



WATER QUALITY
ASSESSMENT GUIDANCE MANUAL
for
Y2002

305(b) Water Quality Report
and
303(d) Impaired Waters List

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Preface

This guidance manual was produced to assist DEQ regional and central office staff in the production of the 2002 edition of the 305(b) Water Quality Assessment report and the 303(d) Impaired Waters list. The manual uses excerpts from “Guidelines for the Preparation of the 1998 State Water Quality Assessments 305(b) Reports”, and “Assessment Data Base (ADB) Systems User’s Manual” both published by EPA, along with other State and Federal documents.

The Water Quality Monitoring, Information, and Restoration Act (WQMIRA) requires the 303(d) and 305(b) reports be developed in consultation with scientists from State universities prior to the submission of these documents to the U.S. Environmental Protection Agency (EPA). In order to meet this directive, DEQ has updated this document containing water quality assessment guidance and/or procedures previously used to assist the scientists in the review of the 2000 305(b) report. This updated guidance document has been submitted to the Academic Advisory Committee (AAC) for technical review and comment. The AAC was assembled by the Virginia Water Resources Research Center in the summer of 1997 and consists of scientists and engineers from the Virginia Institute of Marine Science, Virginia Commonwealth University, University of Virginia, and Virginia Polytechnic Institute and State University.

WQMIRA directs DEQ to develop and publish a procedure governing the process for defining and determining impaired waters. Additionally, DEQ shall provide for public comment on this procedure. The processes for defining and determining impaired waters are contained in this guidance document and these will be public noticed in the Virginia Register. Copies of this guidance document will be available for the public and other interested parties.

The guidance document will be updated to incorporate input from the review processes of the AAC and any pertinent public responses. This guidance manual will be used to guide the water quality assessment process for the year 2002 305(b) and 303(d) reports. Any subsequent changes to the guidance document will be made in consultation with the AAC and public noticed in the Virginia Register prior to each biennial assessment cycle.

Purpose

Section 305(b) of the Clean Water Act requires each State to submit a biennial report to EPA describing the quality of its navigable waters. The 305(b) report provides DEQ’s best overall assessment of water quality conditions and trends in the Commonwealth. The report is intended to be used as a tool in planning and management (40 CFR 130, page 4) of waters in Virginia. The report also directs continuous planning and implementation activities in coordination with the State Water Quality Management Plan and the Continuous Planning Process (CPP).

Primary objectives of the 305(b) report are:

1. To educate and inform citizens and public officials about Virginia’s water quality.
2. To analyze water quality data in order to determine the extent to which Virginia’s waters are supporting the beneficial uses for all state waters and to compare the results to Water Quality Standards and other appropriate criteria and guidelines.
3. To determine the causes for the “failure to support” the designated uses of the State’s waters.

4. To determine the nature and recognizable extent of point and nonpoint source impacts in accordance with state and federal guidelines.

Section 303(d) of the Clean Water Act and the Environmental Protection Agency's regulation 40 CFR Section 130.7 (d) promulgated in July 1992, require each state to submit a Total Maximum Daily Load (TMDL) Priority List to EPA on April 1 of even numbered years. This list consists of two separate Parts. The first Part (Part I) is a summary of the waters identified in the 305(b) assessment process as impaired, meaning they partially and/or not support any or all designated use(s). Part II is a list of waters that are "water quality limited" and requiring development of a TMDL. These are waters where Water Quality Standards are not expected to be met with the application of technology based effluent control technology of secondary treatment and best practicable treatment. Waters receiving effluent from facilities with water quality based effluent limits in their Virginia Pollution Discharge Elimination System (VPDES) permits and schedules of compliance to meet these limits are listed in Part II.

Background

EPA's "Guidelines for Preparation of the 1998 State Water Quality Assessment (305(b) Report)" states:

The Federal Water Pollution Control Act (PL92-500), commonly known as the Clean Water Act, last re-authorized by the Water Quality Act of 1987 (PL100-4), establishes a process for States to develop information on the quality of their water resources. The requirements for this process are found in Sections 106(e), 204(a), 303(d), 305(b), and 314(a) of the Clean Water Act. Each State must develop a program to monitor the quality of its surface and ground waters and prepare a report every 2 years describing the status of its water quality. The EPA issues guidelines for States to use during the reporting cycle. States are encouraged to use these guidelines to prepare these reports for EPA. EPA compiles the data from the State reports, summarizes them, and transmits the summaries to Congress, including an analysis of the water quality nationwide. This 305(b) process is the principal means by which the EPA, Congress, and the public evaluate current water quality, the progress made maintaining and restoring water quality and the extent of remaining work to be done. Many States, including Virginia, rely on the 305(b) process for information needed to conduct water quality planning. The 305(b) process is an integral part of Virginia's water quality management program, requirements for which are set forth in 40 CFR 130.

Virginia's biennial water quality assessment is conducted by the Department of Environmental Quality (DEQ), with the assistance of the Department of Conservation and Recreation (DCR), to determine the water quality conditions in the Commonwealth. The results of this water quality analysis are reported to the EPA in the 305(b) Water Quality Assessment Report submitted on April 1 of even numbered years. Based on recently adopted federal regulations, the 303(d) Impaired Waters List will be produced every four years. The 305(b) report describes the aggregated water quality conditions of the State. The 303(d) report contains the individual listing of those waters that have been identified as "impaired" (partially supporting or not supporting designated uses). EPA compiles the data from all of the State reports into a national water quality status report that is presented to Congress.

In 1998, EPA made a number of important changes to the water quality assessment process which continue to remain in effect. With strong support from the States, EPA changed the data analysis period from two to five years. An important benefit of this change is the increase in the data set size from approximately 8 to 20 samples based on quarterly monitoring and from 24 to 60 samples based on monthly monitoring.

The assessment begins by analyzing the data from ambient water quality, biological, sediment and fish tissue monitoring and/or other special studies. The results of these comprehensive data analyses are compared to both numeric and narrative criteria related to the designated uses contained in the Water Quality Standards (WQS). The WQS are provisions of State and/or Federal Law that contain both numeric and narrative criteria for protecting the designated uses of all waters in the Commonwealth.

There are two basic types of water quality data used in the assessment process. The first type of data is "monitored" data. This data comes from the collection and analysis of chemical, biological, and/or physical samples taken by DEQ and/or any approved data submitted by the U.S. Geological Survey, TVA, U.S. Forest Service, Chesapeake Bay Program, Quality Assured/Quality Controlled (QA/QC) citizen monitoring programs and/or other special studies. For 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 is obtained using EPA accepted and DEQ approved protocols. All non-DEQ monitoring submittals, except USGS chemical data submittals, must provide a sampling protocol and all field data. If data discrepancies or other suspect information is generated, a field verification audit will be conducted by DEQ monitoring staff. Additional information concerning the assessment and use of Citizen Monitoring and U.S. Forest Service data can be found in Part VI, Sections 6.3.1 and 6.3.2.

The second type of data used in the assessment is called "evaluated" data. These physical, chemical and/or biological data are primarily obtained from sources where there is not an EPA accepted and/or DEQ approved sampling and analysis protocol. Evaluated data may also include "land use" analysis, volunteer sampling and monitoring and/or other such information for which the data does not meet the (QA/QC) procedures. Additionally, waters that were on the 1998 303d list but do not have any additional monitoring data for the 2002 assessment period will be considered evaluated and not assessed for designated uses. Segments, where evaluated data potentially indicate water quality degradation, should be designated fully supporting but threatened for associated individual designated uses. Additional monitoring efforts should be targeted for these waters as resources allow.

The following approval process will be used for non-DEQ "monitored" data protocol and QA/QC procedure review:

All ancillary data that have been received and reviewed by DEQ and found acceptable should be used for 305(b) and 303(d) assessment. The data are from two categories, state/federal agencies (other than DEQ) and the Citizen Monitoring program. The approval process for data from the Citizen Monitoring Program

is addressed in Part VI, Section 6.3.1. The following addresses the approval process for data from state and federal agencies.

All “monitored” chemical and biological data must be supported by EPA accepted monitoring protocols. QA/QC procedures must also be reviewed and approved by DEQ. As assessment staff becomes aware of data sources, those parties generating data for DEQ 305b/303d assessment consideration should be requested by the assessment staff to submit QA/QC plans, standard operating procedures (SOPs), and monitoring procedures to the DEQ 305(b) Coordinator. The 305(b) Coordinator will provide copies of supporting documentation for chemical data to QA/QC review staff in the Water Quality Monitoring and Assessment (WQMA) program and provide copies of all supporting documentation for biological monitoring of freshwater benthic macroinvertebrates to the Water Quality Standards staff.

The DEQ staff does not consider, for use in assessment, any non-agency biological monitoring data other than benthic macroinvertebrate. For 305(b) assessment purposes, DEQ has not reviewed and approved monitoring protocols and QA/QC procedures used by other state and federal agencies and insufficient information are available to allow approval for the verbatim use of these data and/or assessments from these sources in the 305(b) cycle. However, information from these sources may be independently assessed by regional biologists to determine their acceptability for 305(b) assessment purposes on an individual basis. Copies of the supporting documentation for freshwater benthic data will be provided to the regional offices where the surveyed sites are located for review by the regional biologists. The regional biologists are most familiar with the various ecoregions in the state and are knowledgeable with what constitutes appropriate reference sites, conditions or benthic metrics that are acceptable for assessing streams in these ecoregions. Because of their expertise with their ecoregions, regional biologists are the best judges of the acceptability of benthic data produced by “other” data generators. The regional biologists will review the available data and make a determination regarding the acceptability of the data for assessing the benthic community at any particular site. The regional biologists will provide any comments or requests for additional information directly to the data generators and will copy such communications to Water Quality Standards staff. Copies of the review results shall be distributed to the regional staff and 305(b) Coordinator.

If the protocols involve estuarine toxics data and/or biological assessments in tidal environments, supporting documents should be provided to and reviewed by the Chesapeake Bay Program staff.

All comments concerning toxics data, chemical (SOPs) and/or QA/QC plans will be coordinated through the WQMA QA/QC review staff. WQMA QA/QC staff is responsible for providing comments to data generators and 305(b) Coordinator concerning the acceptability of SOPs and QA/QC documentation for chemical data.

If a chemical, biological or tidal waters data package can not be used in the assessment process, the appropriate DEQ staff will provide the data generator an explanation for the data not being useable.

PART II WATER QUALITY MONITORING, INFORMATION AND RESTORATION ACT (WQMIRA)

In 1997, the General Assembly enacted the Water Quality Monitoring, Information and Restoration Act (WQMIRA). This legislation supplements the federal requirements for the 305(b)/303(d) process. The requirements of this legislation for State assessment procedures or processes are briefly outlined as follows:

1. The Act requires the 303(d) report to identify geographically defined water segments as impaired if monitoring or other evidence shows:
 - a. violations of ambient water quality standards for aquatic life or human health;
 - b. fishing restrictions or advisories;
 - c. shellfish consumption restrictions due to contamination;
 - d. nutrient over-enrichment;
 - e. significant declines in aquatic life biodiversity or populations; and/or
 - f. contamination of sediment at levels which violate water quality standards or threaten aquatic life or human health.
2. Waters identified as “naturally impaired”, “fully supporting but threatened” or “evaluated” (without monitoring) as impaired shall be set out in the 303(d) report in the same format as those listed as “impaired”.
3. The 303(d) report shall include an assessment, conducted in conjunction with other appropriate state agencies, for the attribution of impairment to point and nonpoint sources. The absence of point source permit violations on or near the impaired water shall not conclusively support a determination that impairment is due to nonpoint sources. In determining the cause for impairment, the Board shall consider the cumulative impact of 1.) multiple point source discharges, 2.) individual discharges over time, and 3.) nonpoint sources.
4. The Board shall develop and publish a procedure governing its process for defining and determining impaired water segments and shall provide for public comment on the procedure.
5. The 305(b) and 303(d) reports shall be produced in accordance with the schedule required by federal law and shall incorporate at least the preceding five years of data. Data older than five years shall be incorporated when scientifically appropriate for trend analysis.
6. The 305(b) and 303(d) reports shall be developed in consultation with scientists from state universities prior to submission by the Board to EPA.
7. The 305(b) and 303(d) reports shall indicate water quality trends for specific, easily identifiable, geographically defined water segments and provide summaries of the trends using available data and evaluations. This will allow the citizens of the Commonwealth to easily interpret and understand the conditions of the geographically defined water segments.
8. Based on the information in the 303(d) and 305(b) reports, the Board shall request the Department of Game and Inland Fisheries (DGIF) or the Virginia Marine Resources Commission (VMRC) to

post notices at public access points for all “toxic” impaired waters. The notice, prepared by the Board, shall contain the basis for the impaired designation and a statement of potential health risks. The Board shall coordinate with the DGIF and VMRC to assure that adequate notice of posted waters is provided to those purchasing hunting and fishing licenses.

The following proposed water quality assessment procedures have been designed to meet the federal 305(b) and 303(d) requirements in addition to the State requirements contained in WQMIRA.

PART III RULES FOR THE 2002 WATER QUALITY ASSESSMENT

Rule 1

Impaired waters (partially or not supporting uses) are defined as those with chronic or recurring monitored violations using QA/QC approved ambient monitoring data, special study data and/or other “predictive” data. Predictive data generally refers to computer generated modeling data. Impaired waters are generally based on exceedences of the numeric Water Quality Standard (WQS) criteria using the guidelines described in Part V and VI of this guidance document and/or exceeding the narrative WQS.

Rule 1 applies to conventional parameters (dissolved oxygen, pH, fecal coliform bacteria, and temperature except in tidal waters) and estuarine biological community assessments. EPA’s guidance recommends States use a violation rate of greater than 10% of the total samples analyzed for classifying waters impaired. However, a single sample resulting in an exceedence will not be assessed. Additional monitoring should be continued until an assessment can be made. For small datasets (2-9 samples), a single exceedence of the WQS results in assessment of the water as fully supporting. The reasoning for this decision stems from the fact that a single exceedence is not chronic or recurring. At least two exceedences and > 10% is required before a water is listed as impaired. Temperature in tidal waters will not be assessed due to the lack of a WQS.

Rule 2

Waters classified as impaired based on biological data or restrictions placed on the designated uses (shellfishing and fish consumption advisories) by the Virginia Department of Health (VDH), are in violation of the Designated Use standard (9 VAC 25–260–10 A.).

Rule 3

Apply the geometric mean criterion of 200 fecal coliform bacteria per 100 milliliters to monitoring data sets generated from special monitoring programs or projects designed to produce 2 or more samples over a 30-day period. If the geometric mean is exceeded for greater than 10% of the calculated geometric means, it should be listed as impaired.

When the monitoring program is designed to provide one sample over a 30-day period, use the instantaneous maximum bacteria criterion of 1000 per 100 milliliters. Similarly, the 1000 per 100 milliliters criterion should always be used where monthly monitoring data are used in evaluations and analysis of compliance with the fecal coliform bacteria standard.

Rule 4

Conventional parameter data, generated by probabilistic monitoring networks, will be used as a “general evaluation” of those waters and should be used to direct additional targeted monitoring into those areas that indicate potential water quality degradation. This is due to the fact that only one data point will be available from probabilistic monitoring and an assessment for conventional parameters will not be made on one data point. This rule does not apply to biological or toxic data assessments.

Rule 5

When assessing multiple sample data, as with a hydrolab sampling unit, the worst case data-point, relative to a particular water quality standard (hourly, daily, etc), will be used as the aggregate

sample. This rule does not apply to depth profile sampling where each depth sample should be assessed as an independent sample. Where information indicates a pycnocline (density gradient in estuarine waters) or thermocline (temperature gradient in lakes) exist, surface and bottom waters will be vertically segmented by the estimated pycnocline/thermocline. See Part VI Section 6.4.1 for additional information.

Rule 6

When data analysis reveals fully supporting but threatened results, additional monitoring, relating to the fully supporting but threatened designation should be continued. This rule applies to conventional and/or toxic parameters (water column, sediment and fish tissue) as well as biological monitoring.

Rule 7

Waters that are assessed as partially or not supporting water quality standards and the source of violations is due to naturally occurring, non-anthropogenic (not human related) conditions (such as low DO in slow flowing swamp) will be included in Part I of the 303(d) list. However, the WQS will be reviewed and updated to reflect variations caused by natural conditions for these waters. Once appropriate WQS are in place, data will be reviewed again to determine whether these waters should be de-listed or a TMDL is needed.

Rule 8

Waters that were on the 1998 303d list, with no additional monitoring data for the 2002 reporting period, will continue to be tracked in the Assessment Database (ADB). These waters will be listed as “evaluated” and “not assessed” for all designated uses. These waters will be tracked until a TMDL is developed or additional monitoring reveals the waters are fully supporting all designated uses and approved for de-listing by EPA.

The 305(b) process assesses a total of 5 designated uses based on the Water Quality Standards. These are aquatic life use, swimming use, fish consumption use, shellfish consumption use and drinking water use. Swimming use is assessed to represent the primary and secondary water contact recreational use. Drinking water use is based on attainment of public water supply criteria. Following are details relating to the assessment of the five designated uses of Virginia's waters.

1. Aquatic Life Use:

Aquatic life use includes the propagation, growth, and protection of a balanced indigenous population of aquatic life (including game and marketable fish) which may be expected to inhabit the waters.

Support of aquatic life use can be determined by the assessment of conventional parameters (dissolved oxygen, pH and temperature except in tidal waters); toxic pollutants in the water column, toxic pollutant analysis of sediments, nutrient analysis and/or the biological assessment of benthic communities.

2. Fish Consumption Use:

Fish consumption use includes the propagation, growth and protection of a balanced population of aquatic life including game and marketable fish.

Support of this use is determined using two separate criteria. First, support or lack thereof, is based on human health related advisories and/or restrictions issued by the Virginia Department of Health (VDH). Impairment for fish consumption results when the public is advised by VDH that fish consumption is prohibited for the general population or there is an "advisory" that certain fish species should not be consumed by the general population or sub-populations at greater risk, such as children and/or pregnant women.

Second, the criteria used for fish consumption use is a comparison of fish tissue data to state screening values for toxic pollutants. Any single observation above the screening value results in assessment of the water as fully supporting but threatened. Two or more exceedences of a particular screening value listed in Table 6(a) results in assessment of the water as partial supporting.

3. Shellfish Consumption Use:

Shellfish consumption use includes the propagation, growth and protection of a balanced population of aquatic life including marketable shellfish.

Support of this use is also determined using two separate criteria. First, the Division of Shellfish Sanitation (DSS) of the VDH bases support or lack thereof on a classification system designed for the harvesting and marketing of shellfish resources in accordance with Food and Drug Administration (FDA) guidelines. Four classifications are used to describe shellfish waters. They are approved, conditionally approved, restricted, and prohibited. **Approved** areas are waters from which shellfish may be taken for direct marketing at all times. **Conditionally approved** (seasonal condemnation) areas are waters where the quality may be affected by a seasonal population increase or sporadic use of a dock or harbor facility. **Restricted** (condemnations) areas are waters where a sanitary survey indicates a limited degree of pollution which makes it unsafe to market shellfish for immediate consumption. Shellfish harvested in these areas must be moved to an approved area for a certain length of time to allow for depuration before marketing. **Prohibited** (condemnations) areas are waters where the DSS sanitary survey indicates dangerous numbers of pathogenic microorganisms or other contaminants that impact the area. Shellfish cannot be harvested or relayed for purification in prohibited areas.

Shellfish waters where restrictions or prohibitions are due solely to a discharge outfall but not due to water quality violations will not be listed in the 303d report. In these cases, the designated use has been administratively removed through the issuance of a discharge permit.

4. Swimming Use:

Swimming use assessment includes swimming and other primary and secondary water contact recreation uses such as water skiing and pleasure boating.

Support or lack thereof of this use is based on a comparison of fecal coliform bacteria data to the instantaneous fecal coliform standard using the EPA percent assessment method. However, if a special study, designed to collect multiple data points within a 30-day period is conducted, then these results should be compared to the geometric mean criterion. Also, any VDH beach closures should be assessed according to Part V.

5. Public Water Supply Use:

Waters that are used for public drinking water supply are identified in the Water Quality Standards and are protected by additional health related standards that are applicable to these waters. Support or lack thereof of this use is based on Virginia Department of Health (VDH) closures or advisories and/or a comparison of water column data to applicable public water supply criteria.

Table 1 is a summary of the designated uses and the criteria used to assess the individual uses.

Table 1 DESIGNATED USE MATRIX

NO.	DESIGNATED USE	SUPPORT OF USE ASSESSMENT CRITERIA
1.	Aquatic Life Use	Conventional parameters (DO, pH, Temp.); Toxics in water column and/or sediments; Biological evaluation. 22 designated “nutrient enriched” waters as described in the Water Quality Standards
2.	Fish Consumption Use	Advisories, limiting consumption, or restrictions issued by VDH; Comparison of fish tissue data to state screening values for toxic pollutants found in Tables 6(a) and 6(b).
3.	Shellfish Consumption Use	Restrictive actions for harvesting and marketing of shellfish resources made by Div. Of Shellfish Sanitation of VDH
4.	Swimming Use	Conventional Pollutant (Fecal Coliform Bacteria) and/or VDH beach closures.
5.	Public Water Supply Use	Closures or advisories by VDH; comparison of data to applicable public water supply standards.

Virginia bases its water quality assessment on the ability of the waters to support the five designated uses. Support is based on the waters meeting the criteria for each use based on the numeric and/or narrative Water Quality Standards. The following is a description of the criteria used to determine the quality of the waters relating to each of the designated uses, and thereby the degree of use support that will be presented in the 305b/303d reports.

1. **Fully Supporting**

The following is a description of the types of data and the acceptable criteria used to assess waters as fully supporting the designated uses.

- *Conventional Parameters:*

Waters fully supporting the designated uses can have up to 10% violations of water quality standards for the conventional parameters fecal coliform bacteria, (swimming use) dissolved oxygen, temperature, and pH (aquatic life use) without negatively affecting the designated uses. This criteria is based on EPA guidance which recommends that the States use a violation rate of these standards in the 0-10% range and designate as fully supporting the aquatic life and swimming designated uses. Any single exceedence in a small dataset (2-9 samples) will be assessed as fully supporting. A single sample will not be assessed. See Section 6.2.2 for additional information.

The Water Quality Standards (9 VAC 25-260-50) criteria for D.O., pH and Temperature do **not** apply below (7Q10). 7Q10 is the lowest flow averaged (arithmetic mean) over a period of seven consecutive days that can be statistically expected to occur once every 10 climatic years (a climatic year begins April 1 and ends March 31). Data from these parameters that are from flow conditions below 7Q10 should not be used in the assessment.

- *Toxic Pollutants:*

For toxic pollutant assessment in free-flowing streams, waters where there are no exceedences of a Water Quality Standard acute criteria within a 3-year period are considered fully supporting for aquatic life. For public water supply and other human health related use (i.e. fish consumption), no exceedences of a Water Quality Standard criteria or a fish tissue screening value are considered fully supporting for drinking water and fish consumption uses.

For toxic pollutant assessment in estuarine waters, where there are several types of toxic data available, a weight of evidence approach has been initiated. Additional information on the details of using this approach can be found in Part VI, Section 6.5.3

- *Fish Tissue/Sediment Contamination*

No exceedences of a state screening value (fish tissue) or ER-M (sediment) screening value are considered fully supporting.

- *Biological Evaluation:*

For free-flowing stream biological community assessment, data for the overall assessment period is rated as not impaired where no biological assemblage (e.g. macro invertebrates) has been modified significantly beyond the natural range of reference conditions based on EPA Rapid Bioassessment Protocol (RBP) II methodology.

For estuarine biological community assessment, sampling results are characterized using the biological index of biotic integrity (B-IBI) developed and used by the Chesapeake Bay Program. This approach is based on a comparison of biological sampling data to reference sites that were deemed minimally impacted by low dissolved oxygen events and sediment contaminants. Waters are considered fully supporting aquatic

life use if $\leq 10\%$ of the samples within the segment have a B-IBI score < 2.0 . Additional information on the estuarine biological assessment program can be found in Part VI, Section 6.4.1.2 of this guidance.

- *Fish Advisories:*

Waters where the VDH has not issued any fish advisories or prohibitions and no human health standards or no state screening values have been exceeded. Unless otherwise noted, all state waters are considered fully supporting fish consumption use.

- *Shellfish Advisories:*

Those growing areas where no restriction or prohibition (condemnation) on shellfish harvesting is imposed as indicated by the Department of Shellfish Sanitation (DSS) summary dated January, 2001. Additional information on shellfish assessment and consumption use is contained in Part VI, Section 6.4.3.

- *Beach Closures:*

No VDH beach closures during the assessment period.

- *Public Water Supply Source Closures:*

No VDH public water supply source closures during the assessment period.

2. Fully Supporting but Threatened

The following is a description of the types of data and the acceptable criteria used to assess waters as fully supporting but threatened for the designated uses. It is the intent of the agency to focus additional monitoring resources on the waters that are identified as threatened, based on initial monitoring data analysis.

- *Conventional Parameters:*

Not Applicable

- *Toxic Pollutants:*

For toxic pollutant assessment in free-flowing streams, waters where there are no more than one exceedence of a Water Quality Standard acute criteria within a 3-year period are considered fully supporting but threatened for aquatic life

For toxic pollutant assessment in estuarine waters, where there are several types of toxic data available, a weight of evidence approach has been initiated. Additional information on the details of using this approach can be found in Part VI, Section 6.5.3.

- *Fish Tissue/Sediment Contamination:*

Waters exceeding a single state screening value (SV) found in Tables 6(a) or 6(b) for fish tissue or Effects Range-Medium (ER-M) value for sediment, are fully supporting but threatened for fish consumption and aquatic life, respectively. If an ER-M value does not exist, then the 99th percentile value is used.

- *Biological Evaluation:*

For free-flowing waters, biological community data for the assessment period with a single rating of moderately impaired using RBP-II methodology should be considered fully supporting but threatened where professional judgement cannot confirm impairment. Additionally, waters should be considered fully supporting but threatened where, through best professional judgement, evaluated biological data reveals potential water quality problems. For waters assessed as fully supporting but threatened for aquatic life use, it is necessary for another biological assessment to be scheduled to make a final aquatic life use determination. Additional information can be found in Part VI Section 6.4.1.

For estuarine biological community assessment, waters are considered threatened for aquatic life use if > 10% of the samples within the segment have a B-IBI score < 3.0. Additional information on the estuarine biological assessment program can be found in Part VI Section 6.4.1.2 of this guidance.

- *Fish Advisories:*

Virginia Department of Health fish consumption advisories, where a general advisory has been issued but fish consumption is not limited are considered fully supporting but threatened.

- *Shellfish Advisories:*

Those growing areas, as indicated by the DSS summary dated January, 2001, that have been classified as conditionally approved (seasonal condemnations) are considered fully supporting but threatened.

Additional information on shellfish assessment and consumption use is contained in Part VI, Section 6.4.3.

- *Beach Closure:*

One, short term (less than one week in duration) VDH beach closure within the 5 year assessment cycle with a low probability, based on best professional judgement, that the pollution will reoccur is considered fully supporting but threatened. Best professional judgement decisions could be based on the source of the pollution causing the closure being generally transient and there are no VDH plans to implement pollution reduction measures or controls.

- *Public Water Supply Source Closure:*

One, short term VDH public water supply source closure during the 5 year assessment cycle with a low probability that the pollution will reoccur are considered fully supporting but threatened. The source of the pollution is generally transient and there are no VDH plans to implement pollution reduction measures or controls.

- *Other Criteria for Placing Waters in the Threatened Category*

Waters for which “evaluated” data, trend analysis, or other water quality indicators show an apparent decline in water quality or a potential for water quality problems. Waters can be designated as threatened where there is a possible loss of a designated use documented by ancillary data such as recurrent fish kills or pollution potential documented by non-agency studies or reports. Additionally, waters that have > 10% exceedence rate for nutrients and/or are listed in WQS as “nutrient enriched” are considered fully supporting but threatened for aquatic life use. For monitoring purposes, all threatened waters should be considered for continued monitoring during the next reporting period. For additional monitoring guidance, see Part VI Section 6.2.2

3 Partially Supporting

The following is a description of the types of data and the acceptable criteria used to assess waters as partially supporting the designated uses.

- *Conventional Parameters:*

Waters with long term or chronic problems based on the assessment of monitored data are considered partially supporting. For conventional parameters, at least two violations of water quality standards and exceedences in the 11-25% range are considered a long term or chronic problem and considered partially supporting. Waters with violations in this range are capable of supporting some of the designated use according to EPA guidance.

- *Toxic Pollutants:*

For toxic pollutant assessment in free-flowing streams, waters where there are 2 exceedences of a Water Quality Standard acute criteria in a 3-year period are considered partially supporting for aquatic life use. For public water supply use, any exceedences of human health criteria are considered partially supporting.

For toxic pollutant assessment in estuarine waters, where there are several types of toxic data available, a weight of evidence approach has been initiated. Additional information on the details of using this approach can be found in Part VI, Section 6.5.3.

- *Fish Tissue Contamination:*

Waters exceeding the same state screening value (SV), listed in Table 6(a), for fish tissue 2 or more times are partially supporting for fish consumption. For example, both of the following situations would qualify as partially supporting under these criteria: two fish samples from different species during one sampling event or two or more samples of the same or different species from different sampling events.

- *Biological Data:*

For free-flowing waters, the biological community survey data are confirmed to be moderately impaired, and are considered partially supporting. Based on professional judgement and/or other supplemental data, a second survey may be required to confirm moderate impairment. In this case, the initial assessment would be considered fully supporting but threatened and follow-up monitoring scheduled.

For estuarine biological community assessment, waters are considered partially supporting for aquatic life use if 11-25% of the samples within the segment have a B-IBI score < 2.0. Additional information on the estuarine biological assessment program can be found in Part VI Section 6.4.1.2 of this guidance.

- *Fish Advisories:*

Virginia Department of Health fish consumption advisories, where fish consumption is limited for “at risk” individuals such as young children or pregnant women, are considered violations of the general Water Quality Standard and therefore considered partially supporting. Waters, where fish consumption is limited and/or restricted but not completely prohibited, are considered partially supporting.

- *Shellfish Advisories:*

Those growing areas, as indicated by the DSS summary dated January, 2001, that have been classified as restricted (condemnations) are considered partially supporting. The loss of shellfish resource in restricted areas is a partial loss of use since the DSS allows harvesting and marketing after relay for cleansing of contamination. Restricted areas that have been administratively condemned due solely to the presence of a VPDES permitted out-fall will not be included in the 303d impaired waters list. Additional information on shellfish assessment and consumption use is contained in Part VI, Section 6.4.3.

- *Beach Closures:*

One or more VDH beach closures of less than one-week duration within the assessment cycle with a medium probability, based on best professional judgement, the pollution will reoccur. There are VDH plans to implement pollution reduction measures or controls.

- *Public Water Supply Source Closure:*

One or more VDH public water supply source closures within the assessment cycle with a medium probability that the pollution will reoccur. There are plans to implement pollution reduction measures or controls.

4 Not Supporting

The following is a description of the types of data and the acceptable criteria used to assess waters as not supporting designated uses.

- *Conventional Parameters:*

Waters with severe long term or chronic problems based on the assessment of monitored data. For waters with conventional parameters, at least two violations of water quality standards and exceedences of greater than 25% do not support the aquatic life use.

- *Toxic Pollutants:*

For toxic pollutant assessment in free-flowing streams, waters where there are 3 or more exceedences of a Water Quality Standard acute criteria in a 3-year period is considered not supporting for aquatic life use. For public water supply use, 2 or more exceedences of the human health criteria is considered not supporting.

For toxic pollutant assessment in estuarine waters, where there are several types of toxic data available, a weight of evidence approach has been initiated. Additional information on the details of using this approach can be found in Part VI, Section 6.5.3.

- *Biological Data:*

Free-flowing waters are considered not supporting when biological community data for the assessment period is rated as severely impaired using the RBP-II survey.

For estuarine biological community assessment, waters are considered not supporting for aquatic life use if >25% of the samples within the segment have a B-IBI score < 2.0. Additional information on the estuarine biological assessment program can be found in Part VI Section 6.4.1.2 of this guidance.

- *Fish Consumption Advisories:*

Virginia Department of Health fish consumption prohibitions are considered violations of the general water quality standard and are not supporting due to the loss of the designated use.

- *Shellfish Advisories:*

Those growing areas, as indicated by the DSS summary dated January, 2001, that have been classified as prohibited (condemnations) are considered not supporting. The loss of shellfish resource in prohibited areas is a complete loss of use due to the presence of excess pathogen indicators or other human health related pollutants. Prohibited areas that have been administratively condemned due solely to the presence of a VPDES permitted out-fall will not be included in the 303d impaired waters list. Additional information on shellfish assessment and consumption use is contained in Part VI, Section 6.4.3.

- *Beach Closures:*

One or more VDH beach closures, of more than one-week duration during the assessment period, with a high probability, based on best professional judgement, that the pollution will reoccur and additional closures will result. VDH initiates plans to implement pollution reduction measures or controls.

- *Public Water Supply Source Closure:*

One or more VDH public water supply source closures with a high probability that the pollution will reoccur. There are VDH plans to implement pollution reduction measures or controls.

Table 2 summarizes the designated use assessment criteria.

Table 2 Designated Use Assessment Criteria

	Fully Supporting	Fully Supporting but Threatened	Partially Supporting	Not Supporting
Conventional Parameters Aquatic Life Use Support (ALUS) and Swimming Use (temperature will not be assessed in tidal waters)	AR ≤ 10%	Not Applicable Nutrient screening values exceeded > 10% or designated “Nutrient Enriched Waters”	AR > 1 exceedence and 11% = AR ≤ 25%	AR > 1 exceedence and > 25%
Toxic Pollutants in Water Column and Sediment Aquatic Life Use Support (ALUS)	No exceedences	No more than 1 exceedence of acute criteria in a 3 year period (water column only) One or more ER-M SV or if no ER-M exists, 99 th percentile SV exceed (sediment only)	2 exceedences of acute criteria in a 3-yr period (water column only)	3 or more exceedences of acute criteria in a 3-yr period (water column only)
Toxic Pollutants related to human health (PWS & Fish Consumption)	No exceedences	A single exceedence of any state SV for fish tissue	1 exceedence of human health criteria (PWS) 2 or more exceedences of the same state SV, listed in Table 6(a), for fish tissue	2 or more exceedences of the human health criteria (PWS) NA for fish tissue
Biological Data	Freshwater: Fully Supporting or Slightly Impaired Estuarine: Samples having ≤ 2.0 B-IBI score are AR ≤ 10%	Freshwater: Unconfirmed, Moderately Impaired, Evaluated data show potential WQ problems Estuarine: Samples having ≤ 3.0 B-IBI score are AR > 10%	Freshwater: Confirmed Moderately Impaired Estuarine: Samples having ≤ 2.0 B-IBI score are 11% ≤ AR ≤ 25%	Freshwater: Severely Impaired Estuarine: Samples having ≤ 2.0 B-IBI score are AR > 25 %
Fish Consumption Advisories or Restrictions	No restrictions or prohibitions	A VDH advisory which does not limit consumption is in effect	A VDH advisory limiting consumption is in effect	A VDH restriction prohibiting consumption is in effect
Shellfish Advisories	No restrictions or prohibitions	Area classified as Conditionally Approved (seasonal condemnations)	Areas classified as Restricted: Excluding VPDES out-falls	Areas classified as Prohibited; Excluding VPDES out-falls
Swimming Use (see Conventional Parameter criteria) And Beach Closures	No exceedences	One short term VDH closure with low probability of recurrence (pollution source transient and no VDH plans to implement any control measures)	One or more VDH closure with medium probability of recurrence (VDH preparing plans to implement controls measures)	One or more VDH closure with high probability of recurrence (VDH implement controls measures)
Public Water Supply (PWS) Source Closures	No closures	One VDH closure with low probability of recurrence (no VDH plan to implement control measures)	One or more VDH closure with medium probability of recurrence (VDH preparing plans to implement controls measures)	One or more VDH closure with high probability of recurrence (VDH must initiate control measures)

AR = arithmetic exceedence rate

SV = screening value

ER-M = effects range – medium value

ALUS = Aquatic Life Use Support

PWS = Public Water Supply

Section 6.1 CONVENTIONAL PARAMETER EVALUATION METHODOLOGY

State and federal law requires DEQ to produce a biennial report to Virginia's citizens and EPA on the condition of its waters. The waters are evaluated in terms of whether five uses are met: 1) aquatic life, 2) fish consumption, 3) shellfish harvest, 4) swimming (primary and secondary contact recreation) 5) drinking water use. DEQ employs the EPA "Percent" Method to evaluate conventional pollutant impacts in waters for two uses: aquatic life use and swimming use.

6.1.1 Description of the EPA Fixed Rate (Percent) Method

National guidance issued by EPA recommends that states use an assessment method for the 305(b) report based on assumptions about the kind and frequency of data needed to support such an assessment. The object is to indicate whether waters are fully, partially, or non-supporting for the designated uses. EPA has proposed two thresholds for this purpose for conventional pollutants: 11-25% violation rate places the waters into the partially supporting category and > 25% violation rate places the waters into the not supporting category. These percentages are fixed.

For the 303(d) list of Impaired Waters, the EPA guidelines require waters to be listed as impaired (i.e. partially supporting or not supporting) only if more than 10% of the samples violate the standard. In effect, the EPA assessment guidelines imply that a violation of the numeric criterion is acceptable in 10% of the samples taken. The rule of thumb is described in Table 3

Table 3 EPA Fixed Rate Assessment Guidelines

Violation Rate (AR) of Total Samples Analyzed	Assessment
AR ≤ 10%	Meets use
11% ≤ AR ≤ 25%	Partially meets use (partial support)
AR > 25%	Fails to meet use (non support)

In recent years, DEQ has been encouraged to spread its monitoring efforts over more of the State's waters. To achieve this goal with a fixed monitoring budget, the average collection frequency changed from monthly to bimonthly (see section 6.2.2). The benefit from this change is that more streams and more stream miles can be assessed. The disadvantage is that the data collected from each station are fewer. The data set has become wide geographically but shallow in frequency. This aspect concerns DEQ due to the fact that the EPA fixed rate method assumptions are based on a monthly sampling frequency. Further monitoring program review and possible update stems from the need for additional monitoring data for Total Maximum Daily Load (TMDL) development. It is clear the monitoring program will require more efficient use of its resources in order to accomplish the increased needs.

Section 6.2 MONITORING STATION METHODOLOGY

6.2.1 Monitoring Station Delineation

DEQ has a vast network of active Ambient Water Quality Monitoring (AWQM) stations and a growing number of biological stations statewide. The AWQM stations are generally monitored monthly, bimonthly, or quarterly while the biological stations are monitored twice a year (usually in the spring and fall). Monitoring programs can be designed based on a "source targeted" (conventional) approach or a "probability based" approach or a combination of the two. Each monitoring program design has its advantages and disadvantages. Historically, most of DEQ's monitoring strategy has been based on the conventional approach. Many of the stations were located in proximity to Virginia Pollutant Discharge Elimination System (VPDES) facility outfalls. In recent years, additional stations have been added to monitor non-point source problems and many of the new stations have been placed at or near the mouths of

watersheds. In order to provide consistency between the regions and to get an accurate number of assessed stream miles in Virginia, the following stream delineation guidelines are the primary considerations used in the assessment process. However, if appropriate, the best professional judgement of the regional staff may be used if the delineation results are contrary to these guidelines. Documentation of these best professional judgement decisions should be included in the segment narrative.

1. Typically, no more than 10 miles of free-flowing stream should be assessed by the conventional pollutant data from one monitoring station. Miles assessed for a toxic pollutant or biological impairment may vary from the miles assessed for conventional parameters.
2. One monitoring station should not be used to assess an entire watershed unless land use, source, and habitat are relatively homogeneous.
3. When determining the miles assessed for a free-flowing monitoring station, the following items need to be considered:
 - a) Water Quality Standards Use Designations (i.e. Classes and/or Special Standards)
 - b) point or nonpoint source input to the stream or its tributaries,
 - c) changes in watershed characteristics such as land use,
 - d) changes in riparian vegetation, stream banks, substrate, slope, or channel morphology,
 - e) large tributary or diversion, or
 - f) hydrologic change such as channelization or a dam.
4. For estuarine stations, EPA guidance suggests using a 4-mile radius for open water stations; a 2-mile radius for bay stations and a 0.5 mile radius for sheltered bay stations.
5. Segment delineation will be performed using either USGS 1:24000 quads or EPA National Hydrography Dataset (NHD) coverage.
6. Spatial coverage for probabilistic monitoring stations should be identified in conjunction with the development of the monitoring plan and coordinated by regional monitoring and assessment staff and/or the Chesapeake Bay Program monitoring coordinator and Bay monitoring staff.
7. When assessing an impaired segment, consideration should be given to the possible existence of a permitted mixing zone within the segment. If a mixing zone is determined to exist within a designated segment, that section of the impaired segment should be removed from the segment if the permitted mixing zone exemptions exist for associated Water Quality Standards designated use(s) and/or contaminants

6.2.2 Watershed Station Rotation and Assessment Criteria

- Conventional Parameters:
pH, Temperature, Dissolved Oxygen, Fecal Coliform
1. The target number of data points is 12 for a new station or continue monitoring for an additional 12 data points for an established station, collected bimonthly for a two year period.

2. For the four conventional parameters, if only 1 sample exceeds the criteria for any or all parameters where $n = 9$, the station may be rotated after the two year cycle. This segment is considered fully supporting.
3. For any one of the four conventional parameters with 2 or 3 exceedances where $n = 2$ but $= 12$, the station will be classified as impaired for the associated parameter(s), depending on total number of samples in comparison to the EPA Percent Method. Monitoring will continue for an additional two-year bimonthly cycle with the target number of data points being 24. For stations with only one sample (including all probabilistic stations) and one exceedence, the station would be listed as not assessed for that parameter(s) and monitoring would continue for next two year, bimonthly cycle.
4. For any one of the four conventional parameters with 4 or more exceedences, where $n = 2$ but $= 12$, and no other exceedences of the other parameters occur, the water is classified as impaired for the associated parameter and fully supporting for the other parameters. The station may be rotated to a new station within the watershed after consultation and agreement of the monitoring and assessment staff. For all impaired waters, the impaired segment should be scheduled for additional TMDL support monitoring in the biennium prior to the scheduled TMDL completion date.
5. For any of the four conventional parameters, any individual parameter with 4 or more exceedences, out of a dataset of 9-12, is listed according to the EPA Percent Method. If any of the other parameters has 2 exceedences, there will be an additional two years of bimonthly monitoring with the target number of data points being 24. The segment is classified as impaired for the parameter with 4 exceedences and threatened for the other parameter(s).

These criteria are found in Table 4.

Table 4 Monitoring Station Assessment and Rotation Criteria (Conventional Parameters Only)

Number of Samples	Number of Exceedences	Assessment Results	Monitoring Station Implications
1	1	Not Assessed	Continue Monitoring
2 – 8	1	Fully Supporting	Continue Monitoring
	2 - 3 of any parameter	Impaired for Parameter(s)	Continue Monitoring
	4 or more for any Parameter & 0 -1 for other Parameters	Impaired for Parameter(s) Fully Supporting	Move Station
	3 or more for any Parameter & 1-2 for any other Parameters	Impaired for Parameter(s) 1 – Fully Supporting 2 – Impaired for Parameter(s)	Continue Monitoring
9 – 12	0-1 for any/all Parameters	Fully Supporting	Move Station
	2 – 3 for any Parameter(s)	Impaired for Parameter(s)	Continue Monitoring
	4 or more & 0-1 for all other Parameters	Impaired for Parameter(s) Fully Supporting	Move Station
	3 or more for any Parameter(s) & 2-3 for any other Parameters	Impaired for Parameter(s) Impaired for Parameter(s)	Continue Monitoring
³ 13		Assess According to Percent Method Results	

Section 6.3 NON DEQ EVALUATION METHODOLOGY

6.3.1 Citizen Monitoring

In 1997, Water Quality Monitoring, Information and Restoration Act (WQMIRA) was passed by the General Assembly. This bill charged DEQ with monitoring and assessing all the waters within the Commonwealth. During this same General Assembly session, the position of Citizen Monitoring Coordinator (CMC) was put into the operating budget of DEQ. The primary duties of the CMC are establishing a forum for exchanging information using the Citizen Monitoring Support Network, developing the channels of communication among citizen groups and other State agencies, sponsoring citizen monitoring seminars, utilizing citizen data in a manner that will enhance consistency to citizen monitoring data and encouraging additional citizen monitoring efforts.

Assessment Process:

1. All citizen water quality data should be sent to the Citizen Monitoring Coordinator (CMC) at DEQ. In conjunction with the DEQ QA/QC coordinator and biological program coordinator, the CMC is responsible for collecting, evaluating and approving the SOPs, QA/QC plans, training manuals, and current monitoring procedures for each of the active citizen monitoring groups. Any changes in

QA/QC and/or SOP methods and/or any additions or deletions of current monitoring sites should be brought to the attention of the CMC.

2. All data collected under documented and approved SOPs and QA/QC plans should be included in the 305(b) assessment as follows:
 - a) All approved conventional parameter data should be summarized by major watershed and characterized according to the procedures and considerations in Part V of this manual.
 - b) Until biological programs are fully evaluated by DEQ biological program coordinator, biological monitoring sites characterized by citizen monitors as either “excellent” or “good” should be designated as “Area of low probability for adverse conditions”. Biological sites periodically characterized as “fair” or “poor” should be designated as “Area of medium probability for adverse conditions” and listed as fully supporting but threatened. Likewise, biological sites that are consistently poor should be characterized as “Area of high probability for adverse conditions” and listed as fully supporting but threatened with DEQ follow up monitoring to be scheduled as soon as possible.
 - c) The summaries of the citizen data will be placed under a separate Citizen Monitoring section of the 305(b) report.
 - d) Segment lengths represented by a monitoring site should be determined by the CMC (in conjunction with the citizen water quality groups and regional assessment staff) using the mileage delineation section of the 305(b) and 303(d) assessment guidance manual. Specific monitoring site location, including latitude, longitude and a physical description of the site (i.e. Route 646 bridge crossing, 3 mile north of route 647) should be provided for each monitoring site. This description should include the side of the river the sample was collected, depth of the sample, and approximate distance from the riverbank where the sample was collected. Each monitoring site should be identified with a unique station id using a system similar to the DEQ station id system.
 - e) Data collected at sites that complement and are comparable (i.e. chemical to chemical comparisons and biological to biological comparisons) to DEQ ambient monitoring sites, should be included in the major basin report. However, the final assessment of that river segment will be made using the DEQ ambient monitoring data (found in the appropriate section of the 305(b) report). The data collected by the citizen should be used as background data.
 - f) The CMC should coordinate with each regional office regarding the final assessment of the citizen monitoring data. In coordination with the CMC and the 305(b) coordinator, each regional office should provide any appropriate final editing of the citizen monitoring assessment to be included in the 305(b) report.
3. The CMC will provide all “approved” data used in the 305(b) report in basic data tables. The tables will be included in the appendices of the 305(b) report. These data tables should include each individual sample period as well as statistical results (average, maximum, minimum).
4. The CMC will review data collected without SOPs and QA/QC plans. This data will be summarized in narrative form only and included in the appropriate river basin evaluation as appropriate.

5. Once the data is summarized into the data tables, they will be sent to each region for their review and comparison to similar DEQ data points.
6. If, during the regional review, a discrepancy between data from DEQ monitoring stations and data from similarly sited citizen monitoring station and/or a citizen monitoring technique is believed to be suspect, the CMC should be notified and an attempt to rectify the discrepancy initiated. The CMC should collaborate with the DEQ water quality assessment QA/QC coordinator to evaluate the potential causes for the data disparity and/or review the QA/QC plan and the monitoring techniques of the citizen group. After this evaluation is complete and a problem is confirmed, the CMC and QA/QC coordinator will recommend appropriate corrective actions to the citizens monitoring group and include any necessary revision(s) to the citizen QA/QC plan. Until the discrepancies with the data and/or methods are fully evaluated by the CMC and the QA/QC coordinator, the data (for either the specific parameter or for the group) should not be used in agency assessments. If corrective action is not initiated by the citizen monitoring group, the QA/QC plan for that parameter and/or for the group as a whole may no longer be considered valid by DEQ and the data will not be considered for state-wide water quality assessments.
7. Regional DEQ planning and monitoring staff will be given a list of all stations classified as “Area of medium probability for adverse conditions” and “Area of high probability for adverse conditions”. The regional monitoring staff should review the station list results and consider including appropriate sites to their regional monitoring plan for future monitoring activities.

6.3.2 U.S. Forest Service (USFS) Water Quality Data

After review and approval of monitoring and QA/QC protocols, DEQ will consider, for use in its 305(b) Water Quality Assessment Report, data generated by other State and Federal monitoring programs. DEQ has established a water quality data sharing agreement with the USFS for the George Washington and Jefferson National Forests using the USFS Fisheries and Aquatic Ecology Program.

The USFS program has collected macroinvertebrate data from approximately 500 monitoring stations within the two National Forests. Sampling for macroinvertebrates are conducted utilizing the same collection methodology (Plafkin et al 1989) that DEQ biologists use in the ambient biomonitoring program. Therefore, the raw data collected by the USFS should be highly comparable with DEQ data. The USFS has used the Macroinvertebrate Aggregated Index for Streams (MAIS) to assess this raw data and make an initial water quality interpretation.

The DEQ regional biologist and planners may use the data, provided to DEQ by the USFS, in the 305(b) report if they find it acceptable for 305b assessment purposes. If the regional biologist or planners have information which conflicts with the initial USFS assessment or for any other reason, question the final USFS stream assessment, they may elect to disregard the USFS assessment results until further verification can be obtained. **If the initial assessment is not used, documentation relating to this decision will need to be provided.** The regional Biologist may elect to reevaluate the raw data using the EPA RBP-II metrics to confirm consistent assessment methodology and conclusions. If differences become apparent, the regional Biologists may decide not to use the assessment data in the 305(b) report until an on-site stream visit can be performed and conditions verified. Final assessment results of the USFS data should be consistent with the ambient biological assessment criteria described in Section 6.4.1 of this guidance.

6.3.3 Non Point Source (NPS) Assessment

Non-point source assessment of hydrologic units will be performed by the Virginia Department of Conservation and Recreation (DCR). Unlike previous NPS assessments, which ranked watersheds on a number of NPS activity levels, the 2002 process calculates net loadings of nitrogen, phosphorous, and sediment, per watershed. Gross load calculations are done via modeling in a manner that closely approximates the results of the Chesapeake Bay Program water quality model in regards to loadings in the

Bay watersheds, thereby diminishing if not removing the uncertainty of having conflicting assessment results for this portion of the state. This model is then employed to calculate similar values for non-Bay watersheds to develop consistent statewide loadings. Inputs to this process included:

- A DCR modified land use / land cover layer
- A DCR developed confined animal data set
- Census of Agriculture animal numbers by jurisdiction
- VDOF forest harvesting data
- The USDA's Natural Resources Inventory

Net loadings are formed by subtracting from calculated gross loads the reductions in nitrogen, phosphorous, and sediment that are realized from both best management plan installations and relevant grant projects.

DCR rates watersheds as high, medium, or low for potential non-point source (NPS) problems as indicated by the non-point source assessment. This categorization is performed so that approximately the highest 20% of the net loadings by watershed are assigned the high rank. The next highest 30% of the net loading values are assigned the medium rank. All other watersheds are assigned a low NPS rank. Rather than make a hard and true category split at these percentages, the category breaks are made where net loading differences occur nearest to the stated percentages.

Several variables used in past NPS assessments will also be calculated by watershed in 2002. They will not, however, be used to determine the net loadings of the NPS assessment. Rather, they (like the NPS assessment rank) will become part of the set of variables used to prioritize watersheds for various program activities. In effect, more emphasis is being given to where NPS pollution control activities are needed to protect human and aquatic species health rather than simply to where the potential loads are greatest.

Section 6.4 DESIGNATED USE EVALUATION METHODOLOGY

6.4.1 Aquatic Life Use Support

Determination of the degree of use support for aquatic life is based on conventional water column pollutants (DO, pH, temperature), sediment SV analysis, along with biological monitoring data and best professional judgement, relying mostly on the most recent data collected during the current reporting period. Up to 5 additional years of data may be used if they reflect current conditions.

- Conventional parameters (DO, pH, temperature)

Conventional pollutant data will continue to make up the bulk of free-flowing, estuarine and lake water quality assessments. The EPA Percent Method will be used to determine the degree of use support. The assessment is objective except where professional judgement indicates that natural causes are responsible for the violations or where the data are suspect. Waters not meeting standards due to natural conditions should be assessed as impaired and the source of impairment listed as natural conditions. For DO, the instantaneous minimum standard will be used to assess exceedences. For estuarine and lake waters, all DO data will be assessed including depth profile data. Each DO measurement associated with the depth profile will be assessed as an independent data point.

6.4.1.1 Free-Flowing Biological Assessment

Evaluations of biological monitoring data from the DEQ biological monitoring program are used to assess support of the aquatic life use. Where ratings have changed during the 5-year reporting period and possibly between fall and spring, the regional biologist should determine the most appropriate rating for the assessment period. The following are considerations to be used when preparing bio-assessment results.

Consideration #1: Is a single biological survey sufficient data to make a water quality assessment?

The DEQ has been utilizing two different rapid bioassessment protocols, RBP-I and RBP-II. The RBP-II surveys follow a highly structured protocol that reaches an objective and repeatable ranking based on the raw data collected. The RBP-I final rankings are based on the field biologist's professional opinion after conducting a less formal survey. The validity of the results is dependent on the skill level of the biologist and is less quantitative in nature. These surveys should be utilized only to target waters for further in-depth monitoring or to make an evaluation that waters are not impaired. RBP-I level surveys should not be used without subsequent RBP-II confirmations to list waters as impaired in 305(b) or 303(d) reports. Some regions have conducted RBP-I surveys in order to have some preliminary monitoring coverage of waters previously not monitored. These results should be considered separately and given less credence from the more in depth RBP-II surveys.

Rankings, based on a single RBP-II survey, are the result of the data evaluation and reduction of numerous measurements and observations conducted during the sampling survey. The survey measures the response of the biological community to all perturbations it has experienced, integrated over time. A single, properly conducted, RBP-II survey is not a "single data-point" analogous to a single D.O. measurement or fecal coliform sample. It is proper to place a large degree of confidence in the results of a single well-conducted RBP-II survey, which shows no impairment or severe impairment. Slightly impaired or moderately impaired rankings are less certain and should be verified with further surveys or other ancillary data before complete confidence can be placed in the results. For the purpose of the 2002 305(b) and 303(d) reports, an unconfirmed, single survey, moderately impaired RBP-II ranked water, will be listed as "fully supporting but threatened for aquatic life use" until further analysis can be conducted. Further analysis should be given a high priority and an additional survey conducted as soon as possible. If additional surveys continue to show moderate impairment, then the water will be listed as "partially supporting". Any single severely impaired RBP-II ranking will be listed as "not supporting" in the 305(b) and 303(d) reports unless more recent RBP-II survey data show conditions have improved.

If the Biologist has observed natural conditions, such as high flow conditions at time of sampling or recent extreme flooding, etc, or believe that unusual natural conditions are responsible for a questionable ranking, they should note the lack of confidence in the survey and it should not be used for assessment purpose nor should it be reported.

Consideration #2: Should Biological survey data be assessed like chemical data i.e. need more than 10% of the rankings to show impairment before it is listed as impaired?

The frequency approach is not appropriate for interpretation of multiple biological survey results over time. Biological data reflect the impacts of water quality conditions over a period of time. These data are different from chemical/physical data, which represent only the water quality at that single point in time. The reason it is acceptable to have 10% violations of a conventional standard and still say the waters are not impaired is that a judgement has been made that the system can sustain that many violations without being damaged. It is based on the assumption that water quality can slip below the standard occasionally for short periods of time without damaging water quality and/or aquatic life. The RBP-II data however, is a direct measurement of damage to the biological integrity of the system. If impairment is noted, it means that damage to the community already has occurred. If you have less than 10% violations of a standard, damage to the aquatic system may or may not occur, however, a single biological survey can indicate that you currently have or had a problem.

Consideration #3: How should five years of RBP-II surveys be interpreted for the 305(b) reporting period.

The regional biologists should review the biological assessments for the five-year period and they should make a final biological assessment ranking based on these data. If you have spring/fall surveys each year for a 5-year period, this record can be used to describe any trend, which has occurred. Since RBP-II

surveys are dependable records of the condition of the community at the time of the survey, the most recent survey should be the most accurate indicator of stream biological health at the time of report preparation. The older data indicate what conditions were at the time the surveys were completed, but if conditions have changed, they should be reflected in the more recent data. An attempt to average the data over a five year time period would weaken your ability to accurately predict current conditions. Aside from trend characterizations, the most recent ranking should be given the most consideration for the overall assessment of current conditions. Place the greatest validity in the last survey completed. If the last survey showed severely degraded conditions (and the biologist has confidence in their survey) but the previous samples showed only slightly impaired conditions, the stream should be considered severely impaired. If the last survey shows stream improvement, this should be given primary consideration.

A standardized fact sheet, as found in Appendix C of this manual, has been developed to help the regional biologists review and assess the data for the five-year period. The fact sheet includes a summary of the biological assessments for the five-year period and will be used to summarize and review all the information available for a site. The fact sheet allows for consideration of supplemental information about the watershed that is important in making the final assessment decision. In a case where the most recent biological assessment shows a significant change from previous rankings, special note should be made of any known recent changes to the watershed that may explain any changes in the more recent biological assessments

If a stream survey shows impairment based on old data (> 5 years), it should be monitored again to verify if conditions have improved, stayed the same or degraded. It should not be assumed that conditions have changed unless data are collected to validate that assumption.

6.4.1.2 Estuarine Biological Assessment

Status and trends of estuarine benthic communities are used to assess the support of aquatic life uses. The DEQ will use benthic data collected by the Chesapeake Bay Monitoring Program for this assessment. The main characterization tool for describing benthic communities in the Chesapeake Bay is a field validated, peer reviewed benthic index of biotic integrity (B-IBI). The B-IBI is based upon comparison of reference sites that were minimally impacted by low dissolved oxygen events and sediment contaminants to other sites. (Ranasinghe, J.A., S. B. Weisberg, D. M. Dauer, L. C. Schaffner, R. J. Diaz and J. B. Frithsen, 1994, Chesapeake Bay Benthic Community Restoration Goals. Report for the U. S. Environmental Protection Agency, Chesapeake Bay Office and the Maryland Department of Natural Resources. 49 pp.) and (Weisberg, S.B., J. A. Ranasinghe, D. M. Dauer, L. C. Schaffner, R. J. Diaz and J. B. Frithsen, 1997, An Estuarine Benthic Index of Biotic Integrity (B-IBI) for Chesapeake Bay. *Estuaries*. 20: 149-158.).

The value of the B-IBI indicates whether the macrobenthic community meets restoration goals developed for benthic habitats of the Chesapeake Bay. Status of the benthic community is classified into four levels based on the B-IBI. Values less than or equal to 2 are classified as severely degraded, values from 2.0 to 2.6 are classified as degraded, values greater than 2.6 but less than 3.0 are classified as marginal, and values of 3.0 or more are classified as meeting goals. Trend analyses for benthic communities are also conducted using the benthic index of biotic integrity and on selected metrics of the B-IBI. The B-IBI goals were developed based upon data from an index period of July 15 through September 30. Therefore, trends in the value of the B-IBI were based upon September cruise values for the 13-year period of 1985-1999. The following selected benthic metrics are used species diversity, community abundance, community biomass, pollution-indicative species abundance, pollution-indicative species biomass, pollution-sensitive species abundance, and pollution-sensitive species biomass. See Weisberg et al., (1997) for a list of pollution-indicative and pollution-sensitive taxa.

An estuarine benthic community sample having a B-IBI score ≤ 2.0 will be considered a violation of the general standard for aquatic life support. As with conventional pollutants, segments with only one benthic sample collected will not be assessed because of the low statistical confidence of only one sample. This is

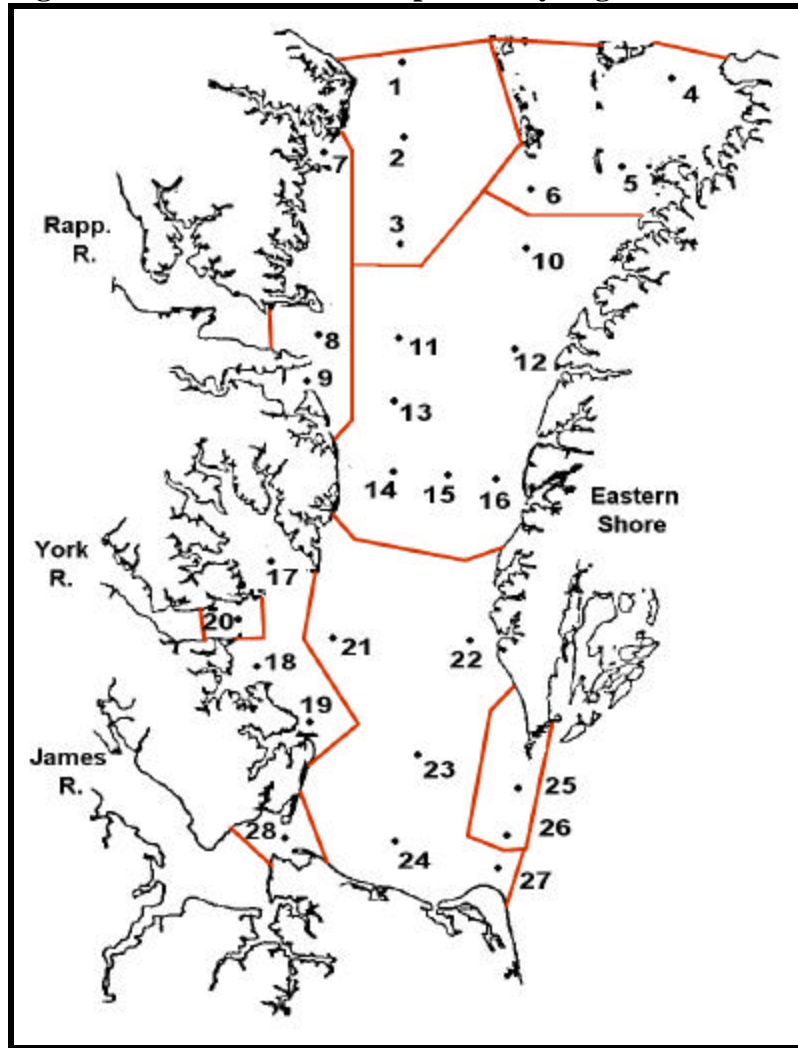
somewhat different from free-flowing benthic assessment due to the fact that estuarine waters are more variable and dynamic environments, both spatially and temporally. For segments with more than one sample the data will be assessed as follows with the “worst case” assessment result being used:

- 1) *Fully Supporting*: Number of samples violating the standard (i.e. having a B-IBI score ≤ 2.0) are $\leq 10\%$ of the samples within the segment.
- 2) *Fully Supporting but Threatened*: Number of samples having a B-IBI score ≤ 3.0 are $> 10\%$ of the samples within the segment.
- 3) *Partially Supporting*: Number of samples violating the standard (i.e. having a B-IBI score ≤ 2.0) are $= 11\%$ and $\leq 25\%$ of the samples within the segment.
- 4) *Not Supporting*: Number of samples violating the standard (i.e. having a B-IBI score ≤ 2.0) are $> 25\%$ of the samples within the segment.

Spatial Segmentation:

Mainstem Chesapeake Bay will be spatially segmented according to patterns determined by a multivariate spatiotemporal analysis as shown in Figure 1 (Alden, et al., 1992, Virginia Chesapeake Bay Water Quality and Living resources Monitoring programs: comprehensive technical report, 1985-89, AMRL technical Report No. 848). Vertical differences in salinity and temperature form a pycnocline in partially mixed estuaries such as Chesapeake Bay and create a waterbody where the surface waters can be of significantly different quality than the deep waters. Therefore, each segment will be split, based on the pycnocline (vertical density gradient), into “surface” and “bottom” water layers that will be assessed separately. The layer separation depth for each vertical profile of data will be based upon the standard CBP monitoring pycnocline calculation protocol. In absence of a calculated pycnocline depth, the layer separation depth will be $\frac{1}{2}$ of the total station depth. All data collected above the pycnocline depth will be aggregated and assessed as representing surface waters of each segment. All data collected below the pycnocline depth will be aggregated and assessed as representing bottom waters of each segment. If a segment is determined to be impaired in either the surface or bottom waters, then that whole segment will be considered to be impaired.

Figure 1. Mainstem Chesapeake Bay Segmentation



The major tidal tributaries (James, York, Rappahannock) will be horizontally segmented according to the segmentation guidelines described in Part VI, Section 6.2.1. Consideration will be given to salinity and the Chesapeake Bay tributary segmentation shown in Figure 2 when determining whether several water quality stations are comparable and should be aggregated into a larger segment. Generally, hydrologic boundaries such as major tributaries, dams, etc., point and non-point source data, EPA guidelines, best professional judgement, and differences in actual assessments between water quality stations will be given stronger consideration and used to subsegment the tributaries around water quality stations. Segments having long term mean salinities above 5 ppt and average sampled depth greater than 4 meters will be assumed to have a vertical density gradient (i.e. pycnocline) creating differing surface vs. bottom water conditions. The layer separation depth for each vertical profile of data will be based upon the standard CBP monitoring pycnocline calculation protocol. In absence of a calculated pycnocline depth, the layer separation depth will be $\frac{1}{2}$ of the total station depth. All data collected above the pycnocline depth will be aggregated and assessed as representing surface waters of each segment. All data collected below the pycnocline depth will be aggregated and assessed as representing bottom waters of each segment. If a segment is determined to be impaired in either the surface or bottom waters, then that whole segment will be considered to be impaired.

The minor tidal tributaries (i.e. Pagan R., Elizabeth R.) will be segmented based on delineation of water column areas hydrologically similar to those water column areas within which monitoring stations are located. Most of these "secondary tributaries" are shallow in depth and usually, well mixed systems with little fresh water inflow. Where information indicates pycnoclines exist, surface and bottom waters will be vertically segmented by the estimated pycnocline. The layer separation depth for each vertical profile of

data will be based upon the standard CBP monitoring pycnocline calculation protocol. In absence of a calculated pycnocline depth, the layer separation depth will be ½ of the total station depth. All data collected above the pycnocline depth will be aggregated and assessed as representing surface waters of each segment. All data collected below the pycnocline depth will be aggregated and assessed as representing bottom waters of each segment. If a segment is determined to be impaired in either the surface or bottom waters, then that whole segment will be considered to be impaired. Where multiple monitoring stations indicate non-uniform water quality conditions, impaired segments will be interpreted to extend one-half the distance between the stations displaying disparate assessment results.

- Additional Spatial Segmentation Consideration

The estuarine benthic monitoring program consists of both fixed station and probabilistic sampling networks. Probabilistic sampling is performed only once at each randomly selected location. These data can be aggregated and assessed as representing the entire spatial area of a segment but do not characterize a single specific geographic location within that segment because of insufficient statistical confidence in only one sample. Data from the fixed sampling network are collected by periodically returning to the same location. These stations represent a specific area and also provide information about long term trends on the condition of the benthic community. Data from each sampling network will be assessed as follows.

- Benthic probabilistic sampling network:

It is well established that salinity is a major factor controlling estuarine benthic community structure. Therefore, segment delineation for purposes of estuarine benthic assessments of the probabilistic sampling network in the Chesapeake Bay tributaries will be based upon the Venice salinity classification system (tidal fresh = <. 5 ppt, oligohaline = .5-5ppt, mesohaline = 6-18ppt, polyhaline = >18ppt.) as shown in Figure 2. This spatial segmentation is used by the Chesapeake Bay Monitoring Program for tributary water quality status and trends analyses and provides ancillary information useful for describing causes of patterns observed. In cases where benthic community data shows well-defined and large spatial demarcations in benthic community conditions, these segments may be further subdivided. The Chesapeake Bay mainstem will be assessed according to the segmentation scheme shown in Figure 1. All probabilistic samples collected within these mainstem and tributary segments during the 5-year assessment period will be statistically analyzed to determine the attainment of aquatic life use.

Figure 2. Chesapeake Bay Tributary Segmentation



- Benthic fixed station sampling network:

The fixed station samples will be used for describing long term trends in the benthic communities. They will also be used for site specific assessment by aggregating all data collected at that site during the 5-year assessment period. The spatial area represented by the fixed stations will be assigned on a site-specific basis using best professional judgement. This will be determined by considering the spatial heterogeneity of sediment type and the bathymetry surrounding the station location. Oligohaline and low mesohaline segments generally have a very heterogeneous sediment type and therefore the station can not be assumed to represent large areas. Stations in polyhaline or tidal fresh segments will have more homogeneous sediment distributions and will be representative of larger areas. Likewise, stations located in deep waters cannot be assumed to represent surrounding shallower water areas because of the differing bottom water quality conditions present in deeper waters as opposed to the surrounding shallow areas.

6.4.2 Fish Consumption Use

The support of the fish consumption use will be based on several types of information. These include consumption advisories limiting consumption and restrictions (bans) issued by the VDH as per the Memorandum of Understanding (MOU) with DEQ and comparison of fish tissue data to state screening values (SV's). See Section 6.5.2 for additional information on fish tissue analysis. Waters will be assessed as partial or not supporting for fish consumption use if an advisory, limiting consumption, or a restriction has been enacted. For additional information, fish consumption use support will be determined according to criteria found in Part V.

6.4.3 Shellfish Consumption Use

The use support for shellfish is based on the determination of restriction on the harvesting and marketability of shellfish resources made by the VDH-Division of Shellfish Sanitation (DSS) as of the most recent restrictions (January 2001). The DSS is the State agency with the statutory authority to determine shellfish harvesting and marketability status. The DSS uses four classifications for describing the status of shellfish waters. They are approved, conditionally approved, restricted, and prohibited and these are assessed according to the considerations found in Part V. A description of these terms follows:

Approved area:	Growing areas from which shellfish may be taken for direct marketing at all times.
Conditionally Approved:	Growing areas where the water quality may be affected by seasonal or sporadic use of boat docks or harbor facilities are considered conditionally approved. Normally, this would occur during the boating season (April 30 through October 31).
Restricted Area:	Growing areas where a sanitary survey indicates a limited degree of pollution which makes it unsafe to market shellfish for direct marketing. Shellfish from such areas may be marketed after purifying or relaying activities in accordance with certain VDH-DSS requirements.
Prohibited Area:	Growing areas where the sanitary survey indicates dangerous numbers pathogenic microorganisms or other contaminants that might reach that area. The harvesting of shellfish from these areas for direct marketing, relaying, or depuration is prohibited.

6.4.4 Swimming Use

Based on the requirements of Section 305(b), support of the swimming and secondary contact recreation uses will be assessed together using the same procedures used in past 305(b) reports. Waters should be assessed as less than fully supporting of the swimming use if either fecal coliform bacteria or bathing area closure indicates less than full support: Assessment of swimming use is conducted as described in Part V.

6.4.5 Public Water Supply Use

Toxics in drinking water are assessed according to the Water Quality Standards criteria (9 VAC 25-260-140.B) for public water supply and support of this use will be based on information provided in Part V.

Section 6.5 ADDITIONAL PARAMETER EVALUATION

6.5.1 Nutrient Evaluation

The 1985 Virginia General Assembly established a joint subcommittee to examine nutrient enrichment problems in Virginia's portion of the Chesapeake Bay. One of the recommendations of their report was to direct the SWCB to develop standards to protect the Chesapeake Bay and tributaries from nutrient enrichment.

In 1986, the SWCB appointed a Technical Advisory Committee (TAC) to assist in the development of nutrient standards. The TAC recommended the following thresholds for identifying nutrient impairment (Table 5).

Table 5 TAC Recommended Nutrient Thresholds

Parameter	Freshwater Lakes	Flowing Waters	Estuarine	Tidal Freshwater
Chl (a)	25 ug/l monthly avg 50 ug/l MAXIMUM	Narrative Standard	120% of Background	120% of Background
Dissolved Oxygen	Narrative Std	24 hr fluctuation > 1/3 oxygen saturation	Standard related to background Chl (a)	Standard related to background Chl (a)
Total Phosphorus	50 ug/l	100-200 ug/l	No Standard Monitor only	No Standard Monitor only
Total Nitrogen	No Std	No Std	No Std	No Std

Ug/l = micrograms per liter

However, the SWCB did not adopt the recommendations of the TAC and these values will not be used unless specified below. The agency adopted two regulations to protect Virginias' waters from the effects of nutrient enrichment. The first regulation allows the Board to designate "nutrient enriched waters" where there has been degradation due to the presence of excessive nutrients. The second regulation allows the control of nutrient discharges from point sources into the designated "nutrient enriched waters". In the absence of other monitored data relative to aquatic life use, DEQ will list the twenty-two "nutrient enriched waters", identified in the Water Quality Standards, as fully supporting but threatened the aquatic life use.

In the absence of approved numerical Water Quality Standards nutrient criteria or universally accepted nutrient criteria, the assessment process will not designate a segment impaired, based on nutrient data alone. However, these waters will be listed as fully supporting but threatened for aquatic life, where monitored nutrient guideline values have been exceeded. It is recognized that other designated uses could be affected but the aquatic life use is considered the primary use affected by nutrient enrichment.

- Procedure for Assessing "Targeted" Nutrient Monitoring Data

For "free flowing" streams, total phosphorus will be assessed for the five-year period. The threshold is 200 ug/l. For assessment of lakes, the total phosphorus threshold is 50ug/l. In the absence of other monitored data related to aquatic life use, if at least two samples are available and exceedences are greater than 10% of the total samples, the water will be listed as fully supporting but threatened for aquatic life use. A single sample will not be assessed. For phosphorus and chlorophyll (a) evaluation, the primary concern is the impact on dissolved oxygen concentrations as it relates to aquatic life.

For tidal fresh waters, estuaries and lakes, chlorophyll (a) will be assessed for the five-year period. The threshold is 50 ug/l. In the absence of other monitored data related to aquatic life use, if at least two samples are available and exceedences are greater than 10% of the total samples, the water will be listed as threatened for aquatic life use. A single sample will not be assessed. Once again, it is recognized that other designated uses could be affected. However, for chlorophyll (a) evaluation, the primary concern is increased algae production and the corresponding impact on dissolved oxygen concentrations.

6.5.2 Fish Tissue and Sediment Toxics Evaluation

- **Fish Tissue (fish consumption use)**

The Water Quality Standards and Biological Monitoring Programs (WQSBMP) collects fish tissue samples from designated monitoring stations for contaminant analysis. WQSBMP staff identifies the results of any analysis that exceeds a screening value (SV) for the toxic contaminants and includes this

information in the data provided to WQA. Due to the delay between sample collection and final analysis results, fish tissue data for this assessment cycle will include samples collected in 1995 through 2000. Older fish tissue data may be included where deemed appropriate

Fish tissue data collected at stations throughout Virginia represent Tier 1 monitoring data. These Tier 1 monitoring data are meant to identify sites where concentrations of contaminants in the edible portions of commonly consumed fish indicate a potential health risk to humans. Usually, three fish tissue composite samples are analyzed for chemical contaminants at each Tier 1 station. Each is a composite of edible fillets for one species of fish from a top-level predator, a mid-level predator, and a bottom feeder.

If Tier 1 results reveal potential problems, a more intensive Tier 2 study is initiated by Water Quality Standards and Biological Monitoring Programs to determine the magnitude, geographical extent, and potential sources of contamination in the fish.

Analytical results for fish tissue are expressed in wet-weight and are compared to screening values (SVs) for the toxic contaminants using EPA risk assessment techniques for noncarcinogen and carcinogen effects. SV calculations use the 10^{-5} risk level adopted by the State Water Control Board in 1992, an average human body weight of 70 kg and a lifetime fish consumption rate of 6.5 grams per day (general U.S. population), which are the same values used to calculate the human health water quality criteria found in 9 VAC 25-260-140.B. Also included in the SV calculation are toxicological data pertinent to human health effects; a reference dose (RfD) is used for non-carcinogen toxic effects and a cancer oral slope factor is used for carcinogen effects. Screening values shown in Table 6a are based on the same toxicological data (and body weight, fish consumption, and cancer risk level) that form the basis for the water quality criteria listed in 9 VAC-25-260-140.B, under the column labeled "Human Health, All Other Surface Waters". These water quality criteria are water column concentrations that are based on a specific fish tissue concentration, which was calculated to represent a safe or acceptable minimal risk level. The water quality criteria are designed to prevent the fish from bioconcentrating the toxic contaminants to these levels greater than these fish tissue concentrations. The SV concentrations listed in Table 6a represent the same fish tissue concentrations that are the basis for the water quality criteria listed in 9 VAC-25-260-140.B and may be considered the fish tissue concentration equivalent of those water quality criteria. Table 6a contains SVs for all chemicals for which Virginia has adopted water quality criteria; however, many of the chemicals listed in Table 6a do not bioaccumulate and are not often found in fish tissue. They are included in Table 6a for completeness. All screening values are rounded to two significant digits.

Table 6b lists SVs for additional toxic chemicals for which Virginia has not adopted water quality criteria that are based on fish tissue concentrations (those criteria listed under "All Other Waters" in 9 VAC-25-260-140.B). It includes chemicals recommended for monitoring by EPA or of special interest to DEQ as well as SVs for some chemicals that are based on recent changes to toxicological data and/or exposure assumptions that are different from those used to calculate the water quality criteria found in 9 VAC-25-260-140.B. The SVs in Table 6b are updated using available data from the EPA IRIS database and/or recommendations from EPA or the Virginia Department of Health before each assessment effort so the assessments are based on the most up to date information available on human health risks.

If a fish tissue composite sample at Tier 1 station exceed a SV in either Table 6a or Table 6b, the water body should be delineated as threatened for fish consumption. If the SV, listed in Table 6a for the same toxic pollutant, is exceeded in two or more samples from the same site, the water is considered partially supporting. For example, both of the following situations would qualify as partially supporting under this criterion: two different fish samples from different species during one sampling event or two or more different samples of the same or different species from different sampling events. Data from all

Tier 1 and Tier 2 monitoring studies are evaluated by DEQ as well as provided to the VDH for their consideration of the need for establishing fish advisories. DEQ and VDH have signed a Memorandum of Agreement (MOA) that describes how the agencies exchange information regarding the results of all Tier 1 and Tier 2 fish tissue monitoring. If VDH issues a fishing ban or advisory, limiting consumption, the segment should be designated either partial or not supporting for fish consumption use based on the severity of the advisory. An advisory limiting fish consumption is considered partially supporting and an advisory prohibiting consumption is considered not supporting the fish consumption use. The results of the Tier 2 study should be clearly communicated in the 305(b) narrative.

**RISK BASED SCREENING VALUES (SV) FOR FISH TISSUE
BASED ON THE SAME TOXICOLOGICAL DATA USED FOR
CALCULATING THE HUMAN HEALTH WATER QUALITY
CRITERIA IN 9 VAC-25-260-140.B UNDER "ALL OTHER
WATERS" FOR GENERAL POPULATION (ADULT)**

BODY WEIGHT (KG) 70
RISK LEVEL 10^{-5}
CONSUMPTION RATE (KG/DAY) 0.0065

Table 6a

COMPOUND		NON CARCINOGEN	CARCINOGEN
		SCREENING VALUE	SCREENING VALUE
	CAS #	PPB	PPB
Acenaphthene	83-32-9	650,000	
Aldrin	309-00-2	320	6.3
Anthracene	120-12-7	3,200,000	
Antimony	7440-36-0	4,300	
Benzene	71-43-2		3,700
Benzo(a)anthracene	56-55-3		15
Benzo(b)fluoranthene	205-99-2		15
Benzo (k)fluoranthene	207-08-9		15
Benzo(a)pyrene	50-32-8		15
Bromoform	75-25-2		14,000
Butyl benzyl phthalate	85-68-7	2,200,000	
Carbon tetrachloride	56-23-5		830
Total Chlordane	57-74-9	650	310*
Chlorodibromomethane	124-48-1	220,000	
Chloroform	67-66-3		18,000
2-Chlorophenol	95-57-8	54,000	
Chrysene	218-01-9		15
Cyanide	57-12-5	220,000	
DDD	72-54-8		450
DDE	72-55-9		320
Total DDT	50-29-3	5380	320
Dibenz(a,h)anthracene	53-70-3		15
Dibutyl phthalate	84-74-2	1,100,000	
Dichloromethane	75-09-2		14,000
1,2-Dichlorobenzene	95-50-1	970,000	
1,3-Dichlorobenzene	541-73-1	140,000	
1,4-Dichlorobenzene	106-46-7	140,000	
Dichlorobromomethane	75-27-4		1,700

1,2-Dichloroethane	107-06-2		1,200
1,1-Dichloroethylene	75-35-4	97,000	
2,4-Dichlorophenol	120-83-2	32,000	
Dieldrin	60-57-1	540	6.7
Diethyl phthalate	84-66-2	8,600,000	
Di-2-ethylhexyl phthalate	117-81-7		7,700
2,4-Dimethylphenol	105-67-9	220,000	
2,4-Dinitrotoluene	121-14-2		350
Dioxin	1746-01-6		0.0062
Endosulfan (I and II)	115-29-7	65,000	
Endrin	72-20-8	3,200	
Ethylbenzene	100-41-4	1,100,000	
Fluoranthene	206-44-0	430,000	
Fluorene	86-73-7	430,000	
Heptachlor	76-44-8	5,400	24
Hexachlorocyclohexane (lindane)	58-89-9	3,200	
Indeno(1,2,3-cd)pyrene	193-39-5		15
Isophrone	78-59-1	2,200,000	
Mercury (Methyl)	22967-92-6	1,100	
Monochlorobenzene	108-90-7	220,000	
Nickel	744-00-2	220,000	
Nitrobenzene	98-95-3	5,400	
PAHs based benzo{a}pyrene			15
PCB Total/congeners	1336-36-3	220	54*
Pentachlorophenol	87-86-5		900
Phenol	108-95-2	6,500,000	
Pyrene	129-00-0	320,000	
Selenium	7782-49-2	54,000	
Tetrachloroethylene	127-18-4	110,000	
Toluene	108-88-3	2,200,000	
Toxaphene	8001-35-2	2,700	98
1,2,4-Trichlorobenzene	120-82-1	110,000	
Trichloroethylene	79-01-6		860
2,4,6-Trichlorophenol	88-06-2		9,800
Vinyl Chloride	75-01-4		6,200

* These screening values are based in EPA recommended cancer slope factors for these compounds which have been updated since DEQ adopted the water quality criteria. These screening values have been used by DEQ in previous years in assessing fish tissue.

RISK BASED SCREENING VALUES (SV) FOR FISH TISUE UPDATED FROM INTEGRATED RISK INFORMATION SYSTEM (IRIS) FOR GENERAL POPULATION (ADULT)

BODY WEIGHT (KG) 70
RISK LEVEL 10^{-5}
CONSUMPTION RATE (KG/DAY) 0.0065

Table 6b

COMPOUND		NON CARCINOGEN	CARCINOGEN
		SCREENING VALUE	SCREENING VALUE
	CAS #	PPB	PPB
Arsenic (inorganic)	74440-38-2	3,200	72**
Barium	7440-39-3	750,000	
Benzene	71-43-2		2,000**
BHC alpha	319-84-6		20
BHC beta	319-85-7		60
BHC isomers	608-93-1		20
Brominated Diphenyl ethers (BDEs)		5,000	
Cadmium	7440-43-9	11,000	
Chromium III	16065-83-1	16,000,000	
Chromium VI	18540-29-9	32,000	
Chlorpyrifos	2921-88-2	32,000	
Diazinon	333-41-5	970	
Dicofol	115-32-2	11,000	
Dioxin	1746-01-6		0.003**
Disulfoton	298-04-4	430	
Ethion	563-12-2	5,4000	
Heptachlor epoxide	1024-57-3	140	10
Hexachlorobenzene	118-74-1	8,600	70
Kepone	143-50-0	300	
Mercury (Methyl)	22967-92-6	300 (EPA 2001)(500VDH)	
Methoxychlor	72-43-5	54,000	
Mirex	2385-85-5	2,200	
Oxyfluorfen	42874-03-3	32,000	830
PCB Total/congeners	1336-36-3	220	54
Terbufos	13071-79-9	1400	
Toxaphene	8001-35-2	2,700	100
Tributyltin	56-35-9	320	
Selenium	7782-49-2	54,000	
Vinyl Chloride	75-01-4		72**

** These screening values are based on recent changes to the toxicological data used to calculate the screening values, or recent recommendations from U.S. EPA or the Virginia Department of Health. These screening values are not based on the same toxicological data that were used to develop the existing water quality criteria.

CAS # = Chemical Abstract Service Number
PPB = parts per billion

- **Sediment (aquatic life use)**

Like the sediment monitoring and analysis conducted by Water Quality Standards and Biological Programs, the regional offices will assess the AWQM sediment data. Sediment contaminant data collected during scheduled AWQM monitoring should be compared to National Oceanic and Atmospheric Administration (NOAA 1995) effects range-medium (ER-M) SVs for sediment. If the ER-M is not available, use the VA 99th percentiles (Table 7). One or more exceedences of an ER-M value results in a fully supporting but threatened status for aquatic life use support. In these cases, additional biological monitoring should be scheduled to assess actual aquatic life use support.

Table 7 Sediment criteria for use in the assessment of aquatic life support.

- **Trace Elements –parts per million (ppm), dry weight**

Substance	ER-M Value (dry weight)	99 th %tile (dry weight)
Antimony (Sb)	NA	
Arsenic(As)	70	
Beryllium	NA	5.0
Cadmium (Cd)	9.6	
Chromium (Cr)	370	
Copper (Cu)	270	
Lead (Pb)	218	
Manganese (Mn)	NA	
Mercury(Hg)	0.71	
Nickel (Ni)	51.6	
Selenium (Se)	NA	20.0
Silver (Ag)	3.7	
Thallium	NA	13.5
Zinc (Zn)	410	

- **Pesticides and Other Organic Substances –parts per billion (ppb), dry weight**

CAS #	Substance	ER-M Value (dry weight)	99 th %tile (dry weight)
1336363	Polychlorinated Biphenyls (PCBs)	180	
309002	Aldrin	NA	
57749	Chlordane	6	
NA	total DDT (include metabolites	46.1	
72548	DDD	20	
50293	DDT	7	
72559	DDE	27	
60571	Dieldrin (EPA proposed criteria)	8	
72208	Endrin	NA	
76448	Heptachlor	NA	
1024573	Heptachlor epoxide	NA	
118741	Hexachlorobenzene	NA	
608731	Hexachlorocyclohexane	NA	
58899	Lindane	NA	
2385855	Mirex	NA	
108952	Phenol	NA	
117817	Di (2-Ehtylhexyl) Phthalate	NA	
84742	N-Butyl Phthalate	NA	

83329	Acenaphthene	500
208968	Acenaphthylene	640
120127	Anthracene	1100
50328	Benzo-A-Pyrene	1600
191242	Benzo [GHI] Perylene	NA
56553	Benz[A] Anthracene	1600
218019	Chrysene	2800
53703	Dibenz [A,H] Anthracene	260
206440	Fluoranthene	5100
86737	Fluorene	540
193395	Indeno (1,2,3-CD) Pyrene	NA
91576	Methylnaphthalene , 2	670
91203	Naphthalene	2100
85018	Phenanthrene	1500
129000	Pyrene	2600
NA	Low Molecular Weight PAH's	3160
NA	High Molecular Weight PAH's	9600
NA	Total PAH's	44,792

6.5.3 Additional Toxics Evaluation

- **Freshwater Toxics Evaluation**

For overall freshwater toxics evaluation, DEQ uses the Virginia Water Quality Standards for human health in surface waters, other than public water supplies (9 VAC 25-260-140.B). These same values are used to assess the fish consumption use in public water supplies as well as all other surface waters. (Please note, the criteria for human health in public water supplies will be used to assess the drinking water use in PWSs only). For metals assessment, only dissolved metals data should be used. In conformance with water quality management plan and VPDES permitting procedures, water column toxicant data collected up to 5 years prior to the current 305(b) period should be assessed along with current data if they reflect current conditions. When assessing the aquatic life use support, compliance with the standard should be based on meeting the acute criteria. See Part V for additional information.

- **Estuarine Toxics Evaluation**

The weight-of evidence approach adopted by DEQ for assessing estuarine toxics data (see EPA 903-R-00-010, June 1999) has been developed through a consensual process between partners of the Chesapeake Bay Program (CBP) with oversight from the Bay Program's Scientific and Technical Advisory Committee (STAC). The CBP partners include the U.S. EPA Chesapeake Bay Program, the Bay jurisdictions, including Virginia, the private sector and several Virginia/Maryland academic institutions. It is suggested this approach be initiated only when a full suite of toxics related data are available. Generally this includes ambient water column chemical data with ambient water toxicity test data, and /or sediment chemical data with sediment toxicity test data. The inclusion of benthic-IBI data collected from the same stations is also important in this approach. If available, other relevant toxicological data such as fish tissue and fish histopathological information may be considered within this approach.

This approach is based on a "weight of evidence" that takes into account data from all stations and media within a defined area, from which evidence can be compiled for or against toxics contamination. Four levels of data analysis have been created. Taken into consideration are exceedences and non-exceedences of thresholds, the varying degrees of confidence in thresholds (e.g., Water Quality Standard vs. an ER-M), and the magnitude of threshold exceedences. Please refer to Appendix B for further detail regarding this approach. As defined, data that fall into the **Level 1** category are indicative of probable contaminant effects within that medium at that station/water body. **Level 2** data suggests possible contaminant effects while **Level 3** data are indicative of low probability for contaminant effects. **Level 4** has been created for

water segments where the available data are insufficient to place it into one of the other three categories. By assigning all the data from the different media within the water body to these four levels, it is possible to establish an overall level ranking for that water body. In many cases the implementation of this approach entails professional judgement.

When applicable toxics data are available within estuarine waters, DEQ staff shall utilize the targeting approach presented in Appendix (B) of this document. Consensus among appropriate DEQ staff will be attained for the final assessment of these tidal areas. Documentation of these assessment results will be developed and included in the assessment database.

Section 6.6 LAKE and RESERVOIR ASSESSMENT

DEQ has completed the process of reviewing and revising the Lakes Monitoring and Assessment Program. A program to prioritize the many lakes and reservoirs has been developed. This prioritization allows the Department to focus on the most important lakes as they relate to designated uses. Limited resources will then be able to be utilized for these priority lakes and an intensive monitoring schedule can be conducted that will allow a thorough assessment of those priority lakes.

Meanwhile, for the 2002 assessment, the lakes and/or reservoirs, which meet the following definition of a “significant lake”, will be reviewed. A list of current significant lakes is included at end of this section (Table 8).

1. All publicly accessible public water-supply lakes and/or;
2. All publicly accessible lakes 100 acres or more in size.

This definition includes the federally owned lakes, which meet these criteria, but all other federally owned lakes would be excluded from the agency lakes monitoring program.

At least one of these two criteria need to be met for the lake assessment consideration:

1. lakes should have a violation of numerical Water Quality Standards, with actual data observations in DEQ files, as well as confirmation made by more than a single data point, or
2. for any parameters for which DEQ does not have a Water Quality Standard, a loss of designated use (fishable, swimmable, public water supply) documented by ancillary data (such as records of conditions preventing swimming and/or boating, recurrent fish kills, other non-agency studies or reports, etc.)

6.6.1 Interpretation/Assessment Issues Unique to Lakes and Reservoirs

The assessor should provide a complete narrative documenting assessment decisions. If uses are impacted, document those uses impacted and how they are impacted. Name causes and sources where possible, (i.e. nuisance algal blooms preventing swimming during summer months, numerous complaints on file or aquatic weed growth preventing free navigation of lake and/or expensive mechanical or chemical clearing, etc).

Assessment should be performed and documented by the regional biologist or other appropriate staff. The regional 305(b) coordinator will be responsible for entering the data into the ADB (Assessment Data Base).

The same 305(b) guidelines, as applied to other State surface waters, will apply to lakes and reservoirs. All dissolved oxygen (DO) data will be assessed including depth profile data. Each DO measurement associated with the depth profile will be assessed as an independent data point. However, each station will

be split, based on the thermocline (vertical temperature gradient), to “surface” and “bottom” waters and will be vertically segmented by the estimated depth of the thermocline (½ of the mean station depth). All data collected above an assumed thermocline depth will be aggregated and assessed as representing surface waters of each segment. All data collected below an assumed thermocline depth will be aggregated and assessed as representing bottom waters of each segment. All data associated with the surface waters will be assessed based on the EPA Percent Method. Likewise, the bottom waters will be assessed in the same manner. If a segment is determined to be impaired in either the surface or bottom waters, then that whole segment will be considered impaired.

For these surface waters, first determine what are the uses of the lake/reservoir and compare to the appropriate water quality standards criterion and/or narrative standards. Next, compare analytical results for the various parameters against the appropriate numerical water quality criteria as you would for streams and rivers and apply the same assessment statistics. Apply the most stringent of the two, (aquatic life or human health) as you would for any surface water assessment, and use the appropriate human health criteria (public water supply or all other surface waters).

Table 8 SIGNIFICANT LAKES BY REGION

Northern Regional Office – 13 Lakes

Able Lake	Stafford Co.	185 (Acres)	PWS (Public Water Supply)
Lake Anna	Louisa Co.	12998	
Aquia Reservoir (Smith Lake)	Stafford Co.	219	PWS
Beaverdam Reservoir	Loudoun Co.	350	PWS
Burke Lake	Fairfax Co., VDGIF	218	
Goose Creek Reservoir	Loudoun Co.	140	PWS
Lake Manassas	Pr. William Co.	741	PWS
Motts Run Reservoir	Spotsylvania Co.	160	PWS
Mountain Run Lake	Culpeper Co.	75	PWS
Ni Reservoir	Spotsylvania Co.	400	PWS
Northeast Creek Res.	Louisa Co.	49	PWS
Occoquan Reservoir	Fairfax Co.	1700	PWS
Pelham Lake	Culpeper Co.	253	PWS

Piedmont Regional Office – 12 Lakes

Airfield Pond	Sussex Co., VDGIF	105	
Amelia Lake	Amelia Co., VDGIF	110	
Brunswick Lake	Brunswick Co., VDGIF	150	
Lake Chesdin	Chesterfield Co.	3196	PWS
Chickahominy Lake	Charles City Co.	1500	PWS
Diascund Reservoir	New Kent co.	1700	PWS
Emporia Lake	Greensville Co.	210	PWS
Falling Creek Reservoir	Chesterfield Co.	110	
Lake Gaston	Brunswick Co.	20300	PWS
Great Creek Reservoir (Bannister Lake)	Lawrenceville	305	
Swift Creek Lake	Chesterfield Co.	156	
Swift Creek Reservoir	Chesterfield Co.	1800	PWS

South Central Regional Office – 21 Lakes

Briery Creek Lake	Pr. Edward Co., VDGIF	850	
Brookneal Reservoir	Campbell Co.	25	PWS
Cherrystone Lake	Pittsylvania Co.	105	PWS
Georges Creek Res.	Pittsylvania Co.	1	PWS
Gordon Lake	Mecklenburg Co., VDGIF	157	
Graham Creek Res.	Amherst Co.	50	PWS
Halifax Reservoir	Halifax Co.	410	PWS
Holiday Lake	Appomattox Co.	145	
Kerr Reservoir	Halifax Co., ACOE	48968	PWS
Keysville Lake	Charlotte Co.	42	PWS
Lake Conner	Halifax Co., VDGIF	111	
Lunenburg Beach Lake	Town of Victoria	13	PWS
Modest Creek Reservoir	Town of Victoria	29	PWS
Nottoway Falls Lake	Lunenburg Co.	60	PWS
Nottoway Lake	Nottoway Co.	188	
Nottoway Pond	Nottoway Co.	65	PWS
Pedlar Lake	Amherst Co.	75	PWS
Roaring Fork	Pittsylvania Co.	19	PWS
Stonehouse Creek Res.	Amherst Co.	125	
Thrashers Creek Res.	Amherst Co.	110	
Troublesome Creek Res. (SCS Impoundment #2)	Buckingham Co.	58	PWS

South West Regional Office – 9 Lakes

Appalachia Res.	Wise Co.	17	PWS
Big Cherry Lake	Wise Co.	76	PWS
Byllsby Reservoir	Carroll Co.	335	
J. W. Flannigan Res.	Dickenson Co., ACOE	1143	PWS
Hungry Mother Lake	Smyth Co.	108	PWS
Lake Keokee	Lee Co., VDGIF	100	
Laurel Bed Lake	Russell Co., VDGIF	300	
North Fork Pound Res.	Wise Co., ACOE	154	PWS
South Holston Res.	Washington Co., TVA	7580	PWS

Tidewater Regional Office – 18 Lakes

Lake Cahoon	Suffolk City	508	PWS
Lake Burnt Mills	Isle of Wight Co.	610	PWS
Harwood Mill Pound	York Co.	300	PWS
Lake Kilby	Suffolk City	226	PWS
Lee Hall Reservoir	Newport News	230	PWS
Little Creek Res.	Norfolk City	185	PWS
Little Creek Res.	James City Co.	860	PWS
Lone Star Lake F	Suffolk City	20	PWS
Lone Star Lake G	Suffolk City	50	PWS
Lone Star Lake I	Suffolk City	39	PWS
Lake Meade	Suffolk City	511	PWS
Lake Prince	Suffolk City	775	PWS
Lake Smith	Norfolk City	222	PWS
Speights Run Lake	Suffolk City	94	PWS

Stumpy Lake	Virginia Beach	210	PWS
Waller Mill Res.	York Co.	315	PWS
Lake Whitehurst	Norfolk City	458	PWS
Lake Wright	Norfolk City	35	PWS

Valley Regional Office – 12 Lakes

Beaver Creek Res.	Albemarle Co.	104	PWS
Mount Jackson Res.	Shenandoah Co.	0.7	PWS
Coles Run Res.	Augusta Co., USFS	9	PWS
Elkhorn Lake	Augusta Co. USFS	55	PWS
Lake Frederick	Frederick Co. VDGIF	120	
Ragged Mount Res.	Albemarle Co.	54	PWS
Rivanna Res.	Albemarle Co.	390	PWS
Staunton Dam lake	Augusta Co.	30	PWS
Strasburg Reservoir	Shenandoah Co.	5.3	PWS
Switzer Lake	Rockingham Co. USFS	110	
Sugar Hollow Res.	Albemarle Co.	47	PWS
Totier Creek Res.	Albemarle Co.	66	PWS

West Central Regional Office – 15 Lakes

Beaverdam Creek Res.	Bedford Co.	123	PWS
Bedford Reservoir	Bedford Co.	28	PWS
Carvin Cove Reservoir	Botetourt Co.	630	PWS
Claytor Lake	Pulaski Co.	4483	PWS
Clifton Forge Res.	Alleghany Co., USFS	16	PWS
Fairystone Lake	Henry Co.	168	
Gatewood Res.	Pulaski Co.	162	
Hogan Lake	Pulaski Co.	40	PWS
Leesville Res.	Bedford Co.	3400	PWS
Little River Res.	Montgomery Co.	113	
Martinsville Res.	Henry	220	PWS
Lake Moomaw	Bath Co., USFS	2430	
Philpott Res.	Henry Co., ACOE	2879	
Smith Mountain Lake	Bedford Co.	19992	PWS
Talbott Reservoir	Patrick Co.	165	

Total 100 Lakes statewide

Section 6.7 COASTAL ASSESSMENT

Virginia has 120 miles of Atlantic Ocean coastline and approximately 2,500 square miles of estuary. This resource has a prominent place in Virginia's history and culture. It is valued for its commercial fishing, wildlife, sporting, and recreational opportunities, as well as its commercial values in shipping and industry. In the 1970's adverse trends in water quality and living resources were noted and prompted creation of the Federal-Interstate Chesapeake Bay Program (CBP). The coastal assessment is conducted in the same manner as the estuarine assessments previously described in Sections 6.4.1.2 and 6.5.3.2.

PART VII 303 (d) LISTING and PRIORITY RANKING EVALUATION METHODOLOGY

Rule 1

When reviewing waters receiving effluent from facilities with water quality based effluent limits in VPDES permits, the following should be considered in developing Part II of the 303(d) list;

- If the permit has been issued with no compliance schedule and the limits are to be met upon permit issuance, then listing is not necessary.
- If the permit for a previously listed water has since been issued with no compliance schedule and the limits are required to be met upon permit issuance, then re-listing is not necessary. EPA must be provided a verification package for de-listing waters (see Rule 2).
- If the permit has been issued with a scheduled compliance date that extends beyond the next 303d listing cycle, the water would be listed. If the compliance date falls within the next listing cycle, the water would not be listed.

Rule 2

The verification process for removing or de-listing waters shown in Appendix D from Part II of 1998 303(d) list must consider the following;

- The removal or de-listing process applies only to waters impacted by a single point source discharge. TMDLs will have to be developed and approved by EPA prior to de-listing waters impacted by multiple discharges or a single point source with a significant nonpoint source “load allocation” component. A water listed in Part II for NH₃-N discharging into a segment listed for nonpoint source fecal coliform bacteria could be removed since the bacteria problem is unrelated to the NH₃-N.
- If compliance with the Water Quality (WQ) based effluent limits is not met by the compliance date, the waters should not be removed from the list or should be re-listed if previously removed. If post operational water quality data shows that water quality standards are not being met, the water should remain on the list or be re-listed.

If the above conditions are met, the following information should be submitted to EPA for de-listing those waters identified in Part II of the 1998 303d Report. Waters that do not meet the above conditions should be listed in Part II of the 2002 303d Report.

Verification Packet for Minor Permits:

Hydrologic Unit Code (HUC), Watershed Identity Number, Stream Name, Parameter, and VPDES Permit Number.

- A statement identifying the basis for de-listing the water. The statement should confirm that water quality based effluent limits were in place by the compliance date, and these effluent controls are sufficient to attain or maintain water quality standards. If the facility will meet the water quality based effluent limits within the 2 year listing cycle and water quality standards are expected to be attained or maintained, the verification should describe the facility’s progress in meeting the effluent requirements and the expectation that the compliance date in the permit will be met.

- Copy of water quality analysis modeling conducted as part of permit development that shows the level of controls necessary to implement water quality standards.
- Copy of permit page (and/or any State compliance order and associated interim limits and schedule to achieve the final limit) that contains the required control levels.
- Copy of permit page that provides the compliance date for water quality based controls.

Verification Packet for Major Permits:

If the VPDES permit and supporting information has already been sent to EPA then you simply contact EPA and identify the sections or page numbers of the permit that contain the information.

Rule 3

Waters listed as impaired in the 303(d) report will remain on the list and tracked in subsequent 305(b) reports until:

- An EPA approved TMDL is developed

OR

A subsequent assessment of the monitoring data or in special cases, modeling results shows that the water is no longer impaired and EPA approves the de-listing of the water from the impaired list. (see Rule 4 for necessary de-listing documentation)

Rule 4

Documentation required by EPA for de-listing previously listed impaired waters:

Scenario # 1: when new data demonstrates a previously impaired waterbody is currently attaining Water Quality Standards (WQS), based on the EPA 10% method, DEQ should submit the following documents to justify the removal of this segment from the next 303d list.

- Rationale for the decision to remove the previously impaired segment from the next 303d list
- Copies of the data that are being used to justify the removal of the segment
- Copies of the previous data which were used to list the segment
- Any differences between the sampling techniques should be documented and submitted
- A description of the water including but not limited to: stream name, river mile, impairment, watershed identification code and hydrologic unit code (HUC)

Scenario # 2: when new water quality modeling determines the stream is now attaining WQS, DEQ should submit the following documents to justify the removal of this segment from the next 303d list.

- Rationale for the decision to remove the previously impaired segment from the next 303d list
- Submission of any new data that were used in the modeling
- A copy of the EPA approved model that was used. A summary of the differences between the new and the old models. The reasons why the stream attains WQS's under the new model opposed to the former model (data, modeling assumptions, modeling applications, etc)
- A description of the water including but not limited to: stream name, river mile, impairment, watershed identification code and hydrologic unit code (HUC)

Scenario # 3: when new management practices from point and/or nonpoint sources lead to the attainment of WQS, DEQ should submit the following documents to justify the removal of this segment from the next 303d list.

- Rationale for the decision to remove the previously impaired segment from the next 303d list
- Submission of any new data associated with the segment that demonstrate the improvement in water quality
- A description of the new management practices and how they will ensure that the segment is attaining standards
- A description of the water including but not limited to: stream name, river mile, impairment, watershed identification code and hydrologic unit code (HUC)

Scenario # 4: when errors are detected in the rationale for the initial listing of the segment and the segment is attaining WQS, DEQ should submit the following documents to justify the removal of this segment from the next 303d list.

- Rationale for the decision to remove the previously impaired segment from the next 303d list
- Documentation of the errors in the initial listing
- A copy of the data and/or modeling that demonstrates the segment attains WQS at least 90% of the time
- A description of the water including but not limited to: stream name, river mile, impairment, watershed identification code and hydrologic unit code (HUC)

In certain cases EPA may request additional documentation ,if needed, to justify the removal of the segment from the 303d list

Rule 5

Section 303(d) of the CWA requires the “impaired waters” list to be prioritized for TMDL development. This ranking encourages a schedule for the development of TMDLs. A high ranking means the TMDL should be scheduled for development within 5 years. Lower ranked waters will have TMDLs developed in subsequent years. Figure 2 (The Priority Ranking Flowchart) found at the end of this section provides additional details.

Priority ranking varies in design and complexity among States. The following ranking considerations are specific to the 1998 Impaired Waters List and the corresponding EPA Consent Decree. A TMDL priority list has been developed for the 1998 303d list. Virginia uses the following 3 priority designations for scheduling waters for TMDL development:

- **High Priority Ranking:** the TMDL will be scheduled for development and submitted to EPA for approval within 5 years after listing on 303(d) list.
- **Medium Priority Ranking:** the TMDL will be scheduled for development and submitted to EPA for approval within 8 years after listing on the 303(d) list.
- **Low Ranking Priority:** the TMDL will be scheduled for development and submitted to EPA for approval within 12 years after listing on the 303(d) list.

The process is a dynamic process and any priority ranking can be changed if substantial factors change or become apparent during the process. Additionally, secondary factors such as the availability of current studies, which will provide additional information needed for TMDL development, may

influence the overall ranking priority. Waters in Part I of the list for non-point source impairments are ranked high only with agreement and approval of DCR.

- Severity of Use Impairment

Waters that do not meet the designated uses should be considered for high or medium priority. For conventional parameters, these are waters designated as “not supporting” the designated uses.

Waters that are rated as severely impaired using benthic evaluations for aquatic life are considered “not supporting” and should be considered for high or medium priority.

Waters that demonstrate threats to human health or impact endangered species are considered “not supporting” or severely impaired and should be considered for high priority.

Waters where toxic parameters exceed human health criteria are considered “not supporting” or severely impaired and should be considered for high priority.

- Resource Value of Importance

Based on resource value, the following not supporting waters should be given high or medium priority in scheduling for TMDL development:

Waters containing or impacting endangered species
Waters used for public water supply

Based on resource value, the following partially supporting waters should be given medium or low priority in scheduling for TMDL development.

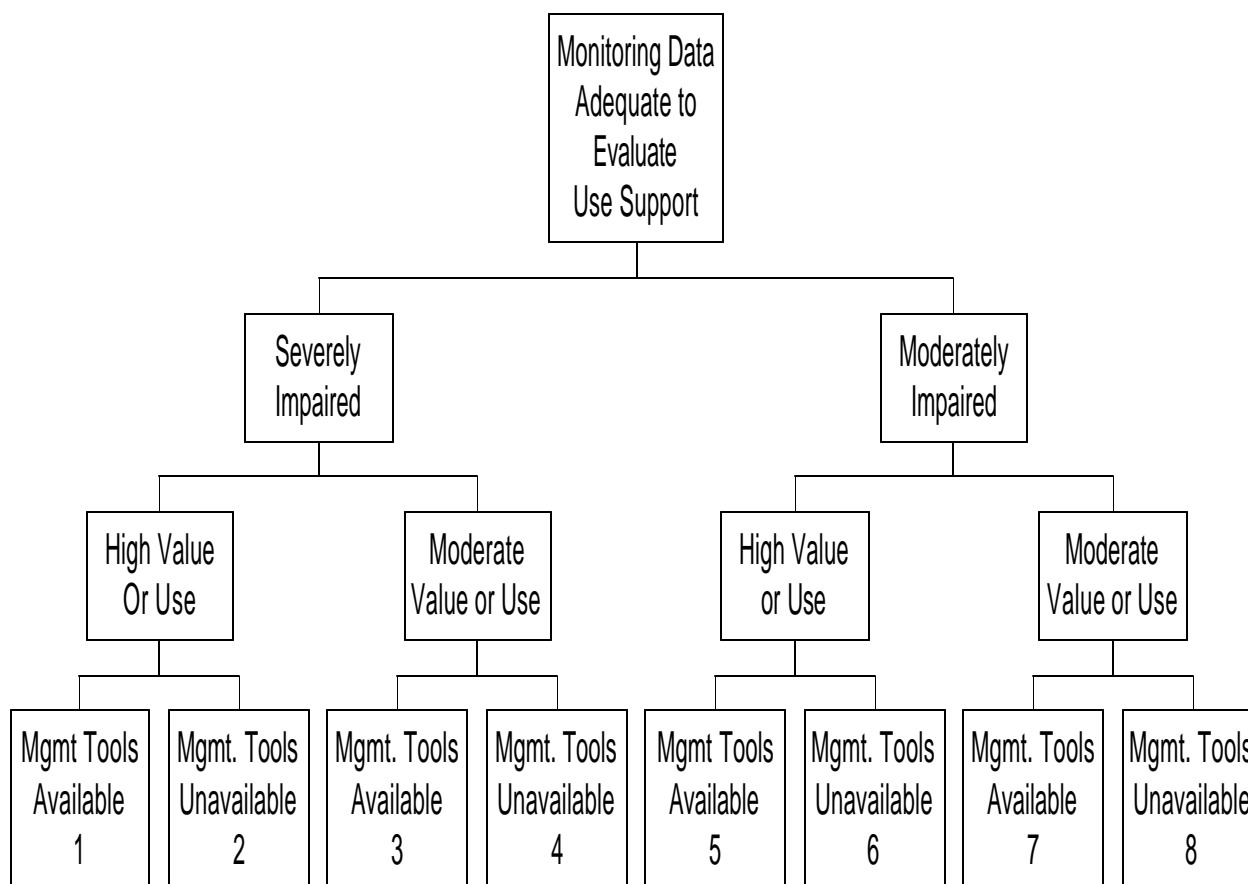
Waters used for public swimming
Waters used for public fishing

- Management Tools Available

Available management tools include technical and institutional factors. Technical factors include the availability of technology to implement controls. Institutional factors include public interest and support and available funding to implement the controls. Management tools are a dynamic factor in this ranking process. Waters ranked 7 or 8, could be moved to a high priority with a change in public interest and support or funding. Figure 3 provides a flowchart for the 303d priority list.

Figure 3

303(d) LIST PRIORITY RANKING FLOWCHART



1 – 3 High Priority
4 - 6 Medium Priority
7 – 8 Low Priority

APPENDIX A

Clean Water Act Sections

Sec.305. WATER QUALITY INVENTORY

(b) (1) Each State shall prepare and submit to the Administrator by April 1, 1975, and shall bring up to date by April 1, 1976, and biennially thereafter, a report that shall include—

- (A) a description of the water quality of all navigable waters in such State during the preceding year, with appropriate supplemental descriptions as shall be required to take into account seasonal, tidal, and other variations, correlated with the quality of water required by the objective of this ACT (as identified by the Administrator pursuant to criteria published under section 304(a) of this Act) and the water quality described in subparagraph (B) of this paragraph;
- (B) an analysis of the extent to which all navigable waters of such State provide for the protection and propagation of a balanced population of shellfish, fish, and wildlife, and allow recreational activities in and on the water;
- (C) an analysis of the extent to which the elimination of the discharge of pollutants and a level of water quality which provides for the protection and propagation of a balanced population of shellfish, fish, and wildlife and allows recreational activities in and on the water, have been or will be achieved by the requirements of this Act, together with recommendations as to additional action necessary to achieve such objectives and for what water such additional action is necessary;
- (D) an estimate of (i) the environmental impact, (ii) the economic and social costs necessary to achieve the objective of this Act in such State, (iii) the economic and social benefits of such achievement, and (iv) an estimate of the date of such achievement; and
- (E) a description of the nature and extent of nonpoint sources of pollutants, and recommendations as to the programs which must be undertaken to control each category of such sources, including an estimate of the costs of implementing such programs. (2) The Administrator shall transmit such State reports, together with an analysis thereof, to Congress on or before October 1, 1975, and October 1, 1976, and biennially thereafter.

GRANTS FOR SEC. 106. POLLUTION CONTROL PROGRAM

- (e) Beginning in fiscal year 1974 the Administrator shall not make any grant under this section to any State which has not provided or is not carrying out as a part of its program—
 - (1) the establishment and operation of appropriate devices, methods, systems, and procedures necessary to monitor, and to compile and analyze data on (including classification according to eutrophic condition), the quality of navigable waters and to the extent practicable, ground waters including biological monitoring; and provision for annually updating such data and including it in the report required under section 305 of this Act;

SEC. 204 LIMITATION AND CONDITIONS

- (a) Before approving grants for any projection for any treatment works under section 201(g)(1) the Administrator shall determine—

“that (A) the State in which the project is to be located (1) is implementing any required plan under section 303(e) of this Act and the proposed treatment works are in conformity with such plan, or (ii) is developing such a plan and the proposed treatment works will be in conformity with such plan, and (b) such State is in compliance with section 305(b) of this Act;”

SEC. 314. CLEAN LAKES

(a) Each State shall prepare or establish, and submit to the Administrator for his approval—

“(A) an identification and classification according to eutrophic condition of all publicly owned lakes in such State;

“(B) a description of procedures, processes, and methods (including land use requirements), to control sources of pollution of such lakes;

“(C) a description of methods and procedures, in conjunction with appropriate Federal agencies, to restore the quality of such lakes;

“(D) methods and procedures to mitigate the harmful effects of high acidity, including innovative methods of neutralizing and restoring buffering capacity of lakes and methods of removing from lakes toxic metals and other toxic substances mobilized by high acidity;

“(E) a list and description of those publicly owned lakes in such State for which uses are known to be impaired, including those lakes which are known not to meet applicable water quality standards or which require implementation of control programs to maintain compliance with applicable standards and those lakes in which water quality has deteriorated as a result of high acidity that may reasonably be due to acid deposition; and

“(F) an assessment of the status and trends of water quality in lakes in such State, including but not limited to, the nature and extent of pollution loading from point and nonpoint sources and the extent to which the uses of lakes is impaired as a result of such pollution, particularly with respect to toxic pollution.

“(2) SUBMISSION AS PART OF 305(b) (1) REPORT. – The information required under paragraph (1) shall be included in the report required under section 305(b) (1) of this Act, beginning with the report required under such section by April 1, 1988.

APPENDIX B

Adopted from “Targeting Toxics: A Characterization Report, A Tool for Directing Management and Monitoring (Actions in the Chesapeake Bay’s Tidal Rivers”, EPA 903-R-99-010, CBP/TRS 222/106, June 1999).

Weight of Evidence Targeting Protocol – Decision Steps for Interpreting Estuarine Toxics Data

Sediment Chemistry

Thresholds

- Set 1: SQCs – EqP-based thresholds – generally highest
- Set 1a: SQALs – EqP-based – generally highest
- Set 2: Lowest of ERM/PELs – medium to high - - 50th %-tile for effects
- Set 3: Lowest of ERL/TELS – generally quite low - - 10th %-tile for effects
- Set 4: TOC-selected thresholds (for chemicals without Thresholds in sets 1-3) – low

Note: freshwater values used only when saltwater values not available

Decision Rules

Level 1

- A. Exceedence of Set 1 threshold for any chemical.
- B. Exceedence of Set 1a threshold for any chemical.
- C. Exceedence of Set 2 threshold for any chemical, Toxic Unit ≥ 2 .

Level 2

- A. Exceedence of Set 2 threshold for any chemical, Toxic Unit < 2
- B. Exceedence of Set 3 threshold for any chemical, Toxic Unit ≥ 2 .
- C. Exceedence of Set 3 threshold for any chemical, Toxic Unit < 2 .
- D. Exceedence of Set 4 threshold for any chemical, Toxic Unit ≥ 2 .
- E. Exceedence of Set 4 threshold for any chemical, Toxic Unit < 2 .

Level 3

- A. No exceedences of any threshold.

Level 4

- A. Above detection limit data without thresholds for comparison.
- B. Below detection limit data without thresholds for comparison
- C. No data collected at station.

Water Column Chemistry

Thresholds

- EPA/State Chronic Water Quality Criteria
- EPA/State Acute Chronic Water Quality Criteria
- ACQUIRE thresholds – for chemicals without EPA criteria

Decision Rules

Level 1

- A. Exceedence of acute WQC for any chemical.
- B. Exceedence of chronic WQC for any metal.
- C. Exceedence of chronic WQC for organic contaminant.

Level 2

- A. Exceedence of AQUIRE for any chemical, Toxic Unit ≥ 2
- B. Exceedence of AQUIRE threshold for any chemical, Toxic Unit < 2 .

Level 3

- A. No exceedences of any WQC or AQUIRE thresholds for any chemicals.

Level 4

- A. Above detection limit data without thresholds for comparison.
- B. Below detection limit data without thresholds for comparison.
- C. No data collected at station.

Fish Tissue Levels

Thresholds

- FDA Action Levels
- EDA Levels of Concern
- EPA screening levels
- Is station located in current fish consumption advisory/ban area ?

Decision Rules

Level 1

- A. Exceedence of FDA Action Level for any chemical
- B. Station located in current fish consumption advisory/ban area.

Level 2

- A. Exceedence of FDA Levels of Concern A.2 EPA screening levels for any chemical.

Level 3

- A. No exceedences of any FDA or EPA thresholds for any chemicals and no fish consumption advisory ban.

Level 4

- A. Above detection limit data without thresholds for comparison
- B. Below detection limit data without thresholds for comparison
- C. No data collected at station.

Benthic Community Data

Thresholds

- Use the interpreted benthic characterization (B-IBI)

Decision Rules

Level 1

- A. Severely Degraded (B-IBI ≤ 2), sufficient DO.

Level 2

- A. Degraded (B-IBI: 2-2.6), sufficient DO
- B. Marginal (B-IBI: 2.6-3), sufficient DO.

Level 3

- A. Meets Goal (B-IBI: ≥ 3)

Toxicity Test Data**Thresholds**

- For DEQ Ambient Toxicity Study (AT) results: reported “degree of toxicity.”
- For other available toxicity test results: percentages of endpoints significantly different from reference.

Decision Rules**Level 1**

- A. “Greatest” sediment AND water column toxicity (AT) or at least 2 significant sediment and water tests each (non-AT).
- B. “Greatest” sediment OR water column toxicity (AT) or at least 2 significant sediment or water tests (non-AT).

Level 2

- A. “Low to Moderate” sediment AND water column toxicity (AT) or any one significant sediment and water test each (non-AT).
- B. “Low to Moderate” sediment OR water column toxicity (AT) or any one significant sediment or water test each (non-AT).
- C. “Significantly Different from Reference but Ecologically Insignificant” sediment AND water column toxicity (AT).
- D. “Significantly Different from Reference but Ecologically Insignificant” sediment OR water column toxicity (AT).

Level 3

- A. “No Significant” sediment AND water column toxicity observed.
- B. “No Significant” sediment OR water column toxicity observed.

Sediment Thresholds for Weight of Evidence

ng/g or ppb dry weight

Analyte	*SQC's (Now referred to as ESGs)	SQALs	ER-L	ER-M	TEL	PEL
Arsenic			8,200	70,000	7,240	41,600
Cadmium			1,200	9,600	676	4,210
Chromium			81,000	370,000	52,300	160,400
Copper			34,000	270,000	18,700	108,200
Lead			46,700	218,000	30,240	112,180
Mercury			150	710	130	696
Nickel			20,900	51,600	15,900	42,800
Silver			1,000	3,700	730	1,700
Zinc			150,000	410,000	124,000	271,000
Di-N-Butyl Phthalate		22,000				
Butyl Benzyl Phthalate		22,000				
Di(2-ethylhexyl)phthalate					182.16	2,646.51
Diethyl phthalate		1,260				
Dibenzofuran		4,000				
Acenaphthene	FW=2,600; SW = 4,600		16	500	6.71	88.90
Acenaphthylene			44	640	5.87	127.87
Anthracene			85.3	1,100	46.85	245.00
Benzo-a-pyrene			430	1,600	88.81	763.22
Benz(a)Anthracene			261	1,600	74.83	692.53
Chrysene			384	2,800	107.77	845.98
Dibenz[A,H]Anthracene			63.4	260	6.22	134.61
Fluoranthene	FW=12,400; SW=6,000		600	5,100	112.82	1,493.54
Fluorene			19	540	21.17	114.35
Methylnaphthalene, 2-			70	670	20.21	201.28
Naphthalene		940	160	2,100	34.57	390.64
Phenanthrene	FW=1,800; SW=4,800		240	1,500	86.68	543.53
Pyrene			665	2,600	152.66	1,397.60
LMW PAHs			552	3,160	311.70	1,442.00
HMW PAHs			1,700	9,600	655.34	6,676.14
Total PAHs			4,022	44,792	1,684.06	16,770.40
Chlordane			0.5	6	2.26	4.79
DDD			2	20	1.22	7.81
DDE			2.2	27	2.07	374.17
DDT			1	7	1.19	4.77
DDT, total			1.58	46.1	3.89	51.70
Dieldrin	FW=220; SW=400		0.02	8	0.72	4.30
Total PCBs			22.7	180	21.55	188.79
Endrin	FW=84; SW=15.2					
Malathion		1.34				
Methoxychlor		38				
Toxaphene		200				
Diazinon		3.8				
Biphenyl		2,200				
Endosulfan Mixed Isomers		11				
Endosulfan Alpha		5.8				
Endosulfan Beta		28				
BHC Delta		260				
Lindane		7.4				

SQC's = Sediment Quality Criteria, EPA 1993; now referred to as ESGs or Equilibrium Partitioning Sediment Guidelines

(above SQCs based on 2% TOC)

SQALs = Sediment Quality Advisory Levels, EPA 1996; (above SQALs based on 2% TOC)

ER-Ls & ER-Ms, Long et al. 1995

TELs & PELs, MacDonald, 1994

SQC and SQAL Site Specific Threshold based on Organic Carbon

Formula = EPA criteria (expressed as ug/g organic carbon) x % TOC/100 = site specific threshold in ug/g

Worksheet for calculating site specific SQCs or SQALs based on % Total Organic Carbon (TOC)

		EPA Derived value ug/g oc	Calculation based on 2% TOC (ug/g)	Threshold concentration in ng/g or ppb
Di-N-Butyl Phthalate	SQAL	1100	22	22000
Butyl Benzyl Phthalate	SQAL	1100	22	22000
Di(2-ethylhexyl)phthalate				
Diethyl phthalate	SQAL	63	1.26	1260
Dibenzofuran	SQAL	200	4	4000
Acenaphthene	SQC	230	4.6	4600
Acenaphthylene				
Anthracene				
Benzo-a-pyrene				
Benz(a)Anthracene				
Chrysene				
Dibenz[A,H]Anthracene				
Fluoranthene	SQC	300	6	6000
Fluorene	SQAL	54	1.08	1080
Methylnaphthalene, 2-				
Naphthalene	SQAL	47	0.94	940
Phenanthrene	SQC	240	4.8	4800
Pyrene				
LMW PAHs				
HMW PAHs				
Total PAHs				
BHC Delta	SQAL	13	0.26	260
Biphenyl	SQAL	110	2.2	2200
Chlordane				
DDD				
DDE				
DDT				
DDT, total				
Diazinon		0.19	0.0038	3.8
Dieldrin	SQC	20	0.4	400
Endosulfan Alpha	SQAL	0.29	0.0058	5.8
Endosulfan Beta	SQAL	1.4	0.028	28
Endosulfan Mixed Isomers	SQAL	0.54	0.0108	10.8
Endrin	SQC	0.76	0.0152	15.2
Lindane	SQAL	0.37	0.0074	7.4
Malathion	SQAL	0.067	0.00134	1.34
Methoxychlor	SQAL	1.9	0.038	38
Total PCBs				
Toxaphene	SQAL	10	0.2	200

* For site specific threshold, replace 2 in equation with site specific %TOC (if available)

Weight of Evidence Matrix

Classification Criteria	Level 1 (Probable adverse effects)	Level 2 (Potential for adverse effects)	Level 3 (No effects)	Level 4 (Insufficient Information)
Water Column Contaminant Concentration				
Water Column Toxicity				
Bottom Sediment Contaminant Concentration				
Sediment Toxicity				
Benthic Community (B-IBI)				
Tissue Contamination				
Fish Histopathology				

Appendix C

Virginia Department of Environmental Quality
Biological Monitoring Program
305(b) Assessment Fact Sheet

Regional Office:

Regional Biologist's Signature: _____

Review Date:

River Basin:

Stream Name and Site Location:

Station ID #:

Reference Station ID #:

Assessment Method:

EPA RBP-II

Coastal Plain

Biological Assessments for the Last Five Years

Year	spring score	Spring assessment	fall score	fall assessment
1996				
1997				
1998				
1999				
2000	0.0		0.0	
Seasonal avg 5-yrs	0.0		0.0	
Seasonal avg last 2-yrs	0.0		0.0	
Final 5-yr average	0.0		0.0	
Final 2-yr average	0.0		0.0	

Note, because of the long, five-year time frame covered by this review and for a variety of reasons, some sites may not have been sampled during every year or season and/or an assessment ranking or score may not be available for every "cell" in the above table. The above table is intended to be a convenient method to summarize and review all the data available for the reporting period. The final assessment ranking for each site should be based on a review of all the available rankings shown in the above table and any pertinent supplemental data described below. For the purpose of 305(b) report preparation, if more recent bioassessment rankings differ significantly from earlier rankings, primary consideration should be given to the more recent assessment data. This is described in more detail of section 6.4.1 of the 305(b) Guidance Manual.

Supplemental Information (if applicable):

Are any seasonal differences noted?

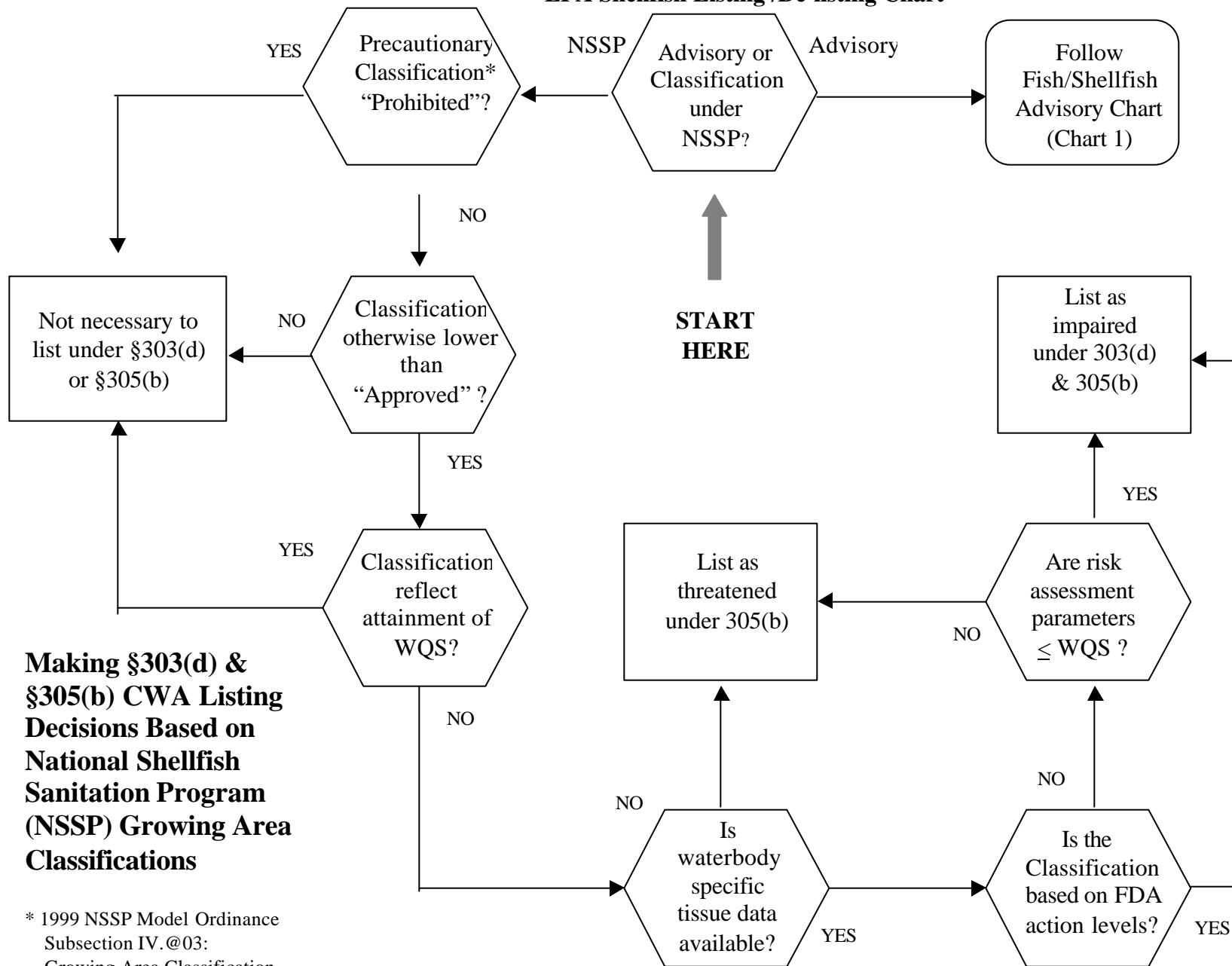
Summary of any comments associated with assessments.

Have any factors been observed in watershed that may be affecting the benthic community? Have there been any recent changes in activity in the watershed that may have affected the more recent bioassessments. Are these changes likely to affect the benthic community for a short or long term basis?

Final Assessment Rating:

Appendix D

EPA Shellfish Listing /De-listing Chart



Making §303(d) & §305(b) CWA Listing Decisions Based on National Shellfish Sanitation Program (NSSP) Growing Area Classifications

* 1999 NSSP Model Ordinance
Subsection IV. @03:
Growing Area Classification