COMMONWEALTH OF VIRGINIA
Department of Environmental Quality
Division of Water Programs Coordination
Larry G. Lawson, P.E., Director

Subject: Guidance Memo No. 02-2003 Amendment #1
2002 Water Quality Assessment Guidance Manual

To: Regional Directors

From: Larry G. Lawson, P.E., Director

Date: July 15, 2002

Copies: Alan Pollock, Regional Water Quality Planning Managers and staff, Office of Water Quality Programs Managers, WQMA Staff

Summary:

A recent review of the assessment rules used to assess data collected as part of the on-going probablistic B-IBI study has resulted in a decision to change the assessment rules pertaining to this data for the 2002 305(b) assessment cycle. The change will result in no segment assessed based on probablistic B-IBI data being listed as impaired for the 2002 cycle. Rather, threatened status will be assigned to delineated segments for which probablistic B-IBI data collected indicates degradation of the benthos, thereby flagging the segment for further monitoring and evaluation.

Electronic Copy:

The full text of this guidance is distributed electronically. The full text may be obtained at: http://www.deq.state.va.us/water/reports.html.

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Disclaimer:

This document is provided as guidance and, as such, sets forth standard operating procedures for the agency. However, It does not mandate any particular method nor does it prohibit any particular method for the analysis of data, establishment of a wasteload allocation, or establishment of a permit limit. If alternative proposals are made, such proposals should be reviewed and accepted or denied based on their technical adequacy and compliance with appropriate laws and regulations.

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

WATER QUALITY ASSESSMENT GUIDANCE MANUAL for

Y2002

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

Amended July 15, 2002

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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.

PART I 305(b)/303(d) ASSESSMENT PROCESS

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 will reflect the results of the previous assessment for designated uses. Segments, where evaluated data potentially indicate water quality degradation, may be designated fully supporting but threatened for associated individual designated uses. Additional monitoring efforts should be targeted for these waters as resources allow.

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

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 assessements 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 overview" 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 <u>not</u> be made on one data point. This rule does not apply to biological or toxic data assessments.

<u>Rule 5</u>

When assessing multiple sample data, as with a hydrolab sampling unit, the worst case data-point 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 swamps) 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 will reflect the results of the previous assessment 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.

PART IV DESIGNATED USES of VIRGINIA'S WATERS

The 305(b) process assesses a total of 5 designated uses, as appropriate for a particular waterbody, based on the Water Quality Standards. Assessed designated uses may include 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. Normally, benthic assessments are the prominent aquatic life use determinant. However, all available data relative to aquatic life use shall be considered to determine if the aquatic life use is being threatened or otherwise being negatively affected.

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 Section 6.5.2 Table 6(a) results in assessment of the water as partial supporting for the fish consumption designated use.

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 determined using the following criteria. 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 and not due to water quality violations will not be included in the 303d report. In these cases, monitoring should not be conducted as the shellfish designated use has been administratively removed through the issuance of a discharge permit. Additional information relative to shellfish use assessment can be found in Appendix D of this guidance.

4. Swimming Use:

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

Normally, 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 bacteria data points within a 30-day period is conducted, then these results should be compared to the geometric mean criterion described in the Water Quality Standards. 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 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; Waters exceeding nutrient screening values
2.	Fish Consumption Use	Advisories, limiting consumption, or restrictions issued by VDH; Comparison of fish tissue data to 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.

PART V CRITERIA TO DETERMINE DEGREE OF USE SUPPORT

Virginia bases its water quality assessment on the ability of the waters to support the associated 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.

<u>The Water Quality Standards (9 VAC 25-260-50) criteria for D.O., pH and Temperature do **not** apply below (7Q10)</u>. 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 will 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 running 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 toxic 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 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 ≤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 toxic screening values found in Section 6.5.2 Table 6(a) have been exceeded. Unless otherwise noted, all state waters are considered fully supporting the 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. These waters are not necessarily predicted to exceed water quality standards or be listed as impaired in the next reporting period.

- *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 running 3-year period are considered fully supporting but threatened for aquatic life. For public water supply use, a single exceedence of any human health criteria is considered fully supporting but threatened.

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 toxic 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:*

VDH 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. Finally, waters where estuarine probablistic monitoring indicates degradation in > 10% of the samples collected will be considered threatened. For monitoring purposes, all threatened waters should be considered in the next regional monitoring plan for continued monitoring during the next reporting period. For additional monitoring guidance, see Part VI Section 6.2.2

3 <u>Partially Supporting</u>

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 running 3-year period are considered partially supporting for aquatic

life use. For public water supply use, two exceedences of the same human health criteria within the reporting period is 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 toxic 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 exceeding the same SV during one sampling event or two or more samples of the same or different species exceeding the same SV from different sampling events within the assessment period.

- *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 fixed station 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 designated use 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 <u>Not Supporting</u>

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 running 3-year period is considered not supporting for aquatic life use. For public water supply use, 3 or more exceedences of the same human health criteria within the reporting period 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 fixed station 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 Advisories:*

VDH fish consumption prohibitions are considered violations of the designated use 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 and not excess bacteria 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, 99th 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 toxic SV for fish tissue A single exceedence of a human health criteria (PWS)	2 exceedences of the same human health criteria (PWS) 2 or more exceedences of the same toxic SV, listed in Table 6(a), for fish tissue	3 or more exceedences of the same 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 **Fixed Station Estuarine Only:** Samples having ≤ 2.0 B-IBI score are 11% ≤ AR ≤ 25%	Freshwater: Severely Impaired **Fixed Station Estuarine Only:** 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 initiates control measures)

AR = arithmetic exceedence rate
SV = screening value
ER-M = effects range – medium value
ALUS = Aquatic Life Use Support
PWS = Public Water Supply

PART VI ASSESSMENT EVALUTION METHODOLOGY

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 the appropriate designated uses are met: These uses are: 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

- **Ambient Water Quality 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, in certain cases, 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.

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.

One monitoring station should not be used to assess an entire watershed unless land use, source, and habitat are relatively homogeneous.

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.

For tidal and 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.

Segment delineation will be performed using EPA National Hydrography Dataset (NHD) coverage.

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.

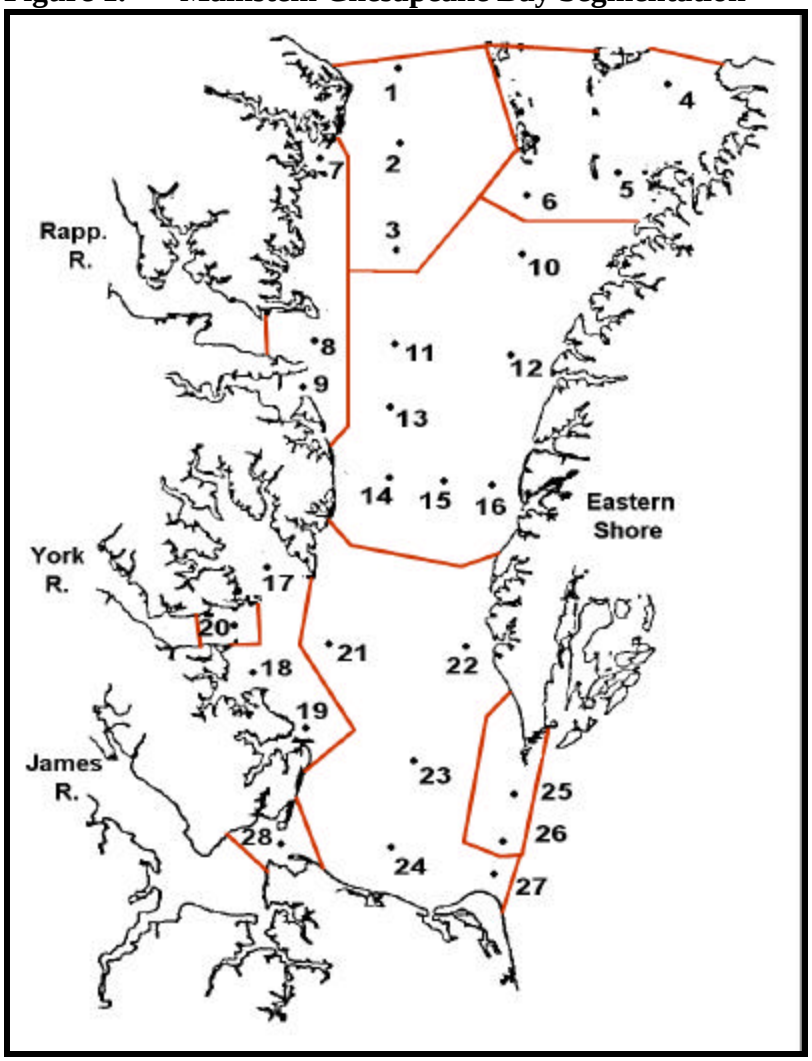
When assessing an impaired segment, consideration should be given to the possible existence of a permitted mixing zone within the segment. If a mixing zone is determined to exist within a designated segment, that section of the impaired segment should be removed from the segment if the permitted mixing zone exemptions exist for associated Water Quality Standards designated use(s) and/or contaminants

- **Chesapeake Bay Monitoring Station Delineation**

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 pycnolcine 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.

Figure 1. Mainstem Chesapeake Bay Segmentation



For the major tidal tributaries (James, York, Rappahannock), consideration will be given to salinity and the Chesapeake Bay tributary segmentation shown in Figure 2 (Section 6.4.1.2) 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 pycnolcine 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.

The minor tidal tributaries (e.g. 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 pycnolcine 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.

6.2.2Watershed Station Rotation and Assessment Criteria

- Conventional Parameters:
  pH, Temperature, Dissolved Oxygen, Fecal Coliform

  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.

  For the four conventional parameters, if only 1 sample exceeds the criteria for any or all parameters where n is = 9, the station may be rotated after the two year cycle. This segment is considered fully supporting.

  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.

  For any one of the four conventional parameters with 4 or more exceedences, where n = 2 but = 12, and no other exceedances 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.

  For any of the four conventional parameters, any individual parameter with 4 or more exceedances, 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.

<u>Assessment Process</u>:

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 then 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 then 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 and nutrient 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 there is reason to believe 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. This type of survey is considered "evaluated" data. 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 evaluated 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 designated use standard (9 VAC 25-260-10) 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 fixed station 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 ≤ 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 ≤ 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.

For random probablistic station segments, the data will be assessed the same as the fixed station segments but due to the lack of statistical confidence, only the first two assessment categories above will be used.

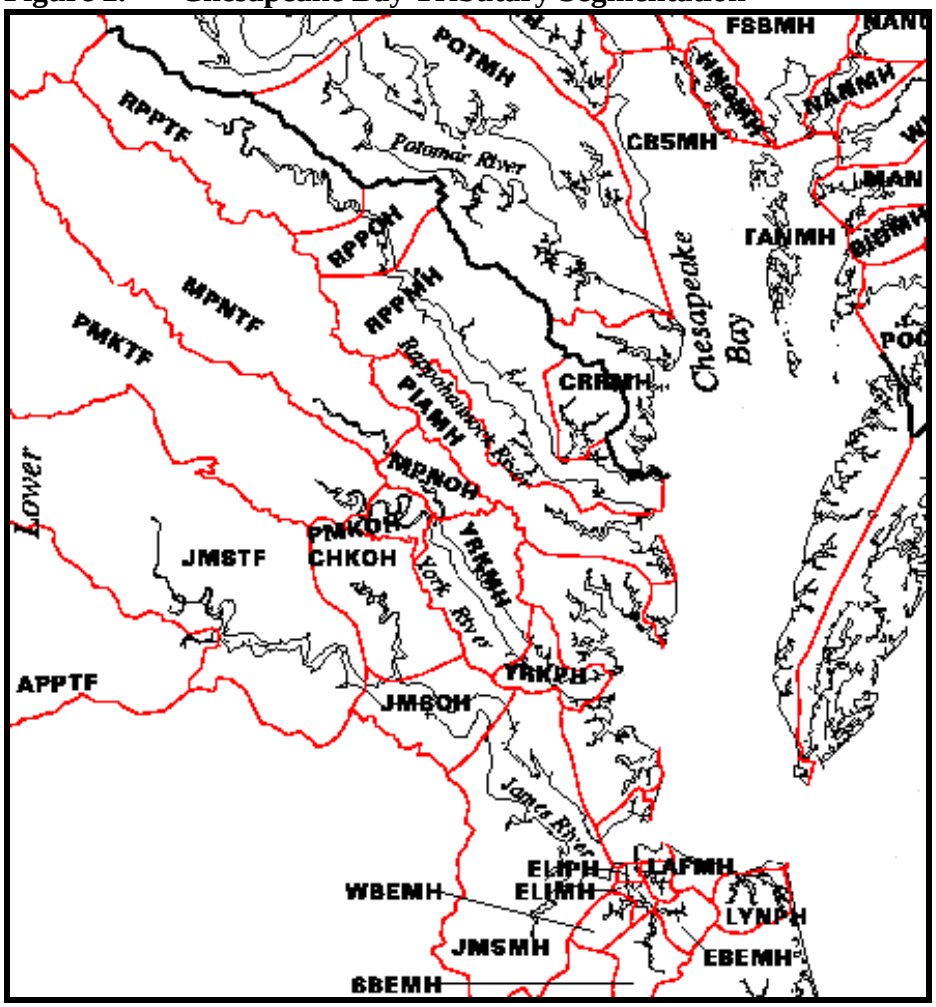
- Spatial Segmentation:

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.

- 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 (Section 6.2.1). 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



- <u>Benthic fixed station sampling network</u>:

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 restrictions or condemnations 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.

Specific information regarding Total Maximum Daily Loading (TMDL) development in shellfish waters and the listing and de-listing flowchart for shellfish waters can be found in Appendix D of this guidance document.

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 0xygen	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 chlorophyl (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 water quality assessment (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 WQSBMP staff 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 were 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 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 VDH 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 exceed an 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-Dinitortoluene	121-14-2		350
Dioxin	1746-01-6		0.0062
Endosulfan (1 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	
Nitrobenzine	98-95-3	5,400	
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	
Tetracholoethylene	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) (500 VDH)	
Methoxychlor	72-43-5	54,000	
Mirex	2385-85-5	2,200	
Oxyfluorfen	42874-03-3	32,000	830
PAH (sum PEC)***			15
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**

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

** 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.

*** Mixtures of seven polynuclear aromatic hydrocarbons (PAHs) that are classed as probable human carcinogens were assessed based on a screening value concentration of 15 ppb calculated as a sum potency equivalency concentration (PEC) using methods described in EPA's Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories, Vol. 1, (EPA 823-R-95-007) and Vol. 2 (EPA 823 B-00-008) using the following equation;

$$PEC = \sum_i (RP_i \times C_i)$$

where; RP_i = relative potency for the ith PAH
C_i = concentration of the ith PAH in fish tissue)

The relative potency estimates used for these PAHs were:

Benzo(a)pyrene	1.0
Benzo(a)anthracene	0.145
Benzo(b) fluoranthene	0.167
Benzo(k)fluoranthene	0.020
Chrysene	0.0044
Dibenz(a,h)anthracene	1.11
Indeno(1,2,3-cd)pyrene	0.055

- **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.

- **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)	99th %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)	99th %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	Acenapthene	500	
208968	Acenapthylene	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, (e.g. 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. <u>If a segment is determined to be impaired in either the surface or bottom waters, then that whole segment will be considered impaired</u>.

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.	9,600	
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/DE-LISTING and PRIORITY RANKING EVALUATION

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 and recent DMRs showing compliance.

- 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 listing cycle required by federal law 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 to justify the removal of the segment from the 303d list.

Scenario # 5: *Using the "Proactive Approach"*
The TMDL staff should apply the Proactive Approach any time a TMDL is scheduled for development and a review of the most recent information shows the following:

- the most recent 2 years of water quality data indicates the water is a candidate for delisting and
- changes have occurred in the watershed to explain the change in water quality.

- **Incorporating the *Proactive Approach* to delisting 303(d) listed segments into the 2002 and Subsequent Water Quality Assessments**

In August 2001, the Office of Water Quality Programs negotiated with EPA an approach, termed the *Proactive Approach*, which results in the proposed delisting of waters on the Section 303(d) list through assessment of less than 5-years of data. Correspondence and information related to the issue is available upon request. In short, EPA Region III has consented that Virginia can delist a segment on the 303(d) list if the following requirements are met:

1) For conventional parameters, no more than one of twelve samples taken over a two-year period exceeds the water quality criteria (10 percent or less exceedance for larger data sets).
2) For biological impairment, a minimum of 2 consecutive samples, taken over a one to two year period, show attainment of the applicable standard.
3) The samples are taken at the same location (monitoring station) which demonstrated the impairment.
4) A rationale document is submitted to EPA justifying why the State believes the waters are achieving water quality standards. This rationale document can consist of a description of measures taken in the watershed which are considered to be responsible for improvement of the water quality.

- **Eligibility and Water Quality Assessment**

The following procedure is to be used to consider the eligibility of, and to subsequently assess, any particular waterbody segment submitted for consideration for delisting under the *Proactive Approach*.

Locations where proactive measures are being taken to improve water quality through the TMDL or Water Quality Management Plan program such that the *Proactive Approach* is eligible for consideration are to be provided by the DEQ TMDL program. Assessment staff can recommend segments for consideration, but only those locations provided by the DEQ TMDL program as candidates for the *Proactive Approach* are to be considered for assessment under the *Proactive Approach*. Notification must be made in writing through memorandum to the affected regional assessment manager, copied to the DEQ 305(b) coordinator, and must include the required documentation supporting consideration of the *Proactive Approach*. At a minimum, this is to include documentation of those implementation measures considered to be responsible for improvement in water quality and subsequent achievement of water quality standards.

Regional assessment staff are responsible for assessment of water quality in their respective regions and for the defense of their assessments. Therefore, the decision for delisting consideration is to be made by regional assessment staff based on the analysis of the proactive measures being taken, available monitoring data, any ancillary information collected, and their professional knowledge of site specific influences on water quality in the affected segment.

Where there is agreement between TMDL program and assessment staff that it is appropriate to pursue delisting based on implementation of the *Proactive Approach*, the assessment must be performed based on the requirements outlined in 1, 2 and 3 above. For a scheduled 305(b)/303(d) assessment, only the last two years of the assessment window are to be used for assessment of eligible segments. For delisting assessment at any other time, the most recent two years of data must be used. See Table 9

Table 9 Assessment Documentation and Delisting Procedure

ADB Database	A segment meeting the above criteria is considered monitored, fully supporting. The 303(d) button is NOT checked. The assessment comments section should include the phrase *Proactive Approach Assessment*. The *Proactive Approach* data window used must be specifically identified.
303(d) Database	The TMDL phase field should state DELIST-PA. The "comments" section of the fact sheet must start with the phrase *Proactive Approach Assessment* and should include the justification for delisting. Again, the data window used must be specifically identified, consistent with ADB.
Appendix B	Appendix B should include only the results of the assessment using the *Proactive Approach*. The acronym *PA* and the data window used must be entered into the Appendix B comments field.
Delisting Documentation	Documentation must include the information provided by the TMDL program related to control measures implemented using the *Proactive Approach* (requirement 4, above), and the results of data analysis related to requirements 1, 2, and 3 above.
EPA Review, Approval and Public Participation	Fulfillment of EPA review and approval requirements, and fullfilment of public participation requirements for removal of waterbody segments (delisting) at EPA required 303(d) list submittal dates, is the responsibility of the Monitoring and Assessments Program. At other times, fulfillment of these requirements in an effort to delist waters not needing TMDLs is the responsibility of the TMDL program. Final documentation for segments delisted by the TMDL program staff must be provided to the regional assessment manager and copied to the DEQ 305(b) coordinator at least five months prior to any EPA required 303(d) list submittal date, if time permits.

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

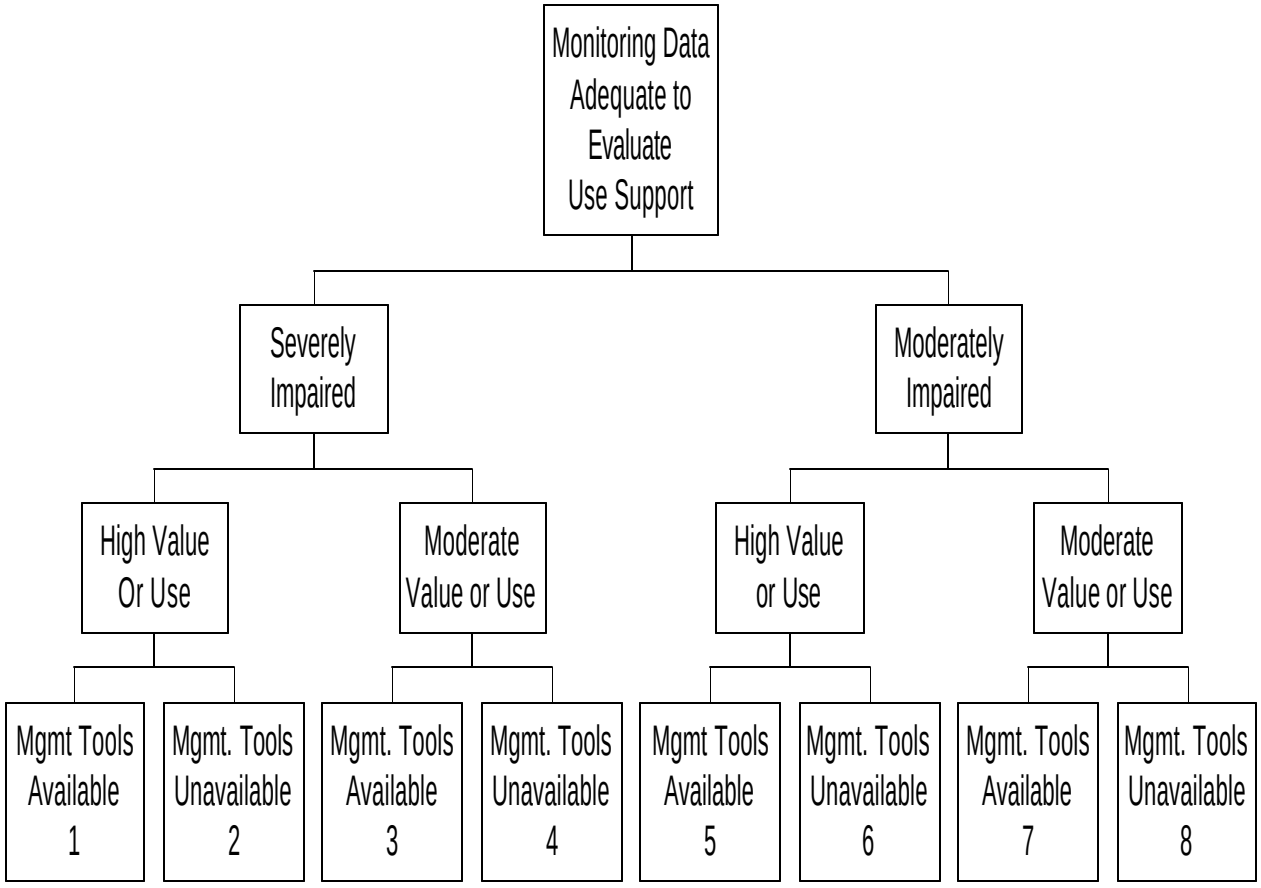
Waters used for public fishing

- 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 (1) 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: $\geq$ 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	*SQCs (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				

SQCs = 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

Total Maximum Daily Load Development on Shellfish Restricted Waters

Background: Virginia listed 260+ shellfish waters on its 1998 Section 303(d) list as impaired due to restrictions imposed by Virginia's Department of Shellfish Sanitation (DSS). The Consent Decree entered into by the Environmental Protection Agency (EPA) in June of 1999 called for the development of a procedure to address these impaired waters by June 2002 and Total Maximum Daily (TMDL) development on 50% of these waters by 2006. The fecal coliform criteria (for shellfish waters) is a 30-month geometric mean of 14 most probable number (MPN) per 100 milliliters, using the MPN approach, and the estimated 90th percentile shall not exceed an MPN of 49 MPN for 100 ml for a 3 tube serial dilution method. The following procedure was developed to address shellfish restricted waters in Virginia but may be to applied in all EPA Region III States. Section 1 details how waters affected by administrative closures will be addressed. Section 2 deals with the approach that will be used to address simple situations. Finally, Section 3 describes the modeling approach that will be used, when deemed necessary, to address more complex watersheds.

1. Administrative Closures: Virginia DSS closes waters due to their proximity to a marina or waste water treatment plants (WWTP). These closures are precautionary in nature and often do not have data documenting a violation of the fecal coliform criteria.

   A. Twenty Marina waters:

      i. Determine if the 20 waters associated with marinas were listed unnecessarily. The State is only required to list waters with observed contamination, these waters should not have been listed since the criteria was not shown to be violated on these waters (Virginia Department of Environmental Quality (DEQ) Water Quality Assessment Guidance Manual, 09-09-99).

   B. Forty-two WWTP waters:

      i. Investigate the use since to 1975. If there were no shellfish in these waters since November 28, 1975, then the use is not an "existing use" under the water quality standards (WQS) regulations and the use may be removed from the water. Thereby making a TMDL unwarranted as long as standards are being attained.

      ii. The waters that are achieving WQS can be de-listed using the methodology for the marina waters.

      iii. A Use Attainability Analysis (UAA) would be needed to address the other areas. Since all of these waters are associated with the restricted designation, the standard needs to be changed through a refinement of the designated use or establishment of site-specific criteria to coincide with the designation. These waters would remain on the Section 303(d) list until the completion of the UAA or TMDL.

      iv. TMDLs will be developed for waters which have violations both inside and outside of the buffer zone.

2. Simple Approach: Personnel from EPA, Virginia DEQ, Virginia Department of Conservation and Recreation (DCR), Maryland Department of the Environment (MDE), Virginia DSS, Virginia Institute of Marine Sciences (VIMS), United States Geological Survey, Virginia Polytechnic University, James Madison University, and Tetra Tech composed the shellfish TMDL workgroup and developed a procedure for developing TMDLs using either a simple or complex approach. The goal of the procedure is to use

bacteriological source tracking (BST) data to determine the sources of fecal coliform violations and the load reductions needed to attain the applicable criteria.

A. What water bodies will be covered ?

i. It is believed that this approach can be used on most of the waters listed for shellfish restrictions on Virginia's 1998 Section 303(d) list. This approach is appropriate for listed segments under 0.5 square miles in size, unless bacterial loading is determined to be from multiple, diverse sources or if the loading is dominated by point sources. Waters greater than 0.5 square miles should be addressed via the complex approach, unless their watershed to waterbody area ratio is low (less than about 6), the BST data shows the loading is wildlife dominated, or other local factors support use of the simple approach.

B. Sampling and Data requirements

i. Virginia DSS collects random monthly samples from designated sampling stations on shellfish waters. In addition to the monthly MPN sample, DSS will collect a 500 ml sample for BST analysis. The BST sampling will occur for 1 year (12 samples) for the pilot study; this will help to determine if there is seasonal variability in the loading. It is anticipated that a wet weather event will be captured by one of the random samples. If a wet weather sample is not obtained within the first nine months, one or more additional sampling events will be arranged, to capture a wet weather event.

ii. The pilot study BST analysis will use the Antibiotic Resistance Approach (ARA), to determine the sources of fecal coliform to the waterbody. ARA uses fecal streptococcus or *Escherichia coli (E. Coli)* and patterns of antibiotic resistance for separation of sources. The premise is that human, domestic animal, and wild animal fecal bacteria will have significantly different patterns of resistance to the battery of antibiotics used in this test. There are studies being initiated around the country to compare the accuracy of the ARA method with other bacterial source tracking approaches. If these studies show that the ARA method is not as accurate as the other approaches, its use for this work will be reconsidered. The ARA will determine the percent loading per source category to the water. The six major source categories will be human, pets, mammalian livestock, avian livestock, mammalian wildlife, and avian wildlife.

C. The TMDL Calculation:

i. The most recent 30-months of data will be reviewed to determine the loading to the waterbody. The approach will insure compliance with the 90th percentile and geometric mean criteria. The geometric mean loading will be based on the most recent 30-month geometric mean of fecal coliform. The load will also be quantified for the 90th percentile of the 30-month grouping.

(1) <u>Geometric Mean Analysis</u>: The geometric mean load will be determined by multiplying the geometric mean concentration based on the most recent 30 month period of record by the volume of the water. The acceptable load will be determined by multiplying the geometric mean criteria by the volume of the water. The load reductions needed for the attainment of the geometric mean will be determined by subtracting the acceptable load from the geometric mean load.

(2) <u>90th Percentile Analysis</u>: The 90th percentile load will be determined by multiplying

the 90th percentile concentration, based on the most recent 30 month period of record, by the volume of the water. The acceptable load will be determined by multiplying the 90th percentile criteria by the volume of the water. The load reductions needed for the attainment of the 90th percentile criteria will be determined by subtracting the acceptable load from the 90th percentile load.

(3) The more stringent reductions between the two methods will be used for the TMDL.

ii. The BST data will determine the percent loading for each of the major source categories and will be used to determine where load reductions are needed. Since there will be 12 BST samples, the percent loading per source may be averaged over the 12 month period if there is no seasonality between sources. If a seasonality between the sources is established, they may need to be averaged on a seasonal basis. The percent loading by source will be multiplied by the total geometric mean or 90th percentile load to determine the load by source. The percent reduction needed to attain WQS will be allocated to each source category. This will fulfill the TMDL requirements by insuring that the criteria is attained, all sources and loadings will be identified and quantified via the BST and mathematical calculations, and season variability and critical conditions will be addressed via the sampling and BST data. A Margin of Safety equivalent to 5% of the geometric mean or 90th percentile load will be included in the TMDL, and there will be reasonable assurance that the reductions will be met.

iii. Example: Cod Creek, a tributary to the Little Wicomico River (Illustrated in Attachment #1)

(1) The water surface area is 264,000 square meters, with an average depth of 1.2 meters. Therefore the volume is 316,800 cubic meters.

(2) The 30-month geometric mean was 37.8 mpn/100 ml (378,000 mpn per cubic meter) at station 13.5 y. Therefore, the geometric mean load would be 1.19E11 derived by multiplying the observed concentration (378,000 mpn/cubic meter) by the volume (316,800 cubic meters). The 90th percentile load for the same 30-month period was 98.7 mpn/100ml (987,000 mpn/cubic meter) at station 13.5y. Therefore, the 90th percentile load would be 3.12E11 organisms derived by multiplying the concentration (987,000 per cubic meter) by the volume (316,800 cubic meters).

(3) The total allowable geometric mean load would be 4.43E10 derived by multiplying the geometric mean criteria (140,000 mpn per cubic meter) by the volume (316,800 cubic meters). The total allowable load for the 90th percentile would be 1.55E11 derived by multiplying the 90th percentile criteria (490,000 mpn per cubic meter) by the volume (316,800 cubic meters).

(4) The reductions needed for the attainment of the geometric mean and 90th percentile criteria would be 7.46E10 and 1.57E11 respectively. In this example, the reductions would be based on the corresponding 90th percentile.

(5) The ARA analysis will provide a percent loading by source to the water. That percentage will be multiplied by the geometric mean or 90th percentile load to determine the load for each source. If mammalian livestock represented 40% of the isolates detected, the mammalian livestock load would be determined by multiplying the 90th percentile load of 3.12E11 by 0.40. Therefore, a 1.24E11 load would be attributed to mammalian livestock. This process would be repeated for all sources,

thereby identifying a percent and load for each source.

(6) The procedure will then determine the percent reduction needed by each source to attain standards. In the example above, if a 75% reduction were needed from mammalian livestock, the allocated load for mammalian livestock would be 3.1E10. This would be repeated for all sources.

3. The Complex Model: The shellfish TMDL workgroup identified a method for developing TMDLs on waters for which the simple approach is not appropriate. Generally, the complex approach should be used when:

- Watershed loading is dominated by non-wildlife sources.
- Efficiencies can be gained by using the same model for multiple parameters in the same watershed
- Waters are greater than 0.5 square miles.
- Watershed to waterbody ratio is large (i.e., greater than about 6).

A. The State will document the bacterial source loading via bacterial source tracking to determine if the watershed is eligible for the complex approach. Generally, if wildlife loading dominates the watershed, the simple approach should be used. The rationale behind this is that it will not be feasible to allocate to wildlife sources, therefore, complex modeling will not necessarily yield any better allocation estimates than the simple approach. The simple approach should be used when wildlife represents the largest source of the loading (fecal coliform or when reducing all non-wildlife loads by 100% will not result in achieving water quality standards.

B. A receiving water model, such as the Tidal Prism Model (TPM) or Environmental Fluid Dynamics Computer Code (EFDC), should be used to model these waterbodies. All models that are applied to a tidally influenced waterbody must account for the tidal cycle and the time-variable source bacteria loading rates.

C. The TPM approximates the impacts of the tidal process, allows for the time variable modeling of point and nonpoint sources, and has already been established and calibrated on several of Virginia's waters. The EFDC model is a public domain, general purpose package for simulating 2-dimensional or 3-dimensional flow and transport processes in rivers, lakes, estuaries, wetlands, and coastal waters. The EFDC model was developed at the VIMS and has been applied and calibrated on several Virginia estuaries.

D. In order to model these watersheds, the State will need to determine the land-uses within each watershed and the fecal coliform loading associated with each land-use. Loadings for the land-uses should remain constant between waters in the same region. The State will need to obtain weather data from the nearest weather station with the most complete data set. A combination of weather stations can be used to provide for all of the needed data. If the water is listed for another impairment as well, that TMDL should be completed concurrently with the same model.

E. The BST loading breakdown will be used to verify the accuracy of the model. For example, if the model has human wastes representing 55% of the load but the BST data documents the human load at 20%, the model will need to be refined so that the delivery of the source load to the waterbody corresponds closely to the BST data. The accuracy of the BST results will be crucial for this determination. The standard deviation of BST results (or another appropriate statistical methodology) at any given sampling station will be used to assess the accuracy and repeatability of the BST methodology. Seasonality of the BST numbers should also be taken into consideration in the analysis.

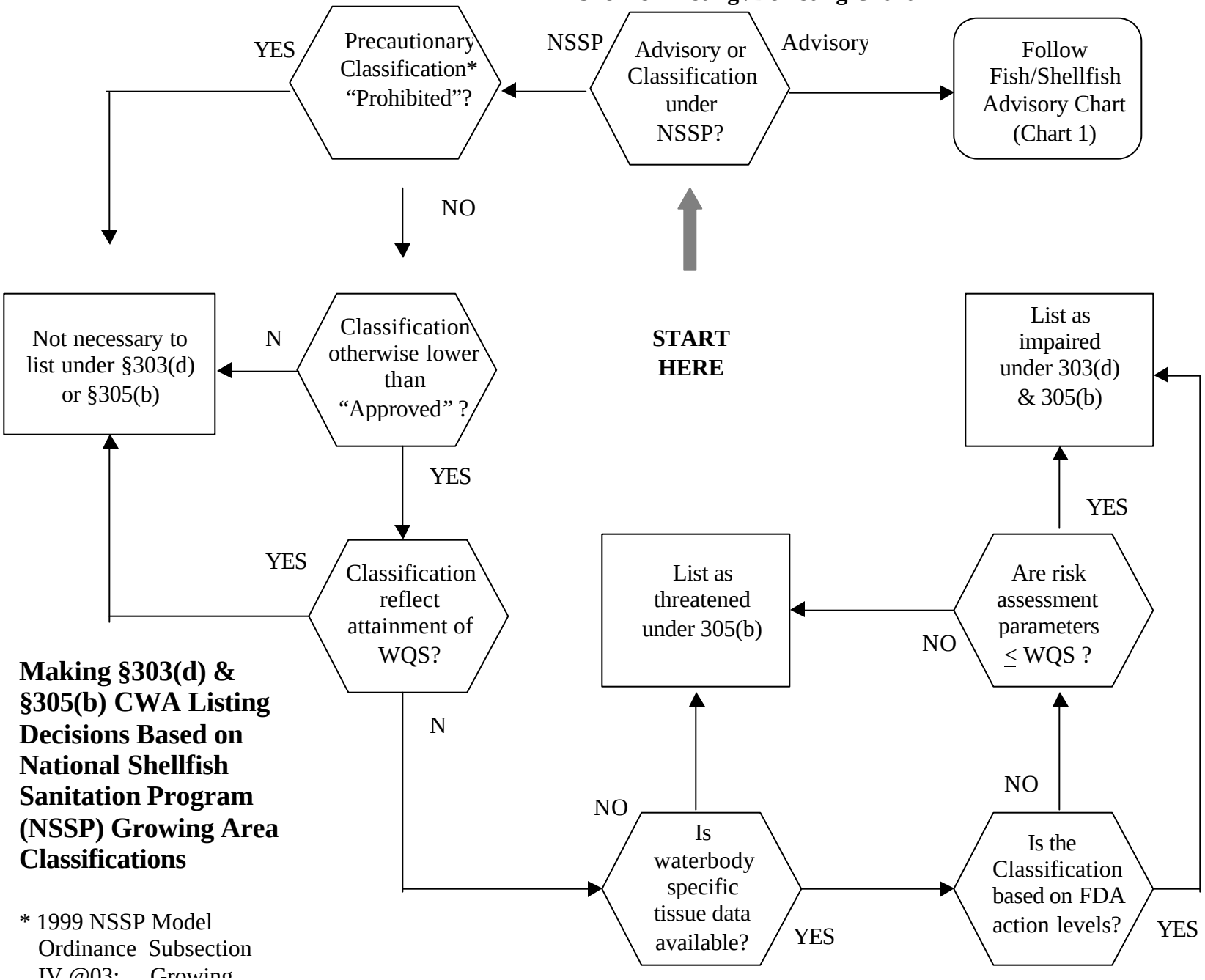
F. The model predictions of fecal coliform concentration will be averaged over a twenty-four-hour period, recognizing that the model timestep may need to be finer to maintain stability. These daily values will be used for identifying the 30-month geometric mean and 90th percentile.

G. The wasteload allocation for each permitted facility will be set for each facility at permitted flow and concentration values. If those concentrations need to be reduced in order for the water to attain standards, it must be reflected in the next permit.

H. The allocations will be developed to achieve the more stringent of the two criteria, 30-month geometric mean or 90th percentile.

Figure 4

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

Appendix E

Assessment Guidance Public Comment Response Issues
From VMA

ISSUES:

1. VMA asks that DEQ consider (or re-consider, as appropriate) all of VMA's comments on the draft Manual and revise, or explain the rationale for not revising, the Manual based on those comments.

   Response: DEQ intends to consider and address the public comments received. Where it is deemed necessary, DEQ will make appropriate revisions to the guidance for the 2002 assessment. DEQ's responses to public comments will be included as part of the final guidance manual for the 2002 assessment.

2. VMA urges DEQ to postpone finalization of the Manual until it has had a chance to review and digest the final versions of EPA's forthcoming guidance documents.

   Response: DEQ has reviewed EPA's "2002 Integrated Water Quality Monitoring and Assessment Report Guidance". DEQ is preparing the 2002 assessment in accordance with the DEQ "Water Quality Assessment Guidance Manual for Y2002 305(b) Water Quality Report and 303(d) Impaired Waters List". This guidance is based on EPA's 1997 guidance. This decision is based on several conclusions. First, the assessment database (ADB) EPA encourages states to use to report the assessment in accordance with EPA's 2002 guidance is not yet available. Second, there are some potential issues in EPA's 2002 guidance that DEQ believes will add confusion to the report under EPA's new guidance, specifically with regard to severity of impairment and categorization of threatened waters. In an effort to illuminate these issues, DEQ proposes to include in its 2002 submittal a table which lists all segments assessed, the current (1997 EPA guidance base) assessment results, and the "new" category under which the segment would fall if EPA's 2002 guidance were followed. DEQ believes incorporation of this table may illuminate some potential issues in EPA's 2002 guidance that we believe will add confusion to the report under EPA's new guidance, without compromising the assessment reported in accordance with the existing DEQ guidance.

3. VMA urges DEQ to revise the Manual consistent with substantive or procedural safeguards guaranteed by federal and state constitutions and then subject it to a full and fair public process. These safeguards are required by the Virginia Administrative Process Act (VAPA) for agency actions that have the force of law and affect the rights and conduct of VMA and its members.

   Response: The assessment manual and the 305(b) report and 303(d) list prepared by DEQ based on the manual do not have the force of law.

4. VMA believes that the listing of a waterbody as impaired should be based only on the exceedence (at an appropriate statistical level) of instream water quality criteria that are numerical.

   Response: Exceedences of numerical water quality criteria are an integral part of the assessment of a particular waterbody as impaired. However, DEQ's water quality standards include general criteria (9 VAC 25-260-20) which also must be taken into consideration when a waterbody is assessed.

5. A numerical standard, or a "translator" to convert a narrative standard into a numerical one, must be promulgated with the required administrative process, including advance notice and opportunity for public comment.

Response: See response to comment # 4. Virginia's designated use standard (9 VAC 25-260-10) and the general standard (9 VAC 25-260-20) are part of the Water Quality Standards, which were promulgated with the required administrative process, including notice and opportunity for public comment. In the absence of numerical standards, or "translators", DEQ must assess data relative to the general criteria. DEQ's assessment protocols relative to the general criteria are made available to the public through the assessment guidance manual and are open to public comment.

6. In light of the uncertainty with the proposed new TMDL Rule, VMA recommends that DEQ *choose* not to list waters as threatened, unless mandated to do so under Water Quality Information and Restoration Act (WQMIRA), as discussed in Section III.C below. Instead, DEQ should classify those waters as having insufficient data and information to determine if the standards are being attained.

Response: DEQ uses the threatened category as a management tool to indicate that additional monitoring and assessment is required to determine whether a water quality problem exists. Threatened waters, although set out in the State's 303(d) report in the same format as those listed as impaired, as per WQMIRA, will not be included in Virginia's official 303(d) list submittal to EPA.

7. For the following reasons, VMA believes that the ER-M or other screening values (SVs) criterion is inappropriate for use in designating a waterbody as "threatened" under the WQMIRA or the new EPA TMDL regulations:

- The technical document from which the ER-Ms were taken clearly states that the "numerical guidelines should be used as informal screening tools in environmental assessments. They are not intended to preclude the use of toxicity tests or other measures of biological effects."

- The ER-Ms presented in Table 6a were developed for use as screening tools with marine and estuarine sediments and are not appropriate for statewide application.

- The use of an upper 99th percentile sediment concentration is inappropriate because it does not consider the possibility that the existing data may represent the "normal" sediment concentration range for a particular parameter. DEQ must demonstrate that the observed sediment pollutant concentration falls outside the normal range for that particular location.

- When evaluating sediment pollutant data, DEQ must consider the number of sediment samples that contain pollutant concentrations greater than a particular SV, the degree to which a particular sediment concentration exceeds a particular SV, and the spatial distribution of the observed exceedences. It is not appropriate to base any decision on a single concentration that exceeds a particular SV. Similarly, it is not appropriate to designate an entire water segment as impaired or threatened based on the results of sediment samples collected from a very localized area.

- DEQ must also consider the relative difference between a particular sediment concentration and the associated ER-M. An examination of the technical document from which the SVs were taken shows that for many metals, no adverse effects were noted in a relatively high percentage of cases where sediment concentrations exceeded the ER-M (see Table 3 from Long *et al.* 1995). This was particularly true for nickel, for which

adverse effects were noted only 16.9% of the time (10 out of 59 instances) when nickel sediment concentrations were greater than the ER-M. Sediment concentrations that just barely exceed an ER-M should not be given the same weight as those that are well above the SV.

For the above reasons, VMA believes that the DEQ should never rely on sediment SVs alone to list a waterbody as threatened for aquatic life use. In short, VMA has fundamental legal and technical concerns about DEQ's use of ER-M screening values as the basis for listing decisions.

Response: DEQ agrees that there are fundamental concerns regarding the use of screening values as the basis for impaired waters listing decisions. DEQ uses screening values only for identifying waters as threatened. The identification of waters as threatened is exclusively as a management tool for DEQ to use to identify those waters where additional data should be collected to determine whether actual water quality impairment exists.

8. VMA agrees that fish advisories may be used to inform listing decisions, but only where the advisories are based on an adequate scientific process and developed in accordance with state administrative procedural requirements.

Response: Virginia Department of Health (VDH) has the authority and process to issue fish consumption advisories based on human health related consumption of contaminated fish.

Water Quality Monitoring, Information and restoration Act (WQMIRA) (§ 62.1-44.19:5.C.1) directs that the 303(d) report shall define water segments as impaired where fishing restrictions or advisories apply. Fish advisories are developed and issued by the Virginia Department of Health and are developed according to the appropriate procedures used by the Virginia Department of Health. Fish advisories and restrictions issued by a state entity responsible for public health and safety are widely recognized as an indication of impaired water use. The fish advisories used in this 305(b) assessment include fish advisories that were in effect when WQMIRA was passed as well as additional fish advisories that have been developed since that date including advisories and restrictions that have been developed under the procedures described in Code of Virginia 32.1-248.01.

9. VMA objects to the use of assessment criteria such as the fish tissue screening values, which have not been officially adopted by DEQ through the required VAPA process.

Response: SVs that are used to assess fish tissue for possible impairment (those SVs found in table 6a) are directly linked to the water quality criteria listed in 9 VAC 25-260-140.B under the column "Human Health, All Other Surface Waters". These water quality criteria are designed to protect human health via fish consumption and are based on a specific fish - tissue concentration, which is the equivalent to the screening values used for impairment assessment. These water quality criteria and the underlying scientific data have undergone public review and comment as required by the VAPA process during the criteria adoption process. These fish-tissue SVs are the fish-tissue concentration that the water quality criteria are designed to protect against and represent the level of protection intended by the water quality criteria. Measurement of this concentration in fish-tissue is an alternate way of assessing compliance with the human health water quality criteria. These numerical water quality criteria are designed to prevent the fish from being contaminated to levels greater than a pollutant specific concentration, i.e. a fish-tissue concentration that is identical to the screening value. A fish-tissue sample that exceeds the screening value indicates that the effect that the water quality criterion was intended to prevent has occurred and the level of protection intended by the water quality criteria is not being supported.

Monitoring for the chemical in fish tissue is an alternate means of assessing whether the intent of the water quality criteria has been exceeded. The guidance is designed to treat a fish sample that exceeds a fish-tissue screening value for a pollutant in the same manner as will an exceedence of a water quality criterion in a water sample.

10. VMA believes that DEQ can reach a sound conclusion that a waterbody is impaired for fish consumption only where the average concentration of all fish tissue samples collected from a particular water segment is greater than the respective SV.

Response: DEQ does not sample every species of fish resident to a water body segment. DEQ collects from each water body segment representative samples of between three and five different species of fish and selects these species to act as surrogates for different classes of fish depending on their feeding habits and ecological niche. Typically, many other species of fish resident to a waterbody go unanalyzed. Each fish species is analyzed as a composite of several individuals, so the resulting data represent an average for that species and this is a long term average since the fish have accumulated the pollutant over their lifetimes. Under these conditions a fish species sample that exceeds the screening value will represent 20% - 33% (depending on whether five or three species were collected at the site, respectively) of the samples analyzed for a waterbody segment. A 20-33% exceedence rate represents a significant level of adverse effect on the fish resource. Additionally, certain classes of bioaccumulative pollutants are known for accumulating in certain species of fish, while others may not be contaminated to such high levels, ever. Yet if a species of fish is contaminated beyond an acceptable level, then the resource can not be considered a fully supporting waterbody. The water quality criteria that are the basis for the screening values do not specify that a certain level of fish contamination that is to be considered acceptable and it is inappropriate to wait until all species are contaminated beyond acceptable levels before any action is taken.

11. VMA recommends that a waterbody be listed as impaired for a human health criterion only where the average concentration of a pollutant in the waterbody is determined, through extensive monitoring, to exceed its respective human health criteria.

Response: DEQ uses human health criteria found in the water quality standards as the basis for listing the water as impaired. If two or more human health criteria exceedences are detected in a water segment, DEQ believes that is enough evidence to indicate a potential human health concern within that water segment.

12. In many cases, alterations in the biological community can be traced to anthropogenic causes other than pollutants, such as habitat destruction or increased predation. Therefore, it is imperative that the cause of the impairment be determined before a waterbody is listed. This is particularly true when changes in the biological community are the basis of listing, since the causes of such changes are myriad. On page 27 of the Manual, DEQ allows a stream segment to be labeled as “not supporting” based on a single RBP-II sample. Unless the suspected impairment can be tied to a specific cause of pollution, there is no basis for listing the segment.

Response: As described in the guidance, there is a large degree of confidence placed in a well conducted RPB II survey evaluation that shows either no impairment or severe impairment. The current guidance reflects this. The actual cause of the impairment is often not known for biological impacts without further, detailed investigation. Knowledge of the actual cause of the impairment is not a prerequisite for identifying a water body as impaired according to the designated use criteria (9 VAC 25-260-10).

13. DEQ attempts to define impairment in the Manual based on comparison of biological samples to a reference condition. Although this concept is a valid underpinning of the development of a biocriteria approach, DEQ has not sufficiently developed this program to allow this type of application. Neither the reference condition nor the criteria by which the comparison is made have been sufficiently defined.

Response: The biological monitoring program has been functioning in the same manner for more than ten years with reference conditions being defined by those measured in a reference stream selected by the Regional Biologist to be representative of the assessed stream. EPA requires DEQ to assess the attainment of biological use based on the available data.

14. On page 15 of the Manual, DEQ allows variations in listing based on best professional judgments regarding the biological data. This approach is too subjective. A quantitative approach is needed.

Response: Assessment of biological data against Virginia's water quality standards is fundamentally an assessment based on professional judgment. DEQ has established biological monitoring and assessment protocols which are used and implemented by trained biologists qualified to make such judgments.

15. On page 28 of the Manual, the guidance allows a stream segment to be listed based on the most recent biological survey, even if it differed radically from a previous survey. This should be done only if the impairment can be tied to a specific cause of pollution.

Response: Data from the biological monitoring surveys represent a direct measurement of the impacts, or lack thereof, on the aquatic community integrated over time. The most recent survey most accurately represents the condition of the community at the time of the preparation of the 305(b) report and fulfills the intent of the report by providing an up-to-date assessment of the condition of the water body at the time of the report publication. The guidelines also provide sufficient flexibility to consider all previous data as well as supplemental information about the watershed to allow the assessor to reach a balanced conclusion based on the weight of evidence.

16. Even if a waterbody otherwise meets the requirements for listing, as recommended in these comments, Virginia should exempt waterbodies where attainment is likely based on planned water quality improvements. Alternatively, if a waterbody is listed, or was included on a previous § 303(d) list, TMDL development should be postponed if control measures are planned or underway.

Response: The water quality assessment process does not exempt waterbodies where planned water quality improvements are likely to result in attainment. However, scheduling for TMDL development does take this factor into consideration.

17. VMA recognizes that EPA guidance directs the states to use "all readily available data" to develop the § 305(b) report and § 303(d) list. While we agree that all data should be considered in the evaluation of a waterbody, we do not believe that all data are relevant or appropriate to use in determining that a waterbody is impaired. For example, in some cases, an exceedence of a water quality standard may be due to natural background conditions (such as high aluminum content in non-contaminated sediments or low dissolved oxygen in parts of wetlands or deep estuarine waters) or to physical alterations not related to pollutant discharges (such as higher temperatures in dammed waterways). DEQ's proposed listing methodology should state that such exceedences are not an indication that a waterbody is impaired. Exceedences within mixing zones should be treated in a similar manner, since those exceedences are authorized by the state and have already been determined not to interfere with designated uses.

Response: The water quality standards by which the waters are being assessed do not have exemptions for natural causes. A review of the water quality standards relative to naturally occurring factors is being conducted for possible update relative to natural causes of impairment. It is recognized that there are certain exemptions associated with mixing zones and low flow conditions.

18. In some cases, DEQ may have data that are known to be unrepresentative of typical waterbody conditions. Where the regulator knows or has reason to believe that the data are unrepresentative, they should not be used in the listing decision. Florida, for example, excludes data collected after (1) a rainfall in excess of a 25-year, 24-hour storm, (2) contaminant spills, or (3) discharges due to upsets or bypasses. 27 Fla. Admin. Weekly 1395, 1403, to be codified at Fla. Admin. Code 62-303.420(5). Florida also excludes exceedences solely attributable to NPDES violations and "outlier values" or values due to transcription errors. *Id.*

All the Florida categories of unrepresentative data would apply to Virginia waters, and we recommend that the Manual be amended to exclude such data. Virginia should also modify the Manual to incorporate procedures to ensure that the data used to list a water as impaired are representative of the water quality criteria with which they are compared. For example, Virginia's numeric water quality criteria are applied using the following "critical" stream flows: 30Q5 (human health non-carcinogens), harmonic mean (human health carcinogens), 7Q10 (chronic aquatic life), and 1Q10 (acute aquatic life). Consequently, any data collected during periods when stream flows are less than these "critical" flows should not be used to determine impairment.

Response: The guidance allows for data to be rejected if it is "suspect" or does not meet QA/QC protocols. There are also certain exemptions relative to the water quality standards during low flows (< 7Q10) and within mixing zones where the data would be considered unrepresentative.

19. As part of its data assessment, DEQ should evaluate the number of samples – as well as the sampling locations – for a waterbody segment in relation to the size of the segment, the uses of the segment, and any known sources of contaminants. VMA recommends that a minimum of 20 samples spaced over a five-year period be required for a listing decision.

Response: DEQ has established a minimum number of samples to make an assessment decision.

20. DEQ also should be willing to reconsider the waterbody segment size, based on the data it collects. In some instances, it might be appropriate to list only a portion of the waterbody or segment.

Response: Segment size can be adjusted as additional monitoring within a waterbody defines the actual problem area.

21. VMA disagrees with DEQ's proposed Part III Rule 5, which calls for the worst-case data point to be used as the aggregate sample for multiple sample data. A statistical method should be used to represent the aggregation of data, preferably the mean or median value. DEQ should revise the Manual to clarify that segment size is, at least in part, a function of collected data, and that the worst case data point will not be considered the aggregate sample within a hydrolab sampling unit.

Response: Where multiple observations are made over a short period, these would seriously bias the long-term data set of single observations unless reduced to a single observation themselves. Reducing multiple observations by taking the median or other statistic makes a presumption about the distribution of the variable. Most often the data set is too small to judge the

distribution type. In any case, DEQ are only interested in whether the standard has been instantaneously violated. Consequently, the best representative for whether a violation has occurred during a multiple observation period is the worst-case data point. This is the data point farthest in the direction of a standard violation.

22. VMA has concerns about DEQ's approach to the number and frequency of exceedences that may support listing decisions, as well as DEQ's failure to account for the magnitude and duration of exceedences. Due to the potential for data error, VMA believes that DEQ must develop valid and objective confirmatory evidence before making listing decisions on the basis of a single exceedence. For toxics, the Manual does not account for potential errors associated with analytical variability. For fish tissue and sediment chemicals, the criteria are appropriate only for screening, and under no circumstances should they be a basis for listing in any category without confirmatory evidence. For biological evaluations, VMA's previously submitted comments on the 2000 version of the Manual described technical upgrades needed to DEQ's sampling program, particularly its dependence on EPA's RBP II methodology, which has been shown to lack the necessary discriminating power for use in this type of application.

Response: DEQ will not list waters based on a single exceedence. Additionally, TMDL priority ranking considers exceedence magnitude when setting up schedules for TMDL development. DEQ is currently in the process of developing new protocols for the biological monitoring program.

23. A more rigorous statistical approach has been developed by Dr. Robert Gibbons of the University of Illinois at Chicago. Dr. Gibbons' approach is appropriate for a variety of different concentration distributions (*e.g.*, normal, lognormal, and non-parametric) and offers other significant improvements over a binomial distribution approach like that which Florida has adopted. VMA recommends the Gibbons approach. At a minimum Virginia should follow Florida's example and require at least twenty samples over a five-year period with a 10% exceedence frequency and a minimum 90% confidence level for listing.

Response: In past cycles, DEQ has considered, and has utilized a different approach to assessment of water quality data for purposes of 305(b) and 303(d). Based on comment received from EPA, DEQ has made a management decision to use the percentage method outlined in the 1997 EPA guidance for its 2002 assessment.

24. DEQ must consider not only the frequency of water quality criteria exceedences, but also their magnitude and duration.

Response: EPA's 1997 assessment guidance does not consider the magnitude and duration of water quality criteria exceedences.

25. Any data not validated by documented methods using adequate QA/QC should be excluded from consideration.

Response: DEQ has dedicated staff responsible for establishing and implementing quality assurance/quality control (QA/QC) protocols in the ambient water quality monitoring program. Data from sources external to DEQ are subjected to a QA/QC review before the data is approved for use in the water quality assessment. DEQ reviews all data used in the assessment if data validity is suspect, DEQ has the option to disregard the data.

26. VMA recommends the following minimum QA/QC criteria for data used for listing decisions:

- All data should be collected, handled, and analyzed according to fully validated and approved test methods. Quality assurance procedures for all laboratories and organizations providing data to DEQ should be readily available to DEQ and be viewed for adequacy.
- Data that fall outside of acceptable QA/QC ranges or that are derived from tests that were not performed in strict conformance with test method protocols should be excluded.
- Clean sampling techniques should be used when analyzing for certain contaminants (*e.g.,* mercury and other toxic metals).
  - Data generated by an unknown source should be excluded, since their quality cannot be determined.
  - Data below the quantification or detection levels of the analytical methods used should be excluded when the criterion is below these levels.

Response: See response to comment # 25 above. DEQ has dedicated staff responsible for establishing and implementing quality assurance/quality control (QA/QC) protocols in the ambient water quality monitoring program. Additionally, data from sources external to DEQ are subjected to a QA/QC review before the data is approved for use in the water quality assessment. Monitoring data collected in accordance with established QA/QC protocols is used in the water quality assessment.

27. To avoid straining DEQ resources by an ever-lengthening list of old, "legacy" listed waters, Part VII of the Manual should include an "action-forcing" mechanism to ensure that listed waters are reassessed periodically to see if they deserve to be taken off the list.

Response: Waters are re-assessed for every 305(b) cycle. Additionally, the DEQ water quality monitoring strategy provides protocols for re-visiting waters and performing pre-TMDL monitoring for further evaluation.

DEQ recently developed a "proactive approach" which allows re-evaluation, based on a truncated assessment window, if water quality improvement measures have been conducted in the watershed.

Assessment Guidance Public Comment Response Issues
From VAMWA

ISSUES**:**

1. Does DEQ intend to fully consider public comments and make appropriate revisions to guidance before it is applied to the 2002 assessment ?

   Response: DEQ is considering and addressing all comments received on the 2002 assessment guidance manual. Where it is deemed necessary, DEQ will make appropriate revisions to the guidance for the 2002 assessment. DEQ's responses to public comments will be included as part of the final guidance manual for the 2002 assessment.

2. VAMWA requests a written response to their comments.

   Response: See response to comment # 1 above. DEQ's responses to public comments will be included as part of the final guidance manual for the 2002 assessment.

3. VAMWA would like DEQ to consider and use the most recent EPA assessment guidance. They request that DEQ state in the final assessment guidance document that DEQ will reconsider all listings based on the latest listing procedures at the time of the next 303d list after 2002.

   Response: DEQ is preparing the 2002 assessment in accordance with the DEQ "Water Quality Assessment Guidance Manual for Y2002 305(b) Water Quality Report and 303(d) Impaired Waters List". This guidance is based on EPA's 1997 guidance. This decision is based on several conclusions. First, the assessment database (ADB) EPA encourages states to use to report the assessment in accordance with EPA's 2002 guidance is not yet available. Second, there are some potential issues in EPA's 2002 guidance that DEQ believes will add confusion to the report under EPA's new guidance, specifically with regard to severity of impairment and categorization of threatened waters. In an effort to illuminate these issues, DEQ proposes to include in its 2002 submittal a table which lists all segments assessed, the current (1997 EPA guidance base) assessment results, and the "new" category under which the segment would fall if EPA's 2002 guidance were followed. DEQ believes incorporation of this table may illuminate some potential issues in EPA's 2002 guidance that we believe will add confusion to the report under EPA's new guidance, without compromising the assessment reported in accordance with the existing DEQ guidance.

   DEQ updates its guidance document for every 305(b) assessment cycle. When the guidance document is developed, all current EPA guidance is considered. The assessment process reconsiders all waters which are assessed, including waters which were previously listed as impaired.

4. It is inappropriate to list water bodies and develop TMDL's based on factors or thresholds that have not been adopted as water quality standards (BIBI, ER-M, chlorophyl a, sediment quality screening values (SV's), toxicity tests, other SV's, etc). Before a water can be listed based on violations of the narrative designated use standard (9VAC25-260-10) or the narrative standard (9 VAC 25-260-20) DEQ must translate narrative standards to objective, measurable criteria in accordance with rulemaking procedures of the Virginia Administrative Process Act (VAPA).

Response: An exceedence of sediment or nutrient screening values, will not require a TMDL since it will only result in a "Fully Supporting but Threatened" classification. A TMDL may be required only when a classification of "Partially Supporting" or "Not Supporting" is made. Two or more exceedences of the fish tissue screening value listed in table 6a are cause for a classification of the water as "partially supporting" and represent the fish-tissue concentration of the toxic chemical that is the basis for the water quality criterion. These criteria have been adopted by the Water Control Board and are listed in 9 VAC 25-260-140.B under the column "Human Health, All other Surface Waters". These numerical water quality criteria are designed to prevent the fish from being contaminated to levels greater than a fish-tissue concentration (i.e. the screening value). A fish-tissue sample that exceeds the screening value indicates that the effect the water quality criterion was intended to prevent has occurred and the level of protection intended by the water quality criteria is not being supported. Monitoring for the chemical in fish tissue is an alternate means of assessing whether the intent of the water quality criteria has been exceeded. A fish sample that exceeds a fish-tissue screening value for a pollutant will be treated in the same manner as will an exceedance of a water quality criterion in a water sample.

The assessment protocol for the estuarine benthic monitoring B-IBI data as presented in the guidance, while different than that for freshwater benthic monitoring data, is felt to be most appropriate. This assessment protocol was determined with assistance and review from Dr. Daniel Dauer, a main participant in the development of the estuarine B-IBI who is also the data collector and has significant publications on the subject as partially listed below.

Alden, R.W. III, D.M. Dauer, J.A. Ranasinghe, L.C. Scott, and R.J. Llansó. 2001. Statistical Verification of the Chesapeake Bay Benthic Index of Biotic Integrity. Environmetrics. IN PRESS.,

Daniel M. Dauer And Roberto J. Llansó: In Press, Spatial Scales And Probability Based Sampling In Determining Levels Of Benthic Community Degradation In The Chesapeake Bay

Dauer, D.M.: 1993, ›Biological criteria, environmental health and estuarine macrobenthic community structure‹, *Marine Pollution Bulletin* **26**: 249-257.

Dauer, D.M.: 1997, ›Dynamics of an estuarine ecosystem: Long-term trends in the macrobenthic communities of the Chesapeake Bay, USA (1985-1993)‹, *Oceanologica Acta* **20**: 291-298.

Dauer, D.M.: 2000, ›Benthic Biological Monitoring Program of the Elizabeth River Watershed (1999)‹, Final Report to the Virginia Department of Environmental Quality, Chesapeake Bay Program, 73 pp.

Dauer, D.M. and Alden III, R.W.: 1995, ›Long-term trends in the macrobenthos and water quality of the lower Chesapeake Bay (1985-1991)‹, *Marine Pollution Bulletin* **30**: 840-850.

Dauer, D.M., Lane, M.F., Marshall, H.G., Carpenter, K.E. and Diaz, R.J.: 1999, ›Status and trends in water quality and living resources in the Virginia Chesapeake Bay: 1985-1998‹, Final report to the Virginia Department of Environmental Quality. 65 pp.

Dauer, D.M., Luckenbach, M.W. and Rodi, Jr., A.J.: 1993, ›Abundance biomass comparison (ABC method): effects of an estuarine gradient, anoxic/hypoxic events and contaminated sediments‹, Marine *Biology* 116: 507-518.

Dauer, D.M., Ranasinghe, J.A. and Rodi, Jr., A.J.: 1992, ›Effects of low dissolved oxygen levels on the macrobenthos of the lower Chesapeake Bay‹, Estuaries *15*: 384-391.

Dauer, D.M., Ranasinghe, J.A. and Weisberg, S.B.: 2000, ›Relationships between benthic community condition, water quality, sediment quality, nutrient loads, and land use patterns in Chesapeake Bay‹, Estuaries **23**: 80-96.

Virginia's benthic assessments are based on meeting the designated use standard (9 VAC 25-260-10) using selected reference sites

5. TMDLs must identify the pollutant causing impairment and the source(s)of the pollutant. TMDL cannot be developed if tools are used to establish impairment that cannot identify the pollutant causing impairment or source of the pollutant. This would apply to ER-M's, BIBI, water column and sediment toxicity tests. These tools cannot differentiate between "pollutant" and "pollution" caused impairments and therefore cannot differentiate which impaired waters need TMDLs. DEQ should reconsider use of such tools to assess waters as impaired for TMDL development until such information is obtained which identifies the pollutants causing impairment.

   Response: DEQ's methodology is based on EPA assessment guidance (1997) which requires assessment of biological monitoring results. TMDL studies are designed to confirm pollutant impairment and identify maximum pollutant loading where compliance with the associated water quality standard can still be met. DEQ uses all available information to determine causes and sources of impaired waters needing TMDL's.

6. VAMWA supports the use of the binomial assessment method. DEQ should reconsider using the binomial assessment method.

   Response: In past cycles, DEQ has considered, and has utilized a different approach to assessment of water quality data for purposes of 305(b) and 303(d). Based on comment received from EPA, DEQ has made a management decision to use the percentage method outlined in the 1997 EPA guidance for its 2002 assessment.

7. VAMWA believes DEQ should use the "weight of evidence" approach for assessing all types of data.

   Response: Water quality assessment is a process incorporating both statistical analysis of data and professional judgment, particularly where multiple sources of information and data are available for a particular waterbody. DEQ routinely considers multiple data sources and their relative contribution to impairment for assessment of waters where data from multiple sources has been collected. However, where data is from a single source, this data is used to make the assessment in accordance with DEQ's assessment guidance. It is important to note that the 305(b) assessment is only the first step in an extensive process to identify impaired waters, the extent and degree of the impairment, the causes and sources thereof, and the necessary steps that need to be taken to restore the impaired waterbody such that it supports its designated uses. Considerable additional segment delineation, impairment assessment, and cause/source identification may be performed during the TMDL development phase of this process.

8. DEQ should consider "prioritizing" waters for TMDL development based on the percentage of designated uses supported as well as to the frequency and magnitude of exceedences of thresholds.

   Response: DEQ uses several criteria to determine TMDL priority ranking as expressed in Part VII of the guidance document. In many cases, TMDL priority ranking is based on data availability, and professional judgement based on considerations such as those proposed in the comment.

9. The guidance manual should recognize that the "once in three years" exceedence frequency adopted by DEQ for certain parameters should be based on catastrophic environmental events from extreme exceedences.

Response: The "once in three years" scenario relates directly to the water quality standard (9 VAC 25-260-140) and the acute criteria identified within this standard.

10. The guidance needs to identify, in sufficient detail, how much data is necessary to change an assessment. Text should be developed and included in the guidance manual to address the issue of de-listing according to a change in the assessment results.

Response: DEQ has developed a "proactive approach" for de-listing outside of the normal 305b assessment cycle. EPA has approved this approach and incorporated data requirements to meet this de-listing approach. For waters where the proactive approach does not apply, the 305b assessment process, as identified in the guidance manual, will be used to assess whether a water is meeting all designated uses and therefore a de-listing candidate.

11. VAMWA believes that decisions made by other agencies that affect the listing process should be subject to public notice and comment in manner similar to the 303d listing guidance.

Response: Under §62.1-44.19:5.C.1 of the Code of Virginia, the State Water Control Board is required to develop and publish a procedure governing its process for defining and determining impaired water segments and shall provide for public comment on the procedure. Some DEQ assessment decisions are made based on decisions and/or actions taken by other state agencies, such as 305(b) impairments based on shellfish condemnations and fish consumption advisories issued by the Virginia Department of Health. DEQ maintains ongoing communication with such other state agencies to ensure that the results of their decisions remain applicable to 305(b) assessment. However, the assessment guidance manual is directed toward the assessment methodology employed by DEQ assessment staff, and DEQ therefore does not include documentation regarding the specific analysis process utilized by other agencies to arrive at their decisions. Although the process that other state agencies utilize to make their decisions is not included in DEQ's assessment guidance manual, DEQ's process for determining impaired water segments based on these decisions is clearly documented in the assessment guidance manual. In the interest of communicating as much of the assessment process to the public, DEQ will consider incorporating the decision making process utilized by other state agencies into future 305(b) assessment guidance manuals.

12. VAMWA requests DEQ establish a process for conducting a designated use review of all listed waters as a component of the TMDL process and identify a date that this "use" review was last conducted.

Response: DEQ agrees that designated uses should be reviewed with a priority on listed waters and is currently doing this for categories of waters as time and resources allow. We believe it is already a component of the TMDL process since the data used to develop the TMDL is useful to a designated use review. DEQ already has a legal requirement to review uses every three years as part of the water quality standards program.

13. DEQ has failed to set an adequate minimum data set size for all types of data used to derive an assessment and where data set size is inadequate, provide an assessment conclusion of "insufficient data".

Response: DEQ assesses all monitored data to determine compliance with the water quality standards. However, a policy decision has been made concerning a single sample. It has been decided that a single sample is not appropriate to make an assessment call due to the lack of confidence associated with a single sample.

14. Two areas of monitoring data review have not been considered within the guidance. First, sampling and analytical uncertainty and secondly, data interpretation relative to quantitation limits rather than detection limits.

Response: Sampling and analytical uncertainties are addressed in the 305(b) assessment by requiring a minimum data set size and minimum frequency of exceedances before an assessment will result in an impaired designation. In its 305(b) assessment, DEQ is mainly concerned about exceedances of the water quality standards, and therefore data interpretation relative to quantitation limits rather than detection limits does not materially affect the assessment. Sampling and analytical uncertainty, exceedance frequency, and range of pollutant concentration information is, however, considered during the subsequent TMDL development phase applied to impaired waters, which incorporates severity and frequency of exceedances into the simulation models used to establish pollutant loadings.

15. DEQ should abandon the use of “indicators” for sediment toxicity since EPA is close to adopting sediment quality guidelines.

Response: DEQ is not aware that EPA will be adopting new freshwater sediment quality criteria or guidelines in the near future. Until better sediment quality guidelines or criteria are published by EPA and adopted by the Water Control Board, the use of sediment screening values is a reasonable means of assessing the sediment contamination to identify areas with an increased potential of impact on benthic organisms. The use of these screening values will not result in an assessment of "partially" or "not supporting" and will not result in the requirement of a TMDL. The use of sediment screening values as indicators may result in a "fully supporting but threatened" classification. This will provide a means of identifying sites in need of additional investigation and act as an incentive to reassess the site, as better guidelines become available for assessing sediment contamination.

DEQ believes sediment toxicity assays are very useful in determining toxic impacts to aquatic life as sediments can be prominent sources of chemical contaminants. Exposing a benthic/epibenthic test organisms to sediments can provide the link between biological effects and the bioavailability of chemical contaminants in the sediment. EPA’s 1997 guidance on making “Use Support Determinations” suggests sediment toxicity tests can be used to determine if aquatic life is fully supported, partially supported, or not supported. DEQ’s guidance recommends sediment toxicity tests be evaluated within the context of the “weight of evidence” approach, by using complementary components of the sediment quality triad (Chapman 1992).

Citations

US Environmental Protection Agency 1997. Guidelines for Preparation of the Comprehensive State Water Quality Assessments (305(b) Reports) and Electronic Updates. EPA-841-B-97-002B.

Chapman, P.M. 1992. Sediment Quality Triad Approach. In: Sediment Classification Methods Compendium; EPA 823-R-92-006.

16. DEQ should not list waters that are impaired due to natural conditions.

Response: The water quality standards normally do not include exemptions for natural conditions. In situations involving low flow or flood conditions, DEQ agrees that waters should not be

listed as impaired, if the reason for the measured impairment is due solely to natural conditions. For biological monitoring data, section 6.4.1.1, consideration #1 states that if the Biologist has reason to believe that unusual natural conditions are responsible for a questionable ranking, a note should be made of the lack of confidence in the survey and it should not be used for assessment purposes. Guidance specifically addresses exemptions for low flow conditions.

17. DEQ should establish objective criteria for establishing when threshold exceedences are due to natural conditions.

Response: Guidance specifically addresses exemptions for low flow conditions which are allowable exemptions recognized by water quality standards.

18. DEQ has numerous decisions which appear to be highly subjective. DEQ must define and quantify subjective descriptors such as significant, low medium and high probability, apparent, severe, etc.

Response: Best professional judgement is an integral aspect of water quality assessment due to the many factors that must be considered. Where necessary, decisions are made on a case by case basis based on all factors.

19. DEQ should provide a page listing all acronyms and their meanings.

Response: Acronyms are identified the first time they are used in the document. DEQ will consider this in the future guidance reviews.

20. DEQ should not list nutrient enriched waters as fully supporting but threatened for “overall use”.

Response: The “overall use” category is no longer used in the 305(b) assessment and has been removed from the guidance.

21. VAMWA recommends DEQ use an alpha rate of 5 percent when setting type I error rates to be consistent with other DEQ programs within Virginia. Also, the number of exceedences required to support conclusions of partial or full impairment for each data set size be based on a standardized alpha rate of 5 percent.

Response: DEQ has made a management decision to use the percent method outlined in EPA’s 1997 guidance for the 2002 assessment. Therefore, the use of alpha and type I error rates are not applicable to the 2002 assessment.

22. VAMWA is concerned that appropriate reference sites and conditions may not be used when BIBI and RBP approaches form the focus of the assessment, particularly when habitat for a segment has been significantly modified (an example is where dredging and industrialization in the Elizabeth River have permanently modified the benthos). VAMWA suggests these approaches can not be used to list waters if inappropriate reference conditions are selected.

Response: The selection of an appropriate reference site or condition is important to the biomonitoring program and care is taken to ensure appropriate selection. However, the purpose of the reference site or conditions is to provide a measurement to judge an alteration of the aquatic community from what would be found under minimally impacted conditions. Drastic alterations of habitat can adversely affect the aquatic community, just as can organic or toxic pollution. The current water quality standards do not recognize specific classes of waters such as "dredged channels" where a lower standard of use has been designated. The issue of

permanently modified habitats can be addressed through use attainability studies or site-specific standards.

23. VAMWA contends the guidance manual should state that point and nonpoint sources may perform studies in stream segments or waterbodies and that DEQ will accept and consider data that stakeholders generate in the development of the 305b report and 303d list, provided the data meets the same level of QA/QC used by DEQ to qualify its own data.

Response: DEQ will consider all QA/QC approved monitoring data submitted prior to beginning the assessment. Data generators should contact DEQ Water Quality Monitoring and Assessment Program (WQMAP) for data considerations and QA/QC protocol reviews.

24. VAMWA would like to stress that only QA/QC approved data be used to classify waters as impaired; no exceptions should be allowed.

Response: DEQ has dedicated staff responsible for establishing and implementing quality assurance/quality control (QA/QC) protocols in the ambient water quality monitoring program. Additionally, data from sources external to DEQ are subjected to a QA/QC review before the data is approved for use in the water quality assessment. Based on a review of each data set considered for inclusion in the assessment, a decision is made whether to accept and analyze the data for assessment purposes. Where the data set is rejected, the decision and basis are documented and communicated to the data generator.

25. DEQ should include a table listing the acceptable protocols for every type of data that is used to assess state waters. VAMWA is concerned that DEQ will be using protocols for sampling and analysis specific to particular types of data used that have not been approved by EPA and that unapproved methods are currently being used to assess waters as impaired needing TMDLs.

Response: See response to comment # 24. DEQ intends to include in its 2002 305(b) report a table listing all data sets considered for the 2002 assessment. Rejected data sets will be identified as such in the table. Data generators are encouraged to contact the DEQ's WQMAP QA/QC office prior to the initiation of monitoring projects if the data generator would like the data to be considered for inclusion in Virginia's 305(b) assessment.

26. DEQ states that waters listed on the 1998 list will not be assessed for uses if no additional data has been collected since 1998 listing. VAMWA believes DEQ should review old listings to determine if listing conclusions would change given the current guidance and whether the current listing is defensible.

Response: DEQ updates its guidance document for every 305(b) assessment cycle. When the guidance document is developed, all current EPA guidance is considered. The assessment process considers all waters which are assessed, including waters which were previously listed as impaired. There are specific requirements that need to be met for a segment to be removed (delisted) from the current 303(d) list. If no additional data exists to support or contradict an assessment for an impaired waterbody, the previous assessment stands.

27. VAMWA objects to the use of non QA/QC data being used to designate waters as fully supporting but threatened as indicated in the fifth paragraph of Part I. These waters should be designated as "insufficient data" and put them on a different list.

Response: DEQ has dedicated staff responsible for establishing and implementing quality assurance/quality control (QA/QC) protocols in the ambient water quality monitoring

program. Additionally, data from sources external to DEQ are subjected to a QA/QC review before the data is approved for use in the water quality assessment. The fully supporting but threatened category in DEQ's 305(b) assessment is used as a management tool for identifying where additional data is necessary to make an assessment regarding impairment of a waterbody. In accordance with §62.1-44.19:5.C2, threatened waters are set out in the 303(d) report in the same format as those listed as impaired. However, these waters will not be included as part of DEQ's official 303(d) list of impaired waters submittal to EPA.

28. The guidance states that assessment staff "should" request QA/QC plans, SOPs and monitoring procedures from providers of monitored data. VAMWA believes the word "must" is required rather than "should" due to the importance and weight of such data in listing waters as impaired**.**

Response: In order for DEQ to approve the use of "monitored data", QA/QC, SOPs and any other sampling related procedure must be submitted. However, DEQ can consider non-approved data for evaluated purposes, primarily to target additional monitoring. If a monitoring group does not want to submit QA/QC, SOPs, etc, DEQ will not use the data to list impaired waters.

29. VAMWA believes that "standards" for biological expertise should be developed before biologists make best professional judgement decisions regarding other biological program data that is to be reviewed by regional biologists for acceptability.

Response: There are currently no "standards" of biological expertise requirements for biological data collected by non-DEQ biological programs, DEQ will generally not use biological assessments from citizen monitoring programs to make an assessment of "partial or non-support" classifications.

30. VAMWA suggests the guidance manual must allow any member of the Chesapeake Bay Program Toxics Characterization Team make assessments because all of these members participated in developing the criteria used in the Chesapeake Bay "Weight of Evidence" approach.

Response: DEQ views the consensus based "Weight of Evidence" approach development as a distinctly separate effort from implementing the approach. The "Weight of Evidence" approach developed by the Chesapeake Bay Program partnership provides DEQ with a technically sound tool that can be used for assessment of the Commonwealth's waters when the full complement of toxics data are available. Currently, the approach is limited to tidal estuaries since the full suite of chemical and biological toxics related data are collected in those areas.

DEQ appreciates the outside interest in helping with the implementation of the "Weight of Evidence" approach. In keeping with the federal mandate, DEQ is fully responsible for meeting the water quality reporting requirement. Therefore, while data generated from outside entities can be used to augment monitoring efforts, DEQ will maintain the responsibility of making the assessments to fulfill the reporting requirement.

31. Standards for acceptability of QA/QC documentation must be developed and provided to the public to ensure consistency and objectivity in acceptance of such documentation and the data collected using this documentation.

Response: QA/QC protocols and requirements are available on request from DEQ WQMAP.

32. DEQ should distinguish between water bodies that are listed by federal law from those that must be listed under the broader provisions of WQMIRA.

Response: DEQ lists waters as impaired based on meeting the associated designated use(s) whether or not these impairments are based on federal or state laws.

33. DEQ should provide written guidance on how to determine sources of impairment especially where there are multiple point source discharges, individual discharges over time and/or multiple nonpoint sources within the impaired water body.

Response: TMDL studies are designed to determine all sources of impairment. Each study is a water specific study for that particular waterbody and each waterbody has different factors/sources causing the impairment. Development of "broad based guidance" is impractical.

34**.** DEQ should elaborate on how trends will be established and what data quality objectives (DQOs) will be used to define reliable and defensible trend conclusions.

Response: DEQ intends to include summary trend information from the special report *Long-Term Water Quality Trends in Virginia's Waterways* published through the Water Resources Research Center at Virginia Polytechnic Institute and State University. Additionally, trend work has been conducted by the Chesapeake Bay Program and the results of this work will also be summarized and included in the report. As DEQ begins to conduct its own trend analysis, DQO's will be established.

35. DEQ must consider QA/QC approved predictive data submitted by stakeholders.

Response: DEQ will consider all QA/QC approved data. See comment response # 23.

36. DEQ must provide data quality objectives for approving QA/QC procedures for verifying "approved" data.

Response: See response to item 25 above. Data quality objectives for specific data sets are available from DEQ's water quality monitoring program. The 305(b) assessment guidance manual outlines the general process for determining whether data sets will be considered valid for purposes of the 305(b) assessment. The primary intent of the manual, however, is to document the methodology to be used to analyze data for purposes of the 305(b) assessment after that data has been determined to be acceptable.

37. Part II Rule 1 defines impaired waters as those with chronic or recurring exceedences. VAMWA feels this is not defensible if two data points are collected 3-5 years apart on the same water segment and they represent excursions of the same water quality standard. A single recurrence does not seem sufficient to qualify as "chronic".

Response: Using the EPA percent method, two exceedences in a small dataset may result in impairment. Although two exceedences may not qualify as "chronic", it does do meet the "recurring" requirement of the rule.

38. Under Rule 3, DEQ intends to use as little as two fecal coliform data points to calculate a geometric mean for comparison to the standard. Given the uncertainty with fecal coliform measurements, VAMWA feels that much more data must be required to assess compliance with the standard and to reach conclusions regarding impairment.

Rule 3 should also address differences in fecal coliform bacteria relative to the source of impairment. (SSO,CSO and septic system vs CAFOs vs wildlife)

Response: DEQ agrees that more than two data points will result in a more technically correct conclusion of impairment. However, the water quality standard for fecal coliform (9 VAC 25-260-170) requires a geometric mean calculation if two or more samples are collected within a 30-day period. Likewise, the fecal coliform standard does not recognize bacteria differences relative to the source of bacteria.

Rule 3 should also allow for consideration of monitoring data sets from special monitoring projects or programs where alternative bacterial indicators are utilized. DEQ should also recognize in the guidance document that Virginia is considering adoption of a bacterial indicator different from fecal coliform.

Response: The water quality standards are in the process of being updated to recognize alternative bacteria standards and these will be used once they are adopted.

Rule 5 states that the worst case data point will be used as the aggregate sample when assessing multiple data points. VAMWA feels this is very unclear, making meaningful comment impossible. This rule needs additional clarification.

Response: Multiple observations made over a short period would seriously bias the long-term data set of single observations unless reduced to a single observation. Reducing multiple observations by taking the median or other statistic makes a presumption about the distribution of the variable. Most often the data set is too small to judge the distribution type. In any case, DEQ is only interested in whether the standard has been instantaneously violated. Consequently, the best representative for whether a violation has occurred during a multiple observation period is the worst-case data point. This is the data point farthest in the direction of a standard violation.

Rule 7 states that exceedences due to naturally occurring, non-anthropogenic conditions will be included in Part I of the 303d list. Guidance has not been provided on how to make this determination, but must be to ensure that the issue is adequately and consistently addressed.

Response: The water quality standards do not exempt naturally occurring exceedences. Therefore, these waters must be included as impaired in the 303d list. The water quality standards are being revised to acknowledge naturally occurring conditions and criteria used to determine natural conditions are being considered in this process.

VAMWA proposes a new Rule 9: Waters identified by EPA for inclusion on Virginia's 303d list may be included in future versions of the 303d report. However, these waters will be set forth in a separate section of the report and will be specifically identified as "EPA-Listed Waters". The Virginia 303d list will specifically indicate that 1.) the EPA listed waters have not been identified by Virginia for inclusion on the 303d list and 2.) DEQ is not endorsing the listing of these waters simply by setting them forth in a separate section of the 303d report. In the case of the Chesapeake Bay and its tributaries, Virginia intends for these waters to be addressed through the multi-state Chesapeake Bay program and the associated tributary strategies process, rather than through the TMDL process.

Response: DEQ will specifically identify "EPA-Listed Waters" in the 2002 303(d) list where there is no basis in the 2002 assessment guidance manual for listing. Specific language discussing such segments has not yet been developed.

Part IV Section 2 refers to state screening values and that two or more exceedences of a screening value may result in an impairment conclusion. VAMWA is concerned that the reference to "state" screening values infers that these screening values have been formally adopted through the APA, which they have not.

Secondly, if they are only screening values they should not be used to determine impairment.

Response: Reference to "state" SV's has been removed from the guidance manual. The SVs that DEQ used to assess fish tissue for possible impairment (those SVs found in table 6a) are directly linked to the water quality criteria designed to protect human health via fish consumption. These criteria and the underlying scientific data have undergone public review and comment during the criteria adoption process. These fish-tissue SVs are the fish-tissue concentration that the water quality criteria are designed to protect against and represent the level of protection intended by the water quality criteria. Measurement of this concentration in fish-tissue is an alternate way of assessing compliance with the "human health' water quality criteria.

The guidance should explain what results of a sanitary survey trigger a "prohibited" classification for a shellfish bed. The current text defines these classifications but does not indicate how they are determined.

This same section refers to non-productive shellfish areas and DEQ should explain how this determination is made. DEQ should use this information regarding shellfish productive areas to set appropriate designated uses.

Response: See response to comment # 11 above. Under §62.1-44.19:5.C.1 of the Code of Virginia, the State Water Control Board is required to develop and publish a procedure governing its process for defining and determining impaired water segments and shall provide for public comment on the procedure. The requirement is limited to the State Water Control Board. Some DEQ assessment decisions are made based on decisions and/or actions taken by other state agencies, such as 305(b) impairments based on shellfish condemnations issued by the VDH. Although DEQ maintains ongoing communication with VDH to ensure that the results of their decisions remain applicable to 305(b) assessment, the assessment guidance manual is directed toward the assessment methodology specifically employed by DEQ assessment staff. Therefore, DEQ does not include documentation regarding the specific analysis process utilized by other agencies to arrive at their decisions. As previously stated in the response to Item 11, in the interest of communicating as much of the assessment process to the public, DEQ will consider incorporating the decision making process utilized by other state agencies into future 305(b) assessment guidance manuals.

The guidance manual has identified only one criterion for shellfish assessment even (FDA classification) though the guidance states two separate criteria are used.

Response: Reference to the second criteria has been removed from the guidance manual.

The guidance manual states that assessments are based "on the ability of the waters to support the five designated uses. Assessments must be based only on the designated uses for a particular water body. If all five uses do not apply, all five uses cannot be used to assess these waters.

Response: Guidance will be adjusted

The fish tissue/sediment contamination section does not provide a timeframe over which the data is used for each listing. Since time periods vary for each parameter, DEQ should provide the time period for each parameter.

Response: During this 305(b) cycle, the fish tissue and sediment data were collected in different river basins on a rotational basis, often with several years elapsing before sampling was repeated in the same waterbody. The timeframe was adjusted to try to ensure that where possible, the timeframe included two sample events. WQMIRA requires the use of at least five years of data and more if appropriate for trend analysis. For this assessment, fish and sediment data were used from the time period 1995-2000 with some earlier data included where it was considered appropriate. To help identify the sampling of fish and sediment, the year of the fish and sediment monitoring has been added to the "comments" column of Appendix B.

The guidance must outline criteria for defining the “natural range of reference conditions” to ensure defensible and consistent decisions on the part of DEQ staff.

Response: The range of reference conditions recorded for the reference site defines the ranges of reference conditions.

The B-IBI was never intended to be used as a metric based solely on single data point. Use of the B-IBI assumes that a database will exist and that confidence in conclusions will be acceptable only when multiple data points are available.

Response: The estuarine B-IBI is not used on a single data point basis. In fact even when multiple data points are assessed, each data point is actually an average of 3 replicates. An impact on use support occurs at a score of 2.0 (i.e. less than 2.6). A percentage basis (i.e. 10%, 25%) is used rather than an average to be consistent with assessment protocols for conventional parameters.

Text under fully supporting but threatened in the “other criteria for placing waters in the threatened category” section states that a decline in water quality or a potential for water quality problems results in a fully supporting but threatened assessment. The guidance fails to identify how a “decline” is determined or how “potential” is determined. DEQ must provide better guidance on these qualifiers to insure consistency between assessments.

Response: Currently, there is no specific guidance on declining trends. These decisions are based on the professional judgement of the regional assessment staff on a case by case basis. DEQ intends to incorporate trend analysis into the assessment and specific guidance for this is anticipated.

In the fish tissue/sediment section, suggests the use of the 99th percentile value be used when an ER-M screening value is not available. DEQ must require a minimum data set size for establishing such a percentile and the time period over which data is analyzed.

Response: The 99th percentile was calculated for 3 trace elements that do not have ER-M SV’s. The calculations included all available data in the DEQ database.

In the beach and drinking water closure section, the guidance discusses “transient” sources of pollution. DEQ should provide more guidance on how to determine that sources of pollution are transient.

Response: These decisions are based on the professional judgement of the regional assessment staff, with VDH input, on a case by case basis.

B-IBI data has never intended to be used on a single data point basis, therefore this approach must be adjusted to require more data and an average score less than that confirming impact. As recognized by the Chesapeake Bay

program and the creators of the B-IBI, impact is uncertain to a score of 2.6. The trigger for this assessment should be an average value less than 2.6.

Response: See response to comment # 49.

The “Partially Supporting” section of Part V states that a second biological survey *may* be required to confirm this level of assessment and type of data. This requirement must be mandatory.

Response: Waters are classified as "Partially Supporting" when the assessor is satisfied that data are already available to confirm that the biological community is "moderately impaired". The guidance allows for another biological survey to be performed if best professional judgement or supplemental data indicate the need to reconfirm the assessment.

The guidance requires that supporting data for B-IBI be reviewed and confirmed by regional staff. This requirement places significant burden on regional staff. If each regional office does not have staff qualified to review such data, DEQ should begin training staff on the B-IBI approach and how data is reviewed and interpreted.

Response: As new assessment methods are developed and/or incorporated into the monitoring and assessment procedures, guidance documents are generally developed or updated.

It is unclear how the terms “long term” and “chronic” relate to only two violations over a five-year period, which results in a conclusion of “partially supporting”. Minimum data sets of adequate size are required if this assessment is intended to relate to long term, chronic conditions.

Response: Two violations do not necessarily relate to partial support. The trigger for partial support is at least two violations and greater than 10% total violation rate. Two violations in a small dataset may result in partial support because this satisfies the recurring part of the rule.

The human health trigger for toxics should be two exceedences rather than one.

Response: Guidance has been updated to reflect this decision.

The “Not Supporting” section of Part V differs from the partially supporting for conventional parameters only by the term “severe”. This infers that magnitude of exceedence is included in the guidance but this is not the case. Only the frequency of exceedences differs between the two assessments. This emphasizes the need for adequate minimum data set sizes and more resolution in the evaluation system in order to differentiate clearly between different assessments.

Response: As per EPA guidance, the frequency of exceedences is enough to distinguish between partial and non support.

In the “Not supporting section of Part V, the human health trigger for toxics should be three exceedences rather than one.

Response: The “not supporting” exceedence trigger for toxics is 3.

60. The only difference in the beach closure section between not supporting and partially supporting is one day and the meaning of “high” versus “medium” probability of reoccurrence. The resolution between these two assessments is insufficient to draw reliable conclusions.

Response: In either case, the water is listed as impaired. The "high vs medium" probability is a judgement call that will not affect the listing of the water as impaired but may affect the TMDL priority ranking. During the TMDL development phase, additional data may be collected to draw more reliable conclusions.

61. Part VI section 6.1.1 states that EPA guidance "requires" that waters be listed as impaired if more than 10% of the samples violate the standard. This is incorrect; guidelines are not requirements.

Response: Virginia agrees that guidelines are not requirements. It has been our experience that waters exceeding the 10% violation rate will be added to the 303d list by EPA if not listed by DEQ.

62. Section 6.2.1 allows for the use of best professional judgement rather than following certain guidelines. This is unacceptable and must be removed from the guidance manual.

Response: Although guidance sets specific criteria, professional judgement is often necessary on a case by case basis for stream delineation. All professional judgement decisions are documented.

63. DEQ must provide a "cap" on segment size when assessing toxic impairment.

Response: See comment response # 62. Professional judgement is often necessary for stream delineation on a case by case basis such as with fish and shellfish consumption advisories. Once again, local factors may affect segment delineation making a "cap" inappropriate.

64. A single estuarine station can represent water quality within a radius of four miles. This is an unacceptable degree of extrapolation. The radius should be no more than two miles to minimize extrapolation.

Response: An "open bay" station can represent a vast area, as wind and tide move large volumes of water. Small embayment stations represent a smaller radius and limit the degree of extrapolation.

65. The criteria for concluding partially supporting and supporting but threatened must be adjusted to raise the certainty levels to that assumed by DEQ for supporting and not supporting assessment conclusions.

Response: DEQ believes the certainty levels that have been established for fully supporting but threatened waters are acceptable and these provide DEQ waters that have been identified as needing additional monitoring.

66. The guidance needs to define how toxics data will be handled when provided by citizen monitoring groups.

Response: All QA/QC approved data is reviewed by DEQ. This would include toxics data provided by citizens or other groups.

67. A QA/QC review of USFS data itself is a must not just the QA/QC monitoring protocols.

Response: DEQ reviews all data used in the assessment. If data validity is suspect, DEQ has the option to disregard the data.

68. It is unclear why urban and agricultural toxics loads were omitted from the list of inputs considered by DCR for the 2000 non point source assessment.

Response: DCR is in the process of revising the non-point source assessment methodology. The commentor should contact DCR for this information.

69. DEQ can assess data that was collected more than five years ago if they reflect current conditions but DEQ has not provided any guidance on how to make that determination.

Response: These decisions are based on the professional judgement of the assessment staff on a case by case basis.

70. Although the standards for DO have not yet changed, DEQ should acknowledge in the guidance that they will soon change and therefore, providing less specific language.

Response: DEQ must make assessments based on current water quality standards

71. DEQ must elaborate on what makes data "suspect" when assessing data.

Response: These decisions are based on the professional judgement of the assessment and/or monitoring staff on a case by case basis. See response to comment # 67

72. VAMWA holds that more than one RBP evaluation must be used to assess any water and that slightly impaired or moderately impaired rankings be verified with additional surveys.

Response: Current guidance (section 6.4.1.1) stipulates that for this 2002 305(b) and 303(d) assessment, "an unconfirmed, single survey, moderately impaired RBP-II ranked water will be listed as fully supporting but threatened for aquatic life until further analysis can be conducted".

73. VAMWA does not support the guidance placing the greatest validity in the last survey completed.

Response: Data from the biological monitoring surveys represent a direct measurement of the impacts, or lack thereof on the aquatic community integrated over time. The latest survey most accurately represents the condition of the community at the time of the preparation of the 305(b) report and fulfils the intent of the report by providing an up-to-date assessment of the condition of the water body at the time of the report publication. The guidelines also provide sufficient flexibility to consider all previous data as well as supplemental information about the watershed to allow the assessor to reach a balanced conclusion based on the weight of evidence.

74. VAMWA believes a segment must be monitored again to verify if conditions have improved when data is > 5 years old.

Response: DEQ agrees. This is reflected in DEQ's water quality monitoring strategy

75. In biological consideration #1, the guidance states that RPB assessments should not be considered if conducted during high flow or recent flooding. VAMWA supports this consideration but believes this should be a consideration of all monitoring and subsequent data analysis.

Response: Virginia's water quality standards do not allow for any exemptions other than where flow rates fall below 7Q10.

76. DEQ must incorporate the magnitude of exceedence into a weight of evidence approach for all data, uses and assessments.

Response: DEQ bases water quality assessments on meeting the water quality standards. When the standards are not met, an exceedence is recognized. While the magnitude is something that is considered when developing TMDL's, the fact that the water quality is not being met in greater than 10% of the samples is the major factor to be considered.

77. VAMWA recommends the word "should" be replaced with "must" when describing monitoring and assessment of data > 5 years old.

Response: It is the goal of DEQ to make assessments based on data that has been collected within the reporting data window. However, there are times where this may not be met due to monitoring scheduling or other priorities such as "rotating basin" monitoring. DEQ feels the use of the word "should" properly covers the intent of the current monitoring strategy for the assessment of data. Decisions to use data outside of the assessment window are made based on professional judgement of the assessment staff on a case by case basis.

78. DEQ should apply the decision not to assess waters as impaired based on the lack of standards or accepted criteria to all data.

Response: Waters are assessed as impaired based on not or partially meeting an applicable designated use(s) using appropriate criteria described in the water quality standards as the basis of making this determination. See response to comment # 79.

79. Given the fact that SV's have not undergone public review and approval, VAMWA believes SV's should not be used to conclude impairment.

Response: DEQ agrees that SVs for sediment and nutrients have not undergone public review and adoption by the State Water Control Board and these SVs are not used to conclude impairment. Both nutrient and sediment SVs are used only to identify a "threatened " classification. However, the SVs that are used to assess fish tissue for possible impairment (those SVs found in table 6a) are directly linked to the water quality criteria designed to protect human health via fish consumption. These criteria and the underlying scientific data have undergone public review and comment during the criteria adoption process. These fish-tissue SVs are the fish-tissue concentration that the water quality criteria are designed to protect against and represent the level of protection intended by the water quality criteria. Measurement of this concentration in fish-tissue is an alternate way of assessing compliance with the "human health" water quality criteria.

Screening values are used to determine only if a water segment is threatened and direct monitoring efforts. Waters will not be 303(d) listed based on screening values. DEQ believes that public noticing the screening values in the guidance manual is the suitable forum for receiving public input on the values themselves. All citizens are welcome to submit comments if they feel that screening values should be adjusted for any given parameter based on scientific information.

80. Data quality objectives should be identified for collection of fish tissue data and additional review should be given to migratory fish species that travel outside of the water segment.

Response: QA/QC data accompanies analytical fish tissue data to ensure data quality and accuracy. In addition, DEQ usually collects four or more fish species and at least one sediment sample from each sampling station. In areas where highly migratory fish are present (usually estuarine or salt-water locations) DEQ attempts to collect both non-migratory and migratory fish species. Contaminants found in highly migratory fishes may not reflect local pollution problems but may be used to calculate human health risks from consumption. Contaminants found in sediment and resident (non-migratory) fishes may be used to identify local inputs of bioaccumulative contaminants. The entire data set helps to determine if any unacceptable human health risks are associated with fish consumption, and if local inputs of bioaccumulative contaminants are present in tissue and/or sediment at levels of concern. ***Note***: There is evidence that fishes (e.g. striped bass) that are considered highly migratory may become contaminated by relatively localized pollution sources (i.e. kepone in striped bass in the James R. and PCB in striped bass in the Roanoke R).

81. The guidance should take into account the number of fish species that introduce unacceptable risk when determining impairment.

Response: The draft guidance does this. See Part 5 Table 2 (**Toxic Pollutants Related to Human Health** and **Fish Consumption Advisories or Restrictions)** from the draft guidance manual.

82. The guidance needs to recognize the probable changes to the "weight of evidence" approach used by DEQ in assessing toxics in estuarine waters.

Response: As a participant, DEQ is aware the Federal Chesapeake Bay Program's Toxics Subcommittee is in the process of updating and possibly improving the Weight of Evidence Targeting Protocol. Since the revisions to the method are currently in a state of flux, and without review from the Scientific and Technical Advisory Committee (STAC), the revised approach was not completed in time to incorporate the impending changes into the draft 2002 305(b) report.

83. VAMWA supports the use of the weight of evidence approach, but none that bases decisions on an absolute rather than percentage of biological measures.

Response: As applicable to the "Weight of Evidence" approach in the Estuarine Toxics Evaluations (section 6.5.3), DEQ will not base an assessment of a water body on biological measures alone. That is not to say biological measures are not important, however. To support this concept for sediment assessments, the scientific community has previously indicated these assessments are strongest when the three data components are used in combination to balance the relative strengths and weaknesses. (Chapman 1992, Long et al. 2000, Anderson et al. 2001, Ingersol et al. 1997, EPA 1997). Decisions are made on a case by case basis depending on the preponderance of the evidence. If for example, 50% of the biological measures (2 of 4 biological endpoints) illicit responses, all the information (i.e., the magnitude of the exposure data, which biological endpoints are affected, potential test artifacts, etc.) has to be considered in unison.

Citations

Anderson, B.S., J.W. Hunt, B.M. Phillips, R. Fairey, C.A. Roberts, J.M. Oakden, H.M. Pucket, M. Stephenson, R.S. Tjeerdema, E.R.Long, C.J.Wilson, and J.M.Lyons. 2001.

Sediment Quality in Los Angeles Harbor, USA: A Triad Assessment. *Environmental Toxicology and Chemistry*, Vol. 20. No. 2, pp. 359-370.

Chapman, P.M. 1992. Sediment Quality Triad Approach. In: Sediment Classification Methods Compendium; EPA 823-R-92-006.

Long, E.R., D.D MacDonald, C.G. Severn, and C.B. Hong. 2000. Classifying Probabilities of Acute Toxicity in Marine Sediments with Empirically Derived Sediment Quality Guidelines. *Environmental Toxicology and Chemistry*, Vol. 19, No. 10, pp. 2598-2601.

Ingersol, C.G., T. Dillon, and G.R Biddinger. 1997. Ecological Risk Assessment of Contaminated Sediments. SETAC Press. Chapter 7.

US Environmental Protection Agency 1997. Guidelines for Preparation of the Comprehensive State Water Quality Assessments (305(b) Reports) and Electronic Updates. EPA-841-B-97-002B.

84. In previous draft guidance, the manual states that impairment was not to be considered for lake assessment. VAMWA requests DEQ identify the reason(s) this language was deleted from current draft.

Response: Previously significant lakes were only sampled once in a five year cycle and assessment staff found this to be an insufficient basis for assessment . Therefore, an in-house workgroup consisting of monitoring and planning staff developed a new monitoring strategy for lakes that provides the frequency of sampling needed to provide adequate data for assessment of impairment. This revised guidance has been implemented statewide thereby providing data sufficient to assess these recently sampled lakes.

85. All monitoring data should be field validated before being used for water assessment.

Response: See response to item 25 above. Data quality objectives for specific data sets are available from DEQ's water quality monitoring program. The 305(b) assessment guidance manual outlines the general process for determining whether data sets will be considered valid for purposes of the 305(b) assessment. The primary intent of the manual, however, is to document the methodology to be used to analyze data for purposes of the 305(b) assessment after that data has been determined to be acceptable.

86. DEQ should develop guidance and a scenario where the listing methodology has changed between listings and conclusion of assessment also changes.

Response: Changes in status between "listings" are documented in 303d fact sheets and documented in the information that accompanies waters proposed for de-listing.

87. The weight of evidence approach used for estuarine toxics data must be changed to interpret data in relation to quantitation levels rather than detection levels based on the approach that the VPDES program has taken regarding the interpretation of chemical-specific data.

Response: DEQ's ambient monitoring program (including the Ambient Toxicity Program) does not employ the use of quantification levels for toxic parameters. This includes the analytical methods for clean metals in the water column and total bulk metals analyzed in sediment. The data sets used for the "weight of evidence" are only those generated through DEQ's Ambient Toxicity Program and non-DEQ entities that are funded by the Federal Chesapeake

Bay Program (with an EPA/DEQ approved SOP). Since the DEQ ambient monitoring program does not require quantitation limits (QLs), this requirement would not be imposed on outside entities.

For the Estuarine Toxics Evaluation, where the "Weight of Evidence" approach is used, the chemical data are a piece of information considered within the assessment. Again, the idea behind this approach is to use data that complement one another, and not to base decisions on one data type.

Assessment Guidance Public Comment Response Issues
From the Navy

ISSUES:

General Comments

1. The Guidance Manual incorporates EPA's Fixed Rate Assessment Guidelines into use attainment and listing decisions. The EPA guidelines recommend an 11-25% violation rate and a > 25% violation rate for 305(b) report decisions, and a >10% violation rate for 303(d) listing decisions. The VDEQ's August 2000 305(b) Report recommended using a binomial method for interpreting conventional pollutant data to determine use attainment. EPA to-date has not approved this alternate method. We support use of the binomial method for 305(b) and 303(d) decision making because: it is a sounder method than the percent method for small data sets; it incorporates the distribution of actual pollutant concentrations from sampling data in determining the probability of violations; and, it results in less false positives (i.e.: listing of a water segment as impaired when it is not). In light of the fact that VDEQ is expected to assess more and more stream miles while it's monitoring budget remains stagnant, more defensible methods for evaluating limited data sets are needed. Although we understand that VDEQ cannot incorporate the binomial method into the 2002 Assessment Guidance Manual without EPA approval of the method, we strongly encourage VDEQ to continue to pursue approval of the method by EPA.

   Response: DEQ has made a management decision to use the percentage method outlined in the 1997 EPA guidance for its 2002 assessment.

2. We recommend information on stream segment designation either be included in the VDEQ Guidance Manual, or referenced so that the public can determine where the stream segments are actually located. Currently, 303(d) listing uses a HUC, a VDEQ identification number, and a general narrative description of water segments, which are impaired. There is also information on VDEQ's web site that provides the sample results from monitoring stations. However, there isn't clear information available to the public that ties the monitoring station data to a given water segment and the listing. Additionally, the segment sizes are not clear (i.e. where each segment begins and ends).

   Response: It is DEQ's intent to include 303d impaired waters maps for 2002 cycle. Additionally, the 303d impaired waters will have a "fact sheet" associated with each segment that describes the segment beginning and end and also states which monitoring stations were used to determine impairment.

3. Part IV.3, page 12 – Shellfish Consumption Use Designation. The Guidance Manual states that support of the shellfish consumption designated use is determined using two separate criteria. One criterion cited is the Virginia Department of Health (VDH) Division of Shellfish Sanitation (DSS) classification system of approved, conditionally approved, restricted, and prohibited. Is the second criterion an administrative closure due solely to the proximity of a discharge outfall, but not to water quality violations? We note that the VDEQ Water Quality Assessment Guidance Manual for Year 2000 included VDEQ bacterial monitoring data as a decision criterion. Was this actually the second criterion?

   Response: The guidance has been updated to reflect the classification system used by the VDH-DSS. All references to a second criterion have been deleted. The DEQ bacteria data is unsuitable for determining shellfishing use support because of the detection level of the analysis.

4. Part IV.3, page 13 – Shellfish Consumption Use Designation. The Guidance Manual states that shellfish waters where restrictions or prohibitions are made by VDH-DSS based solely on the presence of an NPDES discharge outfall, and not due to actual water quality violations, will not be listed in the 303(d) list. We strongly support this change in the state's assessment procedures. This will eliminate many water segments from being unnecessarily listed.

   Response: Comment noted.

5. Part VI.6.2.1, page 21 – Monitoring Station Delineation. In number 4 of this section, the Guidance Manual discusses how monitoring stations for estuarine waters are spaced. It would be helpful to provide definitions for the different station types. Also, of the listed stations which is for estuarine rivers?

   Response: Depending on the size of the estuarine river, the normal segment size would be associated with the sheltered bay station.

6. Part VII, Rule 2 – This rule states that the de-listing process for waters shown in Appendix D, Part II of Virginia's 1998 303(d) list only applies to waters impacted by a single point source. We do not understand the rationale for this restriction and request that an explanation be provided.

   Response: Part II waters are those waters that are "water quality limited" due to a point source discharge that has not met the permitted limit but has an enforceable compliance schedule. The waters are defined by single point sources.

Assessment Guidance Public Comment Response Issues
From EPA RIII

ISSUES:

1. Page 6, Part I: Will the state be listing waters on its Section 303(d) list when an impairment is identified via modeling?

   Response: Yes. DEQ has used modeling and will continue to as deemed appropriate on a case by case basis, to list waters as impaired. (Example: Muddy Cr. was listed as impaired for nitrates based on TMDL modeling) Additionally, "potential" impairments (VPDES discharges operating under a compliance schedule) are identified by modeling and would be included in Part II of the 303d submittal.

2. Page 6, Part I: The third paragraph states Additionally, waters that were on the 1998 Section 303(d) list but do not have any additional monitoring data for the 2002 assessment period will be considered evaluated and not assessed for designated uses. Waters that were on the 1998 Section 303(d) list should not be removed from the list without data documenting that they are attaining standards. Please remove the term "evaluated" as either the data is or is not sufficient to make a determination.

   Response: This comment is related to the EPA Assessment Database (ADB) used for the 2002 assessment. Virginia State Law requires the 303(d) and 305(b) reports to be consistent and comparable documents. ADB tracking of waters must reflect this requirement. Because the only choices in the ADB are "evaluated" or "monitored", waters that were on the 1998 section 303(d) list that do not have any additional monitoring data for the 2002 assessment period are considered "evaluated" based on the 1998 303(d) listing as impaired and will be included on the 2002 303(d) list. If a water is on the 303(d) list, it is considered impaired, thus an evaluated "assessment" is made. The degree of use support impairment in ADB will reflect the degree of use impairment on the 303(d) list.

   "Not assessed" has been changed to "listed as previously assessed" in the guidance manual.

3. Page 8, Part II: Will modeling data alone be sufficient to list waters which suffer from nutrient over-enrichment? The Water Quality Monitoring, Information and Restoration Act calls for the listing of waters when an impairment is documented by means other than sampling.

   Response: Since Virginia has not adopted nutrient criteria which could be used as the comparative "standard" for determining impairment, 303d impairment listing due to exceedences of a nutrient screening value is not appropriate at this time. However, if a water is identified as impaired for dissolved oxygen via modelling and the cause is identified as nutrient enrichment, the water will be listed.

4. Page 8, Part II: Are the definitions for nutrient over-enrichment and significant decline in aquatic life biodiversity explicitly defined under the Commonwealth's laws and regulations?

   Response: Virginia laws and regulations do not define nutrient over-enrichment. However, DEQ uses nutrient screening values as an indicator of nutrient loading. DEQ uses reference sites for comparison of aquatic life biodiversity for benthic assessments.

5. Can “nutrient over-enrichment” be expanded beyond the 22 watersheds already noted in the WQS, if monitoring data or other information document impairment ?

Response: Yes. If nutrient screening values are exceeded in 10% or more of samples taken, the water is assessed as fully supporting but threatened for the Aquatic Life use support goal but will not be considered impaired. The Nutrient Enriched Waters designation in the Commonwealth’s Water Quality Standards can be modified or expanded during triennial review (with appropriate public involvement) if conditions warrant.

6. How is significant decline defined in reference to the B-IBI methodology?

Response: Generally, a statistical significance level of $p \leq .05$ is used for consideration of temporal trends.

7. Will waters which have always evidenced a biological impairment be included on the Section 303(d) list if the conditions remain static?

Response: Unless waters show fully supporting aquatic life based on benthic assessments, the waters will continue to be included in the 303d list

8. Page 10, Part III: Please clarify what is meant by “predictive” data in the first sentence, this seems to imply that waters may be listed on modeling data alone.

Response: See response to comment # 1.

9. Page 10, Rule 3: This rule does not follow the conditions set forth in the 97 Guidance as stated on pages 3-34 and 35 of the supplement. Virginia should use the recommendation found in the Ambient Water Quality Criteria for Bacteria 1986 (EPA 440/5-84-002) for determining attainment of the primary contact use.

Response: Virginia’s Water Quality Standard 9VAC 25-260-170 requires the geometric mean to be calculated from two or more samples over a 30 day period and is applied, as such, in the guidance manual making it more stringent than EPA guidance.

10. Page 11, Rule 8: Waters which were listed on the 1998 Section 303(d) list must remain on that list unless there is additional data or information documenting that the impairment has been mitigated. Therefore, this Rule should be removed or restated.

Response: Rule has been updated to acknowledge the waters will be considered evaluated and assessed the same as the previous asssessment.

11. Page 13, Item 3: Administratively closed shellfish waters should be listed as impaired if monitoring data documents a violation of WQS.

Response: DEQ considers the use as removed in administratively closed shellfish waters. If the standard is removed, it is no longer applicable. However, per agreement with EPA, some closures, where the shellfish use is in effect, may be precautionary due to preliminary shoreline survey results as described in EPA’s letter (11/15/01) to DEQ. Monitoring data collected in such waters are assessed according to the guidance manual.

Citation

Tom Henry (EPA RIII) to Larry Lawson (DEQ): Total Maximum Daily Load Development on Shellfish Restricted Waters 11/15/2001

12. Page 14, Toxic pollutants: As discussed in pages 3-21 thru 3-27 of Section 3.2.5 of the supplement to the 97 Guidance, EPA's Policy of Independent Application basically states that any one data analysis which shows an impairment should put the water in the impaired category, with other data analysis used to determine degree of impairment (partial or not supporting). Sections throughout this manual which discuss the procedure for using toxic pollutant and bioassay data for making use determinations should follow these recommendations.

Response: Section 6.5.3, Estuarine Toxics Evaluation, which includes the "Weight of Evidence" approach was incorporated into DEQ's Water Quality Assessment Guidance to provide a means to include toxics related data (water column and sediment toxicity data) within the assessment process. Historically, these data were left out of the assessment process as a technically sound interpretive method did not exist.

DEQ agrees that exceedences of water quality criteria are sufficient to establish non-use attainment for a specific water body. However, in many instances the frequency of data collection is inadequate to make a proper assessment. This applies primarily to dissolved metals as organic compounds are infrequently monitored in the water column. It is for these situations, if ambient water toxicity test data were collected concurrently with analytical data, that the toxicity tests can provide supporting evidence for meeting (or not meeting) the designated use.

The greater applicability and utility for the "Weight of Evidence" approach is for the toxicant assessment of sediments, which historically has not been addressed. Protecting sediment quality is an important part of restoring and maintaining the biological integrity of state waters. Contaminated sediment can cause adverse effects in benthic or other sediment-associated organisms through exposure to pore water or direct ingestion of sediments or contaminated food. Traditionally, benthic community surveys have been used to determine if a water body is meeting the aquatic life designated use. If the community is impaired, the causality is often unknown unless obvious signs such as altered habitat or low dissolved oxygen are evident. The recommended approach is based on the sediment quality triad (Chapman et al., 1987; triad includes benthic community, chemical analyses, and toxicity tests) where scientific consensus suggests these assessments are strongest when the three data components are used in combination to balance their relative strengths and weaknesses. (Chapman 1992, Long et al. 2000, Anderson et al. 2001, Ingersol et al. 1997).

Because numeric water quality criteria do not exist for the protection of sediment, DEQ must rely on the narrative standard which forms the basis for implementing a "Weight of Evidence" approach.

Citations

Anderson, B.S., J.W. Hunt, B.M. Phillips, R. Fairey, C.A. Roberts, J.M. Oakden, H.M. Pucket, M. Stephenson, R.S. Tjeerdema, E.R.Long, C.J.Wilson, and J.M.Lyons. 2001. Sediment Quality in Los Angeles Harbor, USA: A Triad

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Chapman, P.M., R.N. Dexter, and E.R. Long. 1987. Synoptic measures of sediment contamination, toxicity, and infuanal community structure (the Sediment Quality Triad) in San Francisco Bay, *Mar. Ecol. Prog. Ser*. 37:75-96.
Chapman, P.M. 1992. Sediment Quality Triad Approach. In: Sediment Classification Methods Compendium; EPA 823-R-92-006.
Long, E.R., D.D. MacDonald, C.G. Severn, and C.B. Hong. 2000. Classifying Probabilities of Acute Toxicity in Marine Sediments with Empirically Derived Sediment Quality Guidelines. *Environmental Toxicology and Chemistry*, Vol. 19, No. 10, pp. 2598-2601.
Ingersol, C.G., T. Dillon, and G.R Biddinger. 1997. Ecological Risk Assessment of Contaminated Sediments. SETAC Press. Chapter 7.

13. Page 14, Conventional Pollutants: Waters with a single exceedence in a small data set should be considered not assessed, since the violation rate is greater than 10% but the data set is too small to make any determination with certainty.

Response: A single exceedence in a small dataset does not equate to “chronic or recurring” problems and is considered fully supporting, unless it is the only sample and then it would be considered not assessed. This is identified in Rule 1 of the guidance manual.

14. Page 14, Biological Evaluation: It is stated that the designated use determination is fully supporting when no biological assemblage has been modified significantly. How does VADEQ define “modified significantly”?

Response: DEQ Regional Biologists use the guidance provided in EPA's Rapid Bioassessment Protocol II (RBP II) methodology as well specific knowledge of the reference stream and the stream being evaluated to determine when the macroinvertebrate assemblage is within the natural range of reference conditions.

15. Page 15, Toxic Pollutant: Waters should be listed in this section if there is no more than one exceedence of a WQS (acute criteria) within a running three year period or the last three years.

Response: The assessment is performed in accordance with a running three-year period. This includes the last three years.

16. Page 15, Biological evaluation: It is stated that another biological assessment will be scheduled if a free flowing RBP II ranking of moderately impaired is made. Is there an established protocol as to when this reassessment will occur? These streams should be considered not assessed since additional sampling is warranted before a determination can be made.

Response: The guidance in section 6.4.1.1. states that in a case like this, "further analysis should be given high priority and an additional survey conducted as soon as possible ".

DEQ utilizes the threatened category to direct monitoring activities toward waters that require additional data to make an assessment determination. This is a long-used DEQ process that fulfills Virginia’s needs for planning monitoring activities.

WQMIRA requires DEQ to direct its monitoring to waterbodies for which there is credible evidence to support an indication of impairment.

17. Page 16, Other Criteria for placing waters in the threatened category: These waters should be listed as partially supporting, since the Rule allows for the listing of waters based on "predictive" data.

Response: Typically, DEQ makes 305(b) assessments relative to impaired waters based on actual in-stream sampling data. Predictive and other evaluated data are generally used to direct monitoring and sampling to waters where a more thorough assessment determination as to support of the beneficial use is necessary on a case by case basis. DEQ does consider modeling results. See response to comment # 1.

18. Page 16, Toxic Pollutants: Section 3.2.4 of the supplement to the 97 Guidance (page 3-18) considered a water partially supporting for any one pollutant, acute or chronic, when the criteria is exceeded more than once in a 3-year period but in less than (or equal to) 10 percent of samples. The 10 percent condition should be included in the protocol. For estuarine waters, the EPA Policy on independent application with weight of evidence should be used.

Response: EPA's guidance as described in the comment applies only to datasets of more than 10 samples collected over a 3 year period. For smaller data sets, the EPA guidance allows for State discretion. DEQ's rule applies to all data sets, regardless of size. Virginia believes it is applying an appropriate and defensible assessment method to toxics based on Virginia's water quality standards independent of the 10 percent condition. If the criteria are exceeded, more than once in a 3-year period, the water is assessed as partially supporting, regardless of data set size.

19. Page 17, Shellfish Advisories: If monitoring data shows a violation of a WQS, the water should be listed.

Response: DEQ reverts to the Virginia Department of Heath, Division of Shellfish Sanitation (VDH-DSS), to perform assessments relative to the shellfishing use support goal. That State agency has been delegated the responsibility for assessing Virginia's shellfish growing areas, and performs extensive monitoring and analysis on shellfish growing areas to continuously make assessment determinations relative to this use support goal.

DEQ's fecal coliform network is designed to determine swimming use support, therefore the sampling locations and analytical protocols are not appropriate for use in determining shellfish use support. The commonly used analytical method has a detection limit of 100 colonies/ 100 ml,; however the shellfish standard is 14/100 ml. VDH's network is specifically designed around the shellfish standard.

20. Page 18, Not Supporting; Toxic Pollutants: Section 3.2.4 of the supplement to the 97 Guidance (page 3-18) considered a water not supporting for any one pollutant, acute or chronic, when the criteria is exceeded in more than 10 percent of samples. Therefore, the 10 percent condition should be included in the protocol.

Response: See response to comment 18. EPA's guidance as described in the comment applies only to datasets of more than 10 samples collected over a 3-year period. For smaller data sets, the EPA guidance allows for State discretion. DEQ's rule applies to all data sets, regardless of size. Virginia believes it is applying an appropriate and defensible assessment method to toxics based on Virginia's water quality standards

independent of the 10 percent condition. If the criteria is exceeded more than twice in a 3-year period, the water is assessed as not supporting, regardless of data set size.

21. Page 19, Table 2: It is recommended that the column "Fully Supported but Threatened" be reformatted to reflect EPA's guidance. Rows for Toxic Pollutants and Biological Data should be reformatted to follow EPA guidance as well. Waters in which nutrient screening values document an exceedence rate greater than 10% should be listed as partially or not supporting. Waters should be listed as partially supporting if they have an exceedence rate between 10% and 25%. Biological data showing a slight impairment should be listed as threatened.

Response: Part V Table 2 reflects the rules in the guidance document for assessment of waters. Responses relative to assessment of each of the specific assessment rules addressed in this comment are addressed elsewhere in this document.

22. Page 21, Section 6.2.2, Conventional Parameters: Is the State using the last five years of data (if available) for its use determinations? This criteria appears to apply to a rotating basin scenario which has only recently been implemented.

Response: For the 2002 assessment, Virginia is generally using the five year period January 1, 1996 through December 31, 2000 for the assessment. The criteria referenced in the comment is intended to apply to the rotating basin scenario adopted through Virginia's water quality monitoring strategy, starting in 2001. In future assessments, Virginia intends to continue to use a five-year data window for the assessment. However, at many monitoring stations, only two-years of monitoring will have been performed.

23. Page 24, 6.3, Citizen monitoring: Is it correct to state that citizen biological monitoring data will not be used in making use determinations, and will not be included in the designated use attainment tables, but only used as background data? VADEQ needs to be consistent in how it handles citizen monitoring data. Do protocols exist for when the follow up monitoring will occur?

Response: DEQ is consistent in using citizen monitoring data in its assessment. Citizen benthic assessments are conducted using a "non-approved" sampling method. Assessment results from this methodology are being reviewed for comparability to currently approved EPA methodology. The results of the analysis of citizen monitoring data can result in assessment of a water as threatened. However, citizen monitoring is not used to make a use support determination of impaired without corroborating data from DEQ monitoring activities. Locations of threatened waters are provided to the DEQ monitoring program for consideration for inclusion in the agency's water quality monitoring plans.

24. Page 25, 6.3.2, USFS Water Quality Data: In regard to checking USFS findings, what established protocols exist for timetables for this activity? Who ensures consistency between VADEQ Regional offices? Waters that were assessed by the USFS should be considered for Section 303(d) listing, since monitoring data from other agencies (Tennessee Valley Authority) have been used for delisting.

Response: All non DEQ monitoring data must meet DEQ QA/QC protocol review prior to being used directly for assessment purposes. Where sampling and analysis meet approved protocols, the data will be assessed along with all other approved water quality data. The assessment guidance provides the basis for consistent regional assessments.

25. Page 27, Section 5.4.1, Conventional parameters: Fecal coliform should be listed in this section as well. How will the State be determining if the data is "suspect"?

Response: Section 6.4.1 (the referenced section in the comment is believed to be a typographical error) refers to the Aquatic Life use support goal. Fecal coliform data is used to assess the Swimming use support goal. Therefore, it is inappropriate to include fecal coliform in this section. DEQ uses all available data and any additional information available to determine if data is "suspect".

26. Page 27, 6.4.1.1, Free-flowing biological assessment: VADEQ needs to be consistent in its use of RBP-I survey data. If the RBP-I survey data is sufficient to make a determination of Fully Supporting on its own, it should be sufficient to make a determination of partially/not supporting on its own. This protocol for RBP-I makes it appear as though it is acceptable to pick and choose the data used in making use determinations.

Response: DEQ believes that a less intensive RBP I survey evaluation provides sufficient reliability to evaluate the waterbody as non-impaired or to target a waterbody for further study with the more intensive RBP II methods. DEQ believes that RBP II evaluations are needed to provide sufficient information to differentiate between classifications of supporting but threatened, partially supporting or not supporting.

27. Page 28, Section 6.4.1.1, Consideration #1: Waters should only be delisted if the biological data shows attainment of the standard. Therefore, the assessment must show the stream as being fully supporting or only slightly impaired.

Response: This is what DEQ intends

28. Page 28, 6.4.1.2, Estuarine Biological Assessment: VADEQ appears to be handling the results of a single B-IBI survey inconsistently. A free-flowing water B-IBI survey, which documents a severe impairment, will be used to assess the water as not supporting ALUS while in estuarine water, B-IBI is treated like a single conventional pollutant sample. In the 1997 EPA Guidance, it was recommended in Section 2.1 of the supplement (page 2.2) that a single estuarine sample can cover a certain area depending on the characteristic of the location.

Response: Estuarine B-IBI data is not used on a single-sample basis assessed because of the wide confidence limits associated with a single sample (reference: Alden, R.W. III, D.M. Dauer, J.A. Ranasinghe, L.C. Scott, and R.J. Llansó. 2001. Statistical Verification of the Chesapeake Bay Benthic Index of Biotic Integrity. Environmetrics. IN PRESS).

The estuarine benthic monitoring data is assessed inconsistently from freshwater benthic monitoring data for several reasons. The estuarine benthic environment and biotic communities are more spatially and temporally variable than that found in freshwater. Sample site locations are mostly randomly selected for the estuarine benthic monitoring program vs. fixed sites for the freshwater program. Sample collection protocols, sample processing, and data recorded are different. The Index of Biotic Integrity for each program has been developed using different statistical procedures and assumptions. The assessment protocol for the estuarine benthic monitoring data as presented in the guidance, while different than that for freshwater benthic monitoring data, is felt to be most appropriate. This assessment protocol was determined with assistance and review from Dr. Daniel Dauer, a main

participant in the development of the estuarine B-IBI who is also the data collector and has significant publications on the subject as partially listed below.

Alden, R.W. III, D.M. Dauer, J.A. Ranasinghe, L.C. Scott, and R.J. Llansó. 2001. Statistical Verification of the Chesapeake Bay Benthic Index of Biotic Integrity. Environmetrics. IN PRESS.,

Daniel M. Dauer And Roberto J. Llansó: In Press, Spatial Scales And Probability Based Sampling In Determining Levels Of Benthic Community Degradation In The Chesapeake Bay

Dauer, D.M.: 1993, Biological criteria, environmental health and estuarine macrobenthic community structure, *Marine Pollution Bulletin* **26**: 249-257.

Dauer, D.M.: 1997, Dynamics of an estuarine ecosystem: Long-term trends in the macrobenthic communities of the Chesapeake Bay, USA (1985-1993), *Oceanologica Acta* **20**: 291-298.

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Dauer, D.M. and Alden III, R.W.: 1995, Long-term trends in the macrobenthos and water quality of the lower Chesapeake Bay (1985-1991), *Marine Pollution Bulletin* **30**: 840-850.

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Dauer, D.M., Ranasinghe, J.A. and Weisberg, S.B.: 2000, Relationships between benthic community condition, water quality, sediment quality, nutrient loads, and land use patterns in Chesapeake Bay, Estuaries **23**: 80-96.

29. Page 29, Section 6.4.1.2: The use of the percent method for characterizing a large area with multiple B-IBI sample points may not be the best method for making use determination. The most recent data should be used for making a use attainment decision. VADEQ should be consistent in how it handles its biological data whether collected in free-flowing streams, lakes, or, estuarine waters.

Response: The five-year window of data is used for use attainment assessment in order to have maximum number of data points and therefore maximum assessment confidence. This was also chosen to be consistent with the assessment data window of other parameters and information used for the 305b assessment. There is inconsistency in biological assessments because of reasons explained above.

30. Page 29, Section 6.4.1.2: It needs to be explained why a B-IBI survey score between 2 -2.6 (degraded category) is not used in any of the segment assessments.

Response: A B-IBI survey score between 2-2.6 is used in the determination of Threatened ALUS waters.

31. Page 30, Section 6.4.1.2: In this section on Biological Assessment, there is a two-paragraph explanation on how conventional pollutants will be assessed from major and minor tidal tributaries. Shouldn't this discussion be addressed under a separate section heading dealing only with estuarine conventional parameters?

Response: Yes, these sections have been moved to a new subsection under section 6.1. Guidance has been updated to reflect this.

32. Page 31, Additional Spatial Segmentation Consideration: It needs to be explained why a single estuarine B-IBI assessment cannot be used to delineate a certain area around that point. See above comment on page 28. In the Benthic probabilistic sampling network section, the word "if" should be changed to "in".

Response: Estuarine B-IBI data is not used on a single-sample basis assessed because of the wide confidence limits associated with a single sample (reference: Alden, R.W. III, D.M. Dauer, J.A. Ranasinghe, L.C. Scott, and R.J. Llansó. 2001. Statistical Verification of the Chesapeake Bay Benthic Index of Biotic Integrity. Environmetrics. IN PRESS).

In the Benthic probabilistic sampling network section, the word "if" has been changed to "in".

33. Page 35, Section 6.5.1, Nutrient Evaluation: Waters should be listed as partially supporting if they are unable to attain the nutrient criteria more than 10% of the time.

Response: Since Virginia has not adopted nutrient criteria which could be used as the comparative "standard" for determining impairment, 303d impairment listing due to nutrient over-enrichment is not appropriate at this time. Virginia has established a nutrient "Screening Value" which is used to place waters in the threatened category when exceeded > 10% frequency. See response to comment # 3.

34. Page 40, 6.5.3, Additional Toxics Evaluation, Freshwater Toxics Evaluation: For conducting a use determination using the physical/chemical method (specifically toxicants), the 97 Guidance, on page 3-18 in the supplement, maintains that both the chronic and acute criteria should be met in order to achieve a fully supporting use determination.

Response: DEQ's monitoring program is not generally designed to produce data sets adequate to assess against the chronic criteria in Virginia's water quality standards. However, where special studies are performed, data may be considered on a case by case basis for assessment against the chronic criteria.

35. Page 41, Section 6.5.3, Estuarine Toxics Evaluation: The VADEQ protocol for the weight of evidence approach does not follow the 97 Guidance. As discussed previously, the 97 Guidance recommends the use of EPA's Policy of Independent Application in conjunction with the "Weight of Evidence" approach. Independent Application determines if there is a violation of designated use while the use of "Weight of Evidence" determines the severity of the impairment. If any one assessment method determines less than full compliance with a WQS, then that water does not fully support its designated use. All other collected data and assessments can be used to determine the degree of non compliance.

Response: See the response to comment # 12

36. Page 41, Section 6.6, Lake and Reservoir Assessment: In the 2002 Guidance, information on the Lake Trophic Status is needed for developing an integrated State listing. It is not clear from the content of this section whether sufficient data has been collected or assessed to make these trophic determinations.

Response: Virginia water quality standards do not recognize trophic status of lakes. Therefore, DEQ is basing the 2002 assessment of significant lakes using the same assessment criteria as other free-flowing waters.

37. Page 47, Rule 2: Please clarify what is meant by "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. Waters identified under the third bullet, if addressed via an enforcement program, may not warrant listing.

Response: Waters on Part II of DEQ's 303(d) list are listed only because a point source discharge with a VPDES permit is under a compliance schedule to meet certain effluent limitations but has not yet met those limits. The rule indicates that, if the discharge complies with the effluent limitations in its permit, the segment can be removed from Part II of the 303(d) list, but only relative to that parameter. If the segment is also on Part I of the 303(d) list based on assessment of in-stream water quality monitoring data, then the only allowable removal is the listing relative to the parameter based on the VPDES permit.

DEQ agrees that waters, which are addressed through an existing enforcement program, should not be included on the 303(d) list. DEQ believes that it is unnecessary to list any 303(d) Part II waters because all these waters are already subject to an enforceable control mechanism, the VPDES permit. DEQ therefore requests that EPA approve delisting of all current Part II 303(d) listings, and elimination of Part II of the 303(d) list for the 2002 and future assessment cycles.

38. Page 47, Verification Packet for Minor Permits: DMRs should be included into the packet. Is the 2-year listing cycle a State requirement, because the Federal listing cycle is every 4-years?

Response: DEQ intends to include DMR's in its delisting package for Part II facilities. State law requires Virginia to produce the 305(b) and 303(d) reports in accordance with the schedule required by federal law. The listing cycle will be changed to conform to the requirements under federal law.

39. Page 49, Rule 4, Scenario 3: Waters should only be delisted when they demonstrate attainment of the standard. In Scenario 4, a "t" needs to be added to the word segment and a period needs to be added to the last sentence.

Response: Editorial corrections have been made as noted.

40. Page 52, Appendix B: See above discussion on EPA Policy of Independent Application with "weight of evidence" approach. This policy appears to make moot this entire protocol for making designated use attainment.

Response: See response to comment # 12.