Addendum to the CALM: Kentucky's Updated Fish Consumption Methodology

Commonwealth of Kentucky

Energy and Environment Cabinet

Department for Environmental Protection

Division of Water

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Action By	Signature	Date
Katie McKone Author, Assessment Coordinator		1/16/20
Melanie Arnold Approved, Manager Water Quality Branch	Melanie Arnold	1-17-20
Mary Rockey Approved, Quality Assurance Officer Division of Water	Mary Rockey	1-17-2020
Carey Johnson Approved, Assistant Director Division of Water		1/17/2020
Paul Miller Approved, Director Division of Water		1/22/20

Commonwealth of Kentucky

Andy Beshear, Governor

Energy and Environment Cabinet

Rebecca Goodman, Secretary

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Introduction

Fish consumption is not a designated use per state regulation. However, there exists human health criteria in water quality standards for the protection of the population should they choose to catch local fish for consumption. Applicable criteria can be found in WQS 401 KAR 10:031 Sections 2 and 6. Section 2(3) states:

The water quality criteria for the protection of human health related to fish consumption in Table 1 of Section 6 of this administrative regulation shall apply to all surface water at the edge of the assigned mixing zones except for those points where water is withdrawn for domestic water supply use.

> (a) The criteria are established to protect human health regarding the consumption of fish tissue and shall not be exceeded.
>
> (b) For those substances associated with a cancer risk, an acceptable risk level of not more than one (1) additional cancer case in a population of 1,000,000 people, or 1×10^{-6} shall be utilized to establish the allowable concentration.

Unlike other designated uses, attainment is divided into two categories, full support and nonsupport, when considering tissue data, and into three categories, full support, partial support, and nonsupport, when considering water column data. Full support means that water quality standards are being met, while partial or nonsupport means that water quality standards are not being met; therefore, the parameter is identified as impairing the designated use.

This designated use is assessed for dammed waterbodies (reservoirs) or natural lakes, and for flowing water. Since the type and size of fish available for tissue analysis varies greatly from a lake to a small headwater stream, a hierarchy of sample collection and processing methods are outlined below in order of preference. Field biologists apply this hierarchy when sampling fish for tissue analysis, and may have to implement a different method for the different trophic levels that are being targeted as outlined in the project's study plan (e.g. trophic level 4 and 3 fish may be collected as part of a fish advisory study, where the fillet of fish from trophic level 4 can be analyzed individually, while the fillet of fish from trophic level 3 may be analyzed as a composite).

Collection and Processing Methods:

1. Fish large enough to produce a fillet
    a. Right fillet analyzed individually, or
    b. If size of fish warrants both fillets to meet tissue requirements, right and left fillets can be analyzed together
2. Fish of size that would not produce enough tissue for individual fillet analysis (right or right and left combined) but a fillet can be produced
    a. Composite fillet samples produced and analyzed
3. Fish of size where a fillet cannot be produced but an entire fish would provide enough tissue for individual analysis
    a. Each whole body analyzed individually
4. Fish of size that would not produce enough tissue for individual fish analysis, even as a whole body
    a. Composite whole body samples produced and analyzed

Mercury in Fish Tissue

Table 1 in Section 6 of 401 KAR 10:031 has a numeric water quality criterion for methylmercury in fish tissue of 0.3 mg/Kg.

The water quality standard (WQS) is set at 0.3 mg/Kg wet weight methylmercury in fish tissue and can be expressed as either a fillet or whole body sample. In Kentucky, methylmercury accounts for approximately 98% of the total mercury in fish tissue (Figure 1). Per guidelines from the United States Environmental Protection Agency (USEPA) (2010), the use of total mercury is acceptable in the assessment process, and "when measuring only mercury, the state or authorized tribe might make the conservative assumption that all mercury in fish tissue is methylmercury". From here forward, the parameter will simply be referred to as 'Mercury in Fish Tissue', knowing either total or methylmercury is acceptable.

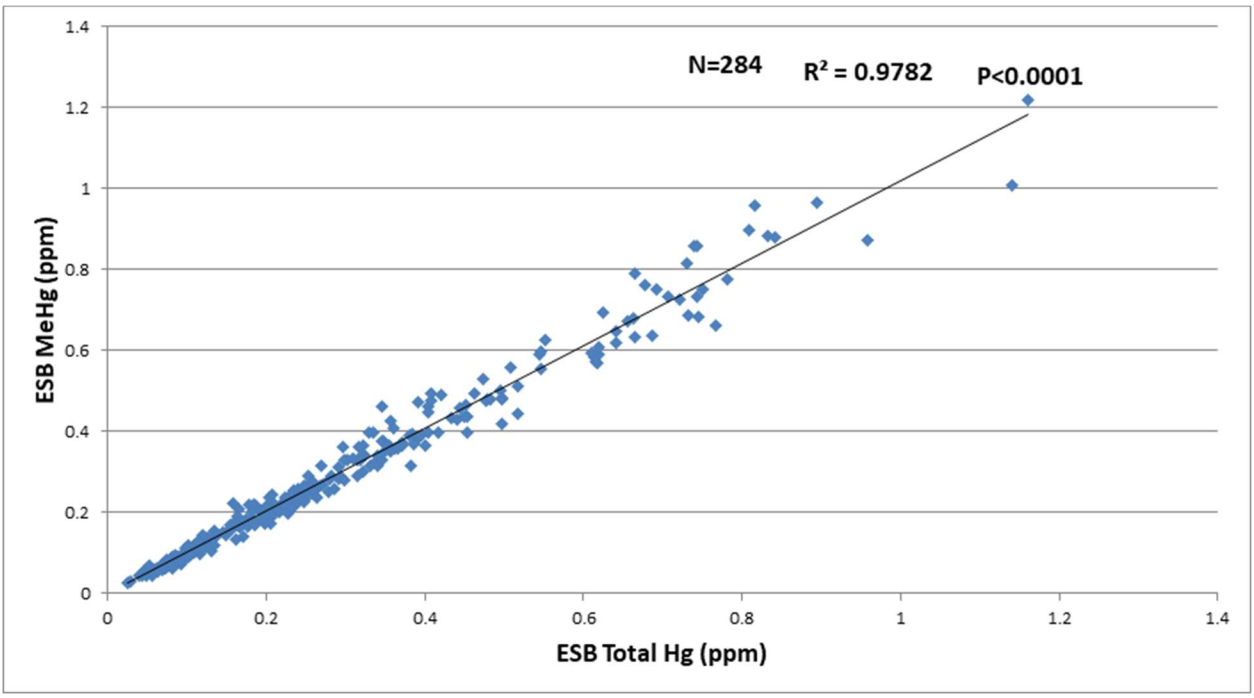

Figure 1. Relationship between total mercury and methylmercury (ppm) for 284 fish samples collected in Kentucky and analyzed by the Department of Environmental Program Support (DEPS) laboratory (formerly referred to as Environmental Services Branch (ESB) as referenced in figure), where methylmercury accounts for approximately 98% of total mercury.

Data Requirements

When determining use attainment for the fish consumption designated use for the parameter 'Mercury in Fish Tissue', predator fish (Table 1) must be collected to make a full support attainment decision, even if other trophic levels were collected and analyzed for mercury. However, if other trophic levels are collected, how to track this information, and how it may impact parameter attainment, is outlined in the section below entitled 'Supplementary Data to Track'.

Table 1. Target predator species (Trophic Level 4) for collection by the Kentucky Division of Water (DOW 2018, Draft).

Desired Order	Common Name	Scientific Name
1a	Largemouth	*Micropterus salmoides*
1b	Spotted	*M. punctulatus*
1c	Smallmouth	*M. dolomieu*
2	White Bass	*Morone chrysops*
3	Walleye	*Sander vitreus*
4	Sauger	*Sander canadensis*

The following data requirements apply:

- Fish Species: Largemouth Bass (*Micropterus salmoides)* or other *Micropterus* sp.
    - If outside agencies collect different fish species, predator fish (trophic level 4) as outlined in Table 1 will be considered for assessment purposes
- Size of Largemouth Bass: 12 inches or larger
    - If 12-inch bass are not available, the largest fish available should be retained for analysis
    - If predator species other than Largemouth Bass are used, the Minimum Size Limit or larger should be retained for analysis (as determined by Kentucky Fish and Wildlife's Fishing and Boating Guide)
        - If target size fish are not available, then the largest fish sampled should be retained for analysis
        - If no minimum size is provided, then the largest fish sampled should be retained for analysis
- A minimum of 10 Largemouth Bass (or other trophic 4 species if determined appropriate) from a single waterbody
    - Samples collected in a 1 – 5 year time frame will be considered to achieve 10 individual fish for assessment purposes, or
    - Samples collected at multiple sites within the same assessment unit will be considered to achieve 10 individual fish for assessment purposes
- If fillets or whole bodies are being composited, a minimum of two five-fish composite samples shall meet the following requirements:
    - All individuals of the same species
    - Similar in size so that the smallest individual in a composite is no less than 75% of the total length of the largest individual
    - Collected at the same time
- Use a skinless fillet if applicable
- Convert dry weight to wet weight, if necessary

Attainment Decision for Mercury in Fish Tissue

If fish were analyzed individually as a fillet or as a whole body, and the assessment data requirements were met, then attainment is determined as such:

- Full Support: If the median is ≤ 0.3 mg/Kg mercury

    - In KATTS, the indicator 'Mercury in Fish Tissue (predator) <= WQS' should be used, and the parameter status "Full Support" should accompany the parameter 'Mercury in Fish Tissue'
- Nonsupport: If the median is > 0.3 mg/Kg mercury
    - In KATTS, the indicator 'Mercury in Fish Tissue (predator) > WQS' should be used, and the parameter status "Nonsupport" should accompany the parameter 'Mercury in Fish Tissue'
- Additional Considerations
    - If some of the fish analyzed are below the detection limit, and some are above, then use the detection limit to calculate the median
        - If this value is ≤ 0.3 mg/Kg mercury, then a full support attainment decision is supported
        - If this value is > 0.3 mg/Kg mercury, then how many fish were non-detect and the concentration of the fish that had detection should be considered before making a nonsupport attainment decision

If fish were analyzed as a fillet composite or as a whole body composite, and the assessment data requirements were met, then attainment is determined as such:

- Full Support: The median of two or more composite samples is ≤ 0.3 mg/Kg of mercury
    - In KATTS, the indicator 'Mercury in Fish Tissue (predator) <= WQS' should be used, and the parameter status "Full Support" should accompany the parameter 'Mercury in Fish Tissue'
- Nonsupport: The median of two or more composite samples is > 0.3 mg/Kg of mercury
    - In KATTS, the indicator 'Mercury in Fish Tissue (predator) > WQS' should be used, and the parameter status "Nonsupport" should accompany the parameter 'Mercury in Fish Tissue'
- Additional Considerations
    - Often, 2 to 5 composite samples are collected from a waterbody. If some of the composite samples are > 0.3 mg/Kg, while others are ≤ 0.3 mg/Kg of mercury:
        - An attainment decision does not have to be made and the parameter status "Insufficient" should accompany the parameter 'Mercury in Fish Tissue' and further data collection should take place before making an attainment decision.
        - If an attainment decision is made, one should consider if the median was above or below 0.3 mg/Kg of mercury, the magnitude of the individual exceedances, and the listing history. The appropriate indicator should accompany the parameter and parameter status, and the resulting attainment decision should be well documented in KATTS.

Supplementary Data to Track

Predator fish are required for analysis of the Fish Consumption designated use when determining if the parameter 'Mercury in Fish Tissue' is meeting WQS. However, the Kentucky Division of Water (DOW) also collects and analyzes panfish (trophic level 3), such as bluegill, for mercury. The potential for bioaccumulation of mercury exists in lower trophic levels, and therefore the assessment method requires documentation of attainment of the mercury fish tissue standard in panfish, when available.

The Kentucky DOW collects panfish as outlined in Table 2. Most often, panfish are collected and analyzed as described in Method 2, where two or more composite fillet samples are produced and analyzed.

Table 2. Target panfish species (Trophic Level 3) for collection by the Kentucky Division of Water (DOW 2018, Draft).

Desired Order	Common Name	Scientific Name
1a	Bluegill	*Lepomis macrochirus*
1b	Other sunfish	*L. sp.*
2	Crappie	*Pomoxis* sp.
3	Rock Bass	*Ambloplites rupestris*

The data requirements for considering panfish for attainment are as follows:

- Fish Species: Bluegill (*Lepomis macrochirus)* or any other panfish outlined in Table 2 if bluegill not collected
- Size of Fish: the Minimum Size Limit or larger should be retained for analysis (as determined by Kentucky Fish and Wildlife's Fishing and Boating Guide)
    - If target size fish are not available, then the largest fish sampled should be retained for analysis
    - If no minimum size is provided, then the largest fish sampled should be retained for analysis
- A minimum of 10 fish from a single waterbody
    - Samples collected in a 1 – 5 year time frame will be considered to achieve 10 individual fish for assessment purposes, or
    - Samples collected at multiple sites within the same assessment unit will be considered to achieve 10 individual fish for assessment purposes
- When fillets are composited, a minimum of two five-fish composite samples shall meet the following requirements:
        - All individuals of the same species
        - Similar in size so that the smallest individual in a composite is no less than 75% of the total length of the largest individual
        - Collected at the same time
- Use a skinless fillet if applicable
- Convert dry weight to wet weight, if necessary

Attainment for panfish shall use the following guidelines:

- Full Support: The median of two or more composite samples is ≤ 0.3 mg/Kg of mercury
    - In KATTS, the indicator 'Mercury in Fish Tissue (panfish) <= WQS' should be used in conjunction with the predator indicator, which determines the parameter status
        - If no predator fish were collected, the parameter status "Insufficient" should be used
- Nonsupport: The median of two or more composite samples is > 0.3 mg/Kg of mercury
    - In KATTS, the indicator 'Mercury in Fish Tissue (panfish) > WQS' should be used in conjunction with the predator indicator

    - If predator fish OR panfish exceeds the WQS (even if no predator fish were collected), then the parameter status "Non Support" should be used
- If some of the composite samples are ≤ 0.3 mg/Kg, while other composite samples are > 0.3 mg/Kg of mercury, the indicator 'Mercury in Fish Tissue (panfish) <= WQS' or 'Mercury in Fish Tissue (panfish) > WQS' should be used, depending on if the median was ≤ or > 0.3 mg/Kg, in conjunction with the predator indicator
    - If the predator fish indicator suggests "Non Support", then the parameter status "Non Support" should be used
    - If both the predator fish and panfish indicators suggest "Full Support", then the parameter status "Full Support" should be used
    - If the predator fish indicator suggests "Full Support" and the panfish indicator suggests "Non Support", then either "Non Support" or "Insufficient" should be used for the parameter status, with a comment explaining the decision for the selected parameter status
        - A final attainment decision is at the discretion of the assessor
    - If no predator fish were collected, then the parameter status "Non Support" or "Insufficient" should be used, with a comment explaining the decision for the selected parameter status
        - A final attainment decision is at the discretion of the assessor

To reiterate, panfish alone cannot be used to determine that the parameter 'Mercury in Fish Tissue' is fully supported; predator fish are required for a full support determination of the parameter. However, if the data exists, the levels of mercury in panfish, which are often the type of fish people consume, can be related to attainment as described above, and then appropriately noted and tracked in the KATTS application. This same schematic could be applied to other groups of fish, such as bottom feeders, where data requirements are met for analysis.

Delisting Requirements

To delist, an effort should be made to match or exceed the data set used in the original assessment, considering species, size class, tissue type, and number of fish. In some cases, newer data that does not meet or exceed the original data set may be used for delisting, and the decision for why this is acceptable will be well documented in the KATTS application.

When individual fish are analyzed:

- If, in the most recent data set, the median is ≤ 0.3 mg/Kg of mercury, then mercury in fish tissue will be proposed for delisting.

When composites are analyzed:

- If, in the most recent data set, the median of the composite samples is ≤ 0.3 mg/Kg of mercury, and a majority of the composite samples have a concentration ≤ 0.3 mg/Kg of mercury, then mercury in fish tissue will be proposed for delisting.
    - It is unlikely that composite samples will be used to delist mercury in fish tissue, as predator fish, which are often large enough to analyze individually, are required for a full support attainment decision.

PCBs in Fish Tissue

The Food and Drug Administration (FDA) protocols for fish consumption advisories for polychlorinated biphenyls (PCBs) are based on fish tissue residue concentrations, and are triggered when tissue residue exceeds 0.2 mg/Kg. Historically, this number (0.2 mg/Kg) had been used for assessment purposes. However, per Kentucky regulation, "For those substances associated with a cancer risk, an acceptable risk level of not more than one (1) additional cancer case in a population of 1,000,000 people, or 1×10^{-6}, shall be utilized to establish the allowable concentration" (401 KAR 10:031, Section 2,3,b). PCBs are classified as a carcinogen (American Cancer Society) and therefore the acceptable risk level as outlined in regulation applies.

In Table 1 (401 KAR 10:031), Kentucky has adopted a water column number (0.000064 µg/L) for PCBs that uses the 1×10^{-6} risk specific dose. The water column number can be used to determine a screening value for fish tissue that also protects to the 1×10^{-6} level for extra cancer risk (USEPA 2000, VA DEQ 2017). When Kentucky's water column number for PCBs is used in this equation with a 1×10^{-6} level for extra cancer risk (as Kentucky standards prescribe), the fish tissue number is 0.002 mg/Kg (USEPA 2000, VA DEQ 2017); two orders of magnitude lower than the FDA number of 0.2 mg/Kg.

The 0.002 mg/Kg screening value for PCBs poses a challenge from the analytical side. At Kentucky's Department for Environmental Protection (DEP) state laboratory, the limit of detection (LOD) in dry weight (DW) is approximately 0.0275 mg/Kg, which, when converted to wet weight (WW), ranges between 0.005 and 0.008 mg/Kg (using 72% – 82% moisture), both of which are greater than the screening value 0.002 mg/Kg PCBs that protects to the 1×10^{-6} risk level. Consequently, 1) all PCB values that are detected or estimated would be above the screening level, and 2) there would be fish with PCB concentrations above the screening level but below the LOD, so the exceedance could not be detected and the risk could not be communicated accurately.

To align more closely with the risk level specified in regulation (1×10^{-6}), while also acknowledging the laboratory limitation in detection (0.005 to 0.008 mg/Kg), the screening value for PCBs in fish tissue will be changed to 0.01 mg/Kg for assessment purposes, protecting at a risk level of 5×10^{-6}. The methodology outlined below has built in conservatism by targeting fish species known to accumulate PCBs at a higher rate, targeting larger fish for analysis, and by requiring at least 10 fish for comparison to the screening value (referred to as SV in name of indicators).

Data Requirements

When determining use attainment for the fish consumption designated use for the parameter 'PCBs in Fish Tissue', bottom feeders (Table 3) must be collected to make a full support attainment decision, even if other trophic levels were collected and analyzed for PCBs. However, if other trophic levels are collected, how to track this information, and how it may impact parameter attainment, is outlined in the section below entitled 'Supplementary Data to Track'.

Table 3. Target bottom feeder species (Trophic Level 3) for collection by the Kentucky Division of Water (DOW 2018, Draft).

Desired Order	Common Name	Scientific Name
1	Channel catfish	*Ictalurus punctatus*
2	Carp	*Cyprinus carpio*
3	Redhorse suckers	*Moxostoma* sp.
4	White Sucker	*Catostomus commersoni*
5	Other sucker species	*Ictiobus* sp., *Carpiodes* sp.

The following data requirements apply:

- Fish Species: Channel catfish (*Ictalurus punctatus)* or other appropriate bottom feeders as outlined in Table 3
- Size of Fish: The Minimum Size Limit or larger should be retained for analysis (as determined by Kentucky Fish and Wildlife's Fishing and Boating Guide)
    - If target size fish are not available, then the largest fish samples should be retained for analysis
    - If no minimum size is provided, then the largest fish sampled should be retained for analysis
- A minimum of 10 fish from a single waterbody
    - Samples collected in a 1 – 5 year time frame will be considered to achieve 10 individual fish for assessment purposes, or
    - Samples collected at multiple sites within the same assessment unit will be considered to achieve 10 individual fish for assessment purposes
- If fillets or whole bodies are being composited, a minimum of two five-fish composite samples shall meet the following requirements:
    - All individuals of the same species
    - Similar in size so that the smallest individual in a composite is no less than 75% of the total length of the largest individual
    - Collected at the same time
- Use a skin-on or -off fillet, when applicable
- Convert dry weight to wet weight, if necessary

Attainment Decisions for PCBs in Fish Tissue

If fish were analyzed individually as a fillet or as a whole body, and the assessment data requirements were met, then attainment is determined as such:

- Full Support: If the median is ≤ 0.01 mg/Kg PCB
    - In KATTS, the indicator 'PCBs in Fish Tissue (bottom feeders) <= WQS' should be used, and the parameter status "Full Support" should accompany the parameter 'PCBs in Fish Tissue'
- Nonsupport: If the median is > 0.01 mg/Kg PCB

    - In KATTS, the indicator 'PCBs in Fish Tissue (bottom feeders) > WQS' should be used, and the parameter status "Nonsupport" should accompany the parameter 'PCBs in Fish Tissue'
- Additional Considerations
    - If some of the fish analyzed are below the detection limit, and some are above, then use the detection limit to calculate the median
        - If this value is ≤ 0.01 mg/Kg PCB, then a full support attainment decision is supported
        - If this value is > 0.01 mg/Kg PCB, then how many fish were non-detect and the concentration of the fish that had detection should be considered before making a nonsupport attainment decision

If fish were analyzed as a fillet composite or as a whole body composite, and the assessment data requirements were met, then attainment is determined as such:

- Full Support: The median of two or more composite samples is ≤ 0.01 mg/Kg PCB
    - In KATTS, the indicator 'PCBs in Fish Tissue (bottom feeders) <= WQS' should be used, and the parameter status "Full Support" should accompany the parameter 'PCBs in Fish Tissue'
- Nonsupport: The median of two or more composite samples is > 0.01 mg/Kg PCB
    - In KATTS, the indicator 'PCBs in Fish Tissue (bottom feeders) > WQS' should be used, and the parameter status "Nonsupport" should accompany the parameter 'PCBs in Fish Tissue'
- Additional Considerations
    - If the concentration of some composite samples are > 0.01 mg/Kg PCB, while other composite samples are ≤ 0.01 mg/Kg PCB
        - An attainment decision does not have to be made and the parameter status "Insufficient" should accompany the parameter 'PCBs in Fish Tissue' and further data collection should take place before making an attainment decision.
        - If an attainment decision is made, one should consider if the median was above or below 0.01 mg/Kg of PCBs, the magnitude of the individual exceedances, and the listing history. The appropriate indicator should accompany the parameter and parameter status, and the resulting attainment decision should be well documented in KATTS.

Supplementary Data to Track

If other trophic levels, such as predator fish or panfish, were collected and analyzed for PCBs, and the minimum data requirements were met, then the appropriate indicators can be entered into the KATTS application. Decisions for attainment of the parameter 'PCBs in Fish Tissue' when considering panfish or predator fish are as follows:

- Full Support: The median is ≤ 0.01 mg/Kg PCB (individual fish or composites)
    - In KATTS, the indicator 'PCBs in Fish Tissue (*panfish or predator as appropriate*) <= SV' should be used in conjunction with the bottom feeder indicator, which determines the parameter status

        - If no bottom feeders were collected, the parameter status “Insufficient” should be used
- Nonsupport: The median is > 0.01 mg/Kg PCB (individual fish or composites)
    - In KATTS, the indicator ‘PCBs in Fish Tissue (*panfish or predator as appropriate*) > SV’ should be used in conjunction with the bottom feeder indicator
    - If any group (predator, panfish, or bottom feeder) exceeds the SV (even if bottom feeders were not collected), then the parameter status “Non Support” should be used
- If composite samples are being considered, and the concentration of some composite samples are ≤ 0.01 mg/Kg, while other composite samples are > 0.01 mg/Kg of PCBs, the indicator ‘PCBs in Fish Tissue (*panfish or predator as appropriate*) <= SV’ or ‘PCBs in Fish Tissue (*panfish or predator as appropriate*) > SV’ should be used, depending on if the median was ≤ or > 0.01 mg/Kg, in conjunction with the bottom feeder indicator
    - If the bottom feeder indicator suggests “Non Support”, then the parameter status “Non Support” should be used
    - If both the bottom feeder and the predator fish or panfish indicators suggest “Full Support”, then the parameter status “Full Support” should be used
    - If the bottom feeder indicator suggests “Full Support” and the predator fish or panfish indicator suggests “Non Support”, then either “Non Support” or “Insufficient” should be used for the parameter status, with a comment explaining the decision for the selected parameter status
        - A final attainment decision is at the discretion of the assessor
    - If no bottom feeders were collected, then the parameter status “Non Support” or “Insufficient” should be used, with a comment explaining the decision for the selected parameter status
        - A final attainment decision is at the discretion of the assessor

To reiterate, predator fish or panfish alone cannot be used to determine that the parameter ‘PCBs in Fish Tissue’ is fully supported; bottom feeders are required for a full support determination of the parameter. However, if the data exists, the levels of PCBs in predator fish or panfish can be related to attainment as described above, and then appropriately noted and tracked in the KATTS application.

Delisting Requirements

To delist, an effort should be made to match or exceed the data set used in the original assessment, considering species, size class, tissue type, and number of fish. In some cases, newer data that does not meet or exceed the original data set may be used for delisting, and the decision for why this is acceptable will be well documented in the KATTS application.

When individual fish are analyzed:

- If, in the most recent data set, the median is ≤ 0.01 mg/Kg of PCBs, then PCBs in fish tissue will be proposed for delisting

When composites are analyzed:

- If, in the most recent data set, the median of the composite samples is ≤ 0.01 mg/Kg of PCBs, and a majority of the composite samples have a concentration ≤ 0.01 mg/Kg of PCBs, then PCBs in fish tissue will be proposed for delisting

- It is unlikely that composite samples will be used to delist PCBs in fish tissue, as bottom feeders, which are often large enough to analyze individually, are required for a full support attainment decision

Cautions and Considerations

The updated screening value of 0.01 mg/Kg for PCBs in fish tissue is just above the LOD, which ranges between 0.005 and 0.008 mg/Kg depending on the % moisture and the amount of tissue used in the analysis. But, the updated screening value of 0.01 mg/Kg for PCBs in fish tissue is below the Limit of Quantification (LOQ), and therefore values between the LOD and LOQ will be estimated values. It is possible to have 10 fish that all have estimated values where the median is < 0.01 mg/Kg but is quantified and therefore known to be above 0.002 mg/Kg, the value that translates to the risk level specified in regulation (1×10^{-6}). In these rare circumstances, the assessment coordinator may make the decision to list the waterbody as impaired due to PCBs in Fish Tissue, but is not obligated to do so. Considerations include size of fish, season of catch, and type of fish when making this decision. Such a decision will be well justified and clearly outlined in the KATTS application.

Tissue Analysis: Further Guidance

In recent years, smaller, headwater streams have been sampled for fish where tissue has been analyzed for mercury and PCBs. When this data exists, attainment decisions for the Fish Consumption designated use can be made, under certain circumstances, as outlined below. As more data of this type is collected, this method will be updated and revised as necessary.

Data Requirements

The following data requirements apply:

- Fish Species: Creek Chub (*Semotilus atromaculatus*)
  - If creek chubs are not available, Stonerollers (*Campostoma spp.*) may be used
- Size of Fish:
  - Creek chub – minimum length of 100 mm
  - Stonerollers – minimum length of 80 mm
- A minimum of 10 fish from a stream reach
- A minimum of two five-fish composite samples shall meet the following requirements:
  - All individuals of the same species
  - Similar in size so that the smallest individual in a composite is no less than 75% of the total length of the largest individual
  - Collected at the same time
- Composite samples will be analyzed as whole body samples
- Convert dry weight to wet weight, if necessary

Mercury in Fish Tissue (Headwater Fish - Creek Chubs or Stonerollers)

If the assessment data requirements were met, then attainment is determined as such:

- Full Support: The median of two or more composite samples is ≤ 0.3 mg/Kg of mercury
  - If the biologists were able to catch larger, older fish where the accumulation of mercury is likely, then the indicator 'Mercury in Fish Tissue (HW Fish) <= WQS' should be

associated to the parameter 'Mercury in Fish Tissue' with a parameter status "Full Support"
    - If there is any concern that the data is not representative of the intention of the indicator, then the parameter status "Insufficient" should accompany the parameter 'Mercury in Fish Tissue'
- Nonsupport: The median of two or more composite samples is > 0.3 mg/Kg of mercury
    - The indicator 'Mercury in Fish Tissue (HW Fish) > WQS' should be associated with the parameter 'Mercury in Fish Tissue' with the parameter status "Nonsupport"
    - If there is any concern that the data is not representative of the intention of the indicator, then the parameter status "Insufficient" should accompany the indicator 'Mercury in Fish'
- Additional Considerations
    - If the concentration of some composite samples are > 0.3 mg/Kg, while the concentration of other composite samples are ≤ 0.3 mg/Kg of mercury
        - An attainment decision should not be made and the parameter status "Insufficient" should accompany the parameter 'Mercury in Fish Tissue' and further data collection should take place before making an attainment decision

PCBs in Fish Tissue (Headwater Fish - Creek Chubs or Stonerollers)

If the assessment data requirements were met, then attainment is determined as such:

- Full Support: The median of two or more composite samples is ≤ 0.01 mg/Kg of PCBs
    - If the biologists were able to catch larger, older fish where the accumulation of PCBs is likely, then the indicator 'PCBs in Fish Tissue (HW Fish) <= WQS' should be associated with the parameter 'PCBs in Fish Tissue' with a parameter status of "Full Support"
    - If there is any concern that the data is not representative of the intention of the indicator, then the parameter status "Insufficient" should accompany the parameter 'PCBs in Fish Tissue'
- Nonsupport: The median of two or more composite samples is > 0.01 mg/Kg of PCBs
    - The indicator 'PCBs in Fish Tissue (HW Fish) > WQS' should be associated with the parameter 'PCBs in Fish Tissue' with a parameter status of "Nonsupport"
    - If there is any concern that the data is not representative of the intention of the indicator, then the parameter status "Insufficient" should accompany the parameter 'PCBs in Fish Tissue'
- Additional Considerations
    - If the concentration of some composite samples are > 0.01 mg/Kg of PCBs, while the concentration of other composite samples are ≤ 0.01 mg/Kg of PCBs
        - An attainment decision should not be made and the parameter status "Insufficient" should accompany the parameter 'PCBs in Fish Tissue' and further data collection should take place before making an attainment decision

Case by Case Situations

When mercury is the pollutant of concern, clear guidelines have been documented for predator fish and panfish. When PCBs are the pollutant of concern, clear guidelines have been documented for bottom feeders. However, there may be times when it is appropriate to compare predator and panfish to the

PCB standard, and vice versa, to compare bottom feeders to the mercury standard. Although it's not the group in which accumulation of those pollutants is most common, certain situations, such as a spill, may create a situation where the comparison is appropriate. In these circumstances, it is reasonable to use other organisms beyond those outlined in the above method to track results and inform attainment decisions, acknowledging that the same data requirements for the specific species will still apply. If this comparison is done and used for attainment decisions, then the rationale for doing so will be well documented in the KATTS application.

Water Column Data

All Waterbody Types

Table 1 in Section 6 of 401 KAR 10:031 outlines water quality criteria for Human Health (Fish) that aim to protect human health regarding fish consumption. For those parameters that have a numeric value, a minimum of quarterly samples over a three year period is required such that:

- Full Support
  - No more than 1 excursion in a 3 year time frame
- Partial Support
  - More than 1 excursion in 3 years, but in less than 10 % of samples
- Nonsupport
  - More than 1 excursion in 3 years and in greater than 10 % of samples

While three years of quarterly or more frequent sample collection is preferred, there are exceptions where less than three years of data may be considered. Assessment may occur where multiple samples are collected and a criterion is exceeded by a magnitude of concentration or frequency that supports an impairment decision without three full years of data.

Delisting Requirements

If a waterbody has been listed as impaired for the fish consumption designated use due to a parameter outlined in Table 1 of Section 6 of 401 KAR 10:031, then data requirements to delist the parameter are as follows:

- Minimum of quarterly samples over a three year period where there is no more than one exceedance of the water quality standard for the parameter of concern
- If less than 3 years of data was used to originally list the parameter of concern, then the same number of years of samples can be used to delist the parameter so long as 1) all seasons represented, 2) low and high flow regimes represented in each season, and 3) there is no more than one exceedance of the water quality standard for the parameter of concern during the sampling effort

The assessment coordinator has the final determination of whether the data set is sufficient to warrant a delisting if less than 3 years of data is collected.

Works Cited

Kentucky Division of Water (DOW). 2018. Standard Operating Procedure for Issuing Fish Consumption Advisories. Kentucky Department for Environmental Protection, Division of Water, Frankfort, Kentucky.

USEPA. 2000. Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health (2000), EPA-822-B-00-004. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

USEPA. 2010. Guidance for Implementing the January 2001 Methylmercury Water Quality Criterion. EPA 823-R-10-001. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

Virginia Department for Environmental Quality (VA DEQ), 2017. Background Information of Fish Tissue Screening Values Compared to Water Quality Criteria Designed to Protect Human Health. Virginia Department of Environmental Quality, Richmond, VA.