APPENDIX D
DWM 2002 - 2004 LAKE SURVEY DATA FOR THE CHARLES RIVER WATERSHED

The MassDEP Division of Watershed Management (DWM) staff conducted baseline lake surveys and nutrient criteria surveys at several lakes and ponds in the Charles River Watershed between 2002 and 2005. Baseline surveys were conducted in seven lakes in 2002 and selected lakes were also sampled in 2003, 2004 and 2005 as part of a nutrient criteria development project (see lists below). Data from lakes sampled in 2005 have not been finalized and are not included in this appendix. Sampling was conducted in the following lakes.

Baseline Lake Surveys in 2002
Chandler Pond, Hammond Pond, Jamaica Pond, Lake Pearl, Mirror Lake, Uncas Pond, Weld Pond

Nutrient Criteria Development Project Surveys in 2003
Jamaica Pond, Lake Pearl, Uncas Pond

Nutrient Criteria Development Project Surveys in 2004
Charles River Lakes District (also referred to as Moody Street Pond), Jennings Pond

Nutrient Criteria Development Project Surveys in 2005
Jamaica Pond

Lake surveys were conducted to coincide with maximum growth of aquatic vegetation, highest recreational use, and highest lake productivity (June to September). *In-situ* depth profile measurements using multiprobe instruments (including dissolved oxygen, water temperature, pH, conductivity, and depth and calculates total dissolved solids and % oxygen saturation) were recorded once in each waterbody at deep-hole stations. In-lake samples were also collected and analyzed for total phosphorus, apparent color, and chlorophyll *a* (depth integrated).

Procedures used for water sampling and sample handling are described in the *Sample Collection Techniques for DWM Surface Water Quality Monitoring Standard Operating Procedure* and the *Hydrolab® Series3/Series 4 Multiprobe Standard Operating Procedure* (MassDEP 2001a and MassDEP 2001b). Apparent color and chlorophyll *a* were measured according to standard procedures at the MassDEP DWM office in Worcester (MassDEP 2001c and MassDEP 2001d). The aquatic plant cover (native and non-native) and species distribution were mapped and recorded (MassDEP 2002b) . Details on procedures used can be found in the *Quality Assurance Project Plan for TMDL Baseline Lakes Survey 2002* (MassDEP 2002a) and the *Quality Assurance Project Plan for Nutrient Criteria Lakes Survey 2003*, which was also continued into 2004 (MassDEP 2003). Standard operating procedures were also being developed in 2004 to deploy multiprobe units for unattended data logging (MassDEP 2007).

The Wall Experiment Station (WES), the Department's analytical laboratory, supplied all sample bottles and field preservatives, which were prepared according to the WES *Laboratory Quality Assurance Plan and Standard Operating Procedures* (MassDEP 1995). Samples were preserved in the field as necessary, transported on ice to WES, and analyzed according to the WES Standard Operating Procedures (SOP). Quality control samples (field blanks and duplicates) were also taken and transported on ice to WES on each sampling date.

Information about data quality objectives (accuracy, precision, completeness, representativeness and comparability) is available in the *2002 Data Validation Report* (MassDEP 2005a), the *Data Validation Report for Year 2003 Project Data* (MassDEP 2005b), and the *Data Validation Report for Year 2004* (MassDEP 2006). Water quality data were excerpted from the *Baseline Lake Survey 2002 Technical Memo* (Mattson 2007), the *Baseline Lake Survey 2003 Technical Memo* (Haque and Mattson 2007), and are presented in tables D1, D2, D3, and D4. Deployed multi-probe data collected in August 2004 are provided in Figures 1 and 2 although data tables are available upon request. Symbols and qualifiers used for DWM data are provided in Attachment 1 (excerpted from data validation report).

Table D1. 2002 MassDEP DWM Charles River Watershed Baseline Lakes *physico-chemical* data.

Chandler Pond, Unique ID: W0978 Station: A

Description: deep hole, Boston

Date	Secchi (m)	Secchi Time (24hr)	Depth (m)	OWMID	QAQC	Time (24hr)	Sample Depth (m)	Chl-a (mg/m3)	TP (mg/L)	Apparent Color (PCU)
07/11/02	0.6	11:00	1.5							
				LB-1967	--	11:00	0.5	--	0.15 b	44*
				LB-1968	--	11:05	0 - 1.0	58*	--	--
08/06/02	0.6	10:15	1.5							
				LB-2108	--	10:10	0.5	--	0.18	60*
				LB-2109	--	10:18	** - **	43.3*	--	--
09/12/02	0.3	15:05	1.5							
				LB-2249	--	15:05	0.5	--	0.15 f	70* f
				LB-2250	--	15:10	0 - 0.6	37.3*	--	--

Hammond Pond, Unique ID: W0977 Station: A

Description: deep hole, Newton

Date	Secchi (m)	Secchi Time (24hr)	Depth (m)	OWMID	QAQC	Time (24hr)	Sample Depth (m)	Chl-a (mg/m3)	TP (mg/L)	Apparent Color (PCU)
07/11/02	>1.5	12:05	1.5							
				LB-1978	LB-1979	12:01j	0.5	--	## b	43*
				LB-1979	LB-1978	12:01j	0.5	--	## b	45*
				LB-1982	LB-1983	12:01j	0 - 1.1	5.2*	--	--
				LB-1983	LB-1982	12:01j	0 - 1.1	4.9*	--	--
08/06/02	1.4	11:25	1.9							
				LB-2119	LB-2120	11:20	0.5	--	0.034	43*
				LB-2120	LB-2119	11:25	0.5	--	0.032	39*
				LB-2121	--	11:30	0.9	--	0.042	--
				LB-2123	LB-2124	11:30	0 - 0.9	5.7*	--	--
				LB-2124	LB-2123	11:30	0 - 0.9	5.5*	--	--
09/12/02	>1.7	13:25	1.7							
				LB-2260	--	13:25	0.5	--	0.025 f	37* f
				LB-2261	--	13:25	0.2	--	0.026 f	37* f
				LB-2264	LB-2265	14:00	** - **	17.6*	--	--
				LB-2265	LB-2264	14:01	** - **	19.4*	--	--

Jamaica Pond, Unique ID: W0973 Station: A

Description: deep hole, Boston

Date	Secchi (m)	Secchi Time (24hr)	Depth (m)	OWMID	QAQC	Time (24hr)	Sample Depth (m)	Chl-a (mg/m3)	TP (mg/L)	Apparent Color (PCU)
07/11/02	5.2	10:00	15.2							
				LB-1985	--	09:50	0.5	--	0.010 j	<15*
				LB-1986	--	09:55	14.5	--	0.36	--
				LB-1987	--	10:05	0 - 8.0	5.5*	--	--
08/06/02	2.9	13:10	13.8							
				LB-2126	--	13:15	0.5	--	0.016 b	<15*
				LB-2127	--	13:20	12.0	--	0.29 br	--
				LB-2128	--	13:25	0 - 8.7	8.1*	--	--
09/12/02	4.4	10:45	12.8							
				LB-2268	--	10:45	0.5	--	0.014 bfj	<15*
				LB-2269	--	11:00	12.3	--	0.30 bf	--
				LB-2252	--	10:50	--	--	0.014 fj	--
				LB-2263	--	10:55	0 - 12.3	17.6*	--	--

Table D1 (continued). 2002 MassDEP DWM Charles River Watershed Baseline Lakes *physico-chemical* data.

Pipe/Discharge to Jamaica Pond, Unique ID: W0986 Station: pipe
Description: 8 inch metal storm water pipe draining into Jamaica Pond approximately 60 feet north of park pavilion, Boston

Date	Secchi (m)	Secchi Time (24hr)	Depth (m)	OWMID	QAQC	Time (24hr)	Sample Depth (m)	Chl-a (mg/m3)	TP (mg/L)	Apparent Color (PCU)
09/12/02	--	--	--							
				LB-2257	--	11:40	--	--	0.009 fhj	--

Lake Pearl, Unique ID: W0970 Station: A
Description: deep hole, Wrentham

Date	Secchi (m)	Secchi Time (24hr)	Depth (m)	OWMID	QAQC	Time (24hr)	Sample Depth (m)	Chl-a (mg/m3)	TP (mg/L)	Apparent Color (PCU)
07/10/02	2.6	11:20	10.2							
				LB-1996	--	11:11	0.5	--	0.014 j	16* d
				LB-1997	--	11:14	9.5	--	0.058	--
				LB-1998	LB-1999	11:20	0 - 8.0	8.4*	--	--
				LB-1999	LB-1998	11:22	0 - 8.0	8.4*	--	--
08/07/02	2.4	10:35	10.4							
				LB-2138	--	10:45	0.5	--	0.017	23*
				LB-2139	--	10:50	9.0	--	0.066	--
				LB-2140	--	10:55	0 - 7.0	19.4*	--	--
09/03/02	3.7	10:25	10.2							
				LB-2281	--	10:35	0.5	--	## b	<15*
				LB-2282	--	10:45	9.7	--	## b	--
				LB-2283	--	10:30	0 - 9.7	17.7*	--	--

Mirror Lake, Unique ID: W0971 Station: A
Description: deep hole, Wrentham

Date	Secchi (m)	Secchi Time (24hr)	Depth (m)	OWMID	QAQC	Time (24hr)	Sample Depth (m)	Chl-a (mg/m3)	TP (mg/L)	Apparent Color (PCU)
07/10/02	0.5	13:35	2.0							
				LB-1991	LB-1992	13:20	0.5	--	0.051	33* d
				LB-1992	LB-1991	13:22	0.5	--	0.048	60* d
				LB-1994	--	13:40	0 - 1.5	16.5*	--	--
08/07/02	0.6	09:20	2.7							
				LB-2132	LB-2133	09:25	0.5	--	0.064 j	55*
				LB-2133	LB-2132	09:29	0.5	--	0.064 j	46*
				LB-2135	LB-2136	09:30	0 - 1.7	12.7*	--	--
				LB-2136	LB-2135	09:37	0 - 1.7	11.8*	--	--
09/03/02	0.7	13:40	1.8							
				LB-2273	LB-2274	13:50	0.5	--	0.045 b	49*
				LB-2274	LB-2273	13:50	0.5	--	0.046 b	50*
				LB-2275	--	13:55	1.3	--	0.046 b	--
				LB-2277	LB-2278	13:45	0 - 1.3	24.8*	--	--
				LB-2278	LB-2277	13:45	0 - 1.3	22.7*	--	--

Table D1 (continued). 2002 MassDEP DWM Charles River Watershed Baseline Lakes *physico-chemical* data.

Uncas Pond, Unique ID: W0969 Station: A
Description: deep hole, Franklin

Date	Secchi (m)	Secchi Time (24hr)	Depth (m)	OWMID	QAQC	Time (24hr)	Sample Depth (m)	Chl-a (mg/m3)	TP (mg/L)	Apparent Color (PCU)
07/10/02	3.7	10:00	7.2							
				LB-2004	--	09:55	0.5	--	0.014 bj	18* d
				LB-2005	--	09:58	6.5	--	0.040 b	--
				LB-2006	--	10:05	0 - 6.5	7.8*	--	--
08/07/02	3.0	13:04	6.7							
				LB-2145	--	13:12	0.5	--	0.011 j	24*
				LB-2146	--	13:14	5.0	--	0.027	--
				LB-2147	--	13:22	0 - 5.0	7.2*	--	--
09/04/02	5.3	15:02	6.7							
				LB-2286	LB-2287	15:28	0.5	--	0.012 j	<15*
				LB-2287	LB-2286	15:28	0.5	--	0.012 j	<15*
				LB-2288	--	15:25	6.2	--	0.19	--
				LB-2290	LB-2291	15:20	0 - 6.2	18.3*	--	--
				LB-2291	LB-2290	15:20	0 - 6.2	18.4*	--	--

Weld Pond, Unique ID: W0972 Station: A
Description: deep hole, northeast lobe, Dedham

Date	Secchi (m)	Secchi Time (24hr)	Depth (m)	OWMID	QAQC	Time (24hr)	Sample Depth (m)	Chl-a (mg/m3)	TP (mg/L)	Apparent Color (PCU)
07/10/02	>2.3	16:00	2.3							
				LB-2007	--	15:50	0.5	--	0.010 j	22* d
				LB-2008	--	15:52	1.7	--	0.012 j	--
				LB-2009	--	16:02	0 - 1.7	2.6*	--	--
08/06/02	>2.1	15:45	2.1							
				LB-2149	--	15:40	0.5	--	0.015	23*
				LB-2150	--	15:43	1.5	--	0.013 j	--
				LB-2151	--	15:45	0 - 1.5	2.5*	--	--
09/04/02	>1.9	10:20	1.9							
				LB-2294	--	10:50	0.5	--	0.012 bj	22*
				LB-2295	--	10:52	1.4	--	0.005 bj	--
				LB-2296	--	10:40	0 - 1.4	2.0*	--	--

Table D2. 2003 MassDEP DWM Charles River Watershed Nutrient Criteria Lakes *physico-chemical* data.

Jamaica Pond, Unique ID: W0973 Station: A

Description: deep hole, Boston

Date	Secchi (m)	Secchi Time (24hr)	Depth (m)	OWMID	QAQC	Time (24hr)	Depth (m)	Chl-a (mg/m3)	TP (mg/L)	Apparent Color (PCU)
08/12/03	1.8	12:11	**							
				LC-0163	LC-0164	12:15	0.2	--	##* m	15*
				LC-0164	LC-0163	12:15	0.2	--	##* m	15*
				LC-0165	--	13:12	**	--	##* m	--
				LC-0167	--	13:06	0 - 6.0	23.0*	--	--

Lake Pearl, Unique ID: W0970 Station: A

Description: deep hole, Wrentham

Date	Secchi (m)	Secchi Time (24hr)	Depth (m)	OWMID	QAQC	Time (24hr)	Depth (m)	Chl-a (mg/m3)	TP (mg/L)	Apparent Color (PCU)
07/16/03	3.9	13:18	8.0							
				LC-0172	--	13:59	8.0	--	##* m	--
				LC-0170	LC-0171	13:25	--	--	##* m	16*
				LC-0171	LC-0170	13:25	--	--	##* m	19*
				LC-0174	--	13:30	0 - 8.0	13.0* d	--	--

Uncas Pond, Unique ID: W0969 Station: A

Description: deep hole, Franklin

Date	Secchi (m)	Secchi Time (24hr)	Depth (m)	OWMID	QAQC	Time (24hr)	Depth (m)	Chl-a (mg/m3)	TP (mg/L)	Apparent Color (PCU)
07/16/03	3.5	11:13	6.5							
				LC-0178	--	11:17	6.0	--	##* m	--
				LC-0177	--	10:55	--	--	##* m	17*
				LC-0179	LC-0180	11:25	0 - 6.0	##* d	--	--
				LC-0180	LC-0179	11:26	0 - 6.0	##* d	--	--

Table D3. 2002 MassDEP DWM Charles River Watershed Baseline Lakes *in-situ* data.

Chandler Pond, Unique ID: W0978 Station: A
Description: deep hole, Boston

Date	OWMID	Time (24hr)	Depth (m)	Temp (C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/l)	DO (mg/l)	DO Saturation (%)
09/05/02									
	LB-2255	14:58	0.5	23.4	8.5 c	700	448	11.5	133
	LB-2255	15:04	0.8	22.7 u	8.2 cu	701	449	9.1 u	103 u
09/12/02									
	LB-2251	15:04	0.5	21.8	8.2 c	712	456	9.0 u	101 u

Hammond Pond, Unique ID: W0977 Station: A
Description: deep hole, Newton

Date	OWMID	Time (24hr)	Depth (m)	Temp (C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/l)	DO (mg/l)	DO Saturation (%)
09/05/02									
	LB-2253	10:14	0.5	20.7	6.5	539	345	6.0	66
	LB-2253	10:20	1.2	20.7	6.5	540	346	6.2 u	68 u
09/12/02									
	LB-2258	13:47	0.5	21.0	6.6	547	350	6.8	76
	LB-2258	13:53	1.2	20.9	6.6	546	350	7.0 u	77 u
	LB-2266	13:32	0.5	20.9	6.6	546	350	6.8	76
	LB-2266	13:39	1.2	20.8 u	6.6	545	349	7.2	80

Jamaica Pond, Unique ID: W0973 Station: A
Description: deep hole, Boston

Date	OWMID	Time (24hr)	Depth (m)	Temp (C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/l)	DO (mg/l)	DO Saturation (%)
09/05/02									
	LB-2254	12:28	0.5	22.1	7.7 c	425	272	8.9	100
	LB-2254	12:38	3.5	22.0	7.7 c	426	273	8.8	99
	LB-2254	12:44	5.5	21.8 u	7.6 c	427	273	8.5 u	95 u
	LB-2254	12:49	6.0	19.9 u	7.1 cu	421	270	6.9 u	75 u
	LB-2254	12:54	6.5	15.5 u	6.8 u	427	273	2.2 u	22 u
	LB-2254	12:59	7.0	13.0 u	6.6	424	271	1.1	10
	LB-2254	13:04	7.4	12.0 u	6.5	421	269	0.8	7
	LB-2254	13:08	9.4	8.9 u	6.6	429 u	275 u	0.3 u	2 u
	LB-2254	13:17	11.8	7.1	6.4	449 u	287 u	0.3	2
09/12/02									
	LB-2271	10:27	0.4	21.7	7.7 c	424	271	9.0	101
	LB-2271	10:32	1.5	21.7	7.7 c	424	271	9.0	101
	LB-2271	10:37	6.0	21.5	7.7 c	426	273	8.8	99
	LB-2271	10:48	7.0	15.1 u	6.7	417	267	2.8	28
	LB-2271	10:58	8.0	11.9	6.5	417	267	1.3 u	12 u
	LB-2271	11:12	9.0	9.5 u	6.4	425	272	2.2 u	19 u
	LB-2271	11:17	10.0	8.1	6.4	427	273	0.3	2
	LB-2271	11:21	11.0	7.5	6.3	442	283	0.3	2
	LB-2271	11:25	12.3	7.1	6.3	453 u	290 u	0.3	2

Table D3 (continued). 2002 MassDEP DWM Charles River Watershed Baseline Lakes *in-situ* data.

Lake Pearl, Unique ID: W0970 Station: A
Description: deep hole, Wrentham

Date	OWMID	Time (24hr)	Depth (m)	Temp (C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/l)	DO (mg/l)	DO Saturation (%)
09/03/02									
	LB-2284	10:13	0.5	21.3	7.1 c	502	321	6.8	75
	LB-2284	10:19	1.5	21.3	7.1 c	502	321	6.8	75
	LB-2284	10:25	2.5	21.3	7.1 c	503	322	6.8	75
	LB-2284	10:30	3.5	21.2	7.1 c	503	322	6.8	75
	LB-2284	10:36	4.5	21.2	7.1 c	501	320	6.8	75
	LB-2284	10:42	5.5	21.2	7.1 c	504	323	6.6	73
	LB-2284	11:05	6.0	20.8	6.9 c	501	321	5.3	58
	LB-2284	10:46	6.5	19.9 u	6.8 u	488	312	2.6	28
	LB-2284	11:10	6.7	19.5 u	6.6	487 u	312 u	2.9 u	31 u
	LB-2284	10:57	7.0	17.2 u	6.6	473	303	1.7 u	17 u
	LB-2284	11:16	7.5	15.4 u	6.6	481	308	<0.2	<2
	LB-2284	11:24	8.4	13.6 u	6.9 cu	504	322	<0.2	<2
	LB-2284	11:30	9.5	12.6 u	7.3 cu	554 u	354 u	<0.2	<2

Mirror Lake, Unique ID: W0971 Station: A
Description: deep hole, Wrentham

Date	OWMID	Time (24hr)	Depth (m)	Temp (C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/l)	DO (mg/l)	DO Saturation (%)
09/03/02									
	LB-2279	13:38	0.5	20.3	7.5 c	322	206	9.2	100
	LB-2279	13:45	1.3	20.0	7.5 c	321	206	8.9	96

Uncas Pond, Unique ID: W0969 Station: A
Description: deep hole, Franklin

Date	OWMID	Time (24hr)	Depth (m)	Temp (C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/l)	DO (mg/l)	DO Saturation (%)
09/04/02									
	LB-2292	15:09	0.5	22.3 u	6.4	217	139	6.4 u	72 u
	LB-2292	15:17	1.5	20.9	6.4	216	138	6.3	69
	LB-2292	15:26	2.5	20.7	6.4	215	138	5.8	63
	LB-2292	15:31	3.5	20.5	6.3	216	138	5.2 u	57 u
	LB-2292	15:38	4.0	20.0	6.1	231	148	2.0 u	22 u
	LB-2292	15:42	4.5	18.6	5.9	269	172	0.3	3
	LB-2292	15:49	5.5	14.5 u	6.1	333 u	213 u	1.8 u	17 u
	LB-2292	15:56	5.7	13.8	6.5	447 u	286 u	<0.2 u	<2 u

Weld Pond, Unique ID: W0972 Station: A
Description: deep hole, northeast lobe, Dedham

Date	OWMID	Time (24hr)	Depth (m)	Temp (C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/l)	DO (mg/l)	DO Saturation (%)
09/04/02									
	LB-2297	10:34	0.5	20.5	6.4	858 c	549 c	6.9	75
	LB-2297	10:42	1.4	20.3	6.3	861 c	551 c	5.5	60

Table D4. 2003 MassDEP DWM Charles River Watershed Nutrient Criteria Lakes *in-situ* data.

Jamaica Pond, Unique ID: W0973 Station: A

Description: deep hole, Boston

Date	OWMID	Time (24hr)	Depth (m)	Temp (C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/l)	DO (mg/l)	DO Saturation (%)
08/12/03									
	LC-0168	12:12	0.4	27.6 u	9.2 c	419	268	8.8	113
	LC-0168	12:15	1.5	27.1	9.3 c	420	269	8.7	111
	LC-0168	12:19	2.9	26.2	9.3 c	421	269	9.1	114
	LC-0168	12:22	4.0	22.3 u	7.7 uc	431	276	10.1 u	117 u
	LC-0168	12:26	5.5	13.3	7.1 c	445	285	10.0	97
	LC-0168	12:30	7.1	8.6	6.4	445	285	1.7 u	14 u
	LC-0168	12:34	8.6	6.8	6.4	444	284	<0.2	<2
	LC-0168	12:37	10.9	5.7	6.5	461	295	<0.2	<2
	LC-0168	12:44	13.8	5.3	6.3	547	350	<0.2	<2

Lake Pearl, Unique ID: W0970 Station: A

Description: deep hole, Wrentham

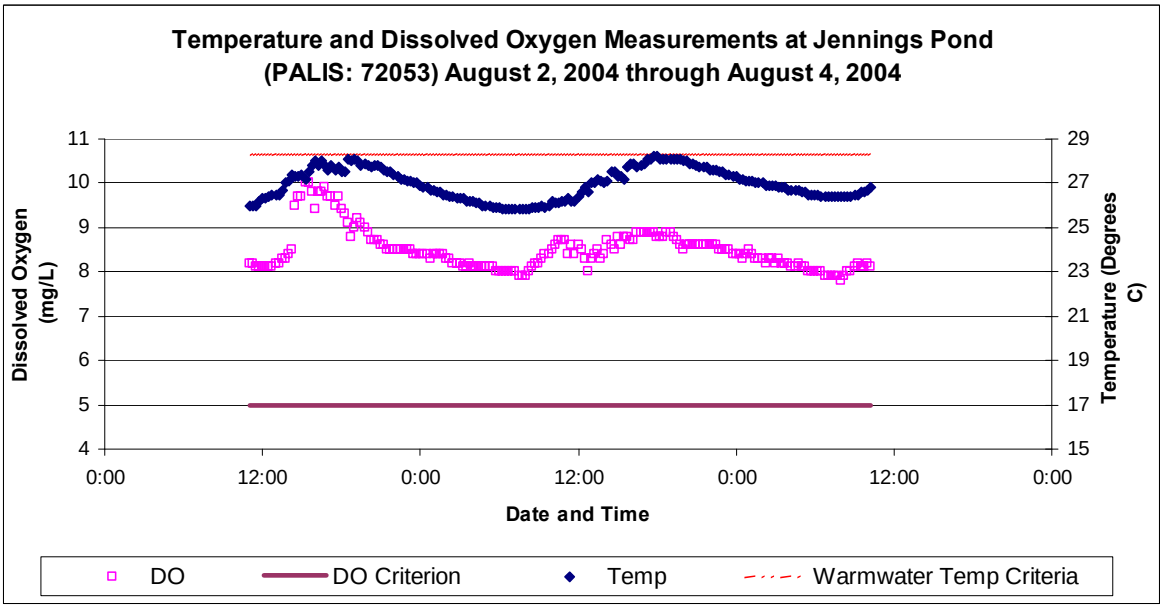
Date	OWMID	Time (24hr)	Depth (m)	Temp (C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/l)	DO (mg/l)	DO Saturation (%)
07/16/03									
	LC-0175	13:19	0.5	25.1	7.9 c	487	312	8.6	106
	LC-0175	13:23	1.4	25.0	7.9 c	487	312	8.6	106
	LC-0175	13:30	2.5	24.9	7.9 c	488	312	8.6	106
	LC-0175	13:35	3.5	24.9	7.8 c	488	312	8.6	105
	LC-0175	13:40	4.6	17.9 u	7.6 c	490	314	9.7 u	104 u
	LC-0175	13:48	5.5	15.4 u	6.6	500	320	0.4 u	4 u
	LC-0175	13:53	6.5	13.7 u	6.6	497	318	0.3	3
	LC-0175	13:58	7.6	12.4	6.6	495	317	<0.2	<2
	LC-0175	14:01	8.3	11.3	6.8	497	318	<0.2	<2

Uncas Pond, Unique ID: W0969 Station: A

Description: deep hole, Franklin

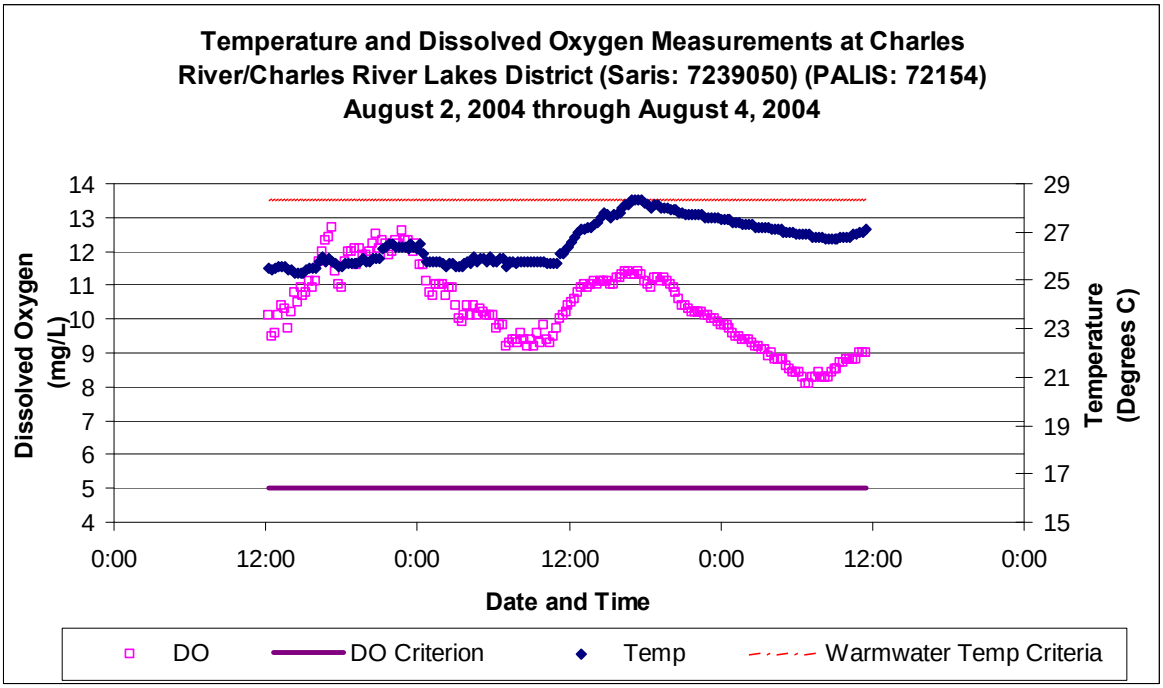
Date	OWMID	Time (24hr)	Depth (m)	Temp (C)	pH (SU)	Conductivity at 25°C (µS/cm)	TDS (mg/l)	DO (mg/l)	DO Saturation (%)
07/16/03									
	LC-0181	11:00	0.5	24.8	6.7	259	165	7.7	95
	LC-0181	11:05	1.4	24.7	6.7	259	166	7.8 u	95 u
	LC-0181	11:12	2.5	23.9 u	6.4	265	170	9.7 u	117 u
	LC-0181	11:19	3.5	20.3	6.2	283	181	9.5 u	107 u
	LC-0181	11:28	4.4	16.7 u	6.0	318	203	8.6 u	90 u
	LC-0181	11:36	5.5	14.5	5.8	379	243	3.7	37
	LC-0181	11:43	6.0	14.0	5.7	409 u	262 u	2.9 u	29 u

Figure 1. Temperature and Dissolved Oxygen Measurements at Jennings Pond August 2, 2004 through August 4, 2004.



	Data						
	Number of Measurements	Min Temp	Max Temp	Min DO	Max DO	Min DO % Saturation	Max DO % Saturation
Total	190	25.8°C	28.2°C	7.8 mg/L	10 mg/L	98	128

Figure 2. Temperature and Dissolved Oxygen Measurements at Charles River/Charles River Lakes District August 2, 2004 through August 4, 2004.



	Data. It should be noted that all DO data were qualified with an i.						
	Number of Measurements	Min Temp	Max Temp	Min DO	Max DO	Min DO %Saturation	Max DO %Saturation
Total	190	25.3°C	28.3°C	8.1 mg/L	12.7 mg/L	103	158

ATTACHMENT 1

The following data qualifiers or symbols are used in the MADEP/DWM Water Quality Database (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 calibration readings outside typical acceptance range for the low ionic check and for the deionized blank water check, lack of calibration of the depth sensor prior to use, or to checks against laboratory analyses.

"i" = General Depth Criteria: Apply to each OWMID#
- Clearly erroneous readings due to faulty depth sensor: Censor (i)
- Negative and zero depth readings: Censor (i); (likely in error)
- 0.1 m depth readings: Qualify (i); (potentially in error)
- 0.2 and greater depth readings: Accept without qualification; (likely accurate)

Specific Depth Criteria: Apply to entirety of depth data for survey date

- If zero and/or negative depth readings occur more than once per survey date, censor all negative/zero depth data, and qualify all other depth data for that survey (indicates that erroneous depth readings were not recognized in the field and that corrective action (field calibration of the depth sensor) was not taken, ie. that all positive readings may be in error.)

" m " = method not followed; one or more protocols contained in the DWM Multi-probe SOP not followed, ie. operator error (eg. 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.

" ? " = Light interference on Turbidity sensor (Multiprobe error message). Data is typically censored.

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 reagant 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 (eg. sediment in sample, floc formation), lab error (eg. 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).

Sample codes for sampling:

OWMID: Office of Watershed Management Identification Code for the bottle.

QAQC: the OWMID codes (e.g. LB-1903) refer to the field duplicate sample (usually immediately above or below in the table) to be compared with the current sample.

Time: Local time.

References

Haque, A.A. and Mattson, M.D. 2007. *Baseline Lake Survey 2003 Technical Memo.* CN205.0. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.

MassDEP. 1995. January Draft *Laboratory Quality Assurance Plan and Standard Operating Procedures.* Massachusetts Department of Environmental Protection, Division of Environmental Analysis, Wall Experiment Station, Lawrence, MA.

MassDEP. 2001a. *Sample Collection Techniques for DWM Surface Water Quality Monitoring.* CN001.1. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.

MassDEP. 2001b. *Hydrolab® Series 3/Series 4 Multiprobe Standard Operating Procedure*. CN004.1. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.

MassDEP. 2001c. *Standard Operating Procedures for Apparent Color*. CN002.1. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA

MassDEP. 2001d. *Standard Operating Procedures for Chlorophyll a.* CN003.2. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA

MassDEP 2002a. *Quality Assurance Project Plan for TMDL Baseline Lake Survey 2002.* CN72.0. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.

MassDEP. 2002b. *Standard Operation Procedures for Aquatic Plant Mapping.* CN067.1. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.

MassDEP. 2003. *Quality Assurance Project Plan for Nutrient Criteria Lakes Survey 2003.* CN 165.0 Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.

MassDEP 2005a. *Data Validation Report for Year 2002 Project Data*. CN202.0. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.

MassDEP. 2005b. *Data Validation Report for Year 2003 Project Data.* CN211.0. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.

MassDEP. 2006. *Data Validation Report for Year 2004 Project Data.* CN265.0. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.

MassDEP. 2007. *Standard Operating Procedures for Multi-probe Deployments for Unattended Logging.* CN004.41. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA

Mattson, M. 2007. *Baseline Lake 2002 Technical Memo*. CN204.0. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.