Part A — Water Quality Standards Attainment Decisions

Contents

3. Overview of Process To Assess WQS Attainment Status and Identify Impaired Waters

Contents

3. Overview of Process To Assess WQS Attainment Status and Identify Impaired Waters

3.1 Introduction

Most states, territories, and authorized tribes organize their water quality standards (WQS) according to the designated beneficial uses assigned to waters. Recall that the WQS consists of three elements, the designated use, the narrative and numeric criteria adopted to protect the use, and antidegradation policies. Once these WQS are adopted, the state ensures they are met. This includes monitoring to assess attainment status, reporting on attainment and identifying impaired waters, and implementing appropriate measures to ensure WQS are met.

For each WQS, the state, territory, or authorized tribe should describe how it assesses attainment with the standard. The description may be included in the approved WQS or in other implementing regulations or policies and procedures such as the state, territory, or authorized tribe's continuous planning process or consolidated assessment and listing methodology. This includes defining the water quality indicators it measures and the procedures for analyzing and interpreting data in order to decide whether standards are met or water quality is impaired. This should include collection and analysis of multiple types of data providing information relevant to assessing attainment with approved WQS. This information not only is used for reporting attainment status in the Integrated Report but also supports development of appropriate controls that address the full range of water quality problems.

This chapter is organized according to general categories of designated use–based WQS: aquatic life, recreation, public water supply, and fish and shellfish consumption. Each section briefly describes the types of data frequently used in WQS attainment decisions and how these data are interpreted. It also presents examples of how states, territories, and authorized tribes work through situations in which different data types do not indicate the same attainment decision.

3.1.1 Elements of State Water Quality Standards

The objective of the Clean Water Act (CWA) is to "restore and maintain the physical, chemical, and biological integrity of the Nation's waters." To achieve this objective, section 303(c)(2) calls for states, territories, and authorized tribes to adopt WQS including designated uses, narrative and numeric criteria to protect those uses, and antidegradation policies to prevent deterioration of high-quality waters. Under section 106(e), states, territories, and authorized tribes also implement monitoring programs that allow them to report on attainment of WQS and to identify and prioritize waters not attaining standards.

Section 101(a)(2) of the CWA establishes as a national goal "water quality which provides for the protection and propagation of fish, shellfish, and wildlife, and recreation in and on the water, wherever attainable." Section 303(c)(2)(A) of the CWA requires WQS to protect the public health and welfare, enhance the quality of water, and serve the purposes of the Act. EPA's regulations at 40 CFR 131 interpret and implement sections 101(a) and 303(c)(2)(A) of the CWA by requiring that State WQS provide at a minimum for the section 101(a) "fishable/swimmable" uses unless those uses have been shown to be unattainable. In designating

waters, states, territories, and authorized tribes consider the use and value of water for public water supplies; protection and propagation of fish, shellfish and wildlife; recreation in and on the water; consumption of fish and shellfish by humans; and agricultural, industrial, and other purposes including navigation. In no case may waste transport or assimilation be adopted as a designated use for any waters of the United States. Table 3-1 is an example of the many designated uses that may be adopted by a state.

Table 3-1. California's applicable designated uses

Agricultural supply	Marine habitat*
Aquaculture	Municipal and domestic navigation
Cold freshwater habitat*	Noncontact recreation
Commercial and sport fishing*	Preservation of biological habitats of special
Estuarine habitat*	significance*
Fish spawning*	Rare and endangered species*
Fish migration*	Saline water habitat*
Flood control	Shellfish harvesting*
Freshwater replenishment	Warm freshwater habitat
Groundwater recharge	Water quality enhancement
Hydroelectric power generation	Water contact recreation
Industrial service supply	Wildlife habitat
Industrial process supply	

* Aquatic life–related uses.

Although some states, territories and authorized tribes have detailed categories and subcategories of designated uses that apply to specific waters or classes of waters, many have adopted general categories of use that apply broadly to all waters. A recent report by the National Research Council recommended that states, territories, and authorized tribes move beyond general categories of "fishable" and "swimmable" and adopt refined or detailed uses that better describe the expectations for the water (NRC 2001). For example, a state, territory, or authorized tribe may want to distinguish between primary contact recreation and secondary contact recreation. Similarly, the aquatic life use should describe the attributes of aquatic communities expected for the water.

States, territories, and authorized tribes adopt numeric and narrative water quality criteria to protect designated uses. Numeric water quality criteria are adopted based on EPA's 304(a) criteria guidance, 304(a) criteria modified to reflect site-specific conditions, or other scientifically defensible methods. Narrative criteria are adopted to supplement numeric criteria or if numerical criteria cannot be determined. Narrative criteria are descriptions of the conditions necessary for a waterbody to attain its designated use, whereas numeric criteria are values expressed as chemical concentrations, toxicity units, aquatic community index levels, or other numbers deemed necessary to protect designated uses. A "translator" identifies a process, methodology, or guidance that States or Tribes will use to quantitatively interpret narrative criteria statements. Translators may consist of biological assessment methods (e.g., field measures of the biological community), biological monitoring methods (e.g., laboratory toxicity tests), models or formulae that use input of site-specific information/data, or other scientifically defensible methods. Translators are particularly useful for addressing water quality conditions that require a greater degree of sophistication to assess than can be typically expressed by

numerical criteria that apply broadly to all waters with a given use designation. Criteria must be based on sound scientific rationale and should contain sufficient parameters or constituents to protect the designated use. The National Research Council report also emphasized selection of criteria that are accurate indicators of the designated use.

Where a state, territory or authorized tribe adopts narrative criteria for toxic pollutants to protect designated uses, it must provide information identifying the method by which it intends to regulate point source discharges of toxic pollutants on water quality limited segments based on such narrative criteria. Such information may be included as part of the standards or may be included in documents generated by the state, territory or authorized tribe in response to the Water Quality Planning and Management Regulations (40 CFR part 35). Where a state, territory, or authorized tribe adopts narrative criteria for non-toxic pollutants to protect designated uses, it should provide information identifying the method by which it intends to regulate point sources discharges on water quality limited segments based on such narrative criteria in the state, territory, or authorized tribe's WQS or alternatively in other implementing regulations or policies and procedures documents such as the continuous planning process of consolidated assessment and listing methodology.

States, territories, and authorized tribes also adopt an antidegradation policy specifying the framework to be used in making decisions regarding changes in water quality. The intent of an antidegradation policy is to ensure that in all cases, at a minimum: (1) water quality necessary to support existing uses is maintained; (2) where water quality is better than the minimum level necessary to support protection and propagation of fish, shellfish, and wildlife, and recreation in and on the water ("fishable/swimmable"), that water quality is also maintained and protected unless, through a public process, some lowering of water quality is deemed necessary to allow important economic or social development to occur; and (3) where waterbodies are of exceptional recreational or ecological significance, water quality is maintained and protected.

3.1.2 Monitoring To Assess Attainment With WQS and Identify Impaired Waters

Monitoring to determine attainment of applicable WQS should include a multi-indicator approach that may include biological, toxicological, physical, and chemical indicators of the WQS and its components. Each type of data provides unique insights into the integrity and health of an aquatic system, as well as the ability of the public to safely recreate in such waters. These indicators are frequently organized on a continuum from loadings entering the system, to stressors present in the system, to response of the system (see Figure 3-1).

Each type of data offers different strengths and limitations. For example, biological assessments measure the response of aquatic life to the cumulative effects of past or current impacts from multiple physical and chemical stressors. However, these assessments may be limited in their ability to predict future impacts, or identify new stresses that have not begun to be reflected in the biological community. Chemical-specific assessments evaluate and predict impacts from single pollutants, but do not capture the combined interactions of pollutants or their cumulative impacts over time. Assessment of the physical, chemical, and biological integrity of the nation's waters should be based on an appropriate combination of indicators selected to characterize WQS

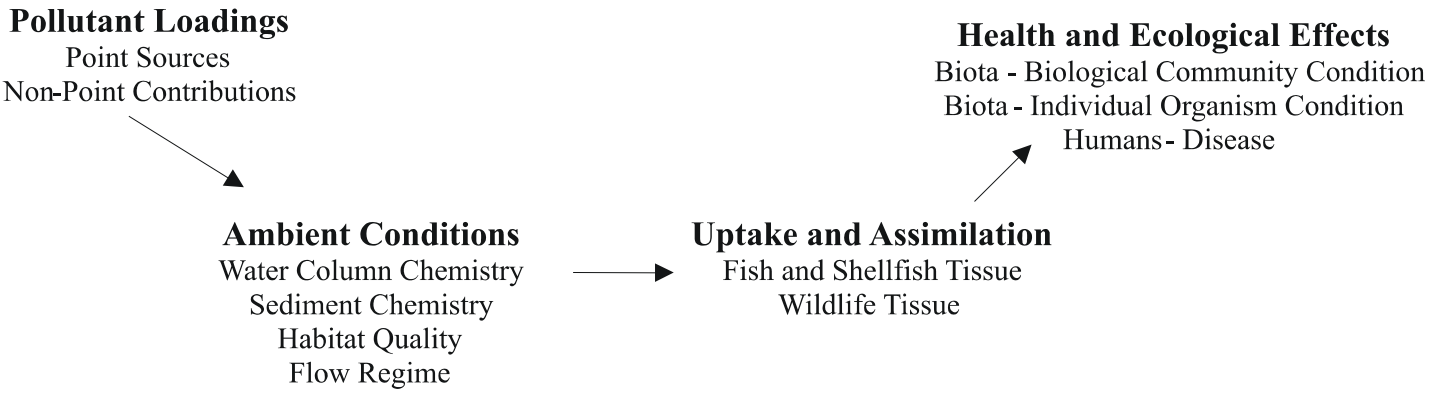


Figure 3-1. Continuum of water quality indicators.

attainment status, including physical, chemical, and toxic characteristics of water and sediment; chemical accumulations in fish tissue; a biological assessment of the aquatic community; and physical condition of habitats. Chapter 10 provides more information on selection of indicators.

State, territory, or tribal WQS (uses, criteria, and the antidegradation policy) adopted pursuant to section 303(c) of the CWA are the basis for attainment or nonattainment determinations for the purposes of identifying impaired waters pursuant to CWA section 303(d). Under section 303(d)(1) of the CWA, states, territories, and authorized tribes must identify waterbodies for which technology-based controls required by the Act are not sufficient to implement applicable WQS, and prioritize such waterbodies for TMDL establishment. For purposes of determining whether a waterbody is impaired and should be included on section 303(d) lists, states, territories, and authorized tribes are required by EPA regulations to consider all existing and readily available data and information. For example, if a state shares a waterbody with another state, it must consider existing and readily available data from the state that shares the waterbody. This may include physical, chemical, and biological data, including data on pathogens (such as bacteria and phytotoxins), as well as fish and shellfish tissue concentration data, where such data are existing and readily available. The assessment methodology prepared by states, territories, and authorized tribes should describe how it collects or obtains data and information relevant to applicable WQS, how it evaluates the suitability of the data or information for decision making, and how it analyzes and interprets data to make attainment or nonattainment decisions.

3.2 Aquatic Life–Based Water Quality Standards

Section 101(a)(2) of the CWA establishes as a national goal "water quality which provides for the protection and propagation of fish, shellfish, and wildlife, and recreation in and on the water, wherever attainable." EPA's WQS regulations require that standards provide for these "fishable/swimmable" uses wherever attainable. Each state, territory and authorized tribe develops and adopts aquatic life–based WQS for waters under its jurisdiction.

The form of aquatic life–based WQS varies from state to state. Some states adopt aquatic life–based WQS that contain broad aquatic life uses and criteria that essentially apply to all waters. Others, like the example in Table 3-1, have a variety of different aquatic life use categories based on the type or function of the water. The narrative and numeric criteria adopted to protect those uses may apply to all of the uses or be tailored to each specific use. Still others have used biological assessments to develop refined or tiered aquatic life–based WQS categories that reflect expectations for characteristics of the aquatic community in each category. With tiered aquatic life uses, a state can set numeric biocriteria that clearly define the upper and lower bounds of biological conditions expected within each aquatic life tier. Similiarly, the state can adopt physical and chemical criteria appropriate for each tier. When approached in this fashion, a state will have aquatic life–based WQS that clearly and precisely define what the management objective is for a given waterbody and the numeric thresholds or criteria above and below which the objective is or is not achieved.

Some states, such as Maine, Ohio, Vermont, Florida, Maryland, Kentucky, and Oregon, have already constructed biological assessment and standards programs for streams and small rivers incorporating tiered aquatic life uses derived from their bioassessment data, and are protecting those uses through numeric or narrative biocriteria. Most other states are developing programs and are at different levels of implementation.

3.2.1 Which Types of Data and Information Does the State Use for Assessing Whether Aquatic Life–Based WQS Are Attained?

State water quality standards are comprised of three distinct elements: (1) designated use, (2) numeric and narrative criteria that protect the use, and (3) antidegradation policy. For each state standard, the state should describe how it assesses attainment with the standard, and each component element. Ideally, this description should be included in the state's water quality standards. Alternatively, it may be defined in other implementing regulations or policies and procedures documents such as the state's continuous planning process or consolidated assessment and listing methodology.

States, territories and authorized tribes should describe the indicators and thresholds that are used to assess attainment status for each WQS. The term "indicators" is used to refer to a wide range of measures of water quality (e.g., physical, chemical, biological, habitat, toxicity, tissue data). "Thresholds" refers to the numeric value or narrative description that distinguishes attainment from impairment. These thresholds may be adopted into the state, territory or authorized tribe's WQS ordefined in other implementing regulations or policy and procedure documents as a translator or implementation procedure for interpreting the WQS.

Following are brief descriptions of the various indicators or types of data a state may use to interpret its aquatic life–based WQS. Subsequent chapters in this document provide detailed descriptions of how these different types of data may be used.

- *Biological data*—Biological data measure actual effects of pollutants on an aquatic community. Biological assessments typically quantify the difference between reference or

expected conditions of aquatic communities and those found at a specific site being evaluated. Reference conditions are the expected biological attributes (e.g., the structure, function, and condition) of the aquatic community in a particular type or class of waterbody. Chapter 5 provides more detail and references to technical documents on the use of biological data to assess WQS attainment/impairment. EPA recommends that states include biological indicators among the core indicators used to assess attainment with aquatic life–based WQS.

- *Habitat data*—Habitat assessments are often conducted in conjunction with biological assessments. A general habitat assessment incorporates physical attributes from microhabitat features such as substrate, velocity, and depth, with waterbody morphology features such as width, sinuosity, flow, or volume, and macrohabitat features such as vegetation and land use. All of these features can be incorporated into an index or summary of overall habitat conditions. Typically, states, territories, and authorized tribes integrate habitat assessments with biological assessments when assessing applicable WQS attainment. These indices are sometimes used independently to determine whether aquatic life uses are being attained. Chapter 8 provides more detail and references to technical documents about development and application of habitat indicators.

- *Toxicity data from water column and sediment*—Ambient water column and sediment toxicity tests are useful for examining the effects of unknown mixtures of chemicals in surface waters. They may also be used to confirm that an observed impairment is not due to chemical or toxicity-related sources. Toxicity thresholds are expressed in terms of "toxic units" that cause toxic effects to aquatic organisms. Toxicity levels are determined by exposing aquatic organisms to water samples. To sensitive aquatic organisms, toxicity testing integrates the biological effects of most chemical stressors present, potentially giving a more accurate estimate of the actual water or sediment quality compared with chemical concentration measurements. Even unknown toxicants are addressed during testing.

  States and tribes may have water or sediment toxicity criteria in numeric form (toxic units) or narrative form ("free from"). Whole effluent toxicity (WET) testing is commonly performed at point-source discharges and can be used to trigger monitoring for toxicity. Chapter 6 provides more detail and references to technical documents about the use of toxicity testing as an indicator of WQS attainment.

- *Chemical and physical data*—Chemical and physical data address toxicants (e.g., priority pollutants and nonpriority pollutants) and physical characteristics (e.g., dissolved oxygen, suspended solids, pH, and temperature) in water and sediments. Chemical and physical data provide direct information about whether specific pollutants are present in amounts that are causing or likely to cause adverse impacts to aquatic organisms.

  EPA has published water quality criteria for the protection of aquatic life for 31 pollutants, under the authority of section 304(a) of the CWA. States, territories, and authorized tribes use these water quality criteria as guidance in adopting water quality criteria into their

WQS. Chapter 4 provides more information on the use of chemical and physical data for determining WQS attainment. As described in Chapter 11, EPA recommends the use of physical and chemical indicators as core and supplemental indicators of aquatic life–based WQS.

An important element of a state's consolidated assessment and listing methodology is a description of how it assesses attainment with its WQS. In the most comprehensive circumstance, the state may measure indicators of the use and all applicable numeric and narrative criteria in addition to ensuring that the antidegradation policy is met. A state following this approach would identify a water as attaining a particular WQS only when the state has demonstrated that all of these indicators are in attainment.

States are often more selective in the water quality indicators used to assess attainment with water quality standards. States may describe a subset or hierarchy of indicators that serve to characterize whether a WQS (and its components) are attained. Under this approach, a state may identify core indicators that represent the most direct measures of the WQS as the first tier of data used to support WQS attainment decisions and identify impaired waters. If measurements of these core indicators show attainment, the state may list the water as attaining the WQS. Regardless of the approach, the state should clearly document how attainment decisions are made. If not documented elsewhere, the consolidated assessment and listing method is the appropriate place.

Supplemental indicators are added to the monitoring and data collection strategy as appropriate. For example, supplemental indicators may be added for waters where there is a reasonable potential for specific pollutants to cause or contribute to water quality impairments based on evaluation of watershed conditions, including land use and source assessments. Additionally, a state may add supplemental indicators to explore the presence of pollutants widely distributed by atmospheric deposition or to establish a baseline for emerging pollutants of concern. Chapter 11 provides more discussion of potential core and supplemental indicators and how this approach may be used to improve the efficiency of water quality assessments.

It is important to note that even though the use of core and supplemental indicators should make the state, territory or authorized tribe's monitoring, information collection, and decision making activities more efficient, it cannot preclude the consideration of other relevant data and information. The state, territory, or authorized tribe is obliged to consider any other data that are relevant to its WQS (and each component) when making attainment decisions. For example, if a state shares a waterbody with another state, it must consider existing and readily available data from the state that shares the waterbody. Therefore, the assessment methodology should also address how each component of the WQS will be assessed in the event the state, territory, or authorized tribe collects or receives additional data.

3.2.2 How Does the State Interpret Data from Multiple Sources To Make WQS Attainment Impairment Decisions?

This question represents another key element of a state's consolidated assessment and listing methodology. The first step involves evaluation of the monitoring results for each indicator or type of data independently. This step includes seeking data, evaluating their quality, and interpreting the results against the applicable component of the WQS. Subsequent chapters in this document describe this process for each type of data or indicator.

The second step involves looking across the multiple types of data that serve as indicators of aquatic life–based WQS and making an attainment decision for the standard. In most cases, the WQS will be attained only when all of the indicators that the state evaluates show attainment. If one or more indicators show nonattainment, the state will typically categorize the water as not attaining the aquatic life–based WQS. There are, however, exceptions to this general policy of independent applicability, as described below.

To address the possibility of conflicting results among different types of data used to assess attainment with WQS, EPA recommends that states, territories, and authorized tribes apply the policy on independent applicability as appropriate for making WQS attainment decisions. This policy was initially crafted to address development of NPDES permit discharge limits. Its use is slightly different in the context of WQS attainment decisions.

The intent of this policy is to protect against dismissing valuable information when evaluating aquatic life use attainment, particularly in detecting impairment. EPA's policy on independent application is based on the premise that any valid, representative dataset indicating an actual or projected water quality impairment should not be ignored when one is determining the appropriate action to be taken. However, EPA recognizes that there are circumstances when conflicting results should be investigated further before the attainment or nonattainment decision is made. For example, states may obtain multiple datasets of varying quality, which may influence the reliability of the assessment results.

Figure 3-2 elaborates on the use of the independent application policy in reconciling conflicting results among different datasets used to assess attainment with aquatic life–based WQS. The decision process begins in the upper left of the figure. When a state, territory, or authorized tribe has two or more types of data that do not indicate consistent attainment status, it should determine whether differences in assessment results can be attributed to differences in the quality of the datasets. For example, this may involve consideration of analytical methods, review of sampling techniques, and detailed assessment of datasets. When the differences are due to data quality issues, the independent application policy allows for resolving the differences by cleaning the data or weighing the higher quality dataset more favorably in the attainment decision.

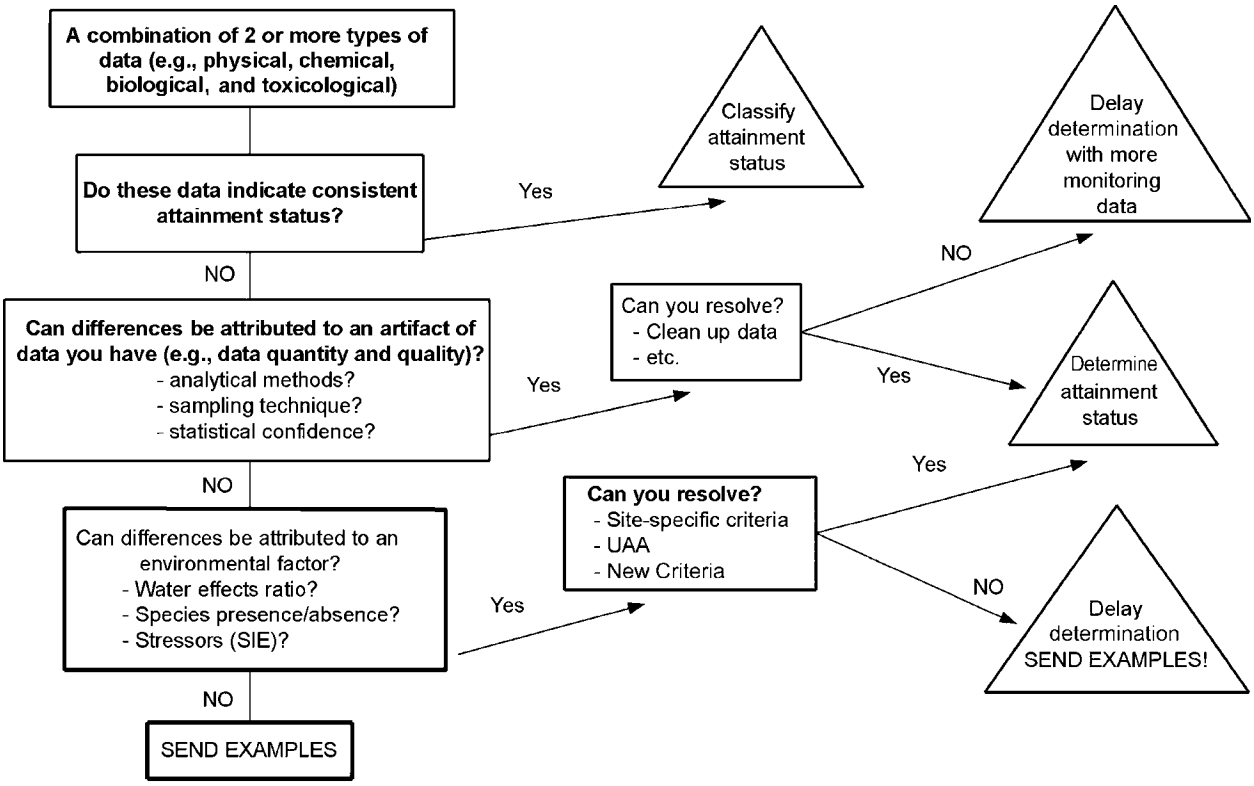


Figure 3-2. Using multiple types of data to assess attainment.

For Purposes of WQS Attainment/Nonattainment Determinations:

Policy of independent applicability *says*:

- When evaluating multiple types of data (e.g., biological, chemical) and any one type of data indicates an element of a WQS is not attained, the water should most likely be identified as impaired.
- If there is reason to doubt the nonattainment finding, re-evaluate all of the data sets to resolve discrepancies. In some cases this may lead to modification of applicable WQS to account for site-specific information.

Policy of independent applicability *does not say*:

- Always assume that a single sample result showing impairment outweighs all other data showing attainment.
- Accept all differences in data findings at face value.
- Ignore data quality and site-specific environmental factors.

When detailed data analysis fails to identify data quality issues that explain the discrepancies, site-specific environmental conditions should be considered (e.g., effects of water chemistry, or the ability of species to adapt over time). Three procedures may be explored to assess whether site-specific environmental conditions explain the discrepancies: application of the water effects ratio, development of site-specific criteria, revisions to State criteria, or conducting a use attainability analysis (UAA). These are examples of techniques that examine whether the WQS and its component elements are appropriate for the water being assessed.

Table 3-2 provides three simplified case studies demonstrating how aquatic life use support decisions are made when different types of data provide differing findings. It illustrates the importance of documenting data quality in the assessment process. EPA requests that states, territories, and authorized tribes send examples of cases in which differences in assessment results cannot be attributed either to artifacts of the data or to environmental factors. This will help the Agency further refine the independent applicability policy.

3.2.3 Examples of State Approaches To Integrate Multiple Types of Data To Assess WQS Attainment

Several States have adopted policies or legislation specifically addressing how the state defines and assesses attainment with aquatic life–based WQS. Examples from Montana and Idaho are presented below. Inclusion of these examples does not imply that these approaches are best for other states, territories, or authorized tribes. Rather, it serves to demonstrate some different approaches to documenting how the aquatic life–based WQS were assessed to identify attaining and nonattaining waters.

Montana State Profile: Montana Aquatic Life–Based WQS Assessment Process

Montana's process is presented here to illustrate a state approach to integrating multiple types of data to assess applicable WQS attainment. Additional details are available on the State's Department of Environmental Quality (DEQ) website at http://www.deq.state.mt.us/ppa/mdm.

Montana law requires the DEQ to use sufficient credible data to make WQS attainment determinations. The law defines sufficient credible data as "chemical, physical, or biological monitoring data alone or in combination with narrative information that supports a finding as to whether a waterbody is achieving compliance with applicable WQS" (75-5-103 MCA). The DEQ has developed data quality objectives to ensure that use support determinations are made with a reasonable amount of information, unless limited data provide overwhelming evidence of a water quality impairment.

The data evaluation process employs decision tables similar to the tables presented in Chapters 4 and 5 that help the reviewer score the quality of the data. For aquatic life use, the decision tables consider physical/habitat, biology, and chemistry/toxicity data. Table 3-3 presents Montana's decision table for scoring biological data for streams. Similar tables exist for physical/habitat data and chemical/toxicity data. Each category of data available for an assessment is reviewed to

Table 3-2. Applying independent applicability to cases where different data types suggest different assessment results

	Data Type	Case Study 1	Case Study 2	Case Study 3
		Waterbody Description		
		0.8-Mile Stream Reach in Rural Watershed	4-Mile Coastal Blackwater Stream	1.5-Mile Stream Reach in Urban Watershed
Type of Assessment Data and Information	Biological	RBP (Rapid Bioassessment Protocol) (benthic)	RBP (benthic)	RBP (benthic and fish)
	Habitat	Visually based RBP	None	None
	Toxicity	None	None	Sediment toxicity
	Physical/chemical	Conventionals	Conventionals	Conventionals and metals
Level of Information (see Table 4-2)	Biological	2	2	4
	Habitat	2	N/A	N/A
	Toxicity	N/A	N/A	4
	Physical/chemical	1	3	2
Assessment Findings	Biological	Benthos show no impairment	Benthos show no impairment	Benthos show impairment; fish show no impairment
	Habitat	Habitat shows no degradation	N/A	N/A
	Toxicity	N/A	N/A	Sediment toxicity testing indicates no exceedance
	Physical/chemical	Upstream exceedances of dissolved oxygen standard	Exceedances of pH standard	No exceedances of chronic criteria
Attainment Result	Based on decision rules documented in state, territory, or authorized tribe's assessment methodology	Attaining or inconclusive—Because of low confidence in P/C data, base decision on bio/habitat data or delay pending further monitoring.	Impaired—Investigate whether differences can be attributed to site-specific factors. If yes, develop site-specific criteria.	Impaired—Due to high confidence in biological data showing impairment.

Table 3-3. Montana's Decision Table for Scoring Biological Data (streams)

Score	Technical components	Spatial/temporal coverage	Data quality	Data currency
1	- Visual observations of biota were made with no true assessment. - Simple documentation. - Unable to make a comparison to reference condition. - Relative abundance of fish data that are not supplemented with quantitative data or cannot be interpreted by a biologist. - Fish creel surveys with limited supplemental information.	- Very limited monitoring. - Data are extrapolated from other sites.	- Data precision and sensitivity are very low or unknown. - Qualified professional does not provide any oversight. - Poor taxonomic resolution.	- Data are not relevant; biological communities may have changed significantly since the assessment was made.
2	- Only one assemblage assessed (e.g., RBP protocols). - Probable sources and causes of impairment are documented. - Reference condition can be approximated by a professional scientist. - Relative fish abundance data can be interpreted by a qualified professional or also includes quantitative fish density.	- Limited to a single sampling. - Limited sampling for site-specific studies.	- Data precision and sensitivity are low to moderate. - Data were collected following appropriate protocols; however, individuals had limited training. - Qualified professional provided oversight. - Good taxonomic resolution.	- It is unlikely that the biological communities have changed significantly since the survey was conducted.
3	- Two assemblages assessed or one assemblage with quantitative (e.g., biomass) measurements also made following standard operating procedures (SOPs). - Often include biotic index interpretations. - Fisheries data often include information about growth rates, age class, and condition; the entire fish assemblage is targeted. - Reference condition can be determined with reasonable degree of confidence and used as a basis for assessment.	- Monitoring normally occurs during a single season. - Monitoring may include site-specific studies; however, also has limited spatial coverage of the stream reach.	- Data have moderate precision and sensitivity. - Qualified professional performs survey or provides training; the individual making the survey is well trained. - Qualified professional performs the survey. - Detailed taxonomic resolution.	- Data were collected recently or it is very unlikely that the biological community has changed significantly since the survey was conducted.
4	- Two or more assemblages assessed and often include quantitative measurements following SOPs. - Reference condition is well understood and is used as the basis of the assessment. - Often include biotic index interpretations.	- Surveys conducted for multiple years and/or seasons. - Broad coverage of sites. - Often uses targeted or probabilistic design.	- High precision and sensitivity. - Assessment performed by a highly experienced qualified professional.	- Data are current; there is no doubt that the biological survey reflects current conditions.

determine its level of information, with scores ranging from a low of 1 to the highest score of 4. Scores from the different data categories are added together, and a combined score of 6 is generally considered necessary for a determination of sufficient credible data. The State does make exceptions, however, in cases where low scoring data provide overwhelming evidence (see text box) of an impairment.

Montana Criteria for Overwhelming Evidence of Impairment
Montana's methodology defines particular circumstances where data may be used to identify impairments even if the data score is less than 6. If the state, while reviewing the available data, determines that there is "overwhelming evidence" that a particular beneficial use is not supported, the use of the decision tables is unnecessary. Following are the criteria for overwhelming evidence:

- Any exceedance of an acute aquatic life standard
- A 250% exceedance of a chronic aquatic life standard, even if there is only one credible data point
- Any exceedance of an aquatic life standard based on sufficient data to calculate a geometric mean
- Any 50% exceedance of a narrative standard
- Any activities that negatively impact habitat by more than 50%
- Any activities that negatively impact biological communities by more than 50%.

Once the state has determined it has sufficient and credible data, it employs the decision criteria tables for aquatic life–based WQS for streams, lakes, or wetlands. Table 3-4 is a copy of the decision table for lakes and wetlands.

Idaho State Profile: Idaho Ecological Assessment Framework for Rivers and Small Streams

The Idaho Department of Environmental Quality (DEQ) uses a "multiple data type integration" approach to assess coldwater biota beneficial use, one of the state's aquatic life-based WQS. As part of Idaho's beneficial use reconnaissance program (BURP), the DEQ monitors a number of biological and chemical indicators. Idaho's assessment process is unique in that after considering each type of data independently to assess WQS attainment status, it combines the data into an aggregate score and uses that score as another independent measure of attainment status.

Idaho uses different bioassessment indexes for smaller streams than for larger rivers. The streams methodology is used in this example to illustrate the State's approach. Figure 3-3 demonstrates how Idaho assesses stream coldwater biota use attainment with one or more types of data. When only a single set of data exists (e.g., fish, macroinvertebrate, or physical/chemical), the DEQ applies the single data type approach illustrated on the left side of the flowchart to determine attainment of WQS. When there are two or more types of data, the DEQ uses the multiple data type integration approach illustrated on the right side of the flowchart. Idaho's multiple data type integration approach uses the following steps to determine attainment of standards for coldwater biota for streams:

Table 3-4. Montana's Decision Criteria Table for Aquatic Life-Based WQS Attainment for Lakes and Wetlands (fish, aquatic life, and wildlife)

Data category (lakes/wetlands)	Not/least impaired	Moderately impaired	Severely impaired
1. Chemistry			
Toxicity	Bioassay test indicates no acute or chronic toxicity.	Bioassay test indicates chronic toxicity.	Bioassay test indicates acute toxicity.
Chemical (toxicants, e.g., trace metals, ammonia, chlorine, organics, pesticides)[a,b] *Acute and chronic water quality standards*	For any pollutant: No exceedence of acute or chronic standard values; and/or the chronic standard values are exceeded by < 10% no more than once for one parameter in a 3-year period when measurements were taken at a minimum frequency of 4 times/year.	For any pollutant: Acute standard values are exceeded by 0.1-25%, or chronic standard values are exceeded by 0.1-50%, and/or water quality standard values are exceeded ≤10% of the measurements from a large dataset.	For any pollutant: Acute standard values are exceeded by >25%; or chronic standard values are exceeded by >50%; and/or water quality standard values are exceeded in >10% of the measurements from a large data set.
Sediment chemistry (toxicants, e.g., metals, organic compounds)	Average sediment trace metal concentrations are similar to reference condition.	Average sediment trace metal concentrations are moderately higher than reference condition.	Average sediment trace metal concentrations are substantially higher than reference condition.
Trophic status	Trophic status is similar to reference condition.	Trophic status exceeds reference condition.	Trophic status is hyper-eutrophic.
Models	Predictive models do not indicate impairment.	Predictive models indicate moderate impairment.	Predictive models indicate severe impairment.
Bioaccumulation	Pollutants are not bioaccumulated above background levels.	Bioaccumulation of pollutant is slightly above background levels.	Bioaccumulation of pollutant is substantially higher than background levels.

[a] When possible, use the average concentration of samples collected over a 96-hour period and compare directly with chronic standard values; one data point (n=1) is sufficient if no other data were collected within 96 hours.

[b] Reference condition may use a combination of the following: (1) least-impaired lake or wetland, (2) historical data, (3) upstream/down stream, (4) paired watershed, (5) review of existing literature, or (6) expert opinion.

[c] For this guidance document, exceedence is defined as a result that is higher or lower than what Montana's WQS allow.

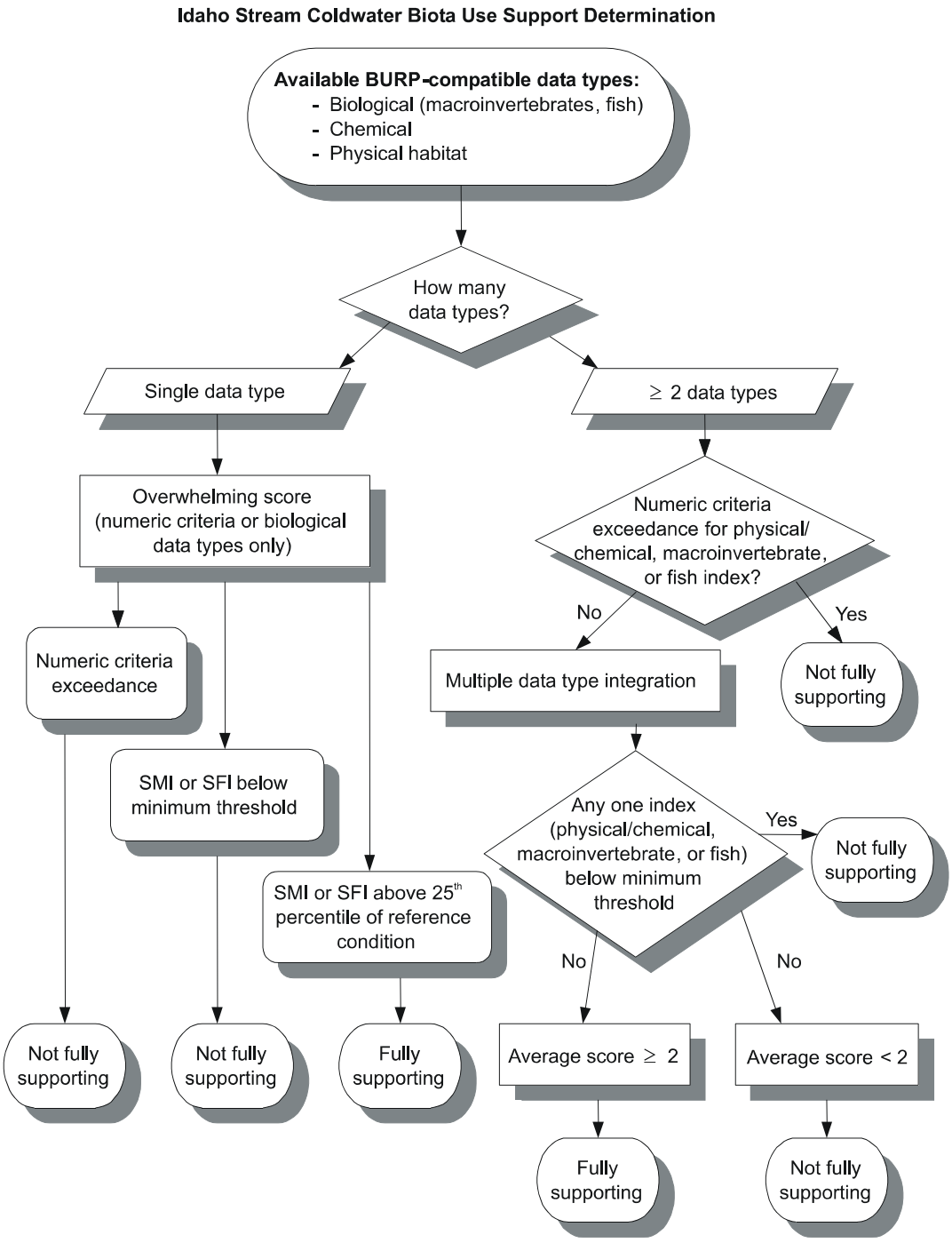


Figure 3-3. Idaho's use support determination process for stream coldwater biota use.

- Identify any numeric criteria exceedance using the criteria exceedance policy. *If there is a numeric criteria exceedance, the DEQ automatically determines the waterbody is not supporting.*

- Calculate the index scores and determine corresponding percentile categories.

- Identify any stream macroinvertebrate index (SMI) or stream fish index (SFI) scores below minimum threshold levels. *If the SMI and/or SFI scores are below minimum threshold levels, the DEQ automatically determines the waterbody is not fully supporting.*

- Identify a corresponding 1, 2, or 3 condition rating for each index. The stream habitat index (SHI) receives a 1 or 3 rating. Note that the SHI is incorporated into the combined, multi-index score, but is not considered robust enough to be used as an independent indicator of attainment status.

- Average the index ratings to determine the use support. To average the individual index ratings sum the ratings, and divide by the number of indexes uses. *An average score ≥2 is considered fully supporting. An average score <2 is considered not fully supporting.*

3.3 Recreation-Based Water Quality Standards

As discussed at the beginning of this chapter, section 101(a)(2) of the CWA establishes a goal of "fishable/swimmable" uses wherever attainable. States, territories, and authorized tribes adopt WQS to ensure that waters meet the swimmable goal. These water quality standards comprise three distinct elements: (1) designated use, (2) numeric and narrative criteria that protect the use, and (3) antidegradation policy. The form of these standards varies from state to state. Some states designate all waters for primary contact recreational use and adopt criteria to protect that use. Others assign subcategories or tiers of designated uses that reflect the nature and intensity of the use, for example, bathing beach or noncontact recreation, and criteria appropriate for each use tier. A more detailed description of subcategories of recreational uses is provided in *Implementation Guidance for Ambient Water Quality Criteria for Bacteria* (U.S. EPA 2002 - projected).

EPA's section 304(a) water quality criteria guidance for the protection of human health recommends adopting water quality criteria for two bacteria indicators for the protection of recreational uses, as appropriate. The bacteria indicators are enterococcus bacteria (for fresh or marine waters) and/or *Escherichia coli* (*E. coli*) (for fresh waters only). Many states, territories, and authorized tribes are still using the less reliable fecal coliform indicator as water quality criteria for protection of recreational uses. EPA continues to encourage states, territories, and authorized tribes that have not adopted the recommendations set forth in Ambient Water Quality Criteria for Bacteria – 1986 or other water quality criteria for bacteria based on scientifically defensible methods into their WQS to replace water quality criteria for total or fecal coliforms with criteria for *E. coli* and/or enterococci, as appropriate. In addition, the BEACH Act of 2000 amended the CWA to include section 303(i) to require states with coastal recreational waters to

adopt by April 10, 2004, WQS for pathogens and bacteria for which EPA has published criteria under CWA section 304(a).

3.3.1 What Types of Data and Information Does the State Use To Assess Whether the Recreational-Based WQS Are Attained?

For each recreation-based WQS, the state, territory, or authorized tribe should describe how it assesses attainment with the standard, and each component element. Ideally, this description should be included in the approved WQS. Alternatively, it may be defined in other implementing regulations or policies and procedures documents such as the state's continuous planning process or consolidated assessment and listing methodology.

As was described previously, states should describe the indicators and thresholds that are used to assess attainment status for each WQS. Attainment decisions for recreation-based WQS are typically based on bacteria criteria monitoring data, including the enterococci and *E. coli* indicators and fecal coliform. States, territories, and authorized tribes also consider esthetic conditions, chemical water quality criteria for protection of public health, and information on use restrictions (e.g., beach closures or public advisories). Following are brief descriptions of the various indicators or types of data that should be used to interpret recreation-based WQS.

- *Bacteria criteria*—Bacteria of fecal origin have been used for many years as an indicator of the possible presence of pathogens in surface waters and the risk of disease based on epidemiological evidence of gastrointestinal disorders from ingestion of contaminated surface water or raw shellfish. Contact with contaminated water can also lead to ear or skin infections, and inhalation of contaminated water can cause respiratory diseases. The pathogens responsible for these diseases can be bacteria, viruses, protozoans, fungi, or parasites that live in the gastrointestinal tract and are shed in the feces of warm-blooded animals.

  However, because of the difficulties in analyzing for and detecting the many possible pathogens or parasites, concentrations of fecal bacteria, including fecal coliforms, enterococci, and *E. coli*, are used as the primary indicators of fecal contamination. The latter two indicators have a higher degree of association with outbreaks of certain diseases than do fecal coliforms and were recommended as the basis for bacterial WQS in EPA's 1986 Ambient Water Quality Criteria for Bacteria document (enterococci for marine waters, *E. coli* and enterococci for fresh waters). The water quality criteria are defined as a concentration of the indicator above which the health risk from waterborne disease is unacceptably high. In 2002, EPA will publish *Implementation Guidance for Ambient Water Quality Criteria for Bacteria*, to assist states, territories, and authorized tribes in adopting and implementing these water quality criteria for recreational waters. (U.S. EPA 2002 - projected).

  See Chapter 7 for a discussion of approaches for using bacteria criteria data to assess waterbodies for recreational uses.

- *Information on indicators of fecal pollution*—Many state, territory, and authorized tribe recreation-based WQS contain narrative water quality criteria to protect waters designated for recreational use from objectionable levels of turbidity, algae, taste and odor, oil and grease, and solid waste (e.g., trash, medical waste). For example, the State of New Jersey has a narrative water quality criterion for all applicable designated uses that prohibits taste- and odor-producing substances at a level that would render the water unsuitable for the use. Data or field observations of objectionable conditions can be used to make an attainment decision, and procedures to do so should be described in the consolidated assessment and listing methodology.

  Although this document does not include a separate chapter addressing implementation of esthetic criteria, it is important that the state, territory, or authorized tribe describe how it collects and interprets information to determine attainment or nonattainment with these criteria. This description may already be developed as a translator policy or implementation procedure for that element of the WQS. If not, it should be included in the consolidated assessment and listing methodology.

- *Use restrictions and closures*—Many states, territories, and authorized tribes' water quality programs use information on bathing area restrictions and closures to determine attainment with recreation-based WQS. This information comes from state and local health departments and may be based on water quality monitoring, calibrated rainfall alert curves, or precautionary information. Before using this information on use restrictions and closures, it is important to document the basis for them. For example, the water quality agency may want to verify that the health department uses indicators and thresholds that are consistent with the state, territory, or authorized tribe's WQS.

  In general, water quality–based bathing closures or restrictions that are consistent with the state, territory, or authorized tribe's assessment methodology and are in effect during the reporting period should be used as an indicator of nonattainment. There are some exceptions, however. Bathing areas subject to precautionary administrative closures such as automatic closures after storm events of a certain intensity may not trigger an impairment decision if they are not associated with an exceedance of applicable WQS. Similarly, closures or restrictions based on other conditions like rip-tide or sharks should not trigger a nonattainment decision.

- *Chemical data*—Most recreation-based WQS include numeric chemical human health criteria for other pollutants or stressors to protect recreational uses. As noted by the Intergovernmental Task Force on Monitoring (ITFM), potentially hazardous chemicals in water and bottom sediment can be important indicators for recreational use support determinations. See Chapter 4 for discussion of chemical data.

The types of data and information available for use as indicators of recreation-based WQS attainment status come from a variety of sources. These sources range from local health departments, to interstate water resource commissions, to Federal agencies like the U.S. Geological Survey. EPA encourages states, territories, and authorized tribes to partner with

these potential sources of information when determining which indicators are most appropriate for assessing WQS attainment and when developing monitoring designs to collect appropriate data and information. For example, if a state shares a waterbody with another state, data from the state that shares the waterbody will be useful in making appropriate attainment decisions. These partnerships may reduce the monitoring and data analysis burden facing water quality assessment programs.

The assessment methodology prepared by the state, territory, or authorized tribe should describe the indicators or types of data used to assess WQS attainment status and the thresholds that distinguish attainment from nonattainment. The methodology should also describe how the state will collect and evaluate the data.

3.3.2 How Does the State Interpret Multiple Types of Data To Assess WQS Attainment?

This question represents another key element of a state's consolidated assessment and listing methodology. The first step in answering this question involves describing how the state, territory, or authorized tribe evaluates the data and information obtained for each indicator or type of data independently. This step includes seeking data, evaluating their quality, and interpreting the results against the applicable component of the state's WQS. Subsequent chapters in this document describe this process for each type of data or indicator.

The second step involves looking across the multiple types of data that serve as indicators of recreation-based WQS and making an attainment decision for the standard. In most cases, the WQS will be attained only when all of the indicators that the state evaluates show attainment. If one or more indicator show nonattainment, the state will typically categorize the water as not attaining the aquatic life–based WQS. There are, however, exceptions to this general policy, as described in Section 3.1.2.

3.3.3 Examples of State Approaches To Assess Recreation-Based WQS Attainment

EPA plans to profile different types of approaches that states, territories, and authorized tribes use to integrate multiple types of indicators or data to assess attainment with recreation-based WQS based on the documentation provided in the assessment and listing methodologies that states, territories, and authorized tribes include with the 2002 Integrated Report submissions.

3.4 Public Water Supply–Based Water Quality Standards

Public water supplies are protected under both the Safe Drinking Water Act (SDWA) and the CWA. The SDWA established a multiple-barrier approach to protecting public water supplies. The multiple-barrier approach includes assessing and protecting drinking water sources, protecting wells and collection systems, making sure water is treated by qualified operators, ensuring the integrity of distribution systems, and making information available to the public on the quality of their drinking water.

A central element of the multiple-barrier approach is the source water assessment, which is primarily a vulnerability assessment and action plan to protect source water from contamination. It includes delineation of the hydrologic boundaries of the source water and identification of potential sources of contamination within those boundaries. It then focuses on activities to prevent those sources from contaminating source waters. It does not typically include monitoring source water quality, although it may include collection and evaluation of existing water quality data. A more detailed discussion of the elements of a source water assessment is provided in the State Source Water Assessment and Protection Programs Guidance (EPA 816-R-97-009).

Under the CWA, states, territories, and authorized tribes adopt WQS for surface waters, and in some cases ground water, that protect public water supply uses. As with all WQS, public water supply–based WQS include designated use, numeric and narrative criteria to protect the use, and antidegradation policies. Water quality standards adopted into state, territory, or authorized tribal law or regulation serve to implement the SDWA's "multiple barrier" approach to drinking water protection.

To improve consistency among implementation of the SDWA and CWA, states, territories, and authorized tribes should review WQS to ensure that they have been adopted for waters delineated under source water assessments. When a state, territory, or authorized tribe has adopted WQS for the protection of drinking water uses, including public water supplies, and classified waters under its jurisdiction for such uses, those uses must be maintained and protected, consistent with section 303(c) of the CWA and the implementing Federal WQS regulations at 40 CFR 131. This includes protection of existing uses of waters as drinking water or public water supplies.

3.4.1 Which Types of Data and Information Does the State Use To Assess Whether the Public Water Supply–Based WQS Are Attained?

When adopting public water supply–based WQS, the state, territory, or authorized tribe should describe how it will assess attainment with the standard and each component element. This description should identify the indicators and thresholds that are used to assess attainment with the WQS. If this description is not a part of the approved WQS, it should be defined in other implementing regulations or policies such as the continuing planning process document or the consolidated assessment and listing methodology.

Monitoring programs should consult with the source water assessments to help identify water quality indicators that should be monitored. Following is a brief description of the various indicators or types of data that are commonly used to interpret attainment with public water supply–based WQS. More information on selecting water quality indicators is included in Chapter 11.

- *Chemical data*—To ensure that water quality protects public drinking water uses, states, territories, and authorized tribes adopt human health–based chemical criteria for waters. EPA has published section 304(a) water quality criteria guidance for the protection of

human health. Human health–based water quality criteria protect human health from exposure to carcinogens and noncarcinogenic toxicants through the consumption of drinking water and fish. Chemicals addressed through human health criteria include metals, organics, chloride, and dissolved solids. Refer to EPA's website at http://www.epa.gov/ost/humanhealth/ for more information about human health water quality criteria. Chapter 4 provides more information on using chemical data to interpret WQS attainment or nonattainment status.

Data on source water quality may be available from a variety of sources including the drinking water utilities that may screen source water before treating it. If data on source water quality are not available, states, territories, and authorized tribes may choose to evaluate monitoring data from treated or finished water supplies. These data are typically collected by the drinking water utilities to determine compliance with SDWA National Primary Drinking Water Regulations (NPDWRs or primary standards). These standards regulate the quality of treated or finished water supplied by public water systems. Primary standards protect drinking water quality by limiting the levels of specific pollutants that can adversely affect public health and are known or anticipated to occur in public water systems. Pollutants monitored for the protection of human health under the NPDWRs include volatile organic compounds, semivolatile organic compounds, inorganic constituents, salinity, radioactive constituents, and disinfection by-products.

If routine drinking water treatment is not likely to remove or alter the form or concentration of certain pollutants, states, territories, and authorized tribes may use data related to these pollutants from treated or finished water quality source water for making attainment or nonattainment decisions. In this case, levels of these pollutants in treated waters are likely to represent levels in untreated source waters. On the other hand, data on treated or finished water should probably not be used as an indicator of source water quality for pollutants that are likely to be altered, introduced to, or removed from the finished water during treatment or distribution.

- *Bacteria criteria*—Many states, territories, and authorized tribes have microbiological thresholds to protect drinking water. The NPDWRs contain criteria for treated water quality for Cryptosporidium, Giardia lambia, Legionella, total coliform, and viruses. While EPA is working on WQS for bacteria indicators to protect public water supply uses, existing standards apply to the quality of finished water rather than source water quality. However, the state, territory, or authorized tribe may choose to use these data on finished water to determine attainment with a public water supply–based WQS.

- *Use restrictions*—Another source of information that has been used by states, territories, and authorized tribes for determining whether waters attain public water supply–based WQS is drinking water use restrictions. Use restrictions include the following:

  - Closures, based on water quality concerns, of source waters that are used for drinking water supply

- Contamination-based drinking water supply advisories lasting more than 30 days per year
- Public water supplies requiring more than conventional treatment (i.e., other than coagulation, sedimentation, disinfection, and conventional filtration) due to known or suspected source water quality problems
- Public water supplies requiring increased monitoring due to confirmed detections of one or more pollutants (excluding cases with minimum detection limit issues).

The types of data and information available for use as indicators of public water supply–based WQS attainment status come from a variety of sources. These sources range from local health departments, to interstate water resource commissions, to Federal agencies like the U.S. Geological Survey. For example, many utilities collect source water quality data for process control monitoring and to comply with the Unregulated Contaminant Monitoring Rule. EPA encourages states, territories, and authorized tribes to request that drinking water utilities provide these data whenever available. EPA encourages states, territories, and authorized tribes to partner with these potential sources of information when determining which indicators are most appropriate for assessing WQS attainment and when developing monitoring designs to collect appropriate data and information. For example, if a state shares a waterbody with another state, data from the state that shares the waterbody may be useful in making appropriate attainment decisions. These partnerships may reduce the monitoring and data analysis burden facing water quality assessment programs.

3.4.2 How Does the State Interpret Multiple Types of Data To Assess WQS Attainment?

This question represents another key element of a state, territory, or authorized tribe's consolidated assessment and listing methodology. The methodology should include a description of procedures to seek data, evaluate its quality, and interpret the results against the applicable component of the WQS for purposes of making an attainment or nonattainment decision. Subsequent chapters in this document describe this process for each type of indicator or data.

All existing and readily available data and information that are consistent with the state, territory, or authorized tribe's assessment methodology must be assembled and evaluated when making a WQS attainment determination. For example, if a state shares a waterbody with another state, it must consider existing and readily available data from the state that shares the waterbody.

For purposes of making WQS attainment/impairment decisions about source waters serving as public water supplies, EPA recommends that states, territories, and authorized tribes first evaluate source water quality data. States should also evaluate treated or finished water quality data to identify potential problems with source water supplies. If one source of data indicates impairment but others do not, the reviewer should investigate the quality, quantity, and relevance of data and site-specific conditions. For example, untreated source water quality monitoring may indicate no exceedances of applicable WQS although treated water quality exceeds

maximum contaminant levels for lead and chlorine. These exceedances could be due to problems in the water treatment facility or distribution system. In this case, the source water could be assessed as attaining applicable WQS because the other data sources are not representative of the source water supply.

3.4.3 Examples of State Approaches To Assess Public Water Supply–Based WQS Attainment

EPA plans to profile different types of approaches that states, territories, and authorized tribes use to integrate multiple types of indicators or data to assess attainment with public water supply–based WQS based on the documentation provided in the assessment and listing methodologies that states, territories, and authorized tribes include with the 2002 Integrated Report submissions.

3.5 Fish and Shellfish Consumption–Based Water Quality Standards

Along with aquatic life use, fish and shellfish consumption uses compose the "fishable" goal of the CWA. Fish and shellfish consumption designated uses provide for the protection of human health related to consumption of fish and shellfish. "Fishable" means that fish and shellfish can not only thrive in a waterbody, but also, when caught, be safely eaten by humans. Although some states, territories, and authorized tribes address consumption of fish and shellfish in their aquatic life–based standards, others have a specific fish and shellfish consumption–based WQS.

3.5.1 What Type of Data and Information Does the State Use To Assess Whether Fish and Shellfish Consumption–Based WQS Are Attained?

Describing the data and information used to assess attainment with WQS is a key element of the state, territory, or authorized tribe's assessment methodology.

When adopting a fish and shellfish consumption–based WQS, the state, territory, or authorized tribe should describe how it will assess attainment with the standard and each component element. This description should identify the indicators and thresholds that are used to assess attainment with the WQS. If this description is not a part of the approved WQS, it should be defined in other implementing regulations or policies such as the continuing planning process document or the consolidated assessment and listing methodology.

Following is a brief description of the types of data and information that should be used to assess attainment with fish and shellfish consumption–based WQS.

- *Chemical data*—Three types of chemical data are used by states, territories, and authorized tribes to assess whether a particular waterbody attains fish consumption use standards: fish tissue, water column, and sediment. Chapter 4 provides more information on using chemical data to interpret WQS attainment or nonattainment status. The majority of states, territories, and authorized tribes directly monitor the level of chemical pollutants in fish and

shellfish tissue samples; however, several states monitor the level of chemical pollutants in water column and/or sediment samples.

- *Tissue data*—There are several advantages to measuring the levels of chemical pollutants directly in fish tissue samples. First, pollutant concentrations in the water column may fluctuate greatly over time. These changes occur in response to changes in chemical discharges from point and nonpoint sources as well as from fluctuations in river flow. Bioaccumulation processes occurring in the fish and shellfish act to concentrate up to 10^6 times minute levels of chemical contaminants present in the water column. In addition, levels of chemical pollutants in fish tissue tend to reflect an integration of the wide fluctuations that can occur in chemical concentrations in the water column over time. Direct measurement of the levels of chemical pollutants in fish tissues can also be used directly by states in their risk assessment methodology for calculating human health screening values and ultimately for determining fish consumption limits.

- *Water column data*—States, territories, and authorized tribes adopt human health–based chemical criteria to ensure that water quality protects fish and shellfish consumption uses. EPA has published section 304(a) water quality criteria guidance for the protection of human health. Human health–based water quality criteria protect human health from exposure to carcinogens and noncarcinogenic toxicants through the consumption of drinking water and fish. Chemicals addressed through human health criteria include metals, organics, chloride, and dissolved solids. Refer to EPA's website at http://www.epa.gov/ost/humanhealth/ for more information about human health water quality criteria.

- *Sediment data*—For some chemical contaminants that are metabolized by physiological processes in fish tissues (such as PAHs), analysis of sediment concentrations may provide a more accurate picture of the levels of environmental contamination that may result in WQS impairment. However, chemical cleanup of sediment samples prior to analysis may be both more time consuming and more expensive than direct analysis of chemical residues in fish tissue samples.

- *Fish consumption advisory information*—Fish consumption advisories are typically administered by state, territory, and authorized tribal health or environmental agencies. For information on the National Listing of Fish and Wildlife Advisories, visit EPA's website at http://www.epa.gov/ost/fish. Additional detail on how fish and shellfish consumption advisories are used to assess WQS attainment is provided under Section 3.5.2.

- *Shellfish growing area classifications*—Shellfish growing area classifications developed by the National Shellfish Sanitation Program (NSSP) can be used as part of the determinations of attainment of applicable shellfish WQS. The NSSP uses water column and tissue data (where available), along with information from sanitary surveys of the contributing watershed, to determine classifications. Certain NSSP classifications are *not* appropriate to consider when performing a beneficial use assessment. These instances are: "Prohibited" classifications set as a precautionary measure due to the proximity of wastewater treatment

discharges or absence of a required sanitary survey. Likewise, it is not appropriate to consider short-term periods when a growing area was placed in the closed status, or instances when shellfish tissue or water column pathogen data exceeded criteria, but which were not beyond the frequency, intensity (or magnitude), and duration specified in the WQS. These exceedences may be due to, for example, storm events or non-anthropogenic loadings (e.g., wildlife whose presence is not due to human influence).

- *Bacteria criteria*—Fecal coliform is the primary indicator used by the NSSP to determine whether water quality is safe for shellfish consumption.

3.5.2 How Does the State Interpret Multiple Types of Data To Assess WQS Attainment?

This question represents another key element of a state, territory, or authorized tribe's consolidated assessment and listing methodology. The methodology should include a description of procedures to seek data, evaluate their quality, and interpret the results against the applicable component of the WQS for purposes of making an attainment or nonattainment decision.

States, territories, or authorized tribes should use all relevant data and information that are consistent with its assessment methodology to assess the fish and shellfish consumption–based WQS. For example, if a state shares a waterbody with another state, data from the state that shares the waterbody should be useful in making appropriate attainment decisions. In addition to using water column data relevant to a state, territory, or authorized tribe's human health–based chemical criteria, water quality agencies often base attainment decisions on advisories and classifications provided by other organizations responsible for ensuring that fish and shellfish are safe for human consumption. Subsequent chapters in this document describe the use of chemical and bacteria criteria for making WQS attainment decisions. The use of tissue-based fish and shellfish consumption advisories and NSSP shellfish growing area classifications for making attainment decisions is described below.

On October 24, 2000, EPA issued a policy memorandum to clarify the use of tissue-based fish and shellfish consumption advisories and the NSSP classifications in WQS attainment/impairment decisions. The recommendations of this memorandum, updated to reflect the new reporting categories in the 2002 Integrated Report memorandum, are summarized below.

For purposes of determining whether a waterbody is impaired and should be included on a section 303(d) list, a fish or shellfish consumption advisory, an NSSP classification, and the supporting data would be considered existing and readily available data and information that may demonstrate nonattainment of a section 101(a) "fishable" use when:

1. The advisory is based on site-specific fish or shellfish tissue data

2. A lower than "approved" NSSP classification is not consistent with the WQS or is based on water column data showing the WQS is not attained

3. The risk assessment parameters (e.g., toxicity, risk level, exposure duration, and consumption rate) of the advisory or classification are cumulatively equal to or less protective than those in the applicable state, territory, or authorized tribal WQS.

Some fish and shellfish consumption advisories are based on Food and Drug Administration (FDA) action levels as opposed to EPA's risk-based methodology for the protection of human health. FDA action levels are established to protect consumers of interstate shipped, commercially marketed fish and shellfish rather than fish and shellfish caught and consumed within the state. FDA action levels include nonrisk-based factors (e.g., economic impacts) in their derivation, whereas water quality criteria must protect the designated uses without regard to economic impacts. EPA has therefore concluded that FDA action levels do not provide a greater level of protection for consumers of fish and shellfish caught and consumed within the state than do human health criteria. Because tissue contamination that triggers an advisory based on FDA action levels would also trigger an advisory based on human health criteria, EPA believes that a fish or shellfish consumption advisory based on FDA action levels may also indicate that section 101(a) "fishable" uses are not attained.

EPA acknowledges that, in some cases, fish and shellfish consumption advisories or restrictions may not demonstrate that a section 101(a) "fishable" use is not being attained in an individual waterbody. For example, a state may have issued a statewide or regional warning regarding fish tissue contaminated with a bioaccumulative pollutant, on the basis of data from a subset of waterbodies that do not necessarily represent the population of waters covered by this type of protective advisory. Similarly, a state may classify shellfish-growing areas "prohibited" as a precautionary measure because of the proximity of wastewater treatment discharges or where a required sanitary survey has not been conducted. Without data or information demonstrating whether the water was attaining or not attaining, there are inconclusive data to make an attainment decision.

Tissue-based fish and shellfish consumption advisories

Figure 3-4 provides EPA's recommendations for using tissue-based fish and shellfish consumption advisories when making decisions about WQS attainment status. This flowchart illustrates the conditions under which a fish or shellfish consumption advisory, and the supporting data, may demonstrate impairment of a "fishable" use for a specific waterbody.

The decision rules recommended in Figure 3-4 should apply to all pollutants that constitute potential risks to human health, regardless of the source of the pollutant. However, for fish and shellfish advisories for "dioxin and dioxin-like compounds," EPA recommends that because of the unique risk characterization issues, listing decisions should be made on a case-by-case basis. EPA is currently evaluating the role of fish advisories as part of its overall strategy to reduce

Making 303(d) & 305(b) Listing Decisions based on Fish/Shellfish Advisories

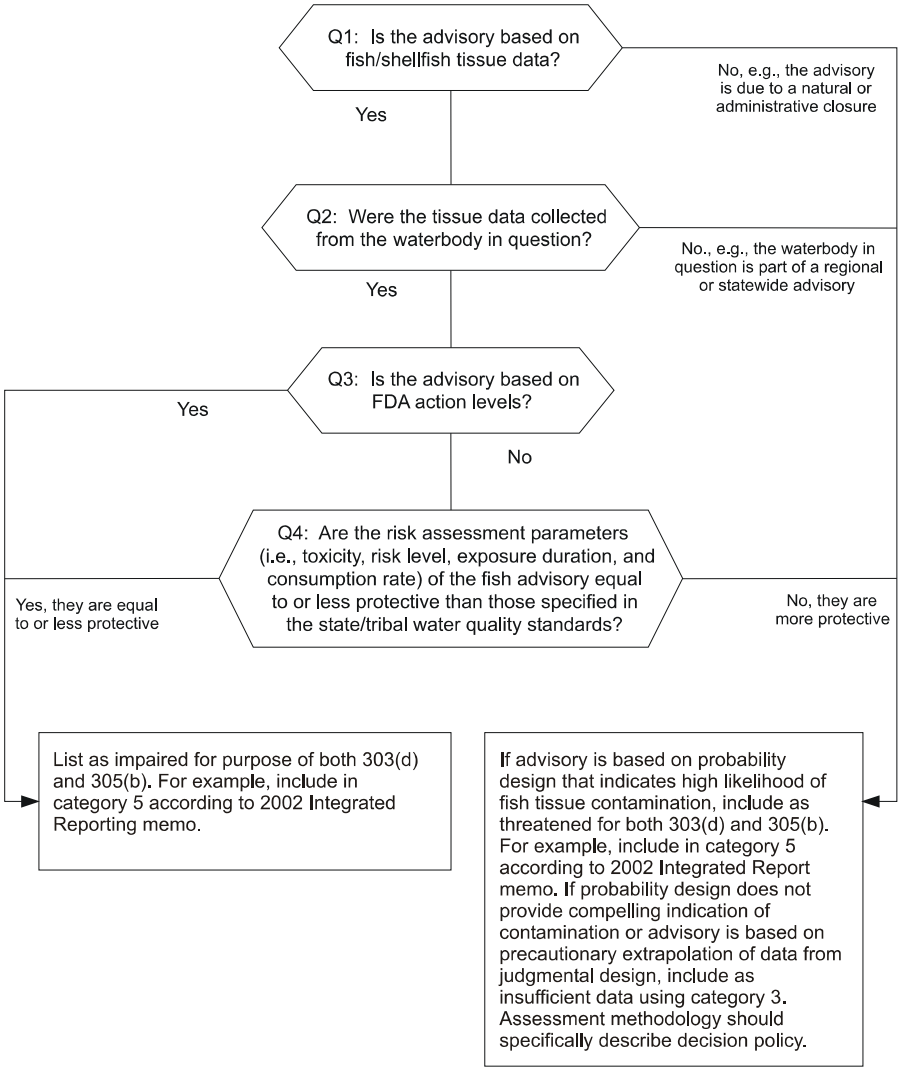


Figure 3-4. Using fish consumption advisories as indicators of WQS attainment.

human exposure to dioxin and dioxin-like compounds. EPA will be developing additional guidance specific to dioxin and dioxin-like compounds in the near future.

National Shellfish Sanitation Program classifications

The NSSP classifies shellfish-growing areas in one of five categories:

- Approved
- Conditionally approved
- Restricted
- Conditionally restricted
- Prohibited

These classifications can be used as part of the determinations of attainment of applicable shellfish WQS. The NSSP uses water column and tissue data (where available), along with information from sanitary surveys of the contributing watershed, to determine classifications. The precautionary prohibited classification is a special subcategory of prohibited that is set, without any supporting water quality data, due to the proximity of potential sources of contamination, like wastewater treatment discharges, or due to the absence of a required sanitary survey.

Before making conclusions about water quality attainment status based solely on the NSSP classifications, it is important to verify whether the WQS reflect the NSSP classification, and consider available water quality data. For example, if the state, territory, or authorized tribe's WQS specifically restricts the shellfishing use in an area that is classified as restricted, then the NSSP classification indicates the WQS attainment status of the water. In this example, the water would be identified as impaired if water quality data indicated it did not meet the definition of restricted shellfishing waters. Refer to the NSSP website for additional information on the shellfish growing area classifications.

If the WQS do not reflect the NSSP classification, the WQS could be reviewed and potentially revised to be consistent with the NSSP classification. If shellfishing is an "existing use"[1] it cannot be removed. However, if, for example, historical data and information show that the use of shellfish harvesting (or water quality that would support the use) has never been attained on a sustained basis, e.g., has had a "conditionally approved" shellfish classification, the WQS may be considered for revision to recognize the conditional nature of the shellfishing under the "subcategory of use" provision in 131.10(c). To do so, conduct a Use Attainability Analysis (UAA) using the tests in 131.10(g), and include in the description of the subcategory of use the maximum number of times per year the area would be closed or restricted from shellfish harvesting. This description should be based on historical data and model information, and should include a plan to review the WQS in accord with any remediation or long-term control plans to address the causes of the conditions resulting in the episodic nonattainment.

[1] 40 CFR 131.3(e): "*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."

Figure 3-5 suggests an approach for using NSSP growing area classifications to assess shellfishing use support. In general, the approved and conditionally approved classifications are supporting the use, unless water quality monitoring data indicate otherwise. The restricted, conditionally restricted, and prohibited (other than precautionary prohibited) classifications should be considered impaired, unless water quality monitoring data or applicable WQS indicate otherwise.

3.5.3 Examples of State Approaches To Assess Fish and Shellfish Consumption–Based WQS Attainment

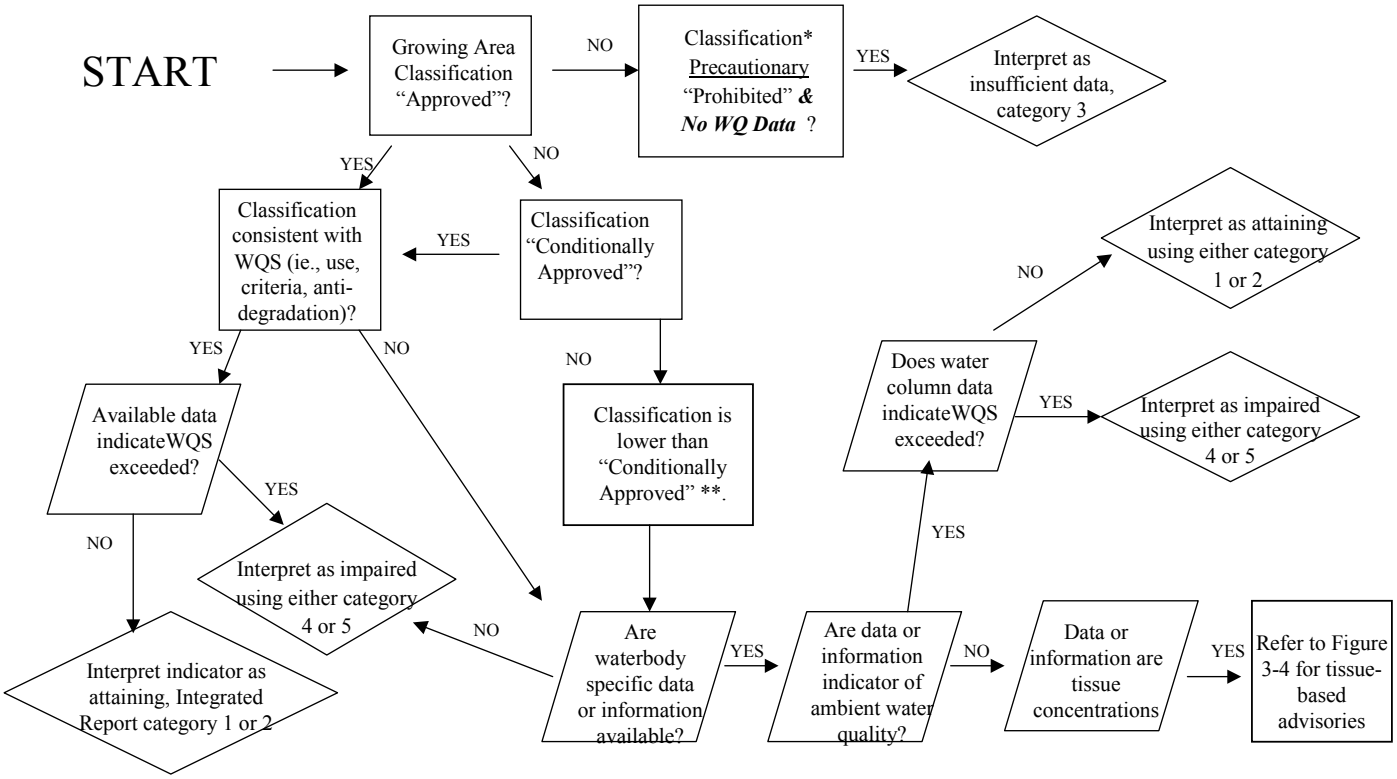
EPA plans to profile different types of approaches that states, territories, and authorized tribes use to integrate multiple types of indicators or data to assess attainment with public water supply–based WQS based on the documentation provided in the assessment and listing methodologies that states, territories, and authorized tribes include with the 2002 305(b) and 303(d) submissions.

Following are brief highlights of the programs of two states: Vermont and North Carolina.

Vermont uses fish tissue mercury data to assess fish consumption use in the state's lakes. These data are used to determine attainment of standards for toxic substances and habitat (because of accumulation up the food chain). The state assigns a finding of impairment to waterbodies only where there is a "no consumption" advisory for a subpopulation of enhanced sensitivity (with supporting fish tissue data) and where the target species are actually present. Vermont employs a probability design to determine which lakes should be sampled for mercury in fish tissue. The state recognizes that this design produces data that better represent actual mercury levels in the target population. Relying solely on consumption advisories based on limited targeted monitoring designs may give false impressions of where problems exist.

North Carolina employs two shellfish classifications, Conditionally Approved-Open and Conditionally Approved-Closed, that require interpretation regarding appropriate attainment and reporting decisions under 303(d) and 305(b). Since North Carolina's Conditionally Approved-Open appears to be equivalent to NSSP Conditionally Approved, the waterbody is in attainment if the WQS identifies shellfish harvesting as a designated use that is attainable except in certain conditions. As long as the classification and WQS are consistent and monitoring data continue to indicate they are met, the water is in attainment. North Carolina's Conditionally Approved-Closed appears to be equivalent to NSSP Conditionally Restricted or Restricted classifications. Again, unless the WQS is consistent in excluding shellfish harvesting as a use, the waterbody is not in attainment of WQS, and therefore should be so identified as impaired.

Using NSSP Growing Area Classifications as Indicator of WQS Attainment



* 1999 NSSP Model Ordinance Subsection IV.@03: Growing Area Classification
Restricted, Conditionally Restricted, or Prohibited (not precautionary prohibited)

Figure 3-5. Using NSSP growing area classifications as indicator of WQS attainment.

3.6 References

Association of State and Interstate Water Pollution Control Administrators. 1997. Important concepts and elements of an adequate state watershed monitoring and assessment program. Paper prepared for ASIWPCA Standards and Monitoring Task Force by Chris Yoder under cooperative agreement to EPA Office of Water, August 1997.

National Research Council (NRC). 2001. Assessing the TMDL Approach to water quality management. Washington DC: National Academy Press.

U.S. Environmental Protection Agency (U.S. EPA). 1991. EPA policy on independent application. Transmittal memorandum of final policy on biological assessment and criteria from Tudor Davies to EPA Regions, June 19, 1991.

U.S. EPA. 1997. State source water assessment and protection programs guidance. EPA 816-R-97-009. August 1997.

U.S. EPA. 2000. Use of fish and shellfish advisories and classifications in 303(d) and 305(b) listing decisions - WQSP-00-03. Transmittal memorandum of policy on use of fish and shellfish consumption advisories from Geoffrey Grubbs and Robert Wayland, October 24, 2000.

U.S. EPA. 2002 (projected date). Implementation guidance for ambient water quality criteria for bacteria. Office of Water, Washington, DC.

Van den Berg, et al. 1998. Toxic equivalency factors (TEFs) for PCBs, PCDDs, PCDFs for humans and wildlife. Environ Health Perspect 106(12):775–792.