New Jersey Department of Environmental Protection
Division of Water Monitoring and Standards
Bureau of Water Quality Standards and Assessment

2012 Integrated Water Quality Monitoring and Assessment Methods

This document was prepared pursuant to Section 303(d)
of the Federal Clean Water Act

Chris Christie, Governor
Bob Martin, Commissioner

Final

June 2012

State of New Jersey
Chris Christie, Governor

NJ Department of Environmental Protection
Bob Martin, Commissioner

Table of Contents

List of Figures and Tables

1.0 Introduction

1.1 Background

Since 2001, the United States Environmental Protection Agency (USEPA) has recommended that states integrate their Water Quality Inventory Report (required under Section 305(b) of the federal Clean Water Act (Act)) with their List of Water Quality Limited Segments (required under Section 303(d) of the Act). New Jersey submitted its first Integrated Water Quality Monitoring and Assessment Report (Integrated Report) in 2002. The New Jersey Department of Environmental Protection's (Department) 2012 Integrated Report will continue to follow the integrated format to provide an effective tool for maintaining high quality waters where designated uses are supported, and improving the quality of waters that do not fully support their designated uses.

The Integrated Report includes the "303(d) List of Water Quality Limited Waters" (303(d) List), which satisfies the Section 303(d) requirement to biennially produce a list of waters that are not meeting surface water quality standards (SWQS) despite the implementation of technology-based effluent limits and thus require the development of total maximum daily loads (TMDLs) to restore water quality. The 303(d) List is the only part of the Integrated Report that is subject to regulatory requirements, which include public participation and submission to USEPA for approval and adoption. The 2012 303(d) List will include all assessment units that do not fully support one or more of the applicable designated uses along with the specific pollutant(s) causing non-support and the relative priority of the assessment unit/pollutant combination for TMDL development. The Integrated Report also includes an "Integrated List of Waters" (Integrated List) that combines the reporting requirements of Sections 305(b) and 303(d) of the Act by depicting the use assessment results for every applicable designated use in each assessment unit as "fully supporting", "not supporting", or "insufficient information". The Department will be submitting the 2012 303(d) and Integrated List to USEPA Region 2 via its Assessment Database (ADB) and will publish reports generated from ADB to afford the public the opportunity to review and comment on the draft 303(d), in accordance with N.J.A.C. 7:15-6.2.

Prior to developing the 303(d) and Integrated Lists, states are required to publish, for USEPA and public review, the methods used to collect, analyze, and interpret data to determine compliance with applicable water quality standards and assess support of applicable designated uses. This Methods Document serves that function by providing an objective and scientifically sound assessment methodology, including:

- A description of the data the Department will use to assess support of the designated uses;
- The quality assurance aspects of the data;
- A detailed description of the methods used to evaluate compliance with the SWQS; and
- A detailed description of the methods used to evaluate designated use support;
- Changes in the assessment methodology since the last reporting cycle.
- Rationales for any decision to not use any existing and readily available data and information.

Some use assessments are based on indicators or translators of water quality data or conditions, rather than comparing raw water quality data to numeric criteria. The methods for assessing use support based on these indicators or translators are explained in the Methods Document. These include: the assessment of recreational uses based on beach closure data; the assessment of the general aquatic life use based on indices of biological impairment (see Section 4.3), translators of the SWQS narrative nutrient policies (see Section 4.4); assessment of the fish consumption use based on fish tissue thresholds used for fish consumption advisories or water quality targets established in the Statewide Mercury TMDL (see Section 6.3); and assessment of the shellfish harvest for consumption use based on shellfish classifications (see Section 6.4).

The Delaware River Basin Commission (DRBC) assesses water quality data for the Delaware River mainstem, Estuary, and Bay. Their assessment results are reported in New Jersey's Integrated List and sub-tables of the 303(d) List. DRBC's *2012 Delaware River and Bay Integrated List Water Quality Assessment Report* and corresponding methods are available on DRBC's Web site at: http://www.state.nj.us/drbc/public.htm#305b.

1.2 Summary of Major Changes from the 2010 Methods Document

Arsenic: Arsenic in New Jersey streams was investigated by USGS through a cooperative agreement initiated by the Department in 2003 through a series of studies involving streams in the Highlands, Piedmont, and Coastal Plain Physiographic Provinces. The studies' objectives were: to determine background levels of arsenic; to determine the natural geologic inputs of arsenic; and to identify anthropogenic inputs of arsenic. The studies concluded that the concentration of naturally-occurring arsenic ranges from 0.24-0.61 ug/l in the Outer Coastal Plain and 0.36-0.70 ug/l for the Inner coastal Plain. Waters previously placed on the 303(d) List for exceeding the SWQS for arsenic will be re-assessed and delisted if the concentrations of arsenic are considered "natural" (see Section 4.1, "Metals").

Barnegat Bay: The Department, in cooperation with Barnegat Bay stakeholders, has initiated a comprehensive study of the Barnegat Bay Estuary and its tributaries that will provide water quality data to determine the locations and extent of water quality impairment. The Department is currently developing indexes to assess biological health and other methods for identifying the causes and sources of water quality impairment within the watershed, with the goal of developing watershed-specific nutrient criteria. Additional information about this effort is available on the Department's Web site at http://www.state.nj.us/dep/barnegatbay/plan-wqstandards.htm. Because of its priority status, the Barnegat Bay initiative is proceeding on a different timeline than the 2012 303(d) List, which must be submitted to USEPA by April 2012. The Department will still include the Barnegat Bay in its statewide assessment of water quality for 2012; however, that assessment will be based primarily on concentrations of dissolved oxygen, levels of pathogenic bacteria, and other relevant data, as described in the 2012 Methods Document. This assessment will also utilize the extensive water monitoring data collected in Barnegat Bay and the tributaries throughout 2011 as part of this priority initiative. New assessment methods developed for the Barnegat Bay will be proposed for public review and comment separately from the draft 2012 Methods Document and, once those new methods are finalized, they will be employed to assess the waters of the Barnegat Bay Watershed. The Department expects the water quality assessment of the Barnegat Bay to be completed by 2013.

Any new 303(d) Listings that emerge as a result of the Barnegat Bay assessment will be proposed as a separate amendment to the Statewide Water Quality Management Plan, in accordance with N.J.A.C. 7:15-6.2.

Biological Data: The Department will no longer utilize macroinvertebrate assessments based on the New Jersey Impairment Score (NJIS) metric since more accurate metrics have been developed for the entire State. The Department will only use macroinvertebrate assessments based on the applicable ecoregional metric to assess the general aquatic life use. A new Benthic Index of Biotic Integrity has been developed for the New York/New Jersey Harbor Estuary (see Section 4.3).

2.0 Overview of the Assessment Process

The Department is required to use all existing and readily available data to assess water quality for the 303(d) and Integrated Lists. With data originating from a host of different entities with different monitoring and analytical capabilities, the Department must ensure that the data used for assessment purposes is reliable and of good quality. The Department must also determine how to use the diverse types of data it generates and receives in a consistent manner to ensure an accurate evaluation of water quality on a station level, which will then be used to determine designated use support at the assessment unit level. The overall assessment process used by the Department, beginning with the collection of raw data, through the assessment of designated use support, to the development of the 303(d) and Integrated Lists, is comprised of five steps, each of which is explained in detail in Chapters 3 through 7. Below is a brief summary of each chapter/step in the assessment process.

Chapter 3: Use and Interpretation of Data

Chapter 3 outlines the requirements regarding quality assurance and quality control, monitoring design, age of data, accurate sampling location information, data documentation, and use of electronic data management that are taken into consideration when deciding if data are readily available and appropriate for use in generating the Integrated and 303(d) Lists. Chapter 3 also discusses the relevant policies established in the SWQS and how they relate to data interpretation.

Chapter 4: Evaluation of Data at the Station Level

Chapter 4 explains the many issues affecting the interpretation of chemical, physical, pathogenic, and biological data that the Department must take into consideration, such as sample size, frequency and magnitude, duration, outliers, and censored data. Chapter 4 describes the procedures used to evaluate chemical parameters and determine if an individual parameter complies with the applicable SWQS (including policies and narrative criteria) at each station. This chapter also describes how the Department evaluates pathogenic and biological indicators to assess water quality impairment at a station level as well as assessment of nutrient impacts on water quality based on translators of the SWQS narrative nutrient policies.

Chapter 5: Evaluating Data from Multiple Stations within an Assessment Unit

Chapter 5 defines the scale ("assessment unit") used by the Department to assess designated uses and explains the process used to identify all sampling stations associated with each assessment unit. Chapter 5 also explains the additional evaluations and policies that are applied when data for the same parameter is combined from different stations within an assessment unit, including assessment units with more than one stream classification or waterbody type, relative weight of datum, *de minimus* data results, contradictory data sets, and modeling results.

Chapter 6: Designated Use Assessment Methods

Chapter 6 identifies the uses designated for each SWQS classification, the type of data necessary to assess each use, the parameters associated with each designated use (Appendix A), and the minimum suite of parameters needed to determine full support of each use (Table 6.0). Chapter 6 also discusses the methods used to assess use support based on data sampled from multiple locations and/or for multiple parameters. Figure 2 illustrates the relationship between the different levels of data assessment explained in Chapters 4, 5, and 6 and used to generate the 303(d) and Integrated Lists.

Chapter 7: Integrated Listing Guidance

Chapter 7 explains how use assessment results for each assessment unit/designated use combination are entered into ADB and depicted on the published 303(d) and Integrated Lists, taking into consideration causes and sources of non-support, the status of TMDLs, and reasons for removing assessment unit/pollutant combinations from the 303(d) List (i.e., "delisting").

Chapters 8, 9, and 10: Prioritizing, Monitoring, and Public Participation.

Chapter 8 describes the methods used to rank and prioritize assessment unit/pollutant combinations for TMDL development pursuant to the requirements of the federal Clean Water Act and the New Jersey Water Quality Management Planning rules. Chapter 9 describes the State's approach to obtaining additional data to assess compliance with SWQS and use support in all New Jersey assessment units. Chapter 10 outlines the public participation requirements and process, regulatory and non-regulatory, employed in the development and finalization of the 303(d) and Integrated Lists, including the data solicitation and the public notification processes employed by the Department.

3.0 Use and Interpretation of Data

The Department reviews all existing and readily available data in assessing water quality. With data originating from many diverse entities, the Department must ensure that the data used for assessment purposes is reliable and of good quality. The Department must also determine how to use the diverse types of data in a consistent manner to ensure an accurate assessment of the water quality in each assessment unit. This process is outlined below. The Integrated Report will include a list all the sources of data received and identify which sources were used, as well as provide an explanation for any data not used, to develop the 303(d) and Integrated Lists.

3.1 Data Quality

Data Age: The Department will use the most recent five years of readily available data to characterize current conditions. Past assessments are considered valid until new data show that conditions have changed. Data received in response to the Department's solicitation that are more than five years old may be used on a case-by-case basis if they enhance the Department's ability to assess current conditions. Older data may also be used in conjunction with newer data to demonstrate water quality trends where appropriate analytical methods have been used and results can easily be compared with more recent data.

Electronic Data Management: The Department has migrated to a new water quality data exchange system (WQDE) for the submission of all water quality monitoring data. Only data submitted via WQDE (including the Volunteer Monitoring System) at http://www.nj.gov/dep/wms/wqde. Additional information about WQDE and instructions for data submittal are available on the Department's Web site at http://www.state.nj.us/dep/wms/WQDE%20fact%20sheet.pdf. The Department will also consider data available in USEPA's STORET data warehouse and USGS National Water Information System (NWIS) as "readily available".

Locational Data: Accurate locational data are required to ensure comparison to appropriate SWQS, as well as confirming that sampling stations are located outside of regulatory mixing zones. Digital spatial data in the form of a Geographical Information System (GIS) shape file or Global Positioning System (GPS) coordinates, or latitude/longitude information, must be provided for all monitoring station locations, which must be accurate to within 200 feet. Only sampling stations that are spatially referenced will be used to develop the 303(d) and Integrated Lists.

Quality Assurance: The Department maintains a strong commitment to the collection and use of high quality data to support environmental decisions and regulatory programs. All data and information used to develop the Integrated Report must comply with the Department's Quality Assurance Guidelines, the Department's field sampling procedures, and be analyzed by a certified laboratory. Department policy mandates that all environmental data collection activities performed (or for use) by the Department comply with and be accompanied by an approved Quality Assurance Project Plan (QAPP). QAPPs describe the procedures used to collect and analyze samples and review and verify the results to assure high quality data. QAPPs must be approved by the Department, DRBC, USEPA, or the U.S. Geological Survey (USGS). **The**

QAPP must be approved prior to the start of any sampling. The USEPA's QAPP guidance document is available at http://www.epa.gov/region02/qa/qa_documents/air_h20_qapp04.pdf. The Department also provides guidance for developing QAPPs for volunteer monitoring data which is available at http://www.state.nj.us/dep/wms/bwqsa/vm/quality_assurance.html. Additional information about the Department's QAPP process is available on the Department's Web site at http://www.nj.gov/dep/oqa/. Entities responsible for generating data are responsible for compiling the data, completing a detailed quality assurance review, and addressing questions regarding the data set.

The sampling protocol for data used in the Integrated Report must also comply with the procedures in the Department's Field Sampling Procedures Manual (NJDEP, 2005) or follow equivalent field procedures, as determined by the Department's Office of Quality Assurance. The Department's Manual includes approved procedures for sample collection, field quality assurance, sample holding times, and other data considerations, and is available for download from the Department's Web site at http://www.state.nj.us/dep/srp/guidance/fspm/). Samples must be analyzed at a laboratory certified by the Department's Office of Quality Assurance, or a federal laboratory (e.g., the USGS National Water Quality Laboratory in Denver) using analytical methods or their equivalents, as certified by the Department pursuant to N.J.A.C. 7:18, USEPA, or USGS.

3.2 Criteria and Policies

The Surface Water Quality Standards (SWQS) provide the foundation for the 303(d) and Integrated Lists. The SWQS establish surface water classifications, the designated uses associated with the surface water classifications, and the criteria and policies established to protect, maintain, and restore the designated uses. Water quality data are assessed for compliance with the SWQS to determine impairment and designated use support.

Antidegradation Policy: The SWQS contain an antidegradation policy that applies to all surface waters of the State. Antidegradation is a requirement of the federal Clean Water Act designed to prevent or limit future degradation of the nation's waters. Under this policy, existing uses shall be maintained and protected. Designated uses shall be maintained or, as soon as technically and economically feasible, be supported wherever these uses are not precluded by natural conditions. No irreversible changes may be made to existing water quality that would impair or preclude support of the designated use(s) of a waterway. No changes shall be allowed in waters that constitute an outstanding national or state resource or in waters that may affect these Outstanding National Resource Waters. The Department applies the antidegradation policy in tandem with the classification of the receiving waterbody in making decisions about proposed new or expanded discharges to surface waters, including stormwater permits, as well as certain land use permits. Additional information about the SWQS antidegradation policy is available on the Department's Web site at http://www.state.nj.us/dep/wms/bwqsa/swqs.htm.

Assessment of Threatened Waters: Lists of Water Quality Limited Waters (303(d) Lists) are required to include all "threatened and impaired" waters. "Threatened waters" are waters that currently meet water quality standards but are likely to exceed standards by the time the next 303(d) List is generated. Assessing threatened waters requires sufficient existing and readily

available data and information on adverse declining trends to predict future water quality. This means a dataset must be sufficiently robust to support the evaluation of short-and long-term statistical trends; generally, at least ten years of seasonally (four times per year) data. The Department maintains a series of long-term monitoring locations, which support statistical trends assessments developed by the USGS. Assessments to determine if waters are threatened will be conducted by the Department wherever sufficient data and trends assessments are available to make such predictions.

Narrative Water Quality Criteria: Narrative water quality criteria are non-numeric descriptions of the conditions necessary for a waterbody to support its designated uses. To implement narrative criteria, which are qualitative in nature, the Department has identified assessment approaches, also known as "translators", to quantitatively interpret narrative criteria. New Jersey's SWQS contain narrative criteria for toxics, biological assessment, nutrients, and natural conditions.

Toxics: The SWQS contain two narrative criteria for toxic substances:

1. None, either alone or in combination with other substances, in such concentrations as to affect humans or be detrimental to the natural aquatic biota, produce undesirable aquatic life, or which would render the waters unsuitable for the desired use; and

2. Toxic substances shall not be present in concentrations that cause acute or chronic toxicity to aquatic biota, or bioaccumulate within the organism to concentrations that exert a toxic effect on that organism or render it unfit for human consumption.

The Department uses several translators to assess compliance with the narrative toxic criteria. These translators include: fish tissue concentrations used for consumption advisories (see Section 6.3, Fish Consumption Use Assessment) and shellfish closure data (see Section 6.4, Shellfish Use Designated Use Assessment.

Biological Assessments: Biological metrics (Table 4.3) translate the observed biological conditions into quantitative scales delineating impaired and non-impaired status, which are then assessed along with chemical water quality data (where available) to determine support of aquatic life uses (see Section 4.3).

Nutrients: The SWQS include narrative nutrient criteria that apply to all freshwaters of the State, in addition to the applicable numeric criteria for phosphorus. The narrative nutrient criteria prohibit nutrient concentrations that cause objectionable algal densities, nuisance aquatic vegetation, or render waters unsuitable for designated uses. Biological data, along with continuous dissolved oxygen and Chlorophyll *a* data (where available) are used as translators of the narrative nutrient criteria, as explained in Section 4.4.

Natural Conditions: The SWQS at N.J.A.C 7:9B-1.5(c) state, "Natural water quality shall be used in place of the promulgated water quality criteria of N.J.A.C. 7:9B-1.14 for all water quality characteristics that do not meet the promulgated water quality criteria as a result of natural causes." The concept of "natural causes" is applied when the Department can document that

there is an impairment of the use (e.g., biological impairment causing non-support of the aquatic life use) but there are no anthropogenic sources or causes. Data that do not meet applicable SWQS criteria potentially due to natural conditions will be carefully evaluated and any excursions attributed to natural conditions will be explained and supported in the Integrated Report.

Numeric Water Quality Criteria: The surface water quality criteria established for each of the different surface water classifications in the SWQS are numeric estimates of constituent concentrations, including toxic pollutants that are protective of the designated uses. Numeric surface water quality criteria have been established for conventional parameters (e.g., dissolved oxygen, pH, temperature), toxics (e.g., metals, organics, unionized ammonia), and sanitary quality (e.g., pathogens). Additional information about numeric water quality criteria is available on the Department's Web site at http://www.state.nj.us/dep/wms/bwqsa/swqs.htm.

4.0 Evaluation of Data at the Station Level

4.1 Evaluation of Physical and Chemical Data

The Department assesses physical and chemical data for which criteria have been established in the SWQS. Once the data is reviewed and deemed appropriate for use in generating the 303(d) and Integrated Lists (see Chapter 3), the data for each parameter sampled at a specific monitoring station are evaluated for compliance with the SWQS. Any samples that do not comply with the applicable numeric SWQS criteria are considered **excursions** and are reviewed to determine if the excursion is within the margin of error of the analytical method (see next paragraph) or can be attributed to natural conditions, transient events, or flow conditions that do not represent design flows.

An excursion may be attributed to **"natural conditions"** where the Department can document impairment without any anthropogenic sources or causes (see Section 3.2). "**Transient events**" are water quality conditions that occur at very low frequencies over very brief timeframes and, as such, neither impair the designated use of the waterbody nor represent overall water quality conditions. For regulatory purposes, water quality criteria apply only where stream flow is maintained at or above the "**design flow**" specified for the applicable numeric SWQS criteria, which is usually the MA7CD10 (see N.J.A.C. 7:9B-1.5(c)). Flow conditions are evaluated for all excursions to determine if the data were collected under appropriate flow conditions. Any data that are collected when stream flows are below design flows are not assessed.

Excursions that can be attributed to any of these conditions are not assessed as exceedances of the SWQS criteria. Excursions attributed to any of these conditions will be explained and supported in the Integrated Report. Two or more exceedances of the applicable water quality criteria associated at a given station are required to confirm water quality impairment at that location (see "Frequency of Exceedance", below).

Analytical Uncertainty: The Department will take into consideration the analytical uncertainty of the analytical method used to measure the data when an ambient measurement is compared to a numeric SWQS criterion. This uncertainty is a product of the methods used to sample, analyze, and report the data and defines the ability of the analysis to discriminate between minute differences in a measurement. For example, if the surface water quality criterion is "not to exceed 1.0 mg/l" and the margin of error for the instrument is "(+) or (-) 0.2 mg/l," the analysis is unable to discriminate between an ambient level of 0.8, 0.9, 1.0, 1.1 and 1.2 mg/l.

Rounding of Decimal Places: When comparing ambient data to a numeric criterion, the recorded values will be rounded to match the decimal accuracy of the criterion. For example, when a parameter is measured in a concentration whose value is reported to three decimal places but the applicable criterion is represented by only two decimal places, the parameter concentration will be rounded to two decimal places to determine compliance with the criterion.

Computations Using Censored Data: Censored data are reported values that are less than the minimum reporting level of an analytical procedure. These data are usually labeled with a "<" symbol followed by the reporting limit in the data report received from the laboratory. In calculating geometric means for pathogenic data, New Jersey follows EPA's recommendations whereby the censored values are set to the reporting limit and the geometric mean is then calculated. In other instances of computing an average, in order to compare to a criterion expressed as either a either short or long term average, non-parametric methods will be used to evaluate datasets containing censored values. When censored values represent less than 50 percent of the dataset, the Department will calculate a *median* value for the dataset and compare that median to the applicable criterion. When censored values exceed 50 percent of the data, the Department will consider the dataset insufficient to determine if the criterion has been exceeded.

Continuous Monitoring: More and more frequently, instruments such as Datasondes are being deployed to continuously monitor the water from as short as three days to very long time periods. The parameters most commonly measured in this fashion are dissolved oxygen (DO), pH, water temperature, and turbidity. The protocol for comparing continuous monitoring data, collected over a minimum of three days, to the SWQS criteria is as follows (see also "Duration (Exposure Periods)"):

- Dissolved Oxygen: The SWQS criteria for DO are expressed as either a minimum, "not less than…at any time" concentration or as a 24-hour average concentration. An exceedance of the minimum criteria occurs when the lowest concentration over a 24-hour period is below the DO criterion for at least a one-hour duration. Two such exceedances at the same location during two or more 24-hour periods constitute an exceedance of the criterion. An exceedance of the 24-hour average criterion occurs when the average concentration of all measurements recorded within a 24-hour period is below the criterion. Two such exceedances occurring at the same location constitutes an exceedance of the criterion. See Section 4.4 for additional protocols employing continuously monitored DO data to assess nutrient impacts.

- DO Swing: When assessing diurnal DO swing (i.e., continuous change in DO concentration over time), the Department will review the results from continuous monitoring performed

during the growing season and calculate the average of the daily measured DO swings, to determine if excess photosynthetic activity is occurring.

- pH: When evaluating continuously recorded pH data, an exceedance occurs when the pH criterion is not met for a duration equivalent to one hour or more during a 24-hour period (as with DO).

- Temperature: The SWQS criteria for temperature are expressed as either a daily maximum or as a rolling 7-day average of the daily maximum. An exceedance of the daily maximum criteria occurs when the water temperature measured over a 24-hour period is above the daily maximum value for at least a one-hour duration. Two or more exceedances of the daily maximum at the same location constitute non-compliance with the temperature criteria. When evaluating continuous monitoring data for compliance with temperature criteria, the daily maximum of each 7-day period will be averaged and compared to the rolling 7-day average criterion. Any exceedance of the rolling 7-day average at one location constitutes non-compliance with the temperature criteria.

- Turbidity: The SWQS criteria for turbidity are expressed as either a maximum "not to exceed at any time" or as a 30-day average. An exceedance of the maximum criteria occurs when the highest concentration over a 24-hour period is above the turbidity criterion for at least a one-hour duration. Two or more exceedances of the "not to exceed" criterion constitute non-compliance with the turbidity criteria. When evaluating long-term continuous monitoring data for compliance with turbidity criteria, continuous recordings taken over 30 days or longer will be compared to the 30-day average criterion as well as the "not to exceed" criteria. Recordings for less than 30 days will be compared only to the "not to exceed" criteria.

Duration (Exposure Periods): The SWQS include criteria-specific exposure periods (durations) that range from one hour to 70 years. In assessing compliance with the SWQS, the Department takes into consideration the specific duration applicable to the criterion for the parameter being assessed. For example, chronic aquatic life criteria require a four-day exposure period; therefore, data collected under flow conditions that last less than four days (as is generally the case for high flow conditions) are not considered valid for assessment of chronic aquatic life criteria but such data may be used to assess acute aquatic life criteria, which do not have such duration constraints. For human health carcinogen criteria, which are based on a 70-year exposure rate, the Department calculates a long-term average of all data available for the most recent five-year period for comparison to the applicable criterion.

Frequency and Magnitude of Exceedance: The Department has determined that a minimum of two exceedances of a numeric SWQS criterion are necessary to confirm noncompliance with the criterion. The Department has determined that a second exceedance is necessary to ensure that the first exceedance was not a transient condition. When the minimum exceedance is met but the dataset is very large (more than 30 data points), the Department will consider the relative frequency and magnitude of the exceedances within the dataset and use Best

Professional Judgment to determine if they represent non-support of the designated use. Any such determinations will be documented in the Integrated Report.

Metals: SWQS criteria for metals include human health (HH), acute aquatic life (AQLa), and chronic aquatic life (AQLc). HH criteria are based on the total recoverable (TR) form of the metal to protect human health from all forms of the metals. To the extent available, total recoverable (TR) and dissolved fraction (DF) data will be compared to the TR and DF criterion, respectively. When only TR data are available, in addition to comparing the TR concentration to the TR criterion, the Department will also compare the TR concentrations to the DF criterion. If the TR concentrations are below the DF criterion, the Department assumes the DF criterion is also met. TR concentrations above the DF criterion will trigger additional sampling for DF.

Since 2003, the Department has worked with the United States Geological Survey (USGS) to investigate arsenic levels that were expected to represent natural conditions based on geology, monitoring of ground water in aquifers, surface water, and soil samples, including speciation between arsenic (V) and arsenic (III). Based on these USGS studies (referenced in Section 11.1), it was determined that the natural range of arsenic is 0.24-0.61 ug/l in the Outer Coastal Plain and 0.36-0.70 ug/l for the Inner Coastal Plain. When determining if a sampling location in the Outer or Inner Coastal Plain exceeds natural conditions, the higher limit of the natural range will be used. Waters previously placed on the 303(d) List for exceeding the SWQS for arsenic will be re-assessed and delisted if the concentrations of arsenic are considered "natural".

Minimum Number of Samples: Unless described differently for a particular parameter, the minimum data set consists of eight samples. The Department believes that two years of data collected quarterly provide an adequate representation of conditions. These recommendations are intended to ensure that existing water quality conditions are accurately portrayed by the data and that the results do not reflect transitional conditions. The Department will consider a data set which does not meet this minimum requirement on a case-by-case basis to determine if the data adequately characterizes the water quality conditions. Summer-only sampling for nutrients, pathogenic quality, and temperature may be acceptable since summer generally represents the critical condition for these parameters. If the Department determines that the data set adequately represents water quality conditions and there are at least two exceedances of the Surface Water Quality Standards, this limited data set will be used to determine that a use is not supported (see Chapter 6, Use Assessment Methods).

Outliers: Any datum that is identified as an outlier based on an accepted statistical methodology (such as ASTM E178, available on the American Society for Testing and Materials Web site at http://www.astm.org/Standards/E178.htm) is not considered a valid result and is not assessed.

4.2 Pathogenic Indicators

Pathogenic indicators are used to assess recreational and shellfish harvest for consumption uses. The type of pathogenic indicator sampled depends on the type of use assessed: *Escherichia coli* (E. coli) is sampled to assess primary contact recreation in freshwaters; fecal coliform is sampled to assess secondary contact recreation in SE2 and SE3 waters; *Enterococcus* is sampled to assess

primary contact recreation in SE and SC waters; and total coliform is sampled to assess the shellfish harvest for consumption use in shellfish waters.

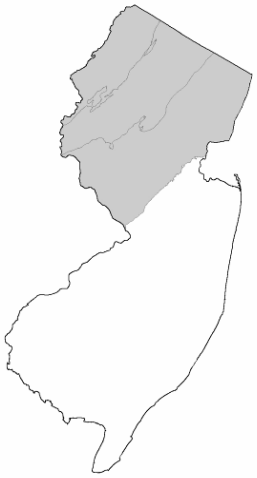
4.3 Biological Data

The Department has developed biological indicators (benthic macroinvertebrates and fin fish) to evaluate aquatic life use support.

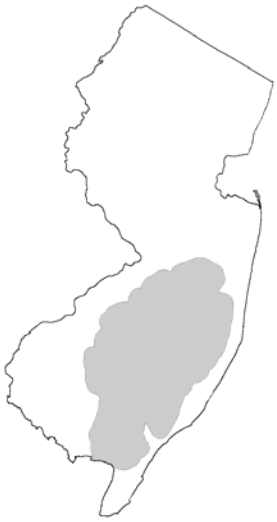
Benthic Macroinvertebrate Data: The Department uses three biological indices based upon genus level taxonomy to evaluate biological conditions in freshwater streams. The three indices were developed for different physiographic regions of the State: the High Gradient Macroinvertebrate Index (HGMI), which applies to the streams of northern ecoregions (Highlands, Ridge and Valley, and Piedmont); the Coastal Plain Macroinvertebrate Index (CPMI), which applies to the Coastal Plain (excluding waters considered Pinelands waters); and the Pinelands Macroinvertebrate Index (PMI), which applies to PL waters contained within the jurisdictional boundary of the Pinelands as well as FW2 waters within five kilometers of the Pinelands Area boundary. For the PMI, scores in the fair category are assessed as impaired if the waters are classified as PL but are assessed as not impaired if the waters are classified as FW2. This is because the PMI was developed specifically to reflect the unique conditions of nondegradation PL waters. Additional information about these three metrics is available in the Standard Operating Procedures for Ambient Biological Monitoring Using Benthic Macroinvertebrates - Field, Lab, Assessment Methods (NJDEP, 2007), available on the Department's Web site at http://www.state.nj.us/dep/wms/bfbm/download/AMNET_SOP.pdf). A fourth Benthic Index of Biotic Integrity was developed for the New York/New Jersey Harbor Estuary based on USEPA Region 2's Regional Environmental Monitoring Assessment (REMAP) protocol and will be applied to all waters within the New York/New Jersey Harbor Estuary. This index was developed by scoring each of five metrics as 5, 3, or 1. Overall index scores less than 3 are considered biologically impaired while scores greater than 3 are considered not impaired Additional information is available on USEPA's Web site at http://www.epa.gov/emap/remap/html/docs/nynjsedapp1.pdf. The four regions applicable to each metric are shown in Figure 4.3. Assessment result scenarios for each metric are shown in Table 4.3a.

Figure 4.3: Spatial Extent of Application for Each of the Benthic Macroinvertebrate Indices Applied in New Jersey

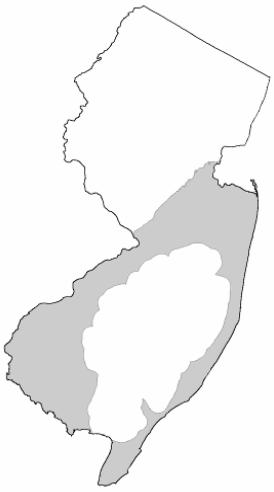
Region Assessed by High Gradient Macroinvertebrate Index (HGMI)



Region Assessed by Pinelands Macroinvertebrate Index (PMI)



Region Assessed by Coastal Plain Macroinvertebrate Index (CPMI)



Region Assessed by REMAP Estuarine Index

Table 4.3a: Descriptive and Regulatory Thresholds for Biological Metrics

Macroinvertebrate Index for High Gradient Streams (HGMI Metric)
(Highlands, Ridge and Valley, Piedmont Physiographic Provinces)

Category	Metric Score	Assessment
Excellent	63 - 100	Not Impaired
Good	42 - < 63	Not Impaired
Fair	21 - < 42	Impaired
Poor	< 21	Impaired

Macroinvertebrate Index for Low Gradient (CPMI Metric)
Coastal Plain (Non Pinelands) Streams

Category	Metric Score	Assessment
Excellent	22 - 30	Not Impaired
Good	12 - 20	Not Impaired
Fair	10 - 6	Impaired
Poor	< 6	Impaired

Macroinvertebrate Index for Pinelands Waters (PMI Metric)

Category	Metric Score	Assessment Result
Excellent	63 - 100	Not Impaired
Good	56 - < 63	Not Impaired
Fair	34 - < 56	PL waters: Impaired FW2 Waters: Not Impaired
Poor	< 34	Impaired

Regional Monitoring and Assessment Program (REMAP)
Assessments (Raritan & Newark Bay, Arthur Kill, Kill Van Kull)

Overall Metric Score	Assessment Result
≥3	Not Impaired
<3	Impaired

Fin Fish Data: Fin fish population data are assessed using the Fish Index of Biotic Integrity (FIBI). A more detailed description of the FIBI program, including sampling procedures, is available on the Department's Web site at http://www.state.nj.us/dep/wms/bfbm/fishibi.html. The current FIBI metric applies to high gradient streams above the fall line (Highlands, Ridge and Valley, and Piedmont physiographic provinces). This metric has four assessment result categories: excellent, good, fair, and poor. Scores in the "excellent", "good", and "fair" categories indicate that biology is not impaired while scores in the "poor" category indicates that the biology is impaired (see Table 4.3b).

**Table 4.3b: Fish Index of Biotic Integrity (FIBI) -
Highlands, Ridge and Valley, Piedmont Physiographic Provinces**

Category	Metric Score	Assessment Result
Excellent	45 - 50	Not Impaired
Good	37 - 44	Not Impaired
Fair	29 - 36	Not Impaired
Poor	10 - 28	Impaired

Additional Considerations When Evaluating Biological Data

- In general, biological assessments will be based on the most recent results. However, the Department will take into consideration the results from the previous years' samples in making a final assessment decision.

- Disturbed or impaired biota can result from drought conditions that result in reduced base flow and very high flows. If biological communities are impaired due to drought-induced, low flow conditions or very high flood conditions, the impairment will be attributed to natural conditions and the data will not be considered valid for assessment purposes (see "Natural Conditions" in Section 3.2).

- The Department has developed multiple biological indices based upon both fish and benthic macroinvertebrates that represent several tropic levels and each assessing significantly different spatial and temporal scales. Where multiple indices are employed on a waterbody, if one indicates impairment, the aquatic life use will be listed as impaired.

4.4 Assessment of Nutrient Impacts in Freshwater Streams

The Surface Water Quality Standards include both narrative nutrient policies and numeric phosphorus criteria for all waters of the State. The Department has selected appropriate response indicators to evaluate compliance with the narrative nutrient policies in freshwater wadeable streams and, where the policy is not met, to determine if phosphorus is a cause of aquatic life use non-support (see Section 6.1, "Aquatic Life Designated use Assessment Method"). The relationship has long been established between excess nutrients and the potential for depressed dissolved oxygen (DO) levels, broad swings in DO (resulting from high rates of daytime photosynthesis coupled with nighttime respiration), excess levels of algal growth (measured as Chlorophyll *a*) and changes to the aquatic ecosystem. The Department believes that these cause/response relationships are better indicators of adverse nutrient impacts on the aquatic ecosystem than an assessment of the in-stream concentration of total phosphorus alone.

Where benthic macroinvertebrate indices indicate impairment (see Section 4.3), the assessment unit will be assessed as not supporting the general aquatic life use. The purpose of the nutrient impact assessment is to determine whether phosphorus is a cause of non-support. Continuous DO monitoring data, collected within the same season and year as the biological data, is required to evaluate whether the DO criteria is exceeded and to determine if robust daytime photosynthesis is occurring at the site. The Department has determined that diurnal fluctuations in DO

concentration in excess of 3 mg/l are a strong indication that photosynthetic activity is occurring at the site due to nutrient over enrichment (see Section 4.1, "Continuous Monitoring - Dissolved oxygen"). Table 4.4 summarizes the possible outcomes of the Nutrient Impact Assessment based upon various combinations of data and results.

The Department recognizes that there may be situations where the nutrient impact assessment is **inconclusive** because of site-specific factors (see Table 4.4). For example, where biology is impaired and there is a DO swing above 3 mg/l but the DO criteria are not exceeded, the Department will review periphyton Chlorophyll *a* data to determine if phosphorus is a cause of the impairment. If the seasonal average Chlorophyll *a* concentration from a minimum of three sampling events exceeds 150 mg/sq. meter, the Department will conclude that phosphorus is a cause of aquatic life use non-support and will place that assessment unit on the 303(d) List for total phosphorus This periphyton Chlorophyll *a* threshold is based upon a consensus in the scientific literature that, at this concentration and above, algal growth has reached nuisance levels.

Where sufficient data is not available to apply the nutrient impact assessment method, the cause assessment will be based on compliance with the applicable numeric SWQS criteria for phosphorus. Freshwaters previously assessed as not attaining the general aquatic life use based solely on exceedance of the numeric phosphorus criteria will be reassessed using the new nutrient impact assessment method, where sufficient data are available, and will be delisted for phosphorus if it can be demonstrated that the narrative nutrient criteria are met.

Table 4.4: Nutrient Impact Assessment Outcomes in Freshwater Streams*

Results of Biological Assessment	Dissolved Oxygen	Results of Nutrient Impact Assessment
Benthic macroinvertebrate indices indicate impairment; therefore, the general aquatic life use is not supported	No exceedances of criteria; Swing is at or below 3 mg/l	Phosphorus not a cause; (Place "Cause Unknown" on 303(d) List)
	No exceedances of criteria; Swing is above 3 mg/l	Inconclusive regarding phosphorus; Evaluate Chlorophyll *a* and reassess
	Exceedances of criteria; Swing is at or below 3 mg/l	Phosphorus not a cause; (Place DO on 303(d) List)
	Exceedances of criteria; Swing is above 3 mg/l	**Phosphorus is confirmed as the cause** (Place/retain phosphorus on 303(d) List)

*This assessment method does not apply to other waterbody types. For lakes, the Department will assess the general aquatic life use based on compliance with the numeric phosphorus criterion for lakes.

5.0 Evaluating Data from Multiple Stations within an Assessment Unit

While the initial data evaluation is conducted at the station level, use assessments are conducted for entire assessment units, each of which may contain data from multiple stations and multiple waterbody types. Data from one or more monitoring stations located within a given assessment

unit are used to evaluate water quality within that assessment unit's boundaries. Exceedances of applicable SWQS or biological indices identified at the parameter/station level are further evaluated collectively for each parameter sampled at all monitoring stations within the assessment unit. Where stations within an assessment unit yield different assessment results, the assessment decision is based on the worst case. Where there are numerous beach or shellfish harvest closures within an assessment unit, the spatial coverage of these impairments are evaluated in assessing support of the recreation and shellfish consumption uses for the respective assessment units. Where monitoring station data is inconclusive, insufficient or inconsistent, the Department may take into consideration additional data such as visual habitat assessments, macroinvertebrate assessments evaluated at order/family level, land use/aerial photos and use Best Professional Judgment to determine if the weight of evidence collectively demonstrates full support or non-support of the designated use. Such BPJ decisions will be documented in the Integrated Report.

Assessment Units: New Jersey's assessment units are delineated based on 14-digit Hydrologic Unit Code (HUC) boundaries. HUCs are geographic areas representing part or all of a surface drainage basin or distinct hydrologic feature as delineated by USGS in cooperation with the Natural Resources Conservation Service (NRCS). The HUC system starts with the largest possible drainage area and progressively smaller subdivisions of that drainage area are then delineated and numbered in a nested fashion. In 2009, the Department revised the HUC 14 boundaries to be more consistent with the new federal HUC 12 boundaries, which are based on 1:24,000 base maps for elevation control and a new 1:2,400 hydrography coverage (see NJGS TM09-2 available on the Department's Web site at http://www.state.nj.us/dep/njgs/pricelst/tmemo/tm09-2).

The Integrated List presents the assessment results for a total of 962 assessment units, which include New Jersey's 952 HUC 14 subwatersheds, which are assessed by the Department, and 10 assessments units for the Delaware River and Bay, which are assessed by DRBC. (The 303(d) List for the 10 Delaware assessment units is displayed in a sub-table of New Jersey's 303(d) List.) A coverage containing discrete polygons for each of New Jersey's 952 HUC 14 subwatersheds is available for download and interactive applications on the Department's Geographic Information System (GIS) and other on-line tools available on the Department's Web site at www.nj.gov/dep/gis/ and www.nj.gov/dep/gis/newmapping.htm.

Station Representation: Monitoring stations are associated with an assessment unit. When a monitoring station falls within 200 feet of a given AU boundary, the data from that station will be used to assess both assessment units. The Department will evaluate station locations on a case-by-case basis to determine if the data from a station in an adjacent assessment unit (AU) can be used to assess conditions in an assessment unit without monitoring stations. The Department will consider the location of significant tributaries, impoundments, or other hydrological alterations that could impact water quality between the monitoring site and the adjacent assessment unit. If there are no applicable monitoring stations for an assessment unit, the uses designated for that AU will be assessed as "insufficient information".

Assessment Units With More Than One Stream Classification: Data will be compared to the SWQS for the stream classification where the station is located. Assessment

units may contain both FW and SE waters, or a combination of Trout Production, Trout Maintenance, and Non-Trout waters. Where the assessment unit contains more than one classification and there is no data for the higher classification, then data from the station located in the lower classification will be compared to the SWQS for higher classification. If the station meets the SWQS for higher classification, the data will be used to assess both classifications. However, if the station located in the lower classification does not meet the SWQS for the higher classification, the higher classification cannot be assessed and the use associated with the higher classification will be assessed as "insufficient information."

Assessing Lake Data: Lakes are assessed based upon *in-lake* chemistry data collected just below the *surface* (generally at a one-meter depth if the lake is sufficiently deep). Lakes may have multiple in-lake sampling locations, depending on their size. Each sampling location within a lake is considered a "subsample". Lake subsamples that do not comply with the applicable numeric SWQS criteria are considered exceedances; however, exceedances occurring at multiple locations or subsamples within a lake on the same date are considered a single exceedance. Two or more exceedances occurring within a lake on separate dates constitute an exceedance of the applicable criterion.

Continuous Monitoring and Grab Sampling: Where both grab sample and continuous monitoring data are available, the Department will give more weight to the continuous monitoring data because grab samples collected quarterly may not capture the most critical time period; therefore, they may not reflect the worst case scenario for use support.

De minimus: When evaluating data from multiple stations within an assessment unit, the Department may evaluate the spatial extent of impairment. If the Department determines that the station with impaired water quality represents a very small portion of the assessment unit, and water quality at the other stations is not impaired, then the impairment will be considered "*de minimus*" and the entire assessment unit will assessed as "fully supporting" the applicable use. These decisions will be documented in the Integrated Report.

Evaluating Contradictory Data Sets: Weighing data is necessary when evaluating numerous data sets that have different data collection and analysis methods, or have temporal or spatial sampling variability. Contradictory data sets will "weighed" as follows: newer data will override older data; larger data sets might override or be combined with nominal data sets; and higher quality data will override data sets of lower quality based on sampling protocol, equipment, training and experience of samplers, quality control program, and lab and analytical procedures.

Modeling and Sampling Results: Water quality models are used to predict changes in water quality over time under different flow, weather, and temporal conditions. The Department may use the results obtained through a validated water quality or dynamic model to assess use support and/or place or remove an assessment unit/pollutant combination from the 303(d) List, if the Department determines that the model adequately predicts water quality in that assessment unit.

6.0 Designated Use Assessment Methods

The SWQS identify specific designated uses for the waters of the State according to their waterbody classifications. Designated uses include:

- Aquatic Life (General and Trout);
- Recreation (Primary and Secondary Contact);
- Fish Consumption;
- Shellfish Harvest For Consumption;
- Drinking Water Supply;
- Industrial Water Supply; and
- Agricultural Water Supply.

The Department uses both numeric and narrative criteria and policies to protect designated uses. Numeric criteria are estimates of constituent concentrations that are protective of the designated uses. Narrative criteria and policies are non-numeric descriptions of conditions to be supported, maintained, or avoided. The Department has identified assessment approaches, also known as "translators", to quantitatively interpret narrative criteria/policies, which are qualitative in nature. This section outlines the methodologies used to assess support of each designated use based on the numeric and/or narrative criteria applicable to each use and the integration of data for multiple parameters at multiple stations for each assessment unit.

Appendix A of the Methods Document identifies the parameters associated with each designated use. The Department assesses designated use support by evaluating compliance of the water quality results with the applicable SWQS criteria or translators. However, data for every parameter associated with a particular use is not required to assess the use. The Department uses a conservative approach regarding use assessment that requires more extensive data for concluding that an assessment unit is "fully supporting" a designated use than is needed to conclude that the use is not supported. Specifically, an assessment unit will be assessed as fully supporting the designated use only if data for the minimum suite of parameters are available and the data indicate that there are no exceedances of the applicable criteria. If data for the minimum suite of parameters is not available, the applicable use will be assessed as "insufficient information", even if there are no exceedances within that data set. If data for any one parameter associated with a designated use (Appendix A parameters) exceed the applicable criteria, the assessment unit will be assessed as not supporting the designated use even if data for the minimum suite of parameters are not available. (Note that "insufficient information" can mean either that sufficient data are not available to assess the designated use (Table 6.0) or that no data are available (i.e., that use/assessment unit is not sampled).

Table 6.0: Minimum Suite of Parameters Needed to Determine Use Is "Fully Supporting"

Designated Use	Minimum Suite of Parameters
General Aquatic Life	Biological data
Aquatic Life - Trout	Biological data and Temperature and DO
Recreation	Pathogenic Indicator Bacteria
Shellfish Harvest for Consumption	Shellfish Classifications
Drinking Water Supply	Nitrate and TDS
Agricultural Water Supply	TDS
Industrial Water Supply	TSS and pH
Fish Consumption	Fish tissue data

6.1 Aquatic Life Use Assessment Method

The aquatic life use is assessed by evaluating impairment of biotic communities using metrics developed for benthic macroinvertebrate data, in conjunction with fin fish Index of Biotic Integrity (FIBI) data, supplemented with a broad suite of biologically-relevant physical/chemical data (e.g., dissolved oxygen, temperature, toxic pollutants). The biological assessment integrates a full suite of environmental conditions over many months (for macroinvertebrates) to many years (for fish). Biological data is required to conclude that aquatic life uses are fully supported; however, chemical data alone is sufficient to determine that the use is not supported and to place the chemical parameter on the 303(d) List as the cause of non-support. The associated physical/chemical parameters differ for the two designated aquatic life uses, based on the criteria associated with their respective stream classifications). Specifically, both temperature and dissolved oxygen are required, in addition to biological data, to determine if the trout aquatic life use is fully supported but only biological data is required to determine if the general aquatic life use is fully supported (see Table 6.0). Table 6.1 summarizes the possible outcomes of the aquatic life use assessment based upon various combinations of data and results.

Table 6.1: Aquatic Life Use Assessment Results

Results of Biological Assessment*	Results of Aquatic Life Use Assessment (General and Trout)
Biological Monitoring Data Available, No Chemical/Physical Data Available	
Biology is not impaired or threatened	• General aquatic life use is "Fully Supporting" • Trout aquatic life use is "Insufficient Information".
Biology is impaired or threatened	Both aquatic life uses are not supported; "cause unknown" identified as the cause.
Both Biological and Chemical/Physical Data Available	
Biology is not impaired or threatened, there are no chemical exceedances, and water quality is not threatened	Both aquatic life uses are "Fully Supporting"
Biology is impaired or threatened AND chemical/physical data show exceedances of aquatic life criteria or are threatened	Both aquatic life uses are "Not Supporting"; parameter(s) exceeding criteria identified as the cause. Note: The outcome of the nutrient impact assessment will determine which parameter is listed as the cause of use non-support, as illustrated in Table 4.4.
Biology is impaired or threatened BUT chemical/physical data show no exceedances of aquatic life criteria	Both aquatic life uses are "Not Supporting"; "cause unknown" identified as the cause.
Biology is not impaired or threatened BUT chemical/physical data show exceedances of aquatic life criteria or waters quality is threatened	Both aquatic life uses are "Not Supporting"; parameter(s) exceeding criteria identified as the cause unless due to natural conditions.
No Biological Data Available; Chemical/Physical Data Available	
No exceedances of aquatic life criteria	Insufficient data to assess both aquatic life uses
Exceedance of any aquatic life criterion (including phosphorus)	Both aquatic life uses are "Not Supporting"; parameter(s) exceeding criteria identified as the cause.

* The methods for assessing biological data are explained in Section 4.3, "Biological Data".

6.2 Recreational Use Assessment Method

The SWQS identify two levels of recreational use – primary contact and secondary contact. Primary contact recreation is defined as those water-related recreational activities that involve significant ingestion risks and includes, but is not limited to, wading, swimming, diving, surfing, and water skiing. Secondary contact recreation is defined as those water-related recreational activities where the probability of water ingestion is minimal and includes, but is not limited to, boating and fishing. SWQS criteria have been promulgated for primary contact recreation in SC, SE1, and FW2 waters. SWQS criteria have been promulgated for secondary contact recreation in SE2 and SE3 waters. Primary contact recreation in FW1 and PL waters is assessed using the

SWQS criteria for FW2 waters because numeric criteria for recreational uses have not been promulgated for FW1 or PL waters.

Recreational use support is assessed primarily by comparing the geometric mean (geomean) of the water quality data for pathogenic indicators to the appropriate SWQS criterion (see Section 4.2). At least five samples collected over a 30-day period are required to calculate the geomean; however, other sampling frequencies may be acceptable provided that the frequency supports the statistical method for calculating a seasonal geomean. Beach closure data is also considered in assessing recreation uses in assessment units that contain designated bathing beaches. "Designated bathing beaches" include beaches that are heavily used for primary contact recreation, such as swimming, bathing, and surfing, during the recreational season pursuant to the New Jersey State Sanitary Code, N.J.A.C. 8:26. Assessment units containing designated bathing beaches are assessed as fully supporting primary contact recreation if the pathogenic geomean does not exceed the applicable SWQS and there are no beach closures lasting seven or more consecutive days in a given year, or the average number of beach closures is less than two per year over a five-year period. Beach closure procedures are established at N.J.A.C. 8:26-8.8, which is available on the U.S. Department of Health and Senior Service's Web site at http://www.state.nj.us/health/eoh/phss/recbathing.pdf. In assessing designated bathing beaches, the Department will review the beach closure data to confirm that the closures were due to water quality data showing exceedance of the SWQS. Beach closures for issues other than water quality (e.g., precautionary closure) are not considered in assessing recreational use support. Table 6.2 summarizes the possible outcomes of the recreational use assessment.

Table 6.2: Recreational Use Assessment Results

Data Assessment Results	**Use Assessment Results***
a) Beach closure data does not identify impairment (Primary Contact), AND b) Applicable pathogenic indicator SWQS criteria are met	Use Is Fully Supported
a) Beach closure data identifies impairment* (Primary Contact), OR: b) Applicable pathogenic indicator SWQS criteria are not met	Use Is Not Supported
Neither beach closure nor pathogenic geomean data is available	Insufficient Information

*Note: When determining the spatial extent, a designated bathing beach represents the area within 1,500 feet from the shoreline in the saline coastal (SC) waters, and the area within 200 feet from the shoreline in saline estuarine (SE1) waters. When impaired bathing beaches represent a minute portion of the total area of the assessment unit, generally less than 5% of the AU, the Department may regard the impairment as *de minimus* and consider the recreational use fully supported for the entire assessment unit (see Section 5.0, "De Minimus").

6.3 Fish Consumption Use Assessment Method

The fish consumption use is assessed primarily by comparing fish tissue samples with the thresholds for fish tissue concentrations of specific bioaccumulative toxic pollutants that are used

to develop fish consumption advisories (Table 6.3a). The Department follows USEPA's "Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories – Volume 1, 2 and 3 (USEPA 2000b) for establishing fish tissue thresholds. Thresholds for fish tissue-based toxics, except mercury, are intended to protect the high risk population, which includes infants, children, pregnant women, nursing mothers, and women of childbearing age. Where fish tissue concentrations are below these thresholds, fish consumption is unrestricted.

For mercury, the Department has established a threshold of 0.18 ug/g, which reflects a "one meal per week" consumption restriction for high risk populations. This threshold is based on the water quality target concentration established in the Department's Statewide Mercury TMDL, which was approved by USEPA on September 25, 2009. (The TMDL report is available on the Department's Web site at: http://www.nj.gov/dep/wms/bear/tmdls.) The mercury threshold is based on the expected mercury concentration in fish tissue due to natural sources that can not be addressed by the TMDL. Because of these natural sources, it is likely that fish consumption advisories for mercury will continue to be necessary to protect high risk populations even after all anthropogenic sources of mercury have been eliminated.

Table 6.3a: Thresholds for Fish Tissue-based Toxics

Bioaccumulative Toxic Parameter	Tissue Concentration Threshold
Mercury	0.18 ppm (ug/g)
PCBs	8 ppb (ug/Kg)
Chlordane	11.0 ppb (ug/Kg)
Dioxin	0.19 pptr (ng/Kg)
DDT and Metabolites (DDX)	86.0 ppb (ug/Kg)

In addition to fish tissue concentrations, the Department also evaluates water column data for certain toxic pollutants expected to bioaccumulate in fish tissue, where available, to determine compliance with applicable human health criteria. The Department utilizes the human health criteria for SE/SC waters, which are based on "fish consumption only" for all assessment units. These pollutants were selected based upon USEPA's "National Study of Chemical Residues in Lake Fish Tissue" (USEPA, 2009) and are identified Appendix A as associated with the fish consumption use. Table 6.3b summarizes the possible outcomes of the fish consumption use assessment.

Table 6.3b: Fish Consumption Use Assessment Results

Data Assessment Results	Use Assessment Result
a) Fish tissue concentrations are below the applicable thresholds for all parameters, AND b) There are no exceedances of the SWQS SE/SC human health criteria for selected parameters in the water column	Use is Fully Supported
a) Fish tissue concentrations exceed the applicable threshold for one or more parameters; OR b) One or more selected parameters in the water column exceed the applicable SWQS SE/SC human health criteria.	Use is Not Supported
Neither fish tissue nor water column data is available	Insufficient Information

6.4 Shellfish Harvest for Consumption Use Assessment Method

The shellfish harvest for consumption use is designated in all waters classified as SC and SE1. The shellfish sampling and assessment program is overseen by the federal Food and Drug Administration (FDA) and administered through the National Shellfish Sanitation Program (NSSP) to ensure the safe harvest and sale of shellfish. The NSSP's guidance, entitled *National Shellfish Sanitation Program Guide for the Control of Molluscan Shellfish*, is available on the FDA's Web site at http://www.fda.gov. The Department's Bureau of Marine Water Monitoring determines shellfish classifications based on sampling data and assessment procedures in the NSSP manual. Waters are classified as approved ("unrestricted"), special restricted, special seasonal restricted, seasonally approved, or prohibited for harvest. The legal description of shellfish classification areas is updated annually in the Shellfish Growing Water Classification rules at N.J.A.C. 7:12. The Department's shellfish classification areas are included in the SWQS by reference at N.J.A.C. 7:9B-1.12.

Administrative closures of shellfish waters are established in areas around potential pollution sources, such as sewage treatment plant outfalls and marinas, as a preventive measure to prevent the harvest of shellfish that could become contaminated by boat wastes and stormwater runoff. Where shellfish harvest is prohibited due an administrative closure, such prohibited areas will not be included in the overall shellfish use assessment.

Only assessment units containing shellfish waters classified as unrestricted are assessed as fully supporting the shellfish harvest for consumption use. This assessment method may exaggerate the extent of shellfish waters actually impaired; therefore, the official adopted Shellfish Classification maps should be referenced for the actual areas approved for shellfish harvest. All other shellfish waters are assessed as not supporting the shellfish harvest for consumption use and the pollutant causing the waters to be prohibited for harvest (fecal coliform or total coliform)

will be identified on the 303(d) List. Table 6.4 summarizes the possible outcomes of the use assessment for the shellfish harvest use.

Table 6.4: Shellfish Harvest for Consumption Use Assessment Results

NSSP Classification	Assessment Results*
Unrestricted	Use Is Fully Supported *
Prohibited, Special Restricted, or Seasonal classifications based on water quality	Use Is Not Supported

*Note: When the area classified as prohibited, special restricted or seasonal represents a minute portion of the total area of the assessment unit, generally less than 5% of the AU, the Department may regard the impairment as *de minimus* and consider the shellfish harvest for consumption use fully supported for the entire assessment unit (see Section 5.0, "De Minimus").

6.5 Drinking Water Supply Use Assessment Method

The drinking water supply use is defined as waters that are potable after conventional filtration treatment and disinfection, without additional treatment to remove other chemicals. All FW2 and PL waters are designated as drinking water supply use. It is important to note that many waterbodies do not have drinking water intakes due to stream size and other considerations. The drinking water supply use is assessed primarily by comparing concentrations of associated chemical parameters (see Appendix A) to the applicable SWQS criteria. Nitrate concentrations are the minimum data necessary to assess the drinking water supply use; however, other parameters (i.e., arsenic, cadmium, chromium, copper, cyanide, lead, mercury, thallium, zinc, nitrate, TDS, chloride, radioactivity, and volatile organic compounds) will also be used to assess the drinking water supply use when sufficient data for these parameters is available.

The Department also evaluates monitoring data from treated or finished water supplies, where available, to determine compliance with the Safe Drinking Water Act's National Primary Drinking Water Regulations (NPDWRs, or primary standards). Pollutants monitored for the protection of human health under the primary standards include volatile organic compounds, semi-volatile organic compounds, inorganic constituents, salinity, radioactive constituents, and disinfection by-products. Use restrictions include closures, contamination-based drinking water supply advisories, better than conventional treatment requirements, and increased monitoring requirements due to confirmed detection of one or more pollutants.

Water supply use restrictions established by the Department's Bureau of Safe Drinking Water in response to documented violations of the Safe Drinking Water Act (SDWA) may also be considered in assessing drinking water supply use support. Only violations that can be attributed to surface water sources are considered. Violations for copper and lead, which may be attributed to the collection system, are not used in assessing source water unless the violations occur in ambient waters.

Table 6.5 summarizes the possible outcomes of the drinking water supply use assessment. Since human health concerns associated with bioaccumulative constituents are generally addressed through consumption advisories, the Department will review exceedances of human health criteria for such constituents to determine which use is not supported: the drinking water supply use, the fish consumption use, or both.

Table 6.5: Drinking Water Supply Use Assessment Results

Assessment Outcomes	Assessment Results
SWQS criteria are met for all associated parameters, waters are not threatened, AND there are no SDWA closures or use restrictions,	Use is Fully Supported
SWQS are exceeded for one or more associated parameters, waters are threatened, OR there are one or more SDWA closures or use restrictions	Use is Not Supported
Sufficient nitrate data is not available	Insufficient Information

6.6 Industrial Water Supply Use Assessment Method

Industrial water supply use includes (ambient) waters used for industrial processing or cooling. The Department uses total suspended solids (TSS) and pH, a measure of acidity, as indicators of support for this use. The use is not supported if the ambient concentration of TSS exceeds the applicable SWQS criterion or if the ambient pH falls outside of the threshold range of 5 to 9.

6.7 Agricultural Water Supply Use Assessment Method

The agricultural water supply use includes water used for irrigation and livestock farming. Only waters classified as FW2 or PL are designated for this use. The Department uses total dissolved solids (TDS) as the indicator of agricultural use support because of its adverse and immediate detrimental effects on agricultural practices; however, the existing numeric TDS SWQS criterion of "no increase in background which would interfere with the designated or existing uses, or 500 mg/L, whichever is more stringent" was promulgated to protect the drinking water supply use and is not relevant to impacts related to agriculture. Instead, the Department uses guidelines established by the U.S. Department of Interior, Natural Resources Conservation Service, and other states (Follet and Soltanpour, 1999; Bauder, 1998) for evaluating whether water supplies can fully support common agricultural uses such as irrigation and raising livestock. These guidelines establish acceptable levels for TDS in agricultural water supplies as at or below 2,000 mg/l (Follet and Soltanpour, 1999). The agricultural water supply use is not supported if the ambient concentration of TDS exceeds this threshold.

7.0 Integrated Listing Guidance

The 2012 Integrated List will show the use assessment results for each applicable designated use in each assessment unit and, for each use that is not supported, the Integrated List will identify

the parameter "cause" and TMDL status for that cause or causes. USEPA's ADB further distinguishes between pollutant causes that require a TMDL (Category 5) and pollutant causes for which TMDLs have already been approved (Category 4A). In some cases, a regulatory response outside of a TMDL is permissible and the waterbody/pollutant combination is assigned to Category 4B in ADB (TMDL alternative). Only assessment unit/pollutant combinations for which a TMDL is required are placed on the 303(d) List (see Section 7.1). Where TMDLs have been approved, the assessment unit/pollutant combination is removed from the 303(d) List (see Section 7.2) and reassigned in ADB from Category 5 to Category 4A. The Integrated List will show such assessment units as "not supporting" those uses and will show the date completed under TMDL status for the corresponding cause.

7.1 Identifying Causes and Sources of Non-Support (303(d) List)

The List of Water Quality Limited Segments (303(d) List) is comprised of assessment unit/pollutant combinations, of which the "pollutant" is the chemical parameter (i.e., "pollutant") causing non-support of the applicable designated use. A pollutant is considered to be the cause of use non-support if it is associated with the designated use (see Appendix A) and it exceeds the applicable SWQS criterion.

If chemical data are unavailable or show no exceedance of applicable criteria, but biological data indicate impairment, the cause of Aquatic Life Use non-support will be identified on the 303(d) List as "cause unknown". Where biological data indicate impairment and chemical data show exceedance(s) of applicable criteria, the chemical parameter(s) will be identified as pollutant causes in ADB and placed on the 303(d) List; "cause unknown" will be identified as a "non-pollutant" cause of Aquatic Life Use non-support in ADB and in the Integrated List of Waters (Appendix A), but will not be identified on the 303(d) List.

A source assessment is conducted for each pollutant identified on the 303(d) List as causing non-support. "Suspected" sources of pollutants causing impairment are identified using the Department's Geographic Information System (GIS). A more thorough investigative study will be conducted through the TMDL process to determine the specific sources, and relative contributions, of the pollutant(s) and nonpoint sources causing use non-support.

7.2 Delisting Assessment Unit/Pollutant Combinations

There are specific scenarios under which USEPA will allow states to remove an assessment unit/pollutant combination from the List of Water Quality Limited Segments (303(d) List), a process commonly referred to as "delisting". Appendix C of the 2012 Integrated Report will identify all assessment unit/pollutant combinations delisted from the 2012 303(d) List and the corresponding reason for each delisting action. Table 7.2 displays the ADB delisting codes and associated reasons applied by New Jersey for the 2012 Integrated List.

Table 7.2: Delisting Codes and Associated Reasons

ADB Delisting Code	Delisting Reason
3	TMDL Alternative (4B)
5	TMDL approved or established by EPA (4A)
8	Applicable WQS attained; due to restoration activities
9	Applicable WQS attained; due to change in WQS
10	Applicable WQS attained; according to new assessment method
11	Applicable WQS attained; original basis for listing was incorrect
12	Applicable WQS attained; threatened water no longer threatened
13	Applicable WQS attained; reason for recovery unspecified
14	Data and/or information lacking to determine water quality status; original basis for listing was incorrect

As explained under Section 4.1 under "Metals", the new assessment method for arsenic is designed to determine where the arsenic concentrations are due to the natural condition. The Department will delist such arsenic/waterbody combinations using delisting code 10 – "Applicable water quality attained, according to new assessment method".

8.0 Method to Rank and Prioritize Assessment Units That Do Not Fully Support Designated Uses

Section 303(d) of the federal Clean Water Act requires states to rank and prioritize assessment units that require development of TMDLs. The goal of priority ranking is to focus available resources on developing TMDLs in the most effective and efficient manner, while taking into account environmental, social, and political factors. Assessment units ranked as high (H) priority for TMDL development, based on the factors outlined below, are those the Department expects to complete within the next two years. Assessment units ranked as medium (M) priority are those the Department expects to complete in the near future, but not within the next two years. Assessment units ranked as low (L) priority are those the Department does not expect to complete in the immediate or near future. The Department will prioritize assessment units identified on the 303(d) List and schedule them for TMDL development based on the following factors:

- Importance of pollutants of concern (see Table 8.0);

- TMDL complexity;
- Status of parameter (actively produced or legacy pollutant);
- Additional data and information collection needs;
- Sources of pollutants;
- Severity of the actual or threatened exceedance/impairment;
- Spatial extent of the exceedance/impairment;
- Nature of the designated uses not being supported (i.e., recreational, economic, cultural, historic, and aesthetic importance);
- Efficiencies of grouping TMDLs by drainage basin or parameter;
- Efficiencies related to leveraging water quality studies triggered by NJPDES permit renewals;
- Status of TMDLs currently under development;
- Timing of TMDLs for shared waters;
- Status of watershed management activities (e.g., priority watershed selection or 319 grant activities);
- Status of other ongoing pollutant/pollution control actions that could result in water quality restoration (e.g., site remediation activities);
- Existence of endangered and sensitive aquatic species;
- Recreational, economic, cultural, historic and aesthetic importance; and
- Degree of public interest and support for addressing particular assessment units.

Table 8.0: Importance of Pollutants of Concern

Pollutant of Concern	Importance
Pathogen indicators, nitrate	Direct human health issues
Metals and Toxics	• Direct human health issues • Designated use impacts
Other conventional pollutants such as phosphorous, pH, dissolved oxygen, temperature, total dissolved solids, total suspended solids, unionized ammonia	• Significant designated use implications • Indirect human health issues

9.0 Method for Developing the Monitoring and Assessment Plan

The Integrated Report guidance (USEPA, 2005) recommends that states include descriptions and schedules of additional monitoring needed to: 1) assess all designated uses in all assessment units, and 2) support development of TMDLs for all assessment unit/pollutant combinations identified as not attaining designated uses. New Jersey's 2012 Integrated Report will identify its future monitoring plans and needs in Appendix H: New Jersey's Water Monitoring and Assessment Strategy, as well as in Chapter 9 Next Steps: Preparing for 2012 and Beyond. Chapter 9 of the 2012 Integrated Report will summarize information gaps and steps the Department is taking to bridge data gaps and improve assessment methods.

The Department's goal for water monitoring and assessment is to ultimately have enough data to assess every designated use in every assessment unit and for assessment results to indicate that every assessment unit is fully supporting every applicable designated use (except fish consumption). It is important to recognize that monitoring and assessing each assessment unit will require significant effort and can only be accomplished over the long term.

10.0 Public Participation

The public is afforded the opportunity to participate in three key phases of development of the Integrated Report: 1) submission of data, 2) review and comment on the proposed assessment methods; and 3) review and comment on the proposed Integrated List and 303(d) List. Section 10.1 explains the Department's process for soliciting data for use in the Integrated Report. The Department also strives to continuously interact with other data collecting organizations and facilitate the exchange of data and information.

Section 10.2 explains the Department's process for announcing public availability of the draft Methods Document, draft Integrated List, and draft 303(d) List for review and comment prior to adoption of the final Methods Document and Lists. As explained in Chapter 1, the Integrated Report combines the reporting requirements of Sections 305(b) and 303(d) of the federal Clean Water Act. The 303(d) List component of the Report, which satisfies the reporting requirements of Section 303(d), includes the assessment units identified as not supporting one or more designated uses, the pollutants causing non-support of those assessment units, and their priority ranking for TMDL development. The public participation requirements of these two components are different. The 303(d) requirements are considered regulatory requirements because they trigger TMDL development. Therefore, the regulatory requirements identified in this section regarding public participation, USEPA approval, and adoption apply only to the 303(d) List component of the Integrated Report.

The Department is required under 40 CFR 130.7(b)(6) to provide a description of the methodology used to develop the 303(d) List. This Methods Document lays out the framework for assessing data and uses, entering the results into USEPA's ADB, and publishing those results as reports out of ADB that represent the Integrated List and 303(d) List. The Department develops a draft Methods Document that is made available for public review and comment through public notification, as outlined below. After finalizing the Methods Document, the Department assesses the data in accordance with those methods and develops the Integrated Report, which includes the draft Integrated List, draft 303(d) List, and two-year TMDL Schedule. A public notice is published in the New Jersey Register and newspapers of general circulation announcing that the Methods Document has been finalized and the draft Integrated List and draft 303(d) List are available for public review and comment. The Integrated List and 303(d) List are revised, as appropriate, after full consideration of comments received. The public participation procedures related to proposal and adoption of the Integrated List and final 303(d) List are outlined in Section 10.2 below.

10.1 Request for Data

The Department pursues several avenues for notifying the public of its intent to seek water quality-related data and information from external partners, including notices published in the New Jersey Register, public notices published in newspapers of general circulation, announcements published in Department-generated newsletters, and direct mailings and email to interested individuals and organizations. The time period for submitting data is specified in the public notice. The data solicitation notice for the 2012 Integrated Report established a data collection deadline of December 31, 2010 and a data submission deadline of July 1, 2011. A cut-off date for data submission is necessary to allow the data to be received, analyzed, and assessed for timely completion of the Integrated Report and submission of the Integrated List and 303(d) List to USEPA by April 1 of even-numbered years. Data collected or submitted after the respective deadlines may be considered for subsequent 303(d) Lists and/or other water quality assessments conducted by the Department. An exception will be made for data collected in 2011 in the Barnegat Bay Watershed as part of the Department's priority initiative to restore the Barnegat Bay (see Section 1.2).

10.2 Public Notification

Public Notices: The Department will publish a notice announcing the availability of the draft Methods Document for public review and requesting comments. The Department may revise the Methods Document based on public comment.

The Department will propose the 303(d) List of Water Quality Limited Segments as an amendment to the Statewide Water Quality Management Plan, provide an opportunity for public comment, and adopt the amendment in accordance with N.J.A.C. 7:15-6.4. A public notice announcing availability of the proposed 303(d) List for public review and comment shall be published in the New Jersey Register, on the Department's Web site, and in newspapers of general circulation throughout the State. Adjacent state, federal, and interstate agencies shall also be notified, as necessary. The public notice shall include a description of the procedures for comment; and the name, address, and Web site of the Department office or agent from which the proposed document may be obtained and to which comments may be submitted. The public notice for the draft 2012 303(d) List will also notify the public that the Department has finalized the 2012 Methods Document. The final Methods Document, including agency responses to public comments, will be included as an Appendix to the 2012 Integrated Report.
Comment Period: The comment period shall be a minimum of 30 days.

Public Hearings: Within 30 days of publication of the public notice, interested persons may submit a written request to extend the comment period for an additional 30 days, or request a public hearing. If the Department determines that there are significant environmental issues or that there is a significant degree of public interest, the Department may hold a public hearing and/or extend the comment period. If granted, a notice announcing extension of the comment period and/or public hearing will be published promptly on the Department's Web site.

Final Action: After the close of the public comment period for the Methods Document, the Department will address the comments and publish the final Methods Document on the Department's Web site along with the Response to Comments. After the close of the public

comment period for the proposed 303(d) List, the Department will address the public comments, make any necessary revisions, and prepare a final 303(d) List. The Department will submit the final 303(d) List to USEPA Region 2 in accordance with 40 CFR 130.7. Upon receipt of a response from USEPA Region 2, the Department may amend the final list based on their comments. The Department will adopt the final 303(d) List as an amendment to the Statewide Water Quality Management Plan by placing a notice in the New Jersey Register and on the Department's Web site. However, the Department may repropose the 303(d) List if the Department determines that revisions made in response to USEPA Region 2 comments result in substantive changes that should be subject to public review and comment.

Availability of Final Documents: The Integrated Report, which will include the Integrated List, monitoring needs and schedules, TMDL needs and schedules, and any other information usually included in the 305(b) Report, will be submitted to the USEPA Region 2 as required by Section 305(b) of the federal Clean Water Act. The Department will post the availability of the final Integrated Report and the 303(d) List on its Web site after receipt of approval from the USEPA.

11.0 Literature Cited and Additional References

Bauder, J, 1998. *When is Water Good Enough for Livestock*. Montana State University. Online. Internet. July 9, 2000.

Commission on Life Sciences, 2000. *Toxicological Effects of Methylmercury*. National Research Council. Copies available at http://books.nap.edu/openbook.php?record_id=9899&page=R1 .

CFR, 1985. Code of Federal Regulations. *Water Quality Planning and Management* Final Rule. 40 CFR, Parts 35 and 130. Washington, D.C.

CFR, 1992. Code of Federal Regulations. Federal Register, Volume 57, No. 143 July 24, 1992.Pg 33047, Preamble to Section 130.7 TMDLs

Follet, R.H. and Soltanpour, P. 1999. *Irrigation Water Quality Criteria.* Colorado State University Cooperative Extension. Online. Internet. July 9, 2000.

Forman, Richard T.T. 1979, ed. *New Jersey Pine Barrens: Ecosystem and Landscape*. New York, NY. Academic Press Inc.

Harshberger, John W., 1916, *Vegetation of the New Jersey Pine Barrens; An Ecological Investigation*. Philadelphia, PA. Christopher Sower Co., 329 pp.

Long, E.R., MacDonald, D.D., Smith, S.L., and Calder, F.D. 1995. *Incidence of adverse biological effects within ranges of chemical concentrations in marine and estuarine sediments.* Environmental Management Vol. 19, No.1. pp. 81-97.

McCormick, J. and Andresen, J.W. 1963, *The Role of Pinus virginiana in the Vegetation of Southern New Jersey*. New Jersey Nature News 18, 27-38.

National Research Council. 2001. *Assessing the TMDL Approach to Water Quality Management*. National Academy Press. Washington, DC.

NJDEP. 1996. *Regulations Governing the Certification of Laboratories and Environmental Measurements*. (N.J.A.C. 7:18). July 1, 1996. NJDEP Office of Quality Assurance Trenton, NJ.

NJDEP. 2006. *FY07 - FY10 Departmental Quality Management Plan.* Department of Environmental Protection, Office of Quality Assurance. Trenton, New Jersey. Document Control Number OQA-QAD-001-07/06.

NJDEP. 2007. *Standard Operating Procedures Ambient Biological Monitoring Using Benthic Macroinvertebrates Field, Lab, Assessment Methods*. Department of Environmental Protection. Available at: http://www.state.nj.us/dep/wms/bfbm/download/AMNET_SOP.pdf

NJDEP. 2008. *Technical Manual for Phosphorus Evaluations N.J.A.C. 7:9B-1.14(c) For NJPDES Discharge to Surface Water Permits*. Department of Environmental Protection. August 2008. Trenton, NJ. Available http://www.state.nj.us/dep/dwq/pdf/p-manual-07-30-08.pdf

NJDEP. 2009. *New Jersey Nutrient Criteria Enhancement Plan.* Department of Environmental Protection, Bureau of Water Quality Standards and Assessment. April 2009. Trenton, NJ.

NJDEP, *Surface Water Quality Standards* N.J.A.C. 7:9B, including all proposals and adoptions, at http://www.nj.gov/dep/rules/.

NJGS. 2009. *Revision to New Jersey's HUC 14s, 2009, with a correlation to HUC 12s*. Department of Environmental Protection. New Jersey Geological Survey. TM09-2. 2009. Available http://www.state.nj.us/dep/njgs/pricelst/tmemo/tm09-2.

NJDHSS. 2006. N.J. Sanitary Code Chapter IX *Public Recreation Bathing*. March 2006. Trenton, NJ.

USEPA. 1978. *Total Maximum Daily Loads Under Clean Water Act*. Federal register, Vol. 43, No. 250. Thursday, December 28, 1978. Six pages.

USEPA. 1984. *Guidance for Preparation of Combined Work/Quality Assurance Project Plans for Environmental Monitoring*. May. Office of Water Regulations and Standards, 553, Washington, DC 20460.

USEPA. 1991. *Guidance for Water Quality Based Decisions, The TMDL Process (April 1991*). EPA National Policy. . EPA-440/4-91-001 7/91. Office of Water. Washington DC 20460.

USEPA. 1993. *Volunteer Estuary Monitoring: A Methods Manual*. EPA 842-B-93-004. December. Office of Wetlands, Oceans, and Watersheds, 4503F, Washington, DC 20460.

USEPA. 1996a. *The Volunteer Monitor's Guide to Quality Assurance Project Plans*. EPA 841-B-96-003. September. Office of Wetlands, Oceans, and Watersheds, 4503F, Washington, DC 20460.
USEPA. 1996b. *The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion* (EPA 823-B-96-007) June, 1996.

USEPA. 1997a. *National Clarifying Guidance for 1998 State and Territory Clean Water Act Section 303(d) Listing Decisions*. August 17, 1997. 11 pages. Office of Water. Washington, DC 20460.

USEPA. 1997b. *The Use of Existing and Readily Available Biological and Habitat for Listing Waters on the 1998 303(d) List*. December, 1997. Assessment and Watershed Protection Division .Washington, D.C.

USEPA. 1997c. *Volunteer Stream Monitoring: A Methods Manual*. EPA 841-B-97-003. November. Office of Wetlands, Oceans, and Watersheds, 4503F, Washington, DC 20460.

USEPA. 1998. *Guidance on Quality Assurance Project Plans* (QA/O-5). February, 1998. Washington, DC. 20460.

USEPA. 1999a. *EPA Requirements for QA Project Plans* (QA/R-5), Interim Final, November. Washington, DC. 20460.

USEPA. 1999b. *Guidance for the Development of Quality Assurance Project Plans for Environmental Monitoring Programs*. USEPA Region 2. May 1, 1999. New York, NY.

USEPA. 1999c. *Rapid Bioassessment Protocols for use in Wadeable Streams and Rivers-Periphyton, Benthic, Macroinvertebrates, and Fish*.. EPA 841-B-99-002.July. Office of Water. Washington, DC.
USEPA, 2000a. *Nutrient Criteria. Technical Guidance Manual. Rivers and Stream*. Office of Water. EPA-822-B-00-002. July 2000.

USEPA. 2000b. *Guidance: Use of Fish and Shellfish Advisories and Classification in 303(d) and 305(b) Listing Decisions.* WQSP-00-03. October. Office of Water. Washington, DC. 20460.

USEPA. 2001. *Memorandum from Robert H. Wayland III to EPA Regional Water Management Directors, Science and Technology Directors and State, Territory and Authorized Tribe Water Quality Program Directors. Re: 2002 Integrated Water Quality Monitoring and Assessment Report Guidance*. November 19, 2001

USEPA. 2002. *Consolidated Assessment and Listing Methodology: Toward a Compendium of Best Practices. First Edition*. July 2002. U.S. Environmental Protection Agency. Office of Wetlands, Oceans, and Watersheds (http://www.epa.gov/owow/monitoring/calm.html)

USEPA 2005. *Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act.* U.S. Environmental Protection Agency. Office of Wetlands, Oceans, and Watersheds. Assessment and Watershed Protection Division, Watershed Branch.

USEPA 2009. *The National Study of Chemical Residues in Lake Fish Tissue*. September 2009. Available at http://www.epa.gov/waterscience/fish/study/data/finalreport.pdf.

11.1 Arsenic Studies:

Barringer, J.L., Haussmann, N., Sutley, S.J., S.J., Sanzolone, R.F., Garbarino, J.R., Johnson, A.J., Patrick, D., Gomaa, O., 2006. Contributions of Arsenic from Bed Sediments to Water in the Wallkill River, Northwestern New Jersey, USA. Geological Society of America Abstract Program p. 150-151 http://gsa.confex.com/gsa/2006AM/finalprogram/abstract_112959.htm

Barringer, J.L., Bonin, J.L., Deluca, M.J., Romagna, T., Cenno, K., Alebus, M., Kratzer, T., Hirst, B., March 2007, Sources and Temporal Dynamics of Arsenic in a New Jersey Watershed US. Science of the Total Environment Volume 379, Issue 1 p. 56-74 http://www.referencerepository.com/searches/publication/0/Science%20of%20The%20Total%20Environment/379

Barringer, J.L., Wilson, T.P., Szabo, Z., Bonin, J.L., Fischer, J.M., and Smith, N.P., 2007, Diurnal Variations in, and Influences on, Concentrations of Particulate and Dissolved Arsenic and Metals in the Mildly Alkaline Wallkill River, New Jersey, USA: Environmental Geology, vol. 53, p. 1183-1199 http://www.deepdyve.com/search-saved?queryId=i0Rk0AEYAj

Barringer, J.L., Mumford, A., Young, L.Y., Reilly, P.A., Bonin, J.L., Rosman, R., May 2010, Pathways for Arsenic from Sediments to Groundwater to Streams: Biogeochemical Processes in the Inner Coastal Plain, New Jersey, USA Water Research vol. 44, p. 5532-5544 http://www.ncbi.nlm.nih.gov/pubmed/20580401

Barringer, J.L., Szabo, Z., Wilson, T.P., Bonin, J.L., Kratzer, T., Cenno, K., Romagna, T., Alebus, M., and Hirst, B. 2010, Distribution and seasonal dynamics of arsenic in a shallow lake, northwestern New Jersey, USA: Environmental Geochemistry and Health, v. 33, p. 1-22. http://www.springerlink.com/content/p5u1136v054x3162/

Barringer, J.L., Reilly, P.A., Mumford, A., Young, L., Cenno, K., Hirst, B., and Alebus, M. , 2010, Arsenic Release from Coastal Plain sediments in New Jersey, USA: Biogeochemical Processes: Geological Society of America Annual Meeting 10/31-11/03/2010, Program with Abstracts http://gsa.confex.com/gsa/2010AM/finalprogram/abstract_178036.htm

Barringer, J.L., Reilly, P.A., Eberl, D.D., Blum, A.E., Bonin, J.L., Rosman, R., Hirst, B., Alebus, M., Cenno, K., Gorska, M., May 2011, Arsenic in Coastal Plain Stream, New Jersey, USA; Geologic Contributions, Anthropogenic Additions, and Streambed and Instream Processes Chemical "fingerprints" for Geogenic and Anthropogenic Sources: Applied Geochemistry Vol 26, Issue 5, P. 763-776 http://www.sciencedirect.com/science/article/pii/S0883292711000527

Barringer, J.L., Szabo, Z., Bonin, J.L., and McGee, C.K., 2011, Arsenic, Metals, and Nutrients in Runoff from Two Detention Basins to Raccoon Creek, Coastal Plain, New Jersey, 2008: Scientific Investigations Report 2011-5017, 28 p http://pubs.usgs.gov/sir/2011/5017/

Barringer, Julia L. and Reilly, Pamela A. et al Arsenic in New Jersey Coastal Plain Stream, Sediments, and Shallow Groundwater: effects from Different Geologic Sources and Anthropogenic Inputs on Biogeochemical and Physical Mobilization Processes USGS Scientific Investigative Report 2012-xxxx DRAFT Publication

Dooley, J.H., 1998. Comprehensive Chemistry of Selected Greensand from the New Jersey Coastal Plain: New Jersey Geological Survey Technical Memorandum 98-1. NJ Department of Environmental Protection – Division of Science and Research http://www.state.nj.us/dep/njgs/pricelst/tmemo/tm98-1.pdf

Dooley, J.H., 2001. Baseline Concentrations of Arsenic, Beryllium and Associated Elements in Glauconite and Glauconitic Soils in the New Jersey Coastal Plain. N.J. Geological Survey Investigation Report, NJ Department of Environmental Protection http://www.state.nj.us/dep/dsr/publications/pub.htm

Appendix A: Parameters Associated With Each Designated Use

Parameter	Aquatic Life (general and trout)	Recreation	Drinking Water Supply	Agricultural Water Supply	Industrial Water Supply	Shellfish Harvest for Consumption	Fish Consumption
Ammonia, un-ionized	X						
Acenaphthene			X				
Acrolein			X				
Acrylonitrile			X				
Aldrin	X		X				
Anthracene			X				
Antimony			X				
Arsenic	X		X				
Asbestos			X				
Barium			X				
Beach Closure Data		X					
Benz(a)anthracene			X				
Benzene			X				
Benzidine			X				
3,4-Benzofluoranthene (Benzo(b)fluoranthene)			X				
Benzo(k)fluoranthene			X				
Benzo(a)pyrene (BaP)			X				
Beryllium			X				
alpha-BHC (alpha-HCH)			X				X
beta-BHC (beta-HCH)			X				X
gamma-BHC (gamma-HCH/Lindane)	X		X				X
Biological Community Data	X						
Bis(2-chloroethyl) ether			X				
Bis(2-chloroisopropyl) ether			X				
Bis(2-ethylhexyl) phthalate			X				

Parameter	Aquatic Life (general and trout)	Recreation	Drinking Water Supply	Agricultural Water Supply	Industrial Water Supply	Shellfish Harvest for Consumption	Fish Consumption
Bromodichloromethane (Dichlorobromomethane)			X				
Bromoform			X				
Butyl benzyl phthalate			X				
Cadmium	X		X				
Carbon tetrachloride			X				
Chlordane in Water Column	X		X				
Chlordane in Fish Tissue							X
Chloride	X		X				
Chlorine Produced Oxidants (CPO)	X						
Chlorobenzene			X				
Chloroform			X				
2-Chloronaphthalene			X				
2-Chlorophenol			X				
Chlorpyrifos	X						
Chromium			X				
Chromium+3	X						
Chromium+6	X						
Chrysene			X				
Copper	X		X				
Cyanide (Total)	X		X				
4,4'-DDD (p,p'-TDE)			X				X
4,4'-DDE			X				X
4,4'-DDT	X		X				X
Demeton	X						
Dibenz(a,h)anthracene			X				

Parameter	Aquatic Life (general and trout)	Recreation	Drinking Water Supply	Agricultural Water Supply	Industrial Water Supply	Shellfish Harvest for Consumption	Fish Consumption
1,2-Dichlorobenzene			X				
1,3-Dichlorobenzene			X				
1,4-Dichlorobenzene			X				
3,3'-Dichlorobenzidine			X				
1,2-Dichloroethane			X				
1,1-Dichloroethylene			X				
trans-1,2-Dichloroethylene			X				
2,4-Dichlorophenol			X				
1,2-Dichloropropane			X				
1,3-Dichloropropene (cis and trans)			X				
Dieldrin	X		X				X
Diethyl phthalate			X				
2,4-Dimethyl phenol			X				
4,6-Dinitro-o-cresol			X				
2,4-Dinitrophenol			X				
2,4-Dinitrotoluene			X				
1,2-Diphenylhydrazine			X				
Dissolved Oxygen	X						
E. Coli (freshwater)		X					
Endosulfans (alpha and beta)	X		X				
Endosulfan sulfate			X				
Endrin	X		X				
Endrin aldehyde			X				
Enterococci (saline)		X					
Ethylbenzene			X				
Fecal Coliform (saline)		X*				X	

Parameter	Aquatic Life (general and trout)	Recreation	Drinking Water Supply	Agricultural Water Supply	Industrial Water Supply	Shellfish Harvest for Consumption	Fish Consumption
Fluoranthene			X				
Fluorene			X				
Guthion	X						
Heptachlor	X		X				X
Heptachlor epoxide	X		X				X
Hexachlorobenzene			X				
Hexachlorobutadiene			X				
Hexachlorocyclopentadiene			X				
Hexachloroethane			X				
Indeno(1,2,3-cd)pyrene			X				
Isophorone			X				
Lead	X		X				
Malathion	X						
Manganese							X
Mercury in Water Column	X		X				
Mercury in Fish Tissue							X
Methoxychlor	X		X				
Methyl bromide (bromomethane)			X				
Methyl t-butyl ether (MTBE)			X				
Methylene chloride			X				
Mirex	X						
Nickel	X		X				
Nitrate (as N)			X				
Nitrobenzene			X				
N-Nitrosodi-n-butylamine			X				
N-Nitrosodiethylamine			X				
N-Nitrosodimethylamine			X				

Parameter	Aquatic Life (general and trout)	Recreation	Drinking Water Supply	Agricultural Water Supply	Industrial Water Supply	Shellfish Harvest for Consumption	Fish Consumption
N-Nitrosodiphenylamine			X				
N-Nitrosodi-n-propylamine (Di-n-propylnitrosamine)			X				
N-Nitrosopyrrolidine			X				
Parathion	X						
Pentachlorobenzene			X				
Pentachlorophenol	X		X				
pH (Standard Units)	X		X		X		
Phenol			X				
Phosphorus, Total	X						
Polychlorinated biphenyls (PCBs) in Water Column	X		X				
PCBs in Fish Tissue							X
Pyrene			X				
Radioactivity			X				
Salinity				X			
Selenium	X		X				
Shellfish Closures						X	
Silver	X		X				
Solids, Suspended (TSS)	X				X		
Solids, Total Dissolved (TDS)			X	X	X		
Sulfate			X				
Sulfide-hydrogen sulfide (undissociated)	X						
Temperature	X						
1,2,4,5-Tetrachlorobenzene			X				
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)			X				X

Parameter	Aquatic Life (general and trout)	Recreation	Drinking Water Supply	Agricultural Water Supply	Industrial Water Supply	Shellfish Harvest for Consumption	Fish Consumption
1,1,2,2-Tetrachloroethane			X				
Tetrachloroethylene			X				
Thallium			X				
Toluene			X				
Total Coliform						X	
Toxaphene	X		X				
1,2,4-Trichlorobenzene			X				
1,1,1-Trichloroethane			X				
1,1,2-Trichloroethane			X				
Trichloroethylene			X				
2,4,5-Trichlorophenol			X				
2,4,6-Trichlorophenol			X				
Turbidity	X						
Vinyl chloride			X				
Zinc	X		X				

* secondary contact recreation only

Appendix B

Comments and Agency Responses on the Draft 2012 Water Quality Monitoring and Assessment Methods (Methods Document)

Commenters:

Thomas Amidon, OMNI Environmental, LLC (OMNI)
Brent Gaylord, United States Environmental Protection Agency (EPA)
Laura Kelm, Great Swamp Watershed Association (GSWA)
Todd Kratzer, New Jersey Water Supply Authority (NJWSA)
Carleton Montgomery, Pinelands Preservation Alliance (PPA) and on behalf of the American Littoral Society and Clean Ocean Action.
Ashley Slagle, Passaic Valley Sewerage Authority (PVSA)

Section 1.1: Background

1. **Comment:** The Department should revise the third paragraph on page 1, so that it reads as follows (suggested text is shown in italics): "This Methods Document … provid[es] an objective and scientifically sound assessment methodology, including:
   - A description of the data the Department will use to assess support of the designated uses;
   - The quality assurance aspects of the data;
   - A detailed description of the methods used to evaluate compliance with the SWQS; and
   - A detailed description of the methods used to evaluate designated use support;
   - Changes in the assessment methodology since the last reporting cycle.
   - Rationales for any decision to not use any existing and readily available data and Information." (EPA)

   Response: The Department agrees and has revised this section of the final Methods Document as suggested by the commenter.

Section 1.2: Summary of Major Changes from the 2010 Methods Document

2. **Comment**: The Department should amend the Methods Document now to make the existing methods for assessing nutrient impacts on Aquatic Life uses accurate to the known condition of the Bay and applicable to other estuaries where scientific data is available. The background for this recommendation is the scientific data that sea grass biomass has plummeted from their natural states in Barnegat Bay and damaging macroalgae and phytoplankton blooms have repeatedly occurred (Kennish et al. 2007; Velinsky et al. 2011; Barnegat Bay Partnership 2011; Kennish et al. undated). To satisfy its required purposes, the Methods document must provide means to capture these impacts of eutrophication on Aquatic Life. (PPA)

Response: As indicated in the public notice and Section 1.2 of the Methods Document, work is currently underway to develop indexes to assess biological health and other methods for identifying the causes and sources of water quality impairment within the Barnegat Bay Watershed. This may include the development of watershed-specific thresholds and indices to evaluate biological conditions of submerged aquatic vegetation, benthic macroinvertebrates, phytoplankton, and chlorophyll *a*. Until such work is complete, the Department will assess water quality in the Bay based on existing water quality criteria and assessment methods for estuarine waters.

3. **Comment:** Will the Department use the most recent data available for Barnegat Bay to determine attainment status under the current methods? Or is the Department proposing to wait until all their 2-3 year monitoring and response indicator data is collected, and then assess the attainment status for Barnegat Bay based on the new methods developed? (EPA)

   Response: The Department used Summer 2011 data generated by the Barnegat Bay Monitoring Partnership, as well as data collected during the reporting period (January 2006 through December 2010) to assess compliance with adopted water quality criteria applicable to SE waters for dissolved oxygen, pH, temperature, and turbidity as part of the 2012 Integrated List. The Department also considered benthic macroinvertebrate assessments collected at stations located in the freshwater sections of the tributaries to the Barnegat Bay to assess support of the designated Aquatic Life Use.

4. **Comment**: The Department has proposed to de-list waters where arsenic levels exceed the Human health criteria because of the natural background levels. Where the natural background concentration is documented this information may require that the human health use designation to be reevaluated. Where the information indicates that the natural background concentration does not support a human health use previously believed attained, it may be necessary for the State to change the human health use to one that the natural background concentration will support (e.g., from drinking water supply to drinking water supply only after treatment). When evaluating natural conditions it is important to evaluate the protection of the designated human health uses (e.g., fish consumption, drinking water, and primary and/or secondary contact recreation). This evaluation is of particular significance because human health criteria are based on human health risk assessments, which include such elements as exposure pathways, state and tribally adopted risk levels, carcinogenicity, and systemic toxicity. These elements and considerations are not components in establishing naturally occurring levels of a naturally occurring pollutant. Based on the results of this evaluation, the state would determine that the human health use is still protected at the identified natural background concentration therefore attainable, or if not, re-evaluate and possibly remove the human health use designation. EPA will work with NJDEP to develop options to more fully address these potential issues as part of the upcoming Surface Water Quality Standards (SWQS) review/revision process. (EPA)

   Response: The Surface Water Quality Standards at N.J.A.C. 7:9B-1.5(c)1 state: "the natural water quality shall be used in place of the promulgated water quality criteria of N.J.A.C. 7:9B-1.14 for all water quality characteristics that do not meet water quality criteria as a

result of natural causes". The Department suspected that, for many waterbodies listed as impaired for arsenic, the arsenic concentrations assessed as exceeding criteria actually reflected the natural condition of the waterbody. The Department contracted with the U.S. Geological Survey (USGS) to conduct and analyze the levels of arsenic found in New Jersey waters to determine the concentrations that represent natural conditions. The results of this study will be used as a basis to delist arsenic where concentrations are found to represent natural conditions, as well as assessing new arsenic data. The Methods Document has been revised to include a new assessment method for arsenic that is based on a comparison to the naturally-occurring range of arsenic concentrations that occur in waters of the Inner and Outer Coastal Plain of New Jersey (see Sections 1.2, 4.1, and 7.2).

5. **Comment:** Commenter supports the Department's proposal to de-list arsenic impairments in areas where natural arsenic concentrations are expected to exceed criteria and requests that specific citations for the USGS study reports be included in the Methods Document, and that the USGS report(s) be made available for public review. (OMNI)

   Response: The Department appreciates the commenter's support. The Methods Document has been revised to include a new assessment method for arsenic that is based on a comparison to the naturally-occurring range of arsenic concentrations that occur in waters of the Inner and Outer Coastal Plain of New Jersey (see Sections 1.2, 4.1, and 7.2. While the Department cannot publish or duplicate copyrighted material, these reports are publically available and may be viewed in person upon request. A reference list for these studies has been added to the Methods Document at Section 11.1.

Section 3.0: Use and Interpretation of Data

6. **Comment:** What is the Department's justification/explanation for picking the 200-foot limit for AU representation? (EPA)

   Response: The Department assigns all monitoring stations to one or more subwatersheds. Stations located within 200 feet of another subwatershed are assigned to both subwatersheds. The Department may choose to associate stations more than 200 feet from the subwatershed after reviewing the land use patterns, tributaries, and known point and nonpoint sources of pollution.

7. **Comment:** The Department should specify in the Methods Document that ambient monitoring can utilize certified wet chemistry methods for the analysis of ambient water quality samples, which are not certified methods for New Jersey Pollutant Discharge Elimination System (NJPDES) permit compliance, then that should be clearly stated in the Methods Documents. (PVSC)

   Response: The Department does not require the use of analytical methods approved for use by the NJPDES permit program when analyzing ambient waters. The Department does require monitoring organizations to develop a Quality Assurance Project Plan (QAPP) that clearly identifies the methods to be used and the status of lab certification. The Department

reviews each QAPP to determine if the methods will generate valid water quality data that complies with the Department's methods for assessing compliance with applicable water quality criteria and designated use support.

Section 4.0: Evaluation of Data at the Station Level

8. **Comment:** A "*very brief timeframe*" should be more explicitly defined. For example, a two month shellfish closure due to a sewer line break should not be considered a transient event Events that are characterized as "Transient" must still be carefully considered and assessed to ensure that impacts are not major and do not have long-lasting effects. If and when a "transient event" is the justification used to not list an impairment, this decision needs to be explained and supported in the integrated report. (PPA)

   Response: A shellfish closure for any period of time caused by a known problem would not qualify as a transient event or result in placing the waterbody on the Section 303(d) List of Water Quality Limited Waters. Under the given scenario, the assessment unit would be assigned to Sublist 4B: "The designated use is not attained or is threatened and development of a TMDL is not required because other enforceable pollutant control measures are reasonably expected to result in the attainment of the designated use in the near future." Where a shellfish closure is implemented due to an unknown cause, the assessment unit would be assigned to Sublist 5 and placed on the Section 303(d) List for "Cause Unknown." As stated in Section 4.1 of the Methods Document, "Excursions attributed to any of these conditions will be explained and supported in the Integrated Report."

9. **Comment:** Why did the Department select non-parametric analysis if censored data are arbitrarily assigned the value of the detection limit and NJDEP calculates a median for those sets where the number of censored data points are below 50% of the set and deem the set insufficient if it is above 50%? (EPA)

   Response: The Department only assigns detection limit values to censored *pathogen data* because the Department uses a geometric mean in its standards. In other scenarios not requiring a geometric mean, where the criteria are based upon long-term averages, the Department believes it is justified in employing non-parametric procedures in determining central tendency because of the non-normal distribution patterns characteristic of these data.

10. **Comment:** The Department should add turbidity to the list of continuously monitored parameters and explain how continuous turbidity data will be compared against SWQS criteria. (OMNI)

    Response: The Department agrees that turbidity results generated from continuous data recorders should be used to assess compliance with applicable water quality criteria. Section 4.1 of the final Methods Document, under Continuous Monitoring - Turbidity", has been revised to read: "When evaluating continuous monitoring data for compliance with turbidity criteria, continuous records that are equal to or exceed 30 days will be compared against the 30-day average as well as the "not to exceed" criteria in the standards. Recordings of less

than 30 days will be assessed against the "not to exceed criteria". The Department will also revise the Surface Water Quality Standards turbidity criteria in future rulemaking to address the type of data generated by continuous monitoring meters.

11. **Comment:** The term "DO Flux" should be replaced with "DO Swing." Flux generally refers to mass transport. Here, the Department appears to be using the term as shorthand for "fluctuation." Table 4-4 uses the term "Swing," and it would be much clearer to use that terminology throughout. (OMNI)

    Response: The term flux here refers to the dictionary definition of "continuous change"; however, the Department agrees with the commenter about using consistent terminology and, as suggested, has replaced "flux" with "swing" in Section 4.1 under "Continuous Monitoring".

12. **Comment:** Under the heading "DO Flux", the Department should include frequency of exceedance information relating to whether the DO Swing is over 3 mg/l. If three 3-day events are monitored, this would result in 15 DO swing measurements (i.e. peak-to-trough, trough-to-peak, peak-to-trough, etc.). Surely NJDEP is not suggesting that if one out of fifteen swings exceeds 3 mg/l, the site would be assessed as having "robust photosynthetic activity." Here is one way NJDEP could handle this frequency of exceedance issue: discard the lowest individual DO swing during each diurnal event, and average the remaining swings for each diurnal event to determine the DO swing characteristic of that event. If the average DO swing over any three days exceeds 3 mg/l, then NJDEP could conclude that "robust photosynthesis is occurring at the site." There are many other methods that could be selected, but the important point is that NJDEP define the method in its Methods Document. (OMNI)

    Response: The Department agrees that using an average DO swing represents an improvement to the methodology; however, we are not clear as to the logic behind dropping the lowest value from a relatively limited data set. Therefore, the Department has revised the final Methods Document under Section 4.1 – Continuous Monitoring" to state that the Department will calculate the average of the daily measured DO swings to determine if the conditions indicate photosynthetic activity due to nutrient over-enrichment.

<u>Section 4.1: Evaluation of Physical and Chemical Data</u>

13. **Comment:** This section should include a reference to the DRBC criteria for Special Protection Waters in the Lower and Middle Delaware River. Are there cases where the more stringent State (NJ and PA) water quality criteria would be used for the Delaware River? (NJWSA)

    Response: As stated on page 2 of the Methods Document, the Delaware River Basin Commission (DRBC) assesses water quality data for the Delaware River mainstem, Estuary, and Bay. Their assessment results are reported in New Jersey's Integrated List and sub-tables of the 303(d) List. DRBC's 2012 Delaware River and Bay Integrated List Water Quality

Assessment Report and corresponding methods are available on DRBC's Web site at: http://www.state.nj.us/drbc/public.htm#305b.

14. **Comment:** Storm samples (±1.25" water-quality storm) should be used for determining the frequency of exceedances for TMDLs, loadings would be computed. (NJWSA)

    Response: Monitoring methods outlined in the Methods Document are used to support statewide water quality assessment, not to develop TMDLs. The commenter's recommendation is beyond the scope of the Methods Document.

15. **Comment:** Continuous monitoring for DO, pH, water temperature, salinity, and conductivity should be performed during seasonal (e.g., mid-June thru mid Sept) baseflow conditions. (NJWSA)

    Response: Continuous monitoring is performed during the summer growing season, which represents the most critical period for DO, temperature and pH.

16. **Comment:** Nutrient loadings should be weighted to MA7CD10 flows to determine ambient background concentrations during lower flows. (NJWSA)

    Response: The Department does not use loading estimates to project possible exceedences of criteria expressed as in-stream concentration. The Surface Water Quality Standards rules (N.J.A.C. 7:9B) establish the flow conditions under which criteria apply; generally, often, criteria do not apply to flows below the MA7CD10.

17. **Comment:** To accurately determine exceedances in DO and pH, aquatic-plant biomass should be: 1) quantified in the monitored section of stream for rooted or attached growths of periphyton and macrophytes, since chlorophyll α from phytoplankton can be masked in reaches with dense/competing growths of other aquatic plants; and 2) monitoring should be performed in stream reaches more susceptible to biomass productivity (i.e., open to sunlight, up to 3-foot depths, etc.). (NJWSA)

    Response: Aquatic macrophytes often draw their nutrients from their roots in the stream bottoms and may not depend on water column-based nutrients. Hence, such an intensive biomass study would be highly cumbersome and inconclusive. The Department's sampling method for periphyton is deigned to obtain as representative a sample as possible at the location in question. The Department acknowledges that stream reaches may be heavily shaded, in which case the water column nutrient concentration may not be expressed in high primary productivity. This is one of the reasons why the nutrient impact assessment methodology was developed by the Department.

18. **Comment:** Nutrient and other water quality analytes related to non-point source contamination should be monitored/sampled during storm-runoff events (including leading edge and trailing edge of hydrograph). Most sampling is, and has historically been more representative of trailing-edge and baseflow conditions. (NJWSA)

Response: The Department does not agree that stormwater monitoring data is required for the Integrated Water Quality Monitoring and Assessment process that is conducted on a statewide basis.

Section 4.2: Pathogenic Indicators

19. Comment: This section should include a substrate assessment similar to that utilized in Section 4.3 for Benthic Macroinvertebrate Data, since finer substrates can promote shallower anaerobic conditions and extensive coliform bacteria colonization and re-suspension, unrelated to anthropogenic contaminant sources. (NJWSA)

Response: The Department us unclear as to what "substrate assessments" the comment is referring to in Section 4.3.

Section 4.3: Biological Data

20. Comment: The Biotic Index of Integrity proposed is "currently being developed for the New York/New Jersey Harbor Estuary" based on EPA's REMAP protocol and studies from 1998. It is not clear if the method is being updated or not, or how this information will be used. It is also not clear if this index is being developed to evaluate specific nutrient-related impacts or if it will be used to only assess dissolved oxygen (DO) and toxin impacts. More information is needed to explain the benthic macro invertebrate analysis process. (PPA)

21. Comment: The index is applicable to Raritan Bay, Arthur Kill, and Kill van Kull, but does not mention Newark Bay (although Newark Bay was part of the area the index was developed for). Will another index be used for Newark Bay or will it not be assessed? (EPA)

Response to Comments 20 and 21: The benthic index for the NY-NJ Harbor waters was developed by USEPA in 1998. This index will be used to assess any new benthic macroinvertebrate samples collected from all waters of the NY-NJ Harbor Estuary. The Department has revised Section 1.2 "Summary of Changes" to read: "A new Benthic Index of Biotic Integrity has been developed for the New York/New Jersey Harbor Estuary (see Section 4.3)." The Department has revised the second paragraph under "Benthic Macroinvertebrate Data" in Section 4.3 to read: "A fourth Benthic Index of Biotic Integrity was developed for the New York/New Jersey Harbor Estuary based on USEPA Region 2's Regional Environmental Monitoring Assessment (REMAP) protocol and will be applied to all waters within the New York/New Jersey Harbor Estuary."

22. Comment: The cutoffs for impaired/not impaired, the ranges should include the possibility of a score of "3", e.g. <3 and 3-5 (instead of <3 and >3). (EPA, NJWSA)

Response: The Department has revised Table 4.3a: Descriptive and Regulatory Thresholds for Biological Metrics to indicate scores equal to or greater than 3 denote no impairment while scores less than 3 denote impairment.

23. Comment: An index is still needed for the coastal ocean assessment. (PPA)

Response: As stated on page 22 of the 2010 Integrated Report, "New Jersey is working in partnership with USEPA's Atlantic Ecology Division (AED) and USEPA Region 2's Monitoring and Assessment Program to develop additional biological assessment methods for New Jersey's marine and estuarine waters. The Department, USEPA AED, USEPA Region 2, and Rutgers University are working together to develop a benthic index to evaluate aquatic life use in the nearshore New Jersey ocean waters. The Department received a draft of the final report in March. This index is expected to be finalized later in 2012. Since this index is not yet final it was not included in the 2012 Methods Document. We expect to include the new index in the 2014 Methods Document.

24. Comment: What is the rationale for listing the fish IBI fair category as "not impaired" in Table 4.3b - Fish Index of Biotic Integrity (FIBI)? Could "Fair" be interpreted as "Impaired" pending site conditions? (EPA, NJWSA)

Response: A workgroup comprised of representatives from the Department's Division of Fish and Wildlife, Bureau of Freshwater and Biological Monitoring, Bureau of Water Quality Standards and Assessment, along with the USEPA, USGS, and the Philadelphia Academy of Natural Sciences (PANS) reviewed the Department's preliminary work developing an Index of Biotic Integrity (IBI) for the northern part of the State. In reviewing the biological condition (i.e. raw data) reflected in each of the assessment categories of "excellent," "good," "fair" and "poor," that the workgroup determined that the "excellent" and "good" categories clearly reflected unimpaired conditions and the "poor" category clearly reflect impaired conditions. The "fair' category was less clear, showing a mixed assemblage of fish community types, some of which are associated with impaired conditions and others that are associated with unimpaired (i.e., healthy) conditions. As a result, the Department determined that only the "poor" category would be assessed as impaired. The Department will continue to refine this index and is currently exploring how the breakpoints of "good", "fair", and "poor" might be adjusted to provide clear thresholds delineating aquatic life use support and non-support

<u>Section 4.4: Assessment of Nutrient Impacts</u>

25. Comment: The proposed method for assessing nutrient impacts continues to ignore estuarine waters such as Barnegat Bay and should be amended before adoption. The current narrative standard for nitrogen can and should be applied now to estuary waters and evaluated in light of impacts such as sea grass declines and harmful algal blooms. The Methods document should include a description of how the Department will apply existing data on aquatic life to the narrative nutrient criteria provision. The section which focuses on whether phosphorus is the cause of impairment of freshwaters omits consideration of the transport of phytoplankton and/or macro algae detritus and deposition. We are concerned about the precedence this sets for the assessment of all nutrient impacts. Table 4.4 and the section text indicate a benthic impairment that has a DO exceedance but does not have a DO swing present on site is,

therefore, not caused by phosphate. However, it seems plausible, and even likely, that phosphate (or nitrogen) could support phytoplankton and/or macro algae photosynthesis at an upstream location. This organic matter could then be transported downstream where it could smother the benthos or decompose reducing DO levels and cause impairments. Yet, because of the lack of DO swing at the downstream site, this area would be incorrectly determined to be not caused by phosphate. The potential spatial disconnect between surface and bottom water DO levels needs to be recognized and evaluated in the assessment process. (PPA)

26. Comment: In December of 2010, the NJDEP adopted the revisions to its narrative nutrient criteria making it applicable to all waters of the State. The first sentence of the paragraph should read as follows: "The SWQS include narrative nutrient criteria that apply to all waters of the State". (EPA)

Response to Comments 25 and 26: The Department has revised Section 4.4 to indicate that the narrative nutrient criteria apply to all waterbody types; however, the Department has developed a method to evaluate nutrient impacts only in freshwater wadeable streams. The titles of Section 4.4 and Table 4.4 have been revised to make that clear. Until assessment methods and thresholds are developed for lakes, estuaries, ocean waters, and non-wadeable rivers, and incorporated into the Methods Document, no assessments will be made to determine whether the narrative nutrient criteria is met for those waters.

As stated in the public notice for the draft 2012 Methods Document, the Barnegat Bay has received priority status and as such is proceeding on a separate timeline, independent of the 2012 303(d) List. The assessment method developed for the Bay will be proposed for public review and comment separately from the draft 2012 Methods Document and, once finalized, will be employed to assess the waters of the Barnegat Bay Watershed. The Department expects the water quality assessment of the Barnegat Bay to be completed in 2013. Any new 303(d) Listings that emerge as a result of the Barnegat Bay assessment will be proposed as a separate amendment to the Statewide Water Quality Management Plan, in accordance with N.J.A.C. 7:15-6.2. The Department will still include the Barnegat Bay in its statewide assessment of water quality for 2012; however, that assessment will be based primarily on concentrations of dissolved oxygen and levels of pathogenic bacteria, as described in the draft 2012 Methods Document.

27. Comment: According to the EPA approved TP criterion, TP concentrations of 0.05 mg/L must be met and there is no "biological off-ramp" available. State's "new" nutrient criteria are providing such off-ramp, however these "new" criteria are not approved by EPA. In addition, State did not yet develop an appropriate assessment methodology for lakes. (EPA)

Response: As indicated in the previous response, a nutrient assessment method has not been established for lakes. Therefore, the Department will continue to evaluate lakes based on the numeric phosphorus criteria of 0.05 mg/l.

28. Comment: New Jersey established an assessment procedure for wadeable streams only, thus the nonwadeable streams remain not assessed against applicable numeric standard for TP. (EPA)

Response: A narrative nutrient assessment method has only been established for freshwater wadeable streams. The Department will continue to use the numeric phosphorus criteria of 0.1mg/l to evaluate nonwadeable freshwater rivers that are not tidal.

29. Comment: The new method for assessing compliance with the numeric TP criteria applicable to NJ's streams is not consistent with EPA approved numeric nutrient criterion. The assessment methodology refers to the "new" criteria not yet approved by EPA but does not refer to an assessment of "limiting factor", which is one of the criteria listed in the EPA-approved numeric criterion for TP. (EPA)

Response: On June 30, 2011, EPA approved the recodification and revisions to the narrative nutrient criteria and the extension of the narrative nutrient criteria to our SE and SC waters. At our request, EPA did not review the changes proposed to the numeric phosphorus criteria. The limiting nutrient was removed from the narrative nutrient criteria and was approved by EPA. The narrative nutrient criteria assessment method only applies to freshwater wadeable streams. The method requires biological monitoring and diurnal dissolved oxygen to be monitored during the same growing season. Few locations have the necessary data to make an assessed decision. Where data is not available but the numeric phosphorus criteria is exceeded, the waterbody will be added to or remain on the 303(d) list until the necessary data is available to complete an assessment.

30. Comment: The Department indicates "These Chlorophyll a measurements are required only when the nutrient impact assessment is inconclusive". Chlorophyll should be measured before the assessment is completed. At that time it would be determined if the chlorophyll a data will be used for assessment or not. The sentence should be revised to read as follows: "The use of Chlorophyll a data is required only when the nutrient impact assessment is inconclusive". (EPA)

Response: The Department agrees with the comment and has removed the statement: "These Chlorophyll *a* measurements are required only when the nutrient impact assessment is inconclusive" from Section 4.4

31. Comment: The nutrient criteria method described in this document refers only to the assessment of the Aquatic Life use. If the Department believes that by protecting the Aquatic Life use, other uses are also protected, then the Department would need to show that Aquatic Life use is the most sensitive use. (EPA)

Response: The Department believes that addressing nutrient impairment to aquatic life use in streams will improve other uses. The Department is not asserting that the Aquatic Life Use is the most sensitive or protective of other designates uses. The nutrient impact assessment method described in the 2012 Methods Document address the narrative nutrient criteria

which is intended to protect Aquatic Life Uses in freshwater wadeable streams. The impact of excessive nutrients on recreation and water supply are subjective and may be related more to personal preference than science. Aquatic plants can be perceived as a nuisance by bathers and boaters but are often necessary to maximize the habitat necessary for aquatic life. As a result, numeric and/or narrative nutrient criteria have not been promulgated that are protective of the other designates uses.

As stated on page 3 of the Department's Nutrient Criteria Enhancement Plan, which was approved by USEPA in June 2009, "Additional monitoring, as well as biological indicator development, is needed in other types of waters to support nutrient criteria development … monitoring data is needed to identify the causes and effects of excessive nutrients on riverine, estuarine, and marine ecosystems and to determine if aquatic life use is impaired, if impairment is due to nutrients, and if so, to develop appropriate nutrient criteria and/or reduction strategies for these types of waters."

The Methods Document includes methods for assessing compliance with promulgated water quality criteria. Once nutrient criteria protective of the other designated uses have been promulgated, methods for assessing compliance with such criteria will be developed and proposed in a subsequent Methods Document.

32. Comment: The Department should replace the word "exceedance" with the word "violation" every time it occurs in the "Dissolved Oxygen" column. Since DO criteria are minimums rather than maxima, it is confusing to use the term "exceedance." (OMNI)

Response: The Methods Document uses the term "exceedance" to mean non-compliance with an applicable criterion, whether non-compliance is due to parameter levels that are lower or higher than the criterion. While we agree that it may be confusing to refer to non-compliance with the DO criterion as an "exceedance" when it actually refers to a concentration that is lower than the criterion, the meaning of the term "exceedance" is inferred from its context within the Methods Document, and specifically in context with other relevant terms (e.g., "excursion") defined in Section 4.1: Evaluation of Physical and Chemical Data. We believe that use of the term "violation" for DO only would be even more confusing, and use of the term violation for all exceedances could be misconstrued as an event that triggers a regulatory response such as a "permit violation" under the NJPDES Permitting Rule at NJAC 7:14A.

33. Comment: Please provide literature citations that support the 3 mg/l D.O. swing guideline. (EPA)

Response: This comment refers to the statement in Section 4.4 that reads, "The Department has determined that diurnal fluctuations in DO concentration in excess of 3 mg/l are a strong indication that photosynthetic activity is due to nutrient over-enrichment." This statement does not mean that the Department intends to apply DO swing as an independent indicator of nutrient impairment. Neither the Department nor its Science Advisory Board (SAB) has found any literature to support adopting a swing in DO as a water quality standard. However,

the Department has determined that where biology is impaired and DO criteria are met, diurnal DO swing above 3 mg/L may indicate causes other than total phosphorus, which may be confirmed by evaluation of other factors, such as periphyton Chlorophyll *a.* Therefore, the Department intends to use diurnal DO swing, along with other factors, to determine if nutrients (specifically, total phosphorus) are the cause of aquatic life use non-support, as explained in the Methods Document.

34. Comment: Change "that photosynthetic activity is due to nutrient over-enrichment" to "that robust photosynthesis is occurring at the site." A diurnal DO swing of 3 mg/l is certainly not indicative of nutrient enrichment. On the contrary, as shown in Table 4-4, if the diurnal DO swing is above 3 mg/l, but there is no violation of DO criteria and chlorophyll-a density is not excessive, the Department would conclude that phosphorus is not causing use impairment. The suggested language is consistent with the Department's nutrient assessment methodology as summarized in Table 4-4. This paragraph should also include reference to nighttime lowering of DO and pH from aquatic plant and other biotic respiration, transforming the resultant CO2 to carbonic acid. (OMNI, NJWSA)

Response: The language used in Table 4-4, specifically the term "excessive photosynthetic activity," is consistent with the narrative nutrient criteria in the Surface Water Quality Standards.

Section 5.0: Evaluation Data from Multiple Stations with an Assessment Unit

35. Comment: Assessment results from tributary stations should be weighted based on the percentage of flow volume that the tributary contributes to the assessment unit. A low flow tributary not meeting an applicable SWQS should not be the only determining factor for an assessment unit being listed as non-supporting. (GSWA)

Response: The assessment methods utilize a conservative approach and equally weights the assessment outcomes at all stations within an assessment unit. However, the Department agrees with the commenter that each station should be evaluated based on its overall contribution. The Department employed a more holistic approach to review potential new listings and delistings for the 2012 listing cycle. As a result, in assessment units with multiple monitoring locations, we placed more emphasis on stations located at the downstream end of a given subwatershed, validated the applicability of station assignments, and in some cases, used a weight of evidence approach to list and/or delist a pollutant. This comprehensive assessment information will be published with the draft Integrated Report.

36. Comment: TMDLs and C1 stream classification should continue to upstream HUC 14s where appropriate to suppress current or future degradation of water quality in those stream sections flowing into the protected downstream reach(es) from upstream contaminant source(s). This would provide quantitative regulatory criteria for protection of designated uses, specifically "Drinking Water Supply" for the more than 1.5 million users of surface water in the NJ Water Supply Authority's service area. (NJWSA)

Response: This comment is beyond the scope of the Methods Document.

37. Comment: "Measurable Change" and "Existing" water quality should be quantified in-situ to determine any existing or future site-specific degradation, similar to the DRBC criteria for these same regulatory parameters. This would provide a target criterion for undesignated HUC 14s upstream of TMDL and C1 stream sections (i.e., many streams in NJ have TP levels less than 1.0 mg/l, thus susceptible to degradation up to the regulatory limit). This would provide quantitative regulatory criteria for protection of designated uses, specifically "Drinking Water Supply" for the more than 1.5 million users of surface water in the NJ Water Supply Authority's service area. (NJSWA)

Response: This comment refers to the Antidegradation Policy established in the Surface Water Quality Standards rules at N.J.A.C. 7:9B and is beyond the scope of the Methods Document.

38. Comment: Water quality models are predictive tools. As such, models should only be used in the management decisions for determining pollutant loading reductions required by Total Maximum Daily Loads (TMDLs), and not for determination of compliance with SWQS and attainment of designated uses in the Integrated Report. If current tangible data is available, that data should supersede any model predictions for the determination of compliance with Surface Water Quality Standards (SWQS) and attainment of designated uses in the Integrated Water Quality Monitoring and Assessment Report (Integrated Report). (PVSC)

39. Comment: The Department should not delist a water body, or assessment unit, based on modeling results alone. While modeling is a useful tool for determining threatened status and increasing understanding of water quality dynamics, compliance with the SWQS criteria must be based on actual sampling data for listing and delisting purposes. Models cannot account for all environmental variability and should not be relied on exclusively for assessment purposes. However, if modeling data is the only option available, then it must be used only as a protective measure for a water body and not for a delisting. (PVSC)

Response to Comments 38 and 39: Water quality models are generally used to simulate critical conditions, which are very difficult on monitor in real time. In addition, water quality models may have the ability to predict water quality outcomes over various scenarios over various time periods, whereas, actual sampling data depicts only a static set of conditions at one point in time. Therefore, water quality models may actually provide a better assessment of water quality than actual sampling data. However, as indicated in Section 5.0 of the Methods Document, model may be used to list/delist causes in an assessment unit, if the Department determines that the model adequately predicts water quality conditions.

<u>6.0: Designated Use Assessment Methods</u>

40. Comment: TSS and turbidity should be included in the "Minimum Suite of Parameters" needed to assess the Drinking Water Supply Use in Table 6.0: Minimum Suite of Parameters Needed to Determine Use Is "Fully Supporting".

Response: The surface water quality criteria for TSS and turbidity established in the Surface Water Quality Standards rules (N.J.A.C. 7:9B) were developed for aquatic life use protection. TSS and turbidity are not evaluated to assess the Drinking Water Supply use. Therefore, it would not be appropriate to include TSS and turbidity in the minimum suite of parameters for the Drinking Water Supply use assessment.

Section 6.1: Aquatic Life Use Assessment

41. Comment: The Aquatic Life use assessment method should be amended to make explicit biological monitoring data to be incorporated into this use assessment includes all available data, such as data on sea grass and shellfish declines in Barnegat Bay. DO temperature and toxic chemicals are not the only physical/chemical parameters relevant to the shallow estuary context, such as in Barnegat Bay, and exclusive reliance on such measures can be misleading in this context. In addition, therefore, this section should be amended to clarify that in shallow estuaries, where biology is impaired but DO and temperature are not, the water body should be categorized as impaired for aquatic life. (PPA)

Response: This may include the development of watershed-specific thresholds and indices to evaluate biological conditions of submerged aquatic vegetation, benthic macroinvertebrates, phytoplankton, and chlorophyll *a*. Until such work is complete, the Department will assess water quality in the Bay based on existing water quality criteria and assessment methods for estuarine waters.

6.2: Recreational Use Assessment Method

42. Comment: This section states in part that, "Recreational use support is assessed primarily by comparing the geometric mean (geomean) of the water quality data for pathogenic indicators to the appropriate SWQS criterion (see Section 4.2). At least five samples collected over a 30-day period are required to calculate the geomean; however, other sampling frequencies may be acceptable provided that the frequency supports the statistical method for calculating a seasonal geomean." The SWQS state that, "The Department shall utilize a geometric mean to assess compliance with the bacterial quality indicators at N.J.A.C.7:9B-1.14(d)1ii-iii. The geometric mean shall be calculated using a minimum of five samples collected over a thirty-day period." The SWQS do not include the qualifier that, "however, other sampling frequencies may be acceptable provided that the frequency supports the statistical method for calculating a seasonal geomean." Each applicable State criterion for pathogens must include a specified magnitude, duration and frequency (EPA currently allows for State flexibility in defining appropriate averaging periods for enterococci and e-coli to protect the primary contact recreation use). The assessment methods must then be based on the specified magnitude, duration and frequency components of each criterion, and not provide for "other sampling frequencies" which may be inconsistent with the

underlying criteria. EPA Region encourages NJDEP to clearly specify the allowable duration and frequency components of each of its pathogen criteria as part of the upcoming SWQS review/revision process. (EPA)

Response: While this comment is beyond the scope of the Methods Document, the Department agrees with the commenter and will clarify the allowable duration and frequency components of its pathogen criterion in future Surface Water Quality Standards rulemaking.

Section 6.4: Shellfish Harvest for Consumption Use Method

43. Comment: The Department has historically used this method and designated use only to measure the safety of consuming what shellfish a person can find in a water body. This interpretation is too narrow. Where water quality changes and other stressors have substantially – or, as in the case of Barnegat Bay, catastrophically, reduced the abundance of shellfish to be harvested, this use is impaired. The method to assess the shellfish harvest for consumption should include a distinct measure of impairment based on quantitative reduction in shellfish populations. (PPA)

Response: The shellfish harvest for consumption use is based upon the water quality necessary to support unrestricted shellfish harvest. Water quality conditions that impact whether shellfish are safe to harvest are factored into the Department's shellfish classification system. Many factors could affect the shellfish population, including overharvest, temperature, habitat, invasive species, and water quality. For this reason, the Department is working to develop an integrated biotic index for our estuaries that considers benthic community, submerged aquatic vegetation, phytoplankton, fish, and crabs. Once this new IBI is available for Barnegat Bay, it will be evaluated for use in other estuarine waters.

44. Comment: Extensive dissolved oxygen, salinity, temperature, and chlorophyll *a* data have been generated for the near shore zone of NJ in 2009, 2010, and 2011 (funding from EPA to DEP and Rutgers). Those data should be incorporated into NJ's assessment process. This data should be used until assessment methods have been developed to utilize the Autonomous Underwater Vehicle (AUV) data. (EPA)

Response: Beginning in 2011, the Department began collecting continuous monitoring data for dissolved oxygen along the New Jersey coast using an Autonomous Underwater Vehicle (AUV). This equipment monitors conditions along transects collecting measurements from the surface down thru the water column. The Department continues to use available grab sample measurements for the ocean assessment. In estuarine waters, the grab sample measurements are supplemented with data reported at a few fixed monitoring stations. This data was used to list the nearshore ocean waters as impaired based on grab samples collected at the bottom of the water column for dissolved oxygen. The Department plans to validate the DO listing for the nearshore ocean waters based upon the biological conditions as determined by the nearshore ocean index.

Section 7.1: Identifying Causes and Source of Non-Support (303(d) List

45. Comment: The DEP should document the sources of data used in assessing each assessment unit, particularly those assessment units listed as non-supporting for a designated use. (GWWA)

Response: The Department began utilizing EPA's Assessment Database (ADB) in 2006 to document assessment results. The Department identified stations (current and historic) assigned to each assessment unit in Appendix A – Status of Designated Uses by Subwatershed. Through the comprehensive assessment process employed for the 2012 cycle, the Department has developed detailed documentation supporting each new listing and delisting decision, including the station or stations with data that resulted in a listing decision. The Department is currently working to develop an appropriate format to make this information available to the public.

Section 8.0: Method to Rank and Prioritize Assessment Units That Do Not Fully Support Designated Uses

46. Comment: The priority ranking methodology appears to be largely driven by the TMDL schedule. While establishing TMDLs is certainly an important regulatory milestone, priority should also be given to address toxic contamination that might be due to ongoing local sources. For instance, as you may recall, only two freshwater streams were designated as impaired by benzene in the 2010 List: the lower Raritan River and Middle Brook. A major Superfund site lies just upstream of the confluence of these streams, and is known to have significantly contaminated the shallow groundwater with benzene and other toxics. However, the 2010 Integrated List identified the benzene impairment as a Low Priority, while phosphorus and TSS were identified as "Medium Priority." As part of the prioritization process, impairments due to toxics should be screened to identify those that might be caused by local environmental hazards, as opposed to regional or background influences that will take longer to isolate. The fact that these two streams, adjacent to one another, are the only ones impaired by benzene implies that the cause is likely local in nature (which we now know to be true), and should have provided the basis to assign a high priority for closer evaluation. Such a prioritization methodology would have focused attention sooner on the ongoing benzene contamination in the Raritan River, even if a TMDL is not the preferred regulatory solution. There may be other ongoing local contamination sources in the State, and the impairment prioritization should help draw attention to them as well. (OMNI)

Response: Section 8 of the Methods Document identifies the factors the Department takes into consideration when ranking pollutant/waterbody combinations for TMDL development, including expected TMDL complexity, additional data and information needed, potential sources of the pollutant, severity of the actual or threatened exceedance, the spatial extent, the status of other TMDLs currently under development; and other ongoing pollutant/pollution control actions that could result in water quality restoration such as a site remediation activity. EPA allows states to delist causes from the 303(d) list if other enforceable measures are in place and will ensure that the water quality is restored. The Department could consider delisting the benzene impairment in lower Raritan River and

Middle Brook with a TMDL alternative, if the remediation effort is expected to treat benzene to meet water quality standards. The Department believes that the factors used to prioritize the development of TMDLs adequately addresses water quality problems due to contaminated sites.