APPENDIX G

MassDEP DWM 2002 Fish Toxics Monitoring in the Connecticut River Watershed

INTRODUCTION

Fish contaminant monitoring is a cooperative effort between three Massachusetts Department of Environmental Protection (MassDEP) Divisions/Offices (Watershed Management (DWM), Environmental Analysis, and Research and Standards), the Massachusetts Department of Fish and Game, and the Massachusetts Department of Public Health (MA DPH). Fish contaminant monitoring is designed to screen the edible fillets of several species of fish desired by the angling public for consumption, as well as species representing different feeding guilds (i.e., bottom dwelling omnivores, top-level predators, etc.) for the presence of heavy metals (Pb, Cd, Se, Hg, As), polychlorinated biphenyls (PCBs), and organochlorine pesticides. These data are used by the MA DPH in assessing human health risks associated with the consumption of freshwater fishes.

In the Connecticut River Watershed fish contaminant monitoring surveys were conducted by MassDEP DWM staff in Lower Mill Pond in Easthampton in 2002. The objective of these surveys was to screen the edible fillets of fishes for potential contaminants (e.g., selected metals, PCBs and organochlorine pesticides). All results were submitted to the MA DPH for review.

Project Objectives

Fish contaminant monitoring is typically conducted to assess the levels of toxic contaminants in freshwater fish, identify waterbodies where those levels may impact human health, and identify waters where toxic chemicals may impact fish and other aquatic life. Nonetheless, human health concerns have received higher priority and, therefore, fish tissue analysis has been restricted to edible fillets. The fish toxics monitoring was designed to screen the edible fillets of several species of fish representing different feeding groups (i.e., bottom-dwelling omnivores, top-level predators, etc.) for the presence of heavy metals, PCBs and chlorinated pesticides.

Fish toxics monitoring conducted in 2002 followed guidance in the Quality Assurance Project Plan (QAPP) for Fish Toxics Monitoring (MassDEP 2003). Data quality objectives are presented in the above-mentioned QAPP.

METHODS

Field Methods

Uniform protocols, designed to assure accuracy and prevent cross-contamination of samples, were followed for collecting, processing and shipping fish (MassDEP 2003 and MassDEP 2005). The characteristics of each site determine the method(s) of sample collection. Lower Millpond was sampled by DWM using boat electrofishing and trot line collection methods. Electrofishing was performed by maneuvering the boat through the littoral zone and shallow water habitat of a given waterbody and collecting most fish shocked. Fish collected by electrofishing were stored in a live well filled with site water until the completion of sampling. Fish to be included in the sample were stored on ice and transported to the DWM laboratory in Worcester.

DWM Laboratory Methods (Sample processing)

Fish brought to the MassDEP DWM laboratory in Worcester were processed using protocols designed to assure accuracy and prevent cross-contamination of samples (MassDEP 2003 and MassDEP 2005). Specimen lengths and weights were recorded along with notes on tumors, lesions, or other anomalies noticed during an external visual inspection. Species, length, and weight data can be found in Table G1. Fish were filleted (skin off) on glass cutting boards and prepared for freezing. All equipment used in the filleting process was rinsed in tap water and then rinsed twice in de-ionized water before and or after each sample. Samples (individual or composite) targeted for % lipids, PCBs and organochlorine pesticide analysis were wrapped in aluminum foil. Samples targeted for metals analysis were placed in VWR high density polyethylene (HDPE) cups with covers. Composite samples were composed of three fillets from like-sized individuals of the same species (occasionally the same genus). Samples were tagged and frozen for subsequent delivery to the MassDEP's Wall Experiment Station (WES).

WES Laboratory Methods (Analytical)

Mercury analysis were conducted using EPA Method 245.1. This is a cold vapor method using a Perkin Elmer, FIMS (Flow Injection Mercury System), which uses Flow Injection Atomic Absorption Spectroscopy. All analyses for cadmium, lead and selenium were conducted using EPA Method 200.7. Cadmium and lead were analyzed using a Perkin Elmer, Optima 3000 XL ICP - Optical Emmission Spectrophotometer. Arsenic and selenium were analyzed using a Perkin Elmer, Zeeman 5100 PC, Platform Graphite Furnace, Atomic Absorption

Spectrophotometer. PCB arochlor, PCB congener, and organochlorine pesticide analysis was performed on a gas chromatograph equipped with an electron capture detector "according to the modified AOAC 983.21 procedure for the analysis of PCB arochlors, congeners, and organochlorine pesticides" (Maietta *et al*. 2004). Additional information on analytical techniques used at WES is available from the laboratory.

RESULTS

Electrofishing at Lower Mill Pond in East Hampton on 6/6/02 resulted in the collection of three largemouth bass, three yellow perch, and three bluegill. Trotlines set overnight and retrieved on 6/7/02 resulted in the collection of three yellow bullhead. Additional species observed included pumpkinseed, chain pickerel, American eel, white perch, white sucker, and bowfin *Amia calva.*

All fish tissue data met DWM data quality objectives and passed quality control acceptance limits of the WES laboratory unless otherwise noted below (Maietta *et al*. 2004).

> "Fish tissue data passed the QC acceptance limits of the WES laboratory. WES reported a number of lab-validated data with "qualification". All but one of these "qualified" data points were for very low concentrations of either PCBs (Congeners and Arochlors) and/or organochlorine pesticides. One data point for arsenic at the detection limit was also qualified. The lab fortified matrix spike recovery for toxaphene was 50% resulting in "J" (estimated) qualification by WES. These QC data suggest potential poor recovery of toxaphene in samples. Lab accuracy estimates for metals (all analytes) using lab-fortified matrix samples were acceptable ranging from 80-112 % recovery except for two selenium samples at 126 and 128 % recovery and one lead sample at 130% recovery. QC sample recoveries were acceptable ranging from 83-117%. Lab accuracy estimates for metals (all analytes) using lab fortified blanks were acceptable ranging from 82 to 111 % recovery except for one lead sample at 128% recovery.

All quality assurance and quality control data are available from the laboratory upon request.

Fish toxics monitoring survey data can be found below in Table G1 (excerpted from Maietta *et al*. 2004).

Table G1. Analytical Results for 2002 Lower Millpond Fish Toxics Monitoring Survey. Results reported in wet weight, are from composite samples of fish fillets with skin off.

Sample ID	Collection Date	Species Code[1]	Length (cm)	Weight (g)	Sample ID (laboratory sample #)	Cd (mg/kg)	Pb (mg/kg)	Hg (mg/kg)	As (mg/kg)	Se (mg/kg)	% Lipids (%)	PCB Arochlors and Congeners (μg/g)	Pesticides (μg/g)
Lower Mill Pond, Easthampton, Connecticut River Watershed													
LMF02-1	6/6/02	LMB	31.9	400	2002020 (L2002192-1) (L2002196-1)	<0.040	<0.20	0.33	<0.060	0.18	0.05	A1254-0.020J A1260-0.038J BZ#180-0.0048 BZ#170-0.0022J	DDE-0.0076J
LMF02-2	6/6/02	LMB	33.4	470									
LMF02-3	6/6/02	LMB	32.3	420									
LMF02-4	6/6/02	YP	26.1	220	2002021 (L2002192-2) (L2002196-2)	<0.040	<0.20	0.12	<0.060	0.34	0.21	BZ#118-0.0012J	ND
LMF02-5	6/6/02	YP	25.6	200									
LMF02-6	6/6/02	YP	25.7	210									
LMF02-7	6/6/02	B	20.4	160	2002022 (L2002192-3) (L2002196-3)	<0.040	<0.20	0.08	<0.060	0.22	0.12	A1260-0.025J BZ#118-0.0015J BZ#180-0.0042 BZ#170-0.0019J	DDE-0.0064J
LMF02-8	6/6/02	B	20.1	160									
LMF02-9	6/6/02	B	19.4	150									
LMF02-10	6/7/02	YB	29.2	340	2002023 (L2002192-4) (L2002196-4)	<0.040	<0.20	0.12	<0.060	0.14	0.79	A1260-0.10 BZ#118-0.0035J BZ#180-0.020 BZ#170-0.0034J	Chlor[2]-0.064J DDE-0.015J
LMF02-11	6/7/02	YB	24.7	220									
LMF02-12	6/7/02	YB	27.0	260									

[1] Species Code | Common Name | Scientific name
(B) | bluegill | *Lepomis macrochirus*
(LMB) | largemouth bass | *Micropterus salmoides*
(YB) | yellow bullhead | *Ameiurus natalis*
(YP) | yellow perch | *Perca flavescens*

[2] - Chlordane

ND - not detected or the analytical result is at or below the established method detection limit (MDL).

J-estimated value, concentration <RDL or certain QC criteria not met

RDL = reporting detection limit

< = result not detected above method detection limit, unless otherwise noted

REFERENCES

MassDEP. 2003. CN096.0. *Quality Assurance Project Plan for Fish Toxics Monitoring.* Massachusetts Department of Environmental Protection, Division of Watershed Management. Worcester, MA.

MassDEP. 2005. CN040.1. *Standard Operating Procedure for Fish Toxics Monitoring Fish Collection and Preparation.* Massachusetts Department of Environmental Protection, Division of Watershed Management. Worcester, MA.

Maietta, R. J. undated. *1983-2004 Fish Toxics Monitoring Survey List*. CN219.0. Massachusetts Department of Environmental Protection, Division of Watershed Management. Worcester, MA. (TM-S-18).

Maietta, R. J., J. Ryder, and R.F. Chase. 2004. CN099.0. *2002 Fish Toxics Monitoring Public Request and Year 2 Watershed Surveys.* Massachusetts Department of Environmental Protection, Division of Watershed Management. Worcester, MA.