



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

WASHINGTON, D.C. 20460

OFFICE OF WATER

**MEMORANDUM**

**SUBJECT:** Information Concerning 2024 Clean Water Act Sections 303(d), 305(b), and 314 Integrated Reporting and Listing Decisions

**FROM:** Brian Frazer, Director (Acting)  
Office of Wetlands, Oceans, and Watersheds

**TO:** Water Division Directors, Regions 1 – 10

I am pleased to provide you with information to assist you and the states and territories in your EPA Region prepare for submittal and review of the 2024 Integrated Reports (IRs) developed in accordance with Clean Water Action (CWA) Sections 303(d), 305(b), and 314. This memorandum provides considerations on a range of relevant and timely topics, including:

1. 2022-2032 CWA Section 303(d) Vision
2. Clarification Regarding Priority Rankings and Total Maximum Daily Load Submission Schedules
3. Environmental Justice
4. Participatory Science
5. Climate Change
6. Indian Tribes and Tribal Water Resources
7. CWA Section 303(d) Assessment/Listing for Trash-Related Impairments
8. CWA Section 303(d) Assessment/Listing for Nutrient-Related Impairments
9. Identifying the Pollutants Causing or Expected to Cause an Exceedance of Applicable Water Quality Standards for Waters on the CWA 303(d) List.

We are issuing this 2024 Integrated Reporting memorandum in advance of the 2024 IR deadline (April 1, 2024) to allow opportunity for consideration of these topics for the 2024 reporting cycle, though we expect this memorandum will be a helpful resource for states, territories, authorized tribes, and EPA in future cycles as well.

This memorandum is not regulation and does not impose legally binding requirements on EPA, states, territories, or authorized tribes. EPA recommends that the states and territories prepare their 2024 IRs consistent with previous Integrated Reporting memoranda and this memorandum available at: <https://www.epa.gov/tmdl/integrated-reporting-guidance-under-cwa-sections-303d-305b-and-314>.

I appreciate your continued hard work and dedication in developing IRs to help EPA report to the public the status of the nation's waters. If you have any questions or comments concerning this memorandum, please contact me or have your staff contact Emily Ciria in the Watershed Branch at [cira.emily@epa.gov](mailto:cira.emily@epa.gov) or (202) 566-2835.

Attachment

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**INFORMATION CONCERNING 2024 CLEAN WATER ACT  
SECTIONS 303(d), 305(b), AND 314 INTEGRATED  
REPORTING AND LISTING DECISIONS**

**March 29, 2023**

**Office of Wetlands, Oceans and Watersheds  
Office of Water  
United States Environmental Protection Agency**

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## Introduction

The objective of this document is to provide additional context, detail, and clarity on a selection of topics that are timely and relevant for the 2024 reporting cycle, including: addressing relevant aspects of the recently released 2022-2032 Clean Water Act (CWA) Section 303(d) Program Vision, highlighting relevant aspects of specific agency and program priorities, and addressing considerations for specific listing topics. Specifically, this memorandum focuses on the following topics:

1. 2022-2032 CWA Section 303(d) Vision
2. Clarification Regarding Priority Rankings and Total Maximum Daily Load (TMDL) Submission Schedules
3. Environmental Justice
4. Participatory Science
5. Climate Change
6. Indian Tribes and Tribal Water Resources
7. CWA Section 303(d) Assessment/Listing for Trash-Related Impairments
8. CWA Section 303(d) Assessment/Listing for Nutrient-Related Impairments
9. Identifying the Pollutants Causing or Expected to Cause an Exceedance of Applicable Water Quality Standards (WQS) for Waters on the CWA 303(d) List.

Biennial submittal of Integrated Reports (IRs) supports meeting the reporting requirements under CWA Sections 303(d) and 305(b). It provides the public with up-to-date information regarding the water quality status of the nation's waters and the management actions necessary to protect and restore them. The U.S. Environmental Protection Agency (EPA) continues to support the use of both statistical survey designs and targeted monitoring to cost-effectively meet the needs of CWA Sections 303(d) and 305(b). The topics addressed here are intended to supplement and amplify existing reporting memoranda in advance of the 2024 IR cycle.

While this document cites statutes and regulations that contain requirements applicable to topics such as WQS, water quality assessment, and the establishment of TMDLs, it does not impose legally binding requirements on EPA, states, territories, authorized tribes, other regulatory authorities, or the regulated community, and may not apply to a particular situation based upon the circumstances. EPA, state, territorial, authorized tribal, and other decision makers retain the discretion to adopt approaches on a case-by-case basis that differ from those provided in this Integrated Reporting memorandum (IR memo) as appropriate and consistent with statutory and regulatory requirements. EPA may update this document as new information becomes available. In addition to this document, EPA recommends that states and territories prepare their 2024 IRs consistent with previous IR memoranda, as appropriate.<sup>1</sup> EPA acknowledges that some states have already started their 2024 process and emphasizes that this IR memo can help inform future cycles as well. EPA also recognizes that some suggestions in this IR memo and the appendices may take time to consider and implement, as appropriate, and consistent with statutory and regulatory requirements.

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<sup>1</sup>This and previous memoranda can be accessed at <https://www.epa.gov/tmdl/integrated-reporting-guidance-under-cwa-sections-303d-305b-and-314>.

## 1. 2022-2032 CWA Section 303(d) Vision

### *Long-Term Planning and Prioritization*

The 2022-2032 Vision for the CWA Section 303(d) Program (“2022 Vision”)<sup>2</sup> communicated the expectation that states, territories, and authorized tribes<sup>3</sup> would engage in a long-term planning process and document their decisions in a Prioritization Framework that is shared with EPA by April 1, 2024. As recommended in the Vision, states and territories are encouraged to utilize the 2024 IR public participation process to develop and share (either by incorporation or reference) their Prioritization Frameworks.<sup>4</sup> EPA also encourages states and territories to use their IRs to report on the progress towards development of TMDLs, other restoration plans, and protection plans. The information in this section aims to support the development of Prioritization Frameworks and the long-term planning process.

The Prioritization Framework is a planning document that serves two key purposes: (1) to describe long-term Vision priorities and a rationale for selecting those Vision priorities; and (2) to outline a general strategy for implementing the Goals of the 2022 Vision over the next decade.<sup>5</sup>

Consistent with the first purpose, the Prioritization Framework should explain how the state, territory, or authorized tribe established its long-term planning objectives and Vision priorities in a written rationale. This rationale can express the long-term Vision priorities (for TMDL development or other restoration and protection plans) with as much detail as each state, territory, and authorized tribe deems appropriate. This may range from narrative explanations of the geographic priority area(s), pollutant(s), etc., to specific Vision priority waters or watersheds for the entire long-term planning period of the Vision. As noted in the Vision, it is then anticipated that states, territories, and authorized tribes would identify and communicate specific waterbodies to be addressed over shorter increments.

EPA encourages states, territories, and authorized tribes to consider various factors including public interest, environmental considerations, and resource implications to inform their Vision prioritization process. The factors included in the Appendix to the [2016 IR memo](#) “Considerations for setting State long-term priorities from 2016 to 2022” are appropriate for the new purpose of developing a Prioritization Framework through 2032. The 2016 IR memo also includes a section on the distinction between the long-term Vision priorities and the required priority ranking of listed waters, which remains relevant to implementation of the 2022 Vision. Although states and territories are encouraged to include or reference their long-term Vision priorities in their 2024 IRs, EPA’s formal decision on the CWA

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<sup>2</sup>Additional information about the 2022 Vision can be accessed at <https://www.epa.gov/tmdl/Vision>.

<sup>3</sup>Several federal environmental laws authorize EPA to treat eligible federally recognized tribes in a similar manner as a state (TAS) for implementing and managing certain environmental programs (for more information go to: <https://www.epa.gov/tribal/tribal-assumption-federal-laws-treatment-state-tas>). This IR memo will discuss tribes both as potential entities to be authorized to implement CWA Section 303(d), through TAS, and tribes that do not yet have TAS. When referring to entities that may implement CWA Section 303(d) this IR memo uses “states, territories, and authorized tribes.” The term “authorized tribes” in this memorandum refers specifically to tribes that have obtained TAS authorization for CWA 303(d). See also [Final Rule - Treatment of Indian Tribes in a Similar Manner as States for Purposes of Section 303\(d\) of the Clean Water Act](#).

<sup>4</sup>EPA is not anticipating that any tribes will be submitting 2024 CWA 303(d) lists, but as tribes obtain TAS for the 303(d) Program, tribes may use 303(d) processes in future cycles to communicate regarding their Prioritization Frameworks.

<sup>5</sup>For reference, Prioritization Frameworks developed as part of the 2013 Vision are compiled here: <https://www.eli.org/freshwater-ocean/state-and-territorial-prioritization-frameworks>.

Section 303(d) list (CWA 303(d) list)<sup>6</sup> will not include action on the long-term planning and priorities identified under the Vision.

The second purpose is meant to promote broader consideration of all the Goals in the 2022 Vision and how they can be utilized to address the long-term Vision priorities. The CWA Section 303(d) Program has an inherent planning role because it applies WQS to develop pollutant loading targets and allocations for the point source permitting and nonpoint source management programs, as well as other programs under and outside of the CWA. States, territories, and authorized tribes are encouraged to identify broad water quality objectives and actions across programs that could help them progress towards those objectives in a way that aligns with the Vision Goals. To illustrate, here are several examples to consider:

- Identify approaches to set in motion engagement with groups in watersheds so that they may contribute to planning activities (e.g., water quality monitoring), and the development and implementation of TMDLs, and understand what actions they need to take to restore the waterbody (Restoration Goal and Partnerships Goal).
- Identify areas with environmental justice concerns that lack ambient monitoring data and consider ways to leverage resources and assemble data and information that can be used in future assessments and plan development (Data and Analysis Goal).
- Partner with the CWA 319 Program to support TMDL development and implementation and develop and implement other restoration plans and protection plans that incorporate knowledge of local nonpoint source activities and entities (Restoration Goal and Partnerships Goal).
- Coordinate with National Pollutant Discharge Elimination System (NPDES) permitting programs to consider prioritizing watersheds for TMDL development where permits are coming up for issuance, reissuance, or renewal, furthering cross-program coordination (Partnerships Goal).
- Consider areas where TMDLs have resulted in restoration and where protection efforts might prevent a future impairment, and also consider leveraging efforts to protect these waterbodies (Protection Goal).

Coordination of CWA Section 303(d) Program activities with other programs can aid in strategically focusing limited resources to address broader water quality objectives most effectively.

Flexibility and adaptability are central to the Planning and Prioritization Goal of the 2022 Vision because each state, territory, or tribe is unique and subject to changing circumstances. EPA supports flexibility in developing Prioritization Frameworks in a way that best supports reaching water quality objectives. Recognizing that there is flexibility in how CWA 303(d) Program responsibilities are implemented and consistent with existing statutory and regulatory authorities, EPA will work closely with states, territories, and authorized tribes as they do long-term planning and identify Vision priorities that reflect a meaningful plan or roadmap on how best to meet their ongoing CWA 303(d) Program requirements.

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<sup>6</sup>CWA Section 303(d) lists include waters that are impaired or threatened and still require a TMDL. The definition of “water quality limited segment” in EPA’s regulations implementing CWA Section 303(d) at 40 CFR 130.2(j) includes waters not expected to meet applicable water quality standards, which EPA refers to as “threatened” waters.

Long-term planning from fiscal year 2025 (FY25) to FY32 provides states, territories, and authorized tribes an opportunity to strategically focus their efforts and demonstrate progress over time in achieving environmental results. While long-term planning objectives are not expected to substantially change from FY25 to FY32, EPA recognizes that Vision priorities may change over time, prompting states, territories, and authorized tribes to make short-term decisions on which waterbodies to address consistent with long-term planning objectives. EPA has identified ways to facilitate reporting and support flexibility (see performance metrics discussion below). In addition, although the 2022 Vision calls for states, territories, and authorized tribes to identify their priorities through FY32, some may choose to establish a framework that allows them to identify priorities beyond FY32.

### ***Relationship to EPA Performance Metrics for the CWA 303(d) Program***

Beginning in FY25 and continuing through FY32, states, territories, and authorized tribes will identify plan priorities under a new Vision metric. Similar to the approach used under the FY23 and FY24 “bridge” metric, states, territories, and authorized tribes will identify plan priorities in individual two-year increments. States, territories, and authorized tribes should identify their two-year priorities under this Vision metric considering the long-term planning documented in the Prioritization Framework. States, territories, and authorized tribes will identify priority plans every two years for purposes of the EPA Vision metric by September 30 in 2024, 2026, 2028, and 2030.

States, territories, and authorized tribes would identify and communicate to EPA specific waterbody parameter combinations to be addressed over each two-year increment. Reported priorities may include TMDLs, other restoration plans (e.g., plans for impairments in IR Subcategories 4b, 4c, and 5r), or protection plans.<sup>7</sup> States, territories, and authorized tribes are not required to identify their Vision metric priorities in their CWA 303(d) lists. States, territories, and authorized tribes would have the flexibility to begin and complete plans over the course of multiple two-year reporting cycles. Each two-year period will provide an opportunity to report on priorities that will have a plan completed or in progress in line with the Prioritization Framework. Each period will be measured separately from other two-year periods. However, states, territories, and authorized tribes can continue to develop a particular plan over the course of multiple two-year Vision metric increments.<sup>8</sup>

Identification of priority plans as part of this Vision metric is distinct from the requirement that each CWA 303(d) list include a priority ranking for listed waters still requiring TMDLs under CWA Section 303(d)(1)(A) and 40 CFR 130.7(b)(4). For example, plans identified under the Vision metric may include non-TMDL restoration plans, protection plans, and TMDLs.

### ***Role of Non-TMDL Restoration Plans under the 2022 Vision (Plans for Subcategories 4b, 4c, and 5r)***

As emphasized in the Restoration Goal of the Vision, the statutory and regulatory obligations to develop TMDLs for waters identified on states’, territories’, and authorized tribes’ CWA 303(d) lists remain unchanged, and TMDLs will remain the primary analytic and informational tool for addressing such waters. However, EPA recognizes that under certain circumstances, other restoration approaches may be more immediately beneficial or practicable in achieving WQS than pursuing the TMDL approach in the near term. The Restoration Goal of the 2022 Vision highlights several types of restoration plans, in

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<sup>7</sup>For information on protection approaches, see, e.g., <https://www.epa.gov/tmdl/protection-approaches>.

<sup>8</sup>EPA will continue to work with states, territories, and authorized tribes to explore additional metrics to communicate overall program progress.

addition to TMDLs, for waters placed in Subcategories 4b, and 4c,<sup>9</sup> and for waters that remain in Category 5. Each of these generally is a near-term plan or description of actions, with a schedule and milestones, that is more immediately beneficial or practicable in achieving WQS.

### ***Description of an Advance Restoration Plan (ARP) Pursued for CWA 303(d) Listed Waters***

An advance restoration plan (ARP) is a plan designed to address impairments for waters that will remain on the CWA 303(d) list (i.e., Category 5), as restoration activities are implemented prior to TMDL development. These plans were discussed in the 2013 Vision and 2016 IR memo under the “Alternatives” Goal but, in order to address the potential misconception that these plans are alternatives instead of a TMDL, EPA is discontinuing the use of the term “alternatives” moving forward, and recommends that states, territories, and authorized tribes discontinue the use of the term as well. EPA is not requesting this change in terminology be applied retroactively to plans currently in place.

EPA and states, territories, and authorized tribes will work together to determine the most effective tool to achieve WQS in the near term—be it TMDL development or pursuing an ARP—for waters that remain on the CWA 303(d) list. EPA recommends that states, territories, and authorized tribes consider the following non-exclusive circumstances associated with the listed water when evaluating whether an ARP is appropriate:

1. There are unique local circumstances (e.g., the type of pollutant or source or the nature of the receiving waterbody; presence of watershed groups or other parties interested in implementing the ARP; available funding opportunities for the ARP).
2. Initial review of the pollutant or cause of impairment shows that particular point and non-point sources are responsible for the impairment with clear mechanisms to address all sources (both point and nonpoint), as appropriate (e.g., CWA 319 nine-element watershed-based plans or other restoration plans; source water protection plans; setting new limits when permit is re-issued; which are expected to achieve WQS in the listed water).
3. There is stakeholder and public support for the ARP, which is important for achieving timely progress in implementing the restoration activities.

#### **Key Points**

- EPA is replacing the term “Alternative Restoration Plan” with “Advance Restoration Plan” moving forward.
- EPA recommends use of IR Subcategory 5r (instead of the previously-recommended 5-alt) to make the public aware of these plans.
- While TMDLs remain the primary tool for addressing impaired waters, in certain cases there may be other restoration approaches that may achieve WQS in the near term.

### ***Use of a Subcategory in Category 5 (i.e., 5r) to Report on Advance Restoration Plans for CWA 303(d) Listed Waters***

Listed waters for which a state, territory, or authorized tribe develops and pursues an ARP will remain on the CWA 303(d) list (i.e., Category 5) and still require TMDLs until WQS are achieved. EPA recommends using a subcategory under Category 5 (Subcategory 5r) as an organizing tool to clearly articulate which listed waters have such plans, and to provide transparency to the public. In addition, this

<sup>9</sup>For more information on waters placed into Subcategory 4c and associated plans, see pages 4-6 of the [2016 IR memo](#).

Subcategory will facilitate tracking ARP implementation in these CWA 303(d) listed waters. Note that, as recognized in previous IR memos, states, territories, and authorized tribes may separate their impaired waters within their own defined subcategories.

For further details regarding considerations for ARP development, IR categorization, and EPA’s role in ARP review, please consult Appendix A of this document as well as the [2016 IR memo](#).

## 2. Clarification Regarding Priority Rankings and TMDL Submission Schedules

Both the CWA, in Section 303(d)(1)(A), and EPA’s regulations at 40 CFR 130.7(b)(4), require states, territories, and authorized tribes to establish a priority ranking for the waters on their CWA 303(d) list “taking into account the severity of the pollution and the uses to be made of such waters.” 33 U.S.C. 1313(d)(1)(A); 40 CFR 130.7(b)(4). The regulations at 40 CFR 130.7(b)(4) provide that this priority ranking must include “all listed water quality-limited segments still requiring TMDLs” and further require that states, territories, and authorized tribes submit their priority rankings to EPA as a component of their biennial CWA 303(d) lists. Additionally, the regulations mandate that the priority ranking identify the impaired waters targeted for TMDL development in the next two years. See 40 CFR 130.7(b)(4). Accordingly, the regulations clarify that the priority ranking, including identifying waters targeted for TMDL development in the next two years, is a required component of a biennial CWA 303(d) list submission from a state, territory, or authorized tribe.

Separately, EPA’s regulations at 40 CFR 130.7(d)(1) state that “[s]chedules for submission of TMDLs shall be determined by the Regional Administrator and the State.” This provision regarding TMDL submission schedules is distinct from the priority ranking requirements. Pursuant to

### Key Points

#### Priority Ranking for TMDL Development (33 U.S.C. 1313(d)(1)(A); 40 CFR 130.7(b)(4))

- Required as part of a CWA 303(d) list (due April 1 each even numbered year).
- Must include all listed water quality-limited segments still requiring TMDLs.
- Must identify the impaired waters targeted for TMDL development in the next two years.

#### TMDL Submission Schedules (40 CFR 130.7(d)(1))

- Not required as part of a CWA 303(d) list but can be submitted at the same time.
- Updated as appropriate.
- Shall be determined by the Regional Administrator and the state, territory, or authorized tribe.

#### Long -Term Planning and Prioritization (2022 Vision)

- Shared with EPA by April 1, 2024.
- Can include TMDLs, other restoration plans, and protection plans.

#### Priority Plans for EPA Performance Metric

- States, territories, and authorized tribes identify priority plans every two years for purposes of the EPA metric (by September 30 in 2024, 2026, 2028, 2030).
- States, territories, and authorized tribes would identify whether a plan will be in progress or completed for each two-year increment.
- Priority plans include TMDLs, other restoration plans, and protection plans.
- Tracked based on EPA fiscal year.

40 CFR 130.7(b)(4), states, territories, and authorized tribes “shall include” a priority ranking as part of their list submissions, a requirement that derives from the CWA at Section 303(d)(1)(A). In contrast, 40 CFR 130.7(d)(1) states that the TMDL submission schedules “shall be determined by the Regional Administrator and the State,” without specifying when or where such determinations are made. The TMDL submission schedule provision derives from CWA Section 303(d)(2), which directs states, territories, and authorized tribes to submit TMDLs to EPA “from time to time.” Thus, in contrast to the priority ranking, states, territories, and authorized tribes are not required to submit a TMDL submission schedule as a component of their biennial CWA 303(d) list submission.

States, territories, and authorized tribes may choose to include TMDL submission schedules in their IRs. If a state, territory, or authorized tribe opts to do so, EPA recommends that the state, territory, or authorized tribe clearly identify that its IR includes a TMDL submission schedule. As the TMDL submission schedule is not a component of a CWA 303(d) list, EPA will not take action on the submission schedule in its decision on a CWA 303(d) list from a state, territory, or authorized tribe. As an alternative to including the TMDL submission schedule with their IR submissions, states, territories, and authorized tribes may document their schedules elsewhere, for example, in ongoing work planning efforts with EPA, such as Performance Partnership Agreements.

EPA’s regulation regarding TMDL submission schedules at 40 CFR 130.7(d)(1) leaves considerable flexibility to the states, territories, and authorized tribes, and EPA in determining the TMDLs appropriate for inclusion in a TMDL submission schedule and establishing a format for this schedule.<sup>10</sup> However, a TMDL submission schedule should identify a time by which the state, territory, or authorized tribe plans to submit specified TMDLs<sup>11</sup> to EPA, rather than identifying other TMDL development milestones. EPA recognizes that many factors influence the scheduling of any particular TMDL project and does not interpret the applicable regulation to bind states, territories, and authorized tribes by their TMDL submission schedules. Accordingly, EPA encourages these entities to work with EPA regional offices to update these schedules regularly as circumstances change.

### 3. Environmental Justice

Poor water quality can disproportionately affect urban and rural communities that are predominately people of color, indigenous, linguistically isolated, low-income, and/or impacted by other stressors.<sup>12</sup> EPA is dedicated to advancing environmental justice (also referred to as EJ) so that no group bears a disproportionate burden of environmental harm or is more likely to have its water quality degrade.<sup>13</sup> As relevant to Integrated Reporting activities, advancing environmental justice in the context of water quality may encompass monitoring, assessment, listing, reporting, and prioritization of actions that protect and restore water quality.

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<sup>10</sup>See [2006 IR memo](#), at 63.

<sup>11</sup>The regulation at 40 CFR 130.7(d)(1) does not require that each iteration of the TMDL submission schedule include each TMDL the state, territory, or authorized tribe must submit to EPA. It is reasonable for states, territories, and authorized tribes, and EPA to address the task of scheduling TMDL submissions in increments; an incremental approach addresses the informative and work planning purposes of this provision and may be more practically feasible.

<sup>12</sup>Recovery Potential Screening (RPS) and Watershed Index Online (WSIO) [Population Demographics Indicator Reference Sheet](#).

<sup>13</sup>For more information on EPA’s commitment to advancing EJ in the 303(d) Program see the [2022-2032 Program Vision](#).

EPA defines environmental justice as: “The **fair treatment** and **meaningful involvement** of all people regardless of race, color, culture, national origin, income, and educational levels with respect to the development, implementation, and enforcement of protective environmental laws, regulations, and policies.”<sup>14</sup> EPA’s [EJ 2020 Glossary](#) defines these terms as follows:

<b>Fair Treatment</b>	<b>Meaningful Involvement</b>
<p>The principle that no group of people, including a racial, ethnic or a socioeconomic group, should bear a disproportionate share of the negative environmental consequences from industrial, municipal and commercial operations or the execution of federal, state, local and tribal programs and policies. In implementing its programs, EPA has expanded the concept of fair treatment to include not only consideration of how burdens are distributed across all populations, but the distribution of benefits as well.</p>	<p>Potentially affected community residents have an appropriate opportunity to participate in decisions about a proposed activity that will affect their environment and/or health.</p> <p>The public's contribution can influence the regulatory agency's decision.</p> <p>The concerns of all participants involved will be considered in the decision-making process.</p> <p>The decision makers seek out and facilitate the involvement of those potentially affected.</p>

EPA encourages states, territories, and authorized tribes to incorporate environmental justice considerations as they carry out water quality monitoring, assessment, listing, and TMDL programs. Regulatory requirements particularly relevant for the incorporation of environmental justice considerations in the context of Integrated Reporting include, but are not limited to, the requirements for states, territories, and authorized tribes to:

1. Assemble and evaluate all existing and readily available water quality-related data and information (40 CFR 130.7(b)(5)).
2. Use such data and information to determine whether WQS are attained, unless they provide a rationale not to (40 CFR 130.7(b)(6))<sup>15</sup> (see also Section 4 (Participatory Science) below).
3. Provide for public participation, including describing their process for involving the public and other stakeholders in their Continuing Planning Processes (CPP) (40 CFR 130.7(a)).
4. Include in CWA 303(d) list submissions a priority ranking for all listed water quality-limited segments still requiring TMDLs (40 CFR 130.7(b)).

Appendix B includes ideas for how states, territories, and authorized tribes can integrate fair treatment and meaningful involvement in their programs to drive water quality outcomes through planning, prioritization, and public engagement. EPA recognizes that states, territories, and authorized tribes may have their definitions and procedures regarding environmental justice and that integrating EJ into program processes may occur in stages and over time, given capacity and resources, as long as it is consistent with existing requirements.

<sup>14</sup>EPA’s [EJ 2020 Glossary](#) (emphasis added).

<sup>15</sup>EPA will evaluate whether a state, territory, or authorized tribe provides a technical, science-based rationale for decisions not to use data or information. See [2006 IR memo](#), at 37; *Sierra Club v. Leavitt*, 488 F.3d 904, 913-14 (11<sup>th</sup> Cir. 2007); *Potomac Riverkeeper, Inc. v. Wheeler*, 381 F. Supp. 3d 1, 14-18 (D.D.C. 2019), *aff’d*, 815 F. App’x 551 (D.C. Cir. 2020); *Center for Biological Diversity v. EPA*, 90 F. Supp. 3d 1177, 1211-12 (W.D. Wash. 2015); *Friends of the Wild Swan, Inc. v. US EPA*, 130 F. Supp. 2d 1184, 1193-94 (D. Mont. 1999).

#### 4. Participatory Science

In developing their CWA 303(d) lists, states, territories, and authorized tribes are required to assemble and evaluate all existing and readily available water quality-related data and information, including for waters for which water quality problems have been reported by local, state, or federal agencies; members of the public; or academic institutions.<sup>16</sup> These organizations and groups should be actively solicited for research they may be conducting or reporting.<sup>17</sup> States, territories, and authorized tribes must use such data and information in developing the CWA 303(d) list unless they provide a rationale not to.<sup>18</sup> EPA will evaluate whether a state, territory, or authorized tribe provides a technical, science-based rationale for decisions not to use data or information.<sup>19</sup> Further, as discussed in the [2014 IR memo](#), the evaluation of these data/information should balance using the highest quality data and information with using the most useful data and information about the condition of as many segments as possible. EPA supports reasonable approaches to ensuring that data and information used to make listing decisions are of appropriate quality.

Participatory science is the involvement of the public in the scientific process, often in collaboration with professional scientists and scientific institutions. Participatory science is an essential way for community members to contribute to and be invested in water quality management decisions in their community. In 2022, EPA published [Using Participatory Science at EPA: Vision and Principles](#) to guide EPA on use of participatory science in its programs. EPA encourages states, territories, and authorized tribes to support participatory science by decreasing barriers to the submission of data and information and increasing the use of such data and information in assessment and listing decisions.

Ideas for decreasing barriers to the submission and use of participatory science data and information in the context of IRs can be found in Appendix C. EPA recognizes that support for participatory science may occur in stages and over time given the capacity and resources of states, territories, and authorized tribes, as long as it is consistent with existing requirements.

More resources to support participatory science can be found on EPA's [participatory science website](#) including a quality assurance toolkit and EPA's Vision for Participatory Science. More information on data assembly can be found in earlier IR memos, including the [2006 IR memo](#).

#### 5. Climate Change

Climate change has complex, wide-ranging impacts on all aspects of the CWA Section 303(d) Program. EPA's 2021 Climate Adaptation Action Plan identifies potential effects, including warming air and water, lower flows that can concentrate pollutants, changing precipitation patterns, increased storm intensity and frequency, sea level rise, and changing ocean characteristics,<sup>20</sup> all of which can be inter-related and spatially and/or temporally variable. Additionally, conditions impacting impairment determinations are not static, and climate change can exacerbate the variability of these conditions,

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<sup>16</sup>See 40 CFR 130.7(b)(5).

<sup>17</sup>40 CFR 130.7(b)(5)(iii).

<sup>18</sup>40 CFR 130.7(b)(6)(iii).

<sup>19</sup>See FN 15.

<sup>20</sup>[US EPA Climate Adaptation Action Plan, 2021](#); see also [EPA Office of Water 2022-2026 Climate Adaptation Implementation Plan](#).

which can lead to more waterbodies being impaired even when pollutant loadings remain stable.<sup>21</sup> These factors can have an impact on and should be taken into consideration while carrying out CWA Section 303(d) assessment and listing responsibilities and related activities.

EPA offers a non-comprehensive collection of observations in Appendix D of ways climate change may be considered when carrying out existing CWA Section 303(d) requirements and activities for the 2024 IR cycle and future cycles. These include the requirements for states, territories, and authorized tribes to:

1. Assemble and evaluate all existing and readily available water quality-related data and information (40 CFR 130.7(b)(5)).
2. Use such data and information to determine whether WQS are attained, unless they provide a rationale not to (40 CFR 130.7(b)(6)),<sup>22</sup> to develop the impaired waters list.
3. Provide for public participation, including describing their process for involving the public and other stakeholders in their Continuing Planning Processes (CPP) (40 CFR 130.7(a)).
4. Include in CWA 303(d) list submissions a priority ranking for all listed water quality-limited segments still requiring TMDLs (40 CFR 130.7(b)).

EPA offers observations in Appendix D to help inform states, territories, and authorized tribes as they consider climate change factors in carrying out CWA Section 303(d) assessment and listing requirements and related activities (such as coordination with monitoring programs) for the 2024 IR cycle and future cycles. Among other things, Appendix D discusses further how climate change can impact attainment of WQS.

## 6. Indian Tribes and Tribal Water Resources

EPA works closely with tribal partners and provides support as they protect and steward their waters. The [2022 Vision](#) includes a Tribal Water Quality and Program Development Focus Area to help interested federally recognized tribes administer the CWA Section 303(d) Program, assess waters, and plan for restoration and protection of tribal waters, as well as to ensure meaningful government-to-government consultation opportunities and otherwise enable tribes to engage with EPA, states, and others on CWA Section 303(d) Program activities relevant to tribal interests.

### *Tribal Treatment in a Similar Manner as a State (TAS) for the CWA Section 303(d) Program*

EPA encourages tribes to apply for authorization to implement the CWA Section 303(d) Program, including development of CWA 303(d) lists. On September 26, 2016, EPA published regulations (40 CFR 130.16) establishing a process for federally recognized tribes to obtain TAS authority to administer the water quality restoration provisions of CWA Section 303(d), including the submission of CWA 303(d) lists and TMDLs (81 FR 65901).<sup>23</sup>

<sup>21</sup>A review of climate change effects on practices for mitigating water quality impacts. *Journal of Water and Climate Change* (2022) 13 (4): 1684–1705. <https://doi.org/10.2166/wcc.2022.363>.

<sup>22</sup>EPA will evaluate whether a state, territory, or authorized tribe provides a technical, science-based rationale for decisions not to use data or information. See FN 15.

<sup>23</sup>[Final Rule - Treatment of Indian Tribes in a Similar Manner as States for Purposes of Section 303\(d\) of the Clean Water Act.](#)

Like states and territories, authorized tribes will be required to submit their CWA 303(d) lists to EPA for approval every two years on April 1 of even-numbered years. A tribe gaining TAS status would have at least 24 months to submit its first CWA 303(d) list to EPA (40 CFR 130.16(c)(5)). The first list would be due to EPA in the next listing cycle (April 1 in a given even-numbered year) that is at least 24 months from the date the tribe's TAS application is approved or the date that EPA approved or promulgated WQS for the tribe's waters become effective, whichever is later (40 CFR 130.16(c)(5)).

By obtaining TAS authorization for the CWA Section 303(d) Program, tribes would take the lead role in the CWA Program to assess and develop plans to restore and protect their reservation waters. Among other things, authorized tribes would assume the primary responsibility to determine what waters on their reservations<sup>24</sup> are impaired or threatened and in need of TMDLs, the priority ranking for TMDL development, and the development of TMDLs, including pollutant source allocations for those waters.

EPA's "frequently asked questions" document, [Treatment of Indian Tribes in a Similar Manner as States for Purposes of Section 303\(d\) of the Clean Water Act](#), provides additional information about responsibilities of authorized tribes under CWA Section 303(d), benefits of assuming the program, and other questions related to CWA Section 303(d) TAS. In addition, EPA developed a working-draft [TAS Application Template for the CWA Section 303\(d\) Impaired Water Listing and TML Program](#) to help streamline the TAS application process.

Tribes are not subject to CWA Section 305(b). Many tribes have TAS for CWA Section 106 and develop tribal water quality assessment reports. EPA encourages tribes authorized for the CWA Section 303(d) Program to combine their CWA Sections 303(d) and 106 assessments into a Section 303(d)/106 report, similar to state and territory IRs submitted under CWA Sections 303(d) and 305(b).

EPA intends to continue to work with tribes to help build capacity for water quality assessment, including sustained data management and reporting activities. Among other capacity building efforts, EPA plans to continue training sessions for tribes on the Assessment and Total Maximum Daily Load Tracking and Implementation System (ATTAINS)<sup>25</sup> to facilitate tribal implementation of CWA Section 303(d) Program functions.

### ***EPA Action on State Lists with Respect to Waters in Indian Country***

EPA-approved state CWA 303(d) lists do not include waters within Indian country,<sup>26</sup> except in unique situations. In the absence of an express demonstration of authority by a state and an EPA finding that the state has authority for those Indian country waters, EPA has excluded Indian country waters from its approval of state CWA 303(d) lists (as well as TMDLs). As a general matter, EPA actions on state lists should continue to exclude Indian country waters using language such as:

EPA's approval of [State]'s CWA 303(d) list extends to all waterbodies on the list except those waters that are within Indian country, as defined in 18 U.S.C. Section 1151. EPA is taking no

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<sup>24</sup>EPA's longstanding position is that the term "reservation" includes both formal reservations (e.g., named reservations established through federal treaties with tribes, federal statutes, or Executive Orders of the President) as well as tribal trust lands that may not be formally designated as reservations, but that qualify as informal reservations. See, e.g., 56 FR 64876, 64881, December 12, 1991.

<sup>25</sup><https://www.epa.gov/waterdata/attains>.

<sup>26</sup>The term Indian country is defined at 18 U.S.C. 1151.

action to approve or disapprove the State's list with respect to those waters. EPA, or eligible Indian tribes, as appropriate, will retain responsibilities under CWA Section 303(d) for those waters.

### ***EPA Consultation with Tribes on EPA Actions on State List Decisions***

The [EPA Policy on Consultation and Coordination with Indian Tribes](#) describes EPA's commitment to consulting on a government-to-government basis with federally recognized tribal governments when EPA actions and decisions may affect tribal interests. Thus, EPA will invite tribes to consult when preparing for upcoming actions on state CWA 303(d) lists<sup>27</sup> that may impact tribes or tribal interests. Tribes may have an interest in consulting on state list submittals (which are based on applicable WQS) even if that interest is not immediately apparent. In determining potential tribal impacts of EPA actions on state lists, EPA will consider an array of factors, including views of tribes, upstream or adjacent Indian country waters, EPA promulgated WQS, approved tribal WQS for Indian reservation waters, and tribal treaty and other rights, both inside and outside of Indian country.

EPA Regions should seek to pursue approaches that allow EPA to continue to meet its statutory 30-day deadline for action on state list submittals. EPA Regions are encouraged to engage tribes early in the process to ensure timely action and meaningful consultation. Some EPA Regions have had success engaging tribes on an informational basis during state public processes; identifying tribes potentially interested in having more formal discussions; encouraging states to engage tribes during list development; working through issues before submittal; and establishing consultation opportunities early in the 30-day period once a list is submitted (scheduled in advance when possible). Scheduling consultation in advance of submittal can help ensure the appropriate tribal decision-making officials are able to attend, anticipate issues, and avoid potential perceptions that consultation is rushed, etc. While EPA encourages tribes and states to collaborate on issues of importance to tribes, EPA is responsible for government-to-government consultation with tribes on Agency actions.

### ***Downstream Standards***

In evaluating attainment of all applicable WQS, it is essential to evaluate whether applicable WQS designed to protect standards in adjacent or downstream waters are attained. Under 40 CFR 131.10(b), “[i]n designating uses of a water body and the appropriate criteria for those uses, the state shall take into consideration the WQS of downstream waters and ensure that its WQS provide for the attainment and maintenance of the WQS of downstream waters.” The EPA interprets the term “downstream” to include both intra- and interstate waters, as well as waters that form a boundary between adjacent jurisdictions, and states, territories, and authorized tribes use various approaches to meet this requirement.<sup>28</sup> States, territories, and authorized tribes “may adopt narrative criteria, numeric criteria or a combination of these criteria” to address 40 CFR 131.10(b).<sup>29</sup>

Some states have met the downstream standards requirement by submitting narrative criteria for protection of downstream standards for EPA approval. As states, territories, and authorized tribes develop their lists and EPA reviews lists, it is essential to evaluate whether applicable provisions

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<sup>27</sup>While this IR memo is intended to address CWA Section 303(d) assessment and listing activities, [EPA Policy on Consultation and Coordination with Indian Tribes](#) applies to TMDL activities as well.

<sup>28</sup>See [Protection of Downstream Waters in Water Quality Standards: Frequently Asked Questions](#).

<sup>29</sup>See *id.*

addressing downstream standards are attained. For example, for waters where there is an applicable narrative standard requiring protection of downstream standards, a state would list those waters when that narrative is not being attained. This activity will likely warrant significant collaboration among states, territories, tribes, and EPA.

### ***Tribal Treaty and other Reserved Rights***

EPA's [Policy on Consultation and Coordination with Indian Tribes: Guidance for Discussing Tribal Treaty Rights](#) recognizes the importance of respecting tribal treaty rights and EPA's obligation to do so. As EPA reviews state CWA 303(d) lists and consults with tribes on list submittals, appropriate consideration must be given to tribal treaty and other reserved rights that exist within and outside of Indian country. Many tribes have rights related to water quality that are reserved by treaty or another instrument that may be relevant to assessments regarding applicable WQS (which include, among other things, waterbody uses and narrative criteria).<sup>30</sup>

### ***Direct Implementation***

EPA's [1984 Indian Policy](#) states that:

“Until Tribal Governments are willing and able to assume full responsibility for delegable programs, the Agency will retain responsibility for managing programs for reservations (unless the State has an express grant of jurisdiction from Congress sufficient to support delegation to the State Government). Where EPA retains such responsibility, the Agency will encourage the Tribe to participate in policy-making and to assume appropriate lesser or partial roles in the management of reservation programs.”

In the 2022 Vision, EPA included a focus area on Tribal Water Quality and Program Development. In the focus area, EPA highlighted that it is considering “the appropriate scope of direct implementation by EPA of CWA Section 303(d) listing and TMDL functions.” When a tribe lacks TAS authorization for CWA Section 303(d), EPA generally is the authority for establishing impaired waters lists in Indian country. Where a tribe has not applied for or received TAS for the CWA Section 303(d) Program and is interested in having EPA determine under CWA Section 303(d) whether CWA WQS are attained for particular waters, EPA will work with the tribe to determine appropriate next steps, consistent with available resources. In instances where EPA establishes lists of impaired waters in Indian country, EPA would work closely with impacted tribes and would provide for full and meaningful public participation in the listing processes.

## **7. CWA Section 303(d) Assessment/Listing for Trash-Related Impairments**

Improperly handled trash, including microplastics, can enter fresh water and marine ecosystems and prevent waterbodies from attaining their designated uses, such as protecting and propagating fish and wildlife, recreation, or protecting public water supplies. The term “trash” is not defined by statute but is commonly used in water management programs to mean any persistent solid material that is manufactured or processed and that has been disposed of or abandoned in the environment. Though

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<sup>30</sup>40 CFR 130.7(b)(3).

typically intended to be contained via waste management systems, trash may end up polluting the water environment because of littering, unintentional spillage, or other means. Trash may enter waterways via various pathways, such as stormwater, wind, and direct dumping.

Although the term “trash” is not explicitly included in the definition of “pollutant” under the CWA, the CWA definition includes “garbage,” “solid waste,” and “industrial, municipal, and agricultural waste,” thereby encompassing trash.<sup>31</sup>

### ***Data Assembly, Evaluation, and Use***

States, territories, and authorized tribes are required under 40 CFR 130.7(b)(5) to assemble and evaluate all existing and readily available water quality-related data and information when determining which waterbodies belong on the state’s, territory’s, or authorized tribe’s CWA 303(d) list.<sup>32</sup> States, territories and authorized tribes must use such data and information in making listing decisions unless they provide a rationale for not doing so. 40 CFR 130.7(b)(6)(iii). EPA will evaluate whether a state, territory, or authorized tribe provides a technical, science-based rationale for decisions not to use data or information.<sup>33</sup>

Existing and readily available water-quality related data and information includes segment-specific ambient monitoring<sup>34</sup> and observations and comments from the public. Data and information should be solicited from a wide variety of entities including, but not limited to, local governments, research institutions, outdoor recreation organizations, citizen monitoring groups, and environmental organizations. For more information on data assembly see, e.g., EPA’s [2006 IR memo](#).

### ***Sources of Data and Information***

Although the presence of trash in waterways is often apparent, it can be challenging to quantify and geographically define especially by water quality programs with competing priorities and limited staff and funding. Trash pollution, however, is a water quality concern throughout the United States and a regular focus of many different entities, including non-governmental organizations, local governments, community groups, state-participatory science collaborations, and federal agencies.<sup>35</sup> The data collected by these entities can be key in successfully determining the location, quantity, and types of trash pollution throughout waterbodies. In line with EPA’s and the federal government’s focus on combatting trash pollution, EPA encourages states, territories, and authorized tribes to (1) actively solicit, collect, and evaluate trash data from external entities and (2) use that data, along with available state data, to make water quality assessment decisions for 303(d) purposes and identify trash-impaired waterbodies, consistent with requirements. States, territories, and tribes should strive to ensure data is inclusive of all communities, including those with EJ concerns.

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<sup>31</sup>CWA Section 502(6).

<sup>32</sup>For further discussion of the phrase “all existing and readily available water quality-related data and information,” consult earlier IR memos, including the [2006 IR memo](#).

<sup>33</sup>See FN 15.

<sup>34</sup>EPA recognizes that states have various levels of monitoring for trash and is not requesting states to prioritize monitoring for trash over other pollutants.

<sup>35</sup><https://www.epa.gov/trash-free-waters>.

Although trash data from external sources may be widespread, it is not always in a format that is immediately suitable for making assessment determinations. States, territories, and authorized tribes can work with these entities to:

- Promote standard protocols for trash monitoring where appropriate.
- Establish and communicate clear guidelines for quality assurance and quality control.
- Share instructions on how to submit data and information for listing purposes.
- Provide transparency on any deadlines for data and information submission.

When feasible, states, territories, and authorized tribes should also conduct outreach to inform entities about the CWA Section 303(d) listing process and how their data can be used to inform decision making. All outreach and communication should be done with equity in mind, using platforms and approaches that make the information accessible to the public.

For more information on data quality considerations see, e.g., EPA's earlier IR memos, including the [2006 IR memo](#).

Appendix E provides examples of potential data and information sources regarding trash.

### ***State Assessment Methods for Trash***

Even when data are useable, readily available, and of sufficient quality, states, territories, and authorized tribes may be unsure how to evaluate and assess the data due to a lack of a defined assessment method. It is important to note that the lack of an assessment methodology does not negate the requirement, in developing the CWA 303(d) list, to assemble and evaluate all existing and readily available water quality-related data and information and use such data and information to determine if all applicable WQS (including numeric and narrative criteria)<sup>36</sup> are attained (unless a rationale is provided for not using particular data and information).<sup>37</sup> Several states have employed methods to monitor and assess for trash.<sup>38</sup>

Appendix E provides examples of state assessment approaches.

### ***Additional Resources for Trash Assessment***

For more tools related to trash assessment and compendiums of trash-related policies and programs visit the [EPA Trash Free Waters website](#).

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<sup>36</sup>For information on narrative water quality criteria related to trash and plastics, see <https://www.epa.gov/wqs-tech/narrative-water-quality-criteria-related-trash-and-plastics>.

<sup>37</sup>EPA will evaluate whether a state, territory, or authorized tribe provides a technical, science-based rationale for decisions not to use data or information. See FN 15.

<sup>38</sup>States, territories, and authorized tribes develop assessment methodologies for preparing their CWA 303(d) lists. These methodologies should be consistent with applicable WQS and sound science. While states, territories, and authorized tribes must provide with their lists a description of the assessment methodology used to develop the lists, EPA does not approve assessment methodologies. Instead, in acting on CWA 303(d) lists, EPA evaluates whether the state, territory, or authorized tribe met listing requirements in determining whether applicable WQS are met.

## 8. CWA Section 303(d) Assessment/Listing for Nutrient-Related Impairments

Addressing nutrient pollution has been a continued priority in the CWA Section 303(d) Program, though nutrients continue to be widespread stressors across rivers and streams, lakes, and coastal areas. Excess nutrients (primarily nitrogen and phosphorus) contribute to harmful algal blooms (HABs), areas of low oxygen known as “dead zones,” and high levels of nitrates that contaminate waters used for recreation, drinking water, wildlife, pets and livestock, and aquatic life—while also damaging the economy in many communities.<sup>39</sup> In a nutrient reduction memo released in 2022,<sup>40</sup> EPA affirms the foundational principles and approaches described in previous Office of Water nutrient policy memos and aims to accelerate progress in controlling excess nutrients entering our nation’s waters moving forward. Included in the memo are strategies and related activities to drive continued reductions in nutrient pollution, including a recommendation to apply EPA’s 2021 recommended numeric nutrient criteria for lakes and reservoirs.<sup>41</sup> The memo also notes that EPA “expects that states will either adopt numeric nutrient criteria into their [WQS] or commit to us[ing] numeric targets to implement applicable narrative criteria statements.”<sup>42</sup>

### *Translating Narrative Nutrient-Related Criteria*

There is flexibility in how numeric targets for nutrient-related parameters can be incorporated into scientifically sound assessment approaches consistent with narrative criteria.<sup>43</sup> For example, numeric targets may be appropriate for specific nutrients and/or response parameters (e.g., dissolved oxygen, chlorophyll *a*) and may be applied independently or in combination. While the specific approaches, parameters, and associated numeric targets may vary depending on the narrative criteria and other state-, territory-, or authorized tribe-specific considerations,<sup>44</sup> it is important that the decision process used to develop and implement the assessment approach is technically sound and consistent with the WQS.<sup>45</sup> The decision process should be clearly described in the state’s, territory’s or authorized tribe’s assessment methodology and account for situations where data for one or more parameters may be absent, in a manner that is consistent with the WQS and sound science.<sup>46</sup>

A state, territory, or authorized tribe may have a variety of applicable narrative criteria that encompass nutrients and nutrient-related impairments. For example, some criteria generally speak to no “substances” that “impair uses,” while others specifically discuss nutrients or nutrient-related responses. There is no one-size-fits all approach in determining which assessment approach is appropriate for each applicable narrative criterion.

Regardless of the approach used in developing the CWA 303(d) list, states, territories, and authorized tribes are required to assemble and evaluate all existing and readily available water quality-related data

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<sup>39</sup>[2022 EPA Nutrient Reduction Memorandum](#).

<sup>40</sup>*Id.*

<sup>41</sup>[Ambient Water Quality Criteria to Address Nutrient Pollution in Lakes and Reservoirs](#).

<sup>42</sup> [2022 EPA Nutrient Reduction Memorandum](#) page 7.

<sup>43</sup>Numeric targets may also be used to determine whether designated uses are attained.

<sup>44</sup>Such considerations include designated uses (e.g., shellfish harvesting) and waterbody classifications (e.g., deep lakes).

<sup>45</sup>[2006 IR memo](#), at 29.

<sup>46</sup>While this resource was developed to support adoption of combined criteria in WQS, many principles in [Guiding Principles on an Optional Approach for Developing and Implementing a Numeric Nutrient Criterion that Integrates Causal and Response Parameters](#) may also support development of numeric targets for interpreting narrative criteria. These principles note, for example, that “[i]f a causal parameter is exceeded and data are unavailable for any applicable response parameters, then the criterion is not met and the waterbody is not meeting its designated uses.” (*Id.* at 3).

and information. They must use such data and information in determining whether all applicable WQS are attained (unless they provide a rationale for not using particular data and information). 40 CFR 130.7(b)(6)(iii). EPA will evaluate whether a state, territory, or authorized tribe provides a technical, science-based rationale for decisions not to use data or information.<sup>47</sup> The types of data and information that may be appropriate to support water quality assessments for narrative criteria are broad, potentially including HABs-related swimming advisories or other HABs-related information, reported fish kills, public complaints about odor or excessive algal growth, wide diel swings in dissolved oxygen concentrations or shifts in a biological community index, among many others. EPA expects that states, territories, and authorized tribes will be inclusive in the types of data and information they use to make attainment determinations as required by the regulations (40 CFR 130.7(b)(5)).

See Appendix F for examples of approaches for assessing whether waters are attaining nutrient-related narrative criteria and/or supporting designated uses. Appendix F also contains resources related to understanding nutrient pollution, translating narrative criteria and deriving targets, and prioritizing nutrient-related TMDLs and restoration plans.

## **9. Identifying the Pollutants Causing or Expected to Cause an Exceedance of Applicable WQS for Waters on the CWA 303(d) List**

CWA Section 303(d) and EPA's implementing regulations require states, territories, and authorized tribes to identify waters not meeting any applicable WQS (CWA 303(d)(1)(A), 40 CFR 130.7(b)(3)) and requiring a TMDL (CWA 303(d) list). Additionally, as part of their CWA 303(d) lists, states, territories, and authorized tribes are required to identify the pollutants causing or expected to cause violations of the applicable WQS (40 CFR 130.7(b)(4)). This includes a pollutant that by itself or in combination with other pollutants causes or is expected to cause violations of applicable WQS. States, territories, and authorized tribes must identify in their lists all pollutants that are known to be causing or are expected to cause the impairment of a segment. Identifying the pollutant(s) causing or expected to cause an exceedance of applicable WQS serves to communicate the state's, territories', or authorized tribe's current understanding of the pollutant(s) for which loads will be established in the subsequent TMDLs, and has value for the CWA Section 303(d) Program, other CWA programs, and the general public. For example, identifying pollutants may inform setting priorities for TMDL development and monitoring plans and provides the public with the most current understanding of water quality concerns and causes.

In some cases, a pollutant that is causing or expected to cause an exceedance of an applicable WQS is the same as the parameter assessed to determine exceedance of that WQS (e.g., copper is the pollutant causing exceedance of a numeric copper criterion). In other cases, a pollutant causing or expected to cause an exceedance of an applicable WQS is different from the parameter(s) assessed to determine exceedance of the WQS and would need to be identified as a pollutant as part of a CWA 303(d) list (e.g., phosphorus may be identified as a pollutant causing or expected to cause an exceedance of a narrative criterion designated to protect aquatic life use). In the latter case, pollutants may be identified through a stressor identification process<sup>48</sup> or, as appropriate, based on relevant thresholds, criteria, and

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<sup>47</sup>See FN 15.

<sup>48</sup>One tool to consider is EPA's Causal Analysis/Diagnosis Decision Information System (CADDIS), which details a Stressor Identification process designed to help scientists and resource managers in the Regions, states, territories, and tribes identify causes of biological impairment in aquatic systems. <https://www.epa.gov/caddis>.

other scientific and site-specific information (e.g., information about the ecological relationship between nitrogen and chlorophyll *a* and relevant knowledge about precipitation events in a particular waterbody).

EPA recognizes there are varied approaches for meeting the requirement to identify the pollutant(s) causing or expecting to cause violations of WQS as part of a CWA 303(d) list. An optional approach for identifying pollutants in ATTAINS is described in Appendix G.

### ***Best Practices for Identifying the Pollutants Causing or Expected to Cause an Impairment***

Included below are some best practices for addressing this requirement:

- **Identify the pollutants causing or expected to cause exceedances of the applicable WQS with as much specificity as the data and analysis allow.** Doing so is informative and valuable to the public, the CWA Section 303(d) Program, and other CWA programs. If, when assembling and evaluating all readily available water quality-related data and information, a state, territory, or authorized tribe is not able to make a reasonable determination as to what a specific pollutant might be, it may identify the pollutant causing or expected to cause the exceedance as a more general term (e.g., “nutrients”) and reassess that determination when additional data and information become available.
- **If the available data and information do not support identification of pollutants causing or expected to cause the exceedance, identify the pollutant as “unknown” and reassess that determination when additional data and information become available.** Subsequent lists provide opportunities to identify pollutants that were previously not known. Prior to establishing a TMDL for such waters, the pollutant causing the impairment must be identified. Additional monitoring may be needed to determine the pollutant causing the exceedance of an applicable WQS. States, territories, and authorized tribes may schedule additional monitoring to support stressor analysis before TMDL development to better inform TMDL priority setting or as part of data collection for TMDL development.
- **Use each IR cycle as an opportunity to update and refine identified pollutants.** Identifying the pollutants causing or expected to cause an exceedance of the applicable WQS is an iterative process, and biennial IRs represent opportunities to update the identification of pollutants to reflect the current understanding. States, territories, and authorized tribes are encouraged to reassess and make refinements to the pollutants causing or expected to cause a WQS exceedance each reporting cycle, as additional data and information may become available, such as through stressor identification analyses and the TMDL development and implementation process.
- **It may be appropriate and necessary for more than one pollutant to be identified.** For example, if a narrative criterion for aquatic life use is exceeded based on a biological assessment, a state, territory, or authorized tribe may find it appropriate to identify multiple pollutants, such as aluminum and sediment, as causing or expected to cause the exceedance.
- **A waterbody impairment may be caused by both non-pollutant pollution and one or more pollutants.** For example, a waterbody’s aquatic life use may be impaired due to both non-pollutant pollution (e.g., flow alteration) and one or more pollutant(s) (e.g., temperature, sediment, and/or nutrients), and the impairment would be included in both Subcategory 4c and Category 5. Inclusion in Category 5 may apply even when a specific pollutant is not identified/is unknown. Impaired “segments must be listed [i.e., in Category 5] unless the state can demonstrate that no pollutant(s) causes or contribute[s] to the impairment.” [2006 IR memo](#), page

60.<sup>49</sup> A demonstration that no pollutant is causing or contributing to the impairment can be a case-by-case showing based on a reasonable justification.

- **Place waterbody/pollutant combinations in Subcategory 4a as TMDLs are completed.** Doing so is informative and valuable to the public, the CWA Section 303(d) Program, and other CWA programs. A waterbody will remain in Category 5 until TMDLs for all impairments have been completed and approved by EPA or the waterbody is determined to be attaining WQS.

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<sup>49</sup>This is based on, among other things, Sections 303(d)(1)(A) (states must identify waters not meeting applicable WQS) and 303(d)(1)(C) (for listed waters, TMDLs must be written for “pollutants”) and 40 CFR § 130.7(b)(4) (the list “shall identify the pollutants causing or expected to cause violations of the applicable water quality standards”).

## Appendix A. Additional Considerations for Non-TMDL Restoration Plans

As emphasized in the [2016 IR memo](#), the statutory and regulatory obligations to develop TMDLs for waters identified on CWA 303(d) lists remain unchanged, and TMDLs will remain the most dominant analytic and informational tool for addressing such waters. However, EPA recognizes that under certain circumstances, there are non-TMDL restoration approaches that may be more immediately beneficial or practicable in achieving WQS than pursuing the TMDL approach in the near-term.

### *Advance Restoration Plans*

An advance restoration plan (ARP) is a plan designed to address impairments for waters that will remain on the CWA 303(d) list (i.e., Category 5) while restoration activities are implemented prior to TMDL development. An ARP is a near-term plan or description of actions, with a schedule and milestones, that is more immediately beneficial or practicable in achieving WQS. Once a state, territory, or authorized tribe decides to pursue an ARP for impaired waters, EPA requests that the state, territory, or authorized tribe provide or reference, either in a separate public notice on the proposed ARP or as part of its IR, a description of the plan. Such descriptions will provide transparency to the public and help facilitate state, territory, or authorized tribe and EPA discussions on whether EPA will include the ARP under the CWA 303(d) Program Vision performance metric.

States, territories, and authorized tribes should consider the following elements in preparing their plan descriptions:<sup>1</sup>

- Identification of specific impaired water segments or waters addressed by the ARP and identification of all sources contributing to the impairment.
- Analysis to support why the state, territory, or authorized tribe believes that the implementation of the ARP is expected to achieve WQS.
- A description of the actions to address all sources (both point and nonpoint sources, as appropriate) necessary to achieve WQS and a schedule of actions designed to meet WQS with clear milestones and dates, which includes interim milestones and target dates with clear deliverables.
- Identification of available funding opportunities to implement the ARP.
- Identification of all parties committed, and/or additional parties needed, to take actions that are expected to meet WQS.
- An estimate or projection of the time when WQS will be met.
- Plans for effectiveness monitoring to demonstrate progress made toward achieving WQS following implementation, identify needed improvement for adaptive management as the project progresses, and evaluate the success of actions and outcomes.

Waters targeted for restoration in an ARP might be assigned a lower priority for TMDL development in an IR during the period that restoration activities are pursued and expected to achieve WQS in the near term. However, recognizing the statutory and regulatory obligations to develop TMDLs for waters on the CWA 303(d) list, states, territories, and authorized tribes should consider how long waters have been on the CWA 303(d) list before pursuing ARPs, meaning that waters that have been listed as impaired for many years may not be the best candidates for new ARP development. In addition, states, territories, and

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<sup>1</sup>See [2016 IR memo](#).

authorized tribes should periodically evaluate ARPs to determine if such plans are still expected to be more immediately beneficial or practicable in achieving WQS than a TMDL approach in the near term. If not, the state, territory, or authorized tribe should re-evaluate whether a higher priority for TMDL development should be assigned in the next IR.

Because waters for which ARPs are pursued still remain on the CWA 303(d) list, EPA will not take action to approve or disapprove a state's, territory's, or authorized tribe's ARP under CWA 303(d). Therefore, as long as waters with an ARP remain on the CWA 303(d) list, EPA's review of the list would not be affected or delayed by near-term development of an ARP. However, when requested by states, territories, or authorized tribes, EPA will coordinate with states, territories, and authorized tribes on ARP development and review ARPs to determine whether it is appropriate to include such plans under the Vision metric. EPA does not expect that all of the activities or controls to carry out an ARP be fully implemented, or that WQS be achieved, before the ARP can be reported as a plan under the Vision metric. However, the ARP does need to clearly demonstrate how WQS will be achieved for EPA to include it under the Vision metric.

### *Distinction between Subcategories 4b and 5r*

#### **Subcategory 4b**

1. As noted in the [2008 IR memo](#), Subcategory 4b includes impaired waters for which a state, territory, or authorized tribe has provided sufficient demonstration that there are other pollution control requirements sufficiently stringent to achieve applicable WQS within a reasonable period of time.
2. These impaired waters are not included in the state's, territory's, or authorized tribe's CWA 303(d) list (i.e., Category 5) consistent with 130.7(b)(1)(iii).
3. EPA reviews and approves the exclusion of such waters from Category 5 consistent with CWA requirements.
4. EPA may review the progress of the 4b demonstration and may determine that a segment that has been placed into Subcategory 4b must go into Category 5 if the circumstances have changed such that the state, territory, or authorized tribe can no longer support its original 4b demonstration.

#### **Subcategory 5r**

1. This includes impaired waters on the CWA 303(d) list (i.e., Category 5) for which a state, territory, or authorized tribe has developed an ARP to meet WQS in a manner that is more immediately beneficial or practicable than a TMDL in the near term.
2. These impaired waters will remain on the CWA 303(d) list until WQS are achieved or a TMDL is established. Taking into account the severity of the pollution and uses, such waters might be assigned lower priority for TMDL development as restoration activities expected to meet WQS are pursued.
3. As long as such waters remain on the CWA 303(d) list, EPA's review of the list would not be affected or delayed by near-term development of an ARP.
4. EPA will consider the adequacy of the state's, territory's, or authorized tribe's description of the ARP in determining whether to include such an approach under the Vision metric.

## Appendix B. Additional Considerations for Environmental Justice

This appendix includes ideas for how states, territories, and authorized tribes can integrate fair treatment and meaningful involvement in their programs' processes to drive water quality outcomes through planning, prioritization, and public engagement. States, territories, and authorized tribes are encouraged to adopt and/or adapt these ideas according to their environmental justice objectives. EPA will collaborate with interested state, territorial, and tribal partners to further incorporate environmental justice opportunities into 303(d) and 305(b) program operations. EPA will look to promote opportunities through case studies, tools, and guidance as appropriate.<sup>1</sup> It should be noted that Section 4 (Participatory Science) of this IR memo also includes ideas relevant to environmental justice but is not exclusive to environmental justice.

### *Planning and Prioritization to Drive Equitable Water Quality Outcomes*

Water quality programs should strive to use their time and resources in a way that leads to equitable water quality outcomes. Thus, the needs of communities with the most significant pollution burden and/or communities with environmental justice concerns<sup>2</sup> should be considered when prioritizing resources for water quality monitoring and TMDL development.

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<sup>1</sup>Additional helpful resources for integrating environmental justice into water quality programs include the [EPA Legal Tools to Advance Environmental Justice](#) and the CWA Section 319 memorandum [Near-term Actions to Support Environmental Justice in the Nonpoint Source Program](#).

<sup>2</sup>According to the [EPA Legal Tools to Advance Environmental Justice](#), communities with environmental justice concerns are communities overburdened by pollution as identified in EO 12898. Those communities may include communities of color, low-income communities, and Indigenous Peoples. In addition, environmental justice analyses involve evaluating social vulnerability factors and environmental factors to identify and address disproportionately high and adverse human health and environmental effects. When establishing the baseline data for communities affected by a program and when analyzing the benefits from projects that have occurred, all relevant data, including race and national origin demographic data, should be considered. However, using race or national origin demographic data as a criterion for distributing benefits, such as grants, contracts or prioritization, can raise unique legal questions. EPA's nondiscrimination regulations, including those implementing Title VI of the Civil Rights Act, prohibit recipients of EPA financial assistance from taking actions in their programs or activities that are intentionally discriminatory and/or have a discriminatory effect based on race, color, national origin (including limited English proficiency), age, disability, or sex. Additionally, there are situations where the Constitution limits whether the government can make decisions on these bases. For example, at EPA, when distributing government benefits, EPA will generally use relevant factors other than race, color or national origin to target resources where they are needed most. Such factors may include pollution overburden (i.e., data showing that communities are disproportionately and adversely impacted by environmental and health harms or risks), proximity to polluting facilities, health statistics (including data related to social determinants of health), life expectancy, education, income, lack of prior investment or grant awards, and size (e.g., small businesses). Some of these factors are included in EPA's EJScreen Supplemental Index and the RPS Tool. In other words: (1) indicators regarding minority status may be used to help analyze which communities are overburdened by pollution before and after making prioritization decisions, and (2) other indicators of social vulnerability in a community may be used when distributing government benefits such as percent low income, percent unemployment, percent limited English speaking, percent less than high school education, and low life expectancy. Recipients should work with their legal counsel to ensure compliance with civil rights laws, including equal protection and Title VI. EPA can provide interested recipients with technical assistance and training to support their compliance with Title VI obligations. Lastly, it is important that there is engagement with the community identified as a community with environmental justice concerns to confirm that they identify in this way.

This process begins by examining where monitoring and TMDL development is occurring.<sup>3</sup> If there is a lack of monitoring and TMDL development occurring in communities with environmental justice concerns, what are the barriers to doing this work and what can be done to remove these barriers? It is exceedingly important that states, territories, and authorized tribes strategically target areas and communities most in need of water quality management.

Environmental justice-related indicators in the Watershed Index Online (WSIO) data library can be applied in the Recovery Potential Screening (RPS) Tool to help prioritize areas for monitoring and TMDL development. More information on these social indicators can be found on the [WSIO website](#). Additionally, states, territories, and authorized tribes could provide opportunities for stakeholders with environmental justice concerns to weigh in on prioritization decisions for monitoring and TMDL development through forums like advisory committees or public meetings.

**Example: Virginia**

Virginia's Department of Environmental Quality (DEQ) has partnered with EPA Region 3 staff to explore and incorporate environmental justice into Virginia's CWA Section 303(d) and Water Quality Monitoring Programs. The goal of the project is to provide an example of how tools, such as EPA's EJScreen and DEQ's VA EJSCREEN+, can be used to evaluate the distribution of state resources used to assess human health risks through water quality programs. Information gained from this project will also help DEQ's Water Planning and Environmental Justice Programs and the Virginia Department of Health inform communities about safe fish consumption. Over the next year, EPA and DEQ intend to create reciprocal analyses that evaluate DEQ fish tissue sampling distribution and effort in potential areas of EJ concern, as these areas are defined by VA's Environmental Justice Act. Future extensions of this project may incorporate other monitoring programs and other EJ mapping tools. Additionally, Virginia DEQ has built environmental justice into its TMDL prioritization. Most of the priority TMDLs spatially overlap with areas that have been identified as having environmental justice concerns and the department currently has three major TMDL projects underway that are associated with subsistence fishing.

***Public Engagement in Development of CWA 303(d) Lists***

There are two key aspects of public engagement in the context of the CWA 303(d) listing process. First, EPA regulations provide that states, territories, and authorized tribes should actively solicit organizations and individuals for water quality-related data and information.<sup>4</sup> Second, states, territories,

<sup>3</sup>CWA 303(d) list submissions must include a priority ranking for all waters on the impaired waters list still requiring a TMDL, taking into account the severity of the pollution and the uses to be made of the waters, and this priority ranking must identify waters targeted for TMDL development in the next two years. 40 CFR 130.7(b)(4). Each state is required to establish TMDLs for the water quality limited segments identified in the impaired waters list, and in accordance with the priority ranking. 40 CFR 130.7(c)(1).

<sup>4</sup>See 40 CFR 130.7(b)(5)(iii). Ideas for decreasing barriers to submitting and using data are discussed in detail in Section 4 (Participatory Science) of this memo.

and authorized tribes are expected to provide opportunities for the public to review and comment on CWA 303(d) lists and to demonstrate how they considered public comments in their final decisions. States, territories, and authorized tribes must describe in their Continuing Planning Processes (CPPs) how they involve the public in the CWA 303(d) listing process (40 CFR 130.7(a)). States, territories, and authorized tribes should consider updating their CPPs with an environmental justice lens.<sup>5</sup> In addition, if EPA were to add waters to a state, territory, or authorized tribes' CWA 303(d) list, EPA would need to publish a notice for public comment, which is another opportunity for engaging the public, including those with environmental justice concerns (see 40 CFR 130.7(d)(2)).

### **Key Opportunities for Public Engagement in Development of CWA 303(d) Lists**

#### ***Contribute Data***

40 CFR 130.7(b)(5) provides that “each state shall assemble and evaluate all existing and readily available water quality-related data and information[,]” including for “waters for which water quality problems have been reported by local, state, or federal agencies; members of the public; or academic institutions. These organizations and groups should be actively solicited for research they may be conducting or reporting.”

#### ***Comment on Draft List***

EPA regulations require states to describe in their Continuing Planning Processes (CPP) the process for involving the public and other stakeholders in the development of the CWA 303(d) list (40 CFR 130.7(a)). EPA expects the state to provide opportunities for public participation in the development of the IR and demonstrate how it considered public comments in its final decisions.

Ensuring a robust public engagement process is one way to enable meaningful involvement. Below is a non-exclusive list of ideas for conducting outreach to meaningfully engage communities with environmental justice concerns throughout the monitoring, assessment, and listing process.

- Coordinate with other environmental quality programs conducting outreach and engagement to take a holistic approach and decrease the burden on the community.
- Identify and build relationships with local leaders to understand how the CWA Sections 303(d) and 305(b) Programs can address communities' environmental justice concerns.
- Maintain a list of communities with environmental justice concerns that could be impacted by 303(d) listing decisions. Notify them in a timely manner about significant decisions and provide outreach and enhanced technical assistance (including translated materials) throughout the 303(d) listing process.<sup>6</sup> EPA's [EJScreen](#) can be a starting point for identifying areas that may have EJ concerns, but the results should be cross checked with local data and information.
- Send letters, emails, publish notices in the local paper, and conduct other outreach suited for the context to solicit feedback on water quality monitoring plans, assessment guidance, and IRs.
- Convene a mix of virtual and in-person public meetings and make recordings available to reach more people.

<sup>5</sup>For further information on public participation and environmental justice, see <https://www.epa.gov/environmentaljustice/model-guidelines-public-participation>.

<sup>6</sup>[EPA Legal Tools to Advance Environmental Justice](#).

- Conduct an analysis of limited English proficiency and research community demographics to help determine the best modes of outreach where 303(d) assessment decisions may occur.
- Employ the IR as a tool for informing people about the status of their waters, building an understanding of CWA Sections 303(d) and 305(b), and helping inform what actions EPA, states, territories, tribes, and communities may want to take to restore or protect waters. Create plain language summaries of assessments and develop user-friendly interactive map viewers like story maps for IRs. EPA's [How's My Waterway](#) can be a resource for sharing monitoring data, assessment status, impairment status, indicators from EJSscreen and more, with the public in an easy-to-use format.

**Example:** New Mexico<sup>7</sup>

The New Mexico Environment Department (NMED) conducts an assessment for English proficiency (Limited English Proficiency or LEP) in the area where the proposed action is likely to impact. This assessment is then built into a more comprehensive evaluation of community demographics to determine the most appropriate forms of communication to the public. These Public Involvement Plans (PIP) use EPA's EJSscreen as part of the basis for what type of outreach is provided to communities and in what languages. As part of the NMED policy, these PIPs are published on the Department's website for feedback. Both LEPs and PIPs are developed for all TMDLs, IRs, and WQS actions. Communication with tribal partners during all TMDL, IR, and WQS actions is coordinated through the NMED Tribal Liaison.

See the Partnerships Goal of the [2022 Vision](#) for more ideas on meaningful engagement.

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<sup>7</sup>More information can be found on the NMED Environmental Justice website. (<https://www.env.nm.gov/general/environmental-justice-in-new-mexico/>), as well as this presentation given to ACWA in 2020: <https://www.acwa-us.org/wp-content/uploads/2020/08/EJ-NMED.pdf>. NMED Tribal Liaison information can be found at: <https://www.env.nm.gov/tribal-liaison/>.

## **Appendix C. Additional Considerations for Participatory Science**

Appendix C lists ideas for decreasing barriers to submitting and using participatory science data and information. States, territories, and authorized tribes should consider coordinating participatory science engagement across their water programs to maximize efforts.

### ***Decrease Barriers to Submitting Data and Information***

Ideas for facilitating the submission of data and information from participatory science efforts include but are not limited to the following:

- Work proactively with participatory science programs to expand participation within communities that are predominantly of color, indigenous, linguistically isolated, and low-income to help increase water quality data in these communities where needed. Organizations already working in the community may be best suited to help coordinate these efforts with the support of the CWA Section 303(d) Program (e.g., faith-based institutions, youth groups, etc.).
- Build an understanding of the monitoring and assessment process and awareness of the opportunity to submit data and information.
- Put the data call in plain language and include languages that are prevalent in communities with environmental justice concerns in your state, territory, or authorized tribe.
- Provide an estimate for when the data call will open so people can plan accordingly. Share the data call with communities with environmental justice concerns including instructions for how to submit data and information.
- Decrease the burden on the individual or entity submitting data as much as possible. Available phone/web applications may be one way to facilitate ease of data submission with the understanding that training and quality control are still necessary.

### ***Decrease Barriers to Using Participatory Science Data and Information***

Approaches for enabling the use of participatory science data and information include but are not limited to the following:

- Establish clear guidelines for the quality-control of data and information, and communicate these guidelines in the public call for data.
- Develop quality assurance and quality control (QA/QC) measures that enable all scientifically-sound data to be assessed; if needed, reach out to whoever submitted the data/information to work through quality concerns before deciding to exclude it from listing decisions.
- Provide in list submissions a scientific, technical rationale for any decision to not use data/information that does not align with state QA/QC procedures.
- Identify what data and information was used for listing decisions and explain why such data and information was used to increase transparency.
- Work proactively with community groups, universities, and other entities to help make sure their data and information will be usable.
- Ensure that water quality testimonial information and photographs submitted from communities are evaluated, and used, unless a scientific, technical rationale not to do so is provided. More information on QA/QC procedures for this type of information can be found in the [2014 IR memo](#) (see pages 12-13 regarding testimonials and photographs). Additional information

regarding data quality, quantity, and representativeness considerations for making CWA Section 303(d) listing decisions is available in previous IR memoranda, including the [2006 IR memo](#).

**Example: Wisconsin<sup>1</sup>**

Volunteer monitoring is a key part of the statewide monitoring strategy for the Wisconsin Department of Natural Resources (DNR). The State has multiple levels of volunteer monitoring from basic to assisting with unique research projects. The mid-level volunteers use the same data collection methods as Wisconsin DNR staff and volunteer-collected data goes through the same quality assurance process. Data collected from volunteers can be used to ground truth satellite imagery, allowing the State to assess many more waters. Wisconsin DNR provides volunteers with interactive workshops and entertaining training materials to help recruit excited volunteers. These opportunities emphasize the importance of keeping volunteers involved in the process and feeling appreciated for their service, while providing outlets for their feedback.

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<sup>1</sup>Visit Wisconsin DNR's stream and lake monitoring program webpages for more information: <https://wateractionvolunteers.org/>, <https://dnr.wisconsin.gov/topic/lakes/clmn>.

## Appendix D. Additional Considerations for Climate Change

EPA offers the following observations to help inform states, territories, and authorized tribes as they consider climate change factors in carrying out CWA Section 303(d) assessment and listing responsibilities for the 2024 cycle and future cycles:

- **Attainment of WQS.** The CWA and EPA’s regulations require states, territories, and authorized tribes to identify water-quality limited segments still requiring TMDLs where pollution controls are not stringent enough to meet applicable WQS. Applicable WQS include designated uses, water quality criteria (numeric and narrative), and antidegradation requirements. Climate change-related variables can impact attainment of WQS, including an array of water quality criteria and uses. For example, climate change can impact attainment of criteria for particular pollutants, such as temperature, nutrients, and sediment. It can also impact attainment of criteria for certain water quality conditions, such as dissolved oxygen, and harmful algal blooms/algal growth. Climate change can also impact the toxicity of pollutants (e.g., temperature impact on ammonia toxicity<sup>1</sup>). Importantly, oceanic uptake of CO<sub>2</sub> emissions contributing to ocean acidification, as well as climate-related stressors (e.g., excess temperature, hypoxia) and pollutants such as nutrients can impact criteria attainment for pH and other aquatic life criteria.<sup>2</sup> In addition, climate change is impacting attainment of multiple water quality uses, including drinking water, recreation, traditional/cultural, navigation, and aquatic life.<sup>3</sup>
- **Vulnerable Communities/Populations.** Certain communities and populations are uniquely and disproportionately vulnerable to climate change impacts due to a variety of factors, including higher pollution burdens, greater exposure to environmental contaminants, lack of financial and technical resources, limited access to quality health care, and other issues. Some climate change impacts may also be more likely to be experienced in certain regions and localities. States, territories, and authorized tribes should actively solicit data and information from communities and take steps to help communities provide data and information that are informed and usable for listing purposes. Along with monitoring data, information to be assembled may include water-quality related testimonials/stories and local knowledge from communities. See further discussion in Section 3 (Environmental Justice) of this IR memo. Attention should be paid to developing, analyzing, and using data and information that improves understanding of compounding stressors and their impacts on communities’ public health and resources.
- **Coordination with Monitoring Programs.** CWA Section 303(d) Programs can coordinate with their monitoring programs to evaluate and promote monitoring approaches that help develop data and information that account for climate change impacts to water quality. For example, some states have indicated that effective monitoring can be improved to account for a higher variability in flows requiring more strategic placement of monitoring equipment, more robust or durable monitoring equipment, collection of more data/sampling events, and more complex/robust statistical assessment packages to evaluate data.<sup>4</sup> States, territories and tribes have also identified the value of multiple other factors in developing monitoring strategies for evaluating water quality impacts from climate change, including cross-jurisdictional

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<sup>1</sup>[Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater \(2013\)](#).

<sup>2</sup>See [Integrated Reporting and Listing Decisions Related to Ocean Acidification](#).

<sup>3</sup>See [EPA Office of Water 2022-2026 Climate Adaptation Implementation Plan](#); A review of climate change effects on practices for mitigating water quality impacts. *Journal of Water and Climate Change* (2022) 13 (4): 1684–1705. <https://doi.org/10.2166/wcc.2022.363>.

<sup>4</sup><https://www.eli.org/sites/default/files/files-pdf/S751%20-%20Kirsch.pdf>.

coordination, monitoring of biology in rivers and streams to distinguish between changes due to climate change as opposed to other local watershed disturbances, and investigating the relationship between warming, precipitation, and HABs through targeted HABs surveys and sampling.

- **Assembling Data and Information.** States, territories, and authorized tribes are required under 40 CFR 130.7(b)(5) to assemble and evaluate all existing and readily available water quality-related data and information when developing their CWA 303(d) lists.<sup>5</sup> They must use such data and information in determining whether WQS are attained (unless they provide a rationale for not using particular data and information). 40 CFR 130.7(b)(6)(iii). EPA will evaluate whether a state, territory, or authorized tribe provides a technical, science-based rationale for decisions not to use data or information.<sup>6</sup> Climate change factors can inform appropriate approaches for assembling all available data and information. For example, if there is reason to expect impacts from variations in rainfall, runoff, water temperature, or other climatic effects on pollutant loading conditions, consider whether there are available data and information that result from monitoring strategies, water quality planning activities, or other approaches that account for these impacts and more effectively represent current pollutant loading conditions. In addition, to seek to account for climate change impacts on impairment, it is important to include cross-jurisdictional sources, appropriate water quantity data, HABs surveys, advisories and sampling, and other data and information particularly relevant to climate change impacts on impairment.
- **Evaluating/Weighting Data and Information.** In evaluating available data and information, consider potential impacts of climate change, including increased water temperatures, changing precipitation patterns, increased storm intensity and frequency, increased droughts, sea level rise, etc. For example, certain data may be more valuable (i.e., should be weighed more heavily) for assessment of a waterbody depending on seasonal pollutant loading patterns. Appropriate weighting of data sets from multiple time scales can help to account for climate change factors in identifying impairments. In addition, appropriate weighting/evaluation of water quantity data as it relates to water quality can help account for climate change impacts on attainment status.
- **Appropriate Use of Subcategory 4c.** Climate change is exacerbating the water quality effects of hydrologic and habitat alteration and EPA continues to encourage states, territories, and authorized tribes to more fully monitor, assess, and report the impacts of all types of pollution,<sup>7</sup> thereby improving the opportunities for increasing resilience and restoration of these waters.<sup>8</sup> Where a water is not meeting applicable WQS due to non-pollutant pollution – for example anthropogenic hydrologic and habitat alteration – the water/non-pollutant impairment may be placed in IR Subcategory 4c. However, as noted above, climate change is also impacting pollutant loadings, e.g., temperature and sediment, in numerous ways. As described in Section 9 (Identifying the Pollutants Causing or Expected to Cause an Exceedance of Applicable WQS for

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<sup>5</sup>As a reminder, while states, territories and authorized tribes may use rotating basin approaches for their monitoring, “[s]tates are expected to actively solicit data and information on a State-wide basis for all waters . . . . Additionally, EPA expects that the State will consider all existing and readily available data and information during the development of their [lists], regardless of where in the State the data and information were generated.” [2004 IR memo](#), page 27. In other words, while monitoring resources may be marshalled on a rotating basin basis, EPA expects that a state using a rotating basin approach will assemble and evaluate data and information from outside of the target basin and continue to submit a 303(d) list/IR on a biennial basis that reports on the water quality status of all waters in the state. See, e.g., [2010 IR memo](#), page 4.

<sup>6</sup>See FN 15 in main body of this memo.

<sup>7</sup>Pollution is defined under the CWA as “the man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of water” (Section 502(19)).

<sup>8</sup>See [2016 IR memo](#) at 13.

Waters on the CWA 303(d) List) of this IR memo, a water/impairment may appropriately be in both Subcategory 4c and Category 5.<sup>9</sup>

- **Identifying Priorities for TMDL Development.** As states, territories, and authorized tribes identify priorities for TMDL development, they can consider whether there are impairments that may be particularly sensitive to changing climate conditions. [The RPS Tool](#) and [WSIO Indicator Library](#) are tools that include indicators for projected hydrologic changes, precipitation, and temperature that can be used to support prioritization of impaired waters for TMDL development. The inherent variability and uncertainty surrounding climate change and assessment of waterbodies can pose a challenge when attempting to account for those impacts and set priorities for TMDL development. Modeling for sensitivity analysis, especially if models are already developed for a waterbody, can also be helpful to manage uncertainty and determine pollutants/waterbodies to prioritize for TMDL development. For example, where multiple pollutants drive an impairment, sensitivity analysis can be used to determine which driver may have the largest impact on the system and inform TMDL prioritization. Depending on specific regional or geographic considerations (e.g., extreme conditions, multiple potential scenarios, and projecting future conditions vs. determining real impacts to-date), particular modeling approaches may be more appropriate than others. While model development can be resource intensive, if a model has previously been developed for a waterbody it can be a useful tool for projecting and assessing the degree of impact from certain pollutants. EPA recognizes that in some circumstances, due to a lack of sufficient data or significant uncertainties, it may be particularly challenging to determine suitable approaches for addressing an impairment, particularly where a state, territory, or authorized tribe believes that climate change effects may have an important impact on pollutants and impairments. In such cases states, territories, and authorized tribes may consider these challenges when setting their priorities for TMDL development as further information is developed.

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<sup>9</sup>See also [2016 IR memo](#) at 13-16.

## Appendix E. Additional Considerations regarding CWA Section 303(d) Assessment/Listing for Trash-Related Impairments

### *Examples of Potential Data Sources for Trash*

Examples of potential data sources are provided below, keeping in mind that entities may need guidance on how best to develop and submit data, as discussed in the main body of the memo.

- **Non-Governmental Organization Efforts.** Trash cleanups through partnerships with nonprofit organizations are prevalent across states and territories. They have the potential to provide readily available data on the volume, location, and type of trash in waterbodies. Many trash cleanup events emphasize collecting and consolidating quantitative data.
  - **Example: Alice Ferguson Foundation Potomac River Watershed Cleanup.** The Potomac River Watershed Cleanup, supported by the Alice Ferguson Foundation, is a regional trash cleanup event across Maryland, Virginia, the District of Columbia, West Virginia, and Pennsylvania. Cleanup participants are provided with training and are encouraged to submit data into a portal on the location, type, and quantity of trash collected during each event. The initiative notes that data “helps environmental agencies track progress toward removing trash from the region’s waterways and informs policy to further regulate the sources of trash.”<sup>1</sup>
- **State Participatory Science Programs.** Several states utilize participatory science collaborations to gather data on the volume, location, and type of trash collected. Partnerships like this can provide a direct way to gather data in a suitable format.
  - **Example: Arizona Department of Environmental Quality (ADEQ).** The Arizona Water Watch trash cleanup program provides training, field forms to record data, and data portals for participatory science volunteers to collect and submit information on trash pollution in and around waterways. Volunteers can do basic training or participate in a more rigorous training for more comprehensive sampling. For both of these methods, ADEQ provides quality assurance and quality control for listing purposes.<sup>2</sup>
  - **Example: Anacostia Green Boats.** Anacostia Green Boats is a partnership between the District of Columbia Department of Energy and Environment (DOEE) and Living Classrooms that utilizes a participatory science program for trash cleanups, providing information on the volume, location, and types of trash collected.<sup>3</sup>
- **Local Government.** Local governments often install trash capture devices, organize local cleanups, and partner with NGOs and other organizations to clean up trash and track its presence. Some local governments use standard protocols for quantifying and geographically defining trash, like the Escaped Trash Assessment Protocol (ETAP)<sup>4</sup> developed by EPA’s Trash Free

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<sup>1</sup><https://www.fergusonfoundation.org/get-involved/>.

<sup>2</sup><https://azdeq.gov/azww/trash>.

<sup>3</sup><https://www.kingmanisland.com/green-boats>.

<sup>4</sup>EPA “developed ETAP in order to align stakeholders collecting litter data by providing one standardized method designed to address existing data gaps. ETAP provides a consistent methodology that can be used . . . in all accessible environments from urban to rural, terrestrial to aquatic, and inland to coastal. The data can help users identify dry and wet weather trash distribution, longitudinal variability within watersheds, and variability across watersheds by comparing various site

Waters Program. Availability of ETAP results can prove especially useful, as standardized, intensive protocols like ETAP are time and cost intensive and therefore may not always be practical for states, territories, or authorized tribes to regularly collect. Some local governments use the information to advocate for action and make the data available for external stakeholders.

- **Example: City of Mobile, Alabama.** Mobile Alabama’s OneMobile dashboard shows “data about the litter collected by members of the Community, the City of Mobile Public Services Litter Crews and the Osprey Initiative.” The dashboard includes data collected using ETAP.<sup>5</sup>
- **Federal Agency Data Collection Efforts.** Several federal agencies also work on trash-related issues and can be sources of data not only from the federal agencies, but also from their partners.
  - **Example: NOAA’s Marine Debris Monitoring and Assessment Project (MDMAP).** MDMAP engages NOAA partners and volunteers to survey and record the amount and types of marine debris on shorelines. The project aims to answer several questions, including the extent of marine debris, how marine debris is changing over time, and the types of debris in specific locations.<sup>6</sup>

### *Example State Assessment Methods for Trash*

Below are examples for assessing whether waters are attaining WQS related to trash. These examples are intended to demonstrate the flexibility in approaches; their inclusion here is not intended to constitute an endorsement of a particular approach. Likewise, the appropriateness of a particular method will depend on the variety of fact-specific circumstances that may be present.

- **California**
  - California Narrative Criteria: Trash shall not be present in inland surface waters, enclosed bays, estuaries, and along shorelines or adjacent areas in amounts that adversely affect beneficial uses or cause nuisance.<sup>7</sup> Trash shall not be present in ocean waters, along shorelines or adjacent areas in amounts that adversely affect beneficial uses or cause nuisance.<sup>8</sup>
  - California Assessment Approach: California uses Rapid Trash Assessment (RTA), a methodology developed by the California Regional Water Quality Control Board, San Francisco Bay Region, to systematically examine the amount and types of trash in stream channels, the effects of trash on beneficial uses, and potential sources of trash. RTA includes monitoring design, site definition, data collection, scoring and quality assurance, and generates site-specific scores in six scoring categories, including level of trash, actual number of trash items found, threat to aquatic life, threat to human health, illegal dumping and littering, and accumulation of trash.<sup>9</sup> It is also used in California’s Surface Water Ambient Monitoring Program (SWAMP) and EPA's Trash Free Waters Program.

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assessments within a region.” [U.S. EPA Escaped Trash Assessment Protocol Reference Manual](#). This protocol will be updated as needed due to innovation in packaging and/or the influx of trash tracking data. For more information see:

<https://www.epa.gov/trash-free-waters/epas-escaped-trash-assessment-protocol-etap>.

<sup>5</sup><https://www.cityofmobile.org/litter/>.

<sup>6</sup><https://marinedebris.noaa.gov/our-work/monitoring>.

<sup>7</sup><https://www.epa.gov/sites/default/files/2016-02/documents/ca-amendment-appendix.pdf>.

<sup>8</sup><https://www.epa.gov/sites/default/files/2017-01/documents/ca-cop2012.pdf>.

<sup>9</sup><https://www.waterboards.ca.gov/sanfranciscobay/docs/swamptrashreport.pdf>.

There are two evaluation guidelines for trash that can be used for 100-foot sections of stream or shoreline:

1. If the stream, bank surfaces, and immediate riparian zone contain substantial levels of litter and debris (>100 pieces), the level of trash is in the poor condition category (scores 0-5), and therefore non-contact water recreation (REC-2) beneficial use is not supported.
2. If the amount of transportable, persistent, buoyant litter or settleable grass or metal is >50 pieces, the threat to aquatic life is in the poor condition category (scores 0-5), and therefore wildlife habitat (WILD) beneficial use is not supported.<sup>10</sup>

The assessed waterbody is considered impaired by trash if there were exceedances of the evaluation guidelines in more than one location or on more than one date.

- Example: San Pablo Creek: Results from RTA showed that the level of trash was in the poor condition category (scores 0-5) in two separate locations and on two different dates. Therefore, San Pablo Creek was considered impaired by trash and its REC-2 beneficial use was not supported.<sup>11</sup>
- For information on TMDLs developed for trash in California visit the California TMDL program website.<sup>12</sup>

- **Massachusetts**

- Massachusetts Surface Water Quality Standards (314 CMR 4.00) Narrative Criteria: Solids. These waters shall be free from floating, suspended and settleable solids in concentrations and combinations that would impair any use assigned to this Class, that would cause aesthetically objectionable conditions, or that would impair the benthic biota or degrade the chemical composition of the bottom.
- Aesthetics. All surface waters shall be free from pollutants in concentrations or combinations that settle to form objectionable deposits; float as debris, scum or other matter to form nuisances; produce objectionable odor, color, taste or turbidity; or produce undesirable or nuisance species of aquatic life.<sup>13</sup>
- Massachusetts Assessment Approach: As described in the Massachusetts 2022 Consolidated Assessment and Listing Methodology (CALM) Guidance Manual, MassDEP field staff look for “aesthetically objectionable and abnormal conditions” at river, lake, and estuary at sampling stations in order to make an evaluation “regarding the aesthetic quality of a waterbody” using both the magnitude and frequency of observations noted during field surveys. This approach is used to evaluate “nutrient enrichment (e.g., algal growth/blooms) or other aesthetically objectionable conditions (e.g., deposits, sheens, odors, unnatural color, turbidity (clarity), trash/debris, etc.)” The Aesthetics Use is assumed to be supported unless field notes indicate otherwise. Gross level aesthetic impairments are identified as not supporting and more data are collected when aesthetic impairment is not as clear. Where persistent and/or other more serious indicators of aesthetic degradation are present, a waterbody is assessed as impaired. Additional guidelines for interpreting aesthetic observations are provided in MA’s 2022 CALM manual.”<sup>14</sup>

<sup>10</sup>[https://www.waterboards.ca.gov/water\\_issues/programs/tmdl/2014\\_16state\\_ir\\_reports/01823.shtml#35094](https://www.waterboards.ca.gov/water_issues/programs/tmdl/2014_16state_ir_reports/01823.shtml#35094).

<sup>11</sup>[https://www.waterboards.ca.gov/water\\_issues/programs/tmdl/2010state\\_ir\\_reports/00703.shtml#7657](https://www.waterboards.ca.gov/water_issues/programs/tmdl/2010state_ir_reports/00703.shtml#7657).

<sup>12</sup>[https://www.waterboards.ca.gov/water\\_issues/programs/tmdl/index.html](https://www.waterboards.ca.gov/water_issues/programs/tmdl/index.html).

<sup>13</sup><https://www.epa.gov/system/files/documents/2022-12/mawqs-2022.pdf>.

<sup>14</sup><https://www.mass.gov/doc/2022-consolidated-assessment-and-listing-methodology-guidance/download>.

States, territories, and authorized tribes may also consider adapting assessment methods used for other pollutants, such as appropriately designed User Perception Surveys, which can be a helpful tool for translating narrative criteria. Additionally, states, territories, and authorized tribes may consider using standardized protocols for collecting information on trash when feasible. As mentioned previously, protocols such as ETAP provide practitioners and citizen scientists with a comprehensive and rigorous method for quantifying trash loadings.

## Appendix F. Additional Considerations regarding CWA Section 303(d) Assessment/Listing for Nutrient-Related Impairments

This appendix includes examples of assessment approaches used to assess whether waters are attaining nutrient-related narrative criteria and/or supporting designated uses,<sup>1</sup> and also includes select examples of EPA nutrient-related resources.

### *State Examples of CWA Section 303(d) Assessment Approaches for Nutrient-Related Narrative Criteria*

Below are examples for assessing whether waters are attaining nutrient-related narrative criteria and/or supporting designated uses. These examples are intended to demonstrate the flexibility in approaches; their inclusion here is not intended to constitute an endorsement of a particular approach. Likewise, the appropriateness of a particular method will depend on the variety of fact-specific circumstances that may be present.

- **New Mexico**
  - Waterbody Type: Perennial streams and select river segments
  - New Mexico Narrative Criteria (20.6.4.13 NMAC): (E) “Plant nutrients from other than natural causes shall not be present in concentrations which will produce undesirable aquatic life or result in a dominance of nuisance species in surface waters of the state.”<sup>2</sup>
  - Designated Use: all
  - New Mexico Assessment Approach: A protocol was developed for perennial streams and selected river segments to support the above narrative standard as described in the Appendix C of the Comprehensive Assessment and Listing Methodology (CALM): Procedures for Assessing Water Quality Standards Attainment for the State of New Mexico CWA §303(d)/§305(b) Integrated Report, August 8, 2021.<sup>3</sup> A separate nutrient assessment approach for lakes and reservoirs can also be found in Appendix D of that same document.<sup>4</sup>

The assessment method includes a two-step process after available site data are collated and outliers removed as described in the protocol. The first step considers causal indicators alone (TN and TP). Specifically, TN and TP site medians are compared to the applicable assessment thresholds by site class. If enrichment is indicated, the assessor

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<sup>1</sup>Approaches for assessing whether waters are attaining numeric nutrient criteria may also serve as helpful examples. For instance, see Minnesota’s eutrophication criteria for lakes, reservoirs, rivers, and streams (<https://www.epa.gov/sites/default/files/2014-12/documents/mnwqs-chapter-7050.pdf>) and the associated assessment approach (<https://www.pca.state.mn.us/sites/default/files/wq-iw1-04l.pdf>). When assessing lakes and reservoirs, Minnesota utilizes a combined approach assessing a causative variable (total phosphorus) and a response variable (e.g., chlorophyll-a or Secchi Disk depth), against ecoregion-based lake eutrophication numeric criteria. Impairment determinations using Minnesota’s river eutrophication standards involve the consideration of a causative variable (total phosphorus) and a response variable (chlorophyll-a (seston), five-day biochemical oxygen demand, dissolved oxygen flux, pH and/or periphyton).

<sup>2</sup>[https://www.env.nm.gov/surface-water-quality/wp-content/uploads/sites/18/2022/11/2022-09-24-SRCA-NMAC\\_Integrated\\_Rule.pdf](https://www.env.nm.gov/surface-water-quality/wp-content/uploads/sites/18/2022/11/2022-09-24-SRCA-NMAC_Integrated_Rule.pdf) and <https://www.epa.gov/sites/default/files/2014-12/documents/nmwqs.pdf>.

<sup>3</sup>[https://www.env.nm.gov/surface-water-quality/wp-content/uploads/sites/18/2021/09/CALM\\_2021-FINAL\\_with\\_appendices.pdf](https://www.env.nm.gov/surface-water-quality/wp-content/uploads/sites/18/2021/09/CALM_2021-FINAL_with_appendices.pdf).

<sup>4</sup>*Id.*

then determines if there is a response in either the assessed Assessment Unit (AU) or downstream by comparing available daily delta DO data to the applicable threshold. If a delta DO response is documented, the AU is noted as Not Supporting. If not, it is noted as Fully Supporting (prioritized for additional sampling as resources allow) because the high nutrients do not appear to result in either a local or downstream effect. Considering both the causal indicators (TN and TP) and the downstream AU responses is necessary because the displacement of effects from excessive nutrient input is a common and challenging problem with nutrient impairment determinations. For example, excessive point or non-point nutrient inputs that result in TN or TP levels well above their respective thresholds in an upstream AU may not result in excessive algal growth and concurrent DO impacts in that particular stream reach due to substrate type or shading (e.g., a sandy stream bed that is not conducive to algal growth). In these cases, a downstream stream reach with a more conducive substrate or exposure can experience excessive vegetative growth that will take up the nutrients and result in low in-stream TN and TP values.

If an AU is determined to be impaired due to excessive nutrients following the above procedures, it will be listed as not meeting the nutrient narrative criteria. If only response variables with water quality criteria are identified as impaired, the AU will be determined to be not meeting the applicable response variable criteria.

- **Ohio**

- Waterbody Type: Lake Erie site-specific methodology for recreation assessment of algae
- Designated Use: Recreation
- Ohio Narrative Criteria (OAC 3745-1-04):<sup>5</sup> states that “[t]he following general water quality criteria shall apply to all surface waters of the state including mixing zones. To every extent practical and possible as determined by the director, these waters shall be as follows:
  - (A) Free from suspended solids or other substances that enter the waters as a result of human activity and that will settle to form putrescent or otherwise objectionable sludge deposits, or that will adversely affect aquatic life.
  - (B) Free from floating debris, oil, scum and other floating materials entering the waters as a result of human activity in amounts sufficient to be unsightly or cause degradation.
  - (C) Free from materials entering the waters as a result of human activity producing color, odor or other conditions in such a degree as to create a nuisance.
  - (D) Free from substances entering the waters as a result of human activity in concentrations that are toxic or harmful to human, animal or aquatic life or are rapidly lethal in the mixing zone.
  - (E) Free from nutrients entering the waters as a result of human activity in concentrations that create nuisance growths of aquatic weeds and algae.”
- Assessment Approach: The narrative criteria sections D and E (above) provide the basis for describing algal bloom targets for Lake Erie assessment units. Complete details on this method are provided in the *Ohio 2022 Integrated Water Quality Monitoring and*

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<sup>5</sup>Ohio Administrative Code, (OAC 3745-1-04), <https://codes.ohio.gov/ohio-administrative-code/rule-3745-1-04> and [https://www.epa.gov/sites/default/files/2015-09/documents/oh\\_34751\\_1\\_to\\_40.pdf](https://www.epa.gov/sites/default/files/2015-09/documents/oh_34751_1_to_40.pdf).

*Assessment Report*, Section F<sup>6</sup> and have been published in the scientific journal *Harmful Algae* (Davis *et al.*, 2019<sup>7</sup>). Ohio recognizes the importance of phosphorus as the limiting nutrient that drives algal productivity in Lake Erie. Because of the dynamic nature of algal growth temporally and the movement of algal blooms in Lake Erie, Ohio employs a different approach from its nutrient monitoring and assessment efforts in surface waters of the state. Ohio assembled a group of academic, state, and federal scientists to develop a data-driven assessment framework that quantified bloom size and intensity indicators, allowed for seasonal variability, and provided a clear set of thresholds. This methodology also leveraged existing monitoring data and published studies on the algal (cyanobacterial) bloom dynamics in Lake Erie.

Ohio developed a remote sensing assessment approach using satellite imagery data collected by the Ocean Land Colour Instrument on the Sentinel-3 satellite platform. Data processing is conducted by National Oceanic and Atmospheric Administration, National Centers for Coastal Ocean Science (NOAA-NCCOS), which also provide forecasts for seasonal blooms in Lake Erie.<sup>8</sup> Moreover, historical satellite data were used to establish threshold targets for size and intensity of algal blooms in this assessment and were also used to develop phosphorus loading goals for western Lake Erie through Annex 4 of the Great Lakes Water Quality Agreement (GLWQA).

Ohio's satellite-derived recreation assessment methodology for algae is used for multiple assessment units in Lake Erie, but the following example focuses on the specific metric for the Western Basin Open Waters. The metric considers concentration, extent, and duration of the algal bloom to determine an impaired or not impaired (supporting beneficial use) condition, which are critical considerations with temporally and spatially variable algal blooms. Ohio established an algae (cyanobacteria) cell count level (e.g., 20,000 cells/mL) for satellite-derived data. This level is informed by the resolution of the satellite sensors, bloom dynamics (diurnal movement, buoyancy, and potential for scum formation), and the relationship between density and toxicity (i.e., microcystin concentration) of *Microcystis* dominated blooms in western Lake Erie. The threshold for extent of the bloom (30 percent coverage for Western Basin Open Waters assessment unit) is based on the satellite-based assessment of past blooms (since 2002) and is consistent with the threshold targets (i.e., bloom conditions in 2004 and 2012) established under Annex 4 of the GLWQA. These components are combined to assess bloom conditions for an individual year and consider interannual variation during a rolling six-year period for determining impairment. Complete details for each assessment unit are available in *Ohio 2022 Integrated Water Quality Monitoring and Assessment Report*, Section F.<sup>9</sup>

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<sup>6</sup>Ohio EPA, 2022 Methodology, Section F, (<https://epa.ohio.gov/static/Portals/35/tmdl/2022intreport/Section-F.pdf>).

<sup>7</sup>Davis, T.W., R. Stumpf, G.S. Bullerjahn, R.M.L. McKay, J.D. Chaffin, T.B. Bridgeman, and C. Winslow. 2019. "Science meets policy: A framework for determining impairment designation criteria for large waterbodies affected by cyanobacterial harmful algal blooms". *Harmful Algae*. <https://doi.org/10.1016/j.hal.2018.11.016>.

<sup>8</sup>NOAA-NCCOS, Lake Erie Harmful Algal Bloom Forecast, <https://coastalscience.noaa.gov/science-areas/stressor-impacts-mitigation/hab-forecasts/lake-erie/>.

<sup>9</sup>Ohio EPA, 2022 Methodology, Section F, (<https://epa.ohio.gov/static/Portals/35/tmdl/2022intreport/Section-F.pdf>).

## Resources

Below are select examples of EPA resources<sup>10</sup> related to understanding nutrient pollution, translating narrative criteria and deriving targets, and prioritizing nutrient-related TMDLs and restoration plans. These may be helpful for states, territories, and authorized tribes interested in developing new nutrient assessment approaches, and for those wanting to update their existing approaches to reflect the latest science.

- [Development of User Perception Surveys to Protect Water Quality from Nutrient Pollution: A Primer on Common Practices and Insights](#): A resource for development of numeric nutrient criteria or translation of narrative criteria into numeric values as part of assessment approaches, released in 2021. **Uses:** aesthetic, recreational; **waterbody types:** all.
- **304(a) Recommended Water Quality Criteria:** While these recommendations are intended to support development of criteria, the science, models, and analyses behind the recommendations may support interpretation of narrative nutrient criteria.
  - [304\(a\) Recommended Water Quality Criteria to Address Nutrient Pollution in Lakes and Reservoirs](#): **Uses:** aquatic life use, recreational use, drinking water source; **waterbody types:** lakes, reservoirs.
  - [304\(a\) Recommended Human Health Recreational Ambient Water Quality Criteria or Swimming Advisories for microcystins and cylindrospermopsin](#): **Uses:** recreational designated use; **waterbody types:** freshwaters.
- [Nutrient Scientific Technical Exchange Partnership & Support \(N-STEPS\) Online](#): An online resource library developed by the N-STEPS Program, which contains information relevant to development of numeric nutrient criteria. Some of the technical resources may support interpretation of narrative nutrient criteria. **Uses:** all; **waterbody types:** all.
- [Watershed Index Online \(WSIO\) Indicator Library and Recovery Potential Screening \(RPS\) Tool](#): WSIO is a national library of attributes for evaluating watershed characteristics anywhere in the conterminous US and includes nutrient-related indicators. RPS Tools, which are available for all states and territories and include many WSIO indicators, provide a flexible, user-driven approach for comparing watersheds to inform management decisions, such as prioritizing impaired waters for TMDL development. WSIO indicators and RPS Tools may be helpful for practitioners interested in prioritizing management decisions to address nutrient pollution. **Uses:** all; **waterbody types:** all (note not all indicators are available for all geographic areas of the US).
- [Guiding Principles on an Optional Approach for Developing and Implementing a Numeric Nutrient Criterion that Integrates Causal and Response Parameters](#): A resource for development of numeric nutrient criteria that integrate causal (nitrogen and phosphorus) and response parameters into one WQS. Principles may also be informative for translation of narrative criteria as part of assessment approaches. **Uses:** all; **waterbody types:** all.

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<sup>10</sup>Additional resources regarding nutrient-related 304(a) water quality criteria and nutrient criteria development can be found at <https://www.epa.gov/nutrient-policy-data/epas-recommended-ambient-water-quality-criteria-nutrients> and <https://www.epa.gov/nutrient-policy-data/nutrient-criteria-development-documents>.

## Appendix G. An Optional Approach for Identifying Pollutants Causing or Expected to Cause an Exceedance of Applicable WQS in ATTAINS

In cases where the pollutant causing or expected to cause exceedance of an applicable WQS is the parameter assessed to determine attainment of that WQS, there are no additional steps for identifying the pollutant in ATTAINS. In cases where the pollutant causing or expected to cause exceedance of an applicable WQS is different from the parameter(s) assessed to determine attainment of that WQS, the information about the pollutant would be included as a separate parameter, demonstrated with the examples below. The following examples are intended to demonstrate the flexibility with identifying and updating pollutant information in ATTAINS. Each example illustrates how pollutant information may be captured for an AU that has either a criteria or designated use that is not being attained; the examples are not meant to be directive, and do not capture all listing scenarios.<sup>1</sup>

- **Example 1: An Assessment Unit (AU) is not attaining the dissolved oxygen (DO) numeric WQS.**

At the time of listing, total phosphorus (TP) is expected to be a contributing cause. The user may capture this information in ATTAINS by:

- **Parameter Status<sup>2</sup> (user selected):** Both DO and TP would be included as parameters with a status of “cause.”
- **Pollutant Indicator Flag (user selected):** The pollutant indicator flag would be “Yes” for both parameters, because DO is pollutant-related, and TP is a pollutant.
- **AU-parameter IR Category (generated based on combination of parameter status and pollutant indicator flag selected above):** The IR category associated with both DO and TP is 5.

- **Example 2: An AU is not attaining the recreation use based on a threshold for excessive algae growth.**

At the time of listing, flow alteration, temperature, and TP are expected to be contributing to the impairment. This information would be captured in ATTAINS as follows:

- **Parameter Status (user selected):** IBI, flow alteration, temperature, and TP would be included as parameters with a status of “cause.”
- **Pollutant Indicator Flag (user selected):** The pollutant indicator flag for flow alteration would be “No” because in this example it is “non-pollutant pollution.” The pollutant indicator flags would be “Yes” for temperature and TP because they are pollutants. The pollutant indicator flag for excessive algae growth would be “Yes” because it is pollutant-related.

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<sup>1</sup>In spring 2023, an update is planned be made in ATTAINS to clarify the intent of the pollutant flag. The pollutant flag would be defined as: *Flag indicating whether the parameter you have identified for the impairment is (or is expected to be) pollutant-related. Selecting “No” will put this parameter in EPA IR Subcategory 4c. Only select “No” if (1) the parameter is non-pollutant pollution (and a separate entry for the impairment is pollutant-related) or (2) you can demonstrate that no pollutant is causing or contributing to the impairment.* The updated flag definition would more accurately reflect how information about pollutants and related parameters are captured in ATTAINS and adds detail on the proper use of the flag, more clearly indicating the distinction in categorization for parameters related to pollutants as opposed to non-pollutant pollution.

<sup>2</sup>For information on ATTAINS field codes and available options, see “Assessment Batch Upload: Tips to Avoid Common Errors” at <https://www.epa.gov/waterdata/upload-data-resources-registered-attains-users#tutorials-and-training>.

- **AU-parameter IR Category (generated based on combination of parameter status and pollutant indicator flag selected above):** The IR category associated with excessive algae growth, temperature, and TP is 5, while that of flow alteration is 4c.
- **Example 3: An AU is not attaining the aquatic life use based on an Index of Biological Integrity (IBI) threshold.**  
At the time of listing, flow alteration is expected to be contributing to an impairment based on observed changes to hydrology that can result in aquatic life use impairment,<sup>3</sup> and there is no available data and/or information on whether a pollutant is causing or contributing to the impairment. This information would be captured in ATTAINS as follows:
  - **Parameter Status (user selected):** Both IBI and flow alteration would be included as parameters with a status of “cause.”
  - **Pollutant Indicator Flag (user selected):** For flow alteration, the pollutant indicator flag would be “No” because in this example it is “non-pollutant pollution.” For IBI, the pollutant indicator flag would be “Yes” because there is no available data and/or information on whether a pollutant is causing or contributing to the impairment.
  - **AU-parameter IR Category (generated based on combination of parameter status and pollutant indicator flag selected above):** The IR category associated with IBI is 5, while that of flow alteration is 4c.

By the next listing cycle, stressor identification process was used to identify TP as a contributing pollutant. The user may add TP as a pollutant in ATTAINS as follows (the parameters above, and their associated IR categories, would remain unchanged):

- **Parameter Status (user selected):** TP would be selected as a parameter with a status of “cause.”
- **Pollutant Indicator Flag (user selected):** The pollutant indicator flag would be “Yes” because this parameter has been identified as a pollutant.
- **AU-parameter IR Category (generated based on combination of parameter status and pollutant indicator flag selected above):** The IR category associated with TP is 5.

After initially identifying pollutant(s) for each water on their CWA 303(d) list, states, territories, and authorized tribes are encouraged to review and update the pollutant-related information captured in ATTAINS for each listing cycle. For example, an AU that remains in Category 5 may have recent monitoring data that helps refine the identification of a pollutant from “nutrients” to “total phosphorus.” Additionally, a newly developed TMDL may contain more detailed information about pollutants in a waterbody than was available when the waterbody was originally identified as impaired. Regularly checking and updating this assessment information as appropriate will help ensure that the relevant regulatory requirements are met and the data captured in the ATTAINS data system accurately informs the public (such as [How’s My Waterway](#)).

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<sup>3</sup><https://www.epa.gov/sites/default/files/2016-12/documents/final-aquatic-life-hydrologic-alteration-report.pdf>.