APPROVAL OF OHIO'S SUBMISSION OF THE STATE'S INTEGRATED REPORT WITH RESPECT TO SECTION 303(d) OF THE CLEAN WATER ACT (CATEGORY 5 WATERS)

The U.S. Environmental Protection Agency has conducted a complete review of the Ohio Environmental Protection Agency's (Ohio) 2016 Section 303(d) list and supporting documentation and information. Based upon this review, EPA is approving Ohio's list of Water Quality Limited Segments (WQLS) still requiring total maximum daily loads (TMDLs) under Section 303(d) of the Clean Water Act (CWA or "the Act") and EPA's implementing regulations. Ohio's list appears in Category 5 of the Ohio 2016 Integrated Water Quality Monitoring and Assessment Report (2016 Integrated Report or 2016 IR), and EPA's approval extends only to the waterbodies listed in Category 5 of the 2016 Integrated Report.[1] The statutory and regulatory requirements are described in detail below.

I. Statutory and Regulatory Background

Identification of Water Quality Limited Segments (WQLSs) for Inclusion on Section 303(d) List

Section 303(d)(1) of the Act directs states to identify those waters within their jurisdiction for which effluent limitations required by Section 301(b)(1)(A) and (B) of the Act are not stringent enough to implement any applicable water quality standard (WQS), and to establish a priority ranking for such waters, taking into account the severity of the pollution and the uses to be made of such waters. The Section 303(d) listing requirement applies to waters impaired by point and/or nonpoint sources, pursuant to EPA's long-standing interpretation of Section 303(d) of the Act.

EPA's implementing regulations require states to submit biennially a list identifying WQLSs still requiring a TMDL (40 C.F.R. §§ 130.7(b)(1) and 130.7(d)). EPA regulations provide that states do not need to list waters where the following controls are adequate to implement applicable standards: (1) technology-based effluent limitations required by the Act; (2) more stringent effluent limitations required by state or local authority; and (3) other pollution control requirements required by state, local, or federal authority (40 C.F.R. § 130.7(b)(1)).

[1] Ohio EPA, Ohio 2016 Integrated Water Quality Monitoring and Assessment Report (October 2016), available at http://www.epa.ohio.gov/dsw/tmdl/OhioIntegratedReport.aspx#1766910016-report

Consideration of Existing and Readily Available Water Quality-Related Data and Information

In developing Section 303(d) lists, states are required to assemble and evaluate all existing and readily available water quality-related data and information, including, at a minimum, consideration of existing and readily available data and information about the following categories of water: (1) waters identified as partially meeting or not meeting designated uses, or as threatened,[2] in the state's most recent Section 305(b) report; (2) waters for which dilution calculations or predictive models indicate nonattainment of applicable standards; (3) waters for which water quality problems have been reported by government agencies, members of the public, or academic institutions; and (4) waters identified by the state as impaired or threatened in a nonpoint assessment submitted to EPA under Section 319 of the Act (40 C.F.R. § 130.7(b)(5)). In addition to these minimum categories, states are required to consider any other existing and readily available data and information. EPA's guidance describes categories of water quality-related data and information that may be existing and readily available.[3] While states are required to evaluate all existing and readily available water quality-related data and information, states may, subject to EPA approval, decide to rely or not rely on particular data or information in determining whether to list particular waters.

In addition to requiring states to assemble and evaluate all existing and readily available water quality-related data and information, EPA regulations require states to include, as part of their submissions to EPA, documentation to support decisions to list or not list waters. Such documentation must include, at a minimum, the following information: (1) a description of the methodology used to develop the list; (2) a description of the data and information used to identify waters; (3) a rationale for any decision to not use any existing and readily available data and information; and (4) any other reasonable information required by the Region (40 C.F.R. § 130.7(b)(6)).

The Ohio 303(d) list of prioritized impaired waters (i.e., Category 5 of the 2016 Integrated Report) is contained in Section L4 of the 2016 Integrated Report. EPA has reviewed Ohio's description of the data and information it considered, its methodology for identifying waters, and considered any other relevant information including information the State submitted to EPA in response to requests for additional information.

Section 303(d) lists are to include all WQLSs still needing TMDLs, regardless of whether the source of the impairment is a point and/or nonpoint source. EPA's long-standing interpretation is that Section 303(d) of the Act applies to waters impacted by point and/or nonpoint sources.

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[2] EPA's guidance states that threatened waters are waters that are currently attaining WQSs, but which are expected to exceed WQSs by the next listing cycle (Guidance for 2004 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d) and 305(b) of the Clean Water Act; TMDL-01-03 page 11).

[3] EPA, Guidance for Water Quality-Based Decisions: the TMDL Process (April 1991) (hereinafter referred to as EPA's 1991 Guidance).

Ohio has provided its rationale for not relying on particular existing and readily available water quality-related data and information that it evaluated as a basis for listing waters it assessed. Specifically, Ohio explains that it does not rely on external data that do not meet the requirements of its credible data law, Ohio Revised Code (ORC) §§ 6111.50 - 6111.56. This law requires the Director of Ohio EPA to adopt rules that would, among other things, require that data be collected by a qualified data collector (QDC) and be compliant with the specifications of "Level 3 credible data," in order to be used for listing waters under Section 303(d) of the Act. Those rules, effective March 24, 2006, have been codified in Chapter 3745-4 of the Ohio Administrative Code (OAC). Within Section D5 of the 2016 Integrated Report is a June 2, 2015 memorandum sent by Ohio to solicit Level 3 data from external sources and all Level 3 QDCs. External sources include state and county health departments, universities, U.S. Geological Survey, Northeast Ohio Regional Sewer District (NEORSD), permittees, compliance databases, and atrazine registrants. The data collectors either received intensive training and certification from Ohio EPA to become QDCs, or the entities have submitted data in the past. The Ohio River data collection is through the Ohio River Valley Water Sanitation Commission (ORSANCO), and Ohio EPA defers to ORSANCO for listing of segments in the Ohio River.[4]

Ohio's assessment included drinking water use. Ohio assembled and evaluated microcystin data from drinking water intakes, including those within the Lake Erie intakes associated with the shoreline assessment units (AUs).

Priority Ranking

EPA regulations also require states to establish a priority ranking for listed waters. In prioritizing and targeting waters, states must, at a minimum, take into account the severity of the pollution and the uses to be made of such waters and shall identify the pollutants causing or expected to cause violations of the applicable water quality standards. The priority ranking must specifically include the identification of waters targeted for TMDL development in the next two years (40 C.F.R. § 130.7(b)(4)). States may consider other factors relevant to prioritizing waters for TMDL development, including immediate programmatic needs, vulnerability of particular waters as aquatic habitats, recreational, economic and aesthetic importance of particular waters, degree of public interest and support, and state or national policies and priorities (57 Fed. Reg. 33040, 33045 (July 24, 1992) and EPA's 1991 Guidance).

II. Description of Ohio's Submission

Listing Methodology and Reporting.

The waterbodies in Category 5, at Section L4 of Ohio's 2016 IR, constitute Ohio's Section 303(d) list. Ohio's 2016 IR discusses several issues that impact Ohio's assessment program and

[4] ORSANCO, Assessment of Ohio River Water Quality Conditions 2010-2014 (June 2016). http://www.orsanco.org/publications/biennial-assessment-305b-report/ and Section D of the 2016 Integrated Report.

several changes to Ohio's assessment program for the 2016 listing cycle are highlighted and discussed below. The most significant addition to the 2016 303(d) list is the inclusion of the Lake Erie Central Basin Shoreline and the Lake Erie Islands Shoreline as impaired for the Public Drinking Water Supply (PDWS) designated use based on microcystin data. Several sections of the 2016 IR are not discussed in this decision document because they did not represent a significant departure from past monitoring and assessment practices.

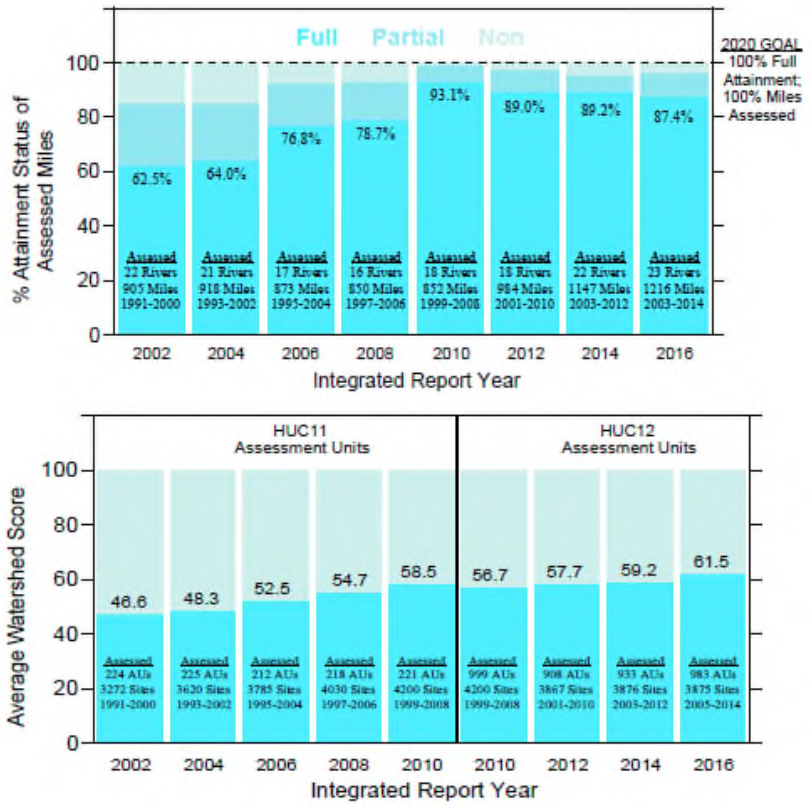
Section A of the 2016 IR: An Overview of Water Quality in Ohio.

This Section provides a summary of the status of Ohio's surface waters that were assessed for the 2016 listing cycle, including progress toward achieving the state's overall goals. One of the goals of Ohio's surface water program is to assess all large rivers (23 rivers in 38 AUs) and have those waters attain applicable water quality standards by 2020.

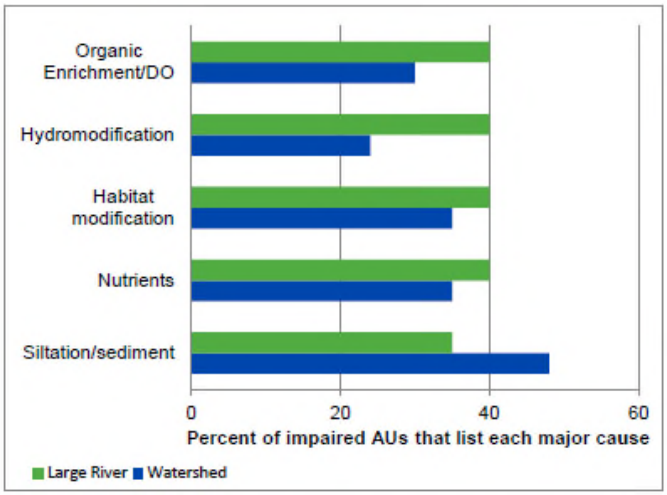
The top figure below represents the attainment status of the large rivers. A total of 87.4% of the assessed miles of large rivers are in full attainment, which is very similar to the last reporting cycle (89.2%) and represents all data for all large rivers from 2003-2014.

The bottom figure below represents the average watershed scores using data through 2014. These assessments are further discussed and compared in EPA's review of Section G below.[5]

[5] Summary information on the individual AUs is available at:
http://wwwapp.epa.ohio.gov/gis/mapportal/IR2016.html



The following figure shows the major causes of impairment identified by Ohio in Section A of the IR.



Ohio included in its 2016 IR a brief description of these major causes of impairment and sources of water quality problems:

- Organic enrichment occurs as living organisms increase, then decompose and deplete oxygen supplies.
- Sediment/siltation includes deposition of fine soil particles, usually after high flow events as erosion and runoff occur, and sediment can transport other pollutants. Low flows deposit sediment and can degrade habitat for aquatic life.
- Nutrient enrichment is primarily due to phosphorus and nitrogen. Though these nutrients are not toxic, they affect the habitat by promoting excess algal growth, and the subsequent decay of algae that depletes oxygen for other organisms. Harmful algal blooms (HABs) may:
    - Introduce toxins into the water (e.g., microcystin),
    - Cause taste and odor problems in drinking water,
    - Pollute beaches and surface waters with scum,
    - Reduce oxygen for fish and other animals,
    - Cause processing problems for public water supplies, and
- Habitat modification refers to manmade changes of a stream's natural channel for the purpose of improving drainage. The channel may be straightened, widened, or deepened, and the stream loses its function as an ecosystem or its ability to naturally process water pollutants.
- Hydromodification is flow alteration that may be due to stream impoundment, increased peak flow from urbanization, or water table regulation through sub-surface drainage. Current or flow changes may result and negatively affect the habitat.

Contamination by pathogens is also a cause of impairment of the state's surface waters and may occur when human or animal waste reaches a waterbody. Contamination by pathogens is a human health issue, as skin contact or accidental ingestion can lead to various conditions such as skin irritation, gastroenteritis or other more serious illnesses.

Section B of the 2016 IR: Water Resources.

EPA has reviewed this section of the IR and finds it provides an adequate description of water resources assessment in Ohio.

Section C of the 2016 IR: Managing Water Quality.

Section C of the 2016 IR states that Ohio's Nonpoint Source (NPS) Program updated the "Nonpoint Source Management Plan" and forwarded it to EPA on December 31, 2013. The plan includes goals that tie in with the strategic vision for the agency. These include urban sediment and nutrient reduction, altered stream and habitat restoration, NPS reductions, and protection of high quality waters. Ohio continues to administer Great Lakes Restoration Initiative (GLRI) grants for activities to reduce runoff into Lake Erie, which include agriculture conservation practices, storm water runoff reduction, riparian restoration, home sewage treatment system

work, innovative agricultural runoff/reuse practices, and channel and drainage water management.

Section C of the 2016 IR also discusses Ohio's Section 401 Certification program. The CWA establishes state certification as part of the permitting process. Ohio may review and then certify, conditionally certify, or deny water quality certification for federal permits or licenses that might result in a discharge to its waters, including wetlands. Rules for the 401 review process were codified in OAC §§ 3745-1-05 (Stream Antidegradation), 3745-1-50 through 54 (Wetland Water Quality Standards), and 3745-32-01 through 07 (Water Quality Certification). Ohio's regulations require applicants to provide three alternatives for each proposed project: a preferred, a minimal degradation, and a non-degradation alternative. These alternatives will be considered to minimize impacts on current aquatic resources and evaluate future mitigation. After review, Ohio will determine the best alternative. Ohio encourages permit applicants to coordinate in advance, as well as include 10 specific items within the 401 application before review may begin.

Section C describes various surface water quality management programs and Ohio's Lake Erie programs.[6] These efforts include the ongoing Remedial Action Plans (RAPs) in the Areas of Concern (AOCs) in the Maumee, Black, Cuyahoga and Ashtabula Rivers, all of which flow into Lake Erie. Environmental restoration projects for these tributary rivers are funded under the Great Lakes Restoration Initiative and the Great Lakes Legacy Act (GLLA) to reduce nutrient loadings to Lake Erie, remove contaminated sediments, restore habitat, remove dams, and achieve other water-quality related aims, with the ultimate goal of reducing the Beneficial Use Impairments (BUIs) for the AOCs.

Another program highlighted in Section C of the 2016 IR is the Lake Erie Lakewide Action and Management Plan (LAMP), an individualized plan for restoring and protecting the Lake. ,. The Great Lakes Water Quality Agreement (GLWQA) between the United States and Canada (amended in 2012), describes the actions that will be taken through the LAMP and RAPs. Annex 2 of the GLWQA addresses lakewide management for each of the Great Lakes and nearshore monitoring to support a more integrated nearshore monitoring framework. Annex 4 of the GLWQA addresses nutrient loadings to Lake Erie and establishes an interim target for total phosphorus of 15 µg/l for the Western Basin and 10 µg/l for the Central and Eastern Basins, as well as a process to develop final loading targets for total phosphorus and an allocation for each country along with domestic action plans to meet the targets.[7]

Ohio EPA is actively monitoring Lake Erie, and states that it "conducts routine monitoring of Lake Erie (within Ohio's jurisdiction) and is responsible for reporting the Lake's condition and identifying impaired waters under the CWA. Ohio EPA initiated a *Comprehensive Lake Erie Nearshore Monitoring Program* in 2011 with the assistance of a GLRI grant to develop and

[6] 2016 IR, pp. C6-10.
[7] Under Annex 4 of the GLWQA, loading targets for phosphorus were developed in 2015 for Lake Erie; a load reduction plan and adaptive management planning via domestic action plans is ongoing.

implement a comprehensive monitoring program."[8] Its long-term monitoring program includes tracking of burrowing mayfly populations and calculation of fish index scores at select shoreline locations. Hypoxia is monitored in the Central Basin, and via intensive surveys in select bays and estuaries. These efforts support Lake Erie ecosystem objectives as found in Annex 4 of the GLWQA, such as reducing algae and improving the overall trophic status of the lake. Another monitoring initiative began in 2012 with participation of the Lake Erie Charter Boat captains. The 2016 IR states, "[i]nitiated in 2012, Ohio EPA expanded monitoring efforts to support the Lake Erie Charter Boat captain monitoring initiative. This unique public-private partnership engaged a key stakeholder that is directly impacted by the recent harmful algal blooms and declining water quality conditions on the lake. Ohio EPA has continued to provide funding to Ohio State University's (OSU) Stone Lab to manage the project and conduct sample analyses from the Charter Boat sampling initiative."[9]

Section C also discusses HABs which occur in inland lakes and Lake Erie, especially within the Western Basin.[10] The 2016 IR states, "[c]yanobacteria are photosynthesizing bacteria, commonly called blue-green algae. Some are capable of producing toxins (cyanotoxins) that affect the skin, liver or nervous system. They can also cause water quality deterioration associated with excessive biomass production (such as depleted dissolved oxygen levels, fish kills, taste and odor problems in drinking water and elevated trihalomethane levels). A large bloom of cyanobacteria that causes harmful effects is called a harmful algal bloom (HAB)."[11] The 2016 IR recognizes that "[t]he harmful effects of these blooms are well documented in scientific literature and recognized by U.S. EPA, Center for Disease Control (CDC) and World Health Organization (WHO) as causing acute and chronic impacts in human and animal populations. U.S. EPA recognizes that HABs are increasing in spatial and temporal prevalence in the U.S. and worldwide and that their highly potent toxins are a significant hazard for human health and ecosystem viability."[12] Furthermore, the 2016 IR reports that "Ohio Senate Bill 1 was passed in July 2015 and directed Ohio EPA to implement actions to protect against cyanobacteria in the Western Basin of Lake Erie and in public water supplies. This legislation led to creation of Ohio Revised Code § 3745.50 authorizing the director to Ohio EPA to serve as the coordinator of harmful algae management and response. Ohio EPA was required to implement actions that manage wastewater and limit nutrient loading and develop and implement protocols and actions to protect against cyanobacteria and public water supplies. Ohio adopted new and revised rules, effective June 1, 2016, to meet these requirements."[13]

Ohio has established a recreational use advisory system for HABs to provide information and warnings to the public to prevent exposure to cyanotoxins within HABs. Section C 7 of the 2016 IR describes Ohio's HAB advisory system in detail.[14]

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[8] 2016 IR, p. C-6.
[9] *Id.*
[10] 2016 IR, pp. C-28-35.
[11] 2016 IR, p. C-28.
[12] *Id.*
[13] 2016 IR, p. C-29.
[14] *Id.*

Section D of the 2016 IR: Framework for Reporting and Evaluation.

Ohio continues to use the watershed orientation from previous reports and a framework for assessment of aquatic life, recreation, human health, and PDWS designated uses. The classification of AUs for the 2016 IR has not changed significantly from the 2014 IR. The three types of AUs are: Watershed Assessment Units (WAU) for the inland lakes and streams, Large River Assessment Units (LRAU) for the large rivers, and Lake Erie is assessed in three units, the Western Basin shoreline, the Central Basin shoreline, and the Lake Erie Islands shoreline.[15]

Inland lake assessments and listings are within the WAU framework. Reporting and evaluation are completed by the Ohio EPA and outside entities that are certified as Level 3 qualified collectors, as described previously in this document. Data may be chemical, physical, or biological. Ohio defers to ORSANCO for the Ohio River listings. There have been ongoing discussions in an ORSANCO workgroup to promote consistency in 305(b) and 303(d) reporting. Ohio EPA relies on data certified as Level 3 data to make attainment determinations.[16] Ohio solicited data from all Level 3 QDCs for the 2016 IR. The Northeast Ohio Regional Sewer District data were used in the past IRs; in this listing cycle Ohio used data that were either submitted by the QDCs or readily available from reports. New data sources include the Ohio Department of Natural Resources, the USGS, Midwest Biodiversity Institute/Center for Applied Bioassessment and Biocriteria, Heidelberg College, The Ohio State University, Ohio Department of Health, Cuyahoga County Board of Health, EnviroScience, Inc., EA Science and Technology, Inc., and Cleveland Metroparks.[17]

Section D3 of the 2016 IR discusses the assessment and impairment designations for Lake Erie. In its 2014 IR, Ohio listed, for the first time, the Lake Erie Western Basin Shoreline as impaired due to microcystin in PDWS (measured within a 500-yard radius of intake zones), and EPA approved the 2014 303(d) list.[18] In its 2016 IR, Ohio has added the Central Basin Shoreline and the Lake Erie Islands Shoreline to the impaired waters list for the PDWS designated use, due to microcystin.

Ohio EPA has not assessed the open waters of Lake Erie.[19] EPA is deferring to the State's judgment not to assess these waters for the 2016 list. Importantly, EPA recognizes the State's ongoing efforts to control nutrient pollution in the Western Basin of Lake Erie.[20] EPA understands that Ohio EPA intends to evaluate options for developing objective criteria (e.g.

[15] Ohio notes that it "does not currently have an assessment methodology for determining the aquatic life use status of the open waters of Lake Erie based on the narrative standard defined in the Ohio Water Quality Standards." 2016 IR p. D-26. EPA reiterates here that the lack of a formalized assessment methodology by itself is not a basis for a state to avoid evaluating data or information when developing its Section 303(d) list.
[16] Section D5 of the 2016 IR discusses sources of data and the Ohio Credible Data Law enacted in 2003 (ORC §§ 6111.50 - 6111.56).
[17] Details of the years and type of data are given in Tables D-2 and D-3 in the 2016 IR.
[18] Letter from Tinka G. Hyde, Director, EPA Region Water Division, to Craig W. Butler, Director, Ohio EPA (22 Feb. 2016).
[19] 2016 IR, pp. D-5, 6.
[20] See discussion below regarding Section J of the state's 2016 IR.

microcystin or other metrics) for use in making decisions regarding the Western Basin of Lake Erie for the 2018 list. EPA is committed to working with the State in those efforts.

Section D5 of the 2016 IR discusses sources of existing and readily available data Ohio EPA evaluated in assessing and listing waterbodies. Table D-2 discusses data types used in the 2016 IR, while Table D-3 contains a description of data from sources other than Ohio EPA.[21]

Data Solicitation and Public Comments:

On June 2, 2015, Ohio EPA sent a mailing to all Level 3 qualified data collectors, including major NPDES discharge permit holders, and a call for Level 3 Credible Data was posted on Ohio EPA's web site. Details of Level 3 Qualified Data Collector requirements are described in OAC § 3745-4-03(A)(4). Qualifications include a minimum of two years of practical experience in the following assessment categories: stream habitat assessment, fish community biology, benthic macroinvertebrate biology and/or chemical water quality assessment.

On July 28, 2016, the State public noticed its 303(d) TMDL priority list for 2016.[22] The formal comment period for the 2016 Integrated Report was from July 29, 2016 through August 29, 2016. Section D of Ohio's 2016 IR discusses the public involvement in compiling the 2016 303(d) list and summarizes public comments Ohio received on its draft 2016 IR, as well as the State's responses.[23]

During the public comment period the State received many comments that expressed concerns about several topics, including the four uses evaluated for listing, wetlands, and harmful algal blooms. A number of commenters advocated for the listing of Lake Erie. The IR also includes copies of the letters and email messages sent to Ohio during the public comment period.

Section E of the 2016 IR: Evaluating Beneficial Use – Human Health (Fish Contamination).

Ohio has adopted human health water quality standards to protect the public from adverse impacts of contaminants found in drinking water and consumption of contaminated fish. Fish contamination as it affects human health is addressed through the control of six contaminants which may bioaccumulate in fish tissue.[24] Ohio measures fish tissue concentrations to determine whether exceedance of concentration values trigger a fish consumption advisory (FCA), including factors such as size and type of fish.

[21] 2016 IR, pp. D-10-12.
[22] Section D6.3 of the 2016 IR.
[23] See Section D7 of the 2016 IR.
[24] The six contaminants reviewed were mercury, PCBs, chlordane, DDT, mirex and hexachlorobenzene. These contaminants were chosen for review based on current and recent fish consumption advisories in Ohio caused by these contaminants, as well as existing human health WQS criteria.

Section F of the 2016 IR: Evaluating Beneficial Use – Recreation.

Recreational water quality standards are based on the protected use associated with the various waterbody types, i.e., bathing water, primary contact waters and secondary contact waters.[25] *E. coli* standards are expressed as a seasonal geometric mean of 126 cfu/100ml during the recreational season for bathing; the single sample maximum is 235 cfu/100ml for bathing waters and human health advisories at beaches. The LRAU, WAU, inland lakes, and shoreline AUs for the Lake Erie Basins (Western and Central) and Lake Erie Islands were evaluated for recreational use. The Western and Central Basin Shorelines are listed for recreational use impairment due to *E. coli* in the 2016 IR.

Section F of the 2016 IR states that Lake Erie beach advisories for each beach are based on "exceedance of the single sample maximum *E. coli* criterion for beaches of 235 cfu/100 ml." This is the threshold that triggers the issuance of beach advisories, and has been used since 2006. Use of the single sample maximum *E. coli* criterion for the purpose of issuing beach advisories complies with the federal BEACH Act rule[26], which became effective on December 16, 2004.[27] Where this threshold was exceeded during more than 10% of the recreational season from late May through early September, Ohio listed the Lake Erie beach as being in non-attainment (Table F-2 below).[28]

Table F-2. Determining assessment status of Lake Erie shoreline AUs.

LEAU Status	Attainment Status of Individual Beaches
Full	Frequency of advisory postings less than 10 percent of recreation season for all of the beaches in the AU for all years assessed
Non	Frequency of advisory postings more than 10 percent of recreation season for one or more of the beaches in the AU for one or more of the years assessed

Table F-10 below shows the 65 Lake Erie beaches divided into the three geographical areas. The percentage of days in exceedance of *E. coli* from 2011 to 2015 was as follows: 15.9% for the Western Basin, 25.8% for the Central Basin, and 3.1% for the Lake Erie Islands.

[25] 2016 IR, Table F-1.
[26] Water Quality Standards for Coastal and Great Lakes Recreation Waters, 69 Fed. Reg. 67217 (Nov. 16, 2004).
[27] 2016 IR, p. F-8.
[28] Section F of the 2016 IR also provides an overview of the various assessments for determining recreational use impairment for Lake Erie beaches.

Table F-10. Bathing water geometric mean *E. coli* exceedance frequency at 65 Lake Erie public beaches from 2011-2015 (pooled by LEAU to report use support).

	Western Basin	Central Basin	Lake Erie Islands
Number of beaches	15	48	2
Total recreation days	7,400	22,962	930
Total days in exceedance	1,549	5,926	29
Percentage of days in exceedance	15.9%	25.8%	3.1%
Average # of days *E. coli* criteria exceeded per beach per season[1]	20.9	26.2	1.0
Attainment status	Does not support	Does not support	Full support

[1]Calculated by dividing the total days in exceedance in the basin by the total number of beach seasons in the basin. The total number of beach seasons in a basin is equal to aggregated sum of the total number of beaches for which monitoring was conducted during each season for the 2011-2015 reporting period.

Table F-12 below shows the *E. coli* results for the four most recent listing cycles for rivers and streams in WAUs. For the 713 AUs analyzed for the 2016 IR, shown in the last two columns, 10% fully supported recreational use with respect to *E. coli* while 90% did not.

Table F-12. Overall differences in the assessment of RU attainment, 2010-2016.

	2010 Report		2012 Report		2014 Report		2016 Report	
	Number	Percent	Number	Number	Number	Percent	Number	Percent
total AUs	1,576	100	1,576	100	1,576	100	1,576	100
assessed	487	31	588	37	680	43	713	45
not assessed	1,089	69	988	63	896	57	863	55
supporting use*	65	13	88	15	130	19	73	10
not supporting use*	422	87	500	85	550	81	640	90

[a] Note: The percentage of AUs reported as supporting the RU and not supporting the RU are based on the total AUs that were assessed (e.g., 487 in the 2010 analysis).

Beaches at inland lakes are tested less frequently compared to Lake Erie beaches. The overall frequency of exceedances at inland lakes was 12.4 % in a five-year reporting period (2011-2015), an increase from 10.5% reported in the 2008-2012 reporting period. Sampling was most frequent at Alum Creek Lake, Buck Creek Lake-main, Buckeye Lake, and Grand Lake St. Marys. There were 45 inland lake beaches with exceedance frequency of less than 10% (for the five-year reporting period). There were 23 inland lake beaches where the aggregated exceedance frequency was over 10%. The highest frequency was at 42% at Brooks Park beach at Buckeye Lake. There were nine beaches that exceeded the bathing water *E. coli* criteria over 25% of the time:

- Buckeye Lake Brooks Park, Fairfield and Crystal beaches;
- Grand Lake St. Mary's main beach (west) and Windy Point beaches; and
- Dillon Lake swimmers beach, Caesar Creek (south beach), Madison Lake and Scioto Trail Lake.

Section G of the 2016 IR: Evaluating Beneficial Use – Aquatic Life Use (ALU).

Table G-1 below indicates that overall:

- The average AU score increased slightly from 59.2% to 61.5% for the HUC12 assessments.
- The number of LRAUs achieving full attainment of ALU decreased from 89.2% to 87.4%, and the data show that in 2016 13.3% of the sites for the Lake Erie AUs were in full attainment for ALU.
- Lake Erie sampling occurred using 116 fish community collections at 45 sites in 2011-2014. The current cycle impairment values are not significantly different.

Table G-1. Summary of ALU assessment for Ohio's WAUs[2], LRAUs and LEAUs: 2002-2016 IR cycles.

IR Cycle	2002 (1991-2000)	2004 (1993-2002)	2006 (1995-2004)	2008 (1997-2006)	2010 (1999-2008)	2012 (2001-2010)	2014 (2003-2012)	2016 (2005-2014)
HUC11 Watershed AUs (331)								
No. AUs Assessed (% of total)	224 (68%)	225 (68%)	232 (64%)	218 (66%)	221 (67%)	-	-	-
No. Sites Assessed	3272	3620	3785	4080	4200	-	-	-
Average AU Scores								
Full Attainment	46.6	48.8	52.5	54.7	58.5	-	-	-
Partial Attainment	25.2	23.6	22.6	22.4	21.2	-	-	-
Non-Attainment	28.2	28.1	24.9	22.9	20.3	-	-	-
HUC12 Watershed AUs (1538)								
No. AUs Assessed (% of total)[4]	-	-	-	-	999 (65%)	908 (59%)	933 (61%)	983 (64%)
No. Sites Assessed	-	-	-	-	4200	3867	3876	3875
Average AU Score[4]	-	-	-	-	56.7	57.7	59.2	61.5
% Sites Full Attainment	-	-	-	-	55.1	57.0	57.8	59.3
% Sites Partial Attainment	-	-	-	-	20.0	21.6	22.3	20.7
% Sites Non-Attainment	-	-	-	-	24.9	21.4	19.9	20.0
Large River AUs (23 rivers/38 AUs totaling 1247.54 Miles)								
No. Rivers/AUs Assessed	22	21	17	16	18/30	18/31	22/37	23/38
No. Sites Assessed	422	425	374	278	265	312	332	358
No. Miles Assessed (% of total)	905 (70%)	918 (71%)	875 (68%)	850 (66%)	852 (69%)	984 (80%)	1147 (92%)	1216 (98%)
% Miles Full Attainment	62.5	64.0	76.8	78.7	93.1	89.0	89.2	87.4
% Miles Partial Attainment	23.0	21.4	15.1	13.9	5.5	7.5	6.3	8.7
% Miles Non-Attainment	14.5	14.6	8.1	7.4	1.4	3.5	4.5	3.9
Lake Erie AUs (3)								
No. AUs Assessed	3	3	3	3	3	3	3	3
No. Sites Assessed[5]	92	111	95	49	34	23	38	45
% Sites Full Attainment	12.0	18.0	18.4	10.2	14.7	30.4	13.2	13.3
% Sites Partial Attainment	13.0	14.4	16.1	22.4	17.7	30.4	34.2	31.1
% Sites Non-Attainment	75.0	67.6	64.5	67.4	67.6	39.2	52.6	55.6

[2] WAUs for the IR 2002-2010 cycles were based on HUC11s; WAUs transitioned to HUC12s for cycles beginning with 2010.
[3] 2010 statistics based on direct assessment of HUC12 AUs with data collected between 2005 and 2008 (n=545) and HUC11 extrapolated assessment of HUC12 AUs with data collected between 1998 and 2004 (n=454). 2012, 2014 and 2016 IR assessments based on direct assessment of HUC12 AUs with data collected between 2001 and 2010 (n=908), 2003 and 2012 (n=933) and 2005 and 2014 (n=983), respectively.
[4] Statistic based on the average of available AU scores with current data, derived as explained in Section G2.2.
[5] Data for sites used in the 2002-2012 IR cycles were generally collected between 1993 and 2002; for the 2014 and 2016 IRs, data were collected 2011-2014.

Section H of the 2016 IR: Evaluating Beneficial Use – Public Drinking Water Supply.

Ohio's 2014 list included the Western Basin Shoreline of Lake Erie for PDWS use impairment. For its 2016 IR, Ohio has assessed and listed all three Lake Erie shoreline assessment units for the PDWS use due to microcystin levels measured above threshold values of 1 µg/L.

For the 2016 IR, Ohio used chemical water quality data collected by Ohio and by public water systems from 2010 through December 2015 to assess waters designated for PDWS use. The

algal toxin sample data collection has greatly increased in response to public drinking water HAB incidents. Algal/cyanotoxin exceedances occurred in streams, creeks and shorelines. For Lake Erie AUs, water samples were above the microcystin PDWS concentration threshold for all three AUs.[29]

- Western Basin Shoreline – six public water systems (PWS) had at least two raw water sample exceedances;
- Central Basin Shoreline – one PWS had at least two raw water sample exceedances; and
- Lake Erie Islands Shoreline – four PWS had at least two raw water sample exceedances.

Other locations with microcystin and saxitoxin exceedances in public water system intakes in reservoirs or streams were added to the state's 2016 303(d) list. They include:

- Honey Run (City of Lima – Williams Reservoir and Bresler Reservoir) – seven exceedances in raw water samples;
- Haskins Ditch - Maumee River (Bowling Green Reservoir) – 19 exceedances in raw water samples;
- Maumee River Mainstem - Beaver Creek to Maumee Bay (Bowling Green Reservoir) – intake from Maumee, four exceedances in raw water samples;
- Raccoon Creek, Beaver Creek, Green Creek (City of Clyde) – routine exceedances in raw water from the reservoirs in Raccoon and Beaver Creeks;
- Norwalk Creek (Norwalk - Memorial Reservoir) - at least two raw water sample exceedances;
- E. Br. Cuyahoga River, Bridge Creek, Cuyahoga River (Akron – LaDue Reservoir, East Branch Reservoir, and Lake Rockwell) – at least two raw water sample exceedances;
- Upper Sunfish Creek (Woodfield) – at least two raw water exceedances from Ruble Lake and Witten Lake;
- Wolf Creek (Barberton – Wolf Creek Reservoir) – multiple raw water exceedances of saxitoxin;
- Up. Little Stillwater Cr. (Cadiz – Tappan Lake) – routinely exceeded microcystins threshold (48 raw water samples in 2015, seven in 2014);
- Headwaters Straight Cr. (Waynoka Region PWS, Sycamore Run Reservoir) – several exceedances of saxitoxin in raw water samples;
- Lucy Run, East Fork Little Miami River (Clermont County) PWS from Harsha Lake had multiple exceedances of microcystin. Saxitoxins were detected in raw water but did not exceed limits;
- Grand Lake St. Marys (City of Celina) – exceedances above the microcystin drinking water threshold value have occurred every year since sampling began in 2009; the mean microcystin concentration is 60µg/L, and 50 samples were above the microcystin threshold in 2015.

[29] 2016 IR, pp. H-13-17.

Section I of the 2016 IR: Considerations for Future Lists.

Wetlands: EPA provided comments and commended Ohio on its 2016 IR related to wetlands. Ohio has completed a comparison of two wetland assessment methodologies and found consistency in the results of both rapid and detailed methodology, as well as validation of the accuracy of a probabilistic survey of 50 wetlands.

Inland lakes and reservoirs: All inland lakes in Ohio are currently designated as exceptional warm water habitat (EWH) for ALU. Ohio is in the process of changing this designation to lake habitat (LH). The revised designation will retain the current criteria and include nutrient water quality criteria.

Ohio indicated that future lake assessments will also likely include HABs and cyanotoxins, focusing on both PDWS use and recreational use. Ammonia, Chlorophyll a, dissolved oxygen, nitrogen, pH, phosphorus, Secchi disk and temperature are being proposed by Ohio as parameters for its LH criteria and these criteria are listed in Table I-1 below.

Table I-1. Proposed[1] lake habitat use criteria.

Note: All criteria are outside mixing zone averages unless specified differently.

Parameter Lake type	Form[2]	Units[3]	Statewide criteria	Ecoregional Criteria[4] ECBP	EOLP	HELP	IP	WAP
Ammonia	T	mg/L	Table 43-4	--	--	--	--	--
Chlorophyll a[5]								
Dugout lakes	T	µg/L	6.0	--	--	--	--	--
Impoundments	T	µg/L	--	14.0	14.0	14.0	14.0	6.2
Natural lakes	T	µg/L	14.0	--	--	--	--	--
Upground reservoirs	T	µg/L	6.0	--	--	--	--	--
Dissolved oxygen[6] All lake types	T	mg/L	5.0 OMZM 6.0 OMZA	--	--	--	--	--
Nitrogen[5]								
Dugout lakes	T	µg/L	450	--	--	--	--	--
Impoundments	T	µg/L	--	930	740	930	688	350
Natural lakes	T	µg/L	638	--	--	--	--	--
Upground reservoirs	T	µg/L	1,225	--	--	--	--	--
pH All lake types	--	s.u.	A	--	--	--	--	--
Phosphorus[5]								
Dugout lakes	T	µg/L	18	--	--	--	--	--
Impoundments	T	µg/L	--	34	34	34	34	14
Natural lakes	T	µg/L	34	--	--	--	--	--
Upground reservoirs	T	µg/L	18	--	--	--	--	--
Secchi disk transparency[7]								
Dugout lakes	--	m	2.60	--	--	--	--	--
Impoundments	--	m	--	1.19	1.19	1.19	1.19	2.16
Natural lakes	--	m	1.19	--	--	--	--	--
Upground reservoirs	--	m	2.60	--	--	--	--	--
Temperature All lake types	--	--	B	--	--	--	--	--

[1] Proposed in draft water quality standards rules, August 2008.
[2] T = total.
[3] m = meters; mg/L = milligrams per liter (parts per million); µg/L = micrograms per liter (parts per billion); s.u. = standard units.
[4] ECBP stands for Eastern Corn Belt Plains; EOLP stands for Erie/Ontario Lake Plain; HELP stands for Huron/Erie Lake Plains; IP stands for Interior Plateau; and WAP stands for Western Allegheny Plateau.
[5] These criteria apply as lake medians from May through October in the epilimnion of stratified lakes and throughout the water column in unstratified lakes.
[6] For dissolved oxygen, OMZM means outside mixing zone minimum and OMZA means outside mixing zone minimum twenty-four-hour average. The dissolved oxygen criteria apply in the epilimnion of stratified lakes and throughout the water column in unstratified lakes.
[7] These criteria apply as minimum values from May through October.
A pH is to be 6.5-9.0, with no change within that range attributable to human-induced conditions.
B At no time shall the water temperature exceed the average or maximum temperature that would occur if there were no temperature change attributable to human activities.

Section J of the 2016 IR: Addressing Waters not Meeting Water Quality Goals.

Section J reviews and summarizes the listing framework, explains the prioritization and delisting process and results, and reports on Ohio's program and schedule for TMDL development and monitoring. Table J-1 below shows the attainment and listing categories Ohio uses, with the

shaded categories indicating those defined by EPA, and includes the attainment, impairment, or unknown status in each designated use category.[30] New subcategories in this listing cycle are:

- 1d - where a TMDL is complete and new data show the AU is meeting water quality standards;
- 5d - where a TMDL is complete but new data show the AU is not meeting water quality standards due to new contaminants;
- 5 alt - which includes waters that have an alternative restoration approach; Ohio currently has no waters in this subcategory.

Table J-1. Category definitions for the 2016 Integrated Report and 303(d) list.

Category[3]		Subcategory	
0	No water currently utilized for water supply		
1	Use attaining	d	TMDL complete; new data show the AU is attaining WQS
		h	Historical data
		t	TMDL complete at HUC[4] 11 scale; AU attaining WQS at HUC 12 scale
		x	Retained from 2008 IR
2	Not applicable in Ohio system		
3	Use attainment unknown	h	Historical data
		i	Insufficient data
		t	TMDL complete at HUC 11 scale; there may be no or not enough data to assess this AU at the HUC 12 scale
		x	Retained from 2008 IR
4	Impaired; TMDL not needed	A	TMDL complete[5]
		B	Other required control measures will result in attainment of use
		C	Not a pollutant
		h	Historical data
		n	Natural causes and sources
		x	Retained from 2008 IR
5	Impaired; TMDL needed	alt	Alternative restoration approaches[6]
		M	Mercury
		d	TMDL complete; new data show the AU is not attaining WQS
		h	Historical data
		x	Retained from 2008 IR

[3] Shading indicates categories defined by U.S. EPA; other categories and subcategories are defined by Ohio EPA.
[4] HUC means "hydrologic unit code."
[5] While Ohio has completed these TMDLs and they were approved by U.S. EPA, in March 2015 in *Fairfield Cty. Bd. of Commrs. v. Nally*, 143 Ohio St. 3d 93, 2015-Ohio-991, the Ohio Supreme Court determined that "A TMDL established by Ohio EPA pursuant to the Clean Water Act is a rule that is subject to the requirements of R.C. Chapter 119, the Ohio Administrative Procedure Act." See Section C (page C-17) for more details.
[6] Ohio currently has no waters that are listed under this subcategory.

Ohio has an active stakeholder process for developing TMDLs and works on collecting data through the five-year rotating basin plans. Ohio's ALU data are valid for up to ten years for evaluating assessment units, so each AU must be monitored at least once every ten years. Each AU is assigned to one of the subsequent monitoring cycles using the following criteria: Ohio EPA's five-year Basin Monitoring Strategy; time since most recent assessment; distribution of work effort among Ohio EPA district offices; priority ranking; and TMDL schedule. Ohio has generated its long-term TMDL schedule based on local interest, funding and partnership potential. Some flexibility remains in long-term scheduling because it is difficult to predict these

[30] 2016 IR, p. J2.

variables. Table J-15 of the 2016 Integrated Report provides the short-term schedule for TMDL development.

As previously discussed, for the 2016 IR Ohio did not assess the open waters of the Western Basin of Lake Erie. Section J3 describes the existing state, national, and international programs to reduce nutrient loadings in Lake Erie and states that:

> Ohio is working to address its contribution to the problems in Lake Erie through nutrient TMDLs on tributaries; numerous state initiatives to reduce nutrient loads from Ohio; and active participation on Annex 4 (Nutrients) and other Great Lakes Water Quality Agreement (GLWQA) efforts. Effective lake management and coordinated implementation are needed to address the Western Basin of Lake Erie algal blooms and the Central Basin hypoxia issues, requiring a multi-state and binational effort. Currently, there are a number of parallel planning and management efforts ongoing at the state, federal and binational level. With regard to the open waters of Lake Erie, respecting and working through the binational governance framework is the appropriate process and Ohio intends to aggressively pursue state measures that complement the process and are neither duplicative nor contradictory.[31]

Section J3 summarizes these efforts under Annex 4 of the Great Lakes Water Quality Agreement and other programs, agreements, and projects that are ongoing, such as:

- Great Lakes commission: Lake Erie Nutrient Targets (LENT) Working Group;
- Lake Erie Collaborative Agreement; and
- Ohio EPA's completion of 22 of 32 possible TMDLs whose watersheds drain to Lake Erie.[32]

In addition to these programs, Ohio requested EPA assistance in establishing TMDLs for certain impaired waterbodies within the Lake Erie basin. In February 2017, EPA agreed to federally establish TMDLs for the Sandusky River Lower Tributaries and Sandusky Bay Tributaries, and for the Black River Watershed. EPA and Ohio signed two Memoranda of Understanding that lay out the respective roles and responsibilities of the two agencies. These TMDLs will address nutirents, sediment, and bacteria (*E.coli*) within those waterbodies, and help address loadings and associated impairments within the Western Lake Erie Basin.

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[31] 2016 IR, pp. J-10, 11.

[32] As of May 9, 2013, Ohio EPA had listed approximately 86 water bodies for TMDL development, approximately one-half of which have been completed and approved by U.S. EPA, with the remaining in various stages of development. *Fairfield Cty. Bd. of Commrs. v. Nally*, 143 Ohio St.3d 93, 2015-Ohio-991, at 97. But while Ohio has completed these TMDLs and EPA approved them, the Ohio Supreme Court determined that "a TMDL established by Ohio EPA pursuant to the Clean Water Act is a rule that is subject to the requirements of R.C. Chapter 119, the Ohio Administrative Procedure Act. Ohio EPA must follow the rulemaking procedure in R.C. Chapter 119 before submitting a TMDL to U.S. EPA for its approval and before the TMDL may be implemented in an NPDES permit." *Id*. at 106.

Priority Ranking and Targeting

Ohio has included a discussion of its prioritization process for TMDL development in Section C and J of the IR. EPA agrees that, as to the WQLSs included on the 2016 Section 303(d) list, Ohio satisfied the requirement to submit a priority ranking.

Removal of Waters from the 303(d) List

Section J of the 2016 IR describes the delisting of waters from the 2014 303(d) list. Table J-5 below shows both delisting and listing of new waters in Ohio's 2016 303(d) list.

Table J-5. Number of AUs removed from or added to the 303(d) list.

	Number of AUs			
	Watershed	Large River	Lake Erie	*Total*
Delistings [Remove from 303(d) list]				
Human Health (fish tissue)	15	0	0	15
Recreation	37	1	0	38
Aquatic Life	76	2	0	78
Public Drinking Water Supply	1	0	0	1
Total	130	3	0	132
New Listings [Add to 303(d) list]				
Human Health (fish tissue)	21	0	0	21
Recreation	261	3	0	264
Aquatic Life	31	0	0	31
Public Drinking Water Supply	11	0	2	13
Total	326	3	2	329

Ohio removed waters from its 303(d) list because of 1) a flaw in original listing; 2) new data showing that the waters are meeting the WQSs; or 3) TMDL approval.[33]

Long-term schedule

The 2016 IR included Ohio's long-term schedule for TMDL development for all waters on the state's Category 5 list of impaired waters.[34] Ohio states that the five-year basin approach provides the foundation for most monitoring, and aquatic life use monitoring data up to ten years old are considered valid. However, Ohio states that cycling through the entire basin rotation would take about 15 to 20 years at current resource levels. Ohio plans to pursue additional resources for funding and partnering.

[33] 2016 IR, Tables J-7, J-8, J-9 and J-10.
[34] Section J6.2 of the 2016 IR.

Section K of the 2016 IR: Maps

Maps for informational purposes are included in Section K and includes Hydrologic Unit Codes (HUCs), Assessment Units, designated uses, index scores, and monitoring schedules and TMDL progress.

Section L of the 2016 IR: Summary Tables of Waterbody Conditions; Lists of Prioritized Impaired Waters; and Monitoring and TMDL Schedules

This Section provides the waters included on Ohio's 2016 impaired waters list. This Section also describes several projects classified as *Category 4B - Impaired, Other Required Control Measures will result in Attainment of Use.* Ohio included updated information on these 4B demonstration projects.[35] With these Category 4B projects, the state has demonstrated there are other pollution control requirements imposed by state, local or federal authority that could result in attainment of water quality standards within a reasonable time.

Section M of the 2016 IR: An Overview of Ground Water Quality in Ohio.

EPA has reviewed this Section of the IR and finds it provides an adequate description of ground water quality assessment in Ohio.

III. EPA's Approval of Ohio's 303(d) List

EPA has reviewed Ohio's submittal, and is approving Ohio's 2016 303(d) list.

[35] Section L5 of the 2016 IR.

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