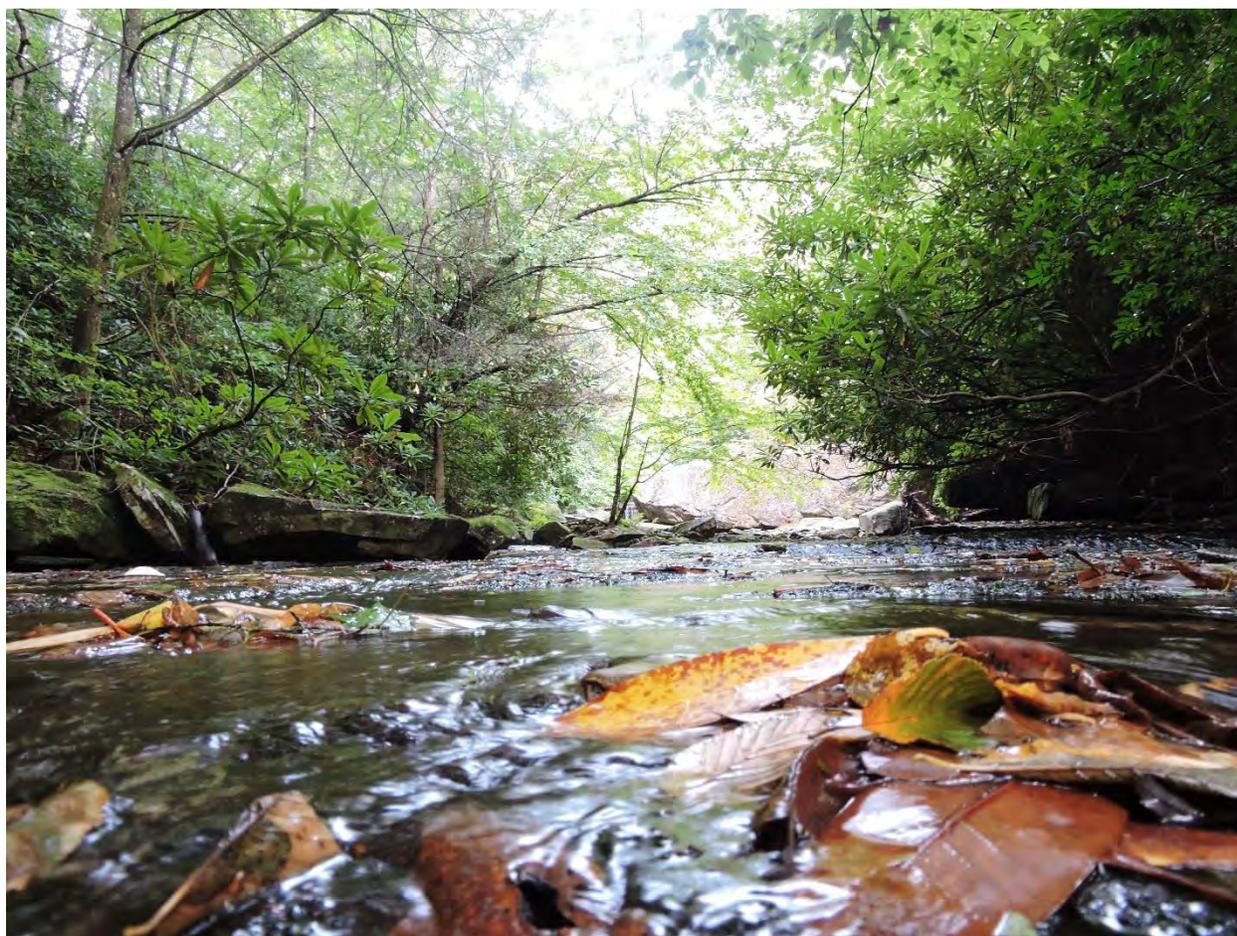


Integrated Report to Congress on the Condition of Water Resources in Kentucky, 2016

Assessment Results with Emphasis on the Big Sandy, Little Sandy,
Tygarts River and Kentucky River Basin Management Units and a
Statewide Update



Kentucky Energy and Environment Cabinet
Department for Environmental Protection
Division of Water
Water Quality Branch
February 28th, 2018

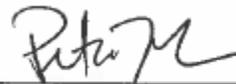
The Energy and Environment Cabinet does not discriminate on the basis of race, color, national origin, sex, age, religion, or disability and provides, on request, reasonable accommodations including auxiliary aids and services necessary to afford an individual with a disability an equal opportunity to participate in all services, programs and activities.

Integrated Report to Congress on the Condition of Water Resources in Kentucky, 2016

Assessment Results with Emphasis on the Big Sandy, Little Sandy,
Tygarts River and Kentucky River Basin Management Units and a
Statewide Update

Kentucky Energy and Environment Cabinet
Department for Environmental Protection
Division of Water
Water Quality Branch
February 28th, 2018

This report has been approved for release:



Peter Goodman, Director
Kentucky Division of Water

3/1/2018

Date

Table of Contents

Table of Contents	4
List of Tables	8
List of Figures	10
List of Acronyms.....	15
Notes for the Reader.....	16
Acknowledgements.....	16
Executive Summary.....	17
Designated Uses.....	17
Kentucky’s Categories.....	17
Monitoring and Assessment	18
Assessment Results.....	19
Statewide Results.....	19
Streams and Rivers – Statewide – Aquatic Life.....	19
Streams and Rivers – Statewide – Primary Contact Recreation	21
Lakes and Reservoirs – Statewide – Aquatic Life	23
Lakes and Reservoirs – Statewide – Secondary Contact Recreation	25
Ambient Program.....	27
Big Sandy, Little Sandy, Tygarts BMU - Streams - Aquatic Life	27
Kentucky BMU - Streams - Aquatic Life	28
Big Sandy, Little Sandy, Tygarts BMU - Streams – Primary Contact Recreation.....	28
Kentucky BMU - Streams – Primary Contact Recreation	28
Probabilistic Program.....	33
Big Sandy, Little Sandy, Tygarts BMU - Streams – Aquatic Life	33
Kentucky BMU - Streams – Aquatic Life.....	33
Fish Consumption Assessment Results	36
Domestic Water Supply Results	36
Additional Results	37
Introduction	38
Designated Uses.....	38
Monitoring and Assessment	40
Kentucky’s Categories.....	40

State Wide Assessment Results	43
Streams and Rivers - Statewide	46
Streams and Rivers – Statewide – Aquatic Life.....	48
Streams and Rivers – Statewide – Primary Contact Recreation	50
Lake and Reservoirs – Statewide	51
Lakes and Reservoirs – Statewide – Aquatic Life.....	53
Lakes and Reservoirs – Statewide – Secondary Contact Recreation	55
Springs – Statewide.....	57
Springs – Statewide – Aquatic Life.....	59
Springs – Statewide – Primary Contact Recreation	59
Monitoring Programs and Results	60
Ambient Program - Streams	60
Program Description	60
Ambient Program Assessment Results - Streams	60
Aquatic Life	60
Outstanding State Resource Waters (OSRW)	67
Primary Contact Recreation.....	67
Secondary Contact Recreation.....	68
Overall Assessment Results	68
Lakes Program.....	72
Program Description	72
Assessment Results – Lakes Program	72
Aquatic Life	72
Secondary Contact Recreation.....	77
Overall Assessment Results	77
Probabilistic Monitoring Program.....	81
Program Description	81
Assessment Results – Probabilistic Program	81
Aquatic Life	81
Outstanding State Resource Water	88
Overall Assessment Results	88
Reference Reach Program	88
Program Description	88

Assessment Results - Reference Reach.....	90
Aquatic Life	90
Outstanding State Resource Waters.....	90
Overall Assessment Results	92
Total Maximum Daily Load Program.....	94
Program Description	94
Assessment Results.....	94
Pond Creek Watershed	94
Sulphur Creek Watershed	100
Sand Lick Fork Watershed.....	103
Approved TMDLs.....	105
Prioritization for TMDL Development.....	105
Other Programs and Outside Agencies.....	107
Nonpoint Source Program Description	107
Assessment Results – NPS Program.....	107
Aquatic Life	108
Outstanding State Resource Waters.....	109
Primary Contact Recreation	109
Secondary Contact Recreation.....	110
Overall Assessment Results	110
Groundwater Program Description	111
Assessment Results – Groundwater Program	111
Aquatic Life	111
Primary Contact Recreation.....	112
Secondary Contact Recreation.....	112
Overall Assessment Results	113
Other Internal and External Data Contributors – Assessment Results.....	113
Aquatic Life	113
Primary Contact Recreation.....	113
Overall Assessment Results	114
Public Health	114
Domestic Water Supply	114
Assessment Results.....	114

Fish Tissue Program	115
Program Description	115
Fish Consumption Advisories and Assessments	116
Assessment Results.....	119
Harmful Algal Blooms	121
Swimming Advisories	123
Water Quality Improvements	124
Delisting Section.....	124
Nonpoint Source Program	124
Implementation	125
Success Stories	125
Water Pollution Control Program	125
Program Description	125
Combined Sewer Overflows and Sanitary Sewer Overflows	125
Nutrient Monitoring.....	126
Cost/Benefit Assessment	126
Program Enhancement	127
Public Participation	128
Public Notice	128
Water Health Portal	128
Stay Informed / Get Involved.....	128
TMDL Listserv.....	128
Watershed Planning Webpage (basin coordinators).....	128
Bibliography	130
Appendices.....	133
Appendix 1. Vision priorities for TMDL development prior to 2022 to EPA in fall of 2016, these priorities were developed with the 2014 303(d).....	133
Appendix 2. TMDLs planned for public notice in FY2018 and FY2019.	143
Appendix 3. BMP Implementation during the September 2012 – September 2014 time frame, organized by project and BMP type.....	149
Appendix 4. Response to Comments	157
Comments received via email 07/28/17 from Bobby D. Smith, Project Manager	157
Comments received via email 07/28/17 from Bob Weiss, Executive Vice President.....	160

Comments received via email 07/28/17 from Adam Andrews for Laura Knoth Executive Director	166
Comments received via email 07/17/17 from Mindy Scott for James P. Gibson, Jr. Director of Integrated Watershed Management	173
Comments received via email 06/29/17 from Karen Schaeffer	174

List of Tables

Table 1. Definition of each category found in the Integrated Report.	18
Table 2. Top 10 causes impairing streams and rivers statewide for the aquatic life designated use.	20
Table 3. Causes impairing streams and rivers statewide for the primary contact recreation designated use.	22
Table 4. Causes impairing lakes and reservoirs statewide for the aquatic life designated use.	24
Table 5. The three causes impairing lakes and reservoirs statewide for the secondary contact recreation designated use.	26
Table 6. Definition of each category found in the Integrated Report.	41
Table 7. Statewide - number of waterbodies (streams, river, lakes, reservoirs, ponds, or springs) per category at the designated use level and the assessment unit level, and percent of assessed waterbodies meeting (categories 1, 2, 2B, 2C), unassessed (category 3), not meeting (category 4A, 4C, 5), and not meeting based on evaluated data (category 5B) at the designated use level and at the assessment unit level.	45
Table 8. Statewide – Number of segments per category per designated use for streams and rivers .	46
Table 9. Number of stream or river segments assessed, fully supporting, partially supporting, or not supporting per designated use, with percentages for each attainment calculated.	47
Table 10. Top 10 causes impairing streams and rivers statewide for all applicable designated uses.	47
Table 11. Top 10 causes impairing streams and rivers statewide for the aquatic life designated use.	49
Table 12. Causes impairing streams and rivers statewide for the primary contact recreation designated use.	51
Table 13. Statewide – Number of segments per category per designated use for lakes and reservoirs .	52
Table 14. Number of lake and reservoir segments assessed, fully supporting, partially supporting, or not supporting per designated use, with percentages for each attainment calculated.	52
Table 15. Causes impairing lakes and reservoirs statewide for all applicable designated uses.	53
Table 16. Causes impairing lakes and reservoirs statewide for the aquatic life designated use.	54
Table 17. The three causes impairing lakes and reservoirs statewide for the secondary contact recreation designated use.	56
Table 18. Statewide – Number of segments per category per designated use for springs .	58

Table 19. Number of spring segments assessed, fully supporting, partially supporting, or not supporting per designated use, with percentages for each attainment calculated.	58
Table 20. Causes impairing springs statewide for all applicable designated uses.	59
Table 21. Causes impairing springs statewide for the aquatic life designated use.	59
Table 22. List of causes at ambient sites impaired for aquatic life in the Big Sandy, Little Sandy, Tygarts BMU during the integrated reporting years when this particular BMU was the BMU of focus.	63
Table 23. List of causes at ambient sites impaired for aquatic life in the Kentucky BMU during the integrated reporting years when this particular BMU was the BMU of focus.	65
Table 24. Use attainment of assessment units determined to be outstanding state resource waters associated with ambient sites.	67
Table 25. List of causes at probabilistic sites impaired for aquatic life in the Big Sandy, Little Sandy, Tygarts BMU during the integrated reporting years when this particular BMU was the BMU of focus. ..	84
Table 26. List of causes at probabilistic sites impaired for aquatic life in the Kentucky River BMU during the integrated reporting years when this particular BMU was the BMU of focus.	86
Table 27. Outstanding state resource water segments that probabilistic stations fell on during 2013 sampling of the Kentucky BMU and the use attainment for that designated use.	88
Table 28. Causes at reference reach sites impaired for the aquatic life designated use.	91
Table 29. Causes at reference reach sites impaired for the outstanding state resource waters designated use.	92
Table 30. A list of all pollutant waterbody combinations for the 2016 assessment results from the TMDL program’s sampling of the Pond Creek watershed per designated use.	95
Table 31. A list of all pollutant waterbody combinations for the assessment results from the TMDL program’s sampling of the Sulphur Creek watershed per designated use.	101
Table 32. A list of all pollutant waterbody combinations for the assessment results from the TMDL program’s sampling of the Sand Lick Fork watershed per designated use.	104
Table 33. List of causes at NPS program sites impaired for aquatic life	109
Table 34. Assessment results for the aquatic life designated use for springs where data from the groundwater section were utilized.	112
Table 35. Assessment results for the primary contact recreation designated use for springs where data from the groundwater section were utilized.	112
Table 36. Assessment results for the aquatic life designated use for waterbodies where data from other programs and outside agencies were utilized.	113
Table 37. Fish consumption advisory level, mercury concentration, and recommended meals for the general public and sensitive population in relation to assessment results for fish consumption.	116
Table 38. Statewide fish consumption advisory for mercury for the general and sensitive populations outlined for 1) predatory fish, and 2) bottom feeder and panfish.	117

Table 39. Fish consumption advisory for specific waterbodies within Kentucky, with the contaminant of concern noted.....	118
Table 40. Causes of impairment associated with waterbodies found to be partial or nonsupport of the fish consumption designated use.....	120
Table 41. Number of delisting requests for the 2016 IR per basin.	124
Table 42. Combined Sewer Overflows and Sanitary Sewer Overflows mitigation projects in Kentucky.	126
Table 43. Funds spent using the Clean Water State Revolving Fund and Drinking Water State Revolving Fund in Kentucky.....	127

List of Figures

Figure 1. Statewide - A) Percent impaired (partial and nonsupport) and percent meeting and B) attainment of all streams and rivers assessed for the aquatic life designated use.	20
Figure 2. Statewide attainment of the aquatic life designated use for streams and rivers	21
Figure 3. Statewide - A) Percent impaired (partial and nonsupport) and percent meeting and B) attainment of all streams and rivers assessed for the primary contact recreation designated use.....	22
Figure 4. Statewide attainment of the primary contact recreation designated use for streams and rivers	23
Figure 5. Statewide - A) Percent impaired (partial and nonsupport) and percent meeting and B) attainment of all lakes and reservoirs assessed for the aquatic life designated use.	24
Figure 6. Statewide attainment of the aquatic life designated use for lakes and reservoirs	25
Figure 7. Statewide - A) Percent impaired (partial and nonsupport) and percent meeting and B) attainment of all lakes and reservoirs assessed for the secondary contact recreation designated use. .	26
Figure 8. Statewide attainment of the secondary contact recreation designated use for lakes and reservoirs	27
Figure 9. Attainment results for the aquatic life designated use from ambient stations located within the Big Sandy, Little Sandy, Tygarts BMU during the integrated reporting years when this particular BMU was a BMU of focus. Pie graphs along top show proportion of impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status.....	29
Figure 10. Attainment results for the aquatic life designated use from ambient stations located within the Kentucky BMU during the integrated reporting years when this particular BMU was a BMU of focus. Pie graphs along top show proportion of impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status.	30
Figure 11. Attainment results for the primary contact recreation designated use from ambient stations located within the Big Sandy, Little Sandy, Tygarts BMU during the integrated reporting years when this particular BMU was a BMU of focus. Pie graphs along top show proportion of impaired (partial and	

nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status..... 31

Figure 12. Attainment results for the **primary contact recreation** designated use from **ambient** stations located within the **Kentucky BMU** during the integrated reporting years when this particular BMU was a BMU of focus. Pie graphs along top show proportion of impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status..... 32

Figure 13. Assessment results from the 2006, 2010, and 2016 Integrated Reports for the **aquatic life** designated use where data from the **probabilistic** program was used when the **Big Sandy, Little Sandy, Tygarts River BMU** was sampled. Pie graphs along top show proportion of impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status..... 34

Figure 14. Assessment results from the 2006 and 2016 Integrated Reports (no data available for 2019) for the **aquatic life** designated use where data from the **probabilistic** program was used when the **Kentucky River BMU** was sampled. Pie graphs along top show proportion of impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status..... 35

Figure 15. A) Percent impaired (partial and non support) and percent meeting and B) attainment of all waterbodies that have been assessed for **fish consumption**..... 36

Figure 16. Schematic of how the presence or absence of a category on the cause level determines the designated use category, and then again on how the presence or absence of a category on a designated use level determines the overall assessment unit category..... 42

Figure 17. Statewide - A) Percent impaired (partial and nonsupport) and percent meeting and B) attainment of all **streams and rivers** assessed for the **aquatic life** designated use. 48

Figure 18. Statewide attainment of the **aquatic life** designated use for **streams and rivers**. 49

Figure 19. Statewide - A) Percent impaired (partial and nonsupport) and percent meeting and B) attainment of all **streams and rivers** assessed for the **primary contact recreation** designated use..... 50

Figure 20. Statewide attainment of the **primary contact recreation** designated use for **streams and rivers**. 51

Figure 21. Statewide - A) Percent impaired (partial and nonsupport) and percent meeting and B) attainment of all **lakes and reservoirs** assessed for the **aquatic life** designated use. 54

Figure 22. Statewide attainment of the **aquatic life** designated use for **lakes and reservoirs**. 55

Figure 23. Statewide - A) Percent impaired (partial and nonsupport) and percent meeting and B) attainment of all **lakes and reservoirs** assessed for the **secondary contact recreation** designated use. . 56

Figure 24. Statewide attainment of the **secondary contact recreation** designated use for **lakes and reservoirs**..... 57

Figure 25. Attainment results for the **aquatic life** designated use from **ambient** stations located within the **Big Sandy, Little Sandy, Tygarts BMU** during the integrated reporting years when this particular BMU was a BMU of focus. Pie graphs along top show proportion of impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status..... 62

Figure 26. Causes at **ambient** sites impaired for **aquatic life** in the **Big Sandy, Little Sandy, Tygarts BMU** associated with each integrated reporting year that this particular BMU was the BMU of focus..... 63

Figure 27. Attainment results for the **aquatic life** designated use from **ambient** stations located within the **Kentucky BMU** during the integrated reporting years when this particular BMU was a BMU of focus. Pie graphs along top show proportion of impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status. 64

Figure 28. Causes at **ambient** sites impaired for **aquatic life** in the **Kentucky BMU** associated with each integrated reporting year that this particular BMU was the BMU of focus. 65

Figure 29. **Ambient** sites (black squares) sampled in the **Big Sandy, Little Sandy, Tygarts and Kentucky BMU's**. Attainment of the **aquatic life** designated use displayed as full support (green), partial support (yellow), and nonsupport (red), with sites associated with the cause of lead marked with a white dot. . 66

Figure 30. Attainment results for the **primary contact recreation** designated use from **ambient** stations located within the **Big Sandy, Little Sandy, Tygarts BMU** during the integrated reporting years when this particular BMU was a BMU of focus. Pie graphs along top show proportion of impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status..... 69

Figure 31. Attainment results for the **primary contact recreation** designated use from **ambient** stations located within the **Kentucky BMU** during the integrated reporting years when this particular BMU was a BMU of focus. Pie graphs along top show proportion of impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status. 70

Figure 32. **Ambient** sites (black squares) sampled in the **Big Sandy, Little Sandy, Tygarts and Kentucky BMU's**. Attainment of the **primary contact recreation** designated use displayed as full support (green), partial support (yellow), and nonsupport (red). Hood Creek is also partial support for Secondary Contact Recreation due to pH as noted. 71

Figure 33. Assessment results from the 2006, 2010, and 2016 Integrated Reports for the **aquatic life** designated use where data from the **ambient lake** program was used when the **Big Sandy, Little Sandy, and Tygarts River BMU** was sampled. Pie graphs along top show proportion of impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status..... 74

Figure 34. Assessment results from the 2006, 2010, and 2016 Integrated Reports for the **aquatic life** designated use where data from the **ambient lake** program was used when the **Kentucky River BMU** was sampled. Pie graphs along top show proportion of impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status. 75

Figure 35. **Ambient lake** sites (black circles) sampled in the **Big Sandy, Little Sandy, Tygarts and Kentucky BMU's**. Attainment of the **aquatic life** designated use displayed as full support (green), partial support (yellow), and nonsupport (red). 76

Figure 36. Assessment results from the 2006, 2010, and 2016 Integrated Reports for the **secondary contact recreation** designated use where data from the **ambient lake** program was used when the **Big Sandy, Little Sandy, and Tygarts River BMU** was sampled. Pie graphs along top show proportion of

impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status..... 78

Figure 37. Assessment results from the 2006, 2010, and 2016 Integrated Reports for the **secondary contact recreation** designated use where data from the **ambient lake** program was used when the **Kentucky River BMU** was sampled. Pie graphs along top show proportion of impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status..... 79

Figure 38. **Ambient lake** sites (black circles) sampled in the **Big Sandy, Little Sandy, Tygarts and Kentucky BMU's**. Attainment of the **secondary contact recreation** designated use displayed as full support (green), partial support (yellow), and nonsupport (red)..... 80

Figure 39. Assessment results from the 2006, 2010, and 2016 Integrated Reports for the **aquatic life** designated use where data from the **probabilistic** program was used when the **Big Sandy, Little Sandy, Tygarts River BMU** was sampled. Pie graphs along top show proportion of impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status..... 83

Figure 40. Causes at **probabilistic** sites impaired for **aquatic life** in the **Big Sandy, Little Sandy, Tygarts BMU** associated with each integrated reporting year that this particular BMU was the BMU of focus. .. 84

Figure 41. Assessment results from the 2006 and 2016 Integrated Reports (no data available for 2019) for the **aquatic life** designated use where data from the **probabilistic** program was used when the **Kentucky River BMU** was sampled. Pie graphs along top show proportion of impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status..... 85

Figure 42. Causes at **probabilistic** sites impaired for **aquatic life** in the **Kentucky River BMU** associated with each integrated reporting year that this particular BMU was the BMU of focus. 86

Figure 43. **Probabilistic** sites (black circles) sampled in the **Big Sandy, Little Sandy, Tygarts and Kentucky BMU's**. Attainment of the **aquatic life** designated use displayed as full support (green), partial support (yellow), and nonsupport (red)..... 87

Figure 44. Statewide assessment results as of the 2016 Integrated Report for the **aquatic life** designated use where data collected by the **reference reach program** was used to make an attainment decision. Pie graph shows proportion of impaired (partial and nonsupport) to meeting segments, while bar graph shows number of segments in each attainment status..... 91

Figure 45. Statewide assessment results as of the 2016 Integrated Report for the **outstanding state resource waters** designated use where data collected by the **reference reach program** was used to make an attainment decision. Pie graph shows proportion of impaired (partial and nonsupport) to meeting segments, while bar graph shows number of segments in each attainment status..... 92

Figure 46. **Reference reach** program sites (black circles) sampled statewide. Attainment of the **aquatic life** designated use displayed as full support (green), partial support (yellow), and nonsupport (red)..... 93

Figure 47. **Aquatic life** designated use attainment in the **Pond Creek** watershed where data collected by the **TMDL** program was used for the assessment. 99

Figure 48. **Primary contact recreation** designated use attainment in the **Pond Creek** watershed where data collected by the **TMDL** program was used for the assessment..... 100

Figure 49. **Aquatic life** designated use attainment in the **Sulphur Creek** watershed where data collected by the **TMDL** program was used for the assessment. 102

Figure 50. **Primary contact recreation** designated use attainment in the **Sulphur Creek** watershed where data collected by the **TMDL** program was used for the assessment. 103

Figure 51. **Aquatic life** designated use attainment in the **Sand Lick Fork** watershed where data collected by the **TMDL** program was used for the assessment. 104

Figure 52. Number of TMDLs approved for unimpaired assessment units and impaired assessment units, and number of TMDLs required for assessment units impaired by a pollutant..... 105

Figure 53. 2022 Clean Water Act 303(d) vision priorities submitted to EPA in the fall of 2016..... 106

Figure 54. A) Percent impaired (partial and nonsupport) and percent meeting and B) attainment of all segments assessed for the **aquatic life** designated use where the assessment utilized data collected or coordinated by the **NPS program**. 108

Figure 55. A) Percent impaired (partial and nonsupport) and percent meeting and B) attainment of all segments assessed for the **primary contact recreation** designated use where the assessment utilized data collected or coordinated by the **NPS program**. 110

Figure 56. Attainment of the **domestic water supply** designated use displayed as full support (green) or partial support (yellow) statewide (no waterbodies are nonsupport for this designated use). Luzerne Lake, the only waterbody listed as partial support, is noted..... 115

Figure 57. A) Percent impaired (partial and nonsupport) and percent meeting and B) attainment of all waterbodies that have been assessed for **fish consumption**..... 120

Figure 58. Attainment of the **fish consumption** designated use displayed as full support (green), partial support (yellow), or nonsupport (red)..... 121

Figure 59. Examples of Harmful Algal Blooms 122

List of Acronyms

- ADB – Assessment Database
- ATTAINS – Assessment, TMDL Tracking, and Implementation System
- BMP – Best Management Practice
- BMU – Basin Management Unit
- CAH – Cold Water Aquatic Habitat
- CCR – Consumer Confidence Report
- CSO – Combined Sewer Overflow
- CWA – Clean Water Act
- CWSRF – Clean Water State Revolving Fund
- DOW – Division of Water
- DWS – Domestic Water Supply
- DWSRF – Drinking Water State Revolving Fund
- EDAS – Ecological Data Application System
- EPA – Environmental Protection Agency
- GIS – Geographic Information System
- Harmful Algal Bloom – HAB
- HUC – Hydrological Unit Code
- IR – Integrated Report
- KATTS – Kentucky Assessment and TMDL Tracking System
- KDEP – Kentucky Department for Environmental Protection
- KDFWR – Kentucky Department of Fish and Wildlife Resources
- KPDES – Kentucky Pollutant Discharge Elimination System
- KWA – Kentucky Waterways Alliance
- K-WADE – Kentucky Water Assessment Data for Environmental Management
- LFUCG – Lexington-Fayette Urban County Government
- MCL – Maximum Contaminant Level
- MBI – Macroinvertebrate Biological Index
- MOR – Monthly Operating Reports
- NPS – Nonpoint Source
- ORSANCO - Ohio River Valley Water Sanitation Commission
- OSRW – Outstanding State Resource Water
- PCB – Polychlorinated Biphenyl
- PCR – Primary Contact Recreation
- PWC – Pollutant Waterbody Combination
- SCR – Secondary Contact Recreation
- SSO – Sanitary Sewer Overflow
- TMDL – Total Maximum Daily Load
- USACE – United States Army Corps of Engineers
- USFS – United States Forest Service
- WAH – Warm Water Aquatic Habitat
- WHP – Water Health Portal
- WQB – Water Quality Branch
- WQS – Water Quality Standards

Notes for the Reader

If you are reading this, thank you for taking an interest in Kentucky's water resources. This document is simply referred to as the Integrated Report; there is no Volume I and Volume II. Volume II has been incorporated into the TMDL section of this document, where information about TMDLs completed, scheduled, and priorities are discussed.

This 2016 Integrated Report is organized differently than previous Integrated Reports. It is recommend to use the headings navigation to help orient yourself to the document and to help you navigate through the document. Following the executive summary, statewide results are presented. After such, each program that collects data is discussed in more detail. Thereafter, designated uses that relate to public health are discussed, including a section on harmful algal bloom (HAB)s. Again, using the navigation can help direct you to the parts in which you are most interested.

Another important difference of this Integrated Report is that assessment results are described in the context of assessment units instead of being discussed as river miles or lake/ reservoir acres. This was done to normalize the results of the 305(b).

In addition to this document, there are three spreadsheets that are essential to the overall understanding of the assessment results that this Integrated Report discusses: the 305(b) list, the 303(d) list, and the Programmatic Workbook, which are attached to this PDF document or can be downloaded from [Kentucky's Integrated Report webpage](#). They are frequently referenced throughout this document, and can be searched and filtered to find the most specific information about each assessment unit.

If you have any questions about this report, or the assessment program in Kentucky, please contact Katie McKone at katie.mckone@ky.gov.

Acknowledgements

Many individuals and organizations contribute to the assessment process, and is by no means a solo endeavor. 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 and Watershed Management branches at the Kentucky Division of Water for their dedication to the efforts of monitoring and assessing the waters of the Commonwealth.

Executive Summary

The 2016 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 (P.L. 92-500), as subsequently amended. Section 305(b) of the Act requires states to assess and report current water quality conditions to EPA every two years.

Designated Uses

All waterbodies in Kentucky have assigned certain designated 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:

- warm water aquatic habitat (WAH)
- cold water aquatic habitat (CAH)
- primary contact recreation (PCR)
- secondary contact recreation (SCR)
- domestic water supply (DWS)
- outstanding state resource water (OSRW)
- fish consumption¹

Note: Collectively, WAH and CAH are referred to as the aquatic life designated use.

With the exception of CAH and OSRW, the remaining designated uses apply by default to all waterbodies. OSRW is a state-defined designated use for waterbodies that support federally listed threatened or endangered aquatic species or may support an excellent biological community (e.g., waters that are in the exceptional/reference reach categories in [401 KAR 10:030](#)).

Kentucky's Categories

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) are put into different categories depending upon the assessment decision made for that waterbody (Table 1).

Impaired waters are those waters found to partially support or not support one or more of its designated uses due to either a pollution or a pollutant. This includes waterbodies that are in category 4A, where a Total Maximum Daily Load (TMDL) has been written for the pollutant identified as causing the impairment, category 4B, where an approved alternative pollution control plan is in place for the pollutant identified as causing the impairment, category 4C, where the cause of impairment is a pollution, and category 5. The 303(d) list, which is a subset of the 305(b), is only those waters in category 5, where a TMDL is required.

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

Table 1. Definition of each category found in the Integrated Report.

Category	Definition
1	All designated uses for waterbody are Fully Supporting.
2	Assessed designated use(s) is/are Fully Supporting, but not all designated uses assessed.
2B	Segment currently supporting use(s), but 303(d) listed & proposed to EPA for delisting.
2C	Segment with an EPA approved or established TMDL for the following use(s) now attaining Full Support.
3	Designated use(s) has/have not been assessed (insufficient or no data).
4A	Segment with an EPA approved or established TMDL for the following listed use(s) not attaining Full Support.
4B	Nonsupport segment with an approved alternative pollution control plan (e.g., BMP) stringent enough to meet full support level of all uses within a specified time.
4C	Segment is not meeting Full Support of assessed use(s), but this is not attributable to a pollutant or combination of pollutants.
5	Segment does not support designated use(s) and is impaired by a pollutant or a combination of pollutants. A TMDL is required.
5B	Segment does not support designated uses based on evaluated data, but based on Kentucky listing methodology, insufficient data are available to make a listing determination. No TMDL needed.

Monitoring and Assessment

DOW uses information collected by biologists and scientists to perform assessments on waterbodies to determine if that waterbody is meeting [water quality standards](#) (WQS), and therefore supporting its designated use(s). When sampling occurs, specific information is gathered for each designated use. For example, bacteria levels are examined when determining if the PCR designated use is being supported, while water chemistry, habitat, and biological communities are examined when determining if aquatic life is being supported. For more detailed information about Kentucky’s assessment and listing methodology, refer to the [Consolidated and Listing Methodology](#) (CALM): Surface Water Quality Assessment in Kentucky, the Integrated Report (Kentucky Division of Water 2015).

The DOW operates its primary monitoring programs under a five-year rotating watershed management approach implemented in 1998. This IR represents monitoring efforts from the Big Sandy, Little Sandy, and Tygarts Rivers Basin Management Unit (BMU) sampled in April 2012 – March 2013 and the Kentucky River BMU sampled in April 2013 – March 2014. This report also incorporates assessment data and results from monitoring that occurred during this reporting cycle outside of the BMUs of focus. Therefore, results are presented in a few different ways.

For programs that have sampled following the BMU rotation, such as the ambient and probabilistic programs, results from this IR and the two previous IRs are presented (2006 and 2010), where those same BMUs were the BMU of focus. By comparing the 2016 IR to the 2006 and 2010 IR, attainment changes over time can be related to changes in water quality or habitat quality.

For programs that do not follow the BMU rotation, such as the TMDL program and the Nonpoint Source Program (NPS), results from the program's monitoring that contributed assessments to the 2016 305(b) are presented.

For the two designated uses that relate to public health, fish consumption and DWS, all assessment results for any waterbody that has been assessed for those designated uses are presented on a statewide scale.

Assessment Results

This IR utilized data from approximately 530 stations. Assessment results are presented only for waterbodies where data has been collected and an assessment has been completed. For streams, this equates to ~14% of Kentucky's stream miles. Presented below are the most pertinent results from this IR. For all assessment results, refer to the main document.

Statewide Results

The 2016 305(b) has 2,751 assessed waterbodies, totaling 12,753 stream miles, 180,366 lake, reservoir, or pond acres, and 12.2 spring miles (see 305(b) Table). The 2016 303(d), which is a subset of the 305(b) and only includes those waterbodies in category 5, has 2,788 pollutant waterbody combinations (PWC). Kentucky has requested to delist 68 PWCs (see 303(d) Table). PWCs count the number of pollutants affecting a waterbody.

Streams and Rivers – Statewide – Aquatic Life

Of the streams and rivers assessed for the aquatic life designated use, statewide, 42% fully support this designated use, while 31% partially support and 27% do not support the aquatic life designated use, meaning 58% are impaired (Figures 1 and 2). Looking at only the streams and rivers impaired for the aquatic life designated use statewide, 31 causes are associated with the impairments; the 10 most common causes of impairment for the aquatic life designated use for streams and rivers are outlined in Table 2.

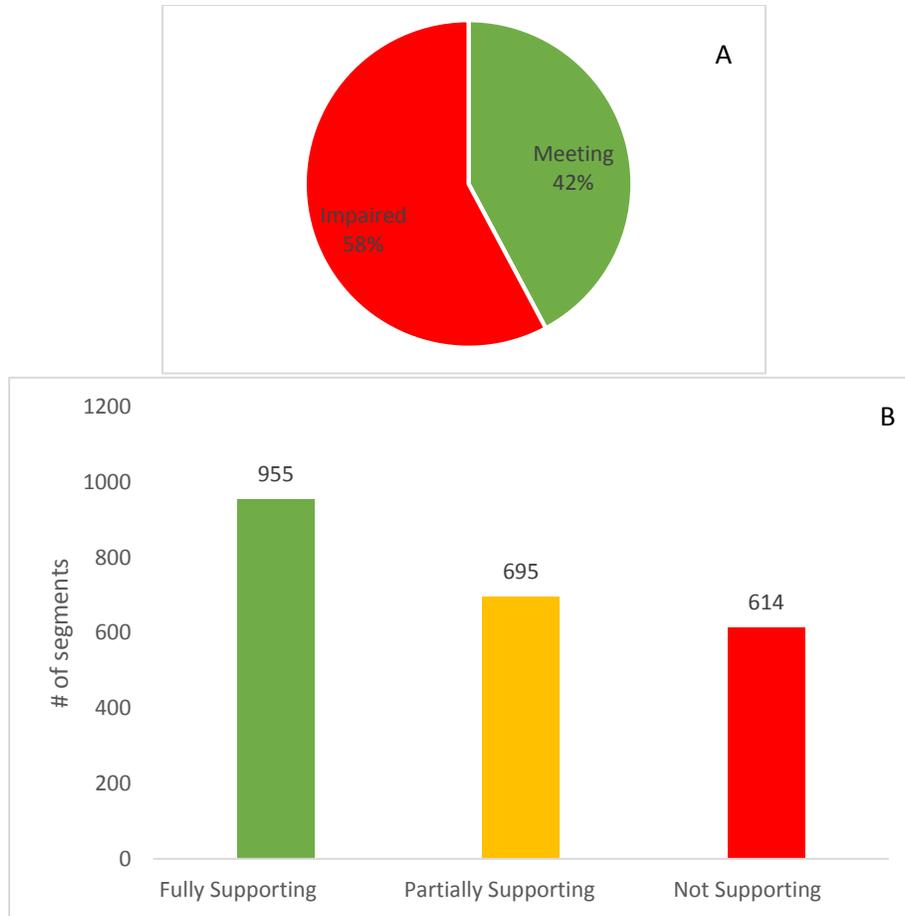


Figure 1. Statewide - A) Percent impaired (partial and nonsupport) and percent meeting and B) attainment of all **streams and rivers** assessed for the **aquatic life** designated use.

Table 2. Top 10 causes impairing **streams and rivers** statewide for the **aquatic life** designated use.

Cause	Total # of Segments	Total Stream or River Miles
Sedimentation/Siltation	722	3419
Nutrient/Eutrophication Biological Indicators	350	1753
Specific Conductance	221	1042
Cause Unknown	208	821
Total Dissolved Solids	153	747
Organic Enrichment (Sewage) Biological Indicators	141	757
Iron	67	475
pH	57	226
Oxygen, Dissolved	51	297
Lead	42	366

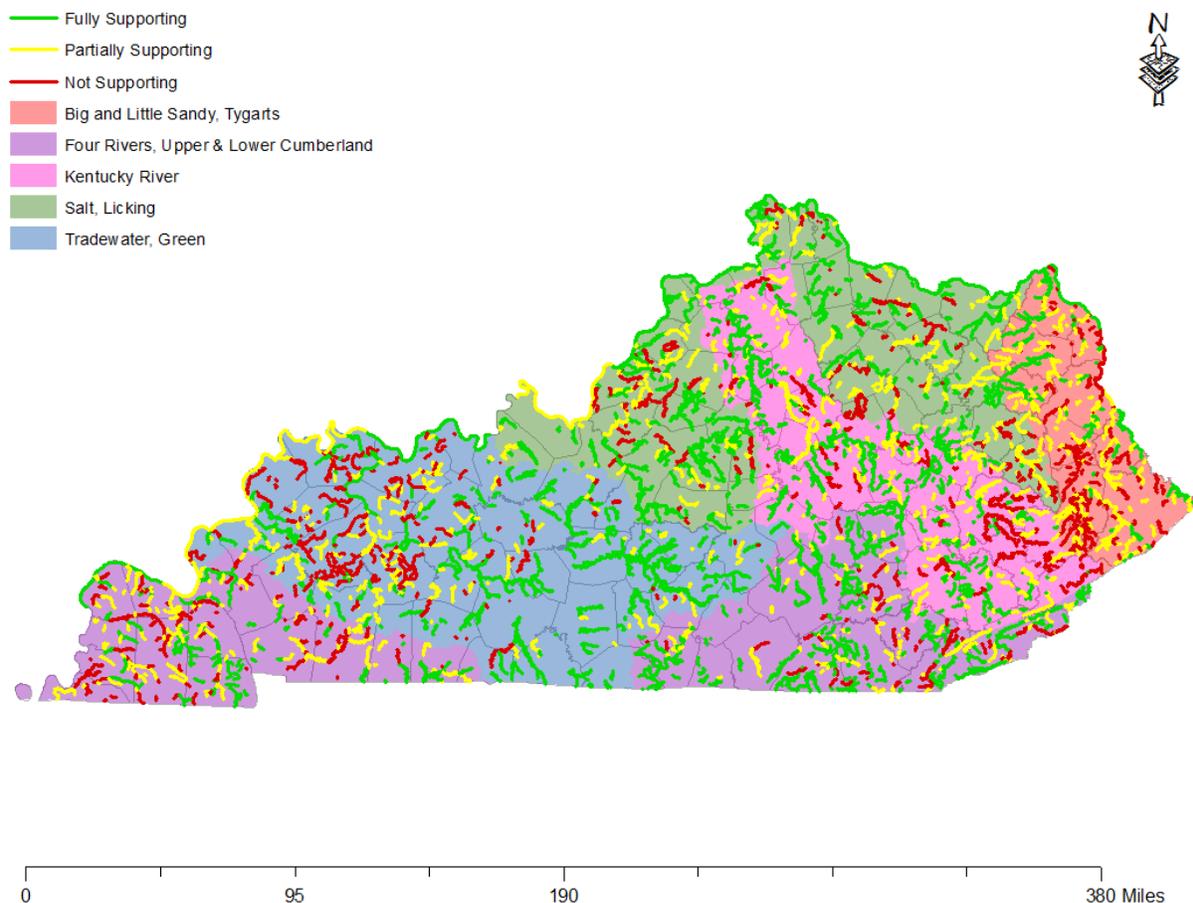


Figure 2. Statewide attainment of the **aquatic life** designated use for **streams and rivers**.

Streams and Rivers – Statewide – Primary Contact Recreation

Of the streams and rivers assessed for the PCR designated use, statewide, 21% fully support this designated use, while 20% partially support and 59% do not support the PCR designated use, meaning 79% are impaired (Figures 3 and 4). Looking at only the streams and rivers impaired for the PCR designated use statewide, 2 causes are associated with the impairments: bacteria and pH (Table 3).

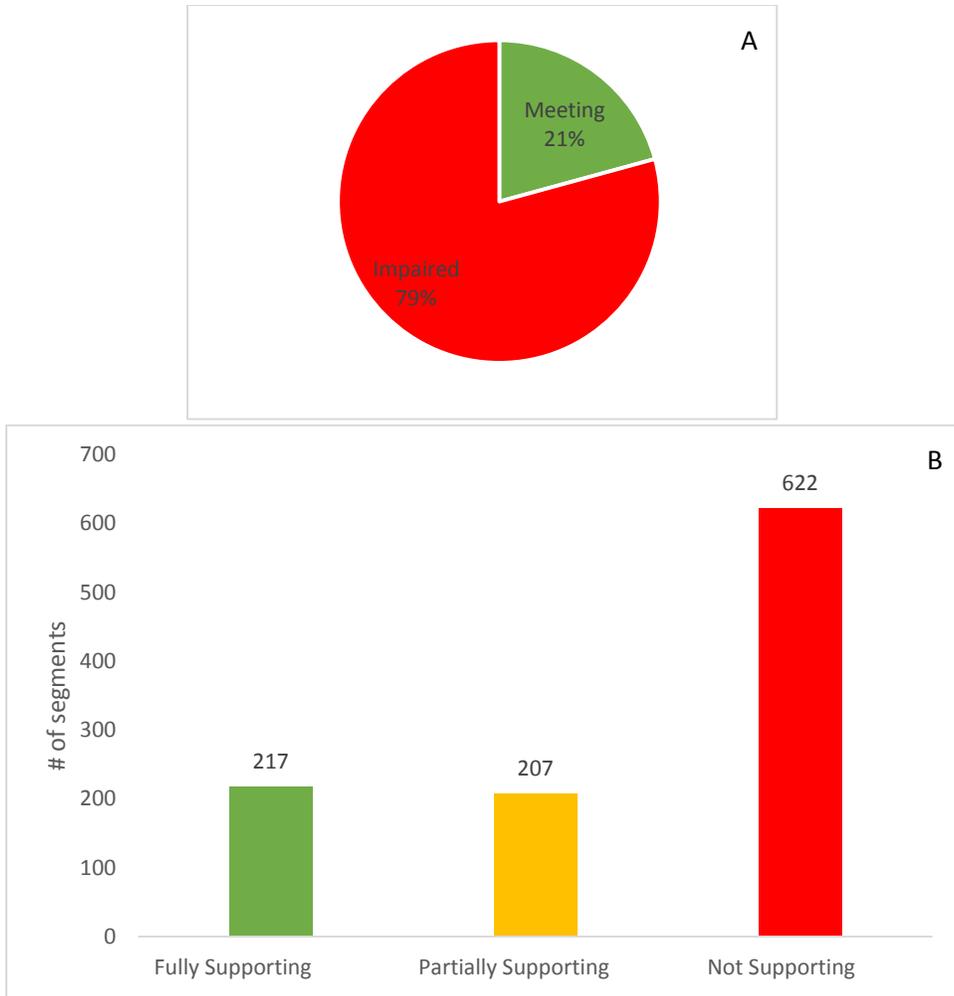


Figure 3. Statewide - A) Percent impaired (partial and nonsupport) and percent meeting and B) attainment of all **streams and rivers** assessed for the **primary contact recreation** designated use.

Table 3. Causes impairing **streams and rivers** statewide for the **primary contact recreation** designated use.

Cause	Total # of Segments	Total Stream or River Miles
Bacteria	755	4422
pH	57	226

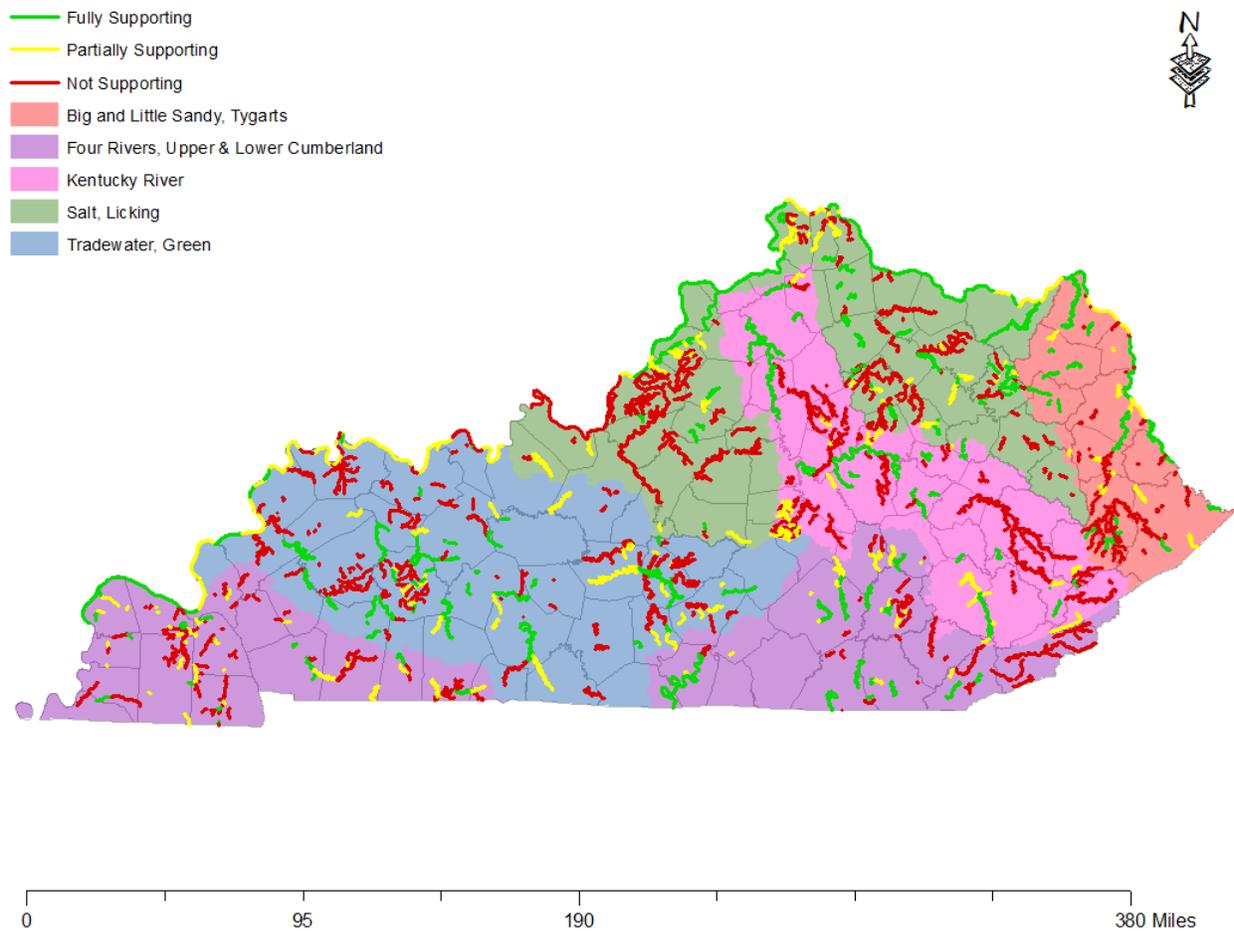


Figure 4. Statewide attainment of the **primary contact recreation** designated use for **streams and rivers**.

Lakes and Reservoirs – Statewide – Aquatic Life

Of the lakes and reservoirs assessed for the aquatic life designated use, statewide, 75% fully support this designated use, while 18% partially support and 7% do not support the aquatic life designated use, meaning 25% are impaired (Figures 5 and 6). Looking at only the lakes and reservoirs impaired for the aquatic life designated use statewide, 4 causes are associated with the impairments (Table 4).

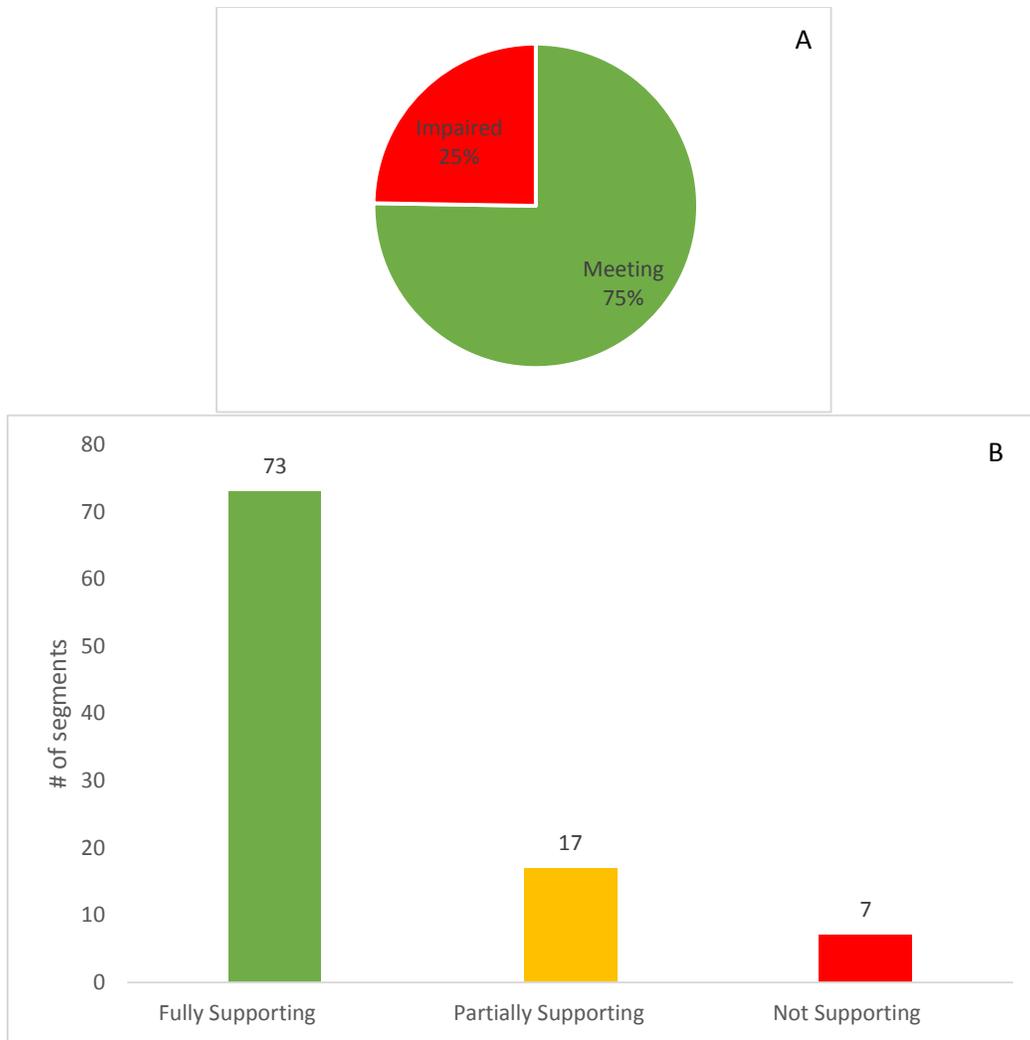


Figure 5. Statewide - A) Percent impaired (partial and nonsupport) and percent meeting and B) attainment of all **lakes and reservoirs** assessed for the **aquatic life** designated use.

Table 4. Causes impairing **lakes and reservoirs** statewide for the **aquatic life** designated use.

Cause	Total # of Segments	Total Lake or Reservoir Acres
Nutrient/Eutrophication Biological Indicators	21	8217
Oxygen, Dissolved	18	7705
Organic Enrichment (Sewage) Biological Indicators	7	3883
pH	3	123

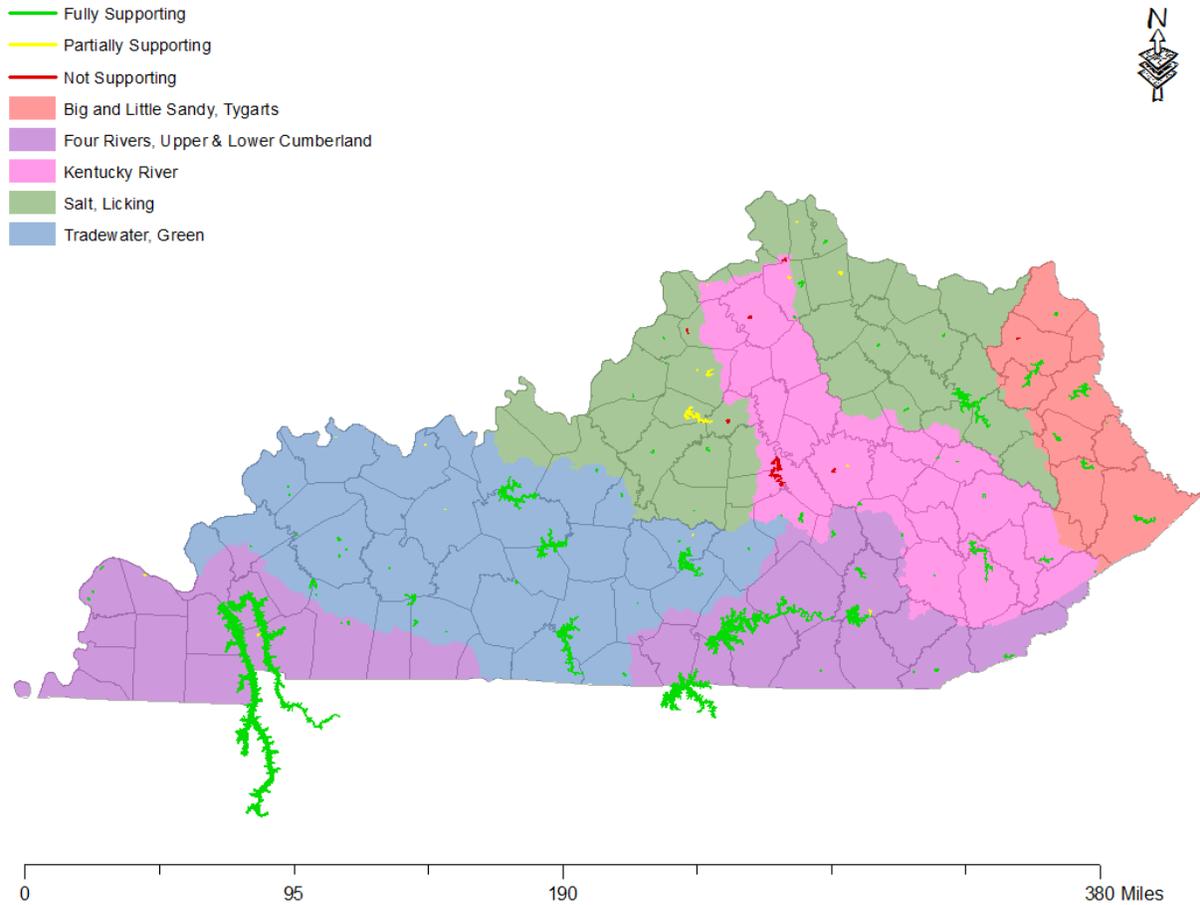


Figure 6. Statewide attainment of the **aquatic life** designated use for **lakes and reservoirs**.

Lakes and Reservoirs – Statewide – Secondary Contact Recreation

Of the lakes and reservoirs assessed for the SCR designated use, statewide, 88% fully support this designated use, while 9% partially support and 3% do not support the SCR designated use, meaning 12% are impaired (Figures 7 and 8). Looking at only the lakes and reservoirs impaired for the SCR designated use statewide, 3 causes are associated with the impairments: sedimentation/ siltation, pH, and chlorophyll-a (Table 5).

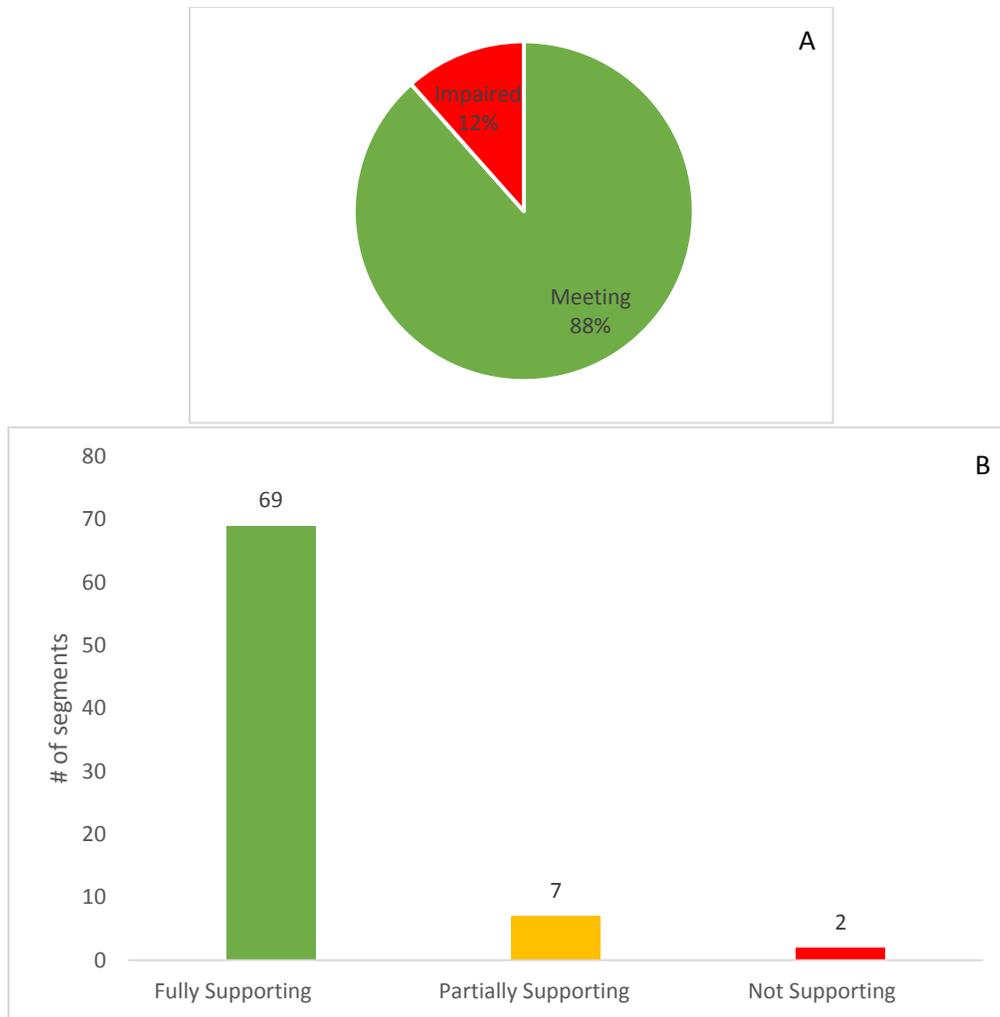


Figure 7. Statewide - A) Percent impaired (partial and nonsupport) and percent meeting and B) attainment of all **lakes and reservoirs** assessed for the **secondary contact recreation** designated use.

Table 5. The three causes impairing **lakes and reservoirs** statewide for the **secondary contact recreation** designated use.

Cause	Total # of Segments	Total Lake or Reservoir Acres
Sedimentation/Siltation	3	338
pH	3	123
Chlorophyll-a	1	200

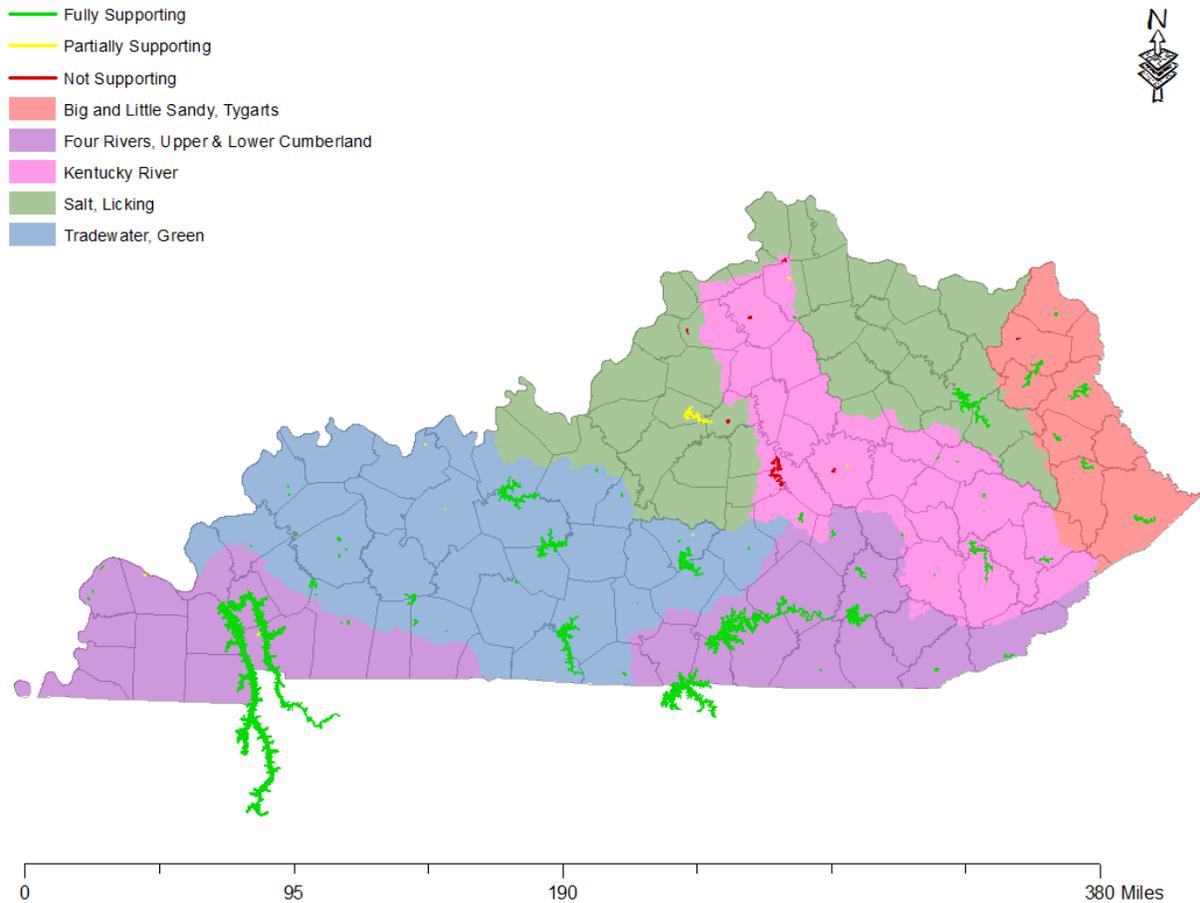


Figure 8. Statewide attainment of the **secondary contact recreation** designated use for **lakes and reservoirs**.

Ambient Program

Big Sandy, Little Sandy, Tygarts BMU - Streams - Aquatic Life

Of the 32 ambient sites in the Big Sandy, Little Sandy, Tygarts BMU, 69% were found to be impaired for the aquatic life designated use, which relates to either partial support or nonsupport. An increase in the proportion of impaired sites to supporting sites has been observed since 2006 in this BMU. In 2006, of these same 32 sites, 59% were meeting while 41% were found to be impaired. In 2010, 45% were found to be supporting, while 55% were found to be impaired (Figure 9). Most of the new impaired segments can be attributed to the cause of lead².

² The new observation of lead is yet to be understood. These findings have triggered a more intensive survey of the area to understand the prevalence of this cause. Refer to the main document for more information.

Kentucky BMU - Streams - Aquatic Life

Of the 29 ambient sites in the Kentucky BMU, 55% were found to be impaired for the aquatic life designated use, which relates to either partial support or nonsupport. In 2006 and 2010, there was a higher percentage of supporting segments, with 80% supporting the aquatic life designated use in 2010 and 45% supporting the aquatic life designated use in 2016 (Figure 10). Most of the new impaired segments can be attributed to the cause of lead³.

Big Sandy, Little Sandy, Tygarts BMU - Streams – Primary Contact Recreation

Of the 32 ambient sites in the Big Sandy, Little Sandy, Tygarts BMU, 55% were found to be impaired for the PCR designated use, which relates to either partial support or nonsupport. A slight increase in the proportion of impaired sites to supporting sites has been observed since 2006 in this BMU. In 2006, of these same 32 sites, 56% were meeting and 44% were found to be impaired. In 2010, 50% were meeting and 50% were impaired (Figure 11).

Kentucky BMU - Streams – Primary Contact Recreation

Of the 29 ambient sites in the Kentucky BMU, 44% were found to be impaired for the PCR designated use, which relates to either partial support or nonsupport. An increase in the proportion of impaired sites to supporting sites has been observed since 2006 in this BMU. In 2006, of these same 29 sites, 65% were meeting and 35% were found to be impaired. In 2010, 48% were meeting and 52% were impaired (Figure 12).

³ The new observation of lead is yet to be understood. These findings have triggered a more intensive survey of the area to understand the prevalence of this cause. Refer to the main document for more information.



Figure 9. Attainment results for the **aquatic life** designated use from **ambient** stations located within the **Big Sandy, Little Sandy, Tygarts BMU** during the integrated reporting years when this particular BMU was a BMU of focus. Pie graphs along top show proportion of impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status.

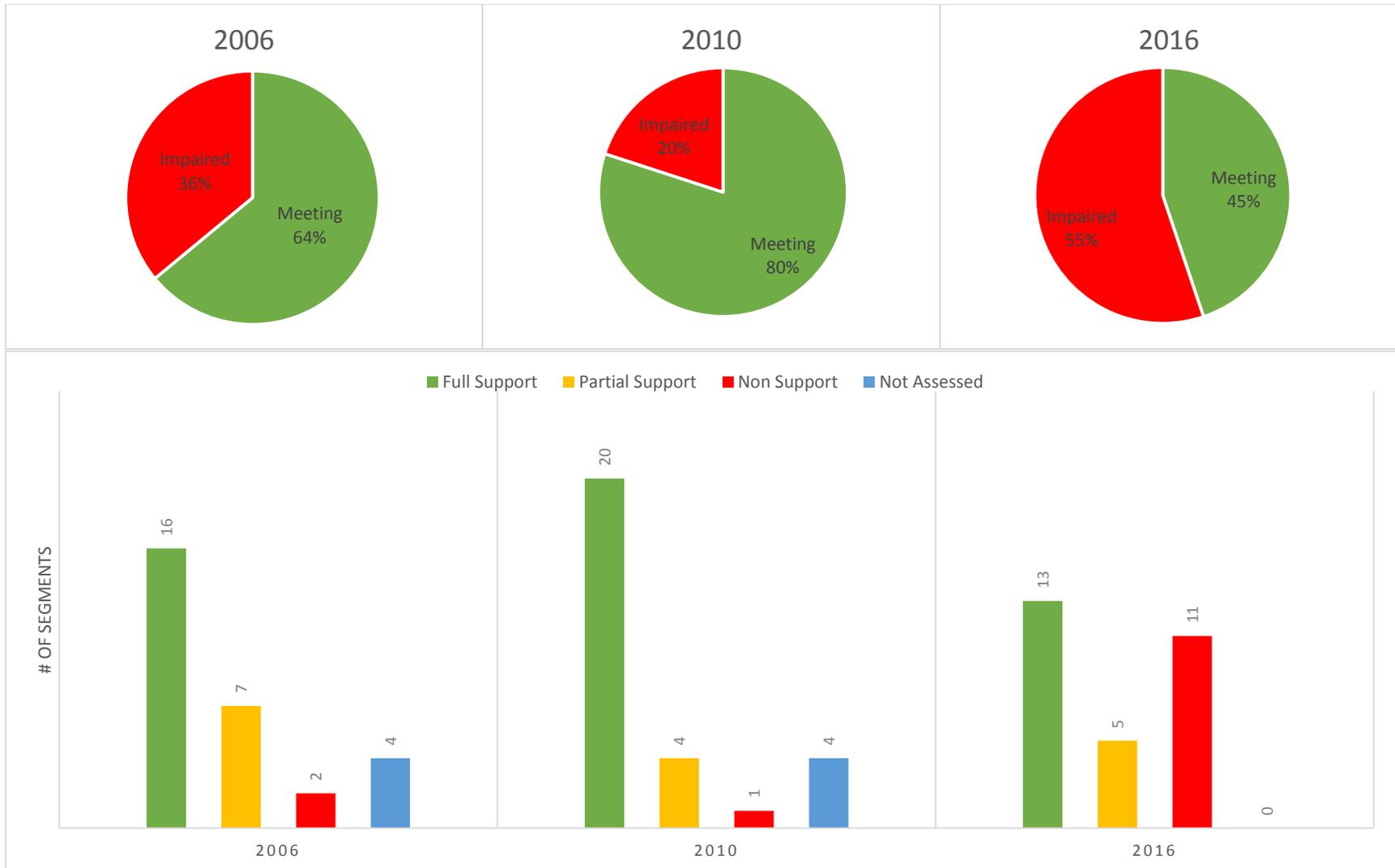


Figure 10. Attainment results for the **aquatic life** designated use from **ambient** stations located within the **Kentucky BMU** during the integrated reporting years when this particular BMU was a BMU of focus. Pie graphs along top show proportion of impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status.



Figure 11. Attainment results for the **primary contact recreation** designated use from **ambient** stations located within the **Big Sandy, Little Sandy, Tygarts BMU** during the integrated reporting years when this particular BMU was a BMU of focus. Pie graphs along top show proportion of impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status.

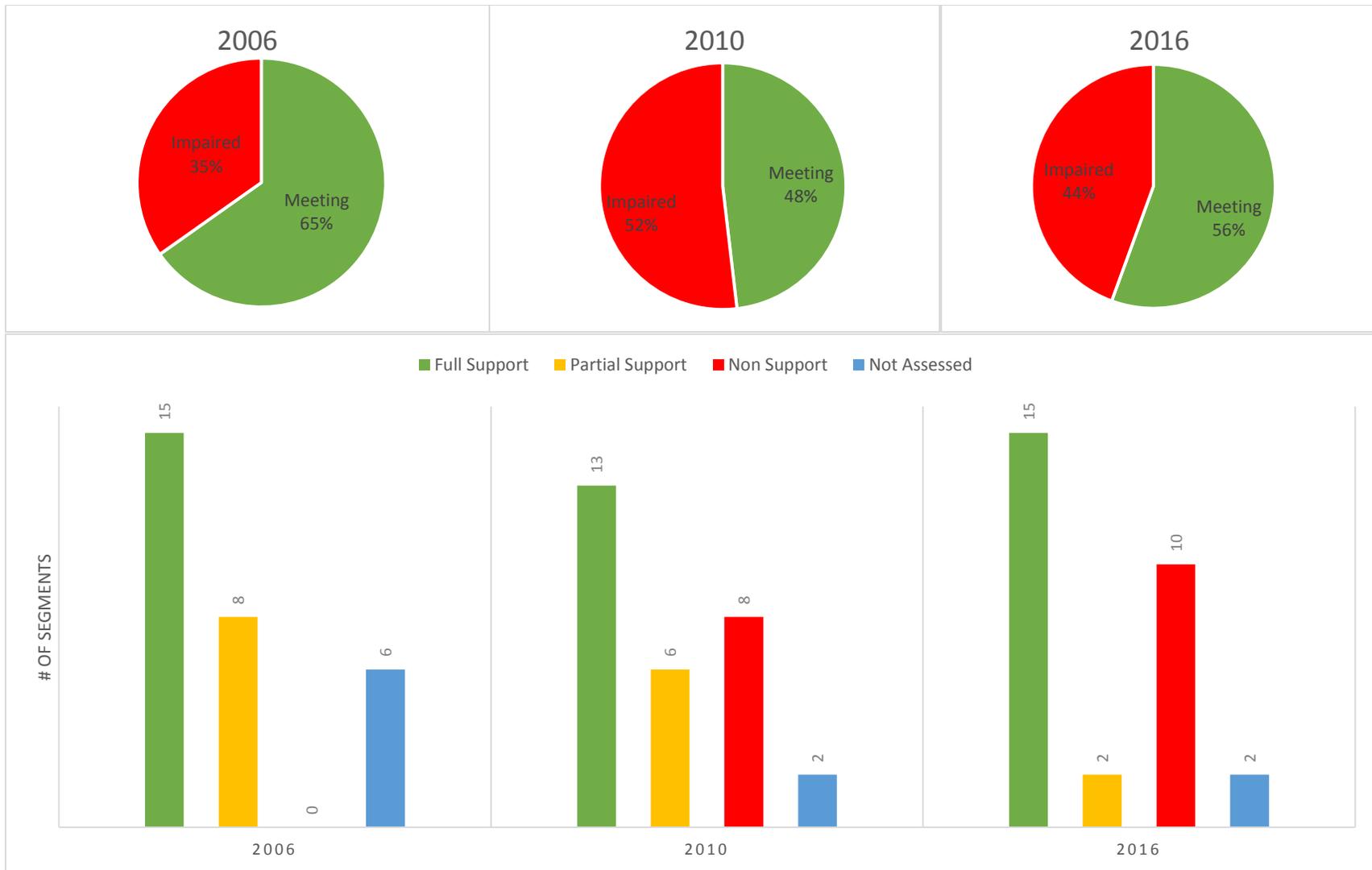


Figure 12. Attainment results for the **primary contact recreation** designated use from **ambient** stations located within the **Kentucky BMU** during the integrated reporting years when this particular BMU was a BMU of focus. Pie graphs along top show proportion of impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status.

Probabilistic Program

Big Sandy, Little Sandy, Tygarts BMU - Streams – Aquatic Life

In the Big Sandy, Little Sandy, Tygarts BMU, of the 51 sites sampled for the 2016 IR, 8% were found to fully support the aquatic life use, while 92% were found to be impaired. This is similar to the results from the 2010 and 2006 IRs, where 89% and 85% of the sites were found to be impaired, respectively. Although the percentage of impaired sites (partial and nonsupport segments) is similar between the three cycles, the proportion found to be nonsupport versus partial support almost doubled in the 2016 IR when compared to the 2010 and 2006 IRs (Figure 13).

Kentucky BMU - Streams – Aquatic Life

In the Kentucky BMU, of the 48 sites sampled for the 2016 IR, 22% were found to fully support the aquatic life use, while 78% were found to be impaired. This is similar to the results from the 2006 IR when 24% of the sites were found to fully support the aquatic life use and 76% were found to be impaired (Figure 14).

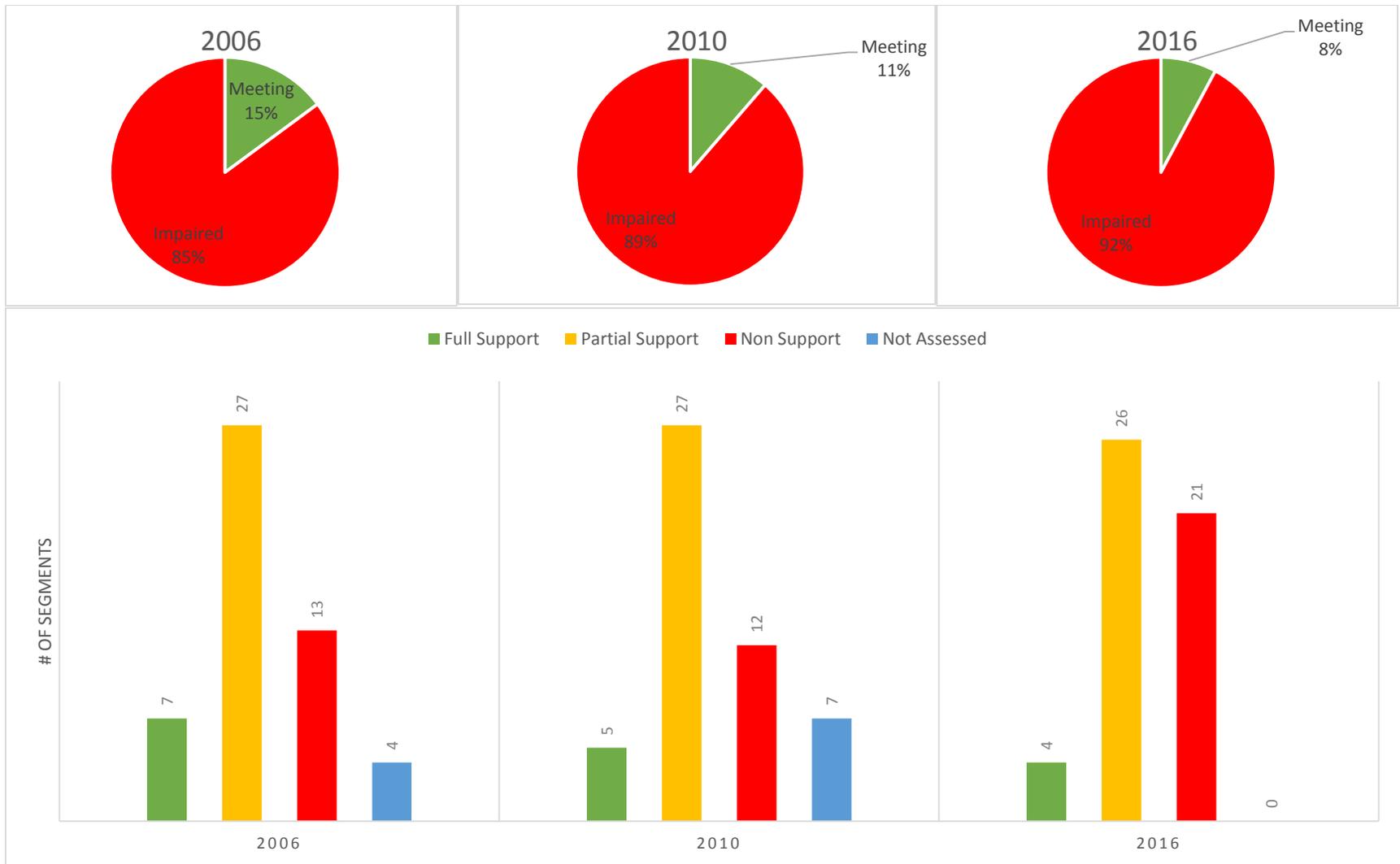


Figure 13. Assessment results from the 2006, 2010, and 2016 Integrated Reports for the **aquatic life** designated use where data from the **probabilistic** program was used when the **Big Sandy, Little Sandy, Tygarts River BMU** was sampled. Pie graphs along top show proportion of impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status.

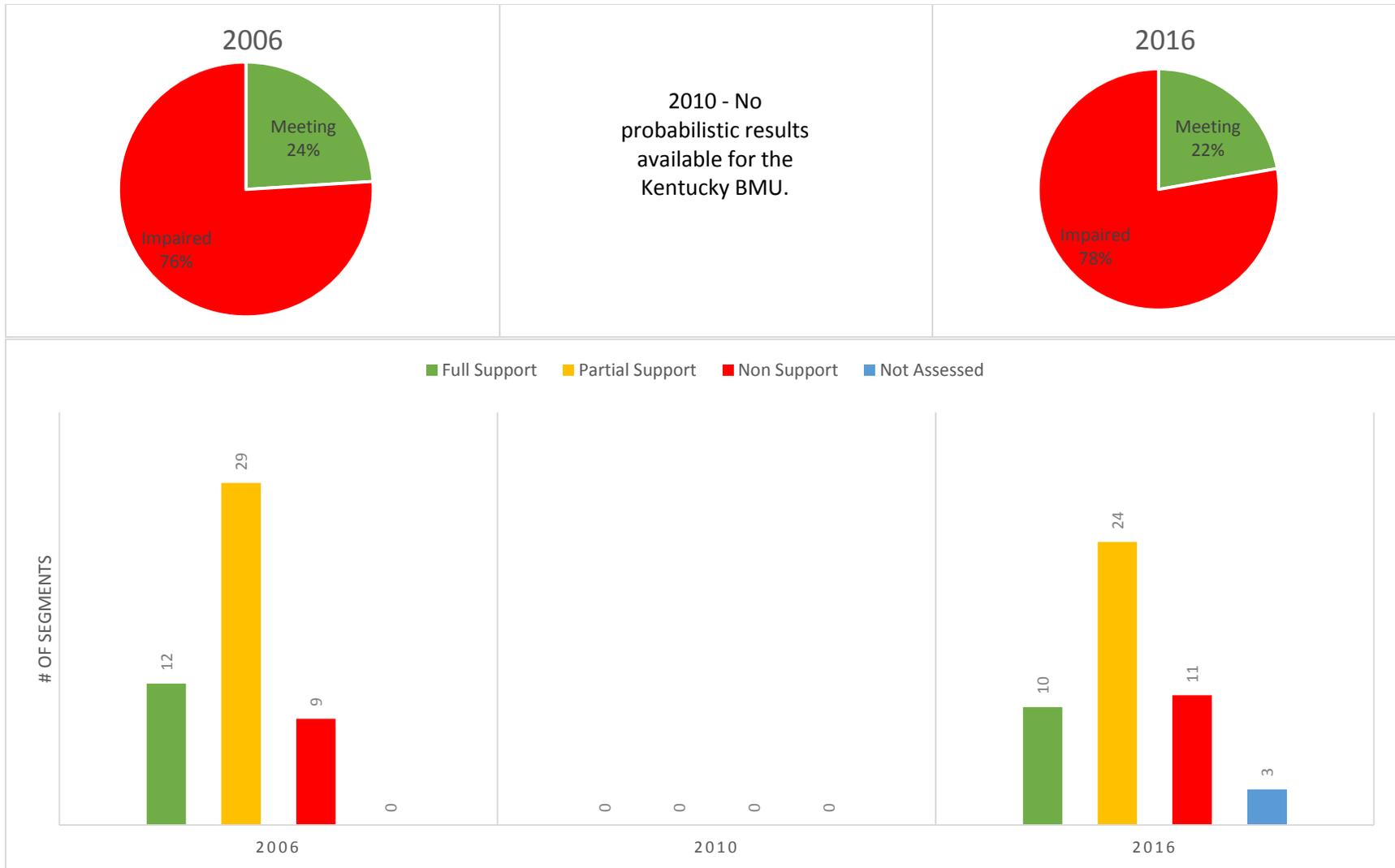


Figure 14. Assessment results from the 2006 and 2016 Integrated Reports (no data available for 2019) for the **aquatic life** designated use where data from the **probabilistic** program was used when the **Kentucky River BMU** was sampled. Pie graphs along top show proportion of impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status.

Fish Consumption Assessment Results

Currently, there are 173 waterbodies assessed for the fish consumption designated use, 26 of which were updated for this IR. Of those assessed waterbodies, 75 (43%) were found to support the designated use, while 84 partially support and 14 do not support the designated use, which relates to 57% being impaired for fish consumption (Figure 15). Of the 98 assessment units impaired for fish consumption, 49 are along the Ohio River.

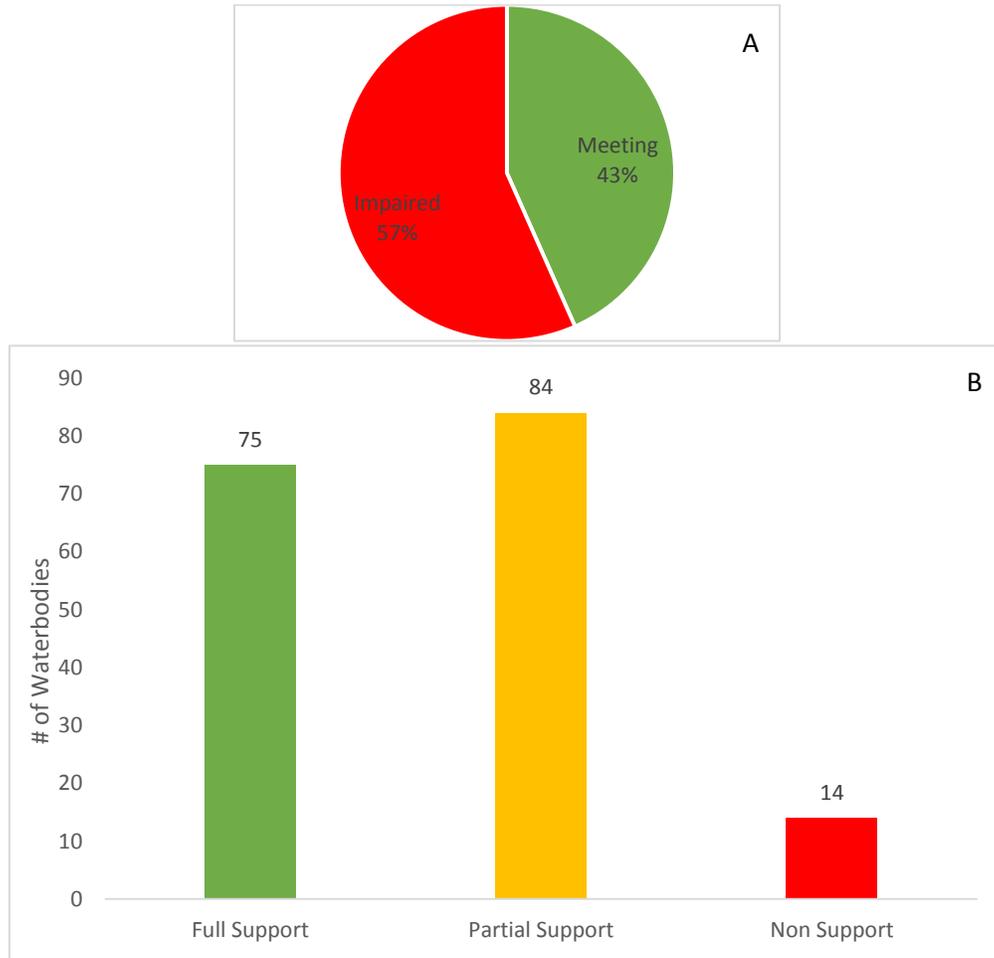


Figure 15. A) Percent impaired (partial and nonsupport) and percent meeting and B) attainment of all waterbodies that have been assessed for **fish consumption**.

Domestic Water Supply Results

There are 173 surface water intakes for DWS use for the commonwealth of Kentucky outlined in Table B of [401 KAR 10:026](#). There are 138 waterbodies that have been assessed for DWS, which results in 943.9 stream or river miles, 180,366 lake or reservoir acres, and 0.75 miles of spring runs. Of those waterbodies assessed, all but Luzerene Lake (55 acres) fully supports the DWS designated use. Luzerene Lake, which has not been assessed for DWS since 1992, partially supports the designated use due to

taste and odor, and nutrient/ eutrophication biological indicators. However, this does not imply that the water from this facility is not safe to drink; it implies that, in the past, the facility faced additional challenges to ensure the water it provided was safe for consumption. Looking at the most recent consumer confidence reports (CCR) for the facility, there have been no maximum contaminant level (MCL) violations in the past 5 years.

Additional Results

Other programs, which are discussed at length in the main document, contributed significantly to the overall 305(b). These programs include:

- Ambient Lakes
- Reference Reach
- TMDL
- NPS
- Groundwater

Lastly, other sections of this document that may be of particular interest include:

- Public Health
- Water Quality Improvements
- Program Enhancement
- Public Participation

Introduction

The 2016 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 (P.L. 92-500), as subsequently amended. Section 305(b) of the Act requires states to assess and report current water quality conditions to EPA every two years.

Designated Uses

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

- warm water aquatic habitat (WAH)
- cold water aquatic habitat (CAH)
- primary contact recreation (PCR)
- secondary contact recreation (SCR)
- domestic water supply (DWS)
- outstanding state resource water (OSRW)
- fish consumption⁴

With the exception of CAH and OSRW, the remaining designated uses apply by default to all waterbodies. OSRW is a state-defined designated use for waterbodies that support federally listed threatened or endangered aquatic species or may support an excellent biological community (e.g., waters that are in the exceptional/reference reach categories in [401 KAR 10:030](#)). Below is a description of each designated use.

Cold Water Aquatic Habitat (CAH)

As defined in [401 KAR 10:001](#), CAH is designated for waterbodies that support a self-sustaining or reproducing trout population on an annual basis. All waterbodies that support the CAH are listed in regulation ([401 KAR 10:026](#)). There are implementing criteria specific to CAHs; however, where there are no specific criteria to CAH, those criteria promulgated for WAH apply.

Warm Water Aquatic Habitat (WAH)

WAH applies to the majority of waterbodies in the Commonwealth – those not designated as CAH (with a few exceptions that are designated as both CAH and WAH). The applicable definition of WAH is aquatic habitat capable of supporting indigenous warm water life.

⁴ Fish consumption is not a designated use, but is assessed as such and therefore included in this list.

Collectively, CAH and WAH are commonly referred to as the aquatic life designated use, and are referenced as such throughout this IR. Usually, a waterbody is either WAH or CAH, but a few waterbodies have been designated as both CAH and WAH.

Primary Contact Recreation (PCR)

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 primarily 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. *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)

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 primarily 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 with regard to acidic and basic conditions. Additional criteria exist to protect the beneficial designated use from such conditions including nuisance algal blooms and nuisance aquatic macrophytes that may result from eutrophication and floating scum.

Domestic Water Supply (DWS)

This 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). These criteria were developed to protect water quality for human consumption.

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 qualities or attributes that qualify a waterbody for OSRW designation are found in WQS, [401 KAR 10:031](#) Section 8. In addition to the listing of special waters in regulation, a

webpage was created to facilitate access to all [special waters](#); this webpage is organized into 12 river basins and by designation. However, final authority for determination of whether a waterbody has a special designated use or category is through WQS procedures that encompass a formal promulgation of any given waterbody with an exception of certain OSRWs. Waters that are determined to support a federal threatened or endangered species are typically afforded OSRW protection through enabling language found in [401 KAR 10:031](#) Section 8(1)(a)3. Both designated and candidate OSRW 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.

Fish Consumption

The quality of fish flesh needed for human consumption is a desired goal set forth in WQS. While fish consumption is not a designated use it is strongly implied in WQS, particularly [401 KAR 10:031](#) Sections 2 and 6. As such, the U.S. EPA agrees and requires the assessment results of fish tissue residue monitoring be reported in Section 305(b) of the CWA under the fish consumption use.

Monitoring and Assessment

DOW uses information collected by biologists and scientists to perform assessments on waterbodies to determine if that waterbody is meeting [water quality standards](#) (WQS) and therefore supporting its designated use(s). The DOW operates its primary monitoring programs under a five-year rotating watershed management approach implemented in 1998. This IR represents monitoring efforts from the Big Sandy, Little Sandy, and Tygarts Rivers BMU sampled in April 2012 – March 2013 and the Kentucky River BMU sampled in April 2013 – March 2014. This report also incorporates assessment data and results from monitoring that occurred during this reporting cycle outside of the BMUs of focus by programs such as the TMDL and NPS programs. Therefore, results are presented in a few different ways. If a program samples under a five-year rotating watershed management approach, then the results from this IR are presented and compared to the two previous integrated reporting years where that BMU was the BMU of focus (2006 and 2010 for the Big Sandy, Little Sandy, Tygarts and Kentucky BMUs). If a program does not sample under a five-year rotating watershed management approach, then the cumulative results of that program are presented, where some of the assessment units may have been updated with new data, while other assessment units may have been carried forward from the previous IR.

When sampling occurs, specific information is gathered for each designated use. For example, bacteria levels are examined when determining if the PCR and SCR designated uses are being supported, while water chemistry, habitat, and biological communities are examined when determining if aquatic life is being supported. For more detailed information about Kentucky's assessment and listing methodology, refer to the [Consolidated and Listing Methodology](#) (CALM): Surface Water Quality Assessment in Kentucky, the Integrated Report (Kentucky Division of Water 2015).

Kentucky's Categories

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) are put into different categories depending upon the assessment decision made for that waterbody (Table 6). The two most common categories are category 2, where assessed designated use(s) is/are fully supporting, but not all designated uses have been assessed, and category

5, where assessed designated use(s) are not fully supporting, the cause of impairment is identified as a pollutant, and therefore a TMDL is required. If a waterbody has not been assessed, it is considered to fully support each applicable designated use for regulatory purposes, such as permitting and [antidegradation](#).

Table 6. Definition of each category found in the Integrated Report.

Category	Definition
1	All designated uses for waterbody are Fully Supporting.
2	Assessed designated use(s) is/are Fully Supporting, but not all designated uses assessed.
2B	Segment currently supporting use(s), but 303(d) listed & proposed to EPA for delisting.
2C	Segment with an EPA approved or established TMDL for the following use(s) now attaining Full Support.
3	Designated use(s) has/have not been assessed (insufficient or no data).
4A	Segment with an EPA approved or established TMDL for the following listed use(s) not attaining Full Support.
4B	Nonsupport segment with an approved alternative pollution control plan (e.g., BMP) stringent enough to meet full support level of all uses within a specified time.
4C	Segment is not meeting Full Support of assessed use(s), but this is not attributable to a pollutant or combination of pollutants.
5	Segment does not support designated use(s) and is impaired by a pollutant or a combination of pollutants. A TMDL is required.
5B	Segment does not support designated uses based on evaluated data, but based on Kentucky listing methodology, insufficient data are available to make a listing determination. No TMDL needed

Impaired waters are those waters found to partially support or not support one or more of its designated uses due to either a pollution or a pollutant. This includes waterbodies that are in category 4A, where a TMDL has been written for the pollutant identified as causing the impairment, category 4B, where an approved alternative pollution control plan is in place for the pollutant identified as causing the impairment, category 4C, where the cause of impairment is a pollution, and category 5. The 303(d) list, which is a subset of the 305(b), is only those waters in category 5, where a TMDL is required.

Category 5B is where a segment does not support designated uses based on evaluated data, but based on Kentucky listing methodology, insufficient data are available to make a listing determination, and therefore no TMDL is required. Waterbodies that are in category 5B are not included in the overall discussion of impaired waters since evaluated data refers to data from Discharge Monitoring Reports (DMR) and therefore no instream data has been collected to confirm the impairment. For this 2016 IR, no new assessments that utilized category 5B were completed. However, some older assessments that included category 5B were updated.

Categories are assigned on many levels. They are assigned on the cause level, designated use level, and assessment unit level. The cause level is the most individualized; that is, a cause can only have one category. When a designated use is found to be impaired for multiple causes that have different

categories, the designated use category defaults to the most impaired scenario as outlined in Figure 16. For example, if a waterbody is found to not support aquatic life and the causes were identified as habitat alteration, category 4C, pH, which has a TMDL and is therefore 4A, and iron, category 5, then the designated use, overall, would be in category 5. The same logic follows for when an assessment unit has been assessed for multiple designated uses. If aquatic life is found to be full support, category 2, but the PCR designated use is impaired due a pollutant and is therefore category 5, the overall assessment unit is in category 5.

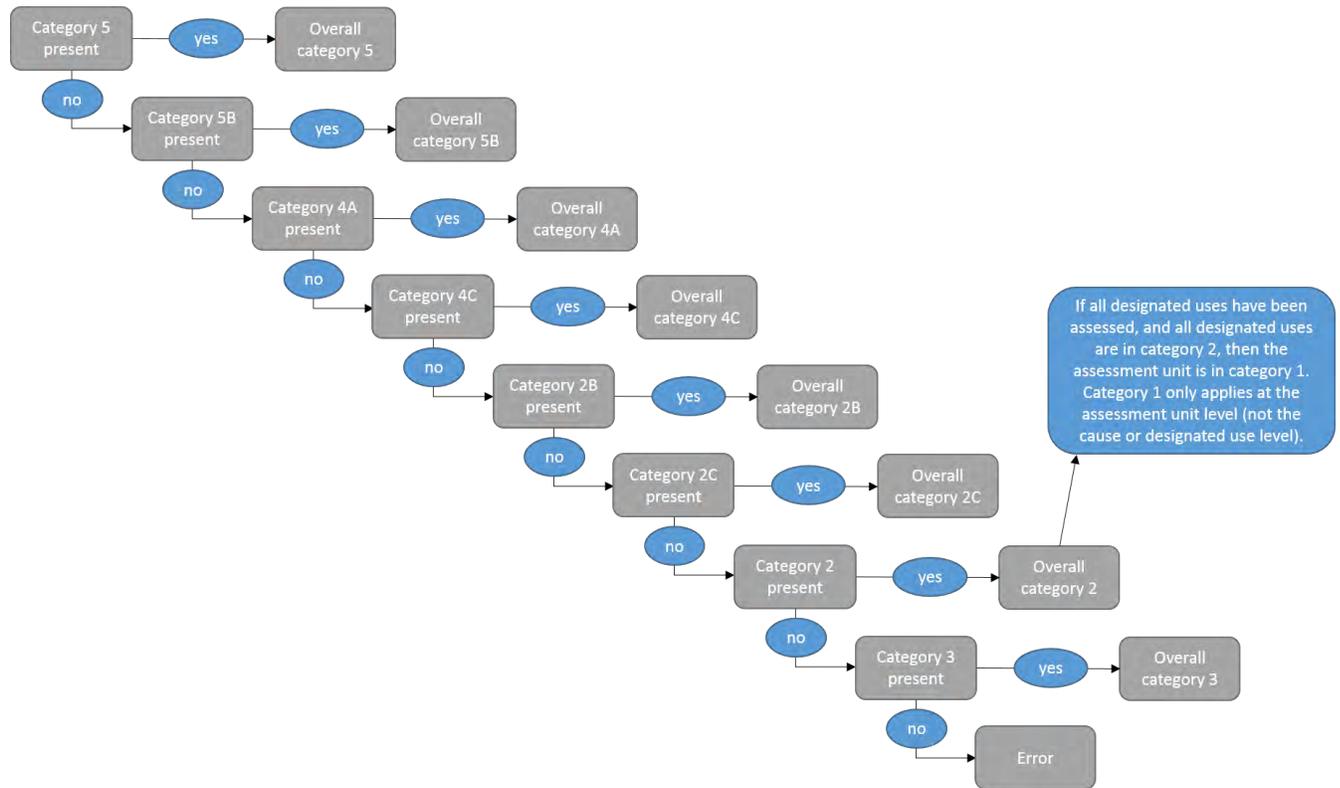


Figure 16. Schematic of how the presence or absence of a category on the cause level determines the designated use category, and then again on how the presence or absence of a category on a designated use level determines the overall assessment unit category.

This IR describes in the most detail the waterbodies where new data was collected for the 2016 IR, which accounts for most of the changes from the 2014 305(b) to the 2016 305(b). The 305(b) is a cumulative list; once a waterbody is on this list, it remains. A waterbody may change categories depending upon the use attainment, but it is always an assessed waterbody. Some of the waterbodies sampled and assessed for this IR had been sampled and assessed previously, so those waterbodies may have had use attainment updates, but did not add to the overall 305(b) list. If a waterbody had previously been found to be impaired for a pollutant and was placed on the 303(d), and was now found to support its designated use(s), then a delisting request has been submitted and the waterbody is removed from the 303(d) and changes categories on the 305(b). Conversely, if a waterbody had previously been found to fully support its designated use(s) and was now found to be impaired where the cause of impairment was identified as a pollutant, then this waterbody would be added to the 303(d) and change categories within the 305(b). Other waterbodies sampled and assessed had never

been assessed before, so their assessment adds to the 305(b) and potentially the 303(d) if they are found to be impaired for a pollutant. This IR will focus on what waters had available data for an assessment for the 2016 IR, which was approximately 530 stations. Any historic assessment from the 2014 305(b) that did not have new data collected was simply passed forward to the 2016 305(b) unchanged.

State Wide Assessment Results

In Kentucky, there are 90,961 stream miles at the scale of 1:24,000, of which only 14% have been assessed. The agency considers all unassessed waterbodies to fully support each applicable designated use for regulatory purposes. This resource management practice results in 78,208 stream miles meeting its uses for permitting and antidegradation implementation.

The 2016 305(b) has 2,751 assessed waterbodies (the 2014 305(b) had 2,570 assessed waterbodies, Kentucky Division of Water 2014), totaling 12,753 stream miles, 180,366 lake, reservoir, or pond acres, and 12.2 spring miles (see 305(b) Table). The 2016 303(d), which is a subset of the 305(b) and only includes those waterbodies in category 5, has 2,788 pollutant waterbody combinations (PWC). Kentucky has requested to delist 68 PWCs (see 303(d) Table). For comparison purposes, the 2014 303(d) had 2,596 PWCs (Kentucky Division of Water 2014). PWCs count the number of pollutants affecting a waterbody. For example, a waterbody may be impaired for aquatic life due to pH and lead. Therefore, that one stream has two PWCs, and would therefore require a TMDL for pH and a TMDL for lead.

Table 7 outlines how many waterbodies (streams, rivers, lakes, reservoirs, ponds, or springs) of the 2,751 assessed waterbodies that are in each category at the designated use level and at the assessment unit level. It's important to reiterate that the tables that follow, and this entire IR, only discuss those waterbodies where data has been collected, and an assessment has been completed or attempted to be completed; for streams, this equates to ~14% of all stream miles in Kentucky. Categories 1, 2, 2B, and 2C relate to the designated use being met (full support), category 3 is unassessed, categories 4A, 4C, and 5 relate to the designated use being impaired (partial support or nonsupport), and category 5B is impaired based on evaluated data. This tables demonstrates a few important points about the assessment process:

- Some designated uses are assessed more often than others. For example, the unassessed percentage for aquatic life is 13%, while the unassessed percentage for DWS is 95%.
- It demonstrates how categories “roll up” from the designated use level to the assessment unit level. For example, at the assessment unit level, only 1% of the streams are unassessed even though 95% are unassessed for DWS, demonstrating that a waterbody is almost always assessed when data is available for at least one of the applicable designated uses.
- Some designated uses have more TMDLs. For example, PCR is associated with 358 assessment units in category 4A, while fish consumption and aquatic life are associated with 1 and 21 assessment units in category 4A, respectively.

The statewide results for the 2,751 assessed waterbodies on the 305(b), which includes streams, rivers, lakes, reservoirs, ponds, and springs, are as follows:

- Aquatic Life
 - 38.5% Meeting
 - 45.3% Impaired
 - 13.2% Unassessed
 - 3.0% in 5B
- Fish Consumption
 - 2.7% Meeting
 - 3.5% Impaired
 - 93.7% Unassessed
 - <1% in 5B
- Primary Contact Recreation
 - 8.2% Meeting
 - 28.6% Impaired
 - 60.9% Unassessed
 - 2.3% in 5B
- Secondary Contact Recreation
 - 7.6% Meeting
 - 4.3% Impaired
 - 87.9% Unassessed
 - <1% in 5B
- Domestic Water Supply
 - 5.0% Meeting
 - <1% Impaired
 - 95% Unassessed (Although the DWS designated use applies to all waterbodies, drinking water standards only apply to the source water at point of intake, explaining the high percentage of unassessed waterbodies for this particular designated use.)
 - 0 in 5B
- Outstanding State Resource Waters
 - 83.9% Meeting
 - 15.9% Impaired
 - 0% Unassessed (OSRW does not apply to all waterbodies, only those designated as such. If the use applies, then it is assessed. Therefore, there are no unassessed OSRWs.)
 - <1% in 5B
- Assessment Unit Level, which considers all designated uses
 - 33.4% Meeting all assessed designated uses
 - 61.4% Impaired for at least one assessed designated use
 - 1.3% Unassessed for all applicable designated uses
 - 3.8% in 5B for all assessed designated uses

This broad perspective of the 305(b) is helpful to understand assessments in Kentucky, but looking at particular waterbody types per designated use, where the use has been assessed, is more informative to understanding water quality at the statewide level.

Table 7. Statewide - number of waterbodies (streams, river, lakes, reservoirs, ponds, or springs) per category at the designated use level and the assessment unit level, and percent of assessed waterbodies meeting (categories 1, 2, 2B, 2C), unassessed (category 3), not meeting (category 4A, 4C, 5), and not meeting based on evaluated data (category 5B) at the designated use level and at the assessment unit level.

Category	Aquatic Life				Fish Consumption		Primary Contact Recreation		Secondary Contact Recreation		Domestic Water Supply ⁵		Outstanding State Resource Water ⁶		Assessment Unit	
	WAH #	CAH #	WAH/CAH #	AL %	FC #	FC %	PCR #	PCR %	SCR #	SCR %	DWS #	DWS %	OSRW	%	AU #	AU %
1	0	0	0	38.5	0	2.7	0	8.2	0	7.6	0	5.0	0	83.9	5	33.4
2	990	46	10		74		200		195		136		312		900	
2B	9	0	0		1		12		6		1		0		10	
2C	3	0	0		0		13		8		0		0		5	
3	360	3	0	13.2	2578	93.7	1676	60.9	2417	87.9	2613	95.0	0	0	37	1.3
4A	21	0	0	45.3	1	3.5	358	28.6	59	4.3	0	<1	1	15.9	180	61.4
4C	11	0	0		0		0		3		0		2		10	
5	1204	11	0		96		430		57		1		56		1499	
5B	82	1	0	3.0	1	<1	62	2.3	6	<1	0	0	1	<1	105	3.8

⁵ Although the DWS designated use applies to all waterbodies, drinking water standards only apply to the source water at point of intake, explaining the high percentage of unassessed waterbodies for this particular designated use.

⁶ The designated use OSRW does not apply to all waterbodies, only those designated as such. If the use applies, then it is assessed. Therefore, there are no unassessed OSRWs.

Streams and Rivers - Statewide

Stream and river assessments are the most common, which account for 2,594 of the 2,751 assessment units on Kentucky’s 305(b). The total mileage of streams and rivers that have been assessed is 12,753 miles. Table 8 outlines how many segments are in each category at the designated use level and at the assessment unit level. Again, categories 1, 2, 2B, and 2C relate to the designated use being met (full support), category 3 is unassessed, categories 4A, 4C, and 5 relate to a designated use being impaired (partial support or nonsupport), and category 5B is impaired based on evaluated data.

Table 8. Statewide – Number of segments per category per designated use for streams and rivers.

Category	Aquatic Life			Fish Consumption	PCR	SCR	DWS	OSRW	Assessment Unit
	WAH	CAH	WAH/CAH						
1	0	0	0	0	0	0	0	0	3
2	908	46	1	53	192	126	79	310	812
2B	9	0	0	0	12	5	0	0	9
2C	3	0	0	0	13	8	0	0	5
3	327	3	0	2462	1548	2339	2515 ⁷	0 ⁸	35
4A	21	0	0	1	356	59	0	1	178
4C	11	0	0	0	0	0	0	2	9
5	1172	11	0	77	411	51	0	55	1439
5B	81	1	0	1	62	6	0	1	104

Next, Table 9 outlines the number of stream or river segments that have been assessed statewide per designated use, meaning, Table 9 does not include streams or rivers in category 3. Then, of those assessed segments, Table 9 outlines the number of segments that either fully support, partially support, or do not support each designated use. The impaired columns combine the partial and nonsupport segments.

⁷ Although the DWS designated use applies to all waterbodies, drinking water standards only apply to the source water at point of intake, explaining the high percentage of unassessed waterbodies for this particular designated use.

⁸ The designated use OSRW does not apply to all waterbodies, only those designated as such. If the use applies, then it is assessed. Therefore, there are no unassessed OSRWs.

Table 9. Number of **stream or river** segments assessed, fully supporting, partially supporting, or not supporting per designated use, with percentages for each attainment calculated.

Designated Use	Total Assessed	Fully Supporting	Partially Supporting	Not Supporting	Impaired	% Meeting	% Partially Supporting	% Not Supporting	% Impaired
Aquatic Life	2264	955	695	614	1309	42	31	27	58
Fish Consumption	132	53	68	11	79	40	52	8	60
Primary Contact Recreation	1046	217	207	622	829	21	20	59	79
Secondary Contact Recreation	255	139	24	92	116	55	9	36	45
Domestic Water Supply	79	79	0	0	0	100	0	0	0
Outstanding State Resource Water	369	310	33	26	59	84	9	7	16

Of those streams and rivers listed as impaired, 41 causes are associated with the impairments (see 305(b) Table for all causes). The top 10 causes are summarized in Table 10.

Table 10. Top 10 causes impairing **streams and rivers** statewide for all applicable designated uses.

Cause	Total # of Segments	Total Stream or River Miles
Bacteria	755	4422
Sedimentation/Siltation	722	3419
Nutrient/Eutrophication Biological Indicators	350	1753
Specific Conductance	221	1042
Cause Unknown	208	821
Total Dissolved Solids	153	747
Organic Enrichment (Sewage) Biological Indicators	141	757
Iron	67	475
pH	57	226
Oxygen, Dissolved	51	297

The two most common designated uses assessed for streams and rivers are aquatic life, where 2,264 segments have been assessed statewide, and PCR, where 1,046 segments have been assessed statewide. The statewide results for aquatic life and PCR are discussed below in more detail.

Streams and Rivers – Statewide – Aquatic Life

For the aquatic life designated use, statewide, 42% of streams and rivers fully support this designated use, while 31% partially support and 27% do not support the aquatic life designated use, meaning 58% are impaired (Figure 17). This relates to 5,935 stream or river miles being impaired and 5,569 stream or river miles meeting the aquatic life designated use at the statewide level⁹ (Figure 18). Looking at only the streams and rivers impaired for the aquatic life designated use statewide, 31 causes are associated with the impairments; the 10 most common causes of impairment for the aquatic life designated use are outlined in Table 11.

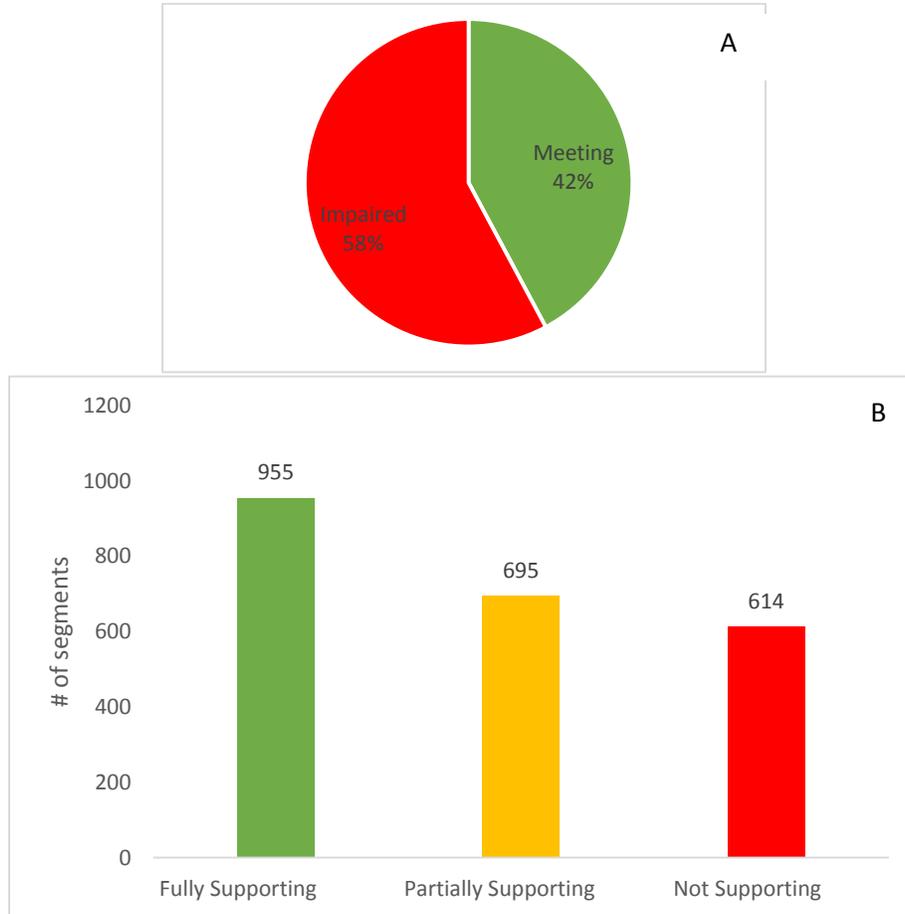


Figure 17. Statewide - A) Percent impaired (partial and nonsupport) and percent meeting and B) attainment of all **streams and rivers** assessed for the **aquatic life** designated use.

⁹ Stream and river mile proportion of meeting to impaired will not match segment proportion of meeting to impaired; segments are normalized units while assessment unit length varies between assessment units.

Table 11. Top 10 causes impairing **streams and rivers** statewide for the **aquatic life** designated use.

Cause	Total # of Segments	Total Stream or River Miles
Sedimentation/Siltation	722	3419
Nutrient/Eutrophication Biological Indicators	350	1753
Specific Conductance	221	1042
Cause Unknown	208	821
Total Dissolved Solids	153	747
Organic Enrichment (Sewage) Biological Indicators	141	757
Iron	67	475
pH	57	226
Oxygen, Dissolved	51	297
Lead	42	366

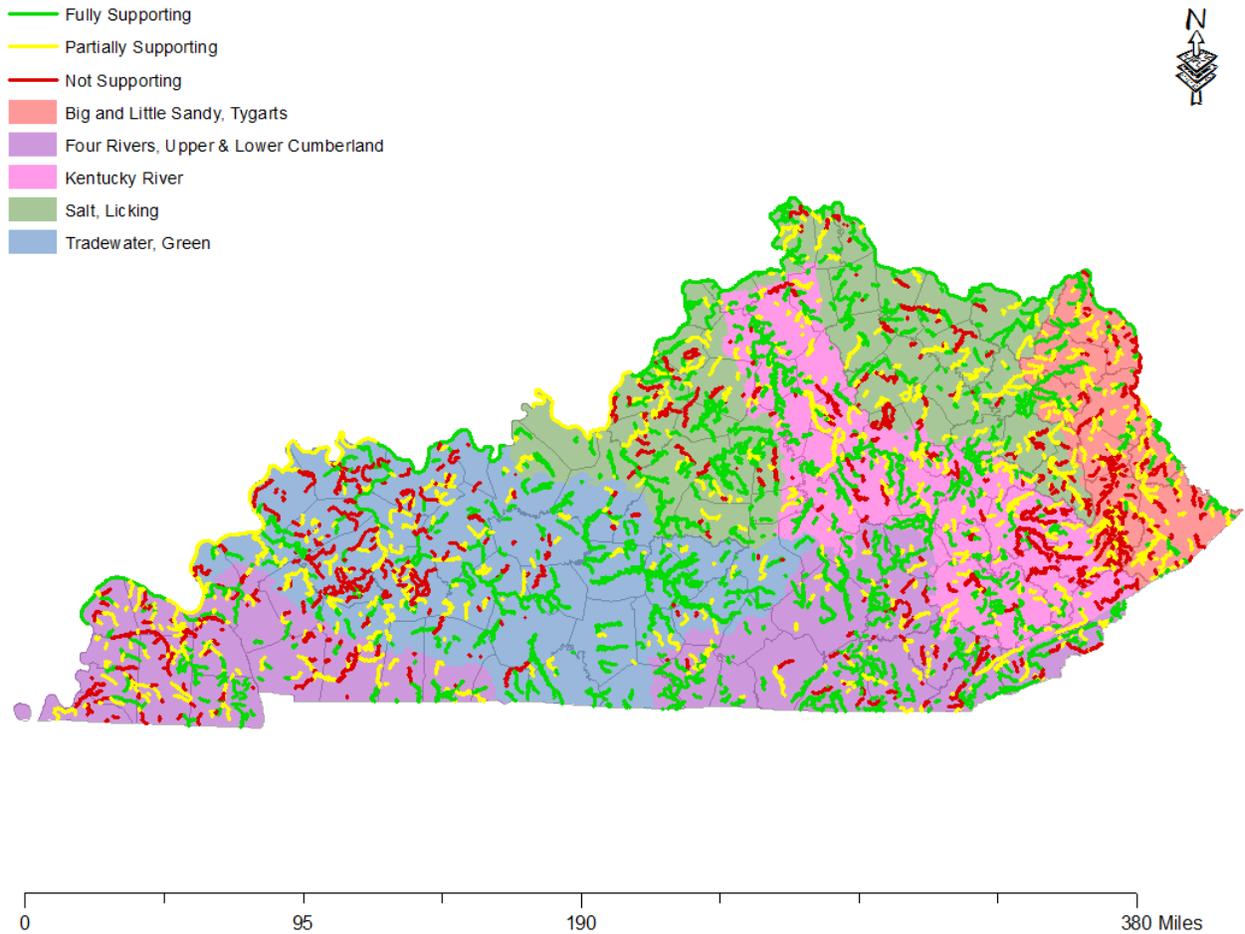


Figure 18. Statewide attainment of the **aquatic life** designated use for **streams and rivers**.

Streams and Rivers – Statewide – Primary Contact Recreation

For the PCR designated use, statewide, 21% of streams and rivers fully support this designated use, while 20% partially support and 59% do not support the PCR designated use, meaning 79% are impaired (Figure 19). This relates to 4,665 stream or river miles being impaired and 1,774 stream or river miles meeting the PCR designated use at the statewide level¹⁰ (Figure 20). Looking at only the streams and rivers impaired for the PCR designated use statewide, 2 causes are associated with the impairments: bacteria (*E. coli* or fecal coliform), and pH (Table 12).

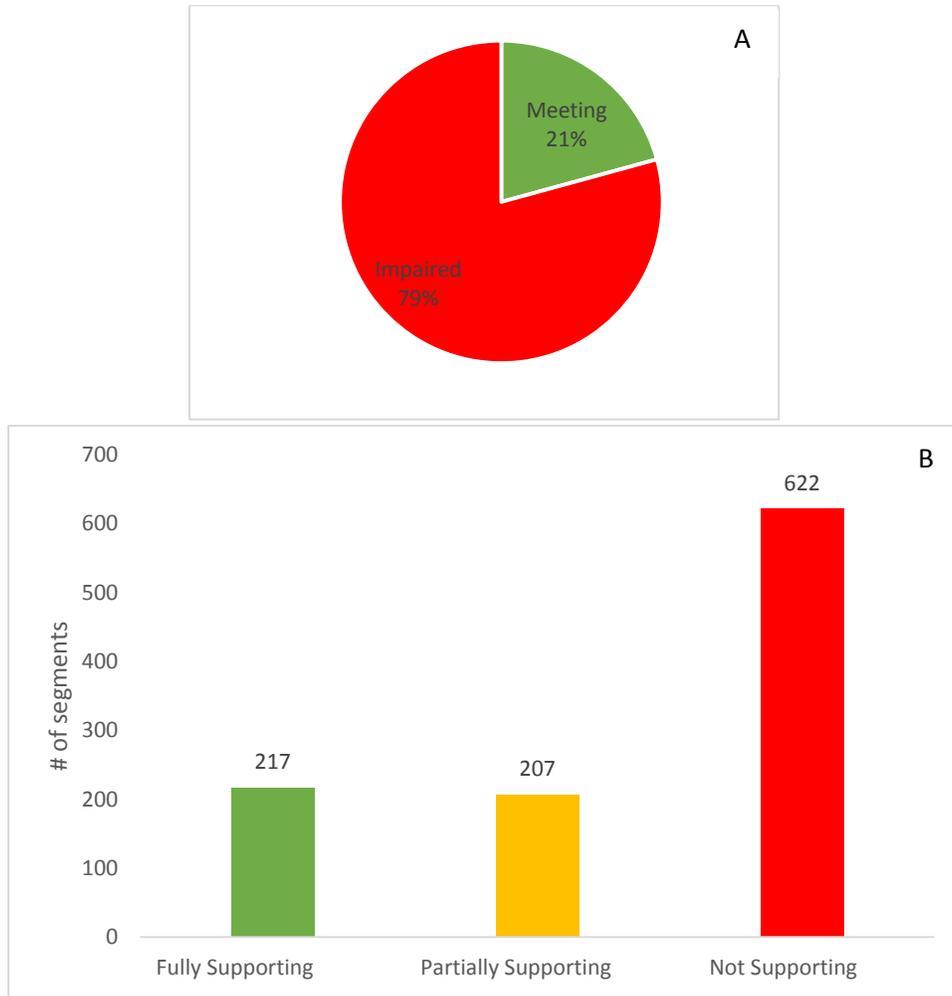


Figure 19. Statewide - A) Percent impaired (partial and nonsupport) and percent meeting and B) attainment of all **streams and rivers** assessed for the **primary contact recreation** designated use.

¹⁰ Stream and river mile proportion of meeting to impaired will not match segment proportion of meeting to impaired; segments are normalized units while assessment unit length varies between assessment units.

Table 12. Causes impairing **streams and rivers** statewide for the **primary contact recreation** designated use.

Cause	Total # of Segments	Total Stream or River Miles
Bacteria	755	4422
pH	57	226

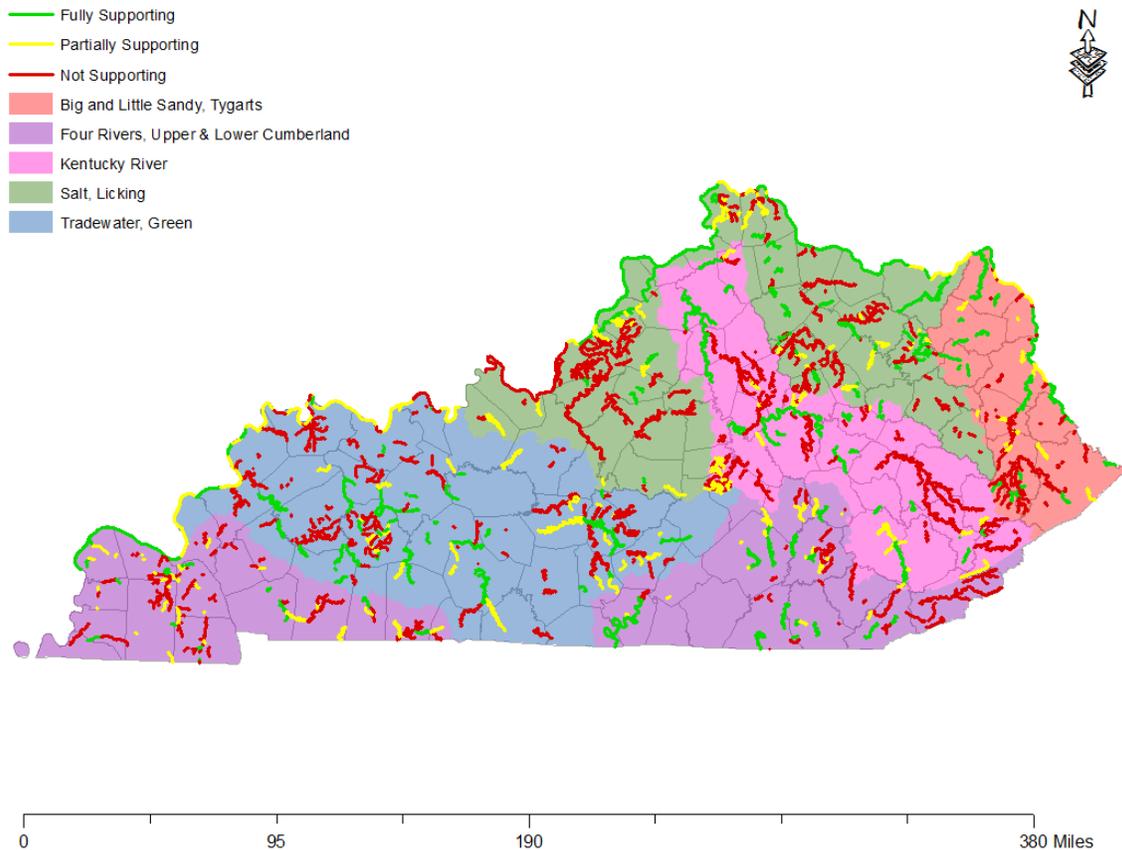


Figure 20. Statewide attainment of the **primary contact recreation** designated use for **streams and rivers**.

Lake and Reservoirs – Statewide

Lake and reservoir assessments are the second most common, which account for 128 of the 2,751 assessment units on Kentucky’s 305(b). The total acreage of lakes and reservoirs that have been assessed is 180,366 acres. Table 13 outlines how many segments are in each category at the designated use level and at the assessment unit level. Again, categories 1, 2, 2B, and 2C relate to the designated use being met (full support), category 3 is unassessed, categories 4A, 4C, and 5 relate to a designated use being impaired (partial support or nonsupport), and category 5B is impaired based on evaluated data.

Table 13. Statewide – Number of segments per category per designated use for lakes and reservoirs.

Category	Aquatic Life			Fish Consumption	PCR	SCR	DWS	OSRW	Assessment Unit
	WAH	CAH	WAH/CAH						
1	0	0	0	0	0	0	0	0	2
2	64	0	9	21	5	68	56	1	80
2B	0	0	0	1	0	1	1	0	1
2C	0	0	0	0	0	0	0	0	0
3	31	0	0	87	120	50	70 ¹¹	0 ¹²	2
4A	0	0	0	0	0	0	0	0	0
4C	0	0	0	0	0	3	0	0	1
5	24	0	0	19	3	6	1	1	42
5B	0	0	0	0	0	0	0	0	0

Next, Table 14 outlines the number of lake or reservoir segments that have been assessed statewide per designated use, meaning, Table 14 does not include lakes or reservoirs in category 3. Then, of those assessed segments, Table 14 outlines the number of segments that either fully support, partially support, or do not support each designated use. The impaired columns combine the partial and nonsupport segments.

Table 14. Number of lake and reservoir segments assessed, fully supporting, partially supporting, or not supporting per designated use, with percentages for each attainment calculated.

Designated Use	Total Assessed	Fully Supporting	Partially Supporting	Not Supporting	Impaired Segments	% Meeting	% Partially Supporting	% Not Supporting	% Impaired
Aquatic Life	97	73	17	7	24	75	18	7	25
Fish Consumption	39	20	16	3	19	51	41	8	49
Primary Contact Recreation	8	5	2	1	3	63	25	13	38
Secondary Contact Recreation	78	69	7	2	9	88	9	3	12
Domestic Water Supply	58	56	2	0	2	97	3	0	3
Outstanding State Resource Water	2	1	1	0	1	50	50	0	50

¹¹ Although the DWS designated use applies to all waterbodies, drinking water standards only apply to the source water at point of intake, explaining the high percentage of unassessed waterbodies for this particular designated use.

¹² The designated use OSRW does not apply to all waterbodies, only those designated as such. If the use applies, then it is assessed. Therefore, there are no unassessed OSRWs.

Of those lakes and reservoirs listed as impaired, 8 causes are associated with the impairments (Table 15).

Table 15. Causes impairing lakes and reservoirs statewide for all applicable designated uses.

Cause	Total # of Segments	Total Lake or Reservoir Acres
Nutrient/Eutrophication Biological Indicators	21	8217
Oxygen, Dissolved	18	7705
Mercury in Fish Tissue	12	18831
Organic Enrichment (Sewage) Biological Indicators	7	3883
Methylmercury	6	61773
pH	3	123
Sedimentation/Siltation	3	338
PCB in Fish Tissue	2	9353

At Kentucky’s lakes and reservoirs, aquatic life has been assessed for 97 segments totaling 217,957 acres, fish consumption has been assessed for 39 segments totaling 207,448 acres, SCR has been assessed for 78 segments totaling 215,918 acres, and DWS has been assessed for 58 segments totaling 180,441 acres. The fish consumption and DWS designated uses are discussed specifically in the public health section (insert link), but the statewide results for aquatic life and SCR are discussed below in more detail.

Lakes and Reservoirs – Statewide – Aquatic Life

For the aquatic life designated use, statewide, 75% of lakes and reservoirs fully support this designated use, while 18% partially support and 7% do not support the aquatic life designated use, meaning 25% are impaired (Figure 21). This relates to 8,350 lake or reservoir acres being impaired and 209,607¹³ lake or reservoir acres meeting the aquatic life designated use at the statewide level (Figure 22). Looking at only the lakes and reservoirs impaired for the aquatic life designated use statewide, 4 causes are associated with the impairments (Table 16).

¹³ Lake Cumberland, which is assessed as full support for aquatic life, accounts for 50,250 acres. Lake and reservoir acreage proportion of meeting to impaired will not match segment proportion of meeting to impaired; segments are normalized units while assessment unit area varies between assessment units.

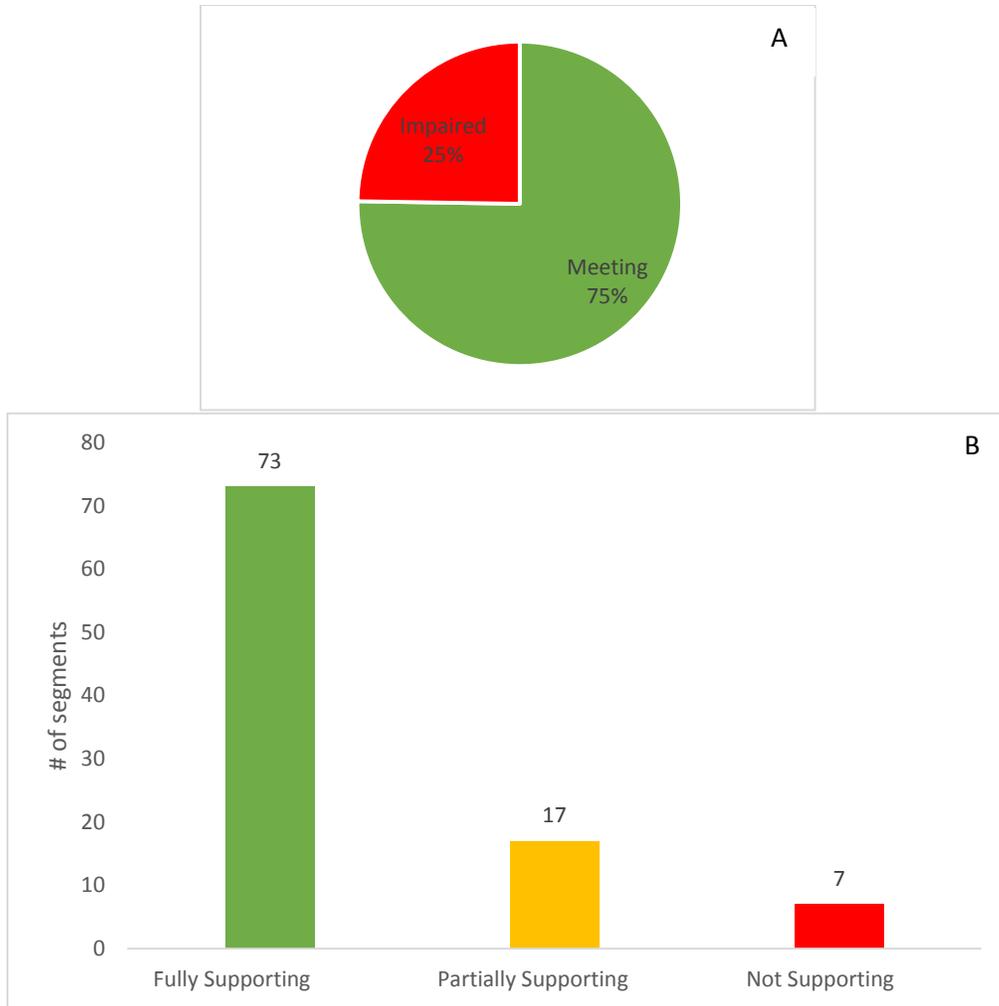


Figure 21. Statewide - A) Percent impaired (partial and nonsupport) and percent meeting and B) attainment of all **lakes and reservoirs** assessed for the **aquatic life** designated use.

Table 16. Causes impairing **lakes and reservoirs** statewide for the **aquatic life** designated use.

Cause	Total # of Segments	Total Lake or Reservoir Acres
Nutrient/Eutrophication Biological Indicators	21	8217
Oxygen, Dissolved	18	7705
Organic Enrichment (Sewage) Biological Indicators	7	3883
pH	3	123

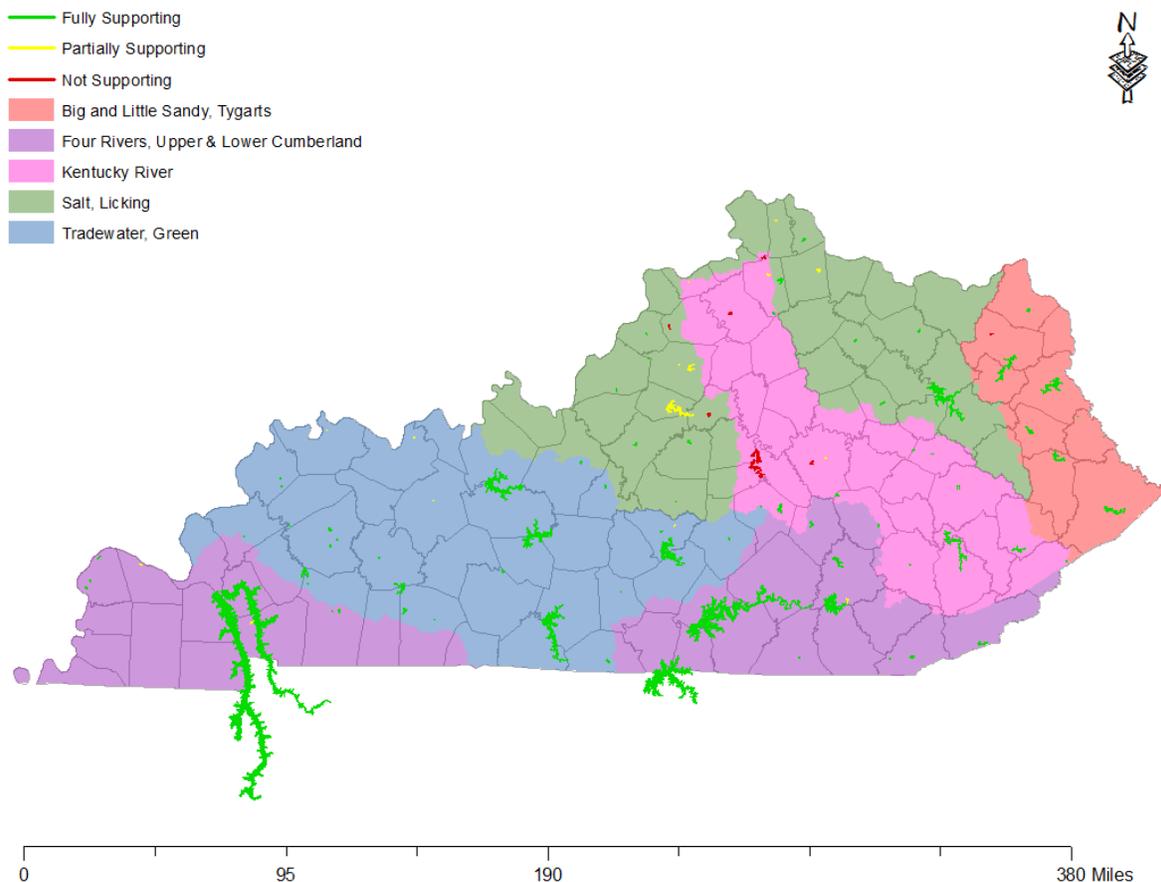


Figure 22. Statewide attainment of the **aquatic life** designated use for **lakes and reservoirs**.

Lakes and Reservoirs – Statewide – Secondary Contact Recreation

For the SCR designated use, statewide, 88% of lakes and reservoirs fully support this designated use, while 9% partially support and 3% do not support the SCR designated use, meaning 12% are impaired (Figure 23). This relates to 461 lake or reservoir acres being impaired and 215,457¹⁴ lake or reservoir acres meeting the SCR designated use at the statewide level (Figure 24). Looking at only the lakes and reservoirs impaired for the SCR designated use statewide, 3 causes are associated with the impairments: sedimentation/ siltation, pH, and chlorophyll-a (Table 17).

¹⁴ Lake Cumberland, which is assessed as full support for aquatic life, accounts for 50,250 acres. Lake and reservoir acreage proportion of meeting to impaired will not match segment proportion of meeting to impaired; segments are normalized units while assessment unit area varies between assessment units.

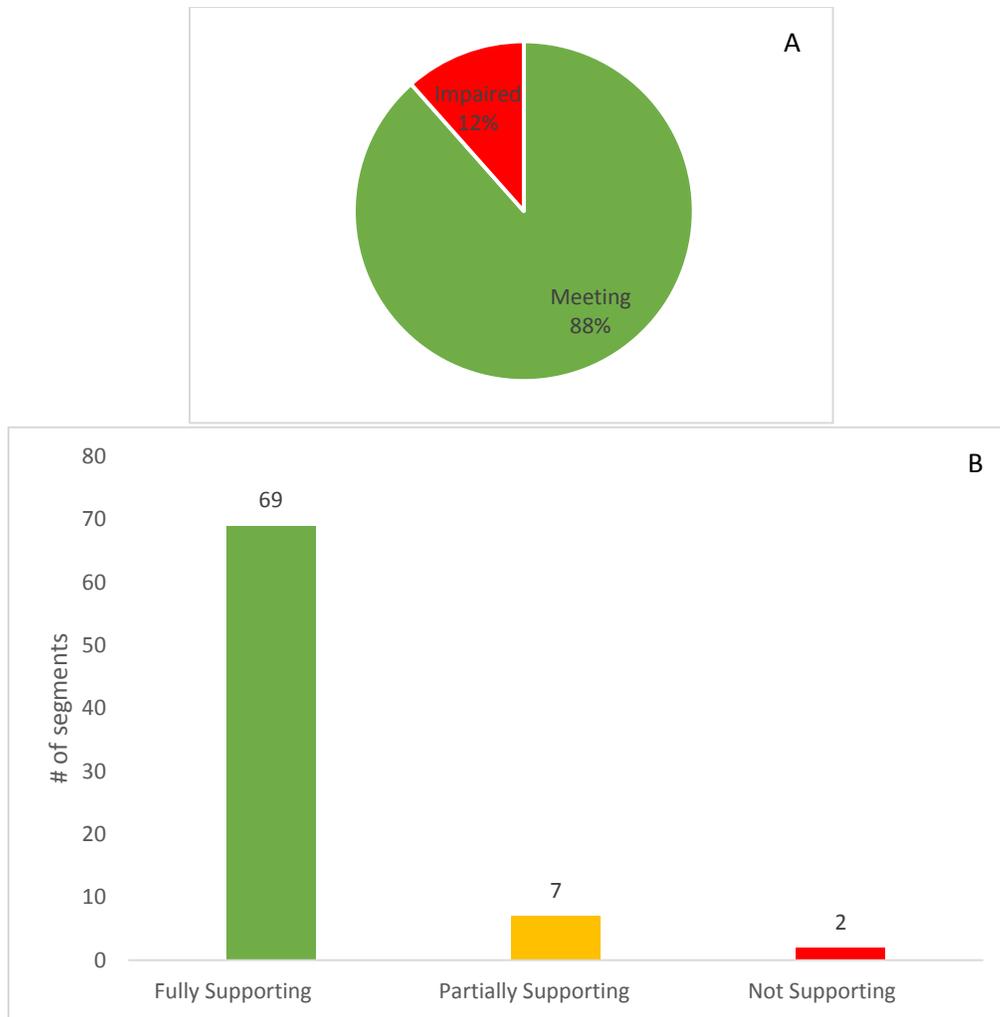


Figure 23. Statewide - A) Percent impaired (partial and nonsupport) and percent meeting and B) attainment of all **lakes and reservoirs** assessed for the **secondary contact recreation** designated use.

Table 17. The three causes impairing **lakes and reservoirs** statewide for the **secondary contact recreation** designated use.

Cause	Total # of Segments	Total Lake or Reservoir Acres
Sedimentation/Siltation	3	338
pH	3	123
Chlorophyll-a	1	200

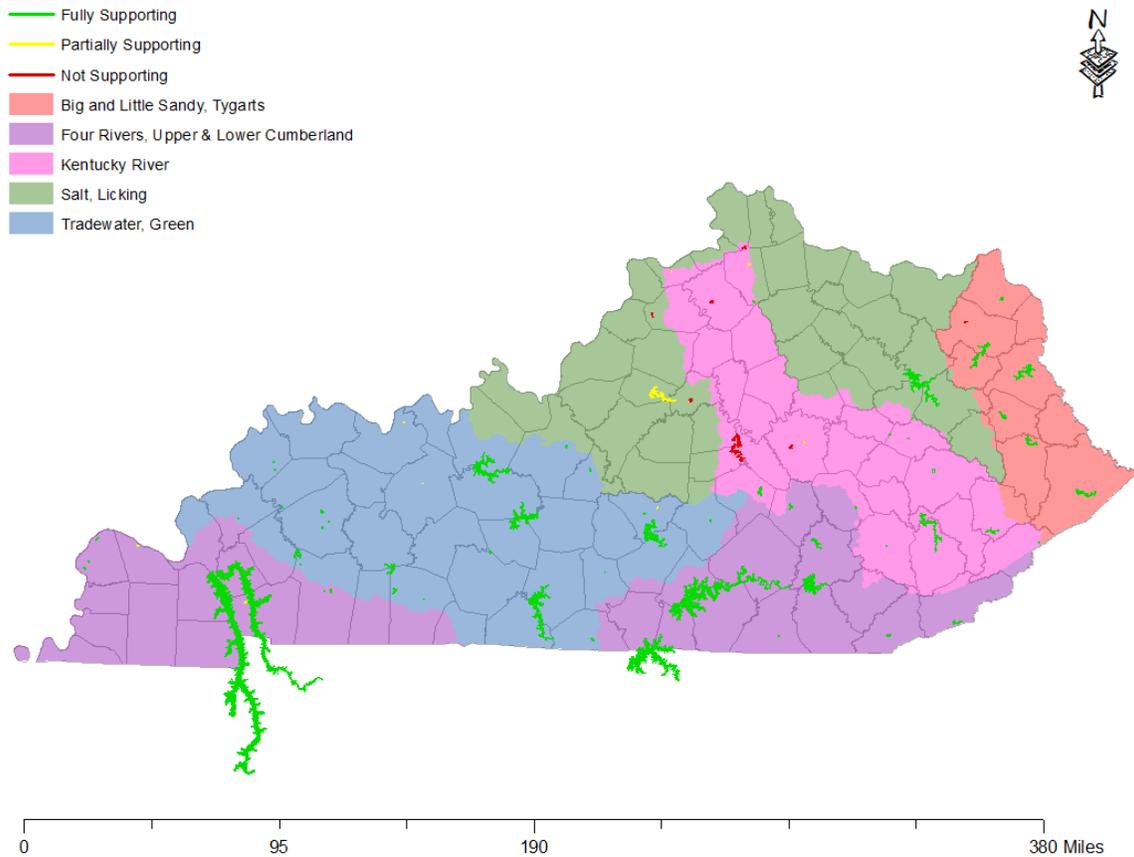


Figure 24. Statewide attainment of the **secondary contact recreation** designated use for **lakes and reservoirs**.

Springs – Statewide

Spring assessments are uncommon, and only account for 29 of the 2,751 assessment units on Kentucky’s 305(b). The total spring miles that have been assessed is 12.2 miles. Table 18 outlines how many segments are in each category at the designated use level and at the assessment unit level. Again, categories 1, 2, 2B, and 2C relate to the designated use being met (full support), category 3 is unassessed, categories 4A, 4C, and 5 relate to a designated use being impaired (partial support or nonsupport), and category 5B is impaired based on evaluated data.

Table 18. Statewide – Number of segments per category per designated use for **springs**.

Category	Aquatic Life			Fish Consumption	PCR	SCR	DWS	OSRW	Assessment Unit
	WAH	CAH	WAH/CAH						
1	0	0	0	0	0	0	0	0	0
2	18	0	0	0	3	1	1	1	8
2B	0	0	0	0	0	0	0	0	0
2C	0	0	0	0	0	0	0	0	0
3	2	0	0	29	8	28	28 ¹⁵	0 ¹⁶	0
4A	0	0	0	0	2	0	0	0	2
4C	0	0	0	0	0	0	0	0	0
5	8	0	0	0	16	0	0	0	18
5B	1	0	0	0	0	0	0	0	1

Next, Table 19 outlines the number of spring segments that have been assessed statewide per designated use, meaning, Table 19 does not include springs in category 3. Then, of those assessed segments, Table 19 outlines the number of segments that either fully support, partially support, or do not support each designated use. The impaired columns combine the partial and nonsupport segments.

Table 19. Number of **spring** segments assessed, fully supporting, partially supporting, or not supporting per designated use, with percentages for each attainment calculated.

Designated Use	Total Assessed	Fully Supporting	Partially Supporting	Not Supporting	Impaired Segments	% Meeting	% Partially Supporting	% Not Supporting	% Impaired
Aquatic Life	27	18	7	2	9	67	26	7	33
Fish Consumption	0	0	0	0	0	N/A	N/A	N/A	N/A
Primary Contact Recreation	21	3	7	11	18	14	33	52	86
Secondary Contact Recreation	1	1	0	0	0	100	0	0	0
Domestic Water Supply	1	1	0	0	0	100	0	0	0
Outstanding State Resource Water	1	1	0	0	0	100	0	0	0

¹⁵ Although the DWS designated use applies to all waterbodies, drinking water standards only apply to the source water at point of intake, explaining the high percentage of unassessed waterbodies for this particular designated use.

¹⁶ The designated use OSRW does not apply to all waterbodies, only those designated as such. If the use applies, then it is assessed. Therefore, there are no unassessed OSRWs.

Of those springs listed as impaired, 5 causes are associated with the impairments (Table 20).

Table 20. Causes impairing **springs** statewide for all applicable designated uses.

Cause	Total # of Segments	Total Spring Miles
Bacteria	18	10.5
Nutrient/Eutrophication Biological Indicators	5	5.0
Oxygen, Dissolved	2	0.1
Phosphorus (Total)	1	0.8
Nitrogen (Total)	1	0.8

The two most common designated uses assessed for springs are aquatic life, where 27 segments have been assessed statewide, and PCR, where 21 segments have been assessed statewide. The statewide results for aquatic life and PCR are discussed below in more detail.

Springs – Statewide – Aquatic Life

For the aquatic life designated use, statewide, 67% of springs fully support this designated use, while 26% partially support and 7% do not support the aquatic life designated use, meaning 33% are impaired (Table 19). This relates to 5.8 spring miles being impaired and 6.2 spring miles meeting the aquatic life designated use at the statewide level¹⁷. Looking at only the springs impaired for the aquatic life designated use statewide, 4 causes are associated with the impairments (Table 21).

Table 21. Causes impairing **springs** statewide for the aquatic life designated use.

Cause	Total # of Segments	Total Spring Miles
Nutrient/Eutrophication Biological Indicators	5	5.0
Oxygen, Dissolved	2	0.1
Phosphorus (Total)	1	0.8
Nitrogen (Total)	1	0.8

Springs – Statewide – Primary Contact Recreation

For the PCR designated use, statewide, 14% of springs fully support this designated use, while 33% partially support and 52% do not support the PCR designated use, meaning 86% are impaired (Table 19). This relates to 10.3 spring miles being impaired and 0.2 spring miles meeting the PCR designated use at the statewide level¹⁸. Looking at only the lakes and reservoirs impaired for the PCR designated use statewide, 1 cause, *E. coli*, is associated with the 18 impaired segments totaling 10.5 spring miles.

¹⁷ Spring mile proportion of meeting to impaired will not match segment proportion of meeting to impaired; segments are normalized units while assessment unit length varies between assessment units.

¹⁸ Spring mile proportion of meeting to impaired will not match segment proportion of meeting to impaired; segments are normalized units while assessment unit length varies between assessment units.

Monitoring Programs and Results

Ambient Program - Streams

Program Description

Following enactment of the CWA and subsequent state legislation (e.g. KRS 224.10), DOW established a network of 44 stream stations for long-term monitoring in 1979. These stations were sampled bimonthly (6 visits per year), with the goals of determining and tracking water quality conditions in larger watersheds throughout the Commonwealth over time. In 1998, the network was expanded to 72 primary ambient water quality stations, and the sampling strategy shifted to a rotating five-year BMU approach, where extra effort is focused on one BMU during each project year. While all primary ambient monitoring stations are sampled every project year, they are sampled monthly in BMU study years and bi-monthly in non-BMU project years. These stations are located at mid- and lower watershed reaches of 8-digit hydrological unit code (HUC) basins. Stations also occur near the inflow and outflow of major reservoirs.

In addition to the 72 stations of the primary network, the DOW established a rotating watershed network in each BMU in 1998. The 106 rotating stations are situated within smaller sub-watersheds of each BMU. They are monitored for the same suite of water quality parameters as primary stations. The objectives of these stations include: 1) obtain an overall representation of the quality of each basin's water resources; 2) determine water quality conditions associated with major land cover or land uses such as forest, urban, agriculture and mining; 3) characterize each basins' least impacted waters; 4) collect data to assist with establishing TMDLs as required by Section 303(d) of the CWA; and 5) define water quality conditions in a watershed to answer special issues that may arise requiring long-term water quality monitoring.

For this IR, the Big Sandy, Little Sandy, Tygarts and Kentucky BMUs are the BMU of focus. Thirty-two (32) sites from the Big Sandy, Little Sandy Tygarts BMU and 29 sites from the Kentucky BMU were visited and their data analyzed to make attainment decisions for this IR. Specifically, in the Big Sandy, Little Sandy, Tygarts BMU, 9 primary sites were visited April 2009 – March 2013, while the 23 rotating sites were visited April 2012 – March 2013. In the Kentucky BMU, 16 primary sites were visited April 2010 – March 2014, while 13 rotating sites were visited April 2013 – March 2014 (refer to the 'Ambient Streams Station' tab of Program Workbook).

Ambient Program Assessment Results - Streams

Aquatic Life

Big Sandy, Little Sandy, Tygarts BMU

Of the 32 ambient sites in the Big Sandy, Little Sandy, Tygarts BMU, 69% were found to be impaired for the aquatic life designated use, which relates to either partial support or nonsupport (Figure 25, see 'Ambient Streams Attainment' tab of Program Workbook). An increase in the proportion of impaired sites to supporting sites has been observed since 2006 in this BMU. In 2006, of these same 32 sites, 59% were meeting while 41% were found to be impaired. In 2010, 45% were found to be supporting, while 55% were found to be impaired (Figure 25).

Looking at only the impaired segments, the top three causes of impairment at these 32 sites are sedimentation/ siltation, specific conductance, and lead (Table 22 and Figure 26). Sedimentation/ siltation has consistently been observed as a cause of impairment in this BMU since 2006 (brown in Figure 26). Specific conductance became a major proportion of the causes impairing these sites beginning in 2010 (peach color in Figure 26). Lead (red in Figure 26), which was found to be the cause of impairment at 10 segments, had never been recorded as a cause of impairment at the ambient sites in the Big Sandy, Little Sandy, Tygarts BMU prior to this IR (see 2016 303(d) and 305(b) for listing specifics).

Kentucky BMU

Of the 29 ambient sites in the Kentucky BMU, 55% were found to be impaired for the aquatic life designated use, which relates to either partial support or nonsupport (Figure 27, see 'Ambient Streams Attainment' tab of Program Workbook). In 2006 and 2010, there was a higher percentage of supporting segments, with 80% supporting the aquatic life designated use in 2010 and 45% supporting the aquatic life designated use in 2016 (Figure 27).

Looking at only the impaired segments, the top three causes of impairment at these 29 sites are sedimentation/ siltation, specific conductance, and lead (Table 23 and Figure 28). Sedimentation/ siltation has consistently been observed as a cause of impairment in this BMU since 2006 (brown in Figure 28). Specific conductance was listed as a cause of impairment for one segment in 2010 and four segments in 2016 (peach color in Figure 28). Lead (red in Figure 28), which was found to be the cause of impairment at 12 segments, had never been recorded as a cause of impairment at the ambient sites in the Kentucky BMU prior to this IR (see 2016 303(d) and 305(b) for listing specifics).

Aquatic Life Discussion

The new observation of lead, which resulted in the impairment of 22 segments with the cause of lead, is yet to be understood. The high occurrence of lead is mostly isolated to the mountain region of eastern Kentucky (Figure 29). These findings have triggered a more intensive survey of the area to understand the prevalence of this cause. Data used to make these assessments were collected April 2009 – March 2013 in the Big Sandy, Little Sandy Tygarts BMU and April 2010 – March 2014 in the Kentucky BMU. A peak in both levels and frequency of exceedance was observed in the 2012 – 2014 time frame. Since then, lead levels have dropped, and the frequency in which the water quality standard has been exceeded is also lower. However, exceedances are still being observed, and as the DOW continues to monitor these areas, updates will be provided. Monitoring efforts have increased in this area, and the latest data will be used to update these assessments for the 2018 IR.

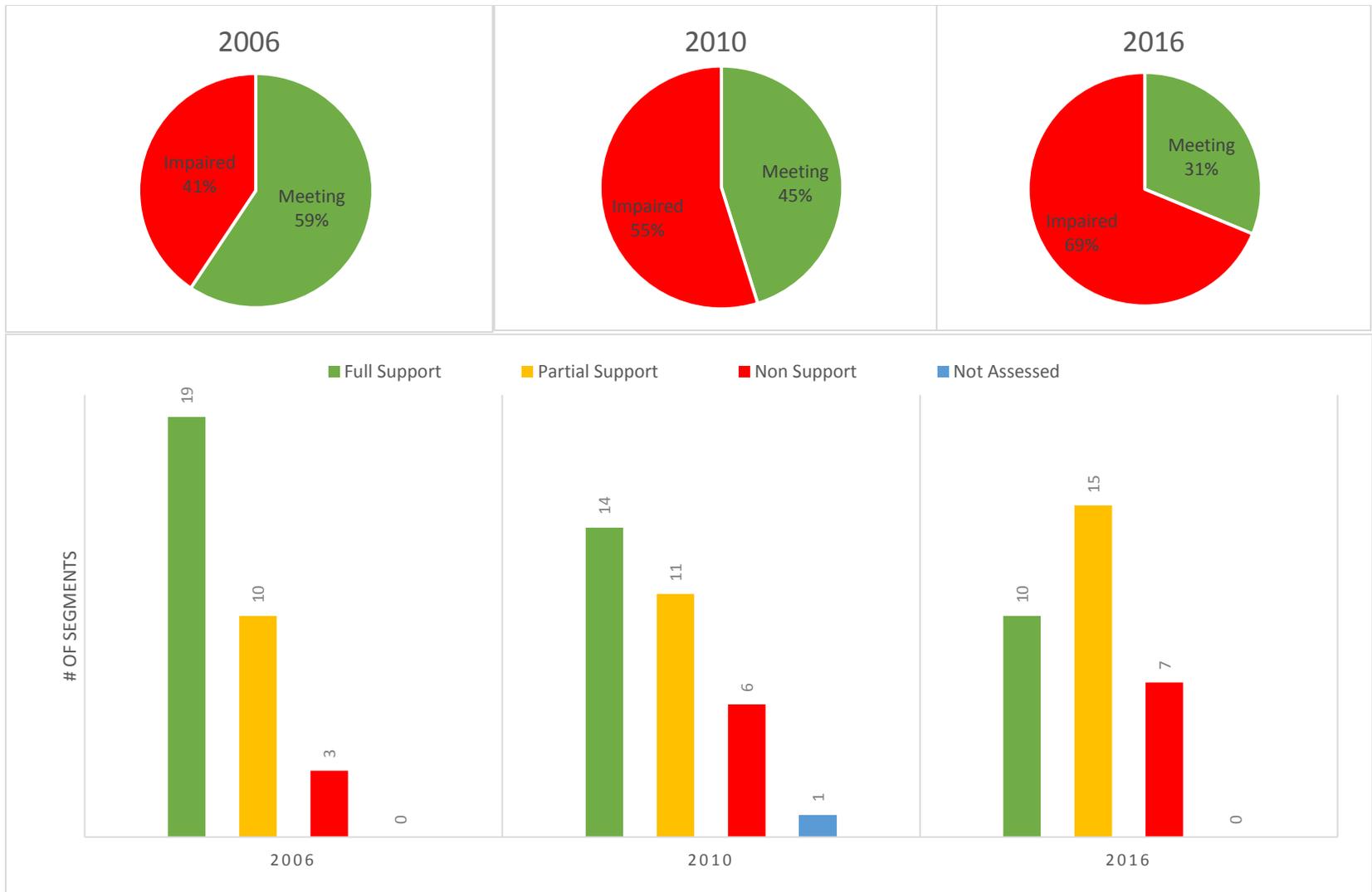


Figure 25. Attainment results for the **aquatic life** designated use from **ambient** stations located within the **Big Sandy, Little Sandy, Tygarts BMU** during the integrated reporting years when this particular BMU was a BMU of focus. Pie graphs along top show proportion of impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status.

Table 22. List of causes at **ambient** sites impaired for **aquatic life** in the **Big Sandy, Little Sandy, Tygarts BMU** during the integrated reporting years when this particular BMU was the BMU of focus.

Cause	number of segments with this cause		
	2006	2010	2016
Ammonia (Un-ionized)	0	0	1
Cause Unknown	1	0	0
Dissolved Oxygen	0	1	0
Iron	0	1	2
Lead	0	0	10
Nitrate/Nitrite (Nitrite + Nitrate as N)	0	1	1
Nutrient/Eutrophication Biological Indicators	1	4	4
Organic Enrichment (Sewage) Biological Indicators	0	3	3
pH	0	0	1
Sedimentation/Siltation	11	14	15
Specific Conductance	0	11	12
Sulfates	2	0	0
Temperature, Water	1	1	0
Total Dissolved Solids	6	5	2
Total Suspended Solids (TSS)	0	9	9
Total	22	50	60

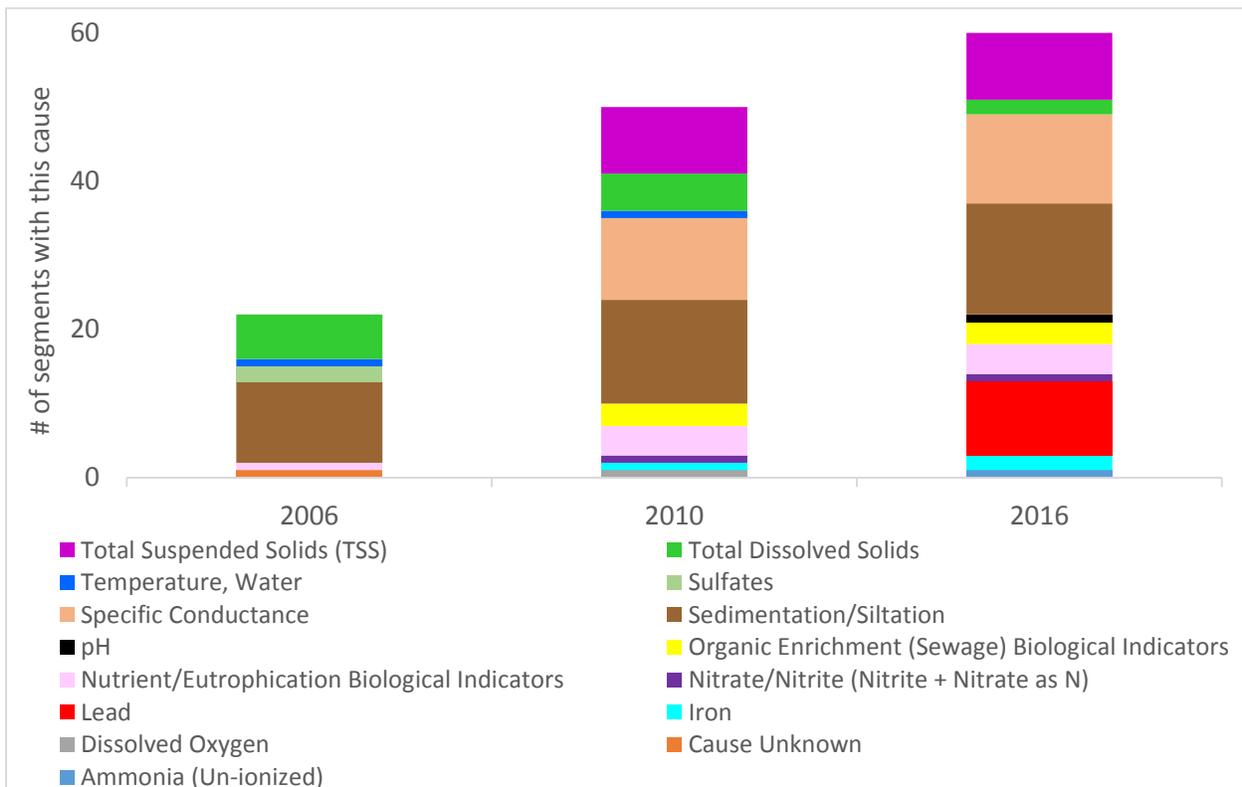


Figure 26. Causes at **ambient** sites impaired for **aquatic life** in the **Big Sandy, Little Sandy, Tygarts BMU** associated with each integrated reporting year that this particular BMU was the BMU of focus.

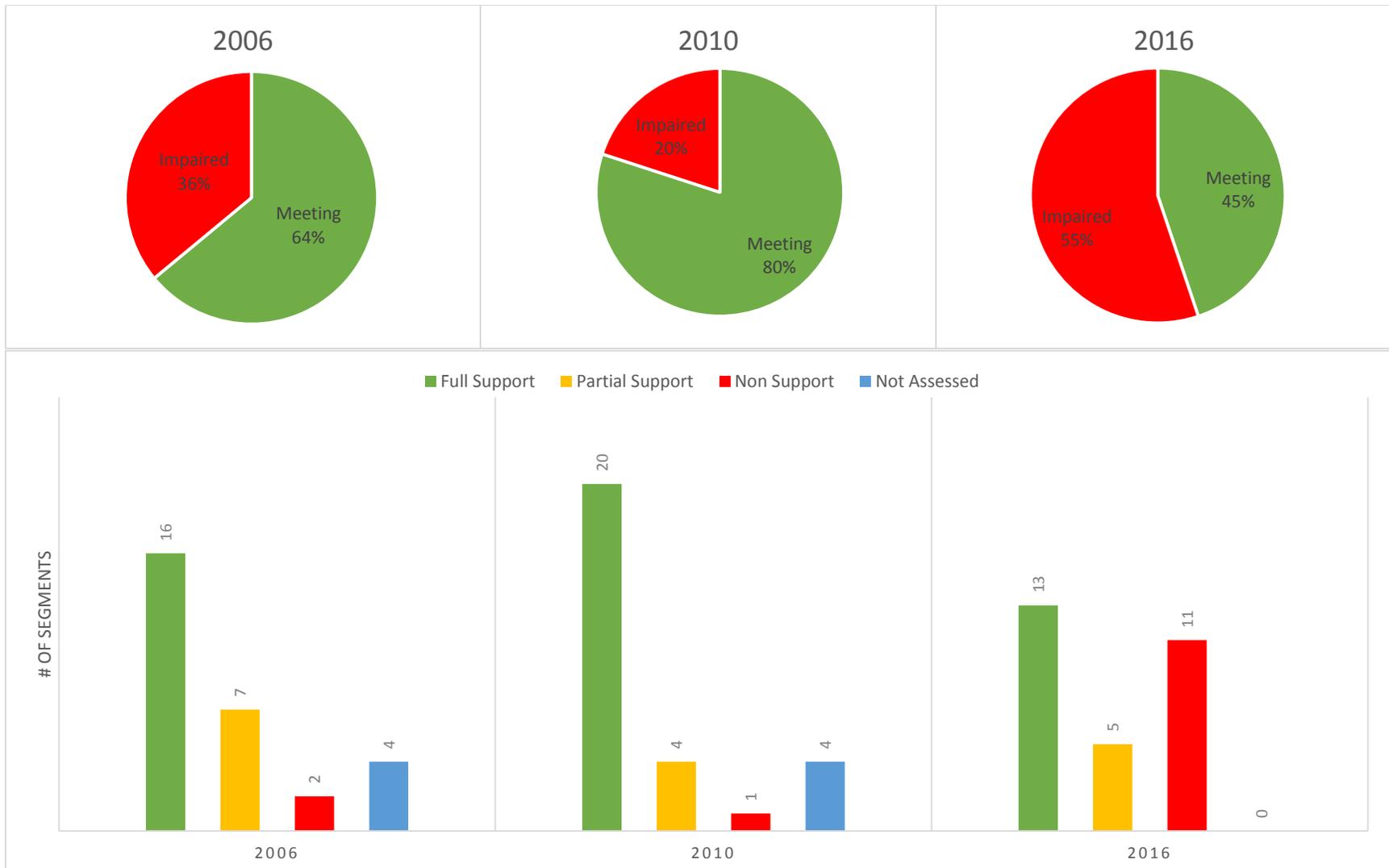


Figure 27. Attainment results for the **aquatic life** designated use from **ambient** stations located within the **Kentucky BMU** during the integrated reporting years when this particular BMU was a BMU of focus. Pie graphs along top show proportion of impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status.

Table 23. List of causes at **ambient** sites impaired for **aquatic life** in the **Kentucky BMU** during the integrated reporting years when this particular BMU was the BMU of focus.

Cause	number of segments with this cause		
	2006	2010	2016
Cause Unknown	2	2	0
Dissolved Oxygen	0	1	0
Iron	0	0	1
Lead	0	0	12
Nutrient/Eutrophication Biological Indicators	2	1	0
Organic Enrichment (Sewage) Biological Indicators	1	0	0
Sedimentation/Siltation	5	5	6
Specific Conductance	0	1	4
Total Dissolved Solids	3	3	2
Total Suspended Solids (TSS)	0	0	1
Turbidity	3	3	2
Total	16	16	28

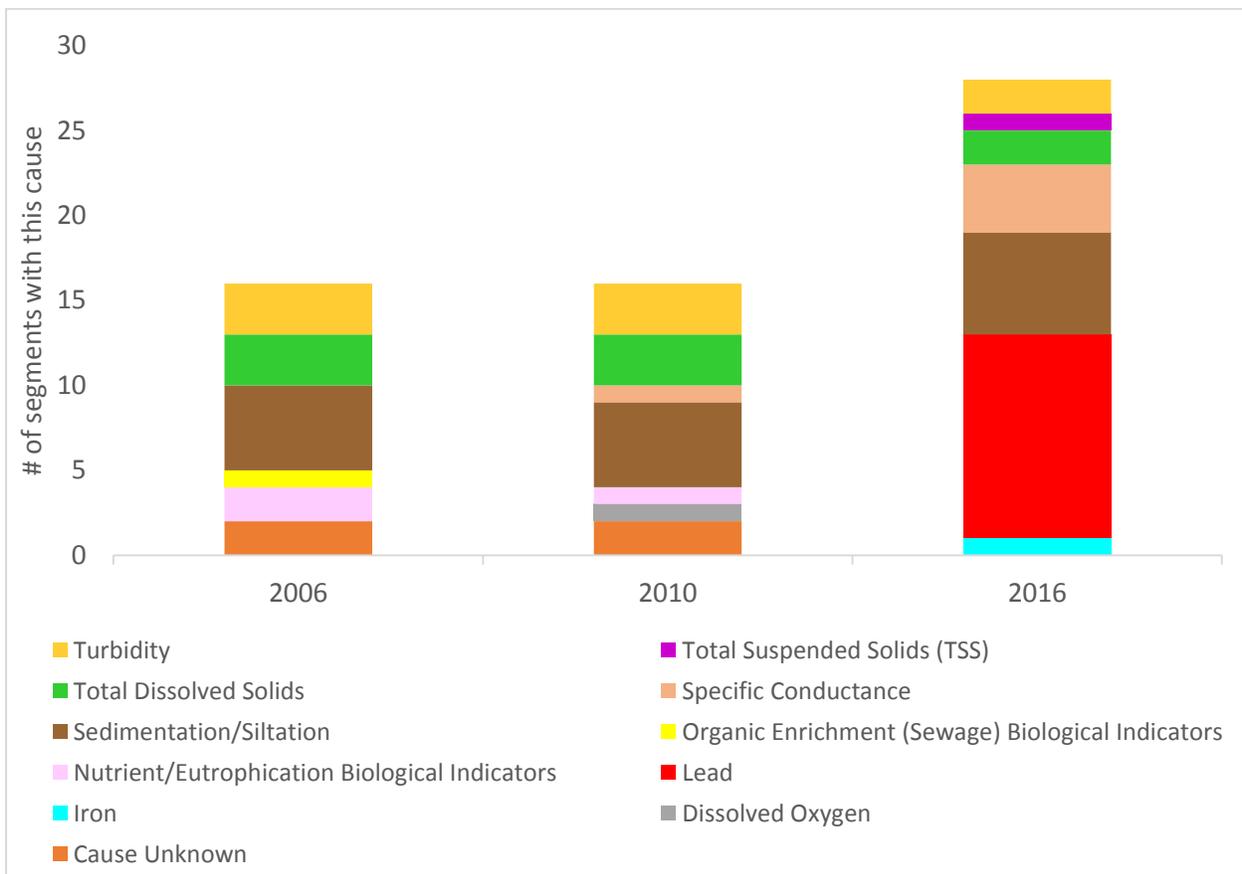


Figure 28. Causes at **ambient** sites impaired for **aquatic life** in the **Kentucky BMU** associated with each integrated reporting year that this particular BMU was the BMU of focus.

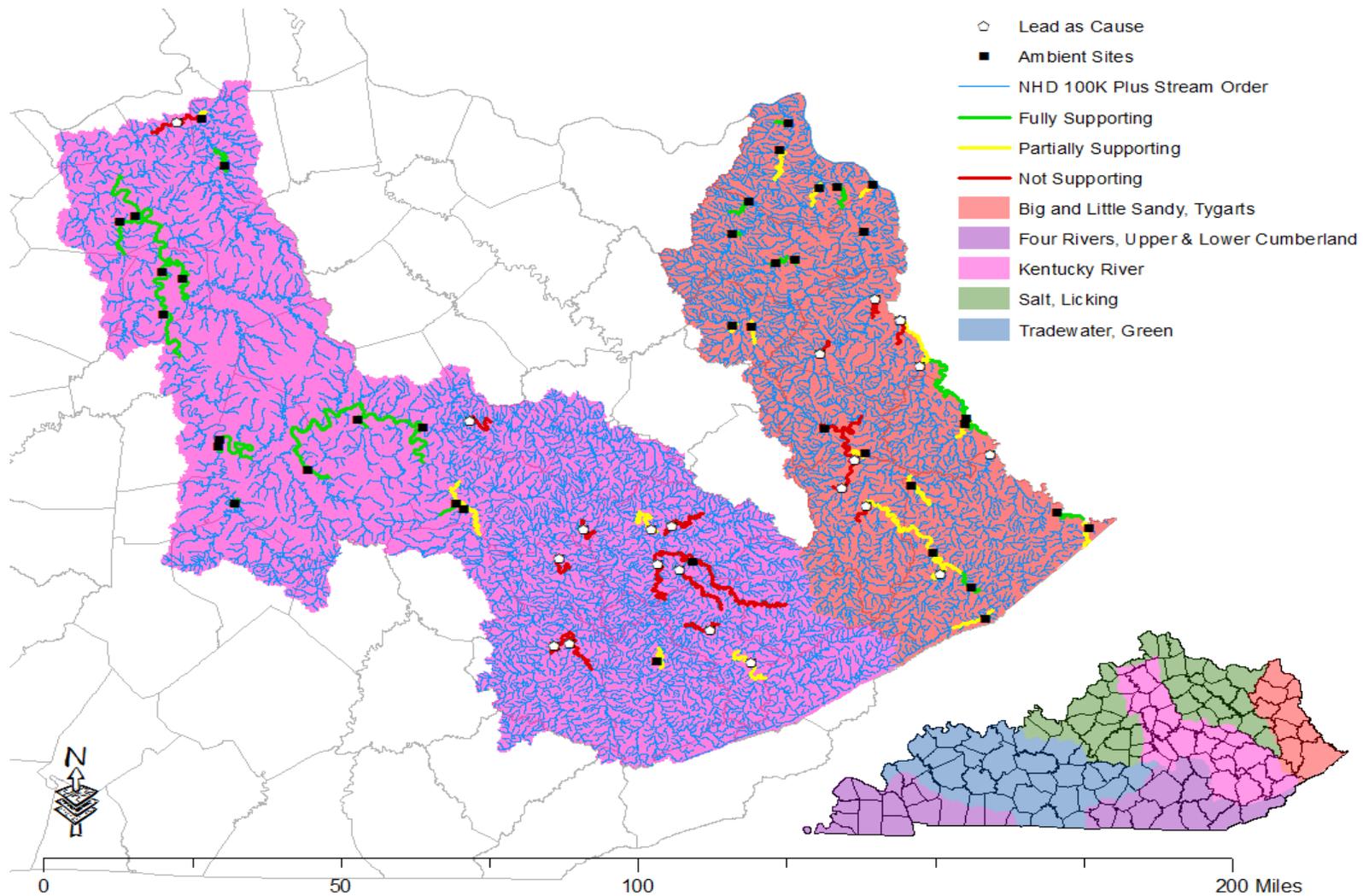


Figure 29. **Ambient** sites (black squares) sampled in the **Big Sandy, Little Sandy, Tygarts and Kentucky BMU's**. Attainment of the **aquatic life** designated use displayed as full support (green), partial support (yellow), and nonsupport (red), with sites associated with the cause of lead marked with a white dot.

Outstanding State Resource Waters (OSRW)

In the Big Sandy, Little Sandy, Tygarts BMU, none of the ambient stations are associated with an OSRW.

In the Kentucky BMU, 6 assessment units associated with the ambient network are also determined to be OSRWs. Of those 6 segments, 1 fully supports, 1 partially supports, and 4 do not support the OSRW designated use (Table 24, see 'Ambient Streams Attainment' tab of Program Workbook). The use attainment of the OSRW designated use matches the aquatic life use attainment, when available.

Table 24. Use attainment of assessment units determined to be **outstanding state resource waters** associated with **ambient** sites.

Assessment Unit Name	Stream Name	Station ID	OSRW Attainment
Sixmile Creek 0.1 to 11.9	Sixmile Creek	KRW028	Fully Supporting
Station Camp Creek 0.0 to 21.3	Station Camp Creek	KRW034	Partially Supporting
Middle Fork Kentucky River 6.45 to 12.6	Middle Fork Kentucky River	PRI032	Not Supporting
South Fork Kentucky River 11.75 to 18.9	South Fork Kentucky River	PRI033	Not Supporting
Red Bird River 0.0 to 15.3	Red Bird River	PRI091	Not Supporting
Goose Creek 0.0 to 8.3	Goose Creek	PRI092	Not Supporting

Primary Contact Recreation

Big Sandy, Little Sandy, Tygarts BMU

Of the 32 ambient sites in the Big Sandy, Little Sandy, Tygarts BMU, 55% were found to be impaired for the PCR designated use, which relates to either partial support or nonsupport (Figure 30 and 32, see 'Ambient Streams Attainment' tab of Program Workbook). A slight increase in the proportion of impaired sites to supporting sites has been observed since 2006 in this BMU. In 2006, of these same 32 sites, 56% were meeting and 44% were found to be impaired. In 2010, 50% were meeting and 50% were impaired (Figure 30).

Looking at only the impaired segments, all 17 segments are listed as impaired due to *E. coli*. One segment, Hood Creek, is also listed as impaired due to pH (see SCR discussion below) (Figure 32, see 2016 303(d) and 305(b) for listing specifics).

Kentucky BMU

Of the 29 ambient sites in the Kentucky BMU, 44% were found to be impaired for the PCR designated use, which relates to either partial support or nonsupport (Figure 31 and 32, see 'Ambient Streams Attainment' tab of Program Workbook). An increase in the proportion of impaired sites to supporting sites has been observed since 2006 in this BMU. In 2006, of these same 29 sites, 65% were meeting and 35% were found to be impaired. In 2010, 48% were meeting and 52% were impaired (Figure 31).

Looking at only the impaired segments, all 10 segments are listed as impaired due to *E. coli* (see 2016 303(d) and 305(b) for listing specifics).

Secondary Contact Recreation

Only one site, Hood Creek in the Big Sandy, Little Sandy, Tygarts BMU, was found to be impaired for SCR due to high pH (>9.0) (see 'Ambient Streams Attainment' tab of Program Workbook, see 2016 303(d) and 305(b) for listing specifics). This site is located near Ashland in Boyd County (Figure 32).

There are 21 stream segments that are assessed for SCR from ambient data in the Kentucky BMU, all of which are assessed as full support for this designated use (see 'Ambient Streams Attainment' tab of Program Workbook). These assessment results are from historical fecal coliform data; no new fecal coliform data was collected to update the attainment results for this designated use since the 2010 IR (see 2016 305(b) for listing specifics).

Overall Assessment Results

The following TMDLs have been written from where the ambient program collects data:

- Bacteria TMDL for the [North Fork Kentucky River](#)
- Bacteria TMDL for [Beaver Creek](#)
- Bacteria TMDL for [Dix River](#)
- Chlorides TMDL for [Newcombe Creek](#) to address Total Dissolved Solids impairment
- Bacteria TMDL for [Troublesome Creek](#)

Therefore, from the Ambient Stream program, there are

- 73 waterbody/ designated use combinations that are in category 2, where the assessed designated use is fully supporting
- 132 PWCs in category 5, which require a TMDL
- 5 PWCs in category 4A, where the cause is associated with an impairment and a TMDL has been written for that cause
- 9 PWCs in 4C, where the cause of impairment is a pollution and therefore does not require a TMDL
- 3 PWCs in category 2C, where the pollutant is no longer causing an impairment and a TMDL has been written for that pollutant
- 16 PWCs in category 2B, where the pollutant is no longer causing an impairment, but is 303(d) listed and proposed to EPA for delisting

For all streams assessed by the ambient program for the 2016 IR, refer to the 'Ambient Streams Attainment' tab of Program Workbook; for more specific information per assessment unit reference the 305(b) and the 303(d) tables.



Figure 30. Attainment results for the **primary contact recreation** designated use from **ambient** stations located within the **Big Sandy, Little Sandy, Tygarts BMU** during the integrated reporting years when this particular BMU was a BMU of focus. Pie graphs along top show proportion of impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status.



Figure 31. Attainment results for the **primary contact recreation** designated use from **ambient** stations located within the **Kentucky BMU** during the integrated reporting years when this particular BMU was a BMU of focus. Pie graphs along top show proportion of impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status.

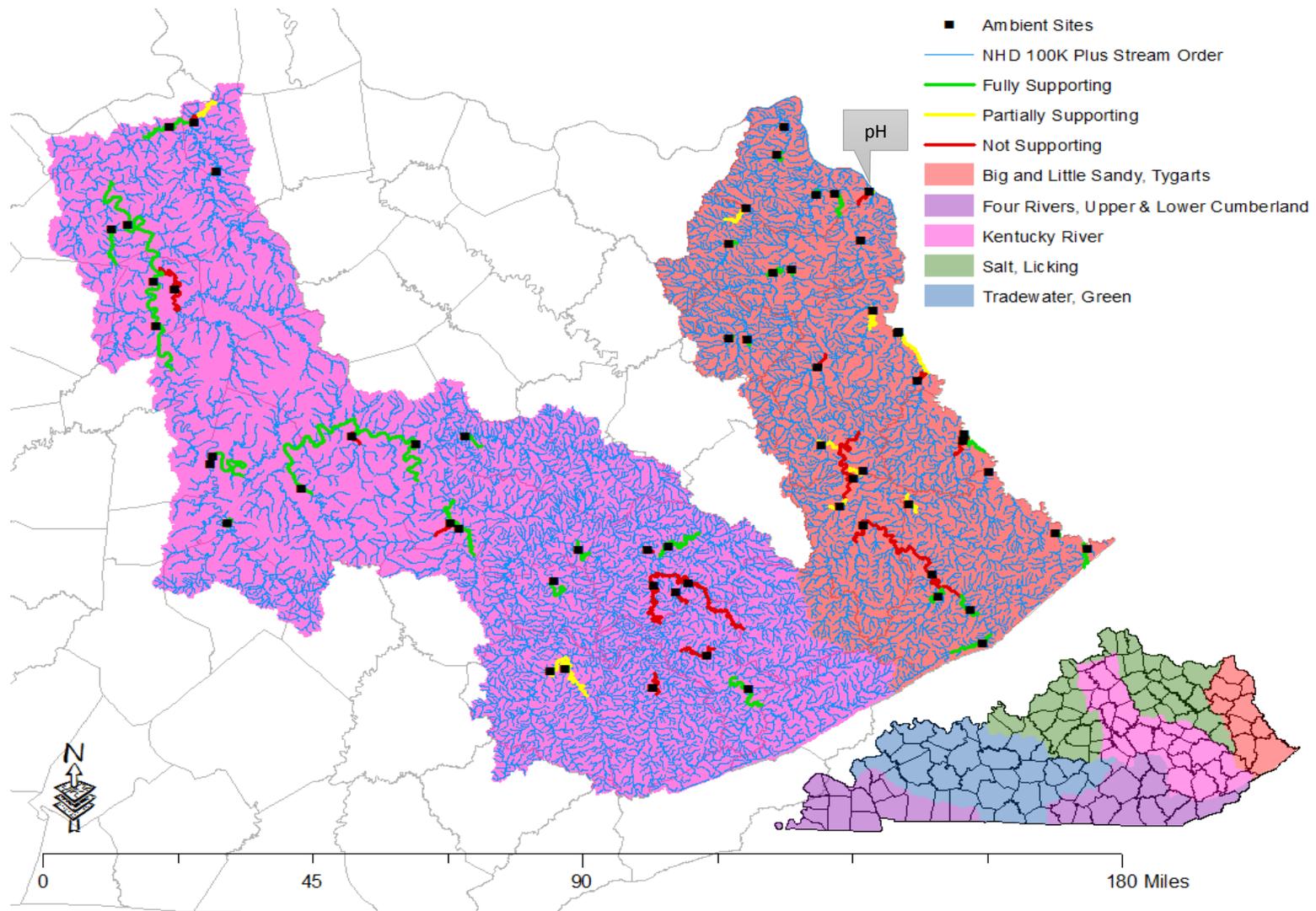


Figure 32. Ambient sites (black squares) sampled in the Big Sandy, Little Sandy, Tygarts and Kentucky BMU's. Attainment of the primary contact recreation designated use displayed as full support (green), partial support (yellow), and nonsupport (red). Hood Creek is also partial support for Secondary Contact Recreation due to pH as noted.

Lakes Program

Program Description

The U.S. EPA began sampling the major reservoirs in Kentucky in 1973 as a part of the National Eutrophication Survey. Following enactment of the (CWA) in 1972, DOW established a network of lake and reservoir stations from 1981 to 1983. This network of lakes and reservoirs were initially selected to satisfy a U.S. EPA Cooperative Agreement Award in 1980. This award was the initial push towards the goal of Section 314(a) that each state shall prepare or establish: (1) an identification and classification according to trophic conditions of all publicly owned freshwater lakes in the state; (2) procedures, processes, and methods (including land use requirements) to control sources of pollution to lakes; and (3) methods and procedures, in conjunction with appropriate Federal agencies, to restore the quality of impaired lakes. By 1984, there were 73 lakes/reservoirs in the state program. (Technically, most of the “lakes” in Kentucky are reservoirs.)

Currently, Kentucky lakes are sampled on a Watershed Management Framework Initiative approach. Approximately 108 lakes that are listed in DOW’s lakes inventory are sampled every five years BMU. This data is primarily used for determining designated use support as defined by Kentucky’s WQS regulations. Designated use support assessments are typically made for aquatic life and SCR.

For this IR, the Big Sandy, Little Sandy, Tygarts and Kentucky BMUs are the BMU of focus. In the Big Sandy, Little Sandy, Tygarts BMU, 7 of the 8 lakes that are part of the ambient network’s lake program have been sampled during the 3 most recent basin rotations and are therefore included in the analysis. They were sampled during the spring, summer, and fall of 2012. In the Kentucky BMU, 18 lakes are part of the ambient network’s lake program. They were sampled during the spring, summer, and fall of 2013 (refer to the ‘Ambient Lake Station’ tab of Program Workbook).

Assessment Results – Lakes Program

Aquatic Life

In the Big Sandy, Little Sandy, Tygarts BMU (sampled in 2012), one lake of the 7 sampled from the ambient network was found to be impaired. Based on most recent data, Smoky Valley Lake (Carter Caves State Resort Park Lake) was determined to be impaired for the aquatic life designated use due to low dissolved oxygen. All other lakes from the ambient network in this BMU were found to fully support the aquatic life designated use (Figure 33 and 35) (see ‘Ambient Lake Attainment’ tab of Program Workbook).

In the Kentucky BMU, sampled in 2013, 7 of the 18 lakes (39%) sampled from the ambient network were found to be impaired for the aquatic life designated use. These results are similar to 2006 and 2010, when 44% and 35% were found to be impaired, respectively (Figure 34 and 35) (see ‘Ambient Lake Attainment’ tab of Program Workbook). The 7 lakes found to be impaired in the Kentucky BMU, and the causes associated with these impairments, are as follows (see 303(d) for listing specifics):

- Boltz Lake, causes dissolved oxygen and nutrient/ eutrophication biological indicators
- Bullock Pen Lake, causes dissolved oxygen and nutrient/ eutrophication biological indicators
- Elmer Davis Lake, causes dissolved oxygen and nutrient/ eutrophication biological indicators, organic enrichment (sewage) biological indicators

- General Butler State Park Lake, causes dissolved oxygen and nutrient/ eutrophication biological indicators
- Herrington Lake, causes dissolved oxygen and nutrient/ eutrophication biological indicators, organic enrichment (sewage) biological indicators
- Lake Reba , causes dissolved oxygen and nutrient/ eutrophication biological indicators
- Wilgreen Lake, causes dissolved oxygen and nutrient/ eutrophication biological indicators, organic enrichment (sewage) biological indicators



Figure 33. Assessment results from the 2006, 2010, and 2016 Integrated Reports for the **aquatic life** designated use where data from the **ambient lake** program was used when the **Big Sandy, Little Sandy, and Tygarts River BMU** was sampled. Pie graphs along top show proportion of impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status.

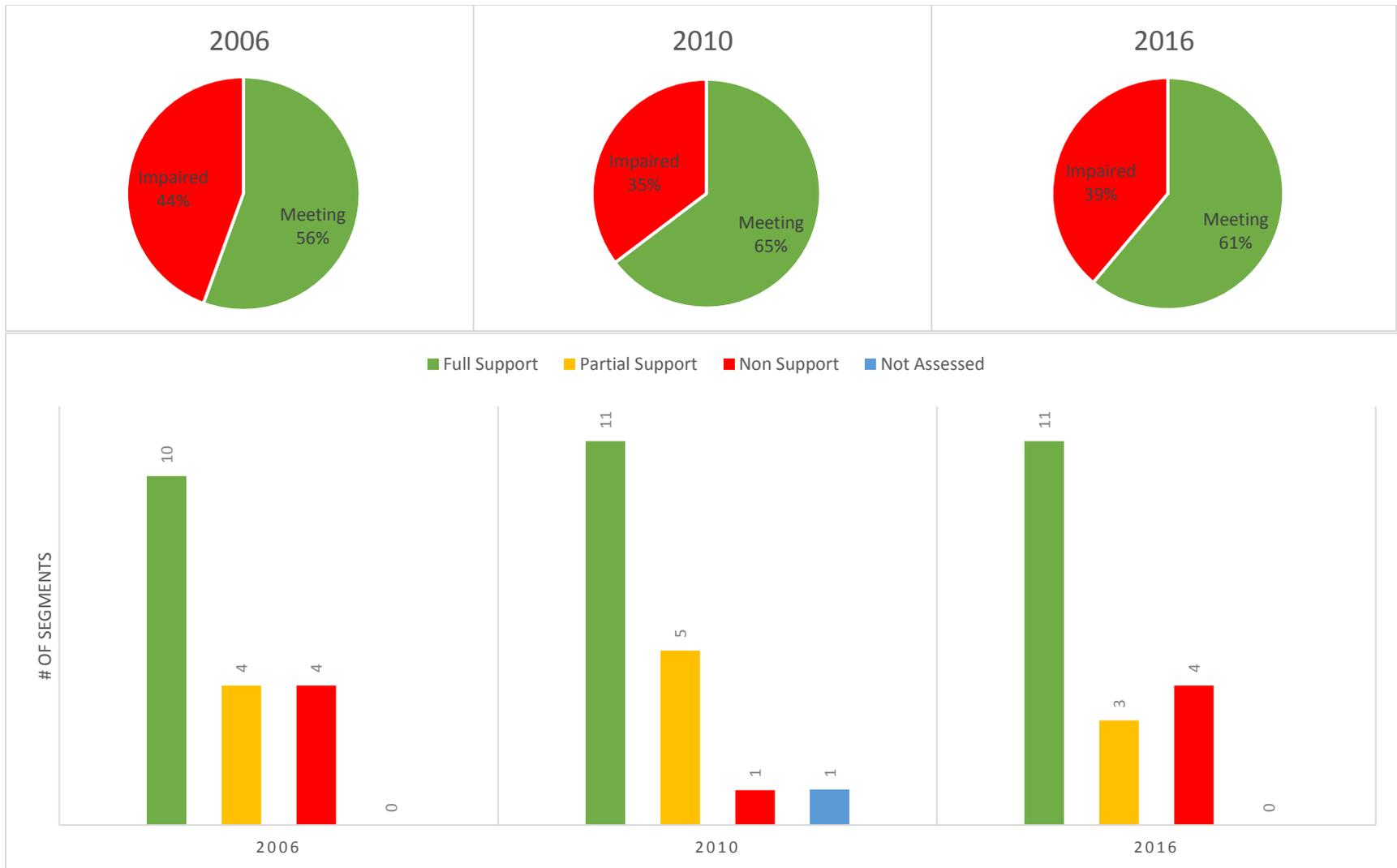


Figure 34. Assessment results from the 2006, 2010, and 2016 Integrated Reports for the **aquatic life** designated use where data from the **ambient lake** program was used when the **Kentucky River BMU** was sampled. Pie graphs along top show proportion of impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status.

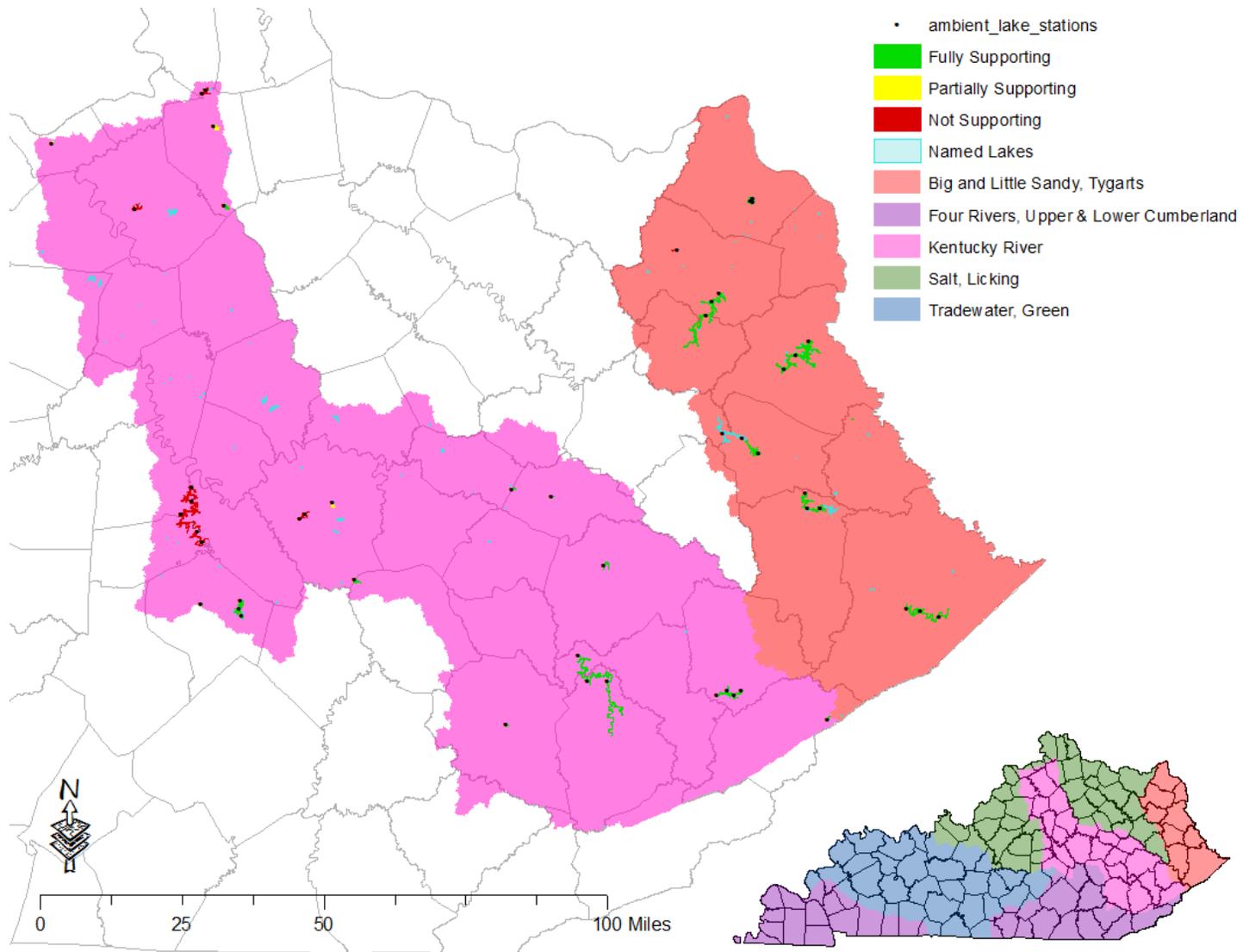


Figure 35. **Ambient lake** sites (black circles) sampled in the **Big Sandy, Little Sandy, Tygarts and Kentucky BMU's**. Attainment of the **aquatic life** designated use displayed as full support (green), partial support (yellow), and nonsupport (red).

Secondary Contact Recreation

In the Big Sandy, Little Sandy, Tygarts BMU (sampled in 2012), all 7 lakes assessed from the ambient network were found to fully support the SCR designated use for this IR. In the 2006 IR, 5 of the 7 lakes were unassessed for SCR. In the 2010 IR, all 7 lakes were assessed, and one lake, Dewey Lake, was found to be impaired for SCR due to high levels of total suspended solids (TSS). New data collected for this 2016 IR supported delisting TSS as a cause of impairment for Dewey Lake, thereby moving the lake to full support of the SCR use (Figure 36 and 38) (see 'Ambient Lake Attainment' tab of Program Workbook).

In the Kentucky BMU (sampled in 2013), all 18 lakes assessed from the ambient network were found to fully support the SCR designated use for this 2016 IR. In the 2006 IR, 3 lakes (Carr Fork Reservoir, Wilgreen Lake, and Buckhorn Lake) were found to partially support this designated use due to total suspended solids, sedimentation/ siltation, or aquatic algae. Wilgreen Lake was found to still only partially support this designated use in 2010 due to aquatic algae, while Carr Fork and Buckhorn Lake were delisted and moved to full support of the SCR designated use. The most recent data demonstrated that Wilgreen Lake fully supports the SCR use, and the cause aquatic algae has been delisted, resulting in all 18 assessed lakes from the ambient network attaining the SCR use in the Kentucky BMU for the 2016 IR (Figure 37 and 38) (see 'Ambient Lake Attainment' tab of Program Workbook).

Overall Assessment Results

No TMDLs have been written for any lakes in the Big Sandy, Little Sandy, Tygarts or Kentucky BMUs. Therefore, from the ambient lakes program, there are

- 42 waterbody/ designated use combinations that are in category 2, where the assessed designated use is fully supporting
- 18 PWCs in category 5, which require a TMDL
- 1 PWC in category 2B, where the pollutant is no longer causing an impairment, but is 303(d) listed and proposed to EPA for delisting

For all lakes or reservoirs assessed by the ambient program for the 2016 IR, refer to the 'Ambient Lake Attainment' tab of Program Workbook; for more specific information per assessment unit reference the 305(b) and the 303(d) tables.



Figure 36. Assessment results from the 2006, 2010, and 2016 Integrated Reports for the **secondary contact recreation** designated use where data from the **ambient lake** program was used when the **Big Sandy, Little Sandy, and Tygarts River BMU** was sampled. Pie graphs along top show proportion of impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status.

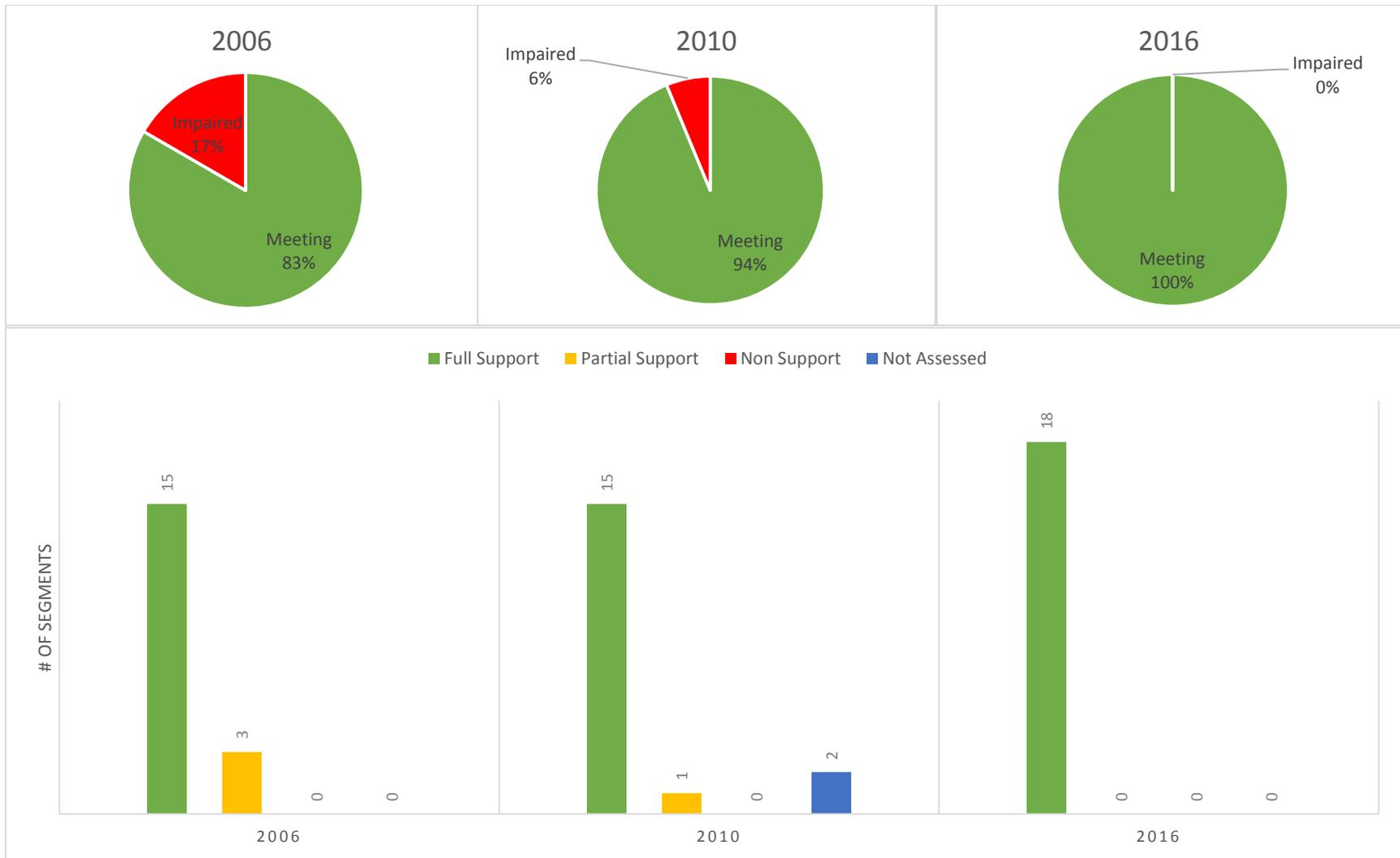


Figure 37. Assessment results from the 2006, 2010, and 2016 Integrated Reports for the **secondary contact recreation** designated use where data from the **ambient lake** program was used when the **Kentucky River BMU** was sampled. Pie graphs along top show proportion of impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status.

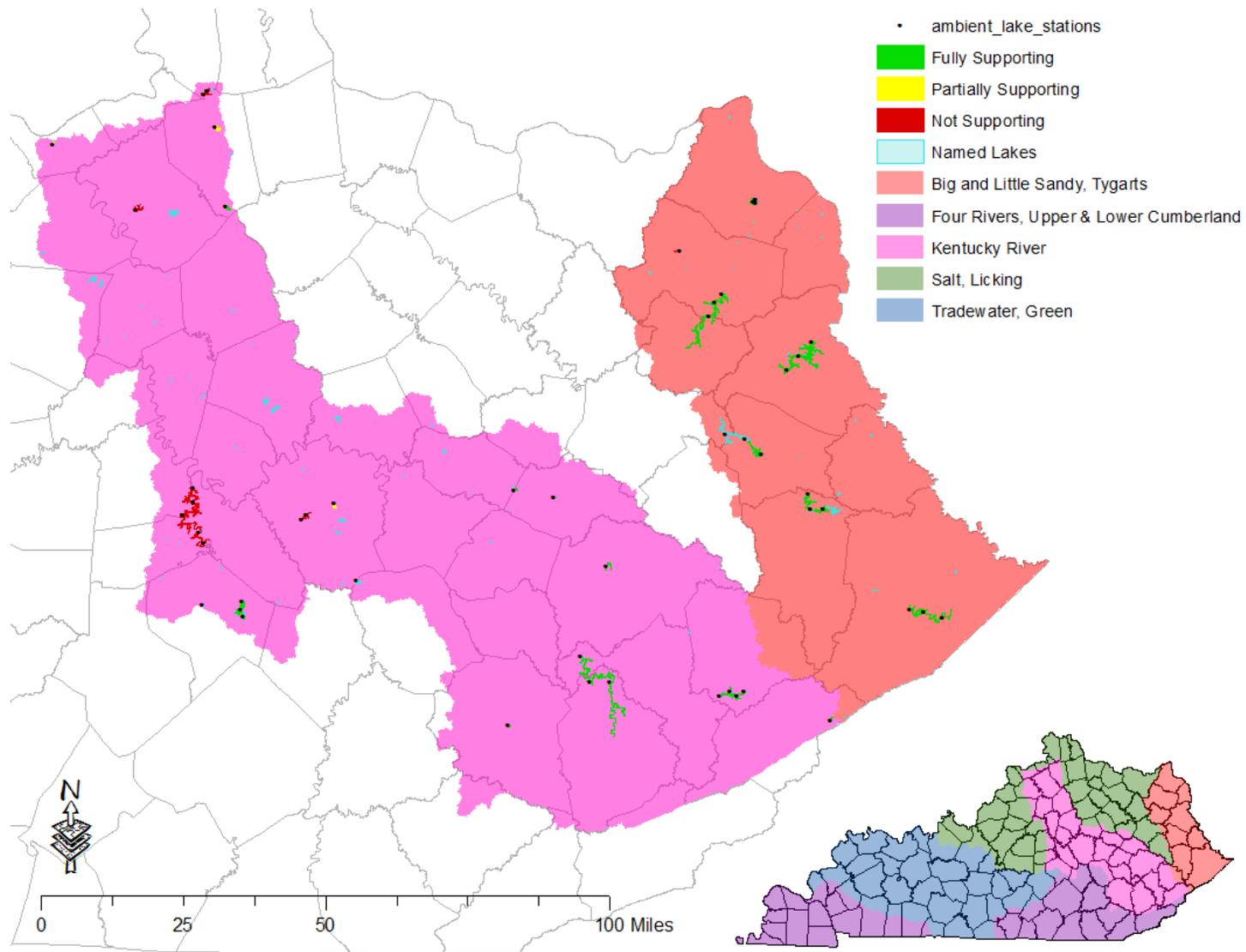


Figure 38. Ambient lake sites (black circles) sampled in the **Big Sandy, Little Sandy, Tygarts and Kentucky BMU's**. Attainment of the **secondary contact recreation** designated use displayed as full support (green), partial support (yellow), and nonsupport (red).

Probabilistic Monitoring Program

Program Description

The Probabilistic Stream Bio-assessment Program, first implemented in 1998, collects data from randomly selected sites within a BMU for use-support designations and to assess the health of Kentucky's stream resources. The program selects waterbodies (or sites within waterbodies) using a statistically sound probability-based sampling design. Sites are randomly selected for sampling and the results from the random sample can then be applied to the entire region with a known level of uncertainty. This allows resources to be used efficiently to obtain valuable site-specific and study area condition information.

The probabilistic approach to assessing stream health is used for numerous reasons:

- It provides data that can be statistically applied to all BMU waters within the original sample frame in order to assess the condition of Kentucky's stream resources over time.
- It is inherently unbiased and provides a representative assessment of BMU stream health.
- It provides an objective and repeatable method by which use support can be extrapolated to thousands of un-sampled stream miles.

For this IR, the Big Sandy, Little Sandy, Tygarts and Kentucky BMUs are the BMU of focus. In the Big Sandy, Little Sandy, Tygarts BMU, 51 randomly selected sites were sampled in 2012 and in the Kentucky BMU, 48 randomly selected sites were sampled in 2013 (refer to the 'Probabilistic Station' tab of Program Workbook). The results herein only discuss the assessment results of the 51 sites sampled, which is important to distinguish from the sites that were visited but could not be sampled due to land owner denial, safety concerns, or appropriateness. These visited but not sampled sites are not considered in this IR, but are considered in the probabilistic survey results. Only the sites that were sampled, and the assessment decision that resulted from that sample, are discussed below. The assessment results from the sites sampled by the probabilistic program for the 2016 IR are compared to the assessment results for the 2010 and 2006 IRs. For the Kentucky BMU, there are no results for the 2010 IR since the probabilistic program did not sample that basin due to resource priorities and availability during that time frame.

Assessment Results – Probabilistic Program

Aquatic Life

In the Big Sandy, Little Sandy, Tygarts BMU, of the 51 sites sampled for the 2016 IR, 8% were found to fully support the aquatic life use, while 92% were found to be impaired (see 'Probabilistic Attainment' tab of Program Workbook). This is similar to the results from the 2010 and 2006 IRs, where 89% and 85% of the sites were found to be impaired, respectively (Figure 39 and 43). Although the percentage of impaired sites (partial and nonsupport segments) is similar between the three cycles, the proportion found to be nonsupport versus partial support almost doubled in the 2016 IR when compared to the 2010 and 2006 IRs (Figure 39).

Looking specifically at the impaired segments within the Big Sandy, Little Sandy, Tygarts BMU, the top five pollutants that resulted from probabilistic monitoring for the 2016 IR were sedimentation/ siltation

(40 segments), specific conductance (27 segments), total dissolved solids (9 segments), nutrient/ eutrophication biological indicators (6 segments) and organic enrichment (sewage) biological indicators (6 segments). There were a total of 90 pollutants associated with the 51 sites sampled within this BMU (see 2016 303(d) and 305(b) for listing specifics). The results from the 2006 and 2010 integrated reporting years are similar to the 2016 IR, with the total number of pollutants reported as 90 and 92, respectively (Table 25, Figure 40).

In the Kentucky BMU, of the 48 sites sampled for the 2016 IR, 22% were found to fully support the aquatic life use, while 78% were found to be impaired (3 of the 48 sites were not assessed due to insufficient information) (Figure 41 and 43, see 'Probabilistic Attainment' tab of Program Workbook). This is similar to the results from the 2006 IR when 24% of the sites were found to fully support the aquatic life use and 76% were found to be impaired (Figure 41).

Looking specifically at the impaired segments within the Kentucky BMU, the top three pollutants that resulted from probabilistic monitoring for the 2016 IR were 1) sedimentation/ siltation (21 segments), specific conductance (16 segments), and nutrient/ eutrophication biological indicators (5 segments). There were a total of 55 pollutants associated with the 48 sites sampled within this BMU (see 2016 303(d) and 305(b) for listing specifics). In the 2006 IR, the top three pollutants were 1) sedimentation/ siltation (34 segments), total dissolved solids (16 segments), and nutrient/ eutrophication biological indicators (4 segments) with a total of 62 pollutants associated with the 50 sites sampled (Table 26, Figure 42).

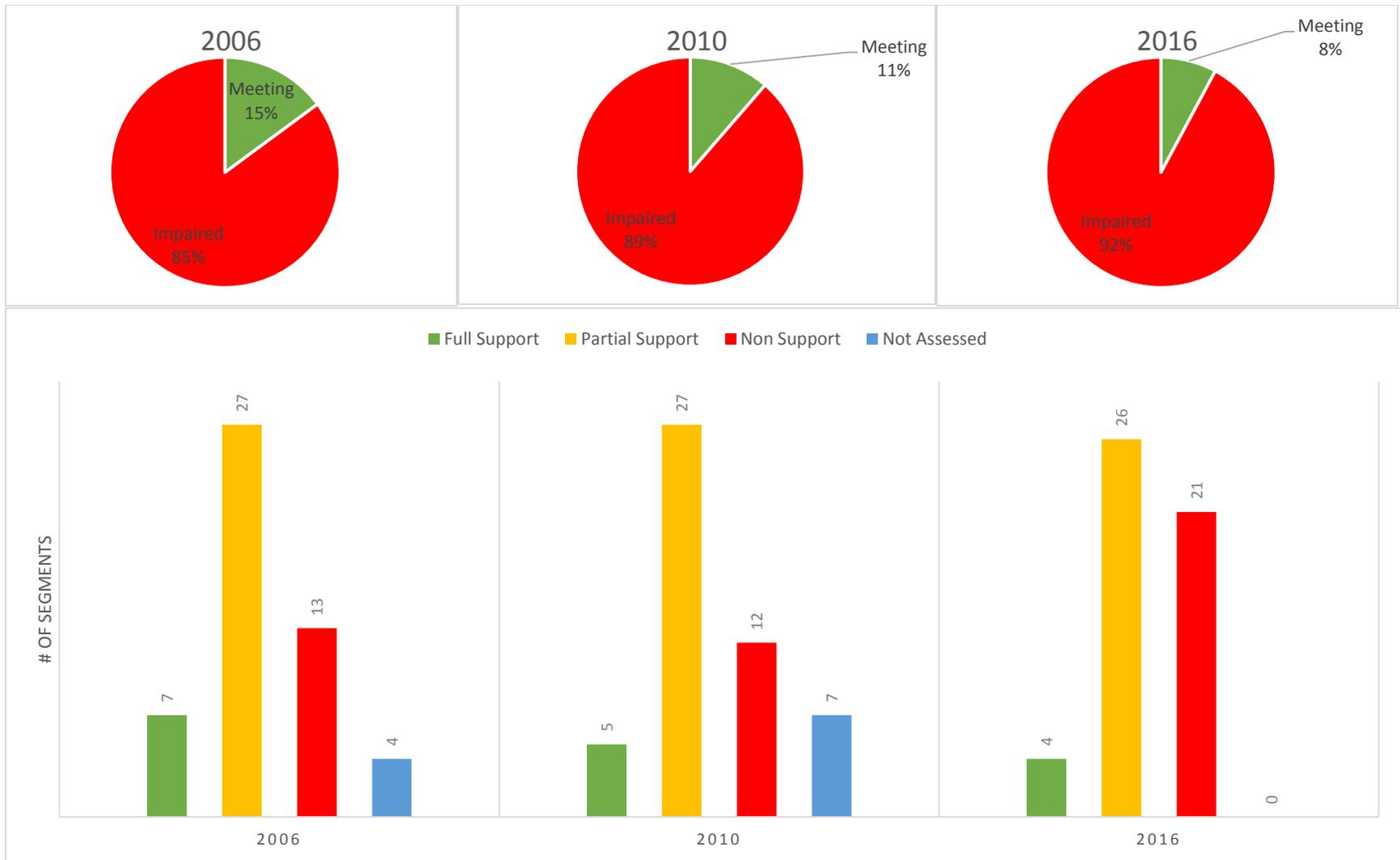


Figure 39. Assessment results from the 2006, 2010, and 2016 Integrated Reports for the **aquatic life** designated use where data from the **probabilistic** program was used when the **Big Sandy, Little Sandy, Tygarts River BMU** was sampled. Pie graphs along top show proportion of impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status.

Table 25. List of causes at **probabilistic** sites impaired for **aquatic life** in the **Big Sandy, Little Sandy, Tygarts BMU** during the integrated reporting years when this particular BMU was the BMU of focus.

Cause	number of segments with this cause		
	2006	2010	2016
Cause Unknown	0	9	1
Chlorophyll-a	1	0	0
Chlorine	0	1	0
Iron	0	2	0
Nitrogen (Total)	0	1	0
Nutrient/Eutrophication Biological Indicators	4	13	6
Oil and Grease	1	0	0
Organic Enrichment (Sewage) Biological Indicators	9	4	6
Oxygen, Dissolved	0	1	0
pH	1	1	0
Phosphorus (Total)	0	1	0
Sedimentation/Siltation	38	28	40
Specific Conductance	0	17	27
Sulfates	3	1	0
Temperature	11	0	0
Total Dissolved Solids	21	9	9
Total Suspended Solids (TSS)	0	4	1
Turbidity	1	0	0
Total	90	92	90

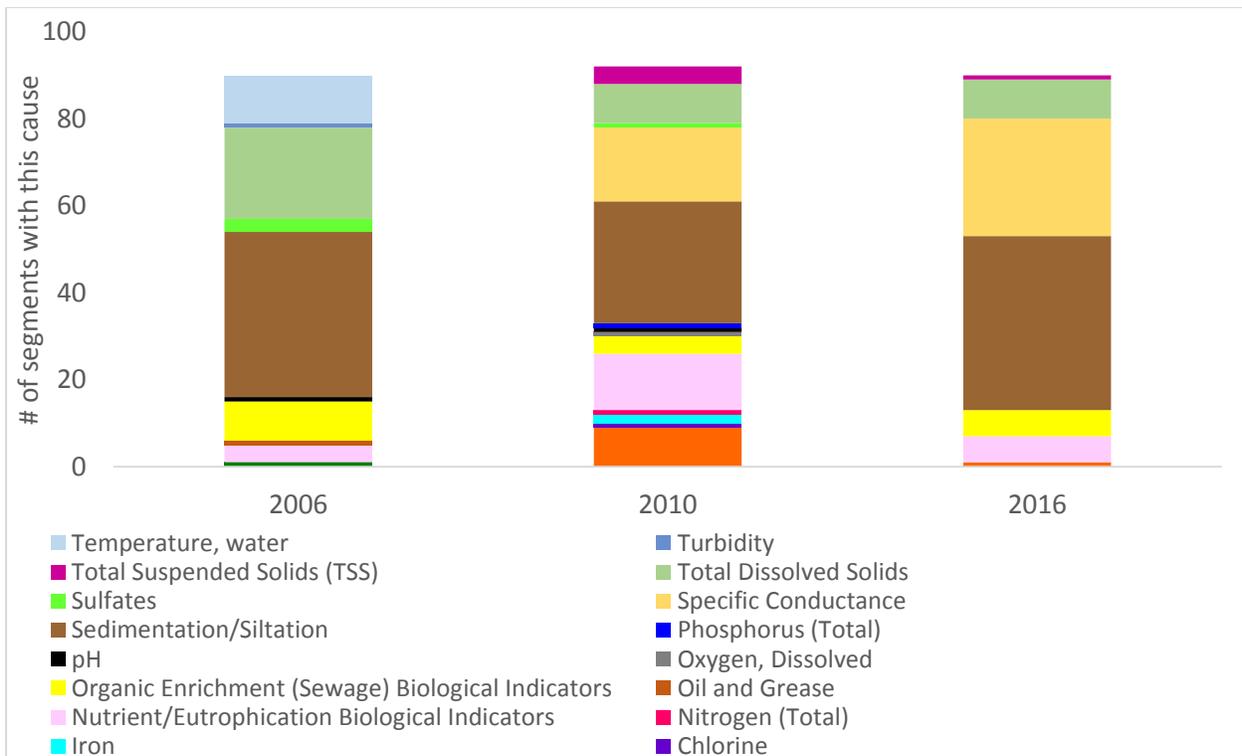


Figure 40. Causes at **probabilistic** sites impaired for **aquatic life** in the **Big Sandy, Little Sandy, Tygarts BMU** associated with each integrated reporting year that this particular BMU was the BMU of focus.

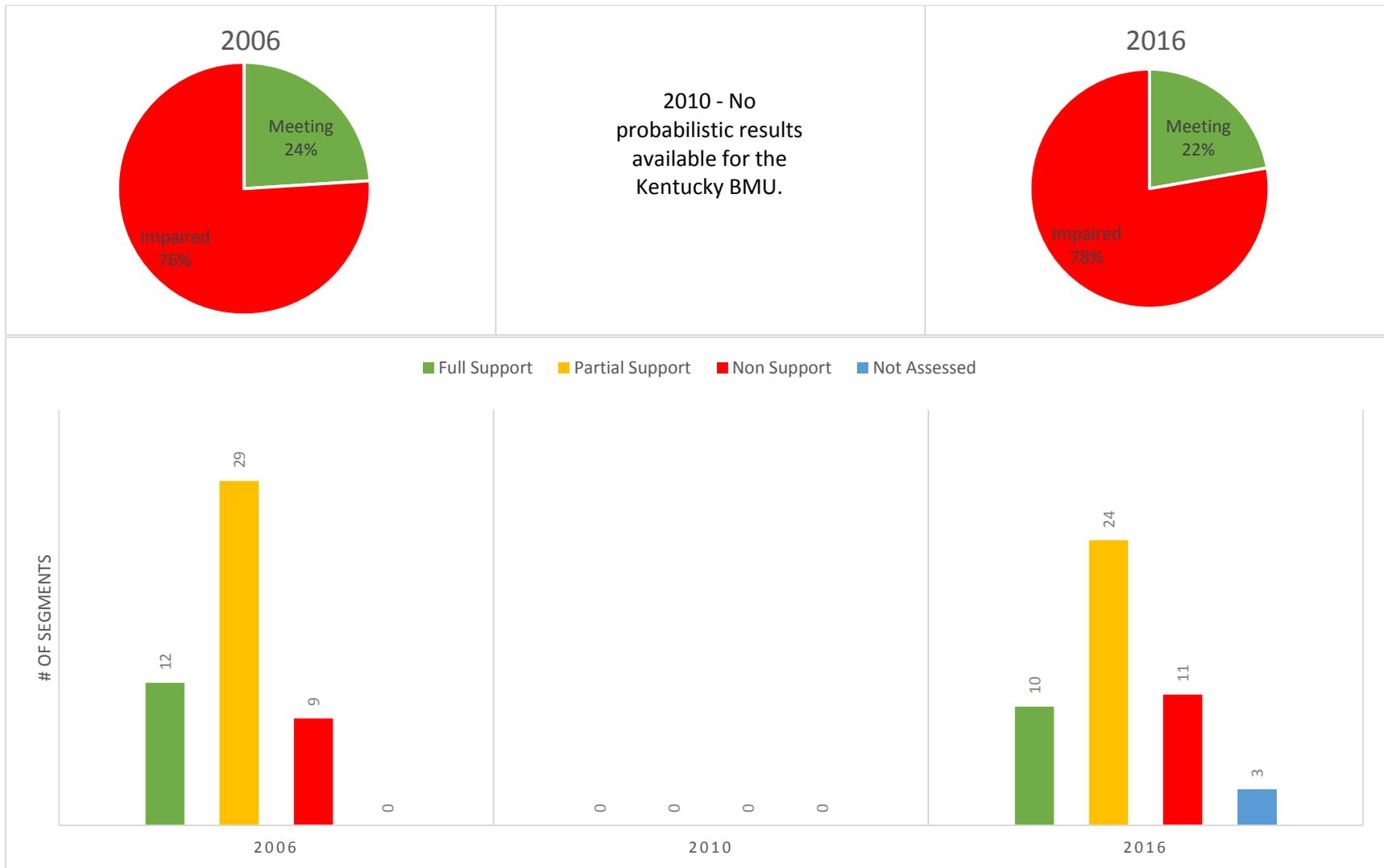


Figure 41. Assessment results from the 2006 and 2016 Integrated Reports (no data available for 2019) for the **aquatic life** designated use where data from the **probabilistic** program was used when the **Kentucky River BMU** was sampled. Pie graphs along top show proportion of impaired (partial and nonsupport) to meeting segments, while bottom bar graphs show number of segments in each attainment status.

Table 26. List of causes at **probabilistic** sites impaired for **aquatic life** in the **Kentucky River BMU** during the integrated reporting years when this particular BMU was the BMU of focus.

Cause	number of segments with this cause		
	2006	2010	2016
Cause Unknown	1	No Data	4
Chlorine	2	No Data	0
Lead	0	No Data	2
Nutrient/Eutrophication Biological Indicators	4	No Data	5
Organic Enrichment (Sewage) Biological Indicators	2	No Data	0
Other	0	No Data	1
Sedimentation/Siltation	34	No Data	21
Temperature, water	1	No Data	0
Specific Conductance	0	No Data	16
Total Dissolved Solids	16	No Data	4
Total Suspended Solids (TSS)	1	No Data	0
Turbidity	1	No Data	2
Total	62	No Data	55

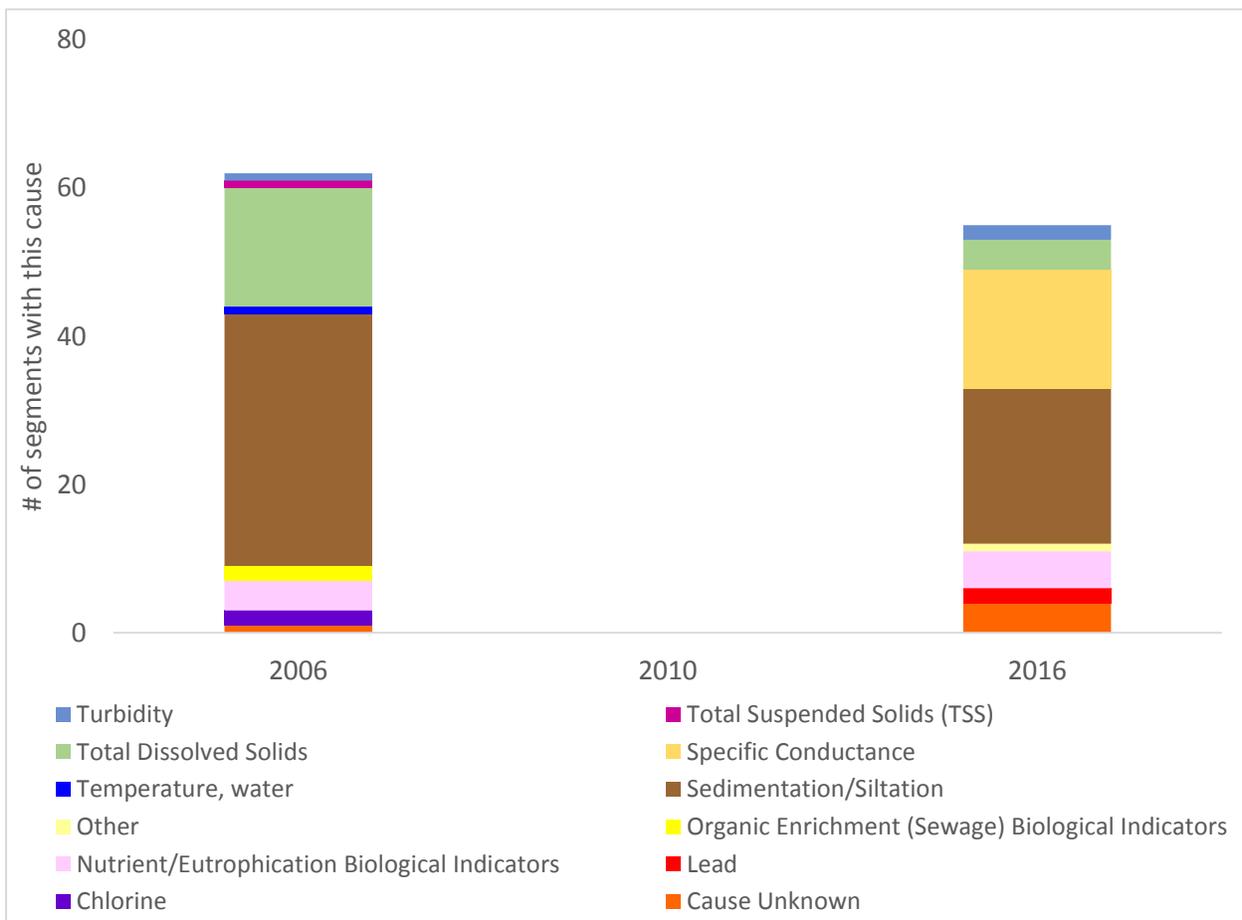


Figure 42. Causes at **probabilistic** sites impaired for **aquatic life** in the **Kentucky River BMU** associated with each integrated reporting year that this particular BMU was the BMU of focus.

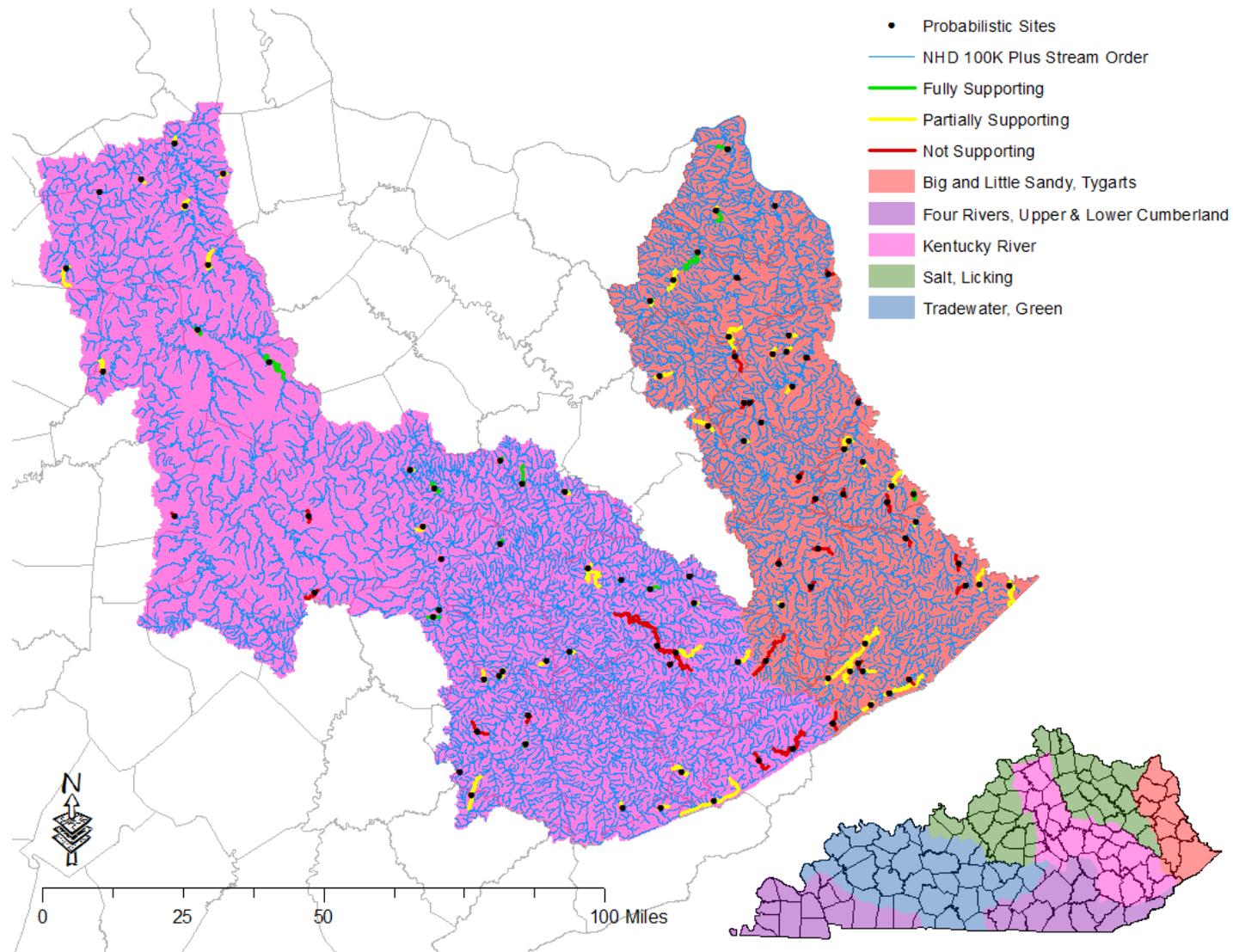


Figure 43. Probabilistic sites (black circles) sampled in the **Big Sandy, Little Sandy, Tygarts and Kentucky BMU's**. Attainment of the **aquatic life** designated use displayed as full support (green), partial support (yellow), and nonsupport (red).

Outstanding State Resource Water

In the Big Sandy, Little Sandy, Tygarts BMU, none of the probabilistic stations fell on streams designated as OSRWs.

For the 2016 IR, in the Kentucky BMU, 6 probabilistic stations fell on streams designated as OSRWs. Of those 6 segments, 4 fully supports, 1 partially supports, and 1 does not support the OSRW designated use (Table 27, see 'Probabilistic Attainment' tab of Program Workbook). The use attainment of the OSRW designated use matches the aquatic life use attainment, when available.

Table 27. **Outstanding state resource water** segments that **probabilistic** stations fell on during 2013 sampling of the **Kentucky BMU** and the use attainment for that designated use.

Assessment Unit Name	Stream Name	Station ID	OSRW Attainment
Big Buck Lick 0.0 to 2.45	Big Buck Lick	DOW04036028	Fully Supporting
Hardwick Creek 0.0 to 3.25	Hardwick Creek	DOW04040013	Fully Supporting
Line Fork 12.2 to 28.65	Line Fork	DOW04055012	Partially Supporting
Red Bird River 0.0 to 15.3	Red Bird River	DOW04052048	Not Supporting
Red River 50.1 to 60.9	Red River	DOW04042027	Fully Supporting
War Fork 0.0 to 13.85	War Fork	DOW04036029	Fully Supporting

Overall Assessment Results

No TMDLs have been written for any pollutants impairing aquatic life in the Big Sandy, Little Sandy, Tygarts or Kentucky BMUs that the probabilistic program visited for this IR. Therefore, from the probabilistic program, there are

- 17 waterbody/ designated use combinations that are in category 2, where the assessed designated use is fully supporting
- 149 PWCs in category 5, which require a TMDL
- 13 PWCs in 4C, where the cause of impairment is a pollution and therefore does not require a TMDL
- 10 PWCs in category 2B, where the pollutant is no longer causing an impairment, but is 303(d) listed and proposed to EPA for delisting

For all waterbodies assessed by the probabilistic program for the 2016 IR, refer to the 'Probabilistic Attainment' tab of Program Workbook; for more specific information per assessment unit reference the 305(b) and the 303(d) tables.

Reference Reach Program

Program Description

The Reference Reach Program began in 1991, and the initial program goal was to determine a network of least-impacted streams within defined regions of the state. Reference Reaches are not necessarily

pristine streams, but represent streams least impacted by human activities in each region. As such, they can be considered to represent best available conditions and can be used as benchmarks for comparing water quality parameters with other streams in the same region. Data gathered from the Reference Reach program were used primarily in the past to develop biological indices used for 305(b) assessments of aquatic life use support.

Currently, priorities for Reference Reach Monitoring focus on characterizing the natural variability within the reference condition in each region, identifying new reference reach locations, and monitoring the condition of existing reference reaches as identified in 401 KAR 10:030. A firm understanding of the inherent biological variability and natural potential of the streams in a region is needed to address levels of impact to any given stream. This is accomplished using a regional reference approach, which is based on the range of natural conditions found in a population of sites or streams with similar physical characteristics and minimal human impact. The reference condition collectively refers to the range of quantifiable and naturally occurring ecological elements (i.e., chemistry, habitat and biology) present in an area.

In many regions of Kentucky, finding reference quality streams can be a difficult task because of the prevalence of human disturbance across the landscape. First, staff members identify least-impacted waters representative of geographic regions of the state known as ecoregions. Typical reference reach watersheds contain a high proportion of natural vegetation and have minimal human disturbance such as point-source discharges, agricultural land, mining, and urban development. Then, data on chemical water quality, sediment quality, habitat condition, and biotic communities are collected to (1) define the quality of the streams of a particular ecoregion and (2) allow other streams in the same ecoregion to be compared to the reference condition.

The reference reach program has 3 major priorities.

1) Reference Trend Monitoring Network: In 2012, a draw of reference sites was selected from the Ecological Data Application System (EDAS) database (based on the 75th percentile for the macroinvertebrate biological index (MBI). From this draw, 16 high quality sites were identified using the MBI and knowledge of sites believed to represent stable reference land use and habitat conditions. Sites were stratified by headwater (< 5 square mile drainage) and wadeable (\geq 5 square mile drainage) streams. These 16 sites have been sampled every year for chemical water quality, sediment quality, habitat condition, and biotic communities. In future IRs, these sites will allow for reporting year comparisons, and provide insight to landscape scale effects on use attainment, such as hydrological stress.

2) Identification of Potential New Reference Reaches: New sites are sites selected for sampling each year that are not currently part of the Reference Reach Network, but have been identified as potential candidate stream reaches to add to the network. These sites are typically identified through field observations, data collected from other monitoring programs in the Water Quality Branch (WQB), and through geographic information system (GIS) and spatial analyses.

3) Condition Checks on Existing Reference Reaches: Sites selected under this category will focus on examining established reference reaches where there have been potential issues with reference reach

impacts (e.g. development, extraction activities, etc.) observed by staff in the field as well as various permit reports.

Assessment Results - Reference Reach

The assessment results for the reference reach program are presented differently than the ambient and probabilistic programs. Since the same sites are not visited on a BMU rotation (like the ambient program), and the same process is not used from year to year to select sites (like the probabilistic program), integrated reporting years cannot be compared. Therefore, the attainment decisions for the entire reference reach network are discussed, with the knowledge that some of these assessments are older. For example, some of the reference reach sites have not been visited since their original assessment in the early 2000's when biological indices were under development, while others have been visited regularly with the BMU rotation.

Aquatic Life

Of the 256 sites sampled by the reference reach program (refer to the 'Reference Station' tab of Program Workbook), 254 have been used to assess for the aquatic life designated use resulting in 201 assessment units (not all 256 sites sampled by the reference reach program are part of the DOW's reference reach network, remembering that the reference reach program samples sites that are part of the network and also samples new sites that may or may not be included in the reference reach network.) Of the 201 assessed segments, 91% were found to support the aquatic life designated use, while 9% were found to be impaired for the aquatic life designated use (Figure 44 and 46). Of those that are impaired, 13 segments partially support the aquatic life use and 5 segments do not support the aquatic life use (Figure 44 and 46, see 'Reference Attainment' tab of Program Workbook).

Looking specifically at the 18 impaired segments, 8 were assessed in the past 5 years, 9 were assessed in the past 10 years, and 1 has not been visited since being assessed in 2001 (Brush Creek in the Mississippi Basin). Four segments, upon their initial assessment, were found to be impaired for the aquatic life use, including the segment that has not been assessed since 2001. The other 14 segments were originally assessed as full support and have since been assessed as impaired. The causes associated with the impaired segments, in order of frequency, are sedimentation/ siltation (10 segments), cause unknown (6 segments), nutrient/ eutrophication biological indicators (4 segments), dissolved oxygen (1 segment), organic enrichment (sewage) biological indicators (1 segment), and specific conductance (1 segment). Therefore, a total of 23 pollutants are associated with the 18 impaired segments where reference reach sites have been utilized to assess for the aquatic life designated use (Table 28, see 2016 303(d) and 305(b) for listing specifics).

Outstanding State Resource Waters

Of the 201 assessment units associated with reference reach sites, 179 of those segments are deemed as OSRWs, making this designated use apply to those assessment units (as a note, there are 399 OSRWs in the state). Of the 179 segments with the OSRW designated use, 93% are currently assessed as full support, while 7% are impaired (Figure 45). Of those that are impaired, 12 segments partially support the OSRW use and 1 segment does not support the OSRW use (Figure 45, see 'Reference Attainment'

tab of Program Workbook). The causes associated with the impaired segments, in order of frequency, are sedimentation/ siltation (7 segments), cause unknown (4 segments), nutrient/ eutrophication biological indicators (3 segments), dissolved oxygen (1 segment), organic enrichment (sewage) biological indicators (1 segment), and specific conductance (1 segment). Therefore, a total of 17 pollutants are associated with the 12 impaired segments where reference reach sites have been utilized to assess for the OSRW designated use (Table 29, see 2016 303(d) and 305(b) for listing specifics). Assessments for OSRW, when data is available, matches the assessment for the aquatic life use, explaining why the results between the two designated uses are so similar.

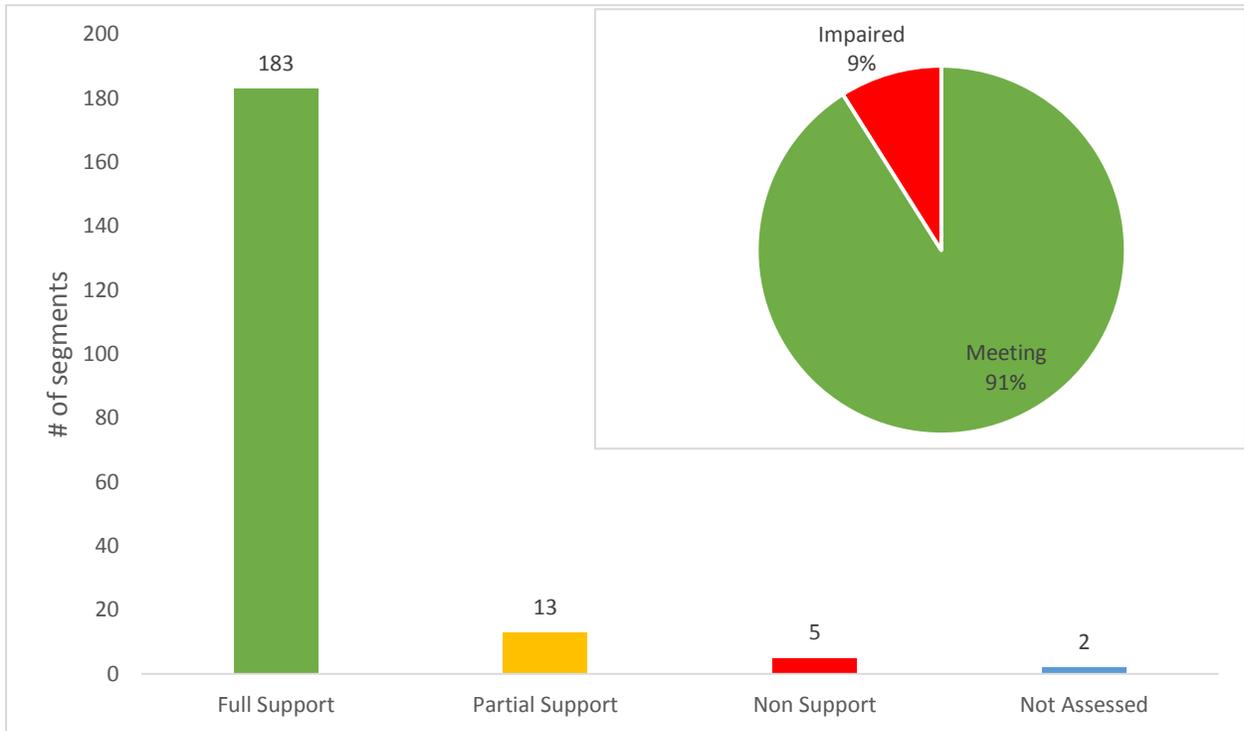


Figure 44. Statewide assessment results as of the 2016 Integrated Report for the **aquatic life** designated use where data collected by the **reference reach program** was used to make an attainment decision. Pie graph shows proportion of impaired (partial and nonsupport) to meeting segments, while bar graph shows number of segments in each attainment status.

Table 28. Causes at **reference reach** sites impaired for the **aquatic life** designated use.

Cause	Number of segments
Sedimentation/Siltation	10
Cause Unknown	6
Nutrient/Eutrophication Biological Indicators	4
Oxygen, Dissolved	1
Organic Enrichment (Sewage) Biological Indicators	1
Specific Conductance	1
Total	23

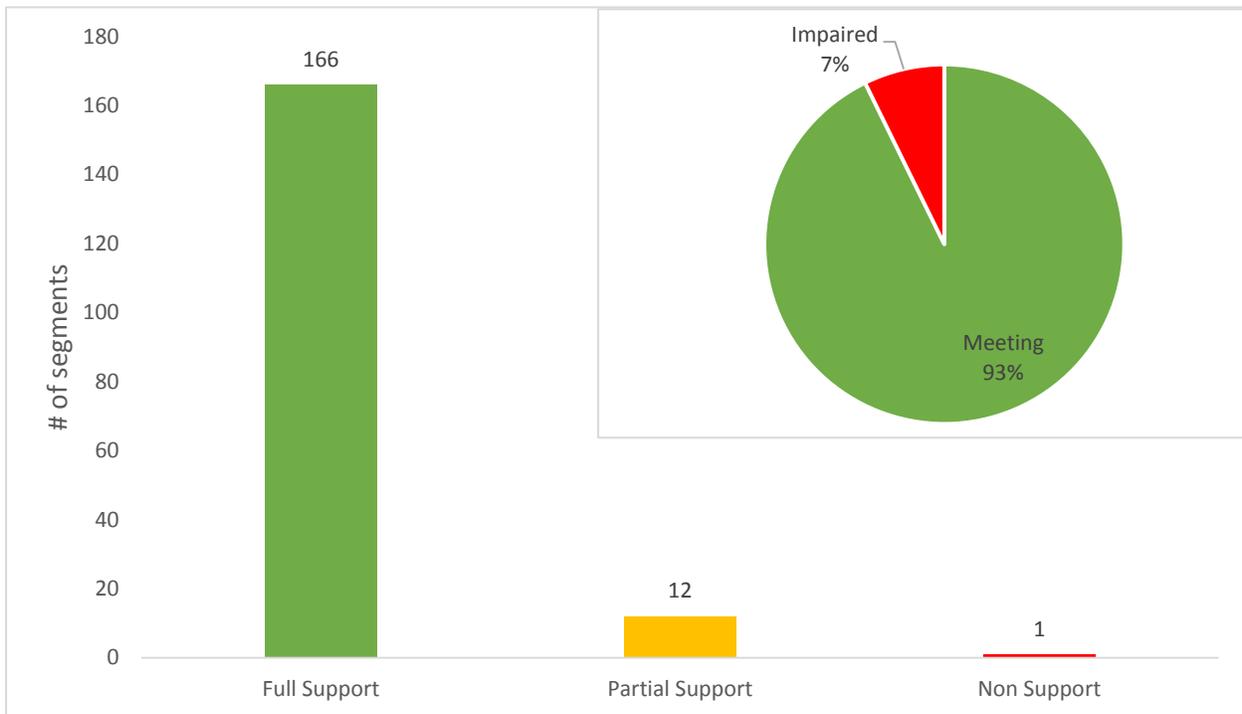


Figure 45. Statewide assessment results as of the 2016 Integrated Report for the **outstanding state resource waters** designated use where data collected by the **reference reach program** was used to make an attainment decision. Pie graph shows proportion of impaired (partial and nonsupport) to meeting segments, while bar graph shows number of segments in each attainment status.

Table 29. Causes at **reference reach** sites impaired for the **outstanding state resource waters** designated use.

Cause	Number of segments
Sedimentation/Siltation	7
Cause Unknown	4
Nutrient/Eutrophication Biological Indicators	3
Oxygen, Dissolved	1
Organic Enrichment (Sewage) Biological Indicators	1
Specific Conductance	1
Total	17

Overall Assessment Results

The following TMDLs have been written from where the ambient program collects data:

- pH TMDL for [Rock Creek](#); the cause pH is proposed for delisting

Therefore, from the reference reach program, there are

- 349 waterbody/ designated use combinations that are in category 2, where the assessed designated use is fully supporting
- 42 PWCs in category 5, which require a TMDL

- 4 PWCs in 4C, where the cause of impairment is a pollution and therefore does not require a TMDL
- 1 PWC in category 2C, where the pollutant is no longer causing an impairment and a TMDL has been written for that pollutant

For all waterbodies assessed by the reference reach program for the 2016 IR, refer to the 'Reference Attainment' tab of Program Workbook; for more specific information per assessment unit reference the 305(b) and the 303(d) tables.

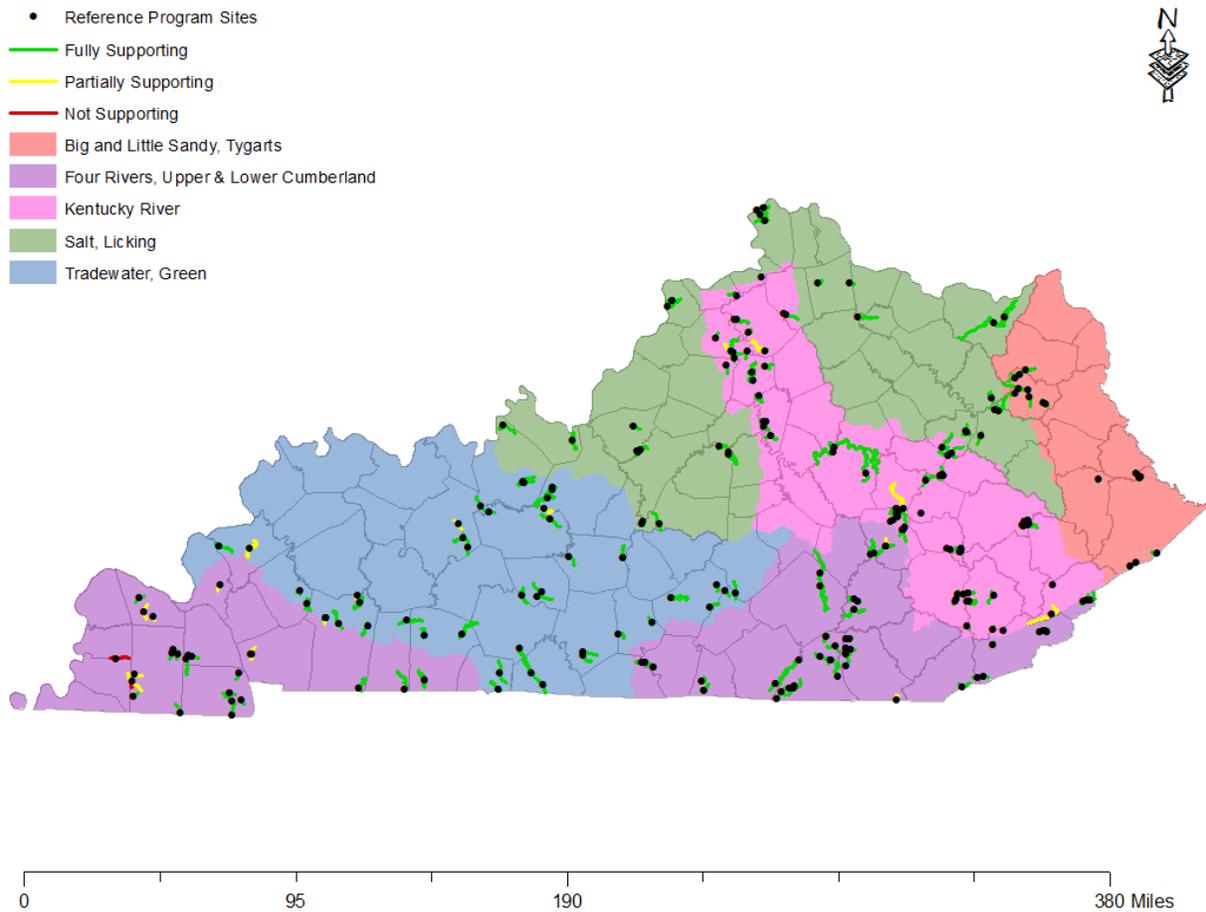


Figure 46. Reference reach program sites (black circles) sampled statewide. Attainment of the aquatic life designated use displayed as full support (green), partial support (yellow), and nonsupport (red).

Total Maximum Daily Load Program

Program Description

Section 303(d)(1)(C) of the CWA and its associated policy and program requirements for water quality planning, management, and implementation (40 CFR Part 130) require the establishment of a TMDL for the achievement of state WQS when a waterbody is impaired by a pollutant for one or more designated uses. A TMDL identifies the pollutant/waterbody-specific assimilative capacity, which will allow the waterbody to meet its designated uses. Data collected by the TMDL program may be used to develop TMDLs for listed impairments, assess the current use attainment of aquatic life and PCR, and to delist currently impaired segments if no impairments are found. The data may also be used by other programs within DOW for activities such as WQS development, water quality trend analysis, and nonpoint source (NPS) pollution management projects.

For the 2016 IR, the following TMDL projects were included:

- Pond Creek watershed located in the Green River Basin in Muhlenberg county, sampled in 2011, 2013, and 2014 at 26 locations
- Sulphur Creek watershed located in the Salt River Basin in Anderson, Mercer, and Washington counties, sampled in 2012 and 2013 at 10 locations
- Sand Lick Fork watershed located in the Kentucky River Basin in Powell county sampled in 2013 at 7 locations

Refer to the 'TMDL Station' tab of Program Workbook for all stations visited as part of these TMDL projects.

Assessment Results

Pond Creek Watershed

In the Pond Creek watershed, the sampling completed by the TMDL program resulted in the following assessments for the 2016 IR (note that some segments within the Pond Creek watershed were listed on the 2014 IR. The discussion herein only considers those segments newly listed or updated for this 2016 IR):

- 21 assessment units were assessed for aquatic life; 2 segments were found to fully support aquatic life, 7 segments were found to partially support aquatic life, and 12 segments were found to not support aquatic life (Figure 47). The causes associated with the impaired segments can be found in Table 30.
- 21 assessment units were assessed for PCR; 4 segments were found to fully support PCR, 4 segments were found to partially support PCR, and 13 segments were found to not support PCR (Figure 48). The causes associated with the impaired segments can be found in Table 30.
- 8 assessment units were assessed for SCR; 3 segments were found to fully support SCR, 1 segment was found to partially support SCR, and 4 segments were found to not support SCR. All segments impaired for the SCR designated use are due to the cause pH (Table 30).

A [TMDL](#) has been written for the Pond Creek watershed for the following pollutants:

- Cadmium
- Copper
- Bacteria
- Iron
- Lead
- Nickel
- pH
- Zinc

Therefore, there are

- 9 waterbody/ designated use combinations that are in category 2, where the assessed designated use is fully supporting
- 50 PWCs in category 5, which require a TMDL (Table 30)
- 46 PWCs in category 4A, where the cause is associated with an impairment and a TMDL has been written for that cause (Table 30)
- 14 PWCs in category 4C, where the cause of impairment is a pollution and therefore does not require a TMDL (Table 30)
- 8 PWCs in category 2C, where the pollutant is no longer causing an impairment and a TMDL has been written for that pollutant (Table 30)
- 1 PWC in category 2B, where the pollutant is no longer causing an impairment, but is 303(d) listed and proposed to EPA for delisting (Table 30).

Table 30. A list of all pollutant waterbody combinations for the 2016 assessment results from the TMDL program's sampling of the Pond Creek watershed per designated use.

Assessment Unit ID	Assessment Unit Name	Designated Use	Cause	Category
KY486697_01	Beech Creek 0.0 to 3.9	PCR	pH	4A
KY487614_01	Bogges Creek 0.0 to 3.0	PCR	<i>E. coli</i>	4A
KY488838_01	Caney Creek 0.0 to 3.6	PCR	<i>E. coli</i>	4A
KY488838_02	Caney Creek 3.6 to 7.65	PCR	<i>E. coli</i>	4A
KY489022_01	Carters Creek 0.0 to 1.9	PCR	<i>E. coli</i>	4A
KY499964_01	Opossum Run 0.0 to 1.6	PCR	<i>E. coli</i>	4A
KY500964_01	Plum Creek 0.0 to 1.65	PCR	<i>E. coli</i>	4A
KY501042_04	Pond Creek 10.9 to 13.5	PCR	pH	2C
KY501042_06	Pond Creek 17.3 to 17.9	PCR	<i>E. coli</i>	4A
KY501042_06	Pond Creek 17.3 to 17.9	PCR	pH	2C
KY501042_03	Pond Creek 6.7 to 10.9	PCR	<i>E. coli</i>	4A
KY501042_03	Pond Creek 6.7 to 10.9	PCR	pH	2C
KY502844_01	Saltlick Creek 0.0 to 3.7	PCR	<i>E. coli</i>	4A
KY502963_01	Sandlick Creek 0.0 to 4.1	PCR	<i>E. coli</i>	4A
KY486462-6.1_01	UT of Bat East Creek 0.0 to 1.9	PCR	<i>E. coli</i>	4A
KY486462-1.6_01	UT of Bat East Creek 0.0 to 3.6	PCR	<i>E. coli</i>	4A
KY488838-1.8_01	UT of Caney Creek 0.0 to 2.35	PCR	<i>E. coli</i>	4A
KY488838-2.3_01	UT of Caney Creek 0.0 to 2.6	PCR	<i>E. coli</i>	4A
KY500964-1.65_01	UT of Plum Creek 0.0 to 2.45	PCR	pH	4A
KY501042-6.9_02	UT of Pond Creek 2.4 to 4.2	PCR	pH	4A

KY501042-6.9_02	UT of Pond Creek 2.4 to 4.2	PCR	<i>E. coli</i>	4A
KY486697_01	Beech Creek 0.0 to 3.9	SCR	pH	4A
KY501042_04	Pond Creek 10.9 to 13.5	SCR	pH	2C
KY501042_06	Pond Creek 17.3 to 17.9	SCR	pH	2C
KY501042_03	Pond Creek 6.7 to 10.9	SCR	pH	2C
KY500964-1.65_01	UT of Plum Creek 0.0 to 2.45	SCR	pH	4A
KY501042-6.9_02	UT of Pond Creek 2.4 to 4.2	SCR	pH	4A
KY486462_02	Bat East Creek 3.4 to 7.5	WAH	Dissolved Oxygen	2B
KY486697_01	Beech Creek 0.0 to 3.9	WAH	Sedimentation/Siltation	5
KY486697_01	Beech Creek 0.0 to 3.9	WAH	Iron	4A
KY486697_01	Beech Creek 0.0 to 3.9	WAH	pH	4A
KY486697_01	Beech Creek 0.0 to 3.9	WAH	Habitat Assessment (Streams)	4C
KY486697_01	Beech Creek 0.0 to 3.9	WAH	Oxygen, Dissolved	5
KY486697_01	Beech Creek 0.0 to 3.9	WAH	Specific Conductance	5
KY486697_01	Beech Creek 0.0 to 3.9	WAH	Cadmium	4A
KY486697_01	Beech Creek 0.0 to 3.9	WAH	Nickel	4A
KY486697_01	Beech Creek 0.0 to 3.9	WAH	Alkalinity, Carbonate as CaCO ₃	5
KY486697_01	Beech Creek 0.0 to 3.9	WAH	Copper	5
KY486697_01	Beech Creek 0.0 to 3.9	WAH	Zinc	4A
KY487614_01	Boggess Creek 0.0 to 3.0	WAH	Habitat Assessment (Streams)	4C
KY487614_01	Boggess Creek 0.0 to 3.0	WAH	Nutrient/Eutrophication Biological Indicators	5
KY487614_01	Boggess Creek 0.0 to 3.0	WAH	Sedimentation/Siltation	5
KY488838_01	Caney Creek 0.0 to 3.6	WAH	Specific Conductance	5
KY488838_01	Caney Creek 0.0 to 3.6	WAH	Sedimentation/Siltation	5
KY488838_01	Caney Creek 0.0 to 3.6	WAH	Physical substrate habitat alterations	4C
KY488838_01	Caney Creek 0.0 to 3.6	WAH	Nutrient/Eutrophication Biological Indicators	5
KY488838_01	Caney Creek 0.0 to 3.6	WAH	Cadmium	4A
KY488838_01	Caney Creek 0.0 to 3.6	WAH	Habitat Assessment (Streams)	4C
KY488838_02	Caney Creek 3.6 to 7.65	WAH	Cadmium	4A
KY488838_02	Caney Creek 3.6 to 7.65	WAH	Physical substrate habitat alterations	4C
KY488838_02	Caney Creek 3.6 to 7.65	WAH	Alkalinity, Carbonate as CaCO ₃	5
KY488838_02	Caney Creek 3.6 to 7.65	WAH	Sedimentation/Siltation	5
KY488838_02	Caney Creek 3.6 to 7.65	WAH	Lead	4A
KY488838_02	Caney Creek 3.6 to 7.65	WAH	Specific Conductance	5
KY489022_01	Carters Creek 0.0 to 1.9	WAH	Alkalinity, Carbonate as CaCO ₃	5
KY489022_01	Carters Creek 0.0 to 1.9	WAH	Direct Habitat Alterations	4C
KY499964_01	Opossum Run 0.0 to 1.6	WAH	Sedimentation/Siltation	5
KY499964_01	Opossum Run 0.0 to 1.6	WAH	Habitat Assessment (Streams)	4C

KY500964_01	Plum Creek 0.0 to 1.65	WAH	Oxygen, Dissolved	5
KY500964_01	Plum Creek 0.0 to 1.65	WAH	Cadmium	4A
KY500964_01	Plum Creek 0.0 to 1.65	WAH	Chloride	5
KY500964_01	Plum Creek 0.0 to 1.65	WAH	Total Dissolved Solids	5
KY500964_01	Plum Creek 0.0 to 1.65	WAH	Specific Conductance	5
KY501042_01	Pond Creek 0.0 to 4.1	WAH	Specific Conductance	5
KY501042_01	Pond Creek 0.0 to 4.1	WAH	Alkalinity, Carbonate as CaCO3	5
KY501042_01	Pond Creek 0.0 to 4.1	WAH	Iron	4A
KY501042_01	Pond Creek 0.0 to 4.1	WAH	Sedimentation/Siltation	5
KY501042_04	Pond Creek 10.9 to 13.5	WAH	Sedimentation/Siltation	5
KY501042_04	Pond Creek 10.9 to 13.5	WAH	Total Dissolved Solids	5
KY501042_04	Pond Creek 10.9 to 13.5	WAH	Ammonia (Un-ionized)	5
KY501042_04	Pond Creek 10.9 to 13.5	WAH	Iron	4A
KY501042_04	Pond Creek 10.9 to 13.5	WAH	Specific Conductance	5
KY501042_04	Pond Creek 10.9 to 13.5	WAH	Cadmium	4A
KY501042_04	Pond Creek 10.9 to 13.5	WAH	Alkalinity, Carbonate as CaCO3	5
KY501042_06	Pond Creek 17.3 to 17.9	WAH	Oxygen, Dissolved	5
KY501042_06	Pond Creek 17.3 to 17.9	WAH	Sedimentation/Siltation	5
KY501042_06	Pond Creek 17.3 to 17.9	WAH	pH	2C
KY501042_03	Pond Creek 6.7 to 10.9	WAH	Total Dissolved Solids	5
KY501042_03	Pond Creek 6.7 to 10.9	WAH	Sedimentation/Siltation	5
KY501042_03	Pond Creek 6.7 to 10.9	WAH	Iron	4A
KY501042_03	Pond Creek 6.7 to 10.9	WAH	Specific Conductance	5
KY501042_03	Pond Creek 6.7 to 10.9	WAH	Habitat Assessment (Streams)	4C
KY501042_03	Pond Creek 6.7 to 10.9	WAH	Alkalinity, Carbonate as CaCO3	5
KY501042_03	Pond Creek 6.7 to 10.9	WAH	Cadmium	2C
KY502963_01	Sandlick Creek 0.0 to 4.1	WAH	Iron	4A
KY502963_01	Sandlick Creek 0.0 to 4.1	WAH	Lead	4A
KY502963_01	Sandlick Creek 0.0 to 4.1	WAH	Alkalinity, Carbonate as CaCO3	5
KY502963_01	Sandlick Creek 0.0 to 4.1	WAH	Cause Unknown	5
KY502963_01	Sandlick Creek 0.0 to 4.1	WAH	Physical substrate habitat alterations	4C
KY486462-6.1_01	UT of Bat East Creek 0.0 to 1.9	WAH	Alkalinity, Carbonate as CaCO3	5
KY486462-6.1_01	UT of Bat East Creek 0.0 to 1.9	WAH	Habitat Assessment (Streams)	4C
KY486462-1.6_01	UT of Bat East Creek 0.0 to 3.6	WAH	Habitat Assessment (Streams)	4C
KY486462-1.6_01	UT of Bat East Creek 0.0 to 3.6	WAH	Alkalinity, Carbonate as CaCO3	5
KY486462-1.6_01	UT of Bat East Creek 0.0 to 3.6	WAH	Sedimentation/Siltation	5
KY488838-1.8_01	UT of Caney Creek 0.0 to 2.35	WAH	Sedimentation/Siltation	5
KY488838-1.8_01	UT of Caney Creek 0.0 to 2.35	WAH	Habitat Assessment (Streams)	4C

KY488838-1.8_01	UT of Caney Creek 0.0 to 2.35	WAH	Lead	4A
KY488838-2.3_01	UT of Caney Creek 0.0 to 2.6	WAH	Lead	4A
KY488838-2.3_01	UT of Caney Creek 0.0 to 2.6	WAH	Nutrient/Eutrophication Biological Indicators	5
KY488838-2.3_01	UT of Caney Creek 0.0 to 2.6	WAH	Habitat Assessment (Streams)	4C
KY488838-2.3_01	UT of Caney Creek 0.0 to 2.6	WAH	Sedimentation/Siltation	5
KY500964-1.65_01	UT of Plum Creek 0.0 to 2.45	WAH	Zinc	4A
KY500964-1.65_01	UT of Plum Creek 0.0 to 2.45	WAH	Nickel	4A
KY500964-1.65_01	UT of Plum Creek 0.0 to 2.45	WAH	Cadmium	4A
KY500964-1.65_01	UT of Plum Creek 0.0 to 2.45	WAH	Oxygen, Dissolved	5
KY500964-1.65_01	UT of Plum Creek 0.0 to 2.45	WAH	Alkalinity, Carbonate as CaCO ₃	5
KY500964-1.65_01	UT of Plum Creek 0.0 to 2.45	WAH	pH	4A
KY500964-1.65_01	UT of Plum Creek 0.0 to 2.45	WAH	Specific Conductance	5
KY500964-1.65_01	UT of Plum Creek 0.0 to 2.45	WAH	Iron	4A
KY500964-1.65_01	UT of Plum Creek 0.0 to 2.45	WAH	Sedimentation/Siltation	5
KY501042-11.1_01	UT of Pond Creek 0.0 to 3.0	WAH	Specific Conductance	5
KY501042-11.1_01	UT of Pond Creek 0.0 to 3.0	WAH	Alkalinity, Carbonate as CaCO ₃	5
KY501042-11.1_01	UT of Pond Creek 0.0 to 3.0	WAH	Cadmium	4A
KY501042-11.1_01	UT of Pond Creek 0.0 to 3.0	WAH	Sedimentation/Siltation	5
KY501042-6.9_02	UT of Pond Creek 2.4 to 4.2	WAH	pH	4A
KY501042-6.9_02	UT of Pond Creek 2.4 to 4.2	WAH	Specific Conductance	5
KY501042-6.9_02	UT of Pond Creek 2.4 to 4.2	WAH	Habitat Assessment (Streams)	4C
KY501042-6.9_02	UT of Pond Creek 2.4 to 4.2	WAH	Sedimentation/Siltation	5
KY501042-6.9_02	UT of Pond Creek 2.4 to 4.2	WAH	Cadmium	4A

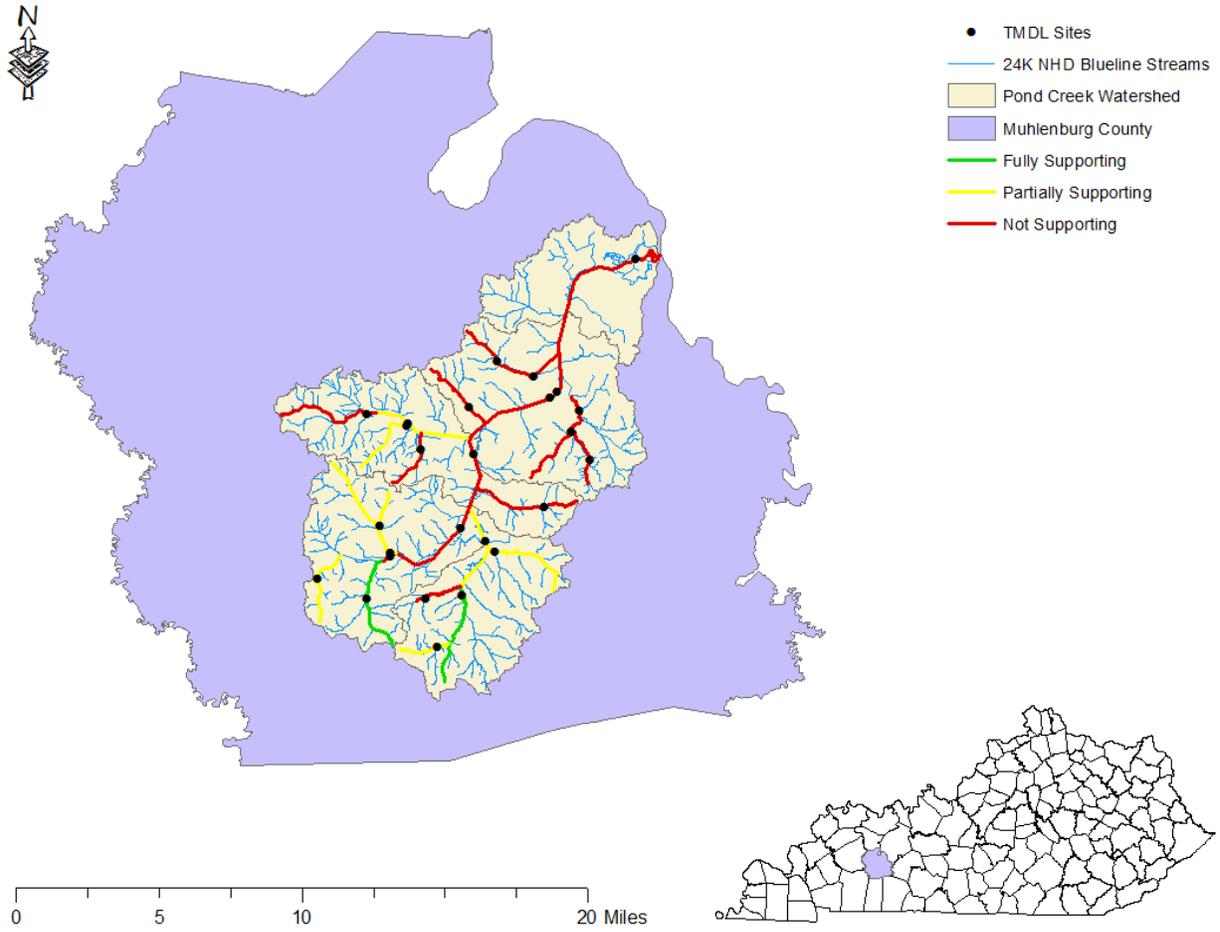


Figure 47. **Aquatic life** designated use attainment in the **Pond Creek** watershed where data collected by the **TMDL** program was used for the assessment.

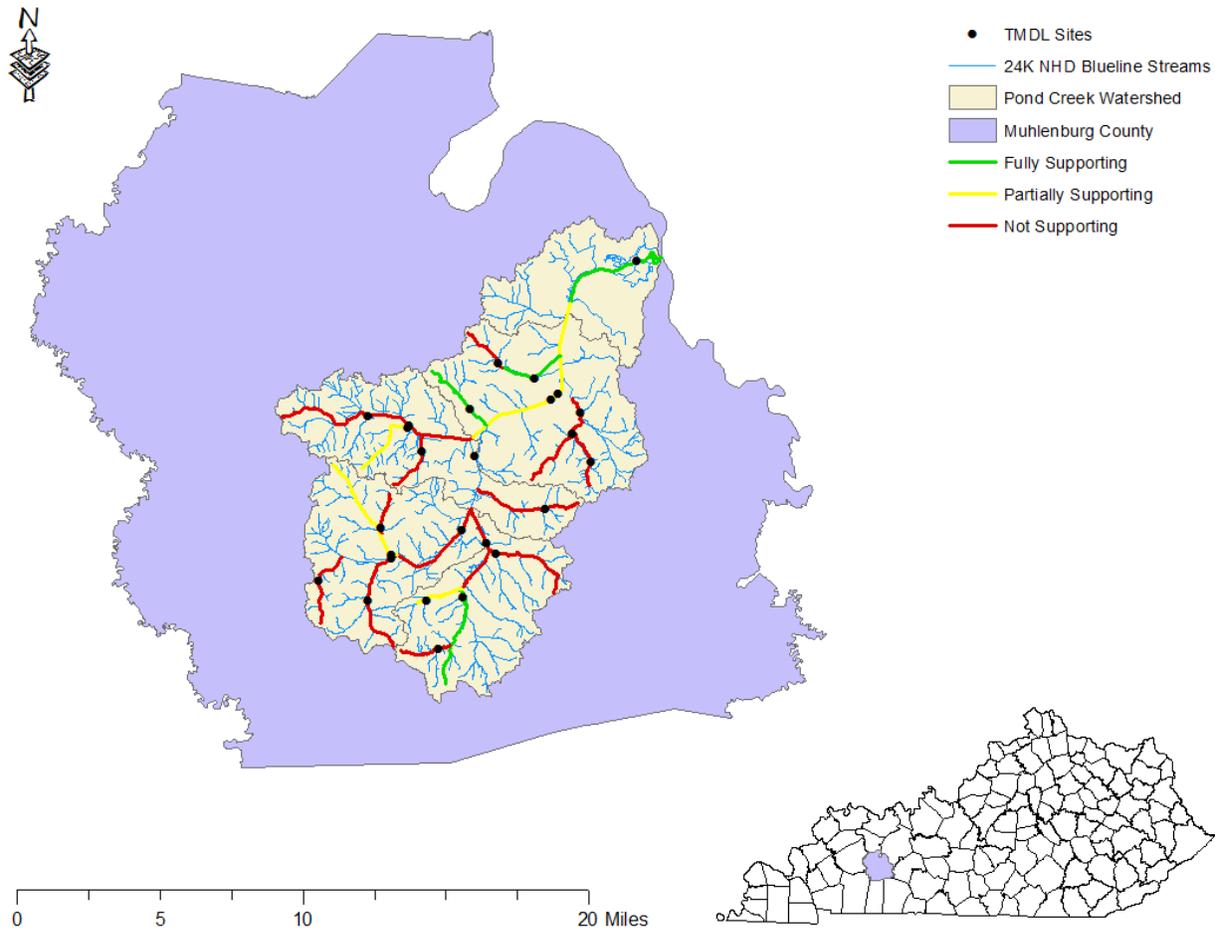


Figure 48. **Primary contact recreation** designated use attainment in the **Pond Creek** watershed where data collected by the **TMDL** program was used for the assessment.

Sulphur Creek Watershed

In the Sulphur Creek watershed, the sampling completed by the TMDL program resulted in the following assessments:

- 9 assessment units were assessed for aquatic life; 7 were found to fully support aquatic life, and 2 were found to partially support aquatic life (Figure 49). The causes associated with the impaired segments can be found in Table 31.
- Sulphur Creek is designated as an OSRW along its entire 10 mile length. The downstream portion, river mile 0.0 to 6.8, fully supports the OSRW designated use, while the upstream portion, river mile 6.8 to 10.0, partially supports the OSRW designated use. This segment is also part of the DOW's reference reach network. The causes of impairment match the causes of impairment for the aquatic life designated use (Table 31).
- 8 assessment units were assessed for PCR; all 8 were found to not support PCR due to *E. coli*, which is a pollutant and therefore a TMDL is required (Table 31, Figure 50).

- Sulphur Creek main stem, which is comprised of 2 assessment units, was assessed as full support (category 2) for SCR in previous integrated reporting cycles. No new data was collected to update the assessment for this designated use. Therefore, the two assessments for this designated use were passed forward as fully supporting SCR (Table 31).

Therefore, there are

- 10 waterbody/ designated use combinations that are in category 2, where the assessed designated use is fully supporting
- 14 PWCs in category 5, which require a TMDL (Table 31)
- 3 PWCs in category 4C, where the cause of impairment is a pollution and therefore does not require a TMDL (Table 31)
- 2 PWCs in category 2B, where the pollutant is no longer causing an impairment, but is 303(d) listed and proposed to EPA for delisting (Table 31).

Two projects in the watershed, which are in their beginning phases, are attempting to address impairments using the actions recommended in the watershed plan.

1. The Sulphur Creek Septic Reclamation project aims to reduce pathogen levels in the Sulphur Creek watershed by addressing failing septic systems within the two priority subwatersheds of Brush Creek and Log Lick. The project is also seeking to improve community education and understanding of watershed issues, including proper septic maintenance.
2. The Sulphur Creek Watershed Ag Implementation project seeks to address those impairments that stem from agricultural sources within the two priority subwatersheds of Brush Creek and Log Lick.

Table 31. A list of all pollutant waterbody combinations for the assessment results from the TMDL program's sampling of the Sulphur Creek watershed per designated use.

Assessment Unit ID	Assessment Unit Name	Designated Use	Cause	Category
KY504729_02	Sulphur Creek 6.8 to 10.0	OSRW	Nutrient/Eutrophication Biological Indicators	5
KY504729_02	Sulphur Creek 6.8 to 10.0	OSRW	Sedimentation/Siltation	5
KY504729_02	Sulphur Creek 6.8 to 10.0	OSRW	Habitat Assessment (Streams)	4C
KY488079_01	Brush Creek 0.0 to 5.0	PCR	<i>E. coli</i>	5
KY489380_01	Cheese Lick 1.45 to 5.2	PCR	<i>E. coli</i>	5
KY489380_02	Cheese Lick 5.2 to 8.2	PCR	<i>E. coli</i>	5
KY496970_01	Log Lick 0.0 to 4.20	PCR	<i>E. coli</i>	5
KY504729_01	Sulphur Creek 0.0 to 6.8	PCR	<i>E. coli</i>	5
KY504729_02	Sulphur Creek 6.8 to 10.0	PCR	<i>E. coli</i>	5
KY489380-5.2_01	UT of Cheese Lick 0.0 to 1.5	PCR	<i>E. coli</i>	5
KY504729-0.75_01	UT of Sulphur Creek 0.0 to 1.2	PCR	<i>E. coli</i>	5
KY489380_01	Cheese Lick 1.45 to 5.2	WAH	Nutrient/Eutrophication Biological Indicators	2B
KY489380_01	Cheese Lick 1.45 to 5.2	WAH	Sedimentation/Siltation	2B
KY504729_02	Sulphur Creek 6.8 to 10.0	WAH	Habitat Assessment (Streams)	4C

KY504729_02	Sulphur Creek 6.8 to 10.0	WAH	Sedimentation/Siltation	5
KY504729_02	Sulphur Creek 6.8 to 10.0	WAH	Nutrient/Eutrophication Biological Indicators	5
KY489380-5.2_01	UT of Cheese Lick 0.0 to 1.5	WAH	Nutrient/Eutrophication Biological Indicators	5
KY489380-5.2_01	UT of Cheese Lick 0.0 to 1.5	WAH	Sedimentation/Siltation	5
KY489380-5.2_01	UT of Cheese Lick 0.0 to 1.5	WAH	Habitat Assessment (Streams)	4C

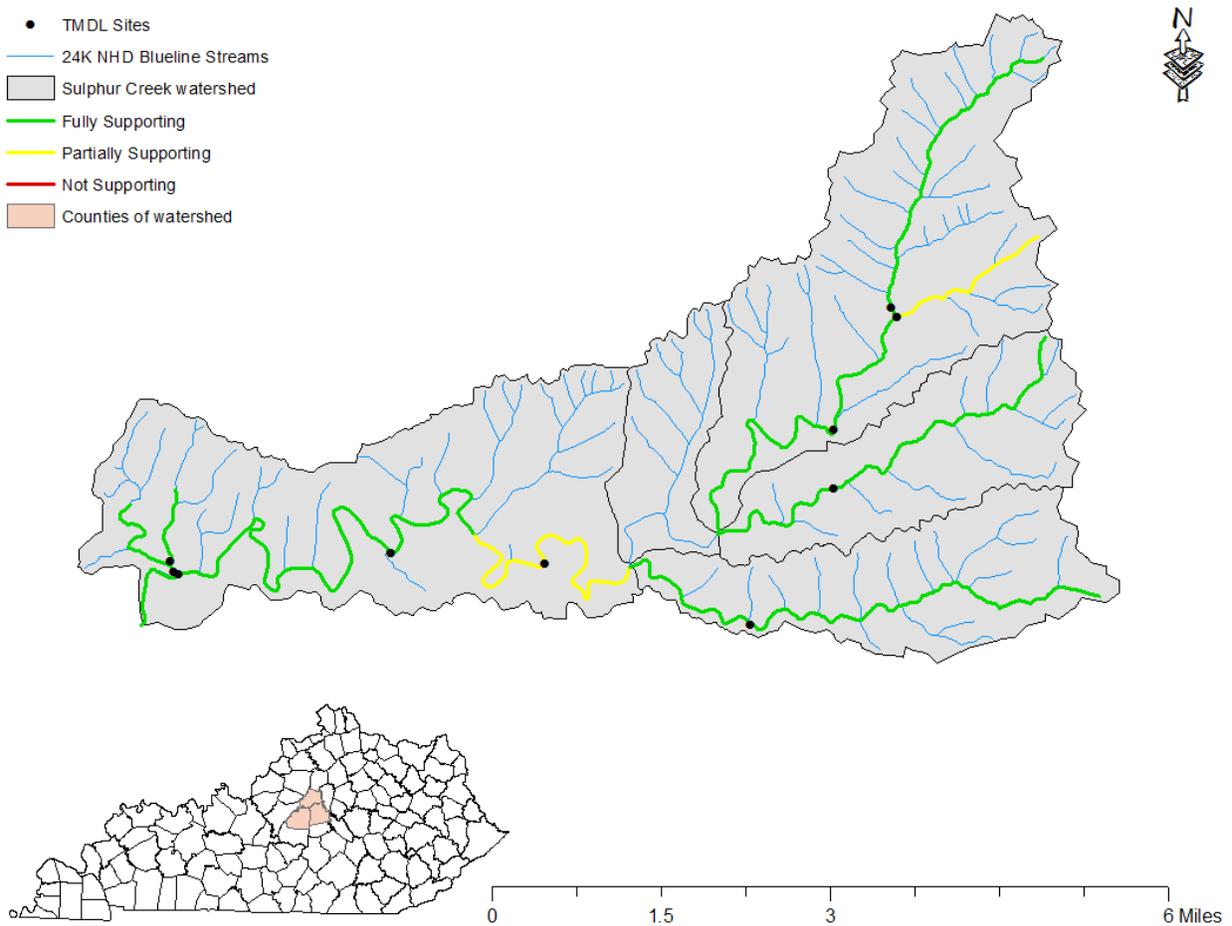


Figure 49. **Aquatic life** designated use attainment in the **Sulphur Creek** watershed where data collected by the **TMDL** program was used for the assessment.

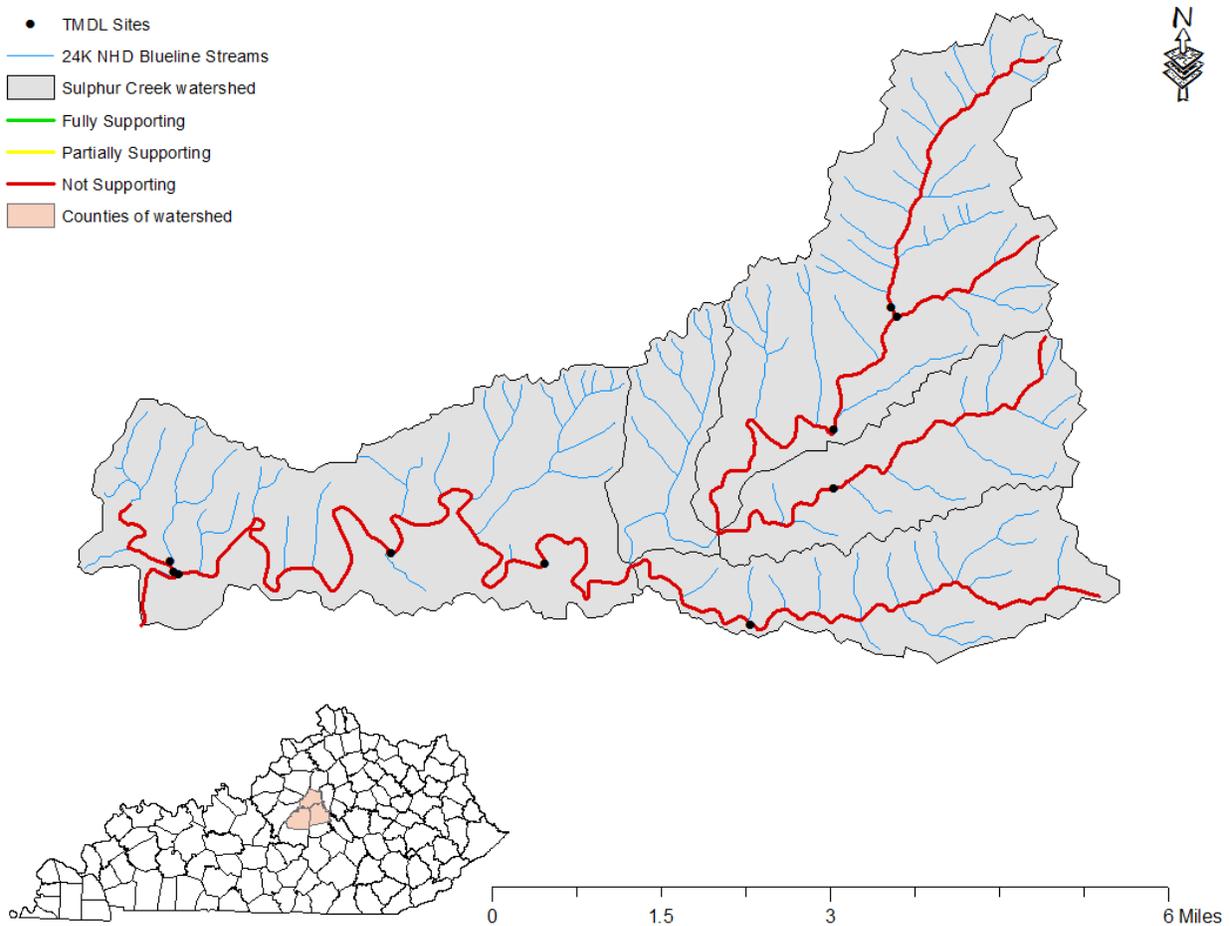


Figure 50. **Primary contact recreation** designated use attainment in the **Sulphur Creek** watershed where data collected by the **TMDL** program was used for the assessment.

Sand Lick Fork Watershed

Sand Lick Fork was listed as impaired for aquatic life due to total dissolved solids, the result of brine discharges to surface streams from oil production activities, and cause unknown. A [TMDL for chlorides](#) was written for the South Fork of the Red River and its major tributary, Sand Lick Fork, in 2000 to address the total dissolved solids impairment.

In 2013, the TMDL section monitored Sand Lick Fork and its tributaries. All 7 sites, which resulted in 4 assessment units, were found to fully support the aquatic life designated use (Figure 51). The mainstem of Sand Lick Fork, which was previously 303(d) listed, is proposed to EPA for delisting.

Therefore, there are

- 3 waterbody/ designated use combinations that are in category 2, where the assessed designated use is fully supporting

- 1 PWC in category 2C, where the pollutant is no longer causing an impairment and a TMDL has been written for that pollutant (Table 32)
- 1 PWC in category 2B, where the pollutant is no longer causing an impairment, but is 303(d) listed and proposed to EPA for delisting (Table 32).

The United States Forest Service (USFS) owns ~47% of the watershed. They continue to engage in activities to protect Sand Lick Fork, its habitat, and its water quality so that it may continue to meet WQS and support the aquatic life designated use.

Table 32. A list of all pollutant waterbody combinations for the assessment results from the TMDL program’s sampling of the Sand Lick Fork watershed per designated use.

Assessment Unit ID	Assessment Unit Name	Designated Use	Cause	Category
KY515225_01	Sand Lick Fork 0.0 to 5.3	WAH	Cause Unknown	2B
KY515225_01	Sand Lick Fork 0.0 to 5.3	WAH	Total Dissolved Solids	2C

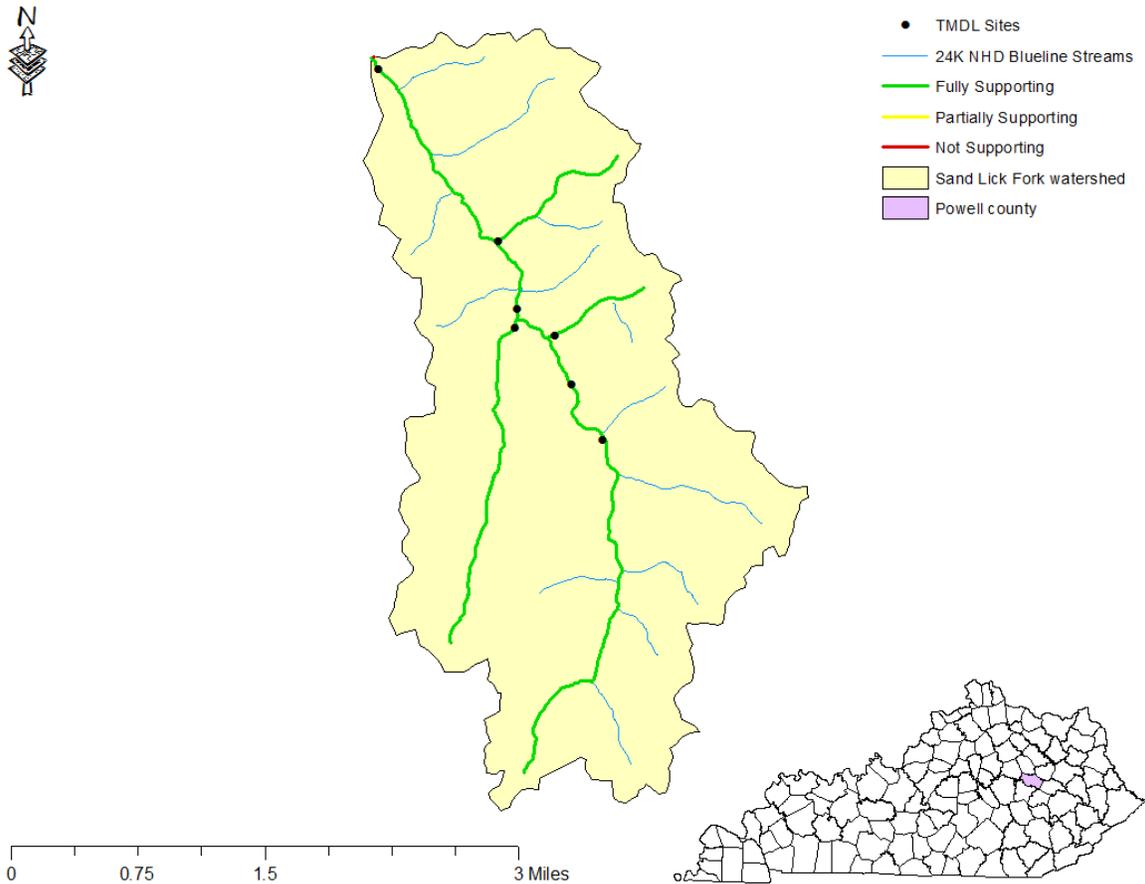


Figure 51. Aquatic life designated use attainment in the Sand Lick Fork watershed where data collected by the TMDL program was used for the assessment.

For all waterbodies assessed by the TMDL program for the 2016 IR, refer to the ‘TMDL Attainment’ tab of Program Workbook; for more specific information per assessment unit reference the 305(b) and the 303(d) tables.

Approved TMDLs

As of Feb 2017 DOW has submitted and EPA has approved TMDLs for 468 PWCs. There are 23 TMDLs for waterbodies that are meeting WQS, TMDLs remain in place for waterbodies regardless of their impairment status once they are approved by EPA. There are 2788 PWCs that require a TMDL (303(d) listed waters) (Figure 52).

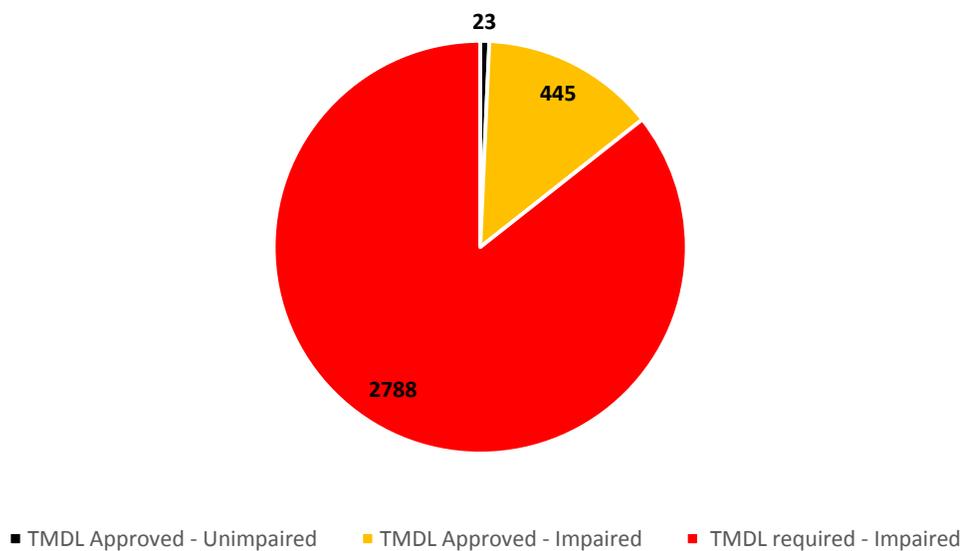


Figure 52. Number of TMDLs approved for unimpaired assessment units and impaired assessment units, and number of TMDLs required for assessment units impaired by a pollutant.

Prioritization for TMDL Development

EPA and state TMDL program managers began developing a new path forward for the TMDL program in August 2011, the CWA 303(d) Program Vision (henceforth referred to as ‘the vision’). The vision fosters multiple approaches and stakeholder engagement to enable watersheds to meet WQS, and to protect healthy watersheds. The vision also allows for flexible watershed management, but requires the support of many stakeholders, including the public, federal and state agencies to attain this common goal. The division submitted vision priorities for TMDL development prior to 2022 to EPA in fall of 2016, these priorities were developed with the 2014 303(d) listings and can be found in Appendix 1 (Figure 53). These priorities will be updated in May of 2018 with the up to date 2016 303(d) listings. TMDLs planned for public notice in 2018 and 2019 can be found in Appendix 2.

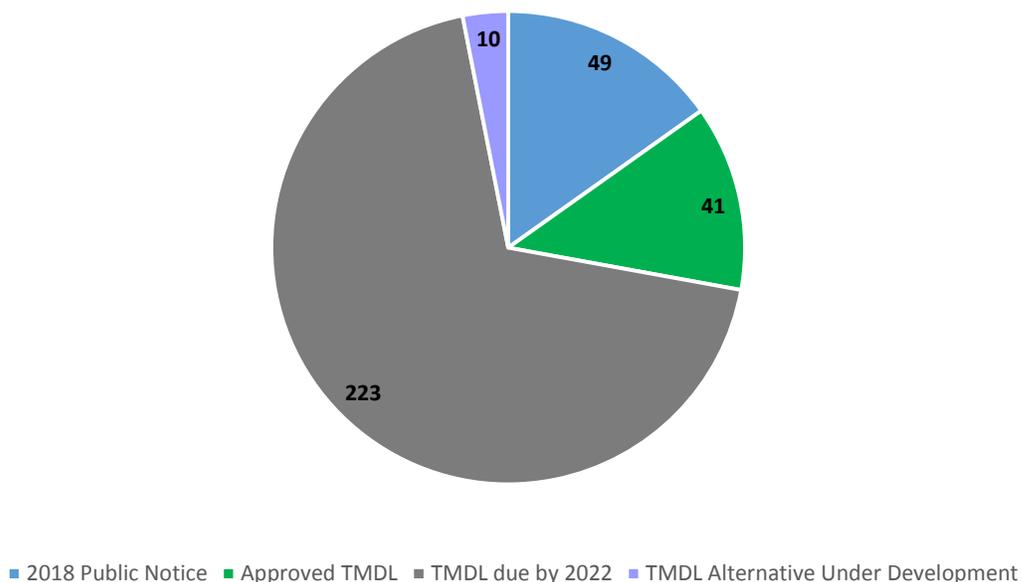


Figure 53. 2022 Clean Water Act 303(d) vision priorities submitted to EPA in the fall of 2016.

The top priority of division staff with TMDL development is addressing bacteria impairments in the commonwealth. The approach for meeting this priority was the development of a Statewide Bacteria TMDL methodology, this constitutes a core document and basin appendices. The Statewide Bacteria Core Document and Green and Tradewater Basin Appendices have been through an internal review and are expected to go to public notice in early 2018.

Other priorities include working with stakeholders to develop TMDL Alternatives where there are on the ground resources that would be more effective than TMDL development and implementation. The division has one TMDL Alternative under development with the cooperation of various stakeholders in the Gunpowder Creek Watershed. The metals, pH, and bacteria impairments addressed in the Pond Creek TMDL were also considered a priority by the division, this priority was met with the development and approval of a TMDL for the impairments in the watershed. The complete list of impairments addressed in these watersheds are not reflected in the TMDL priorities or the figure below, as they are based on the 2014 listings and there have been additional listings added to the 2016 303(d) list. These priorities and the newly listed pathogen impairments will be updated in May of 2018 as noted above.

Through the implementation of the vision the division is focusing internal resources on efficient TMDL development or more effective plans where it is appropriate. This effort is being undertaken in order to foster relationships with stakeholders to encourage engagement for improvement of water quality in the Commonwealth, be it through education or on the ground implementation of best management practices in watersheds. Additionally, this will allow the division to focus resources to address more complicated impairments effectively.

Other Programs and Outside Agencies

Other programs within the DOW and outside agencies contribute data that is used for assessment purposes. For this IR, the following programs and agencies contributed data that resulted in an assessment: DOW Nonpoint Source Pollution Control program, DOW Groundwater program, DOW Intensive Survey program, Kentucky Waterways Alliance (KWA), Kentucky Department of Fish and Wildlife Resources (KDFWR), the USFS, and Lexington-Fayette Urban County Government (LFUCG).

Nonpoint Source Program Description

Kentucky's Nonpoint Source Pollution (NPS) Control Program mission is to protect surface and groundwater from NPS pollution, to abate pollution threats, and to restore degraded waters so that WQS are met and beneficial uses are supported. The NPS Program is achieving these goals through federal, state, local, and private partnerships, which promote complimentary, regulatory, and non-regulatory NPS pollution control initiatives at both statewide and watershed levels. The Program serves as the lead for coordinating and documenting on-the-ground implementation of TMDLs and Watershed Plans in priority watersheds.

For this IR, 155 stations were visited within the following watersheds between 2009 and 2014. The NPS program either completed the sampling or coordinated with contractors who completed the sampling. The sampling at these watersheds provides baseline data in watersheds where 319 money is being spent to develop watershed plans and implement best management practices (BMPs) with the hopes of improving water quality.

- Bacon Creek in Hart and Larue counties in the Green River basin
- Currys Fork in Oldham county in the Salt River basin
- Darby Creek in Oldham county in the Ohio River basin
- Elkhorn Creek in Pike and Letcher counties in the Big Sandy River basin
- Hinkston Creek in Bourbon, Nicholas, Bath, and Montgomery counties in the Licking River basin
- Lower Howards Creek in Clark county in the Kentucky River basin
- Red Bird River in Bell, Clay and Leslie counties in the Kentucky River basin
- Triplett Creek in Rowan county in the Licking River basin
- Wolf Run in Fayette county in the Kentucky River basin
- Chestnut Creek in Marshall county in the Tennessee River basin
- Gunpowder Creek in Boone county in the Ohio River basin
- Sinking Creek in Laurel county in the Upper Cumberland River basin
- Brushy Creek in Pulaski and Rockcastle counties in the Upper Cumberland River basin
- Cane Run in Mercer county in the Kentucky River basin
- Greenbrier Creek in Montgomery county in the Licking River basin
- Stoner Creek in Bourbon and Clark counties in the Licking River Basin
- Woolper Creek in Boone county in the Ohio River basin

Assessment Results – NPS Program

The sampling completed or coordinated by the NPS program between 2009 and 2014 resulted in 109 updated or new assessment units.

Aquatic Life

49 assessment units were assessed for aquatic life; 23 were found to fully support aquatic life, 16 were found to partially support aquatic life, and 10 were found to not support aquatic life. Therefore, 26 segments are impaired (Figure 54). The causes associated with the impaired segments can be found in Table 33.

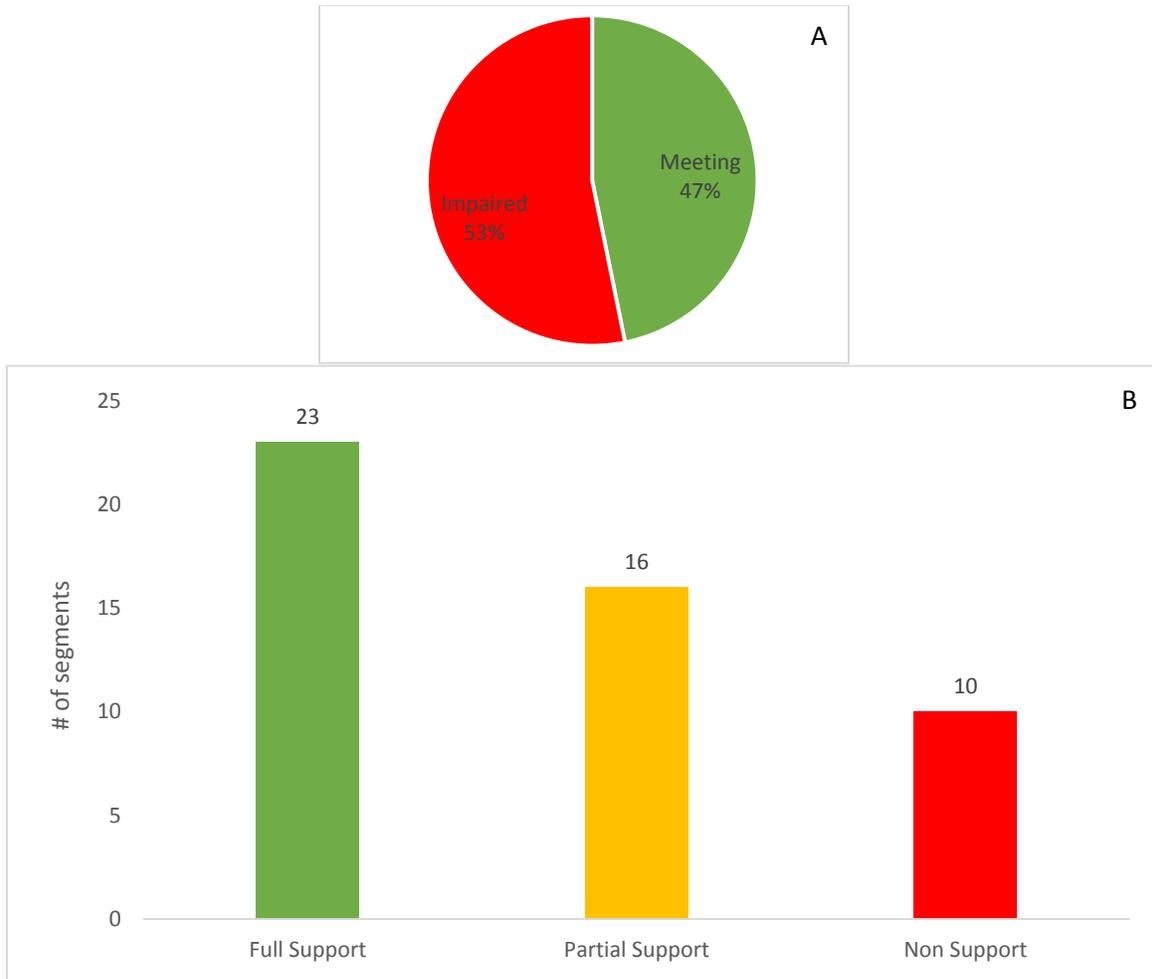


Figure 54. A) Percent impaired (partial and nonsupport) and percent meeting and B) attainment of all segments assessed for the **aquatic life** designated use where the assessment utilized data collected or coordinated by the **NPS program**.

Table 33. List of causes at **NPS program** sites impaired for **aquatic life**.

Cause Name	Number of Segments
Nutrient/Eutrophication Biological Indicators	18
Sedimentation/Siltation	10
Organic Enrichment (Sewage) Biological Indicators	5
Specific Conductance	4
Cause Unknown	3
Oxygen, Dissolved	2
Combined Biota/Habitat Bioassessments	2
Total Suspended Solids (TSS)	2
Total Kjeldahl Nitrogen (TKN)	1
Nitrogen (Total)	1
pH	1
Turbidity	1

Outstanding State Resource Waters

7 of the assessment units visited are designated as an OSRW, 5 of which were found to full support the OSRW designated use, while 2 were found to not support the OSRW designated use and are therefore impaired. The causes of impairment match the causes of impairment for the aquatic life designated along those specific assessment units, and include nutrient/ eutrophication biological indicators, organic enrichment (sewage) biological indicators, specific conductance, and combined biota/ habitat bioassessments.

Primary Contact Recreation

107 assessment units were assessed for PCR; 27 were found to fully support the PCR, 44 were found to partially support PCR, and 36 were found to not support PCR. Therefore, 80 segments are impaired (Figure 55). Looking specifically at the causes of impairment, 77 of the assessment units are impaired due to *E. coli*, 2 of the assessment units are impaired due to fecal coliform, and 1 assessment unit is impaired due to pH.

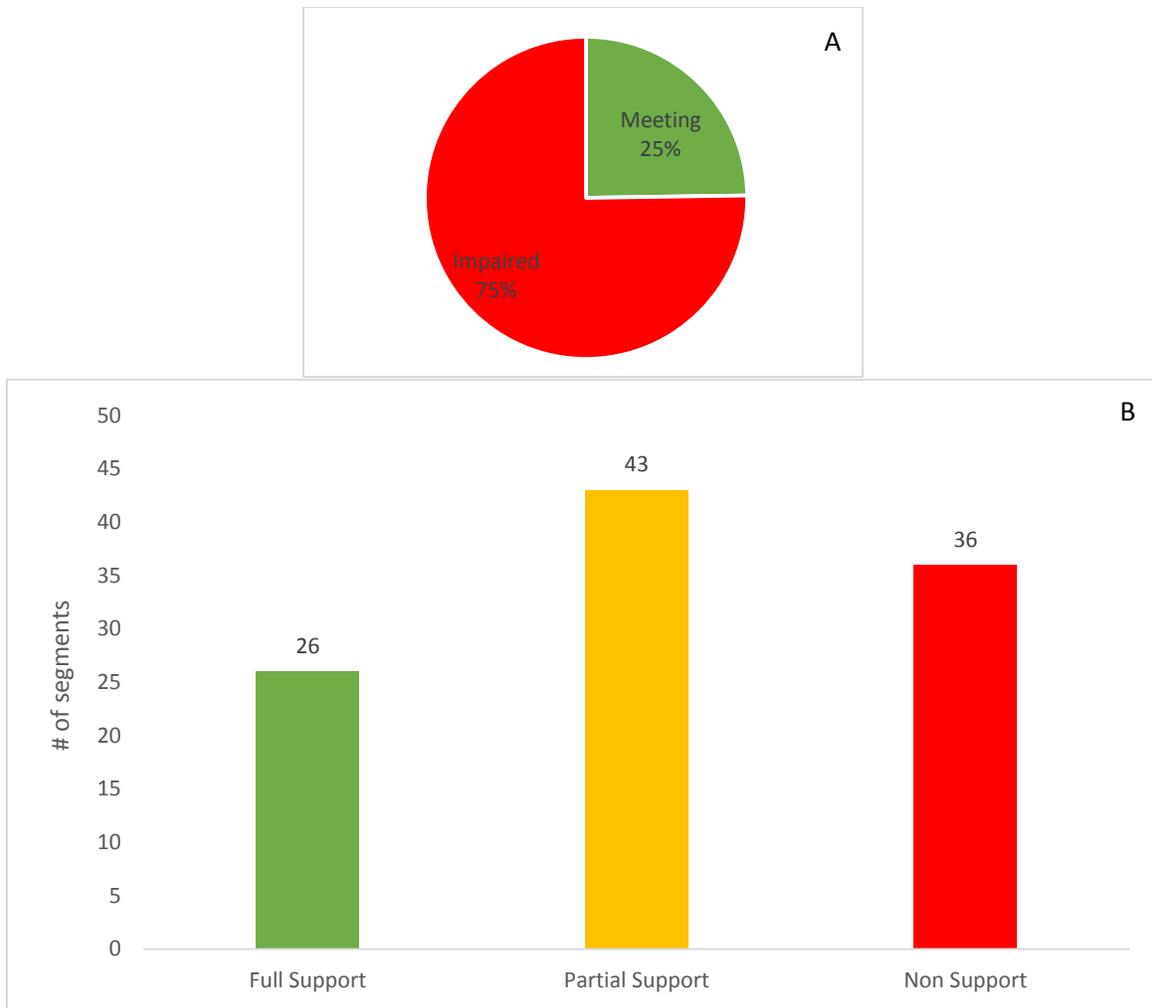


Figure 55. A) Percent impaired (partial and nonsupport) and percent meeting and B) attainment of all segments assessed for the **primary contact recreation** designated use where the assessment utilized data collected or coordinated by the **NPS program**.

Secondary Contact Recreation

13 of the assessment units have assessments for SCR. Eleven of these assessments are previous assessments carried forward to this IR; 6 are full support and 5 are impairments due to fecal coliform. Two assessments where the cause of impairment is pH were updated with new data for this IR; one assessment unit will remain impaired for pH, while one is being proposed for delisting.

Overall Assessment Results

The following TMDLs have been written for watersheds where NPS monitored between 2009 and 2014:

- Bacteria TMDL for the [Bacon Creek](#) watershed
- Bacteria TMDL for the [Chestnut Creek](#) watershed
- Bacteria TMDL for the [Wolf Run](#) watershed

Therefore, from the NPS program, there are

- 61 waterbody/ designated use combinations that are in category 2, where the assessed designated use is fully supporting
- 129 PWCs in category 5, which require a TMDL
- 10 PWCs in category 4A, where the cause is associated with an impairment and a TMDL has been written for that cause
- 3 PWCs in category 4C, where the cause of impairment is a pollution and therefore does not require a TMDL
- 7 PWCs in category 2B, where the pollutant is no longer causing an impairment, but is 303(d) listed and proposed to EPA for delisting

For all waterbodies assessed by the NPS program for the 2016 IR, refer to the 'NPS Attainment' tab of Program Workbook; for more specific information per assessment unit reference the 305(b) and the 303(d) tables.

Groundwater Program Description

Groundwater is a major source for public water systems that provide drinking water to more than 1.2 million Kentuckians. This includes water from public wells, springs, abandoned mines, and riverbank infiltration systems that supply large metropolitan areas. Groundwater is also a vital source for industry and agriculture, and is a contributing factor to the health of Kentucky's surface water systems through sustained recharge to streams, rivers, lakes, and wetland areas.

In 1998, legislation established the Kentucky Interagency Groundwater Monitoring Network. DOW's [groundwater section](#) maintains an active groundwater sampling and analysis program that monitors and assesses the quality of Kentucky's groundwater by collecting water samples from wells and springs. These samples are routinely analyzed for metals, nutrients, herbicides, pesticides, major inorganic ions, and organic and volatile organic compounds.

Assessment Results – Groundwater Program

The groundwater section and the WQB combined sampling efforts to collect the necessary data to assess 12 (see 'GW Stations tab of Program Workbook) springs for aquatic life and/ or PCR for this IR.

Aquatic Life

Of the 10 springs assessed for aquatic life, 7 were assessed as full support, 2 were assessed as partial support, and 1 was assessed as nonsupport, meaning 3 were found to be impaired for the aquatic life designated use. The causes of impairment were dissolved oxygen, nitrogen (total), or phosphorus (total) (Table 34).

Table 34. Assessment results for the **aquatic life** designated use for springs where data from the **groundwater** section were utilized.

Assessment Unit ID	Assessment Unit Name	WAH	Cause of Impairment
KY90001145_00	Big Spring	Fully Supporting	
KY90003741_00	Cohorn Spring	Fully Supporting	
KY90003861_00	Conway Spring	Partially Supporting	Oxygen, Dissolved
KY90001823_00	Harpending Spring	Fully Supporting	
KY90003740_00	Martin Spring	Fully Supporting	
KY90001825_00	Mill Bluff Spring	Fully Supporting	
KY90001853_00	Puckett Spring	Partially Supporting	Oxygen, Dissolved
KY90003742_00	Ruben Ray Spring	Fully Supporting	
KY90001855_00	Wallace Branch Spring	Fully Supporting	
KY90000055_00	Royal Spring 0.0 to 0.75	Not Supporting	Nitrogen (Total), Phosphorus (Total)

Primary Contact Recreation

Of the 11 springs assessed for PCR, 3 were assessed as full support, 6 were assessed as partial support, and 2 were assessed as nonsupport, meaning 8 were found to be impaired for the PCR designated use. The cause of impairment was always identified as *E. coli* (Table 35).

Table 35. Assessment results for the **primary contact recreation** designated use for springs where data from the **groundwater** section were utilized.

Assessment Unit ID	Assessment Unit Name	PCR	Cause of Impairment
KY90001145_00	Big Spring	Not Supporting	<i>E. coli</i>
KY90003741_00	Cohorn Spring	Fully Supporting	
KY90003861_00	Conway Spring	Fully Supporting	
KY90000157_00	Gardenside Spring	Partially Supporting	<i>E. coli</i>
KY90001823_00	Harpending Spring	Partially Supporting	<i>E. coli</i>
KY90003740_00	Martin Spring	Partially Supporting	<i>E. coli</i>
KY90001825_00	Mill Bluff Spring	Partially Supporting	<i>E. coli</i>
KY90001853_00	Puckett Spring	Partially Supporting	<i>E. coli</i>
KY90003742_00	Ruben Ray Spring	Fully Supporting	
KY90001855_00	Wallace Branch Spring	Partially Supporting	<i>E. coli</i>
KY90001161_00	McConnell Springs	Not Supporting	<i>E. coli</i>

Secondary Contact Recreation

One spring, McConnell Springs, has been assessed for SCR, and its attainment is full support for this designated use.

Overall Assessment Results

[Bacteria TMDLs](#) have been written for Gardenside Spring and McConnell Springs.

Therefore, from the groundwater program, there are

- 11 waterbody/ designated use combinations that are in category 2, where the assessed designated use is fully supporting
- 10 PWCs in category 5, which require a TMDL
- 2 PWCs in category 4A, where the cause is associated with an impairment and a TMDL has been written for that cause

For all waterbodies assessed by the groundwater program for the 2016 IR, refer to the 'GW Attainment' tab of Program Workbook; for more specific information per assessment unit reference the 305(b) and the 303(d) tables.

Other Internal and External Data Contributors – Assessment Results

DOW Intensive Survey program, KWA, KDFWR, the USFS, and LFUCG contributed data that was used to assess waterbodies for this 2016 IR. The sampling completed by these other programs or agencies resulted in 18 updated or new assessment units.

Aquatic Life

10 assessment units were assessed for aquatic life; 3 were found to fully support aquatic life, and 6 assessment units were found to partially support the aquatic life designated use and are therefore impaired. The causes associated with the impaired segments can be found in Table 36.

Primary Contact Recreation

15 assessment units were assessed for PCR; 3 were found to fully support the PCR designated use, 3 were found to partially support the PCR designated use, and 9 were found to not support the PCR designated use. Therefore, 12 assessment units were found to be impaired for PCR, and the cause of impairment is either *E. coli* or fecal coliform.

Table 36. Assessment results for the **aquatic life** designated use for waterbodies where data **from other programs and outside agencies** were utilized.

Cause Name	Number of segments
Nutrient/Eutrophication Biological Indicators	4
Sedimentation/Siltation	3
Habitat Assessment (Streams)	2
Cause Unknown	2
Oxygen, Dissolved	1
Specific Conductance	1
Organic Enrichment (Sewage) Biological Indicators	1

Overall Assessment Results

No TMDLs have been written for the waterbodies assessed by other programs or outside agencies, therefore, there are:

- 6 waterbody/ designated use combinations that are in category 2, where the assessed designated use is fully supporting
- 24 PWCs in category 5, which require a TMDL
- 2 PWCs in 4C, where the cause of impairment is a pollution and therefore does not require a TMDL

For all waterbodies assessed by the other programs or agencies for the 2016 IR, refer to the 'Other Attainment' tab of Program Workbook; for more specific information per assessment unit reference the 305(b) and the 303(d) tables.

Public Health

Domestic Water Supply

Drinking water standards apply to the source water at point of intake. While all waterbodies in the Commonwealth carry this designated use, it is only implemented through WQS where an active drinking water intake is located. The drinking water use support was assessed by review of the consumer confidence reports (CCR) over a five-year span. The annual CCR is based on the average annual quarterly results for contaminants as reported in monthly operating reports (MORs) and are required by the Safe Drinking Water Act. The average annual result of these quarterly data is determined for compliance purposes; if an average annual quarterly contaminant exceeds the MCL the source water does not support the designated use. The MCLs are based on concentration of each contaminant in the finished product distributed for public consumption.

For more information about drinking water source assessment and protection visit <http://water.ky.gov/DrinkingWater/Pages/DWSrcAssessProt.aspx>.

Assessment Results

There are 173 surface water intakes for DWS use for the commonwealth of Kentucky outlined in Table B of [401 KAR 10:026](#) (see 'DWS Locations' tab of Program Workbook). There are 138 waterbodies that have been assessed for DWS, which results in 943.9 stream or river miles, 180,366 lake or reservoir acres, and 0.75 miles of spring runs. Of those waterbodies assessed, all but Luzerene Lake (55 acres) fully supports the DWS designated use (Figure 56). Luzerene Lake, which has not been assessed for DWS since 1992, partially supports the designated use due to taste and odor, and nutrient/ eutrophication biological indicators (see 'DWS Attainment' tab of Program Workbook). However, this does not imply that the water from this facility is not safe to drink; it implies that, in the past, the facility faced additional challenges to ensure the water it provided was safe for consumption. Looking at the most recent CCRs for the facility, there have been no MCL violations in the past 5 years. Updating this assessment for the 2018 IR with more recent data will be a priority.

For all waterbodies assessed for the DWS designated use for the 2016 IR, refer to the 'DWS Attainment' tab of Program Workbook; for more specific information per assessment unit reference the 305(b) and the 303(d) tables.

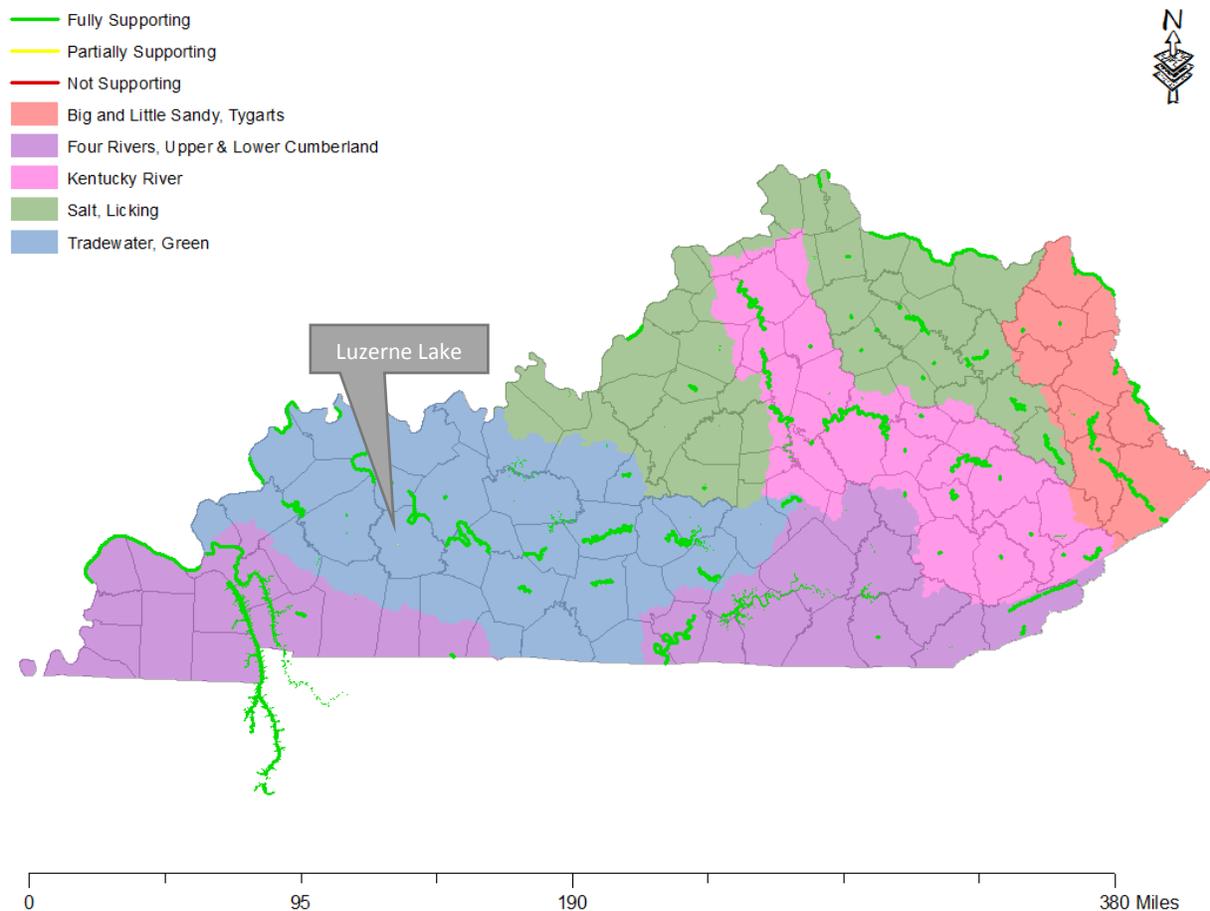


Figure 56. Attainment of the **domestic water supply** designated use displayed as full support (green) or partial support (yellow) statewide (no waterbodies are nonsupport for this designated use). Luzerne Lake, the only waterbody listed as partial support, is noted.

Fish Tissue Program

To reiterate, fish consumption is not a designated use in Kentucky, but it is implied as one in WQS ([401 KAR 10:031](#) Sections 2 and 6). Like contact recreation uses, this use is based on criteria to protect human health. Fish tissue is analyzed for possible residue of contaminants; the two contaminants of primary concern are methylmercury and polychlorinated biphenyl (PCB) chemicals.

Program Description

The Kentucky Department for Environmental Protection (KDEP) began collecting fish for tissue analysis in 1979. At that time, only whole body samples were collected from a small number of fixed biological

monitoring sites to assess contaminant levels that might impact fish communities. However, as concern for human health impacts from consuming sport fish grew, fillet samples became the main emphasis since this is the part of the fish most often consumed (although whole bodies were also collected in some areas).

In the 1980s, KDEP responded to the discovery of PCBs in streams such as West Fork Drakes Creek, Town Branch, and Mud River where fish consumption advisories are still in effect. During 1987, in addition to regular monitoring, special studies of fish contamination were undertaken in cooperation with other state and regional agencies in the lower Ohio and Mississippi rivers (chlordane), Levisa Fork, and Fishtrap Lake (PCB) and the National Dioxin Study for U.S. EPA.

In 1990, protocols were established with the Cabinet for Health Services outlining the procedures for issuing fish consumption advisories. According to these protocols, the KDFWR also participates in advisory issuance.

Since that time, the Kentucky DOW has continued to monitor fish tissue contamination at a rotating network of lake and stream sites throughout the state (see 'Fish Consumption Stations' tab in Program Workbook). In addition, the DOW cooperates with the Ohio River Valley Water Sanitation Commission (ORSANCO) on collecting and assessing data for the Ohio River.

Fish Consumption Advisories and Assessments

Several fish consumption advisories have been put in place, including one for the entire Ohio River, and a statewide advisory for mercury. The assessments and advisories differ, but are related. The consumption advisory is a set of guidelines to inform the population that consume locally caught fish. Based on fish advisory studies, there is evidence that the level of mercury may be elevated to a point that warrants consideration in the quantity of fish consumed statewide, but the actual contaminant residue is not known for the fish from a particular waterbody. For assessments, when actual monitored data indicate mercury concentrations at the level of nonsupport for a waterbody, sensitive members of the population (children under 6 years of age and pregnant or nursing women) should not consume the fish flesh from that waterbody (Table 37).

Table 37. Fish consumption advisory level, mercury concentration, and recommended meals for the general public and sensitive population in relation to assessment results for fish consumption.

Advisory Level	Mercury (mg/Kg)	General Public	Sensitive Population	Assessment Equivalent
Level 1	0.0 – 0.029	No Advisory	1 Meal/Week	Full Support
Level 2	0.030 – 0.23	1 Meal/Week	1 Meal/Month	Partial Support
Level 3	0.24 – 0.94	1 Meal/Month	6 Meals/Year	Partial Support
Level 4	0.95 – 1.90	6 Meals/Year	Do Not Eat	Nonsupport ¹⁹
Level 5	>1.90	Do Not Eat	Do Not Eat	Nonsupport

¹⁹ Nonsupport, according to Kentucky's CALM, is triggered at 1.1 mg/Kg mercury in fish tissue, so the transition from Level 3 to Level 4 advisory and transition from partial support to nonsupport attainment do not align.

The statewide fish consumption advisory for mercury suggests members of the sensitive population should consume no more than six meals per year of predatory fish and no more than one meal per month of panfish and bottom feeder fish, while the general public should consume no more than one meal per month of predatory fish and no more than one meal per week of panfish and bottom feeder fish (a meal is 8 ounces of fish flesh) (Table 38).

Table 38. Statewide fish consumption advisory for mercury for the general and sensitive populations outlined for 1) predatory fish, and 2) bottom feeder and panfish.

Location	Species	General Population	Sensitive Population ²⁰	Contaminant
Statewide	Predatory fish ²¹	1 meal per month	6 meals per year	Mercury
Statewide	Bottom feeder fish ²² and Panfish ²³	1 meal per week	1 meal per month	Mercury

More restrictive guidance for fish consumption is recommended for the waterbodies outlined in Table 39 since fish tissue collected from these waterbodies have had contaminant levels that were considered unsafe. The presence of fish consumption advisories is not used as a basis for attainment of the fish consumption designated use. Therefore, where fish consumption advisories occur for specific waterbodies, these recommendations should be considered over the use attainment decision for the fish consumption designated use.

²⁰ Sensitive Populations: Women of childbearing age and children 6 years and younger.

²¹ Predatory fish include: Bowfin, Smallmouth Bass, Spotted Bass, Largemouth Bass, White Bass and Striped Bass and their hybrids, Yellow Bass, Flathead Catfish, Blue Catfish, Musky, Sauger and Walleye and their hybrids, Chain Pickerel and all Gars.

²² Bottom feeder fish include: Bullhead species, Drum, Carp Sucker, White Sucker, Common Carp, Northern Hog Sucker, Channel Catfish, Buffalo species, Spotted Sucker, Redhorse species, Shovelnose Sturgeon and Creek Chub.

²³ Panfish include: Rock Bass, Green Sunfish, Longear Sunfish, Redear Sunfish, Bluegill and Crappie species.

Table 39. Fish consumption advisory for specific waterbodies within Kentucky, with the contaminant of concern noted.

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
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	Predatory fish/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
Knox Creek	Pike County	Flathead Catfish	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
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	Predatory fish	1 meal per week	1 meal per month	PCB

Fishtrap Lake	VA/KY state line to dam	Bottom feeder fish/White 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
Western KY Wildlife Management Area	McCracken County	All fish	No Consumption	No Consumption	Mercury

Fish consumption advisories were updated January 2016; for more information about fish consumption advisories in Kentucky, visit <http://water.ky.gov/waterquality/Pages/FishConsumption.aspx>.

Additionally, Ohio River advisories issued by ORSANCO can be found here: <http://216.68.102.178/comm/fishconsumption/default.asp>.

Assessment Results

Although fish tissue data is the preferred data type for assessing the fish consumption designated use, water column standards do apply to the designated use as outlined in Table 1 of [401 KAR 10:031](#). Therefore, the assessment results not only include assessments based on the results from the fish tissue program, but also include assessments where other programs collected sufficient water column data to assess for the designated use. Many of the assessments based on water column data are historic assessments that are carried forward; no new data was necessarily collected. For the Ohio River assessments, data collected by ORSANCO was compared to Kentucky’s WQS to make a use attainment decision for the fish consumption designated use.

Currently, there are 173 waterbodies assessed for the fish consumption designated use, 26 of which were updated for this IR. The assessments cover 1,791.2 stream or river miles, and 20,747.5 lake or reservoir acres. Of those assessed waterbodies, 75 (43%) were found to support the designated use, while 84 partially support and 14 do not support the designated use, which relates to 57% being impaired for fish consumption (Figure 57 and 58, see ‘Fish Consumption Attainment’ tab of Program Workbook). Of the 98 assessment units impaired for fish consumption, 49 are along the Ohio River. The causes of impairment are, in order of frequency, PCB in water column (all 49 OH river segments), dioxin (including 2,3,7,8-TCDD) (all 49 OH River segments), mercury in fish tissue, (21 segments), methylmercury (17 segments), PCB in fish tissue (15 segments), PCBs (2 segments), and cause unknown (1 segment on the OH River) (Table 40). These listings result in 154 PWCs in category 5, and are therefore placed on the 303(d) and require a TMDL.

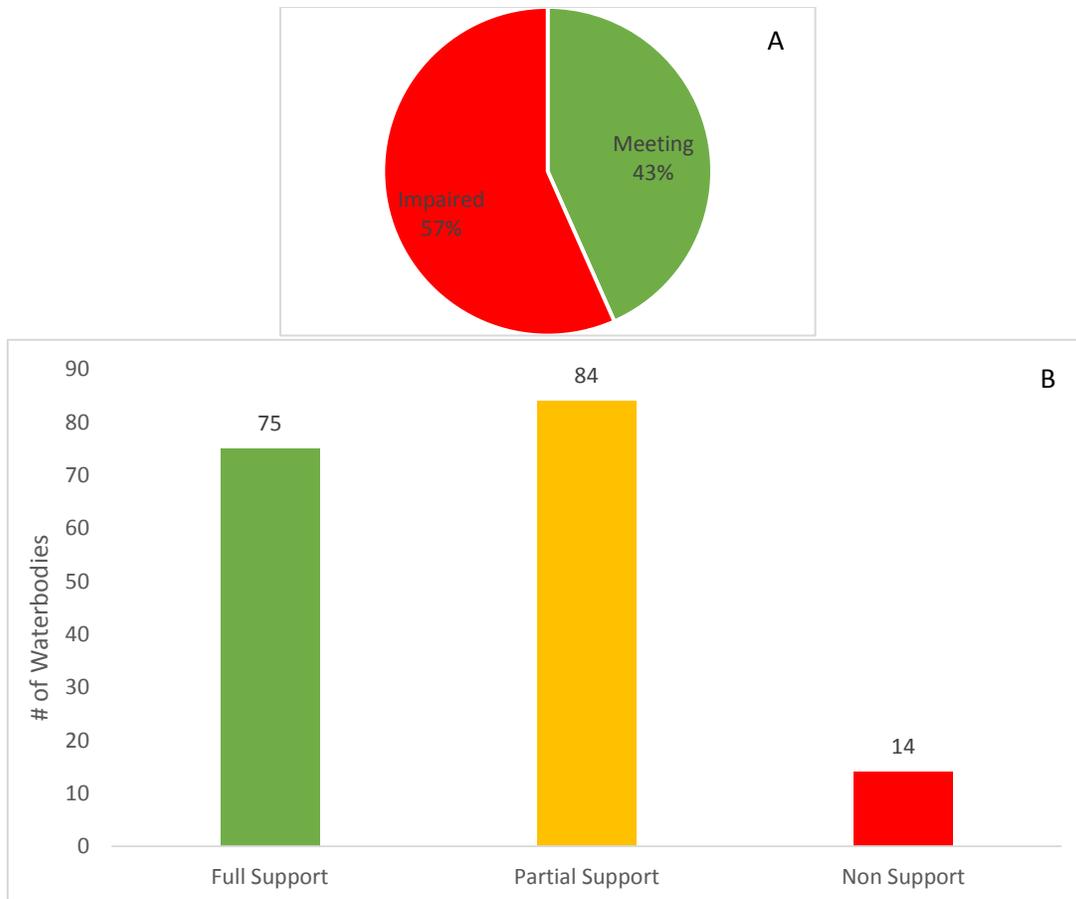


Figure 57. A) Percent impaired (partial and nonsupport) and percent meeting and B) attainment of all waterbodies that have been assessed for the **fish consumption** designated use.

Table 40. Causes of impairment associated with waterbodies found to be partial or nonsupport of the **fish consumption** designated use.

Cause	Number of Waterbodies
PCB in Water Column	49
Dioxin (including 2,3,7,8-TCDD)	49
Mercury in Fish Tissue	21
Methylmercury	17
PCB in Fish Tissue	15
PCBs	2
Cause Unknown	1

For all waterbodies assessed for the fish consumption designated use for the 2016 IR, refer to the 'Fish Consumption Attainment' tab of Program Workbook; for more specific information per assessment unit reference the 305(b) and the 303(d) tables.

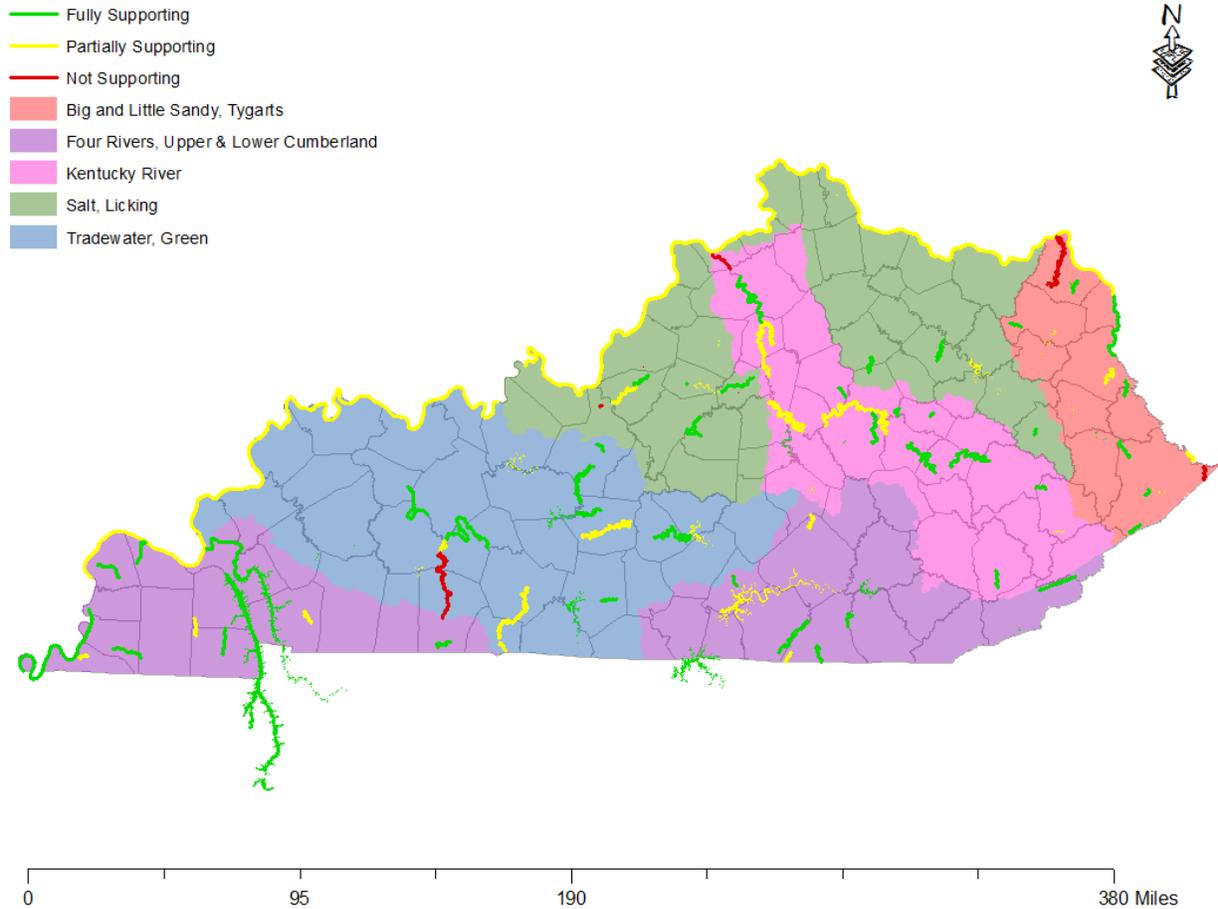


Figure 58. Attainment of the **fish consumption** designated use displayed as full support (green), partial support (yellow), or nonsupport (red).

Harmful Algal Blooms

Cyanobacteria are photosynthetic bacteria that live in all types of water in. They are also known as blue-green algae because of their blue-green appearance, which is caused by the presence of the blue pigment, phycocyanin. Cells of these bacteria commonly form chains, filaments, or mats. During certain times of the year, cyanobacteria can be the dominant component of the algae community in a river or lake. Certain environmental conditions allow for the prolific reproduction of blue-green cells forming a “bloom.” A bloom can take the appearance of a mat covering rocks on the bottom of a waterbody or a floating surface scum or mat. Blooms can be blue-green, lime green, pink or red depending upon the species of cyanobacteria that are forming the bloom (Figure 59).

Cyanobacteria are normal components of the planktonic community in Kentucky waters. During most of the year, their presence causes minimal negative impact to water quality or human/animal health. However, when blue-green algal blooms form, water quality and human/animal health can be negatively

impacted in several ways. Water quality is negatively impacted by the bloom causing discoloration of the water, drastic reductions and wide fluctuations in dissolved oxygen levels, increased turbidity and decreased light penetration. Fish may be negatively affected by an overall reduction in food availability or when oxygen levels drop and become limited in lakes. Public recreation is negatively impacted by blooms because the nuisance scums and mats make swimming or wading in the water less desirable. In lakes that serve as sources of drinking water, blue-green algal blooms can cause taste and odor problems resulting in increased lake management (i.e. application of copper sulfate or other algacide) and filtration costs. Additionally, blooms can clog filters at the intake structure causing increased maintenance costs.



Figure 59. Examples of Harmful Algal Blooms

Although the above-mentioned impacts are important issues to consider when cyanobacteria blooms form, the most significant issue could be the presence of toxins produced by the cyanobacteria cells as the bloom is occurring and during the dying off process. The cyanobacteria taxa can cause skin irritation and flu-like symptoms from endotoxins located within the cell walls. Additionally, these taxa can produce liver and nerve toxins, called cyanotoxins. Although not directly implicated in human death, exposure to cyanotoxins has been linked to liver disease/cancer, respiratory problems, and nervous system problems. Health risks from contact or ingestion exposure of cyanotoxins are increased for the elderly, young children, pregnant women, and persons with suppressed immune systems. General

contributing factors that promote the formation of harmful algal blooms (HABs) are: 1) ample sunlight, 2) warm water temperatures, 3) low-water or low-flow conditions, and 4) excessive nutrients (nitrogen and phosphorus).

DOW and the U.S. Army Corps of Engineers (USACE) began testing and documenting cyanobacteria in 2013 in 5 USACE reservoirs and 14 additional non-USACE reservoirs using cell counts (the number of cyanobacteria cells in a milliliter of water). Based on elevated cell counts in 2014, DOW and USACE identified the presence of potential HABs at Barren River Reservoir, Beaver Lake, Campbellsville City Reservoir, Carpenters Lake, General Butler State Park Reservoir, Green River Reservoir, Greenbrier Creek Reservoir, Guist Creek Lake, Lake Reba, Long Run Lake, McNeely Lake, Nolin Reservoir, Reformatory Lake, Rough River Reservoir, Taylorsville Reservoir, and Willisburg Lake.

In 2015, DOW began working with other agencies in the state to develop protocols for sampling and issuing HAB-related advisories based on microcystin and cylindrospermopsin toxin concentrations in recreational waters. Cyanotoxin concentrations are a more reliable indicator of potential health concerns than relying on cell counts alone, as the presence of cyanobacteria does not necessarily indicate that toxins are present also. For the 2015 recreation season, DOW and USACE revisited the reservoirs that had HAB recreational advisories in 2014 and collected samples for cyanotoxin testing during June-August of 2015. Most of the reservoirs had toxin levels that were below the laboratory detection limit at the time sampled. However, Herrington Lake and Lake Reba experienced microcystin toxin levels above 20 ug/L during the 2015 season. The bloom at Herrington Lake was short-lived and disappeared before an advisory could be issued. Additionally, the Ohio River had elevated microcystin levels in August-October 2015 that prompted the issuance of advisories for the Ohio River and direct tributaries from the West Virginia state line to the Cannelton Locks and Dam near Cannelton, IN.

In 2016, 12 reservoirs, 3 rivers, and 2 streams were sampled due to visible blooms or reported illnesses. The reservoirs included the FFA Lake in Breckinridge Co., Herrington Lake, Washburn Lake, Beaver Lake, Boltz Lake, Greenbrier Lake, Briggs Lake, Nolin Lake, Rough River Lake, Williamstown Lake, Reformatory Lake, and Lake Beshear. The Kentucky River (near Frankfort, KY), Cumberland River (Livingston area), Ohio River near Olmstead L&D, Benson Creek (Frankfort, KY), and Goose Creek were also visited. Following sampling, advisories were issued for the FFA Lake, Boltz Lake, and Briggs Lake based on elevated cyanotoxin results. The recreational advisories were lifted for Briggs Lake and the FFA Lake in December 2016, while the advisory for Boltz Lake was lifted in June 2017.

The HABs advisory webpage can be found at the following link:
<http://water.ky.gov/waterquality/pages/HABS.aspx>.

Swimming Advisories

On July 1st, 2014, the Kentucky DOW and the Department for Public Health announced swimming advisories. 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. For a list of waterbodies where the swimming advisory applies, visit <http://water.ky.gov/waterquality/Pages/SwimmingAdvisories.aspx>.

Additionally, DEP issues water recreation guidelines at the beginning of each recreation season. The Water Recreation Guidelines issued for 2016 can be found at <https://kydep.wordpress.com/2017/05/16/water-recreation-guidelines-issued-for-summer-season-2/>.

Water Quality Improvements

Delisting Section

With each IR, Kentucky DOW requests to delist either specific pollutants or entire assessment units from the 303(d) list. These delisting requests can be due to improvement in water quality or because listing methodology has been updated and a pollutant or attainment determination no longer applies. For the 2016 IR, DOW requested delisting for 68 PWCs from 48 assessment units for 22 unique pollutants (Table 41). For more specific information about the delisting requests, refer to the tab entitled “Delisting Requests” of the 2016 303(d). EPA has approved delisting requests for nearly 500 PWCs to date. Delisting approval is granted when DOW demonstrates that a PWC listed in Category 5 does not require a TMDL. The approval of a delisting request results in the removal of the PWC from the 303(d) list. The assessment unit may still have PWCs that remain on the 303(d) and require a TMDL for different pollutants.

Table 41. Number of delisting requests for the 2016 IR per basin.

Basin	2016 Delisting Requests
Big Sandy	14
Green River	11
Kentucky River	14
Licking River	1
Little Sandy River	2
Lower Cumberland River	2
Ohio River direct tributaries	7
Salt River	5
Tennessee River	3
Upper Cumberland River	9
Total	68

Nonpoint Source Program

Due to the numerous causes and sources of NPS pollution, Kentucky’s NPS Management Program partners with a wide variety of organizations including other state, local, and federal agencies as well as private partners to promote non-regulatory pollution control initiatives at the statewide, regional, and local levels. Improvements in designated use support are documented and reported to EPA annually in the form of [Nonpoint Source Success Stories](#). Detailed implementation efforts are outlined in the DOW’s [NPS Management Plan](#) and the [NPS Program Annual Report to EPA](#).

Implementation

Looking specifically at implementation activities that took place between September 2012 and September 2014 (the time frame where most data was collected for this IR), 41 types of BMPs were installed in 160 locations covering 29 projects. The NPS program will continue to track these projects with follow up monitoring to document what type of water quality improvements result from these BMP efforts. For project information, refer Appendix 3.

Success Stories

In 2013, the Licking River was highlighted as a success story for improvements to dissolved oxygen levels that resulted from BMPs and outreach and education activities. For the full story, visit https://www.epa.gov/sites/production/files/2015-10/documents/ky_licking-2.pdf.

In 2014, Townsend Creek was highlighted as a success story for reduced loads of bacteria that resulted from installing agricultural BMPs. For the full story, visit https://www.epa.gov/sites/production/files/2015-11/documents/ky_townsend.pdf.

Water Pollution Control Program

Program Description

The CWA prohibits releasing any wastewater containing pollutants into waters of the Commonwealth unless the discharge is permitted through the [Kentucky Pollutant Discharge Elimination System](#) (KPDES). The KPDES permit establishes the amount of pollutant that can be discharged from industrial facilities, publicly owned treatment works, and other activities without harming human health or the environment. The KPDES program has three types of permits: individual permits with site specific requirements, general permits that cover industries with similar activities and processes, and state-authorized permits that place limits on activities that may cause harm to waters of the Commonwealth.

Combined Sewer Overflows and Sanitary Sewer Overflows

Many older cities in Kentucky have sewer systems designed to manage both sanitary wastewater and stormwater in the same piping system. During high rainfall events, the flow of stormwater combined with the sanitary wastewater becomes too much for a city's sewer system to manage, and the excess water is discharged. This is referred to as a Combined Sewer Overflow (CSO).

Some cities have sewer systems with piping dedicated to manage sanitary water and separate piping to manage stormwater. Periodically, entire sewer systems will overflow and the wastewater enters the stormwater piping. This discharge from a sewer system is known as a Sanitary Sewer Overflow (SSO).

Sixteen Kentucky communities are under federal consent orders to eliminate SSOs and to repair systems to reduce CSOs. Communities implement projects to manage wastewater capacity and develop long term control plans. The projects often include repairing sewer lines and increasing the storage capacity in the

sewer system. Final completion dates of these projects vary depending on the scope of work and financial considerations (Table 42).

Table 42. Combined Sewer Overflows and Sanitary Sewer Overflows mitigation projects in Kentucky.

Community	Expected Completion Date
Ashland	12/31/2025
Catlettsburg	12/31/2014
Frankfort	12/31/2023
Harlan	12/31/2020
Henderson	3/31/2015
LFUCG	12/31/2026
Louisville MSD	12/31/2024
Loyall	10/31/2017
Maysville	12/28/2015
Morganfield	12/28/2018
Northern KY SD1	12/31/2025
Owensboro RWRA	12/31/2026
Paducah JSA	12/31/2038
Pikeville	Completed 07/01/2014
Pineville	09/5/2017
Prestonsburg	Completed 10/01/2015
Vanceburg	Completed 12/31/2012
Winchester	12/31/2025
Worthington	12/31/2015

There are 230 Kentucky communities that have varying degrees of aging infrastructure that cause bypasses and overflows at wastewater treatment plants. DOW personnel inspect approximately 10% of the systems in these communities, 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.

Nutrient Monitoring

Monitoring of the influent and effluent for total phosphorus and total nitrogen is included on KPDES permits. Excess nutrients impede water quality by causing adverse effects on natural water chemistry and indigenous aquatic community. 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.

Cost/Benefit Assessment

The [Clean Water State Revolving Fund](#) (CWSRF) and [Drinking Water State Revolving Fund](#) (DWSRF) are environmental programs implemented by the states with support from EPA. These programs address the costs associated with wastewater and drinking water, respectively. Since 2007, Kentucky has

invested \$764,779,773 in wastewater projects and \$258,696,139 in drinking water projects (Table 43). Visit the following reports for more information:

[Clean Water SRF Program Information for the State of Kentucky](#)

[Drinking Water State Revolving Fund Program Information for the State of Kentucky](#)

Table 43. 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	\$630,454,505.00	\$123,988,451.00
2008	No Data	\$7,348,924.00
2009	\$153,528,182.00	\$47,132,853.00
2010	\$244,090,672.00	\$43,266,284.00
2011	\$73,920,155.00	\$32,789,765.00
2012	\$137,248,729.00	\$41,980,912.00
2013	\$38,615,084.00	\$19,899,509.00
2014	\$37,913,020.00	\$20,452,413.00
2015	\$43,067,011.00	\$24,150,899.00
2016	\$36,396,920.00	\$21,674,580.00
Since 2007	\$764,779,773.00	\$258,696,139.00
Cumulative	\$1,395,234,278.00	\$382,684,590.00

Putting a dollar figure on the costs associated with water pollution is difficult to determine. The costs outlined above are only a portion of the total costs to society. The following resources are provided for the reader interested in learning more about this topic.

- [Ecological Benefits Assessment](#) (EPA 2006)
- [The Economic Benefits of Protecting Healthy Watersheds](#) (EPA 2012)
- [Forests for Water: Exploring Payments for Watershed Services in the U.S. South](#) (Hanson et al 2011)
- [Linking water quality and well-being for improved assessment and valuation of ecosystem services](#) (Keeler et al 2012)
- [A Compilation of Cost Data Associated with the Impacts and Control of Nutrient Pollution](#) (EPA 2015)
- [Healthy Watersheds Protection](#) webpage (EPA 2017)

Program Enhancement

For the 2016 and previous IRs, the DOW utilized the Assessment Database (ADB) to store designated use assessments and produce tables for the IR. ADB had been modified to function per the particular needs of Kentucky DOW.

In 2014 EPA began redesigning the Assessment, TMDL Tracking, and Implementation System (ATTAINS). The ATTAINS re-design project is part of the larger Water Quality Framework, which seeks to better integrate EPA's existing data systems. The framework will first focus on the ATTAINS data system. This program will provide an electronic avenue to submit IR data to EPA and make that data visible to the public. One goal of this workgroup will be to redesign the ATTAINS data system and make it the system of record for strategic measures reporting to reduce the reporting burden on states.

Kentucky DOW is currently developing its own database, the Kentucky Assessment and TMDL Tracking System (KATTS), using money received from an Exchange Network grant. The KATTS database will provide state specific needs for the assessment and TMDL programs, and will be used to flow its IR data directly to ATTAINS where the public interface can be used to view information about Kentucky's waterways. By developing a Kentucky specific database, the DOW has the opportunity to leverage our existing database (Kentucky Water Assessment Data for Environmental Management (K-WADE)), which stores Kentucky's water quality and biological data, as the foundation of our assessment process. KATTS will also will increase transparency outside and within the agency and seeks to improve public communication about assessed and impaired waters throughout Kentucky.

Public Participation

Public Notice

Between May 2, 2017 and July 28, 2017 the DOW published the 2016 draft 303(d) list of impaired waters requiring a TMDL for public comment, as required by the federal CWA. Notification was sent via Commonwealth of Kentucky Energy and Environment Cabinet press release. Additionally, the public notice was distributed electronically through the TMDL Listserv, which is a list of persons interested in TMDL-related issues. Comments received were incorporated where necessary. Responses to comments can be found in Appendix 4.

Water Health Portal

The division maintains the Kentucky Water Health Portal (WHP) as a public resource for communication of the status of water quality in the commonwealth. The draft 2016 305(b) data was published to the WHP at the beginning of the public comment period.

To find information about any waterway in Kentucky, visit the Water Health Portal at <http://watermaps.ky.gov/WaterHealthPortal/>. Type in your location, click on a stream, and learn about the health of any assessed waterway. There are easy identifiable color-coded icons that indicate whether a stream or lake supports a particular use, such as swimming, fishing, and drinking.

Stay Informed / Get Involved

TMDL Listserv

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

Watershed Planning Webpage (basin coordinators)

You can also visit the Watershed Planning webpage to see what's going on in your basin at <http://water.ky.gov/watershed/Pages/default.aspx>. Each basin has a coordinator and they are happy to help and answer any questions you may have.

Bibliography

Compton, M.C., G.J. Pond, and J.F. Brumley. 2003. Development and application of the Kentucky Index of Biotic Integrity (KIBI). Kentucky Department for Environmental Protection, Division of Water. Frankfort, Kentucky. http://water.ky.gov/Documents/QA/MBI/KIBI_paper.pdf

Hanson, Criag, John Talberth, and Logan Yonavjak. 2011. Forests for Water: Exploring Payments for Watershed Services in the U.S. South. Southern Forests for the Future Incentives Series, Issue Brief 2. World Resources Institute, Washington D.C. Online publication at http://www.wri.org/sites/default/files/pdf/forests_for_water.pdf

Keeler, Bonnie L., Stephen Polasky, Kate A. Brauman, Kris A. Johnson, Jacques C. Finlay, Ann O'Neill, Kent Kovacs, and Brent Dalzell. 2012. Linking water quality and well-being for improved assessment and valuation of ecosystem services. Proceedings of the National Academy of Sciences of the United States of America, Vol. 109, No. 45, 18619 – 18624. Online publication at <http://www.pnas.org/content/pnas/109/45/18619.full.pdf>

Kentucky Administrative Regulations. 2016. 401 KAR 10:026 Designation of uses of surface waters, effective 7/8/2016. Frankfort, KY. <http://www.lrc.ky.gov/kar/401/010/026.htm>

Kentucky Administrative Regulations. 2016. 401 KAR 10:030 Antidegradation policy implementation methodology, effective 7/8/2016. Frankfort, KY. <http://www.lrc.ky.gov/kar/401/010/030.htm>

Kentucky Administrative Regulations. 2016. 401 KAR 10:031 Surface water standards, effective 7/8/2016. Frankfort, KY. <http://www.lrc.ky.gov/kar/401/010/031.htm>

Kentucky Administrative Regulations. 2013. 401 KAR 10:001 Definitions for 401 KAR Chapter 10, effective 4/5/2013. Frankfort, KY. <http://www.lrc.ky.gov/kar/401/010/001.htm>

Kentucky Department for Environmental Protection. 2017. Water Recreation Guidelines Issues for Summer Season. Naturally Connected, a blog of the Kentucky Energy and Environment Cabinet. Frankfort, KY. <https://kydep.wordpress.com/2017/05/16/water-recreation-guidelines-issued-for-summer-season-2/>

Kentucky Division of Water. 2016. Drinking Water. Kentucky Department for Environmental Protection, Division of Water. Frankfort, Kentucky. <http://water.ky.gov/DrinkingWater/Pages/default.aspx>

Kentucky Division of Water. 2016. Nonpoint Source Pollution Annual Report. Kentucky Department for Environmental Protection, Division of Water. Frankfort, KY. <http://water.ky.gov/nsp/Documents/NPS%20Annual%20Report.pdf>

Kentucky Division of Water. 2016. Nonpoint Source Program. Kentucky Department for Environmental Protection, Division of Water. Frankfort, Kentucky. <http://water.ky.gov/nsp/Pages/default.aspx>

Kentucky Division of Water. 2016. Special Use Waters. Kentucky Department for Environmental Protection, Division of Water, Frankfort, Kentucky.

<http://water.ky.gov/waterquality/Pages/SpecialUseWaters.aspx>

Kentucky Division of Water. 2016. Total Maximum Daily Load Program. Kentucky Department for Environmental Protection, Division of Water. Frankfort, Kentucky.

<http://water.ky.gov/waterquality/Pages/TMDLProgram.aspx>

Kentucky Division of Water. 2016. Water Advisories. Kentucky Department for Environmental Protection, Division of Water. Frankfort, Kentucky.

<http://water.ky.gov/waterquality/Pages/WaterAdvisories.aspx>

Kentucky Division of Water. 2016. Wastewater Discharge. Kentucky Department for Environmental Protection, Division of Water. Frankfort, Kentucky.

<http://water.ky.gov/permitting/Pages/WastewaterDischarge.aspx>

Kentucky Division of Water. 2016. Water Quality Standards. Kentucky Department for Environmental Protection, Division of Water. Frankfort, Kentucky.

<http://water.ky.gov/waterquality/Pages/WaterQualityStandards.aspx>

Kentucky Division of Water. 2015. Consolidated assessment and listing methodology: surface water quality assessment in Kentucky, the Integrated Report. Kentucky Department for Environmental Protection, Division of Water, Frankfort, Kentucky.

<http://water.ky.gov/Documents/QA/Surface%20Water%20SOPs/CALM%20SOP%20for%20Assessment%20signed.pdf>

Kentucky Division of Water. 2014. Integrated Report to Congress on the condition of water resources in KY, 2014. Kentucky Department for Environmental Protection, Division of Water. Frankfort, Kentucky.

<http://water.ky.gov/waterquality/Integrated%20Reports/KY%20IR%20VI-2014.pdf>

Kentucky Division of Water. 2014. Nonpoint Source Management Plan. Kentucky Department for Environmental Protection, Division of Water. Frankfort, KY.

<http://water.ky.gov/nsp/Documents/NPS%20Management%20Plan%20-%20Final%20EPA%20R4.pdf>

Ohio River Valley Water Sanitation Commission. 2016. Assessment of Ohio River Water Quality Conditions, 2010 – 2014. Cincinnati, Ohio. [http://www.orsanco.org/wp-](http://www.orsanco.org/wp-content/uploads/2016/07/2016-305b-Report-Final-Draft.pdf)

[content/uploads/2016/07/2016-305b-Report-Final-Draft.pdf](http://www.orsanco.org/wp-content/uploads/2016/07/2016-305b-Report-Final-Draft.pdf)

Pond, G.J., S.M. Call, J.F. Brumley and M.C. Compton. 2003. The Kentucky macroinvertebrate bioassessment index: derivation of regional narrative ratings for wadeable and headwater streams. Kentucky Department for Environmental Protection, Division of Water, Frankfort, Kentucky.

http://water.ky.gov/Documents/QA/MBI/Statewide_MBI.pdf

U.S. Environmental Protection Agency. 2018. Clean Water State Revolving Fund (CWSRF) National Information Management System Reports. Office of Water. Washington D.C.
<https://www.epa.gov/cwsrf>

U.S. Environmental Protection Agency. 2018. Drinking Water State Revolving Fund National Information Management System Reports. Office of Water. Washington D.C.
<https://www.epa.gov/drinkingwatersrf>

U.S. Environmental Protection Agency. 2017. Clean Water SRF Program Information for the State of Kentucky. Office of Water. Washington D.C. Online publication at
<https://www.epa.gov/sites/production/files/2016-12/documents/ky.pdf>

U.S. Environmental Protection Agency. 2017. Drinking Water State Revolving Fund Program Information for the State of Kentucky. Office of Water. Washington D.C. Online publication at
https://www.epa.gov/sites/production/files/2018-01/documents/kydw17_508.pdf

U.S. Environmental Protection Agency. 2017. Healthy Watershed Protection. Office of Water. Washington D.C. <https://www.epa.gov/hwp>

U.S. Environmental Protection Agency. 2017. Nonpoint Source Success Stories. Office of Water. Washington D.C. <https://www.epa.gov/nps/nonpoint-source-success-stories>

U. S. Environmental Protection Agency. 2016. Grants Reports and Tracking. Office of Water. Washington D.C. <https://www.epa.gov/nps/grants-reporting-and-tracking-system-grts>

U.S. Environmental Protection Agency. 2015. A Compilation of Cost Data Associated with the Impacts and Control of Nutrient Pollution. EPA-820-F-15-096. Office of Water. Washington D. C. Online publication at <https://www.epa.gov/sites/production/files/2015-04/documents/nutrient-economics-report-2015.pdf>

U.S. Environmental Protection Agency. 2012. The Economic Benefits of Protecting Healthy Watersheds. EPA-841-N-12-004. Office of Water. Washington D.C. Online publication at
<https://nepis.epa.gov/Exe/ZyPDF.cgi/P100NB86.PDF?Dockey=P100NB86.PDF>

U.S. Environmental Protection Agency. 2006. Ecological Benefits Assessment Strategic Plan. EPA-240-R-06-001. Office of the Administrator, Washington, DC. Online publication at
<https://nepis.epa.gov/Exe/ZyPDF.cgi/P100N0ZW.PDF?Dockey=P100N0ZW.PDF>

U.S. Environmental Protection Agency. 2006. Wadeable streams assessment: a collaborative survey of the Nation's streams. EPA 841-B-06-002. Office of Water. Washington, D.C.

U. S. Environmental Protection Agency. 2005. Guidance for 2006 assessment, listing and reporting requirements pursuant to sections 303(d), 305(b) and 314 of the clean water act. Office of Water. Washington, D.C.

U. S. Environmental Protection Agency. 1997. Guidelines for preparation of the comprehensive state water quality assessments (305(b) Reports) and electronic updates. Office of Water. Washington, D.C.

Appendices

Appendix 1. Vision priorities for TMDL development prior to 2022 to EPA in fall of 2016, these priorities were developed with the 2014 303(d).

Waterbody Name	Waterbody ID	Cause Name	Plan
West Fork Red River 14.75 to 26.8	KY1269347_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Little Bee Lick Creek 0 to 2.6	KY2743838_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Ten Mile Creek 0.0 to 3.0	KY485704_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Ten Mile Creek 3.0 to 11.9	KY485704_02	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Woolper Creek 2.8 to 7.45	KY485711_01	FECAL COLIFORM	TMDL Under Development
Woolper Creek 11.9 to 14.0	KY485711_02	FECAL COLIFORM	TMDL Under Development
Angle Creek 0.0 to 0.8	KY485958_01	FECAL COLIFORM	TMDL Under Development
Arnolds Creek 0 to 10.8	KY486059_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Ashers Run 0.0 to 4.8	KY486088_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Ashers Run 0.0 to 4.8	KY486088_01	FECAL COLIFORM	TMDL Under Development
Banklick Creek 0.0 to 3.45	KY486315_01	FECAL COLIFORM	TMDL Under Development
Banklick Creek 3.45 to 8.2	KY486315_02	FECAL COLIFORM	TMDL Under Development
Banklick Creek 8.2 to 19.2	KY486315_03	FECAL COLIFORM	TMDL Under Development
UT of Bat East Creek 0 to 3.3	KY486462-1.6_01	<i>ESCHERICHIA COLI (E. COLI)</i>	Approved TMDL
UT of Bat East Creek 0 to 1.9	KY486462-6.1_01	<i>ESCHERICHIA COLI (E. COLI)</i>	Approved TMDL
Bat East Creek 0.0 to 3.3	KY486462_01	COPPER	Approved TMDL
Bat East Creek 0.0 to 3.3	KY486462_01	<i>ESCHERICHIA COLI (E. COLI)</i>	Approved TMDL
Bat East Creek 0.0 to 3.3	KY486462_01	LEAD	Approved TMDL
Bear Creek 0.6 to 1.6	KY486552_00	FECAL COLIFORM	TMDL Under Development
Bear Creek 4.0 to 7.2	KY486553_02	FECAL COLIFORM	TMDL Under Development
Bear Creek 0.0 to 2.0	KY486557_01	FECAL COLIFORM	TMDL Under Development
Beaver Creek 8.5 to 15.5	KY486609_01	FECAL COLIFORM	2018
Big Bee Lick Creek 0 to 4.2	KY486674_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Beech Creek 0 to 3.9	KY486697_01	CADMIUM	Approved TMDL
Beech Creek 0 to 3.9	KY486697_01	COPPER	Approved TMDL
Beech Creek 0 to 3.9	KY486697_01	IRON	Approved TMDL
Beech Creek 0 to 3.9	KY486697_01	NICKEL	Approved TMDL
Beech Creek 0 to 3.9	KY486697_01	ZINC	Approved TMDL

Beech Creek 4.6 to 19.6	KY486700_01	FECAL COLIFORM	TMDL Under Development
Beech Fork 39.5 to 50.4	KY486703_02	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Big Creek 0.0 to 1.9	KY487161_01	FECAL COLIFORM	TMDL Under Development
Big Reedy Branch 0.0 to 2.4	KY487230_01	FECAL COLIFORM	2018
Big South Fork 0.0 to 12.65	KY487258_01	FECAL COLIFORM	TMDL Under Development
Blackford Creek 0.0 to 3.8	KY487412_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
UT of Blacks Creek 0.0 to 1.7	KY487421-2.7_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
UT of Blacks Creek 0.0 to 2.3	KY487421-3.0_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Blacks Creek 0.0 to 5.7	KY487421_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Blaine Creek 35.0 to 39.8	KY487428_02	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Blaine Creek 35.0 to 39.8	KY487428_02	FECAL COLIFORM	TMDL Under Development
Bogges Creek 0 to 3.0	KY487614_01	<i>ESCHERICHIA COLI (E. COLI)</i>	Approved TMDL
Boone Creek 5.2 to 9.1	KY487686_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Boone Creek 5.2 to 9.1	KY487686_02	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Boone Creek 7.4 to 12.6	KY487688_02	FECAL COLIFORM	TMDL Under Development
Brashears Creek 0.0 to 13.0	KY487840_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Brush Creek 0.0 to 2.35	KY488069_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
UT of Buck Creek 0 to 1.7	KY488213-8.0_01	<i>ESCHERICHIA COLI (E. COLI)</i>	2018
Buck Creek 0 to 8.0	KY488213_01	FECAL COLIFORM	2018
Buck Creek 8.0 to 11.0	KY488213_02	<i>ESCHERICHIA COLI (E. COLI)</i>	2018
Buck Fork 12.9 to 19.3	KY488223_02	FECAL COLIFORM	2018
Buckhorn Creek 0.0 to 2.4	KY488268_01	FECAL COLIFORM	TMDL Under Development
Burning Fork 0.0 to 3.3	KY488450_01	FECAL COLIFORM	TMDL Under Development
Caney Creek 1.4 to 5.3	KY488828_01	FECAL COLIFORM	2018
UT of Caney Creek 0 to 2.3	KY488838-1.8_01	<i>ESCHERICHIA COLI (E. COLI)</i>	Approved TMDL
UT of Caney Creek 0 to 2.6	KY488838-2.3_01	<i>ESCHERICHIA COLI (E. COLI)</i>	Approved TMDL
Caney Creek 0.0 to 3.6	KY488838_01	<i>ESCHERICHIA COLI (E. COLI)</i>	Approved TMDL
Caney Creek 3.6 to 7.6	KY488838_02	<i>ESCHERICHIA COLI (E. COLI)</i>	Approved TMDL
Caney Creek 0 to 6.8	KY488846_01	<i>ESCHERICHIA COLI (E. COLI)</i>	2018
UT of Canoe Creek 0.49 to 0.99	KY488897-19.8_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Canoe Creek 0.2 to 4.05	KY488897_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Canoe Creek 0.2 to 4.05	KY488897_01	FECAL COLIFORM	TMDL Under Development
Canoe Creek 4.05 to 14.4	KY488897_02	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Canoe Creek 14.4 to 23.8	KY488897_03	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development

Cartwright Creek 0.0 to 6.6	KY489030_01	FECAL COLIFORM	TMDL Under Development
Chaplin River 0.0 to 23.1	KY489350_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Chenoweth Run 0.0 to 5.25	KY489391_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Chenoweth Run 0.0 to 5.25	KY489391_01	FECAL COLIFORM	TMDL Under Development
Clear Creek 26.2 to 26.5	KY489610_03	FECAL COLIFORM	2018
UT of Cooper Run 0.0 to 3.8	KY490062-5.85_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
UT of Cooper Run 0.0 to 1.0	KY490062-6.95_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
UT of Cooper Run 0.0 to 3.05	KY490062-7.25_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Cooper Run 0.0 to 10.15	KY490062_00	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Crooked Creek 0.0 to 3.0	KY490376_00	FECAL COLIFORM	2018
Crooked Creek 0 to 9.4	KY490377_01	FECAL COLIFORM	TMDL Under Development
Relict Channel of Cypress Creek 0.5 to 3.3	KY490527_01	<i>ESCHERICHIA COLI (E. COLI)</i>	2018
Relict Channel of Cypress Creek 0.5 to 3.3	KY490527_01	FECAL COLIFORM	2018
Deer Creek 0.0 to 8.4	KY490771_01	<i>ESCHERICHIA COLI (E. COLI)</i>	2018
Dennis O'nan Ditch/Cypress Creek 0.4 to 10.9	KY490816_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Deserter Creek 0.0 to 3.1	KY490828_01	FECAL COLIFORM	2018
Doe Run 4.7 to 8.3	KY490968_01	FECAL COLIFORM	TMDL Under Development
Donaldson Creek 0.0 to 14.2	KY490999_01	<i>ESCHERICHIA COLI (E. COLI)</i>	2018
Donaldson Creek 0.0 to 14.2	KY490999_01	FECAL COLIFORM	2018
East Fork of Canoe Creek 0.0 to 4.4	KY491444_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
East Fork Little Sandy River 4.7 to 14.2	KY491469_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
East Fork Little Sandy River 24.9 to 26.4	KY491469_03	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
UT of East Hickman Creek 0.8 to 2.2	KY491487-11.8_01	FECAL COLIFORM	TMDL Under Development
East Hickman Creek 4.2 to 10.2	KY491487_01	FECAL COLIFORM	TMDL Under Development
UT of Elam Ditch 0 to 0.82	KY491607-2.8_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Elam Ditch 0 to 7.3	KY491607_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
UT of Elk Creek 0 to 1.0	KY491656-7.1_01	FECAL COLIFORM	2018
Elk Creek 7.6 to 10.6	KY491656_02	FECAL COLIFORM	2018
UT of Elk Fork Creek 0.0 to 4.8	KY491660-26.4_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Elk Fork 22.3 to 31.1	KY491660_02	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Elk Fork 31.1 to 33.1	KY491660_03	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Elk Pond Creek 0.0 to 4.9	KY491671_00	FECAL COLIFORM	2018
Fern Creek 0.0 to 1.3	KY492042_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Fern Creek 1.3 to 4.4	KY492042_02	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development

Fern Creek 4.4 to 5.9	KY492042_03	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Fishpool Creek 0 to 1.9	KY492132_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
UT to Flat Creek 3.1 to 4.1	KY492181-2.0_02	FECAL COLIFORM	2018
Flat Creek 0.0 to 0.9	KY492182_00	FECAL COLIFORM	TMDL Under Development
UT of Flat Run 0.0 to 2.1	KY492217-3.9_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Flat Run 2.2 to 9.05	KY492217_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Flat Run 2.2 to 9.05	KY492217_02	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Floyds Fork 0.0 to 11.7	KY492278_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Floyds Fork 11.7 to 24.2	KY492278_02	FECAL COLIFORM	TMDL Under Development
Floyds Fork 40.1 to 45.7	KY492278_05	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Floyds Fork 40.1 to 45.7	KY492278_05	FECAL COLIFORM	TMDL Under Development
Floyds Fork 45.7 to 61.9	KY492278_06	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Floyds Fork 45.7 to 61.9	KY492278_06	FECAL COLIFORM	TMDL Under Development
Fourmile Creek 0.2 to 8.5	KY492390_01	FECAL COLIFORM	TMDL Under Development
Gasper River 7.8 to 14.6	KY492748_01	<i>ESCHERICHIA COLI (E. COLI)</i>	2018
Goose Creek 0.3 to 3.6	KY493014_01	FECAL COLIFORM	TMDL Under Development
Goose Creek 3.6 to 13.0	KY493014_02	FECAL COLIFORM	TMDL Under Development
Greasy Ditch 0 to 2.6	KY493242_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Green River 210.4 to 250.2	KY493284_08	<i>ESCHERICHIA COLI (E. COLI)</i>	2018
Green River 283.1 to 309.0	KY493284_13	FECAL COLIFORM	2018
Gunpowder Creek 0.0 to 15.0	KY493502_01	SEDIMENTATION/SILTATION	TMDL Alt
Gunpowder Creek 15.4 to 17.1	KY493502_02	NUTRIENT/EUTROPHICATION BIOLOGICAL INDICATORS	TMDL Alt
Gunpowder Creek 15.4 to 17.1	KY493502_02	ORGANIC ENRICHMENT (SEWAGE) BIOLOGICAL INDICATORS	TMDL Alt
Gunpowder Creek 15.4 to 17.1	KY493502_02	SEDIMENTATION/SILTATION	TMDL Alt
Gunpowder Creek 18.9 to 21.6	KY493502_03	CAUSE UNKNOWN	TMDL Alt
UT to Hancock Creek 0.0 to 3.72	KY493672-4.2_01	FECAL COLIFORM	TMDL Under Development
Harrods Creek 0.0 to 3.2	KY493826_01	FECAL COLIFORM	TMDL Under Development
Highland Creek 0.0 to 7.6	KY494210_01	FECAL COLIFORM	TMDL Under Development
Highland Creek 7.6 to 21.4	KY494210_02	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Highland Creek 7.6 to 21.4	KY494210_02	FECAL COLIFORM	TMDL Under Development
Hinkston Creek 0.0 to 12.6	KY494298_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Hinkston Creek 20.8 to 31.0	KY494298_03	FECAL COLIFORM	TMDL Under Development

Hinkston Creek 41.8 to 49.1	KY494298_05	FECAL COLIFORM	TMDL Under Development
Hoods Creek 0.0 to 6.3	KY494496_01	FECAL COLIFORM	TMDL Under Development
Houston Creek 0.0 to 9.0	KY494646_01	FECAL COLIFORM	TMDL Under Development
Humphrey Creek 3.4 to 11.2	KY494758_02	FECAL COLIFORM	TMDL Under Development
Island Creek 0.0 to 5.7	KY495045_01	FECAL COLIFORM	TMDL Under Development
Jarrels Creek 0.0 to 1.8	KY495175_00	FECAL COLIFORM	2018
Lost River Rise (9000-0054)	KY495207-3.2_00	<i>ESCHERICHIA COLI (E. COLI)</i>	2018
Johns Creek 24.0 to 30.65	KY495347_02	FECAL COLIFORM	TMDL Under Development
Johnson Creek 0.0 to 3.1	KY495397_01	FECAL COLIFORM	TMDL Under Development
Johnson Creek 0.0 to 0.9	KY495398_01	FECAL COLIFORM	TMDL Under Development
Kennedy Creek 0.0 to 5.7	KY495646_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Knoblick Creek 0.0 to 2.1	KY495848_00	FECAL COLIFORM	2018
Knox Creek 0.0 to 8.0	KY495859_01	FECAL COLIFORM	TMDL Under Development
Left Fork Middle Creek Levisa Fork 0.0 to 10.3	KY496241_01	FECAL COLIFORM	TMDL Under Development
Levisa Fork 31.4 to 54.7	KY496312_04	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Levisa Fork 65.2 to 98.0	KY496312_06	FECAL COLIFORM	TMDL Under Development
Levisa Fork 98.0 to 101.25	KY496312_07	FECAL COLIFORM	TMDL Under Development
Levisa Fork 118.8 to 127.7	KY496312_08	FECAL COLIFORM	TMDL Under Development
Little Cypress Creek 0.0 to 3.4	KY496700_01	FECAL COLIFORM	TMDL Under Development
Little Goose Creek 0.0 to 9.5	KY496745_01	FECAL COLIFORM	TMDL Under Development
Little Sandy River 0.15 to 0.3	KY496857_01	FECAL COLIFORM	TMDL Under Development
Little Stoner Creek 0.0 to 5.3	KY496870_00	FECAL COLIFORM	TMDL Under Development
Little Whippoorwill Creek 0 to 4.05	KY496894_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Little Whippoorwill Creek 4.05 to 7.0	KY496894_02	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Locust Creek 0.0 to 4.1	KY496941_01	FECAL COLIFORM	TMDL Under Development
Long Falls Creek 0.0 to 7.6	KY497098_01	FECAL COLIFORM	2018
Long Falls Creek 7.6 to 11.9	KY497098_02	FECAL COLIFORM	2018
Lost Creek 0.0 to 3.7	KY497178_01	FECAL COLIFORM	TMDL Under Development
Marrowbone Creek 0.0 to 2.8	KY497560_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Martins Fork 19.4 to 28.85	KY497628_03	FECAL COLIFORM	TMDL Under Development
Mayfield Creek 10.65 to 16.0	KY497717_02	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Mayfield Creek 37.7 to 40.4	KY497717_08	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Middle Creek Levisa Fork 0.0 to 4.6	KY498108_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Middle Fork of Licking River 0 to 2.5	KY498128_01	FECAL COLIFORM	TMDL Under Development

Mill Creek 0.0 to 4.2	KY498260_00	FECAL COLIFORM	2018
Mill Creek 0.0 to 9.9	KY498268_01	FECAL COLIFORM	TMDL Under Development
Mill Creek Cutoff 0.0 to 2.4	KY498275_01	FECAL COLIFORM	TMDL Under Development
Mud Creek 0 to 4.35	KY498984_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
UT of North Fork Canoe Creek 0 to 2.15	KY499544-0.7_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
North Fork Canoe Creek 0 to 8.0	KY499544_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
North Fork Licking River 2.3 to 18.55	KY499554_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
North Fork Licking River 18.55 to 45.5	KY499554_02	FECAL COLIFORM	TMDL Under Development
North Fork of Panther Creek 4.2 to 9.1	KY499562_02	FECAL COLIFORM	2018
Northern Ditch 0.0 to 7.3	KY499598_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Obion Creek 1.35 to 16.25	KY499767_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Otter Creek 0.0 to 2.9	KY500024_01	FECAL COLIFORM	TMDL Under Development
Otter Creek 0.0 to 10.7	KY500026_00	FECAL COLIFORM	TMDL Under Development
Paint Creek 0.0 to 7.1	KY500114_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Paint Creek 0.0 to 7.1	KY500114_01	FECAL COLIFORM	TMDL Under Development
Paint Creek 7.1 to 8.3	KY500114_02	FECAL COLIFORM	TMDL Under Development
Paint Lick Creek 0.0 to 7.5	KY500121_01	FECAL COLIFORM	TMDL Under Development
Panther Creek 0.1 to 3.0	KY500157_01	<i>ESCHERICHIA COLI (E. COLI)</i>	2018
Panther Creek 0.1 to 3.0	KY500157_01	FECAL COLIFORM	2018
Panther Creek 3.0 to 5.9	KY500157_02	FECAL COLIFORM	2018
Phillips Creek 0.0 to 5.4	KY500540_01	FECAL COLIFORM	TMDL Under Development
Pleasant Grove Creek 0 to 2.25	KY500832_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Pleasant Run 0 to 2.15	KY500905_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
UT of Plum Creek 0 to 2.45	KY500964-1.65_01	CADMIUM	Approved TMDL
UT of Plum Creek 0 to 2.45	KY500964-1.65_01	NICKEL	Approved TMDL
UT of Plum Creek 0 to 2.45	KY500964-1.65_01	PH	Approved TMDL
UT of Plum Creek 0 to 2.45	KY500964-1.65_01	ZINC	Approved TMDL
Plum Creek 0.0 to 1.7	KY500964_01	CADMIUM	Approved TMDL
Plum Creek 0.0 to 1.7	KY500964_01	<i>ESCHERICHIA COLI (E. COLI)</i>	Approved TMDL
Plum Creek 1.7 to 3.9	KY500964_02	CADMIUM	Approved TMDL
Plum Creek 1.7 to 3.9	KY500964_02	<i>ESCHERICHIA COLI (E. COLI)</i>	Approved TMDL
Plum Creek 1.7 to 3.9	KY500964_02	NICKEL	Approved TMDL
Plum Creek 1.7 to 3.9	KY500964_02	PH	Approved TMDL
Plum Creek 1.7 to 3.9	KY500964_02	ZINC	Approved TMDL

Plum Lick Creek 0 to 5.9	KY500972_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
UT of Pond Creek 0 to 1.4	KY501042-11.1_01	CADMIUM	Approved TMDL
UT of Pond Creek 0 to 2.4	KY501042-6.9_01	IRON	Approved TMDL
UT of Pond Creek 2.4 to 4.2	KY501042-6.9_02	<i>ESCHERICHIA COLI (E. COLI)</i>	Approved TMDL
UT of Pond Creek 2.4 to 4.2	KY501042-6.9_02	PH	Approved TMDL
Pond Creek 4.95 to 7.5	KY501042_02	CADMIUM	Approved TMDL
Pond Creek 4.95 to 7.5	KY501042_02	<i>ESCHERICHIA COLI (E. COLI)</i>	Approved TMDL
Pond Creek 4.95 to 7.5	KY501042_02	IRON	Approved TMDL
Pond Creek 7.5 to 11.7	KY501042_03	CADMIUM	Approved TMDL
Pond Creek 7.5 to 11.7	KY501042_03	<i>ESCHERICHIA COLI (E. COLI)</i>	Approved TMDL
Pond Creek 7.5 to 11.7	KY501042_03	IRON	Approved TMDL
Pond Creek 14.4 to 18.1	KY501042_05	<i>ESCHERICHIA COLI (E. COLI)</i>	Approved TMDL
Pond Creek 14.4 to 18.1	KY501042_05	LEAD	Approved TMDL
Pond Creek 18.1 to 22.1	KY501042_06	<i>ESCHERICHIA COLI (E. COLI)</i>	Approved TMDL
Pond Creek 0.0 to 9.7	KY501044_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Pond Creek/Southern Ditch 5.1 to 8.1	KY501046_01	FECAL COLIFORM	TMDL Under Development
Pond Run 0.0 to 6.8	KY501057_01	<i>ESCHERICHIA COLI (E. COLI)</i>	2018
Puncheon Camp Creek 0.0 to 1.15	KY501442_01	FECAL COLIFORM	TMDL Under Development
Quicksand Creek 0.0 to 17.0	KY501481_01	FECAL COLIFORM	TMDL Under Development
Red River 50.95 to 54.5	KY501672_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Red River 54.5 to 56.9	KY501672_02	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Red River 57.0 to 65.8	KY501672_03	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Red River 74.3 to 81.3	KY501672_05	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Rockcastle Creek 0.0 to 3.7	KY502158_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Rockhouse Creek 0.0 to 3.6	KY502192_01	FECAL COLIFORM	TMDL Under Development
Rolling Fork 0.0 to 37.75	KY502293_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Rolling Fork 37.75 to 40.7	KY502293_02	FECAL COLIFORM	TMDL Under Development
Rough River 0.0 to 10.4	KY502390_01	<i>ESCHERICHIA COLI (E. COLI)</i>	2018
Rough River 0.0 to 10.4	KY502390_01	FECAL COLIFORM	2018
Rough River 55.1 to 64.3	KY502390_04	<i>ESCHERICHIA COLI (E. COLI)</i>	2018
Rough River 55.1 to 64.3	KY502390_04	FECAL COLIFORM	2018
Rough River 125.2 to 149.4	KY502390_06	FECAL COLIFORM	2018
Salt Block Creek 0 to 3.35	KY502818_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Salt River 11.7 to 25.9	KY502830_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development

Salt River 77.8 to 88.8	KY502830_05	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Salt Lick Creek 0 to 3.7	KY502844_01	<i>ESCHERICHIA COLI (E. COLI)</i>	Approved TMDL
Sandlick Creek 0 to 4.05	KY502963_01	<i>ESCHERICHIA COLI (E. COLI)</i>	Approved TMDL
Sellers Ditch 0 to 1.3	KY503159_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Shawnee Creek 0.0 to 3.2	KY503285_01	FECAL COLIFORM	TMDL Under Development
Shelby Creek 0.0 to 6.0	KY503319_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Sinking Creek 0 to 3.3	KY503559_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Sinking Fork Little River 2.1 to 5.55	KY503569_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Skaggs Creek 12.7 to 23.5	KY503595_01	<i>ESCHERICHIA COLI (E. COLI)</i>	2018
Wetwoods Creek (Slop Ditch) 2.2 to 4.25	KY503711_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Snag Creek 1.1 to 6.4	KY503833_01	FECAL COLIFORM	TMDL Under Development
South Fork Gunpowder Creek 0.0 to 2.0	KY503926_01	NUTRIENT/EUTROPHICATION BIOLOGICAL INDICATORS	TMDL Alt
South Fork Gunpowder Creek 0.0 to 2.0	KY503926_01	ORGANIC ENRICHMENT (SEWAGE) BIOLOGICAL INDICATORS	TMDL Alt
South Fork Gunpowder Creek 0.0 to 2.0	KY503926_01	SEDIMENTATION/SILTATION	TMDL Alt
South Fork Gunpowder Creek 0.0 to 2.0	KY503926_01	TURBIDITY	TMDL Alt
South Fork Gunpowder Creek 4.1 to 6.8	KY503926_02	FECAL COLIFORM	TMDL Alt
South Fork Licking River 11.6 to 16.95	KY503932_03	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
South Fork of Panther Creek 0.0 to 2.4	KY503939_01	FECAL COLIFORM	TMDL Under Development
South Fork of Panther Creek 9.55 to 14.0	KY503939_03	FECAL COLIFORM	2018
South Fork of Panther Creek 14.0 to 18.3	KY503939_04	FECAL COLIFORM	2018
South Fork Red River 0 to 5.3	KY503943_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Southern Ditch 0.0 to 5.9	KY503998_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Southern Ditch 5.75 to 9.00	KY503998_02	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
UT of Blue Spring Ditch 0 to 2.5	KY504133-1.85_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Blue Spring Ditch 0.0 to 2.1	KY504133_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Stoner Creek 0.0 to 5.55	KY504482_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Stoner Creek 5.55 to 15.0	KY504482_02	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Stoner Creek 17.3 to 30.1	KY504482_04	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Stoner Creek 35.7 to 45.1	KY504482_05	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
UT of Strodes Creek 0.0 to 3.7	KY504593-22.2_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
UT of Strodes Creek 0.0 to 3.7	KY504593-22.2_01	FECAL COLIFORM	TMDL Under Development
Strodes Creek 2.7 to 7.9	KY504593_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development

Strodes Creek 2.7 to 7.9	KY504593_01	FECAL COLIFORM	TMDL Under Development
Strodes Creek 7.9 to 19.3	KY504593_02	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Strodes Creek 7.9 to 19.3	KY504593_02	FECAL COLIFORM	TMDL Under Development
Strodes Creek 19.3 to 26.4	KY504593_03	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Strodes Creek 19.3 to 26.4	KY504593_03	FECAL COLIFORM	TMDL Under Development
Sulphur Creek 0.0 to 10.0	KY504729_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Sulphur Spring Creek 0 to 6.6	KY504760_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Terrapin Creek 2.8 to 6.9	KY505081_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Threemile Creek 0.1 to 4.7	KY505251_00	FECAL COLIFORM	TMDL Under Development
Tradewater River 0.0 to 17.1	KY505460_01	FECAL COLIFORM	2018
Trammel Creek 0 to 24.0	KY505463_01	<i>ESCHERICHIA COLI (E. COLI)</i>	2018
Vaughn Ditch 0.0 to 3.2	KY505996_01	<i>ESCHERICHIA COLI (E. COLI)</i>	2018
West Fork of Buck Creek 0 to 3.3	KY506423_01	<i>ESCHERICHIA COLI (E. COLI)</i>	2018
UT of West Fork Canoe Creek 0 to 2.2	KY506424-3.4_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
West Fork Canoe Creek 0 to 7.6	KY506424_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
West Hickman Creek 0.0 to 3.1	KY506457_01	FECAL COLIFORM	TMDL Under Development
Whippoorwill Creek 0 to 13.2	KY506557_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Williams Creek 0.0 to 5.3	KY506817_01	FECAL COLIFORM	TMDL Under Development
Wilson Creek 0 to 6.9	KY506900_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Wilson Creek 0 to 5.6	KY506904_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Wolf Creek 0.0 to 6.6	KY507001_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Wolf Lick Creek 0.0 to 14.6	KY507017_01	<i>ESCHERICHIA COLI (E. COLI)</i>	2018
Woodruff Creek 0.0 to 3.7	KY507110_01	FECAL COLIFORM	TMDL Under Development
Yellow Creek 0.0 to 6.65	KY507211_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Elkhorn Creek 0.0 to 10.7	KY509461_01	FECAL COLIFORM	TMDL Under Development
Red Lick Creek 0.0 to 5.0	KY510193_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Blackwater Creek 3.9 to 11.8	KY510765_01	FECAL COLIFORM	TMDL Under Development
Brushy Fork 0 to 4.5	KY510977_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Butler Creek 0 to 4.1	KY511100_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
UT Crooked Creek 0 to 0.4	KY511648-4.6_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
UT of Crooked Creek 0 to 1.4	KY511649-8.3_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Crooked Creek 0.0 to 11.9	KY511649_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Crooked Creek 11.9 to 26.2	KY511649_02	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Fox Creek 0.0 to 10.1	KY512230_01	FECAL COLIFORM	TMDL Under Development

Goose Creek 0.0 to 8.3	KY512349_01	FECAL COLIFORM	TMDL Under Development
Grassy Branch 0.0 to 0.55	KY512376_01	FECAL COLIFORM	TMDL Under Development
Horse Lick Creek 0.0 to 12.3	KY512798_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Licking River 0.0 to 4.65	KY513416_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Licking River 4.8 to 14.9	KY513416_02	FECAL COLIFORM	TMDL Under Development
Licking River 76.65 to 88.8	KY513416_06	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Licking River 76.65 to 88.8	KY513416_06	FECAL COLIFORM	TMDL Under Development
Licking River 174.3 to 180.6	KY513416_11	FECAL COLIFORM	TMDL Under Development
Licking River 224.1 to 241.1	KY513416_12	FECAL COLIFORM	TMDL Under Development
Line Fork 11.6 to 27.5	KY513437_02	FECAL COLIFORM	TMDL Under Development
UT of UT of Little Laurel River 0.0 to 0.1	KY513497-19.65-1.0_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Lynn Camp Creek 0.04 to 3.45	KY513739_01	FECAL COLIFORM	TMDL Under Development
Middle Fork Kentucky River 6.45 to 12.6	KY513931_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Middle Fork, Kentucky River 61.5 to 64.2	KY513931_03	FECAL COLIFORM	TMDL Under Development
Middle Fork of Kentucky River 67.9 to 74.6	KY513931_04	FECAL COLIFORM	TMDL Under Development
North Fork Licking River 8.5 to 12.3	KY514292_01	FECAL COLIFORM	TMDL Under Development
Pitman Creek 5.4 to 6.0	KY514627_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Poplar Creek 4.7 to 5.85	KY514710_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Red Bird River 0.0 to 15.3	KY514862_01	FECAL COLIFORM	TMDL Under Development
ROUNDSTONE CREEK 0.0 TO 10.9	KY515136_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Sinking Creek 8.7 to 15.4	KY515434_02	FECAL COLIFORM	TMDL Under Development
Sinking Creek 15.4 to 39.75	KY515434_03	FECAL COLIFORM	TMDL Under Development
Slate Creek 0.0 to 13.55	KY515470_01	FECAL COLIFORM	TMDL Under Development
South Fork Kentucky River 11.75 to 18.9	KY515545_01	<i>ESCHERICHIA COLI (E. COLI)</i>	TMDL Under Development
Triplett Creek 5.8 to 12.3	KY516023_01	FECAL COLIFORM	TMDL Under Development
Barren River 0 to 8.4	KY517526_01	<i>ESCHERICHIA COLI (E. COLI)</i>	2018
Barren River 104.9 to 119.4	KY517526_06	FECAL COLIFORM	2018

Appendix 2. TMDLs planned for public notice in FY2018 and FY2019.

Waterbody Name	Waterbody ID	Pollutant 1	Pollutant 2	Pollutant 3	Fiscal Year
Clear Creek 26.2 to 26.5	KY489610_03	Fecal Coliform			2018
Cypress Creek 0 to 3.3	KY490527_01	<i>E. coli</i>			2018
Cypress Creek 0 to 3.3	KY490527_01	Fecal Coliform			2018
Donaldson Creek 0 to 14.2	KY490999_01	<i>E. coli</i>			2018
Donaldson Creek 0 to 14.2	KY490999_01	Fecal Coliform			2018
Tradewater River 0.0 to 16.8	KY505460_01	Fecal Coliform			2018
Vaughn Ditch 0 to 3.25	KY505996_01	<i>E. coli</i>			2018
Barren River 0 to 8.4	KY517526_01	<i>E. coli</i>			2018
Barren River 104.8 to 119.3	KY517526_06	Fecal Coliform			2018
Beaver Creek 8.5 to 15.75	KY486609_01	Fecal Coliform			2018
Buck Creek 0 to 8.0	KY488213_01	Fecal Coliform			2018
Buck Creek 8.0 to 11.0	KY488213_02	<i>E. coli</i>			2018
Buck Fork Pond River 12.9 to 19.3	KY488223_02	Fecal Coliform			2018
Caney Creek 0 to 6.8	KY488846_01	<i>E. coli</i>			2018
Crooked Creek 0 to 3.0	KY490376_00	Fecal Coliform			2018
Deer Creek 0 to 8.4	KY490771_01	<i>E. coli</i>			2018
Deserter Creek 0 to 3.1	KY490828_01	Fecal Coliform			2018
Elk Creek 7.6 to 10.6	KY491656_02	Fecal Coliform			2018
Elk Pond Creek 0 to 4.9	KY491671_00	Fecal Coliform			2018
Gasper River 7.8 to 14.6	KY492748_01	<i>E. coli</i>			2018
Green River 210.4 to 250.2	KY493284_08	<i>E. coli</i>			2018
Green River 283.1 to 309.0	KY493284_13	Fecal Coliform			2018
Jarrels Creek 0 to 1.8	KY495175_00	Fecal Coliform			2018
Knoblick Creek 0 to 2.1	KY495848_00	Fecal Coliform			2018
Long Falls Creek 0 to 7.6	KY497098_01	Fecal Coliform			2018
Long Falls Creek 7.6 to 11.9	KY497098_02	Fecal Coliform			2018
Mill Creek 0 to 4.2	KY498260_00	Fecal Coliform			2018
North Fork of Panther Creek 4.2 to 9.1	KY499562_02	Fecal Coliform			2018
Panther Creek 0.1 to 3.0	KY500157_01	<i>E. coli</i>			2018
Panther Creek 0.1 to 3.0	KY500157_01	Fecal Coliform			2018
Panther Creek 3.0 to 5.9	KY500157_02	Fecal Coliform			2018

Pond Run 0 to 6.75	KY501057_01	<i>E. coli</i>		2018
Rough River 0.1 to 10.45	KY502390_01	Fecal Coliform		2018
Rough River 125.2 to 149.4	KY502390_06	Fecal Coliform		2018
Rough River 55.1 to 64.5	KY502390_04	<i>E. coli</i>		2018
Rough River 55.1 to 64.5	KY502390_04	Fecal Coliform		2018
Skaggs Creek 12.7 to 23.55	KY503595_01	<i>E. coli</i>		2018
South Fork of Panther Creek 14.0 to 18.3	KY503939_04	Fecal Coliform		2018
South Fork of Panther Creek 9.55 to 14.0	KY503939_03	Fecal Coliform		2018
UT of Buck Creek 0 to 1.7	KY488213-8.0_01	<i>E. coli</i>		2018
UT of Elk Creek 0 to 1.0	KY491656-7.1_01	Fecal Coliform		2018
UT of Flat Creek 3.1 to 4.1	KY492181-2.0_02	Fecal Coliform		2018
West Fork of Buck Creek 0 to 3.3	KY506423_01	<i>E. coli</i>		2018
Brooks Run 0 to 2.7	KY487968_01	Nutrient/Eutrophication Biological Indicators	Organic Enrichment (Sewage) Biological Indicators	2018
Brooks Run 2.7 to 4.4	KY487968_02	Nutrient/Eutrophication Biological Indicators	Organic Enrichment (Sewage) Biological Indicators	2018
Brooks Run 4.4 to 6.4	KY487968_03	Nutrient/Eutrophication Biological Indicators	Organic Enrichment (Sewage) Biological Indicators	2018
Cedar Creek 4.3 to 12.1	KY489183_01	Nutrient/Eutrophication Biological Indicators		2018
Chenoweth Run (Upper) 0 to 4.05	KY489392_01	Nutrient/Eutrophication Biological Indicators		2018
Chenoweth Run 0 to 5.25	KY489391_01	Nutrient/Eutrophication Biological Indicators		2018
Chenoweth Run 5.25 to 9.2	KY489391_02	Nutrient/Eutrophication Biological Indicators		2018
Floyds Fork 11.7 to 24.2	KY492278_02	Nutrient/Eutrophication Biological Indicators	Organic Enrichment (Sewage) Biological Indicators	2018
Floyds Fork 45.7 to 61.9	KY492278_06	Nutrient/Eutrophication Biological Indicators	Organic Enrichment (Sewage) Biological Indicators	2018

North Fork Currys Fork 0 to 6.0	KY499547_01	Nutrient/Eutrophication Biological Indicators			2018
Pennsylvania Run 0 to 3.3	KY500387_01	Nutrient/Eutrophication Biological Indicators			2018
South Fork Currys Fork 0 to 6.1	KY503919_01	Nutrient/Eutrophication Biological Indicators	Organic Enrichment (Sewage) Biological Indicators	Dissolved Oxygen	2018
South Long Run 0 to 3.6	KY503961_01	Nutrient/Eutrophication Biological Indicators	Organic Enrichment (Sewage) Biological Indicators	Dissolved Oxygen	2018
UT of Brooks Run 0 to 2.0	KY487968-4.3_01	Nutrient/Eutrophication Biological Indicators	Organic Enrichment (Sewage) Biological Indicators		2018
UT of South Fork Currys Fork 0 to 1.8	KY503919-3.9_01	Nutrient/Eutrophication Biological Indicators	Organic Enrichment (Sewage) Biological Indicators		2018
Bear Creek 0.0 to 2.0	KY486557_01	Fecal Coliform			2019
Big Creek 0.0 to 1.95	KY487161_01	<i>Escherichia coli</i>			2019
Blaine Creek 8.2 to 17.6	KY487428_01	<i>Escherichia coli</i>			2019
Blaine Creek 35.0 to 39.7	KY487428_03	<i>Escherichia coli</i>			2019
Buffalo Creek 0.0 to 6.7	KY488320_01	<i>Escherichia coli</i>			2019
East Fork Little Sandy River 24.9 to 26.4	KY491469_03	<i>Escherichia coli</i>			2019
Johns Creek 0.0 to 5.8	KY495347_01	<i>Escherichia coli</i>			2019
Johns Creek 24.0 to 34.3	KY495347_02	<i>Escherichia coli</i>			2019
Left Fork Middle Creek Levisa Fork 0.0 to 9.65	KY496241_01	Fecal Coliform			2019
Levisa Fork 0.0 to 5.8	KY496312_01	<i>Escherichia coli</i>			2019
Levisa Fork 31.2 to 54.55	KY496312_04	<i>Escherichia coli</i>			2019
Levisa Fork 65.05 to 97.8	KY496312_06	<i>Escherichia coli</i>			2019
Levisa Fork 97.8 to 101.0	KY496312_07	Fecal Coliform			2019
Levisa Fork 118.5 to 127.45	KY496312_08	Fecal Coliform			2019
Little Sandy River 0.0 to 0.15	KY496857_01	Fecal Coliform			2019
Middle Creek Levisa Fork 0.0 to 4.6	KY498108_01	<i>Escherichia coli</i>			2019
Paint Creek 0.0 to 7.1	KY500114_01	<i>Escherichia coli</i>			2019
Paint Creek 7.1 to 8.2	KY500114_02	Fecal Coliform			2019
Pond Creek 0.0 to 9.7	KY501044_01	<i>Escherichia coli</i>			2019

Rockcastle Creek 0.0 to 3.7	KY502158_01	<i>Escherichia coli</i>		2019
Tug Fork 0.0 to 10.45	KY1548311_01	<i>Escherichia coli</i>		2019
Wolf Creek 0.0 to 6.6	KY507001_01	<i>Escherichia coli</i>		2019
Arnolds Creek 0.0 to 10.8	KY486059_01	<i>Escherichia coli</i>		2019
Big Creek 0.0 to 4.25	KY510641_01	<i>Escherichia coli</i>		2019
Boone Creek 7.55 to 12.95	KY487688_02	Fecal Coliform		2019
Buckhorn Creek 0.0 to 2.4	KY488268_01	Fecal Coliform		2019
Cane Run 3.1 to 5.2	KY488798_01	<i>Escherichia coli</i>		2019
Cane Run 5.2 to 6.35	KY488798_02	<i>Escherichia coli</i>		2019
East Hickman Creek 0.0 to 4.2	KY491487_01	Fecal Coliform		2019
East Hickman Creek 4.2 to 10.55	KY491487_02	Fecal Coliform		2019
Elk Creek 0.0 to 5.75	KY512036_01	<i>Escherichia coli</i>		2019
Elkhorn Creek 0.0 to 18.2	KY491690_01	<i>Escherichia coli</i>		2019
Goose Creek 0.0 to 8.3	KY512349_01	<i>Escherichia coli</i>		2019
Hanging Fork 0.0 to 1.25	KY2566651_01	<i>Escherichia coli</i>		2019
Hickman Creek 0.05 to 6.0	KY494112_01	Fecal Coliform		2019
Hickman Creek 6.0 to 25.5	KY494112_02	Fecal Coliform		2019
Knoblick Creek 4.75 to 8.15	KY495849_02	<i>Escherichia coli</i>		2019
Lawson Creek 0.0 to 2.85	KY513272_01	<i>Escherichia coli</i>		2019
Line Fork 12.2 to 28.65	KY513437_02	<i>Escherichia coli</i>		2019
Lost Creek 0.0 to 3.7	KY497178_01	Fecal Coliform		2019
Lost Creek 3.7 to 20.4	KY497178_02	<i>Escherichia coli</i>		2019
Lower Howard Creek 0.0 to 2.7	KY497285_01	<i>Escherichia coli</i>		2019
Lower Howard Creek 2.7 to 6.55	KY497285_02	<i>Escherichia coli</i>		2019
Lower Howards Creek 6.6 to 10.5	KY497285_03	<i>Escherichia coli</i>		2019
Martins Branch 0.0 to 2.2	KY497626_01	<i>Escherichia coli</i>		2019
Middle Fork Kentucky River 62.45 to 65.4	KY513931_03	Fecal Coliform		2019
Middle Fork Kentucky River 67.85 to 74.55	KY513931_04	<i>Escherichia coli</i>		2019
Otter Creek 0.0 to 4.1	KY500025_01	<i>Escherichia coli</i>		2019
Paint Lick Creek 0.0 to 7.7	KY500121_01	Fecal Coliform		2019
Red Bird River 0.0 to 15.3	KY514862_01	<i>Escherichia coli</i>		2019
Red Lick Creek 0.0 to 5.0	KY510193_01	<i>Escherichia coli</i>		2019
Rockhouse Creek 0.0 to 3.6	KY502192_01	Fecal Coliform		2019
Shelby Branch 0.0 to 4.35	KY503313_01	Fecal Coliform		2019

Spears Creek 0.0 to 2.2	KY507343_01	<i>Escherichia coli</i>		2019
Swift Camp Creek 7.5 to 13.95	KY515834_02	<i>Escherichia coli</i>		2019
Ten Mile Creek 0.0 to 3.0	KY485704_01	<i>Escherichia coli</i>		2019
Ten Mile Creek 3.0 to 11.9	KY485704_02	<i>Escherichia coli</i>		2019
Upper Jacks Creek 0.0 to 2.3	KY516133_01	<i>Escherichia coli</i>		2019
UT of Balls Branch 0.0 to 1.4	KY486303-3.5_01	<i>Escherichia coli</i>		2019
UT of Balls Branch 0.0 to 1.15	KY486303-3.55_01	<i>Escherichia coli</i>		2019
UT of Baughman Creek 0.0 to 1.3	KY486477-0.65_01	<i>Escherichia coli</i>		2019
UT of Blue Lick Creek 0.0 to 1.3	KY487526-2.25_01	<i>Escherichia coli</i>		2019
UT of Cane Run 0.0 to 1.3	KY488798-3.1_01	<i>Escherichia coli</i>		2019
UT of Cane Run 0.0 to 3.5	KY488798-4.2_01	<i>Escherichia coli</i>		2019
UT of Cane Run 0.0 to 0.07	KY488798-5.2_01	<i>Escherichia coli</i>		2019
UT of Clarks Run 0.0 to 2.3	KY489554-10.0_01	<i>Escherichia coli</i>		2019
UT of Clarks Run 0.0 to 1.2	KY489554-10.4_01	<i>Escherichia coli</i>		2019
UT of Clarks Run 0.0 to 1.25	KY489554-7.55_01	<i>Escherichia coli</i>		2019
UT of Clarks Run 0.0 to 0.7	KY489554-8.4_01	<i>Escherichia coli</i>		2019
UT of Clarks Run 0.0 to 0.8	KY489554-9.2_01	<i>Escherichia coli</i>		2019
UT of Clarks Run 0.0 to 1.0	KY489554-9.65_01	<i>Escherichia coli</i>		2019
UT of East Hickman Creek 0.8 to 2.3	KY491487-11.8_01	Fecal Coliform		2019
UT of East Hickman Creek 0.0 to 3.9	KY491487-8.55_01	Fecal Coliform		2019
UT of Hanging Fork 0.0 to 1.7	KY493684-24.55_01	<i>Escherichia coli</i>		2019
UT of Hanging Fork Creek 0.0 to 1.85	KY493684-19.7_01	<i>Escherichia coli</i>		2019
UT of Hanging Fork Creek 0.0 to 2.0	KY493684-24.1_01	<i>Escherichia coli</i>		2019

UT of Hanging Fork Creek 0.0 to 2.4	KY493684-25.25_01	<i>Escherichia coli</i>		2019
UT of Hanging Fork Creek 0.0 to 1.3	KY493684-26.05_01	<i>Escherichia coli</i>		2019
UT of Hanging Fork Creek 0.0 to 1.8	KY493684-29.1_01	<i>Escherichia coli</i>		2019
UT of Hanging Fork Creek 0.0 to 1.8	KY493684-30.6_01	<i>Escherichia coli</i>		2019
UT of Lower Howard Creek 0.0 to 1.4	KY497285-0.6_01	<i>Escherichia coli</i>		2019
UT of Lower Howard Creek 0.0 to 1.0	KY497285-8.55_01	<i>Escherichia coli</i>		2019
UT of Lower Howard Creek 0.0 to 1.4	KY497285-9.35_01	<i>Escherichia coli</i>		2019
UT of McKinney Branch 0.0 to 2.45	KY497908-0.65_01	<i>Escherichia coli</i>		2019
UT of Swift Camp Creek 0.0 to 2.2	KY515834-11.9_01	<i>Escherichia coli</i>		2019
UT of UT of Hanging Fork Creek 0.0 to 0.50	KY493684-25.25-1.6_01	<i>Escherichia coli</i>		2019
UT of Vaughns Branch 0.0 to 1.85	KY506001-1.7_01	Fecal Coliform		2019
UT of Vaughns Branch 0.0 to 1.85	KY506001-1.7_01	<i>Escherichia coli</i>		2019
UT of White Oak Creek 0.0 to 2.4	KY506612-2.0_01	<i>Escherichia coli</i>		2019
UT of White Oak Creek 0.0 to 2.2	KY506612-3.4_01	<i>Escherichia coli</i>		2019
UT of White Oak Creek 0.0 to 0.85	KY506612-4.5_01	<i>Escherichia coli</i>		2019
UT of Wolf Run 0.0 to 0.7	KY507029-2.0_01	Fecal Coliform		2019
UT of Wolf Run 0.0 to 0.7	KY507029-2.0_01	<i>Escherichia coli</i>		2019
Vaughns Branch 0.0 to 2.2	KY506001_01	<i>Escherichia coli</i>		2019
Vaughns Branch 0.0 to 2.2	KY506001_01	Fecal Coliform		2019
West Fork Lower Howard Creek 0.0 to 3.85	KY506437_01	<i>Escherichia coli</i>		2019
West Hickman Creek 0.0 to 3.1	KY506457_01	Fecal Coliform		2019
West Hickman Creek 3.1 to 8.4	KY506457_02	Fecal Coliform		2019

Appendix 3. BMP Implementation during the September 2012 – September 2014 time frame, organized by project and BMP type.

Project Title	BMP Type	BMP Implementation Date	Number Installed	Unit of Measure	HUC12	Drainage Area Name
Currys Fork Comprehensive Watershed Based Plan- Development and Implementation	Riparian Buffers - Vegetative	09/30/2013	1,020.00	FT	051401020803	Currys Fork
Watershed Based Planning in three impacted sub-watersheds of Big South Fork-Source Water for McCreary County Water District	Onsite Waste Water Treatment System (New/Existing)	06/03/2013	4.00	UNITS	051301040701	Wolf Creek Big South Fork
	Onsite Waste Water Treatment System (New/Existing)	06/03/2013	5.00	UNITS	051301010902	Lower Marsh Creek
	Onsite Waste Water Treatment System (New/Existing)	09/30/2013	9.00	UNITS	051301040701	Wolf Creek Big South Fork
Assessment and Restoration Design for Sediment Impaired Watersheds	Stream Channel Restoration (stream bed)	09/02/2013	18,600.00	FT	050901030302	050901030302
Banklick Creek Watershed Based Planning, Implementation and Results	Onsite Waste Water System [Repair]	09/30/2013	1.00	UNITS	051001011304	Upper Banklick Creek
	Raingarden/ bioretention basin	09/29/2014	9,600.00	SQUARE FEET	051001011304	Upper Banklick Creek
	Raingarden/ bioretention basin	09/29/2014	16,400.00	SQUARE FEET	051001011304	Upper Banklick Creek
	Riparian Buffers - Vegetative	09/29/2014	14.30	ACRES	051001011304	Upper Banklick Creek
	Riparian Buffers - Vegetative	09/29/2014	6,000.00	FT	051001011304	Upper Banklick Creek
	Tree/Shrub Establishment	09/30/2013	3,100.00	UNITS	051001011304	Upper Banklick Creek
Hancock Creek: Watershed Improvement Initiative	Agro forestry Planting	09/30/2013	4,203.00	FT	051001020101	Hancock Creek
	Onsite Waste Water Treatment System (New/Existing)	09/30/2013	1.00	UNITS	051001020101	Hancock Creek
	Stormwater Runoff Control	09/30/2013	1.00	UNITS	051001020101	Hancock Creek
Cane Run And Royal Spring Watershed Based Plan Implementation Project	Diversion	09/30/2013	600.00	FT	051002050804	Cane Run
	Fence	09/30/2013	5,150.00	FT	051002050804	Cane Run
	Filter Strip	09/30/2013	51,200.00	FT	051002050804	Cane Run

	Filtration Basin	09/30/2013	500.00	FT	051002050804	Cane Run
	Grazing Planned Systems	09/30/2013	27.50	ACRES	051002050804	Cane Run
	Heavy Use Area Protection	09/30/2013	44,160.00	SQUARE FEET	051002050804	Cane Run
	Raingarden/ bioretention basin	09/30/2013	905.00	FT	051002050804	Cane Run
	Recreation Trail & Walkway	09/30/2013	1,500.00	FT	051002050804	Cane Run
	Riparian Buffers - Vegetative	09/30/2013	62,240.00	FT	051002050804	Cane Run
	Waste Storage Facility	09/30/2013	2,000.00	SQUARE FEET	051002050804	Cane Run
	Watering Facility	09/30/2013	400.00	SQUARE FEET	051002050804	Cane Run
	Raingarden/ bioretention basin	09/01/2013	240.00	SQUARE FEET	051002050701	Jessamine Creek
	Raingarden/ bioretention basin	09/29/2014	100.00	SQUARE FEET	051002050303	Upper Paint Lick Creek
	Raingarden/ bioretention basin	09/29/2014	200.00	SQUARE FEET	051001020101	Hancock Creek-Strodes Creek
	Raingarden/ bioretention basin	09/29/2014	200.00	SQUARE FEET	051002040404	Upper Red Lick Creek
	Raingarden/ bioretention basin	09/29/2014	300.00	SQUARE FEET	051002050903	Lee Branch-South Elkhorn Creek
	Raingarden/ bioretention basin	09/29/2014	400.00	SQUARE FEET	051001020205	Kennedy Creek-Stoner Creek
	Raingarden/ bioretention basin	09/29/2014	400.00	SQUARE FEET	051002050805	Dry Run North Elkhorn Creek
	Cistern	09/30/2012	60.00	UNITS	051001010605	Lower Triplett Creek
	Cistern	09/30/2013	1.00	UNITS	051001010605	Lower Triplett Creek
	Cistern	09/29/2014	2.00	UNITS	051001010605	Lower Triplett Creek
	Cistern	09/29/2014	3.00	UNITS	051001010605	Lower Triplett Creek
	Raingarden/ bioretention basin	10/01/2012	120.00	FT	051001010605	Lower Triplett Creek
	Raingarden/ bioretention basin	09/29/2014	45.00	SQUARE FEET	051001010605	Lower Triplett Creek
	Raingarden/ bioretention basin	09/29/2014	80.00	SQUARE FEET	051001010605	Lower Triplett Creek
Triplett Creek Watershed Based Plan						

	Raingarden/ bioretention basin	09/29/2014	120.00	SQUARE FEET	051001010605	Lower Triplett Creek
	Raingarden/ bioretention basin	09/29/2014	350.00	SQUARE FEET	051001010605	Lower Triplett Creek
	Tree/Shrub Establishment	09/30/2013	1.00	ACRES	051001010605	Lower Triplett Creek
	Wetland Creation	09/30/2012	0.25	ACRES	051001010601	Upper North Fork Triplett Creek
City of Radcliff Green Parking Lot BMP Demonstration Project	Stormwater Runoff Control	09/29/2014	1.65	ACRES	051401021304	Cedar Point Branch-Salt River
Gunpowder Creek Watershed Initiative	Conservation Easements	09/30/2012	1.00	UNITS	051001011305	051001011305
	Stream Channel Stabilization	09/30/2012	1.00	UNITS	051001011305	051001011305
Red River Gorge Restoration and Watershed Based Plan	Recreation Area Improvement	09/30/2012	8.00	UNITS	051002040205	Clifty Creek - Red River
	Recreation Area Improvement	09/30/2012	9.00	UNITS	051002040206	Gladie Creek - Red River
	Recreation Area Improvement	09/30/2012	19.00	UNITS	051002040209	Indian Creek - Red River
	Recreation Area Improvement	09/29/2014	0.50	ACRES	051002040206	Gladie Creek - Red River
	Recreation Trail & Walkway	09/30/2013	2.50	ACRES	051002040205	Clifty Creek - Red River
	Recreation Trail & Walkway	09/30/2013	7.50	ACRES	051002040204	Swift Camp Creek
	Recreation Trail & Walkway	09/30/2013	15.50	ACRES	051002040206	Gladie Creek - Red River
	Recreation Trail & Walkway	09/29/2014	7,286.00	FT	051002040206	Gladie Creek - Red River
	Recreation Trail & Walkway	09/29/2014	9,240.00	FT	051002040204	Swift Camp Creek
	Recreation Trail & Walkway	09/29/2014	23,517.00	FT	051002040209	Indian Creek - Red River
	Stream Habitat Improvement and Management	09/29/2014	9,190.00	FT	051002040206	Gladie Creek - Red River
	Stream Habitat Improvement and Management	09/29/2014	20,080.00	FT	051002040209	Indian Creek - Red River
	Stream Habitat Improvement and Management	09/29/2014	56,590.00	FT	051002040205	Clifty Creek - Red River
Brushy Creek sediment and water quality investigation	Animal Trails and Walkways	09/29/2014	966.00	FT	051301030105	Price Valley-Buck Creek

	Fence	09/29/2014	131.00	FT	051301030101	Headwaters Buck Creek
	Fence	09/29/2014	915.00	FT	051301030102	Barney Branch - Buck Creek
	Fence	09/29/2014	1,110.00	FT	051301030105	Price Valley-Buck Creek
	Fence	09/29/2014	1,860.00	FT	051301030103	Brushy Creek
	Fence	09/29/2014	2,065.00	FT	051301030103	Brushy Creek
	Heavy Use Area Protection	09/30/2013	6,264.00	SQUARE YARDS	051301030103	Brushy Creek
	Heavy Use Area Protection	09/29/2014	2,250.00	SQUARE FEET	051301030101	Headwaters Buck Creek
	Heavy Use Area Protection	09/29/2014	2,750.00	SQUARE FEET	051301030102	Barney Branch - Buck Creek
	Livestock Pipeline	09/29/2014	1,289.00	FT	051301030105	Price Valley-Buck Creek
	Pasture & Hayland Management	09/30/2013	31.80	ACRES	051301030101	Headwaters Buck Creek
	Pasture & Hayland Management	09/30/2013	32.20	ACRES	051301030104	Flat Lick Creek
	Pasture & Hayland Management	09/30/2013	34.80	ACRES	051301030103	Brushy Creek
	Pasture & Hayland Management	09/30/2013	97.40	ACRES	051301030102	Barney Branch - Buck Creek
	Pasture & Hayland Management	09/29/2014	14.30	ACRES	051301030102	Barney Branch - Buck Creek
	Pasture & Hayland Management	09/29/2014	20.70	ACRES	051301030102	Barney Branch - Buck Creek
	Stream Crossing	09/29/2014	364.00	SQUARE FEET	051301030105	Price Valley-Buck Creek
	Stream Crossing	09/29/2014	1,125.00	SQUARE FEET	051301030102	Barney Branch - Buck Creek
	Watering Facility	09/29/2014	3.00	UNITS	051301030105	Price Valley-Buck Creek
Bacon Creek Watershed Plan Implementation	Fence	09/30/2013	2,650.00	FT	051100011101	Upper Bacon Creek
	Fence	09/30/2013	3,540.00	FT	051100010903	Lower Walters Creek-South Fork Nolin River
	Fence	09/30/2013	3,584.00	FT	051100011102	Lower Bacon Creek
	Heavy Use Area Protection	09/30/2013	2,100.00	SQUARE FEET	051100010903	Lower Walters Creek-South Fork Nolin River
	Onsite Waste Water Treatment System (New/Existing)	09/30/2013	2.00	UNITS	051100011101	Upper Bacon Creek

	Onsite Waste Water Treatment System (New/Existing)	09/30/2013	4.00	UNITS	051100011102	Lower Bacon Creek
	Onsite Waste Water Treatment System (pumpout)	09/30/2013	2.00	UNITS	051100010806	Boiling Springs Hollow-Green River
	Onsite Waste Water Treatment System (pumpout)	09/30/2013	2.00	UNITS	051100010903	Lower Walters Creek-South Fork Nolin River
	Onsite Waste Water Treatment System (pumpout)	09/30/2013	2.00	UNITS	051100011102	Lower Bacon Creek
	Stream Crossing	09/30/2013	20.00	FT	051100011102	Lower Bacon Creek
	Watering Facility	09/30/2013	2,100.00	SQUARE FEET	051100010903	Lower Walters Creek-South Fork Nolin River
Dix River Watershed Implementation Project – Phase I	Cistern	09/30/2012	10.00	UNITS	051002050505	Clarks Run
	Onsite Waste Water Treatment System (New/Existing)	09/29/2014	10.00	UNITS	051002050505	Clarks Run
	Raingarden/ bioretention basin	09/30/2012	4.00	UNITS	051002050505	Clarks Run
	Riparian Buffers - Vegetative	09/29/2014	475.00	SQUARE FEET	051002050505	Clarks Run
Habitat for Humanity Green Infrastructure Demonstration	Native Plant Community Restoration and Management	09/30/2013	4.50	ACRES	051100020902	Jennings Creek
	Pond	09/30/2013	0.20	ACRES	051100020902	Jennings Creek
	Raingarden/ bioretention basin	09/30/2013	1.10	ACRES	051100020902	Jennings Creek
Livestock Stewardship BMP Training and Demo	Alternative Water Sources	06/01/2013	100.00	SQUARE FEET	051302050704	Upper Eddy Creek
	Alternative Water Sources	06/01/2013	100.00	SQUARE FEET	051402050301	Flynn Fork
	Alternative Water Sources	09/29/2014	100.00	SQUARE FEET	051302050704	Upper Eddy Creek
	Alternative Water Sources	09/29/2014	100.00	SQUARE FEET	051402050301	Flynn Fork
	Feed Management	09/29/2014	1.00	UNITS	051402050301	Flynn Fork
	Fence	09/29/2014	3,030.00	FT	051402050301	Flynn Fork
	Windbreak/Shelterbelt Establishment	09/29/2014	3.00	UNITS	051402050301	Flynn Fork

Restoring Currys Fork	Onsite Waste Water Treatment System (pumpout)	09/29/2014	3.00	UNITS	051401020803	Currys Fork
Woolper Creek Watershed Based Plan	Stream Channel Stabilization	08/01/2014	600.00	FT	051001011305	Lower Banklick Creek
Agricultural BMPs in the Hanging Fork and Clarks Run Watershed	Fence	09/30/2013	1,760.00	FT	051002050503	Lower Hanging Fork Creek
	Fence	09/30/2013	6,160.00	FT	051002050505	Clarks Run
	Heavy Use Area Protection	09/30/2013	3.00	ACRES	051002050503	Lower Hanging Fork Creek
	Heavy Use Area Protection	09/30/2013	7.00	ACRES	051002050505	Clarks Run
Chautauqua Park's Green Solution to Pollution	Cistern	09/29/2014	44.00	INDIVIDUAL UNITS	051100050306	Rhodes Creek-Panther Creek
	Raingarden/ bioretention basin	09/30/2013	3,938.00	SQUARE FEET	051402011201	Yellow Creek
	Raingarden/ bioretention basin	09/29/2014	100.00	SQUARE FEET	051100050306	Rhodes Creek-Panther Creek
	Raingarden/ bioretention basin	09/29/2014	160.00	SQUARE FEET	051100050306	Rhodes Creek-Panther Creek
Coarse sediment assessment and stream restoration design alternatives for upper Kinniconick Creek	Stream Channel Restoration (stream bed)	12/30/2012	2,598.00	FT	050902011208	Ninemile Creek-Ohio River
Franklin County Judicial Green Streets Demonstration Project	Porous Pavement	09/30/2013	2,960.00	SQUARE FEET	051002050710	Cedar Run - Ky River
	Raingarden/ bioretention basin	09/30/2013	300.00	SQUARE FEET	051002050710	Cedar Run - Ky River
Hinkston Creek Watershed-Based Plan Implementation Project	Heavy Use Area Protection	09/30/2013	1.00	UNITS	051001020305	Blacks Creek-Hinkston Creek
	Heavy Use Area Protection	09/30/2013	1.00	UNITS	051001020306	Big Brushy Creek
	Heavy Use Area Protection	09/30/2013	3.00	UNITS	051001020307	Hooktown Branch-Hinkston
	Onsite Waste Water System [Repair]	09/30/2013	2.00	UNITS	051001020307	Hooktown Branch-Hinkston
	Onsite Waste Water System [Repair]	09/30/2013	3.00	UNITS	051001020303	Somerset Creek
	Onsite Waste Water Treatment System (New/Existing)	09/30/2013	1.00	UNITS	051001020307	Hooktown Branch-Hinkston

	Seeding (Re- Vegetation)	09/30/2013	70.00	ACRES	051001020303	Somerset Creek
	Seeding (Re- Vegetation)	09/30/2013	120.00	ACRES	051001020307	Hooktown Branch-Hinkston
	Seeding (Re- Vegetation)	09/30/2013	180.00	ACRES	051001020304	Boone Creek-Hinkston Creek
	Seeding (Re- Vegetation)	09/30/2013	270.00	ACRES	051001020306	Big Brushy Creek
	Stream Channel Stabilization	09/30/2013	1.00	UNITS	051001020302	HW Hinkston Creek
	Stream Crossing	09/30/2013	1.00	UNITS	051001020305	Blacks Creek-Hinkston Creek
	Stream Crossing	09/30/2013	1.00	UNITS	051001020306	Big Brushy Creek
	Stream Crossing	09/30/2013	1.00	UNITS	051001020307	Hooktown Branch-Hinkston
	Stream Crossing	09/30/2013	3.00	UNITS	051001020304	Boone Creek-Hinkston Creek
	Stream Exclusion Fencing	09/30/2013	1,200.00	FT	051001020303	Somerset Creek
	Stream Exclusion Fencing	09/30/2013	4,800.00	FT	051001020306	Big Brushy Creek
	Stream Exclusion Fencing	09/30/2013	6,678.00	FT	051001020307	Hooktown Branch-Hinkston
	Stream Exclusion Fencing	09/30/2013	17,900.00	FT	051001020304	Boone Creek-Hinkston Creek
	Stream Exclusion Fencing	09/30/2013	18,612.00	FT	051001020305	Blacks Creek-Hinkston Creek
	Watering Facility	09/30/2013	1.00	UNITS	051001020307	Hooktown Branch-Hinkston
	Watering Facility	09/30/2013	3.00	UNITS	051001020305	Blacks Creek-Hinkston Creek
	Watering Facility	09/30/2013	3.00	UNITS	051001020306	Big Brushy Creek
	Watering Facility	09/30/2013	4.00	UNITS	051001020304	Boone Creek-Hinkston Creek
Kentucky Stream Restoration Manual	Riparian Forest Buffer	09/30/2013	1,695.00	ACRES	051401020803	051401020803
	Stream Channel Restoration (stream bed)	09/30/2014	3,710.00	FT	051401020803	051401020803
Little Laurel River Watershed – Watershed Plan Implementation	Riparian Buffers - Vegetative	09/29/2014	2,400.00	FT	051301010802	Little Laurel River
	Stream Channel Stabilization	09/30/2013	1,200.00	FT	051301010802	Little Laurel River
	Wetland Creation	09/30/2013	2.50	ACRES	051301010802	Little Laurel River
Sinking Creek Water Quality Sediment and Habitat Investigation	Conservation Easements	09/29/2014	459.00	ACRES	051301020503	Lick Creek-Rockcastle River

Bacon Creek WBP implementation	Conservation Crop Rotation	09/29/2014	2.00	UNITS	051100011101	Upper Bacon Creek
	Pasture & Hayland Management	09/29/2014	1.00	UNITS	051100010808	Ugly Creek-Green River
	Pasture & Hayland Management	09/29/2014	1.00	UNITS	051100011101	Upper Bacon Creek
Hanging Fork Septic System Education and Improvement Program	Onsite Waste Water System [Repair]	09/30/2014	1.00	UNITS	051002050501	Upper Hanging Fork Creek
Managing Mud, Manure, and Runoff	Raingarden/ bioretention basin	09/29/2014	110.00	SQFT	051002050804	Cane Run
	Raingarden/ bioretention basin	09/29/2014	160.00	SQFT	051002050804	Cane Run
	Raingarden/ bioretention basin	09/29/2014	200.00	SQFT	051002050804	Cane Run
	Riparian Forest Buffer	09/29/2014	117.00	SQFT	051002050804	Cane Run
	Riparian Forest Buffer	09/29/2014	185.00	SQFT	051002050804	Cane Run
	Riparian Forest Buffer	09/29/2014	200.00	SQFT	051002050804	Cane Run
	Riparian Forest Buffer	09/29/2014	270.00	SQFT	051002050804	Cane Run
	Sediment Basin	09/29/2014	3.00	ACRES	051002050804	Cane Run
	Vegetated Filter	09/29/2014	110.00	SQFT	051002050804	Cane Run
	Watering Facility	09/29/2014	300.00	SQUARE FEET	051002050804	Cane Run

Appendix 4. Response to Comments

The public was invited to provide written comments on the Draft 2016 §303(d) List during the period May 2, 2017 and July 28, 2017. The purpose of this appendix is to document the public comments received and provide a response to these comments in writing. There were five submittals with a varying number of comments for the Draft 2016 §303(d) List. Comments are reproduced as received below in black text and DOW responses are in blue text.

Comments received via email 07/28/17 from Bobby D. Smith, Project Manager

Fluor Federal Services, Inc.
Paducah Deactivation Project
P.O. Box 369
Kevil, KY 42053
USA

1. KDOW has developed a draft §303(d) list of water bodies that identifies Bayou Creek in McCracken County as impaired for mercury, lead, copper, gross alpha, beta particles and photon emitters, sedimentation/siltation, and nutrient/eutrophication biological indicators. The list also identifies Little Bayou Creek in McCracken County as impaired for copper, lead, gross alpha, beta particles and photon emitters, and causes unknown. A water body is "impaired," if it does not meet applicable water quality standards.

No instream data generated in the last 20 years, to which FPDP has access supports designating Bayou and Little Bayou Creeks as impaired. As examples, the maximum concentration of copper collected from an instream location was reported at 14.5 ug/L, which is below the warm water habitat (chronic) water quality based effluent limit (WQBEL) of 16.9 ug/L. For lead, all instream results have been below the warm water habitat (chronic) WQBEL of 7.69 ug/L in the last 20 years. For mercury, all instream results have been below the warm water habitat (chronic) WQBEL of 0.77 ug/L in the last 25 years (assuming 200 mg/L hardness).

KDOW recently issued a final Kentucky Pollutant Discharge Elimination Permit (KPDES) permit renewal for Paducah Gaseous Diffusion Plant (PGDP) [Permit No. KY0004049 (July 3, 2017)]. The Fact Sheet for the permit renewal summarized historic effluent concentrations measured at PGDP's 15 outfalls and calculated WQBELs. The following table, summarized from the Fact Sheet, compared measured concentrations to WQBELs for mercury, lead, copper, gross alpha, and gross beta. (Tables excluded for brevity.)

Actual concentrations of these pollutants measured at PGDP outfalls/instream locations all are below related WQBELs. For example, the maximum gross alpha and beta results from outfalls/instream locations are 472 pCi/L and 3,860 pCi/L, respectively. Calculated WQBELs for these pollutants are well over 1,000,000 pCi/L. The maximum concentration for lead from any outfall shown in the draft permit fact sheet is 1.1 ppb, whereas lead daily effluent limits are at least 81 ppb. The limited instream water quality data available to PGDP similarly do not show exceedances of relevant water quality standards in 401 KAR 10:031, Section 6, Table 1. Because historic discharges at PGDP do not exceed WQBELs for mercury, copper, lead, gross alpha, and gross beta and because effluent limits are calculated to ensure that water quality standards are achieved, the available data do not support designating Bayou and Little Bayou Creeks as impaired.

The Administrative Record for this listing does not appear to include required information. In developing the list of impaired water bodies, KDOW must assemble and evaluate all existing and readily available water quality related data and information. KDOW then must provide to the public a detailed summary of the basis of the listing, including the location of all available data.

The listing also must include the sources of information used, sources and methods of data collection and analysis, and the age of the data used. Finally, KDOW must submit its list to the U.S. Environmental Protection Agency Region 4 Regional Administrator to support KDOW's determination to list a certain water body. This submittal must include, among other things, a description of the data and information used to identify waters and rationale for any decision not to use any existing and readily available data and information. FPDP has been unable to locate the sources of information, because it does not appear to be available in a location easily accessible to the public; therefore, FPDP has had to rely upon the substantial database available to it at PGDP.

KDOW permitting actions are inconsistent with the listing of Bayou and Little Bayou Creeks as impaired waters. In the final permit issued July 3, 2017, KDOW removed effluent limits for total recoverable metals, which include mercury, copper, and lead at several outfalls at PGDP.

The process for removing these pollutants is based upon Kentucky's "Permitting Procedures for Determining Reasonable Potential." In relevant part, those procedures state, "... [limitations must control all pollutants or pollutant parameters (conventional, non-conventional, or toxic) which the Cabinet determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any water quality standard, including narrative criteria for water quality." Thus, removal of total recoverable metals shows that this parameter did not have the reasonable potential to cause or contribute to an excursion above any water quality standard. Given the historic data that supported removal of these parameters from the PGDP KPDES permit, and apparent lack of any information supporting the designation of Bayou and Little Bayou Creeks as "impaired, inclusion of these water bodies on the 303(d) impaired list appears to be completely arbitrary.

DOW Response:

New data of sufficient quality and quantity is necessary to demonstrate the waterbody is attaining its use and to remove it from the 303(d) list; historic listings cannot be removed based on the lack of data.

Kentucky Listing methodology protocols allow data collected from outfalls by regulated entities for permitting requirements to be considered: exceedances may be used to determine if a stream should be placed in Category 5b (defined as: segment does not support designated uses based on evaluated data). Data provided by regulated entities from outfalls is insufficient to make a listing determination that requires a TMDL to be developed and conversely to delist a stream that has been previously assessed based on instream data.

If instream data is available, the data and supporting materials can be submitted to DOW to determine if it is of sufficient quantity and quality to justify a delisting. If the public or regulated entities believe they have data that should be considered for determination of use attainment of the waters of the Commonwealth we ask that you contact the Assessment Coordinator, Katie McKone at Katie.McKone@ky.gov.

As stated in the comment above, where DOW's analysis of the DMR data for the permit KY0004049 effective September 1, 2017 for the period beginning January 1, 2010 through December 31, 2012 indicated the concentrations of each of these pollutants did not demonstrate a reasonable potential as determined by DOW's chemical-specific RPA procedures monitoring, the requirement for total recoverable metals was removed. A monitoring requirement for total recoverable copper has remained for outfall 2 where there is reasonable potential. The analysis for each outfall and the resulting decision can be found in the Final Fact Sheet for the KPDES permit No.: KY0004049 at http://dep.gateway.ky.gov/eSearch/Search_Al.aspx. The removal of these parameters from the permit is not indicative of the instream conditions, as the commenter has stated above. Removal of parameters is based on DMR data collected from the outfalls and reported from the facility. This information has no bearing on the determination of the use attainment status of these waterbodies.

2. The draft list of impaired waters incorrectly includes gross alpha and beta particles and photon emitters as water quality standards for a warm water aquatic habitat. In Kentucky, water quality standards for total alpha and total beta apply only to a drinking water supply designated use. As such, the listing is inappropriate.

Further, even if the designated uses for Bayou and Little Bayou Creeks were for drinking water supply because these standards apply at the point of intake of the nearest public water supply (for PGDP, the nearest downstream public water supply is on the Ohio River at Cairo, Illinois), total alpha and total beta concentrations discharged from PGDP would be several orders of magnitude below calculated effluent limits for total alpha and total beta (see Comment 1).

DOW Response:

This assessment was consistent with 401 KAR 10:031 prior to 2008, when there was a revision. It is no longer an appropriate listing. A request for delisting will be submitted this cycle to remove the pollutants: gross alpha and beta particles, and photon emitters from the warm water aquatic life use.

3. The draft impaired waters list places Bayou Creek in Category 5-PS (Partial Support of Designated Use) and Little Bayou Creek in Category 5-NS (Non Support of Designated Use). The designated use identified in the impaired waters list for both water bodies is Warm Water Habitat. Based upon information available to FPDP, Water Quality Standards for Warm Water Habitat set forth in 401 KAR 10:031, Section 6, Table 1, are being attained in both creeks. As such, there appears to be no basis for listing these waters on the draft impaired waters list.

DOW Response:

Your comment has been noted. New data of sufficient quality and quantity is necessary to demonstrate the waterbody is attaining its use and to remove it from the 303(d) list; historic listings cannot be removed based on the lack of data.

Information regarding individual listings can be obtained by submitting a request of records under the Kentucky Open Records Act (KORA) to DEP.KORA@ky.gov or by fax to 502-564-9232. The DEP KORA point of contact may also be reached at 502-564-9232.

4. The draft impaired waters list identifies sedimentation/siltation and nutrient/eutrophication biological indicators as pollutants that impair Bayou Creek from nonirrigated crop production. Nutrient-related impairments are related to nutrients such as nitrates and phosphates, algal growth, ammonia, noxious aquatic plants, and organic enrichment/oxygen depletion. Sedimentation/siltation-related impairments include the deposition of finer grained sediments on coarser substrates, which may lead to degraded benthic habitat and reduced diversity and abundance of macroinvertebrates. Much of the flow in Bayou Creek emanates from PGDP; however, FPDP is unaware of any data or other information on any Bayou Creek segments, either within or outside of DOE property that supports listing sedimentation/siltation and nutrient/eutrophication biological indicators as pollutants impairing Bayou Creek.

DOW Response:

Your comment has been noted. New data of sufficient quality and quantity is necessary to demonstrate the waterbody is attaining its use and to remove it from the 303(d) list; historic listings cannot be removed based on the lack of data.

Information regarding individual listings can be obtained by submitting a request of records under the Kentucky Open Records Act (KORA) to DEP.KORA@ky.gov or by fax to 502-564-9232. The DEP KORA point of contact may also be reached at 502-564-9232.

Comments received via email 07/28/17 from Bob Weiss, Executive Vice President

Home Builders Association of Kentucky
1040 Burlington Lane
Frankfort, KY 40601

The Impaired Waters List and the Consolidated Assessment and Listing Methodology: Surface Water Quality Assessment in Kentucky, The Integrated Report documents have been reviewed. Included below are the following comments:

- The methodology used to make the list of impaired waters available to the public was inadequate. It is virtually impossible for the vast majority of Kentuckians to know or to find the location of the water bodies listed or to access the quantitative information which should provide the reasons for the listing. For that reason and for others stated below, The Impaired Waters List should open another 60 day comment period and provide the public a chance to see where these impaired waters are located and why they are listed so they can provide adequate comments on the proposed list.

DOW Response:

The Division is unable to comply with your request to republish the 303(d) list and open another 60 day comment period.

The Kentucky Division of Water has provided the Water Health Portal as a communication tool for the 303(d) List of Impaired Waters (see: <http://watermaps.ky.gov/WaterHealthPortal/>) . This website meets the requirements of KRS 224.70-150 (referred to in comments as: HB 378 2014 General Assembly, regarding the Impaired Waters List and TMDL listings).

Assessment summaries are found in links on dashboards for newly listed waters of the state and include a plain language basis for listing. The location of the data that is used for listings is on the assessment summary along with information regarding requests for data and contact information for any questions.

In addition to providing information for 303(d) listed waters, this website provides information for all of the assessments completed by the Division, including the Outstanding State Resource Waters, information for those waters meeting water quality standards, and those with a TMDL and the appropriate links.

The 303(d) spreadsheet also includes locational information such as the latitude and longitude for each listed segment, along with the county, basin, and HUC.

Kentucky Division of Water is always working on improvements to the assessment process and communication for the impaired waters of Kentucky, so your feedback is appreciated. The Division provides an email for general questions at water@ky.gov. Alicia Jacobs and staff in the TMDL section are available as well to answer any questions regarding listings and TMDLs (Direct Line: 502-782-6987).

- Many of the streams listed and information provided about the streams on the spreadsheet appear to be disconnected and give the appearance that the streams and the reasons for being listed are not accurate. For example, Raccoon Creek, located in Greenup County is listed as impaired but the cause of the impairment is unknown and suspected sources are unknown. The same applies to Harrods Creek, in Oldham County. The pollutant cause is unknown and the suspected sources are unknown. There are several other streams lacking the same information. For example, Long Fork, Pike County is impaired for sedimentation/Siltation and a suspected source is rural residential area. What was the basis for the suspected source(s)? The UT of Uhlens Run in Greenup county lists the stream as impaired for Sedimentation and lists the suspected source as rural (residential areas). What is the basis for that determination?

DOW Response:

Comment noted. In accordance with 401 KAR 10:031. Surface water standards and the Kentucky DOW's Consolidated Assessment and Listing Methodology the Aquatic Life Use has been determined by the division to be impaired; the causes and sources of this impairment are unknown.

The suspected sources used for the impaired waters list are provided by EPA and can be found at: http://iaspub.epa.gov/pls/waters/f?p=ASKWATERS:SOURCE_LUT. The DOW uses suspected sources to best describe the observed conditions at each monitoring event. The selection of one suspected source does not necessarily exclude other suspected sources. As new assessments are made on existing segments, the suspected sources can be updated to reflect the current conditions.

- The use of reference reach streams to serve as a baseline for water quality in urban areas is unrealistic. Perhaps an explanation of why this method is being used for Kentucky waters would be helpful to the public. It would also enable the public to be able to make better, more informed comments on these listings. The same applies to the Diatom Biotic Index. The reason for the use of these approaches needs to be clarified.

DOW Response:

Comment noted. Waters of the Commonwealth are associated with one of two aquatic life designated uses: Warm Water Aquatic Habitat and Cold Water Aquatic Habitat, both of which hold an expectation of supporting indigenous aquatic life (see 401 KAR 10:001 and 10:031 (<http://www.lrc.state.ky.us/kar/title401.htm>)). The regional reference approach allows assessors to compare biological communities in a waterbody to an appropriate set of expectations based on the naturally occurring aquatic organisms typical in a given region and waterbody type.

The Diatom Biotic Index was a tool that was historically used to supplement information from macroinvertebrate and fish surveys, primarily to assist with determining causes when aquatic life use impairment was evident from those groups. Although there is not a diatom-based index in use at this time, diatoms and other algae are important and sensitive components of the indigenous aquatic community that can be valuable in detecting adverse effects to aquatic life.

- The phrase, "A detailed summary, in plain and unambiguous words that are easily understood by laymen of the basis for listings", is found in HB 378 2014 General Assembly, regarding the Impaired Waters List and TMDL listings. This phrase appears to have been overlooked by the authors of these documents. Information found in the listing methodology and the apparent incongruities found in the Impaired Waters List are not in plain and unambiguous words and should be rewritten and the improved version provided to the public.

DOW Response:

The Kentucky Division of Water has provided the Water Health Portal as a communication tool for the 303(d) List of Impaired Waters (see: <http://watermaps.ky.gov/WaterHealthPortal/>) . This website meets the requirements of KRS 224.70-150 (referred to in comments as: HB 378 2014 General Assembly, regarding the Impaired Waters List and TMDL listings).

Assessment summaries are found in links on dashboards for newly listed waters of the state and include a plain language basis for listing. The location of the data that is used for listings is on the assessment summary along with information regarding requests for data and contact information for any questions.

- Section 3.2, Data Sufficiency, Credibility and Quality, Listing Methodology, states that "volunteer data may be used by the DOW for assessment purposes..." Because the education, training and experience of volunteers is highly variable, the use of volunteers should be highly supervised and utilized sparingly. There should be some identification of listed streams where data was provided by volunteers. The public assumes that this data was gathered by state employees. If it was gathered by others, it should be evident in the table provided.

DOW Response:

Section 3.2, Data Sufficiency, Credibility and Quality, Consolidated Assessment and Listing Methodology, states “Volunteer data may be used by the DOW for assessment purposes, but those data must be collected under SOP that is at least equivalent to the applicable DOW SOP and a DOW-approved QAPP”. It is required and the required practice that all readily available data is considered for assessment purposes, so volunteer or any other available data not meeting quality objectives may be used for screening purposes.

Information regarding individual listings can be obtained by submitting a request of records under the Kentucky Open Records Act (KORA) to DEP.KORA@ky.gov or by fax to 502-564-9232. The DEP KORA point of contact may also be reached at 502-564-9232.

- Smith Management Group requested data that was the basis for certain stream segments were proposed as Impaired Streams. While the data set was only for 12 streams, the conclusions drawn based on the data provided show some reason the be concerned regarding the listing procedures.
 - Beech Creek 0.0 to 3.9-DOW data for alkalinity is being listed as a pollutant but this analyte is non-detected in all samples taken between 2010-2014. Alkalinity should be removed for a reason for listing.

DOW Response:

The alkalinity listing is appropriate per 401 KAR10:031 Surface Water Standards found at: <http://www.lrc.ky.gov/kar/401/010/031.htm> See Section 4

(a) Natural alkalinity as CaCO₃ shall not be reduced by more than twenty-five (25) percent.

1. If natural alkalinity is below twenty (20) mg/L CaCO₃, there shall not be a reduction below the natural level.
2. Alkalinity shall not be reduced or increased to a degree that may adversely affect the aquatic community;

- West Hickman Creek 3.1-8.4-Reason for Listing is Fecal Coliform. No data at site for fecal coliform is available after 2003. Sewer infrastructure upgrades since the 2008 LFUCG consent decree are not reflected in this data. LFUCG fecal coliform results from 2003-2007 appear to be much lower than DOW data in 2003. Before listing, this site should have more current analysis performed to ensure that any water quality improvements in the watershed are reflected in the data.

DOW Response:

West Hickman Creek 3.1-8.4 fecal coliform is an existing listing; new data of sufficient quality and quantity is necessary to demonstrate the waterbody is attaining its PCR use and remove it from the 303(d) list.

- UT of Woolper Creek 0.0-3.4. Reason For Listing is E. coli, managed pasture grazing, non-irrigated crop production and an upstream source. There is not any 2012 data available. Aerial photo show rural homes in a forested area with one grazing and crop farm visible. Reason(s) should be reevaluated. There is a sports field park and parking lots upstream.

DOW Response:

The listing is appropriate and supported by DOW data. The suspected sources used for the impaired waters list are provided by EPA and can be found at: http://iaspub.epa.gov/pls/waters/f?p=ASKWATERS:SOURCE_LUT. The DOW uses suspected sources to best describe the observed conditions at each monitoring event. The selection of one suspected source does not necessarily exclude other suspected sources. As new assessments are made on existing segments, the suspected sources can be updated to reflect the current conditions.

- Big Brushy Creek 0.0-4.75. Reason for listing nutrient/eutrophication, biological indicators-crop production, loss of riparian habitat, rangeland, grazing, unrestricted cattle access. Field DO readings are general good (greater than 7mg/L) and nutrients (NKP) are less than 1mg/L. Other than elevated conductivity readings in 2014 (greater than 400 US/cm constantly), unsure of sources of nutrient/eutrophication from DOW data. Listing should be reconsidered.

DOW Response:

The listing for nutrient/eutrophication, biological indicators is appropriate and supported by DOW data. The Consolidated Assessment and Listing Methodology (CALM) describes the decision processes used in listings, including those involving biological community data (see CALM section 3.3). When the quality of the biological community indicates impairment, then potential causes are reviewed based upon available supporting data and the detailed makeup of the community itself. The evaluation of data in determining excursions from the narrative nutrient criteria in 401 KAR 10:031 Section 1 is discussed on page 44 of the CALM. This evaluation includes examination of the biological community for evidence of adverse effects consistent with a eutrophication problem, in accordance with definitions in 401 KAR 10:001.

If you have more questions, please contact Katie McKone regarding the assessment rationale at Katie.McKone@ky.gov.

The suspected sources used for the impaired waters list are provided by EPA and can be found at: http://iaspub.epa.gov/pls/waters/f?p=ASKWATERS:SOURCE_LUT. The DOW uses suspected sources to best describe the observed conditions at each monitoring event. The selection of one suspected source does not necessarily exclude other suspected sources. As new assessments are made on existing segments, the suspected sources can be updated to reflect the current conditions.

- Boggess Creek 0.0-3.0. Reason for listing nutrient/Eutrophication biological indicators, sedimentation/siltation-Agriculture, loss of riparian habitat. Field DO readings from 2011-2014 generally good (greater than 7 mg/L) and turbidity low (less than 16). Macro is rated as fair, not poor. Recommend this segment be withdrawn from consideration for impairment.

DOW Response:

The listing for nutrient/eutrophication, biological indicators is appropriate and supported by DOW data. The Consolidated Assessment and Listing Methodology (CALM) describes the decision processes used in listings, including those involving biological community data (see CALM section 3.3). When the quality of the biological community indicates impairment, then potential causes are reviewed based upon available supporting data and the detailed makeup of the community itself. The evaluation of data in determining excursions from the narrative nutrient criteria in 401 KAR 10:031 Section 1 is discussed on page 44 of the CALM. This evaluation includes examination of the biological community for evidence of adverse effects consistent with a eutrophication problem, in accordance with definitions in 401 KAR 10:001.

If you have more questions, please contact Katie McKone regarding the assessment rationale at Katie.McKone@ky.gov.

The suspected sources used for the impaired waters list are provided by EPA and can be found at: http://iaspub.epa.gov/pls/waters/f?p=ASKWATERS:SOURCE_LUT. The DOW uses suspected sources to best describe the observed conditions at each monitoring event. The selection of one suspected source does not necessarily exclude other suspected sources. As new assessments are made on existing segments, the suspected sources can be updated to reflect the current conditions.

- Caney Creek 0.0-3.6. Reason for listing nutrient/eutrophication biological indicators-crop production, loss of riparian habitat, non-point source, urban runoff/storm sewers. Listed in 2006 and updated in 2014. DOW says reason for listing is because new data is available but no new data included since

2013 is available. Data should be reviewed but if not available this segment should be withdrawn for consideration.

DOW Response:

The listing for nutrient/eutrophication, biological indicators is appropriate and supported by DOW data. The Consolidated Assessment and Listing Methodology (CALM) describes the decision processes used in listings, including those involving biological community data (see CALM section 3.3). When the quality of the biological community indicates impairment, then potential causes are reviewed based upon available supporting data and the detailed makeup of the community itself. The evaluation of data in determining excursions from the narrative nutrient criteria in 401 KAR 10:031 Section 1 is discussed on page 44 of the CALM. This evaluation includes examination of the biological community for evidence of adverse effects consistent with a eutrophication problem, in accordance with definitions in 401 KAR 10:001.

If you have more questions, please contact Katie McKone regarding the assessment rationale at Katie.McKone@ky.gov.

The nutrient/eutrophication biological indicators listing is an existing listing; new data of sufficient quality and quantity is necessary to demonstrate the waterbody is attaining its use and to remove it from the 303(d) list.

The suspected sources used for the impaired waters list are provided by EPA and can be found at: http://iaspub.epa.gov/pls/waters/f?p=ASKWATERS:SOURCE_LUT. The DOW uses suspected sources to best describe the observed conditions at each monitoring event. The selection of one suspected source does not necessarily exclude other suspected sources. As new assessments are made on existing segments, the suspected sources can be updated to reflect the current conditions.

- Cheese Lick 5.8-8.2. First time being listed but all data is from 2012-2013. Some data suspect. E.Coli ranges from non-detect to 14,136 (CFR/100 ml) in a month. pH reading of 13.56 unlikely. This data point should be removed from consideration until more consistent data becomes available.

DOW Response:

The DOW data supports this listing. The pH data point was not considered for *E. coli* listing. The spreadsheet requested included an abbreviation that should have been clarified: the ND indicated no data, rather than 'non-detect' as assumed by these comments. A non-detect would be denoted by <1.

Kentucky's Consolidated Assessment and Listing Methodology indicates that age of data be within a 5 year window to determine use support and data older than 5 years can be used to make assessment decisions if they are considered to be representative of current conditions.

- East Hickman Creek 4.2-10.55. Listed for fecal coliform, nutrient/eutrophication biological indicators-livestock, unspecified urban stormwater. Listing data for 1996-1999 has been lost. Macro data and habitat data reportedly used to replace but no data was provided in Open Record provided. There does not appear that enough data exists to list this stream segment. This listing should be withdrawn until data can be found and listing substantiated. Otherwise this segment should be removed from impaired waters list.

DOW Response:

The fecal coliform and nutrient/eutrophication biological indicators listings are existing listings; new data of sufficient quality and quantity is necessary to demonstrate the waterbody is attaining its use and to remove it from the 303(d) list.

- Gunpowder Creek 0.0-15.35. Reason for listing I. coli, package plant or other permitted small flows, sanitary sewer overflows. E. coli data being used for listing is from 2011, 2012. 2011 data is much higher than 2012. 2012 E.Coli data shows that only July exceeded the E. Coli monthly standards, other months did not exceed 130 colonies/100 ml monthly average. The data provided does not appear to justify the listing of this stream segment.

DOW Response:

The *E. coli* listing is appropriate, DOW data supports this listing. Greater than 33% of samples taken during the Primary Contact Recreation Season exceeded the standard of 240 colonies per 100 ml (42% of samples); therefore the segment is listed as non-support for *E. coli*. The standard can be found at <http://www.lrc.ky.gov/kar/401/010/031.htm> in Section 7. Recreational Waters, as follows: (1) Primary contact recreation water. The following criteria shall apply to waters designated as primary contact recreation use during the primary contact recreation season of May 1 through October 31:

(a) Fecal coliform content or *Escherichia coli* content shall not exceed 200 colonies per 100 ml or 130 colonies per 100 ml respectively as a geometric mean based on not less than five (5) samples taken during a thirty (30) day period. Content also shall not exceed 400 colonies per 100 ml in twenty (20) percent or more of all samples taken during a thirty (30) day period for fecal coliform or 240 colonies per 100 ml for *Escherichia coli*. Fecal coliform criteria listed in subsection (2)(a) of this section shall apply during the remainder of the year;

- Lytles Fork 0.0-14.7. Reason for listing nutrient/Eutrophication biological indicators-Agriculture. Habitat and macro scores listed as fair or good in 2006 and 2013, with improvement in habitat identified in 2013. Low nutrients N, P (less than 1mg/L) in 2006-2013 data and 2-13 K values also low at 3.32 mg/L. DO is relatively health across all years. Data does not support listing at this time.

DOW Response:

The DOW data supports this listing for nutrient/eutrophication, biological indicators. The Consolidated Assessment and Listing Methodology (CALM) describes the decision processes used in listings, including those involving biological community data (see CALM section 3.3). When the quality of the biological community indicates impairment, then potential causes are reviewed based upon available supporting data and the detailed makeup of the community itself. The evaluation of data in determining excursions from the narrative nutrient criteria in 401 KAR 10:031 Section 1 is discussed on page 44 of the CALM. This evaluation includes examination of the biological community for evidence of adverse effects consistent with a eutrophication problem, in accordance with definitions in 401 KAR 10:001.

If you have more questions, please contact Katie McKone regarding the assessment rationale at Katie.McKone@ky.gov.

- Straight Creek 1.7-23.3. Reason for listing-Specific Conductance, surface mining, sedimentation/siltation-channel erosion from upstream modifications, rural residences, mining. Listed in 2004 and updated in 2008. No data since 2005. There is no data to support this update. Justification for listing should be clarified or remove segment from the list.

DOW Response:

The specific conductance and sediment/siltation listings are existing listings; new data of sufficient quality and quantity is necessary to demonstrate the waterbody is attaining its use and to remove it from the 303(d) list.

- Based on a review of this small data set, files need to be reviewed and information confirmed before stream segment listings are finalized. The process used to determine reasons for listing need to be reviewed because many of these reasons don't match the results of the analytical data and site review on Google Earth.

DOW Response:

Comment noted. DOW reviews and lists segments according to the Kentucky Consolidated Listing and Assessment Methodology. DOW does not have data to support requesting the removal of any of the above listed segments from the 303(d) list. When data is available to DOW that supports removing individual pollutants or updating the use attainment status, that data will be considered. The listing process is intricate; if you have more questions, please contact Katie McKone regarding the assessment rationale at Katie.McKone@ky.gov.

- A considerable amount of decision making is based on or incorporated from EPA guidance which appears to be dated. This information should be reviewed and if more current methods are available or if KDOW employees or contractor could establish better methodologies, they should be incorporated into the Consolidated Assessment Document.

DOW Response:

Comment noted.

Comments received via email 07/28/17 from Adam Andrews for Laura Knoth Executive Director

Ky Corn Growers Association
PO Box 90, Eastwood, KY 40018
O: 502-742-2036
M: 502-974-1121
F: 866-543-9674
www.kycorn.org

July 28, 2017

ATTN: Comments for 2016 Impaired Waters List
Alicia Jacobs, TMDL Section Supervisor
Kentucky Division of Water
300 Sower Blvd
Frankfort, KY 40601

Dear Ms. Jacobs:

Kentucky Corn Growers Association (KyCGA) is a grassroots, member-based organization representing the interests of the more than 6,000 corn farmers in the Commonwealth. On their behalf, KyCGA appreciates the opportunity to comment on The Impaired Waters List and the Consolidated Assessment and Listing Methodology: Surface Water Quality Assessment in Kentucky, The Integrated Report documents have been reviewed. Our comments are below.

- The methodology used to make the list of impaired waters available to the public was inadequate. It is virtually impossible for the farm community to understand the methodologies for listing streams or to find the location of the water bodies listed. For that reason and for other reasons stated below, This Impaired Waters List should be rewritten to make the background information more accessible to the public. Therefore, we request clarifications be made and access to data be provided. Another 60-day comment period should be opened to provide the public the ability to comment on the locations and the basis for the listings of the waters.

DOW Response:

The Division is unable to comply with your request to republish the 303(d) list and open another 60 day comment period.

The Kentucky Division of Water has provided the Water Health Portal as a communication tool for the 303(d) List of Impaired Waters (see: <http://watermaps.ky.gov/WaterHealthPortal/>). This website meets the requirements of KRS 224.70-150 (referred to in comments as: HB 378 2014 General Assembly, regarding the Impaired Waters List and TMDL listings).

Assessment summaries are found in links on dashboards for newly listed waters of the state and include a plain language basis for listing. The location of the data that is used for listings is on the assessment summary along with information regarding requests for data and contact information for any questions.

In addition to providing information for 303(d) listed waters, this website provides information for all of the assessments completed by the Division, including the Outstanding State Resource Waters, information for those waters meeting water quality standards, and those with a TMDL and the appropriate links.

The 303(d) spreadsheet also includes locational information such as the latitude and longitude for each listed segment, along with the county, basin, and HUC.

Kentucky Division of Water is always working on improvements to the assessment process and communication for the impaired waters of Kentucky, so your feedback is appreciated. The Division provides an email for general questions at water@ky.gov. Alicia Jacobs and staff in the TMDL section are available as well to answer any questions regarding listings and TMDLs (Direct Line: 502-782-6987).

- Many of the streams listed and information provided about the streams on the spreadsheet appear to be disconnected and give the appearance that the streams and the reasons for being listed are not accurate. For example, Drennon Creek, located in Henry County is listed as impaired but the cause of the impairment is unknown and suspected sources are unknown. The same applies to Harrods Creek, in McCreary County. The pollutant cause is unknown and the suspected sources are unknown. There are several other streams lacking the same information.

DOW Response:

Comment noted. In accordance with 401 KAR 10:031. Surface water standards and the Kentucky DOW's Consolidated Assessment and Listing Methodology, the Aquatic Life Use has been determined by the division to be impaired; the causes and sources of this impairment are unknown.

The suspected sources used for the impaired waters list are provided by EPA and can be found at: http://iaspub.epa.gov/pls/waters/f?p=ASKWATERS:SOURCE_LUT. The DOW uses suspected sources to best describe the observed conditions at each monitoring event. The selection of one suspected source does not necessarily exclude other suspected sources. As new assessments are made on existing segments, the suspected sources can be updated to reflect the current conditions.

- Farming/agriculture is listed in reasons for impairment numerous times. There is never a reason why farming/agriculture was listed and in many cases farming is listed with other causes. What is the basis for those listings? It seems unrealistic that so many different reasons for an impairment would be feasible along short stream distances. Reasons for listing should be described as well as what exceedances of the water quality assessments were not met. For example:
 - o Big Spring-E.coli, Agriculture, municipal, nonpoint source, residential district, unspecified urban stormwater, urban runoff, storm sewers---really, agriculture in the midst of all other possibilities?
 - o Irvine Lick-Nutrients, Agriculture, as well as onsite treatment system, loss of riparian habitat, non-point source, residential districts. Agriculture in the midst of residential districts?

o Guist Creek (entire) Reservoir-Nutrients-Suspected source agriculture. It is unlikely that water quality problems regarding sources of contaminants associated with potential nutrient problems can be associated to agriculture alone. The DO summary section associates potential sources that are more likely the cause of nutrient contamination of the reservoir. They include: onsite sewage treatment, septic systems, rural residential discharges. Listing agriculture as a source without any information to collaborate is improper.

DOW Response:

The suspected sources used for the impaired waters list are provided by EPA and can be found at: http://iaspub.epa.gov/pls/waters/f?p=ASKWATERS:SOURCE_LUT. The DOW uses suspected sources to best describe the observed conditions at each monitoring event. The selection of one suspected source does not necessarily exclude other suspected sources. As new assessments are made on existing segments, the suspected sources can be updated to reflect the current conditions.

- The use of reference reach streams and Diatom Biotic Index to serve as methods for determining the status of water quality in farming areas is unrealistic. At best, these methods are theoretical propositions that may or may not be accurate in all situations. Perhaps an explanation of why this method is being used for Kentucky waters would be helpful to the public. It would also enable the public to be able to make better, more informed comments on these listings. Based on the information found in these documents, better, more realistic approaches should be used to determine if streams are meeting appropriate water quality standards.

DOW Response:

Comment noted. Waters of the Commonwealth are associated with one of two aquatic life designated uses: Warm Water Aquatic Habitat and Cold Water Aquatic Habitat, both of which hold an expectation of supporting indigenous aquatic life (see 401 KAR 10:001 and 10:031 <http://www.lrc.state.ky.us/kar/title401.htm>). The regional reference approach allows assessors to compare biological communities in a waterbody to an appropriate set of expectations based on the naturally occurring aquatic organisms typical in a given region and waterbody type.

The Diatom Biotic Index was a tool that was historically used to supplement information from macroinvertebrate and fish surveys, primarily to assist with determining causes when aquatic life use impairment was evident from those groups. Although there is not a diatom-based index in use at this time, diatoms and other algae are important and sensitive components of the indigenous aquatic community that can be valuable in detecting adverse effects to aquatic life.

- The phrase, “A detailed summary, in plain and unambiguous words that are easily understood by laymen of the basis for listings”, is found in HB 378 2014 General Assembly, regarding the Impaired Waters List and TMDL listings. These legislative requirements have been overlooked by the authors of these documents. Information found in the listing methodology and the apparent incongruities found in the Impaired Waters List are not in plain and unambiguous words and should be rewritten to clarify the intent of the documents. These clarifications should be developed and provided to the public in another public comment period.

DOW Response:

The Kentucky Division of Water has provided the Water Health Portal as a communication tool for the 303(d) List of Impaired Waters (see: <http://watermaps.ky.gov/WaterHealthPortal/>) . This website meets the requirements of KRS 224.70-150 (referred to in comments as: HB 378 2014 General Assembly, regarding the Impaired Waters List and TMDL listings).

Assessment summaries are found in links on dashboards for newly listed waters of the state and include a plain language basis for listing. The location of the data that is used for listings is on the assessment summary along with information regarding requests for data and contact information for any questions.

- Section 3.2, Data Sufficiency, Credibility and Quality, Listing Methodology, states that “volunteer data may be used by the DOW for assessment purposes...” Because the education, training and experience of volunteers is highly variable, the use of volunteers should be highly supervised and utilized sparingly. There should be some identification of listed streams where data was provided by volunteers. The general public assumes that this data was gathered by well-trained state employees. If it was gathered by others, it should be evident in the table provided.

DOW Response:

Section 3.2, Data Sufficiency, Credibility and Quality, Consolidated Assessment and Listing Methodology, states “Volunteer data may be used by the DOW for assessment purposes, but those data must be collected under SOP that is at least equivalent to the applicable DOW SOP and a DOW-approved QAPP”. It is the required practice that all readily available data is considered for assessment purposes, so volunteer or any other available data not meeting quality objectives may be used for screening purposes.

Information regarding individual listings can be obtained by submitting a request of records under the Kentucky Open Records Act (KORA) to DEP.KORA@ky.gov or by fax to 502-564-9232. The DEP KORA point of contact may also be reached at 502-564-9232.

The importance of obtaining and interpreting stream data is extremely important to the farming community. This information will be used by EPA and the KY. Division of Water to develop complicated and expensive solutions through the TMDL process. The information contained in these documents is not clear and in some cases, appears to be arbitrary. For these reasons, the Division of Water needs to consider these comments and provide information that is clear, concise and easily understood to the public. These documents do not meet the requirement of HB 378.

The Division is always working on improvements to the assessment process and communication for the impaired waters of Kentucky, so your feedback is appreciated. The Division provides an email for general questions at water@ky.gov. Alicia Jacobs and staff in the TMDL section are available as well to answer any questions regarding listings and TMDLs (Direct Line: 502-782-6987).

Smith Management Group requested data that was the basis for certain stream segments that were proposed as Impaired Streams. While the data set was only for 12 streams, the conclusions drawn based on the data provided show some reason to be concerned regarding the listing procedures.

- o Beech Creek 0.0 to 3.9-DOW data for alkalinity is being listed as a pollutant but this analyte is non-detected in all samples taken between 2010-2014. Alkalinity should be removed for a reason for listing.

DOW Response:

The alkalinity listing is appropriate per 401 KAR10:031 Surface Water Standards found at: <http://www.lrc.ky.gov/kar/401/010/031.htm>. See Section 4

(a) Natural alkalinity as CaCO₃ shall not be reduced by more than twenty-five (25) percent.

1. If natural alkalinity is below twenty (20) mg/L CaCO₃, there shall not be a reduction below the natural level.
2. Alkalinity shall not be reduced or increased to a degree that may adversely affect the aquatic community;

- o West Hickman Creek 3.1-8.4-Reason For Listing is Fecal Coliform. No data at site for fecal coliform is available after 2003. Sewer infrastructure upgrades since the 2008 LFUCG consent decree are not reflected in this data. LFUCG fecal coliform results for 2003-2007 appear to be

much lower than DOW data in 2003. Before listing, this site should have more current analysis performed to ensure that any water quality improvements in the watershed are reflected in the data.

DOW Response:

West Hickman Creek 3.1-8.4 fecal coliform is an existing listing; new data of sufficient quality and quantity is necessary to demonstrate the waterbody is attaining its PCR use and remove it from the 303(d) list.

o UT of Woolper Creek 0.0-3.4. Reason For Listing is E.coli, managed pasture grazing, non-irrigated crop production and an upstream source. There is not any 2012 data available. Aerial photo show rural homes in a forested area with one grazing and crop farm visible. Reason(s) should be reevaluated. There is a sports field park and parking lots upstream.

DOW Response:

The listing is appropriate and supported by DOW data. The suspected sources used for the impaired waters list are provided by EPA and can be found at: http://iaspub.epa.gov/pls/waters/f?p=ASKWATERS:SOURCE_LUT. The DOW uses suspected sources to best describe the observed conditions at each monitoring event. The selection of one suspected source does not necessarily exclude other suspected sources. As new assessments are made on existing segments, the suspected sources can be updated to reflect the current conditions.

o Big Brushy Creek 0.0-4.75. Reason for listing nutrient/eutrophication, biological indicators-crop production, loss of riparian habitat, rangeland, grazing, unrestricted cattle access. Field DO readings are general good (greater than 7mg/L) and nutrients (NKP) are less than 1mg/L. Other than elevated conductivity readings in 2014 (greater than 400 US/cm consistently), unsure of sources of nutrient/eutrophication from DOW data. Listing should be reconsidered.

DOW Response:

The DOW data supports this listing for nutrient/eutrophication, biological indicators. The Consolidated Assessment and Listing Methodology (CALM) describes the decision processes used in listings, including those involving biological community data (see CALM section 3.3). When the quality of the biological community indicates impairment, then potential causes are reviewed based upon available supporting data and the detailed makeup of the community itself. The evaluation of data in determining excursions from the narrative nutrient criteria in 401 KAR 10:031 Section 1 is discussed on page 44 of the CALM. This evaluation includes examination of the biological community for evidence of adverse effects consistent with a eutrophication problem, in accordance with definitions in 401 KAR 10:001.

If you have more questions, please contact Katie McKone regarding the assessment rationale at Katie.McKone@ky.gov.

The suspected sources used for the impaired waters list are provided by EPA and can be found at: http://iaspub.epa.gov/pls/waters/f?p=ASKWATERS:SOURCE_LUT. The DOW uses suspected sources to best describe the observed conditions at each monitoring event. The selection of one suspected source does not necessarily exclude other suspected sources. As new assessments are made on existing segments, the suspected sources can be updated to reflect the current conditions.

o Boggess Creek 0.0-3.0. Reason for listing nutrient/Eutrophication biological indicators, sedimentation/siltation-Agriculture, loss of riparian habitat. Field DO readings from 2011-2014 are good (greater than 7 mg/L) and turbidity low (less than 16). Macro is rated as fair, not poor. Recommend this segment be withdrawn from consideration for impairment.

DOW Response:

The DOW data supports this listing for nutrient/eutrophication, biological indicators. The Consolidated Assessment and Listing Methodology (CALM) describes the decision processes used in listings, including those involving biological community data (see CALM section 3.3). When the quality of the biological community indicates impairment, then potential causes are reviewed based upon available supporting data and the detailed makeup of the community itself. The evaluation of data in determining excursions from the narrative nutrient criteria in 401 KAR 10:031 Section 1 is discussed on page 44 of the CALM. This evaluation includes examination of the biological community for evidence of adverse effects consistent with a eutrophication problem, in accordance with definitions in 401 KAR 10:001.

If you have more questions, please contact Katie McKone regarding the assessment rationale at Katie.McKone@ky.gov.

The suspected sources used for the impaired waters list are provided by EPA and can be found at: http://iaspub.epa.gov/pls/waters/f?p=ASKWATERS:SOURCE_LUT. The DOW uses suspected sources to best describe the observed conditions at each monitoring event. The selection of one suspected source does not necessarily exclude other suspected sources. As new assessments are made on existing segments, the suspected sources can be updated to reflect the current conditions.

- o Caney Creek 0.0-3.6. Reason for listing nutrient/eutrophication biological indicators-crop production, loss of riparian habitat, non-point source, urban runoff/storm sewers. Listed in 2006 and updated in 2014. DOW says reason for listing is because new data is available but no new data included since 2013 is available. Data should be reviewed but if not available this segment should be withdrawn for consideration.

DOW Response:

The listing for nutrient/eutrophication, biological indicators is appropriate and supported by DOW data. The nutrient/eutrophication biological indicators listing is an existing listing; new data of sufficient quality and quantity is necessary to demonstrate the waterbody is attaining its use and to remove it from the 303(d) list.

The suspected sources used for the impaired waters list are provided by EPA and can be found at: http://iaspub.epa.gov/pls/waters/f?p=ASKWATERS:SOURCE_LUT. The DOW uses suspected sources to best describe the observed conditions at each monitoring event. The selection of one suspected source does not necessarily exclude other suspected sources. As new assessments are made on existing segments, the suspected sources can be updated to reflect the current conditions.

- o Cheese Lick 5.8-8.2. First time being listed but all data is from 2012-2013. Some data suspect. E.Coli ranges from non-detect to 14,136 (CFR/100 ml) in a month. pH reading of 13.56 unlikely. This data point should be removed from consideration until more consistent data becomes available.

DOW Response:

The DOW data support this listing. The pH data point was not considered for *E. coli* listing. Kentucky's Consolidated Assessment and Listing Methodology indicates that age of data be within a 5 year window to determine use support and data older than 5 years can be used to make assessment decisions if they are considered to be representative of current conditions.

- o East Hickman Creek 4.2-10.55. Listed for fecal coliform, nutrient/eutrophication biological indicators-livestock, unspecified urban stormwater. Listing data for 1996-1999 has been lost. Macro data and habitat data reportedly used to replace but no data was provided in Open Record response. There does not appear to be enough data to list this stream segment. This

listing should be withdrawn until data can be found and listing substantiated. Otherwise this segment should be removed from the impaired waters list.

DOW Response:

The fecal coliform and nutrient/eutrophication biological indicators listings are existing listings; new data of sufficient quality and quantity is necessary to demonstrate the waterbody is attaining its use and to remove it from the 303(d) list.

o Gunpowder Creek 0.0-15.35. Reason for listing *E. coli*, package plant or other permitted small flows, sanitary sewer overflows. *E. coli* data being used for listing is from 2011, 2012. 2011 data is much higher than 2012. 2012 *E. coli* data shows that only July exceeded the *E. coli* monthly standards, other months did not exceed 130 colonies/100 ml monthly average. The data provided does not appear to justify the listing of this stream segment.

DOW Response:

The *E. coli* listing is appropriate, DOW data supports this listing. Greater than 33% of samples taken during the Primary Contact Recreation Season exceeded the standard of 240 colonies per 100 ml (42% of samples), therefore the segment is listed as non-support for *E. coli*. The standard can be found at <http://www.lrc.ky.gov/kar/401/010/031.htm> in Section 7. Recreational Waters, as follows: (1) Primary contact recreation water. The following criteria shall apply to waters designated as primary contact recreation use during the primary contact recreation season of May 1 through October 31:

(a) Fecal coliform content or *Escherichia coli* content shall not exceed 200 colonies per 100 ml or 130 colonies per 100 ml respectively as a geometric mean based on not less than five (5) samples taken during a thirty (30) day period. Content also shall not exceed 400 colonies per 100 ml in twenty (20) percent or more of all samples taken during a thirty (30) day period for fecal coliform or 240 colonies per 100 ml for *Escherichia coli*. Fecal coliform criteria listed in subsection (2)(a) of this section shall apply during the remainder of the year;

o Lyles Fork 0.0-14.7. Reason for listing nutrient/Eutrophication biological indicators-Agriculture. Habitat and macro scores listed as fair or good in 2006 and 2013, with improvement in habitat identified in 2013. Low nutrients N, P (less than 1mg/L) in 2006-2013 data and 2-13 K values also low at 3.32 mg/L. DO is relatively healthy across all years. Data does not support listing at this time.

DOW Response:

The DOW data supports this listing for nutrient/eutrophication, biological indicators. The Consolidated Assessment and Listing Methodology (CALM) describes the decision processes used in listings, including those involving biological community data (see CALM section 3.3). When the quality of the biological community indicates impairment, then potential causes are reviewed based upon available supporting data and the detailed makeup of the community itself. The evaluation of data in determining excursions from the narrative nutrient criteria in 401 KAR 10:031 Section 1 is discussed on page 44 of the CALM. This evaluation includes examination of the biological community for evidence of adverse effects consistent with a eutrophication problem, in accordance with definitions in 401 KAR 10:001.

If you have more questions, please contact Katie McKone regarding the assessment rationale at Katie.McKone@ky.gov.

o Straight Creek 1.7-23.3. Reason for listing-Specific Conductance, surface mining, sedimentation/siltation-channel erosion from upstream modifications, rural residences, mining. Listed in 2004 and updated in 2008. No data since 2005. There is no data to support this update. Justification for listing should be clarified or remove segment from the list.

DOW Response:

The specific conductance and sediment/siltation listings are existing listings; new data of sufficient quality and quantity is necessary to demonstrate the waterbody is attaining its use and to remove it from the 303(d) list.

Based on a review of this small data set, files need to be reviewed and information confirmed before stream segment listings are finalized. The process used to determine reasons for listing need to be reviewed because many of these reasons don't match the results of the analytical data and site review on Google Earth.

DOW Response:

Comment noted. DOW reviews and lists segments according to the Kentucky Consolidated Listing and Assessment Methodology. DOW does not have data to support requesting the removal of any of the above listed segments from the 303(d) list. When data is available to DOW that supports removing individual pollutants or updating the use attainment status, that data will be considered. The listing process is intricate; if you have more questions, please contact Katie McKone regarding the assessment rationale at Katie.McKone@ky.gov.

A considerable amount of decision making is based on or incorporated from EPA guidance which appears to be dated. This information should be reviewed and if more current methods are available or if KDOW employees or contractor could establish better methodologies, they should be incorporated into the Consolidated Assessment document.

DOW Response:

Comment noted.

Again, thank you for the opportunity to submit comments on this important document and the impacts it will have on Kentucky corn farmers.

Sincerely,

Laura Knoth Executive Director

Comments received via email 07/17/17 from Mindy Scott for James P. Gibson, Jr. Director of Integrated Watershed Management

SD1

1045 Easton Drive

Ft. Wright, KY 4101

July 17, 2017

Kentucky Division of Water
300 Sower Blvd

Frankfort, KY 40601

Attention: Alicia Jacobs

Re: 303(d) List Comments

Dear Ms. Jacobs:

Pursuant to a Public Notice issued May 2, 2017, Kentucky Division of Water announced it is seeking comments on its draft list of impaired waters for 2016, as required by the Clean Water Act. The public comment period is open for 60 days and will end on July 28, 2017.

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.

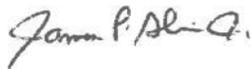
The draft 303(d) list for 2016 shows that there are *E.coli* impairments on three segments in the Gunpowder Creek watershed that reference one of the suspected sources as sanitary sewer overflows that SD1 would request to be removed. These segments are:

- Gunpowder Creek 0.0 to 15.35
- UT of South Fork of Gunpowder Creek 0.0 to 2.5
- UT of Gunpowder Creek 0.0 to 3.85

While these segments may still be impaired segments for *E.coli*, SD1 has documentation from SD1 Consent Decree Quarterly reports, which were submitted to KDOW, that there are no longer sanitary sewer overflows occurring in these segments of Gunpowder Creek. These overflows were eliminated with the improvements related to the Western Regional Water Reclamation Facility beginning in 2012. These improvements eliminated 14 pump stations in the surrounding areas.

If you have any questions regarding this request please don't hesitate to contact Mindy Scott at mscott@sd1.orci or (859) 578-6743.

Best regards,



James P. Gibson, Jr.

Director of Integrated Watershed Management

DOW Response:

Sanitary Sewer Overflows have been removed from the sources for the segments provided in this comment by SD1.

Comments received via email 06/29/17 from Karen Schaeffer

Alicia

I have a couple of questions on the status of Floyds Fork 24.2-34.1 .

For PCR use

What is the current status of PCR use in this segment?

The Draft 2016 303d excel table and pdf have this segment in the delisting requests table for WAH only, no mention of PCR on delisting requests or 303d list tables.

The Draft 2016 303d shapefile on GeoNet has PCR - 2C-FS with the segments above and below Floyds Fork 24.2-34.1 included as PCR 4A-NS

I was expecting Floyds Fork 24.2-34.1 PCR to either have a delisting request or be 4A-NS because of the Bacteria TMDL.

DOW Response:

The status for PCR use in this segment is that it remains impaired for *E. Coli* and there has been a TMDL developed for the pollutant, so it does not appear on the 303(d) list. The correct category should be 4A-NS; the error on the Draft 2016 305(b) shapefile on GeoNet has been addressed.

For WAH use

Can you clarify the impairment pollutant and sources for the WAH impairment?

The Draft 2016 303d excel table and pdf have the WAH impairment pollutant attributed to Organic Enrichment (Sewage) Biological Indicators, and Sources are Municipal Point Source Discharges, Wet Weather Discharges (Non-Point Source), Wet Weather Discharges (Point Source and Combination of Stormwater, SSO or CSO).

The Final 2014 303d excel table has WAH impairment pollutant attributed to Sedimentation/ Siltation and Sources are Agriculture, Site Clearance (Land Development or Redevelopment)

DOW Response:

DOW has requested to delist Sediment/Siltation for this segment. The WAH use is full support for the 2016 cycle.

Any info you can provide would be most appreciated. You can reach me at XXX-XXX-XXXX or XXXXXX@gmail.com.

Karen