2009
Fish Toxics Monitoring
Public Request and
Year 2 Watershed
Surveys

white perch *Morone americana*

Massachusetts Department of Environmental Protection
Divisions of Watershed Management
and Environmental Analysis

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Introduction

Public Request Surveys (Interagency Committee on Freshwater Fish Toxics Monitoring and Assessment)

Due in part to an increasing public demand for fish toxics data, a formal protocol for the public to request fish toxics monitoring surveys of the Commonwealth's waterbodies was initiated in 1993/94. While public requests for fish testing had been fulfilled prior to this time, increased requests beyond the scope of the resources available made formal prioritization necessary. The following protocol is the result of a collaborative effort between the Massachusetts Department of Environmental Protection (MassDEP), the Massachusetts Department of Public Health (MDPH), and the Massachusetts Department of Fish and Game (MDFG). It consists of a Memorandum of Understanding (MOU) (Appendix B), a form for requesting fish testing (Appendix C), and the criteria used for ranking testing requests (Appendix D).

The process is as follows: completed request forms are sent to the MassDEP Division of Watershed Management (DWM) in Worcester. Representatives of the aforementioned agencies make up the Interagency Committee on Freshwater Fish Toxics Monitoring and Assessment (Interagency Committee). The Interagency Committee meets each year in February to prioritize all requests received between February 1st of the previous year and February 1st of the current year. Variables used to prioritize requests include fishing pressure (determined by Division of Fisheries and Wildlife (DFW) and the requester) and the presence of known or potential point and non-point sources of pollution (determined by MassDEP, DFW, and the requester). The number of requests fulfilled during any given year is determined by the amount of field and laboratory resources available in that year. All requesters are notified regarding the status of their request. If a request is denied, re-application in following years is allowed. Request forms are available through each of the agencies involved in the MOU, at the following locations:

Massachusetts Department of Environmental Protection

Division of Watershed Management 627 Main Street, 2nd Floor Worcester, MA 01608 (508) 792-7470	Division of Environmental Analysis Senator William X. Wall Experiment Station 37 Shattuck Street Lawrence, MA 01843 (978) 682-5237
Office of Research and Standards One Winter Street Boston, MA 02108 (617) 292-5510	

Massachusetts Department of Public Health
Bureau of Environmental Health Assessment
250 Washington Street, 7th Floor
Boston, MA 02108-4619
(617) 624-5757

Massachusetts Department of Fish and Game
Division of Fisheries and Wildlife (DFW)
Field Headquarters
One Rabbit Hill Road
Westborough, MA 01581
(508) 792-7270

Year 2 Watershed Surveys

Massachusetts has adopted a watershed approach to planning and implementing water resource protection activities throughout the state. In 1993 the twenty-seven major watersheds and coastal drainage areas in Massachusetts were placed on a rotating five-year schedule for monitoring, assessment, TMDL development, surface water permitting and non-point source pollution control. The rotating watershed cycle allows for the synchronization of these water quality planning and management activities within each watershed. During Year 1 of the rotating basin schedule all pertinent data and information relative to water resource management are gathered and reviewed to identify data gaps and the need for additional information. This process culminates in the development of a plan for obtaining this information during Year 2. At a minimum, a Quality Assurance Project Plan (QAPP) is formulated for all environmental monitoring activities to be performed. The scope of the monitoring effort varies depending upon the resources available and the prevailing water quality issues within each watershed. Input from outside agencies and the general public is actively solicited in order to gain further insight with respect to water quality goals and use-objectives. During Year 2 of this cycle the DWM may perform fish toxics monitoring surveys as part of their larger "biological monitoring" program.

Objective and Scope

The objective of Public Request and Year 2 Watershed Surveys is to screen edible fillets of fishes for potential contaminants (i.e. mercury and/or other metals, polychlorinated biphenyls (Aroclors) and organochlorine pesticides). The list of contaminants for which tissue samples are analyzed is determined on a case-by-case basis. All data are sent to the MDPH and the MassDEP Office of Research and Standards (ORS) for assessment and advisory issuance if appropriate.

PCB Arochlors analyzed for include Arochlors 1232, 1242, 1248, 1254, and 1260.. Organochlorine pesticides analyzed for include: Chlordane, Toxaphene, a-BHC, b-BHC, d-BHC, Lindane, Hexachlorocyclopentadiene, Trifluralin, Hexachlorobenzene, Heptachlor, Heptachlor Epoxide, Methoxychlor, DDD, DDE, DDT, and Aldrin. All organics analyses include lipid determination. Mercury is the only metal which is currently being routinely analyzed for. All analyses for variables listed above are performed at the Senator William X. Wall Experiment Station (WES). Additional variables are addressed on a site-specific basis.

In order to assess the level of contamination present in fish of different trophic guilds and habitat types, fish species targeted include at a minimum; largemouth bass, *Micropterus salmoides,* and/or chain pickerel, *Esox niger,* (predators); yellow perch, *Perca flavescens,* and/or white perch, *Morone americana,* (water column invertivores/omnivores); and bullhead, *Ameiurus* sp. and/or common carp, *Cyprinus carpio,* (bottom feeding omnivores). Average-sized fish (above legal length limit when applicable) are analyzed as composite samples. Additional species or substitute species are chosen on a site-by-site basis.

During 2009, a total of eight locations were sampled as a result of recommendations from the Interagency Committee. An additional eight locations were sampled as part of Year 2 watershed surveys as selected by the MassDEP watershed monitoring coordinators. A list of all of the sampling sites with pertinent locational information is presented in the following table.

Waterbody	Watershed	Town	USGS Quadrangle
Spectacle Pond PALIS#[1] 96307	Cape Cod	Sandwich	SANDWICH, MASS.
Cliff Pond PALIS#[1] 96039	Cape Cod	Brewster	HARWICH, MASS.
Lawrence Pond PALIS#[1] 96165	Cape Cod	Sandwich	SANDWICH, MASS.
Peters Pond PALIS#[1] 96244	Cape Cod	Sandwich	SANDWICH, MASS.
Sandy Pond PALIS#[1] 81117	Nashua River	Ayer	AYER, MASS.
Mother Brook SARIS#[2] 7239425	Charles & Neponset Rivers .	Boston	NORWOOD, MASS.
Ponkapoag Pond PALIS#[1] 73043	Neponset River	Canton	NORWOOD, MASS
Lake George PALIS#[1] 41016	Quinebaug River	Wales	SOUTHBRIDGE, MASS.-CONN.
Reservoir Pond PALIS#[1] 73048	Neponset River	Canton	NORWOOD, MASS.
Sawdy Pond PALIS#[1] 61005	Mount Hope Bay	Fall River	FALL RIVER, MASS.– R.I.
South Watuppa Pond PALIS#[1] 61006	Mount Hope Bay	Fall River Westport	FALL RIVER, MASS.– R.I.
Sunset Lake PALIS#[1] 74020	Weymouth and Weir Rivers	Braintree	NORWOOD, MASS
Richardi Reservoir PALIS#[1] (none assigned)	Weymouth and Weir Rivers	Braintree Randolph	NORWOOD, MASS
Connecticut River (upstream of dam) SARIS#[2] 3417100	Connecticut River	Northampton Easthampton Hadley Holyoke	MT.HOLYOKE, MASS
Connecticut River (downstream of dam) SARIS#[2] 3417100	Connecticut River	Chicopee Holyoke West Springfield	SPRINGFIELD NORTH, MASS
Long Pond PALIS#[1] 96183	Cape Cod	Brewster Harwich	HARWICH, MASS.

[1] PALIS# = Pond and Lake Identification System number (Ackerman 1989)
[2] SARIS# = Stream Classification Inventory of Rivers and Streams (Halliwell, Kimball, Screpetis 1982)

Field Methods

Waterbodies were sampled using an electrofishing boat, trotlines, gill nets, fish traps, and/or rod and reel. 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 until the completion of sampling. Trotlines and fish traps were baited with dog food, catfish bait, or dead fish and left overnight. Gill nets were set in various locations and either checked every two hours, or, occasionally left overnight. All gear left overnight was retrieved the following morning. Rod and reel fishing was performed by casting lures/baited hooks into fish holding cover and retrieving lures/hooks, and at times a fish. Fish to be included in the sample were dispatched, stored on ice, and either transported to the Massachusetts Department of Environmental Protection (MassDEP) Division of Watershed Management (DWM) laboratory in Worcester, or the Wall Experiment Station (WES) in Lawrence. In few cases (Cape Cod Ponds), fish were filleted in the field and then stored on ice or frozen. In all cases, live fish that were not included as part of the sample, were released.

Field Results

Collection methods used during the 2009 season included electrofishing, gill netting, trotlining, and rod and reel fishing. The collection dates, collection methods, species retained for analysis, and other species observed can be found in the following table.

Waterbody	Sampling Date	Collection Method(s)	Species Retained[1]	Other species observed
Spectacle Pond	5/27/09	Electrofishing, gill nets, fish traps	SMB, YP, LMB	not noted on field sheet
Cliff Pond	5/28/09	Electrofishing, gill nets, fish traps	SMB, YP, BB, WS	EBT, BT
Lawrence Pond	5/28/09	Electrofishing	SMB, YP, LMB, CP,P	not noted on field sheet
Peters Pond	5/29/09	Electrofishing, gill nets	SMB, YP, LMB, P, B	not noted on field sheet
Sandy Pond	6/03/09	Electrofishing	LMB, WP, BC, P	BT, CP, AE, B, BB
Mother Brook	6/04/09	Electrofishing	LMB, C, WS, YP, B, WP, WB	RBS, AE, P, CP, BB, GS, CC
Ponkapoag Pond	6/11/09	Electrofishing	LMB, CP, YP, B, BB	not noted on field sheet
Lake George	6/16/09	Electrofishing	LMB, YP, WP, P, BC, BB	not noted on field sheet
Reservoir Pond	6/23/09	Electrofishing	LMB, BC, WP, YP, P	AE, B, CP, BB
Sawdy Pond	6/25/09	Electrofishing	LMB, SMB, BC, WP, YP, BB, B	AE, CP, P
South Watuppa Pond	7/03/09	Electrofishing	SMB, LMB, YP, WP, BB, B	P, CP, WS, K
Sunset Lake	7/15/09	Electrofishing	LMB, BB, B	AE, CP, P, YP
Richardi Reservoir	7/30/09	Electrofishing	LMB, B, BB	AE, CP, P, RFP, BC, WP
Connecticut River Northampton	8/06/09 8/18/09	Electrofishing, trotlines	WS, CC, AE	not noted on field sheet
Connecticut River Chicopee	8/04/09 8/06/09 8/19/09	Electrofishing, trotlines	WS, CC, AE	not noted on field sheet
Long Pond	9/23/09	Electrofishing, gill nets, rod and reel	SMB, WS, BB, YP	not noted on field sheet

[1]Species codes are provided at the end of Table 1 in Appendix A

Laboratory Methods

Fish transported to the MassDEP DWM laboratory in Worcester were processed using protocols designed to assure accuracy and prevent cross-contamination of samples. Specimen lengths and weights were recorded along with notes on tumors, lesions, or other anomalies noticed during an external visual inspection. Scales, spines, or pectoral fin ray samples were obtained for use in age determination. Species, length, and weight data can be found in Appendix A Table 1. 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 after each sample. All samples were placed in VWR high density polyethylene (HDPE) cups with covers. Composite samples were composed of portions of two or three fillets from like-sized individuals of the same species (occasionally the same genus). Samples prepared at DWM in Worcester were tagged and frozen for subsequent delivery to the Department's Wall Experiment Station (WES).

Methods used at WES for metals analysis include the following: Mercury was analyzed by Thermal Decomposition, Amalgamation, and Atomic Absorption Spectrophotometry using EPA method 7473. (Batdorf 2009). PCB Aroclor, and organochlorine pesticide analyses were performed on a gas chromatograph equipped with an electron capture detector "according to the modified AOAC 983.21 procedure for the analysis of PCB Aroclors, and Organochlorine Pesticides."(MassDEP 2002). Additional information on analytical techniques used at WES is available from the laboratory.

Laboratory Results

Seventy five samples were delivered to WES for analysis. All fish tissue data passed WES QC acceptance limits, however, fifty-six percent of the mercury data were reported with "qualification" (See Quality Control Section). Mercury (MDL 0.0020 mg/kg) was detected in all seventy five samples analyzed. Concentrations ranged from 0.029 mg/kg to 1.1 mg/kg. Mercury concentrations varied greatly between waterbodies and species. Waterbody mean mercury concentrations and ranges are detailed on the following page. Complete results of the mercury analysis can be found in Appendix A Table 1.

Twenty six samples were analyzed for PCB Aroclors, and organochlorine pesticides. PCB Aroclors were detected in five of the twenty-six samples analyzed (19%) and DDT and/or it's metabolites DDE and DDD were detected in nine of the twenty-six samples analyzed (34%). Complete results for PCB Aroclors and organochlorine pesticides analysis can be found in Appendix A Table 1.

Waterbody	Mean Total Hg (mg/kg wet weight)	Range (mg/kg (min-max))
Spectacle Pond	0.64 (n=4)	0.23–1.1
Cliff Pond	0.28 (n=4)	0.19–0.42
Lawrence Pond	0.45 (n=5)	0.16–0.97
Peters Pond	0.64 (n=4)	0.18-0.95
Sandy Pond	0.29 (n=4)	0.11-0.53
Mother Brook	0.31 (n=7)	0.076–0.81
Ponkapoag Pond	0.45 (n=5)	0.084-0.91
Lake George	0.23 (n=6)	0.039–0.47
Reservoir Pond	0.34 (n=5)	0.071–0.72
Sawdy Pond	0.34 (n=7)	0.10-0.60
South Watuppa Pond	0.10 (n=6)	0.029-0.18
Sunset Lake	0.06 (n=3)	0.037-0.13
Richardi Reservoir	0.13 (n=3)	0.066-0.25
Connecticut River Northampton	0.25 (n=4)	0.22-0.29
Connecticut River Chicopee	0.34 (n=3)	0.078-0.58
Long Pond	0.28 (n=5)	0.11-0.47

Quality Control

Fifty-six percent of the mercury data were reported with “qualification”. The qualification in all cases was due to “EPA holding time” exceedances. Mercury was analyzed after the U.S. Environmental Protection Agency (EPA) recommended holding time of 28 days and samples were qualified as “Holding time not met but previous studies by WES show that frozen fish samples are stable for mercury for at least one year.” It should be noted that samples were in all cases delivered to WES within the USEPA 28 day holding time. Twelve sets of samples were delivered within 8 days of collection, two sets within 14 days of collection and two sets within 17 days of collection. Lab duplicate precision estimates for mercury were within the acceptance criteria range of 0 – 20 RPD. Lab accuracy estimates for mercury using lab-fortified matrix samples were within the acceptable range from 70-130 % recovery. Mercury quality control sample recoveries were within the acceptable range of 70-130 % recovery. Lab fortified blank recoveries for mercury were within the acceptable range of 85-115% recovery. Lab blanks were all acceptable at ND (analyzed for, but not detected above MDL). Complete quality control data for mercury are available upon request from WES or DWM.

PCB Aroclor and organochlorine pesticide results which were “qualified” as being greater than the Method Detection Limit but less than the Minimum Reporting Limit (>MDL but< MRL) were flagged by WES and appear so designated in the data tables (See Appendix A, Table 1).All but two of the positive Aroclor results were qualified, and approximately half (7 of 13) of the positive DDT (or metabolites) results were similarly qualified.

All laboratory blanks for organics resulted in non-detectable concentrations. Duplicate samples analyzed for PCB Aroclors, and organochlorine pesticides in all cases had resultant RPDs within the acceptance criteria range of 0-35%. The laboratory fortified blank sample recoveries for PCB Aroclors and laboratory fortified matrix sample recoveries for organochlorine pesticides were within the acceptance criteria range of 60-140% recovery. All surrogate PCNB analyses resulted in percent recoveries within the acceptance criteria of 60-140 % recovery. Complete quality control data for PCB Aroclors, and organochlorine pesticides are available upon request from WES or DWM.

Discussion

Edible tissue total mercury continues to be both widespread and detectable at concentrations that at times exceed the USEPA water quality criterion (0.3 μg/g methyl mercury), the MDPH trigger level (0.5 μg/g total mercury) and the USFDA Action level (1.0 μg/g methyl mercury). (USEPA 2005 and USFDA 2009). Mercury concentrations are addressed in the individual waterbody discussions that follow. MDPH is currently assessing the 2009 mercury data with regard to the need for waterbody specific advisory issuance where warranted.

PCB Aroclors and organochlorine pesticides are occasionally found in freshwater fishes from Massachusetts. They are usually found in fishes from waterbodies that have received historical discharges or are associated with known waste sites. As such, they are mostly found in rivers, although their presence in fishes from lakes and ponds can't be entirely ruled out. Current USFDA Action Levels (for fish, edible portion) include chlordane, and mirex, (0.3 μg/g for each individually), aldrin and dieldrin (0.3 μg/g combined) and for DDT and its metabolites DDE and TDE (5.0 μg/g combined) (USFDA 2009). Historic USFDA "Action Levels" were also available for PCBs (2.0 μg/g), however these were not listed in the current reference document. In addition, the MDPH has "trigger levels" for PCBs (1.0 μg/g total Aroclors) and DDT and/or its metabolites (0.06 μg/g). PCB Aroclors and organochlorine pesticides (DDT and its metabolites) were found in a number of samples analyzed in 2009. Concentrations were generally below levels of concern with the exception of two samples from the Connecticut River (2009146-002 and 2009146-007 for DDT and its metabolites).

These data and the mercury results are addressed in the individual waterbody discussions that follow. This information may result in fish consumption advisories and/or modifications.

Spectacle Pond: Spectacle Pond is a 91 acre (36.8 hectare ha) dual basin kettle hole pond located in the Town of Sandwich (Ackerman 1989). The shoreline is mostly forested with small areas of residential development on the southern and northern perimeter. Land use within the pond's watershed is a mix of medium density residential, forested, and water based recreation (summer camp).

Mercury exceeded the MDPH "trigger level" of 0.5 μg/g in both largemouth (0.66 mg/Kg) and smallmouth bass (0.58 mg/Kg) composite samples. In addition a larger individual smallmouth bass was found to contain mercury at 1.1 ug/g. Mercury was below the MDPH trigger in a three fish composite of yellow perch ranging in length from 219 to 249 mm. The elevated mercury in largemouth and smallmouth bass will most likely result in the issuance of a MDPH advisory.

It should be noted that many of the Cape Cod ponds also contain populations of large yellow perch as well as holdover trout. Unfortunately, larger perch were not collected during this survey and holdover trout are usually not targeted for analysis due to their relative scarcity.

Cliff Pond: Cliff Pond is a 193 acre (78.1 ha.) oligotrophic kettle pond located in the Nickerson State Forest within the town of Brewster (Ackerman 1989). The shoreline is totally undeveloped except for two boat ramps and land use within the watershed is entirely forested with the exception of a number of campsites.

Mercury was below the MDPH "trigger level" of 0.5 mg/kg in the four samples analyzed (including smallmouth bass, a top level predator). It should be noted that of the other species sampled,

white sucker and bullhead are bottom feeders which usually do not accumulate large amounts of mercury, and the yellow perch were on the small side.

The Cape Cod Commission had previously sampled an individual largemouth bass and composites of smallmouth bass and yellow perch from Cliff Pond in 2001 (Michaud 2001). As was the case in 2009, smallmouth bass were below the MDPH trigger level at that time. Although the individual largemouth bass collected in 2001 contained mercury in excess of the MDPH trigger level, it was a very large individual, and therefore, an advisory was not issued. In many waterbodies, larger predatory fish such as bass are likely to contain mercury in excess of the MDPH trigger level.

Lawrence Pond: Lawrence Pond is a 138 acre (55.86 ha.) mesotrophic pond located in the Town of Sandwich. The pond was reclaimed in 1958 and was limed in 1986 and 1991 (MDFW 1993). The shoreline is approximately twenty percent developed residentially. Land use within the pond's immediate watershed is a mix of medium density residential, forested, and water-based recreation (summer camp).

The mercury concentration in the composite sample of largemouth bass (0.97 μg/g, n=3) is well above the MDPH "trigger level" of 0.5 μg/g. Although the rest of the species sampled were below the MDPH trigger level, it should be noted that the smallmouth bass composite was approaching the trigger level at 0.46 μg/g. Although all bass (largemouth and smallmouth) analyzed were greater than the minimum legal length requirement of 12 inches, it should be noted that the largemouth bass were larger overall than the smallmouth bass.

The elevated mercury concentrations in largemouth bass will most likely result in a MDPH advisory for Lawrence Pond. Larger smallmouth bass can also be expected to exceed the MDPH trigger level for mercury.

Peters Pond: Peters Pond is a 127 acre (51.4 ha.) oligotrophic kettlehole pond located in the towns of Sandwich and Mashpee (Ackerman 1989). The shoreline is approximately twenty percent developed residentially. Land use within the pond's immediate watershed is a mix of medium and high density residential, forested, mining (sand and gravel) and water-based recreation (summer camp).

The pond was reclaimed for trout management in 1955 and again in 1968. It was also stocked with smallmouth bass brood stock in the late 70s. The pond is "heavily" stocked with trout, both in the spring and fall, and also receives Atlantic salmon broodstock when available. (MDFW 1993).

Composite samples of largemouth bass, smallmouth bass, and yellow perch were found to contain mercury in excess of the MDPH trigger level of 0.5 μg/g, however, it should be noted that all three composites consisted of large individual fish.

The Cape Cod Commission previously sampled an individual largemouth bass and composites of smallmouth bass and yellow perch in 2001 (Michaud 2001). The 2001 sampling resulted in an advisory which recommends that children younger than 12-years, pregnant women, and nursing mothers, should not consume any smallmouth bass from Peters Pond. The advisory also recommends that the general public should limit consumption of smallmouth bass to two meals per month. Largemouth bass and yellow perch will most likely be added to the list of species covered by the current advisory.

Sandy Pond: Sandy Pond is a 74 acre (51.4 ha.) mesotrophic pond located in the Town of Ayer (Ackerman 1989). The immediate shoreline is approximately sixty to seventy percent developed

residentially and land use within the watershed is primarily a mix of forested and residential. Public access for car-top boats and canoes is available along the western shoreline, however, parking is limited. Although it is stocked with trout in the spring the MDFW had no recent data from the pond as of 1993 (MDFW 1993). It should be noted that we collected a number of brown trout in early June of 2009.

Mercury exceeded the MDPH "trigger level" of 0.5 μg/g in black crappie. All other fish (including largemouth bass) were below the MDPH trigger level for mercury. The MDPH will most likely issue an advisory with regard to the consumption of black crappie from Sandy Pond.

Mother Brook: Mother Brook (or the Mother Brook Diversion) is a canal which was historically used for water power. It originates at the Charles River in Dedham and ultimately discharges to the Neponset River in Boston (Hyde Park). The Mother Brook Watershed is heavily developed residentially, commercially, and industrially. The brook has a strong industrial history predating the Industrial Revolution and was used to power mills in Dedham. Like all industrial rivers, Mother Brook received wastewater from these mills for many years.

Mercury exceeded the MDPH "trigger level" of 0.5 μg/g in largemouth bass (0.81 μg/g) but was below the "trigger level" in six other composite samples. It should be noted that the three fish composite of the largemouth bass was comprised of large fish (all greater than 1 kg and 430 mm or 17 inches).

PCB Aroclors were below MDLs in most samples analyzed. The composite of common carp was found to contain a trace amount of PCB Aroclor 1260 (results were qualified due to the analyte concentrations being "greater than Method Detection Limit but less than Reporting Detection Limit"). Organochlorine pesticides, specifically the metabolites of DDT (DDE and/or DDD) were found in four of the seven samples analyzed. Two of the samples (common carp and white sucker) contained DDE and/or DDD just above the MDPH trigger level of 0.06 μg/g. The two remaining samples contained low concentrations of these compounds which were reported as "results were qualified due to the analyte concentrations being "greater than Method Detection Limit but less than Reporting Detection Limit".

The current MDPH advisory for Mother Brook with regard to PCBs recommends that "children younger than 12-years, pregnant women, and nursing mothers should not consume any brown bullhead or white sucker from Mother Brook". In addition, the advisory also recommends that the "general public should not consume white sucker" and that the "general public should limit consumption of brown bullhead to two meals per month". It should be noted that the current advisory pertains to the segment downstream of the Knight Street Dam to the confluence with the Neponset River. The 2009 sampling location is upstream from the Knight Street Dam.

It is unclear if the current MDPH advisory on Mother Brook is the result of site-specific sampling data or whether it was issued based on fish toxics data collected on the Neponset River. Although the 2009 Mother Brook data do not appear to support extension of the advisory in place downstream, the MDPH may modify the current advisory to reflect the data generated in 2009 with regard to mercury in largemouth bass and DDT (or its metabolites) in common carp.

Ponkapoag Pond: Ponkapoag Pond is a 203 acre shallow pond located within the Blue Hills Reservation in Randolph and Canton. The immediate shoreline and watershed is mostly undeveloped except for a few cabins administered by the Appalacian Mountain Club (AMC) which are located on the eastern shore. Land use within the larger watershed includes a mix of forest, medium and high density residential, transportation (highway), and recreational (golf

course). There is a canoe and car top boat access located along the southern shoreline, however, this is a walk-in access only.

Mercury exceeded the MDPH "trigger level" of 0.5 μg/g in largemouth bass and chain pickerel, both predatory species. All other fish were below the MDPH trigger level for mercury. The MDPH will most likely issue an advisory with regard to the consumption of largemouth bass and chain pickerel from Ponkapoag Pond.

Lake George: Lake George (Wales Pond) is a 93 acre (37.6 ha) mesotrophic pond located in the town of Wales. The immediate shoreline is approximately ninety percent developed residentially and land use within the watershed is a mix of forested and low to high density residential. Public access is very limited. Local residents report that there was a landfill in the watershed, however, none are documented in the MassGIS data layer.

Mercury was below the MDPH "trigger level" of 0.5 mg/kg in all six samples analyzed (including largemouth bass and black crappie, both top level predators). PCB Aroclors and organochlorine pesticides were below MDLs in all samples analyzed.

Reservoir Pond: Reservoir Pond is a 243 acre (98.31 ha.) shallow, eutrophic pond in the Neponset River Watershed located in the town of Canton (Ackerman 1989). The shoreline is approximately 50% developed with residences and a golf course. The watershed is a mix of forested, industrial, and low to medium density residential landuses. The pond was drawn down approximately three to four feet due to ongoing dam repairs. Public access appears to be limited. There is also a state Department of Mental Health facility (Massachusetts Hospital School) with beach and sailing center located on the northern shore.

Mercury exceeded the MDPH "trigger level" of 0.5 μg/g in both largemouth bass and white perch. The elevated mercury concentrations will most likely result in a MDPH fish consumption advisory.

Sawdy Pond: Sawdy Pond is a very shallow 363 acre (146.8 ha.) rocky pond located in the Mount Hope Bay Watershed in Westport and Fall River (Ackerman 1989). The shoreline is approximately 60 to 70 percent developed with residences. The watershed is a mix of forested, and low to medium density residential landuses. Public access is very limited.

Mercury exceeded the MDPH "trigger level" of 0.5 μg/g in largemouth bass. All other fish were below the MDPH trigger level for mercury, however, both smallmouth bass and black crappie had mercury concentrations very close to the trigger level (0.48 and 0.46 ug/g, respectively). The elevated mercury in largemouth bass will most likely result in a MDPH advisory. It should be noted that larger specimens of smallmouth bass and black crappie will most likely exceed the "trigger level" as well.

South Watuppa Pond: South Watuppa Pond is a shallow 1473 acre (596 ha.) eutrophic pond located in the Mount Hope Bay Watershed within the city of Fall River and town of Westport. (Ackerman 1989). The shoreline and immediate watershed is approximately 75% developed with residences and industry. Landuse within the pond's watershed includes a mix of residential, forested, industrial, commercial, and transportation. Most of the industrial, commercial, and transportation landuse is located on the northern shoreline of the pond near the outlet.

Mercury was well below the MDPH "trigger level" of 0.5 mg/kg in all six samples analyzed (including largemouth bass and smallmouth bass, both top level predators)..

Sunset Lake: Sunset Lake in Braintree is a 57 acre (23 ha.) eutrophic pond located within the Weymouth and Weir Rivers Watershed. (Ackerman 1989). The pond had recently been treated with herbicides and most of the aquatic macrophytes were dead or dying on the date of the survey. The water was clear with very little vegetation other than large submerged algal globs or masses. The shoreline is 75% developed with residences and land use within the pond's immediate watershed is mostly medium to high density residential except for the high school which is located in the northwest corner of the watershed.

Mercury was well below the MDPH "trigger level" of 0.5 mg/kg in the three samples analyzed (including largemouth bass, a top level predator).

Richardi Reservoir: Richardi Reservoir is a 59.65 acre (24.1 ha.) pond within the Weymouth Weir River Watershed in the towns of Randolph and Braintree. The water in the pond is very clear and it is possible that this waterbody is spring-fed. The shoreline of Richardi Reservoir is undeveloped except for a golf course located on the eastern side of the pond. Landuse classes within the pond's watershed include a mix of medium density residential, forested, industrial, and recreation.

Mercury was well below the MDPH "trigger level" of 0.5 mg/kg in the three samples analyzed (including largemouth bass a top level predator). PCB Aroclors and organochlorine pesticides were below MDLs in all samples analyzed.

Connecticut River (Northampton): The Connecticut is the largest river in Massachusetts. At Northampton the river drains over eight thousand square miles. The sampled reach includes the upper end of the impounded section created by the Holyoke Dam in Holyoke and South Hadley Falls, Massachusetts. Although the immediate watershed and shoreline is mostly agricultural and forested, the river also receives flow from numerous tributaries throughout its upstream watershed. These tributaries have received many historic industrial discharges over the years and landuse within their watersheds is mostly forested with residential, commercial, industrial, and agricultural types mixed in.

Mercury exceeded the MDPH trigger level in a large individual channel catfish only. Trace concentrations of PCB Aroclors were detected in the same channel catfish and the composite of American eel but the concentrations were well below the MDPH trigger level of 1.0 mg/Kg. In addition, DDE was also detected in the composite sample of American eel but the concentration was below the MDPH trigger level.

The Connecticut River has been sampled many times over the years (as recently as 2000 as part of an interagency study). The original MDPH advisory (based on data collected in 1987 and 1988) pertained to PCBs in catfish and recommended that "children younger than 12-years, pregnant women, and nursing mothers should not eat any catfish from the Connecticut River. In addition, the advisory also recommended that the general public limit consumption of channel catfish and white catfish to two meals per month (MDPH 1988). Subsequently, the advisory was modified to recommend that children younger than 12-years, pregnant women, and nursing mothers should not consume any fish from the Connecticut River. In addition, the advisory was modified to recommend that the general public not consume channel catfish, white catfish, American eel, or yellow perch (MDPH 2009). It is unclear if data generated in 2009 will result in modification of the current advisory.

Connecticut River (Chicopee): Downstream of the confluence with the Chicopee River it drains over nine thousand square miles. The sampled reach includes the area from below the confluence with the Chicopee River, the mouth of the Chicopee River upstream to the Holyoke

Dam. The immediate watershed and shoreline is mostly residential, industrial, and commercial land uses. There are many tributaries throughout the Connecticut River's upstream watershed. These tributaries have received historic industrial discharges and landuse within their watersheds is mostly forested with residential, commercial, industrial, and agricultural types mixed in.

Mercury was well below the MDPH "trigger level" of 0.5 mg/kg in the four samples analyzed. PCB Aroclors and organochlorine pesticides were detected in three of the four samples analyzed. In the case of American eel and the sample of smaller sized channel catfish, PCB Aroclor results were qualified due to the analyte concentrations being "greater than Method Detection Limit but less than Reporting Detection Limit". In the case of the larger channel catfish PCB Aroclors 1242 (qualified due to the analyte concentrations being "greater than Method Detection Limit but less than Reporting Detection Limit"), 1254, and 1260 were detected but the concentrations were below the MDPH trigger level of 1.0 mg/Kg. DDT and/or it's metabolites DDD and DDE were detected in three of the four samples. Although the concentrations exceed the trigger level of 0.06 mg/Kg in two of the three samples, in each case one of the metabolite concentrations is reported with qualification due to the analyte concentrations being "greater than Method Detection Limit but less than Reporting Detection Limit") It should be noted that in the larger composite of catfish DDT (and/or it's metabolites DDE and DDD) exceed the MDPH trigger level of 0.06 mg/Kg regardless of the qualification.

As was noted previously the Connecticut River has been sampled many times over the years (as recently as 2000 as part of an interagency study). The original MDPH advisory (based on data collected in 1987 and 1988) pertained to PCBs in catfish and recommended that "children younger than 12-years, pregnant women, and nursing mothers should not eat any catfish from the Connecticut River. In addition, the advisory also recommended that the general public limit consumption of channel catfish and white catfish to two meals per month (MDPH 1988). Subsequently, the advisory was modified to recommend that children younger than 12-years, pregnant women, and nursing mothers should not consume any fish from the Connecticut River. In addition, the advisory was modified to recommend that the general public not consume channel catfish, white catfish, American eel, or yellow perch (MDPH 2009). It is unclear if data generated in 2009 will result in modification of the current advisory.

Long Pond: Long Pond is a 743 acre (300 ha.) mesotrophic natural pond located in the towns of Brewster and Harwich (Ackerman 1989). The shoreline is approximately seventy-five percent developed residentially. Land use within the pond's immediate watershed is primarily a mix of low to medium density residential, forested, and water-based recreation. There also appears to be a small amount of agricultural land (cranberry bogs) within the watershed.

Long Pond was stocked with smallmouth bass sometime prior to 1948. In addition, striped bass were stocked in 1971, however, the most recent survey conducted by MDFW in 1992 does not document their presence in Long Pond. The pond does support alewife, *Alosa pseudoharengus*, which enter the pond via the Herring River and a number of smaller ponds located downstream (MDFW 1993).

Mercury was below the MDPH "trigger level" of 0.5 mg/kg in all five samples. The Cape Cod Commission previously sampled an individual yellow perch and composites of smallmouth bass and white perch from Long Pond in 2001 (Cape Cod Commission 2001). All fish were below the MDPH "trigger level" for mercury at that time, as well.

Conclusions

The 2009 Public Request and Watershed Surveys data set supports previous findings that mercury is a widespread problem, and that, although individual ponds or regions may be at higher risk, it is primarily a problem in predatory or piscivorous species. It is presumed that the mercury present in freshwater fish is due mainly to atmospheric deposition (near and far field emissions from incinerators and coal burning power plants) and possibly bedrock sources. Reducing direct human health risks associated with eating freshwater fish can only be accomplished through educating the public with regard to both fish bioaccumulation patterns as well as the implications of various levels of fish consumption.

It should be noted that although the fish toxics monitoring program addresses the human health risk associated with the consumption of freshwater fishes, the mercury problem also poses threats with regard to ecological risks to piscivorous wildlife (Eisler 1987). Studies have shown that mercury poses a health risk to eagles, loons, and ospreys as well as many other species. Reductions in the amount of mercury in the municipal waste stream and the emissions noted above will also reduce the environmental consequences of this contaminant. It is unclear how rapidly mercury concentrations will respond to recent changes in air emissions standards, however, recent studies of sediment cores from lakes suggest that mercury deposition rates may be decreasing. (MassDEP 2005) It is unclear how long it will take before concentrations in fish drop to a point where human and/or ecological health risks will reach acceptable levels.

The 2009 data set also supports the assertion that PCBs remain essentially a problem in rivers and lakes that have received historic PCB discharges and that high concentrations of organochlorine pesticides continue to be rare in edible fillets of freshwater fishes. It is apparent, however, that certain species of fish can certainly bioaccumulate significant levels of PCB Aroclors and or DDT (and it's metabolites) from rivers or other waterbodies where these contaminants have been historically used and or discharged.

The DWM will continue to screen for contaminants in freshwater fishes as part of Public Request and Year 2 watershed surveys, as resources allow. DWM will also continue to cooperate with other state and federal agencies in an effort to better understand not only the distribution of fish tissue contaminants, but also temporal changes that may be taking place with regard to fish tissue contaminant levels.

This report has been forwarded to the departments involved with the Interagency Committee, the individuals requesting work, and DEP's regional offices. Additional copies of this report are available from the MassDEP, Division of Watershed Management, 627 Main Street 2nd Floor, Worcester, MA 01608. They will also eventually be available online at *http://www.mass.gov/dep/*

REFERENCES

Ackerman, M.T., 1989. *Compilation of Lakes, Ponds, Reservoirs, and Impoundments Relative to the Massachusetts Clean Lakes Program.* Publication: #15901-171-50-4-89-C.R. Technical Services Branch, Massachusetts Division of Water Pollution Control, Department of Environmental Quality Engineering, Westborough, MA.

Batdorf. C. (Carol.Batdorf@state.ma.us) 2009. *Re:Method 7473* Massachusetts Department of Environmental Protection, Wall Experiment Station, Lawrence, MA. Email to Robert Maietta, Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA dated 22 February 2009.

Duerring, C.L., L.E. Kennedy, and P. Mitchell. 2004. *Deerfield River Watershed 2000 Water Quality Assessment Report.* CN 087.0. Massachusetts Department of Environmental Protection, Division of Watershed Management, Worcester, MA.

Eisler, R. 1985. *Selenium Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review.* Patuxent Wildlife Research Center, U.S. Fish and Wildlife Service, Laurel, MD

Eisler, R. 1987. *Mercury Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review.* Patuxent Wildlife Research Center, U.S. Fish and Wildlife Service, Laurel, MD

Halliwell, D. B., Kimball, W. A., Screpetis, A. J. 1982. *Massachusetts Stream Classification Program Part I Inventory of Rivers and Streams.* . Technical Services Branch, Massachusetts Division of Water Pollution Control, Department of Environmental Quality Engineering,

MassDEP. 2007. *Standard Operating Procedure for USEPA Method 7473.* Wall Experiment Station, Lawrence, MA.

MassDEP. 2002. *Standard Operating Procedure for AOAC Method 983.21*. Wall Experiment Station, Lawrence, MA.

MassDEP. 2005. *DRAFT FINAL REPORT 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.

McVoy, R.S. 1992. *Commonwealth of Massachusetts Summary of Water Quality 1992. Appendix II – Massachusetts Lake Classification Program.* Massachusetts Department of Environmental Protection, Division of Water Pollution Control, Technical Services Branch, North Grafton, MA.

MDPH. 1988. Public Health Advisory: Connecticut River Catfish. Massachusetts Department of Public Health. Boston

MDPH. 2009. Freshwater Fish Consumption Advisory List. Massachusetts Department of Public Health, Bureau of Environmental Health, Boston.

MDFW. 1993. Pond Maps of Massachusetts Cape Cod. Massachusetts Division of Fisheries and Wildlife. Westborough, MA.

Michaud, S, 2001, *Evaluation of Mercury Occurrence in Freshwater Fish of Cape Cod*- Cape Cod Commission. USEPA Special Purpose Grant .

Nelson, J.S., E.J. Crossman, H. Espinosa-Pérez, L.T. Findley, C.R. Gilbert, R.N. Lea, and J.D. Williams. 2004. *Common and scientific names of fishes from the United States, Canada, and Mexico.* American Fisheries Society, Special Publication 29, Bethesda, MD.

USEPA, 2005. *National Recommended Water Quality Criteria* [online] United States Environmental Protection Agency. http://www.epa.gov/waterscience/criteria/wqctable/

USFDA, August 2000. *Guidance for Industry: Action Levels for Poisonous or Deleterious Substances in Human Food and Animal Feed.* [Online] United States Food and Drug Administration, http://www.fda.gov/Food/GuidanceComplianceRegulatoryInformation/GuidanceDocuments/ChemicalContaminantsandPesticides/ucm077969.htm
(updated 2009)

Tetra Tech Inc. 1986. *Guidance Manual for Health Risk Assessment of Chemically Contaminated Seafood.* U.S. Environmental Protection Agency. Region 10. Office of Puget Sound, Seattle, WA

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APPENDIX A

Table 1. Analytical Results for 2009 Fish Toxics Monitoring Public Request and Year 2 Watershed Surveys. Results reported in wet weight, are from composite samples of fish fillets (skin off).

Sample ID	Collection Date	Species Code[1]	Length (cm)	Weight (g)	Sample ID (laboratory sample #)	Hg (mg/kg)	% Lipids (%)	PCB Arochlors and Congeners (µg/g)	Pesticides (µg/g)
Spectacle Pond, Sandwich, Cape Cod Watershed									
2009150-001A	5/28/09	LMB	363	770	2009150-001	0.66H			
2009150-001B	5/28/09	LMB	380	780					
2009150-001C	5/28/09	LMB	368	660					
2009150-002A	5/28/09	YP	249	220	2009150-002	0.23H			
2009150-002B	5/28/09	YP	230	160					
2009150-002C	5/28/09	YP	219	130					
2009150-003A	5/28/09	SMB	320	480	2009150-003	0.58H			
2009150-003B	5/28/09	SMB	330	480					
2009150-004A	5/28/09	SMB	425	940	2009150-004	1.1H			
Cliff Pond, Brewster, Cape Cod Watershed									
2009143-001A	5/28/09	BB	290	280	2009143-001	0.28H			
2009143-001B	5/28/09	BB	286	330					
2009143-001C	5/28/09	BB	251	200					
2009143-002A	5/28/09	YP	208	90	2009143-002	0.22H			
2009143-002B	5/28/09	YP	188	80					
2009143-002C	5/28/09	YP	154	50					
2009143-003A	5/28/09	SMB	340	460	2009143-003	0.42H			
2009143-003B	5/28/09	SMB	345	560					
2009143-003C	5/28/09	SMB	309	400					
2009143-004A	5/28/09	WS	369	530	2009143-004	0.19H			
2009143-004B	5/28/09	WS	362	440					
2009143-004C	5/28/09	WS	368	480					

Table 1. Continued Analytical Results for 2009 Fish Toxics Monitoring Public Request and Year 2 Watershed Surveys. Results reported in wet weight, are from composite samples of fish fillets (skin off).

Sample ID	Collection Date	Species Code[1]	Length (cm)	Weight (g)	Sample ID (laboratory sample #)	Hg (mg/kg)	% Lipids (%)	PCB Arochlors and Congeners (µg/g)	Pesticides (µg/g)
Lawrence Pond, Sandwich, Cape Cod Watershed									
2009141-001A	5/28/09	SMB	350	550	2009141-001	0.46H			
2009141-001B	5/28/09	SMB	355	580					
2009141-001C	5/28/09	SMB	409	980					
2009141-002A	5/28/09	LMB	445	1280	2009141-002	0.97H			
2009141-002B	5/28/09	LMB	391	820					
2009141-002C	5/28/09	LMB	423	1020					
2009141-003A	5/28/09	P	222	280	2009141-003	0.16H			
2009141-003B	5/28/09	P	201	230					
2009141-003C	5/28/09	P	188	190					
2009141-004A	5/28/09	YP	280	300	2009141-004	0.18H			
2009141-004B	5/28/09	YP	255	230					
2009141-004C	5/28/09	YP	245	200					
2009141-005A	5/28/09	CP	445	520	2009141-005	0.48H			
2009141-005B	5/28/09	CP	445	500					
2009141-005C	5/28/09	CP	405	300					
Peters Pond, Sandwich, Cape Cod Watershed									
2009142-001A	5/29/09	SMB	436	1140	2009142-001	0.95H			
2009142-001B	5/29/09	SMB	430	1090					
2009142-001C	5/29/09	SMB	430	1110					
2009142-002A	5/29/09	YP	312	430	2009142-002	0.53H			
2009142-002B	5/29/09	YP	322	460					
2009142-002C	5/29/09	YP	317	430					
2009142-003A	5/29/09	P	227	280	2009142-003	0.18H			
2009142-003B	5/29/09	B	213	230					
2009142-004A	5/29/09	LMB	430	1160	2009142-004	0.88H			
2009142-004B	5/29/09	LMB	454	1270					

Table 1. Continued Analytical Results for 2009 Fish Toxics Monitoring Public Request and Year 2 Watershed Surveys. Results reported in wet weight, are from composite samples of fish fillets (skin off).

Sample ID	Collection Date	Species Code[1]	Length (cm)	Weight (g)	Sample ID (laboratory sample #)	Hg (mg/kg)	% Lipids (%)	PCB Arochlors and Congeners (µg/g)	Pesticides (µg/g)
Sandy Pond, Ayer, Nashua River Watershed									
2009144-001A	6/3/09	LMB	345	600	2009144-001	0.29			
2009144-001B	6/3/09	LMB	331	440					
2009144-001C	6/3/09	LMB	341	500					
2009144-002A	6/3/09	BC	271	270	2009144-002	0.53			
2009144-002B	6/3/09	BC	265	260					
2009144-002C	6/3/09	BC	260	240					
2009144-003A	6/3/09	WP	273	290	2009144-003	0.24			
2009144-003B	6/3/09	WP	269	280					
2009144-003C	6/3/09	WP	260	260					
2009144-004A	6/3/09	P	217	200	2009144-004	0.11			
2009144-004B	6/3/09	P	210	240					
2009144-004C	6/3/09	P	205	200					
Mother Brook, Boston, Neponset River Watershed									
2009145-001A	6/4/09	C	556	3000	2009145-001	0.19	1.2	A1260-0.055M	DDE-0.061
2009145-001B	6/4/09	C	632	3420					
2009145-001C	6/4/09	C	597	3370					
2009145-002A	6/4/09	LMB	460	1470	2009145-002	0.81	0.03	ND	ND
2009145-002B	6/4/09	LMB	438	1190					
2009145-002C	6/4/09	LMB	465	1340					
2009145-003A	6/4/09	WS	439	1180	2009145-003	0.41	1.0	ND	DDE-0.059 DDD-0.015M
2009145-003B	6/4/09	WS	423	1060					
2009145-003C	6/4/09	WS	432	1040					
2009145-004A	6/4/09	WP	297	390	2009145-004	0.46	0.11	ND	DDE-0.018M DDD-0.0070M
2009145-004B	6/4/09	WP	262	270					
2009145-004C	6/4/09	WP	268	290					
2009145-005A	6/4/09	YP	264	210	2009145-005	0.16	0.04	ND	ND
2009145-005B	6/4/09	YP	267	220					
2009145-005C	6/4/09	YP	258	220					
2009145-006A	6/4/09	B	175	130	2009145-006	0.076	0.27	ND	DDE-0.014M
2009145-006B	6/4/09	B	187	150					
2009145-006C	6/4/09	B	192	150					
2009145-007A	6/4/09	WB	372	830	2009145-007	0.11	0.19	ND	ND
2009145-007B	6/4/09	WB	357	690					
2009145-007C	6/4/09	WB	390	880					

Table 1. Continued Analytical Results for 2009 Fish Toxics Monitoring Public Request and Year 2 Watershed Surveys. Results reported in wet weight, are from composite samples of fish fillets (skin off).

Sample ID	Collection Date	Species Code[1]	Length (cm)	Weight (g)	Sample ID (laboratory sample #)	Hg (mg/kg)	% Lipids (%)	PCB Arochlors and Congeners (µg/g)	Pesticides (µg/g)
Ponkapoag Pond, Canton, Neponset River Watershed									
2009147-001A	6/11/09	LMB	380	670	2009147-001	0.70			
2009147-001B	6/11/09	LMB	378	630					
2009147-001C	6/11/09	LMB	354	660					
2009147-002A	6/11/09	CP	453	410	2009147-002	0.91			
2009147-002B	6/11/09	CP	417	290					
2009147-002C	6/11/09	CP	390	380					
2009147-003A	6/11/09	YP	234	160	2009147-003	0.33			
2009147-003B	6/11/09	YP	225	140					
2009147-003C	6/11/09	YP	227	120					
2009147-004A	6/11/09	B	196	150	2009147-004	0.25			
2009147-004B	6/11/09	B	209	190					
2009147-004C	6/11/09	B	197	180					
2009147-005A	6/11/09	BB	328	490	2009147-005	0.084			
2009147-005B	6/11/09	BB	320	420					
2009147-005C	6/11/09	BB	310	460					
Lake George, Wales, Quinebaug River Watershed									
2009307-001A	6/16/09	LMB	361	650	2009307-001	0.47	0.17	ND	ND
2009307-001B	6/16/09	LMB	388	780					
2009307-001C	6/16/09	LMB	371	690					
2009307-002A	6/16/09	YP	280	220	2009307-002	0.29	0.23	ND	ND
2009307-002B	6/16/09	YP	287	270					
2009307-002C	6/16/09	YP	282	270					
2009307-003A	6/16/09	WP	222	120	2009307-003	0.31	0.88	ND	ND
2009307-003B	6/16/09	WP	238	180					
2009307-003C	6/16/09	WP	244	200					
2009307-004A	6/16/09	P	197	170	2009307-004	0.13	2.1	ND	ND
2009307-004B	6/16/09	P	180	130					
2009307-004C	6/16/09	P	177	140					
2009307-005A	6/16/09	BC	229	170	2009307-005	0.16	0.84	ND	ND
2009307-005B	6/16/09	BC	245	190					
2009307-006A	6/16/09	BB	310	390	2009307-006	0.039	0.17	ND	ND
2009307-006B	6/16/09	BB	325	470					

Table 1. Continued Analytical Results for 2009 Fish Toxics Monitoring Public Request and Year 2 Watershed Surveys. Results reported in wet weight, are from composite samples of fish fillets (skin off).

Sample ID	Collection Date	Species Code[1]	Length (cm)	Weight (g)	Sample ID (laboratory sample #)	Hg (mg/kg)	% Lipids (%)	PCB Arochlors and Congeners (µg/g)	Pesticides (µg/g)
Reservoir Pond, Canton, Neponset River Watershed									
2009148-001A	6/23/09	LMB	406	800					
2009148-001B	6/23/09	LMB	390	700	2009148-001	0.72			
2009148-001C	6/23/09	LMB	400	880					
2009148-002A	6/23/09	BC	277	260					
2009148-002B	6/23/09	BC	232	250	2009148-002	0.12			
2009148-002C	6/23/09	BC	228	250					
2009148-003A	6/23/09	WP	281	290					
2009148-003B	6/23/09	WP	286	290	2009148-003	0.61			
2009148-003C	6/23/09	WP	281	280					
2009148-004A	6/23/09	YP	254	150					
2009148-004B	6/23/09	YP	237	140	2009148-004	0.16			
2009148-004C	6/23/09	YP	225	110					
2009148-005A	6/23/09	P	194	160					
2009148-005B	6/23/09	P	198	150	2009148-005	0.071			
2009148-005C	6/23/09	P	200	160					
Sawdy Pond, Fall River, Mount Hope Bay Watershed									
2009168-001A	6/25/09	LMB	365	610					
2009168-001B	6/25/09	LMB	355	590	2009168-001	0.60H			
2009168-001C	6/25/09	LMB	345	520					
2009168-002A	6/25/09	SMB	354	540					
2009168-002B	6/25/09	SMB	310	350	2009168-002	0.48H			
2009168-002C	6/25/09	SMB	314	430					
2009168-003A	6/25/09	BC	269	210					
2009168-003B	6/25/09	BC	261	240	2009168-003	0.46H			
2009168-003C	6/25/09	BC	273	240					
2009168-004A	6/25/09	WP	291	330					
2009168-004B	6/25/09	WP	276	300	2009168-004	0.35H			
2009168-004C	6/25/09	WP	291	360					
2009168-005A	6/25/09	YP	239	180					
2009168-005B	6/25/09	YP	230	150	2009168-005	0.21H			
2009168-005C	6/25/09	YP	239	160					
2009168-006A	6/25/09	BB	390	800					
2009168-006B	6/25/09	BB	350	570	2009168-006	0.10H			
2009168-006C	6/25/09	BB	357	570					

Table 1. Continued Analytical Results for 2009 Fish Toxics Monitoring Public Request and Year 2 Watershed Surveys. Results reported in wet weight, are from composite samples of fish fillets (skin off).

Sample ID	Collection Date	Species Code[1]	Length (cm)	Weight (g)	Sample ID (laboratory sample #)	Hg (mg/kg)	% Lipids (%)	PCB Arochlors and Congeners (µg/g)	Pesticides (µg/g)
Sawdy Pond, Fall River, Mount Hope Bay Watershed CONTINUED									
2009168-007A	6/25/09	B	204	160					
2009168-007B	6/25/09	B	202	150	2009168-007	0.15H			
2009168-007C	6/25/09	B	200	160					
South Watuppa Pond, Fall River/ Westport, Mount Hope Bay Watershed									
2009167-001A	7/03/09	SMB	312	410					
2009167-001B	7/03/09	SMB	330	490	2009167-001	0.14H			
2009167-001C	7/03/09	SMB	324	420					
2009167-002A	7/03/09	LMB	355	590					
2009167-002B	7/03/09	LMB	352	580	2009167-002	0.18H			
2009167-002C	7/03/09	LMB	358	600					
2009167-003A	7/03/09	YP	259	200					
2009167-003B	7/03/09	YP	260	220	2009167-003	0.13H			
2009167-003C	7/03/09	YP	257	210					
2009167-004A	7/03/09	WP	255	210					
2009167-004B	7/03/09	WP	254	220	2009167-004	0.093H			
2009167-004C	7/03/09	WP	249	190					
2009167-005A	7/03/09	BB	314	400					
2009167-005B	7/03/09	BB	296	280	2009167-005	0.029H			
2009167-005C	7/03/09	BB	314	380					
2009167-006A	7/03/09	B	250	150					
2009167-006B	7/03/09	B	190	170	2009167-006	0.071H			
2009167-006C	7/03/09	B	193	150					
Sunset Lake, Braintree, Weymouth and Weir Rivers Watershed									
2009170-001A	7/15/09	LMB	335	650					
2009170-001B	7/15/09	LMB	356	690	2009170-001	0.13H	0.13	ND	ND
2009170-001C	7/15/09	LMB	343	610					
2009170-002A	7/15/09	BB	345	430					
2009170-002B	7/15/09	BB	329	380	2009170-002	0.059H	0.19	ND	ND
2009170-002C	7/15/09	BB	320	370					
2009170-003A	7/15/09	B	190	160					
2009170-003B	7/15/09	B	201	150	2009170-003	0.037H	0.36	ND	DDE-0.012M
2009170-003C	7/15/09	B	190	130					

Table 1. Continued Analytical Results for 2009 Fish Toxics Monitoring Public Request and Year 2 Watershed Surveys. Results reported in wet weight, are from composite samples of fish fillets (skin off).

Sample ID	Collection Date	Species Code[1]	Length (cm)	Weight (g)	Sample ID (laboratory sample #)	Hg (mg/kg)	% Lipids (%)	PCB Arochlors and Congeners (µg/g)	Pesticides (µg/g)
Richardi Reservoir, Braintree/Randolph, Weymouth and Weir Rivers Watershed									
2009169-001A 2009169-001B 2009169-001C	7/30/09 7/30/09 7/30/09	LMB LMB LMB	342 355 342	560 640 580	2009169-001	0.25	0.09	ND	ND
2009169-002A 2009169-002B 2009169-002C	7/30/09 7/30/09 7/30/09	B B B	196 199 190	200 180 160	2009169-002	0.082	1.2	ND	ND
2009169-003A 2009169-003B	7/30/09 7/30/09	BB BB	390 282	790 260	2009169-003	0.066	0.06	ND	ND
Connecticut River, Chicopee, Connecticut River Watershed									
2009146-001A 2009146-001B 2009146-001C	8/04/09 8/04/09 8/04/09	WS WS WS	455 471 489	1020 1160 1420	2009146-001	0.22H	0.35	ND	ND
2009146-002A 2009146-002B	8/05/09 8/19/09	CC CC	381 465	820 1240	2009146-002	0.26H	3.0	A1254-0.081M A1260-0.089M	DDE-0.051 DDD-0.011M
2009146-006A 2009146-006B 2009146-006C	8/19/09 8/19/09 8/19/09	AE AE AE	582 604 580	500 550 520	2009146-006	0.29	18	A1242-0.053M	DDE-0.045
2009146-007A 2009146-007B	8/19/09 8/19/09	CC CC	615 649	2600 2910	2009146-007	0.23	6.2	A1242-0.053M A1254-0.36 A1260-0.25	DDE-0.14 DDD-0.038 DDT-0.023M
Connecticut River, Northampton, Connecticut River Watershed									
2009146-003A 2009146-003B 2009146-003C	8/06/09 8/06/09 8/06/09	WS WS WS	304 307 314	340 320 350	2009146-003	0.078H	0.16	ND	ND
2009146-004A	8/06/09	CC	531	2150	2009146-004	0.58H	1.4	A1260-0.032M	ND
2009146-005A 2009146-005B 2009146-005C	8/18/09 8/18/09 8/18/09	AE AE AE	701 632 750	960 570 1000	2009146-005	0.36	20	A1254-0.080M A1260-0.047M	DDE-0.043

Table 1. Continued Analytical Results for 2009 Fish Toxics Monitoring Public Request and Year 2 Watershed Surveys. Results reported in wet weight, are from composite samples of fish fillets (skin off).

Sample ID	Collection Date	Species Code[1]	Length (cm)	Weight (g)	Sample ID (laboratory sample #)	Hg (mg/kg)	% Lipids (%)	PCB Arochlors and Congeners (µg/g)	Pesticides (µg/g)
Long Pond, Brewster/Harwich,Cape Cod Watershed									
2009151-001A 2009151-001B	9/23/09 9/23/09	SMB SMB	470 401	1540 860	2009151-001	0.46H			
2009151-002A 2009151-002B	9/23/09 9/23/09	SMB SMB	295 292	340 350	2009151-002	0.18H			
2009151-003A 2009151-003B 2009151-003C	9/23/09 9/23/09 9/23/09	WS WS WS	446 483 452	850 1070 960	2009151-003	0.20H			
2009151-004A 2009151-004B	9/23/09 9/23/09	BB BB	270 230	320 210	2009151-004	0.11H			
2009151-005A	9/23/09	YP	365	580	2009151-005	0.47H			

[1] Species Code	Common Name	*Scientific name*	Data Qualifiers as reported by WES
AE	American eel	*Anguilla rostrata*	H = USEPA holding time exceeded
B	bluegill	*Lepomis macrochirus*	M = analyte concentration greater than Method Detection Limit but less than Minimum Reporting Limit
BB	brown bullhead	*Ameiurus nebulosus*	ND = analyzed for, but not detected above Method Detection Level
BC	black crappie	*Pomoxis nigromaculatus*	
C	common carp	*Cyprinus carpio*	
CC	channel catfish	*Ictalurus punctatus*	
CP	chain pickerel	*Esox niger*	
LMB	largemouth bass	*Micropterus salmoides*	
P	pumpkinseed	*Lepomis gibbosus*	
SMB	smallmouth bass	*Micropterus dolomieu*	
WB	white catfish	*Ameiurus catus*	
WP	white perch	*Morone Americana*	
WS	white sucker	*Catostomus commersoni*	
YP	yellow perch	*Perca flavescens*	

Table 2. 2009 Fish Toxics Analytical Methods, Project Quantitation Limits, Method Detection and Reporting Detection Limits.

Analyte/Compound	Units	Project Quantitation Limit (PQL)	Achievable Laboratory Method Detection Limit (MDL)	Laboratory Reporting Detection Limit (RDL)	Method
Lipid Concentration	%	N/A	N/A	N/A	Modified AOAC 983.21
Mercury	ug/g wet	0.5	0.020	0.060	EPA 245.6
PCB Arochlor 1232	µg/g wet	1.0 (total)	0.019	0.057	Modified AOAC 983.21
PCB Arochlor 1242	µg/g wet	1.0 (total)	0.019	0.057	Modified AOAC 983.21
PCB Arochlor 1248	µg/g wet	1.0 (total)	0.038	0.11	Modified AOAC 983.21
PCB Arochlor 1254	µg/g wet	1.0 (total)	0.013	0.039	Modified AOAC 983.21
PCB Arochlor 1260	µg/g wet	1.0 (total)	0.022	0.066	Modified AOAC 983.21
Chlordane	µg/g wet	0.3	0.046	0.14	Modified AOAC 983.21
Toxaphene	µg/g wet	Unknown	0.045	0.14	Modified AOAC 983.21
a-BHC	µg/g wet	Unknown	0.0054	0.016	Modified AOAC 983.21
b-BHC	µg/g wet	Unknown	0.0055	0.017	Modified AOAC 983.21
Lindane	µg/g wet	Unknown	0.0056	0.017	Modified AOAC 983.21
d-BHC	µg/g wet	Unknown	0.012	0.036	Modified AOAC 983.21
Hexachlorocyclopentadiene	µg/g wet	Unknown	0.038	0.11	Modified AOAC 983.21
Hexachlorobenzene	µg/g wet	Unknown	0.018	0.054	Modified AOAC 983.21
Trifluralin	µg/g wet	Unknown	0.032	0.096	Modified AOAC 983.21
Heptachlor	µg/g wet	0.3	0.0078	0.023	Modified AOAC 983.21
Heptachlor Epoxide	µg/g wet	Unknown	0.027	0.081	Modified AOAC 983.21
Methoxychlor	µg/g wet	Unknown	0.018	0.054	Modified AOAC 983.21
DDD	µg/g wet	5.0 (total)	0.0051	0.015	Modified AOAC 983.21
DDE	µg/g wet	5.0 (total)	0.0055	0.017	Modified AOAC 983.21
DDT	µg/g wet	5.0 (total)	0.0064	0.019	Modified AOAC 983.21
Aldrin	µg/g wet	5.0 (total)	0.0057	0.017	Modified AOAC 983.21
PCNB	% recovery	NA	NA	NA	Modified AOAC 983.21
Phenol	µg/g wet	Unknown	N/A	250	EPA 8270C
2-Chlorophenol	µg/g wet	Unknown	N/A	250	EPA 8270C
NDPA	µg/g wet	Unknown	N/A	250	EPA 8270C
2-Nitrophenol	µg/g wet	Unknown	N/A	250	EPA 8270C
Dichlorophenol	µg/g wet	Unknown	N/A	250	EPA 8270C
Napthalene	µg/g wet	Unknown	0.050	2.5	EPA 8270C
4-Chloro-3-methylphenol	µg/g wet	Unknown	N/A	250	EPA 8270C
Hexachlorcyclopentadiene	µg/g wet	Unknown	N/A	2.5	EPA 8270C
Trichlorophenol	µg/g wet	Unknown	N/A	250	EPA 8270C
Dimethyl phthalate	µg/g wet	Unknown	N/A	2.5	EPA 8270C
Acenaphathylene	µg/g wet	Unknown	0.060	2.5	EPA 8270C
Acenaphthene	µg/g wet	Unknown	0.070	2.5	EPA 8270C
2,4-Dinitrophenol	µg/g wet	Unknown	N/A	250	EPA 8270C
4-Nitrophenol	µg/g wet	Unknown	N/A	250	EPA 8270C
Florene	µg/g wet	Unknown	0.080	2.5	EPA 8270C

Table 2. Continued. 2009 Fish Toxics Analytical Methods, Project Quantitation Limits, Method Detection and Reporting Detection Limits.

Analyte/Compound	Units	Project Quantitation Limit (PQL)	Achievable Laboratory Method Detection Limit (MDL)	Laboratory Reporting Detection Limit (RDL)	Method
Diethylphthalate	µg/g wet	Unknown	N/A	2.5	EPA 8270C
Pentachlorophenol	µg/g wet	Unknown	N/A	250	EPA 8270C
Phenanthrene	µg/g wet	Unknown	0.12	2.5	EPA 8270C
Anthracene	µg/g wet	Unknown	0.13	2.5	EPA 8270C
Dibutylphthalate	µg/g wet	Unknown	N/A	2.5	EPA 8270C
Fluoranthene	µg/g wet	Unknown	0.17	2.5	EPA 8270C
Pyrene	µg/g wet	Unknown	0.15	2.5	EPA 8270C
Butylbenzylphthalate	µg/g wet	Unknown	N/A	2.5	EPA 8270C
Bis(2-ethylhexyl)adipate	µg/g wet	Unknown	N/A	2.5	EPA 8270C
Benzo(a)anthracene	µg/g wet	Unknown	0.14	2.5	EPA 8270C
Chrysene	µg/g wet	Unknown	0.14	2.5	EPA 8270C
Bis(2-ethylhexyl)phthalate	µg/g wet	Unknown	N/A	2.5	EPA 8270C
Benzo(b)fluoranthene	µg/g wet	Unknown	0.13	2.5	EPA 8270C
Benzo(k)fluoranthene	µg/g wet	Unknown	0.14	2.5	EPA 8270C
Benzo(a)pyrene	µg/g wet	Unknown	0.11	2.5	EPA 8270C
Indeno(1,2,3-cd)pyrene	µg/g wet	Unknown	0.14	2.5	EPA 8270C
Dibenzo(ah)anthracene	µg/g wet	Unknown	0.13	2.5	EPA 8270C
Benzo(ghi)perylene	µg/g wet	Unknown	0.13	2.5	EPA 8270C

Notes:
1) "**NA**"= Not Applicable, no data provided
2) "**Unknown**" = no information available or no Data Quality Objective defined at this time.
3) Analyte MDL/RDL values are based on most recent analyses by WES (2004), and as all Detection Limit values, subject to change.
4) Methods
-EPA 245.6 – Mercury in Tissues by Cold Vapor
-EPA 8270C – Semivolatile Organic Compounds by GC/MS Cap Col
-Modified AOAC 983.21 - Organochlorine Pesticide and Polychlorinated Biphenyl Residues in Fish, Gas Chromatographic Method, Method 983.21. In Association of Official Analytical Chemists (AOAC) Official Methods of Analysis, 15th ed., AOAC, Arlington, VA.

Appendix B

Interagency Committee on Freshwater Fish Toxics Monitoring and Assessment

MEMORANDUM OF UNDERSTANDING
April 1994

MEMBERSHIP: The Committee is comprised of representatives from the following Departments and programs:

- Department of Environmental Protection -
  Office of Watershed Management (OWM)
  Division of Water Pollution Control (DWPC)
  Office of Research and Standards (ORS)
  Division of Environmental Analysis (DEA)
- Department of Public Health
  Environmental Toxicology Program (ETP)
  Physician Education Unit (PEU)
  Community Assessment Unit (CAU)
  Environmental Laboratory (EL)
- Department of Fisheries, Wildlife and Environmental Law Enforcement
  Division of Fisheries and Wildlife (DFW)

INTRODUCTION: The freshwater fish toxics testing efforts of Massachusetts are headed by the MA Department of Environmental Protection (DEP) in cooperation with the MA Department of Public Health (DPH), the Department of Fisheries, Wildlife and Environmental Law Enforcement (DFWELE). The DPH leads efforts to determine the public health impacts of consuming contaminated fish from various locations. These collaborative efforts ensure the state's ability to conduct limited testing and evaluation of contaminants in fish tissue for purposes of protecting public health and the environment. This Memorandum of Understanding (MOU) is limited to the freshwater environment.

PURPOSE: This Memorandum of Understanding is issued by the Interagency Committee to formalize and communicate its goals, objectives and responsibilities for monitoring and assessing toxic contaminants in fresh water fish in Massachusetts.

AUTHORITY: Specific legal mandates do not exist for testing freshwater fish for toxic contaminants. This work, however, is viewed as desirable by the three agencies relative to their respective authorities and mandates, including but not limited to, protecting public health, controlling toxic substances in the environment and protecting wildlife resources. This committee does not have responsibility to direct testing of fish for contaminants at hazardous material sites, but does participate in the process as part of the Superfund programs.

OBJECTIVES: The primary objective of the MOU is to establish a formal interagency mechanism to facilitate the communication, coordination and

dissemination of information pertaining to contaminants in freshwater fish. The objectives of the fish monitoring efforts are described below. Monitoring and assessment activities are planned annually and are based on the agencies' respective available resources. Therefore, in any given year, the scope of the monitoring and assessment efforts may or may not fulfill some or all of the following objectives.

- To determine the public health impacts from human consumption of contaminated fish species from various freshwater bodies in the Commonwealth.
- To develop appropriate technical support documents and public health advisories.
- To develop outreach strategies and environmental education programs for health care professionals, local health agencies and the potentially exposed target populations.
- To coordinate posting efforts with appropriate local, state and federal agencies.
- To provide information useful in managing and controlling toxic pollutants.
- To provide fish monitoring data for use as part of the overall assessment of the health of ecosystems.
- To respond to public requests for fish testing through a standardized questionnaire and ranking process to identify priority sites to be tested.
- To establish and maintain a statewide toxics-in-fish database for use by state and federal agencies, research and educational institutions and other interested parties.
- To conduct research and development projects to enhance fish monitoring activities and the overall health of the fish populations and associated ecosystems of the Commonwealth.

RESPONSIBILITIES: Each of the three agencies named in this MOU have responsibilities unique to its mission. Specific responsibilities that relate to current activities are described below:

- All members of the Interagency Committee participate in the overall planning of the Massachusetts fish toxics program, including the prioritization of testing sites, publication of fish toxics data and their use in assessing the health of ecosystems in Massachusetts.
- The Director of the Office of Research and Standards chairs and coordinates the activities of the Interagency Committee.
- DPH-ETP will formalize a protocol for evaluating the public health risks of consuming contaminated fish. DEP-ORS will work closely with DPH on this protocol to ensure that DEP's risk analysis program is considered.
- DPH-ETP will develop a standard interim protocol for development of fish advisories by spring of 1994. DPH is responsible for decisions regarding the need for public health advisories and for implementing them.

- DPH-ETP in conjunction with DPH-CAU will identify & notify human populations whose health may be affected due to consumption of contaminated fish.
- DPH-ETP in conjunction with DPH-PEU will provide relevant health information to health professionals (Boards of Health, medical community, etc.) and the public regarding potential hazards related to consumption of contaminated fish.
- DEP-OWM will plan and conduct annual fish sampling efforts in conjunction with DFWELE-DFW. DEP-OWM will collect and prepare fish samples, manage data and report results to the committee.
- DEP-OWM will utilize monitoring results for decisions on NPDES permits, for managing nonpoint pollution sources and to provide information for the Chapter 21E site discovery program in cases where oil and hazardous material contaminant levels are found in fish.
- DEP-DWPC will use monitoring results for determining compliance with Surface Water Quality Criteria and water use impairments.
- DFW is responsible for managing and regulating fishing as well as protecting, maintaining, and restorating the Commonwealth's freshwater fish populations.
- DEP-DEA provides QA/QC technical support to the OWM and the Interagency Committee dealing with fish sampling and sample management.
- DEP-DEA analyzes fish and related samples for toxic chemicals and other contaminants, and provides the validated data to the OWM and the Interagency Committee. DPH-EL will provide review and comment on analytical laboratory issues.
- In cooperation with the OWM and the Interagency Committee, DEP-DEA & ORS conduct and publish research dealing with the development and improvement of methods for the analysis of toxic and other contaminants in fish and other aquatic organisms; this includes evaluation of methods for assessing the exposure of fish populations to toxicants (e.g., approaches involving biomarkers and toxicity testing).
- DEP-DEA & ORS advise the OWM and the Interagency Committee on all matters related to the laboratory analysis of fish samples.

MEETINGS: Meetings are scheduled as needed. Meetings in the fall and early winter months generally focus on planning annual sampling activities. Spring meetings generally focus on the evaluations of laboratory analyses and appropriate agency responses.

This MOU will be reviewed and revised as necessary on an annual basis. The following signatures indicate that the three participating agencies view their work duties as set forth in this Memorandum of Understanding as being part of their respective responsibilities for controlling toxic contaminants in the environment, protecting the public health and protecting wildlife resources.

Tom Powers
Acting Commissioner
Department of Environmental Protection

David Mulligan
Commissioner
Department of Public Health

Wayne F. MacCallum
Director
Division of Fisheries & Wildlife
Department of Wildlife & Environmental Law Enforcement

Appendix C

FORM FOR REQUESTING FISH TESTING

The following information will be reviewed by representatives of the Departments of Environmental Protection, Public Health and Fisheries and Wildlife to reach a decision regarding the need for the state to conduct freshwater fish toxics testing. Please answer these questions to the extent possible.

1. Name of the pond/lake river:_____

2. Location (city/town):_____

3. Why do you think that testing is necessary?_____

_____

_____

_____

4. If known, what type of testing is requested? Please state what chemical(s) or compounds are suspected:

_____

_____

5. Do you know of any private testing that has been done at this location? If so, please submit the results, including the quality assurance and control data:_____

_____

_____

_____

_____

6. Do you and your family fish at this location? (Please check one):

Yes___ No___

7. Please estimate how many fish meals you and your family consume over the course of a year of fish caught at this location? (Please check one):

   None (0)____ One (1) Meal a Month _____ 2-4 Meals a Month_____

8. What kind of fish do you eat from this location?:_____

   _____

   _____

   _____

   _____

9. Please not below any additional information you think might be useful in reviewing this request (Example: known or suspected pollution source):

   _____

   _____

   _____

   _____

   _____

   _____

   Your Name: _____

   Address: _____

   Telephone: _____

Thank you for taking the time to provide us with the above information. We will consider your request and will respond to you in mid to late February.

Please return this form to:

Robert Maietta
Department of Environmental Protection
Division of Watershed Management
627 Main Street, 2nd Floor
Worcester, MA 01608

Appendix D

CRITERIA FOR RANKING FISH TOXICS TESTING REQUESTS

Criteria for evaluating and ranking requested fish toxics studies have been developed for the purpose of ensuring that the state's fish toxics testing efforts are aimed at the situations that are most critical for protecting public health and the environment. In addition to prioritizing state efforts, the criteria and ranking scheme provide that all requested studies will be evaluated consistently.

A requested fish testing study will fall into one of four possible categories, where Category A is the highest priority and Category D is the lowest. Table 1 is followed by specific definitions of the criteria used.

TABLE 1

CATEGORY A		
	1.	The location is **heavily-fished**, and
	2.	Have **strong evidence** which indicates a potential for fish contamination.
CATEGORY B		
B1	1.	The location is **moderately-fished**, and
	2.	Have **strong evidence** which indicates a potential for fish contamination.
B2	1.	The location is **heavily-fished**, and
	2.	Have **some evidence** which indicates a potential for fish contamination.
CATEGORY C		
C1	1.	The location is **lightly-fished**, and
	2.	Have **strong evidence** which indicates a potential for fish contamination.
C2	1.	The location is **moderately-fished**, and
	2.	Have **some evidence** which indicates a potential for fish contamination.
C3	1.	The location is **heavily-fished**, and
	2.	Have **no evidence** which indicates a potential for fish contamination.
CATEGORY D		
D1	1.	The location is **lightly-fished**, and
	2.	Have **some or no evidence** which indicates a potential for fish contamination.
D2	1.	The location is **moderately-fished**, and
	2.	Have **no evidence** which indicates a potential for fish contamination.

DEFINITION OF CRITERIA

A. Criteria to estimate the frequency of exposure to fish that is consumed from a *single* location over the course of a year.

1. **Heavily-fished** - the location is one where the amount of fish caught comprise a substantial fraction of diets of individuals. A substantial fraction of the diet is classified when it is estimated that the number of fish meals exceeds four per month or when in the range of two to four meals per month.
2. **Moderately-fished** - the location is one where the amount of fish caught comprise some fairly consistent fraction of diets of individuals and is at a moderate level. A moderate level of fish consumption is classified when the number of fish meals is estimated at one a month throughout the year.
3. **Lightly-fished** - information indicates that fishing and consumption of fish from the location is rare or null.

B. Criteria to estimate the weight of evidence for a potential fish contamination problem at a given location.

1. **Strong evidence** – exists when there is knowledge that

    a. known sources release chemicals into the location (sources include point and/or nonpoint sources), and

    b. the chemicals are ones that tend to bioaccumulate/biomagnify in fish (ex. mercury, PCBs) and have been associated with human health effects traced to the consumption of contaminated fish.

    c. In addition to the above or in combination with either (a) or (b), the fish populations at the location have been shown to indicate evidence of toxic exposure, for example, fish are contaminated or are exposed to toxics associated with fish tumors, lesions, abnormal growth, or reproductive effects.

2. **Some evidence** – exists when there is knowledge that

    a. known sources release chemicals into the location (sources include point and/or nonpoint sources), and

    b. the chemicals are ones that do not bioaccumulate/biomagnify extensively in fish (ex. heavy metals) and have not been commonly associated with human health effects traced to the consumption of contaminated fish.

    c. The fish populations at the location have not been shown to indicate evidence of toxic exposure to toxics associated with fish tumors, lesions, abnormal growth, or reproductive effects.