



# **Preparation of Integrated Water Quality Monitoring and Assessment Reports**

## **Recommendations for Clean Water Act §303(d) and §305(b) Methodologies and Reporting**

### **Volume I**

**Prepared by**

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**Federal Water Quality Coalition  
American Farm Bureau Federation  
Association of Metropolitan Sewerage Agencies**

**March 11, 2002**

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## **Acknowledgments**

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**The Federal Water Quality Coalition** is a group of industrial companies, municipal entities, agricultural parties, and trade associations. Each of the members either owns and operates facilities that are regulated under the Clean Water Act, or has members that own and operate such facilities, or supplies products whose use could be affected by regulations issued under the Act. The Coalition has participated extensively in EPA's TMDL rulemaking, as well as other water quality regulatory efforts, with the goal of helping to ensure that requirements developed by EPA and the states under the Clean Water Act are focused, flexible, and founded on sound science.

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## **Table of Contents**

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I. Executive Summary .....	1
II. Regulatory Background.....	2
Current Federal Rules .....	2
EPA Listing Guidance.....	4
III. Recommendations .....	7
A. Pre-listing Evaluation of Water Quality Standards.....	8
Revision of Water Quality Standards.....	8
Designated Uses .....	10
Water Quality Criteria.....	12
Use Attainability Analysis Process.....	13
B. Collection of Data and Information.....	15
Data Needs.....	15
Quality Assurance Project Plans .....	15
Third Party Data.....	17
C. Evaluation of Existing Data and Information.....	19
Evaluation of Available Data.....	19
State Methodologies .....	20
Period of Record.....	22
Data Sets Representative of Different Water Body Types .....	23
Minimum Number of Samples .....	25
Presumed Standards.....	26
Determining Impairment Based on Exceedances.....	27
Monitored vs. Probabilistic and Evaluated Data .....	29
Weight of Evidence Approach .....	30
Detection and Quantitation Levels.....	31
Invalid Data .....	32
Assessment of Fish Consumption Advisories .....	32

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Temperature Exceedances .....	34
Evaluation of Narrative Criteria .....	35
Regulatory and Legal Basis for Adopting Translator Mechanisms for Narrative Criteria .....	35
Establishing Objective, Quantitative and Verifiable Procedures to Evaluate Attainment of Narrative Criteria .....	36
Evaluation of Ambient Toxicity.....	37
D. Development of Integrated Reports.....	39
Categorization of Water Bodies.....	39
Threatened Waters.....	40
Format of Integrated Report .....	41
Prioritizing and Scheduling .....	42
Stakeholder Participation.....	43
E. Delisting Procedures.....	45
Delisting Process .....	45
Reassessment of Currently Listed Water Bodies.....	46
Exhibit 1: Current Federal Rule--Code of Federal Regulations, 40 CFR §130	
Exhibit 2: EPA Listing Guidance-- <i>2002 Integrated Water Quality Monitoring and Assessment Report Guidance</i> (EPA Nov. 19, 2001)	

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## **I. Executive Summary**

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Under the current federal rules, States<sup>1</sup> must submit their Clean Water Act §303(d) lists of impaired waters, as well as the methodologies used to prepare them, by October 1, 2002. On November 19, 2001, the U.S. Environmental Protection Agency issued a guidance document (called the “EPA Listing Guidance”), which recommends that States combine the §303(d) list with the required §305(b) report into one Integrated Water Quality Monitoring and Assessment Report (or “Integrated Report”).

The EPA Listing Guidance, however, is very general, and does not specifically address a number of details that States will face when revising their listing methodologies and developing their 2002 and subsequent Integrated Reports. This document is an attempt to address some of those details and provide sound, science-based recommendations for States to use during the listing process. The recommendations are grouped into the following categories of issues:

- Pre-Listing Evaluation of Water Quality Standards
- Collection of Data and Information
- Evaluation of Existing Data and Information
- Development of Integrated Reports
- Delisting Procedures

Each category includes a discussion of the requirements of the current federal rules and the EPA Listing Guidance, and recommendations on how States can best implement the requirements in a scientifically sound, legally defensible manner. Where States have already addressed some of these issues, examples from those State rules and methodologies are also included.<sup>2</sup>

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<sup>1</sup> Throughout this document, use of the term “State” or “States” includes states and authorized tribes.

<sup>2</sup> The examples included throughout this document are not intended to be comprehensive, but are provided for illustrative purposes only. Citation to specific provisions of a State methodology does not constitute an endorsement of the entire State methodology.



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## **II. Regulatory Background**

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States must submit their listing methodologies and Integrated Reports by October 1, 2002. This regulatory background section summarizes relevant portions of the current federal rules and the EPA Listing Guidance, which govern the development of the 2002 reports.

### **Current Federal Rules**

EPA's July 13, 2000 final revisions to the TMDL regulations have not gone into effect. EPA issued a rule extending their effective date until April 30, 2003.<sup>3</sup> Before that date, EPA expects to issue a new final rule. In the meantime, however, the currently effective federal regulations concerning the listing of impaired waters are contained in 40 CFR §130.7.<sup>4</sup> The current rules impose a number of basic requirements, which must be included in State §303(d) lists for 2002:

**Identification of waters impaired by pollutants:** The §303(d) list is meant to identify waters that require TMDLs because technology-based effluent limitations, more stringent State or local effluent limitations, and other pollution control requirements such as best management practices, are not stringent enough to implement applicable water quality standards. 40 CFR §130.7(b)(1).

**Identification of waters impaired by thermal discharges:** State §303(d) lists must also include waters that require thermal TMDLs where controls on thermal discharges under §301 or State or local requirements are not stringent enough to assure protection and propagation of a balanced indigenous population of shellfish, fish, and wildlife. 40 CFR §130.7(b)(2).

**Applicable water quality standards:** Water quality standards include the designated uses of the navigable waters and water quality criteria based upon such uses.<sup>5</sup> The current TMDL regulations state that "applicable water quality standards" may include designated uses, numeric and narrative criteria, and antidegradation requirements. 40 CFR §130.7(b)(3).

**Priority ranking:** The §303(d) list must also include a priority ranking that accounts for the severity of the pollution and the uses to be made of the waters. States must specifically identify the waters for which TMDLs will be developed during the next two years. 40 CFR §130.7(b)(4).

**Identification of pollutants:** The pollutants causing or expected to cause violations of water quality standards must also be identified on State §303(d) lists. 40 CFR §130.7(b)(4).

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<sup>3</sup> 66 Fed. Reg. 53043 (Oct. 18, 2001).

<sup>4</sup> Enacted on January 11, 1985 (50 Fed. Reg. 1779) and amended on July 24, 1992 (57 Fed. Reg. 33049), March 31, 2000 (65 Fed. Reg. 17170), and October 18, 2001 (66 Fed. Reg. 53048), attached as Exhibit 1.

<sup>5</sup> 33 USC §1313(c)(2)(A); 40 CFR §§130.2(d), 131.3(i).

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**Data and information:** The current rules require States to assemble and evaluate all existing and readily available water quality-related data and information to develop their §303(d) lists. The data and information includes, at a minimum, the following items (40 CFR §130.7(b)(5)):

- Waters identified on the most recent §305(b) report as not meeting designated uses, only partially meeting designated uses, or not expected to meet designated uses (or threatened).
- Waters for which dilution calculations or predictive models indicate nonattainment of applicable water quality standards.
- Waters for which problems have been reported by local, State, or federal agencies, the public, or academic institutions.
- Waters identified as impaired or threatened in a §319 nonpoint source assessment.

**Methodology:** A description of the methodology used to develop the §303(d) list must be submitted to EPA with the list. 40 CFR §130.7(b)(6)(i).

**Description of data and information:** States also must provide a description of the data and information used to develop the list. 40 CFR §130.7(b)(6)(ii).

**Rationale for not using certain data and information:** States must provide a rationale for any decision not to use a category of data and information to identify waters on the §303(d) list. 40 CFR §130.7(b)(6)(iii).

**Other reasonable information requested by EPA:** If requested by EPA, States must show good cause for not including certain waters on the §303(d) list. 40 CFR §130.7(b)(6)(iv). “Good cause” includes:

- More recent or more accurate data.
- More sophisticated water quality modeling.
- Flaws in the original analysis that led to the water being included in one of the categories of data and information.
- Changes in conditions, such as new control equipment or elimination of discharges.

**Public participation:** The process for involving the public, affected dischargers, designated areawide management agencies, and local governments must be described in the State’s approved continuing planning process (“CPP”). 40 CFR §130.7(a).

**Review and approval by EPA:** The §303(d) list and supporting documentation (methodology, etc.) must be submitted to the appropriate EPA Regional Office for review and action once every two years. 40 CFR §130.7(d)(1). The next §303(d) lists are due to EPA by

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October 1, 2002.<sup>6</sup> After submission, EPA has 30 days to review, and either approve or disapprove a State's §303(d) list. If EPA disapproves a list, it must publish its own list for the State within 30 days of the disapproval. 40 CFR §130.7(d)(2).

## **EPA Listing Guidance**

On November 19, 2001, EPA issued guidance to States concerning development of the §303(d) lists due on October 1, 2002.<sup>7</sup> The EPA Listing Guidance recommends that States develop and submit an integrated water quality report that combines the §303(d) list of impaired waters with the comprehensive §305(b) report on water quality. The EPA Listing Guidance also provides a recommended structure for the integrated report:

- **Category 1:** Waters that are attaining the water quality standard, and where no use is threatened.
- **Category 2:** Waters that are attaining some designated uses and where no use is threatened, but for which there is insufficient or no data or information to determine whether other designated uses are attained or threatened.
- **Category 3:** Waters for which there is insufficient or no data or information to determine whether any designated use is attained or threatened.
- **Category 4:** Waters that are impaired or threatened for one or more designated uses, but for which the development of a TMDL is not required for one of the following reasons:
  - A. A TMDL has already been completed for the water.
  - B. Other pollution control requirements are reasonably expected to result in attainment of standards in the near future. EPA expects that the requirements referred to here are specifically applicable to the water quality problem at issue. Follow up monitoring must be scheduled to verify that the standard is attained as expected.
  - C. The impairment is not caused by a pollutant.
- **Category 5:** Waters that are impaired or threatened for one or more pollutants, and for which development of a TMDL is required.

Under the new Integrated Report format, Categories 1 through 5 will replace what traditionally was submitted as a §305(b) report. The §303(d) list will be replaced by Category 5 of the Integrated Report. Thus, for §303(d) purposes, only those water bodies included in Category 5 will be considered "listed."

The EPA Listing Guidance also provides additional clarification of several other major issues:

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<sup>6</sup> 66 Fed. Reg. 53039 (Oct. 18, 2001).

<sup>7</sup> 2002 *Integrated Water Quality Monitoring and Assessment Report Guidance* (EPA Nov. 19, 2001) ("EPA Listing Guidance"), available on EPA's website at [www.epa.gov/owow/tmdl/2002wqma.pdf](http://www.epa.gov/owow/tmdl/2002wqma.pdf) and attached as Exhibit 2.

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**Comprehensive monitoring and assessment strategy:** As provided in Clean Water Act §106(e)(1), States should develop a comprehensive monitoring and assessment strategy that provides a description of the sampling approach, a list of parameters to be tested, and a schedule for collecting data and information.

**Delisting waters:** The EPA Listing Guidance reiterates the “good cause” provisions for removing waters from §303(d) lists, as contained in 40 CFR §130.7(b)(6)(iv). States may delist waters without collecting new data and information as long as they provide EPA with a rationale justifying the delisting as based on good cause.

**Threatened waters:** EPA maintains that waters must be listed if they are “threatened.” Threatened waters include those currently attaining water quality standards, but where non-attainment is predicted, in accordance with the State listing methodology, by the time the next §303(d) list is due.

**Methodology:** States should include a description of the process and procedures used to assess the quality of waters and should explain how data and information was assembled and used to determine the attainment status of each water.

**Data and information:** The EPA Listing Guidance contains an expanded list of data and information that States should assemble and evaluate in accordance with their listing methodologies:

- The most recent §305(b) report and §314 lakes assessment.
- The most recent §303(d) list.
- The most recent §319 nonpoint source assessment.
- Any reports of water quality problems from local, State, or federal agencies, the public, or academic institutions.
- Any reports of dilution calculations or predictive models.
- Any fish and shellfish advisories or restrictions on water sports or recreational contact.
- Any reports of fish kills or developmental abnormalities.
- The State’s water quality management plans.
- Safe Drinking Water Act §1453 source water assessments.
- CERCLA and RCRA reports.
- The most recent Toxic Release Inventory reports.

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**Biological impairments:** The EPA Listing Guidance recommends that States explain how biological monitoring will be used to determine impairment, the cause of impairment, and the chosen categorization of the water in the integrated report. EPA recommends that waters with biological impairments be placed in the following categories, depending on the State's determination of the cause of the impairment:

- **Category 3:** Waters may be placed in Category 3 if the cause of the biological impairment is not known. If placed in this category, the water should be scheduled for additional monitoring to determine the cause of the impairment.
- **Category 4(C):** Waters should be placed in Category 4(C) if the State believes that the biological impairment is not caused by a pollutant.
- **Category 5:** Waters should be placed in Category 5 if the biological impairment is known or suspected to be caused by a pollutant. According to EPA, States also have the option of including waters in Category 5 when the cause of the biological impairment is not known. However, States are encouraged to provide additional time in the TMDL process to conduct additional monitoring to confirm the cause of the impairment.

**Submission to EPA:** In addition to the integrated report itself, EPA requests that States also submit the following information:

- The assessment and listing methodology or methodologies.
- Identification of waters (called "assessment units" or "AUs") based on the National Hydrography Dataset.
- The data and information supporting the State's categorization decisions.
- A description of the public participation process and a summary of and response to public comments.
- If probability-based sampling design is used in monitoring, an assessment report based on that sampling design.

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### **III. Recommendations**

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This discussion highlights a number of areas in which a State should revise its listing methodology to incorporate some of the concepts included in the EPA Listing Guidance. The topics discussed include the following:

- Pre-listing evaluation of water quality standards
- Collection of data and information
- Evaluation of existing data and information
- Development of Integrated Reports
- Delisting procedures

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## **A. Pre-listing Evaluation of Water Quality Standards**

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The report of the National Research Council on the scientific basis of the TMDL program (“NRC Report”)<sup>8</sup> addresses the importance of setting appropriate water quality standards as the foundation of an ambient water quality management program. A critical step each State should undertake is an evaluation of its current water quality standards and their relationship to the State’s current §303(d) list. States and stakeholders should make a special effort during the next water quality assessment period to determine whether the water quality standards, as currently promulgated, can be achieved and assessed. This will improve the State’s ability to prepare future lists and assure that subsequent TMDLs are appropriately focused with targets set at levels necessary to achieve attainable water quality standards. States should focus on the following water quality standards issues:

- Whether the designated uses assigned to particular waters are appropriate and scientifically valid.
- Whether the criteria established to support those designated uses are attainable.
- Whether compliance with water quality criteria can be accurately assessed using the State’s §305(b) and §303(d) assessment methodologies.
- Whether appropriate numeric translators for narrative criteria have been promulgated in accordance with state administrative procedures.

The standards evaluation process must account fully for natural sources and other factors (including impacts not caused by pollutants) that may be affecting water quality.

### **Revision of Water Quality Standards**

States are required to periodically review and revise their water quality standards through the Triennial Review standards revision process. For some water bodies, however, designated uses and supporting criteria may be based on limited data sets, may be based solely on presumed standards, and in some cases may not have been promulgated at all. As State water quality assessment programs have evolved to meet §305(b) and §303(d) listing requirements, States have acquired a greater amount of data to understand the natural and anthropogenic processes that can affect water quality. As a result, decisions about water quality status should not be limited to a simple yes or no decision about whether a water body achieves its designated uses and associated criteria. The State §305(b) assessment methodologies should allow incorporation of data assessment methods and processes for

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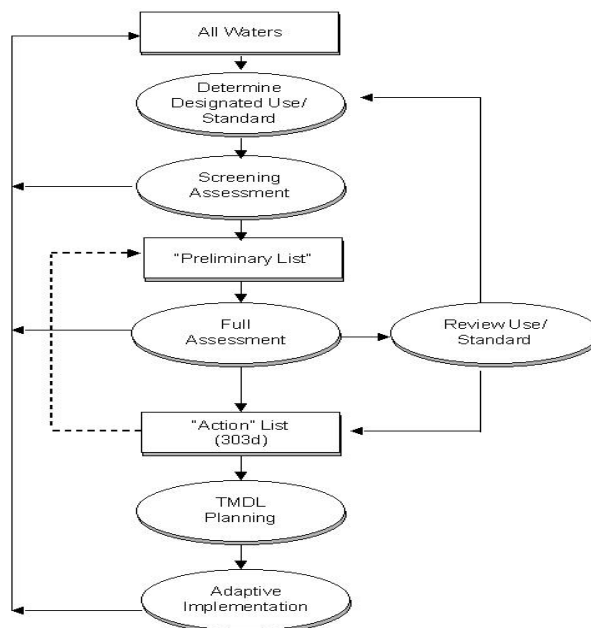
<sup>8</sup> *Assessing the TMDL Approach to Water Quality Management* (Committee to Assess the Scientific Basis of the Total Maximum Daily Load Approach to Water Pollution Reduction, National Research Council June 2001) (“NRC Report”), available at [books.nap.edu/html/tmdl/](http://books.nap.edu/html/tmdl/).

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evaluating whether current water quality standards, including the designated uses and water quality criteria, for a water body need to be modified.

It may not be possible to ascertain whether all waters have been assigned appropriate designated uses and criteria before the next assessments must be submitted in October 2002. This may be particularly difficult, for example, for waters such as intermittent streams, effluent dominated waters, coastal bayous, and desert arroyos. States can, however, establish procedures to determine what data will be necessary and how it will be used to assess whether the uses or criteria for a particular water should be reevaluated through a watershed-specific study. States should include such a procedure in their assessment and listing methodologies, and should establish a schedule for accomplishing the necessary revisions through use attainability analyses (“UAAs”), statewide or site-specific criteria development, and the standards revision process.

For example, NRC recommended the following process, which includes steps for reviewing uses and standards before water bodies are placed on the §303(d) list:<sup>9</sup>



Framework for Water Quality Management.  
 Source: National Research Council, 2001

Similarly, the proposed Texas TMDL development process includes UAAs, criteria assessment, and adjustment of uses and criteria as necessary steps prior to §303(d) listing.<sup>10</sup>

<sup>9</sup> *Id.* at p. 6.



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In order to better accommodate the need to revise water quality standards, States should modify their continuing planning process (“CPP”) documents to specify a clear process and protocols for conducting and successfully completing a use attainability analysis (“UAA”) where required, or changing a water quality standard through the Triennial Review or other standards revision process or the development of statewide or site-specific criteria. These procedures should be incorporated into the beginning of the statewide assessment process to ensure that waters are appropriately assessed under the State’s water quality standards.

## **Designated Uses**

Before a State includes a water body in Category 5 of the Integrated Report (the §303(d) list), the State should first determine whether the designated uses assigned to that water body are appropriate and achievable.

As a beginning point, States should establish a set of designated uses that accurately capture the types of uses being made or realistically to be made of waters in the State. The NRC Report recommends that designated uses be as specific as possible, so that waters can be assigned uses that are appropriate to their characteristics:

The general “fishable” and “swimmable” goals of the Clean Water Act constitute the beginning, rather than the end, of appropriate use designation. For example, a sufficiently detailed designated use might distinguish between beach use, primary water contact recreation, and secondary water contact recreation.<sup>11</sup>

The NRC report also encourages States to recognize that it may not be appropriate to assign a designated use based on a condition that was present before a water body was altered by development. In many circumstances, the NRC noted, attaining a predevelopment condition will not be possible:

For example, a reproducing trout fishery in downtown Washington, D.C., may be desired, but may not be attainable because of the development history of the area or the altered hydrologic regime of the waterbody.<sup>12</sup>

Ohio has adopted specific designated uses that account for the different conditions of water bodies present in the State.<sup>13</sup> The aquatic life habitat use designation is divided into several categories: warm water, limited warm water, exceptional warm water, modified warm water, seasonal salmonid, cold water (inland trout, native fauna) and limited resource. The modified warm water category is meant for waters that have undergone a UAA “and have been found incapable of supporting and maintaining a balanced, integrated, adaptive community of warm water organisms due to irretrievable modifications of the physical habitat.”<sup>14</sup> Limited resource waters are those that have been determined—again through the UAA process—to lack the

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<sup>10</sup> *Preparing a Watershed Action Plan for an Impaired Water Body* (Texas Natural Resource Conservation Commission internal policy paper January 2001).

<sup>11</sup> NRC Report at p. 23.

<sup>12</sup> *Id.* at p. 24.

<sup>13</sup> Ohio Administrative Code §3745-1-07, available at [www.epa.state.oh.us/dsw/rules/01-07feb02.pdf](http://www.epa.state.oh.us/dsw/rules/01-07feb02.pdf).

<sup>14</sup> *Id.*

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potential to resemble any other aquatic life habitat category based on Ohio's biological criteria. Specific water quality criteria are associated with each aquatic life habitat category, and Ohio periodically reviews the use designations assigned to waters, and revises them as necessary.

Colorado has created a subcategory of swimmable waters that have the potential for primary contact recreation. "This classification shall be assigned to water segments for which no use attainability analysis has been performed demonstrating that a recreation class 2 [secondary contact] classification is appropriate, if a reasonable level of inquiry has failed to identify any existing class 1 uses of the water segment."<sup>15</sup> EPA participated in the discussions leading up to the subcategory, and EPA Region 8 approved the new standards.

Of 15 States interviewed by the General Accounting Office in 2001, eight acknowledged that their designated uses required revision.<sup>16</sup> For example, all waters in Virginia and Texas are designated for swimming even though some of those waters are inaccessible and too shallow for swimming.<sup>17</sup> The findings of the NRC and GAO reinforce the recommendations included above that States address water quality standards issues associated with modifying designated uses, statewide criteria, and site-specific criteria before placing waters on §303(d) lists.

States should develop specific data quality objectives to govern future monitoring efforts to support decisions about establishing appropriate designated uses, statewide criteria, and site-specific criteria. Data quality objectives are specific criteria to ensure that the data collected is adequate to support the decisions that will be made using the data. Idaho's Beneficial Use Reconnaissance Project ("BURP") is an example of a monitoring and data collection program designed to provide information necessary to determine whether designated uses are appropriate.<sup>18</sup> BURP focuses on measuring core variables consistently throughout the State, so that data are both reliable and comparable. The core values include:

- **Physical characteristics:** flow, width, depth, shade, substrate, habitat types, pH, bank stability, riparian vegetation, pool complexity, large woody debris, photo documentation and diagrammatic mapping, stream channel classification, and conductivity.
- **Biological characteristics:** macroinvertebrates, fish, periphyton, fecal indicator bacteria, and amphibians.

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<sup>15</sup> 5 Colo. Code Regs. §1002-31.13(1)(a)(ii)(II).

<sup>16</sup> *Inconsistent State Approaches Complicate Nation's Efforts to Identify Its Most Polluted Waters* (GAO-02-186, January 11, 2002) ("GAO Report") at p. 7.

<sup>17</sup> *Id.*

<sup>18</sup> *1999 Beneficial Use Reconnaissance Project Workplan for Wadable Streams* (IDEQ) is available at [ww2.state.id.us/deq/water/surface\\_water/99\\_BURP\\_WORKPLAN.pdf](http://ww2.state.id.us/deq/water/surface_water/99_BURP_WORKPLAN.pdf).

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## **Water Quality Criteria**

Water quality criteria provide numeric or narrative thresholds for determining whether water bodies can support the designated uses.<sup>19</sup> Officials in 14 of the 15 States interviewed by the GAO in 2001 believe that their water quality criteria need to be revised.<sup>20</sup> Waters should be included in Category 5 only after the State has specifically determined that the water quality criteria are appropriate to support the use being impaired, and that the criteria have a sound technical basis.

As the NRC recommended, the criteria chosen to measure use attainment should be logically linked to the designated uses, and verifiable, repeatable monitoring methods should be employed to measure those criteria.<sup>21</sup> States should use the Triennial Review or other standards revision process to determine whether criteria are appropriately tailored to protect the associated designated uses. This process should also be used to develop and promulgate numerical translators for narrative criteria. Existing criteria should be reviewed as new scientific information concerning toxicity, fate and transport, and other relevant data become available.

States should also explore the use of site-specific criteria, which can be established for specific waters based on local conditions. State criteria are typically based on national water quality criteria guidance developed by EPA under Clean Water Act §304(a). Thus, they often do not take into consideration unique characteristics of specific waters. Adoption of site-specific criteria is appropriate in the following situations:

- When species in a particular water body are more or less sensitive than those species used to develop the national or State criteria.
- When physical or chemical characteristics of the water body alter the toxicity or biological availability of a chemical.
- When natural or local hydrology, land use, climate, nutrient species, or other localized factors would justify criteria other than those derived from national guidance.

Indiana has adopted rules allowing the development of site-specific criteria.<sup>22</sup> These rules provide procedures for deriving site-specific criteria under the following circumstances:

- Water quality characteristics, such as pH, hardness, temperature or color.
- The types of species present in the water body, as compared to the types of species used to develop the generally applicable criteria.

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<sup>19</sup> GAO Report at p. 8.

<sup>20</sup> *Id.*

<sup>21</sup> NRC Report at p. 30.

<sup>22</sup> 327 Ind. Admin. Code §2-1-8.2 (acute aquatic criteria for non-Great Lakes waters), 327 Ind. Admin. Code §2-1-8.3 (chronic aquatic criteria for non-Great Lakes waters) and 327 Ind. Admin. Code §2-1.5-16 (site-specific modifications for Great Lakes criteria and values).

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- Local physical or hydrologic conditions.
- The rules provide for site-specific modifications of wildlife and human health criteria in addition to aquatic life criteria.

Several site-specific modifications have been developed and approved in Indiana, including criteria for cyanide, lead, ammonia, and copper.<sup>23</sup>

EPA has provided several sources of guidance on site-specific criteria, including the following:

**Water Quality Standards Handbook:** Chapter 3, Section 7 of this EPA document explains the procedures used to develop site-specific criteria, including recalculation, water-effect ratio, and resident species.<sup>24</sup>

**EPA Site-Specific Criteria Guidance:** EPA has issued a memorandum offering guidance on establishing site-specific aquatic life criteria based on natural local background conditions.<sup>25</sup>

**Great Lakes Guidance:** EPA's Water Quality Guidance for the Great Lakes System contains procedures for developing site-specific modifications to criteria and values for aquatic life, wildlife, and human health.<sup>26</sup> These procedures, as adopted by Great Lakes States, must be used for waters in the Great Lakes system.

### **Use Attainability Analysis Process**

States should use the UAA process to revise designated uses where appropriate, rather than categorizing such waters as impaired based on standards that are not attainable. A UAA is a structured scientific assessment of the factors affecting the attainment of a designated use. A UAA must be conducted when a State considers designation of a use less stringent than the fishable and swimmable goals in Clean Water Act §101(a)(2), or removes or creates subcategories of those fishable and swimmable goals. UAAs are not necessary when removing or revising uses not related to the fishable and swimmable goals.

States may remove or create subcategories of a designated use that is not an existing use<sup>27</sup> if it can be demonstrated that attaining the designated use is not feasible due to one of the following reasons:<sup>28</sup>

- Naturally occurring contaminant concentrations prevent the attainment of a use.

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<sup>23</sup> 22 Ind. Reg. 1659, 1716 (Feb. 1, 1999).

<sup>24</sup> *Water Quality Standards Handbook: Second Edition* (EPA-823-B-005a August 1994) ("EPA Handbook").

<sup>25</sup> *Establishing Site Specific Aquatic Life Criteria Equal to Natural Background* (EPA Nov. 5, 1997), available at [www.epa.gov/waterscience/library/wqcriteria/naturalback.pdf](http://www.epa.gov/waterscience/library/wqcriteria/naturalback.pdf).

<sup>26</sup> 40 CFR Part 132, App. 4, Procedure 1.

<sup>27</sup> "Existing uses" are those uses actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards. 40 CFR §131.3(e).

<sup>28</sup> 40 CFR §131.10(g).

**Federal Water Quality Coalition  
American Farm Bureau Federation  
Association of Metropolitan Sewerage Agencies**

- Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met.
- Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place.
- Dams, diversions or other types of hydrological modifications preclude the attainment of the use and it is not feasible to restore the water body to its original condition or operate such modification in a way that would result in the attainment of the use.
- Physical conditions related to the structural features of the water body, such as lack of proper substrate, channelization, cover, flow, depth, pools, riffles and the like, unrelated to water quality, preclude attainment of aquatic life protection uses.
- Controls more stringent than those required by Clean Water Act §§301(b) and 306 would result in substantial and widespread economic and social impact.

States should initiate efforts and allocate resources to work with EPA to modify and streamline the UAA review and approval process as an integral part of the CPPs. Special attention should be given to defining the data quality objectives for a UAA, because the goals of a UAA are different than those associated with a State ambient monitoring program. For example, Kansas has established UAA protocols for each designated use, including aquatic life, primary and secondary contact recreation, and food procurement.<sup>29</sup> These protocols are used by the State in conducting UAAs, and may also be used by third parties, which may submit UAAs to the State for review. Each protocol sets forth a process that includes the following steps:

- Review of existing data and information (a checklist of available sources is provided).
- Use assessment procedures to determine whether the use is existing.
- Field assessment procedures, including (as appropriate to the use), visual inspections, collection of chemical data, photographic documentation, interviews with riparian landowners, and biological community sampling.

Regardless of whether a State uses the UAA process to revise the uses designated for a particular water body, it should consider whether the current water quality criteria are appropriate to support the designated uses, and should revise its statewide criteria as appropriate.

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<sup>29</sup> *Use Attainability Analysis Protocols* (Kansas Dep't of Health & Environment, Dec. 1, 2001), available at [www.asiwpca.org/programs/docs/UAAKS.pdf](http://www.asiwpca.org/programs/docs/UAAKS.pdf).

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## **B. Collection of Data and Information**

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One goal of the Clean Water Act is to restore waters to attainment of water quality standards. To ensure that this goal is accomplished in an effective, reasonably efficient manner, it is important to base impairment decisions on a sound process for collecting water quality data and information. The discussion below provides recommendations for structuring State information selection processes to make attainment and impairment determinations under §303(d).

### **Data Needs**

A wide range of data and information should be considered by States in conducting §305(b) assessments, including surface water quality monitoring data, finished drinking water quality data, fish tissue data, and volunteer monitoring data. To be used for §303(d) impairment decisions, however, chemical, physical, and biological data must adhere to State defined quality assurance and quality control protocols that ensure that data are of known and appropriate quality.

Designating a water as impaired on the §303(d) list leads to the requirement to develop and implement a TMDL for that water, which will likely result in more stringent discharge limits and control requirements for dischargers and landowners surrounding the water body. It is essential that the listing decision be based on adequate data, in terms of quality, quantity, age, type, and scientific defensibility.

Just as data quantity can be prioritized for decisionmaking using the binomial approach (discussed in more detail below), the quality of data should also influence the decisionmaking process when assessing water quality. It is critical that States be able to quickly and adequately ascertain the quality of different sources of data submitted in support of a §305(b) assessment or a §303(d) list. This is important because States have limited resources to handle data from third parties, and must therefore establish data quality protocols to allow data from different sources to be comparable when assessed.

### **Quality Assurance Project Plans**

State water quality monitoring and assessment programs should establish quality assurance project plans (QAPPs) and refine data quality objectives to improve the process of collecting quality data and information for regulatory and planning decisions. This process includes informing third parties interested in submitting data for water quality assessment purposes about the importance of documenting that the data were collected in accordance with State approved quality assurance and quality control measures.

State approved QAPPs can bring consistency, validity, and integrity to the Integrated Report by defining data quality objectives, current acceptable methods for sampling, and laboratory analysis protocols, including analytical reporting levels.

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In accordance with current EPA guidance, States should specify the essential components to be included in each QAPP.<sup>30</sup> The following recommended elements are derived from the QA program developed by the State of Texas.<sup>31</sup>

**Quality data collection, data validation, and data transfer** using a reliable and technically valid method.

**Project specific QAPPs** to document planning results for environmental data collection, including:

- Project management.
- Problem definition.
- A detailed timeline of the project.
- Background information.
- Specific data quality objectives and performance criteria.

**Measurement and data acquisition procedures** that provide valid and meaningful data, including:

- Detailed project specific methods of data collection, handling, measurement, and analysis of samples.
- Standardized and approved methods and procedures for data collection, validation, and verification.
- Quality control requirements, including matrix spikes, duplicate samples, blanks, and laboratory QA/QC samples.
- Laboratory certification.
- Recordkeeping, chain of custody, and database management.

**Assessment and oversight procedures**, including:

- A description of responsibilities.
- Project assessment, including reviews, audits, performance evaluations, and reports of project activities.

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<sup>30</sup> *EPA Requirements for Quality Assurance Projects Plans QA/R-5* (EPA/240/B-01-003, March 2001).

<sup>31</sup> *Quality Assurance Project Plan for the Texas Natural Resource Conservation Commission for Environmental Monitoring and Measurement Activities Relating to Routine Monitoring, Intensive Surveys, Use Attainability Surveys, Special Studies and Receiving Water Assessments Under the Surface Water Quality Monitoring Program* (Texas Natural Resource Conservation Commission August 2000).

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American Farm Bureau Federation  
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**Data review, validation, and usability requirements**, including:

- A description of consistently used criteria to review and validate data, including calculations and algorithms.
- A data verification process, including details of chain of custody, data review for transmittal errors, quality control criteria, detection limits, holding times, and statistical treatment of data.
- Procedures to address precision, bias, blank corrections, and completeness of project data.

### **Third Party Data**

States have been continuing to improve their capacity to incorporate third party data submittals into the water quality assessment process. To enhance this capability, State water quality monitoring programs and third parties should cooperate to develop QAPPs prior to the collection of water quality data.

**QA/QC documentation:** States should require the preparation of a QAPP prior to the collection of data by a third party. In addition, States should provide third parties with details concerning the statewide monitoring schedule, and requirements for submission of data and information. Some of the items that third parties should include in QAPPs and monitoring plans include, but are not limited to, the following:

- The purpose of the data collection.
- Specific sampling locations, including latitude and longitude.
- Sample type (e.g., grab, composite, depth, etc.).
- The EPA approved analytical technique utilized.
- The entity or persons conducting the analysis.
- Evaluation of duplicate or split samples.
- Sample handling and custody.

**Publication:** States should publicize all submission requirements for monitored data, special studies, or other reports submitted by third parties. To better inform stakeholders about how to provide data for use in the State water quality assessment process, published data requirements for third party data submission should at a minimum include the following:

- Schedules for data submission, based on the State monitoring and assessment cycle (basin cycle).



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American Farm Bureau Federation  
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- Data format requirements.
- Temporal and spatial criteria for sampling design.
- Data quality objectives.
- QAPP requirements.

**Meetings:** States should require third parties to meet with them prior to conducting monitoring so that data quality objectives and the QAPP can be agreed upon and prepared.

**Guidance:** States should develop guidance for preparing QAPPs and QAPP examples readily available to third parties. This guidance should include elements from the following EPA documents:<sup>32</sup>

- *EPA Requirements for Quality Management Plans QA/R-2* (EPA/240/B-01/002, March 2001).
- *EPA Requirements for Quality Assurance Project Plans QA/R-5* (EPA/240/B-01/003, March 2001).
- *Guidance for the Data Quality Objectives Process G-4* (EPA/600/R-96-005, August 2000).
- *Sampling and Analysis Plan Guidance* (EPA Region 9 Quality Assurance Program, March 1997).<sup>33</sup>

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<sup>32</sup> These and other quality assurance documents are available at [www.epa.gov/quality/ga\\_docs.html](http://www.epa.gov/quality/ga_docs.html).

<sup>33</sup> Available at [www.epa.gov/region9/ga/sapguide.pdf](http://www.epa.gov/region9/ga/sapguide.pdf).

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## **C. Evaluation of Existing Data and Information**

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After a State has collected water quality-related data and information, it must evaluate this data and information to determine whether it is valid and appropriate to use to assess the attainment status of waters. This section offers recommendations on strengthening the data requirements and explicitly defining the processes used to conduct water quality assessments.

### **Evaluation of Available Data**

Federal regulations require each State to “assemble and evaluate all existing and readily available water quality-related data and information to develop the [§303(d)] list.”<sup>34</sup> The rule does not require States to apply all data and information regardless of quality or representativeness when making impairment determinations. It simply provides that States must assemble and evaluate all data and information. This distinction between gathering data and applying data is very important and creates the need for States to determine data adequacy.

As States define their data assessment methods, special attention should be given to how data sets will differentiate between pollutant impacts and pollution impacts. States should give greater attention to identifying causes of impairment, which will be necessary to more accurately categorize water bodies in Integrated Reports.

EPA guidance not only allows, but also encourages States to develop methodologies establishing minimum data quality and quantity requirements.

**EPA Listing Guidance:** In the EPA Listing Guidance, EPA acknowledges that States should evaluate data quality and quantity before making assessment and listing decisions. For example, Category 3 of the Integrated Report is meant for waters for which States have insufficient or no data and information to make attainment decisions. The EPA Listing Guidance states that waters should be placed in this category if data or information are not available to determine attainment or impairment “consistent with the requirements of the state’s or territory’s assessment and listing methodology.” EPA clearly anticipates that States will develop and use their own methodologies to determine whether existing data and information are of sufficient quality and quantity to support impairment decisions.

**CALM Guidance:** Another source of direction for States in evaluating available data is the Draft CALM Guidance.<sup>35</sup> EPA anticipates issuing two sections of the CALM Guidance—assessment and monitoring—in final form very shortly to support State efforts to develop the 2002 water quality reports and lists of impaired waters. In the following excerpts from the draft CALM Guidance, EPA emphasizes the need to evaluate data, and defines data quality:

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<sup>34</sup> Exhibit 1, 40 CFR §130.7(b)(5).

<sup>35</sup> *Consolidated Assessment and Listing Methodology* (EPA, Apr. 20, 2001) (“Draft CALM Guidance”).

**Federal Water Quality Coalition  
American Farm Bureau Federation  
Association of Metropolitan Sewerage Agencies**

- “[N]ot all data are of equal value for assessing water quality standards attainment/impairment. Results of chemical data, or any other type of data, analysis are of limited value unless they are accompanied by documentation about sample collection, analytical methods and quality control protocols. Poorly documented monitoring results may provide an indication of potential problems, corroborate other data and information, or trigger additional monitoring, but they are unlikely to support an attainment or impairment decision if they fail to meet accepted data quality objectives.”<sup>36</sup>
- “Documenting data quality requirements and data evaluation procedures is a critical element that states must address.”<sup>37</sup>
- “EPA encourages states, territories, interstate commissions, and authorized tribes to use the data quality objectives process to define minimum quality data requirements. This includes information on appropriate sample size and monitoring design, sample collection and handling protocols, analytical methods and detection limits, quality control procedures, and data management.”<sup>38</sup>

## **State Methodologies**

State methodologies should provide in-depth explanations of the types, quality, and quantity of data necessary to conduct a thorough evaluation of its water quality standards. A State methodology should also explain how the assembled data and information would be evaluated to make impairment determinations. Stakeholders will benefit from explicit guidelines concerning:

- The types and sources of data acceptable to the State.
- How these types and sources of data will be considered during the assessment process.
- Data timelines and submission requirements.

**Sources:** The State’s listing methodology should prescribe a practical and familiar assemblage of data and information sources that will be deemed appropriate and acceptable by the State for water quality assessment purposes. Standard lists of the data sources considered by States are currently provided in most State methodologies. The more sources or types of data outside of the standard list submitted by a third party for consideration, the more qualifiers the State will need to describe how that data will be used in the assessment process.

**Data hierarchy:** State methodologies should establish a hierarchy scheme for the weighting of acceptable sources and types of data for use in the assessment process, including the following concepts:

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<sup>36</sup> Draft CALM Guidance §3.2 at pp. 3-8.

<sup>37</sup> Draft CALM Guidance §3.2 at pp. 3-8.

<sup>38</sup> Draft CALM Guidance §3.2.1 at pp. 3-9.

**Federal Water Quality Coalition  
American Farm Bureau Federation  
Association of Metropolitan Sewerage Agencies**

- Actual monitored water quality data (chemical, physical, or biological) collected under a State approved QAPP should be given the greatest weight, and should serve as the primary basis for determining impairments. Some examples of States using this approach are Virginia<sup>39</sup> and North Carolina<sup>40</sup>.
- The §303(d) list of impaired waters should be based on actual data that can be quantified and qualified, and not on estimated, hypothesized, or projected data or modeling. While the EPA Listing Guidance encourages States to use probabilistic monitoring designs to obtain statistical representations of water quality to assist in determining monitoring priorities, it does not suggest that States should use probabilistic data to determine that a specific water body is impaired. An impairment decision is only valid when based on monitored data that meets the data quality and quantity requirements of a State's methodology.
- Other information, such as reports of fish kills, Toxic Release Inventory and Superfund reports, and evaluated data (such as models and land use projections), may be extensive in quantity, but are not objective indicators that impairment is actually occurring, and are not subject to the same procedural safeguards as water quality criteria. These types of useful assessment information should be acquired by States and used for identifying water bodies of concern in their §305(b) reports. For example, Florida's methodology provides that exceedances based on spills, upsets or bypasses from permitted facilities, rainfall in excess of a 25-year, 24-hour storm, and data collected within an approved mixing zone will not be used to make impairment decisions.<sup>41</sup>

**Data submittal requirements:** States can enhance consistency during the assessment process by establishing specific requirements to be followed by stakeholders interested in providing water quality data and information to the State. These requirements should include, but not be limited to, the following:

- Only the most recent five-year period of data and information is acceptable.<sup>42</sup>
- Only data and information submitted by an established and publicized submission deadline, to ensure that the State has sufficient time for evaluation prior to listing. The following sample timeline is provided for illustrative purposes only:

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<sup>39</sup> *Water Quality Assessment Guidance Manual for Y2002* (Virginia Department of Environmental Quality, September 24, 2001 Final Draft) ("Virginia Methodology," attached as Exhibit 11) at p. 6, available at [www.deq.state.va.us/pdf/water/wqassessguide.pdf](http://www.deq.state.va.us/pdf/water/wqassessguide.pdf).

<sup>40</sup> *2000 Section 303(d) List* (North Carolina Department of Environment and Natural Resources, April 3, 2000) ("North Carolina Methodology," attached as Exhibit 9) at pp. 20-21, available at [h2o.enr.state.nc.us/mtu/files/303d/NC2kTEXT.pdf](http://h2o.enr.state.nc.us/mtu/files/303d/NC2kTEXT.pdf).

<sup>41</sup> *Identification of Impaired Surface Waters*, 62 Fla. Admin. Code r. 62-303 *et seq.* (May 1, 2001) ("Florida Methodology," attached as Exhibit 5) at r. 303.420(5), available at [www.dep.state.fl.us/water/tmdl/docs/AmendedIWR.pdf](http://www.dep.state.fl.us/water/tmdl/docs/AmendedIWR.pdf).

<sup>42</sup> As discussed in more detail below, it may be necessary to consider older data on a case-by-case basis. This may be true particularly when dealing with drought conditions, which can have water supply and water quality impacts longer than five years.

**Federal Water Quality Coalition  
American Farm Bureau Federation  
Association of Metropolitan Sewerage Agencies**

Task	Due Date
Submittal of final State approved §303(d) list to EPA regional office	October 1, 2002
Revisions to draft §305(b)/ §303(d) Integrated Report	June 1 – September 15, 2002
Public comment period on draft §305(b)/ §303(d) Integrated Report	February 15 – April 1, 2002
Data assessment period	October 1, 2001 – February 1, 2002
Cutoff date for submission of electronic water quality data to State	October 15, 2001
Cutoff date for submission of non-electronic water quality data to State	September 15, 2001
Period of record for data considered	October 1996 through October 2001

**Format:** States should describe and publicize data submission formats that are compatible with the State assessment procedures and database management protocols. For example, it may not be feasible for the State to adequately assess a stack of raw data sheets from a six-month special study submitted to the State during the public comment period on the final §303(d) list.

### **Period of Record**

A State methodology should explicitly define a period of record for the data and information that will be assessed and the rationale for that period.

**Period of Record:** Standards attainment decisions should be based on the most recent five years of data.<sup>43</sup>

**Rationale:** Several State methodologies provide a rationale for limiting the period of record to the most recent five years for data sets used to determine water quality standards attainment.<sup>44</sup> Some reasons cited include:

<sup>43</sup> Again, it may be necessary to consider older data on a case-by-case basis, particularly when dealing with drought issues.

<sup>44</sup> *Methodology for Waterbody Assessment and Developing the 2002 Section 303(d) List of Impaired Waterbodies for Nebraska* (Nebraska Department of Environmental Quality, December 2001) (“Nebraska Methodology,” attached as Exhibit 8) at p. 11, available through [www.deq.state.ne.us](http://www.deq.state.ne.us); *Guidance for Assessing Texas Surface and Finished Drinking Water Quality Data 2002* (Texas Natural Resource Conservation Commission, October 16, 2001) (“Texas Methodology,” attached as Exhibit 10) at p. 4, available at [www.tnrcc.state.tx.us/water/quality/02\\_305guide\\_final.pdf](http://www.tnrcc.state.tx.us/water/quality/02_305guide_final.pdf); *Methodology for the Development of the 2002 Section 303(d) List in Missouri* (Missouri Department of Natural Resources, March 2001) (“Missouri Methodology,” attached as Exhibit 6) at p. 8, available at [www.dnr.state.mo.us/wpscd/wpcp/tmdl/tmdl\\_02\\_Method.pdf](http://www.dnr.state.mo.us/wpscd/wpcp/tmdl/tmdl_02_Method.pdf); *Unified Assessment Methodology* (Colorado Water Quality Control Division, November 2001 draft) (“Colorado Methodology,” attached as Exhibit 4) at p. 2, available at [www.cdph.state.co.us/wq/Assessment/Assess\\_pdf/unified\\_assess\\_methodology\\_v1.pdf](http://www.cdph.state.co.us/wq/Assessment/Assess_pdf/unified_assess_methodology_v1.pdf).

**Federal Water Quality Coalition  
American Farm Bureau Federation  
Association of Metropolitan Sewerage Agencies**

- Statewide watershed management cycles have moved to five-year rotating cycles. As a result, State ambient monitoring programs target their resources geographically over a five-year period, providing a data set more representative of the water body conditions.
- Typically, ambient water quality monitoring data shows little change in water quality conditions in periods of less than three years. Therefore, the five-year period of record more appropriately reflects water quality conditions.
- For some pollutants, ongoing improvements in sampling and analytical methods provide more accurate results, making data older than five years of lesser scientific relevance and quality.

**Older data:** Arizona has established conditions for use of older data. Data older than five years may be used on a case-by-case basis if conditions in the water body have not changed, or if the older data are used in conjunction with newer data to demonstrate water quality trends, where appropriate analytical methods were used and the results can easily be compared with more recent data. If data older than five years are used in an assessment, the State should explain why the older data continue to reflect current water quality conditions.<sup>45</sup>

### **Data Sets Representative of Different Water Body Types**

A State methodology should establish representativeness requirements. A representative data set should be described both temporally and spatially for each water body type, including rivers and streams, lakes and reservoirs, estuaries, coastal waters, and wetlands.

**Temporal requirements:** Minimum temporal requirements should be established for a data set to be considered sufficiently representative. Temporal criteria that should be defined in the methodology include, but are not limited to, the following, and should be refined by each State to ensure that data sets are representative of the different regional climates and seasonal variations throughout the nation:

- A two-year minimum data set is recommended to account for inter-year variation, and the sample set should be distributed over a minimum of two seasons to account for inter-seasonal variation.
- No more than two-thirds of the samples should be collected in any one year.<sup>46</sup>
- States should establish a certain limit on the percentage of the data set that consists of high flow events during the course of the five-year period of record, in order to avoid bias from storm water events.

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<sup>45</sup> *Impaired Water Identification*, proposed Ariz. Admin. Code R18-11-6 *et seq.* (December 21, 2001 draft) (“Arizona Methodology,” attached as Exhibit 3), Preamble at p. 15, available at [www.adeg.state.az.us/lead/osc/download/imp.pdf](http://www.adeg.state.az.us/lead/osc/download/imp.pdf).

<sup>46</sup> Texas Methodology, Exhibit 10 at p. 5.

**Federal Water Quality Coalition  
American Farm Bureau Federation  
Association of Metropolitan Sewerage Agencies**

- States should include provisions that allow consideration of data from a longer period of time if the five-year period of record is dominated by drought conditions. States should similarly consider limiting the percentage of the data set that consists of such drought conditions.
- Samples collected fewer than four days apart at the same riverine location should be considered one sample event. Samples collected fewer than seven days apart at the same lake, reservoir, or estuary location should be considered one sample event.<sup>47</sup>

**Spatial requirements:** Minimum spatial requirements should be established by water body type for all data sets assessed. Assessment methods should be developed to more accurately specify the geographical extent of impairment and water quality concern.<sup>48</sup> In addition, States may find it necessary to establish different spatial criteria for different types of pollutants. Spatial requirements States should consider include, but are not limited to, the following examples from current State methodologies:<sup>49</sup>

- Samples collected within 200 meters of each other will be considered the same station or location.<sup>50</sup>
- For rivers and streams, a single monitoring site is considered to be representative of no more than 25 miles in freshwater, tidal streams, and ocean shoreline.<sup>51</sup> This may require the designation of additional water body reaches so that each reach can be independently assessed for impairment.
- For lakes, reservoirs, and estuaries, a single monitoring site is considered to be representative of no more than 25 percent of total acres or square miles, but not more than 5,120 acres or 8 square miles.<sup>52</sup>
- Appropriate requirements should be defined for acceptable depth of water quality measurements, determining mixed surface layer, defining the extent of tidal influence; and assessing ground water/surface water interface.<sup>53</sup>
- Samples from mixing zones generally should not be included as part of the data set.<sup>54</sup>
- Multiple depth samples taken at a single location in a lake less than seven days apart should be aggregated and used as a single value.<sup>55</sup>

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<sup>47</sup> Florida Methodology, Exhibit 5 at r. 62-303.320(4); Arizona Methodology, Exhibit 3, Preamble at p. 15.

<sup>48</sup> Texas Methodology, Exhibit 10 at p. 5.

<sup>49</sup> States should adopt an assessment protocol that allows modification of these requirements in the event that some hydrologic feature alters the spatial metric described. For example, if a tributary flows into the 200-meter reach of a main stem, it may not be appropriate to consider that 200-meter reach to be uniform.

<sup>50</sup> Florida Methodology, Exhibit 5 at r. 62-303.320(4); Arizona Methodology, Exhibit 3, Preamble at p. 15.

<sup>51</sup> Texas Methodology, Exhibit 10 at p. 6; Nebraska Methodology, Exhibit 8 at p. 19.

<sup>52</sup> *Id.*

<sup>53</sup> Texas Methodology, Exhibit 10 at p. 17-18.

<sup>54</sup> Florida Methodology, Exhibit 5 at r. 62-303.100(2); Arizona Methodology, Exhibit 3 at R18-11-604(C)(1)(b).

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**Other data requirements:** In addition, there are a number of other data requirements that States should consider including in their assessment methodologies or water quality standards, including the following:

- Samples collected below low flow criteria, as defined in the State's water quality standards, that exceed the numeric criteria should not be included in the assessment.<sup>56</sup>
- To address and eliminate the bias such measurements can exhibit on data sets, following principles similar to those adopted to exclude certain low flow measurements, States should determine whether individual values collected during high flow (for example, when a stream is flowing at or above the 90<sup>th</sup> percentile hydrograph flow) should be included in the data set.
- When assessing toxic pollutant criteria, the water body's specific pH or hardness must be known. In instances where 30 or more ambient samples are available at a site, pH and hardness values are ranked from lowest to highest, and the lowest 15<sup>th</sup> percentile is used to compute criteria for a specific site or the entire water body.<sup>57</sup> If hardness values are available for the date and site where the sample was collected, criteria calculated for that day can be applied to the sample.<sup>58</sup>

### **Minimum Number of Samples**

States should explicitly define the minimum number of samples that will be required to make listing determinations. States have adopted a variety of minimum sample requirements, including the following examples:

- For assessment of water quality criteria exceedances, a minimum of 10 temporally independent samples from each sampling site over the most recent five-year period of record are required from a water body to reach a technically valid impairment determination.<sup>59</sup> As stated above, no more than two-thirds for the data should be from one year.
- Field measurements, constituents in water, sediment and fish tissue collected at multiple sites may be aggregated to meet the minimum requirement. Field measurements and constituents in water should be collected on different days to be included in the count used to determine the minimum number of samples.<sup>60</sup>
- Sample sets with four to nine samples may be used to identify water quality concerns for waters included in Categories 1-4 (the §305(b) section) of the Integrated Report, but

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<sup>55</sup> Arizona Methodology, Exhibit 3, Preamble at p. 15.

<sup>56</sup> Nebraska Methodology, Exhibit 8 at p. 15.

<sup>57</sup> Texas Methodology, Exhibit 10 at p. 28.

<sup>58</sup> *Id.*

<sup>59</sup> Texas Methodology, Exhibit 10 at p. 5.

<sup>60</sup> Texas Methodology, Exhibit 10 at p. 6.



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American Farm Bureau Federation  
Association of Metropolitan Sewerage Agencies**

should not be used to make impairment decisions to place waters in Category 5 (the §303(d) list).<sup>61</sup>

- Water quality data should not be used for assessment purposes when three or fewer samples are available at a site.<sup>62</sup>

## **Presumed Standards**

A decisionmaking process should be established for assessing unclassified water bodies. Unclassified waters might include intermittent or perennial streams and small lakes where the water quality standards from a higher order stream or another local receiving water are presumed to apply to the unclassified water body. Ideally, these waters should be individually addressed through the State's Triennial Review or other standards revision process, and water body-specific designated uses and water quality criteria should be promulgated.

**Define unclassified water types:** States may be required to consider data for a water body that has presumed water quality standards. In such cases, the State should develop a procedure to evaluate the data set for these types of water bodies. Until States establish such procedures, they may identify concerns on these water bodies, for placement in Category 2 or 3 of the Integrated Report, but should not identify such water bodies as impaired in Category 5.

For example, Texas has developed a method for determining the appropriate water quality criteria to use when assessing streams that are intermittent, intermittent with perennial pools, or perennial.<sup>63</sup> An important objective of this method is to determine whether the natural characteristics of the water body are known, so the uses and water quality criteria can be adequately assessed and determined. First, the State should define certain unclassified waters, including the following:

- **Intermittent:** An intermittent stream is one that has a period of zero flow for at least one week during most years. Where a flow record is available, a stream with a 7Q2 flow of less than 0.1 cfs is considered intermittent.
- **Intermittent with perennial pools:** A stream that has a period of zero flow for at least one week during most years is considered to be intermittent with perennial pools when adequate pools persist that would be expected to provide habitat sufficient to support an aquatic life use.
- **Perennial:** A perennial stream is one that does not have a period of zero flow lasting at least one week during most years.

**Evaluation:** If historic information concerning water body conditions is insufficient to determine the type of a water body consistent with the above definitions, then the water body

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<sup>61</sup> Texas Methodology, Exhibit 10 at p. 6; Nebraska Methodology, Exhibit 8 at pp. 11-12.

<sup>62</sup> *Id.*

<sup>63</sup> Texas Methodology, Exhibit 10 at p. 13.

**Federal Water Quality Coalition  
American Farm Bureau Federation  
Association of Metropolitan Sewerage Agencies**

should be placed in Category 2 or Category 3 of the Integrated Report. If the water can be defined, and the available data set meets all quality and quantity requirements, then the water is evaluated according to the criteria established for that water body type.

**Criteria:** For example, if the water body is defined as intermittent with perennial pools that are not sustained by wastewater treatment flows, but the pools are inadequate to support a significant aquatic life use, the data are evaluated according to the following criteria via rule<sup>64</sup>:

- Data concerning toxics in water are assessed using aquatic life acute criteria.
- Data concerning dissolved oxygen are assessed based on maintaining a 24-hour dissolved oxygen average concentration of 2.0 mg/L, and an absolute minimum concentration of 1.5 mg/L, consistent with no significant aquatic life use.

### **Determining Impairment Based on Exceedances**

**Traditional evaluation methods:** In determining whether a water quality standard is being met, many States have traditionally compared the rate of criteria exceedance to a “partial support” threshold of 10% or a “non-support” threshold of 25%. This approach, including the 10% and 25% thresholds, was originally suggested by EPA in §305(b) report guidance.<sup>65</sup> For certain parameters with criteria based on annual average concentrations, such as total dissolved solids, chlorides, and sulfates, the calculated average concentration has been compared directly with the criterion to determine whether the water is meeting standards.

**Potential errors:** Expanding §303(d) lists around the country, however, drew attention to the weaknesses of the traditional method, particularly when attempting to determine attainment of water quality standards using small data sets. Two types of possible errors were identified:

- **Type I errors:** The determination that a water body is impaired when it is actually meeting all water quality standards is called a Type I error. With small data sets, the likelihood of incorrectly concluding that a water body is impaired can be quite high—over 50% in some cases. For example, the binomial distribution predicts that when 2 of 19 measurements (10.5%) are found to exceed a criterion, there is a 58% probability that a determination that the water body is impaired will be incorrect.
- **Type II errors:** Conversely, the determination that a water body is meeting all water quality standards when it is actually impaired is called a Type II error.

**Controlling errors:** Both Type I and Type II errors can have significant implications for a State’s water quality management planning process, and must therefore be recognized and controlled. By convention, decisionmakers establish an acceptable Type I error rate, and control Type II errors by increasing the required sample size. Determination of an acceptable

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<sup>64</sup> Texas Methodology, Exhibit 10 at p. 15.

<sup>65</sup> *Guidelines for Preparation of the Comprehensive State Water Quality Assessments (305(b) Reports) and Electronic Updates* (EPA841-B-97-002A and EPA841-B-97-002B September 1997).

**Federal Water Quality Coalition  
American Farm Bureau Federation  
Association of Metropolitan Sewerage Agencies**

error rate is a management decision. Lowering the error rate for one type, however, can have the effect of inflating the error rate for the other type.

**Binomial method:** Several States have recently applied the binomial method, a non-parametric approach to estimating the Type I and Type II error rates, during the §303(d) listing process. The binomial method can be applied when individual samples or measurements are compared to the criterion used to calculate a percent exceedance rate. As the number of sample measurements increases, the actual exceedance rate can be estimated more accurately, and the rates of decision errors (both Type I and Type II) decline. Some States currently use either 10% or 20% as the maximum acceptable Type I error rate for §303(d) listing decisions. These States have determined that error rates in this range allow a reasonable balance with Type II error rates. As examples of this approach, Florida uses a binomial distribution method that provides a 90% confidence that the actual frequency of a criterion exceedance is greater than 10%.<sup>66</sup> Arizona<sup>67</sup>, Texas<sup>68</sup> and Nebraska<sup>69</sup> use similar methods.

**Confidence interval method:** The confidence interval approach for comparing ambient measurements to regulatory criteria is another method to manage error rates. This method is based on comparing a one-sided lower confidence bound of the average or some percentile of measurements directly to the regulatory criterion. As an example, we can apply this method to limit the Type I error rate ( $\alpha$ ) to 5% when making a partial support determination by comparing ambient measurement data to a water quality criterion that should not be exceeded by more than 10% of the measurements. First, the lower 95% confidence bound (because  $\alpha=0.05$ ) of the upper 90<sup>th</sup> percentile of the measured data is calculated. If this lower confidence bound exceeds the water quality criterion, then it can be concluded that the true 90<sup>th</sup> percentile of measurements exceed the criterion with known confidence. The confidence interval calculation differs depending on whether the data follow a normal, log-normal, or non-normal distribution.

Some advantages of this method include the following:

- Explicit rates of control.
- It is applicable to data exhibiting normal or lognormal distributions, or other data via nonparametric statistics.
- It can be applied for water quality criteria based on percent exceedances or averages.
- It accommodates data below detection limits.
- It directly incorporates the magnitude of measurements, not just the percent exceedance rate.

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<sup>66</sup> Florida Methodology, Exhibit 5 at r. 62-303.420, Table 2

<sup>67</sup> Arizona Methodology, Exhibit 3 at R18-11-605(D), Table 2.

<sup>68</sup> Texas Methodology, Exhibit 10 at p. 6-10.

<sup>69</sup> Nebraska Methodology, Exhibit 8 at pp. 12-14.

**Federal Water Quality Coalition  
American Farm Bureau Federation  
Association of Metropolitan Sewerage Agencies**

This method is discussed in detail by Gibbons (2000).<sup>70</sup> To date States have not yet used this approach in making listing decisions, but Michigan has included the confidence interval method in its permitting procedures.<sup>71</sup> States should consider including this method in their assessment and listing methodologies.

### **Monitored vs. Probabilistic and Evaluated Data**

States should not base §303(d) impairment decisions on probabilistic data (estimates based on statistical manipulations) or evaluated data (data concerning land use, location of sources, and questionnaire surveys). Probabilistic and evaluated data may be helpful in making decisions about where to target monitoring efforts. However, only measured data that meet the quality and quantity requirements of the State's listing methodology should be used to make listing decisions that lead to the requirement to develop TMDLs.

For example, Virginia's methodology states that "[f]or the 303(d) Impaired Waters list, normally only QA/QC approved "monitored" data are used to classify waters "impaired" due to the assessment confidence associated with the QA/QC monitoring requirements. Monitored data are obtained using EPA accepted and State approved protocols."<sup>72</sup>

**Limitations of probabilistic and evaluated data:** A number of factors diminish the practicality and validity of using probabilistic data or evaluated data. States should acknowledge in their methodologies how these factors limit the capability to make sound, scientifically defensible decisions, and explain why these types of data are appropriately limited to identifying water quality concerns. Some limitations of such data are explained below:

- **Increased uncertainty:** While the NRC Report indicates that uncertainty is a part of the TMDL process and should be taken into account, it goes on to state that mechanisms should be implemented to diminish uncertainty wherever possible.<sup>73</sup> Using probabilistic and evaluated data to predict exceedances of water quality standards unnecessarily increases the level of uncertainty in the TMDL process, because they are not based on direct water quality measurements. While EPA guidance encourages States to incorporate probability-based monitoring into their monitoring programs, it is important to recognize the limitations of this type of data. Probability-based monitoring can allow a State to reach conclusions about the water quality status of its waters as a whole. However, while such monitoring can calculate a percentage of all waters in the state that exceed criteria, it cannot identify the location of specific segments of waters that exceed criteria.<sup>74</sup> Therefore, probability-based monitoring should not be used to identify water quality impairments for Category 5 of the Integrated Report.

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<sup>70</sup> *Alternative Statistical Approach for Performing Water Quality Impairment Assessments Under the TMDL Program* (R. Gibbons October 2000).

<sup>71</sup> See Mich. Admin. Code r. 323.1211.

<sup>72</sup> Virginia Methodology, Exhibit 11 at p. 6.

<sup>73</sup> NRC Report at pp. 17-18.

<sup>74</sup> GAO Report at p. 11.

**Federal Water Quality Coalition  
American Farm Bureau Federation  
Association of Metropolitan Sewerage Agencies**

- **High cost:** The volume of data necessary to use these types of predictive tools is significant and costly to States. Resources should be aimed instead at strengthening existing ambient monitoring coverage and building the necessary infrastructure for third party data to be collected under a State approved QAPP.

Predictive tools using data such as land use projections, buildout scenarios, slope factors and other statistical probability calculations do offer valid tools that can be used for planning purposes. However, such tools should not be used for regulatory management purposes.

### **Weight of Evidence Approach**

When evaluating several types of data, including chemical, biological, and physical data, to make impairment decisions, States should employ a weight-of-evidence approach. This approach considers the amount of each type of data, the quality of each set of data (including the data collection and analysis methods), the variability of each set of data, and the strength of the linkage of each set of data to protection of the water quality standards.

Under a weight-of-evidence approach, all available data would be evaluated using fundamental scientific principles concerning the assessment of data quality, sufficiency, and applicability, which would ensure that the best scientific analysis and the best available data are used to make impairment decisions.

**Example of weight-of-evidence approach:** For example, suppose an acceptable amount of available dissolved oxygen data for a certain water body indicate slight exceedances of the water quality criterion. A sufficient set of biological data for that water body, however, indicates that a healthy fish and macroinvertebrate community exists. Under the weight-of-evidence approach, the biological data should be weighted more heavily, and the State should not include the water body in Category 5 (the §303(d) list) of the Integrated Report as an impaired water. Because of the strong evidence that the water quality standard as a whole is being met, the State should place the water in Category 1.

**State weight-of-evidence approaches:** Several States have proposed or adopted a weight-of-evidence approach, including Arizona,<sup>75</sup> North Carolina,<sup>76</sup> and Montana.<sup>77</sup> Some concepts from those methodologies include:

- Higher quality data are given more weight.
- Newer data will be given more weight than older data, unless the older measurements are determined to be more representative of critical flow or climatic conditions.
- Direct measures of impacts on a designated use will be weighted heavier than measurements of an indicator or surrogate parameter.

<sup>75</sup> Arizona Methodology, Exhibit 3 at R18-11-605(B).

<sup>76</sup> North Carolina Methodology, Exhibit 9 at p. 22.

<sup>77</sup> *Year 2000 Montana 303(d) List, Appendix A, Water Quality Assessment Process and Methods* (Montana Department of Environmental Quality, April 2000) ("Montana Methodology," attached as Exhibit 7) at p. A-16, available at [www.deq.state.mt.us/ppa/mdm/303\\_d/pdf/appendix%20a/Assessment-A.pdf](http://www.deq.state.mt.us/ppa/mdm/303_d/pdf/appendix%20a/Assessment-A.pdf).

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American Farm Bureau Federation  
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- More frequent data collection will be weighted heavier than nominal data sets.
- Data or information collected during critical conditions concerning flow, season, weather, or anthropogenic activities may be considered separately from the rest of a data set.
- Data that do not represent persistent, recurring, or seasonal conditions may be used to place waters on the State's planning list, not on the §303(d) list of impaired waters.

**Use of a single data type:** Using the weight-of-evidence approach does not preclude a State from using only one data type for making a listing decision with a data set of adequate size and quality. For example, suppose that water quality data for a particular metal exceeds in-stream criteria by a factor of 10. In this case, the chemical data could be given a weight of 100%, and the State would therefore include the water body in the §303(d) list or Category 5 of the Integrated Report based solely on the chemical data.

### **Detection and Quantitation Levels**

When evaluating impairment based on monitoring data, States should clarify their data assessment methods for parameters with water quality criteria below detection or quantitation levels. The use of detection and quantitation levels must be carefully considered when determining whether a chemical data set actually denotes a water quality criterion exceedance.

**Current use of MDLs:** Several State methodologies address the use of data below the method detection level ("MDL"), which is sometimes used as a measure of detection. For example, Arizona's proposed methodology provides that when a sample value is less than or equal to the MDL and the MDL is greater than the water quality criteria, the result will not be used for assessment and listing purposes. When a sample value is less than or equal to the MDL and the MDL is less than or equal to the water quality criteria, the result is considered to meet the criteria.<sup>78</sup>

**MDL issues:** MDLs were developed for QA/QC purposes within individual laboratories, and are not reliable as quantitation levels to be used in evaluating data from multiple laboratories. In addition, by definition, detection levels indicate whether the pollutant is present. A test result cannot be used reliably unless it is equal to or above the quantitation level. If data sets are assessed based on the MDL, then samples for certain toxic parameters should not be used to make impairment decisions for §303(d) purposes.

**Quantitation Levels:** To avoid the issues inherent in the use of MDLs, States should rely on appropriate quantitation levels ("QLs") rather than MDLs to determine whether data points are sufficiently reliable for making impairment decisions.

When compliance with State water quality standards is interpreted using the quantification concept instead of the MDL, the QL serves as a reasonable basis, given the current state-of-

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<sup>78</sup> Arizona Methodology, Exhibit 3 at R18-11-603(1).

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American Farm Bureau Federation  
Association of Metropolitan Sewerage Agencies**

the-art of clean sampling and analytical methods, to certify that a standard allowing no quantifiable level of a pollutant is being achieved.<sup>79</sup>

### **Invalid Data**

States should define invalid data, and specify that such data should not be used to support impairment determinations for §303(d) purposes. For example, Arizona's proposed methodology defines invalid data to include the following:<sup>80</sup>

- Measurements from standards for which QA/QC procedures are not followed.
- Measurements outside the range of possible physical or chemical measurements for the pollutant or measurement equipment.
- Data transcription errors or laboratory errors.
- Statistical outliers identified through statistical analysis appropriate to the data set that do not represent valid measures of water quality for the data set.

States should also consider defining invalid data to include results with suspected sample contamination when clean sampling techniques are used.

### **Assessment of Fish Consumption Advisories**

Many States currently base impairment decisions for §303(d) purposes on the existence of fish consumption advisories. These advisories are not water quality standards, and generally have not been subject to the public comment and rulemaking procedures required for water quality standards. In addition, the validity and accuracy of fish tissue data and risk assessments used by State health departments in issuing such advisories can vary. Therefore, States should not automatically list waters as impaired when advisories are issued, and should adopt specific water quality criteria to be used in place of advisories in making impairment decisions.

**Quality of advisories:** Fish consumption advisories are not necessarily consistent with the State's water quality standards and listing methodologies. Therefore, a State should carefully examine the purpose of and basis for the advisory before making an impairment decision. For these reasons, it is improper to presume that a water body with a fish advisory should always be listed as impaired.

- Some advisories are issued based on data that would not be sufficient to satisfy the data quality or quantity requirements contained in the State's listing methodology.

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<sup>79</sup> *Toxic Pollutant Water Quality Standards Issue Paper: Analytical Limitations on Numerical Standards* at pp. 1-4 (L. Tischler and D. Kocurek 1987).

<sup>80</sup> Arizona Methodology, Exhibit 3 at R18-11-603(4).

**Federal Water Quality Coalition  
American Farm Bureau Federation  
Association of Metropolitan Sewerage Agencies**

- In many cases, an advisory is issued for informational purposes only, to trigger further investigation, or on a precautionary basis, even though actual fish tissue levels do not yet pose a significant risk but are worth some attention.
- Some advisories include a number of listed substances without identifying the extent to which any particular contaminant is responsible for the asserted risk.
- In some States, particularly for mercury and dioxin, advisory threshold levels have been set lower than local or even national natural background levels.
- Advisories are often issued without adhering to the State administrative procedures required for water quality standards or other binding requirements.<sup>81</sup>

**EPA guidance:** EPA's recent guidance on the use of fish consumption advisories can assist States in strengthening the scientific basis of impairment decisions involving such advisories.<sup>82</sup> EPA allows States to use advisories to make listing decisions, but identifies specific situations where it is not appropriate to determine that a water is impaired based on an advisory:

- Generic statewide or regional precautionary advisories, based on data collected from a subset of water bodies, should not serve as a basis for listing. In other words, an advisory should not be used to determine that a water body is impaired unless data has been collected from that water body. Florida has adopted that approach in its listing methodology, which allows the use of advisories only for water bodies where tissue data has been collected.<sup>83</sup>
- A water body should not be listed as impaired if the assumptions underlying the advisory are more protective than those used to develop State water quality criteria for the protection of human health.

**Legal issues:** In addition to the technical problems inherent in using fish advisories to make listing decisions, States may face legal challenges as well. As discussed in the section below concerning narrative criteria, States should not list a water unless it finds that a designated use is not being met because an objective, legally adopted criterion associated with that use has been exceeded. Thus, a water body should be listed based on fish tissue contamination only if there is a violation of a promulgated water quality standard that relates to the pollutant present in the fish. Where no such objective standard or criterion has been established, listing based on an advisory is inappropriate.

**Human health standards:** Because of the many technical and legal issues that can arise from the use of fish advisories to make impairment decisions, States should use the

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<sup>81</sup> For example, federal regulations require States to establish a methodology for translation of narrative criteria for toxic pollutants prior to regulation of point sources on impaired water bodies. 40 CFR §131.11(a)(2).

<sup>82</sup> *Use of Fish and Shellfish Advisories and Classifications in 303(d) and 305(b) Listing Decisions* (EPA Oct. 24, 2000) ("EPA Fish Advisory Guidance").

<sup>83</sup> Florida Methodology, Exhibit 5 at r. 62-303-470.



**Federal Water Quality Coalition  
American Farm Bureau Federation  
Association of Metropolitan Sewerage Agencies**

rulemaking process to adopt appropriate water quality standards to protect human health from the consumption of fish. Such standards should be used in evaluating waters for fish consumption uses, rather than any advisories.

## **Temperature/Thermal Issues**

Many States have established numeric temperature criteria to protect aquatic life in certain waters. When evaluating those waters for listing purposes, however, States should not use the state temperature standard as the impairment test if there are thermal discharges from point sources. The Clean Water Act requires that states identify waters that require TMDLs where controls on thermal discharges are not stringent enough to assure protection of a balanced indigenous population of shellfish, fish, and wildlife.<sup>84</sup> This is called the “BIP Standard.” States should specify in their methodologies that the BIP Standard will be used in making impairment determinations and developing TMDLs for water bodies affected by thermal point source discharges.

**The BIP Standard:** The Clean Water Act requires States to list waters as impaired if controls on thermal discharges are not stringent enough to assure protection of a balanced indigenous population of shellfish, fish, and wildlife.<sup>85</sup> EPA has interpreted this provision to mean that States must list waters using this BIP Standard if they are impaired by thermal discharges from point sources.<sup>86</sup> Waters affected by natural thermal loadings should not be listed.

**§316(a) variances:** Dischargers subject to or threatened with temperature limitations in their permits can petition for a variance if they can demonstrate that the heat limits are more stringent than necessary to support a balanced indigenous population. If such a demonstration has been made, and a variance granted, for a particular water body, that water body should not be listed regardless of whether there are exceedances of a State temperature standard.

**Other Thermal Sources:** States should refine their existing water quality standards and assessment methodologies to account for other sources of thermal loadings. Water bodies affected by natural thermal loadings, such as hot springs and solar radiation, as well as riparian habitat loss or diversions, should not be listed as impaired in Category 5 of the Integrated Report.

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<sup>84</sup> Exhibit 1, 40 CFR §130.7(b)(2).

<sup>85</sup> See 33 USC §§1315(b)(1)(B), 1313(d)(1)(B); Exhibit 1, 40 CFR §130.7(b)(2).

<sup>86</sup> 65 Fed. Reg. 43586 (July 13, 2000). Temperature exceedances caused by nonpoint sources should be evaluated using the applicable State temperature standard.

**Federal Water Quality Coalition  
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## **Evaluation of Narrative Criteria**

At the urging of EPA, States have adopted narrative criteria in lieu of or to supplement numeric criteria. Narrative criteria generally provide that all waters shall be “free from” substances that alone or in combination with other substances:

- Settle to form objectionable deposits.
- Float as debris, scum, oil, or other matter forming nuisances.
- Produce objectionable color, odor, taste or turbidity.
- Cause injury to, are toxic to or produce adverse physiological responses in humans, animals or plants.
- Provide undesirable or nuisance aquatic life.<sup>87</sup>

The analysis and determination of narrative criteria attainment is inherently less objective and consistent than that for numeric criteria.<sup>88</sup> The challenge for States, stakeholders, and EPA in addressing narrative criteria is to strengthen the scientific basis for evaluating chemical, biological, or habitat data individually or in combination, in a quantitative, objective manner, to determine whether a water body is impaired.

## **Regulatory and Legal Basis for Adopting Translator Mechanisms for Narrative Criteria**

EPA has recommended that States “translate the applicable narrative criteria on a site-specific basis or through adoption of site-specific numeric criteria.”<sup>89</sup> The draft CALM guidance contains similar provisions:

EPA encourages states, territories and authorized tribes to use chemical data to interpret narrative criteria, however, these jurisdictions should develop implementation procedures that explain how different types of chemical data are used to make attainment/impairment decisions based on narrative criteria.<sup>90</sup>

A number of administrative and judicial decisions have concluded that narrative criteria should not be applied to any water in the absence of a duly promulgated numerical translator. Such decisions have held that narrative criteria cannot serve as a basis for listing if an

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<sup>87</sup> EPA Handbook at p. 3-24.

<sup>88</sup> Arizona Methodology, Exhibit 3, Preamble at p. 18.

<sup>89</sup> EPA Fish Advisory Guidance.

<sup>90</sup> Draft CALM Guidance at pp. 3-8.

**Federal Water Quality Coalition  
American Farm Bureau Federation  
Association of Metropolitan Sewerage Agencies**

objective translation method has not been established using appropriate rulemaking procedures.<sup>91</sup>

For example, the narrative standard at issue in the *Monongahela Power* case was the Division of Environmental Protection's use of the term "biologically impaired" to list streams on its §303(d) list. The Court found that designation of water bodies as "biologically impaired" is not a sufficient basis for designating streams as impaired. The Court stated that the DEP may not rely on narrative criteria in the State water quality standards as the justification for listing "Water bodies with Biological Impairment" on the §303(d) list.

In the *City of Los Angeles* case, the Regional Water Quality Control Board issued a Basin Plan that contained narrative toxicity standards. The Court held that the Board's failure to show in its Basin Plan how it intended to translate the narrative objective into numeric limits violated 40 CFR §131.11(a)(2) and that the Board is "required to 'bridge the analytical gap' between the narrative requirement and its translated numeric equivalent."

## **Establishing Objective, Quantitative and Verifiable Procedures to Evaluate Attainment of Narrative Criteria**

Because the complications surrounding this issue correlate directly to the definitions and implementation procedures that exist in a State's adopted water quality standards, States should deal with narrative criteria through their Triennial Review or other standards revision process. Texas and Arizona,<sup>92</sup> among others, have been explicit about their approach for dealing with narrative criteria where they lack quantitative, repeatable, objective field collection and assessment methods for different narrative criteria. They have stated as part of their methodology that they will develop and adopt implementation guidance documents through their standards development process for assessing and identifying impairments associated with narrative criteria. These States have established a schematic timeline and public process for developing protocols and guidelines for collecting and assessing chemical, biological, and habitat data in future assessments.

Prior to the development of numeric translators through their Triennial Review or other standards revision process, State methodologies should explicitly describe how data related to narrative criteria would be used to identify water quality concerns. Florida and Arizona have established a two-tier approach for assessing narrative criteria.<sup>93</sup> Where these States are currently relying on numeric indicators or screening values of ambient water quality as part of the methodology for determining whether existing narrative criteria are being met, these numeric values are only used in the context of identifying water quality concerns and do not by themselves constitute a measure of use impairment.

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<sup>91</sup> See, e.g., *Monongahela Power Company v. West Virginia DEP*, No. 99-AA-66 (Circuit Court of Kanawha County, W.Va., slip op. May 1, 2001), *app. filed*, No. 30105 (W. Va.); *City of Los Angeles, Bureau of Sanitation v. State Water Resources Control Board*, BS 060 957 (Los Angeles County Sup. Ct. 2001).

<sup>92</sup> Texas Methodology, Exhibit 10 at pp. 68-69; Arizona Methodology, Exhibit 3, Preamble at pp. 18-19 and R18-11-605(B)(2)(e).

<sup>93</sup> *Id.*

**Federal Water Quality Coalition  
American Farm Bureau Federation  
Association of Metropolitan Sewerage Agencies**

For States that have promulgated numeric translators for nutrients, any waters considered impaired by nutrients should identify whether nitrogen or phosphorus, or both, are the limiting nutrient(s), and specify the limiting nutrient(s) in the §303(d) list.

Some States rely on reference site conditions as a metric for evaluating narrative criteria and determining use impairment in impacted waters. Because in many regions human activities have altered the majority of landscapes and aquatic ecosystems, however, such reference sites often are not characteristic of pristine conditions. Consequently, reference conditions should not be defined based on pristine conditions or on conditions that may have existed before human settlement.<sup>94</sup> Comparisons of conditions in a water body to conditions in a reference water body must be made during similar season and/or hydrologic conditions for both water bodies.<sup>95</sup> In some cases, suitable reference sites do not always exist for conducting valid comparative assessments. This further emphasizes the need for States to develop technical assessment guidance as part of their water quality monitoring/standards development program.

## **Evaluation of Ambient Toxicity**

Many of the principles contained in the discussion of evaluation of narrative criteria above also apply to evaluation of toxicity criteria. In other words, States should adopt objective procedures for assessing ambient waters based on toxicity data and information. In fact, federal regulation provides:

Where a State adopts narrative criteria for toxic pollutants to protect designated uses, the State must provide information identifying the method by which the State intends to regulate point source discharges of toxic pollutants on water quality limited segments based on such narrative criteria.

40 CFR §131.11(a)(2). The Water Quality Standards Handbook<sup>96</sup> makes the following recommendations about State implementation procedures for narrative toxicity criteria:

1. Description of specific, scientifically defensible methods by which the State will implement its narrative toxicity criteria, including:
  - Methods for chemical-specific criteria, including application in permits, development and modification of criteria by a translator procedure and calculation of site-specific criteria based on local water chemistry or biology.
  - Methods for developing and implementing whole effluent toxicity criteria or controls.
2. How the methods will be integrated in the State's toxics control program.

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<sup>94</sup> Montana Methodology, Exhibit 7 at p. A-4.

<sup>95</sup> *Id.* at p. A-5.

<sup>96</sup> EPA Handbook at pp. 3-25.

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Association of Metropolitan Sewerage Agencies**

3. Information needed to apply numeric criteria:

- Methods to identify pollutants to be regulated in a specific discharge.
- Incremental cancer risk level for carcinogens.
- Methods to identify compliance thresholds in permits where calculated limits are below detection.
- Methods for selecting appropriate hardness, pH and temperature variables for criteria expressed as functions of those variables.
- Methods or policies concerning mixing zones.
- Design flows to be used in translating criteria into permit limits.
- Other methods and information needed to apply standards on a case-by-case basis.

Toxicity test methods can be imprecise, particularly when used to assess sublethal effects. There is a substantial possibility of false positives with these methods, leading to findings of toxicity when no toxicity actually exists. In addition to the measurement issues, there is a concern regarding the lack of a demonstrated relationship between sublethal effects in a toxicity test and actual toxicity occurring in surface waters. States must have a sufficient number of tests, as well as the proper types of tests and endpoints, to indicate an actual toxicity problem before using these data to make attainment decisions. For example, states should consider whether 100% ambient water should be compared with a control, or a dilution series of the ambient water should be used as the basis for toxicity testing.

In addition, “whole effluent toxicity” concepts, as the name implies, have been applied mostly to effluents, rather than to the ambient waters for purposes of making impairment decisions. Unless States have promulgated numeric ambient toxicity criteria and a methodology for assessing when those criteria will be deemed exceeded, they should not make listing decisions based exclusively on whole effluent toxicity test results applied to ambient waters.

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American Farm Bureau Federation  
Association of Metropolitan Sewerage Agencies**

## **D. Development of Integrated Reports**

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After the State has determined that its water quality standards are appropriate and attainable, established clear data quality and quantity requirements, and evaluated the existing data and information using those requirements, it can begin to place its waters in the recommended categories of the Integrated Report. This section discusses categorization, format, and public participation issues the State should consider when developing its Integrated Report.

States should also use the EPA Listing Guidance as an opportunity to incorporate the §319 Nonpoint Source Assessment Reports into the Integrated Reports discussed here. States should specifically consider the relationships among Categories 2 through 5 of the Integrated Reports, future §319 Nonpoint Source Assessment Reports, and current EPA guidance concerning the targeting of §319 funding to address nonpoint source pollution.

### **Categorization of Water Bodies**

Once the State has evaluated the existing data and information using the data quality and quantity requirements established in its listing methodology, the appropriate category for a given water should be fairly clear. If the data indicate that a water body is meeting the water quality standard, it should be placed in Category 1. If additional data are necessary to make an attainment determination, the water should be placed in Category 2 or Category 3.

Some additional analysis may be required where existing data indicate that a water body is not meeting the water quality standard. The State should first determine whether a TMDL is required to address the identified impairment. EPA has established Category 4 of the Integrated Report for waters that are impaired or threatened for one or more designated uses, but do not require the development of a TMDL for one of three reasons:

- **Category 4(A): A TMDL has been completed.** Where the State has developed an EPA approved TMDL expected to achieve attainment on a particular water, that water may be listed in Category 4(A). EPA recommends that additional monitoring be scheduled to verify attainment after the TMDL has been implemented.
- **Category 4(B): The water is expected to meet the water quality standard.** Where the identified impairment is being addressed through implementation of other requirements, which are reasonably expected to achieve attainment within a reasonable time, the water can be included in Category 4(B). The State should carefully evaluate any other requirements applicable to a given water, including the Clean Air Act, nonpoint source reduction initiatives, regulatory initiatives in progress, voluntary cost share agreements, and the Superfund program. If the implementation of any of these measures will bring the water into compliance within a reasonable time, the substantial cost and effort to develop a TMDL is not warranted. The State should define “reasonable time” to allow a case-by-case determination, taking into account the pollutants and sources involved, as well as the methods by which attainment is expected to be achieved. Again, EPA recommends additional monitoring to verify attainment.

**Federal Water Quality Coalition  
American Farm Bureau Federation  
Association of Metropolitan Sewerage Agencies**

- **Category 4(C): The impairment is not caused by a pollutant.** Where a specific pollutant cannot be identified as causing the impairment, the water should be placed in Category 4(C). This category is appropriate for waters impaired by physical conditions, unspecified pollution, or classes of pollutants. Additional monitoring is recommended to support management actions necessary to address the impairment.

If the available data and information indicate that a water is impaired by a pollutant, and the water does not meet the requirements of Category 4, the water should be included in Category 5.

## **Threatened Waters**

The current rule states that TMDLs must be established for pollutants expected to prevent the attainment of water quality standards.<sup>97</sup> Based on this provision, the EPA Listing Guidance indicates that States should include threatened waters in Category 5 of the Integrated Report. “Threatened” waters are those where “non-attainment is predicted by the time the next Integrated Report is due to be submitted.”<sup>98</sup> It should be noted that EPA decided not to require listing of threatened waters as impaired in its 2000 rules, which have been suspended. Thus, it is not clear that threatened waters will be listed in Category 5 of future reports. States should clearly identify threatened waters if they are included in Category 5 of their 2002 Integrated Reports, so they can be easily recategorized during the following listing cycle. If included in Category 5, threatened waters should be assigned a low priority for TMDL development and should be scheduled for follow up monitoring efforts.

For the 2002 Integrated Report, States should specify in their methodologies when the available data and information are sufficient to determine that a water body is threatened. For example, Montana law provides that water bodies may be determined to be threatened based only on sufficient credible data and calculated increases in loads.<sup>99</sup> Montana’s methodology states that a water body may be considered threatened if:<sup>100</sup>

- Data show a decline in the conditions supporting the beneficial use.
- Activities proposed for the watershed would be sources of anthropogenic pollutants that are not subject to pollution prevention or control actions required by a discharge permit.
- Activities for which a permit is required are occurring within the watershed without a permit.
- Reasonable land, soil, and water conservation practices are not being implemented.

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<sup>97</sup> Exhibit 1, 40 CFR § 130.7(c)(1)(ii).

<sup>98</sup> EPA Listing Guidance, Exhibit 2, App. B at p. 5.

<sup>99</sup> Mont. Code Ann. 75-5-103.

<sup>100</sup> Montana Methodology, Exhibit 7 at p. A-16.

**Federal Water Quality Coalition  
American Farm Bureau Federation  
Association of Metropolitan Sewerage Agencies**

To strengthen this practical approach, States should explicitly define data quality and quantity requirements necessary to show a declining or adverse trend, including the following concepts:

- A technically valid estimation of pollutant loading from proposed activities not requiring a discharge permit should be required.
- More than five years of data should be required to show a sufficient trend analysis.

**Format of Integrated Report**

While each State Integrated Report will be unique in organization, content, and format some basic information should be included in all Integrated Reports. The following table is derived from requirements in the Nebraska Methodology.<sup>101</sup>

**Integrated Assessment Report – Minimum Water Body Specific Information**

<b>Information</b>	<b>Cat. 1</b>	<b>Cat. 2</b>	<b>Cat. 3</b>	<b>Cat. 4</b>	<b>Cat. 5</b>
Water Body Name and Number	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Basin Name and Number	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Water body type (river, estuary, etc.)	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Size of affected area		<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Impaired Beneficial Use				<b>X</b>	<b>X</b>
Parameter of Concern		<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Pollutant source(s) if known				<b>X</b>	<b>X</b>
Pollution impairment				<b>X</b>	
Lake trophic status	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Designated uses and type of pollutant causing water body to be threatened					<b>X</b>
Source(s) of assessment data	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
TMDL Approval Date				<b>X</b>	
Designated uses attained	<b>X</b>				

The State should explain how its Integrated Report will be organized, and should describe the different purposes of the various categories. Categories 1 through 5 (the §305(b) report) includes a comprehensive accounting of the conditions of all waters in the State; Category 5 constitutes the §303(d) list of waters known to be impaired by identifiable pollutants based on the data requirements in the State’s listing methodology. The State should be as explicit as possible in describing the spatial extent of the water quality concern or impairment, particularly for water bodies included in Categories 4 and 5 of the Integrated Report. In

<sup>101</sup> Nebraska Methodology, Exhibit 8 at p. 6.



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Association of Metropolitan Sewerage Agencies**

addition, the State should clearly set forth its rationale for placing water bodies in the five different categories. Nebraska and North Carolina already have some of these explanations and rationale in their current methodologies.<sup>102</sup>

The EPA Listing Guidance suggested that States use the USGS National Hydrography Dataset (“NHD”) reach addressing protocol to identify the waters assessed in their Integrated Reports. Some States, such as Indiana, have begun to identify waters using the NHD protocol. If a State chooses to adopt the NHD protocol, it should also develop a comparative index clearly associating waters identified under the current georeferencing system with the new NHD “Assessment Unit” assignments.

The Integrated Report may also provide priorities for addressing water quality concerns that have not reached the level of impairment. Criteria and a descriptive rationale for prioritizing water bodies of concern could include but are not limited to:

- Water bodies with data sets below the 10 minimum samples with 3 or more exceedances should be targeted for more intensive monitoring.
- Water bodies that are identified as candidates for UAAs, water effect ratios, or other methods to re-evaluate designated uses and statewide or site-specific criteria should be identified and prioritized.
- Water bodies that show indications of toxicity in water or sediment where the specific pollutant is not known should be targeted for more monitoring.
- Information supporting the identification of pollutants and sources of pollutants for impaired and threatened waters should be documented and accompany the Integrated Report.

## **Prioritizing and Scheduling**

The current TMDL regulations require State §303(d) lists to include a priority ranking that accounts for the severity of the pollution and the uses to be made of the waters. States must also identify the waters for which TMDLs will be developed during the next two years.<sup>103</sup> The EPA Listing Guidance also requests that States provide a schedule identifying the year in which each water body will be targeted for TMDL development.<sup>104</sup>

States should consider the issues of prioritization and scheduling separately. Priority assignments do not necessarily correspond to appropriate scheduling decisions. In other

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<sup>102</sup> Nebraska Methodology, Exhibit 8 at pp. 2-3; North Carolina Methodology, Exhibit 9 at pp. 6-8.

<sup>103</sup> Exhibit 1, 40 CFR §130.7(b)(4).

<sup>104</sup> EPA Listing Guidance, Exhibit 2 at p. 7.

**Federal Water Quality Coalition  
American Farm Bureau Federation  
Association of Metropolitan Sewerage Agencies**

words, it may make sense to schedule a TMDL on a high priority water for several years in the future because the state of science does not currently support TMDL development. Likewise, a low priority TMDL may be on a fast track for TMDL development because it will be quite easy to accomplish, because dischargers are willing to fund the TMDL to expedite its development, or because of specific consent decree requirements.

**Prioritization:** The State should take into account both the utility and feasibility of developing a TMDL when making priority determinations. In addition to the severity of the pollutant involved, and the water's designated uses, the utility of developing a TMDL may be influenced by the following factors:

- Availability of sufficient data to develop a TMDL.
- Potential for continuation of or an increase in pollutant loading.

**Scheduling:** Additional factors should be considered in scheduling specific water bodies for TMDL development, many of which can be considered only after the State's §303(d) list has been approved by EPA. Each State should specifically establish how and when TMDL schedules will be prepared and made available as part of the State Continuing Planning Process. Some examples of relevant factors include the following:

- Any EPA revisions to listings and initial priority designations during the approval process.
- Any new State legislative requirements addressing water quality.
- State funding and staff resources available to complete TMDLs.
- Locally initiated TMDLs that allow the State to allocate its resources to other waters.
- Economies of scale and financial savings that may be realized by grouping similar pollutants together despite differing priority designations.
- Basin cycles and court-ordered schedules.
- Pending water quality standards revisions.

### **Stakeholder Participation**

To ensure stakeholder involvement in listing decisions, public outreach should occur throughout the data collection and listing process. The process should be transparent and understandable, and should provide adequate opportunities for public participation, review, and comment. There should be many avenues for stakeholders to access information about

**Federal Water Quality Coalition  
American Farm Bureau Federation  
Association of Metropolitan Sewerage Agencies**

the listing process. States should also explain that listing leads to the requirement to develop TMDLs. States should design a public participation process that provides adequate opportunity for involvement during the preparation of the Integrated Report, as well as modifying the categorization of any water bodies between reporting cycles.

States should also expand their current efforts to provide the public with easily accessible GIS-based maps that display the geographic extent of each water body listed in each category. Specific attention should be given to providing a spatial display of the zone of impairment or concern in Categories 2 through 5 of the Integrated Report. To the greatest extent possible, these GIS maps should display the hydrologic boundaries of each watershed at the highest possible resolution, as well as political boundaries such as counties, cities, federal lands, tribal lands, and other key boundaries, in order to allow stakeholders to understand their geographic proximity to the water body impairment or concern.

**Federal Water Quality Coalition  
American Farm Bureau Federation  
Association of Metropolitan Sewerage Agencies**

## **E. Delisting Procedures**

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The EPA Listing Guidance reiterates the existing federal requirements on removing water bodies from the §303(d) list, or Category 5. States should establish clear procedures in their methodologies for moving waters from Category 5 to another part of the Integrated Report. Specifically, States should address listing and delisting between report cycles, and reassessment of currently listed waters that no longer meet the data quality and quantity requirements.

### **Delisting Process**

States should establish an effective procedure for delisting waters. This procedure should also provide for delisting (or listing) waters between listing cycles. States should establish a procedure, including submission of third party data and public comment on proposed listing changes, that can be used to take any one of the following possible actions, as set forth in the Nebraska methodology.<sup>105</sup>

- Add a water body to the list.
- Move a water body or pollutant from the §303(d) list (Category 5) to another category in the Integrated Report.
- Decrease the spatial scope of an existing impairment on the §303(d) list.
- Expand the spatial scope of an existing impairment on the §303(d) list.

**Basis for Delisting:** When the State establishes a delisting procedure, it should explain how the procedure meets the “good cause” delisting requirement contained in the current federal rules (40 CFR §130.7(b)(6)(iv)), or other rationales for removing waters from the §303(d) section of the report, as set forth in the EPA Listing Guidance. Reasons for delisting include the following:

- More recent or more accurate data.
- More sophisticated water quality modeling.
- Flaws in the original analysis
- Changes in conditions, for example, new control equipment or elimination of discharges.
- The water is expected to meet applicable water quality standards within a reasonable time.
- EPA has approved a TMDL designed to attain water quality standards.

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<sup>105</sup> Nebraska Methodology, Exhibit 8 at p. 24.

**Federal Water Quality Coalition  
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**Current State delisting procedures:** Some States have proposed or adopted delisting procedures. In most cases, States have designed their data quality, quantity, and representativeness criteria to be consistent with their listing procedures. Some of the concepts contained in these methodologies are described below:

- **Arizona:** Arizona's methodology provides for several situations in which a water body would be removed from the list of impaired waters, including the development of an EPA approved TMDL, more recent credible data collected under similar conditions as the original data showing the water is not impaired, an EPA approved change in the applicable standard or designated use, a change in the interpretation of a narrative criteria, a proven deficiency in the analysis of the original data, or if the impairment is caused solely by naturally-occurring conditions. The goal is to make the procedures for listing and delisting comparable.<sup>106</sup>
- **Florida:** Florida has established specific requirements for each type of designated use, and has incorporated the binomial approach to set sample size requirements for determining that a water body is no longer impaired.<sup>107</sup>

### **Reassessment of Currently Listed Water Bodies**

States should ensure that the delisting provisions in their methodologies allow waters to be delisted if the supporting data do not meet the current data quality and quantity requirements.

**Data issues:** After a State has developed a new methodology that integrates the §305(b) report with the §303(d) list, as recommended in the EPA Listing Guidance, the State should reevaluate any water bodies listed before the adoption of the new methodology. Waters that were listed based on data insufficient to meet new data quality and quantity requirements should be removed from the §303(d) portion of the list (Category 5 of the Integrated Report) and placed in one of the §305(b) portions (Category 2 or 3) instead. Such reevaluation should be publicized to stakeholders, and the State should clearly specify the rationale for its approach.

**Categorization:** Each State may need to make a water body-specific determination concerning which category to use for previously listed waters. States should specifically recognize these previously listed waters as they develop criteria for prioritizing their follow-up monitoring plans for Categories 1 through 4 of the newly designed Integrated Report.

**Court-ordered TMDLs:** Some States currently are subject to court-ordered schedules for the development of TMDLs. During the process of reevaluation, however, a State may determine that a previously listed water included within the scope of the court order is not actually impaired, or that the water belongs in a different category of the Integrated Report. In that case, the State should recategorize the water as appropriate, and should not proceed to TMDL development. EPA has supported this approach.

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<sup>106</sup> Arizona Methodology, Exhibit 3 at R18-11-605(E). Similar provisions are contained in the North Carolina, Texas, and Nebraska methodologies.

<sup>107</sup> Florida Methodology, Exhibit 5 at r. 62-303.720, Part IV.

**Federal Water Quality Coalition  
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**TMDLs in progress:** In the interest of focusing limited State and private resources, when a State delists a water body, it should generally stop developing a TMDL for the water body. States may wish to continue the development or implementation of TMDLs for waters no longer included in Category 5 of the Integrated Report because the existing data do not meet the quality and quantity requirements contained in a revised methodology. For example, a previously listed water may have a TMDL already underway, or there may be significant local support or a legislative commitment to complete a TMDL for a given water that would not be considered impaired under the State's new methodology. Such issues should be handled on a case-by-case basis. One possible option for dealing with TMDLs already in progress is to complete the TMDL for informational purposes only, or as a watershed management plan with water quality protection as its goal. Such a TMDL need not be submitted to EPA for formal approval, but could be done merely for information purposes under Clean Water Act §303(d)(3).

