lubbers Brook	7/27/05	92-2462	**	23.3	--	6.4	--	--	--	--	--	0.8	u,i	10	u,i
LB02	W0139	Lubbers Brook	8/22/05	92-2488	0.4	21.0	--	6.9	--	755	--	484	--	<0.2	--	2	--
LB02	W0139	Lubbers Brook	8/24/05	92-2379	0.1	18.5	--	6.6	--	665	--	432	--	1.5	u	16	u
LB02	W0139	Lubbers Brook	8/24/05	92-2489	0.4	19.5	--	6.5	--	720	--	461	--	0.9	--	10	--
LB02	W0139	Lubbers Brook	9/19/05	92-2449	0.4	17.4	--	6.4	--	673	--	431	--	1.0	--	11	--
LB02	W0139	Lubbers Brook	9/21/05	92-2450	0.5	16.6	--	7.0	--	803	--	514	--	0.4	--	4	--
LB02	W0139	Lubbers Brook	9/27/05	92-2621	0.5	15.5	--	6.6	--	##	u	##	u	0.4	--	4	--
MM01	W0143	Maple Meadow Brook	5/24/05	92-2309	0.5	10.1	--	6.3	--	396	--	258	--	5.0	--	45	--
MM01	W0143	Maple Meadow Brook	6/21/05	92-2336	0.3	16.3	--	6.4	--	436	--	283	--	4.8	u	49	u
MM01	W0143	Maple Meadow Brook	7/27/05	92-2363	0.1	22.4	--	6.7	--	553	--	359	--	0.4	i	5	i
MM01	W0143	Maple Meadow Brook	8/24/05	92-2377	0.8	18.4	--	6.7	--	635	--	413	--	0.5	u	5	u
MM01	W0143	Maple Meadow Brook	9/27/05	92-2620	0.8	14.4	u	6.5	--	612	--	392	--	<0.2	--	<2	--

**Table 7 (continued):** 2005 MA DEP Ipswich Watershed *in-situ* attended multi-probe data

Station ID	Unique ID	Waterbody	Date	OWMID	Sample Depth (m)	Temperature (deg. C)	Temperature Qualifiers*	pH (SU)	pH Qualifiers*	Specific Conductivity (uS/cm)	Specific Conductivity Qualifiers*	Total Dissolved Solids (mg/l)	Total Dissolved Solids Qualifiers*	Dissolved Oxygen (mg/l)	Dissolved Oxygen Qualifiers*	Saturation (%)	Saturation Qualifiers*
IR00	W1394	Ipswich River	5/24/05	92-2317	0.6	10.6	--	6.8	--	293	--	190	--	9.4	--	85	--
IR00	W1394	Ipswich River	6/20/05	92-2384	0.4	17.3	--	6.7	--	300	--	192	--	7.0	--	73	--
IR00	W1394	Ipswich River	6/21/05	92-2344	0.4	18.5	--	6.7	--	307	--	200	--	7.2	--	77	--
IR00	W1394	Ipswich River	6/22/05	92-2385	0.3	19.3	--	6.9	--	308	--	197	--	6.4	--	71	--
IR00	W1394	Ipswich River	7/25/05	92-2482	0.6	25.2	--	7.2	--	375	--	240	--	7.6	u,i	94	u,i
IR00	W1394	Ipswich River	7/27/05	92-2371	0.5	27.1	--	7.2	--	376	--	245	--	6.6	i	83	i
IR00	W1394	Ipswich River	7/27/05	92-2483	0.7	26.7	--	7.2	--	--	--	--	--	4.8	u,i	61	u,i
IR00	W1394	Ipswich River	8/22/05	92-2509	0.6	23.8	--	7.4	--	373	--	239	--	4.6	u	55	u
IR00	W1394	Ipswich River	8/24/05	92-2430	0.3	21.2	--	7.3	--	376	--	244	--	7.1	u	80	u
IR00	W1394	Ipswich River	8/24/05	92-2510	0.5	20.6	--	7.0	--	376	--	241	--	6.0	--	68	--
IR00	W1394	Ipswich River	9/19/05	92-2550	0.5	19.4	--	7.3	--	307	--	196	--	9.5	--	105	--
IR00	W1394	Ipswich River	9/21/05	92-2551	0.5	17.9	--	7.1	--	310	--	198	--	7.2	--	77	--
IR00	W1394	Ipswich River	9/27/05	92-2628	0.6	16.7	--	7.3	--	315	--	202	--	8.7	--	91	--
HB01A	W1410	Howlett Brook	8/9/05	92-2781	--	23.1	s	--	--	--	--	--	--	--	--	--	--
HB01A	W1410	Howlett Brook	8/19/05	92-2784	--	18.5	s	--	--	--	--	--	--	--	--	--	--
HB01A	W1410	Howlett Brook	9/13/05	92-2787	--	18.5	s	--	--	--	--	--	--	--	--	--	--

\*see Appendix 1 for a complete list of data qualifiers

**Table 8.** 2005 MassDEP Ipswich River Watershed summary of unattended probe data

For purposes of summarizing the unattended probe data in this technical memorandum, selected statistics for each station and dates of visit are shown. While the data used to calculate the statistics may have been qualified for various reasons (representativeness, inaccuracy, method not followed, etc.), these data are generally considered acceptable for statistical purposes. Censored data were not used in these calculations. For more detailed information about qualified data points for a given station visit, refer to the final data files that have undergone quality assurance/quality control review (available from MassDEP upon request).

Deploy Details							Temperature		Dissolved Oxygen					
Unique ID	Station ID	Water Body	OWMID	Start Date	End Date	Total Deployment Duration (Hours)	Avg (deg. C)	Max (deg. C)	Avg (mg/L)	Min (mg/L)	Avg Daily Amount of Time < 3.0 mg/L (Hours)	Avg Daily Amount of Time < 5.0 mg/L (Hours)	Avg Saturation (%)	Saturation Max (%)
W0107	IP15.5	Ipswich River	92-2478	7/25/2005	7/27/2005	44.0	24.9	25.6	2.6	1.9	17.7	24.0	32	49
W0107	IP15.5	Ipswich River	92-2505	8/22/2005	8/24/2005	43.5	22.6	23.2	4.5	3.1	0.0	20.8	52	62
W0107	IP15.5	Ipswich River	92-2546	9/19/2005	9/21/2005	43.0	19.6	19.7	4.7	3.3	0.0	11.9	52	62
W0107	IP15.5	Ipswich River	92-2386	--	--	--	--	--	--	--	--	--	--	--
W0110	IP09	Ipswich River	92-2475	7/25/2005	7/27/2005	44.0	25.2	27.0	4.6	3.6	0.0	16.0	57	75
W0110	IP09	Ipswich River	92-2502	8/22/2005	8/24/2005	45.0	22.6	24.7	5.2	3.9	0.0	9.8	60	83
W0110	IP09	Ipswich River	92-2543	9/19/2005	9/21/2005	43.0	19.4	20.4	4.5	3.9	0.0	22.8	50	61
W0110	IP09	Ipswich River	92-2389	--	--	--	--	--	--	--	--	--	--	--
W0112	IP04.5	Ipswich River	92-2395	6/20/2005	6/22/2005	42.0	19.7	21.3	4.8	4.0	0.0	16.6	54	61
W0112	IP04.5	Ipswich River	92-2469	7/25/2005	7/27/2005	45.5	21.6	22.7	3.4	3.0	0.0	24.0	39	43
W0112	IP04.5	Ipswich River	92-2496	8/22/2005	8/24/2005	48.5	20.4	22.4	2.9	2.4	14.2	24.0	32	40
W0112	IP04.5	Ipswich River	92-2457	9/19/2005	9/21/2005	42.5	18.0	19.2	2.5	1.6	24.0	24.0	26	35

**Table 8 (continued):** 2005 MassDEP Ipswich River Watershed unattended probe data

Deploy Details							Temperature		Dissolved Oxygen					
Unique ID	Station ID	Water Body	OWMID	Start Date	End Date	Total Deployment Duration (Hours)	Avg (deg. C)	Max (deg. C)	Avg (mg/L)	Min (mg/L)	Avg Daily Amount of Time < 3.0 mg/L (Hours)	Avg Daily Amount of Time < 5.0 mg/L (Hours)	Avg Saturation (%)	Saturation Max (%)
W0113	IP01.5	Ipswich River	92-2301	5/16/2005	5/18/2005	46.0	14.4	16.8	5.8	3.9	0.0	7.1	57	83
W0113	IP01.5	Ipswich River	92-2401	6/20/2005	6/22/2005	38.0	20.6	23.1	4.0	2.2	7.2	17.2	46	71
W0113	IP01.5	Ipswich River	92-2463	7/25/2005	7/27/2005	46.0	25.0	27.4	2.7	2.0	14.1	24.0	33	45
W0113	IP01.5	Ipswich River	92-2451	--	--	--	--	--	--	--	--	--	--	--
W0121	MR01	Miles River	92-2380	6/20/2005	6/22/2005	46.5	18.6	20.2	2.9	2.3	15.5	24.0	32	39
W0121	MR01	Miles River	92-2484	7/25/2005	7/27/2005	43.0	23.8	25.4	1.9	1.6	24.0	24.0	23	29
W0121	MR01	Miles River	92-2511	8/22/2005	8/24/2005	40.5	21.0	23.0	4.1	3.8	0.0	24.0	47	51
W0121	MR01	Miles River	92-2552	9/19/2005	9/21/2005	42.0	18.4	20.1	5.4	5.2	0.0	0.0	58	63
W0130	BO01	Boston Brook/ Upper Boston Brook Pond	92-2392	6/20/2005	6/22/2005	43.0	19.3	21.5	6.4	6.1	0.0	0.0	71	74
W0130	BO01	Boston Brook/ Upper Boston Brook Pond	92-2472	7/25/2005	7/27/2005	44.0	24.4	25.5	5.1	4.9	0.0	4.4	62	64
W0130	BO01	Boston Brook/ Upper Boston Brook Pond	92-2499	8/22/2005	8/24/2005	45.5	19.7	21.9	6.3	5.9	0.0	0.0	69	74
W0130	BO01	Boston Brook/ Upper Boston Brook Pond	92-2540	9/19/2005	9/21/2005	43.0	17.4	18.7	6.5	6.4	0.0	0.0	69	71
W0136	MB02	Martins Brook	92-2300	5/16/2005	5/18/2005	46.0	14.3	15.9	5.7	4.0	0.0	5.5	56	74

**Table 8 (continued):** 2005 MassDEP Ipswich River Watershed unattended probe data

Deploy Details							Temperature		Dissolved Oxygen					
Unique ID	Station ID	Water Body	OWMID	Start Date	End Date	Total Deployment Duration (Hours)	Avg (deg. C)	Max (deg. C)	Avg (mg/L)	Min (mg/L)	Avg Daily Amount of Time < 3.0 mg/L (Hours)	Avg Daily Amount of Time < 5.0 mg/L (Hours)	Avg Saturation (%)	Saturation Max (%)
W0136	MB02	Martins Brook	92-2398	6/20/2005	6/22/2005	41.0	20.1	22.1	3.6	2.3	7.2	24.0	41	58
W0136	MB02	Martins Brook	92-2466	7/25/2005	7/27/2005	46.0	24.1	25.7	1.4	1.0	24.0	24.0	17	28
W0136	MB02	Martins Brook	92-2493	8/22/2005	8/24/2005	49.0	21.3	24.0	1.4	0.7	24.0	24.0	16	27
W0136	MB02	Martins Brook	92-2454	9/19/2005	9/21/2005	43.0	18.2	20.3	1.4	1.0	24.0	24.0	15	20
W0139	LB02	Lubbers Brook	92-2302	5/16/2005	5/18/2005	45.5	13.7	17.2	6.3	3.4	0.0	10.6	61	110
W0139	LB02	Lubbers Brook	92-2404	6/20/2005	6/22/2005	40.0	18.3	20.5	1.5	0.6	20.8	24.0	17	37
W0139	LB02	Lubbers Brook	92-2460	7/25/2005	7/27/2005	45.5	22.3	23.8	0.3	0.2	24.0	24.0	4	12
W0139	LB02	Lubbers Brook	92-2487	8/22/2005	8/24/2005	50.0	19.8	21.0	0.3	0.2	24.0	24.0	3	12
W0139	LB02	Lubbers Brook	92-2448	9/19/2005	9/21/2005	43.0	17.7	19.4	--	--	--	--	--	--
W1394	IR00	Ipswich River	92-2383	6/20/2005	6/22/2005	45.5	18.8	20.2	6.7	6.1	0.0	0.0	74	78
W1394	IR00	Ipswich River	92-2508	8/22/2005	8/24/2005	43.0	22.1	24.2	6.7	5.4	0.0	0.0	78	101
W1394	IR00	Ipswich River	92-2549	9/19/2005	9/21/2005	42.5	18.3	19.4	6.8	5.9	0.0	0.0	73	101
W1394	IR00	Ipswich River	92-2481	--	--	--	--	--	--	--	--	--	--	--

see Appendix 1 for a complete list of data qualifiers

**Table 9:** 2005 MassDEP Ipswich River Watershed continuous temperature deploy data

For purposes of summarizing the continuous temperature data in this technical memorandum, selected statistics for each station and dates of visit are shown. While the data used to calculate the statistics may have been qualified for various reasons (representativeness, inaccuracy, method not followed, etc.), these data are generally considered acceptable for statistical purposes. Censored data were not used in these calculations. For more detailed information about qualified data points for a given station visit, refer to the final data files that have undergone quality assurance/quality control review (available from the MassDEP upon request).

Unique ID	Station ID	Water Body	OWMID	Start Date	End Date	Total Deployment (Hours)	Avg (deg. C)	Standard Deviation	Min (deg. C)	Max (deg. C)	Range of 7-Day Avg of the Daily Max (deg. C)	Maximum Weekly Average Temperature (deg. C)	Avg Daily Amount of Time > 20 deg. C (Hours)	Avg Daily Amount of Time > 28.3 deg. C (Hours)
W0128	FB01	Fish Brook	92-2374	8/9/2005	9/13/2005	839.7	19.2	1.9	15.6	23.5	17.3-22.6	21.9	7.6	0.0
W1410	HB01A	Howlett Brook	92-2375	8/9/2005	9/13/2005	839.8	20.0	2.4	12.5	25.4	19.2-23.6	22.3	12.0	0.0
W0124	GB01	Gravelly Brook	92-2376	8/9/2005	9/13/2005	839.5	17.2	1.9	10.9	22.4	17.0-20.1	18.8	1.7	0.0

## References

- Johnson, A. and J. Fiorentino. 2011. CN 228.3. *Ipswich River Watershed 2005 Benthic Macroinvertebrate Bioassessment*. Massachusetts Department of Environmental Protection, Division of Watershed Management. Worcester, MA.
- Maietta, R. 2006. *Technical Memorandum: Ipswich and Shawsheen River Watersheds 2005 Fish Population Monitoring and Assessment*. Massachusetts Department of Environmental Protection, Division of Watershed Management. Worcester, MA.
- Maietta, R., J. Ryder and R. Chase. 2009. *2005 Fish Toxics Monitoring Public Request and Year 2 Watershed Surveys*. Massachusetts Department of Environmental Protection, Division of Watershed Management. Worcester, MA.
- MassDEP. 2001. *Laboratory Quality Assurance Plan and Standard Operating Procedures*. Massachusetts Department of Environmental Protection, Division of Environmental Analysis, Senator William X. Wall Experiment Station. Lawrence, MA.
- MassDEP. 2004a. CN 1.21 - *Sample Collection Techniques for DWM Surface Water Quality Monitoring SOP*. December 2004. Massachusetts Department of Environmental Protection, Division of Watershed Management. Worcester, MA.
- MassDEP. 2004b. CN 4.2 - *Water Quality Multi-probe Instrument Use*. April 2004. Massachusetts Department of Environmental Protection, Division of Watershed Management. Worcester, MA.
- MassDEP 2004c. CN 4.4 - *Multi-probe Deployments for Unattended Logging Data Collection*. November 2004. Massachusetts Department of Environmental Protection, Division of Watershed Management. Worcester, MA.
- MassDEP 2005a. CN220.2. *Sampling Plan for Year 2005: Surface Water Monitoring in the Ipswich River Watershed*. Massachusetts Department of Environmental Protection, Division of Watershed Management. Worcester, MA.
- MassDEP. 2005b. CN 225.0 - *QUALITY ASSURANCE PROGRAM PLAN, Surface Water Monitoring & Assessment, MassDEP-Division of Watershed Management, 2005-2009*. April 2005. Massachusetts Department of Environmental Protection, Division of Watershed Management. Worcester, MA.
- MassDEP 2005c. CN103.0 - *Standard Operating Procedures: Continuous Temperature Monitoring*. Massachusetts Department of Environmental Protection, Worcester, MA.
- MassDEP 2007. CN 280.0 – *DATA VALIDATION REPORT for Year 2005 Project Data*. Massachusetts Department of Environmental Protection, Division of Watershed Management. Worcester, MA.
- MassDEP. 2008. Open File. *DWM Water quality river field sheets 2005*. Massachusetts Department of Environmental Protection, Central Region Office. Worcester, MA.
- MassDEP. 2012a. CN 56.15 - *DWM Water Quality Data Validation Process (Summary)*. May 2012. Massachusetts Department of Environmental Protection, Division of Watershed Management. Worcester, MA.
- MassDEP. 2012b. CN 56.6 - *DWM Water Quality Data Processing and Validation – Laboratory Data (Draft)*. May 2012. Massachusetts Department of Environmental Protection, Division of Watershed Management. Worcester, MA.
- MassDEP. 2012c. CN 56.4 – *File Processing and Data Validation for Attended Water Quality Probe Data (Draft)*. May 2012. Massachusetts Department of Environmental Protection, Division of Watershed Management. Worcester, MA.
- MassDEP. 2012d. CN 56.5 – *File Processing and Data Validation for Unattended Water Quality Probe Data (Draft)*. May 2012. Massachusetts Department of Environmental Protection, Division of Watershed Management. Worcester, MA.
- NOAA 2008. National Oceanic and Atmospheric Administration. *2005 Lawrence MA Precipitation Data*. [Online]. (<http://www.erh.noaa.gov/box/dailystns.shtml>) 23 October 2008.
- Ries, K.G. III, 1998. *Streamflow measurements, basin characteristics, and streamflow statistics for low-flow partial record station operated in Massachusetts from 1989 through 1996* USGS Water Resources Investigations Report 98-4006. as referenced online at USGS MA-RI Stream Stats at <http://ststdmamrl.er.usgs.gov/streamstats/expert.htm>

USGS 2008. [Online]. Real-time data for Massachusetts- Streamflow.  
<http://waterdata.usgs.gov/ma/nwis/current/?type=flow>. United States Geological Survey, Water Resources Division, Marlborough, MA. Accessed December 11, 2008.



## Appendix 1: 2005 Data Symbols and Qualifiers

### Excerpted from: Data Validation Report for Year 2005 Project Data (CN 280.0)

Department of Environmental Protection  
Division of Watershed Management

The following data qualifiers or symbols are used in the MADEP/DWM WQD database for qualified and censored water quality and multi-probe data. Decisions regarding censoring vs. qualification for specific, problematic data are made based on a thorough review of all pertinent information related to the data.

#### **General Symbols (applicable to all types):**

“ ## ” = Censored data (i.e., data that has been discarded for some reason).

“ \*\* ” = Missing data (i.e., data that should have been reported).

“ -- ” = No data (i.e., data not taken/not required)

\* = Analysis performed by Laboratory OTHER than DEP's Wall Experiment Station (WES)

[ ] = A result reported inside brackets has been “censored”, but is shown for informational purposes (e.g., high blank results).

#### **Multi-probe-specific Qualifiers:**

“ i ” = inaccurate readings from Multi-probe likely; may be due to significant pre-survey calibration problems, post-survey checks outside typical acceptance ranges for the low ionic and deionized water checks, lack of calibration of the depth sensor prior to use, or to checks against laboratory analyses. Where documentation on unit pre-calibration is lacking, but SOPs at the time of sampling dictated pre-calibration prior to use, then data are considered potentially inaccurate.

“ m ” = method not followed; one or more protocols contained in the DWM Multi-probe SOP not followed, i.e., operator error (e.g., less than 3 readings per station (rivers) or per depth (lakes), or instrument failure not allowing method to be implemented.

“ 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, due to lack of sufficient equilibration time prior to final readings, non-representative location, highly-variable water quality conditions, etc. See Section 4.1 for acceptance criteria.

“ c ” = greater than calibration standard used for pre-calibration, or outside the acceptable range about the calibration standard. Typically used for conductivity (>718, 1,413, 2,760, 6,668 or 12,900 uS/cm) or turbidity (>10, 20 or 40 NTU). It can also be used for TDS and Salinity calculations based on qualified (“c”) conductivity data, or that the calculation was not possible due to censored conductivity data ( TDS and Salinity are calculated values and entirely based on conductivity reading). See Section 4.1 for acceptance criteria.

“ r ” = data not representative of actual field conditions.

“ t ” = tidal conditions

#### **Sample-Specific Qualifiers:**

“ a ” = accuracy as estimated at WES Lab via matrix spikes, PT sample recoveries, internal check standards and lab-fortified blanks did not meet project data quality objectives identified for program or in QAPP.

“ b ” = blank Contamination in lab reagent blanks and/or field blank samples (indicating possible bias high and false positives).

“ d ” = precision of field duplicates (as RPD) did not meet project data quality objectives identified for program or in QAPP. Batched samples may also be affected.

“ e ” = not theoretically possible. Specifically, used for bacteria data where colonies per unit volume for e-coli bacteria > fecal coliform bacteria, for lake Secchi and station depth data where a specific Secchi depth is greater than the reported station depth, and for other incongruous or conflicting results.

“ f ” = frequency of quality control duplicates did not meet data quality objectives identified for program or in QAPP.

“ 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’ limit or RDL and greater than the method detection limit or MDL ( $mdl < x < rdl$ ). 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.

“ p ” = samples not preserved per SOP or analytical method requirements.

“ r ” = samples collected may not be representative of actual field conditions, including the possibility of “outlier” data and flow-limited conditions (e.g., pooled).

“ t ” = tidal conditions