



MassDEP

**Massachusetts Department of Environmental Protection
Bureau of Water Resources
Division of Watershed Management
Watershed Planning Program**

STANDARD OPERATING PROCEDURE


Fish Toxics Monitoring


CN 040.4

7/16/2025 – 7/15/27

Revised July 2025

Prepared and
Approved by: /s/ Daniel Davis Date: 7/15/25
Daniel Davis, Environmental Analyst

Approved by:  Date: 7/15/25
Jasper Sha, QA Analyst

Approved by:  Date: 7/15/25
Shervon De Leon, Monitoring Section Chief

List of Revisions

<u>Revision Date</u>	<u>Revision</u>	<u>Pages #s</u>	<u>CN/ (Old CN if applicable)</u>	<u>Initials</u>
Jan 2016	Original			
Feb 2025	Updated addresses, contact information, attachments of field sheets, added EJ language, PFAS language, small procedure changes for decontamination, and fish tissue labeling in LIMS.	Various	CN40.3	DD

TABLE OF CONTENTS

1.0	SCOPE AND APPLICATION	3
2.0	SUMMARY	4
3.0	SAFETY CONSIDERATIONS.....	4
4.0	SAMPLE COLLECTION, PRESERVATION AND HANDLING.....	5
5.0	APPARATUS	7
6.0	REAGENTS.....	8
7.0	CALIBRATION	8
8.0	PROCEDURE.....	8
9.0	QUALITY CONTROL.....	10
10.0	INTERFERENCES.....	10
11.0	PREVENTIVE MAINTENANCE.....	11
12.0	CORRECTIVE ACTIONS	12
13.0	WASTE AND POLLUTION PREVENTION.....	12
14.0	REFERENCES	12

Attachment A: Interagency Committee on Freshwater Fish Toxics Monitoring and Assessment MOU

Attachment B: Form for Requesting Fish Testing (2024)

Attachment C: Criteria for Ranking Fish Toxics Testing Requests

Attachment D: Target Species List

Attachment E: Scientific Collection Permit

Attachment F: Bench Sheet

Attachment G: Field Sheet

Attachment H: Diagram – Fish Aging

1.0 SCOPE AND APPLICATION

Fish Toxics Monitoring focuses on two specific areas. A Public Request component addresses the public's (or other agencies and groups) desire to know the status of the edibility of fish from local waterbodies which they either fish or have other interest in, and a targeted assessment component which addresses various sections of the Clean Water Act.

1.1 Public Requests

Beginning in 1993/94, due to an increased public demand for fish toxics monitoring data, the Massachusetts Departments of Environmental Protection (MassDEP), Public Health (MADPH), and Fisheries Wildlife and Environmental Law Enforcement (MDFWELE) initiated a formal protocol for the public to request fish toxics monitoring surveys of the Commonwealth's waterbodies. The protocol included the development of a formal Memorandum of Understanding (MOU), a Form for Requesting Fish Testing, and Criteria for Ranking Fish Toxics Testing Requests. Request forms are available through each of the Agencies involved in the MOU (listed below) at the following locations (See Attachments A, B and C). The most recent version of the public request form is located on the MassDEP website here: <https://www.mass.gov/doc/fish-toxics-testing>.

Massachusetts Department of Environmental Protection
Watershed Planning Program (WPP)
8 New Bond Street
Worcester, MA 01606

Division of Environmental Analysis
Senator William X. Wall Experiment Station
37 Shattuck Street
Lawrence, MA 01843
(978) 682-5237

Office of Research and Standards
100 Cambridge Street, Suite 900
Boston, MA 02114

Massachusetts Department of Public Health
Bureau of Environmental Health Assessment
250 Washington Street, 7th Floor
Boston, MA 02108-4619
(617) 624-6000

Massachusetts Department of Fisheries and Game
Division of Fisheries and Wildlife (MDFW)
Field Headquarters
One Rabbit Hill Road
Westborough, MA 01581
(508) 389-6300

All completed request forms are sent to the MassDEP's Division of Watershed Management (DWM) Watershed Planning Program (WPP) in Worcester or to Daniel Davis (MassDEP WPP Daniel.Davis@mass.gov). While public requests for fish testing had been fulfilled prior to 1993/94, increased requests beyond the scope of the resources available made prioritization necessary. Each year in February, representatives of the aforementioned agencies meet to prioritize all requests received between February 1st of the previous year and February 1st of the current year. Each request is categorized, taking into account variables such as fishing pressure (determined by the MDFW and the requester), the presence of known or potential point and non-point sources of pollution (determined by

MassDEP, MDFW, and the requestor), and any potential Environmental Justice areas adjacent to requested waterbodies. The field and laboratory resources available determine the number of requests fulfilled during any given year. All requestors are notified regarding the status of their request and re-application in subsequent years is allowed.

1.2 Targeted Assessments

Targeted assessments are conducted on waterbodies that are heavily fished, and/or have the potential to be receiving bioaccumulative contaminants. In many cases, we target waterbodies that have not been sampled previously.

The objective of both Public Request surveys and targeted assessments is to screen edible fillets of fishes for a variety of contaminants (i.e. metals, polychlorinated biphenyls (PCB Arochlors), and organochlorine pesticides). Screening is conducted in an effort to determine fish contaminant concentrations from as many of the Commonwealths' waterbodies as possible. Screening can also be very valuable in discovering "hot spots" or previously unknown sources of contaminants which bioaccumulate. All data is sent to the interagency committee members including those at MDPH, WPP, MDFW and DEPs ORS for assessment and advisory issuance if appropriate. Data (and/or subsequent advisory issuance or non-issuance) is used in assessing the fish consumption use status of a given waterbody or stream segment under Section 305(b) of the Clean Water Act.

2.0 SUMMARY

Fish (live or freshly killed) are collected using a number of different sampling methods and/or fish collection methods including electrofishing, gill netting, trot lines, traps/pots, or angling. The samples are iced immediately and transported back to the WPP biological laboratory for preparation. Preparation consists of dissecting the individual animal into an edible flesh portion and the remaining offal. Flesh samples are then frozen until such time as they can be delivered to the Wall Experiment Station for analysis. Fish samples are routinely analyzed for arsenic, cadmium, lead, mercury, and selenium. In cases where other contaminants are present or suspected, the analysis may include PCB arochlors, and organochlorine pesticides. Additional metals and organics may be analyzed for on a case-by-case basis after input from the committee.

3.0 SAFETY CONSIDERATIONS

All personnel involved in fish toxics monitoring collections shall be educated about proper fish handling techniques to avoid injuries. These injuries include punctures and lacerations caused by spiny fin rays, gill plates, teeth, or other hard parts. Personnel participating in backpack and/or boat electrofishing shall be briefed in basic electrofishing operation and safety prior to commencing sampling activities. Briefing will be conducted by a crew leader who has taken the *Principles & Techniques of Electrofishing* course offered through the Fisheries Academy of the U.S. Fish and Wildlife Service.

Boat electrofishing equipment shall be controlled by a foot switch located in the bow of the boat and operated by a forward collector. In addition, the boat will include a kill switch located in the stern that is accessed by the boat operator. Boat electrofishing crews shall consist of one operator plus one or two forward collectors. At least two of the participants in boat electrofishing should be certified in cardiopulmonary resuscitation (CPR) if possible.

All backpack electrofishing equipment shall include a tilt safety switch that de-activates the electricity when the backpack is tilted. In addition, anode poles shall be equipped with activation switches which need to be squeezed by the operator in order to activate the electrodes. Backpack electrofishing crews shall consist of one operator and up to four collectors. At least two of the participants in backpack electrofishing should be certified in cardiopulmonary resuscitation (CPR) if possible.

Safety equipment including rubber gloves, polarized glasses, and wading cleats or felts will be provided to all crew members. A field AED (Automated External Defibrillator) unit shall be taken on each survey if possible.

4.0 SAMPLE COLLECTION, PRESERVATION AND HANDLING

2.1 Target Species

In order to assess the level of contamination present in fish of different trophic guilds and differing 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*, (benthic feeding omnivores). A list of target species can be found in Attachment D. Other species collected will also be tested if possible as not all communities utilize the same fish species.

4.2 Collection Methods

All collections are made in accordance with a Scientific Collection Permit issued by the MDFW (see Attachment E). Waterbodies are sampled using one or more of the following collection methods:

- 4.2.1 Electrofishing (boat) – Boat electrofishing is performed by maneuvering an electrofishing boat along: shorelines and littoral habitat; submerged, floating, and emergent macrophyte beds; rockpiles, logs, and stumps; and other “structure”. Stunned fish are collected by one or two netters stationed on the platform located in the bow of the boat. Fish are held in a live well filled with site water until the collection is completed. The sample is chosen from the collected fishes. Fish, which are selected as part of the sample, are dispatched with a blow to the head and placed in a cooler on ice. All remaining live fish are released. Dead fish are disposed of either on or off-site.
- 4.2.2 Electrofishing (backpack) – Stream electrofishing is performed by wading in an upstream direction and manipulating a hand-held wand and anode ring in a sweeping motion across the stream in and around likely holding structure such as undercut banks, pools, snags, and aquatic vegetation. Stunned fish are picked up and netted by crew members flanking or following the backpack operator. Fish are held in buckets containing site water. The sample is chosen from the collected fishes. Fish, which are selected as part of the sample are dispatched with a blow to the head and placed in a cooler on ice. All remaining live fish are released. Dead fish are disposed of either on or off-site.
- 4.2.3 Electrofishing (barge) - Stream electrofishing is performed by wading in an upstream direction and manipulating at least two a hand-held wands and anode rings in a sweeping motion across the stream in and around likely holding structure such as undercut banks, pools, snags, and aquatic vegetation. The operator follows with a barge mounted electrofisher, generator, and cooler. Stunned fish are picked up and netted by crew members following the wand operators. Fish are held in the cooler containing site water. The sample is chosen from the collected fishes. Fish, which are selected as part of the sample are dispatched with a blow to the head and placed in a cooler on ice. All remaining live fish are released. Dead fish are disposed of either on or off-site.
- 4.2.4 Gill netting – Gill netting entails the deployment of gill nets (vertical panels of monofilament netting). The nets are anchored by weights at each end attached to the bottom weighted edge of the net (known as the “lead line”). The upper edge of the net is composed of a polyethylene line, which floats and thereby keeps the net “open” or spread. Surface floats are attached with rope to both ends of this “float line”. Nets are usually 50-100 m in length and approximately 2 m in height. Size of fish caught is dependent on the size of mesh that is incorporated in the construction of a particular net. “Experimental” nets typically have multiple panels each with a different size mesh. Mesh sizes usually range from 1.5 – 7.5 cm. Most gill net sets are made on the bottom of the waterbody. Orientation is usually perpendicular to shore or along weed beds or other structures. Sets are between 2 to 24 hours in length. Net set time should be limited to ensure needed fish are collected but to minimize excess bycatch/mortality. Fish that are caught in gill nets for an extended

length of time frequently die. Fish chosen for inclusion as part of a sample are those which are still alive or those appear to have recently expired. Live fish are dispatched with a blow to the head and then placed in a cooler on ice. All remaining live fish are released. Dead fish are disposed of either on or off-site.

- 4.2.5 Trotlines – Trotlines are essentially long lines of baited hooks attached to either a braided or polyethylene mainline. They either rest on the bottom, or in the case of floating trotlines, polyethylene mainlines float the hooks slightly off the bottom. Trotlines are anchored by weights at one or both ends. A floating buoy is usually attached on one end side of the trotline. Trotlines are typically baited with worms or small fishes, set for as little as two hours up to as long as overnight. If possible, set time should be limited to ensure needed fish are collected but to minimize excess bycatch/mortality. Lines are retrieved and all fish are removed from the hooks. Fish chosen for inclusion as part of a sample are those which are still alive or appear to have recently expired. Live fish are dispatched with a blow to the head and then placed in a cooler on ice. All remaining live fish are released alive. Dead fish are disposed of either on or off site.
- 4.2.6 Traps – Fish traps are wooden or metal/plastic gear similar to lobster traps deployed on the bottom of a lake, river, or stream in an attempt to catch bullhead or catfish. Wooden traps require soaking in water for few days prior to deployment or the addition of weights to ensure negative buoyancy. Traps are baited with dog food, fish food pellets, or other bait. Deployment time can be for as little as two hours up to overnight. If possible, set time should be limited to ensure needed fish are collected but to minimize excess bycatch/mortality. Traps are checked the following day, and all fish are removed. Fish chosen for inclusion as part of a sample are dispatched by a blow to the head and placed in coolers on ice. All remaining fish are released alive.
- 4.2.7 Angling– Angling usually pertains to rod and reel fishing or ice fishing. Rod and reel angling is performed by casting or placing lures or bait into areas which likely to be holding fish. Fish which take the bait or lure are hooked and reeled in. Fish meeting species and size requirements are placed on ice, all other fish a released alive. Ice fishing is performed using tip-ups (tilts) and jigging equipment (jig sticks and jigs). A hole is drilled in the ice and lures or bait are lowered into the water column. Fish that take the bait or lure are hooked and reeled or hand lined to the surface and through the ice. Fish meeting species and size requirements are dispatched and are placed in coolers on ice. All other fish a released alive.

4.3 Sample Handling

All fish are transported to the WPP biological laboratory in ice filled coolers. Samples are logged using the most recent version of the Fish Toxics Field/Bench Sheet (currently 2023) and *WES Sample Login Batch Number* (from the LIMS system) during processing (see Attachments F and G).

5.0 APPARATUS

5.1 Electrofishing (boat)

Coffelt 18-foot electrofishing boat equipped with a 40 inch Wisconsin ring and droppers and powered by a Honda EG 5000™ Generator

Smith Root VVP-15B Variable Voltage Pulsator Electrofisher

Dip nets

Rubber gloves

Polarized glasses

Cooler with ice

Gasoline

Depth sounder (optional)

Coffelt was bought out by Smith-Root of Vancouver WA. Boats and most accessories are available directly from Smith-Root Inc. or other similar vendors.

5.2 Electrofishing (barge)

Smith-Root Model SR-7 electrofishing tote barge equipped with and powered by a Honda EU2000i Companion Generator

Dip nets

Rubber gloves

Polarized glasses

Wading cleats

Cooler

Gasoline

Barge is available from Smith-Root Inc.

Most accessories are available directly from Smith-Root Inc. or other similar vendors.

5.3 Electrofishing (backpacks)

Smith-Root Model 12™ battery powered backpack electrofisher

Coffelt Mark 18™ gas powered electrofisher with a Honda EX 350™ generator

Halltech Aquatic Research Inc. HT-2000 battery backpack electro-fisher

Polarized glasses

Wading cleats

Dip nets

Five-gallon buckets

Rubber gloves

Hip boots or waders

Gasoline

Spare batteries

Measuring board

The electrofishers are available from Smith-Root in Vancouver, WA or Halltech Aquatic Research Inc. Ontario Canada. Most other accessories are available directly from Smith-Root Inc, Halltech Aquatic Resource Inc. or other similar vendors.

5.4 Gillnets

Gillnets are comprised of # 3 or # 4 nylon monofilament of varying mesh sizes. They range from 16m to 50 m in length and are usually around 2 m deep. All nets have 12 mm foam core float lines and 30-pound lead core bottom lines. Gill nets are specially ordered from Memphis Net and Twine Company, or other similar companies.

5.5 Trotlines

Trot lines composed of a nylon line equipped with braided drop lines ten to twelve inches in length terminating with 2/0 – 4/0 hooks staged every 12 to 20 inches. Each line is secured to an anchor in the form of a window sash weight or a can filled with cement, as well as a floating marker, usually a polystyrene float. Trotlines can be purchased from numerous net companies or can be constructed with parts available from many fishing supply companies.

5.6 Traps

Wooden cylindrical catfish traps and nylon over metal fish traps both available from Memphis Net and Twine Company or other similar companies.

5.7 Angling

Rods and reels of any style designed to present a lure or bait and play a fish to the boat or shore. Ice fishing equipment; including tilts and jigging equipment of any manufacturer, designed to hold line and hook/lure, indicate strike, and in some instances retrieve line. These items are available from any supplier that sells sport fishing equipment.

5.8 Measuring Equipment used in the fish preparation laboratory.

Measuring board – A board mounted measuring ruler on which a fish can be placed capable of measuring to the nearest 1 mm. These boards are available from Forestry Suppliers Inc. item number 77302, or can be built from materials available at any lumber and hardware store. Scale – A hanging scale with scoop capable of weighing items as heavy as 10 Kg at an accuracy of +/- 20 g. these items are available from industrial supply or scientific equipment supply companies.

6.0 REAGENTS

No reagents are used in this program.

7.0 CALIBRATION

No field equipment used during collection or preparation requires calibration.

8.0 PROCEDURE

8.1 Log in

Fish packed in ice are brought to the DEP DWM WPP office in Worcester. Each fish is assigned a Sample Lab ID that is comprised of the WES Sample Log In Batch Number (the calendar year followed by a three integer identifier determined by the laboratory WES) followed by a three place integer identifier and in the case of composites followed by a small letter. For example, the first sample from a survey conducted in the Year 2015 would be assigned a code of 2015233-001. If it is part of a composite the composite jar is assigned the base code (2015233-001). For the individual fish contained in that composite, each is numbered using the base code plus a letter “a”, “b”, or “c” is added (2015233-001a). The individual fish are assigned their own code so that we can note the length and weight of the individuals that went into the composite sample. Each fish is measured and weighed, and notes are made, when appropriate, as to an individual fish's general condition (i.e. the occurrence of lesions, tumors, or other anomalies). All information is recorded on a Fish Collection and Inventory form and a WES Sample Batch Number Form (see Attachment G).

8.2 Ageing

Ageing structures collection is no longer part of the WPP fish toxics monitoring program. However, the method below can be used in the future to collect these data if necessary. Scales, fin rays, or spines may be removed for use

in age determination. Scales are removed from most fishes. Pectoral spines are removed from bullheads (*Ameiurus* sp.) and catfish (*Ictalurus* sp.), fin rays are removed from carp (*Cyprinus carpio*).

8.2.1 Scale removal - An individual fish that has been measured, weighed, and assigned an individual sample code is placed on its side on a clean cutting board. Mucous (slime) dirt or other foreign matter is removed by passing the blade of a knife gently over the area (towards the tail) from which scales are to be removed (see Attachment H). A stout sharp knife is then used to loosen 10 to 20 scales by pushing on the scales firmly with the point and pushing towards the tail. The loosened scales are then picked up, by passing a knife gently under the scales and lifting. The knife blade is then inserted into an open # 1 coin/scale (2.25 in. x 3.5 in.) envelope (see Attachment 6). The sides of the scale envelope are pressed onto the knife gently with the thumb and forefinger and the knife blade is slowly removed. The scales are left inside the envelope. The year, individual sample lab ID, and species code are noted on the outside of the scale envelope. Flaps are left unglued.

8.2.2 Spine and fin ray removal - An individual fish that has been measured, weighed, and assigned an individual sample code is placed on its side on a clean cutting board. A knife is inserted along the pectoral spine or fin ray and the spine or ray is loosened by cutting the adjacent tissue. The spine or ray is then grasped with pliers, twisted gently and removed. The spine or fin ray is then dropped into a scale envelope. The year, individual sample lab ID, and species code are noted on the outside of the scale envelope. Flaps are left unglued

8.3 Filleting

An individual fish is placed on its side upon a pre-cleaned glass cutting board (washed and rinsed in hot tap water and rinsed three times more in de-ionized water). The fish is filleted, and the fillet is laid skin side down on the cutting board. All fish to be included in a composite sample are processed in the same manner providing there is room on the glass cutting board. Each fillet is then skinned, by running a fillet knife between the skin and the flesh. An appropriate amount of the dorsal muscle tissue is excised from the full fillet. All equipment used in the filleting process is then rinsed in hot tap water to remove slime, scales, and blood, then rinsed three times in de-ionized water and the next sample is prepared. This procedure is followed until all samples have been prepared.

8.4 Partitioning, Packaging, and Labeling

The boneless fish flesh sample is then picked up with the knife and placed in a HDPE container. The cover and the container itself are marked in permanent ink with the sample lab ID or with pre-made waterproof labels. Composite samples range from two to five fish (depending on the success of the catch) from like-sized individuals (ideally within approx. 25% for each total length) of the same species. The tissue samples from each fish should be of roughly equivalent weight and have a total minimum weight of 40g if possible. Any deviations from this definition are noted. Samples from a specific waterbody are put into one or two gallon Ziplock™ freezer bags with the *Sample Tracking Chain of Custody Record* (COC) and the *WES Sample Batch Number Form*. The freezer bags are then placed in the freezer. Fish are delivered to the WES within 14 days.

9.0 QUALITY CONTROL

9.1 Precision

There is currently no routine procedure being employed as part of the Fish Toxics Monitoring collection and preparation to address precision.

9.2 Accuracy

There are currently no routine procedures in place to address accuracy related to field sampling and sample preparation.

9.3 Representativeness

There is currently no way to routinely measure representativeness

9.4 Completeness

A waterbody sample is considered complete when 3 fish composites of at least three species representing three different trophic levels are successfully collected and prepared for analysis (i.e. a total of three composite samples). Samples with fewer species or trophic levels are acceptable in cases where viable fish (i.e., appropriate size or number) were not collected.

9.5 Comparability

Data can be compared with historical data sets from similar waterbodies as well as regional data. Due to the number of factors influencing bioaccumulation rates, it is unclear what these comparisons yield.

10.0 INTERFERENCES

10.1 Fish collection

Depauperate fish communities and low numbers of target fishes can increase the time necessary to collect a viable sample. Typically the maximum time allotted to one survey is two days. Excessive weed growth results in lowering the effectiveness of electrofishing due to the fact that fish are hard to see and do not readily come to the surface. Excessive weed growth can totally preclude the use of gill nets and trot lines. Water clarity can lower the effectiveness of gill nets by making them visible during daylight hours. It can also limit the effectiveness of electrofishing by increasing the distance that the fish can see the boats or collectors approach thus giving the fish an opportunity to vacate the area prior to them entering the electrical field. Very low or very high conductivity can also limit the effectiveness of electrofishing by simply reducing the size and intensity of the electrical field or otherwise decreasing the effectiveness of electroshocking. Lake morphology can limit the effectiveness of electrofishing if the lake drops off too rapidly from the shore thereby decreasing the littoral area where electrofishing is most effective. Intense algal blooms may also limit visibility and hamper efforts to collect target species. The absence or lack of sufficient ice thickness can limit the ability to perform collections through the ice.

10.2 Fish preparation

Cross-contamination with blood, slime, or other bodily fluids, contamination of the sample containers and contamination of the fillet knives or cutting boards could all potentially influence the final concentrations of contaminants in samples.

11.0 PREVENTIVE MAINTENANCE

11.1 Electrofishing (boat)

The Honda generator oil need to be changed once every two years depending on use levels. All items should be checked for tightness (tightened if necessary) prior to each survey. The mercury outboard should be winterized with engine fogger each winter. The electrofishing control box should be stored in the storage room in a protective cooler when not in use. The hull of the electrofishing boat and anode ring/droppers should be cleaned with steel wool once per year. The anode ring should be inspected at least once per year and any frayed/damaged cables or lock rings should be replaced. The ends of the anode droppers should be coated with rubberizing material to prevent fraying and to increase safety when handling.

11.2 Backpack electrofishing gear

Smith Root Model 20™ and Halltech batteries should be re-charged immediately after use. The electrode ring and rat tail cathode should be cleaned with steel wool twice per year or as needed to keep them shiny and bright. The gas powered electrofisher should be winterized by adding gas stabilizer to the main and spare fuel tanks each winter. The anode ring and rat tail cathode should be cleaned with steel wool at least once per year or more frequently as needed to keep them shiny and bright. Battery charge status should be written on the battery waterproof label with the date of last charge. Once used in the field, the date should be crossed out to indicate the need for recharge.

11.3 Electrofishing (barge)

The Honda™ generator oil need to be changed once every two years depending on use. All items should be checked for tightness (tightened if necessary) prior to each survey. The electrofishing control box should be stored in the fish preparation laboratory when not in use. The cathodes mounted on the bottom of the barge and anode rings should be cleaned with steel wool at least once per year or more frequently as needed. To keep them shiny and bright.

12.7 Gillnets

Gillnets need to be cleaned of weeds and debris after each use. Buoy and anchor lines should be visually inspected before deployment. Gill nets should be frozen between surveys or left to dry completely to prevent spreading of invasive macrophytes. Use alternate set of nets or adjust survey dates to ensure suitable dry time between surveys if freezing is not possible.

11.5 Trotlines

Trotlines need to be inspected and hooks need to be added as necessary. Buoy and anchor lines should be visually inspected before deployment.

11.6 Traps

Traps should be visually inspected for broken slats (wooden traps) and tears (net mesh traps) and buoy lines should be visually inspected before deployment.

11.7 Angling

Fishing rods should be inspected for cracks and broken guides and reels should be oiled and filled with fresh lane once per year. Tip ups and jigging equipment should be inspected for proper operation one per year.

NOTE: For all equipment, care must be taken to avoid transporting aquatic vegetation to other locations within waterbodies and to other waterbodies. This is done by thoroughly inspecting and cleaning boats and equipment

of all plant fragments both before launching and after take out. The electrofishing boat and all large equipment (motor, trailer, net poles, live well container, boat interior) are all pressure washed upon return to the office. Freezing is recommended for smaller equipment (oars, nets, anchors etc.) before using the same equipment for another survey. This is standard WPP practice.

12.0 CORRECTIVE ACTIONS

Should un-fixable problems occur in the field the crew should return to WPP. In the event that the field crew can't return to the office the Water Quality Monitoring Section Chief and Fish Toxics Monitoring Coordinators are contacted. In the event that these contacts cannot be reached the Vehicle Coordinator should be contacted. In the case of laboratory problems the Monitoring and Fish Toxics Monitoring Coordinator are also contacted.

Contacts:

Water Quality Monitoring Section Chief – Shervon De Leon 617-780-1074

Fish Toxic Monitoring Coordinator – Daniel Davis 857-278-6652

Vehicle Coordinator – Vivian Gyimah 781-223-5085

13.0 WASTE AND POLLUTION PREVENTION

TBD

14.0 REFERENCES

Grubbs, G.H. and R.H. Wayland III. 2000. Letter to Colleague dated 24 October 2000. *EPA recommendations on the use of fish and shellfish consumption advisories and certain shellfish growing area classifications in determining attainment of water quality standards and listing impaired waterbodies under section 303(d) of the Clean Water Act*. United States Environmental Protection Agency; Office of Wetlands, Oceans and Watersheds; Washington, D.C.

MassDEP. 2021. *Massachusetts Surface Water Quality Standards (Revision of 314 CMR 4.00, effective November 12, 2021)*. Massachusetts Department of Environmental Protection, Boston, MA.

MassDEP. 2022. Massachusetts Consolidated Assessment and Listing Methodology (CALM) Guidance Manual for the 2022 Reporting Cycle. CN 564.0. MassDEP Worcester.

MDPH 2024. MA DPH. 2024. *Freshwater Fish Consumption Advisory Lookup Table*. Massachusetts Department of Public Health, Bureau of Environmental Health Assessment, Boston, MA.
<https://www.mass.gov/info-details/freshwater-fish-consumption-advisory-lookup-table> (accessed 5/5/25)

Nielson, L. A; Johnson, D. L., Eds. Fisheries Techniques. Bethesda, MD: American Fisheries Society; 1983

USEPA, Office of Water, Fish Contaminant Section. Guidance for Assessing Chemical Contaminant Data For Use In Fish Advisories, Volume 1, Fish Sampling And Analysis, Second Edition. Sept 1995. Available from: USEPA. Washington, DC. EPA 823-R-95-007.

Attachment A

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:

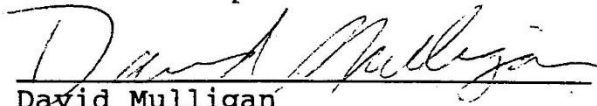
- All members of the Interagency Committee participate in the overall planning of the Massachusetts fish toxics program, including the prioritization of testing sites, publication of fish toxics data and their use in assessing the health of ecosystems in Massachusetts.
- The Director of the Office of 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 DFW-DELE-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

Attachment B
Form for Requesting Fish Testing (2024)



Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

100 Cambridge Street Suite 900 Boston, MA 02114 • 617-292-5500

Maura T. Healey
Governor

Kimberley Driscoll
Lieutenant Governor

Rebecca L. Tepper
Secretary

Bonnie Heiple
Commissioner

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 compound(s) 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 quality control data:

FROM FOR REQUESTING FISH TESTING (CONTINUED)

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):

0 (none) _____ One (1) Meal per Month _____ 2-4 Meals per Month _____

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

9. Please note below any additional information you think might be useful in reviewing this request (Example: known or suspected pollution source):

Your Name: _____

Address: _____

Telephone: _____

Email Address: _____

Thank you for taking the time to provide us with the above information. Though requests may be submitted at any time, decisions on which waterbodies will be tested for the year are usually made in early spring.

Please return this form to:

Daniel Davis
Department of Environmental Protection
Watershed Planning Program
8 New Bond Street
Worcester, MA 01606
Daniel.Davis@Mass.gov

Attachment C

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	
	<ol style="list-style-type: none"> 1. The location is heavily-fished, and 2. Have strong evidence which indicates a potential for fish contamination. 3. The waterbody is located within or is commonly used by residents of an Environmental Justice community.
CATEGORY B	
B1	<ol style="list-style-type: none"> 1. The location is moderately-fished, and 2. Have strong evidence which indicates a potential for fish contamination.
B2	<ol style="list-style-type: none"> 1. The location is heavily-fished, and 2. Have some evidence which indicates a potential for fish contamination.
CATEGORY C	
C1	<ol style="list-style-type: none"> 1. The location is lightly-fished, and 2. Have strong evidence which indicates a potential for fish contamination.
C2	<ol style="list-style-type: none"> 1. The location is moderately-fished, and 2. Have some evidence which indicates a potential for fish contamination.
C3	<ol style="list-style-type: none"> 1. The location is heavily-fished, and 2. Have no evidence which indicates a potential for fish contamination.
CATEGORY D	
D1	<ol style="list-style-type: none"> 1. The location is lightly-fished, and 2. Have some or no evidence which indicates a potential for fish contamination.
D2	<ol style="list-style-type: none"> 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.

Attachment D

Target Species List

largemouth bass	<i>Micropterus salmoides</i>	predator
smallmouth bass	<i>Micropterus dolomieu</i>	predator
chain pickerel	<i>Esox niger</i>	predator
black crappie	<i>Pomoxis nigromaculatus</i>	predator/piscivore
white perch	<i>Morone americana</i>	water column invertivore
yellow perch	<i>Perca flavescens</i>	water column invertivore
bluegill	<i>Lepomis macrochirus</i>	littoral invertivore
pumpkinseed	<i>Lepomis gibbosus</i>	littoral invertivore/omnivore
white sucker	<i>Catostomus commersoni</i>	bottom feeding omnivore
brown bullhead	<i>Ameiurus nebulosus</i>	bottom feeding omnivore
yellow bullhead	<i>Ameiurus natalis</i>	bottom feeding omnivore
carp	<i>Cyprinus carpio</i>	bottom feeding omnivore

While the species above are primary targets for analysis, any species that could be consumed by any local community is a possible species appropriate for analysis.

Attachment E



DIVISION OF
FISHERIES & WILDLIFE

100 Cambridge Street, 6th Floor | Boston, MA 02114
MASS.GOV/MASSWILDLIFE

Scientific Collection Permit
FISH

DEP, WATERSHED PLANNING PROGRAM
Daniel Davis
8 New Bond Street
Worcester, MA 01606

VALID
2024

DATE: **1/24/2024**

PERMIT#: **006.24SCF**

Subpermittee(s): Peter Mitchell, James Meek, Dahlia Tympanick, Steven Bittner

is (are) hereby authorized, in accordance with the provisions of Section 4, Chapter 131 and 131A of the Massachusetts General Laws, to remove from the wild within the Commonwealth, subject to conditions set forth below, the following species and numbers:

all species, numbers to be determined by DEQE-DWPC project objectives for toxicity studies and approved by Todd Richards, Assistant Director of Fisheries, Division of Fisheries and Wildlife, Field Headquarters, Westboro, MA 01581, (617-366-4470).

NHESP species observation forms must be submitted for all state-listed rare species encountered in the field via the Division's online data portal called the Heritage Hub at www.mass.gov/heritagehub. Within 10 days of the first observation of a given state-listed species, a NHESP species observation form must be submitted to the NHESP. All other NHESP species observation forms reporting subsequent observations of a given species shall be submitted by December 31. Also, Prior to releasing any data collected as a part of this permit to individuals or organizations outside of MassWildlife, the permittee must first consult with NHESP.

The following method(s) of taking is (are) hereby authorized:

electrofishing, gill nets, dip nets, seines, minnow traps, spearfishing, trotlines, angling (hook and line)

Collection activities under this permit shall be restricted to the following locations, subject to the approval of private landowners statewide.

All specimens secured under this permit shall be donated to the following institutions:

DEP- Office of Watershed Planning Program., Worcester

No specimen taken under the authority of this permit may be sold. No specimen may be transferred to another not duly licensed.

This permit or a copy thereof shall be carried at all times by the permittee and subpermittee(s) while engaged in the activities authorized herein.

This permit does not absolve the permittee from compliance in full with any and all other applicable federal, state and local requirements, including the acquisition of a federal endangered species permit if required.

Upon expiration of this permit, a complete report detailing all collection activities shall be filed with this office and must include a listing of all species taken, numbers of specimens, and the disposition of same.

This permit, unless sooner revoked for cause, shall expire on December 31 of the year of issue.

A handwritten signature in black ink that reads "Mark S. Tisa".

Mark Tisa, Ph.D., M.B.A., Director

MASSWILDLIFE

Attachment F

- ☐ Fillet, homog., Skin off
- ☐ Other (Specify in comments)

Project:		Waterbody Name/Town:					Unique ID:	
Date-Time:		Field Lat/Long: /					Lat/Long Method:	
FS Login ID:		Crew Lead:					Crew:	
Sample Code	Species	Length (mm)	Weight (g)	Sex (M or F)	Sample Type (I or C)	Aging structure	Collection Method-Gear	Comments
General Comments:								

☐ Fillet, homog., Skin off

☐ Other (Specify in comments)

[illegible]

**MassDEP/DWM/Watershed Planning Program
Fish Toxics Field/Bench Sheet (2023)**

Species

CODE	COMMON NAME	SCIENTIFIC NAME
AS	American shad	<i>Alosa sapidissima</i>
H	blueback herring	<i>Alosa aestivalis</i>
RB	rock bass	<i>Ambloplites rupestris</i>
BB	brown bullhead	<i>Ameiurus nebulosus</i>
WB	white catfish	<i>Ameiurus catus</i>
YB	yellow bullhead	<i>Ameiurus natalis</i>
AE	American eel	<i>Anguilla rostrata</i>
LS	longnose sucker	<i>Catostomus catostomus</i>
WS	white sucker	<i>Catostomus commersoni</i>
C	common carp	<i>Cyprinus carpio</i>
CCS	creek chubsucker	<i>Erimyzon oblongus</i>
CP	chain pickerel	<i>Esox niger</i>
NP	northern pike	<i>Esox lucius</i>
RFP	redfin pickerel	<i>Esox americanus</i>
CB	channel catfish	<i>Ictalurus punctatus</i>
WC	white catfish	<i>Ictalurus catus</i>
B	bluegill	<i>Lepomis macrochirus</i>
P	pumpkinseed	<i>Lepomis gibbosus</i>
YBS	redbreast sunfish	<i>Lepomis auritus</i>
LMB	largemouth bass	<i>Micropterus salmoides</i>
SMB	smallmouth bass	<i>Micropterus dolomieu</i>
WP	white perch	<i>Morone americana</i>
GS	golden shiner	<i>Notemigonus crysoleucas</i>
RT	rainbow trout	<i>Oncorhynchus mykiss</i>
YP	yellow perch	<i>Perca flavescens</i>
BC	black crappie	<i>Pomoxis nigromaculatus</i>
LNS	longnose sucker	<i>Rhinichthys cataractae</i>
BT	brown trout	<i>Salmo trutta</i>
EBT	eastern brook trout	<i>Salvelinus fontinalis</i>
CC	creek chub	<i>Semotilus atromaculatus</i>
FF	fallfish	<i>Semotilus corporalis</i>
W	walleye	<i>Stizostedion vitreum</i>

Sex	
M	Male
F	Female

**MassDEP/DWM/Watershed Planning Program
Fish Toxics Field/Bench Sheet (2023)**

Sample Type	
I	Individual (Grab)
C	Composite

Aging Structure
Spine
Scale
Otolith
Other (Specify)
Not Collected

Collection Method-Gear
SHOCK: Backpack
SHOCK: Boat
SHOCK: Pram
SHOCK: Stream-side
Netting: Gill Net
Netting: Other (Specify)
Rod and Reel
Hook and Line
Trot line
Trap
Other: (Specify)

Bio Part Name
Egg/ovum
Fish fillet, homog., skin off
Fish fillet, homog., skin on
Fish fillet, left, skin off
Fish fillet, left, skin on
Fish fillet, right, skin off
Fish fillet, right, skin on
Fish fillet, whole, skin off
Fish fillet, whole, skin on
Fish fillet, with belly flap
Ovary
Whole fish, homog., skin off
Whole fish, homog., skin on
Whole organism

Attachment G

MassDEP/DWM/Watershed Planning Program
Fish Toxics Field/Bench Sheet (2023) ¹⁴

☒ Fillet, homog., Skin off
☐ Other (Specify in comments)

Project: TAM B2-5 (2024)		Waterbody Name/Town: Kendall Pond Gardner			Unique ID: W3358			
Date-Time: 5/7/24 12:00pm		Field Lat/Long: 1			Lat/Long Method:			
FS Login ID:		Crew Lead: Davis			Crew: Sha, Phan			
Sample Code	Species	Length (mm)	Weight (g)	Sex (M or F)	Sample Type (I or C)	Aging structure	Collection Method-Gear	Comments
2024043	LMB				C			
2024043-01	LMB	455	1480	F	I			Electrofishing Boat
" -01B	LMB	422	1140	F	I		"	
" -01C	LMB	406	850	F	I		"	
" -02	YP				C			
" -02A	YP	267	180		I		"	
" -02B	YP	4238	140		I		"	
" -02C	YP	241	120		I		"	
" -03	BC				C			
" -03A	BC	215	110		I		"	
" -03B	BC	200	90		I		"	
" -03C	BC	192	80		I		"	
General Comments: largemouth bass, Yellow Perch, Black Crappie, Bluegill								
Other species - Golden Shiner, Creek Chub								

☒ Fillet, homog., Skin off
☐ Other (Specify in comments)

Page 2 of 2

Age Determination

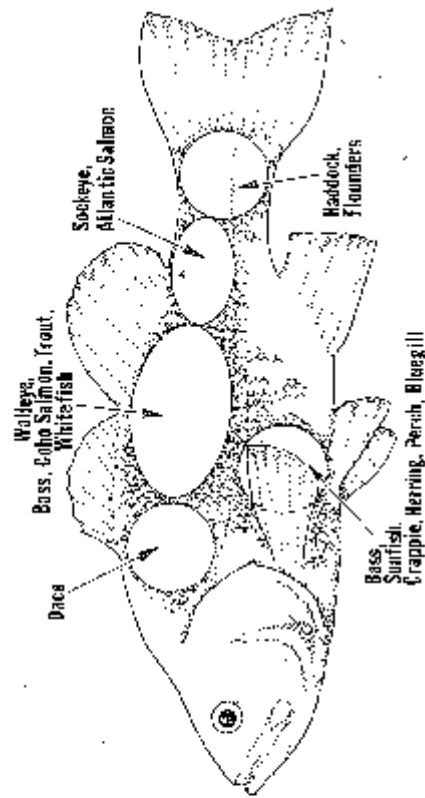


Figure 16.1. General areas on a fish where scales of various species may be removed.