1.0 INTRODUCTION

In Maryland, responsibility for compiling the 303(d) List resides with the Maryland Department of the Environment (MDE). Where feasible, MDE also addresses the cause and source of the water quality impairments. The methodology used to identify impaired water bodies on Maryland's 2004 Integrated 303(d) List is described in this document.

The decision process used for placing waters on the 2004 Integrated 303(d) List is consistent with current Environmental Protection Agency (EPA) regulations defined in §130.23. This document fulfills the requirements of the Clean Water Act (CWA) under Title 40 of the Code of Federal Regulations (CFR) §303(d)(1)(A) and part 130, §130.7. The state of Maryland feels that these federal regulations set forth an effective framework for evaluating all readily available data in order to identify impaired water bodies, assign management priorities, and schedule Total Maximum Daily Load (TMDL) development.

The 2004 Integrated 303(d) List was developed using all readily available data. In Maryland, responsibility for collection and compilation of water quality monitoring data is shared between the Maryland Department of Natural Resources (MDNR) and MDE. MDNR compiles *Maryland's Inventory of Water Quality* [the "305(b) Report"] every two years pursuant to Section 305(b) of the CWA. The 305(b) Report is written to provide the federal government, citizens, and concerned stakeholders with information on the water quality status of waters throughout the State. The 305(b) Report utilizes water quality monitoring information collected by the State and other sources, including direct requests to federal agencies, local environmental agencies, colleges and universities, citizen monitoring groups, and private firms (see Appendices A and B). Interstate water quality impairments are considered only after close coordination with respective water management representatives from neighboring states. Where available, recent interstate data is analyzed during the listing decision process. Interpretation of neighboring state standards are often problematic but are given equal consideration prior to formally adding any new interstate water bodies to the Maryland 303(d) List.
A water body or "water quality limited segment" (WQLS) is considered "impaired" when it does not attain the designated use assigned to it in Maryland regulation [Code of Maryland Regulations (COMAR) §26.08.02]. Use attainment is determined by comparison of field measured or projected values (e.g., modeling runs) of various water quality parameters to the numeric or narrative water quality criteria established in COMAR.

The process of determining impairments for Category 5 of the Integrated List begins with Maryland's 305(b) Report. As part of 305(b) Report development, MDNR identifies those water bodies that currently do not meet the designated uses established in the State's Water Quality Standards (WQS). WQS support the four following designated uses:

1. **Use I waters:** The minimum standard for all waters throughout the State, protects waterways for recreation, fishing, and aquatic life use;
2. **Use II waters:** Protected for shellfish harvesting and consumption;
3. **Use III waters:** Protected to maintain natural trout populations; and,
4. **Use IV waters:** Protect waters utilized for put-and-take trout fishing.

In addition, Uses I, III, and IV can also have a "P" designation if used for public water supply.

Each of these four designated uses have both narrative and numeric water quality criteria. Narrative criteria [COMAR §26.08.02.01(B)(2)] state, among other things, that all water bodies in the State shall "provide water quality for the designated uses of: water contact recreation; fishing; propagation of fish, other aquatic life, and wildlife; and, agricultural and industrial water supply". The 305(b) Report indicates a water quality impairment whenever there is technically a loss of designated use, regardless of the duration of the loss or knowledge of its cause. Numeric Water Quality Criteria (WQC) [COMAR §26.08.02.03(2)(A) through §26.08.02.03(3)(G)] set numerical thresholds which apply to pollutants that can be identified and quantified such as bacterial levels, concentrations of toxic substances, excess nutrients as indicated by low dissolved oxygen (DO), and low pH. For example, Use III or naturally reproducing trout waters must meet a more stringent temperature criteria to sustain a cold-water fishery. Shellfish harvesting waters must meet stringent bacterial criteria to protect human consumption. The 305(b) Report determines water body impairment based on exceedance of the criteria established in COMAR, through application of the State's Listing Methodologies, and in conjunction with current EPA guidance on using data for standards interpretation. The details of this process are documented in Maryland's 305(b) Report and described in the 303(d) listing methodologies (see Appendix C).

Not all of the impairments identified in the 305(b) Report require the development of a TMDL under Section 303(d) of the CWA. For example, impairments for which certain water pollution controls are available to attain water quality standards before the next listing cycle need not be listed. Thus, it is necessary to identify the subset of the water bodies in the 305(b) Report that, based on available data, may require a TMDL. These waters are placed in Category 5 of Maryland's 303(d) List under the guidance of the listing methodologies. (Note: for segments that are listed, further study may determine that the impairment is due to a short-term fixable problem, such as a fractured wastewater line that can be corrected without the establishment of a TMDL. Where documentation supports this finding, the water body will be placed on Category 4b, designating that other pollution control requirements are reasonably expected to result in the attainment of WQS in the near future.)

2.0 EPA GUIDANCE FOR THE 2004 INTEGRATED LIST

On July 21st, 2003, EPA released their most recent guidance for 2004 assessment, listing, and reporting requirements. This guidance is intended to give states, tribes, and authorized territories EPA's interpretation of the 303(d) regulations, as well as help standardize reporting among the various jurisdictions. Current guidance restates some of the 2002 listing guidance and encourages jurisdictions to provide additional information to stakeholders on the overall listing process. The sections that follow (Section 2.1 through 2.7) address specific areas discussed in this guidance and highlight MDE's implementation efforts.

2.1 Multiple Category List Structure

A significant portion of the July 2003 guidance is devoted to giving states clarifying language on the five parts or categories of the list first proposed by EPA in 2002. These different categories are designed to facilitate states' development of an Integrated List by effectively combining the statutory reporting requirements of Sections 303(d) and 305(b) of the CWA. EPA also encourages jurisdictions to create additional subcategories to more accurately document water

body attainment status. The following categories are used to designate water quality conditions in Maryland's 2004 Integrated List:

I. **Category 1: meets all water quality standards and no use is threatened**

II. **Category 2: meets some water quality standards and there are insufficient data and information to determine if other water quality standards are being met.**

III. **Category 3: there are insufficient data and information to determine if any water quality standard is being attained.** Maryland has also added two subcategories to category three which include:
- **Subcategory 3a: Includes waters having an insufficient quantity of data or information to evaluate watershed attainment status.**
- **Subcategory 3b: Includes waters having an insufficient quality of data or information to evaluate watershed attainment status.**

IV. **Category 4: one or more water quality standards are impaired or threatened but a TMDL is not required. EPA has included the following subcategories in category 4:**
- **Subcategory 4a: TMDL approved or established by EPA**
- **Subcategory 4b: Other pollution control requirements (i.e., permits, consent decrees, etc.) are expected to attain water quality standards.**
- **Subcategory 4c: Water body impairment is not caused by a pollutant.**

V. **Category 5: Water body is impaired, does not attain the water quality standard, and a TMDL is required.** This is the part of the List historically known as the 303(d) List.

VI. **Category 6: Maryland added a sixth category in order to designate waters that have been de-listed in the current List using EPA's "good cause" provision, 40 CFR 130.7(b).** "Good cause" may include, but is not limited to, situations where more recent or accurate data becomes available, more sophisticated or improved water quality modeling has been completed, or flaws in the original analysis have led to a water being improperly listed.

2.2 Public Participation

EPA encourages states to provide "adequate public participation in the development of the Integrated Report… consistent with the State's public participation requirements." [1] Maryland recognizes that 303(d) listing decisions, as a precursor to TMDL development and implementation, may impose a regulatory and fiscal burden upon local jurisdictions or the private sector. Consequently, MDE utilizes a public participation process for 303(d) listing similar to that used for promulgation of new regulations. The Administrative Procedures Act mandates that a minimum of 45 days from the date of publication in the Maryland Register must

[1] U.S. Environmental Protection Agency, "Guidance for 2004 Assessment, Listing and Reporting Requirements Pusuant to Sections 303(d) and 305(b) of the Clean Water Act" (Office of Water, July 2003), p.19

be allowed for the adoption of new regulations [see Annotated Code of Maryland, State Government Article, § 10-111(a)]. Thirty of those 45 days must be available for public review and comment. The Department feels that public participation is a vital component of List development and therefore grants 45 days for public review alone. The draft Integrated List is made available to the public via the Internet (www.mde.state.md.us), through distribution to local libraries, and by direct mailing.

During this open comment period for the Integrated List, a public hearing is held in the western (Hagerstown), eastern (Salisbury), and central (Towson) regions of the State to facilitate dialogue between MDE and stakeholders concerning the format, structure, and content of the draft List. All public hearings are recorded by a certified court reporter. MDE also engages interstate river basin commissions, Maryland tributary teams, and watershed councils during the public comment period and gives full presentations on Maryland 303(d) program as requested.

Any outstanding issues that arise during public hearings or the open comment period are fully addressed in a comment-response document included with the final List submitted for EPA approval. Sufficient time is built into 303(d) List development to allow MDE to receive and fully respond to all public comments on the List.

2.3 Listing Methodology Development

EPA encourages states to develop listing methodologies that clearly document the decision making process used to determine water body impairment. In 2002, MDE published seven listing methodologies in concert with development of the 303(d) List. All listing methodologies were publicly reviewed and MDE responded to all related comments and concerns in a comment-response document. These same seven methodologies are included in the current List as Appendix C. The Department considers the methodologies evolving documents that change to incorporate improved scientific standards and methods.

The short timeframe between the 2002 and 2004 Lists allowed MDE to issue only one new Listing Methodology for using estuarine benthic macroinvertebrate in 303(d) listing decisions (see Section 3.2). Also, some minor revisions to existing bacterial and chemical Listing Methodologies have been proposed in Sections 3.3 and 3.6, respectively. The new approach for interpretation of bacterial standards, from using a 5-point moving average to a long-term geometric mean, is proposed to provide a more integrated assessment of watershed conditions and in anticipation of revised bacterial standards. The proposed new threshold for mercury in fish tissue is a change from using a geometric mean of 235 μg/kg to adoption of an arithmetic mean threshold of 300 μg/kg. All changes to current listing methodologies as well as proposals for new methodologies are subject to full public review.

2.4 Watershed Size and Segmentation

Similar to the guidance issued by EPA in 2002, current 2004 guidance requests states to clearly designate the size of the watershed or watershed segments used to list a water body. EPA guidance recommends ways to segment watersheds by designated use, type of water body (e.g., small stream, wide river, a tidal and stratified estuary, a coastal shoreline, etc.), significant influences in the watershed (e.g., land use, point or non-point sources of pollutants), patchy or unique habitats, the distribution of biological communities, etc. Maryland currently uses

watersheds as the basis for water body segmentation. Watersheds provide useful boundaries for listing because they identify fixed geographical units that share a hydrologic connection. Watershed boundaries do not change according to land use or statute and thus remain a stable reference over time. Also, it is very easy for the public to understand the watershed concept and identify the watershed in which they live.

Two watershed scales are currently used in the Integrated List – the 8-digit (Figure 1) watershed scale, which is roughly 75 square miles in size, and the 12-digit watershed scale (Figure 2), which is approximately 11 square miles in size. The 1996 and 1998 303(d) Lists relied exclusively on the 8-digit watershed scale for listing decisions. With the adoption of biocriteria in the 2002 List, however, the 12-digit subwatershed scale became more frequently used as the basis for listings. The Department has since increased use of the 12-digit watershed scale as a listing unit and expanded use of the multiple listing categories recommended by EPA for the 2004 Integrated List. In some cases, the same 12-digit basin has been listed several times for the same impairment to isolate specific subbasins that will need targeted TMDL development. Refining 303(d) listings to this smaller watershed scale will facilitate a more targeted approach to TMDL development, watershed restoration planning, and follow-up monitoring.

2.5 Data Quality and Statistical Approaches to Data Analysis

EPA devotes considerable text in their 2004 guidance discussing statistical approaches to data analysis and interpretation for the purpose of minimizing bias and error. It also discusses data quantity and quality as it relates to data representativeness and reproducibility of results. MDE made every effort to include reasonable statistical approaches and analytical tools when developing the listing methodologies. Use of methods such as confidence intervals, weight-of-evidence approaches, long-term geometric mean, and minimum sample sizes to support specific assessment unit scales were employed to validate listing decisions. Furthermore, MDE added two subcategories within Category 3 of the List to specifically indicate whether data were of insufficient quantity or quality to support water body assessments.

MDE is working closely with MDNR to develop a State position on data quality standards for use in regulatory and management decisions related to aquatic resources. Clearer guidance from the State on data quality will help water quality monitoring professionals from all sectors (e.g., private, county, municipal, volunteer, and non-profit) to better understand how their data can be used for assessments. Such guidance may also encourage stakeholders interested in improving their monitoring programs to collect data with methods that support regulatory decisions, TMDL development and watershed restoration planning efforts at the State level. *The QA/QC required for data considered under these protocols is listed under (Guidance for Quality AssuranceProject Plans. Dec 2002. EPA /240/R-02/009) at http://www.epa.gov/quality/qs-docs/g5-final.pdf.*

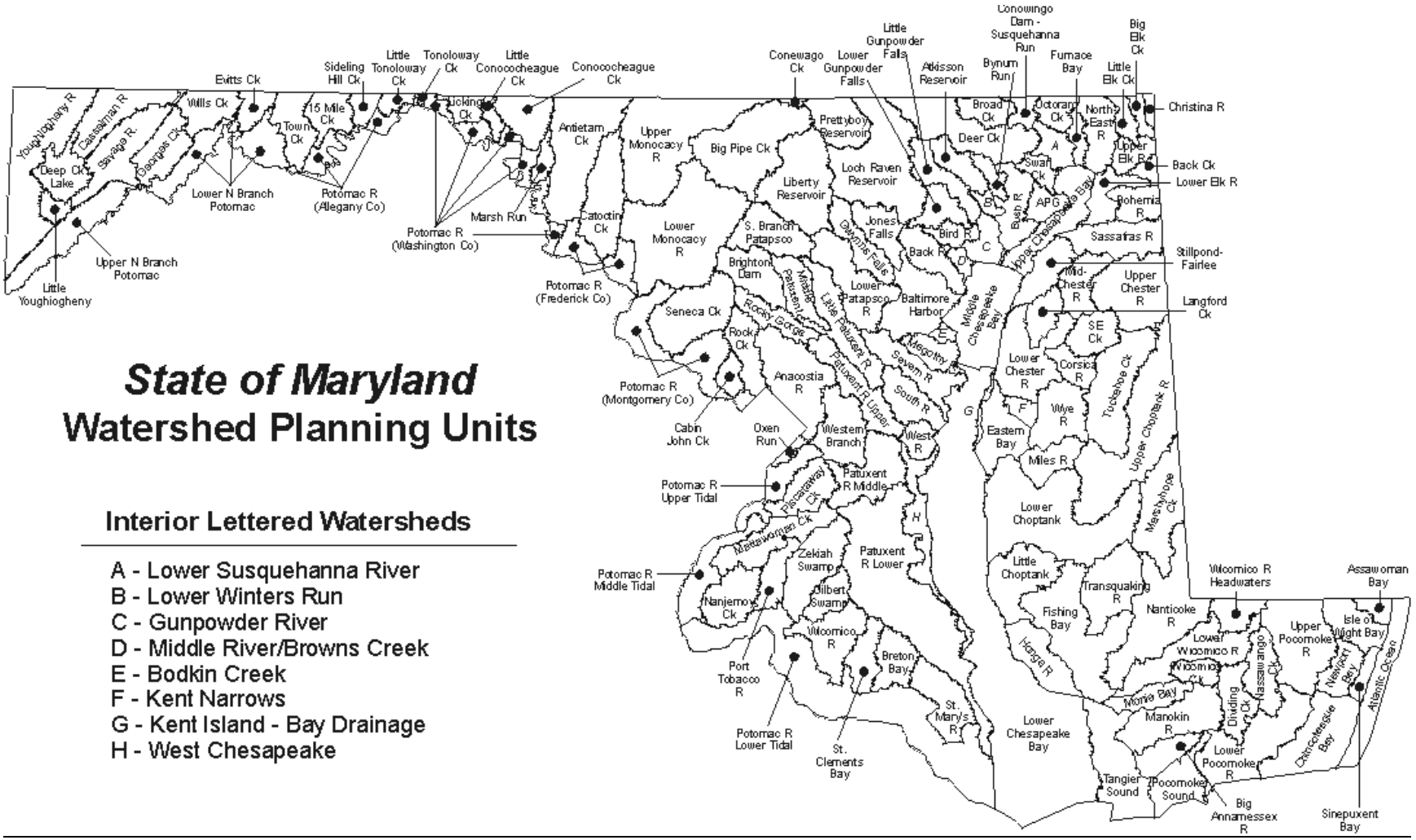

Figure 1: Names of the 8-digit basins (averaging 75 square miles each) used to list waters on the 2004 Integrated 303(d) List.

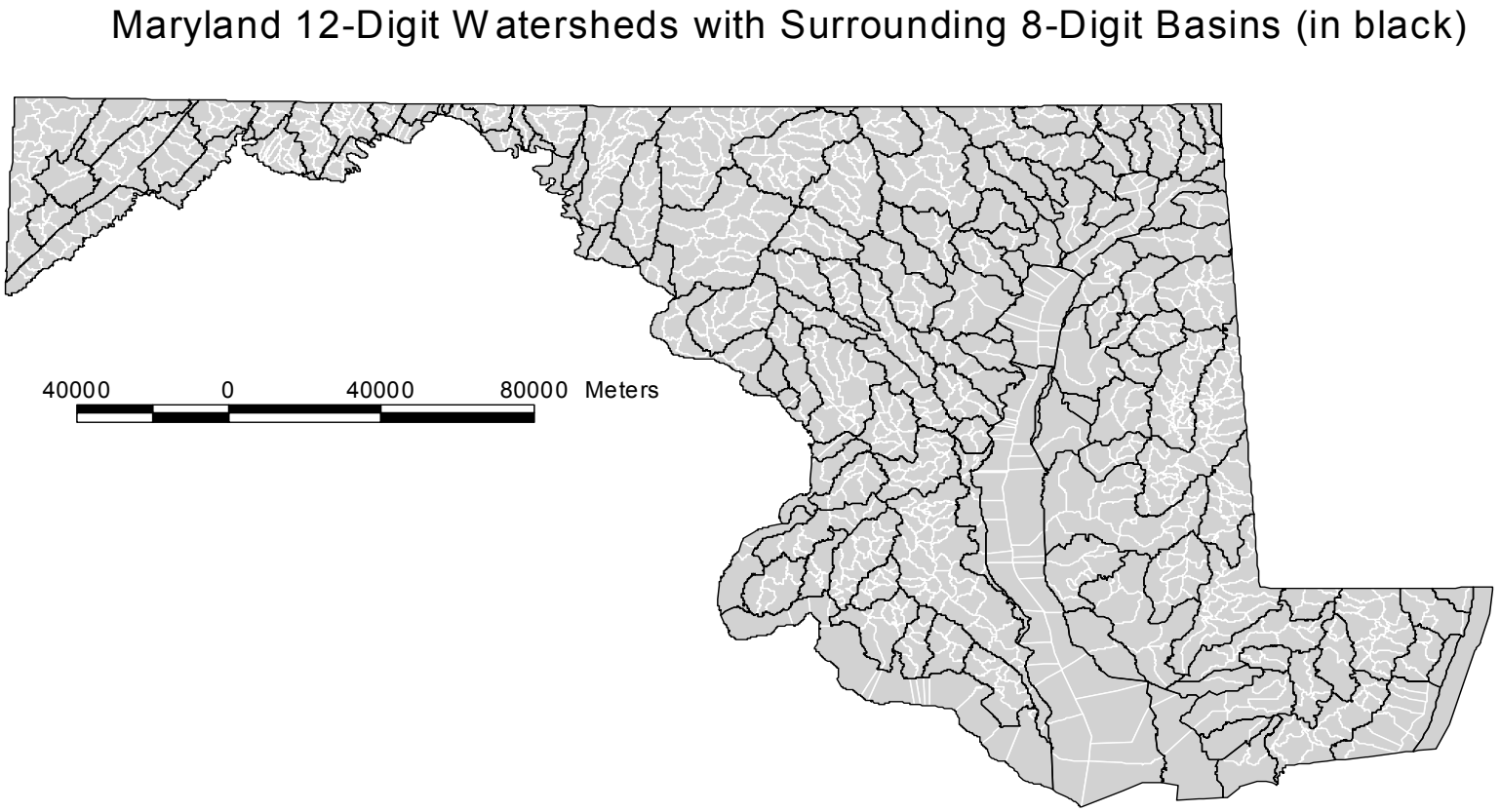

Figure 2: Maryland 12-Digit subwatersheds (outlined in white and approximately 11 square miles each) used to identify subbasins within the 8-Digit planning scale. The 8-digit basins (outlined in black) are overlaid for comparison.

2.6 Probabilistic Monitoring Data

EPA encourages states to use probabilistic surveys as a cost-effective way to make surface water assessments that are both statistically meaningful and cover a large geographical area. Starting in the 2002 Integrated List, MDE began utilizing data collected by MDNR's Maryland Biological Stream Survey (MBSS) for 303(d) Listing decisions. The MBSS uses a probability-based survey design called lattice sampling to schedule statewide sampling over a multi-year period. Data collected during Round One of the MBSS program (1995-1997) were used in the 2002 List. Round Two (2000-2004) of the MBSS sampling is currently underway and data collected for the first three years (2000-2002) are used in the current 2004 draft List. MBSS data support listing decisions at both the 8 and 12-digit watershed scales.

In addition to probability-based surveys, the State also conducts site-specific (e.g., MDNR's CORE/TREND monitoring, MDE's fish tissue sampling, MDE's shellfish and beaches monitoring, etc.) monitoring to assess current watershed status and historical trends. This monitoring is conducted in addition to the many other targeted monitoring programs performed throughout the State by local governments, federal programs, municipalities, volunteer groups, watershed councils, and industrial facilities.

2.7 Monitoring Schedules

EPA is recommending that states provide monitoring schedules in order to assess all waters throughout the nation within a reasonable timeframe. MDE has identified in the 2004 List those waters that will be or have been recently monitored for TMDL development. In addition, Maryland is performing an internal review of its water quality monitoring programs. Presently, MDE is working very closely with the MDNR to identify and re-evaluate statewide water quality monitoring programs in order to minimize program redundancy and target watershed monitoring efforts.

Coordinating monitoring efforts at the State level will help to better implement CWA related programs and set the groundwork for a more effective use of limited State resources. MDE is also exploring opportunities beyond the State to find better ways of utilizing the wealth of local knowledge, expertise, and water quality data that have been unavailable due to insufficient data quantity and/or quality necessary for regulatory decision-making. Forging partnerships and data trading agreements between local governments, watershed councils, and volunteer monitoring groups, to name a few, will significantly increase the volume of data available for watershed impairment determinations and foster more scientifically driven decision making. MDE is also using EPA's STORET system as a central repository for 303(d) data to provide ready access to data used for listing decisions.