



**COMMONWEALTH OF PENNSYLVANIA**

**ASSESSMENT AND LISTING METHODOLOGY  
FOR INTEGRATED WATER QUALITY MONITORING  
AND ASSESSMENT REPORTING**

**CLEAN WATER ACT  
SECTIONS 305(b) / 303(d)  
DECEMBER 2015**

**PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION**

## Overview

The Department of Environmental Protection (DEP) has an ongoing program to assess the quality of waters in Pennsylvania and identify streams and other bodies of water that are not attaining designated and existing uses as “impaired”. Water quality standards are comprised of the uses (including antidegradation) that waters can support and goals established to protect those uses. Uses include aquatic life, water supply, recreation and fish consumption. The goals are numerical or narrative water quality criteria that express the in-stream levels of substances that must be achieved to support the uses. Periodic reports on the quality of waters in this Commonwealth are required under section 305(b) of the federal Clean Water Act.

Section 303(d) of the Act requires states to list all impaired waters not supporting uses even after appropriate and required water pollution control technologies have been applied (Category 5 of the Pennsylvania Integrated Water Quality Monitoring and Assessment Report [Integrated Report]). For example, a waterbody impacted by a point source discharge that is not complying with its effluent limits would not be listed on the 303(d) list (Category 5 of the Integrated Report). DEP would correct this water impairment by taking a compliance action against the discharger and list it in Category 4b of the Integrated Report. If the waterbody still did not meet water quality standards after achieving compliance with its permit requirements, it would be included in Category 5 of the Integrated Report. These listings include the reason for impairment, which may be one or more point sources (like industrial or sewage discharges), or non-point sources (like abandoned mine lands or agricultural runoff).

DEP’s assessment and listing methodology constitutes the “decision rules” DEP uses when assessing the quality of waters and identifying waterbodies that do not meet designated and existing uses. Table 1 lists and defines the sources and causes DEP uses to describe impairments. Problems associated with impacts to aquatic life use are identified primarily through stream biological community assessments. DEP identifies impacts to water supply by evaluating the chemical quality of raw (intake) water monitored by DEP staff and fish consumption uses by analyzing edible portions (fillets) of fish collected throughout this Commonwealth. Recreational use impairments are identified using bacteriological data.

All waterbody information is organized by United States Geological Survey (USGS) Hydrologic Unit Codes (HUCs) that delineate watersheds. Stream and station assessment information is georeferenced to the National Hydrography Dataset (NHD) 1/24,000 GIS stream layer. Stream assessments are referenced to NHD waterbody segments and sites by latitude and longitude. Prior to 2006, the SWP (State Water Plan) watershed was the primary organizational unit on DEP’s 1/24,000 GIS stream layer. In 2006, all data was transferred to the NHD GIS stream coverage. The primary organizational unit of the NHD is the HUC and it now supplants the SWP.

## **Use of Monitoring Data**

State water quality standards assign designated beneficial uses to waters and DEP measures a variety of physical, chemical, and biological water quality and habitat indicators to determine if water uses are attained. The water quality indicators used by Pennsylvania for making use attainment decisions are interpreted within the context of this Commonwealth's Water Quality Standards (WQS). Other factors that influence the state's selection of indicators include: sampling effort, the cost of collecting and analyzing samples, the variability of the indicator in the environment and the sampling frequency required to meet data quality objectives. Raw data is stored in the appropriate biological, chemical, or habitat data tables. All data can be geo-referenced to the NHD stream layer accurate to the 1/24,000 scale.

### **1) Chemical Data**

#### **A) Water Quality Status**

DEP uses physiochemical and bacteriological water quality sampling data to identify bodies of water where anthropogenic pollutant loads cause violations of water quality standards. Within Pennsylvania's regulatory framework, DEP must determine if water bodies meet water quality standards based on such sampling. Often, these determinations require evaluating if water bodies meet water quality standards "at least 99% of the time." A number of interrelated considerations – primarily sampling error and sampling plan design – must be addressed when assessing if water bodies meet water quality standards "at least 99% of the time" based on physiochemical and bacteriological samples.

In light of these and other considerations, DEP recommends context- and site-specific approaches to evaluate various criteria, accounting for the fact that the water quality criteria in Chapter 93 are presented in different ways, and because some parameters vary in different ways with changing natural conditions (e.g., diurnal and annual cycles of solar radiation, changes in stream flow) and may exhibit variable responses to these factors at different locations. DEP believes it inappropriate to develop data requirement guidelines applicable to all criteria across the board since different monitoring efforts may utilize different means and may have different goals, and because different constituents, criteria, and situations call for different monitoring approaches.

While recognizing that each monitoring and assessment situation is unique, DEP will implement the following framework when evaluating physiochemical and/or bacteriological water quality monitoring data in the use assessment decision process. The details of this appraisal process may vary from application to application based on the unique characteristics and contexts of each situation. However, DEP will follow this process as much as possible in order to maintain consistency in the use support decision process and so that the public can clearly see how DEP evaluates physiochemical and bacteriological sample results. This process will be documented for each use support decision. The decision framework aims to document and

communicate each step of the decision process in a clear, consistent manner addressing the study designs, data quality, data analysis, assumptions, uncertainties, and consequences associated with each use assessment decision. DEP attempts to be as concise as possible within this framework while not compromising adequate discussion of critical issues influencing the decisions.

**(i) Describe monitoring effort.** Describe the waterbody and the watershed, including basin size, land uses, geologies, and other characteristics. Discuss any germane history and context pertaining to the monitoring effort. To the extent possible, describe the motivations and intentions of the monitoring effort, including the individuals and organizations involved as well as the intended use of the information collected. Clearly state study goals. Describe and map monitoring locations. Include any photographs.

**(ii) Check data quality.** Evaluate any study plans and objectives, including sampling plan design details such as record keeping, data management, training, sampling techniques, and analytical methods. Check data for typos and other anomalies. Document non-detects and censored data.

**(iii) Gather information on likely sources of variation.** At a minimum, this information will typically include characterization – and quantification where possible – of tributary locations, upstream discharges, geologies, and land uses. Potential sources of this information include stream gages, climatological records, and discharge monitoring reports. Include maps, figures, and diagrams as needed. Discuss relevant physical, chemical, and biological processes and other potential sources of variation for the constituent(s) of concern. Address context-specific considerations (e.g., dams).

**(iv) Explore data.** Perform various graphical analyses (e.g., histograms, probability distribution functions, boxplots, time-series plots, scatterplots with likely sources of variation, LOWESS) to visually explore and illustrate data characteristics. Document summary statistics (e.g., minimum, maximum, mean, median, standard deviation).

**(v) Evaluate data representativeness.** Evaluate how representative samples are of unmonitored conditions, mindful of the sampling plan design (e.g., sample collection frequency, locations, timing, targeting) and the likely sources of variation with special attention to any critical sampling times and locations. Consider if the system is likely to be spatially well-mixed at monitoring location(s) and how quickly conditions are likely to change in time.

**(vi) Describe the relevant standards.** Identify which criteria are being evaluated and the uses to which they apply. Describe how the constituents of concern impact the protected use (i.e., exposure pathways, detrimental effects). Review the associated regulatory language including any relevant criterion rationale documentation.

**(vii) Apply appropriate analytical procedures.** Select and apply appropriate analytical techniques, mindful of the sampling plan design, monitoring objectives, and

the relevant criteria, constituents, and context. State and verify any assumptions associated with each analytical technique. Evaluate decision error rates, if applicable. For hypothesis tests, evaluate null hypothesis choice. Discuss the frequency, duration, and magnitude of any criteria violations.

**(viii) Consider other sources of relevant use support information.** Additional sources of information may include: previous or concurrent monitoring efforts; data from water supply intakes; biological surveys; and discharge monitoring reports.

**(ix) Evaluate all relevant lines of evidence.** Bring together the previous steps into a narrative that addresses contextual data interpretations, possible counter arguments, alternative decision choices, and decision consequences, including evaluation of decision error consequences. Explicitly address any policy ramifications if applicable.

**(x) Decide.** Decide what to do with the dataset and waterbody in question. At a minimum, each decision will include placing the waterbody in one of the Integrated Report categories.

Further details on applying this framework and the reasoning behind it are provided in the '*Chemistry - Bacteriological Evaluations (PDF)*' under the Chemistry and Bacteria section at:

## B) Water Quality Trends

DEP periodically conducts analyses of surface water quality trends in this Commonwealth. These analyses are based on chemical water quality data collected at a series of fixed water quality network (WQN) stations located throughout this Commonwealth. Trend analysis is a statistical technique used to determine if values of a random variable collected over some period of time generally increase or decrease (Helsel, D.R. and R.M. Hirsch. 1993. *Statistical Methods in Water Resources*. Elsevier, Amsterdam.).

Generally, DEP uses a nonparametric test of trend, known as the Seasonal Kendall test (Hirsch, R.M., J.R. Slack, and R.A. Smith. 1982. "Techniques of trend analysis for monthly water quality data" *Water Resources Research* 18: 107-121.), for these analyses primarily due to the multiple-station, multiple-variable nature of such investigations, which render detailed screening of datasets impractical. Furthermore, the Seasonal Kendall test accounts for seasonal variation, a characteristic exhibited by most water quality variables, thus improving the statistical power to detect trend.

## 2) Aquatic Life Use Data

DEP uses a variety of data collection and assessment procedures to determine if aquatic life uses are attained. The wadeable flowing waters are divided into three sub-types in this Assessment Methodology. The current sub-types include freestone, limestone, and low gradient. DEP explored the possibility of a fourth sub-type for

limestone-influenced streams. It was determined these streams could be adequately assessed using the freestone methods. Lake fisheries are assessed for aquatic life using weight of evidence and best professional judgment. Methods for assessing non-wadeable streams are under review. Results of EPA's national great rivers survey and a fish sampling effort by DEP's Southwest Office in the large tributaries of the Ohio River should provide useful information statewide.

The great majority of streams were assessed using the same biological standard and field technique regardless of the aquatic life use designation. The project was known as the Statewide Surface Water Assessment Program (SSWAP). The SSWAP methodologies were published in the 2006 Assessment Methodology. The program ended in 2006 so the protocol was removed in the 2007 and subsequent versions.

Now that the statewide census is completed, the protocol has been replaced by more detailed methods designed to evaluate various aquatic life uses. These detailed methods have multiple biological benchmarks depending on the aquatic life use being evaluated. The methods will be used on both targeted and probabilistically selected sites.

The macroinvertebrate tolerance and trophic values used to calculate the biological metrics in the following protocols are found in Appendix B.

#### **A) Wadeable Flowing Waters – Instream Comprehensive Evaluation Protocol**

Aquatic life use attainment surveys assessments of Pennsylvania's wadeable streams and rivers (waters that do not exceed one meter in depth or one meter/second velocity) have been completed since 2007 using the DEP Instream Comprehensive Evaluation (ICE) assessment protocol.

The ICE assessment protocol consists of benthic macroinvertebrate collections using a semi-quantitative collection method, and habitat assessments that measure the ability of waterbodies to support aquatic life uses. The targeted population of waters characterized by this monitoring design are all wadeable, freestone, riffle/run, true limestone and pool/glide flowing waters of Pennsylvania that were previously assessed using the SSWAP screening method. Probabilistic monitoring was conducted at 30 sites in 25 watershed units to determine the percentage of streams still attaining designated aquatic life use from 2006 through spring 2012. Probabilistic monitoring has been applied to recreational monitoring and there are no plans to apply this type of monitoring to aquatic life use except for special circumstances. Targeted monitoring is conducted on either attained or impaired segments to determine if changing conditions have resulted in the attainment of designated aquatic life use. Information collected includes Genus level macroinvertebrate sampling, habitat assessment, and local land use data. Macroinvertebrates are collected using D-frame kick nets and the sample is returned to the lab for genus level identification. Impairment decisions are based on benchmark metric scores.

## **B) Wadable Flowing Waters - Limestone Streams**

The limestone protocol is used in spring fed streams with drainages of less than twenty square miles, high alkalinity (> 150 mg/l), and constant year-round temperature. These streams are unique and well known to the public because of their productive fisheries. They are especially vulnerable to degradation because limestone springs frequently occur in intensively farmed valleys and their high volume and constant temperature make ideal locations for fish hatcheries. This method uses a modified version of the Rapid Bioassessment Level III protocol. A subsample of 300 organisms collected using two D-frame kicks are identified to genus. The taxa lists are analyzed using the multimetric approach and associated benchmark criteria. The final result is a determination of attainment or impairment of the limestone macroinvertebrate community.

## **C) Wadeable Flowing Waters – Pool/Glide Streams**

Pool/Glide streams are low gradient and lack the riffle habitat targeted by the other macroinvertebrate protocols. This necessitates use of collection methods effective in deeper waters. The protocol calls for 10 net jabs over a 100-meter stream reach. The jabs target five habitat types sampled in proportion to their occurrence in the reach. A subsample of 200 organisms is identified to genus. A multimetric benchmark developed specifically for multi-habitat sampling is used to determine a stream's attainment status.

## **D) Wadeable Flowing Waters – Freestone and Limestone-Influenced Streams with Tiered Aquatic Life Uses**

Wadeable, freestone, and limestone-influenced, riffle-run streams comprise the majority of streams in the state. Six D-frame collections are made over a 100-meter stream reach and composited. For each sample, a subsample of 200 organisms is identified – mostly to genus-level – and a multimetric benchmark approach is applied to the resulting taxa list. This macroinvertebrate protocol incorporates Tiered Aquatic Life Uses (TALU) as well as impairment benchmarks. An upper benchmark defines the EV (Exceptional Value) and HQ (High Quality) streams. The lower benchmark defines the attainment status for CWF (Cold Water Fishes), WWF (Warm Water Fishes), and TSF (Trout Stocking Fishes). This is DEP's first macroinvertebrate protocol that incorporates TALU.

The preferred macroinvertebrate sampling period is November through May because the maturing insects are easier to capture and identify. Also many taxa reach their winged adult stage in late spring or early summer and leave the water to breed and lay eggs. These taxa are represented only by eggs or small unidentifiable and hard to capture instars during the summer. However, workloads, weather and stream flow conditions dictate that stream assessments must continue through the summer months. This multimetric benchmark protocol is designed to detect stream impairment through the summer. In addition to natural seasonal variability, this protocol also accounts for natural variability in benthic macroinvertebrate communities associated with stream

size.

### **E) Wadeable Flowing Waters – Semi-Quantitative Fish Sampling Protocol**

The semi-quantitative fish sampling protocol is applied to larger wadeable warm water streams where macroinvertebrate sampling protocols may not apply or when fish community may provide additional information. The protocol requires sampling of a representative site for the reach assessed with a minimum site length of 100 meters or 10 times the average width with a maximum length of 400 meters. Site length should be extended to include all available habitat types and every effort should be made to collect all fish sighted to have a comprehensive sample of the fish community.

### **F) Non-Wadeable Flowing Waters**

Biological sampling in large non-wadeable flowing waters is a costly and labor intensive endeavor. DEP is following the development of large river assessment techniques by the three river basin commissions; Ohio River Sanitation Commission (ORSANCO) on the Ohio, Susquehanna River Basin Commission (SRBC) on the Susquehanna, and Delaware River Basin Commission (DRBC) on the Delaware River. Tributaries to the Potomac are in Pennsylvania but the mainstem Potomac is not, so any non-wadeable protocols developed by Interstate Commission Potomac River Basin (ICPRB) will not apply in Pennsylvania. DEP will remain active in the non-wadeable protocol development process undertaken by the river basin commissions and is an active partner with the U.S. Environmental Protection Agency (EPA) in its Great Rivers Program. A Great Rivers Program sampling effort in the non-wadeable tributaries to the Ohio River being conducted by the Southwest Regional Office has been expanded to the Delaware and Susquehanna basins and should provide useful information. Until a method is finalized, DEP will assist in field collections when possible and will review large river assessment results and include them in the Integrated List when appropriate.

### **G) Lakes**

Aquatic life use attainability surveys of Pennsylvania's lakes are conducted through a variety of programs involving a number of agencies and/or groups including: EPA, DEP, DCNR (Bureaus of State Parks and Forestry), County Conservation Districts (CCD), conservation groups, and consultants. Lakes are selected for aquatic life use attainment surveys based on a variety of factors including: DEP regional office priorities (NPDES permit issues, fish kills, etc.), public access, hydraulic residence time, input from State Parks and Forestry Bureaus, CCD concerns, and local citizen group interest. Generally, "significant lakes" of special interest to DEP regional offices are prioritized for assessment surveys. Pennsylvania's definition of a "significant lake" is a lake with public access and a hydraulic residence time of 14 days or more. In addition to significant lakes, surveys are also conducted on numerous public lakes with retention times of less than 14 days, and private lakes where citizens have an active interest in the health of their lake.



Physical/chemical data obtained from WQN sampling or Trophic Status Index (TSI) lake surveys are evaluated for anomalies and as indicators of lake designated use support or impairment. Water quality indicators, such as Chapter 93 Water Quality standards, trophic state indices, and nutrient content are evaluated. TSI indices are calculated on mean total phosphorus, secchi depth, and chlorophyll-a concentrations (yearly average) and compared with statewide average TSIs. TSIs above 65 indicate eutrophic conditions and possibly other problems and at this threshold, the lake is evaluated at all levels (chemical, biological, and physical) and if any necessary information is lacking, surveys are scheduled before listing. Biological assessments include aquatic macrophyte, fishery, and plankton survey information; not all biological information will be available on all lakes, but all public lakes will be targeted as needed. Aquatic macrophytes are assessed in each lake for underwater coverage and surface coverage to assess aquatic habitat and boating accessibility (an indicator of recreational use). Genus and/or species are recorded, mapped, and catalogued with special reference to non-native/invasive species. Fisheries data are examined for a number of parameters including species composition, fish community trophic structure (predator/prey relationships), growth rates, recruitment, and recreational opportunities. Lake watershed land use/land cover data is examined for the presence of anthropogenic and natural (e.g., soil type) features that have the potential to substantially influence lake water quality.

Final determination on aquatic and recreational use of each lake is based upon professional staff review of all accumulated evidence. For example, lakes that support a healthy fish community, yet experience short-duration, seasonal variations in dissolved oxygen appear in category 4C of the Integrated Report. Lakes listed under 4C do not require a Total Maximum Daily Load (TMDL).

### **3) Water Supply Use Data**

Potable Water Supply use attainment decisions are made based upon review of data collected through a source water sampling program conducted by DEP staff. Use attainment evaluations are conducted through the review of raw (intake) water quality data collected by DEP staff at drinking water facilities near the point of withdrawal or prior to the treatment process. Nitrite plus nitrate concentration in the raw water is used as the principal screening tool for potable water supply use attainment decisions, however, other water quality criteria for the protection of the potable water supply use can be used in these decisions. Nitrite plus nitrate data collected over extended periods of time are compared to potable water supply criteria outlined in Pennsylvania's Water Quality Standards regulations to determine use attainment status.

Waters currently used as sources of potable water supply have the highest priority for assessment. This practice recognizes existing use and also incorporates existing and readily available data into the assessment and reporting process by utilizing public water supplier source water monitoring. Data sets, regardless of size, are considered depending on their representativeness and frequency and/or duration of sampling.

The nitrite plus nitrate data sets are analyzed using the methods outlined in the Chemistry Evaluations protocol described on page 2 of this document (\*\*This document is unchanged from the last publicly participated document and therefore DEP is not seeking comment at this time.).

#### **4) Fish Consumption Use Data**

The fish tissue sampling program is an interagency, cooperative effort between DEP and the Pennsylvania Departments of Health (DOH), and Agriculture (DOA) and the Pennsylvania Fish and Boat Commission (PFBC). Each year, potential fish tissue sampling locations are selected after consideration of the previous year's results and suggestions made by DEP Regional Biologists, PFBC Area Fisheries Managers, and the Erie County Department of Health. Target species usually consist of waterbody-specific, recreationally important species that are commonly taken by anglers for consumption. Sampling efforts focus on the collection of legal-sized individuals, and in trout streams, collection efforts are geared toward wild or stocked-holdover fish.

Fish are collected, filleted in the field, frozen, and shipped to the laboratory where the tissue is prepared and analyzed for contaminants as outlined in Appendix E of the protocol. Laboratory results are evaluated and compared to current advisory triggers consisting of a mixture of risk assessment-based methods and U.S. Food and Drug Administration (FDA) Action Levels. Risk assessment methods form the basis for meal-specific advisories due to Poly Chlorinated Biphenyls (PCBs) and mercury. Advisories for other compounds use FDA Action levels to issue Do Not Eat advice.

Once the advisories are agreed upon by the Interagency Fish Consumption Advisory Technical Workgroup, DEP determines the appropriate segment of the stream to list in the Integrated Report. First, the fish tissue sample collection site is located on a map, and major upstream and downstream landmarks (e.g., dams, roads, tributaries, other barriers) are identified and evaluated as segment boundaries. Barriers, such as dams, are preferred because they block fish movement. Other boundaries are selected to be relatively easy for fishermen to recognize. Once the segment is determined, the official advisory is sent to the PFBC for inclusion in the fishing regulations booklet for the next calendar year, and the segment is included in Category 5 of the Integrated Report.

#### **5) Recreational Use Data**

Recreational use attainment decisions for Pennsylvania's surface waters are made using bacteriological indicator data collected by government agencies (including the DEP, DCNR, the Pennsylvania DOH, and the USGS) and citizen/volunteer groups. In addition, information on aquatic macrophyte densities is considered in lakes. Fecal coliform and *E. coli* bacteria are used as indicators of possible sewage contamination because they are commonly found in human and animal feces. *E. coli* are used as the indicator in Lake Erie rather than fecal coliforms as required by the Beach Act and 28

Pa. Code Chapter 18, §18.30. Although fecal coliforms are generally not harmful themselves, they indicate the possible presence of human pathogenic (disease causing) bacteria, viruses, and protozoa that also live in human and animal digestive systems. Therefore, their presence in a waterbody suggests that human pathogenic microorganisms may be present as well, and that water contact recreation such as swimming may be a health risk. The presence of dense growths of aquatic plants in lakes, ponds, and impoundments can impair recreational uses like boating or water contact sports and may be indicative of excessive nutrient inputs.

Important recreational areas and aquatic life use-impaired waterbodies with obvious potential sources of bacteria, nutrients, and/or sediments (e.g., municipal point sources, combined sewer overflows, and agricultural sources relating to manure application, livestock grazing, and animal feeding) are targeted for recreational use assessment. Sampling is conducted during the swimming season (May 1 through September 30) when the waterbody is most likely to be used for boating or water contact sports. Nutrients can affect recreational use support by fostering noxious algal blooms and plant growth. Recreational use attainment status is also determined by mapping the location and density of aquatic plant growth (lakes, ponds, and reservoirs only) and determining the impacts of those plants.

Recreational use attainment of a given waterbody is determined by comparing the geometric mean of the fecal coliform sampling groups (five consecutive samples in a 30-day period collected from the waterbody) to Pennsylvania's numerical standards. These standards are a maximum geometric mean of 200 colony forming units per 100 milliliters (CFUs/100 ml) during the swimming season (May 1 through September 30) and 2000 CFUs during the off-season.

## **6) Field Methods for Macroinvertebrates, Fish and Physical Habitat**

Field methods are used that describe the requirements and effort to sample for macroinvertebrates, fish and physical habitat. The methods also include a description of the sample processing and subsampling of all macroinvertebrates, processing and identification of macroinvertebrates and fish and descriptions of the habitat parameters.

## **7) Outside Agency Data: Information Quantity, Quality, and Representativeness**

Because of the significance attached to Category 5 of the Integrated Report, it is important that any determination of impairment be based on scientifically sound methods and data. Assessments based on the comparison of numeric criteria with long-term water quality data typically meet this principle. Chemical assessments based on single, one-time grab samples generally do not. However, properly conducted, one-time biological surveys designed to assess support of designated aquatic life uses are generally acceptable because the biological community serves as an indicator of long-term stresses imposed on an aquatic system throughout an entire waterbody segment. Guidance on sampling methods, quality assurance, and data reporting protocols can be found in the protocol or obtained by contacting:

Penna. Department of Environmental Protection  
Bureau of Clean Water  
Assessment Section  
P.O. Box 8774  
Harrisburg, PA 17105-8555  
E-mail: RA-WQAssessments @ pa.gov

Efforts continue to expand the bacteriological sampling through use of Citizen Volunteer Monitoring groups as well as cooperative efforts with outside agencies. A mailing to hundreds of potential data contributors is done prior to each biennial Integrated Report. This mailing list is updated continuously.

## **8) Distribution of Waterbodies into Use Attainment Categories**

The water quality statuses of Pennsylvania's waters are summarized using a five-part categorization of waters according to their use attainment status. The categories represent varying levels of use attainment, ranging from Category 1, where all designated water uses are met, to Category 5, where impairment by pollutants requires a TMDL to correct. These category determinations are based on consideration of data and information consistent with the methods outlined in the preceding discussion titled **Use of Monitoring Data**. Each DEP water body segment is placed in one of the following categories:

Category 1: Waters attaining all designated uses.

Category 2: Waters where some, but not all, designated uses are met. Attainment status of the remaining designated uses is unknown because data are insufficient to categorize a water consistent with the state's listing methodology.

Category 3: Waters for which there are insufficient or no data and information to determine if designated uses are met is inadequate.

Category 4: Waters impaired for one or more designated use but not needing a TMDL. States may place these waters in one of the following three subcategories:

- *Category 4A:* TMDL has been completed.
- *Category 4B:* Expected to meet designated use(s) within a reasonable timeframe (3 years).
- *Category 4C:* Not impaired by a pollutant.

Category 5: Waters impaired for one or more designated uses by any pollutant and require the development of a TMDL.

- *Category 5Alt:* Impaired waters scheduled for restoration of water quality standards through alternative pollution reduction plans

Category 5 includes waters shown to be impaired as the result of biological and/or chemical assessments used to evaluate protected uses even if the specific pollutant is not known unless the State can demonstrate that non-pollutant stressors cause the impairment or that no pollutant(s) causes or contribute to the impairment. Category 5 constitutes the Section 303(d) list that EPA will approve or disapprove under the CWA. Where more than one pollutant is causing the impairment, the water remains in Category 5 until all pollutants are addressed in a completed/EPA-approved TMDL or one of the delisting factors mentioned below is satisfied.

Category 5Alt includes waters impaired for one or more protected uses that the Department has identified for restoration of water quality standards through alternative methods. Waters identified for 5Alt were selected because management plans have been developed, best management plans have been constructed or will soon be constructed, local organizations are actively pursuing restoration of standards and progress towards restoration will result in achieving water quality standards quicker than the TMDL process.

A list of sources and causes of pollution and their descriptions are found in Appendix A.

DEP maintains a publicly accessible Web site (WAVE) that uses map displays to summarize the stream information listed in the five categories. Streams are displayed at the 1/24,000 scale on USGS 7.5 minute quadrangle maps. The user first locates the general area of interest by zooming and/or querying by county, municipality, or zip code. Once the user is zoomed to the specified area, the streams become visible. The user can then manually select a stream or stream segment or query by any number of locaters such as watershed, stream name, or assessment ID. The summary information from the Integrated List then appears in tabular form in a popup window. This information is current because the GIS system is updated nightly. The Web address is <http://www.depgis.state.pa.us/wave/> and Internet Explorer is required to view this application as other web browsers do not support the application.

## **9) Natural Conditions**

In accordance with the provisions of Pennsylvania's Water Quality Standards, waters that have naturally occurring pollutant concentrations, or "natural quality," that prevent the attainment of an established water use will not appear on List 5, requiring a TMDL, if it can be demonstrated that anthropogenic sources do not cause or contribute significantly to the water use non-attainment and the pollutant(s) of concern are generated by natural processes.

Natural quality is defined in §93.1 as "The water quality conditions that exist or that would reasonably be expected to exist in the absence of human related activity."

## **10) Delisting Requirements**

The fact that a water was previously included on the 303(d) List is not, by itself, positive evidence that it must remain on the list (in Category 5) until a TMDL is established and implemented. Waters generally remain in Category 5 until a TMDL is established unless it is documented that conditions that led to the initial listing have changed or that the basis for the initial listing was in error.

To “delist” waters, Pennsylvania has traditionally used a two-tiered approach. Waters impacted by AMD (acid mine drainage) are easy to evaluate because the effects on the biota and substrate are obvious. An ICE survey is sufficient to justify an AMD delisting when the results indicate attainment. Other pollutants such as nutrients and toxics can be more problematic and more detailed evaluation is required. In these instances, a modified RBP level III equivalent survey or an intensive chemical sampling effort is required to delist. Finally, some delistings occur when the source of a pollutant is removed. Examples are the closing of a wastewater treatment facility, relocation of a discharge, or extending sewerage to areas previously without sewers.

All delisting requests are documented and submitted to EPA Region III for review and approval.