2007
Fish Toxics Monitoring
Public Request and Year 2 Watershed Surveys

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

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COMMONWEATH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
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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 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 MDFGs 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 performs fish toxics monitoring surveys as part of their larger "biological monitoring" program.

Objective and Scope

The objective of Public Request and Watershed Surveys is to screen edible fillets of fishes for a variety of contaminants (i.e. mercury, polychlorinated biphenyls (Aroclors and toxic congeners), and organochlorine pesticides). All data are sent to the MDPH and the MassDEP Office of Research and Standards (ORS) for assessment and advisory issuance if appropriate.

PCB Aroclors analyzed for include Aroclors 1232, 1242, 1248, 1254, and 1260. PCB toxic congeners analyzed for include BZ #s 8, 18, 28, 44, 52, 66, 77, 81, 101, 105, 114, 118, 123, 126, 128, 138, 153, 156, 157, 167, 169, 170, 180, 187, 189, 195, 206, and 209. Organochlorine pesticides analyzed for include: chlordane, toxaphene, a-BHC, b-BHC, d-BHC, lindane, hexachlorocyclopentadiene, trifluralin, hexachlorobenzene, heptachlor, heptachlor epoxide, methoxychlor, DDD, DDE, DDT, endrin, and aldrin. All organics analyses include lipid determination. 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. Additional species included in the 2007 surveys: bluegill *Lepomis macrochirus,* black crappie *Pomoxis nigromaculatus,* brown bullhead A*meiurus nebulosus,* brown trout *Salmo trutta,* pumpkinseed *Lepomis gibbosus,* rainbow trout *Oncorhynchus mykiss,* smallmouth bass *Micropterus dolomieu,* white sucker *Catostomus commersonii,* and yellow bullhead *Ameiurus natalis.*

During 2007, a total of six locations were sampled as a result of recommendations from the Interagency Committee. An additional nine locations were sampled as part of Year 2 watershed surveys as selected by the MassDEP watershed monitoring coordinators.

Waterbody	Watershed	Town	USGS Quadrangle
Long Pond[1] PALIS#[2] 96179	Cape Cod	Wellfleet	WELLFLEET, MASS
Snows Pond[1] PALIS#[2] 96303	Cape Cod	Truro	WELLFLEET, MASS
Great Pond[1] PALIS#[2] 96114	Cape Cod	Truro	WELLFLEET, MASS
Baker Pond[1] PALIS#[2] 96008	Cape Cod	Orleans	HARWICH, MASS
Pilgrim Lake[1] PALIS#[2] 96246	Cape Cod	Orleans	ORLEANS, MASS
Mystic River[1] SARIS#[2] 7138150	Mystic River	Medford	BOSTON NORTH, MASS
Ashland Reservoir PALIS#[2] 82003	SuAsCo	Ashland	HOLLISTON, MASS
Beaver Pond PALIS#[2] 72004	Charles	Bellingham/Milford	FRANKLIN, MASS
Chauncy Lake PALIS#[2] 82017	SuAsCo	Westborough	MARLBOROUGH, MASS
Chebacco Lake PALIS#[2] 93014	North Coastal	Essex/Hamilton	MARBLEHEAD NORTH, MASS
Populatic Pond PALIS#[2] 72096	Charles	Norfolk	HOLLISTON, MASS
Lake Quannapowitt PALIS#[2] 93060	North Coastal	Wakefield	READING, MASS
Konkapot River SARIS#[2] 2103525	Housatonic	New Marlborough	ASHLEY FALLS, MASS
Hoosic River (mainstem) SARIS#[2] 1100500	Hoosic	North Adams	WILLIAMSTOWN, MASS-VT
(South Branch) Hoosic River SARIS#[2] 1100500	Hoosic	North Adams	NORTH ADAMS, MASS-VT

[1] Public Request Waterbody

[2] PALIS/SARIS# = Pond and Lake Identification System / Stream Classification numbers (Ackerman 1989/ Halliwell et.al. 1982)

Field Methods

Waterbodies were sampled using an electrofishing boat, a backpack electrofisher, trotlines, gill nets, and/or rod and reel. Electrofishing was performed by maneuvering the boat or the backpack electrofisher through the littoral zone and/or shallow water habitat of a given waterbody, and collecting most fish shocked. Fish collected by electrofishing were stored in a live well or buckets filled with site water until the completion of sampling. Trotlines were baited with nightcrawlers or shiners, set, and left overnight. Gill nets were set in various locations and either checked every two hours or, on occasion, left overnight. Trotlines and gill nets set overnight were retrieved the following morning. Rod and reel fishing was performed by casting lures/baited hooks into fish holding cover and retrieving lures/hooks and, on occasion, 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 all cases, live fish that were not included as part of the sample, were released.

Field Results

Long Pond: Rod and reel fishing by employees of the DFW on 5/22/07 resulted in the capture of only three small yellow perch, which were released due to their small size. Gillnets set over-night and pulled on 5/23/07 resulted in the collection of the three yellow perch that were ultimately included as part of the sample. Trotlines and fish traps were not successful in capturing fish. No other species were observed in Long Pond.

Snows Pond: Rod and reel fishing by employees of the DFW on 5/23/07 resulted in the collection of two largemouth bass. Gillnets set over-night on 5/23/07 and pulled on 5/24/07 resulted in the collection of two additional largemouth bass. Trotlines and fish traps set overnight on 5/23/07 and pulled on 5/24/07 resulted in the capture of one American eel (trotline) *Anguilla rostrata*, which was not included in this sample. No other species were observed in Snows Pond.

Great Pond: Rod and reel fishing by employees of the DFW on 5/23/07 resulted in the collection of three smallmouth bass. Gillnets set and pulled on 5/23/07 resulted in the collection of one yellow perch and twelve stocked brook trout *Salvelinus fontinalis*. Trotlines and fish traps set overnight on 5/23/07 and pulled on 5/24/07 resulted in the capture/collection of numerous brown bullhead, yellow perch, and American eel.

Baker Pond: Electrofishing at Baker Pond in Orleans on 6/27/07 resulted in the collection of three largemouth bass, three yellow perch, three brown bullhead, and three pumpkinseed. Additional species observed and or caught but not retained for analysis included golden shiner *Notemigonus crysoleucas*. Gill nets resulted in the collection of smallmouth bass, rainbow trout, brown trout, and brook trout.

Pilgrim Lake: Electrofishing at Pilgrim Lake in Orleans on 6/28/07 resulted in the collection of three largemouth bass, three yellow perch, three white perch, and three pumpkinseed Additional species observed and or captured but not retained for analysis included American eel, river herring *Alosa* sp., and chain pickerel.

Ashland Reservoir: Electrofishing at Ashland Reservoir in Ashland on 6/06/07 resulted in the collection of three largemouth bass, three black crappie, three bluegill, and two bullhead *Ameiurus* sp.

Mystic River: Electrofishing the Mystic River in Medford on 6/07/07 resulted in the collection of three largemouth bass, three common carp, three yellow perch, three white perch, and three brown bullhead.

Additional species observed and or captured but not retained for analysis included American eel, striped bass *Morone saxatilus*, and blueback herring *Alosa aestivalis*. Although striped bass and blueback are highly sought after as table fare, both are anadromous fish which are not targeted by the Interagency Committee.

Beaver Pond: Electrofishing at Beaver Pond in Bellingham on 5/17/07 resulted in the collection of three largemouth bass, three yellow perch, three chain pickerel, three bluegill, and three yellow bullhead.

Chauncy Lake: Electrofishing at Chauncy Lake in Westborough on 6/8/07 resulted in the collection of three largemouth bass, three yellow perch, three white perch, three pumpkinseed, three black crappie, and three brown bullhead.

Chebacco Lake: Electrofishing at Chebacco Lake in Essex on 6/14/07 resulted in the collection of three largemouth bass, three yellow perch, three bluegill, two black crappie, and three brown bullhead. Additional species observed and or captured but not retained for analysis included American eel, river herring *Alosa* sp., pumpkinseed, golden shiner, and chain pickerel.

Populatic Pond: Electrofishing at Populatic Pond in Norfolk on 6/20/07 resulted in the collection of three largemouth bass, three common carp, three white sucker, three yellow perch, three bluegill, three black crappie, three white perch, and two brown bullhead. Additional species observed and or captured but not retained for analysis included American eel, pumpkinseed, golden shiner, and chain pickerel.

Lake Quannapowitt: Electrofishing at Lake Quannapowitt in Wakefield on 6/21/07 resulted in the collection of three largemouth bass, three common carp, three yellow perch, three bluegill, and three brown bullhead.

Konkapot River: Backpack electrofishing the Konkapot River in New Marlborough on 7/3/07 resulted in the collection of three white sucker, three brown trout and two rainbow trout. The rainbow trout appeared to be stocked fish as evidenced by slightly deformed pectoral and dorsal fins.

Hoosic River (mainstem): Backpack electrofishing the Hoosic River in North Adams on 7/26/07 resulted in the collection of three brown trout and one rainbow trout. The rainbow trout appeared to be stocked fish as evidenced by slightly deformed pectoral and dorsal fins.

(South Branch) Hoosic River: Backpack electrofishing the (South Branch) Hoosic River in North Adams on 7/26/07 resulted in the collection of three brown trout and three white sucker.

Laboratory Methods

Fish brought to the MassDEP DWM laboratory in Worcester or the WES laboratory in Lawrence 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 or after each sample. Samples targeted for % lipid, PCB and organochlorine pesticide analyses were wrapped in aluminum foil. Samples targeted for mercury analysis were placed in VWR high-density polyethylene (HDPE) cups with covers. Composite samples were composed 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 Atomic Absorption Spectrophotometry using EPA method 7473.

PCB Aroclor, PCB congener, 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, Congeners, and Organochlorine Pesticides."(MA DEP 2002). Additional information on analytical technique used at WES is available from the laboratory.

Laboratory Results

Fifty-nine samples were delivered to WES for analysis. All fish tissue data passed WES QC acceptance limits. Mercury (MDL 0.0020 μg/g) was detected in all fifty-nine samples analyzed. Concentrations ranged from 0.018 μg/g to 2.4 μg/g. Mercury concentrations varied greatly between waterbodies and species. Waterbody mean mercury concentrations and ranges are detailed below.

Waterbody	Mean total Hg (μg/g) wet weight)	Range min-max (μg/g)
Long Pond	2.4 (n=1)	N/A
Snows Pond	0.56 (n=2)	0.47 - 0.64
Great Pond	0.66 (n=3)	0.16 - 0.98
Baker Pond	0.33 (n=4)	0.14 - 0.50
Pilgrim Lake	0.24 (n=4)	0.15 - 0.39
Ashland Reservoir	0.63 (n=4)	0.16 - 0.99
Mystic River	0.15 (n=5)	0.052 - 0.44
Beaver Pond	0.45 (n=5)	0.21 - 0.98
Chauncy Lake	0.24 (n=6)	0.068 - 0.58
Chebacco Lake	0.38 (n=5)	0.14 - 0.85
Populatic Pond	0.42 (n=8)	0.20 - 0.77
Lake Quannapowitt	0.11 (n=5)	0.018 - 0.35
Konkapot River	0.11 (n=3)	0.059 - 0.18
(South Branch) Hoosic River	0.035 (n=2)	0.034 - 0.036
Hoosic River (mainstem)	0.055 (n=2)	0.039 - 0.071

Quality Control

All 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. Samples were in most cases delivered to WES within the 28 day holding time. Seven sets of samples were delivered within 7 days of collection, three sets within 13 days of collection, two sets within 17 days of collection, and one set was delivered on the 28th day following 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 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 less than MDL, respectively.

Laboratory QC samples for organochlorine pesticides and PCB Aroclors and pesticides were generally within acceptance limits, including that for surrogate recoveries (60-140%), lab duplicates (0-35%RPD), lab-fortified matrix (60-140%), lab-fortified blanks (60-140%) and lab blanks (<MDL). PCB Aroclor congener and pesticide results greater than the Method Detection Limit but less than the Reporting Detection Limit (>MDL but < RDL) were reported (and flagged) by the lab. (WES typically provides numerical results for concentrations between the MDL and RDL limits.) For one batch of fish tissue samples analyzed for PCBs, the estimated duplicate precision (RPD) for PCB Aroclors A1254 and A1260, and for PCB congener BZ153 exceeded acceptance limits. The associated data were not qualified or censored by WES, however, because the results "were below reporting limits", i.e., the results were between the MDL and RDL. It is possible that the analytical precision of other, intra-batch results for these specific analytes (A1254, A1260 and BZ153) that were between the MDL and RDL may also have been poor.

Discussion

Mercury continues to be both widespread and detectable at concentrations that exceed both the MDPH trigger level (0.5 μg/g total mercury) and, in some cases, the USFDA Action level (1.0 μg/g methyl mercury). Mercury is discussed in the individual waterbody discussions that follow. MDPH is in the process of assessing the mercury data with regard to the need for waterbody specific advisory issuance where warranted.

PCB Aroclors, PCB toxic congeners, 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. USFDA "Action Levels" exist for mercury (1.0 μg/g methyl mercury), PCBs (2.0 μg/g), chlordane, aldrin, and dieldrin (0.3 μg/g for each individually), and for DDT and its metabolites DDE and DDD (5.0 μg/g combined). The MDPH has "trigger levels" for mercury (0.5 μg/g total mercury), PCBs (1.0 μg/g total Aroclors) and DDT and its metabolites (0.06 μg/g).

PCB toxic congener analysis allows for a detailed look at the PCB compounds that exhibit dioxin-like toxicity. MassDEPs ORS and the MDPH are in the process of looking more closely at evaluating the potential benefits of using PCB toxic congener results in determining the need for fish consumption advisories. Currently all PCB advisories are issued based on total Aroclor concentrations. While

summarized congener results appear in Appendix A Table 1, complete PCB congener results are available from DWM or WES.

PCB Aroclors and congeners as well as organochlorine pesticides (DDT and its metabolites) were found in a number of samples analyzed in 2007. This information may result in fish consumption advisories or modifications.

Long Pond: Located within Cape Cod National Seashore, Long Pond is a 34-acre (Ackerman 1989) oligotrophic kettle pond located in the town of Wellfleet. The shoreline is approximately 50 percent developed with residences. Land use within the pond's immediate watershed is primarily forested with a small amount of low-density residential land use.

Mercury in yellow perch (one composite sample) exceeded both the MDPH "trigger level" of 0.5 µg/g and the USFDA Action level of 1.0 µg/g. It appears that the fish population in Long Pond is comprised of mostly yellow perch and what appeared to be banded killifish *Fundulus diaphanus*, which were observed but not collected. No other species were observed.

Mercury concentrations have resulted in a MDPH advisory, which recommends that: no one should consume any fish from this water body. (MDPH 2007)

Snows Pond: Snows Pond is an eight acre (Ackerman 1989) oligotrophic kettle pond located in the town of Truro. Like Long Pond it also is located within Cape Cod National Seashore. The shoreline is totally undeveloped except for the heavily traveled Route 6, which is located just 50 meters from the ponds western shoreline. Land use within the watershed is entirely forested.

Mercury exceeded the MDPH "trigger level" of 0.5 µg/g in a composite sample of largemouth bass (two fish) that were greater than 340 mm in length. Mercury was just below the trigger level in a composite sample of largemouth bass (two fish) that were near the legal length limit of 304.8 mm or 12 inches (296 and 305mm).

The elevated mercury in largemouth bass has resulted in a MDPH advisory which recommends that: Children younger than 12 years of age, pregnant women, women of childbearing age who may become pregnant and nursing mothers should not eat any largemouth bass from Snows Pond and that the general public should limit consumption of largemouth bass from Snows Pond to two meals per month. (MDPH 2007)

Great Pond: Located just north of Snows Pond and also within the Cape Cod National Seashore, Great Pond is a 17-acre oligotrophic pond located in the town of Truro (Ackerman 1989). The shoreline is largely undeveloped although there are a few scattered residences. Land use within the ponds immediate watershed is primarily forested with the exception of Route 6, which passes within 100 meters of the southwest corner of the pond.

Mercury exceeded the MDPH "trigger level" of 0.5 µg/g in composite samples of smallmouth bass and yellow perch.

The elevated mercury in smallmouth bass and yellow perch has resulted in a MDPH advisory, which recommends that: Children younger than 12 years of age, pregnant women, women of childbearing age who may become pregnant, and nursing mothers should not eat any fish from Great Pond. The advisory

also recommends that: the general public should limit consumption of all fish from Great Pond to two meals per month. (MDPH 2007)

Baker Pond: This 28-acre kettle pond is located in the town of Orleans. The immediate shoreline is largely undeveloped although there are scattered residences within the ponds watershed. Aside from the low-density residential areas, land use is predominantly forested. There is a small access area which can accommodate small trailerable boats, canoes and/or kayaks located on the easternmost corner of the pond. The area is managed by the Massachusetts Department of Fish and Game (MDFG) Office of Fishing and Boating Access (OFBA). It should be noted that parking is limited at this location.

Mercury was equal to the MDPH trigger level of 0.5 μg/g and just below the trigger level (0.48 μg/g) in edible fillets of yellow perch and largemouth bass, respectively. The elevated mercury in yellow perch has resulted in a MDPH advisory which recommends that: Children younger than 12 years of age, pregnant women, women of childbearing age who may become pregnant and nursing mothers should not eat any yellow perch from Baker Pond. The advisory also recommends that: the general public should limit consumption of yellow perch from Baker Pond to two meals per month. (MDPH 2007)

Pilgrim Lake: This 39-acre kettle pond is located in the Town of Orleans. The immediate shoreline is around fifty percent developed residentially. The watershed is a mix of medium density residential and forested land uses. There is limited public access to this lake. The town owns and operates a swimming area, which according to MDFG contains a right of way for launching small boats. There is a ban on the use of internal combustion engines on Pilgrim Lake. Pilgrim Lake appears to be a bit more productive than the other Cape Cod ponds sampled in 2007 as evidenced by the quantity of aquatic vegetation and algae present..

Although the fish from Pilgrim Lake in Orleans were larger than those collected and analyzed from Baker Lake in Orleans, the mercury was well below the MDPH's trigger level in all fish analyzed.

Ashland Reservoir: Ashland Reservoir is a 155-acre mesotrophic man-made lake/reservoir located in the Town of Ashland. The immediate shoreline is undeveloped although there is a large gravel mining operation located at the southwest corner of the lake near the inlet stream (Cold Spring Brook). The watershed is a mix of forested, medium density residential, agricultural, and mining land uses. The Commonwealths' Department of Conservation and Recreation (DCR) operates Ashland State Park which encompasses much of the shoreline and a large portion of the watershed on the west side of the lake. Access is available through the state park and via a gravel ramp located on Spring Street.

Mercury concentrations exceeded the MDPH trigger level in three of the four samples analyzed. Species that exceeded the MDPH trigger level for mercury concentrations were largemouth bass, black crappie, and bluegill. No advisory has been issued as of March 2008, however, elevated mercury will most likely result in the issuance of a fish consumption advisory.

Mystic River: The sampling reach on the Mystic River was a one-mile segment in Medford ending approximately one-mile downstream from Lower Mystic Lake. Due to a lack of migratory barriers, fish from this highly developed area may be indicative of conditions in the Mystic River, the Little River/Alewife Brook, and/or the Aberjona River/Mystic Lakes. The watershed is predominantly a mix of high-density residential, multi-family residential, and industrial land uses. There is a fair amount of recreational land use along the river corridor as well. The historic industrial and highly developed nature of this watershed is well-documented and obvious from direct observation. Subsistence fishing pressure is

reported to be heavy; however, actual fishing (or evidence of heavy fishing pressure) was only observed at a couple of locations during the sampling survey.

The Mystic River was first sampled by MassDEP in 1999. At that time, all contaminants were below concentrations of concern. In 2007, mercury concentrations were again below the MDPH trigger level in the five samples analyzed. Mercury ranged from 0.052 μg/g in yellow perch to 0.44 μg/g in largemouth bass.

PCB Aroclors, congeners, and/or DDT (or its metabolites) were detected in all samples with the exception of yellow perch. In addition, chlordane was detected in fillets of white perch, common carp and brown bullhead. Common carp and brown bullhead are bottom-feeding species. All three species had relatively high lipid content. PCB Aroclors were elevated in excess of the MDPH trigger level of 1.0 μg/g in carp only. Although carp were also sampled in 1999 (and were found to be safe to eat) it should be noted that the carp sampled in 2007 were slightly larger and had higher lipid (fat) content. It is unclear where PCBs and pesticides might be originating, but given the incredible amount of historical industrial development within the Mystic River watershed sources are most likely from past discharges. Concentrations do not appear to be indicative of an ongoing source of these contaminants.

The elevated levels of PCBs, chlordane, and DDT in carp have resulted in a MDPH advisory which recommends that: no one should consume any fish from the Mystic River between outlet of Lower Mystic Lake and Amelia Earhart Dam. (MDPH 2007)

Beaver Pond: Beaver Pond is a 114-acre (Ackerman 1989) shallow dystrophic pond located in the Town of Bellingham. The immediate shoreline is mostly undeveloped, although there are a few homes with backyards extending to the pond/wetland edge. The watershed is a mix of forested, low density residential, and industrial land uses. Access is available through Varney Brothers Concrete located on the southern end of the pond near the outlet. A gravel ramp provides access for small trailerable boats and car toppers.

Mercury concentrations exceeded the MDPH trigger level of 0.5 μg/g in edible fillets of chain pickerel (0.56 μg/g) and largemouth bass (0.98 μg/g), both of which are considered predatory species. No advisory has been issued as of March 2008, however, elevated mercury will most likely result in a MDPH fish consumption advisory.

Chauncy Lake: Chauncy Lake is a 177-acre mesotrophic natural lake located in the Town of Westborough. The immediate shoreline is relatively undeveloped although there is a large state hospital property along the northeast shoreline and a few residences and a beach along the southeast shoreline. The watershed is a diverse mix of forested, medium density residential, agricultural, and urban public and commercial land uses. The Massachusetts Department of Fish and Game (MDFG) manages the Westborough Wildlife Management Area, which is located to the west of the lake. Access is available via a gravel ramp located off Lyman Street.

Mercury concentrations were below MDPH trigger level in the six samples analyzed in 2007

Chebacco Lake: Chebacco Lake is a 209-acre eutrophic/mesotrophic lake located in the towns of Hamilton and Essex. Approximately 60 percent of the shoreline is developed with residences. The watershed is a mix of forested and low/medium density residential land uses. It should be noted that there is a large amount of forested wetland habitat within the lakes' drainage area. Access is provided by an Office of Fishing and Boating Access (OFBA) ramp that is managed by the DCR (MDFW 1993).

Fish from Chebacco Lake were first sampled by MassDEP's DWM in 1998. The 1998 survey resulted in the issuance of a MDPH fish consumption advisory due to elevated mercury in largemouth bass. In 2007, mercury concentrations not only exceeded the MDPH trigger level in largemouth bass but also in black crappie (a two fish composite). The current MDPH advisory recommends that: children younger than 12 years of age, pregnant women, women of childbearing age who may become pregnant and nursing mothers should not eat any largemouth bass from Chebacco Lake and that the general public should limit consumption of largemouth bass from Chebacco Lake to two meals per month. No advisory update has been issued as of March 2008. The 2007 survey will most likely result in a modification or update of the fish consumption advisory.

Populatic Pond: Populatic Pond is a 40-acre eutrophic pond located on the Charles River in the Town of Norfolk. The Charles River flows into and out of the northwest corner of the pond. Approximately sixty to seventy percent of the shoreline is developed with residences. The watershed is a mix of forested, and medium density residential land uses. There is a small boat ramp with minimal room for parking located on the northeastern shore of the pond. It is unclear who maintains this un-improved ramp. There was a moderate amount of algal growth observed on the date of the fish survey.

Fish from this segment of the Charles River (including Populatic Pond) were first sampled and analyzed by MassDEP in 1997. The 1997 survey resulted in the issuance of a MDPH fish consumption advisory due to elevated mercury in largemouth bass. In 2007, mercury concentrations not only exceeded the MDPH trigger level in largemouth bass but also in black crappie (a two fish composite).

Although trace concentrations of PCB Aroclors, PCB congeners, DDT (or it's metabolites DDD and DDE) and Chlordane were found in a number of fillet samples from Populatic Pond in 2007, most concentrations appear to low. The combination of DDE and DDD in carp however exceeded the MDPH trigger level for DDT and it's metabolites.

The current MDPH advisory recommends that: children younger than 12 years of age, pregnant women, women of childbearing age who may become pregnant and nursing mothers should not eat any largemouth bass from the Charles River (between the South Natick Dam in Natick and the Medway Dam in Franklin and Medway) and that the general public should limit consumption of largemouth bass from the Charles River (between the South Natick Dam in Natick and the Medway Dam in Franklin and Medway) to two meals per month. Although no advisory update has been issued as of March 2008, the 2007 survey will likely result in modification of the Charles River fish consumption advisory.

It is unclear where PCBs and DDE might be originating, but given the proximity of Populatic Pond to the Charles River, contaminants and/or fish from the Charles River could easily be ending up in Populatic Pond. Concentrations do not appear to be indicative of an ongoing source of these contaminants.

Lake Quannapowitt: Lake Quannapowitt is a 254 acre eutrophic lake located in Wakefield. Approximately seventy percent of the shoreline is developed with residences and/or commercial properties. The remainder is either cemeteries or town parks. The watershed is primarily a mix of medium density residential and commercial land uses. There is a boat ramp with minimal room for trailer parking located near the southwest corner of the lake. This area appears to be managed by the Town of Wakefield. There was a moderate amount of phytoplankton in the water column on the day of the sampling survey.

Fish from Lake Quannapowitt were first sampled by DEP in 1998. Similar to the results of the survey of 1998, the 2007 mercury concentrations were below MDPH trigger level in the five samples analyzed. In

2007, mercury ranged from 0.018 μg/g in brown bullhead to 0.35 μg/g in largemouth bass. It should be noted that the largemouth bass that were analyzed in 2007 were much larger than legal minimum length.

Although trace amounts of PCB Aroclors and/or PCB congeners were found in carp and largemouth bass, all concentrations appear to be below any MDPH or USFDA criteria. DDT (or it's metabolites DDD and DDE) and/or chlordane were found in carp, yellow perch, largemouth bass and bluegill. These concentrations were low in perch, largemouth bass and bluegill however, the combination of DDE and DDD in carp exceeded the MDPH trigger level. No advisory update has been issued as of March 2008, but the DDD and DDE concentrations may result in a fish consumption advisory.

It is unclear where PCBs and pesticides might be originating, but given the incredible amount of development within the lake's watershed, pesticides could well be from historic household or industrial use. Concentrations do not appear to be indicative of an ongoing source of these contaminants.

Konkapot River: Originating as the outflow from Brewer Lake in Monterey, the Konkapot River flows south approximately twenty-two miles to it's confluence with the Housatonic River near the locality of Ashley Falls in Sheffield. The Konkapot River was first sampled by the MassDEP in 1997. At that time, high mercury was detected in fish from both upstream and downstream of Ashley Falls, mostly near the confluence with the Housatonic River. As a result of the 1997 survey the MDPH issued a fish consumption advisory (due to mercury) for the Konkapot River. The advisory pertains to that portion of the river which extends form the locality of Mill River, New Marlborough downstream to the confluence with the Housatonic River. The advisory recommends: children younger than 12 years of age, pregnant women, women of childbearing age who may become pregnant, and nursing mothers should not eat any fish from this water body and the general public should limit consumption of all fish from this water body to two meals per month. (MDPH 2007)

In 2007 The Konkapot River was re-sampled in the reach downstream of the locality of Mill River adjacent to Clayton Mill River Road and upstream of Hadsell Street. The watershed upstream from the sampled reach is mostly forested with a mix of low/medium density residential, and agricultural landuses.

Mercury concentrations were below MDPH trigger level in the three samples analyzed. Mercury ranged from 0.059 μg/g in stocked rainbow trout (a two fish composite) to 0.18 μg/g in white sucker. PCB Aroclors, Congeners, and organochlorine pesticides were below MDL values in all samples analyzed. MDL values for organics can be found in Appendix A Table 2. It should be noted that white suckers were very small, the brown trout appeared to be native and the rainbow trout appeared to be stocked fish. PCB and organochlorine pesticide results were below the MDL in all samples analyzed. Due to equipment constraints we were unable to re-sample the area that had the highest mercury concentrations in 1997.

While there does not appear to be the need for a fish consumption advisory in the upper most sections of the Konkapot River, the inability to sample the downstream areas will likely result in the consumption advisory remaining unchanged, at least near the locality of Ashley Falls, New Marlborough.

(South Branch) Hoosic River: The (South Branch) Hoosic River originates as the inflow to Cheshire Reservoir and after leaving Cheshire Reservoir flows north through the the towns of Cheshire and Adams to it's confluence with the North Branch Hoosic River in North Adams. The (South Branch) Hoosic River has been sampled by the MassDEP on a number of occasions over the last twenty years. Although there is a fish consumption advisory on the mainstem Hoosic River, fish from the (South Branch) Hoosic River have always been found to be safe to eat.

The 2007 fish sampling was conducted in North Adams just downstream from Hunter Foundry Road within a diked channelized section of the river. The watershed upstream from the sampled reach is a diverse mix of land uses dominated by forests and agriculture, but which includes mining, residential, commercial, and industrial land uses as well.

Mercury concentrations were well below the MDPH trigger level in both samples analyzed. Although trace amounts of PCB Aroclors, PCB congeners, and DDT (or it's metabolites DDD and DDE) were detected in brown trout, all concentrations were well below any MDPH or USFDA criteria. It is unclear where PCBs and pesticides might be originating, but given development within the rivers' watershed and the known historic PCB contamination from downstream locations the trace amounts are not that surprising. Concentrations do not appear to be indicative of an ongoing source of these contaminants.

Hoosic River (mainstem): The mainstem of the Hoosic River flows from the confluence of the North Branch Hoosic River and the (South Branch) Hoosic River in North Adams west and slightly north through Williamstown into Pownal, Vermont. The Hoosic River (mainstem) was sampled just downstream from the confluence of the North Branch Hoosic River and the (South Branch) Hoosic River in North Adams. The Hoosic River (mainstem) has been sampled by the MassDEP many times over the last twenty years. Historic sampling resulted in an advisory, which recommends that due to PCB contamination: no one should consume any fish from this water body. (MDPH 2007)

The 2007 fish sampling was conducted just upstream from Route 2 and downstream from Fairgrounds Avenue. The watershed upstream from the sampled reach is a diverse mix of land uses that is dominated by forests and agriculture, which also includes mining, residential, commercial, and industrial. It should be noted that there is a MassDEP Bureau of Waste Site Cleanup 21E Tier Classified Oil and HAZMAT Site located just upstream and adjacent to the sampled reach (MassDEP 2006a). PCBs are one of the contaminants of concern at this site.

Mercury concentrations were well below the MDPH trigger level in the two samples analyzed. However, PCB Aroclors 1242 and 1254 when combined exceeded MDPH trigger levels for PCBs in both samples analyzed. Although DDT (or it's metabolites DDD and DDE) was detected in both samples as well, concentrations were below any MDPH or USFDA criteria. It is clear where PCB originated, and given the extensive amount of development within the rivers' watershed, trace amounts of DDT (or it's metabolites) are not that surprising. DDT concentrations do not appear to be indicative of an ongoing source of these contaminants. In light of the 2007 data the previous fish consumption advisory will most likely remain unchanged. It should be noted that the rainbow trout, which appeared to be a stocked, was a single fish sample.

Conclusions

The 2007 Public Request and Year 2 Watershed data sets support previous findings that mercury is a widespread problem and that although individual ponds or regions may be at higher risk, mercury is primarily a problem in predatory or piscivorous fish species and older and/or larger individuals of all 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 from 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, mercury bioaccumulation in fishes also poses threats with regard to ecological risks to piscivorous wildlife (Eisler 1987). Mercury in fish poses a health risk to eagles, loons, and ospreys as well as many other fish-eating species. Reductions with regard the amount of mercury in the municipal waste stream and the emissions noted above may 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 2006b). In addition, a long term trend monitoring program managed by DEP's ORS has suggested that mercury concentrations in yellow perch and largemouth bass are also decreasing in a number of monitored waterbodies (Mass DEP 2006b). It is impossible to predict 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 2007 data set 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 high lipid fishes can certainly bioaccumulate significant concentrations of PCB Aroclors and toxic congeners, DDT and it's metabolites, and chlordane. The MassDEP's ORS and the MDPH will continue to evaluate the potential benefits of using PCB toxic congener results in determining the need for fish consumption advisories.

The DWM will continue to screen for contaminants in freshwater fishes as part of Public Request and Year 2 watershed surveys. 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 participating on with the Interagency Committee, the individuals requesting work, and the DWM monitoring coordinators in the watersheds where monitoring was conducted. Additional copies of this report are available from the MassDEP, Division of Watershed Management, 627 Main Street 2nd Floor, Worcester, MA 01608.

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Appendix C: Form For Requesting Fish Testing

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APPENDIX A

Table 1. Analytical Results for 2007 Fish Toxics Monitoring Public Request Surveys. Results reported in wet weight, are from two or three fish composite or individual samples of fish fillets (skin off).

Sample ID	Collection Date(s)	Species Code[1]	Length (mm)	Weight (g)	Sample ID (laboratory sample #)	Cd (µg/g)	Pb (µg/g)	Hg (µg/g)	As (µg/g)	Se (µg/g)	% Lipids (%)	PCB Aroclors and Congeners (µg/g)	Pesticides (µg/g)
Long Pond, Wellfleet, Cape Cod Coastal Watershed													
LPF07-1	5/22-23/07	YP	330	340	2007172-001	-	-	2.4H	-	-	-	-	-
LPF07-2	5/22-23/07	YP	320	210									
LPF07-3	5/22-23/07	YP	326	330									
Snows Pond, Truro, Cape Cod Coastal Watershed													
SPF07-1	5/23-24/07	LMB	345	520	2007175-001	-	-	0.64H	-	-	-	-	-
SPF07-2	5/23-24/07	LMB	349	520									
SPF07-3	5/23-24/07	LMB	296	300	2007175-002	-	-	0.47H	-	-	-	-	-
SPF07-4	5/23-24/07	LMB	305	330									
Great Pond, Truro, Cape Cod Coastal Watershed													
GPF07-1	5/22-24/07	YP	274	210	2007173-001	-	-	0.83H	-	-	-	-	-
GPF07-2	5/22-24/07	YP	279	250									
GPF07-3	5/22-24/07	YP	252	170									
GPF07-4	5/22-24/07	BB	220	140	2007173-002	-	-	0.16H	-	-	-	-	-
GPF07-5	5/22-24/07	BB	222	160									
GPF07-6	5/22-24/07	BB	215	140									
GPF07-7	5/22-24/07	SMB	388	640	2007173-003	-	-	0.98H	-	-	-	-	-
GPF07-8	5/22-24/07	SMB	382	660									
GPF07-9	5/22-24/07	SMB	430	960									
Baker Pond, Orleans, Cape Cod Coastal Watershed													
BPF07-1	6/27/07	LMB	315	500	2007264-001	-	-	0.48H	-	-	-	-	-
BPF07-2	6/27/07	LMB	334	620									
BPF07-3	6/27/07	LMB	320	560									
BPF07-4	6/27/07	P	142	80	2007264-002	-	-	0.20H	-	-	-	-	-
BPF07-5	6/27/07	P	147	90									
BPF07-6	6/27/07	P	136	80									
BPF07-7	6/27/07	YP	197	100	2007264-003	-	-	0.50H	-	-	-	-	-
BPF07-8	6/27/07	YP	180	70									
BPF07-9	6/27/07	YP	166	60									
BPF07-10	6/27/07	BB	228	120	2007264-004	-	-	0.14H	-	-	-	-	-
BPF07-11	6/27/07	BB	207	120									
BPF07-12	6/27/07	BB	225	150									

Table 1. Continued Analytical Results for 2007 Fish Toxics Monitoring Public Request and Year 2 Watershed Surveys. Results reported in wet weight, are from two or three fish composite or individual samples of fish fillets (skin off).

Sample ID	Collection Date(s)	Species Code[1]	Length (mm)	Weight (g)	Sample ID (laboratory sample #)	Cd (µg/g)	Pb (µg/g)	Hg (µg/g)	As (µg/g)	Se (µg/g)	% Lipids (%)	PCB Aroclors and Congeners (µg/g)	Pesticides (µg/g)
Pilgrim Lake, Orleans, Cape Cod Coastal Watershed													
PLF07-1	6/28/07	LMB	393	830	2007263-001	-	-	0.39H	-	-	-	-	-
PLF07-2	6/28/07	LMB	380	770									
PLF07-3	6/28/07	LMB	361	590									
PLF07-4	6/28/07	WP	260	250	2007263-002	-	-	0.15H	-	-	-	-	-
PLF07-5	6/28/07	WP	230	180									
PLF07-6	6/28/07	WP	239	200									
PLF07-7	6/28/07	YP	249	170	2007263-003	-	-	0.17H	-	-	-	-	-
PLF07-8	6/28/07	YP	240	160									
PLF07-9	6/28/07	YP	247	170									
PLF07-10	6/28/07	P	201	190	2007263-004	-	-	0.23H	-	-	-	-	-
PLF07-11	6/28/07	P	191	160									
PLF07-12	6/28/07	P	205	170									
Ashland Reservoir, Ashland, SuAsCo Rivers Watershed													
ARF07-1	6/6/07	LMB	325	520	2007205-001	-	-	0.99H	-	-	-	-	-
ARF07-2	6/6/07	LMB	337	480									
ARF07-3	6/6/07	LMB	330	420									
ARF07-4	6/6/07	BC	267	260	2007205-002	-	-	0.62H	-	-	-	-	-
ARF07-5	6/6/07	BC	214	150									
ARF07-6	6/6/07	BC	216	150									
ARF07-7	6/6/07	B	230	260	2007205-003	-	-	0.73H	-	-	-	-	-
ARF07-8	6/6/07	B	228	210									
ARF07-9	6/6/07	B	210	210									
ARF07-10	6/6/07	BB	292	350	2007205-004	-	-	0.16H	-	-	-	-	-
ARF07-11	6/6/07	YB	252	230									
Mystic River, Medford, Mystic River Watershed													
MRF07-1	6/7/07	C	522	2380	2007206-001	-	-	0.083H	-	-	5.3	A1254-0.73 A1260-0.75 TBZ-0.9453	DDE-0.17 DDD-0.099 Chlordane-0.73
MRF07-2	6/7/07	C	571	2660									
MRF07-3	6/7/07	C	561	2500									

Table 1. Continued Analytical Results for 2007 Fish Toxics Monitoring Public Request and Year 2 Watershed Surveys. Results reported in wet weight, are from two or three fish composite or individual samples of fish fillets (skin off).

Sample ID	Collection Date(s)	Species Code[1]	Length (mm)	Weight (g)	Laboratory Sample ID #)	Cd (µg/g)	Pb (µg/g)	Hg (µg/g)	As (µg/g)	Se (µg/g)	% Lipids (%)	PCB Aroclors and Congeners (µg/g)	Pesticides (µg/g)
MRF07-4	6/7/07	LMB	400	920	2007206-002	-	-	0.44H	-	-	0.06	A1254-0.031M A1260-0.081 TBZ-0.0778	DDE-0.0077M
MRF07-5	6/7/07	LMB	461	1280									
MRF07-6	6/7/07	LMB	421	1220									
MRF07-7	6/7/07	BB	282	400	2007206-003	-	-	0.052H	-	-	0.88	A1254-0.045 A1260-0.048M TBZ-0.0119	DDE-0.014 DDD-0.016 Chlordane-0.088M
MRF07-8	6/7/07	BB	335	580									
MRF07-9	6/7/07	BB	340	610									
MRF07-10	6/7/07	YP	225	150	2007206-004	-	-	0.079H	-	-	0.07	ND	ND
MRF07-11	6/7/07	YP	210	130									
MRF07-12	6/7/07	YP	211	140									
MRF07-13	6/7/07	WP	240	230	2007206-005	-	-	0.11H	-	-	0.42	A1254-0.10 A1260-0.064M TBZ-0.0487	DDE-0.019 DDD-0.010 DDT-0.0069M Chlordane-0.10
MRF07-14	6/7/07	WP	210	150									
MRF07-15	6/7/07	WP	180	80									
Beaver Pond, Bellingham, Charles River Watershed													
BPF07-1	5/17/07	LMB	440	1180	2007174-001	-	-	0.98H	-	-	-	-	-
BPF07-2	5/17/07	LMB	392	850									
BPF07-3	5/17/07	LMB	383	740									
BPF07-4	5/17/07	CP	396	330	2007174-002	-	-	0.56H	-	-	-	-	-
BPF07-5	5/17/07	CP	409	350									
BPF07-6	5/17/07	CP	379	280									
BPF07-7	5/17/07	YP	278	230	2007174-003	-	-	0.26H	-	-	-	-	-
BPF07-8	5/17/07	YP	246	200									
BPF07-9	5/17/07	YP	257	200									
BPF07-10	5/17/07	B	220	260	2007174-004	-	-	0.24H	-	-	-	-	-
BPF07-11	5/17/07	B	228	300									
BPF07-12	5/17/07	B	220	260									
BPF07-13	5/17/07	YB	242	200	2007174-005	-	-	0.21H	-	-	-	-	-
BPF07-14	5/17/07	YB	240	200									
BPF07-15	5/17/07	YB	224	150									
Chauncy Lake, Westborough, SuAsCo Rivers Watershed													
CLF07-1	6/8/07	LMB	465	1540	2007207-001	-	-	0.44H	-	-	-	-	-
CLF07-2	6/8/07	LMB	400	980									
CLF07-3	6/8/07	LMB	418	1040									

Table 1. Continued Analytical Results for 2007 Fish Toxics Monitoring Public Request and Year 2 Watershed Surveys. Results reported in wet weight, are from two or three fish composite or individual samples of fish fillets (skin off).

Sample ID	Collection Date(s)	Species Code[1]	Length (mm)	Weight (g)	Laboratory Sample ID #)	Cd (µg/g)	Pb (µg/g)	Hg (µg/g)	As (µg/g)	Se (µg/g)	% Lipids (%)	PCB Aroclors and Congeners (µg/g)	Pesticides (µg/g)
CLF07-4	6/8/07	WP	243	230	2007207-002	-	-	0.16H	-	-	-	-	-
CLF07-5	6/8/07	WP	250	240									
CLF07-6	6/8/07	WP	245	210									
CLF07-7	6/8/07	BB	299	280	2007207-003	-	-	0.079H	-	-	-	-	-
CLF07-8	6/8/07	BB	289	270									
CLF07-9	6/8/07	BB	255	240									
CLF07-10	6/8/07	BC	202	110	2007207-004	-	-	0.058H	-	-	-	-	-
CLF07-11	6/8/07	BC	206	130									
CLF07-12	6/8/07	BC	190	110									
CLF07-13	6/8/07	P	190	130	2007207-005	-	-	0.096H	-	-	-	-	-
CLF07-14	6/8/07	P	171	120									
CLF07-15	6/8/07	P	180	140									
CLF07-16	6/8/07	YP	185	110	2007207-006	-	-	0.068H	-	-	-	-	-
CLF07-17	6/8/07	YP	187	90									
CLF07-18	6/8/07	YP	190	100									
Chebacco Lake , Essex, North Coastal River Watershed													
CHLF07-1	6/14/07	LMB	411	1120	2007235-001	-	-	0.85H	-	-	-	-	-
CHLF07-2	6/14/07	LMB	428	1020									
CHLF07-3	6/14/07	LMB	385	780									
CHLF07-4	6/14/07	B	189	150	2007235-002	-	-	0.15H	-	-	-	-	-
CHLF07-5	6/14/07	B	185	140									
CHLF07-6	6/14/07	B	193	180									
CHLF07-7	6/14/07	BB	320	420	2007235-003	-	-	0.14H	-	-	-	-	-
CHLF07-8	6/14/07	BB	318	470									
CHLF07-9	6/14/07	BB	340	520									
CHLF07-10	6/14/07	YP	193	100	2007235-004	-	-	0.18H		-	-	-	-
CHLF07-11	6/14/07	YP	186	80									
CHLF07-12	6/14/07	YP	191	90									
CHLF07-13	6/14/07	BC	281	340	2007235-005	-	-	0.58H	-	-	-	-	-
CHLF07-14	6/14/07	BC	234	190									

Table 1. Continued Analytical Results for 2007 Fish Toxics Monitoring Public Request and Year 2 Watershed Surveys. Results reported in wet weight, are from two or three fish composite or individual samples of fish fillets (skin off).

Sample ID	Collection Date(s)	Species Code[1]	Length (mm)	Weight (g)	Laboratory Sample ID #)	Cd (µg/g)	Pb (µg/g)	Hg (µg/g)	As (µg/g)	Se (µg/g)	% Lipids (%)	PCB Aroclors and Congeners (µg/g)	Pesticides (µg/g)
Populatic Pond, Norfolk, Charles River Watershed													
PPF07-1	6/20/07	C	680	4560	2007234-001	-	-	0.32H	-	-	3.2	A1254-0.076 A1260-0.15 TBZ-0.0811	DDE-0.066 DDD-0.011 Chlordane-0.079
PPF07-2	6/20/07	C	665	4220									
PPF07-3	6/20/07	C	725	5700									
PPF07-4	6/20/07	LMB	349	580	2007234-002	-	-	0.77H	-	-	0.15	ND	ND
PPF07-5	6/20/07	LMB	360	620									
PPF07-6	6/20/07	LMB	361	680									
PPF07-7	6/20/07	WS	500	1280	2007234-003	-	-	0.43H	-	-	1.9	A1254-0.061 A1260-0.15 TBZ-0.0895	DDE-0.052 DDD-0.0081M DDT-0.0068M Chlordane-0.052M
PPF07-8	6/20/07	WS	448	1160									
PPF07-9	6/20/07	WS	411	800									
PPF07-10	6/20/07	BC	275	300	2007234-004	-	-	0.51H	-	-	0.10	ND	ND
PPF07-11	6/20/07	BC	201	120									
PPF07-12	6/20/07	BC	210	140									
PPF07-13	6/20/07	B	231	260	2007234-005	-	-	0.29H	-	-	0.32	ND	DDE-0.0045M
PPF07-14	6/20/07	B	203	220									
PPF07-15	6/20/07	B	210	240									
PPF07-16	6/20/07	YP	206	140	2007234-006	-	-	0.37H	-	-	0.11	ND	ND
PPF07-17	6/20/07	YP	231	160									
PPF07-18	6/20/07	YP	239	180									
PPF07-19	6/20/07	WP	251	220	2007234-007	-	-	0.48H	-	-	0.37	A1254-0.034M A1260-0.064M TBZ-0.0622	DDE-0.017
PPF07-20	6/20/07	WP	231	220									
PPF07-21	6/20/07	WP	230	190									
PPF07-22	6/20/07	BB	340	480	2007234-008	-	-	0.20H	-	-	0.39	A1260-0.049M TBZ-0.033	DDE-0.0052M
PPF07-23	6/20/07	BB	283	300									
Lake Quannapowitt, Wakefield, North Coastal River Watershed													
LQF07-1	6/21/07	C	600	2880	2007233-001	-	-	0.070H	-	-	1.5	A1254-0.077 A1260-0.099 TBZ-0.0264	DDE-0.072 DDD- 0.014 Chlordane-0.042M
LQF07-2	6/21/07	C	584	2440									
LQF07-3	6/21/07	C	560	2500									
LQF07-4	6/21/07	LMB	425	1240	2007233-002	-	-	0.35H	-	-	0.12	TBZ-0.0015M	DDE-0.0087M
LQF07-5	6/21/07	LMB	419	1220									
LQF07-6	6/21/07	LMB	411	1040									

Table 1. Continued Analytical Results for 2007 Fish Toxics Monitoring Public Request and Year 2 Watershed Surveys. Results reported in wet weight, are from two or three fish composite or individual samples of fish fillets (skin off).

Sample ID	Collection Date(s)	Species Code[1]	Length (mm)	Weight (g)	Laboratory Sample ID #)	Cd (µg/g)	Pb (µg/g)	Hg (µg/g)	As (µg/g)	Se (µg/g)	% Lipids (%)	PCB Aroclors and Congeners (µg/g)	Pesticides (µg/g)
LQF07-7	6/21/07	YP	226	140									
LQF07-8	6/21/07	YP	245	190	2007233-003	-	-	0.070H	-	-	0.12	ND	DDE-0.0073M
LQF07-9	6/21/07	YP	250	180									
LQF07-10	6/21/07	B	161	130									
LQF07-11	6/21/07	B	152	110	2007233-004	-	-	0.051H	-	-	0.11	ND	DDE-0.0043M
LQF07-12	6/21/07	B	147	85									
LQF07-13	6/21/07	BB	291	260									
LQF07-14	6/21/07	BB	263	200	2007233-005	-	-	0.018H	-	-	0.17	ND	ND
LQF07-15	6/21/07	BB	239	160									
Konkapot River, New Marlborough, Housatonic River Watershed													
KRF07-1	7/3/07	WS	205	100									
KRF07-2	7/3/07	WS	188	70	2007265-001	-	-	0.18H	-	-	0.52	ND	ND
KRF07-3	7/3/07	WS	169	60									
KRF07-4	7/3/07	BT	195	80									
KRF07-5	7/3/07	BT	196	70	2007265-002	-	-	0.088H	-	-	0.53	ND	ND
KRF07-6	7/3/07	BT	194	80									
KRF07-7	7/3/07	*RT	290	260	2007265-003	-	-	0.059H	-	-	0.25	ND	ND
KRF07-8	7/3/07	*RT	295	280									
(South Branch) Hoosic River, North Adams, Hoosic River Watershed													
HRF07-1	7/26/07	BT	232	140	2007332-001	-	-	0.034H	-	-	4.0	A1254-0.077 TBZ-0.025	DDE-0.015 DDD-0.0039M DDT-0.0039M
HRF07-2	7/26/07	BT	230	140									
HRF07-3	7/26/07	BT	218	100									
HRF07-4	7/26/07	WS	142	40									
HRF07-5	7/26/07	WS	139	40	2007332-002	-	-	0.036H	-	-	0.71	ND	ND
HRF07-6	7/26/07	WS	134	30									
Hoosic River (mainstem), North Adams, Hoosic River Watershed													
HRF07-7	7/26/07	BT	270	240								A1242-1.8 A1254-0.34 TBZ-1.021	DDE-0.031 DDT-0.0043M
HRF07-8	7/26/07	BT	222	160	2007332-003	-	-	0.039H	-	-	4.2		
HRF07-9	7/26/07	BT	208	120									
HRF07-10	7/26/07	*RT	345	570	2007332-004	-	-	0.071H	-	-	4.3	A1242-1.9 A1254-0.28 TBZ-1.0085	DDE-0.029

Table 1. Continued Analytical Results for 2007 Fish Toxics Monitoring Public Request and Year 2 Watershed Surveys. Results reported in wet weight, are from two or three fish composite or individual samples of fish fillets (skin off).

[1] Species Code	Common Name	*Scientific name*
B	bluegill	*Lepomis macrochirus*
BB	brown bullhead	*Ameiurus nebulosus*
BC	black crappie	*Pomoxis nigromaculatus*
BT	brown trout	*Salmo trutta*
C	common carp	*Cyprinus carpio*
CP	chain pickerel	*Esox niger*
LMB	largemouth bass	*Micropterus salmoides*
P	pumpkinseed	*Lepomis gibbosus*
RT	rainbow trout	*Oncorhynchus mykiss*
SMB	smallmouth bass	*Micropterus dolomieu*
WP	white perch	*Morone americana*
WS	white sucker	*Catostomus commersonii*
YB	yellow bullhead	*Ameiurus natalis*
YP	yellow perch	*Perca flavescens*

Data Qualifiers as reported by WES

H = USEPA holding time exceeded. Holding time not met but previous studies by Wall Experiment Station (WES) show that frozen fish samples are stable for mercury for at least one year.
M = analyte concentration greater than Method Detection Limit but less than Reporting Detection Limit
ND = analyzed for, but not detected above Method Detection Limit
TBZ = total congeners detected from those analyzed for, see Table 2
- = analyte not analyzed due to lab constraints or study redesign

*RT = stocked fish

Table 2. 2007 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 Minimum Reporting Limit (MRL)	Method
Lipid Concentration	%	N/A	N/A	N/A	Modified AOAC 983.21
Mercury	ug/g wet	0.5[1]	0.0020	0.0060	EPA 7473
Selenium	-	Unknown	-	-	-
PCB Aroclor 1232	µg/g wet	1.0 (total)[1]	0.019	0.057	Modified AOAC 983.21
PCB Aroclor 1242	µg/g wet	1.0 (total)[1]	0.019	0.057	Modified AOAC 983.21
PCB Aroclor 1248	µg/g wet	1.0 (total)[1]	0.038	0.11	Modified AOAC 983.21
PCB Aroclor 1254	µg/g wet	1.0 (total)[1]	0.013	0.039	Modified AOAC 983.21
PCB Aroclor 1260	µg/g wet	1.0 (total)[1]	0.022	0.066	Modified AOAC 983.21
Chlordane	µg/g wet	0.06[1]	0.025	0.075	Modified AOAC 983.21
Toxaphene	µg/g wet	Unknown	0.045	0.14	Modified AOAC 983.21
a-BHC	µg/g wet	Unknown	0.0022	0.0066	Modified AOAC 983.21
b-BHC	µg/g wet	Unknown	0.0038	0.011	Modified AOAC 983.21
Lindane	µg/g wet	Unknown	0.0030	0.0090	Modified AOAC 983.21
d-BHC	µg/g wet	Unknown	0.010	0.030	Modified AOAC 983.21
Hexachlorocyclopentadiene	µg/g wet	Unknown	0.017	0.051	Modified AOAC 983.21
Hexachlorobenzene	µg/g wet	Unknown	0.012	0.036	Modified AOAC 983.21
Trifluralin	µg/g wet	Unknown	0.046	0.14	Modified AOAC 983.21
Heptachlor	µg/g wet	0.3[2]	0.0031	0.0093	Modified AOAC 983.21
Heptachlor Epoxide	µg/g wet	0.3[2]	0.0031	0.0093	Modified AOAC 983.21
Methoxychlor	µg/g wet	Unknown	0.0035	0.011	Modified AOAC 983.21
Endosulfan I	µg/g wet	Unknown	0.0031	0.0093	Modified AOAC 983.21
DDD	µg/g wet	0.06 (total)[1]	0.0030	0.0090	Modified AOAC 983.21
DDE	µg/g wet	0.06 (total)[1]	0.0031	0.0093	Modified AOAC 983.21
DDT	µg/g wet	0.06(total)[1]	0.0030	0.0090	Modified AOAC 983.21
Aldrin	µg/g wet	0.3(total)[3]	0.0024	0.0072	Modified AOAC 983.21
Endrin	µg/g wet	Unknown	0.0036	0.011	Modified AOAC 983.21
PCNB	% recovery	NA	NA	NA	Modified AOAC 983.21
PCB Congener BZ # 8	µg/g wet	Unknown	0.0010	0.0030	Modified AOAC 983.21
PCB Congener BZ # 18	µg/g wet	Unknown	0.0016	0.0048	Modified AOAC 983.21
PCB Congener BZ # 28	µg/g wet	Unknown	0.0033	0.0099	Modified AOAC 983.21
PCB Congener BZ # 44	µg/g wet	Unknown	0.0010	0.0030	Modified AOAC 983.21
PCB Congener BZ # 52	µg/g wet	Unknown	0.0022	0.0066	Modified AOAC 983.21
PCB Congener BZ # 66	µg/g wet	Unknown	0.0022	0.0066	Modified AOAC 983.21
PCB Congener BZ # 77	µg/g wet	Unknown	0.0046	0.014	Modified AOAC 983.21
PCB Congener BZ # 81	µg/g wet	Unknown	0.0010	0.0030	Modified AOAC 983.21
PCB Congener BZ # 101	µg/g wet	Unknown	0.0022	0.0066	Modified AOAC 983.21
PCB Congener BZ # 105	µg/g wet	Unknown	0.0013	0.0039	Modified AOAC 983.21
PCB Congener BZ # 114	µg/g wet	Unknown	0.0013	0.0039	Modified AOAC 983.21
PCB Congener BZ # 118	µg/g wet	Unknown	0.0012	0.0036	Modified AOAC 983.21
PCB Congener BZ # 123	µg/g wet	Unknown	0.0013	0.0039	Modified AOAC 983.21

Table 2. 2007 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 Minimum Reporting Limit (MRL)	Method
PCB Congener BZ # 126	µg/g wet	Unknown	0.0032	0.0096	Modified AOAC 983.21
PCB Congener BZ # 128	µg/g wet	Unknown	0.0012	0.0036	Modified AOAC 983.21
PCB Congener BZ # 138	µg/g wet	Unknown	0.0017	0.0051	Modified AOAC 983.21
PCB Congener BZ # 153	µg/g wet	Unknown	0.0014	0.0042	Modified AOAC 983.21
PCB Congener BZ # 156	µg/g wet	Unknown	0.0011	0.0033	Modified AOAC 983.21
PCB Congener BZ # 157	µg/g wet	Unknown	0.0012	0.0036	Modified AOAC 983.21
PCB Congener BZ # 167	µg/g wet	Unknown	0.0012	0.0036	Modified AOAC 983.21
PCB Congener BZ # 169	µg/g wet	Unknown	0.0006	0.0018	Modified AOAC 983.21
PCB Congener BZ # 170	µg/g wet	Unknown	0.0013	0.0039	Modified AOAC 983.21
PCB Congener BZ # 180	µg/g wet	Unknown	0.0012	0.0036	Modified AOAC 983.21
PCB Congener BZ # 187	µg/g wet	Unknown	0.0022	0.0066	Modified AOAC 983.21
PCB Congener BZ # 189	µg/g wet	Unknown	0.0013	0.0039	Modified AOAC 983.21
PCB Congener BZ # 195	µg/g wet	Unknown	0.0011	0.0033	Modified AOAC 983.21
PCB Congener BZ # 206	µg/g wet	Unknown	0.0012	0.0036	Modified AOAC 983.21
PCB Congener BZ # 209	µg/g wet	Unknown	0.0014	0.0042	Modified AOAC 983.21

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/MRL values are based on most recent analyses by WES (2007), and as all Detection Limit values, subject to change.
4) Methods

-EPA 200.7 – Metals and Trace Elements
-EPA 200.9 – Trace Elements
-EPA 245.6 – Mercury in Tissues by Cold Vapor
-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.

- = analyte not analyzed due to lab constraints or study redesign
[1] MDPH triggerlevel (personal communication with M. Celona 2008)
[2] USFDA Action Level (heptachlor and heptachlor epoxide individually or in combination. Do not count if below 0.1 ug/g) (USFDA 2005)
[3] USFDA Action Level (individually or in combination with dieldrin) (USFDA2005)

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 restoring 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.