2022 Integrated Report to Congress on the Condition of Water Resources in Kentucky

Assessment Results with an emphasis on the following basin management units: 1) Big and Little Sandy Rivers and Tygarts Creek, 2) Kentucky River, 3) Salt and Licking Rivers, and 4) Upper Cumberland and Four Rivers, along with statewide updates including the Ohio River mainstem

Kentucky Energy and Environment Cabinet
Department for Environmental Protection
Division of Water
Water Quality Branch
June 9, 2023

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Assessment Results with an emphasis on the following basin management units: 1) Big and Little Sandy Rivers and Tygarts Creek, 2) Kentucky River, 3) Salt and Licking Rivers, and 4) Upper Cumberland and Four Rivers, along with statewide updates including the Ohio River mainstem

This report has been approved for release:

Carey Johnson, Director

Kentucky Division of Water

June 9, 2023

Date

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List of Acronyms

- AIBI – Avifauna Index of Biotic Integrity
- ATTAINS – Assessment, TMDL Tracking, and Implementation System
- AU – Assessment Unit
- AWQA – Agriculture Water Quality Act
- BMP – Best Management Practice
- BMU – Basin Management Unit
- BIL – Bipartisan Infrastructure Law
- CAH – Cold Water Aquatic Habitat
- CSO – Combined Sewer Overflow
- CSS – Combined Sewer System
- CWA – Clean Water Act
- CWSRF – Clean Water State Revolving Fund
- DEP – Department for Environmental Protection
- DOC – Division of Conservation
- DOW – Division of Water
- DQO – Data Quality Objective
- DWS – Domestic Water Supply
- DWSRF – Drinking Water State Revolving Fund
- ECHO – Enforcement and Compliance History Online
- EPA – Environmental Protection Agency
- ESRI – Environmental Systems Research Institute
- GIS – Geographic Information Systems
- HAB – Harmful Algal Bloom
- HTF – Hypoxia Task Force
- IBI – Indices of Biotic Integrity
- IR – Integrated Report
- KATTS – Kentucky's Assessment and TMDL Tracking System
- KPDES – Kentucky Pollutant Discharge Elimination System
- K-WADE – Kentucky Water Assessment Data for Environmental Monitoring
- KY-WRAM – Kentucky Wetlands Rapid Assessment Method
- LTCP – Long-term Control Plans
- MRBI – Mississippi River Basin Initiative
- NPS – Nonpoint Source
- NRCS – Natural Resources Conservation Service
- NRS – Nutrient Reduction Strategy
- NWQI – National Water Quality Initiative
- ORSANCO – Ohio River Valley Water Sanitation Commission
- OSRW – Outstanding State Resource Water
- PCB – Polychlorinated Biphenyl
- PCR – Primary Contact Recreation
- PMP – Program Management Plan
- PSP – Project Study Plan
- REST – Representational State Transfer
- SDWA – Safe Drinking Water Act
- SCR – Secondary Contact Recreation
- SDWIS – Safe Drinking Water Information System
- SOP – Standard Operating Procedure
- SSO – Sanitary Sewer Overflow
- STP – Sewage Treatment Plant
- TDS – Total Dissolved Solid
- TMDL – Total Maximum Daily Load
- USACE – United States Army Corps of Engineers
- USGS – United States Geological Survey
- VIBI – Vegetation Index of Biotic Integrity
- WAH – Warm Water Aquatic Habitat
- WTP – Water Treatment Plant
- WQP – Water Quality Portal
- WWTP – Wastewater Treatment Plant
- QA – Quality Assurance
- QAPP – Quality Assurance Project Plan

Notes for the Reader

If you are reading this, thank you for taking an interest in Kentucky's water resources.

A few items worth highlighting from this cycle:

1. The Ohio River Mainstem had its assessments updated as part of the 2022 cycle, using data collected by the Ohio River Valley Water Sanitation Commission (ORSANCO). As part of the assessment process, the Ohio River was re-segmented from 49 to 77 assessment units. This re-segmentation occurred to recognize outstanding state resource water designations and domestic water supply intakes along the Ohio River, which impact what water quality criteria apply or are enabled. Although the number of assessment units increased, the assessed mileage is unchanged; the entire Ohio River from the Kentucky – West Virginia border to its confluence with the Mississippi River is assessed for at least one designated use.
2. The assessment unit modification spreadsheet can be used when reviewing assessment units that were split from their extent on the 2018-2020 305(b) list.
3. In conjunction with this Integrated Report document, an Integrated Report site has been developed, where information can be reviewed through story maps, dashboards, and interactive maps.

If you have any questions about this report, the 305(b) list, the 303(d) list, the assessment program, or the Total Maximum Daily Load (TMDL) program in Kentucky, please email TMDL@ky.gov.

If you are interested in being kept up to date with public notice periods for future draft 303(d) lists or TMDL activities, please email TMDL@ky.gov to be added to the TMDL information distribution list.

Acknowledgements

Many individuals and organizations contribute to the assessment process. Thank you to all those that contributed data, information, and assessment recommendations. Specifically, I would like to thank all the staff in the Water Quality Branch; your dedication to the efforts of monitoring and assessing the waters of the Commonwealth is greatly appreciated. I would also like to thank all the staff in the Watershed Management Branch for their dedication to accurate geospatial data and their contributions to improve public communication.

Executive Summary

The 2022 Integrated Report (IR) was prepared by the Kentucky Division of Water (DOW), Department for Environmental Protection (DEP), for submittal to the U.S. Environmental Protection Agency (EPA) to fulfill requirements of sections 303(d), 305(b), and 314 of the Federal Water Pollution Control Act (or Clean Water Act (CWA)) of 1972, as subsequently amended.

Section 305(b) of the CWA requires states to submit a biennial report to EPA describing the quality of the state's waters and to provide an inventory of waterbodies with water quality that supports, or fails to support, their designated uses. Section 303(d) of the CWA requires states to maintain a list of impaired waters and to develop a total maximum daily load (TMDL) for each pollutant-waterbody combination that does not meet water quality criteria.

In conjunction with this IR document, an Integrated Report site has been developed to promote public engagement. To create the IR site, an Environmental Systems Research Institute (ESRI) ArcGIS (Geographic Information System) Hub was used to communicate assessments results from the 2022 305(b) using representational state transfer (REST) services, online maps, ArcGIS dashboards, and story maps. The IR site also has information on topics ranging from designated uses (e.g., swimming and fish consumption), assessment categories, monitoring programs, and methodologies used for determining designated use attainment.

Designated Uses

All waterbodies in Kentucky have uses for the management and goal of attaining a minimum level of water quality. Designated uses are promulgated in 401 KAR 10:026 and the implementing (enabling) criteria are in 401 KAR 10:031. The following are applicable designated uses:

- Cold water aquatic habitat (CAH)
- Warm water aquatic habitat (WAH)
    - CAH and WAH are commonly referred to as the aquatic life designated use, and are referenced as such throughout this IR
    - Rivers and streams are either WAH or CAH
    - Lakes and reservoirs designated as CAH are both CAH and WAH
- Primary contact recreation (PCR)
- Secondary contact recreation (SCR)
- Domestic water supply (DWS)
- Outstanding state resource water (OSRW)
- Fish consumption[1]

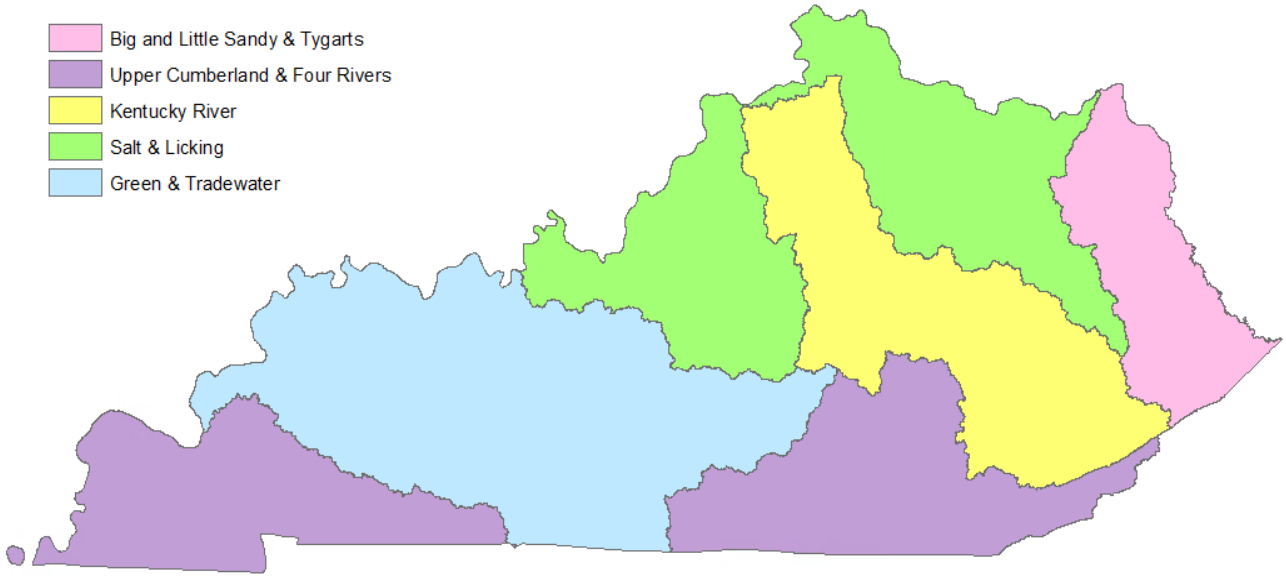
With the exception of CAH and OSRW, the remaining designated uses apply by default to all waterbodies.

[1] Fish consumption is not a designated use but is assessed as such and therefore included in this list.

Monitoring

The DOW operates its ambient rivers monitoring program with a Watershed Management Framework Initiative implemented in 1998, where Basin Management Units (BMU) are sampled on a five-year rotation. Other DOW monitoring programs target the statewide scale of a particular population, or focus on specific watersheds on a small, regional scale.

This reporting cycle represents monitoring efforts that took place between 2016 and 2020. The ambient rivers program sampled in the following BMUs: Big and Little Sandy Rivers and Tygarts Creek BMU, Kentucky River BMU, Salt and Licking Rivers BMU, and the Upper Cumberland and Four Rivers BMU. Data collected by other internal programs and external data contributors provide updates throughout the state. Data collected by the Ohio River Valley Water Sanitation Commission (ORSANCO) were used to update assessments along the Ohio River.



Assessment

Before data are used in the assessment process, they are reviewed to ensure data are of sufficient quantity and quality to make designated use attainment decisions. In total 1,047 sampling locations contributed data to the 2022 cycle, and 615 assessments were completed (Table 1).

To determine if a waterbody meets its designated use(s), available data are summarized and compared to water quality standards according to Kentucky's assessment methodologies, which are developed by the state and approved by EPA. The assessment results are reported in the 305(b), the 303(d), and discussed within this IR.

All assessment results are related to a parameter, such as *E. coli*, sedimentation/siltation, habitat assessments, or flow regime modifications. When there is sufficient evidence to demonstrate that a parameter is not meeting water quality criteria, it is considered a cause of impairment, which can be attributed more generally to pollution or to a specific pollutant. Pollution is a general term that refers to degradation to an ecosystem and can include removing habitat from a streambank to littering.

Pollutants are measurable substances that contribute to pollution that makes the water harmful or unsuitable for a specific purpose; examples include chemicals or waste products.

For more detailed information about Kentucky's assessment and listing methodology, refer to the Consolidated Assessment and Listing Methodology (CALM): Surface Water Quality Assessment in Kentucky, the Integrated Report (KDOW 2015). In addition to this document, an update to Kentucky's Assessment Methodology for Fish Consumption (KDOW 2020) is considered an addendum to the CALM, and should be used in place of the fish consumption method outlined in section 3.6 on page 55 of the 2015 CALM document.

Table 1. Number of samples collected and analyzed per data type where the data were used for assessment during this 2022 Integrated Reporting cycle.

PATHOGENS	CHLOROPHYLL-A	FIELD MEASUREMENT	WATER CHEMISTRY	TISSUE	FISH	MACRO-INVERTEBRATES
8,936	1,284	12,516	9,268	490	348	364

Categories and Attainment

The 305(b) list is a list of all waterbodies that have been assessed for one or more designated uses this cycle or any prior cycle. Waterbodies on the 305(b) list are put into different categories depending upon the assessment decision made for that waterbody. Categories are assigned at the parameter level, which is the level that data are collected and analyzed, the designated use level, which is the level that the water quality standards for a particular parameter apply, and the assessment unit level, which is determined from the assessed designated uses and their categories (Figure 1).

Impaired waters are those waters found to partially support or not support one or more of their designated uses due to either a pollution or a pollutant. The 303(d) list, which is a subset of the 305(b) list, is only those waters in category 5, where the cause of impairment is identified as a pollutant and a TMDL is required (Figure 1).

Results

305(b) Results

The 305(b) list is an inventory of all waterbodies that have been assessed for at least one designated use from this cycle and all prior cycles. The spatial extent of each assessment unit is identified within the list. Kentucky's 2022 305(b) list has 2,954 assessment units representing 13,139.4 river miles, 212,585 lake/ reservoir acres, and 170,469 springshed acres. The 305(b) workbook has a tab for the 305(b) list, the 303(d) list, new listings (cycle first listed 2022), pollutants proposed to EPA for delisting, waters with a TMDL, and impaired waters.

Designated Use Level (all waterbody types)

For all 2,954 assessment units on the 2022 305(b) list, regardless of waterbody type, attainment per designated use is displayed in Figure 2.

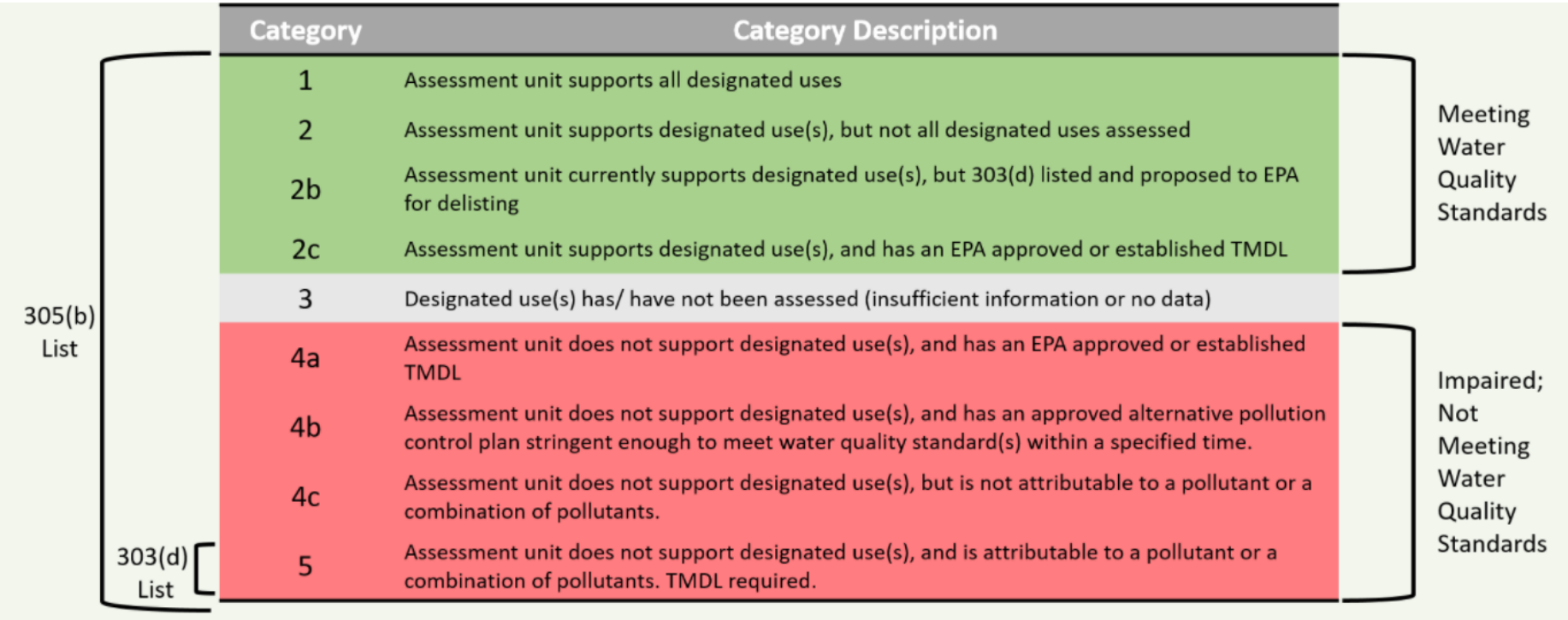


Figure 1. Category definition at the assessment unit level.

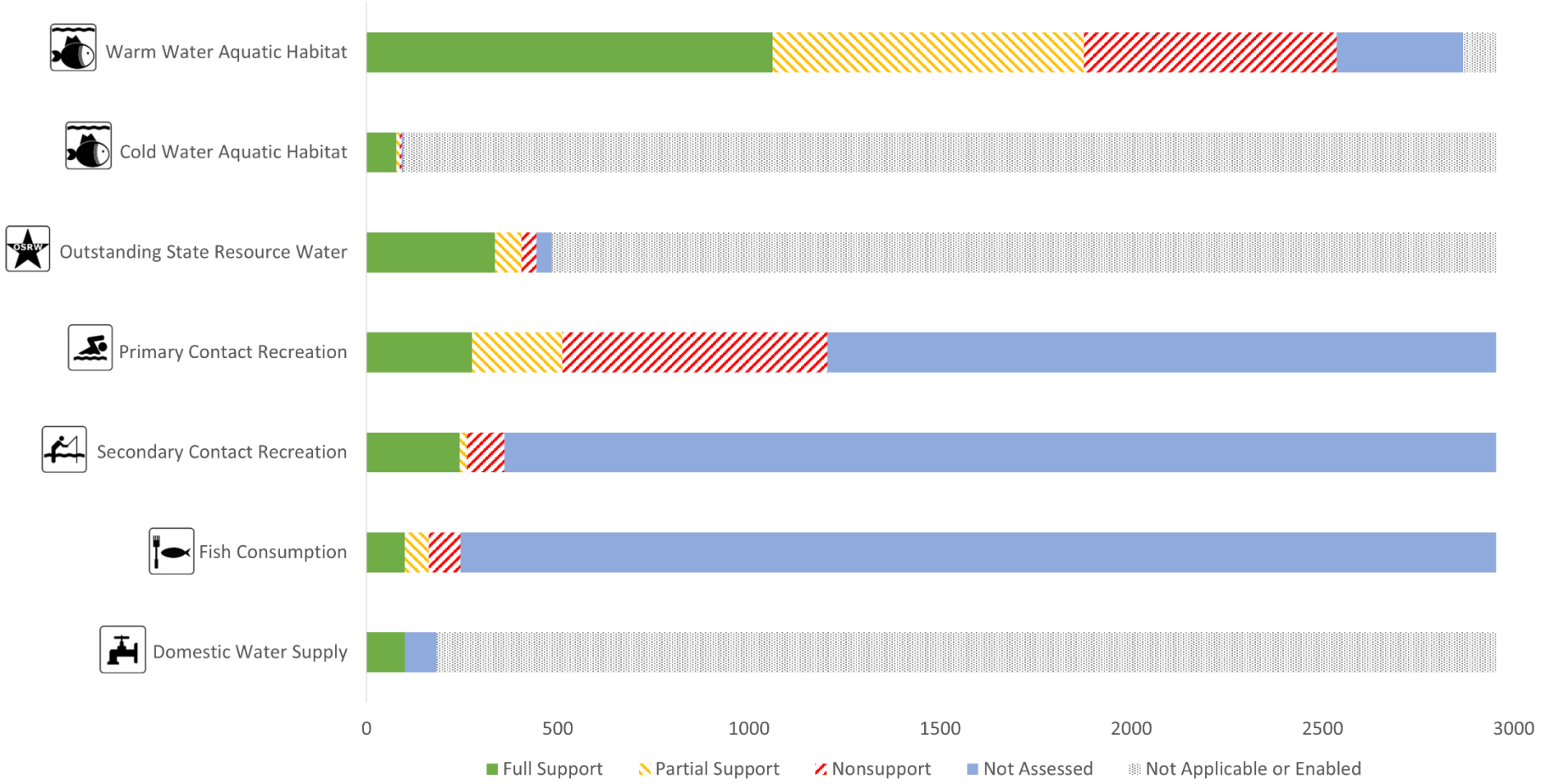


Figure 2. Assessment status and attainment for all 2,954 assessment units on the 2022 305(b) per designated use.

Warm Water Aquatic Habitat

On the 2022 305(b) list, 2,537 assessment units have been assessed for the WAH designated use, making it the most assessed designated use on the 305(b) list. Of those assessed, 1,062 fully support the WAH designated use, while 1,475 are impaired. River and stream assessment units represent 2,435 of the assessment units, of which 1,009 are meeting and 1,426 are impaired. Lake and reservoir assessment units represent 101 of the assessment units, of which 52 are meeting and 49 are impaired (Figure 3).

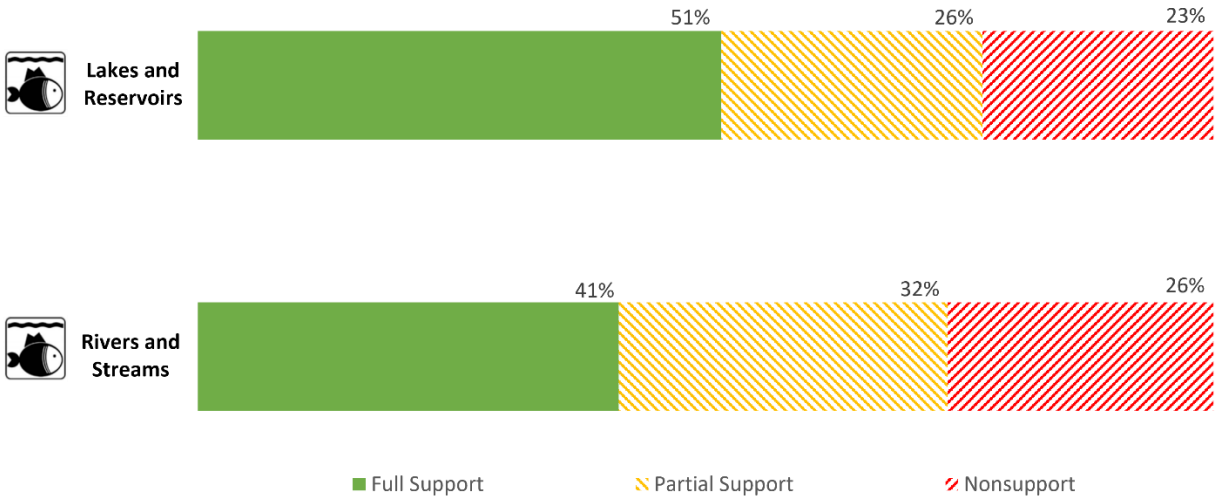


Figure 3. Proportion of rivers/streams and lakes/reservoirs assessed as full support, partial support, or nonsupport of those waterbodies assessed for the WAH designated use.

Cold Water Aquatic Habitat

On the 2022 305(b) list, 92 assessment units have been assessed for the CAH designated use. River and stream assessment units represent 83 of those assessment units, of which 69 are meeting and 14 are impaired (Figure 4). Lake and reservoir assessment units represent 9 of those assessment units, all of which are meeting (100%).

Figure 4. Proportion of rivers/streams assessed as full support, partial support, or nonsupport of those waterbodies assessed for the CAH designated use.

Outstanding State Resource Water

On the 2022 305(b) list, 445 assessment units have been assessed for the OSRW designated use. Most of the waterbodies assessed for this use are rivers and streams (442 of the 445), with 334 assessment units found to fully support the OSRW designated use and 108 found to be impaired (Figure 5).

Figure 5. Proportion of rivers/streams assessed as full support, partial support, or nonsupport of those waterbodies assessed for the outstanding state resource water (OSRW) designated use.

Primary Contact Recreation

On the 2022 305(b) list, 1,205 assessment units have been assessed for the PCR designated use. Of those assessed, 276 were found to fully support the designated use, while 929 were found to be impaired. River and stream assessment units represent 1,186 of the assessment units, of which 268 are meeting and 918 are impaired for the PCR use (Figure 6). Spring assessment units represent 12 of the assessment units, of which one is meeting and 11 are impaired for the PCR use. Lake and reservoir assessment units represent seven of the assessment units, all of which are meeting the PCR use.

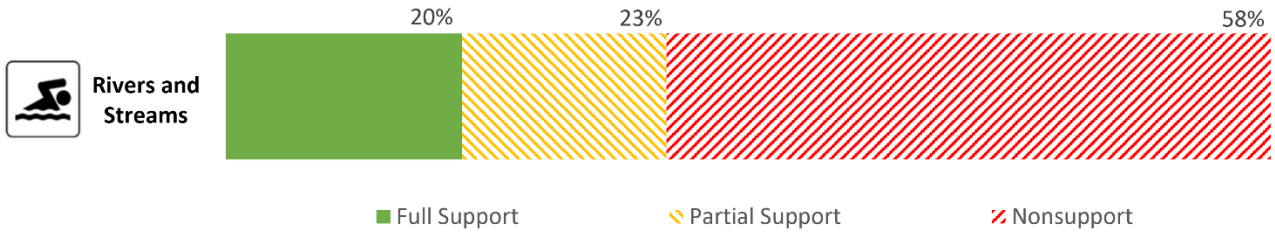


Figure 6. Proportion of rivers/streams assessed as full support, partial support, or nonsupport of those waterbodies assessed for the PCR designated use.

Secondary Contact Recreation

On the 2022 305(b) list, 357 assessment units have been assessed for the SCR designated use. Of those assessed, 243 were found to fully support the designated use, while 114 were found to be impaired. River and stream assessment units represent 287 of the assessment units, of which 173 are meeting and 114 are impaired for the SCR use. Lake and reservoir assessment units represent 69 of the assessment

units, all of which are meeting the SCR use (Figure 7). One spring has been assessed, which is full support.

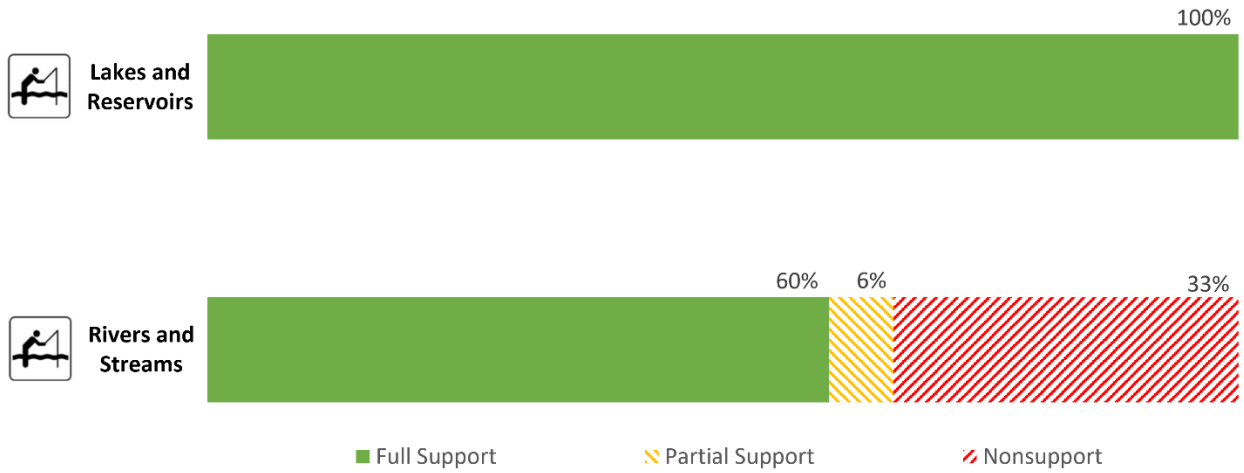


Figure 7. Proportion of rivers/streams and lakes/reservoirs assessed as full support, partial support, or nonsupport of those waterbodies assessed for the SCR designated use.

Fish Consumption

On the 2022 305(b) list, 245 assessment units have been assessed for fish consumption. Of those assessed, 99 were found to fully support the designated use, while 146 were found to be impaired. River and stream assessment units represent 202 of the assessment units, of which 78 are meeting and 124 are impaired for fish consumption. Lake and reservoir assessment units represent 43 of the assessment units, of which 21 are meeting and 22 are impaired for fish consumption (Figure 8).

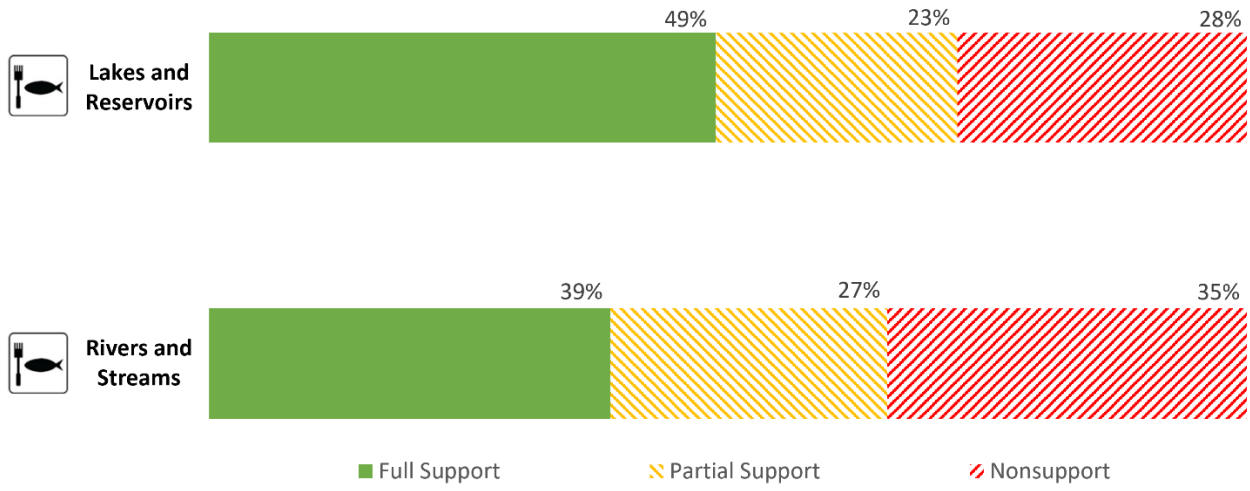


Figure 8. Proportion of rivers/streams and lakes/reservoirs assessed as full support, partial support, or nonsupport of those waterbodies assessed for fish consumption.

Impaired Waters

Impaired waters are a subset of the 305(b) list and are those waterbodies where at least one designated use is not being supported, and the cause of impairment is either a pollution (category 4c), a pollutant but a TMDL has not been developed (category 5), or a pollutant and a TMDL has been developed (category 4a).

Of the 2,954 assessment units on the 2022 305(b) list, 1,979 assessment units are impaired for at least one designated use. Broken down by waterbody type, 1,903 rivers/streams are impaired totaling 9,110.7 river miles, 65 lakes/reservoirs are impaired totaling 185,922 acres, and 11 springs are impaired totaling 86,074 springshed acres.

The impaired waters tab of the 305(b) workbook has specific information about all assessment units identified as impaired for one or more designated uses. Parameter level information for those identified as a cause of impairment is available per assessment unit, including if that parameter has a TMDL, the parameter's category, TMDL priority rank (if applicable), cycle first listed (if applicable), and suspected sources.

Causes of Impairment

There are 4,411 parameter-waterbody combinations on the impaired waters list. Those parameters fall into three reporting categories:

1. 2,925 are in category 5, meaning the parameter is a pollutant, identified as a cause of impairment, and requires a TMDL
    a. This is the 303(d) list
2. 788 are in category 4a, meaning the parameter is a pollutant, identified as a cause of impairment, and has an EPA-approved TMDL
3. 698 are in category 4c, meaning the parameter is a pollution, identified as a cause of impairment, but does not require a TMDL

Parameters can be grouped to explore types of impairments throughout the Commonwealth. Figure 9 shows the parameters identified as a cause of impairment on the 2022 305(b) list grouped into the following themes:

1. Pathogens
2. Sedimentation
3. Nutrients
4. Biologic Integrity (Bioassessments)
5. Salinity/Total Dissolved Solids (TDS)/Chlorides/Sulfates
6. Metals (Other than Mercury)
7. Organic Enrichment/Oxygen Depletion
8. Other (including cause unknown)
9. Polychlorinated Biphenyls (PCBs)
10. Habitat Alterations
11. pH/Acidity/Caustic Conditions
12. Dioxins
13. Hydrologic Alteration
14. Turbidity
15. Mercury

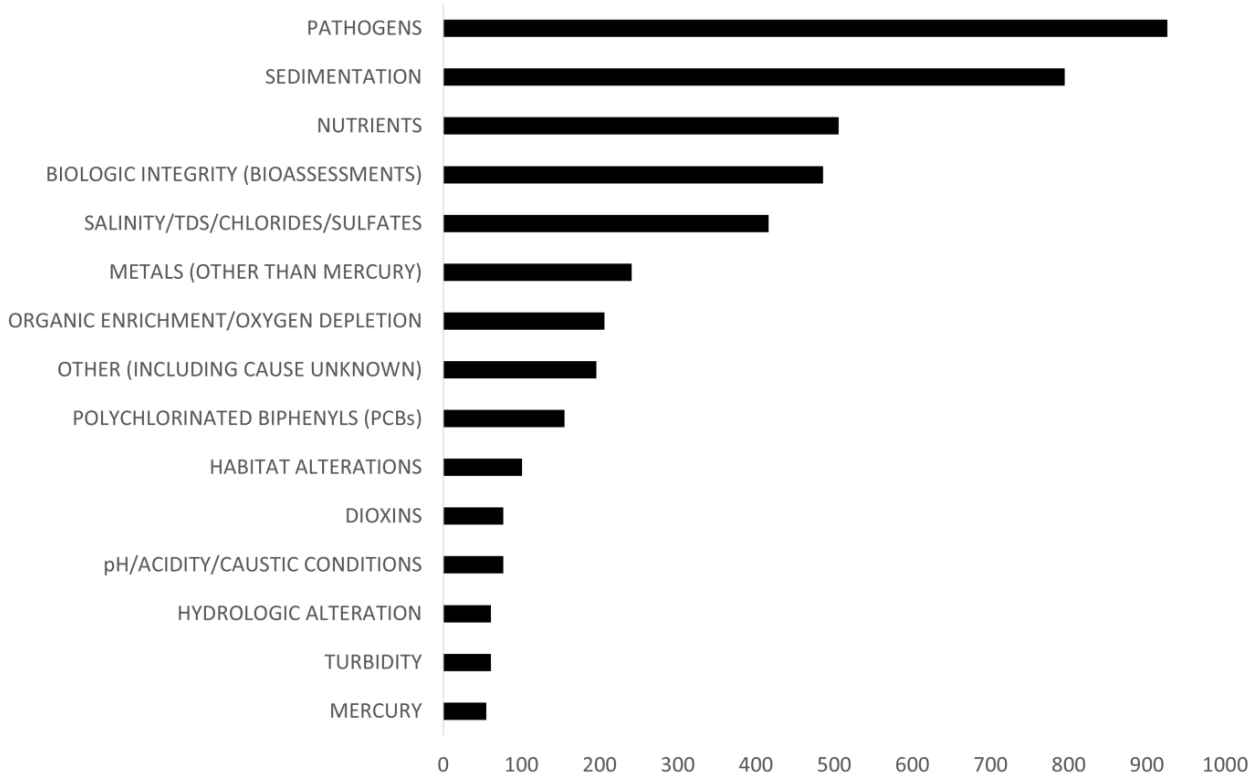


Figure 9. Types of impairments on the 2022 305(b) list where parameters have been grouped into 15 themes to better understand the number and types of impairments throughout the Commonwealth.

The 303(d) List

The 303(d) list includes all waterbodies identified as being impaired (not meeting water quality standards) by one or more pollutants where a TMDL has not yet been developed but is required. The 2022 303(d) list has 2,925 pollutant-waterbody combinations in need of a TMDL. Each pollutant-waterbody combination is in category 5, has a cycle first listed, suspected sources, and a TMDL priority rank (high, medium, or low) (Table 2).

Broken down by waterbody type, 1,468 rivers/streams are on the 303(d) list totaling 7,176.4 river miles, 64 lakes/reservoirs are on the 303(d) list totaling 185,717 acres, and nine springs are on the 303(d) list totaling 82,990 springshed acres.

Although the 303(d) list is sometimes referred to as the "impaired waters list," it is specifically a subset of the impaired waters where the parameter identified as a cause of impairment is a pollutant and a TMDL has not yet been developed. Figure 10 shows the number of impairments per parameter group that are in need of a TMDL, with the priority per parameter group distinguished by low (light gray), medium (dark gray), and high (black).

The 303(d) tab of the 305(b) workbook has the official information about all pollutant-waterbody combinations that are on the 303(d) list.

Table 2. Definitions of TMDL priority ranks.

High	TMDL is in development or will be in development within the next two years and is expected to be completed during the next one to two reporting cycles (within 1-4 years). Waters ranked as high priority focus in part on those identified in the Division's 303(d) Long Term Vision Priorities.
Medium	TMDL strategies are in the planning stage for the waterbody and/or pollutant. Methodologies may be under development or data collection may be planned or ongoing. Opportunities for alternative restoration plans may be under review.
Low	A TMDL is not currently in development. This rank includes TMDLs for which methodologies may be in development for the pollutant or waterbody type. Some waters ranked as low priority for TMDL development have an EPA-accepted alternative restoration plan that is being implemented, or have an alternative restoration plan in development that is expected to be EPA-accepted within the next two reporting cycles. The progress of each alternative restoration plan is reviewed each cycle to ensure the plan is on track to restoring water quality. The TMDL development priority rank may be updated based on this review. See table columns in the 303(d) list related to "Restoration Plans" for information on these alternative restoration plans.

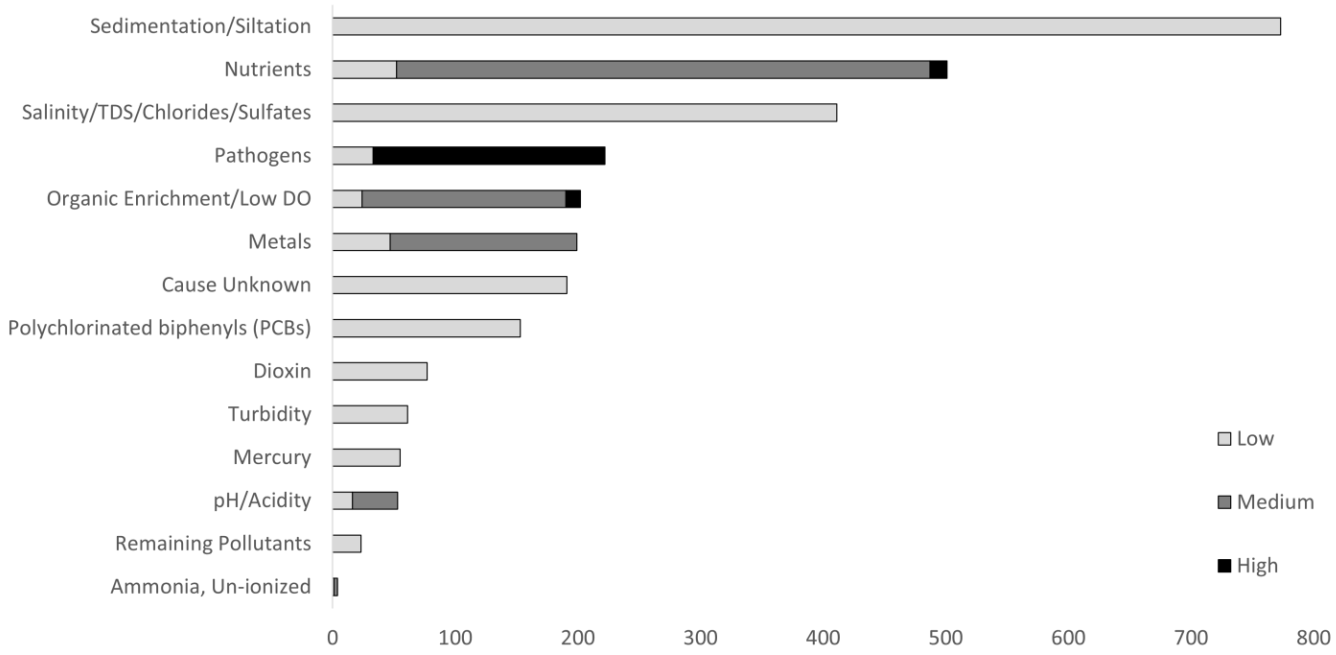


Figure 10. Number of impairments per parameter group where the parameter is on the 303(d) list because a TMDL is required but has not yet been developed. TMDL priority rank distinguished by low (light gray), medium (dark gray), and high (black).

Waters with TMDLs

On the 2022 305(b) list there are 829 pollutant-waterbody combinations with an EPA-approved TMDL. The 'waters with a TMDL' tab of the 305(b) workbook has the official information about all pollutant-waterbody combinations with an EPA-approved TMDL.

Since EPA approved the 2018-2020 303(d) list on February 24, 2022, EPA has approved the following TMDLs, representing 86 pollutant-waterbody combinations:

1. Statewide TMDL for Bacteria Impaired Waters: Lower Cumberland River, Mississippi River Minor Tributary Watersheds, Tennessee River, and Upper Cumberland River Basin Appendices (KYACT_10), approved by EPA on 8/31/2022
2. Statewide TMDL for Bacteria Impaired Waters: Ohio River Minor Tributary Watersheds Appendix (KYACT_11), approved by EPA 9/6/2022

The Approved TMDL Reports webpage has all EPA-approved TMDLs, with a link to each report.

Total Maximum Daily Load Program

The DOW is implementing the national Clean Water Act 303(d) Program Vision, which calls for states to prioritize impaired waters for TMDL development and to develop TMDL Alternative Approaches where appropriate in the context of a long-term planning framework.

In 2011, the Clean Water Act 303(d) Program Vision (henceforth referred to as 'the vision') was developed by the EPA and state TMDL program managers as a new path forward for the TMDL program. Key issues were discussed, and six goals were outlined to encourage creativity in developing tailored approaches to achieve water quality restoration more effectively. These six goals are Prioritization, Assessment, Protection, Alternatives, Engagement, and Integration. The vision allows Kentucky to develop state-specific priorities, encourages stakeholder engagement, and allows Kentucky's TMDL program to integrate their work with other Clean Water Act program priorities. The vision fosters flexible watershed management but requires the support of many stakeholders – including public, federal, and state agencies – to attain this common goal.

In 2016, the DOW submitted a first draft of vision priorities to the EPA. The vision priorities list was updated in 2018 using the 2016 303(d) list. This vision priorities list consisted of pollutant-waterbody combinations that prioritized having a TMDL or TMDL alternative plan developed by 2022. EPA's final measure for the 303(d) Long Term Vision period, which ended in September of 2022, was 92.7%. This number is based on catchment area with plans in place, goal versus completed.

In 2024, the states and EPA anticipate beginning a new long-term 303(d) "vision" planning period. In the interim, DOW will be completing several TMDL Alternative Plans currently in development as well as continuing work on TMDL projects in progress. Kentucky will continue to engage with the public and stakeholders across the Commonwealth and work to integrate with other Clean Water Act programs in developing priorities for the next long-term planning period.

If you have questions about the TMDL program, the vision, or alternative restoration approaches, email TMDL@ky.gov.

Introduction

The 2022 Integrated Report (IR) was prepared by the Kentucky Division of Water (DOW), Department for Environmental Protection (DEP), for submittal to the U.S. Environmental Protection Agency (EPA) to fulfill requirements of sections 303(d), 305(b), and 314 of the Federal Water Pollution Control Act (or Clean Water Act (CWA)) of 1972, as subsequently amended. Section 305(b) of the CWA requires states to assess and report current water quality conditions to EPA every two years.

In conjunction with this IR document, an Integrated Report site has been developed to promote public engagement. To create the IR site, an ESRI ArcGIS Hub was used to communicate assessments results from the 2022 305(b) using REST services, online maps, ArcGIS dashboards, and story maps. The IR site also has information on topics ranging from designated uses (e.g., swimming and fish consumption), assessment categories, monitoring programs, and methodologies used for determining designated use attainment.

Designated Uses

All waterbodies in Kentucky have uses for the management and goal of attaining a minimum level of water quality. Designated uses are promulgated in 401 KAR 10:026 and the implementing (enabling) criteria are in 401 KAR 10:031. The following are applicable designated uses:

- Cold water aquatic habitat (CAH)
- Warm water aquatic habitat (WAH)
    - CAH and WAH are commonly referred to as the aquatic life designated use, and are referenced as such throughout this IR
    - Rivers and streams are either WAH or CAH
    - Lakes and reservoirs designated as CAH are both CAH and WAH
- Primary contact recreation (PCR)
- Secondary contact recreation (SCR)
- Domestic water supply (DWS)
- Outstanding state resource water (OSRW)
- Fish consumption[2]

With the exception of CAH and OSRW, the remaining designated uses apply by default to all waterbodies. View the designated use story map or read below for a description of each designated use.

Cold Water Aquatic Habitat (CAH)

As defined in 401 KAR 10:001, CAH means surface waters and associated substrate that are able to support indigenous aquatic life or self-sustaining or reproducing trout populations on a year-round basis. All waterbodies designated as CAH are listed in 401 KAR 10:026, Table C entitled 'Waters with Added Designated Uses.' There are implementing criteria specific to CAHs; however, where there are no criteria specific to CAH, those criteria promulgated for WAH apply.

Warm Water Aquatic Habitat (WAH)

WAH applies to the majority of waterbodies in the Commonwealth, and are those not designated as CAH (with the exception of lakes or reservoirs that are designated as both CAH and WAH). As defined in 401 KAR 10:001, WAH means a surface water and associated substrate capable of supporting indigenous warm water aquatic life.

Outstanding State Resource Water (OSRW)

This designated use provides additional measures for maintenance of habitat quality, including water quality, for the protection of federally threatened or endangered species that inhabit the OSRW. Additionally, select waterbodies that have water quality and habitat that support a diverse fish or macroinvertebrate community and rate excellent on either the fish (Compton et al. 2003) or macroinvertebrate (Pond et al. 2003) biological community multimetric index may be proposed for designation as an OSRW. Other attributes that qualify a waterbody for OSRW designation can be found in 401 KAR 10:031, Surface Water Standards, Section 8.

[2] Fish consumption is not a designated use but is assessed as such and therefore included in this list.

All waterbodies designated as OSRW are listed in 401 KAR 10:026, Table C entitled 'Waters with Added Designated Uses.' There are implementing criteria specific to OSRWs; however, where there are no criteria specific to OSRW, those criteria promulgated for WAH apply. Both designated and candidate OSRWs are published on the DOW's special waters webpage, so this is often the most up-to-date source of OSRW listings that include candidate waterbodies or segments.

Primary Contact Recreation (PCR) – "Swimming"

PCR is the designated use for waterbodies in the Commonwealth with the implementing criteria to manage water quality for the protection of human health against pathogenic-induced gastrointestinal illnesses during the recreation season of May 1 through October 31. The bacterium *Escherichia coli* (*E. coli*) is a commonly used indicator organism to monitor water quality for safe swimming conditions, where full-body immersion is likely. *E. coli* are bacteria found in the guts of warm-blooded organisms, including humans. The presence of *E. coli* indicate there is likely waste from warm-blooded organisms present in the waterbody and with it the expectation of various pathogenic viruses, parasites, and pathogenic strains of bacteria, including *E. coli*. A criterion for pH applies to this designated use during the recreation season. This criterion provides protection to the bather from extremes of both acidic and basic conditions.

Secondary Contact Recreation (SCR) – "Boating and Wading"

SCR is the designated use for waterbodies in the Commonwealth with the implementing criteria to manage water quality for the protection of human health against pathogenic gastrointestinal illnesses and maintain a safe range for pH. These criteria apply to this designated use year-round. Fecal coliforms are bacteria found in the guts of warm-blooded organisms and are the indicator used to monitor the water quality for safe boating and wading, or any form of recreation that does not include full-body immersion. The pH criterion protects against extremes of water quality regarding acidic and basic conditions. Additional criteria exist to protect the designated use from such conditions including nuisance algal blooms, nuisance aquatic macrophytes, or other forms of pollutions that may deter from the aesthetic qualities of a waterbody.

Domestic Water Supply (DWS)

As defined in 401 KAR 10:001, DWS means surface waters that, with conventional domestic water supply treatment, are suitable for human consumption through a public water system as defined by 40 CFR 141.2, for culinary purposes, or for use in a food or beverage processing industry; and meet state and federal regulations promulgated pursuant to the Safe Drinking Water Act, as amended, 42 U.S.C. 300f - 300j-26.

The DWS designated use applies to all waters in the Commonwealth; however, the enabling criteria that implement this designated use are only applied at the point of withdrawal by a public treatment facility. Public water systems are defined as those systems that have at least 15 service connections or regularly serve an average of 25 or more individuals (40 CFR 141.2). The human health criteria that apply are found in 401 KAR 10:031 (Section 6, Table 1, column entitled 'DWS').

Fish Consumption

Fish consumption is not a designated use per state regulation. However, there exist 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 401 KAR 10:031, Surface Water Standards, Sections 2 and 6. As such, the U.S. EPA agrees and requires the assessment results of fish tissue monitoring be reported in Section 305(b) of the CWA under the fish consumption designated use.

Monitoring & Data Acquisition

The DOW began monitoring the water quality of Kentucky's rivers, streams, and reservoirs over 40 years ago. Early monitoring consisted of 45 stations spread across the state. Since then, the number of monitoring locations has grown considerably. DOW's surface water monitoring programs are designed to meet the following federal Clean Water Act and state objectives:

- Determining if the water quality of the Commonwealth's rivers, streams, and reservoirs is protective of human health while supporting healthy aquatic communities;
- Identifying waters that are not meeting water quality standards, and the causes and sources of the water quality impairments;
- Supporting the development, review, and revision of state water quality standards;
- Aiding in the development and implementation of water quality management programs;
- Evaluating the effectiveness of water quality management programs; and
- Providing data to inform public health advisories for recreation and fish consumption.

Visit DOW's surface water monitoring webpage to learn more about each program within DOW.

The DOW operates its ambient rivers monitoring program with a Watershed Management Framework Initiative implemented in 1998, where Basin Management Units (BMU) are sampled on a five-year rotation. Other DOW monitoring programs target the statewide scale of a particular population (e.g. ambient lakes and fish tissue), or focus on specific watersheds on a small, regional scale (e.g. intensive surveys). All data generated by the DOW is housed in the Kentucky Water Assessment Data for Environmental Monitoring (K-WADE) application, a web-based oracle database.

The DOW also uses data collected by outside agencies, such as Louisville Metropolitan Sewer District (MSD), United States Army Corps of Engineers (USACE), and the Ohio River Valley Water Sanitation Commission (ORSANCO). External data is acquired through a data solicitation process, or through routine communication and collaboration with data partners.

Lastly, facility data is gathered via the Safe Drinking Water Information System (SDWIS) or EPA's Enforcement and Compliance History Online (ECHO) website. Where appropriate, facility data from the cycle's sampling timeframe is reviewed in conjunction with instream data as supplementary information.

The follow monitoring programs provided data that was of sufficient quantity and quality for assessment in the 2022 cycle (view this monitoring program dashboard for a more interactive approach):

- DOW's Ambient Rivers program sampled 150 locations in the following BMUs: Big and Little Sandy Rivers and Tygarts Creek BMU (2017), Kentucky River BMU (2018), Salt and Licking Rivers BMU (2019), and Upper Cumberland and Four Rivers BMU (2020).
    - Data Source: K-WADE
- DOW's ambient lakes program sampled 86 locations across 57 waterbodies.
    - Data Source: K-WADE
- The intensive survey program monitored 131 locations across the state.
    - Data Source: K-WADE
- The fish tissue contaminant monitoring program sampled 123 locations across 72 waterbodies.
    - Data Source: K-WADE

- MSD contributed data from 9 sampling locations.
    - Data Source: Submitted to DOW through the data solicitation process
- USACE contributed data from 162 sampling locations.
    - Data Source: Submitted to DOW through the data solicitation process
- ORSANCO contributed data from 237 sampling locations.
    - Data Source: Water Quality Portal (WQP) or ORSANCO's website

In total, 1,047 locations contributed data and/or information to assessments for this 2022 IR cycle. Those locations represent streams, rivers, lakes, reservoirs, springs, and facilities. Table 3 shows the number of samples collected and analyzed per data type per program for this cycle, where facility data has been excluded (view this data type dashboard for a more interactive approach).

Table 3. Number of samples collected and analyzed per data type per program where the data were used for assessment during this 2022 Integrated Reporting cycle.

PROGRAM	PATHOGENS	CHLOROPHYLL-A	WATER CHEMISTRY	TISSUE	FISH	MACRO-INVERTEBRATES
DOW Ambient Lakes	0	203	204	0	0	0
DOW Ambient Rivers	1,039	0	2,193	0	0	0
DOW Intensive Survey	105	0	745	0	0	32
DOW Fish Tissue	0	0	0	134	0	0
USACE	232	439	1,095	0	11	13
ORSANCO	1,654	0	397	111	163	137
MSD	1,438	0	0	0	0	0

Assessment

Before data are used in the assessment process, they are reviewed to ensure data are of sufficient quantity and quality to make designated use attainment decisions. This review process includes a primary and secondary quality assurance (QA) of the data collected. The following are considered when determining a data's usability, recognizing that not all points of consideration are applicable depending on the data type and source:

- Data were collected in accordance with any applicable Quality Assurance Project Plan (QAPP), Program Management Plan (PMP), or Project Study Plan (PSP)
- Applicable Standard Operating Procedures (SOP) were followed
- Appropriate site(s) visited with necessary field forms and documentation (e.g., Chain of Custody)
- Meters calibrated appropriately and calibration trackable to an instrument and site visit
- Data quality objectives (DQOs) were met as supported by QA samples
- Any other project specific details in need of verification

All decisions to use, or not use, readily available data were tracked in either K-WADE, where DOW houses its monitoring data, or Kentucky's Assessment and TMDL Tracking System (KATTS), where DOW houses its assessment data before submittal to EPA's Assessment and Total Maximum Daily Load Tracking and Implementation System (ATTAINS).

To complete assessments, available data of sufficient quantity and quality are summarized and evaluated against applicable water quality criteria according to Kentucky assessment methodologies. DOW uses a programming script to automate how the data are summarized and compared to water quality criteria. This approach allows large amounts of data to be evaluated consistently and transparently, while avoiding issues associated with manual data processing.

The summarized data are reviewed to make final attainment decisions, which are stored in KATTS and reported in the 305(b), the 303(d), and discussed within this IR. All assessment results are related to a parameter, such as *E. coli*, sedimentation/siltation, habitat assessments, or flow regime modifications. When there is sufficient evidence to demonstrate that a parameter is not meeting water quality criteria, it is considered a cause of impairment, which can be attributed more generally to pollution or to a specific pollutant. Pollution is a general term that refers to degradation to an ecosystem and can include removing habitat from a streambank to littering. Pollutants are measurable substances that contribute to pollution that makes the water harmful or unsuitable for a specific purpose; examples include chemicals or waste products.

When sampling occurs, specific information is gathered for each designated use.

- To assess PCR - bacteria levels are examined during the recreation season (May – October)
- To assess aquatic life for streams - water chemistry, habitat, and biological communities are examined; United States Geological Survey (USGS) gage data is examined if available
- To assess aquatic life for lakes - profile data, chlorophyll-a, and water chemistry data are examined
- To assess fish consumption – fish are collected where their tissue (usually fillet) is examined for pollutants of concern, such as mercury and PCBs

For more detailed information about Kentucky's assessment and listing methodology, refer to the Consolidated Assessment and Listing Methodology (CALM): Surface Water Quality Assessment in Kentucky, the Integrated Report (KDOW 2015). In addition to this document, an update to Kentucky's Assessment Methodology for Fish Consumption (KDOW 2020) is considered an addendum to the CALM, and should be used in place of the fish consumption method outlined in section 3.6 on page 55 of the 2015 CALM document. The reader may also find EPA's factsheets on water quality parameters a helpful resource.

Categories and Attainment

The 305(b) list is a list of all waterbodies that have been assessed for one or more designated uses. Waterbodies on the 305(b) list are put into different categories depending upon the assessment decision made for that waterbody. Categories are assigned at the parameter level, which is the level that data are collected and analyzed, the designated use level, which is the level that the water quality standards for a particular parameter apply, and the assessment unit level, which is determined from the assessed designated uses and their categories (Figure 11).

Impaired waters are those waters found to partially support or not support one or more of their designated uses due to either a pollution or a pollutant. The 303(d) list, which is a subset of the 305(b) list, are those waters identified as impaired where the cause of impairment is a pollutant and a TMDL is required. All pollutant-waterbody combinations on the 303(d) list are in category 5 (Figure 11).

The 305(b) list is a cumulative list; once a waterbody is on this list, it remains. A waterbody may change categories depending upon the use attainment(s), but it is always accounted for on the 305(b) list. This IR focuses on waters that had available data (of sufficient quantity and quality) to make an assessment decision for the 2022 IR. Any historic assessment from the 2018/2020 305(b) list that did not have new data collected was passed forward to the 2022 305(b) list unchanged. View this category story map for a more interactive approach to view and learn about reporting categories in Kentucky.

	Category	Assessment Unit Category Definition	Designated Use Category Definition	Parameter Category Definition	
305(b)	1	Assessment unit supports all designated uses, and all applicable designated uses assessed			Meeting
	2	Assessment unit supports designated use(s), but not all designated uses assessed	Designated use is supported	Parameter meets water quality standard	
	2b	Assessment unit currently supports designated use(s), but previously impaired and proposed for delisting	Designated use is supported, but previously impaired and proposed for delisting	Parameter meets water quality standard, but previously identified as a cause of impairment and proposed for delisting	
	2c	Assessment unit supports designated use(s), and has an EPA approved or established TMDL	Designated use is supported, and has an EPA approved or established TMDL	Parameter meets water quality standard, and has an EPA approved or established TMDL	
	3	Designated use(s) has/have not been assessed (insufficient information or no data)	Designated use has not been assessed (insufficient information or no data)	Parameter level attainment has not been assessed (insufficient information or no data)	
	4a	Assessment Unit does not support designated use(s), and has an EPA approved or established TMDL	Designated use is impaired, and has an EPA approved or established TMDL	Parameter does not meet water quality standards, and has an EPA approved or established TMDL	Impaired
	4b	Assessment unit does not support designated use(s), and has an approved alternative pollution control plan stringent enough to meet water quality standard(s) within a specified time	Designated use is impaired, and has an approved alternative pollution control plan stringent enough to meet water quality standard(s) within a specified time	Parameter does not meet water quality standards, and has an approved alternative pollution control plan stringent enough to meet water quality standard(s) within a specified time	
	4c	Assessment unit does not support designated use(s), but is not attributable to a pollutant or a combination of pollutants	Designated use is impaired, but is not attributable to a pollutant or a combination of pollutants	Parameter does not meet water quality standards, and that parameter is a pollution	
303(d)	5	Assessment unit does not support designated use(s), and is attributable to a pollutant or a combination of pollutants; TMDL required	Designated use is impaired, and is attributable to a pollutant or a combination of pollutants; TMDL required	Parameter does not meet water quality standards, and that parameter is a pollutant; TMDL required	

Figure 11. Definition of each category at the assessment unit level, the designated use level, and the parameter level; the figure demonstrates how these categories relate to the 305(b), meeting versus impaired, and the 303(d).

Results

Statewide Scale Results

The following sections discuss the 305(b) list, the 303(d) list, new listings, delistings submitted to EPA, and waters with an EPA-approved TMDL. This same information can be found in the 305(b) workbook. For a more interactive approach to these results, visit the assessment results page of the IR site.

The 305(b) List

The 305(b) list is an inventory of all waterbodies that have been assessed for at least one designated use from this cycle and all prior cycles. The spatial extent of each assessment unit is identified within the list. Kentucky's 2022 305(b) list has 2,954 assessment units representing 13,139.4 river miles, 212,585 lake/ reservoir acres, and 170,469 springshed acres.

Table 4 shows how many assessment units are in each category at the designated use level and at the assessment unit level. Categories 2, 2b, and 2c relate to the assessment unit or designated use being met (full support), category 3 is unassessed, and categories 4a, 4c, and 5 relate to the assessment unit or designated use being impaired (partial support or nonsupport). Category 1 is only applicable at the assessment unit level and means all applicable designated uses have been assessed and all are meeting, of which there are six (Table 4).

Table 4. Number of assessment units (AU) in each category per designated use and per assessment unit for all assessment units on Kentucky's 2022 305(b) list.

Category	WAH	CAH	OSRW	PCR	SCR	DWS	AU
1	N/A	N/A	N/A	N/A	N/A	N/A	6
2	1047	77	336	249	232	98	944
2b	9	1	0	2	0	1	9
2c	6	0	0	25	11	0	11
3	330	4	39	1749	2593	2855	5
4a	18	1	2	670	77	0	358
4c	105	1	8	0	4	0	80
5	1352	12	99	259	37	0	1541

The 305(b) list tab of the 305(b) workbook has the official information about all assessment units that are on the 305(b) list, or the 305(b) tab of the 305(b) dashboard can be explored for a more interactive approach.

The 303(d) List

The 303(d) list is a subset of the 305(b) list and includes all waterbodies identified as being impaired (not meeting water quality standards) by one or more pollutants where a TMDL is required. Each pollutant-waterbody combination is in category 5, has a cycle first listed, suspected sources, and a TMDL priority rank (high, medium, or low) (Table 5).

Table 5. Definitions of TMDL priority ranks.

High	TMDL is in development or will be in development within the next two years and is expected to be completed during the next one to two reporting cycles (within 1-4 years). Waters ranked as high priority focus in part on those identified in the Division's 303(d) Long Term Vision Priorities.
Medium	TMDL strategies are in the planning stage for the waterbody and/or pollutant. Methodologies may be under development or data collection may be planned or ongoing. Opportunities for alternative restoration plans may be under review.
Low	A TMDL is not currently in development. This rank includes TMDLs for which methodologies may be in development for the pollutant or waterbody type. Some waters ranked as low priority for TMDL development have an EPA-accepted alternative restoration plan that is being implemented, or have an alternative restoration plan in development that is expected to be EPA-accepted within the next two reporting cycles. The progress of each alternative restoration plan is reviewed each cycle to ensure the plan is on track to restoring water quality. The TMDL development priority rank may be updated based on this review. See table columns in the 303(d) list related to "Restoration Plans" for information on these alternative restoration plans.

On the 2022 303(d), there are 2,925 pollutant-waterbody combinations that require a TMDL. Broken down by waterbody type, 1,468 rivers/streams are on the 303(d) list totaling 7,176.4 river miles, 64 lakes/reservoirs are on the 303(d) list totaling 185,717 acres, and nine springs are on the 303(d) list totaling 82,990 springshed acres.

Although the 303(d) list is sometimes referred to as the "impaired waters list," it is specifically a subset of the impaired waters where the parameter identified as a cause of impairment is a pollutant and a TMDL has not yet been developed. Figure 12 shows the number of impairments per parameter group that are in need of a TMDL, with the priority per parameter group distinguished by low (light gray), medium (dark gray), and high (black).

The 303(d) tab of the 305(b) workbook has the official information about all pollutant-waterbody combinations that are on the 303(d) list, or the 303(d) tab of the 305(b) dashboard can be explored for a more interactive approach.

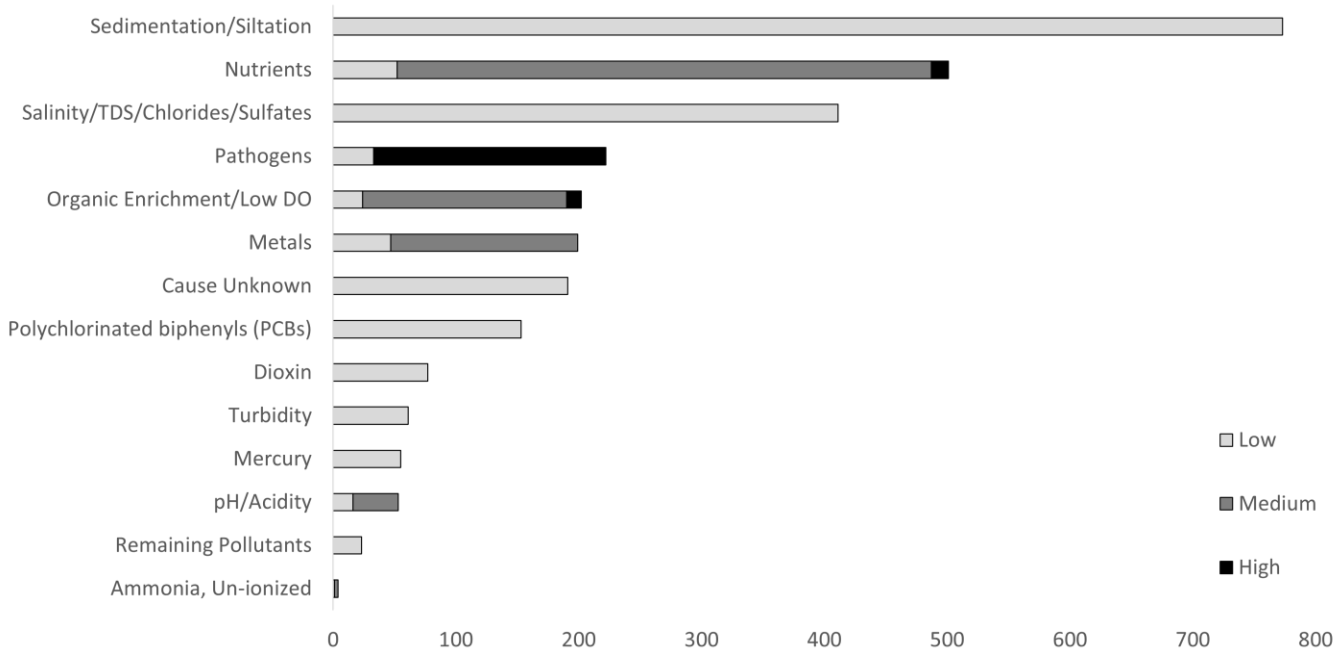


Figure 12. Number of impairments per parameter group where the parameter is on the 303(d) list because it is a pollutant and a TMDL is required but has not yet been developed. TMDL priority rank distinguished by low (light gray), medium (dark gray), and high (black).

New Listings

New listings are a subset of the 303(d) and are those pollutants that are newly listed on the 2022 303(d) as causes of impairment (not meeting water quality standards) and require a TMDL. Each pollutant-waterbody combination is in category 5 and has a cycle first listed of 2022.

On the 2022 303(d), there are 222 new listings (Figure 13). The entire Ohio River has been impaired for fish consumption due to polychlorinated biphenyls (PCBs) since the 2014 cycle based on historic water chemistry data. Recent fish tissue data showed that PCBs were present in the fish as well, accounting for 57 of the new listings.

The new listings tab of the 305(b) workbook has the official information about all pollutant-waterbody combinations that are newly listed during this cycle, or the new listings tab of the 305(b) dashboard can be explored for a more interactive approach.

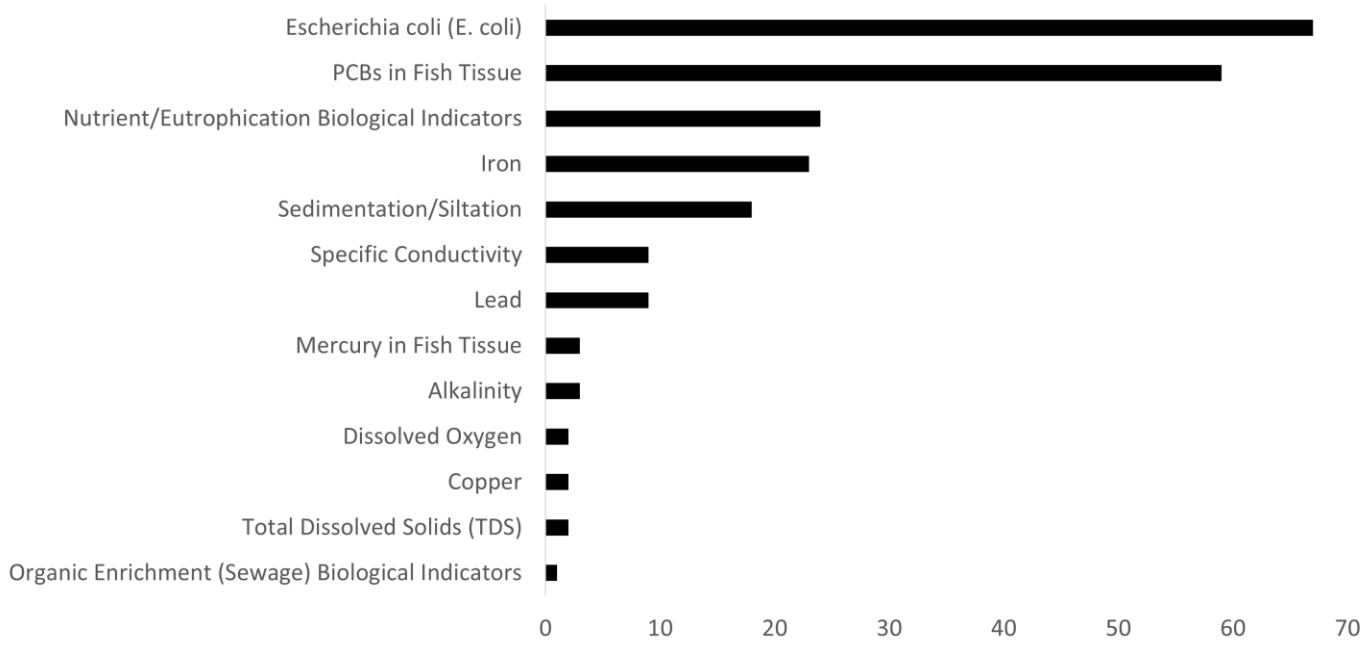


Figure 13. New listings on the 2022 303(d) list per parameter.

Delistings

The delistings are those pollutants that were previously listed as impaired (not meeting water quality standards) and have been proposed for delisting as part of the 2022 reporting cycle.

For this cycle, DOW has requested EPA approval to remove 115 pollutant-waterbody combinations from the 303(d) list (Figure 14). Of these, 66 have been attributed to the applicable water quality standard being attained based on new data. The other 49 delistings are due to a clarification of listing cause or address prior listings where the original basis for listing was incorrect.

The delistings tab of the 305(b) workbook has the official information about all pollutant-waterbody combinations that are proposed for delisting as part of this cycle, or the delistings tab of the 305(b) dashboard can be explored for a more interactive approach.

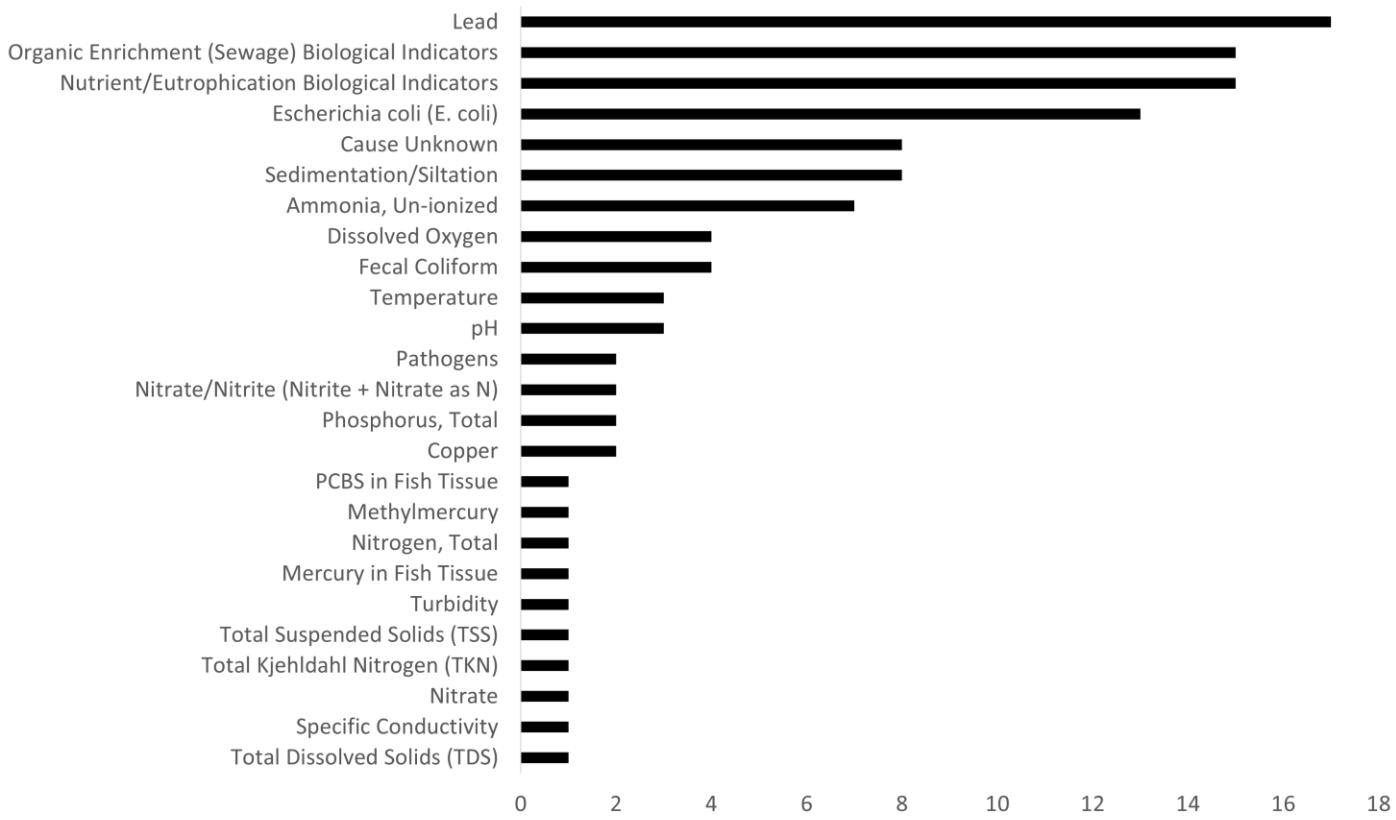


Figure 14. Parameters proposed for delisting as part of the 2022 305(b).

Waters with TMDLs

On the 2022 305(b) list there are 829 pollutant-waterbody combinations with an EPA-approved TMDL. The "waters with a TMDL" tab of the 305(b) workbook has the official information about all pollutant-waterbody combinations with an EPA-approved TMDL.

Since EPA approved the 2018-2020 303(d) list on February 24, 2022, EPA has approved the following TMDLs, representing 86 pollutant-waterbody combinations:

1. Statewide TMDL for Bacteria Impaired Waters: Lower Cumberland River, Mississippi River Minor Tributary Watersheds, Tennessee River, and Upper Cumberland River Basin Appendices (KYACT_10), approved by EPA on 8/31/2022
2. Statewide TMDL for Bacteria Impaired Waters: Ohio River Minor Tributary Watersheds Appendix (KYACT_11), approved by EPA 9/6/2022

The Approved TMDL Reports webpage has all EPA-approved TMDLs, with a link to each report.

The 'waters with a TMDL' tab of the 305(b) workbook has the official information about all pollutant-waterbody combinations with an EPA-approved TMDL; the 'waters with a TMDL tab' of the 305(b) dashboard can be explored for a more interactive approach.

Designated Use Level (all waterbody types)

For all 2,954 assessment units on the 2022 305(b) list, regardless of waterbody type, attainment per designated use is displayed in Figure 15 and outlined in Table 6.

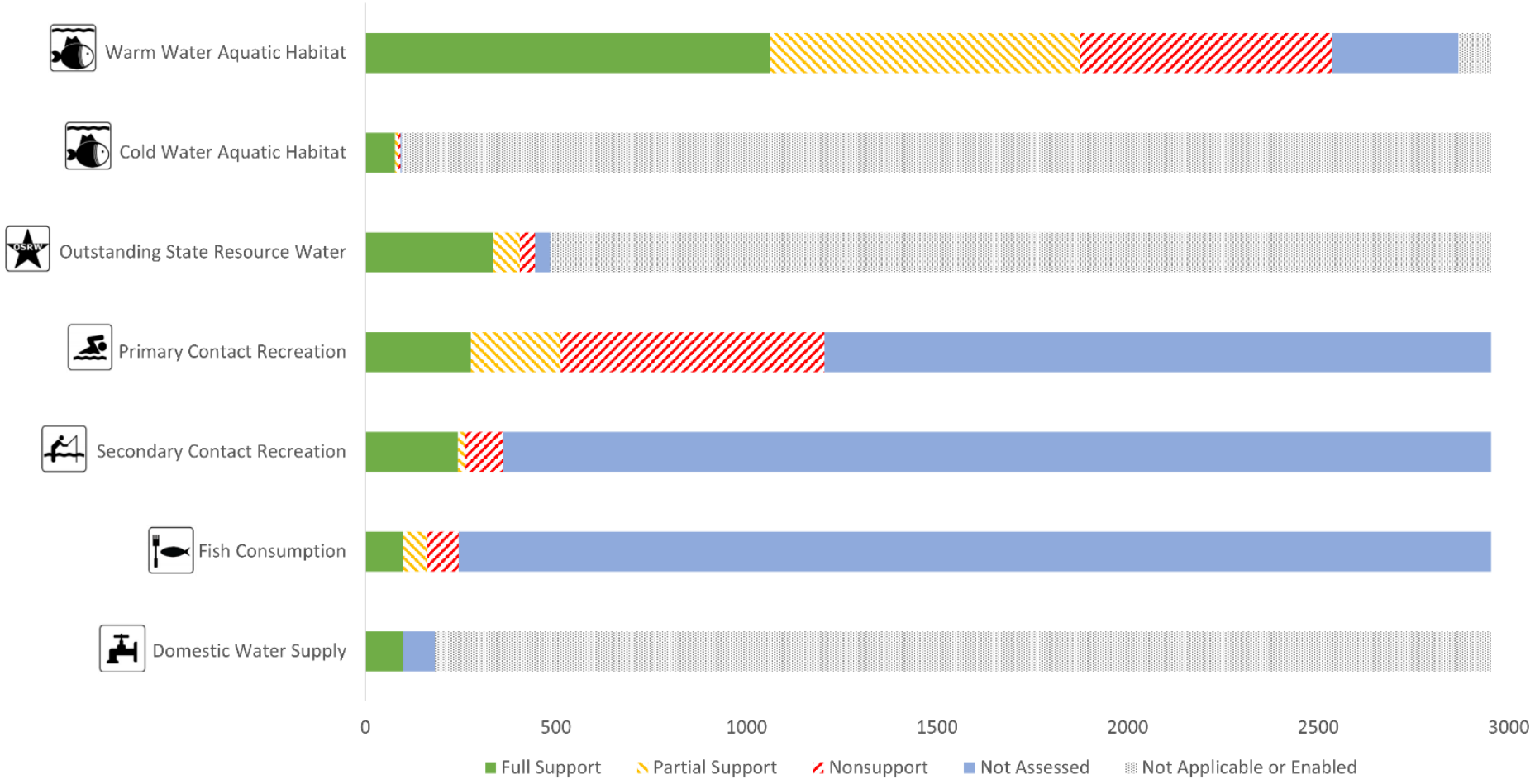


Figure 15. Assessment status and attainment for all 2,954 assessment units on the 2022 305(b) per designated use.

Table 6. Attainment per designated use for all 2,954 assessment units on the 2022 305(b) list.

Attainment	WAH	CAH	OSRW	PCR	SCR	FC	DWS
Full Support	1062	78	336	276	243	99	99
Partial Support	814	9	69	236	20	64	0
Nonsupport	661	5	40	693	98	82	0
Not Assessed	330	4	39	1749	2593	2709	84
Not Applicable or Enabled	87	2858	2470	0	0	0	2771

Aquatic Life and OSRW

On the 2022 305(b) list, 2,537 assessment units have been assessed for the WAH designated use, making it the most assessed designated use. Of those assessed, 1,062 fully support the WAH designated use, while 1,475 are impaired. River and stream assessment units represent 2,435 of the assessment units, of which 1,009 are meeting and 1,426 are impaired. Lake and reservoir assessment units represent 101 of the assessment units, of which 52 are meeting and 49 are impaired (Figure 16). One spring has been assessed, which is full support.

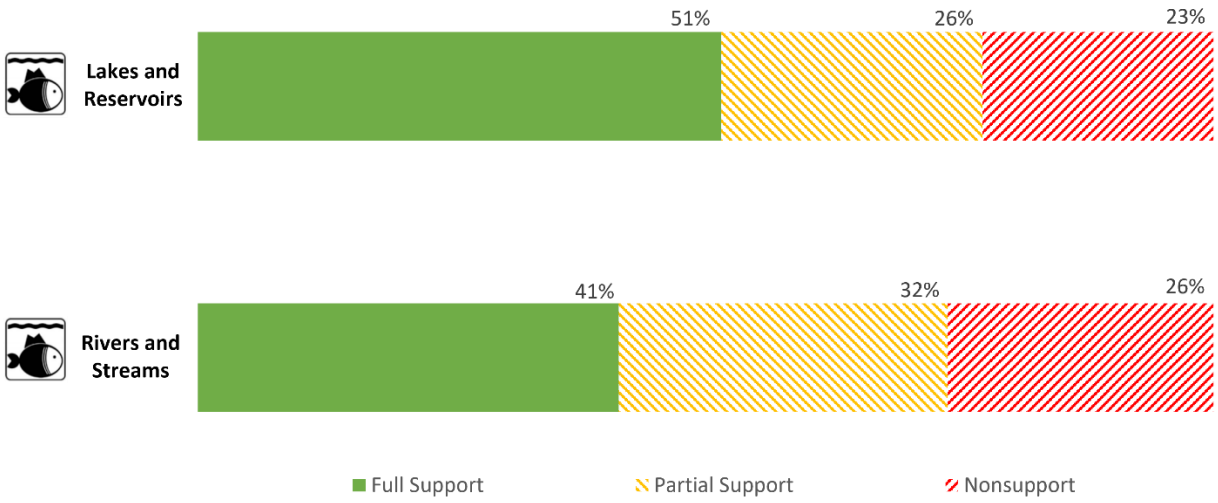


Figure 16. Proportion of rivers/streams and lakes/reservoirs assessed as full support, partial support, or nonsupport of those waterbodies assessed for the WAH designated use.

On the 2022 305(b) list, 96 assessment units have the CAH designated use, 92 of which have been assessed. River and stream assessment units represent 83 of the assessed assessment units, of which 69 are meeting and 14 are impaired (Figure 17). Lake and reservoir assessment units represent 9 of the assessed assessment units, all of which are meeting (100%).

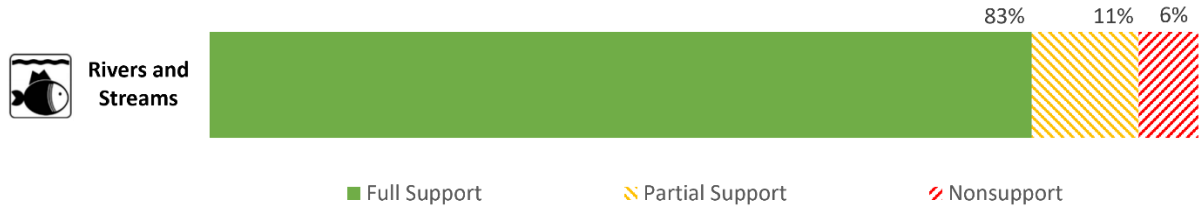


Figure 17. Proportion of rivers/streams assessed as full support, partial support, or nonsupport of those waterbodies assessed for the CAH designated use.

On the 2022 305(b) list, 484 assessment units have the OSRW designated use, of which 445 have been assessed. Most of the waterbodies assessed for this use are rivers and streams (442 of the 445) and are meeting, with 334 assessment units found to fully support OSRW and 108 assessment units found to be impaired (Figure 18).

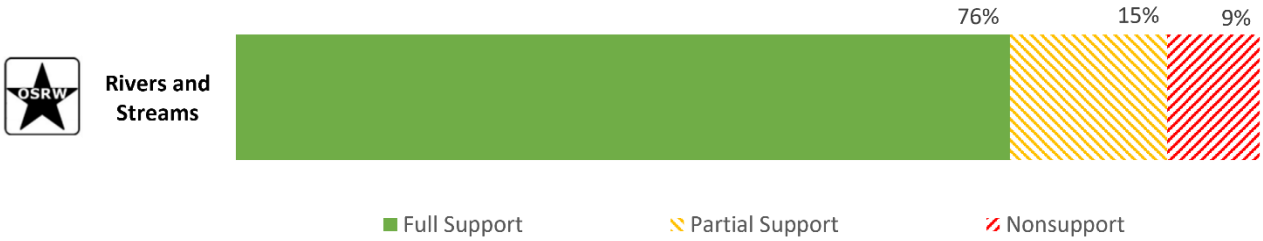


Figure 18. Proportion of rivers/streams assessed as full support, partial support, or nonsupport of those waterbodies assessed for the outstanding state resource water (OSRW) designated use.

Visit the aquatic life dashboard to explore these assessment results in a more interactive platform, which has a tab for WAH, CAH, and OSRW.

Fishing and Recreating

On the 2022 305(b) list, 1,205 assessment units have been assessed for the PCR designated use. Of those assessed, 276 were found to fully support the designated use, while 929 were found to be impaired. River and stream assessment units represent 1,186 of the assessment units, of which 268 are meeting and 918 are impaired for the PCR use (Figure 19). Spring assessment units represent 12 of the assessment units, of which one is meeting and 11 are impaired for the PCR use. Lake and reservoir assessment units represent seven of the assessment units, all of which are meeting the PCR use.

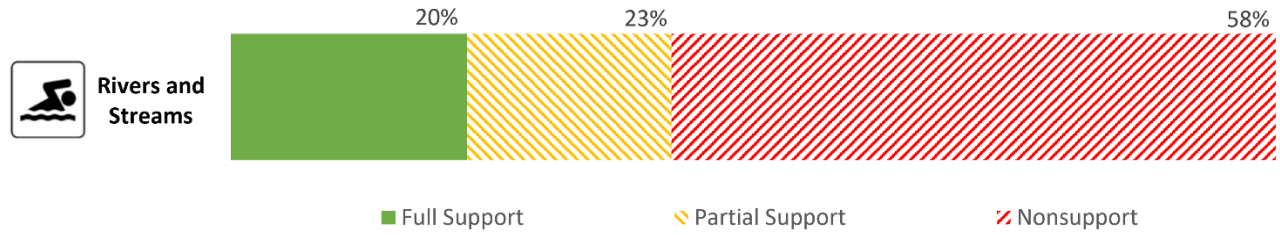


Figure 19. Proportion of rivers/streams assessed as full support, partial support, or nonsupport of those waterbodies assessed for the PCR designated use.

On the 2022 305(b) list, 357 assessment units have been assessed for the SCR designated use. Of those assessed, 243 were found to fully support the designated use, while 114 were found to be impaired. River and stream assessment units represent 287 of the assessment units, of which 173 are meeting and 114 are impaired for the SCR use. Lake and reservoir assessment units represent 69 of the assessment units, all of which are meeting the SCR use (Figure 20). One spring has been assessed, which is full support.

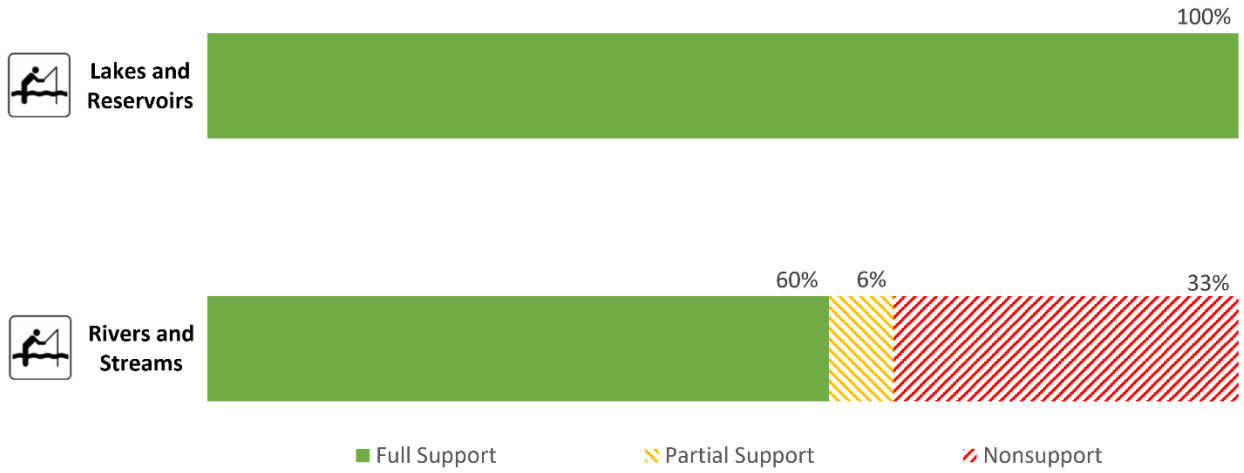


Figure 20. Proportion of rivers/streams and lakes/reservoirs assessed as full support, partial support, or nonsupport of those waterbodies assessed for the SCR designated use.

On the 2022 305(b) list, 245 assessment units have been assessed for fish consumption. Of those assessed, 99 were found to fully support the designated use, while 146 were found to be impaired. River and stream assessment units represent 202 of the assessment units, of which 78 are meeting and 124 are impaired for fish consumption. Lake and reservoir assessment units represent 43 of the assessment units, of which 21 are meeting and 22 are impaired for fish consumption (Figure 21).

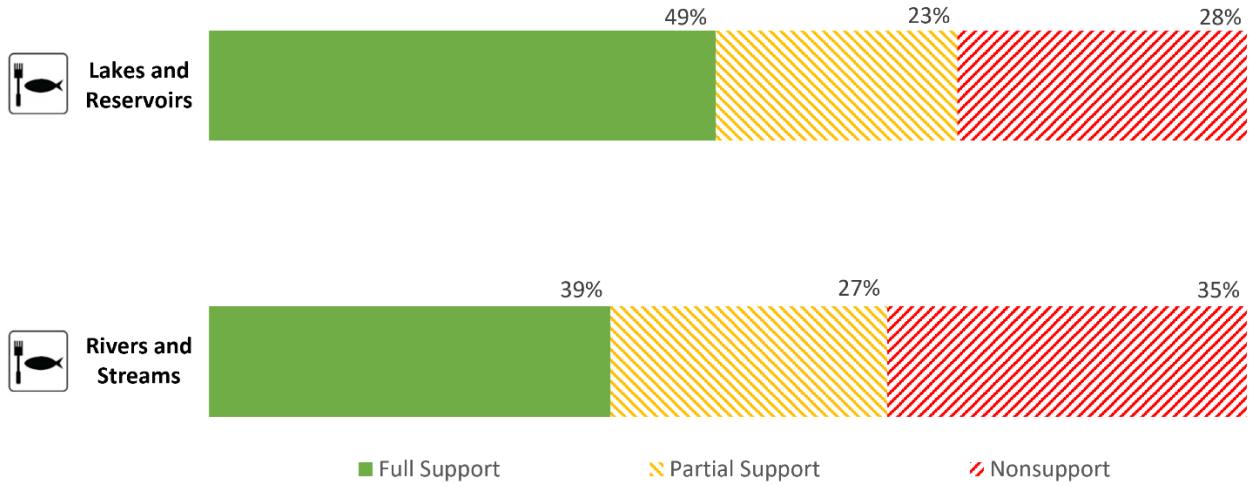


Figure 21. Proportion of rivers/streams and lakes/reservoirs assessed as full support, partial support, or nonsupport of those waterbodies assessed for fish consumption.

Visit the fishing and recreating dashboard to explore these assessment results in a more interactive platform, which has a tab for PCR, SCR, and fish consumption.

Impaired Waters

Impaired waters are a subset of the 305(b) list and are those waterbodies where at least one designated use is not being supported, and the cause of impairment does not require a TMDL (category 4c), requires a TMDL but a TMDL has not been developed (category 5), or a requires a TMDL and a TMDL has been developed (category 4a).

Of the 2,954 assessment units on the 305(b) list, 1,979 assessment units are impaired for at least one designated use. Broken down by waterbody type, 1,903 rivers/streams are impaired totaling 9,110.7 river miles, 65 lakes/reservoirs are impaired totaling 185,922 acres, and 11 springs are impaired totaling 86,074 springshed acres.

The impaired waters tab of the 305(b) workbook has specific information about all assessment units identified as impaired for one or more designated uses. The impaired waters dashboard has a tab for each designated use, and can be used to explore waterbodies impaired for those uses throughout the commonwealth.

Causes of Impairment

There are 4,411 parameter-waterbody combinations on the impaired waters list. Those parameters fall into three reporting categories:

1. 2,925 are in category 5, meaning the parameter is a pollutant, identified as a cause of impairment, and requires a TMDL

    a. This is the 303(d) list
2. 788 are in category 4a, meaning the parameter is a pollutant, identified as a cause of impairment, and has an EPA-approved TMDL
3. 698 are in category 4c, meaning the parameter is a pollution, identified as a cause of impairment, but does not require a TMDL

Parameters can be grouped to explore types of impairments throughout the Commonwealth. Figure 22 shows the parameters identified as a cause of impairment on the 2022 305(b) list grouped into the following themes:

1. Pathogens
2. Sedimentation
3. Nutrients
4. Biologic Integrity (Bioassessments)
5. Salinity/Total Dissolved Solids (TDS)/Chlorides/Sulfates
6. Metals (Other than Mercury)
7. Organic Enrichment/Oxygen Depletion
8. Other (including cause unknown)
9. Polychlorinated Biphenyls (PCBs)
10. Habitat Alterations
11. pH/Acidity/Caustic Conditions
12. Dioxins
13. Hydrologic Alteration
14. Turbidity
15. Mercury

The impaired waters tab of the 305(b) workbook has specific information about all assessment units identified as impaired for one or more designated uses. Parameter level information for those identified as a cause of impairment is available per assessment unit, including if that parameter has a TMDL, the parameter's category, TMDL priority rank (if applicable), cycle first listed (if applicable), and suspected sources.

For a more interactive approach, visit the cause of impairment dashboard, where a map is available to explore causes in the groups discussed above.

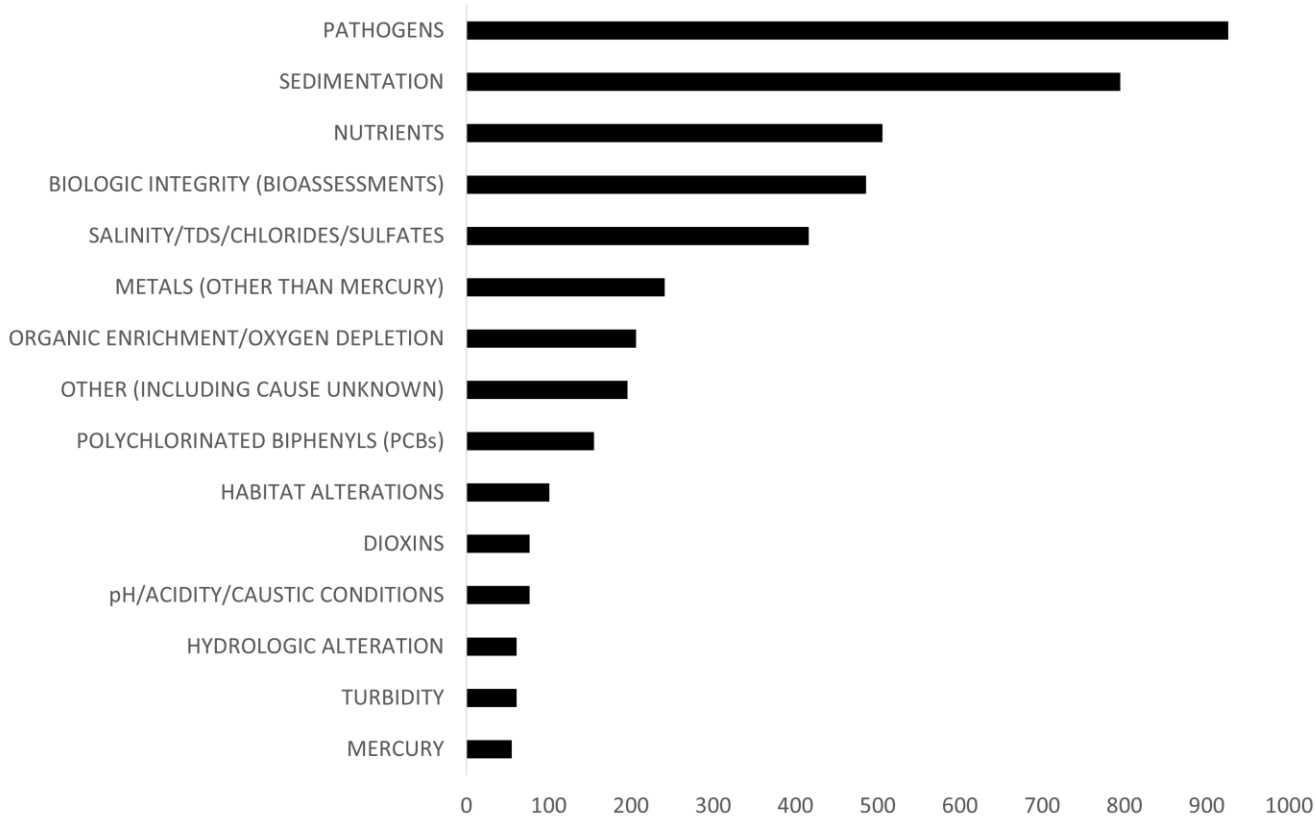


Figure 22. Types of impairments on the 2022 305(b) list where parameters have been grouped into 15 themes to better understand the number and types of impairments throughout the Commonwealth.

Waterbody Type Results

Assessment results per waterbody type per designated use, along with parameters identified as causes of impairment, are discussed in more detail in the following sections of this IR.

Rivers and Streams

River and stream assessments are the most common, which account for 2,814 of the 2,954 assessment units on Kentucky's 305(b) list. The total mileage of streams and rivers that have been assessed is 13,139.4 river miles. For those rivers and streams that have been assessed, the attainment per designated use is displayed in Figure 23.

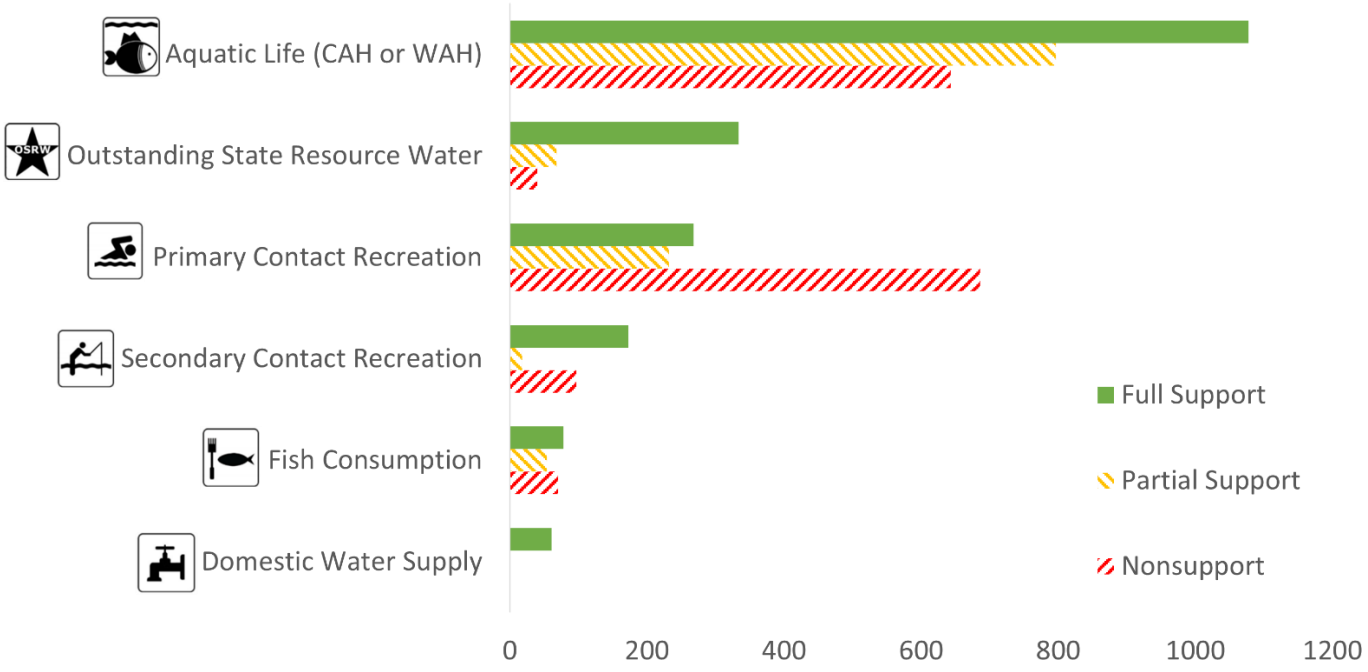


Figure 23. Number of assessment units that are full support, partial support, or nonsupport per designated use for rivers and streams that have been assessed for that use during this cycle or any prior cycle.

Table 7 has attainment results for rivers and streams for only those assessments units that have been assessed for a given designated use, with the results presented as a count of assessment units (number, #) and as a sum of the river miles in each attainment scenario per designated use.

The causes of impairment impacting rivers and streams per designated use are shown in Figure 24 for those causes contributing at least 10 impairments. For all listing information, refer to the 305(b) workbook.

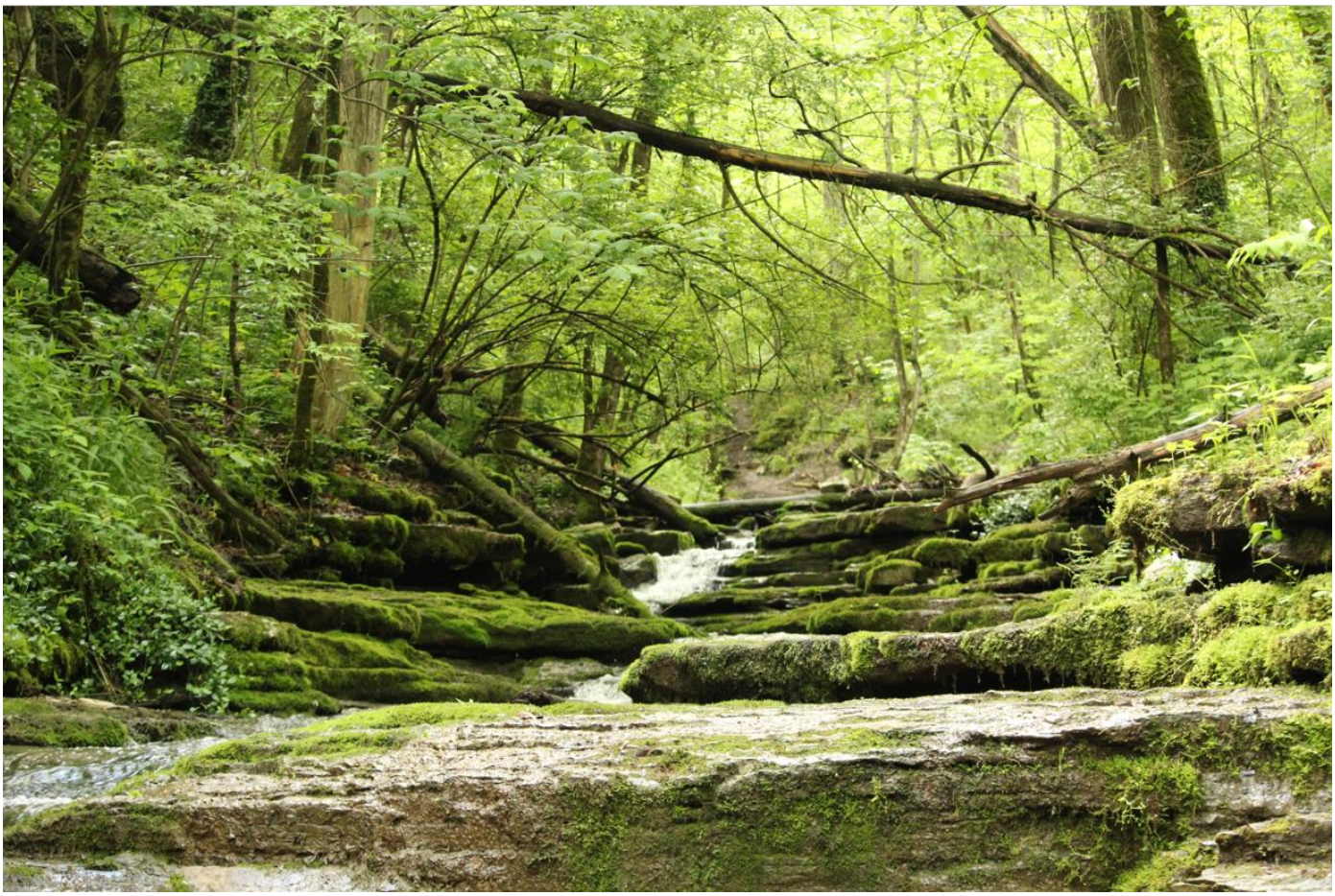
Table 7. Attainment results for rivers and streams that have been assessed for each designated use on the 2022 305(b), with the results presented as a count of assessment units (number, #) and as a sum of the river miles.

Rivers and Streams - Number (#)

	WAH	CAH	OSRW	PCR	SCR	FC	DWS
Assessed (#)	2435	83	442	1186	288	202	61
Full Support (#)	1009	69	334	268	173	78	61
Partial Support (#)	788	9	68	232	18	54	0
Nonsupport (#)	638	5	40	686	97	70	0
Impaired (#)	1426	14	108	918	115	124	0

Rivers and Streams - Miles

	WAH	CAH	OSRW	PCR	SCR	FC	DWS
Assessed (miles)	11,579.92	429.90	2,136.55	6,633.54	2,016.82	1,805.25	66.80
Full Support (miles)	5,006.50	384.20	1,649.15	1,892.55	1,477.25	668.75	66.80
Partial Support (miles)	3,799.05	28.65	302.70	1,297.60	119.20	487.25	0.00
Nonsupport (miles)	2,774.37	17.05	184.70	3,443.39	420.37	649.25	0.00
Impaired (miles)	6,573.4	45.7	487.4	4,741.0	539.6	1,136.5	0.0



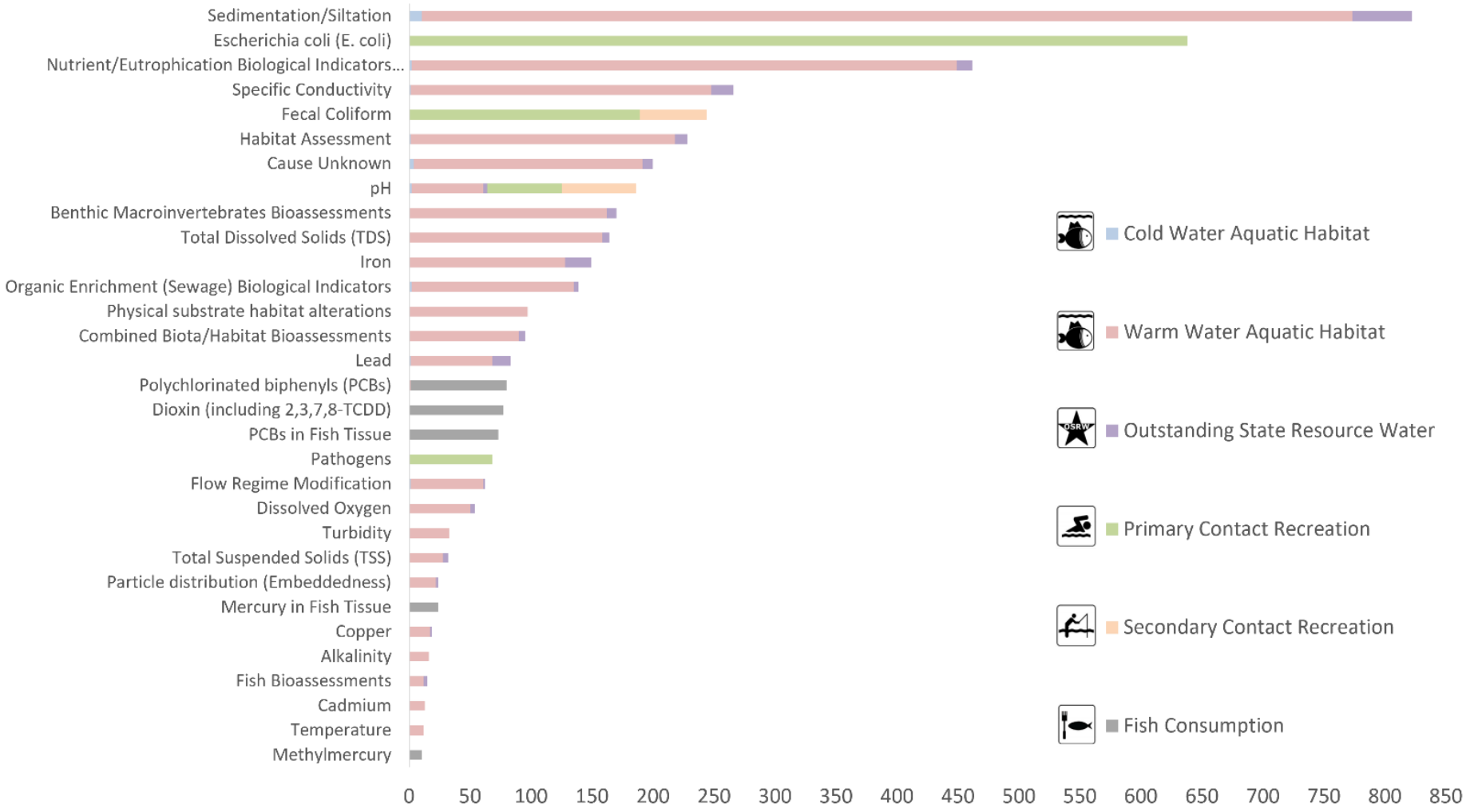


Figure 24. Number of impairments by a particular parameter (or cause) per designated use for rivers and streams on the 2022 305(b).

Lakes and Reservoirs

Lake and reservoir assessments account for 121 of the 2,954 assessment units on Kentucky's 305(b) list. The total acres of lakes and reservoirs that have been assessed is 203,310 acres. For those lakes and reservoirs that have been assessed, the attainment per designated use is displayed in Figure 25.

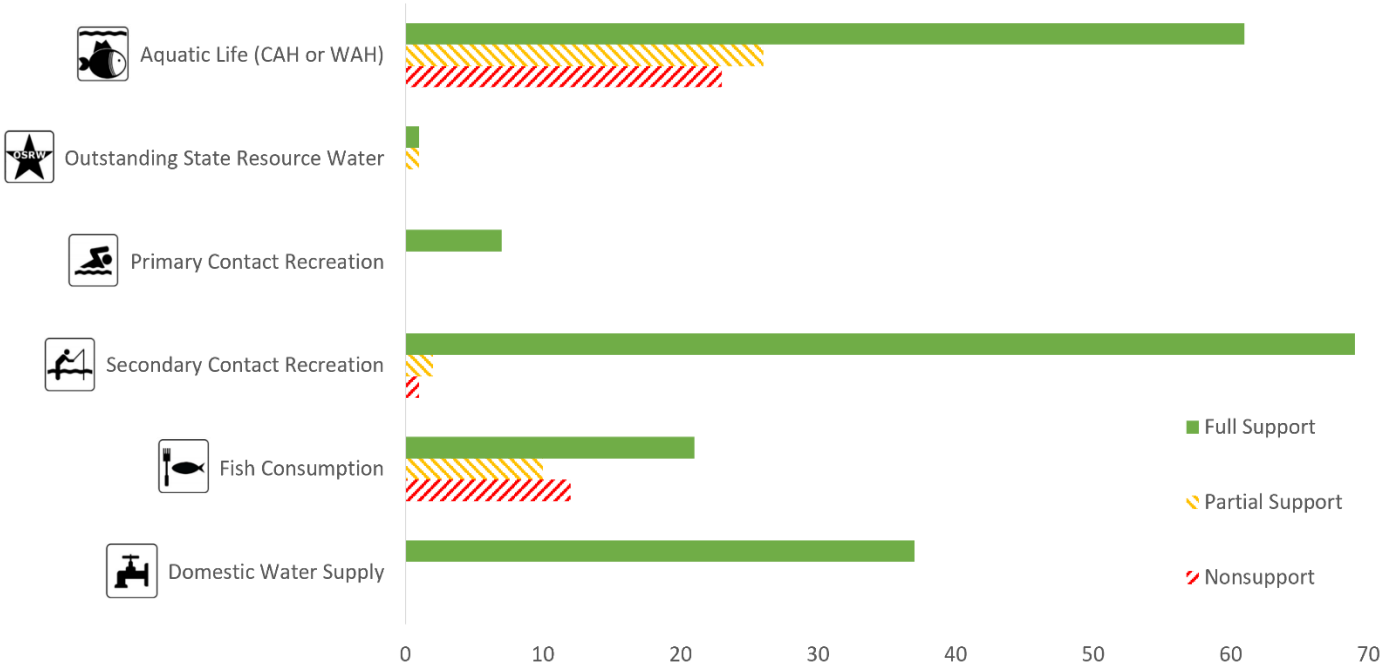


Figure 25. Number of assessment units that are full support, partial support, or nonsupport per designated use for lakes and reservoirs that have been assessed for that use during this cycle or any prior cycle.

Table 8 has attainment results for lakes and reservoirs for only those assessment units that have been assessed for a given designated use, with the results presented as a count of assessment units (number, #) and as a sum of the acreage in each attainment scenario per designated use.

The causes of impairment impacting lakes and reservoirs per designated use are shown in Figure 26, where nutrient/eutrophication biological indicators most often impairs WAH, and mercury in fish tissue most often impairs fish consumption. For lakes and reservoirs assessed for aquatic life, a trophic status is determined from the trophic status index score. In Kentucky, most lakes and reservoirs assessed for the aquatic life designated use are mesotrophic or eutrophic (Figure 27). Most of the lakes and reservoirs identified as oligotrophic are in the mountains.

For all trophic status narratives and listing information, refer to the 305(b) workbook.

Table 8. Attainment results for lakes and reservoirs that have been assessed for each designated use on the 2022 305(b), with the results presented as a count of assessment units (number, #) and as a sum of the acreage.

Lakes and Reservoirs - Number (#)

	WAH	CAH	OSRW	PCR	SCR	FC	DWS
Assessed (#)	101	9	2	7	72	43	37
Full Support (#)	52	9	1	7	69	21	37
Partial Support (#)	26	0	1	0	2	10	0
Nonsupport (#)	23	0	0	0	1	12	0
Impaired (#)	49	0	1	0	3	22	0

Lakes and Reservoirs - Acres

	WAH	CAH	OSRW	PCR	SCR	FC	DWS
Assessed (acres)	211,626	8,405	236	80,978	207,466	201,896	119,537
Full Support (acres)	150,282	8,405	199	80,978	206,966	73,060	119,537
Partial Support (acres)	52,608	0	37	0	339	9,239	0
Nonsupport (acres)	8,736	0	0	0	161	119,597	0
Impaired (acres)	61,344	0	37	0	500	128,836	0

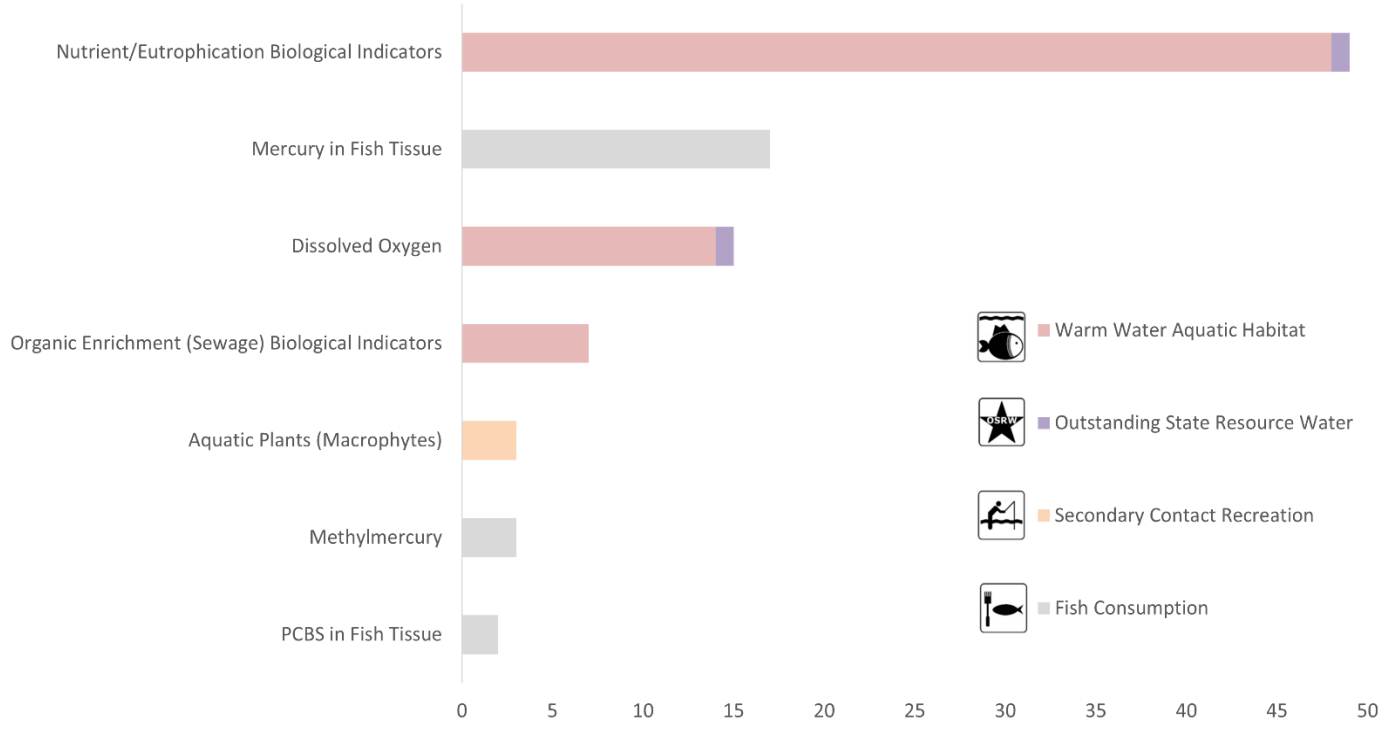


Figure 26. Number of impairments by a particular parameter (or cause) per designated use for lakes and reservoirs on the 2022 305(b).

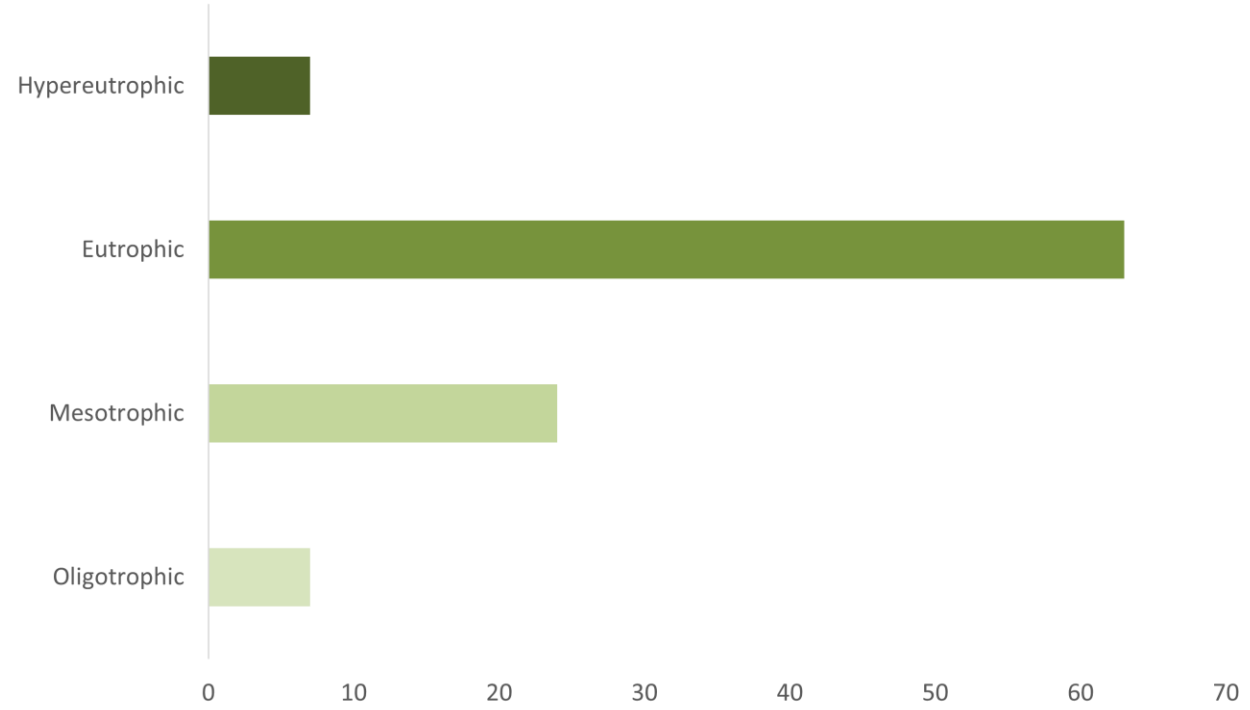


Figure 27. Trophic status for lakes and reservoirs that have been assessed for the aquatic life (CAH or WAH) designated use.

Springs

Groundwater Monitoring

Kentucky has systematically sampled ambient groundwater for more than 20 years. The statewide Ambient Groundwater Monitoring Program provides baseline groundwater data on aquifer characterization, ambient groundwater quality, and nonpoint source pollution. In Kentucky, a predominant feature of the landscape is karst, a term used to describe the landforms and groundwater flow of areas characterized by sinkholes, springs, and caves (Figure 28).

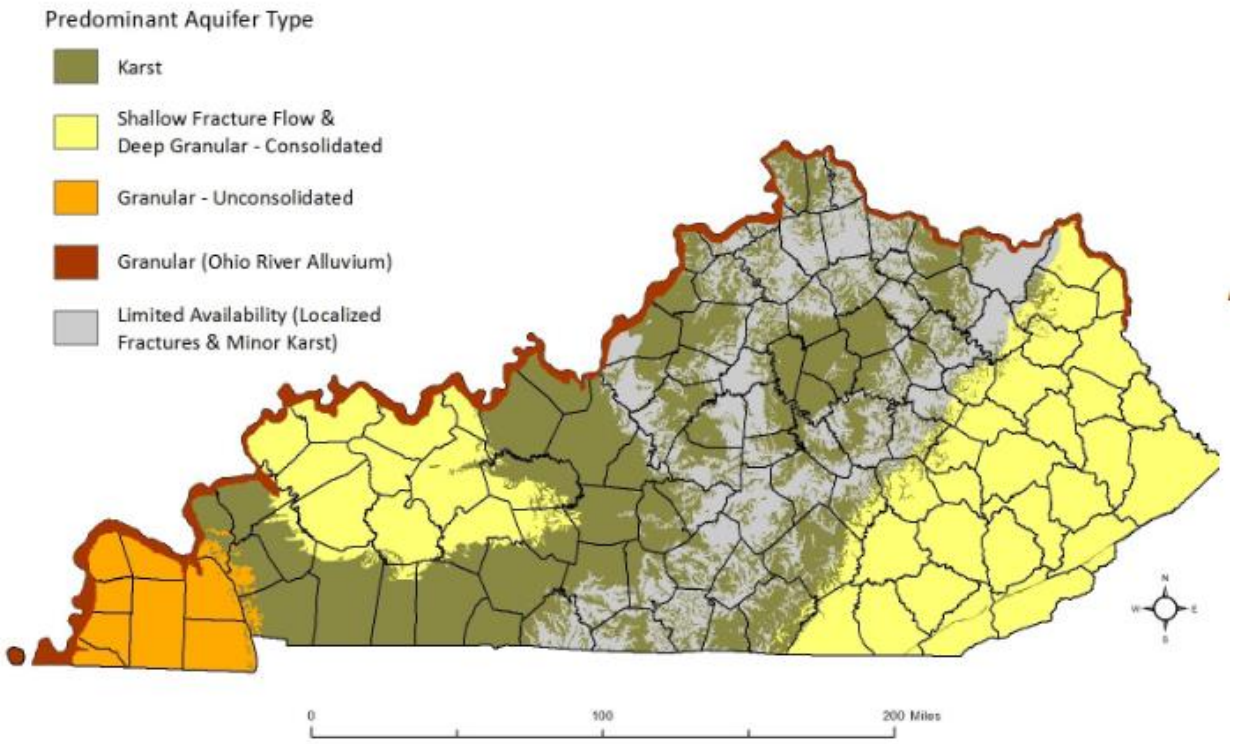


Figure 28. Map illustrating the locations of predominant aquifer types in Kentucky.

Where appropriate, groundwater data from springs is used for assessment purposes and reported on the 305(b), which is discussed below. Additionally, these data were analyzed to characterize groundwater trends in Kentucky in the 2018 publication *Report on the Condition of Ambient Groundwater in Kentucky: Analysis of the Ambient Groundwater Quality Monitoring Network Data* (Chan and Blair, 2018).

Springs – Primary Contact Recreation

Spring assessments account for 15 of the 2,954 assessment units on Kentucky's 2022 305(b) list. The total size of spring assessments (as represented by the springshed) is 170,469 acres.

PCR is the most commonly assessed designated use for spring assessment units. Of the 15 spring assessment units on Kentucky's 2022 305(b) list, 12 have been assessed for PCR. Of these 12 assessment units, one spring is full support, four springs are partial support, and seven springs are nonsupport for PCR. The cause of impairment was always identified as *E. coli*. For all listing information, refer to the 305(b) workbook.

Ohio River Mainstem

The Ohio River Mainstem had its assessments updated as part of the 2022 cycle, using data collected by ORSANCO. Monitoring programs operated by ORSANCO that were used for Kentucky's 305(b) assessments include bimonthly sampling of nutrients and ions, clean metals sampling at the lock and dams, fish population monitoring, macroinvertebrate population monitoring, contact recreation bacteria monitoring, longitudinal bacteria surveys, and fish tissue sampling. Only data from pools adjacent to Kentucky's border were considered when updating assessments (Figure 28).

Figure 28. Ohio River Mainstem navigation system, courtesy of USACE.

As part of the assessment process, the Ohio River was re-segmented from 49 to 77 assessment units. This re-segmentation occurred to recognize OSRW designations and DWS intakes along the Ohio River, which impact what water quality criteria apply or are enabled. Although the number of assessment units increased, the assessed mileage is unchanged; the entire Ohio River from the Kentucky – West Virginia border to its confluence with the Mississippi River is assessed for at least one designated use. For all 77 assessment units along the Ohio River mainstem on the 2022 305(b) list, the attainment per designated use is displayed in Figure 29.

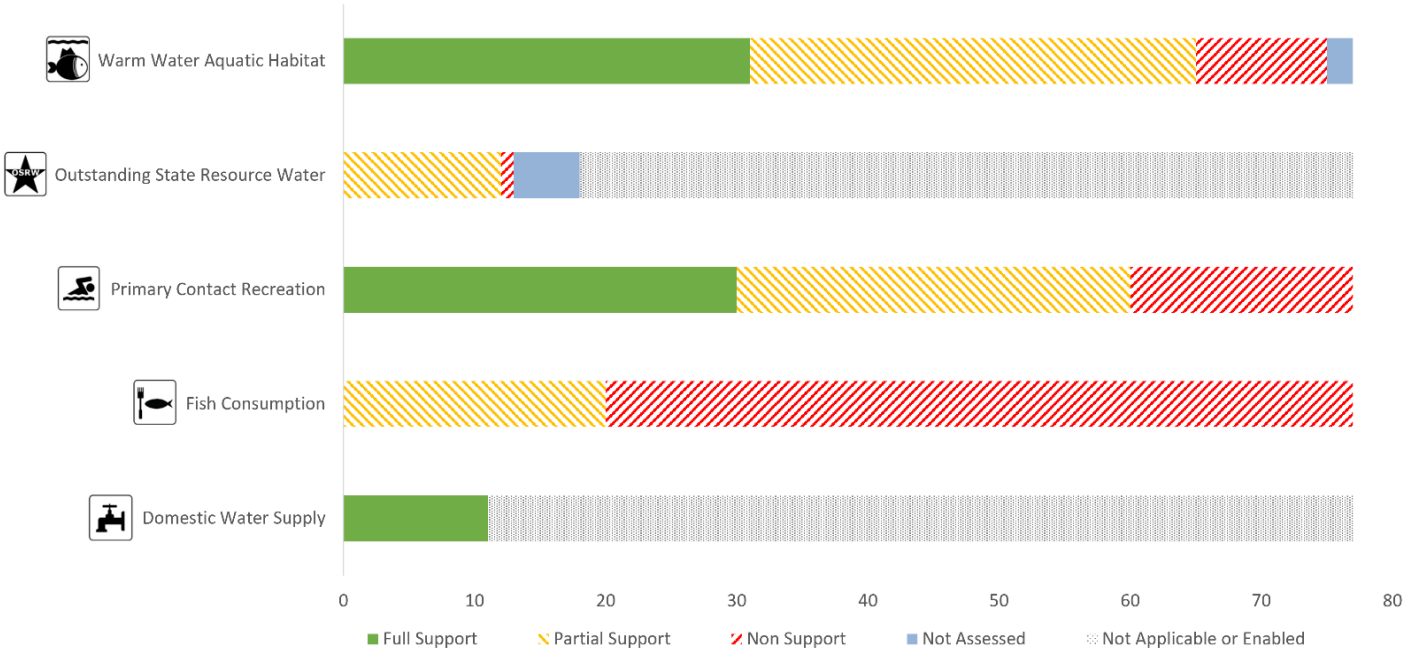


Figure 29. Assessment status and attainment for all 77 Ohio River assessment units on the 2022 305(b) per designated use.

Table 9 has attainment results for only those Ohio River assessment units that have been assessed for a given designated use, with the results presented as a count of assessment units (number, #) and as a sum of the river miles in each attainment scenario per designated use.

Table 9. Attainment results for the Ohio River Mainstem that have been assessed for each designated use on the 2022 305(b), with the results presented as a count of assessment units (number, #) and as a sum of the river miles.

Ohio River Mainstem - Number (#)						
	WAH	**OSRW**	**PCR**	**SCR**	**FC**	**DWS**
Assessed (#)	75	13	77	0	77	11
Full Support (#)	31	0	30	0	0	11
Partial Support (#)	34	12	30	0	20	0
Nonsupport (#)	10	1	17	0	57	0
Impaired (#)	44	13	47	0	77	0
Ohio River Mainstem - Miles						
	WAH	**OSRW**	**PCR**	**SCR**	**FC**	**DWS**
Assessed (miles)	637.9	48.7	654.5	0.0	654.5	14.4
Full Support (Miles)	272.0	0.0	272.5	0.0	0.0	14.4
Partial Support (Miles)	282.6	46.8	246.0	0.0	181.0	0.0
Nonsupport (Miles)	83.3	1.9	136.1	0.0	473.5	0.0
Impaired (miles)	365.9	48.7	382.1	0.0	654.5	0.0

Impairments – Ohio River Mainstem

On the 2022 305(b), there are five causes of impairment identified along the Ohio River, impacting four designated uses (Figure 30).

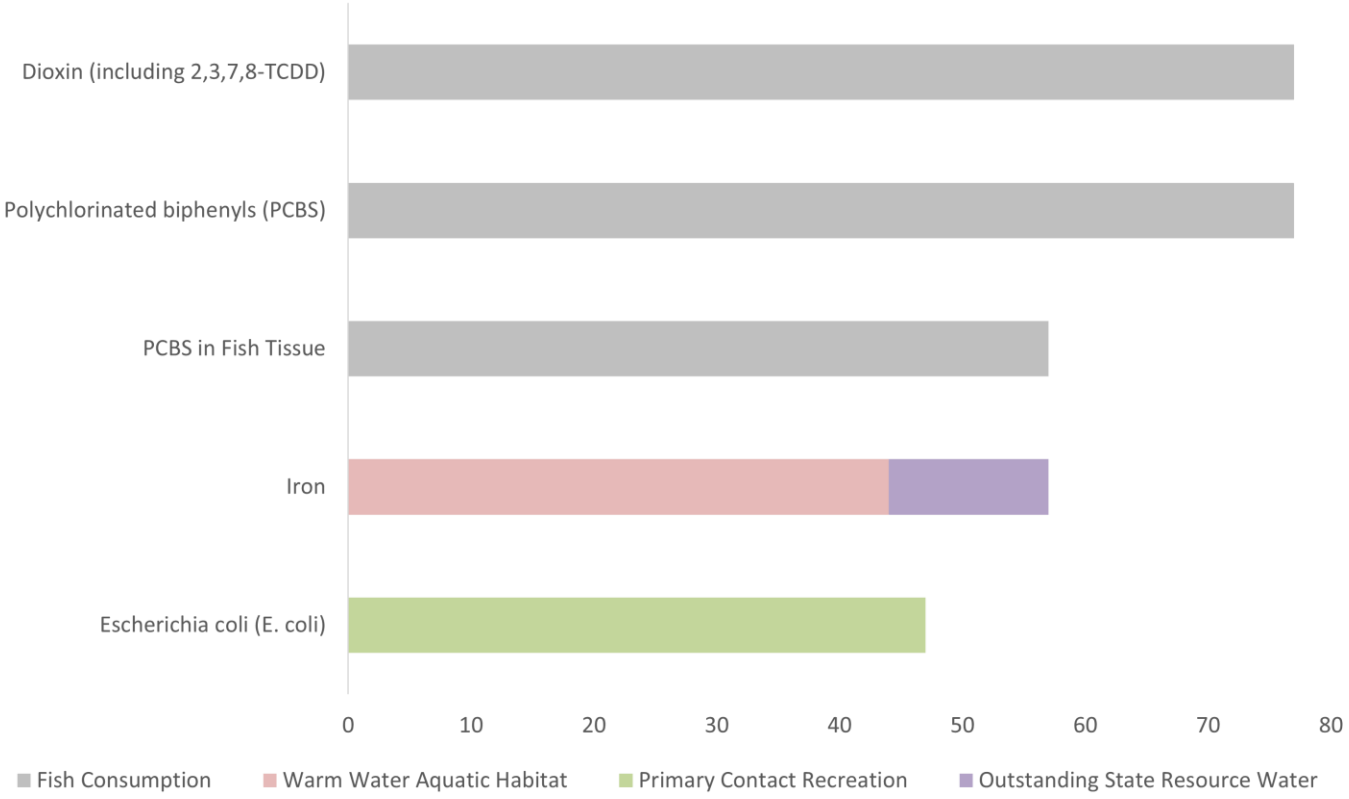


Figure 30. Number of impairments by a particular parameter (or cause) per designated use for the Ohio River mainstem on the 2022 305(b).

The WAH designated use had its assessment updated for 75 of the 77 assessment units along the Ohio River using ORSANCO's most recent water chemistry and biological data. Of those assessed, 44 are impaired and the cause of impairment is always iron. Iron impairments are present in the following 6 pools: Cannelton, Smithland, Olmsted, Newburgh, John T. Myers, and Markland. These iron listings also impair the OSRW designated use along 13 assessment units where the use applies.

The entire length of the Ohio River is impaired for dioxin and PCBs. These impairments are based on water column data collected by ORSANCO between 1997 and 2004. ORSANCO's fish tissue data was reviewed for the 2022 cycle, which updated fish consumption assessments along 57 assessment units within the following 7 pools: Markland, McAlpin, Newburgh, John T. Myers, Smithland, Meldahl, and the Open Water portion. For all 57 assessments, the parameter "PCBs in Fish Tissue" was added as a cause of impairment, since the most recent fish tissue data showed that PCBs were present in the fish as well, confirming the PCB impairment based on water column data.

All 77 assessment units along the Ohio River are assessed for PCR, of which 47 are impaired due to the parameter *E. coli.* Most of these assessments are from a historic longitudinal bacteria survey conducted

by ORSANCO between 2003 and 2006. ORSANCO plans to repeat this survey in the near future, which will allow a full update of the PCR assessments along the Ohio River.

For this cycle, nine PCR assessments within the Markland, Cannelton, McAlpin, and John T. Myers pools were updated based on more recent bacteria data collected by ORSANCO's contact recreation bacteria monitoring program, which focuses on areas above and below combined sewer overflow (CSO) communities. All updated assessments confirmed the impairment due to *E. coli*.

For all listing information, refer to the 305(b) workbook. For information outside Kentucky, refer to ORSANCOs Assessment of Ohio River Water Quality Conditions.

Photo Credit: ORSANCO Staff

Division Programs

Total Maximum Daily Load Program

The TMDL program, established under Section 303(d) of the CWA, focuses on identifying and restoring polluted Kentucky waterbodies such as rivers, lakes and streams.

States must develop a TMDL calculation for each pollutant identified as a cause of impairment on the 303(d) list. TMDL calculations are found in TMDL reports. A TMDL Report is a water quality restoration plan that describes how pollutant loads can be reduced to meet water quality standards.

Total Maximum Daily Load Program Priorities

The DOW is implementing the national Clean Water Act 303(d) Program Vision, which calls for states to prioritize impaired waters for TMDL development and to develop TMDL Alternative Approaches where appropriate in the context of a long-term planning framework.

In 2011, the Clean Water Act 303(d) Program Vision (henceforth referred to as 'the vision') was developed by the EPA and state TMDL program managers as a new path forward for the TMDL program. Key issues were discussed, and six goals were outlined to encourage creativity in developing tailored approaches to achieve water quality restoration more effectively. These six goals are Prioritization, Assessment, Protection, Alternatives, Engagement, and Integration. The vision allows Kentucky to develop state-specific priorities, encourages stakeholder engagement, and allows Kentucky's TMDL program to integrate their work with other Clean Water Act program priorities. The vision fosters flexible watershed management but requires the support of many stakeholders – including public, federal, and state agencies – to attain this common goal.

In 2016, the DOW submitted a first draft of vision priorities to the EPA. The vision priorities list was updated in 2018 using the 2016 303(d) list. This vision priorities list consisted of pollutant-waterbody combinations that prioritized having a TMDL or TMDL alternative plan developed by 2022.

The DOW's top vision priority for TMDL development for the 2016-2022 planning period was to address all remaining bacteria impairments on the 2016 303(d) list. To meet this goal, DOW developed a new method and type of report for addressing these waterbodies. While past TMDL reports were written at the watershed scale, the Kentucky Statewide Total Maximum Daily Load for Bacteria Impaired Waters was designed to address all remaining bacteria-impaired waters for the state in one report. Between 2019 and 2022, Kentucky completed over 300 *E. coli* and fecal coliform TMDLs contained within 13 basin-focused appendices of the Statewide Bacteria TMDL. Kentucky also completed a TMDL report for the Pond Creek watershed (Muhlenberg County) containing 55 TMDLs for metals, pH, and *E. coli*.

Another vision priority for the 2016-2022 planning period included working with stakeholders to develop TMDL Alternative Approaches in communities with the on-the-ground resources to address water quality impairments more quickly than a TMDL approach. Kentucky's first TMDL Alternative Plan was completed in 2018 with the cooperation of various stakeholders in the Gunpowder Creek Watershed. A second TMDL alternative, Threemile Creek, was accepted by EPA in 2022. More TMDL Alternative Plans have been initiated and are currently in development.

EPA's final measure for the 303(d) Long Term Vision period, which ended in September of 2022, was 92.7%. This number is based on catchment area with plans in place, goal versus completed.

In 2024, the states and EPA anticipate beginning a new long-term 303(d) "vision" planning period. In the interim, DOW will be completing several TMDL Alternative Plans currently in development as well as continuing work on TMDL projects in progress. Kentucky will continue to engage with the public and stakeholders across the Commonwealth and work to integrate with other Clean Water Act programs in developing priorities for the next long-term planning period.

For additional information on the vision, read "Questions and Answers" on the Long-term Vision for Assessment, Restoration, and Protection under the Clean Water Act Section 303(d) Program.

If you have questions about the TMDL program, the vision, or alternative restoration approaches, email TMDL@ky.gov.

Nonpoint Source Program

The Kentucky Nonpoint Source Pollution Control Program (NPS Program) is authorized under Section 319 of the CWA amendments of 1987. The Section 319(h) Grant Program was established to provide funding for efforts to reduce nonpoint source pollution. Each year DOW applies to EPA to receive 319(h) funding. Funds may be used to demonstrate innovative best management practices (BMPs), support education and outreach programs, develop Watershed Based Plans, and to implement Watershed Based Plans.

The mission of the Kentucky NPS Program is to protect the quality of Kentucky's surface and groundwater from known NPS pollution, to abate NPS threats, and to restore degraded waters to meet water quality standards. To support this vision, the NPS Program coordinates statewide efforts to minimize nutrient, sediment, and bacteria pollution through partnerships with federal, state, and local entities.

The NPS Program Annual Reports from 2016, 2017, 2018, 2019, and 2020 provide additional information on completed nonpoint source pollution projects and monitoring in Kentucky. To facilitate new

watershed projects, Kentucky's NPS Program developed resources such as the 319 Grant Program Story Map and 319 Grant Reporter.

Implementation

The state Agriculture Water Quality Act (AWQA) is one of many beneficiaries of DOW's engagement with federal and state partners. From 2019 to 2021 DOW worked with the Division of Conservation (DOC) and the AWQA Authority to roll out an updated tool to assist farmers in protecting water quality with farm-specific AWQA plans (eec.ky.gov/agwater). This tool incorporates updates to the State Water Quality Plan in a more user-friendly format to improve planning and BMP adoption. In 2022, DOW ran radio, social media, and print advertisements to promote the new tool between August and October, reaching all 120 counties and over 1.4 million Kentuckians. This tool update and outreach effort was made possible by a federal grant from EPA through the Hypoxia Task Force (HTF).

Looking specifically at Nonpoint Source Program implementation activities between 2016 and 2020 (the data collection period for this IR), over 47 types of BMPs were installed in more than 73 watersheds. DOW estimates these 319-funded BMPs reduced nutrient loading to waterways by 270,291 pounds per year of total nitrogen, 50,305 pounds per year of total phosphorus, and 29,032 tons per year of sediment between 2016 and 2020 (Figure 31). Load reductions for nitrogen, phosphorus, and sediment for watersheds across the state are also available in an interactive Nutrient Pollution Progress Mapper.

In addition to these nonpoint success stories, Kentucky published HTF success stories in 2022, highlighting nutrient tracking and investment progress. Starting in 2020, DOW partnered with the Natural Resources Conservation Service (NRCS) to identify and invest in watersheds sensitive to source water pollution. This HTF success story highlights over 432,000 acres that benefitted from enhanced conservation services. Additionally, DOW and the Kentucky DOC began leveraging load tracking tools used by the NPS Program to estimate the cumulative benefits of State Cost Share investments. As a result, Kentucky estimates that in 2020 and 2021 the DOW NPS Program and DOC Cost Share Program reduced nitrogen loading to local waters by over 250 tons/year, reduced phosphorus loading by over 60 tons/year, and reduced sediment loading by over 85,000 tons/year (Figure 32).

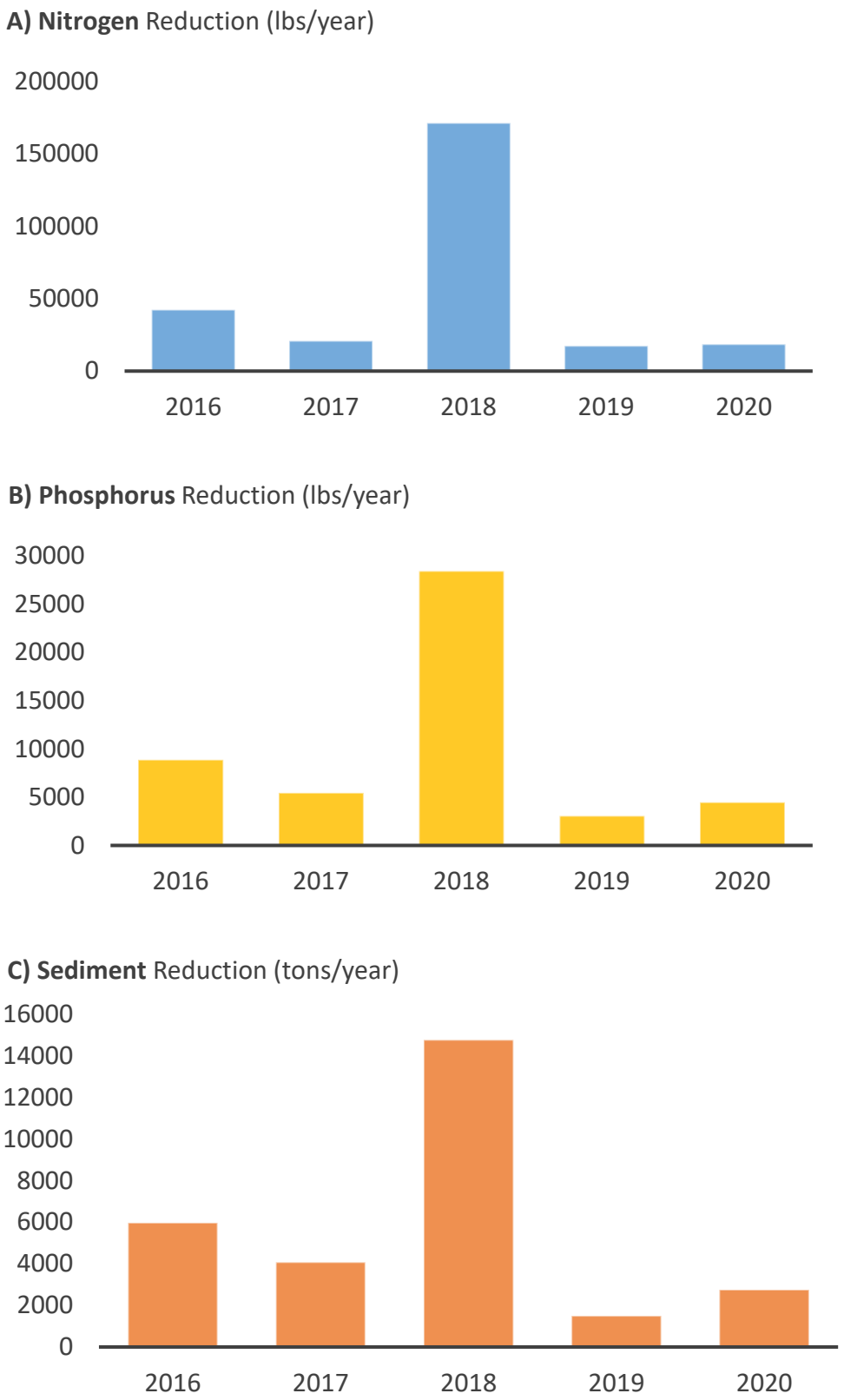


Figure 31. NPS Program Pollution Load Reductions for A) nitrogen (lbs/year), B) phosphorus (lbs/year), and C) sediment (tons/year) per year from 2016-2020.

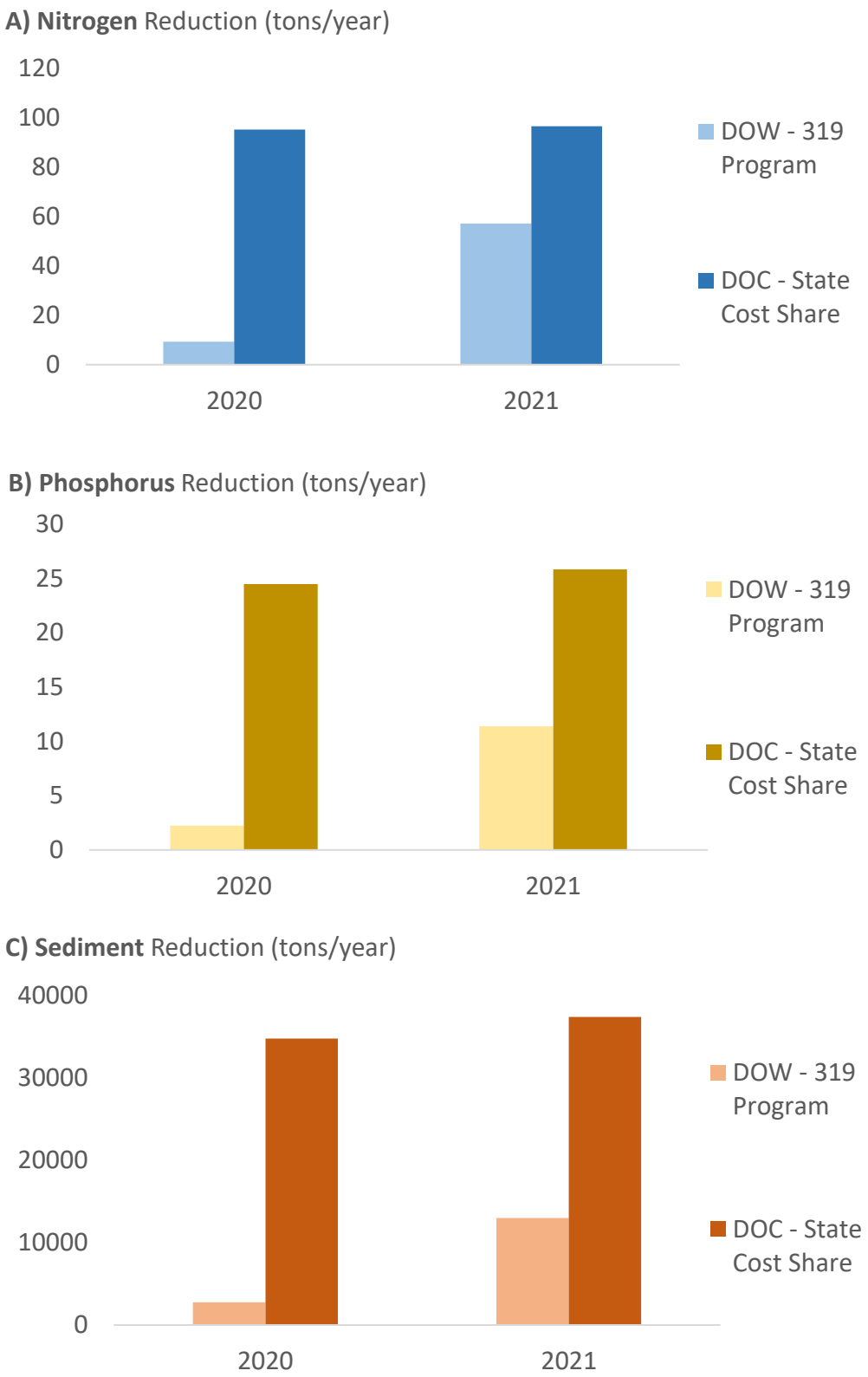


Figure 32. Estimated Kentucky Annual Load Reductions (tons per year) by program for A) nitrogen, B) phosphorus, and C) sediment per year from 2020 and 2021.

Success Stories

DOW works with partners to track and monitor water quality where implemented BMPs are anticipated to reduce nonpoint source pollution. Water quality improvements that result in a pollutant-waterbody delisting in the biennial IR are reported as Clean Water Act 319 nonpoint source pollution success stories to EPA. The following success stories were reported between 2020 and 2022.

In 2020, DOW highlighted Floyds Fork as a 319 Program success story where watershed planning, stream restoration, and agriculture BMPs improved sedimentation. As a result, a segment of Floyds Fork Creek was delisted in the 2016 IR. The full story is available on the EPA's NPS Program Success Story website.

In 2021, DOW identified Clarks River as a 319 Program success story where wastewater and agricultural BMPs reduced bacteria pollution. These actions improved stream quality to the point that a segment of Clarks River was delisted in the 2018/2020 IR. The full story is available on the EPA's NPS Program Success Story website.

In 2022, DOW identified Gunpowder Creek as a 319 Program success story where stormwater controls and watershed planning improved siltation, and led to delisting a segment of Gunpowder Creek in the 2018/2020 IR. The full story is available on the EPA's NPS Program Success Story website.

Water Pollution Control Program

There are four Kentucky communities under federal Consent Decrees and 15 that are under state consent judgements to eliminate sanitary sewer overflows (SSO) and to repair systems to reduce CSOs. Communities implement projects to manage wastewater capacity and develop long-term control plans (LTCPs). The projects often include repairing sewer lines and increasing the storage capacity in the sewer system. Completion dates of these projects vary depending on the scope of work and financial considerations (Table 10).

There are 235 Kentucky communities that have varying degrees of aging infrastructure that cause bypasses and overflows at wastewater treatment plants. DOW personnel inspect approximately 20% of CSO communities and 5% of SSO communities (not including MS4 inspections or pretreatment inspections that are not related to the CSO/SSO aspects of the systems), focusing on systems with frequent and recurring incidents and complaints. During inspections, DOW staff educate communities on identifying causes of overflows, prioritizing corrective actions, finding funding resources, and returning collection systems to compliance with the CWA.

Nutrients

Excess nutrients impair water quality by causing adverse effects on natural water chemistry and the indigenous aquatic community. At a minimum, monitoring of the influent and effluent for total phosphorus and total nitrogen is included on Kentucky Pollutant Discharge Elimination System (KPDES) permits. The monitoring requirements for these parameters are consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions in accordance with numeric and narrative standards.

Table 10. Combined Sewer Overflows (CSO) and Sanitary Sewer Overflows (SSO) mitigation projects in Kentucky (STP = Sewage Treatment Plant; WWTP = Wastewater Treatment Plant).

Community	Expected Completion Date
Ashland STP	12/31/2025
Catlettsburg STP	Completed 1/31/2019
Frankfort Municipal STP	12/31/2023
Harlan STP	2020, pending new date 12/31/2025
Henderson STP	Completed 3/31/2015
Lexington-Fayette Urban County Government (LFUCG): Lexington Town Branch STP; Lexington West Hickman. Not CSOs	12/31/2026
Louisville MSD: Morris Forman WQTC	12/31/2024, pending approval of new date
Loyall STP	2020, pending new date 12/27/2025
Maysville STP	September 2033
Morganfield WWTP	2018, pending new date
Northern KY Sanitation District No. 1 (SD1)	12/31/2025
Owensboro Regional Water Resource Agency (RWRA): Max Rhoads WWTP	12/31/2026
Paducah/McCracken County Joint Sewer Agency (JSA)	12/31/2038
Pikeville WWTP was CSO	Completed 7/01/2014
Pineville STP	2017, pending new date
Prestonsburg STP (was CSO)	Completed 10/1/2015
Vanceburg STP (was CSO)	Completed 12/31/2015
Winchester Municipal Utilities (not CSO)	12/31/2025
Worthington WWTP	12/31/2015

State Revolving Fund Loan Programs

The Clean Water State Revolving Fund (CWSRF) and the Drinking Water State Revolving Fund (DWSRF) are water infrastructure loan programs administered by the states with support from EPA. These programs provide funding to eligible communities to improve water related infrastructure, which has benefits of improving human health and the environment. Many times, without these federally subsidized funds, improvements of infrastructure in small communities may not be possible.

The CWSRF program was created in 1988 to establish a water pollution control revolving fund that would provide financial assistance for construction of publicly owned treatment works under section 212 of the CWA, implementation of watershed management plans under section 319 of the CWA, and development and implementation of conservation and management plans under section 320 of the CWA. Every year Kentucky identifies water pollution control priorities and ranks infrastructure projects based on these priorities. These projects are funded through the CWSRF in the form of low interest loans. The funds are provided by EPA in the form of capitalization grants to all states annually.

The DWSRF was created in 1996 to further the goals of the Safe Drinking Water Act (SDWA). Like the CWSRF, every year Kentucky identifies its drinking water priorities and ranks infrastructure projects based on these priorities. Kentucky receives a capitalization grant and then these projects are funded through the DWSRF in the form of low interest loans.

In November of 2021, Congress passed the Bipartisan Infrastructure Law (BIL) which, over the next five years, will provide additional funding to supplant the CWSRF and the DWSRF. In addition to increases in the base-funding, the BIL also addresses emerging contaminants, such as PFAS, in both drinking water

and wastewater. The BIL also funds projects to remove lead in drinking water, primarily a human health benefit. Since a very small portion of these funds have currently been awarded, the extra grants will be included in the next triennial cycle.

Table 11 lists the dollar amounts spent each year since the inception of both programs. As of April 2023, Kentucky's CWSRF program has funded 424 clean water infrastructure projects, totaling more than $1.75 billion, since the inception of the program. Kentucky has funded 219 drinking water projects, totaling more than $590 million, since the inception of the program.

Table 11. Funds spent using the Clean Water State Revolving Fund and Drinking Water State Revolving Fund in Kentucky.

	Clean Water State Revolving Fund	**Drinking Water State Revolving Fund**
2007 and prior	$479,991,442	$98,011,339
2008	$250,499,329	$53,702,151
2009	$67,267,880	$6,519,566
2010	$82,000,089	$36,227,115
2011	$81,162,663	$20,791,942
2012	$99,156,727	$23,670,604
2013	$73,950,436	$46,847,806
2014	$21,816,396	$10,083,876
2015	$155,169,099	$39,181,612
2016	$38,482,790	$25,545,760
2017	$46,734,571	$20,864,004
2018	$46,690,984	$18,277,845
2019	$94,377,569	$65,738,921
2020	$76,142,831	$36,656,506
2021	$69,537,288	$32,019,918
2022	$9,666,385	$21,648,963
2023	$8,660,000	$19,454,716
Since 2008	$1,270,108,519	$496,517,236
Cumulative	$1,750,099,962	$594,528,575

In the past two years (2020-2022), the CWSRF has funded the following projects:

- In Maysville, a project was funded to completely separate the remaining combined sewer system (CSS), thus eliminating diluted sewage (CSOs) from entering the Ohio River.
- Two additional projects, in Paducah and Pineville, were funded to further reduce CSS impacts in their communities. These projects are part of ongoing phased work in Long Term Control Plans, greatly improving the ability to control combined sewage releases.
- Replacement, upgrade, or expansion of at least 10 aging wastewater treatment systems that were polluting the waterways across the Commonwealth of Kentucky.
- 17 projects that reduced inflow and infiltration and reduced potentially recurring SSOs; All these projects helped systems achieve compliance, resulting in improved water quality.

- Three failing package treatment plants are in the process of being eliminated through regionalization. Regionalization of these plants has resulted in the reduction of system operation costs.
- Several projects provided services to areas that were served by failing septic systems, thus reducing the nutrient and pollutant loading into the waters of the Commonwealth.
- Kentucky, like other states, has been facing algal blooms that have impacted drinking water treatment plants and increased their costs. As projects funded through the state revolving fund reduce the amount of nutrients and pollutants in Kentucky's waterways, treatment plants will see a decline in operational costs.
- The funding through the state revolving fund is also being invested in new, green, energy-efficient technologies. This is increasing the long-term sustainability of Kentucky's water infrastructure.

Overall, these programs are geared towards improving the quality of Kentucky's natural resources, resulting in long-term benefits including diverse ecosystems, increased tourism, and economic development. In the past the programs focused primarily on unserved areas. Since the end of useful life has been reached on much of Kentucky's infrastructure, there is a move to more sustainable solutions when upgrading aging equipment.

Wetland Program

From 2020-2022 the Wetlands Monitoring and Assessment Program made considerable progress toward finalizing two Indices of Biotic Integrity (IBI) for vegetation (VIBI) and avifauna (AIBI) and the Kentucky Wetlands Rapid Assessment Method (KY-WRAM). To ensure that historical data used in the development of the IBIs and validation of the KY-WRAM were of known and sound quality, program staff completed an extensive data review initiative. As a result, the VIBI and AIBI were re-evaluated using an expanded dataset, which included newly collected data from 2020. This re-evaluation resulted in updated VIBI and AIBI metrics and the development of condition categories. These updated IBI's were used to validate the KY-WRAM. Results of analyses indicated that the IBIs and the KY-WRAM are capable of reflecting wetland condition across the human disturbance gradient.

While the IBIs appear to adequately reflect wetland condition, a potential limitation of the methods is that most of the data used in their development or re-evaluation were collected from forested, floodplain wetlands. As such, further testing is needed before they can be fully implemented to assess designated use attainment, track trends, and assess the success of restoration and protection efforts for all wetland types. Currently, program staff are working toward implementation of the tools to assess and report on wetland condition statuses and trends, particularly for forested, floodplain wetlands. In addition, a significant priority of the program is to collaborate with federal and state agencies, as well as private entities, to adopt the wetland assessment tools that have been developed. Through these collaborations, DOW strives to improve the regulatory decision-making process, and to support voluntary restoration and protection of wetland habitat.

Finally, DOW has continued to make progress toward increasing the capacity to perform monitoring activities internally. Over the last two years, additional staffing resources have been allocated to the program, which provided the resources to continue collecting water chemistry and in situ, avian, vegetation, and amphibian data. For example, for the first time since the program was created, DOW performed all its wetland vegetation, avifauna, and amphibian surveys during the 2021 field season.

Visit these wetland resources for more information:

- Wetland Program Plan
- Wetland Story Map
- KY-WRAM

Special State Concerns and Recommendations

Nutrient Reduction Strategy

Kentucky joins 11 other states in the Mississippi River Basin in consolidating efforts to address nutrient problems in waterways. As members of the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force, these states, along with five federal agencies, are working to develop nutrient reduction strategies and protocols to improve water quality at home and downstream.

In 2022, DOW released a draft update to the Nutrient Reduction Strategy (NRS), which builds on findings in the 2019 Loads and Yields Study and 2021 Update to the 2019 Nutrient Loads and Yields in Kentucky Study. This NRS update identifies high nutrient yielding watersheds from these studies, along with nutrient focused drinking water protection needs, and harmful algal bloom impacted watersheds to develop a new set of priority watersheds (Figure 33). These priority watersheds rank higher on 319 Program, Clean Water State Revolving Fund, and State Cost Share applications, and receive a greater NRCS cost share.

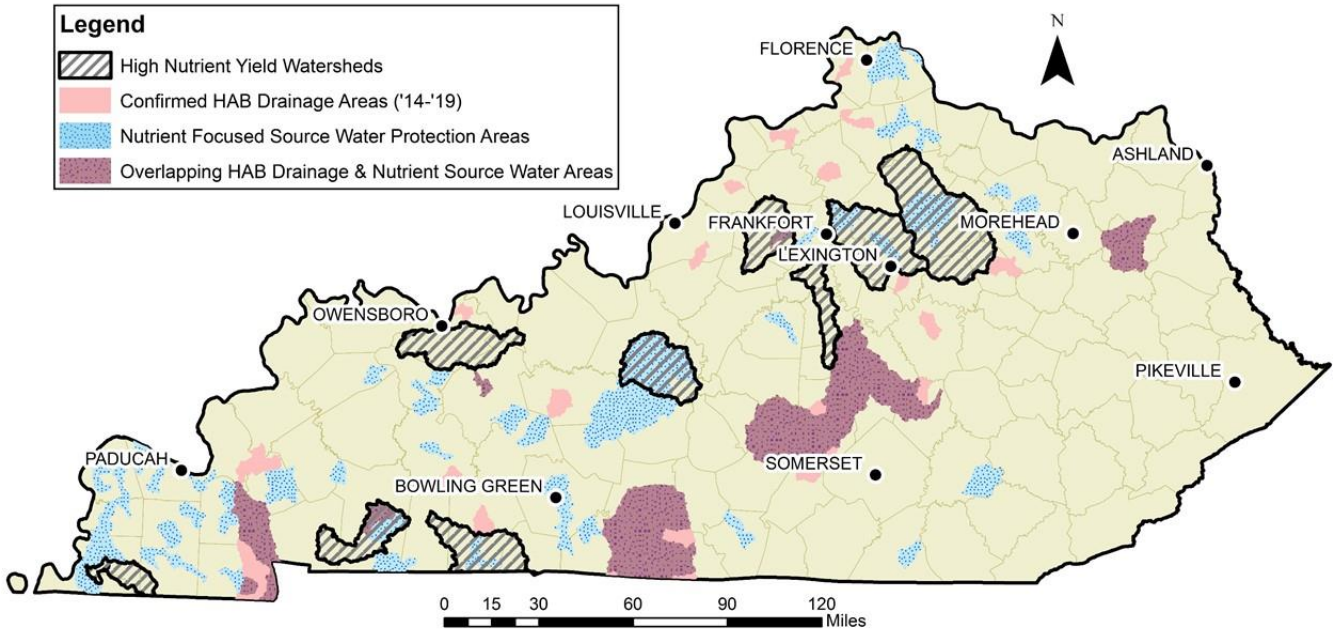


Figure 33. 2022 Nutrient Reduction Strategy Priority Areas

Per- and polyfluoroalkyl substances (PFAS)

Per- and polyfluoroalkyl substances (PFAS) are a large group of chemicals that have been widely used for decades due to their ability to resist heat, oil, grease, and water. Common uses include non-stick cookware, stain-resistant carpets and fabrics, food packaging, and fire-fighting foam. These chemicals break down very slowly in the environment and can be found in water, air, soil, fish, and wildlife. They have also been identified in the blood of people across the globe. There is evidence that exposure to PFAS chemicals may have harmful health effects. Researchers and state and federal agencies continue to investigate the potential health effects, levels of PFAS in the environment, and management options. For additional information, explore the links on this page.

In 2019, department staff sampled finished drinking water from 81 community public drinking water treatment plants (WTP). WTPs were selected to represent surface and groundwater sources, urban and rural land-use influence, and varying sizes of populations served. One or more PFAS were detected in 41 of the 81 WTPs. The full report is available here: Evaluation of Kentucky Community Drinking Water for Per- & Poly-Fluoroalkyl Substances.

In 2020, staff sampled 40 surface water locations across the Commonwealth. Monitoring stations were selected to fill data gaps and represent each of the major river basins in the state. Upstream catchment areas for these monitoring stations ranged from 0.8 to 4,288 square miles. One or more PFAS were detected at 36 of the 40 monitoring stations. The full report is available here: Evaluating Kentucky Source Waters for Per- & Poly-Fluoroalkyl Substances.

In 2021, DEP continued its efforts to evaluate potential paths of exposure to PFAS with a pilot project to test for PFAS in fish from state waters. Current scientific research indicates that certain PFAS can build up in fish over time, and consuming fish from PFAS-contaminated waters can be a route of exposure for

people. Three streams from the 2020 surface water study with confirmed levels of PFAS were selected initially. Four more streams were added in early 2022, as well as fish from a separate lake study. Fish sampled included black bass and sunfish species.

PFAS were detected in all 98 samples from the two projects. Perfluorooctane sulfonic acid (PFOS) occurred at the highest concentrations of any PFAS. Results for PFOS ranged between 0.31 and 50 parts per billion (ppb) in fish tissue. Fifteen other PFAS were detected in at least one sample at concentrations of 18 ppb or less. The average concentration of PFOS in fish from the stream study was 13 ppb; the average for fish from the lake study was 5 ppb.

To lower potential health risks associated with PFAS, the DEP, Department for Public Health, and Department of Fish and Wildlife Resources recommend that citizens follow existing statewide fish consumption guidance for mercury (Table 12) and any site-specific advisories (Table 13). Recent information from the US EPA indicates that infants and young children may be particularly sensitive to some health effects associated with PFAS. In the interim while staff collect additional data and information, sensitive populations may want to exercise additional caution when making choices on the frequency and quantity of fish consumed from state waters.

An Interim Report and a Frequently Asked Questions document are available for additional information.

DEP continues to test for PFAS in fish tissue, surface and ground waters, and drinking water across the state. Currently, fish tissue and surface water PFAS data are available for over 40 waterbodies. Additionally, a drinking water study in 2023 will provide data on finished drinking water for 113 water treatment plants not included in the 2019 study. Results will be available on the PFAS web page.

Fish Consumption Advisories

The Kentucky Departments for Environmental Protection, Public Health, and Fish and Wildlife Resources jointly issue fish consumption advisories to the public when fish are found with trace contaminants of mercury, PCBs, and chlordane.

These advisories caution citizens about potential health problems that may result from eating fish caught statewide (Table 12) as well as from a particular waterbody (Table 13). These advisories do not ban eating fish; it is a guide to help citizens reduce risk and make informed decisions about eating fish from Kentucky waters. This guidance provides information on how often fish may be safely eaten. Most fish are healthy to eat and are an excellent source of low-fat protein. Consumption advisories do not affect those who swim, ski, or boat in Kentucky waters.

A multi-agency workgroup that consists of representatives from the mainstem states, EPA, and ORSANCO establish advisories for the Ohio River.

Table 12. Fish consumption guidance that applies to specific groups of fish from all Kentucky waters.

Species	General Population	Sensitive Population	Contaminant
Predatory fish	1 meal per month	6 meals per year	Mercury
Bottom feeder fish and Panfish	1 meal per week	1 meal per month	Mercury
All other fish	No Advisory	1 meal per week	Mercury

Note: one meal is considered to be an 8 oz. serving for a 150-pound person.

Table 13. More restrictive guidance for fish consumption that applies to specific waterbodies.

Waterbody	Location	Species	General Population	Sensitive Population	Contaminant
Drakes Creek	W. Fork at Franklin, KY downstream to confluence	All fish	No Consumption	No Consumption	PCB
Knox Creek	Pike County	Bottom feeder fish	6 meals per year	No Consumption	PCB
Knox Creek	Pike County	Predatory fish	1 meal per month	6 meals per year	PCB
Knox Creek	Pike County	Panfish	1 meal per month	6 meals per year	PCB/Mercury
Knox Creek	Pike County	Flathead Catfish	No Consumption	No Consumption	PCB
Green River Lake	Lake-wide	Bottom feeder fish	1 meal per month	6 meals per year	PCB/Mercury
Fishtrap Lake	VA/KY state line to dam	Bottom feeder fish/hybrid bass	1 meal per month	6 meals per year	PCB
Fish Lake	Ballard County	Bottom feeder fish	1 meal per month	6 meals per year	Mercury
Little Bayou Creek	McCracken County	All fish	No Consumption	No Consumption	PCB
Mud River	Hancock Lake Dam to Wolf Lick Creek	Bottom feeder fish	No Consumption	No Consumption	PCB
Mud River	Hancock Lake Dam to Wolf Lick Creek	Predatory fish/Panfish	1 meal per month	6 meals per year	PCB
Mud River	Wolf Lick Creek to the Green River	Bottom feeder fish	1 meal per month	6 meals per year	PCB
Mud River	Wolf Lick Creek to the Green River	Panfish	1 meal per week	1 meal per month	PCB
Town Branch	Logan County	All fish	No Consumption	No Consumption	PCB
Metropolis Lake	McCracken County	All fish	No Consumption	No Consumption	PCB/Mercury

Note: one meal is considered to be an 8 oz. serving for a 150-pound person.

- **Sensitive Populations:** Women of childbearing age and children 6 years and younger are advised to eat no more than six meals per year of predatory fish and no more than one meal per month of panfish and bottom feeder fish. The general public is advised to eat no more than one meal per month of predatory fish and no more than one meal per week of panfish and bottom feeder fish.
- **Predatory fish include:** Largemouth Bass, Smallmouth Bass, Spotted Bass, White Bass and Striped Bass and their hybrids, Yellow Bass, Flathead Catfish, Blue Catfish, Musky, Sauger and Walleye and their hybrids, Bowfin, Chain Pickerel and all Gars.
- **Panfish include:** Bluegill, Green Sunfish, Longear Sunfish, Redear Sunfish, Rock Bass, and Crappie species.

- **Bottom feeder fish include:** Channel Catfish, Drum, Carp Sucker, White Sucker, Common Carp, Bullhead species, Northern Hog Sucker, Buffalo species, Spotted Sucker, Redhorse species, Sturgeon and Creek Chub.
- **Other fish include:** Asian Carp, Trout species, Minnows, etc.

Swimming Advisories

The DOW in the Energy and Environment Cabinet and the Division of Public Health Protection and Safety in the Cabinet for Health and Family Services agree that swimming advisories that have been in place for several years in different areas of the state should remain in effect until further notice. These advisories are due to high levels of *E. coli* bacteria.

People should avoid recreational contact with waters in the areas specified because of the bacteria, which occur in human and animal waste and indicate the presence of untreated or inadequately treated sewage. The bacteria create a potential for diarrheal illnesses and other infectious diseases.

Swimming advisories remain in effect for the following:

Upper Cumberland River

- The Cumberland River from Four Mile Bridge (Highway 2014) to Pineville at the Highway 66 Bridge and from Wallins Creek Bridge (Highway 219) to Harlan
- Martins Fork from Harlan to the Cawood Water Plant
- All of Catron Creek, all of Clover Fork and all of Straight Creek
- Poor Fork from Harlan to Looney Creek
- Looney Creek from the mouth to Lynch Water Plant Bridge

Kentucky River

North Fork of the Kentucky River upstream of Chavies. Although still above recommended levels, water quality has continued to improve and is approaching an acceptable level for swimming in some stretches of the river.

Licking River

Banklick Creek to the confluence with the Ohio River. The swimming advisory includes all of Banklick Creek and Three Mile Creek. Inadequate or failing sewage treatment systems can contribute to water quality problems along Kentucky waterways. Efforts by the Cabinet for Health and Family Services and local environmental health staff to ensure all new septic system installations are installed properly, and work by DOW and wastewater plant operators to monitor wastewater treatment plant compliance are reducing bacterial pollution from these possible sources. Work by both agencies is gradually reducing the number of discharges and improving water quality.

Residential and Agricultural Areas

The agencies also recommend against swimming or other full-body contact with surface waters immediately following heavy rainfall events, especially in dense residential, urban and livestock production areas. This recommendation is due to an increased potential for exposure to pollution from urban NPS pollution, bypasses from sewage collection systems, CSOs, and pollution from livestock waste. The public should avoid recreating in stream segments below wastewater treatment facility outfalls, confined animal feedlots or other obvious sources of pollution during any time of the year.

Harmful Algal Blooms

Algae occur naturally in all waterbodies and are a vital part of the ecosystem. When favorable conditions occur in a water body (e.g. excess nutrients, sunny conditions, warm temperatures and/or low-flow), many algae species may grow excessively, producing a nuisance bloom. A harmful algal bloom, or HAB, occurs when toxin-producing cyanobacteria, also known as blue-green algae, grow excessively in a body of water. These bacteria can produce toxins which may affect the liver, nervous system and/or skin in animals or humans. Not all cyanobacteria produce toxins and some produce toxins only under certain conditions.

HABs can have a variety of different colors and looks. HABs may appear bright green, blue-green, brown, red and/or white in color. Some HABs may look like spilled paint, pea soup, parallel streaks and/or green dots or globs in the water. They often have a grainy, sawdust-like appearance upon closer inspection.

Action levels for HAB watch and warning advisories are detailed in Table 14. Recreational advisories will be placed when the action limits in this table are exceeded. Action levels for total microcystins (all congeners) and cylindrospermopsin recommended by EPA were adopted by the Kentucky HAB Work Group in 2019. Action levels for anatoxin-a utilized by Ohio were adopted by the Kentucky HAB Work Group in 2019. Current HAB advisories can be located using the Harmful Algal Bloom Viewer.

Table 14. Thresholds for advisories for total microcystins, cylindrospermopsin, and anatoxin-a.

Advisory Type	Cyanotoxin Thresholds (µg/L)			
	Total Microcystins	Cylindrospermopsin	Anatoxin-a	HAB Viewer Color
Recreational Public Health Advisory - Algal toxins present at unsafe levels. Swimming, wading, and water activities that create spray are not recommended.	8	15	80	Red

In the last five years (2018 – 2022), the following blooms have been reported:

- In 2018, blooms were reported at 7 waterbodies including: Doe Valley Lake, Herrington Lake, Lake Reba, Nolin River Lake, Paint Lick Creek, Panbowl Lake, and Wilgreen Lake. Toxins were detected below the advisory levels at Doe Valley Lake. No recreational advisories were issued.
- In 2019, blooms were reported at 19 waterbodies including: Briggs Lake, Camp Ernst Lake, Caneyville Reservoir, Carpenter Lake, Elmer Davis Lake, Freeman Lake, Grayson Lake, Herrington Lake, Kentucky River, Kingfisher Lakes, Lake Barkley, Lake Malone, Lake Reba, Ohio River, Pikeville City Lake, Salem Lake, Washburn Lake, West Fork Drakes Reservoir, and Wilgreen Lake. Toxins were detected below the advisory levels at Camp Ernst Lake, Caneyville Reservoir, Carpenter Lake, Elmer Davis Lake, Freeman Lake, Grayson Lake, Lake Malone, Salem Lake, and Washburn Lake. Toxins were detected above the advisory level for Microcystins at Briggs Lake and the Ohio River. Recreational public health advisories were issued for Briggs Lake from 09/26/2019 – 11/22/2019 and the Meldahl, Markland, and McAlpine pools of the Ohio River from 09/26/2019 – 11/07/2019.
- In 2020, blooms were reported at 3 waterbodies including: Barren River Lake, McDougal Lake, and Taylorsville Lake. Toxins were detected below the advisory levels at McDougal Lake. No recreational advisories were issued.
- In 2021, blooms were reported at 7 waterbodies including: Boltz Lake, Kentucky River, Licking River, Rough River Lake, Sportsman's Lake, Taylorsville Lake, and Yatesville Lake. Toxins were detected below advisory levels at Sportsman's Lake and Taylorsville Lake. No recreational advisories were issued.
- In 2022, blooms were reported at 2 waterbodies including: Elmer Davis Lake and Shelby Lake. No toxins were detected. No recreational advisories were issued.

Water Recreation Tips

DOW and the Kentucky Department of Public Health issue Water Recreation Tips at the beginning of each recreation season. The following recommendations were made in 2022:

1. Avoid ingesting or inhaling the water.
2. Thoroughly clean hands and other areas that have come in contact with the water.
3. Avoid allowing open wounds to have direct contact with the water.
4. Avoid areas where swimming or harmful algal bloom (HAB) advisories have been issued.
5. Avoid water with obvious odors or surface scums.
6. Avoid getting in water after heavy rainfall, especially in dense residential, urban and agricultural areas.
7. Avoid areas below wastewater treatment facility outfalls, animal feedlots, straight pipes or other obvious sources of pollution.
8. Restrict pets and livestock from drinking the water if a bright green or blue-green surface scum is present.

Public Participation

Water Health Portal

In 2022, the Water Health Portal was updated to an ArcGIS Hub Site platform, where the interactive map is the home page, but the site also incorporates information from the Integrated Report, restoration activities, data sources, and advisories.

The home page of the updated Water Health Portal has all the same functions of the older Water Health Portal, where you can learn about assessed waterbodies, OSRWs, and waterbodies with TMDLs. Navigation options include a search function by waterbody name, address, city, or latitude/longitude. Clicking on a waterbody opens the available dashboards for that waterbody, such as an assessment dashboard, a TMDL dashboard, or an OSRW dashboard.

The assessment dashboard includes easily identifiable color-coded icons that indicate whether a stream, lake, or spring supports a particular use, such as swimming, fishing, and aquatic life. In addition to attainment information, the dashboard provides relevant links, including an assessment summary, basin coordination, and an implementation summary (where applicable) (Figure 34).

The TMDL dashboard includes the name of the parameter(s) that has a TMDL, the approval date of the TMDL, and a link to the TMDL report. The OSRW dashboard includes the use designation reason and waterbody ID of the waterbody designated as an OSRW.

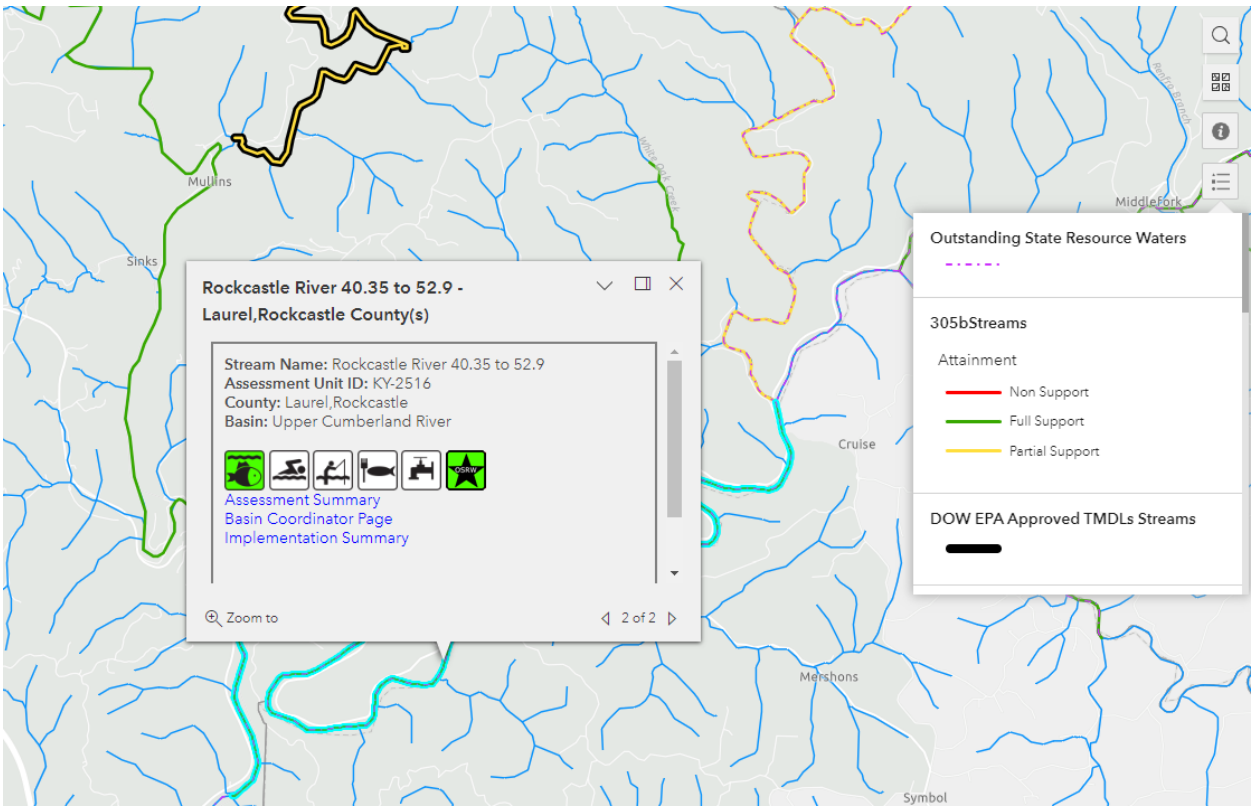


Figure 34. Image captured from the Water Health Portal that displays an assessment dashboard; the legend identifies waters with a TMDL as having a thick black line and those designated as an OSRW having a dashed purple line.

Call For Data

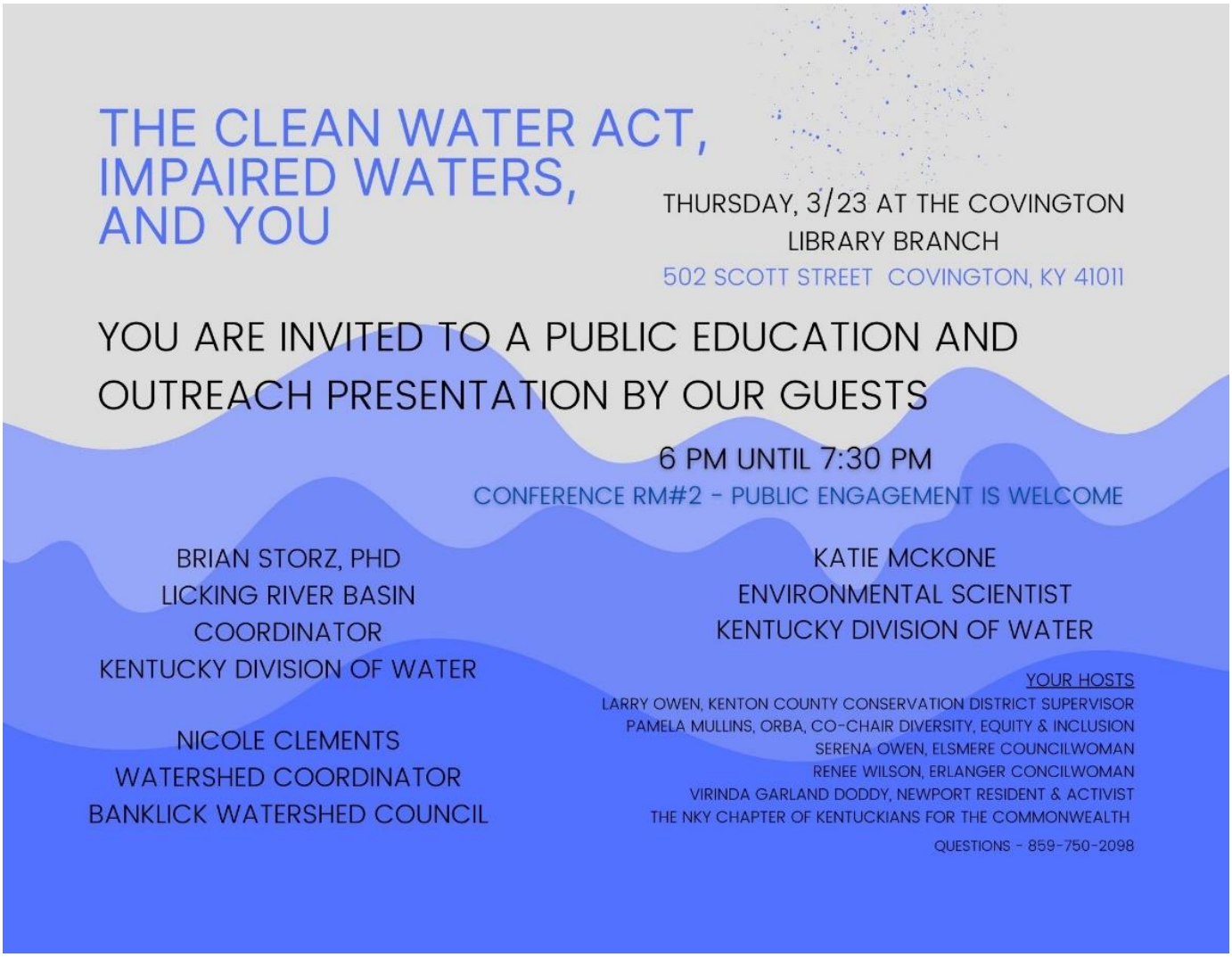
On May 11, 2021, DOW sent out a 'Call for Data' to the TMDL email distribution list, the NPS email distribution list, and various agency partners, such as USACE and Louisville MSD (Appendix A). Attached to this email was a data format template to ensure that submitted data could be reviewed for sufficient quantity and quality to document decisions to use, or not use, the available data as part of the 305(b)/303(d) assessment process. All decisions to use, or not use, readily available data were tracked in either K-WADE, where DOW houses its monitoring data, or KATTS, where DOW houses its assessment data before submittal to ATTAINS.

Public Notice

On February 21, 2023, DOW published the 2022 draft 303(d) list of impaired waters requiring a TMDL for public comment, as required by KRS 224.70-150. A dedicated public notice site was developed for the public to view the draft 303(d) list, new listings, proposed delistings, waters with completed TMDLs, and the 305(b) list. Spreadsheets and interactive maps with video tutorials were available through the site. Links to assessment summaries and TMDL documents were available through the map dashboards or in the provided spreadsheets. The official public notice announcement can be found in Appendix B.

Notification was sent through a Commonwealth of Kentucky Energy and Environment Cabinet blog post (Appendix C). Additionally, the public notice was distributed electronically through the TMDL and NPS email distribution lists. Comments received and responses to comments are included in Appendix D.

At the request of a citizen from Kenton County, a public meeting to discuss the CWA, the public notice process, and work being done in Kenton County by the Banklick Watershed Council was scheduled for the evening of March 23, 2023, at the Kenton County Public Library in Covington, Kentucky. At this meeting, participants were allowed to provide official comments in written form, which have been included, and responded to, in this IR document (Appendix D).


THE CLEAN WATER ACT, IMPAIRED WATERS, AND YOU
THURSDAY, 3/23 AT THE COVINGTON LIBRARY BRANCH
502 SCOTT STREET COVINGTON, KY 41011
YOU ARE INVITED TO A PUBLIC EDUCATION AND OUTREACH PRESENTATION BY OUR GUESTS
6 PM UNTIL 7:30 PM
CONFERENCE RM#2 - PUBLIC ENGAGEMENT IS WELCOME
BRIAN STORZ, PHD
LICKING RIVER BASIN
COORDINATOR
KENTUCKY DIVISION OF WATER
NICOLE CLEMENTS
WATERSHED COORDINATOR
BANKLICK WATERSHED COUNCIL
KATIE MCKONE
ENVIRONMENTAL SCIENTIST
KENTUCKY DIVISION OF WATER
YOUR HOSTS
LARRY OWEN, KENTON COUNTY CONSERVATION DISTRICT SUPERVISOR
PAMELA MULLINS, ORBA, CO-CHAIR DIVERSITY, EQUITY & INCLUSION
SERENA OWEN, ELSMERE COUNCILWOMAN
RENEE WILSON, ERLANGER CONCILWOMAN
VIRINDA GARLAND DODDY, NEWPORT RESIDENT & ACTIVIST
THE NKY CHAPTER OF KENTUCKIANS FOR THE COMMONWEALTH
QUESTIONS - 859-750-2098

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Appendices

Appendix A – Call for Data

The Kentucky Division of Water, Water Quality Branch, is seeking data for the upcoming 2022 305(b)/303(d) Integrated Reporting Cycle. It is strongly encouraged to reach out prior to submitting data to ensure efficiency and address any special circumstances.

For those interested in submitting water quality, bacteria, biological, or tissue data for consideration in the 2022 305(b) assessment process, please email TMDL@ky.gov and place "Data for 2022 Cycle" in the subject line. Data must be submitted no later than **July 11, 2021**.

To streamline the data request process, and to facilitate review, the Division has provided a data template (attached). The template is organized into the following tabs, each with a data dictionary describing the required and optional data elements and an example data set.

1. General – general requirements for submitting data and specific requirements per data type (e.g. bacteria or biological community data)
2. Stations – details for the locations where data were collected
3. Field Measurements and Observations – field measurements (numeric) and observations (categorical)
4. Sample Results - analytical results for water samples, including chemistry (e.g. nutrients and or metals) or bacteria (e.g. *E. coli*)
5. Analytical Methods – information from the laboratory that must accompany any Sample Results, including the method reference, units, detection limit, and reporting limit per characteristic analyzed by that laboratory
6. Qualifier Key – definition of laboratory result qualifiers or other data flags
7. Fish Sample Summary – details of fish sample collections, with the necessary information to verify that collection and identification followed relevant SOPs and are appropriate for use in 305(b) assessment
8. Fish Results – fish sample taxa lists and abundances from which the Division can calculate summary metrics and KIBI where appropriate
9. Macro Sample Summary – details of macroinvertebrate sampling, processing, and analysis to verify that samples followed relevant SOPs and are appropriate for use in 305(b) assessment
10. Macro Results – macroinvertebrate sample taxa list and abundances, from which the Division can calculate summary metrics and MBI where appropriate
11. Tissue Results - analytical sample results for tissue analysis, with details about the specimen(s) comprising the samples and how they were collected

Thank you for your interest in contributing to assessing the quality of Kentucky's waters. We look forward to hearing from you.

Appendix B – Public Notice Announcement

Draft 2022 303(d) List at Public Notice, February 21, 2023

The Kentucky Division of Water has opened a 60-day comment period on the draft 2022 303(d) list of impaired waters as required by KRS 224.70-150. Comments received by email or mail must be dated or postmarked no later than April 22, 2023. Comments on the draft 303(d) list may be sent:

- Via email (*preferred method*) to TMDL@ky.gov (Subject line: "303(d) List")
- Via U.S. Mail to: Water Quality Branch (ATTN: 303(d) List)
  Kentucky Division of Water
  300 Sower Blvd., 3rd Floor
  Frankfort, KY 40601

The Division has developed a dedicated public notice site to view the draft 303(d) list, new listings, proposed delistings, waters with completed total maximum daily loads (TMDLs), and the 305(b) list. Spreadsheets and interactive maps with video tutorials are available through this site. Links to assessment summaries and TMDL documents are available through the map dashboards or in the provided spreadsheets.

Section 305(b) of the Clean Water Act (CWA) requires states to report to Congress every two years on the health of waters in the state, and whether the water quality of individual waterbodies is sufficient to support their designated uses. In Kentucky, these designated uses include primary contact recreation, secondary contact recreation, aquatic life, domestic water supply, fish consumption, and outstanding state resource waters. The determination of designated use attainment is based on water quality sampling and assessment methodologies developed by the state and approved by the U.S. Environmental Protection Agency (EPA).

Section 303(d) of the CWA requires states to identify impaired waters, the pollutant(s) causing the impairment, and to develop a TMDL for each of those pollutants. Section 303(d) also requires states to prioritize waters for TMDL development. The TMDL, which is a daily maximum allowance for a pollutant, supports plans and strategies for restoring water quality.

The 2022 reporting cycle focuses on the following Basin Management Units (BMU) sampled by DOW's Ambient Rivers program: Big and Little Sandy Rivers and Tygarts Creek BMU, Kentucky River BMU, Salt and Licking Rivers BMU, and Upper Cumberland and Four Rivers BMU. Data collected by the Ohio River Valley Water Sanitation Commission (ORSANCO) were used to update assessments along the Ohio River. Data collected by other internal programs and external data contributors provide updates throughout the state.

Assessment results from the 2018-2020 Integrated Report can be accessed at the Kentucky Water Health Portal. Upon EPA approval of the 2022 303(d) list, the Water Health Portal will be updated with the 2022 305(b) assessment information.

Appendix C – Blog Post

Draft 2022 303(d) List at Public Notice, February 21, 2023

The Kentucky Division of Water has opened a 60-day comment period on the draft 2022 303(d) list of impaired waters as required by KRS 224.70-150. Comments received by email or mail must be dated or postmarked no later than April 22, 2023. Comments on the draft 303(d) list may be sent:

- Via email (*preferred method*) to TMDL@ky.gov (Subject line: "303(d) List")
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  Kentucky Division of Water
  300 Sower Blvd., 3rd Floor
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The Division has developed a dedicated public notice site to view the draft 303(d) list, new listings, proposed delistings, waters with completed total maximum daily loads (TMDLs), and the 305(b) list. Spreadsheets and interactive maps with video tutorials are available through this site. Links to assessment summaries and TMDL documents are available through the map dashboards or in the provided spreadsheets.

Section 305(b) of the Clean Water Act (CWA) requires states to report to Congress every two years on the health of waters in the state, and whether the water quality of individual waterbodies is sufficient to support their designated uses. In Kentucky, these designated uses include primary contact recreation, secondary contact recreation, aquatic life, domestic water supply, fish consumption, and outstanding state resource waters. The Division determines if a waterbody meets its designated use by using water quality sampling and assessment methodologies developed by the state and approved by the U.S. Environmental Protection Agency (EPA).

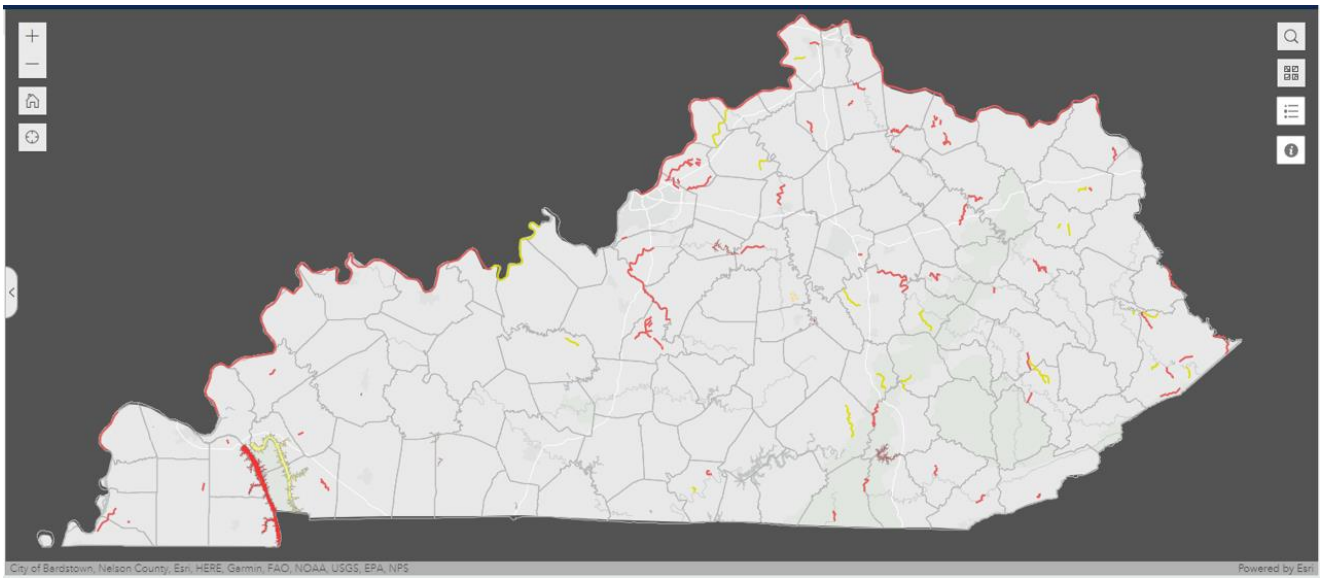
Section 303(d) of the CWA requires states to identify impaired waters, the pollutant(s) causing the impairment, and to develop a TMDL for each of those pollutants. Section 303(d) also requires states to prioritize waters for TMDL development. The TMDL, which is a daily maximum allowance for a pollutant, supports plans and strategies for restoring water quality.

This reporting cycle represents monitoring efforts that took place between 2016 and 2020. In total 1,047 sampling locations contributed data to the 2022 cycle, and 615 assessments were completed. DOW's Ambient Rivers program sampled the following basin management units (BMUs): Big and Little Sandy Rivers and Tygarts Creek BMU, Kentucky River BMU, Salt and Licking Rivers BMU, and Upper Cumberland and Four Rivers BMU. Data collected by other internal programs, such as ambient lakes, fish tissue, and intensive survey, provide updates throughout the state, while data collected by the Ohio River Valley Water Sanitation Commission (ORSANCO) were used to update assessments along the Ohio River.

The draft 2022 305(b) list has 2,954 assessment units representing 13,136.4 river miles, 212,585 lake/reservoir acres, and 170,469 springshed acres, while the 2018-2020 305(b) list has 2,879 assessment units. The additional assessment units have been added by 1) splitting an existing assessment unit into two or more assessment units, or 2) by assessing a previously unassessed waterbody.

As part of the 2022 cycle, the entire Ohio River was re-segmented in recognition of domestic water supply intakes and additional applicable designated uses, such as Outstanding State Resource Waters (OSRW). This re-segmentation occurred by splitting existing Ohio River assessment units into two or more assessment units, making the number of assessment units along the Ohio River increase from 49 to 77. However, the number of miles assessed along the Ohio River has not changed. The modifications spreadsheet provided on the 'Welcome Tab' of the public notice site has information about all assessment units that were re-segmented as part of the 2022 cycle.

Assessment results from the 2018-2020 Integrated Report can be accessed at the Kentucky Water Health Portal. Upon EPA approval of the 2022 303(d) list, the Water Health Portal will be updated with the 2022 305(b) assessment information.



New listings map from the public notice site, which displays waterbodies with pollutants that are newly listed on the 2022 303(d) list as causes of impairment (not meeting water quality standards) and require a Total Maximum Daily Load (TMDL).

Appendix D – Comments Received and Response to Comments

The purpose of this appendix is to document the public comments received and provide a response to these comments in writing. Comments are reproduced as received, then repeated as gray text (where necessary) with DOW responses in black text.

Comment 1:

Hi,

I'm reviewing the updated list for streams in the Currys Fork Watershed.

- The Currys Fork Main Stem is not listed on the 303(d) list even though it is part of the Floyds Fork TMDL and impaired for PCR. Why is this?

Currys Fork 0.0 to 4.8	Mouth to Confluence with North and South Fork Currys Fork	River/Stream	490506

- I would also like to confirm that water quality monitoring completed by Oldham MS4 in 2020 was reviewed as part of this update. I've attached the report.

Please reach out to discuss.

Thanks,

Oldham County Fiscal Court

100 W. Jefferson St., Suite 3

La Grange, KY 40031

Same commenter, separate email:

- Please also confirm that Floyds Fork 45.65 to 61.9 should be considered a new listing when it looks to have the same impairments as it did previously.

Response to Comment 1:

- The Currys Fork Main Stem is not listed on the 303(d) list even though it is part of the Floyds Fork TMDL and impaired for PCR. Why is this?
    - The 303(d) list is a list of all pollutant-waterbody combinations that are impaired and are in need of a Total Maximum Daily Load (TMDL). Since Currys Fork has a TMDL, it is no longer on the 303(d) list, but it can still be found on the impaired waters list in category 4a. The definition of category 4a is "parameter does not meet water quality standard(s) and has an EPA approved or established TMDL."
- I would also like to confirm that water quality monitoring completed by Oldham MS4 in 2020 was reviewed as part of this update. I've attached the report.

- Yes, water quality monitoring completed by Oldham MS4 in 2020 was reviewed and used for assessment as part of the 2022 cycle. All submitted and utilized data confirmed current primary contact recreation impairments due to *E. coli*. Suspected sources were reviewed and updated as appropriate.

- Please also confirm that Floyds Fork 45.65 to 61.9 should be considered a new listing when it looks to have the same impairments as it did previously.
    - Floyds Fork 45.65 to 61.9 is newly listed for dissolved oxygen as part of the 2022 cycle, which impairs the warm water aquatic habitat designated use. This same segment has been impaired since the 2014 cycle, where the causes of impairment for the warm water aquatic habitat designated use were identified as nutrient/eutrophication biological indicators, organic enrichment (sewage) biological indicators, and sedimentation/siltation.

Comment 2:

Pursuant to a Public Notice issued February 21, 2023, Kentucky Division of Water announced it is seeking comments on its draft list of impaired waters for 2022, as required by the Clean Water Act. The public comment period is open for 60 days and will end on April 22, 2023.

Section 303(d) of the Act requires a state to identify those waters that do not or are not expected to meet state water quality standards.

Gunpowder Creek in Boone County has a TMDL Alternative plan which is a near-term water quality restoration plan with a schedule of actions and milestones that are more immediately beneficial or practicable to achieving water quality standards than a traditional TMDL plan. This alternative plan has been accepted by the EPA, and as a result, the existing assessment unit names have "low" under the TMDL Priority column listed in the Draft 2022 303(d) list for PN spreadsheet. However, the two new listings in Gunpowder Creek (Gunpowder Creek UT 0.0 to 4.0 and Riddles Run 0.0 to 4.7) indicate "low" for TMDL Priority (column AC) but do not include the reference to the Gunpowder TMDL Alt as with the other listed segments in the Gunpowder Creek Watershed. Please include this information in the following columns/categories for these two segments:

- Column AE/Associated Action Name — Gunpowder Creek Watershed Plan and PCR Supplement
- Column AF/Associated Action ID — KYACT_2
- Column AG/Associated Action Type — TMDL-Alt
- Column AH/Action Status — EPA Final
- Column Al/Action Status Date — 02/01/2018

If you have any questions regarding this request, please don't hesitate to contact [redacted]

Best regards,

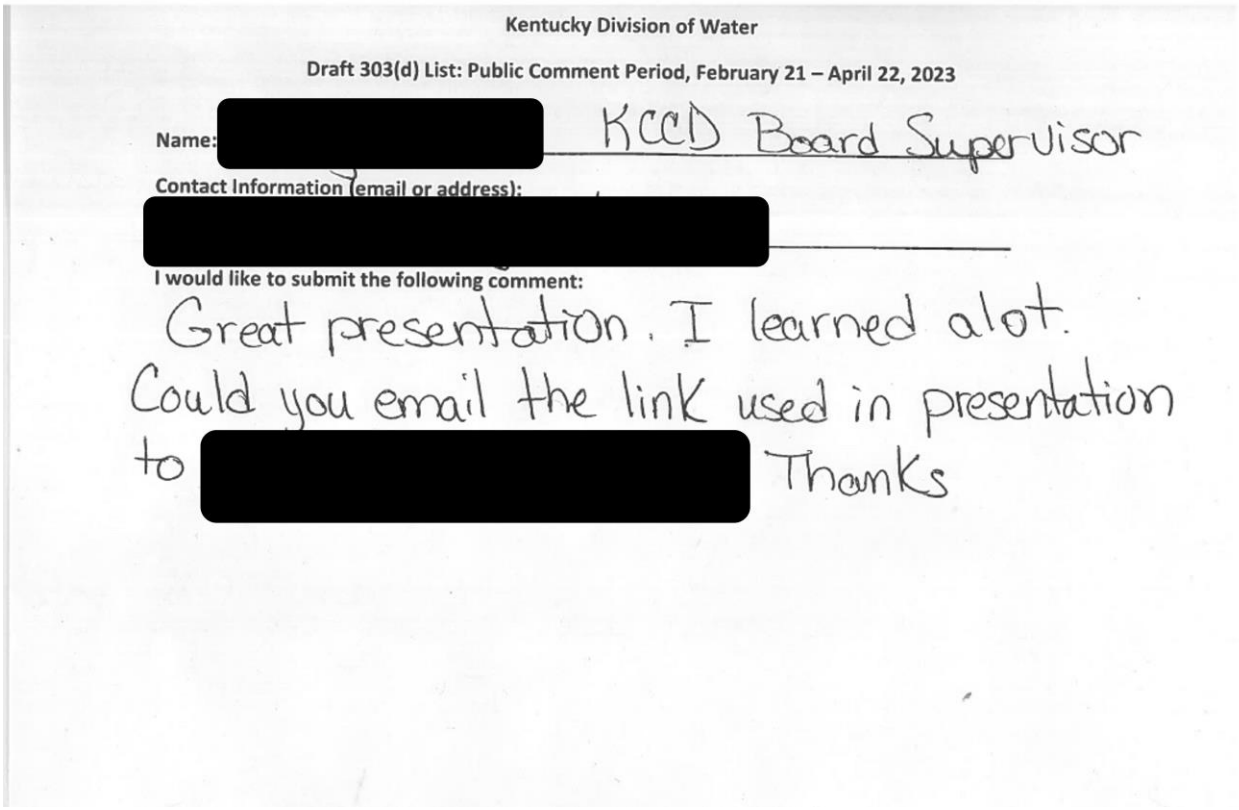
[redacted]

Director of Water Resources

Response to Comment 2:

The Division appreciates the commenter bringing to our attention the two 303(d) listings within the Gunpowder Creek watershed that do not cite the Gunpowder Creek Watershed Plan and PCR Supplement as an active TMDL Alternative Plan Action (TMDL-Alt). The Sedimentation/Siltation listings for Gunpowder Creek UT 0.0 to 4.0 and Riddles Run 0.0 to 4.7 are new listings for the 2022 reporting cycle and did not exist during the development of the original Gunpowder Creek Watershed Plan in 2014 or the later PCR Supplement that comprised the TMDL Alternative Plan, accepted by EPA in 2018. The Division will review the implementation activities outlined in the Gunpowder Creek Watershed Plan and PCR Supplement and supporting documentation to determine whether it is appropriate to consider the TMDL Alternative Plan to be a more immediately beneficial or practicable pathway than a TMDL in addressing the sedimentation listings in these two segments. Pending an affirmative result of this review and a formal acceptance by EPA, these two listings would be updated in the next reporting cycle to acknowledge the TMDL Alternative Plan.

Comment 3:



Kentucky Division of Water

Draft 303(d) List: Public Comment Period, February 21 – April 22, 2023

Name: [redacted] KCCD Board Supervisor

Contact Information (email or address): [redacted]

I would like to submit the following comment:

Great presentation. I learned alot.
Could you email the link used in presentation
to [redacted] Thanks

Response to Comment 3:

Thank you for attending. Presentation emailed to provided contact on 3/24/2023.

Comment 4:

Kentucky Division of Water

Draft 303(d) List: Public Comment Period, February 21 – April 22, 2023

Thanks!

Name: [redacted] Elsmere City Council

Contact Information (email or address):

[redacted]

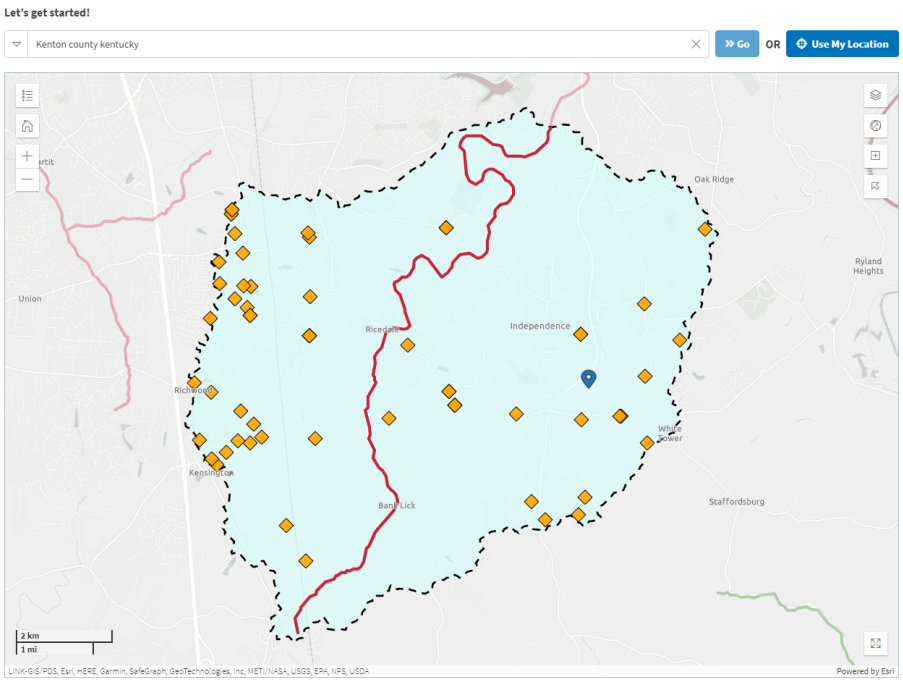
I would like to submit the following comment:

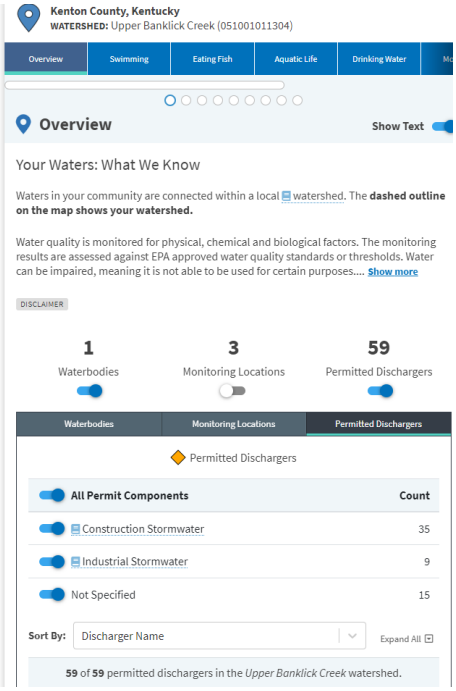
1. What is the best way to identify local regulated communities?

2. How can community members learn more about the Clean Water Act and how they can be engaged in improving water ways in their area/community?

Response to Comment 4:

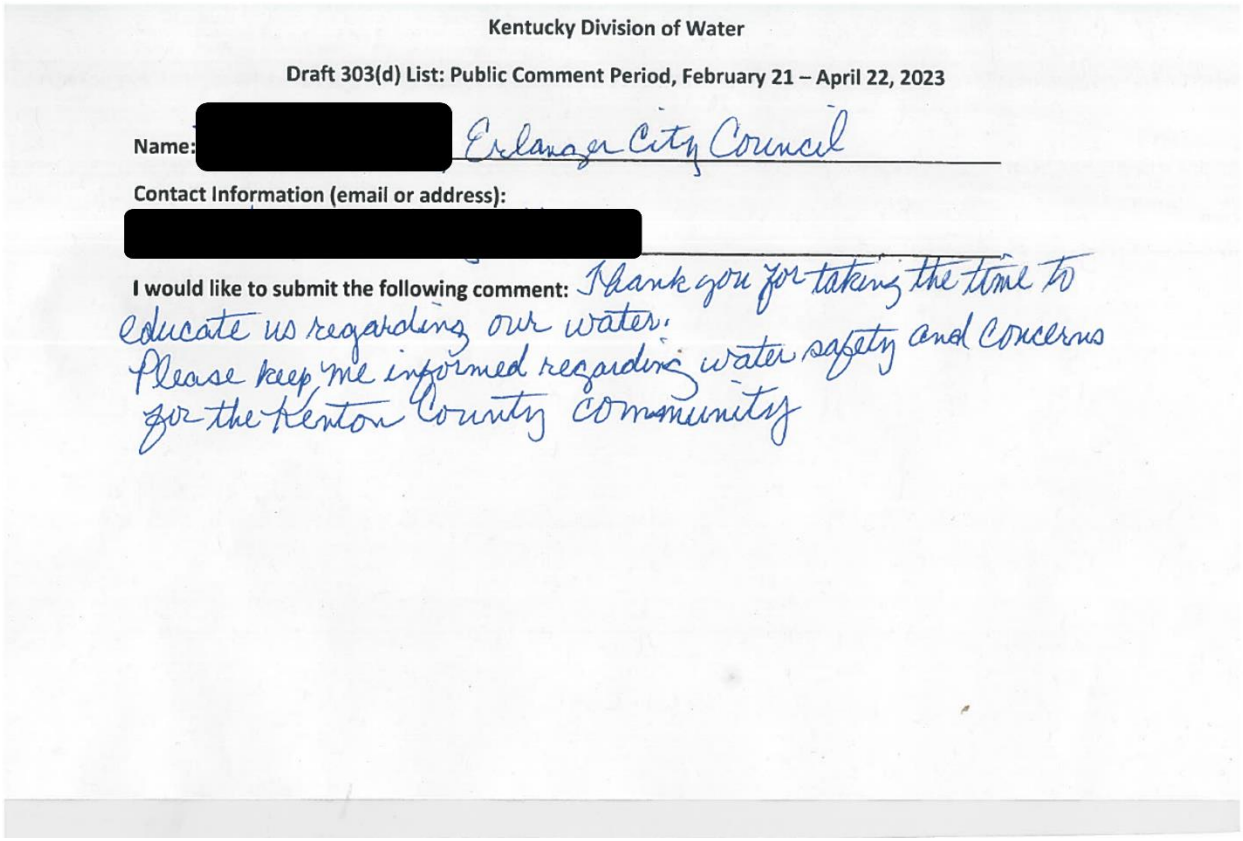
- What is the best way to identify local regulated communities?
  - EPA's How's My Waterway has a community page, which displays permitted dischargers within a watershed.





- How can community members learn more about the clean water act and how they can be engaged in improving water ways in their area/community?
    - Community members can learn more about the clean water act by visiting the EPA's website or the Kentucky Division of Water's website. They can also get involved with their local watershed, Friends of, or environmental group. For more information about local waterways, they can visit the EPA's How's My Waterway tool or the Kentucky Division of Water's Water Health Portal. Watershed Watch in Kentucky and the Volunteer Lake Monitoring Programs also offer a way for community members to improve their knowledge of and participate in efforts to improve their local water health. Both programs are educational, non-advocacy programs. The Banklick Watershed Council is an additional local resource, where many of their events are posted on their Facebook Page - https://www.facebook.com/Banklickwatershed.

Comment 5:



Kentucky Division of Water

Draft 303(d) List: Public Comment Period, February 21 – April 22, 2023

Name: [redacted] Erlanger City Council

Contact Information (email or address):

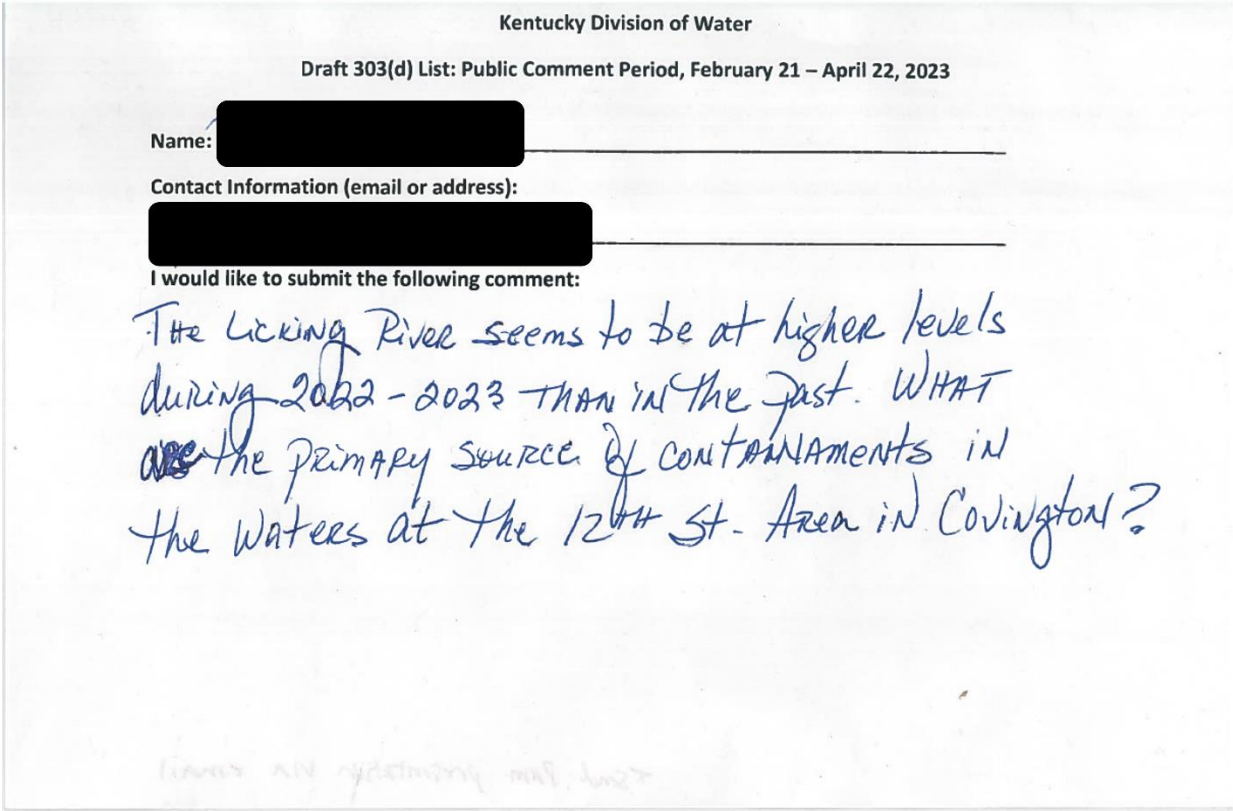
[redacted]

I would like to submit the following comment: Thank you for taking the time to educate us regarding our water. Please keep me informed regarding water safety and concerns for the Kenton County community

Response to Comment 5:

Thank you for attending. We have added you to our email distribution list using the provided email. The Banklick Watershed Council is an additional local resource, where many of their events are posted on their Facebook Page - https://www.facebook.com/Banklickwatershed.

Comment 6:



Kentucky Division of Water

Draft 303(d) List: Public Comment Period, February 21 – April 22, 2023

Name: [redacted]

Contact Information (email or address):

[redacted]

I would like to submit the following comment:

The Licking River seems to be at higher levels during 2022 - 2023 than in the past. What are the primary source of contaminants in the waters at the 12th St. Area in Covington?

Response to Comment 6:

The 2022 305(b) has three assessment units along the Licking River in Kenton County: Licking River 0.1 to 4.75, Licking River 4.75 to 5.75, and Licking River 5.75 to 14.7. The 12th street location is adjacent to the Licking River 0.1 to 4.75 segment.

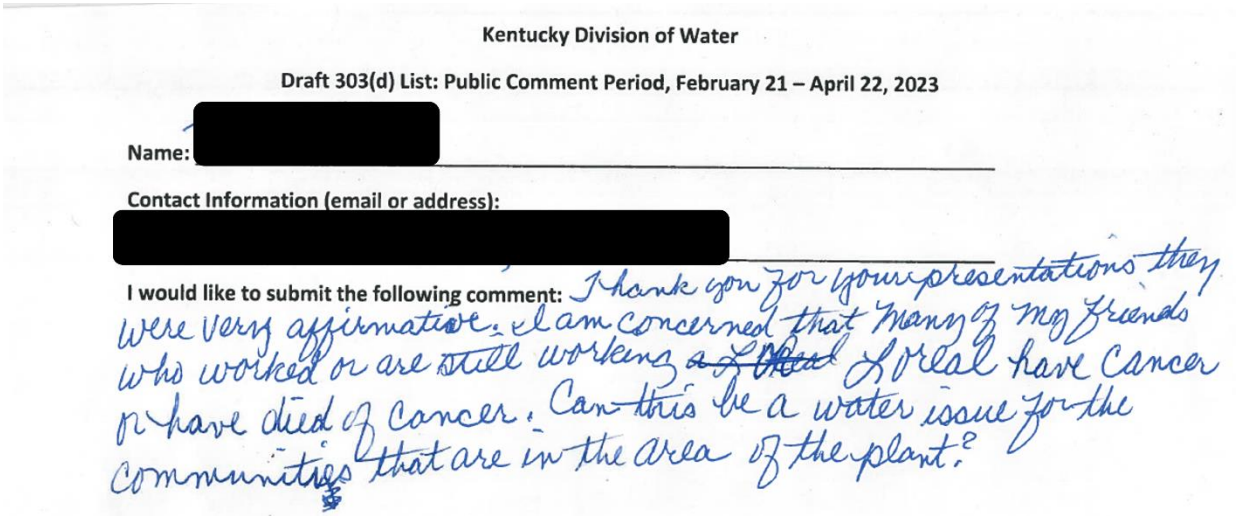
- Licking River 0.1 to 4.75 is full support for the warm water aquatic habitat designated use.
- Licking River 4.75 to 5.75 is full support for the domestic water supply designated use.
- All three assessment units are impaired for primary contact recreation due to either pathogens or *Escherichia coli* (*E. coli*). The suspected sources include Combined Sewer Overflows; Municipal (Urbanized High Density Area); Urban Runoff/Storm Sewers, and Source Unknown.

The impairments were not updated as part of the 2022 cycle. Without more recent data to evaluate, it's difficult to speak to the 2022 – 2023 timeframe, or to make comparisons to prior years.

The table to the right provides annual flow from USGS 03254520 LICKING RIVER AT HWY 536 NEAR ALEXANDRIA, KY. The USGS website for this gage may be of interest to the commentor to review historic water levels along the Licking River near its confluence with the Ohio River.

Water Year	00060, Discharge, cubic feet per second
2008	6,609
2009	4,344
2012	4,639
2014	5,155
2015	6,705
2016	4,629
2017	3,828
2018	7,338
2019	8,002
2020	7,634
2021	6,051
2022	6,092

Comment 7:



Kentucky Division of Water

Draft 303(d) List: Public Comment Period, February 21 – April 22, 2023

Name: [redacted]

Contact Information (email or address):

[redacted]

I would like to submit the following comment: Thank you for your presentations they were very affirmative. I am concerned that many of my friends who worked or are still working ~~at L'Oreal~~ L'Oreal have cancer or have died of cancer. Can this be a water issue for the communities that are in the area of the plant?

Response to Comment 7:

Thank you for attending. Please accept our condolences for your friends who have had, or are fighting, cancer. Connecting water issues to the plant and occurrences of cancer is beyond the scope of this Integrated Report. The National Cancer Institute and the Center for Disease Control and Prevention recommend reaching out to state or local health departments with concerns.