APPENDIX F

MASSDEP DWM 2003 LAKE SURVEY DATA IN THE CONNECTICUT RIVER WATERSHED

From Baseline Lake Survey 2003, Technical Memo CN 205.0.

In the Connecticut River Watershed, baseline lake surveys were conducted in July and September 2003. Metacomet Lake and Upper Highland Lake were each sampled on one occasion. Data were excerpted from the *Baseline Lake Survey 2003* Technical Memorandum (MassDEP 2007) and are presented in tables F1 and F2.

In-situ measurements using the Hydrolab® (measures dissolved oxygen, water temperature, pH, conductivity, and depth and calculates total dissolved solids and % oxygen saturation) were recorded. At deep hole stations measurements were recorded at various depths to create profiles. In-lake samples were also collected and analyzed for alkalinity, total phosphorus, apparent color, and chlorophyll *a* (an integrated sample). Procedures used for water sampling and sample handling are described in the *Grab Collection Techniques for DWM Water Quality Sampling Standard Operating Procedure* and the *Hydrolab® Series 3 Multiprobe Standard Operating Procedure* (MassDEP 1999a and MassDEP 1999b). The Wall Experiment Station (WES), MassDEP'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 Procedure (SOP). Information about data quality objectives (accuracy, precision, detection limits, holding times, representativeness and comparability) is available in the 2003 Data Validation Report (MassDEP 2005). Apparent color and chlorophyll *a* were measured according to standard procedures at the MassDEP DWM office in Worcester (MassDEP 2002a and MassDEP 2002b). No aquatic macrophyte survey was conducted at either lake.

Table F1. 2003 MassDEP DWM Connecticut River Watershed Baseline Lakes *physico-chemical* data.

CONNECTICUT RIVER/Metacomet Lake
Unique ID: W1068 Station: A
Description: deep hole, Belchertown

Date	Secchi	Secchi Time	Station Depth	OWMID	QAQC	Time	SmpTyp	RelDepth[1]	Sample Depth	Chl-a	NO3-NO2-N	TKN	TN	TP	AppColor
	m	24hr	m			24hr			m	mg/m3	mg/L	mg/L	mg/L	mg/L	PCU
07/09/03	2.1	11:45	4.3												
				LC-0053	--	11:50	VDOR	nb	3.5	--	--	--	--	##* m	--
				LC-0051	LC-0052	11:37	MNGR	--	<0.5	--	--	--	--	##* m	35*
				LC-0052	LC-0051	11:37	MNGR	--	<0.5	--	--	--	--	##* m	36*
				LC-0055	--	11:53	DINT	--	0 - 3.5	11.9*	--	--	--	--	--

CONNECTICUT RIVER//Upper Highland Lake
Unique ID: W1080 Station: A
Description: deep hole, southern end, Goshen

Date	Secchi	Secchi Time	Station Depth	OWMID	QAQC	Time	SmpTyp	RelDepth[1]	Sample Depth	Chl-a	NO3-NO2-N	TKN	TN	TP	AppColor
	m	24hr	m			24hr			m	mg/m3	mg/L	mg/L	mg/L	mg/L	PCU
09/03/03	3.5	10:13	4.5												
				LC-0059	--	10:35	VDOR	nb	4.2	--	<0.02	--	## bh	0.012	--
				LC-0058	--	10:30	MNGR	--	<0.5	--	<0.02	--	## bh	0.009	27*
				LC-0060	LC-0061	10:50	DINT	--	0 - 3.5	2.4*	--	--	--	--	--
				LC-0061	LC-0060	10:55	DINT	--	0 - 3.5	1.9*	--	--	--	--	--

[1] **Relative depth key: nb = near bottom.**

Table F2. 2003 MassDEP DWM Connecticut River Watershed Baseline Lakes *in-situ* data.

CONNECTICUT RIVER//Metacomet Lake, Unique ID: W1068 Station: A
Description: deep hole, Belchertown

Date	OWMID	Time	Depth	Temp	pH	Cond@ 25C	TDS	DO	SAT
		(24hr)	(m)	(°C)	(SU)	(uS/cm)	(mg/L)	(mg/L)	(%)
07/09/03									
	LC-0056	10:48	0.5	28.1	6.5 u	127	81.0	8.0	104
	LC-0056	10:58	1.5	26.9	6.2	128	81.9	6.8 u	87 u
	LC-0056	11:28	1.7	24.6 u	5.8	124	79.2	5.5 u	68 u
	LC-0056	11:05	2.0	23.2	6.1	121	77.6	3.9 u	46 u
	LC-0056	11:12	2.5	18.7	6.2 u	119	76.3	0.6	7
	LC-0056	11:19	3.0	15.6	6.2 u	124	79.1	0.4	4

CONNECTICUT RIVER//Upper Highland Lake, Unique ID: W1080 Station: A
Description: deep hole, southern end, Goshen

Date	OWMID	Time	Depth	Temp	pH	Cond@ 25C	TDS	DO	SAT
		(24hr)	(m)	(°C)	(SU)	(uS/cm)	(mg/L)	(mg/L)	(%)
09/03/03									
	LC-0062	10:46	0.1 i	20.4	6.8 u	34.0	22.0	7.4	82
	LC-0062	10:49	0.5	20.4	6.8	34.0	22.0	7.3	81
	LC-0062	10:52	0.8	20.4	6.8	34.0	22.0	7.3	81
	LC-0062	10:55	1.4	20.4	6.9	34.0	22.0	7.3	81
	LC-0062	10:57	1.9	20.4	6.9	35.0	23.0	7.3	81
	LC-0062	10:59	2.5	20.4	6.9 c	34.0	22.0	7.3	81
	LC-0062	11:03	2.9	20.4	6.9 c	34.0	22.0	7.3	81
	LC-0062	11:05	3.5	20.4	6.9 c	34.0	22.0	7.2 u	80 u
	LC-0062	11:08	4.0	20.4	6.9	34.0	22.0	7.1 u	79 u

Data Qualifiers

The following data qualifiers or symbols used in the MassDEP/DWM Water Quality Database (WQD) have been applied to qualify or censor these 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). NOTE: Prior to 2001 data,

"**" denoted either censored or missing data.

" ** " = Missing data (i.e., data that should have been reported). See NOTE above.

" -- " = 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.)

" 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.

Sample-Specific Qualifiers:

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

" h " = holding time violation (usually indicating possible bias low)

" 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.

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.

SymTyp: Sample Type- VDOR= Van Dorn; DINT= Depth integrated by vertical hose; MNGR= Manual Grab; NR= not recorded.

RelDepth: Relative Depth- s= Near Surface; m= middle depth; nb= near bottom.

References

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. 1999a. *Grab Collection Techniques for DWM Water Quality Sampling Standard Operating Procedure* Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA

MassDEP. 1999b. *Hydrolab® Series 3 Multiprobe Standard Operating Procedure* Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.

MassDEP. 2002a. *Standard Operating Procedures for Apparent Color, CN2.1* Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA

MassDEP. 2002b *Standard Operating Procedures for Chlorophyll a, CN3.2* Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA

MassDEP. 2005. *Data Validation Report for Year 2003 Project Data, CN 211.0*. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.

MassDEP. 2007. *Baseline Lake Survey 2003, Technical Memorandum CN 205.0.* Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.