APPENDIX B
Narragansett/Mount Hope Bay Watersheds
Summary of North Watuppa Pond Fish Toxics Monitoring 1989 through 2007

Introduction

Fish toxics monitoring is a cooperative effort between three Massachusetts Department of Environmental Protection (MassDEP) Offices/Divisions----Watershed Management (DWM), Research and Standards (ORS), and Environmental Analysis; the Massachusetts Department of Fish and Game (MA DFG); and the Massachusetts Department of Public Health (MA DPH). Fish toxics monitoring is typically conducted to assess the concentrations of toxic contaminants in freshwater fish, identify waterbodies where those concentrations may pose a risk to human health if consumed, and identify waters where toxic contaminants may impact fish and other wildlife.

MassDEP conducted sampling of fish from North Watuppa Pond in June 1989 (Maietta 1990). Mercury concentrations ranged from 0.61 to 2.4 mg/kg wet weight in the five species tested which included chain pickerel (*Esox niger*), white perch (*Morone americana*), yellow perch (*Perca flavescens*), largemouth bass (*Micropterus salmoides*), and smallmouth bass (*Micropterus dolomieu*) (Maietta 1990). Subsequent sampling of fish from North Watuppa Pond was conducted in 1994 (analysis of edible fillets conducted for As, Cd, Hg, Pb, Se, PCBs, organochlorine pesticides) as part of a mercury research project (MassDEP 1997), and in 2001, 2002, 2004, 2005, and 2007 as part of the MassDEP ORS Mercury Research Project (analysis of edible fillets conducted for Hg) (MassDEP 2006 and Maietta 2007). Fish were also collected from North Watuppa Pond in September 2000 and analyzed for residues for a group of target analytes (e.g., persistent, bioaccumulative, and toxic pollutants (PBTs) such as mercury, dioxins, PAHs, other semivolatile organics, PCBs) as part of the National Fish Tissue Study (EPA 2002 and Tetra Tech, Inc. 2000).

Methods

Field sampling methods are described in detail in the two project reports as are the sample handling and preparation methods (MassDEP 1997 and MassDEP 2006). The analytical methods employed by the laboratory and precision and accuracy data are also described. Similarly, the EPA study details all methods utilized in that project as well (EPA 2002 and Tetra Tech, Inc. 2000).

Results

The results of MassDEP ORS Mercury Research Project sampling are provided in Table B1. Data generated from 1994, 2001, 2002, and 2004 surveys were excerpted from two reports published by the Department (MassDEP 1997 and MassDEP 2006) and no additional data validation procedures were conducted by DWM. The 2005 and 2007 survey data were verified against the laboratory reports and data qualifiers from the laboratory are noted as appropriate. Lab duplicate precision estimates for mercury for the 2005 and 2007 datasets were within the acceptance criteria range of 0 – 20 RPD. Lab accuracy estimates for mercury using lab-fortified matrix and quality control samples were within the acceptance criteria range of 70-130% recovery. Lab accuracy estimates for mercury using lab-fortified blanks and lab blanks were within the acceptance criteria range of 85 – 115% recovery and ND, respectively. All raw data files, field sheets, lab reports, chain of custody forms, data entry QC documentation, and other metadata may be requested from MassDEP.

A summary of the fish tissue data results for North Watuppa Pond in the year 2000 as reported by EPA (2002) are provided in Table B2.

Table B1. Summary (mean, min, max) of mercury concentrations (wet weight) in North Watuppa Pond fish tissue as reported by MassDEP (MassDEP 1997), the MassDEP ORS Mercury Research Project 1999 – 2004 (MassDEP 2006 and Rose 2008), and as calculated from 2005 and 2007 data (MassDEP 2008). *Note: these data are not normalized to size.*

Sampling Year	Species Code[1]	Mean Hg concentration (µg/g)	Min – Max Hg concentration (µg/g)	Sample size (n)
1994	YP	0.34	0.17 – 0.54	8
1994	LMB	0.72	0.32 – 1.0	9
2001	YP	0.57	0.17 – 0.98	42
2001	LMB	0.81	0.25 – 1.7	21
2002	YP	0.40	0.20 – 0.76	60
2004	YP	0.42	0.19 – 0.76	30
2004	LMB	0.93	0.33 – 1.2	12
2005	YP	0.45	0.20 – 0.81	30
2005	LMB	1.0	0.64 – 1.4	15
2007	YP	0.46	0.22 – 0.9	30
2007	LMB	0.92	0.55 – 1.4	15

[1] Species code: YP = yellow perch (*Perca flavescens*), LMB= largemouth bass (*Micropterus salmoides*)

Table B2. *National Study of Chemical Residues in Lake Fish Tissue: Year 1 Analytical Data* (EPA 2002); data excerpt for Hg, %lipids and total PCBs North Watuppa Pond. [Note: field sampling plan prepared by Tetra Tech, Inc. (2000).]

Composite Sample Id	Fish Species	Specimen Number	Length (mm)	Specimen Weight (g)	Composite Weight (g)	Location	Sampling Date	EPA Sample Number	Composite Sample ID	Hg (µg/g)	% Lipids	PCB Arochlors and Congeners (µg/kg)
MA000017PS	Smallmouth bass [1]	1	370	533	1430	West Shore	9/7/2000	56406	MA000017PS	0.917	0.98	20.7226 [2]
MA000017PS	Smallmouth bass	2	390	662	1430	West Shore	9/7/2000	56406				
MA000017PS	Smallmouth bass	3	440	1046	1430	West Shore	9/7/2000	56406				
MA000017PS	Smallmouth bass	4	405	799	1430	Island NW	9/7/2000	56406				
MA000017PS	Smallmouth bass	5	450	1004	1430	East Shore	9/8/2000	56406				

[1] Species: Smallmouth bass (*Micropterus dolomieu*)
[2] qualifiers applied to this result: B = blank contamination, E = estimated value

References

EPA. 2002. *National Study of Chemical Residues in Lake Fish Tissue: Year 1 Analytical Data -- Data CD for Massachusetts.* United States Environmental Protection Agency, Office of Science and Technology, Washington, D.C.

Maietta, R. J. 1990. Memorandum to Arthur Johnson dated March 23, 1990. *1989 North and South Watuppa Ponds Fish Toxics Monitoring (BIO89-14).* Massachusetts Department of Environmental Protection, North Grafton, MA.

Maietta, R. J. 2007. *1983-2007 Fish Toxics Monitoring Survey List.* CN270.2. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.

MassDEP. 1997. *Fish mercury distribution in Massachusetts lakes – Final Report*. Massachusetts Department of Environmental Protection, Office or Research and Standards, Boston, MA, Wall Experiment Station, Lawrence, MA, and Office of Watershed Management, Worcester, MA.

MassDEP. 2006. *Massachusetts Fish Tissue Mercury Studies: long-term monitoring results, 1999-2004.* Massachusetts Department of Environmental Protection, Office of Research and Standards, Boston, MA and Wall Experiment Station, Lawrence, MA.

MassDEP. 2008. *Open Files - fish tissue mercury analytical data reports 2005 and 2007.* Massachusetts Department of Environmental Protection, Wall Experiment Station, Lawrence, MA and Division of Watershed Management, Worcester, MA.

Rose, J. (Jane.Rose@state.ma.us) 2008. *Fish mercury data and attachments; 1997 Fish Mercury Data.xls, 1994 Fish Mercury Data.xls, and Long-Term Lake Sampling List.xls*. Massachusetts Department of Environmental Protection, Office of Research and Standards, Boston, MA. Email to Laurie Kennedy, Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA dated 6 August 2008.

Tetra Tech, Inc. 2000. *Field Sampling Plan for the National Study of Chemical Residues in Lake Fish Tissue.* Tetra Tech, Inc. Owings Mills, MD.