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

2010 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

September 2010

State of New Jersey
Chris Christie, Governor

NJ Department of Environmental Protection
Bob Martin, Commissioner

2010 Final Integrated Water Quality Monitoring and Assessment Methods

Erratum

The Draft 2010 Integrated List of Waters (Integrated List), also known as the "Statewide Water Quality Inventory Report" or the "305(b) Report", was generated using USEPA's Assessment Database (ADB) Assessment Unit Summary report format and was renamed the "Draft 2010 Status of Designated Uses by Subwatershed". A fact sheet explaining how to read the Status Report is available on the Department's Web site at http://www.state.nj.us/dep/wms/bwqsa/2010_integrated_report.htm.

Where the Methods Document refers to the Integrated List of Waters or Integrated List, the reader is referred instead to the Status Report described above. Where the Methods Document refers to the outcomes of assessing "use attainment" as "attained", "not attained", or "not assessed", the Status Report refers to the outcomes of assessing use "support" as "fully supporting", "not supporting", and "insufficient information", respectively. Where the Methods Document refers to the Integrated List Sublists (Sublists 1 through 5), the Status Report displays the assessment results as follows:

Methods Document	**Status Report**
Sublist 1	Fully Supporting for all uses shown
Sublist 2	Fully Supporting
Sublist 3	Fully Supporting
Sublist 4	Not Supporting (pollutant identified; TMDL status "completed")
Sublist 5	Not Supporting (pollutant identified; TMDL status blank)

Table of Contents

List of Tables

List of Figures

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) 2010 Integrated Report will continue to follow the integrated format to provide an effective tool for maintaining high quality waters where designated uses are attained, and improving the quality of waters that do not attain their designated uses.

The Integrated Report includes an "Integrated List" that combines the reporting requirements of Sections 305(b) and 303(d) of the Act. The Integrated 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 Integrated List identifies the status of all applicable designated uses for every assessment unit by labeling the results of each designated use assessment as one of the five sublists (see Section 7.1 for complete sublist descriptions). Sublists 1 through 5 satisfy the assessment and reporting requirements of Section 305(b), while Sublist 5 is also used to specifically satisfy Section 303(d).

Section 303(d) requires states to 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). This list is referred to as the "List of Water Quality Limited Segments" or the "303(d) List". The Department will be submitting the 2010 Integrated List to USEPA Region 2 via its Assessment Database (ADB). However, since the public will be afforded the opportunity to review and comment on the Integrated List, the Department will also generate an Integrated List Table that organizes assessment results by assessment unit, designated use, and sublist. The Department will also generate a separate List of Water Quality Limited Segments (303(d) List) that includes all assessment units identified as Sublist 5 (i.e., not attaining one or more designated uses), the specific pollutants not meeting SWQS in each assessment unit, and the relative rank of the assessment unit/parameter combination for TMDL development.

USEPA Guidance recommends placing the assessment results into one of five specific categories. The Department has chosen to use the term "sublist" rather than "category" when referring to the Integrated List, to avoid confusion between Category 1 of the Integrated List and Category One Waters designated under New Jersey's SWQS at N.J.A.C. 7:9B. Prior to developing an Integrated List, states are required to publish, for USEPA and public review, the methods used to collect, analyze, and interpret data, and place assessment units on their respective sublists. 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 attainment of the designated uses;
- The quality assurance aspects of the data;
- A detailed description of the methods used to evaluate designated use attainment;
- The rationale for the placement of assessment units on one of the five sublists.

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 attainment 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 (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 assesses water quality data for the Delaware River mainstem, Estuary, and Bay. Their assessment results are reported in sub-tables of New Jersey's Integrated List of Waters and Section 303(d) List of Water Quality Limited Waters, except for assessment of shellfish waters in the New Jersey portion of the Delaware Bay, which is assessed by the Department and reported in the main tables of the 2010 Integrated List and 303(d) List. DRBC's *2010 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/10IntegratedList/.

1.2 Summary of Major Changes from the 2008 Methods Document

Assessment Units: The Department revised New Jersey's hydrologic unit code 14 (HUC 14) subwatershed boundaries resulting in a total of 969 HUC 14 subwatersheds in New Jersey.(see NJGS Technical Memorandum TM09-2, *Revision to New Jersey's HUC 14s, 2009, with a correlation to HUC 12s*, available on the Department's Web site at http://www.state.nj.us/dep/njgs/pricelst/tmemo/tm09-2.pdf). New Jersey's assessment units for the 2010 Integrated Report are based on the updated HUC 14 boundaries, excluding HUCs containing international and interstate waters, for a total of 960 assessment units in New Jersey In addition, as indicated above, New Jersey will incorporate DRBC's assessment for 15 AUs for the river, estuary, and bay as a separate table.

Fish Consumption Use Assessment and 303(d) Listing: The Department has modified the fish consumption use assessment method to reflect the direct assessment of concentrations of bioaccumlating toxic parameters in fish tissue. For all bioaccumlating toxic parameters except mercury, the assessment threshold for use attainment is the concentration considered safe for unlimited fish consumption by infants, children, pregnant women, nursing mothers, and women of childbearing age (i.e., the "high risk" population). For mercury, the use attainment threshold is based upon the concentration established in the Department's statewide mercury TMDL, which is designed to protect high risk populations but will still result in a consumption advisory of one meal a week. The fish consumption use assessment methods now also include evaluation of compliance with human health criteria for water column toxic pollutants expected to

bioaccumulate in fish tissue. Details of the new fish consumption use assessment method for mercury and other toxics are provided in Section 6.3.

Nutrients: The Department will use a new assessment method to evaluate nutrient impairment of wadeable freshwaters based on response indicators using a "weight of evidence" approach that will determine whether phosphorus causes non-attainment of the aquatic life use. This method will be applied where biological and continuous monitoring data collected during the same summer season are available. Where sufficient data is not available to apply the new method, the Department will assess nutrient impairment based on compliance with the existing numeric SWQS criteria for phosphorus. Freshwaters previously assessed as not attaining the aquatic life use based on exceedances of the numeric phosphorus criteria will be delisted only if it can be demonstrated that the narrative nutrient criteria has been met. Details of the new assessment methodology are found in Section 4.4. The Department will continue to refine and expand the nutrient impact assessment method to include other types of waterbodies and other response indicators, as explained in the *New Jersey Nutrient Criteria Enhancement Plan* (NJDEP, 2009) available on the Department's Web site at http://www.state.nj.us/dep/wms/bwqsa/Nutrient_Criteria_Enhancement_Plan.Final.pdf.

Temperature: The seasonal average temperature criteria have been replaced with acute and chronic criteria to better protect the State's cold and warm water fisheries (see 41 NJR 4735(a)). The Department will evaluate continuous monitoring data with recordings taken anywhere between once per hour to every 15 minutes for weeks at a time against these new shorter term criteria (see Section 4.1, Temperature under Continuous Monitoring).

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 Integrated List. 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 attainment 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 uses, to the development of the Integrated List, 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 List. 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, 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. Chapter 4 also includes a new method for assessing nutrient impacts on water quality.

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, macroinvertebrate metrics, modeling results, and shellfish classification data.

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, and the minimum suite of parameters needed to assess attainment of each use. Chapter 6 also discusses the process used to assess attainment based on data sampled from multiple locations and/or for multiple parameters, the parameters associated with each designated use (Appendix A), and the minimum suite of parameters needed to determine that each designated use is attained. (Table 6.0).

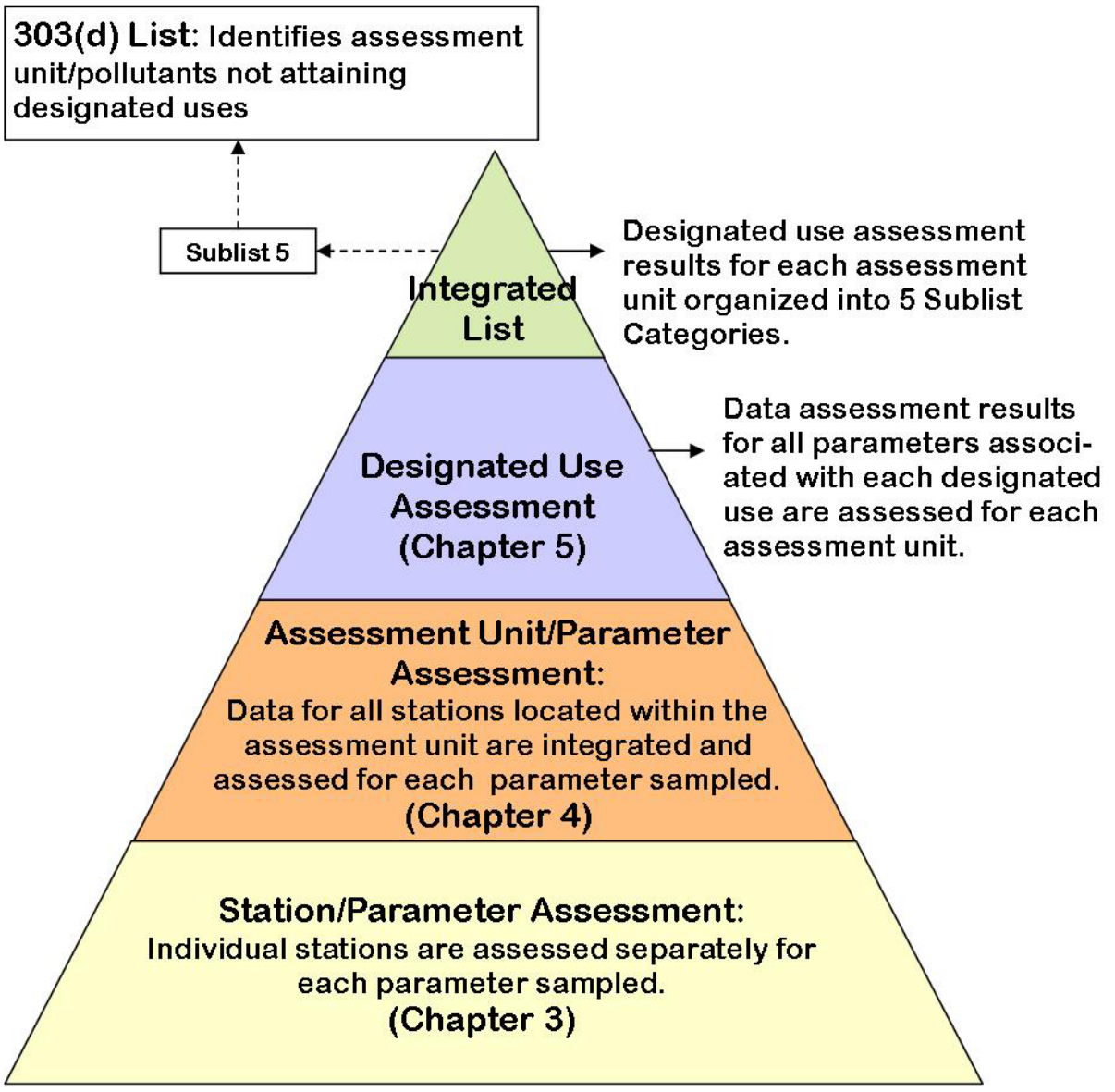
Chapter 7: Integrated Listing Guidance

Chapter 7 explains how assessment results for each assessment unit/designated use combination are depicted on the Integrated List and assigned to the appropriate sublist, taking into consideration the status of TMDLs. For each assessment unit/designated use identified as Sublist 5, the Department will identify the pollutant(s) causing the non-attainment of a designated use and place the assessment unit/pollutant combinations on the 303(d) List along with the assessment unit name and its priority ranking for TMDL development. Figure 2 on the following page illustrates the relationship between the different levels of data assessment explained in Chapters 4, 5, and 6 and used to generate the Integrated List.

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

Chapter 8 describes the methods used to rank and prioritize waterbodies for TMDL development pursuant to the requirements of the federal Clean Water Act. Chapter 9 describes the State's approach to obtaining additional data to assess compliance with SWQS in all assessment units, and to support TMDL development. Chapter 10 outlines the public participation requirements and process, both regulatory and non-regulatory, employed in the development and finalization of the Integrated List. Among other things, Chapter 10 describes the data solicitation and the public notification processes.

Figure 2: Overview of the Water Quality Assessment Process



3.0 Use and Interpretation of Data

The Department reviews all existing and readily available data. 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 Integrated List.

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 are used and results can easily be compared with more recent data. The Department may apply less weight to data less than five years old if newer data was collected or analyzed using scientific methods that are more precise and/or more accurate.

Electronic Data Management: The Department is migrating to a new water quality data exchange system (WQDE) for the submission of all water quality monitoring data. Only data submitted via WQDE will be considered "readily available" for use in developing the Integrated Report due to the significant effort needed to computerize and analyze data submitted in different formats. The Department has requested that monitoring organizations seeking to have their data used for the 2010 Integrated Report submit data via WQDE; however, due to difficulties encountered in launching WQDE, the Department accepted data in other formats on a limited basis. 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.

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 Integrated List.

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 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 the 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

Since water quality data are assessed for compliance with the Surface Water Quality Standards (SWQS), the SWQS provide the foundation for the Integrated List. 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.

Antidegradation Policy: The SWQS contain an antidegradation policy that applies to all surface waters of the State. Antidegradation is a requirement under 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 attained wherever these uses are not precluded by natural conditions. No irreversible changes may be made to existing water quality that would impair or preclude attainment 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 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. Currently 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 attain its designated uses. To implement narrative data, which is 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, 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); shellfish closure data (see Section 6.4, Shellfish Use Designated Use Assessment); source water information (see Section 6.5, Drinking Water Supply Use Assessment) with regard to human health.

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. Section 4.4 details the interpretation of this narrative criterion.

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-attainment 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 Integrated List (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 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 an 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, if captured by the data, 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. Excursions that cannot be attributed to one of these factors are further evaluated at the assessment unit level to determine if they collectively constitute an **exceedance** of the SWQS criteria.

Analytical Precision and Accuracy: The Department will take into consideration the precision and accuracy of the analytical method used to measure the data when an ambient measurement is compared to a numeric SWQS criterion. Analytical precision and accuracy are determined by the methods used to sample, analyze, and report the data. The precision of the analytical method is determined by the margin of error expressed for the method used. The margin of error defines the range of values that are considered to represent valid results for a specific analytical method or instrument. For example, if the surface water quality criterion is 1.0 and the margin of error for the instrument is "(+) or (-) 0.2," a reported value of 1.1 would not be considered an exceedance. Unlike precision, which is a function of the analytical method used, the accuracy of the data is determined by the number of decimal places used to express the surface water quality 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 (i.e. accurate to) only two decimal places, the parameter concentration will be rounded to two decimal places to determine compliance with the criterion.

Continuous Monitoring: More and more frequently, instruments such as Datasondes are being deployed to continuously monitor the water. The parameters most commonly measured in this fashion are water temperature, dissolved oxygen (DO), pH, salinity and conductivity. The protocol for comparing continuous monitoring data, collected over a minimum of three days, to the SWQS criteria is as follows:

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 (see "Duration (Exposure Periods)", below). An excursion 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 excursions at the same location during two or more 24-hour periods constitute an exceedance of the criterion. An excursion 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 excursions occurring at the same location constitutes an exceedance of the criterion. See Section 4.4 for additional protocols employing continuous monitored DO data in the context of assessing nutrient impacts.

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

Temperature: When evaluating continuous monitoring data for compliance with the new temperature criteria, the acute, one-hour maximum criterion will be compared to the maximum temperature recorded within a one-hour duration. Excursions above the acute criterion recorded on two separate days over the period of review (up to five years) are considered an exceedance of the temperature 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. Non-parametric methods must be used to evaluate the central tendency of 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.

Duration (Exposure Periods): The SWQS includes 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 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-attainment of the designated use. The Department will provide an explanation of any assessment which concludes that the use is attained because of relatively low magnitude or frequency of exceedances in a very large dataset.

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.

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 are adequate and represents the minimum dataset necessary for an adequate assessment. 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 attained (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) is not considered a valid result and is not assessed.

4.2 Pathogenic Indicators

Waters classified as PL, FW, SE1, and SC are assessed for primary contact ("in the water") recreation; waters classified as SE2 and SE3 are assessed for secondary contact ("on the water") recreation. This approach is consistent with amendments to the New Jersey Surface Water Quality Standards at N.J.A.C. 7:9B-1.12(a), (b), (c), (d), and (g)), adopted on December 21,

2009. These amendments deleted secondary contact recreation from the designated uses of FW1, PL, FW2, SE1, and SC waters (see 21 N.J.R. 4735(a)).

Assessment for recreation compares the geometric mean (geomean) of the water quality data for pathogenic indicators to the appropriate SWQS criterion. 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.

In addition to assessing primary contact recreation in all PL, FW, SE1, and SC waters using geomean, a second assessment is conducted for "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. Designated bathing beaches are assessed as attaining primary contact recreation if 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.

Designated bathing beaches are sampled weekly. If the sample indicates an exceedance of the single sample maximum (SSM), the beach is resampled. If this follow-up sample also exceeds the SSM, the beach is closed. In assessing designated bathing beaches, the Department will review the beach closure data to confirm that the closures were due to water quality issues. Short term beach closures of less than a week generally signify occasional excursions of the pathogen criterion. If these short term closures occur chronically over several (five or more) years the beach is assessed as impaired. One beach closure lasting seven or more consecutive days in a given year, or an average of two or more beach closures (of any duration) per year over a five-year period, is also assessed as an impairment. Recreational use assessment methods are explained in detail in Section 6.2.

4.3 Biological Data

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

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 (see Figure 4.3). 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.

The Department will also accept macroinvertebrate data collected under New Jersey's Rapid Bioassessment Protocol (RBP) and evaluated using the family level New Jersey Impairment Score (NJIS) system in non-Pinelands waters, if they are submitted by other entities. Assessments based upon family level taxonomy use three condition categories: not impaired, moderately impaired, and severely impaired. Where assessment results based upon the newly developed, genus level metrics (HGMI and CPMI) are available, these results will override those based upon family level metrics when assessing aquatic life use attainment for the entire assessment unit.

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 NJ Impairment Score (NJIS)*

Region Assessed by Coastal Plain Macroinvertebrate Index (CPMI)

*NJIS is no longer used by the Department but may be used by other entities

Fin Fish Data - Fish Index of Biotic Integrity (FIBI): 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 4.3).

Table 4.3: 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

New Jersey Macroinvertebrate Index (NJIS)		
Category	**Metric Score**	**Assessment Result**
Not Impaired	24 - 30	Not Impaired
Moderately Impaired	9 - 21	Impaired
Severely Impaired	0 - 6	Impaired

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

*Source: Standard Operating Procedures 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.

Regional Monitoring and Assessment Program (REMAP) Assessments: A Benthic Index of Biotic Integrity was developed for the New York/New Jersey Harbor based on USEPA Region 2's REMAP protocol and data reflecting benthic invertebrate communities. The results are used to assess the waters of Raritan Bay, the Arthur Kill, and the Kill van Kull. 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 about this metric is available on the USEPA Web site at http://www.epa.gov/emap/remap/html/docs/nynjsedapp1.pdf.

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. If biological communities are impaired due to drought-induced, low flow 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

The Surface Water Quality Standards include both narrative nutrient policies and numeric phosphorus criteria for freshwater lakes and streams. 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-attainment (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 attaining the general aquatic life use. The purpose of the nutrient impact assessment is to determine whether phosphorus is a cause of non-attainment. 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 (see Section 4.1, "continuous monitoring … dissolved oxygen"). 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 (see Section 4.1, "Continuous Monitoring - Dissolved oxygen"). Where benthic macroinvertebrate indices indicate impairment, and the DO criteria are exceeded, and the diurnal DO fluctuation is more than 3mg/l, the Department will conclude that phosphorus is a cause of non-attainment of the general aquatic life use and will list phosphorus and the assessment unit on the 2010 303(d) List of Water Quality Limited Waters. Conversely, where biology is not impaired, the DO criteria are not exceeded, and there is no significant DO fluctuation, the Department will determine that the narrative nutrient criteria have been met and will not place phosphorus on the 2010 303(d) List for that assessment unit even if the in-stream concentrations of total phosphorus exceed the numeric phosphorus criteria for FW streams.

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 the aquatic life use non-attainment and will place phosphorus and that assessment unit on the 2010 303(d) List of Water Quality Limited Waters. This periphyton chlorophyll *a* threshold is based upon a consensus in the scientific literature that at this level and above algal growth has reached nuisance levels. These chlorophyll *a* measurements are required only when the nutrient impact assessment is inconclusive regarding whether phosphorus is a cause of general aquatic life use non-attainment.

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 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*

Results of Biological Assessment	Dissolved Oxygen	Results of Nutrient Impact Assessment
Benthic Macroinvertebrate Indices indicate impairment; therefore, the general aquatic life use is not attained	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 continue to evaluate compliance with the numeric phosphorus criteria.

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. All data from one or more monitoring stations located within a given assessment unit are extrapolated to represent all waters 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 attainment of the recreation and shellfish consumption uses for the respective assessment units.

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 National 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. This boundary refinement process resulted in a total of 969 HUC 14 subwatersheds in New Jersey. A coverage containing discrete polygons for each of New Jersey's 969 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. The Department's report explaining the changes to the HUC 14 boundaries (NJGS Technical Memorandum (TM09-2) entitled, "Revision to New Jersey's HUC 14s, 2009, with a correlation to HUC 12s", is available for download from the Department's Web site at http://www.state.nj.us/dep/njgs/pricelst/tmemo/tm09-2. New Jersey's assessment units for the 2010 Integrated Report are based on the updated HUC 14 boundaries, excluding HUCs containing international and interstate waters, which totals 960 assessment units in New Jersey New Jersey assessment units now range in size from 0.7 to 42 square miles, with an average size of 8.7 square miles.

The Delaware River Basin Commission assesses water quality data for the Delaware River mainstem, Estuary, and Bay. Their assessment results are reported in sub-tables of New Jersey's Integrated List of Waters and Section 303(d) List of Water Quality Limited Waters, except for assessment of shellfish waters in the New Jersey portion of the Delaware Bay, which is assessed by the Department and reported in the main tables of the 2010 Integrated List and 303(d) List. DRBC's *2010 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/10IntegratedList/.

Station Representation: The Department will evaluate station locations on a case-by-case basis to determine if the data from these stations should be used in assessing the adjacent assessment unit (AU). For example, it is common for monitoring sites to be placed at the terminus of one assessment unit as it flows into an adjacent assessment unit. When a monitoring site falls within 200 feet of a given assessment unit boundary, the assessment based upon that site is applied to both the assessment unit containing the site and to the adjacent assessment unit. This assignment is made provided that there are no significant tributaries, impoundments, or other hydrological alterations that could impact water quality between the monitoring site and the neighboring assessment unit. If there are no applicable monitoring stations for an assessment unit, the unit will be identified as not assessed (Sublist 3).

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, an assessment can not be made.

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 can 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 excursions and are reviewed to determine if the excursion is within the margin of error of the analytical method or can be attributed to natural conditions or transient events. Excursions occurring at multiple locations or subsamples within a lake on the same date are considered a "single excursion". Two or more excursions occurring within a lake on separate dates constitute an exceedance.

Continuous Monitoring and Grab Sampling: Grab samples collected quarterly may not capture the most critical time period; therefore, they may not reflect the worst case scenario for use attainment. Thus, the Department will give more weight to continuous monitoring data, provided that the continuous monitoring data is available for at least a single season.

De minimus: When evaluation of data at a station level identifies portions of an assessment unit as impaired but, upon further evaluation, these stations represent minute portions of the total area of the assessment unit, the Department will regard the assessed area as *de minimus* rather than impaired. The concept of *de minimus* is applied to numerous situations when evaluating assessment units. Examples of situations where a *de minimus* determination would be applied are as follows:

Recreational use assessments: Where an assessment unit contains one or more impaired bathing beaches but the spatial extent of the impaired bathing beaches is a minute portion of the assessment unit, the impairment would be considered *de minimus* and would not be considered in

assessing recreational use attainment for the entire assessment unit. 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. In these instances, where the Department uses Best Professional Judgment and determines that the impairment is *de minimus*, the individual impaired bathing beaches will be identified in the Integrated Report for follow up sanitary surveys required by the DHSS.

Shellfish harvest for consumption use assessments: Assessment units overlie but do not follow shellfish classification boundaries. As a result, an assessment unit may include several different shellfish classifications. In most instances, the use assessment will be based on the most restrictive classification found within the assessment unit. In the few instances where only a very small portion of the acreage within the assessment unit is has some degree of restriction, the use assessment will be based on assessment of the larger area. Any *de minimus* areas that are restricted but are not subject to administrative closures (i.e., the restriction is due to poor water quality) will be identified 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. These decisions will apply in the following situations: newer data will override older data; larger data collection 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.

Assigning relative "weight" to data is necessary when evaluating numerous data sets that have different data collection and analysis methods, or temporal or spatial sampling variability. When data sets yield contradictory or ambiguous assessment results, a "weight of evidence" approach will be used to evaluate the different data sets in relation to one another. The Department will take into account the data sets' age, robustness, and accuracy. In large data sets, the magnitude and frequency of the exceedances are evaluated. Other factors, such as changes in pollutant concentration over time and other water quality trends, may also influence the weight of a given data set.

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 model to list or delist a waterbody, if the Department determines that the model adequately predicts water quality in the specific waterbody.

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 attained, 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 assessment methodologies for designated use attainment that include the utilization of both numeric and narrative criteria and involves 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 attainment by evaluating compliance of the associated parameters with the applicable SWQS criteria. However, data for every parameter associated with a particular designated use is not required to assess the use. The Department uses a conservative approach regarding use assessments that requires more extensive data for a finding that a use is attained than for a finding that a use is not attained. Specifically, an assessment unit will be assessed as attaining the designated use only if data for the minimum suite of parameters are available and the data indicate that there are no impairments or exceedances, in which case, the assessment unit will be assigned to Sublist 1 or 2. If data are available for only some of the minimum suite of parameters, the assessment unit will be identified as having insufficient information with which to assess the designated use (Sublist 3), even if there are no exceedances or impairments within that data set. If data for any one parameter associated with a designated use (Appendix A parameters) indicate any impairment or exceedance, the assessment unit will be assessed as not attaining the designated use (Sublist 4 or 5), even if data are not available for the entire suite of parameters.

Table 6.0: Minimum Suite of Parameters Needed to Determine Use Is Attained

Designated Use	**Minimum Suite of Parameters**
General Aquatic Life	Macroinvertebrate Indices or fish IBI
Aquatic Life - Trout	Biological data and Temperature and DO
Recreation	• Primary Contact: Beach closure data • Secondary Contact: Fecal coliform (in SE2 and SE3 waters)
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 IBI (Index of Biotic Integrity) 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-based indicators). The Department may use biologically-relevant chemical water quality data, such as dissolved oxygen (DO), to indirectly assess the health of the biota, even though chemical water quality data provide only a "snapshot" in time rather than the longer-term assessment supported by biological indicators. The associated physical/chemical parameters differ depending on the designated aquatic life use (i.e., the stream classification). For instance, both temperature and dissolved oxygen are required to assess the trout aquatic life use but only dissolved oxygen (DO) is required to assess the general aquatic life use in tidal waters (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	Aquatic life use is attained (Sublist 1 or 2)
Biology is impaired or threatened	Aquatic life use is not attained; listed as “cause unknown” (Sublist 4 or 5).
Both Biological and Chemical/Physical Data Available	
Biology is not impaired or threatened, there are no chemical exceedances, and water quality is not threatened	Aquatic life use is attained (Sublist 1 or 2)
Biology is impaired or threatened AND chemical/physical data show exceedances of aquatic life criteria or are threatened	Aquatic life use is not attained; parameter(s) exceeding criteria identified as the cause (Sublist 4 or 5). Note: The outcome of the nutrient impact assessment will determine which parameter is listed as the cause of use non-attainment, as illustrated in Table 4.4.
Biology is impaired or threatened BUT chemical/physical data show no exceedances of aquatic life criteria	Aquatic life use is not attained; listed as “cause unknown” (Sublist 4 or 5).
Biology is not impaired or threatened BUT chemical/ physical data show	Aquatic life use is not attained; parameter(s) exceeding criteria identified as the cause unless

exceedances of aquatic life criteria or waters quality is threatened	due to natural conditions (Sublist 4 or 5).
No Biological Data Available; Chemical/Physical Data Available	
No exceedances of aquatic life criteria	Insufficient data to assess the aquatic life use (Sublist 3)
Exceedance of any aquatic life criterion (including phosphorus)	Aquatic life use is not attained (Sublist 4 or 5)

* 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 use have not been promulgated for FW1 or PL waters. Assessment units containing bathing beaches are assessed as not attaining the recreational use when beach closure data indicate impairment or when bacterial counts exceed the applicable SWQS criteria (expressed as a geometric mean). Table 6.2 summarizes the possible outcomes of the recreational use assessment based on the appropriate types of data.

Table 6.2: Recreational Use Assessment Results

Data Assessment Results	**Use Assessment Results***
a) Beach closure data does not identify impairment (Primary Contact), or: b) Applicable SWQS criteria are met	Use Is Attained
a) Beach closure data identifies impairment* (Primary Contact), or: b) Applicable SWQS criteria are <u>not</u> met	Use Is Not Attained

*Note: When bathing beaches represent a minute portion of the total area of the assessment unit, the Department will regard the assessed area as *de minimus* rather than impaired (see Section 5.1).

6.3 Fish Consumption Use Assessment Method

The Department has established thresholds for fish tissue concentrations for specific bioaccumulative toxic pollutants used to develop fish consumption advisories. 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, which are listed in Table 6.3a. 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 the thresholds listed in Table 6.3a below, fish consumption is unrestricted. For mercury, the Department has selected 0.18 ug/g, which reflects a 1 meal per week consumption restriction for high risk populations consistent with the Department's Statewide Mercury TMDL established on September 10, 2009 (see the Department's web site at: http://www.nj.gov/dep/watershedmgt/tmdl.htm). 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. It is likely that once all anthropogenic sources of mercury are eliminated, fish consumption advisories will continue to be necessary to protect high risk populations.

In addition to tissue concentrations, the Department will also evaluate compliance with human health criteria for water column toxic pollutants expected to bioaccumulate in fish tissue, where water column data is available for the applicable parameters. The Department will utilize the human health criteria for SE/SC waters which are based on "fish consumption only" for all assessment units. The list of pollutants to be evaluated for fish consumption use are listed in Appendix A and are based upon USEPA's "National Study of Chemical Residues in Lake Fish Tissue" (USEPA, 2009).

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)

Table 6.3b: Fish Consumption Use Assessment Results

Data Assessment Results	Use Assessment Result
a) All fish tissue concentrations are below the threshold, AND b) No exceedances of the SWQS SE/SC human health criteria for selected parameters in water column	Use is Attained
a) One or more parameters exceed the tissue threshold; OR b) One or more parameters exceed the SWQS SE/SC human health criteria for selected parameters in the water column	Use is Not Attained

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.

For assessment purposes, prohibited, special restricted, and seasonal harvest areas are further separated into a) waters where shellfish harvest is prohibited due to poor water quality, and b) administrative closures based on the potential for contamination of the shellfish due to land use, resource availability, or sanitary surveys. Administrative closures 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 assessment, since the classification does not reflect the actual water quality.

Only assessment units containing shellfish waters classified as unrestricted are assessed as attaining the shellfish harvest for consumption use. For assessment units that do not attain the shellfish harvest for consumption use, the pollutant causing the non-attainment will be identified as fecal or total coliform, as appropriate. 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 Attained
Prohibited, Special Restricted, or Seasonal classifications based on water quality	Use Is Not Attained

*Note: Where assessment units contain more than one shellfish classification, the use assessment will be based on the most restrictive classification, except where only a *de minimus* portion is restricted, in which case the assessment will reflect the non-*de minimus* area (see Section 5.1, "De minimus"). 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.

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 waters

classified as Freshwater (FW2) and Pinelands (PL) 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. Nitrate concentrations are the minimum data necessary to assess the drinking water use; however, other Appendix A 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 use when sufficient data for these parameters is available.

In addition to ambient chemical water quality parameters, the Department uses monitoring data from treated or finished water supplies to determine compliance with the Safe Drinking Water Act's National Primary Drinking Water Regulations (NPDWRs, or primary standards) and water supply use restrictions. 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.

The Department's Bureau of Safe Drinking Water summarizes safe drinking water violations annually. The drinking water use assessment method uses the data provided in these reports. Only violations that can be attributed to surface water sources are considered. Violations for copper and lead, which could 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 use assessment for the drinking water use. 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 being attained: the drinking water use, the fish consumption use, or both.

Table 6.5: Drinking Water Supply Use Assessment Results

Safe Drinking Water Actions	**Assessment Results**
No closures, use restrictions, SWQS criteria are met and waters are not threatened*	Use is Attained
Closures are recorded or water quality standards are exceeded or threatened*	Use is Not Attained
Surface water quality is such that more than conventional treatment is required	Use is Not Attained
Contamination-based drinking water supply advisories are in effect	Use is Not Attained
Increased monitoring requirements are in effect due to confirmed detection of one or more pollutants	Use is Not Attained

*****Note: Threatened is defined as chemical/physical data showing no exceedances of surface water quality criteria but degrading water quality trends indicate that criteria are likely to be exceeded within two years (see Section 3.2, "Assessing Threatened Waters").

6.6 Industrial Water Supply Use Assessment Method

Industrial water supply use assessment is conducted for waters used for industrial processing or cooling. The Department will use total suspended solids (TSS) and pH, a measure of acidity, as indicators for assessing attainment of the industrial water supply use. A pH range of 5 to 9 will be used as a threshold for use attainment.

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 and PL are designated for this use. The Department will use total dissolved solids (TDS) as the indicator of agricultural use attainment because of its adverse and immediate detrimental effects on agricultural practices. Currently, the 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. The Department used guidelines that had been established by the U.S. Department of Interior Natural Resources Conservation and other states (Follet and Soltanpour, 1999; Bauder, 1998) for evaluating whether water supplies can support common agricultural uses such as irrigation and raising livestock. These guidelines established acceptable levels for TDS in agricultural water supplies as at or below 2,000 mg/l (Follet and Soltanpour, 1999). This threshold will be used by the Department to assess attainment of the agricultural water supply use. Several other states have established criteria for agricultural uses and further research will be done to evaluate the feasibility of applying their criteria to assess attainment of the agricultural water supply use in New Jersey.

7.0 Integrated Listing Guidance

The 2006 Integrated Report Guidance (USEPA, 2005, supplemented by October 12, 2006 memo) recommends placing assessment results into one of five specific categories on the Integrated List. Based on this guidance and the Department's listing methodology (explained in Section 1.1), the five sublists used to identify an assessment unit on the Department's Integrated List are described below.

Sublist 1: An assessment unit is attaining all applicable designated uses and no uses are threatened. (The Department does not include the fish consumption use for this sublist.)

Sublist 2: The assessment unit is attaining the designated use but is not attaining another/other applicable designated use(s).

Sublist 3: Insufficient data and information are available to determine if the designated use is attained.

Sublist 4: One or more designated uses are not attained or are threatened but TMDL development is not required because (three sub-categories):

A. A TMDL has been completed for the parameter causing the non-attainment.
B. Other enforceable pollutant control measures are reasonably expected to result in the attainment of the designated use in the near future.
C. Non-attainment of the designated use is caused by something other than a pollutant.

Sublist 5: One or more designated uses are not attained or are threatened by a pollutant(s), which requires development of a TMDL.

7.1 Integrated Listing Methodology

As stated above, USEPA encourages states to use a five-category system for classifying the water quality status of each states' waters based on attainment of designated uses. Table 7.1 displays how the results of the designated use assessment results will be displayed on New Jersey's 2010 Integrated List of Waters (Integrated List).

Table 7.1: Assessment Results and Integrated List Outcomes

Assessment Results	Integrated List
Full Attainment (all uses except fish consumption)	Sublist 1: All designated uses are assessed and attained, with the exception of fish consumption.
Designated Use Is Attained	Sublist 2: The designated use is attained but other designated uses within the assessment unit are either not assessed due to insufficient data or not attained.
Insufficient Data	Sublist 3: Insufficient data is available to determine if the designated use is attained.
Designated Use Is Not Attained (TMDL Not Required)	Sublist 4A: The designated use is not attained or is threatened and development of a TMDL is not required because a TMDL for the parameter responsible has already been approved by USEPA.
Designated Use Is Not Attained (TMDL Not Required)	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.

Assessment Results	Integrated List
Designated Use Is Not Attained (TMDL Not Required)	Sublist 4C: The designated use is not attained or is threatened and development of a TMDL is not required because the cause was attributed solely to pollution, not pollutant(s).
Designated Use Is Not Attained (TMDL Required)	Sublist 5: The designated use is not attained or is threatened by a pollutant and development of a TMDL is required.

7.2 Identifying Causes and Sources of Non-attainment (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-attainment of the applicable designated use. A pollutant is considered to be the cause of use non-attainment 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, the cause will be identified on the 303(d) List as "cause unknown".

A source assessment is conducted for each pollutant identified on the 303(d) List as causing non-attainment. "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-attainment.

7.3 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 2010 Integrated Report will identify all assessment unit/pollutant combinations delisted from the 2008 303(d) List and the corresponding reason for each delisting action.

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

Section 303(d) of the federal Clean Water Act requires states to rank and prioritize assessment units that require development of TMDLs (i.e., Sublist 5). 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 (refer to 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 attained (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 2010 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 2010 Integrated Report summarizes the 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 in full attainment, i.e., attaining 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. Several strategies will be key to accomplishing this goal including:

- Exchanging and using data and assessments from other programs within the Department and other entities (e.g., local government, volunteer monitoring groups);
- Expanding ongoing and planned monitoring and assessment to address data limitations for assessment units assigned to Sublist 3.

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 of and comment on the proposed assessment methods; and 3) review of 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 Integrated List component of the Report, which categorizes the results of use assessments for all the State's assessment units into sublists (Sublists 1 through 5), satisfies the reporting requirements of Section 305(b) formerly addressed by the Statewide Water Quality Inventory Report. The 303(d) List component of the Report, which satisfies the reporting requirements of Section 303(d), includes the assessment units identified as not attaining one or more designated uses (Sublist 5), the pollutants causing non-attainment 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 categorizing assessment units into the five sublists of the Integrated 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 2010 Integrated Report established a data collection deadline of December 31, 2008 and a data submission deadline of May 1, 2009. 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 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.

In determining which data are appropriate and readily available for assessment purposes, the Department will consider quality assurance/quality control, monitoring design, age of data, accurate sampling location information, data documentation, and use of electronic data management (see Chapter 3). The Department is migrating to a new water quality data exchange system (WQDE) for the submission of all water quality monitoring data. The Department has requested that monitoring organizations seeking to have their data used for the 2010 Integrated Report submit data via WQDE due to the significant effort needed to computerize and analyze data submitted in different formats. 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. Volunteer organizations may submit data through the Department's data management system for volunteer monitoring data (VM) at http://www.state.nj.us/dep/wms/bwqsa/vm/database.html. Instructions on registering as a data submitter for either system are available on the Department's Web site at www.njdeponline.com.

Data submitted via WQDE or VM must comply with the data submission and formatting requirements of the data system, including but not limited to submission of an approved quality assurance plan (with all required signatures) that was approved prior to data collection, and spatial coordinates for monitoring locations. Spatial coordinates can be identified through the use of the Department's free on-line tools: DataMiner or GeoWeb/NJiMAP, or through the use of geographic positioning system (GPS) units.

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 the following:

- 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 2010 303(d) List will also notify the public that the Department has finalized the 2010 Methods Document The final Methods Document, including agency responses to public comments, will be included as an Appendix to the 2010 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 shall 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 List of Water Quality Limited Segments, the Department will address the public comments, make any necessary revisions, and prepare a final List of Water Quality Limited Segments. The Department will submit the final List of Water Quality Limited Segments 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 List of Water Quality Limited Segments 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 List of Water Quality Limited Segments, 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.

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.

See also:

NJDEP, *Surface Water Quality Standards* N.J.A.C. 7:9B, proposals and adoptions, at http://www.nj.gov/dep/wms/bwqsa/rule_archives.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
Biological Community Data:	X						
Shellfish Closures						X	
Beach Closure Data		X					
Dissolved Oxygen	X						
Enterococci (saline)		X					
Fecal Coliform (saline)		X*				X	
E. Coli (freshwater)		X					
Total Coliform						X	
pH (Standard Units)	X		X		X		
Phosphorus, Total	X						
Solids, Suspended (TSS)	X				X		
Salinity				X			

* secondary only

Parameter	Aquatic Life (general and trout)	Recreation	Drinking Water Supply	Agricultural Water Supply	Industrial Water Supply	Shellfish Harvest for Consumption	Fish Consumption
Solids, Total Dissolved (TDS)			X	X	X		
Sulfate			X				
Temperature	X						
Turbidity	X						
Ammonia, un-ionized	X						
Acenaphthene			X				
Acrolein			X				
Acrylonitrile			X				
Aldrin	X		X				
Anthracene			X				
Antimony			X				
Arsenic	X		X				
Asbestos			X				
Barium			X				
Benz(a)anthracene			X				
Benzene			X				
Benzidine			X				
3,4-Benzofluoranthene (Benzo(b)fluoranthene)			X				
Benzo(k)fluoranthene			X				

Parameter	Aquatic Life (general and trout)	Recreation	Drinking Water Supply	Agricultural Water Supply	Industrial Water Supply	Shellfish Harvest for Consumption	Fish Consumption
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
Bis(2-chloroethyl) ether			X				
Bis(2-chloroisopropyl) ether			X				
Bis(2-ethylhexyl) phthalate			X				
Bromodichloromethane (Dichlorobromomethane)			X				
Bromoform			X				
Butyl benzyl phthalate			X				
Cadmium	X		X				
Carbon tetrachloride			X				
Chlordane	X		X				X
Chloride	X		X				
Chlorine Produced Oxidants (CPO)	X						
Chlorobenzene			X				
Chloroform			X				
2-Chloronaphthalene			X				
2-Chlorophenol			X				

Parameter	Aquatic Life (general and trout)	Recreation	Drinking Water Supply	Agricultural Water Supply	Industrial Water Supply	Shellfish Harvest for Consumption	Fish Consumption
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				
Dibromochloromethane (Chlorodibromomethane)			X				
Di-n-butyl phthalate			X				
1,2-Dichlorobenzene			X				
1,3-Dichlorobenzene			X				
1,4-Dichlorobenzene			X				
3,3'-Dichlorobenzidine			X				
1,2-Dichloroethane			X				
1,1-Dichloroethylene			X				

Parameter	Aquatic Life (general and trout)	Recreation	Drinking Water Supply	Agricultural Water Supply	Industrial Water Supply	Shellfish Harvest for Consumption	Fish Consumption
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				
Endosulfans (alpha and beta)	X		X				
Endosulfan sulfate			X				
Endrin	X		X				
Endrin aldehyde			X				
Ethylbenzene			X				
Fluoranthene			X				
Fluorene			X				
Guthion	X						
Heptachlor	X		X				X
Heptachlor epoxide	X		X				X
Hexachlorobenzene			X				
Hexachlorobutadiene			X				
Hexachlorocyclopentadiene			X				

Parameter	Aquatic Life (general and trout)	Recreation	Drinking Water Supply	Agricultural Water Supply	Industrial Water Supply	Shellfish Harvest for Consumption	Fish Consumption
Hexachloroethane			X				
Indeno(1,2,3-cd)pyrene			X				
Isophorone			X				
Lead	X		X				
Malathion	X						
Manganese							X
Mercury	X		X				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				
N-Nitrosodiphenylamine			X				
N-Nitrosodi-n-propylamine (Di-n-propylnitrosamine)			X				
N-Nitrosopyrrolidine			X				

Parameter	Aquatic Life (general and trout)	Recreation	Drinking Water Supply	Agricultural Water Supply	Industrial Water Supply	Shellfish Harvest for Consumption	Fish Consumption
Parathion	X						
Pentachlorobenzene			X				
Pentachlorophenol	X		X				
Phenol			X				
Phosphorous	X						
Polychlorinated biphenyls (PCBs)	X		X				X
Pyrene			X				
Selenium	X		X				
Silver	X		X				
Sulfide-hydrogen sulfide (undissociated)	X						
1,2,4,5-Tetrachlorobenzene			X				
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)			X				X
1,1,2,2-Tetrachloroethane			X				
Tetrachloroethylene			X				
Thallium			X				
Toluene			X				
Toxaphene	X		X				
1,2,4-Trichlorobenzene			X				
1,1,1-Trichloroethane			X				
1,1,2-Trichloroethane			X				

Parameter	Aquatic Life (general and trout)	Recreation	Drinking Water Supply	Agricultural Water Supply	Industrial Water Supply	Shellfish Harvest for Consumption	Fish Consumption
Trichloroethylene			X				
2,4,5-Trichlorophenol			X				
2,4,6-Trichlorophenol			X				
Vinyl chloride			X				
Zinc	X		X				
Radioactivity			X				

Appendix B

Comments and Agency Responses on the Revised Draft 2010 Water Quality Monitoring and Assessment Methods (Methods Document)

Commenters:

Thomas Amidon, OMNI Environmental, LLC
Kelley Curran, Great Swamp Watershed Association
Ellen Gulbinsky, Association of Environmental Authorities (AEA)
Faith Zerbe, Delaware Riverkeeper
Cindy Zipf, Clean Ocean Action (COA)

General Comments:

1. **Comment**: The changes to the Frequency of Exceedance section, as well as a few others, were not noted in the summary proposal. While the changes in this section appear to provide useful clarification, it is inappropriate and unacceptable that not all of the changes to the document were identified in the summary list of revisions. This undermines the trust and ability of citizens to comment on documents. (Zipf)

   Response: The Department's public notice (see 41 NJR 4853(a)) seeking comment on the revised draft 2010 Integrated Water Quality Monitoring and Assessment Methods (Methods Document) included a list of chapters and sections that were significantly revised. As noted by the commenter, the Department revised other sections to ensure consistency with the significantly revised sections. However, the notice invited comment on the entire document, not just those modified in response to previously received comments.

2. **Comment**: More information is needed on management actions and the number of years a unit is on the 303(d) list and Sublist 4 and 5 on the Integrated List. (Zipf)

   Response: The Department agrees that more information should be included in the Integrated Water Quality Monitoring and Assessment Report (Integrated Report) regarding water quality limited waters. The Department will continue to work with USEPA to implement existing national tools, e.g. USEPA's Assessment Database (ADB) and Assessment Total Maximum Daily Load (TMDL) Tracking and Implementation System (ATTAINS), and develop new tools and reporting formats for sharing water quality assessment information with the public. Additional information about ADB and ATTAINS is available on USEPA's Web site at http://www.epa.gov/waters/adb/ and http://www.epa.gov/waters/ir/.

3. **Comment:** The revised draft 2010 Methods Document is not acceptable as is and needs improvement before finalizing. (Zipf)

   Response: The 2010 Methods Document has been significantly revised to address comments received, as explained in these responses, as well as agency-initiated changes. The final 2010

Methods Document provides a comprehensive description of the methods to be used by the Department for assessing water quality and use attainment in developing the 2010 Integrated List of Waters and the 2010 Section 303 (d) List of Water Quality Limited Waters, as part of the 2010 Integrated Report.

Section 3.1

4. Comment: The change in the last sentence of this section from "*may disregard data*" to "*may apply less weight to data less than five years old if newer data was collected or analyzed using scientific methods that are more precise*" is an improvement. Please note that "and/or accurate" should be added to the end of this sentence, as new scientific methods may also provide more accurate data. (Zipf)

Response: The Department has revised this sentence as requested in the final 2010 Methods Document.

5. Comment: The Department has indicated that it will primarily rely on the most recent five years of information and that less weight will be given to older data when "newer data were collected or analyzed using scientific methods that are more precise." The commenter supports the use of the best available scientific information in rendering impairment determinations. Where data from better analytical methods indicate that impairment does not exist, such information constitutes "good cause" for not identifying the waters as impaired. (See, 40 C.F.R. 130.7(b)(6)(iv). (Gulbinsky)

Response: The Department appreciates the commenter's support.

6. Comment: Sources of external data that are submitted electronically should be considered by the Department even if it is not directly placed in the New Jersey data exchange system. For example, excel electronic databases should be considered "readily available" by the Department as well as other electronic menus that volunteer monitoring groups may use to house their data. (Zerbe)

Response: The Department receives thousands of water quality data points from multiple data sources, all of which must be evaluated for data quality, compiled on a station level to evaluate exceedances of water quality standards, and then compiled on an assessment unit basis to assess designated use attainment. Considering the volume of data received and the limited resources available for data review, the Department must streamline the water quality assessment process by using a uniform electronic format for data submittal. The Department can only consider data submitted in the specified electronic format (and which meets the specified data requirements) as "readily available" for this purpose.

To that end, the Department has developed the New Jersey Water Quality Data Exchange (WQDE) System. WQDE was created through a stakeholder process to address the needs of data submitters, data users, and data viewers. The Department also provided testing and training opportunities available to all parties who registered their intent to submit data for the 2010 Integrated Report. A similar system was created specifically for volunteer monitoring

(VM) data. Both systems are compatible with USEPA's Water Quality Exchange (WQX) system. The Department worked closely with data providers to enter their data into WQDE for the 2010 Integrated Report; however, since the WQDE system was just recently launched, we also accepted some data in Excel format. For the 2012 Integrated Report only data from USEPA's STORET database, USGS' NWIS database, WQX, or WQDE/VM will be considered "readily available" for use in developing future Integrated Reports. The Department continues to provide training and resources for data submittal by volunteers through the Volunteer Monitoring Program.

7. Comment: The commenter supports the change to require QAPP approval prior to sampling. (Zipf)

Response: The Department appreciates the commenter's support.

8. Comment: The Department's proposed policy that only data from outside groups that have a pre-approved (by the state) QAPP may be inconsistent with EPA guidance, which says states should screen all submitted data, and if any of it complies with the state's QAPP policy (especially in the way of the QA/QC) elements thereof, then the state should use it. With the limited data that are available, excluding data submitted with metadata or a QAPP that meets or exceeds the Department QA/QC objectives seems contradictory of the goal of assessment and could exclude perfectly good and rigorous datasets that meet the Tier D requirements. The commenter appreciates the Department's efforts to assist groups with QAPP pre-approval, specifically for Tier D data, but again, if data quality measures are met at the Tier D level without a pre-approved QAPP by the state the commenter feels the data should be used and not disqualified. (Zerbe)

Response: USEPA guidance requires that states consider all "data of a known quality" in assessing water quality. The Department requires the approval of a Quality Assurance Project Plan (QAPP) before monitoring begins to ensure that data are of an acceptable known quality. The Department's Volunteer Monitoring Program, in conjunction with the Department's Office of Quality Assurance, the Watershed Watch Network, and EPA Region 2, developed a multi-tiered (Tiers A through D) approach to quality assurance that tailors quality data quality requirements to the organization's data needs, data users, and intended data use. The quality assurance (QA) planning phase is designed to assure that the level of quality control required is commensurate with these factors. Data collected by an organization that has not successfully completed the QA planning phase (i.e., obtained Department approval of the QAPP) do not meet Tier D requirements, cannot be considered "Tier D data", and cannot be used by the Department for use assessment purposes.

9. Comment: The Department should accept data from groups who provide sampling locations with a stream or road crossing and "drive-to" directions, as coordinates can be developed remotely for these sites. Pennsylvania, for example, will use "drive-to" directions to plot sites on maps when volunteer groups are not able to provide latitude and longitude. (Zerbe)

Response: Spatial data are a necessary component of any water quality data set so that the Department can confirm and map the exact location of the data. The Department does not

have the resources to develop spatial coordinates for data submitted by external data sources (see Response to Comment #6); therefore, site coordinates must be submitted electronically as part of the data package. Spatial coordinates for monitoring locations, which are required in Quality Assurance Project Plans, can be identified through the use of the Department's free on-line tools: DataMiner or GeoWeb/NJiMAP, or through the use of geographic positioning system (GPS) units. The Department's Volunteer Monitoring Program has a number of GPS units available for loan to volunteers and also provides staff assistance with the use of these units, if needed, at monitoring locations. Driving directions or road crossings are useful information but are not an acceptable substitute for spatial coordinates.

10. **Comment**: The Department should replace "in accordance with the corresponding Quality Assurance Project Plan (QAPP)" (page 14), with "in accordance with an accepted statistical methodology (such as ASTM E178)," since many QAPPs do not include any definition for outlier determination. (Amidon)

    Response: The Department agrees with this comment and has revised this sentence as requested in the final 2010 Methods Document.

11. **Comment**: DRBC should be added as an agency that can approve QAPPs (in addition to NJ, EPA, and other state agencies (like PADEP) and USGS). (Zerbe)

    Response: The Department will accept QAPPs approved by DRBC; however, the Department will only use volunteer monitoring data if the QAPP has also been reviewed and approved by the Department's Volunteer Monitoring Program prior to data collection (see Response to Comment #8).

12. **Comment**: Section 3.1 under Data Age states "The Department will use the most recent five years of readily available data to characterize current conditions." This statement is neither clear nor sufficient. A sentence should be added to this section requiring specific dates in the report, such as "The Integrated Report must document the specific data collection dates for data used in the assessments." (Zipf)

    Response: The sentence in question is sufficient since the Methods Document is intended to provide an explanation of the methods used to assess data for the Integrated Report. The Department specifies the data collection period for each Integrated Report in the data solicitation public notice published in the New Jersey Register. For the 2010 Integrated Report, the Department requested submission of data collected January 1, 2004 through December 31, 2008.

13. **Comment**: The evaluation of stream subsamples was removed from the revised draft Methods Document, and should be included in order to specify how to evaluate subsamples from the same location. Subsamples collected across a horizontal transect, or at several locations in close proximity to each other and at the same time, should be averaged together to compare with "not to exceed at any time" criteria, since horizontal transects often include small pools or backwater that are not reflective of the stream as a whole at that location. Vertical cross sections can be even more problematic because the deeper samples will be

influenced by sediment interactions and be even less reflective of stream conditions as a whole. Samples not less than one foot from the bottom or half the water column depth (whichever is less) could be averaged together; alternatively, samples near or above mid-depth could be selected for assessment purposes. (Amidon)

Response: The section on subsamples was removed because it was unnecessary. Typically, the Department receives a single value which could be based upon a composited sample collected along a stream transect. Monitoring and data analysis are addressed in the individual project plans and is beyond the scope of the Methods Document.

Section 3.2

14. Comment: Where new guidance is being applied to interpret narrative criteria or to apply a numeric impairment metrics that have not undergone notice and comment rulemaking, the commenter would appreciate the Department's confirmation that alternative approaches may be considered as appropriate to ensure proper use protection and reasonable application of requirements. (Gulbinsky)

Response: The purpose of the Methods Document is to explain the methods to be used by the Department in assessing water quality and use attainment in developing the Integrated Report, including the Integrated List of Waters and the 303(d) List of Water Quality Limited Waters. The Department revises the Methods Document as needed to incorporate any new assessment methods that have been developed or criteria that have been promulgated and will be applied to the development of the corresponding Integrated Report. In accordance with N.J.A.C. 7:15-6, the public is provided with an opportunity to review and comment on the Department's assessment methods before these methods are finalized and used to assess water quality. As an example, the 2010 Draft Methods Document published for comment on April 20, 2009 included a new method to assess compliance with the existing nutrient policy for FW waters of the State pursuant to N.J.A.C. 7:9B-1.5(g). The draft Methods Document was revised to address comments received and was republished for public comment on December 21, 2009. The draft 2010 Methods Document was also revised to include a new a new fish consumption use assessment method based on newly available fish tissue concentration data.

15. Comment: The section on "Assessment of Threatened Waters" (page 10) is not specific enough to determine whether a particular dataset could be used to designate a waterbody as "threatened." Will a linear trend be calculated, and if so how strong does the correlation have to be for the Department to use it to extrapolate to the next listing cycle? If USGS trend assessments are utilized, the methodology should be described. The statistical test proposed and the degree of certainty (probability) should be described. (Amidon)

Response: The Department uses the U.S. Geological Survey methodology outlined in *Trends in Water Quality of New Jersey Streams, Water Years 1986-95*, Water Resources Investigations Report 98-4204 (available at http://pubs.usgs.gov/wri/wri98-4204/) to assess trends in chemical water quality.

16. Comment: The paragraph on Natural Conditions (page 11) should be expanded to specify those water quality criteria exceedances that are often naturally-occurring and will be evaluated carefully by the Department before designating a waterbody as impaired. These should include stream temperature excursions and low pH excursions, both of which often occur due to natural conditions. (Amidon)

Response: The Methods Document does not establish a set of parameters or conditions that are assumed to be naturally-occurring. Rather, the Methods Document explains the circumstances that the Department may further examine an excursion and determine, based on Best Professional Judgment, that the excursions represent "natural conditions". As indicated in the Aquatic Life use assessment, the Department will evaluate excursions of the DO, temperature, and pH criteria where the biological community is not impaired to determine whether this represents a "natural condition". This provision is general enough to allow the Department to evaluate other pollutants and also make a determination that the excursion is a natural condition for which there are no known man made sources.

17. Comment: Where arsenic is present in a water supply due to "natural conditions" the subsequent discharge of that material at equal or lower concentrations should not be considered an "anthropogenic source". The determination of whether a pollutant concentration occurring is "natural" should relate back to the source not the ultimate discharge point, particularly where these occur within the same watershed. (Gulbinsky)

Response: The Department is currently investigating sources of arsenic in New Jersey waters and to characterize the concentration of arsenic that would be considered naturally-occurring. As this information becomes available, it will be incorporated into the Integrated Report and arsenic will be delisted from the List of Water Quality Limited Segments (303(d) List) as appropriate.

18. Comment: The following sentence needs to be amended with the underlined: *"Data that do not meet applicable SWQS criteria potentially due to natural conditions will be carefully evaluated and data attributed to natural conditions will be explained and supported in the Integrated Report."* It is important that exceptions for natural conditions be scientifically justified in order to prevent misuse or incorrect application of this type of exception for an impairment. (Zipf)

Response: The final 2010 Methods Document has been revised as requested by the commenter.

19. Comment: It is still unclear how the Department determines (or will determine) when low dissolved oxygen (DO) conditions in marine waters are due to excessive nutrient loadings such as nitrogen or due to "natural conditions". While the ocean benthic index under development will lead to a better understanding of the impacts of low DO on benthic life, how it will help clarify the cause of low DO conditions had not been explained. In addition, how long will the Department use lack of knowledge as an excuse to not act on this problem? (Zipf)

Response: The Department has not concluded that the low dissolved oxygen levels observed in New Jersey's ocean waters are due to natural conditions. As stated in the 2008 Integrated Report, "The reason for the benthic low DO cell is not known …" (page 38). The Department is currently working to develop a benthic indicator for estuarine and ocean waters to improve the assessment of aquatic life use. The Department is working with USEPA and Rutgers University to develop a metric for the benthic community that accurately measures impairment of the aquatic life use for these waterbodies. Once this index has been developed, it will be incorporated into a revised Methods Document to be used in a future Integrated Report. At this time, the only benthic indicator available for estuarine and ocean waters is the Benthic Index of Biotic Integrity developed for the New York/New Jersey Harbor based on USEPA Region 2's REMAP protocol. This information was used in 2008. USEPA resampled but the results are not available to update these assessments at this time.

20. Comment: What are the "*other conditions*" the Department attributes to natural conditions that allow for exemptions of impairment? Human activities, such as development, land use changes, dam flow changes, and water withdrawal, can and have changed base-flow conditions as well as groundwater levels in New Jersey according to the USGS. Attributing human-caused, low flow conditions to natural conditions is not acceptable. Furthermore, ignoring the related impairments would be scientifically unjustified and invalid. How can drought-induced water impacts be differentiated from these human activity-related impairments and be "*attributed to natural conditions*" only?" (Zipf)

Response: The Department agrees with this comment and has revised the statement under Section 4.3, "Additional Considerations When Evaluating Biological Data" to read as follows in the final 2010 Methods Document: "Disturbed or impaired biota can result from drought conditions that result in reduced base flow. If biological communities are impaired due to drought-induced, low flow 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)."

21. Comment: The Department discusses that a number of "translators" are used to convert the narrative criteria into some type of numeric endpoints. If such values are applied as mandatory requirements (not just guidance subject to site-specific decision-making) such numeric values must be formally adopted as part of the SWQS. (Gulbinsky)

Response: As discussed in Sections 3.2 and 6.0, the Department has identified "translators" as "assessment approaches" - not mandatory endpoints - to quantitatively interpret the narrative criteria, which are qualitative in nature. These translators are used to assess designated uses such as aquatic life use based on indicators of use attainment when direct measurement of pollutant concentrations is not feasible or appropriate. These translators include biological metrics used to quantify biological indicators used to assess the aquatic life use or the fish tissue concentration thresholds used to assess the fish consumption use. The scientific basis for the benthic indicators, and other indicators of use attainment, is continually being refined and is subject to public review and comment when it is incorporated into a draft Methods Document that is published by the Department. In 2009 the Department adopted a new provision into the SWQS at N.J.A.C. 7:9B-1.5(c)9 to indicate that

the Integrated Water Quality Monitoring and Assessment Methods (Methods Document) developed pursuant to N.J.A.C. 7:15-6.2 are used to evaluate water quality data and identify waters where water quality does not meet the Surface Water Quality Standards at N.J.A.C. 7:9B as required by Section 303(d) and 305(b) of the Federal Clean Water Act. By specifying the numeric endpoints applicable to the development of the Integrated List in the Methods Document, the Department is able to update these endpoints as the science changes, ensuring that the most current scientific methods are used.

22. Comment: New Jersey seeks to use dissolved oxygen swings and chlorophyll *a* readings to help determine narrative criteria attainment. The Department states that automatic data loggers are necessary to document these swings. This is much more difficult and much more expensive to measure as automatic data loggers and installation of loggers can be costly to install. How many automatic data loggers does New Jersey use currently on our streams? During a time of limited resources, the Department should not be proposing more rigorous and expensive monitoring that ultimately weakens a straightforward numeric standard that allows for clear enforcement. (Zerbe)

Response: The Department has determined that response indicators such as dissolved oxygen (DO and other biological measurements are better indicators of adverse nutrient impacts on the aquatic ecosystem than an assessment of the in-stream concentration of total phosphorus alone. As indicated in the proposal to amend the SWQS published April 20, 2009 (see 41 N.J.R. 4587(a)), the effects of excessive nutrients are very waterbody specific. The best method for assessing DO impacts is continuous monitoring of DO levels over multiple 24-hour periods, since the most critical period is just prior to sunrise. The DO swing over a 24-hour period is also valuable information for assessing nutrient impacts, and to identify where DO change is due to photosynthetic activity. This can only be accomplished with continuous monitoring. For the 2010 Integrated Report, six dissolved oxygen continuous data loggers were employed at 18 stations in the Department's freshwater monitoring network. These are supplemented by continuous monitoring data at 145 additional stations provided by other monitoring entities (e.g., volunteers). The development of an assessment method that relies on continuous DO monitoring does not mean that the Department will no longer accept traditional discrete data taken during daylight hours.

23. Comment: A multifaceted assessment method that draws on several symptoms of eutrophication to determine the overall eutrophic condition for both state estuaries and ocean coastal waters is recommended. It is also recommended that NOAA's Assessment of Estuarine Trophic Status (ASSETs) be used as a basis for these assessments. While it may not be possible to test for all of the ASSETs symptoms such as seagrass loss that are specific to estuarine areas, chlorophyll levels and nuisance algal species which are already assessed by the Department could be included for assessments of ocean areas. (Zipf)

Response: Better indicators of nutrient impairment in coastal (tidal, estuarine, and marine) waters are needed, as stated in the 2008 Integrated Report. While the 2010 Methods Document includes a "multifaceted assessment method" for nutrient impairment of freshwater wadeable streams, it also states: "The Department will continue to refine and expand the nutrient impact assessment method to include other types of waterbodies and

other response indicators, as explained in the *New Jersey Nutrient Criteria Enhancement Plan* (NJDEP, 2009) available on the Department's Web site at www.state.nj.us/dep/wms. The Nutrient Criteria Enhancement Plan identifies several initiatives that are currently underway to provide the scientific information necessary to develop appropriate indicators and assessment methods for nutrient impairment of aquatic life uses in coastal waters. The status of these initiatives will be updated in the 2010 Integrated Report. The National Oceanic and Atmospheric Administration's (NOAA) Assessment of Estuarine Trophic Status could be used to assess overall conditions but could not be used to determine exceedances of New Jersey's adopted water quality criteria. For this reason, the Department is actively working with Rutgers University to develop ecological indicators appropriate for our estuarine waters (see Response to Comment #19).

24. Comment: The lack of assessment of impairments to marine waters must be recognized in the revised Methods Document and the Integrated Report. The commenter strongly recommends that the following be added to the end of the first paragraph of the section "Narrative Water Quality Criteria" that states, and if possible provide further updates: "*As of January 2010, there are no narrative nutrient criteria for marine waters. In December 2009, the state proposed extending the nutrient criteria to marine waters and adoption is pending. Methods to assess the narrative nutrient criteria are in development with Rutgers and EPA. The Department recognizes that this 2010 report will not fully assess or identify nutrient-related impairments in marine waters, other than dissolved oxygen.*" This statement, or something very similar, must also be included in the 2010 Integrated Report. Otherwise, these waters appear to not be impaired for nutrients, when in fact they have not been assessed. (Zipf)

Response: This section of the Methods Document is intended to explain the general difference between numeric and narrative criteria for the purposes of water quality assessment. It is not intended to discuss how specific surface water quality criteria, or their implementation, may be changed in the future. The nutrient assessment methods included in the Final 2010 Methods Document are based on the criteria and scientific information available at the time of publication, which will be used to assess water quality for the 2010 Integrated Report. The 2010 Integrated Report will explain the basis and results of the water quality assessments including where there is insufficient information to adequately assess nutrient impacts. The Integrated Report will also discuss where improved methods are needed or under development to improve the assessment process in the future.

Section 4.1 Evaluation of Physical and Chemical Data

25. Comment: The distinction between excursion and exceedance is a useful one (page 11). Also, the commenter agrees with the requirement that individual excursions be reviewed and excluded if they are outside the margin of error for the analytical method or attributable to natural conditions, transient events, or flow conditions not representative of the design flow. (Amidon)

Response: The Department appreciates the commenter's support.

26. Comment: The deletion of the "Unusual Events" section and replacement with "*Transient events*" in the revised Section 4.1 is an improvement in that these events are now further refined, but more specific language and information is still needed. What is a "*very brief timeframe*"? Is a two month shellfish closure due to a sewer-line break considered a transient event? The commenter would argue that this would not be a transient event. In addition, 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 used to not list an impairment, then this decision needs to be explained and supported in the integrated report. (Zipf)

Response: The Department appreciates the commenter's support. 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 requested by the commenter, the Department has revised Section 4.1 of the final 2010 Methods Document to state, "Excursions attributed to any of these conditions will be explained and supported in the Integrated Report."

27. Comment: The "Analytical Precision and Accuracy" section is incorrect. It indicates a disturbing lack of understanding of precision and accuracy, and needs to be rewritten. Precision is correctly defined as "How reproducible a measurement is" where as accuracy is "How close a measurement is to the 'true value'." Both are affected by the analytical method used. Evidently, the section on significant figures in the previous Methods Document was deleted and incorrectly integrated into the accuracy description in this section. (Zipf)

Response: The section described "precision" and "accuracy" from a statistical perspective commonly used in laboratory quality assurance. The paragraph was originally drafted in consultation with chemists from the U.S. Geological Survey and is sound.

28. Comment: The proposed protocol (page 12) for comparing continuous dissolved oxygen (DO) measurements to the SWQS criteria makes no mention of the recording interval used to determine that the DO is below the applicable minimum criterion for at least an hour. The commenter suggests adding a clarification that the DO must be below the applicable minimum criterion for at least two recording intervals and one hour to be considered an excursion. If the recording interval is one hour (as is often the case with NJDEP diurnal monitoring), then two consecutive recording intervals with DO less than the applicable minimum criterion would constitute an excursion. (Amidon)

29. Comment: The Department should clarify that the temperature must be above the applicable criteria for at least two recording intervals and one hour to be considered an excursion. If an hourly recording interval is used (as is common for NJDEP diurnal monitoring), then the temperature threshold should have to be exceeded for two recording

intervals in order to be considered an excursion. Furthermore, the distinction between excursion and exceedance appears to have been left out of the paragraph on evaluating continuous temperature data. (Amidon)

30. Comment: The Department proposes to consider a single excursion (for one hour or more) to be an exceedance. The continuous pH methodology should be similar to the continuous DO methodology, where two excursions at the same location constitute an exceedance. Also, a clarification should be added stating that the pH must be outside the applicable criteria range for at least two recording intervals and one hour to be considered an excursion. If the recording interval is one hour (as is often the case with NJDEP diurnal monitoring), then two consecutive recording intervals with pH outside the applicable criteria range would constitute an excursion. (Amidon)

Response to Comments 28 through 30: Any number of recording intervals may be used to generate continuous monitoring data, which is why the Methods Document establishes the frequency and duration of time that non-compliance with the criteria must occur to be considered an exceedance, rather than a specific recording frequency. For all continuously monitored parameters, an exceedance occurs when continuous monitoring results include two excursions with a total duration of at least one hour each.

31. Comment: The Continuous Monitoring section for Dissolved Oxygen (DO) does not clarify the depth of the sampling instruments. Obviously, there is an important difference as to whether DO readings are from surface or bottom waters in non-shallow areas. Also, an autonomous glider system for assessing coastal waters has been mentioned in past integrated reports for future use in assessing DO. Will this indeed be used in the 2010 Integrated Report as planned? (Zipf)

Response: The Methods Document explains the Department's methods for assessing - not collecting - water quality data. Methods for collecting data are explained in individual Quality Assurance Project Plans (QAPPs), as explained in Section 3.1 under "Quality Assurance". An autonomous glider system was not used by the Department for collecting data in coastal waters; therefore, such data was not available for the 2010 Integrated Report.

32. Comment: The practice of listing a stream as impaired when there are at least two exceedances of the minimum DO criterion is contrary to the NJWQC for DO that states that at no time should there be a reading below the minimum criteria. Furthermore, if DO is measured by field staff (and not automatic data loggers) the "just before dawn reading" when readings of DO are likely to be the lowest is usually not captured in the dataset due to staff constraints. One reading below the minimum DO criteria should equal an exceedance as a result particularly with the knowledge that DO is a critical need for aquatic life health. (Zerbe)

33. Comment: For temperature data, the "not to exceed" temperature criteria should also be adhered to rather than the proposal to only count an exceedance or violation to criteria when there are at least two exceedances within a two-day period. The one-hour maximum for acute criteria should be adhered to and considered a violation when the maximum is recorded by a

grab sample (that may not reflect a one-hour timeframe). The Department should consider any single measurement above the maximum threshold at any given time as an exceedance of the acute temperature criterion, based on the nature of grab samples. (Zerbe)

Response to Comments 32 and 33: As explained in the Methods Document under "Frequency of Exceedance", the Department has determined that a minimum of two exceedances of a numeric SWQS criterion are necessary to confirm noncompliance with a given surface water quality criterion and to ensure that the first exceedance was not a transient condition, which could be the case when all but one datum at a given monitoring location comply with the applicable criterion.

While continuous temperature data are preferred by the Department as a more accurate measurement of the ambient water quality conditions, grab sample data will be assessed when continuous data are not available. Where such grab sample data contain measurements above the applicable criterion on at least two occasions (separate dates), the waters will be considered in exceedance of the applicable criterion and the corresponding assessment unit will be placed on the Section 303(d) List of Water Quality Limited Waters.

34. Comment: Volunteer monitoring groups regularly monitor water quality in local streams and report data, some of which is in the Tier D category, to the Department. The new methods facilitate a more rigorous assessment process for water quality evaluation and preparation of the Integrated List of Waters and 303(d) List. Although the revised draft Methods Document states that "Where sufficient data are not available to apply the new method, the Department will assess nutrient impairment based on compliance with the existing numeric SWQS criteria for phosphorus", it seems clear that the new criteria requiring continuous monitoring will eventually become the preferred standard. The commenter is concerned that their data will not satisfy the new criteria unless they are able to acquire, use and maintain continuous monitoring capabilities for DO (as well as temperature and possibly pH) measurements, and conduct additional sampling and analysis to measure chlorophyll *a* levels. Implementing these capabilities would be a major undertaking for volunteer monitoring groups like ours with limited financial and personnel resources. How will the proposed monitoring methods be implemented? Will the enhanced assessments using continuous monitoring and associated sampling for chlorophyll *a* determination be carried out principally by professional entities such as NJDEP, USGS, and specialist consultants? Or is it anticipated that volunteer monitoring groups will be able to carry out continuous monitoring and provide data relating to the new criteria at the Tier D level? (Curran)

Response: It is anticipated that the Department's Volunteer Monitoring Program will continue to assist volunteer monitoring groups with equipment, training, and additional resources as needed and available. The Department will also continue to use grab sample data from volunteers and other monitoring entities to assess water quality where continuous data are not available for parameters such as DO, temperature, and pH. However, the new assessment method for nutrient impairment of aquatic life uses can only be applied when continuous data are available.

35. Comment: The Department should not designate a stream as impaired unless a thermal alteration has been identified. This is consistent with the newly adopted SWQS, which specifically reference thermal alterations in the description of temperature criteria. A thermal alteration could be a thermal point source or a poor canopy cover in a small stream (larger streams are not greatly influenced by canopy cover). In the absence of either of these potential thermal alterations, the temperature exceedance should be considered naturally occurring. The idea that high stream temperatures might be caused by stormwater impacts defies reality. We have performed continuous temperature measurements at dozens of stream locations in New Jersey during storm events, and have yet to observe a temperature increase during a storm. (Amidon)

Response: The Department added a provision to the SWQS at N.J.A.C. 7:9B-1.5(c)8 and also removed the term "thermal alteration" to address the commenter's concern (See 41 N.J.R. 4735(a)). The Department recognizes that in addition to point and nonpoint sources, temperature increases may be due to natural conditions such as solar radiation, lack of stream canopy and flow conditions. For this reason, the Department does not apply the temperature criteria as an "end of pipe" effluent limitation for point source discharges. If the Department determines that there is an exceedance of the temperature criteria, the Department may require a NJPDES-permitted facility to conduct temperature monitoring upstream and downstream of their discharge. This additional sampling is necessary to determine whether the discharge from the facility increases the ambient stream temperature by more than the acceptable levels established at N.J.A.C. 7:9B-1.5(c)8. Therefore, the temperature criteria and policies take into account the ambient water quality.

36. Comment: For chronic aquatic life criteria which have a 4-day exposure period and where exceedances are captured in a time period that is less than 4-days, special attention needs to be made to capture this additional data on these streams to determine if NJWQC are being violated. The stream should not be penalized because of lack of data. Flows and modeling could also be used to extrapolate continued violations. (Zerbe)

Response: The SWQS include both acute and chronic water quality criteria to protect aquatic life uses. Section 4.1, "Duration (Exposure Periods)" states that "chronic aquatic life criteria require a four-day exposure period; therefore, data collected under flow conditions that last less than four days … are not considered valid for assessment of chronic aquatic life criteria …" This is consistent with the Surface Water Quality Standards at N.J.A.C. 7:9B-1.14(f)2, which state, "Chronic aquatic life protection criteria are determined with no exceedance at or above the MA7CD10 flow and expressed as four-day average." The Department will evaluate sample results that exceed the chronic criteria to determine if the conditions were likely to occur over four days. This provision does not affect the assessment of acute criteria.

37. Comment: This section appropriately recognizes that conditions lasting less than four days do not trigger chronic criteria but may be used for acute criteria assessment. Similarly, long-term averages, not individual readings, apply to assessment of 70-year exposure concerns (e.g., mercury). It is not apparent how the discussion regarding the number of exceedances (minimum of two) lines up with the duration discussion. For example, two of 30 samples exceeding a long-term objective should not constitute a violation of standards. (Gulbinsky)

Response: Exceedance of human health criteria is based on an assessment of the long-term average of the data collected. Unlike other parameters, if the average is exceeded, than the criteria is exceeded. Specifically, Section 4.1, "Duration (Exposure Periods)" states that, "[f]or 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." In the example provided, the criterion would be compared to the average of the thirty-two samples (assuming that they were collected over the most recent five-year period) to determine if there was an exceedance. The two datum with values above the criterion, alone, would not constitute an exceedance of the criterion.

38. Comment: Regarding the Computations Using Censored Data (page 13), the phrase "the central tendency of" should be inserted to form the following sentence: "Non-parametric methods must be used to evaluate *the central tendency of* datasets containing censored values." Presumably, this would not apply to assessment of the maximum value, which is the basis for most criteria. (Amidon)

Response: The Department agrees with the comment and has added the recommended phrase to the text of the Methods Document.

39. Comment: When only the minimum dataset of eight samples is available, one exceedance should be carefully examined and in certain cases may be sufficient to determine impairment or at least result in a higher sampling frequency and/or additional investigation. (Zipf)

Response: The Department requires a second confirmatory excursion before determining a parameter exceeds the applicable criterion to ensure that the excursion was not a transient event.

40. Comment: For large datasets, the Department should consider a minimum percent exceedance (e.g. 5 or 10%) rather than (or in addition to) relying on Best Professional Judgment. (Amidon)

Response: The Methods Document explains that, while the Department considers two excursions to constitute an exceedance, only two excursions out of a very large dataset may not accurately represent non-attainment of the designated use. Therefore, the Department may evaluate factors other than the number of exceedances (e.g., percent exceedance, magnitude of the exceedance and other water quality data) in assessing use attainment where the data set is very large. In such instances, the use assessment would be based on Best Professional Judgment and would be recorded and documented in the Integrated Report on a case-by-case basis. A minimum percent exceedance cannot be established as an assessment method unless the minimum percentage is promulgated as part of the applicable SWQS criteria.

41. Comment: It would appear reasonable to discuss the need to find at least monthly, if not seasonal, levels of TP above the numeric nutrient value. Plant growth and ecological

conditions do not respond to four-day exposures to this constituent. This would line up the TP objective with the growing season average periphyton level that is used to determine whether an impairment may be present. (Gulbinsky)

Response: The 2010 Methods Document includes a new assessment method to evaluate nutrient impairment of freshwaters using a "weight of evidence" approach to determine whether phosphorus causes non-attainment of the aquatic life use, where the response indicator data is available in the same summer season/year. The Department believes that this new assessment method provides a more accurate assessment of nutrient impairment of the aquatic life use than individual phosphorus values. Where sufficient data are not available to apply the new assessment method, the Department will assess nutrient impairment based on compliance with the existing numeric SWQS criteria for phosphorus and will list phosphorus as the cause of non-attainment where there is an exceedance of the numeric phosphorus criteria.

42. Comment: The Department should not eliminate "excursions" (or exceedances of the numeric water quality criteria) from the dataset based on "if noncompliance can be attributed to transient events, natural conditions, or flow conditions". If exceedances to water quality criteria occur during times of low flow and hot weather conditions for example, it is critical these exceedances are included in the dataset and considered a violation of the criteria as the exceedances effect the designated uses and health of aquatic life – as a result the stream can be listed as impaired and cleaned up appropriately. This action of not including these "excursions" in the dataset used to assess the stream for use attainment could be seen as a provision inconsistent with the numerous New Jersey Water Quality Criteria expressed as values and levels not to be surpassed, even for an instant, at any time. The Department should not eliminate these excursions from the dataset as such a practice is likely a violation of the intent of the Clean Water Act. (Zerbe)

Response: The Department does not exclude data from the assessment process. All excursions are evaluated to determine whether the event is due to transient or natural conditions. Should the evaluation determine that the events are due to transient or natural condition, the Department may decide not to identify the waterbody as impaired. These decisions are documented in the Integrated Report.

43. Comment: Assuming data points above the criterion-concentration but within the analytic margin of error (MOE) are not reliable or considered "excursions/outliers", while assuming data points below the criterion-concentration but within the MOE are reliable is inconsistent and not in the spirit of the Clean Water Act. Finally, requiring a minimum of two "exceedances/excursions" before a water quality criterion (WQC) for a non-toxic parameter allows a stream to be listed as impaired is not a good practice and not in spirit of the law. (Zerbe)

Response: The Department's policy regarding analytical precision and accuracy is consistent with sound scientific principles regarding the validity of data based on standard analysis, and reporting methods. When a value is within the margin of error of the analytical method – and the measurement overlies the criterion value – it cannot be determined that the

"excursion" represents an actual "violation" of the criterion or a limitation in the accuracy of the analytical method, in which case, there is not sufficient data (i.e., valid data) to determine that an exceedance of the SWQS criterion has, in fact, occurred.

The Department has established a policy of requiring a second confirmatory excursion before identifying a parameter to be in exceedance of the SWQS to insure that the excursion was not a transitory event.

Sections 4.1 and 4.3

44. Comment: Section 4.1 under "Additional Considerations When Evaluating Biological Data" states, "*Disturbed or impaired biota can result from extended drought or other conditions that result in reduced base flow. If biological communities are impaired due to drought-induced, low flow conditions, the impairment will be attributed to natural conditions and the data will not be considered valid for assessment purposes (see Section 3.2).*" What are the "*other conditions*" the Department attributes to natural conditions that allow for exemptions of impairment? Human activities, such as development, land use changes, dam flow changes, and water withdrawal, can and have changed base-flow conditions as well as groundwater levels in New Jersey according to the USGS. Attributing human-caused, low flow conditions to natural conditions is not acceptable. Furthermore, ignoring the related impairments would be scientifically unjustified and invalid. How can drought-induced water impacts be differentiated from these human activity-related impairments and be "*attributed to natural conditions*" only?" (Zipf)

Response: Section 4.1 of the Final 2010 Methods Document has been revised to remove "extended" and "or other" from the sentence in question, since this section applies only to drought conditions. Low base flow alone does not automatically constitute drought conditions, as suggested by the commenter. Thus, the natural phenomenon of a drought is distinguished from other causes, such as surface water withdrawals, development, and other human activity, is determining that biological impairment is due to natural conditions.

Section 4.4 Assessment of Nutrient Impacts

45. Comment: The commenter appreciates the clarifications regarding how continuous monitoring results will be considered in making impairment determinations. The assessment regarding minimum DO appears to parallel USEPA's suggested approach on minimum criteria application. However, the 3 mg/l DO flux target deserves greater flexibility in its application as a characteristic of nutrient impairment. Although the commenter agrees that an elevated DO flux may be an indicator of plant growth, the degree of flux occurring is governed by a number of factors (such as water depth and re-aeration rate) such that plant growth levels producing a particular flux rate could vary widely. To the commenter's knowledge, there are no reliable scientific studies showing that aquatic life is impaired simply due to a total diurnal DO flux above 3 mg/l or the amount of plant growth associated with such a flux rate. For this reason, this "indicator" necessarily should be combined with other indicators before it is considered to provide proof of nutrient impairment. Moreover, this is certainly not an acute effect and should therefore allow for a longer averaging of

results if it is to be applied as an indicator. USEPA suggests that chronic DO conditions be applied on a 30-day average basis. Therefore, allowing only two individual DO flux occurrences greater than 3 mg/l before declaring a nutrient impairment seems inappropriate. Applying this indicator as some type of a growing season average would be a more appropriate approach. (Gulbinsky)

Response: There seems to be a misunderstanding by the commenter about the role of the DO flux in the nutrient assessment. The sole purpose of the DO flux is to rule out violations in dissolved oxygen criteria that are due to factors other than primary productivity, such as sediment oxygen demand; hence, the DO flux was never intended to be used alone and/or as the commenter stated "*showing that aquatic life is impaired simply due to a total diurnal DO flux above 3 mg/l"* without further evaluation of other response indicators.

46. Comment: The Department is proposing to use the 3 mg/l diurnal DO swing in the exact opposite manner than it was originally intended. The original Technical Manual for Phosphorus Evaluations (NJDEP, 2003) used a diurnal DO swing of 3 mg/l/d as a threshold below which it could be stated unequivocally that whatever impairment may exist in that waterbody cannot be due to excessive productivity (and therefore not caused by phosphorus). This is most clearly stated in the 2008 Technical Manual for Phosphorus Evaluations; the words "dissolved oxygen fluctuations of 3 mg/l or more" are followed by the parenthetical explanation, "indicative of photosynthetic activity" (page 13). In other words, if the diurnal DO swing is less than 3 mg/l, any DO criteria violations cannot be attributed to nutrient enrichment because there is too little photosynthetic activity. The Department is now proposing to use this threshold to mean the inverse, namely that a diurnal DO swing of 3 mg/l/d or more represents an "excessive" DO swing. Such an approach is definitely NOT supported by the diurnal data collected throughout New Jersey. There are many locations in New Jersey that occasionally exhibit diurnal DO variations much higher than 3 mg/l/d due to natural conditions. Furthermore (and more importantly), occasional diurnal variations in excess of 3 mg/l/d occur in streams that would be considered unimpacted by any other measure. It is one thing to apply a conservative swing of 3 mg/l as a value below which it can be said with certainty that a DO violation is not due to excessive productivity. It is quite another to select a diurnal DO flux that represents excessive productivity and is used to assess impairment. Such a value needs to be determined scientifically by evaluating all the diurnal data from NJ streams available to the Department, and comparing with other metrics of productivity. In the context now proposed, such a value takes on almost the same importance as a water quality criteria, and requires a strong technical basis. The Department has provided no such basis, and the use of a 3 mg/l/d swing in the manner proposed is not technically justified. (Amidon)

Response: The nutrient assessment method does not establish excessive DO swing as a water quality criterion or an independent indicator of impairment; it is considered only in combination with other factors that, collectively, may indicate impairment; which is similar to how it was used in the phosphorus evaluation study. The sole purpose of the DO swing remains, as it was in the phosphorus evaluation study, to rule out exceedances of DO criteria that are due to factors other than primary productivity, such as sediment oxygen demand;

hence, the DO swing was never intended to be used alone as an indicator or as a water quality criterion to assess the aquatic life use.

The Department agrees with the commenter that the description of the 3mg/l swing as "excessive" may be inaccurate; the final 2010 Methods Document has been revised to state that the 3mg/l threshold is used as an indicator of photosynthetic activity (see the discussion on Dissolved Oxygen in Section 4.1, "Continuous Monitoring" and Table 4.4: Nutrient Impact Assessment Outcomes).

47. Comment: The Department proposes to simply subtract the lowest recorded value from the highest recorded value in a 24-hour period to determine diurnal DO flux. This approach exaggerates the significance of the single highest and single lowest recorded DO values and, as a result, is not technically sound. Having evaluated data from hundreds of diurnal DO events, I offer several suggestions. First, specify that the 24-hour period be monitored during a dry-weather period, with no indications of increases in flow. Stormwater can cause DO to rise or fall precipitously, but this phenomenon has nothing to do with diurnal variations driven by photosynthesis and respiration. Second, specify that the nighttime low is to be subtracted from the daytime high, to avoid quantifying any anomalous fluctuations that have no relevance to photosynthesis and respiration. Third, the daytime peak and nighttime trough should be calculated as an hourly average consisting of at least two recording intervals. In other words, a running hourly average (consisting of at least two recording intervals) should be calculated, and the daytime peak and nighttime trough should be taken from the hourly averages. This would avoid relying on single DO values that may not be representative of actual water quality. (Amidon)

Response: As indicated by the commenter, stormwater can cause dissolved oxygen levels to fluctuate. Therefore, the Department will review the diurnal monitoring results to ensure that diurnal dissolved oxygen swings decisions are not based on anomalous fluctuations due to factors other than photosynthesis and respiration. The Department has revised Section 4.4 to include a reference to Section 4.1, "Continuous Monitoring - Dissolved oxygen", which states: "When assessing *diurnal* DO flux, the Department will review the results from continuous monitoring performed during the growing season and calculate the difference between the highest and lowest measurements of DO concentration observed over a 24-hour period **(i.e., using the highest and lowest hourly averages over 24 hours)**" (emphasis added).

48. Comment: The second paragraph on page 18 states: "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." The commenter certainly agrees with this statement. (Amidon)

Response: The Department appreciates the commenter's support.

49. Comment: Table 4.4 and the section text indicate that 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 could support

phytoplankton and/or macroalgae 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. (Zipf)

Response: In instances when benthic impairment is coupled with low DO but there is no excessive DO swing, DO will be listed as the cause of aquatic life use non-attainment on the Section 303(d) List. The resulting TMDL analysis will explore all possible contributors to the observed oxygen deficiency including local nutrient impacts, sediment oxygen demand, and possible impacts from upstream.

50. Comment: The commenter strongly recommends that the Department recognize and incorporate the results of the recent SAB review regarding EPA nutrient criteria development and impairment assessment methods into its own assessment methods. The purpose of the SAB review was to ensure methods employed to develop nutrient criteria and regulatory requirements are scientifically defensible. In general, the panel concluded that EPA's recommended approaches did not demonstrate cause and effect when seeking to relate nutrient levels to invertebrate impacts.

Response: USEPA's Science Advisory Board reviewed USEPA's recommendations for developing nutrient criteria and submitted their final report to USEPA on April 27, 2010. The Department's method for assessing nutrient impairment based on response indicators and a "weight of evidence" approach is consistent with the SAB's recommendations and is, thus, scientifically defensible. Under the Department's nutrient assessment method, biological impairment alone is not a sufficient basis for listing phosphorus as the cause of aquatic life use impairment unless the dissolved oxygen criteria is also exceeded and the dissolved oxygen levels show a diurnal swing greater 3 mg/l, which indicates photosynthetic activity.

51. Comment: The basic purpose of a nutrient assessment is to determine areas where water column nutrients are the "cause" of excessive plant growth. The suggested approach in Table 4.4 seems reasonable. (Gulbinsky)

Response: The Department appreciates the commenter's support.

52. Comment: Some of the Department's nutrient impairment assessment methods/indicators could inappropriately target nutrient concentrations as the cause of impairment when other factors (including natural variability) are at work. (Gulbinsky)

Response: The Department's nutrient assessment method evaluates the biological condition as well as the biological response, as measured by the dissolved oxygen concentrations and diurnal swing, to determine whether nutrients cause biological impairment. As described in Table 4-4, a waterbody is listed for phosphorus if the results of biological monitoring indicate impairment AND the dissolved oxygen criteria is exceeded AND a diurnal swing in dissolved oxygen greater than 3mg/l is observed. Where there is biological impairment and no exceedances of DO criteria and the DO swing is at or below 3 mg/l, phosphorus is not a

cause of impairment (and "Cause Unknown" is placed on the 303(d) List). When there is biological impairment, no exceedances of DO criteria, and the DO swing is above 3 mg/l, the assessment is inconclusive regarding phosphorus and chlorophyll *a* needs to be assessed to determine if phosphorus is the cause of impairment. When there is biological impairment, the DO criteria are exceeded, and the DO swing is at or below 3 mg/l, phosphorus not a cause of impairment (DO is placed on the 303(d) List). When there is biological impairment, the DO criteria are exceeded, and the DO swing is above 3 mg/l, **Phosphorus is confirmed as the cause** and placed or retained on the 303(d) List).

53. Comment: Rooted plant growth is the cause of DO swings. In general, rooted plant growth is governed by the soil deposits in the stream. Controlling water column concentrations would not address this situation. (Gulbinsky)

Response: The nutrient assessment method does not evaluate rooted plants. Where the Department determines that phosphorus is the cause of aquatic life use non-attainment, the waterbody will be placed on the 303(d) list. This issue will be addressed through the TMDL process.

54. Comment: Individual periphyton readings could exceed the maximum targets suggested in the Department guidance while average conditions indicate that plant growth is not excessive. Numerous studies in other states show that maximum periphyton values can exceed 200 mg/m2 chlorophyll 'a' even when periphyton growth is quite low. Such transient maximum conditions should not be considered to demonstrate that waters are impaired, as nutrient impairment ecologically is a function of longer term conditions. In any event, an elevated transient high periphyton reading is a natural phenomenon that will not be controlled by TP reduction. (Gulbinsky)

Response: The nutrient assessment method stipulates that the average of a minimum of three periphyton chlorophyll *a* sampling events is used to determine whether phosphorus should be identified as a cause when a DO swing is present but the DO criteria is met. An individual periphyton reading would not be used to under this method.

55. Comment: A key factor controlling plant growth acknowledged by the SAB was tree canopy (light). In many situations, high periphyton growth will occur if canopy is removed, even where low TP levels are present. (See, Critical Evaluation of EPA Stream Nutrient Standard Initiatives, Hall et al. Bureau of National Affairs July 2009.) When assessing whether nutrient levels or habitat changes have caused increased periphyton growth, the Department should evaluate this factor. Tree canopy restoration in many situations, may be the more environmentally beneficial and appropriate remedial measure. Classifying such situations as a "nutrient impairment" will direct resources inappropriately. (Gulbinsky)

Response: The Department agrees that the impact of nutrients is highly dependent on waterbody specific factors; however, periphyton biomass alone will not be used to determine that phosphorus is a cause of aquatic life non-attainment. Periphyton biomass is evaluated when the benthic macroinvertebrate data indicate impairment and the dissolved oxygen criteria is met but the diurnal dissolved oxygen swing is greater than 3 mg/l, which is

indicative of photosynthetic activity. Canopy restoration may be successful for some waterbodies but others are too wide to benefit from this type of restoration activity alone.

56. Comment: The Department needs to present the data showing that invertebrate impairments are caused by a total DO flux greater than 3 mg/l to the public for review and, at a minimum, allow for a demonstration that DO flux is not the cause of invertebrate changes on a site-specific basis. (Gulbinsky)

Response: The Department makes no direct association between benthic macroinvertebrate impairment and DO swings. The DO swing indicates the presence of photosynthetic activity.

57. Comment: The Department indicated that a "weight-of-evidence" approach will be used in evaluating whether or not "phosphorus causes non-attainment of the aquatic life uses." The commenter agrees that an approach that considers a range of relevant scientific information is appropriate when evaluating narrative criteria compliance. EPA's SAB decision also addressed and supported this approach when assessing nutrient impacts. (Gulbinsky)

Response: The Department appreciates the commenter's support.

58. Comment: The concept of "de minimus" impacts also has relevance to nutrient impairment evaluations. In determining whether phosphorus is causing use impairment, the extent of elevated plant growth should be a factor. For example, if a several mile stream reach only had 100 yards with elevated plant growth, it would not appear to be reasonable to assert nutrients were preventing use attainment. Similarly, if a backwater area of a lake that flushes poorly had elevated algal growth but the remainder of the lake did not exhibit such conditions, it would not be reasonable to declare the lake to be impaired. Such an area should not be considered "representative" of the lake conditions. Finally, this concept should also be applied to infrequent exceedance of the maximum periphyton growth target level. If this target were exceeded only in a short reach and only rarely from the dataset collected, the condition should be considered "de minimus" and allow the waters to be considered in attainment. (Gulbinsky)

Response: The 2010 Methods Document does not limit the application of "*de minimus*" to specific types of assessments; recreational use assessment and shellfish harvest use assessment are provided explicitly as examples of how *de minimus* could be applied. However, the method for determining *de minimus* impairment is limited to application on an assessment unit scale, where an individual station that is impaired represents a minute portion of the total area of the assessment unit.

The nutrient assessment method uses biological monitoring (benthic macroinvertebrates and dissolved oxygen) primarily to determine whether phosphorus causes aquatic life use non-attainment. Where the assessment results are inconclusive, the Department evaluates the seasonal periphyton chlorophyll *a* concentration. A minimum of three events during the growing season is required to ensure that the value represents the overall condition, not just an unusual event (see Response to Comment #54).

59. Comment: If insufficient data are available for a particular site to apply the nutrient impact assessment methodology, then compliance with the instream phosphorus criterion (0.1 mg/L TP) will be used to assess the cause of aquatic life impairment. This is completely inconsistent with the nutrient impact assessment methodology, which is based on the reality that there will be circumstances where phosphorus is NOT the cause of aquatic life impairment despite being over 0.1 mg/L in concentration. Therefore, if insufficient data exist to apply the nutrient impact assessment methodology, the Department should list the cause of any aquatic life impairment as "Cause Unknown." (Amidon)

Response: The Department agrees with the commenter that there are circumstances where phosphorous levels in excess of the 0.1 mg/l will not impair the aquatic life use. However, where there are insufficient data to perform a nutrient impact assessment, the Department will continue to evaluate the numeric phosphorus criterion as per N.J.A.C. 7:9B-1.14(d) until such time as it can be demonstrated that phosphorus is not the cause of use impairment.

60. Comment: The Department should reevaluate freshwaters previously assessed as not attaining the general aquatic life use based solely on exceedance of the numeric phosphorus criteria in light of the proposed changes to both the SWQS and the assessment methodology. Given these significant changes, the Department should refrain from imposing phosphorus water quality-based effluent limitations (WQBELs) on dischargers to such waterbodies until this reevaluation is complete. (Amidon)

Response: The Methods Document states that the Department will re-evaluate freshwaters previously listed as impaired based upon exceedance of the numeric phosphorus criteria when sufficient data are available to implement the new nutrient assessment method. In addition, the Department will phosphorus as the cause of use non-attainment where the concentration of total phosphorus does <u>not</u> exceed the SWQS, where the results of the nutrient assessment indicate that phosphorus is the cause (see Response to Comment #52). The Department will continue to impose water quality based effluent limits for phosphorus in NJPDES permits for facilities that discharge to a waterbody listed for total phosphorus on the List of Water Quality Limited Waters (303(d) List).

61. Comment: It should be clearly stated that waters with macroinvertebrate data supporting the aquatic life use will not be designated as impaired by phosphorus, regardless of the instream concentration of phosphorus. Furthermore, waters with no biological data should not be designated as impaired based solely on a high instream concentration of phosphorus (this is rare anyway, since far more sites have biological data than chemical data). Such a situation should trigger biological monitoring, and the waterbody should be placed on Sub-List 3. (Amidon)

Response: The Department's nutrient assessment method for freshwater wadeable streams requires biological monitoring and continuous dissolved oxygen monitoring data. The Department recognizes that are locations where this type of data will not be available. Therefore, the Department has revised the final 2010 Methods Document to clarify that, when sufficient data are not available to apply the nutrient assessment method but phosphorus data are available, the Department will continue to list phosphorus as a cause of

aquatic life use non-attainment where the total phosphorus concentration exceeds 0.1mg/l in freshwater streams.

Section 5.0 Modeling and Sampling Results

62. Comment: The first paragraph on page 21 ("Assessment Units with More Than One Stream Classification") addresses the situation where streams of more than one classification exist within an assessment unit, and the Department has sufficient data in streams of each classification. The language states that "where data is [should be 'are'] available for both higher and lower classification streams, the Department will use the more stringent criteria to assess designated use attainment for the assessment unit." This works fine as long as it is the stream with the more stringent criteria that shows exceedance of the criteria. However, suppose the FW2-TP waters in a particular assessment unit shows it is attaining all uses, but the FW2-NT waters in the same assessment unit shows impairment. The revised draft assessment methodology implies that the Department would designate such an assessment unit as "attaining all uses" based on the results in the FW2-TP waters. The commenter seriously doubts this is intended, but the language is misleading. (Amidon)

Response: The final 2010 Methods Document has been revised as follows:

> **Assessment Units With More Than One Stream Classification**: Data will be compared to the SWQS for the stream classification where the station is located. Each station is evaluated against the applicable criteria. Where the assessment unit contains both higher and lower classification streams but there is no data for the higher classification stream segment, then data from the lower classification stream segment will be compared to the SWQS for higher classification. If the lower classification waters meet the higher classification's SWQS, the data will be used to assess both classifications.

63. Comment: It is unacceptable to delist a waterbody, 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 waterbody and not for a delisting. (Zipf)

Response: Water quality models are used to predicate water quality conditions based on ambient monitoring data. Models can be used to predict water quality conditions that would result under specific flow conditions that may only occur infrequently or when criteria have longer average period than typically sampled. As indicated in the Methods Document, the Department may use modeling results to list and delist if it is determined that the model adequately predicts water quality.

Section 6.0 Assessment Methods

64. Comment: According to Section 4.2, *"Waters classified as PL, FW, SE1, and SC are assessed for primary contact ("in the water") SE2 and SE3 waters are assessed for secondary recreation ("on the water")"* based on the December 2009 adoption of water quality standards. Therefore, Table 6 and Section 6.2 need to be also updated to reflect these changes. (Zipf)

Response: Table 6.0 has been revised in the Final 2010 Methods Document to indicate that the minimum suite of parameters for recreational use assessment is: "Primary Contact: Beach closure data; Secondary Contact: Fecal Coliform (in SE2 and SE3 waters)." Table 6.2 has not been revised because it accurately depicts the possible outcomes of the recreational use assessment; however, the following statement has been added to the Final 2010 Methods Document for further clarification: "Table 6.2 summarizes the possible outcomes of the recreational use assessment based on the appropriate types of data."

65. Comment: The Department has indicated that it plans on employing "three new biological indices based upon genus level taxonomy." The use of biological indicators to identify impaired waters is reasonable, but the public should get an opportunity to review and comment on those methods so it can be understood what factors influence the outcome of such analyses. It is widely understood that numerous, non-pollutant parameters may strongly influence the presence or absence of invertebrates. This was discussed broadly as part of the recent SAB review of EPA's suggested stressor response methods for relating nutrient levels to invertebrate indices and metrics.

A major uncertainty inherent in the Guidance is accounting for factors that influence biological responses to nutrient inputs. For criteria that meet EPA's stated goal of "protecting against environmental degradation by nutrients," the underlying causal models must be correct. Habitat condition is a crucial consideration in this regard (e.g., light [for example, canopy cover], hydrology, grazer abundance, velocity, sediment type) that is not adequately addressed in the Guidance. Thus, a major uncertainty inherent in the Guidance is accounting for factors that influence biological responses to nutrient inputs. Addressing this uncertainty requires adequately accounting for these factors in different types of water bodies. SAB Draft Report @ 37.

A recent California study confirmed the substantial role substrate and sedimentations plays in macroinvertebrate diversity. *Benthic Invertebrate Responses to Patch And Reach-scale Sediment Deposition and the Relation of Land Use and Roads to Sedimentation* by David Herbst, Scott Roberts, Bruce Medhurst, and Nick Hayden Sierra Nevada Aquatic Research Laboratory, University of California. The New Jersey assessment methods cover broad areas and different stream types and suburban/urban settings. The commenter trusts that these critical habitat differences that play a strong role in macroinvertebrate population diversity are being properly addressed in the new biological assessment methods. (Gulbinsky)

Response: The Department developed three macroinvertebrate metrics to address ecoregional differences inherent in the biota of the State, thereby enhancing the utility of the biological indicators. These benthic macroinvertebrate metrics are a direct indicator of aquatic life use. These metrics are based upon the best available information and, as such, are

subject to revisions as new information becomes available. These metrics are detailed in the Methods Document which, when revised, is subject to public review and comment pursuant to N.J.A.C. 7:15-6.2. This provides the public and USEPA with an opportunity to evaluate these metrics and how they are employed.

The Department agrees with the comment that habitat can confound biological assessments and subsequently has selected biologically relevant indicators of nutrient effects such as depressed DO levels, broad swings in DO levels, and/or excess amounts of algal growth, which occur and impair biota independent of habitat condition.

Section 6.1

66. Comment: Table 6.1 on page 25 is inconsistent with Table 6.0 (page 24) and the language in Section 6.1 (page 24). Table 6.0 states that chemical data will only be used to assess General Aquatic Life use attainment if biological data are not available. This is supported by the first two sentences of Section 6.1 on page 24, which state that aquatic life use is assessed directly using biological data. However, the last row under the subheading "Both Biological and Chemical/Physical Data Available" in Table 6.1 (page 25) indicates that aquatic life use can be designated as NOT attained based on chemical data, even when biological data demonstrate that the aquatic life use is supported. This is particularly problematic since TP is listed as one of the supporting chemical parameters. This could be construed to mean that a site with macroinvertebrate data showing attainment of aquatic life use could nonetheless be designated as impaired for aquatic life use by phosphorus, based solely on phosphorus concentration data. Such would appear to also contradict the nutrient impact assessment methodology presented in Section 4.4. (Amidon)

Response: Table 6.0 of the final 2010 Methods Document has been revised to show, not just the data needed to conduct a use assessment, but the minimum data required to determine that the use is attained. This is consistent with the accompanying text, which explains that the Department uses a conservative approach that requires more data to support a finding that a designated use is attained than is needed to support a finding that a use is not attained. For example, waters will be assessed as not attaining a designated use if any of the available data show an exceedance of an associated parameter, even if the full suite of associated parameters is not available; however, waters will be assessed as attaining the designated use only if the full suite of associated parameters is available and shows no exceedance of any of those parameters. If the data show no exceedances but does not meet the minimum data requirements, the designated use will assessed as "insufficient information available".

In addition, Table 6.1 and Section 6.1 have been revised to clarify the outcomes of the different scenarios for aquatic life use assessment, as shown below.

- Where biology is impaired, sufficient data are available to assess nutrient impacts, and the nutrient assessment indicates that phosphorus is the cause of impairment, the aquatic life use will be assessed as not attained and phosphorus will listed as the cause.
- Where biology is impaired, sufficient data are available to assess nutrient impacts, and the nutrient assessment indicates that phosphorus is not the cause of impairment, the

aquatic life use will be assessed as not attained but phosphorus will not be listed as the cause even if in-stream concentrations of phosphorus exceed the numeric criterion. In such cases, the cause will be identified as dissolved oxygen, or other chemical/physical parameter, as applicable, or "cause unknown".

- In cases where biology is impaired and sufficient data are not available to assess nutrient impacts, the aquatic life use will be assessed based on the applicable numeric phosphorus criterion.
- For all other parameters associated with the aquatic life use assessment, any exceedance of the applicable criteria will be assessed as not attaining the designated use.

These revisions are consistent with the outcomes of the Nutrient Impact Assessment (see Table 4.4), which reflect that, phosphorus concentrations will not be used as an indicator of aquatic life use non-attainment in freshwater streams when response indicator data is available that more accurately indicates when phosphorus is the cause of aquatic life use non-attainment. Thus, phosphorus has been removed from the minimum suite of parameters for assessment of the general aquatic life use.

Section 6.2 Recreational Use Assessment Method

67. Comment: The proposed framework for analysis appears to reasonably implement the current standards. For planning purposes, it would be helpful for the Department to identify designated bathing beaches it believes are "heavily used" for contact recreation. The commenter presumes this would include the entire Jersey coast inland tidal waters that are used rather extensively for shipping and cargo transport (e.g., Arthur Kill and much of the New York Harbor area) and streams, in general, would not appear to fall within this definition. The Department's response to this observation would be appreciated. (Gulbinsky)

Response: The actual designation of bathing beaches is conducted by the New Jersey Department of Health and Senior Services, not the Department of Environmental Protection, pursuant to State Sanitary Code (N.J.A.C. 8:26), which defines the term "bathing beach" to mean " … the designated area of a natural or artificially constructed pond, lake, stream, river, bay, tidal waters, ocean or other body of fresh or salt water, which is used for bathing and swimming purposes together with buildings, equipment, and appurtenances, if any, and the land areas used in connection therewith. Therefore, by definition, all "designated bathing beaches" are considered "heavily used" for primary contact recreation, as stated in the 2010 Methods Document. Chapter IX of the State Sanitary Code, which governs public recreational bathing, is available on the Department of Health and Senior Services' Web site at http://www.state.nj.us/health/eoh/phss/recbathing.pdf, which is cited in Section 4.2 of the 2010 Methods Document under "Pathogenic Indicators".

Section 6.3 Fish Consumption Use Assessment Method

68. Comment: The Draft 2010 Guidance discusses the use of fish tissue concentrations in assessing compliance for certain parameters (e.g., mercury). The Draft 2010 Guidance @ 27 indicates that impairment designations will be made if either (1) a fish tissue level of concern is exceeded or (2) the applicable human health-based criteria are exceeded. This approach

has the potential to misdirect local resources. There are a host of EPA human health-based criteria that assume a degree of bioaccumulation is occurring. For example, disinfection byproducts and arsenic criteria applicable to fresh waters assume this route of exposure is occurring. Based upon the most recent study completed by EPA, it is not clear that the fish consumption route is a significant concern for the vast majority of pollutants in fresh waters (see *National Study on Chemical Residues in Lake Fish Tissue*). Where criteria are exceeded, but tissue levels are in the safe range, no actual use impairment exists. The commenter requests that the Department establish a mechanism to consider the actual fish tissue levels for a host of parameters as part of the 303(d) listing and TMDL process to avoid unnecessary regulation and pollutant reduction that could occur if EPA's fish tissue assumptions are misplaced. (Gulbinsky)

Response: The Department has modified the fish consumption use assessment method to be based on concentrations of bioaccumulating toxic parameters in fish tissue, where such data is available. The Department is required to do so as per the Surface Water Quality Standards in the State regulations. The specific constituents used to assess the fish consumption use are listed in Appendix A of the Methods Document and all of these constituents have strong biomagnification potential. The Department has established thresholds for these bioaccumulative toxic pollutants, based on USEPA guidance, to be used in the fish consumption use assessment and as a basis for fish advisories. Details of the new fish consumption use assessment method for mercury and other toxics are provided in Section 6.3.

69. Comment: The Department must require the Methods Document to specify that contaminants in fish tissue concentrations will be used to assess fish consumption use in the Integrated Report, and the report must include these assessments. The first sentence in this section is ambiguous as to what or even if the Department will assess fish consumption use for the report: *"The Department may use fish tissue concentrations or water column concentrations for bioaccumulative toxic pollutants to assess the fish consumption use."* This also appears to be inconsistent yet potentially redundant with the first sentence of the second paragraph: *"The Department will also evaluate compliance with human health criteria for toxic pollutants expected to bioaccumulate in fish tissue."*

What is the basis for using water column concentrations in place of assessing fish tissue bioaccumulation directly? Many of the contaminants that have been found to bioconcentrate and/or bioaccumulate in fish are only transient in the water column, but they are still present throughout the food web due to high concentrations in the sediments. It is therefore inappropriate and insufficient to use water column concentrations as a surrogate for fish tissue concentrations. (Zipf)

Response: The Department has revised Section 6.3 and expanded Table 6.3b to clarify the Fish Consumption Use assessment methods. The Department uses both fish tissue concentration (which supports fish consumption advisories) and water column data to assess the fish consumption use. The Department has established thresholds for fish tissue concentrations for specific bioaccumulative toxic pollutants used to develop fish consumption advisories. The Department will also assess the fish consumption use by

evaluating all applicable assessment units for compliance with the human health criteria developed for SE/SC waters. The human health criteria for these toxic parameters take into consideration bioaccumulation. The human health criteria that may be used to assess the fish consumption use are listed in Appendix A of the Methods Document. The fish consumption use is attained when all fish tissue concentrations are below the threshold and there are no exceedances of the SE/SC human health criteria in water column data. The use is not attained when exceedances are recorded for SE/SC human health criteria in the water column and/or when fish tissue concentrations exceed safe consumption thresholds.

70. Comment: The following sentence has been deleted: *"The data collection, risk assessment, and issuance of fish consumption advisories are overseen by the New Jersey Interagency Toxics in Biota Committee (ITBC), a joint effort between the Department and the DHSS. Through the ITBC, research projects are coordinated to monitor levels of contaminants in commercially and recreationally harvested fish, shellfish, and crustacean species."* Is the Department no longer working with DHSS? Has New Jersey Interagency Toxics in Biota Committee been discontinued given that some pollutants thresholds have been established? Or will this committee continue to work on pollutants that may not have thresholds established for future assessments? (Zipf)

Response: The modified fish consumption use assessment method is based on the Department's assessment of fish tissue data, not on the issuance of fish consumption advisories; therefore, information about the fish advisory process is no longer relevant to the Methods Document. The Toxics in Biota Committee assisted with the development of the modified fish consumption method, which was published for public review and comment in December 2009.

71. Comment: The fish consumption use assessments must include polybrominated diphenyl ethers (PBDEs), flame retardants that persist and bioaccumulate similar to polychlorinated biphenyls (PCBs). The National Oceanic and Atmospheric Administration (NOAA) released a report this spring that identified the Hudson Raritan Estuary as containing the highest levels of PBDEs in the U.S. The report also indicates high levels at Long Branch and Shark River stations. NOAA has stated that flame retardants are a major concern to coastal ecosystems and that "*Laboratory studies indicate that PBDEs may impair liver, thyroid, and neurobehavioral development, and the most sensitive populations are likely to be pregnant women, developing fetuses, and infants*." PBDEs were also detected in all fish tissue samples from 18 different species from the Delaware River Basin and Estuary. The Department must work with the NJ Department of Health through the Interagency Toxics in Biota Committee to include PBDEs for fish consumption advisories. The Department must also account for PBDE contamination levels in shellfish for classifying shellfish harvest areas." If the Department is not able or cannot afford to test for flame retardants, can the Department at least warn people about the potential issue based on NOAA's Mussel Watch findings and better coordinate messaging with NOAA? (Zipf)

Response: The Department's Routine Monitoring for Toxics in Fish Program included analysis of polybrominated diphenyl ethers (PBDE) in a limited number of samples of fish from the coastal and some freshwaters of the State as well as the Delaware River/Estuary.

The Department plans to continue to conduct screening analysis as part of this program. Data for the Delaware Estuary were evaluated and presented in 2007 by the Delaware Department of Natural Resources and Environmental Control at the USEPA National Fish Forum (www.epa.gov/waterscience/fish/forum/). The results indicated that the PBDE concentrations were below risk levels. In addition, those samples with detectable levels of PBDEs typically contained other contaminants (i.e., PCBs) at levels elevated enough to warrant consumption advisories. The interagency Toxics in Biota Committee (TIBC) plans to develop a set of fish consumption advisory criteria for PBDEs based on the most recent data and information. PBDE data are available in the Routine Monitoring for Toxics in Fish Program final reports published on the Department's Web site at www.state.nj.us/dep/dsr/njmainfish.htm. The Department also performed a risk assessment for the Sandy Hook region, which contained the highest concentration of PBDE in mussels found in New Jersey waters[1]. These concentrations were found to be well below the levels of human concern.

Section 6.5 Drinking Water Supply Use Assessment Method

72. Comment: The revised draft Methods Document correctly notes (page 28) that "it is important to note that many waterbodies do not have drinking water intakes due to stream size and other considerations." However, this reality is not reflected in the actual assessment methodology. Drinking water supply use assessment should only be performed on streams that are currently used or could potentially be used as a drinking water source. Designating streams with no possibility of being used as a water supply (due to size limitations, for instance) as being impaired for water supply use due to nitrate may result in the imposition of stringent WQBELs. Such WQBELs for nitrate will require expensive and unnecessary denitrification on dischargers to waters that are too small to be used for potable sources. This is an enormous cost issue at a time when utilities are under the same fiscal pressures as the Department is facing. (Amidon)

Response: The Department is required to routinely assess whether all waters of the State are attaining their designated uses. All New Jersey streams classified as FW2 are designated for the drinking water use. Water quality based effluent limitations are developed and imposed into New Jersey Pollutant Discharge Elimination System (NJPDES) permits to ensure that the designated uses are protected. As long as the stream classification and use designation remain unchanged, the Department will assess attainment of the drinking water use in FW2 waters using the parameters associated with the drinking water use, as identified in Appendix 1, and will develop appropriate effluent limitations to ensure that this use is protected.

Section 7.3 Delisting Assessment Unit/Pollutant Combinations

73. Comment: Insufficient information is not a valid reason for moving an assessment unit off Sublist 5. A delisting must be supported by data and explained. (Zipf)

[1] National Oceanic and Atmospheric Administration (NOAA) National Status & Trends - Mussel Watch Program: An Assessment of Polybrominated Diphenyl Ethers (PBDEs) in Sediments and Bivalves of the U.S. Coastal Zone (2008). Viewed at http://ccma.nos.noaa.gov/about/coast/nsandt/pdf/PBDEreport/states/PBDENewJersey.pdf on July 16, 2010

Response: All listings and delistings must be supported by scientifically valid data and the reason for any delistings must be explained in the Integrated Report. The 2010 Methods Document correctly explains that, where there is no valid data to support a finding that the SWQS have been exceeded or the use is impaired, there is no scientific basis for placing the assessment unit/pollutant combination on the Section 303(d) List of Water Quality Limited Waters (303(d) List). If the assessment unit/pollutant combination was identified on a previous 303(d) List but the reasons for the original listing are no longer considered valid, and there is no readily available data on which to base a new assessment, the assessment unit will be reassigned from Sublist 5 to Sublist 3 and the assessment unit/pollutant combination will be delisted from the previous 303(d) List.

Beyond the Scope of the Methods Document

74. Comment: The Department has indicated that nitrate and TDS values are a focus of water supply attainment decisions. The Department states that "It is important to note that many waterbodies do not have drinking water intakes due to stream size and other considerations." The purpose of the current rule approach is to avoid the need for more than conventional treatment of surface water supplies.

The commenter has long been concerned that the application of drinking water standards to surface waters at the point of discharge, regardless of actual usage, could lead to extraordinary municipal expenditures unrelated to actual public health needs. Nitrate is a common constituent discharged from most municipal facilities and it can degrade rapidly in the environment. Even where an intake exists, the level of nitrate entering the intake may be well below the applicable SWQS due to attenuation and degradation occurring after discharge. Moreover, water intakes are often pumped to reservoirs where they are mixed with other supplies and, therefore, do not require additional, non-conventional treatment prior to distribution. Nonetheless, facilities located on small streams that cannot serve as a water supply and those on larger streams that are diluted/dissipated prior to intake, are being forced into expensive and energy intensive denitrification. Such denitrification is not a substitute for additional treatment by the water purveyor as originally intended by the rule.

The commenter requests that the Department classify such administratively-derived water supply impairments as a minor threat subject to further evaluation and site-specific WQS development. Data from the finished water supply may be used to confirm whether an actual public health concern exists. In those situations where nitrate levels in finished water would exceed the applicable standards, such locations could be identified as high priority TMDLs. If, however, the supply is not and will not exceed drinking water standards, the wastewater facility should not be required to install additional treatment. (Gulbinsky)

Response: This comment pertains to the applicability of water quality based effluent limitations imposed in NJPDES permits and is beyond the scope of the Methods Document.

75. Comment: Commenter supports the proposed amendments to the Surface Water Quality Standards Nutrient Policies that extend the narrative water quality criteria to marine waters. (Zipf)

Response: This pertains to the Surface Water Quality Standards and is beyond the scope of the Methods document; however, the Department appreciates the commenter's support of the proposed amendments.

76. Comment: The scientific community recognizes that nutrients flow downstream and ultimately into our bays and oceans. These nutrients accumulate in the sediments and continue to affect downstream aquatic life. Sending the problem downstream by weakening the nutrient standard will only exacerbate problems in the bay and ocean that are already taxed by so much pollution. Furthermore, new science, such as that published this past winter further strengthens the need for stronger nutrient limits as it relates to global warming and significant effects of nitrous oxide emissions by aquatic macrofauna from excess sediments in our river bottoms, bays and lakes through out-gassing. Therefore, allowing more pollution to enter larger basins is not protective. New Jersey's existing numeric criteria are based on sound scientific data that leads to protective criteria that is easily applied, enforced, and determined. New Jersey has been a leader when it comes to setting stringent numeric criteria and the Department should not backslide. (Zerbe)

77. Comment: Strong numeric standards for streams help drive the improvements in technology that are necessary for dischargers to adhere to – particularly based on projected population growth. The proposed changes to narrative criteria are an exit ramp strategy for polluters and will backslide New Jersey who had been an environmental leader in providing scientifically based numeric standards for phosphorus since 2004. (Zerbe)

78. Comment: In regards to chlorophyll *a*, "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 the aquatic life use non attainment…". The Department is developing more complex monitoring needs to implement the narrative nutrient criteria rather than simply adhering to the numeric and more protective limit of 0.1 mg/L of phosphorus for streams or 0.05 mg/L for lakes. (Zerbe)

79. Comment: At a time when resources are thin, are these site-specific translators really an effective way of enforcing needed pollution controls or will this be a burden on the taxpayers while ultimately weakening standards and allowing polluters to pollute more? (Zerbe)

80. Comment: Nitrogen loading is a problem in the Delaware Bay watershed and SWQS to look at only phosphorus (and not nitrogen) does not provide adequate monitoring tools that could be available to better assess conditions of our streams. Numeric standards for nitrogen should be developed. USEPA's ecoregion approach provides numeric criterion for total nitrogen that could be used. (Zerbe)

Response to Comments 76 through 80: These comments pertain to the Surface Water Quality Standards and are beyond the scope of the Methods Document. The Methods

Document does not propose new nutrient standards; it explains the methods the Department will use to assess attainment of surface water quality standards, and applicable designated uses, based on the standards and criteria that are currently in effect.