



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029
11/15/2006

Dr. Richard Eskin, Ph.D., Director
Technical and Regulatory Services Administration
Maryland Department of the Environment
1800 Washington Boulevard, Suite 540
Baltimore, MD 21230

Dear Dr. Eskin:

The U.S. Environmental Protection Agency (EPA) is pleased to approve the Total Maximum Daily Loads (TMDLs) for fecal coliform for the restricted shellfish harvesting area in the Lower Choptank River mainstem, Dorchester and Talbot Counties, Maryland. The TMDL Report was submitted by the Maryland Department of the Environment (MDE) on September 26, 2006 to EPA for review and approval. These TMDLs were established and submitted in accordance with Section 303(d)(1)(c) and (2) of the Clean Water Act to address impairments of water quality as identified in Maryland's Section 303(d) list. The Lower Choptank River Basin (02-13-04-03) was first identified on Maryland's 1996 Section 303(d) list as impaired by nutrients, sediments, and fecal coliform in tidal portions, with listings of biological impacts in the non-tidal portions added in 2002. Maryland's 2004 Section 303(d) list refined the fecal coliform impairment with the identification of eleven specific restricted shellfish harvesting areas: Jenkins Creek, Tred Avon River, Tar Creek, Cummings Creek, Northeast Branch, Whitehall Creek, Indian Creek, Goose Creek, Warwick River, San Domingo Creek, and the Choptank River mainstem downstream of Hunting Creek and upstream of Warwick River (hereinafter referred to as Lower Choptank River mainstem). Fecal coliform TMDLs for the first ten of these restricted areas have been addressed in separate reports in 2004 and 2006. The nutrient, sediment, and biological impairments within other parts of the Lower Choptank River Basin will be addressed by MDE at a future date. The TMDLs described in this document were developed to address localized water quality impairments identified within the watershed, specifically, excessive bacteria concentrations in the restricted shellfish area of the Lower Choptank River mainstem.

EPA's approval of the Lower Choptank River mainstem TMDLs is based on EPA's understanding that MDE will complete a Bacterial Source Tracking (BST) study in this watershed. MDE will evaluate the BST data when it becomes available in order to verify the nonpoint source loading estimates contained in the TMDL Report. The TMDL analyses identify the current loadings, relate the current loadings to the applicable water quality standard, and identify the necessary reductions for TMDLs that will achieve the applicable water quality standard.



In accordance with Federal regulations at 40 CFR §130.7, a TMDL must comply with the following requirements: (1) be designed to attain and maintain the applicable water quality standards, (2) include a total allowable loading and as appropriate, wasteload allocations (WLAs) for point sources and load allocations for nonpoint sources, (3) consider the impacts of background pollutant contributions, (4) take critical stream conditions into account (the conditions when water quality is most likely to be violated), (5) consider seasonal variations, (6) include a margin of safety (which accounts for uncertainties in the relationship between pollutant loads and in-stream water quality), (7) consider reasonable assurance that the TMDL can be met, and (8) be subject to public participation. The enclosure to this letter describes how the fecal coliform TMDLs for the Lower Choptank River mainstem satisfy each of these requirements.

As you know, all new or revised National Pollutant Discharge Elimination System permits must be consistent with the TMDL WLA pursuant to 40 CFR §122.44 (d)(1)(vii)(B). Please submit all such permits to EPA for review as per EPA's letter dated October 1, 1998.

If you have any questions or comments concerning this letter, please do not hesitate to contact Mr. Thomas Henry at (215) 814-5752.

Sincerely,

Signed

Jon M. Capacasa, Director
Water Protection Division

Enclosure

cc: Melissa Chatham, MDE-TARSA
Nauth Panday, MDE-TARSA





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

Decision Rationale
Total Maximum Daily Loads of Fecal Coliform
for the Restricted Shellfish Harvesting Area in the
Lower Choptank River Mainstem in Dorchester and
Talbot Counties, Maryland

Signed

Jon M. Capacasa, Director
Water Protection Division

Date: 11/15/2006



Decision Rationale
Total Maximum Daily Loads of Fecal Coliform for the
Restricted Shellfish Harvesting Area in the Lower Choptank River Mainstem in
Dorchester and Talbot Counties, Maryland

I. Introduction

The Clean Water Act (CWA) requires a Total Maximum Daily Load (TMDL) to be developed for those water bodies identified as impaired by the state where technology-based and other controls will not provide for attainment of water quality standards. A TMDL is a determination of the amount of a pollutant from point, nonpoint, and natural background sources, including a margin of safety (MOS), that may be discharged to a water quality-limited water body.

This document sets forth the U.S. Environmental Protection Agency's (EPA) rationale for approving the TMDLs for fecal coliform in the Lower Choptank River mainstem. The TMDLs were established to address impairments of water quality, caused by bacteria (i.e., evidenced by fecal coliform), as identified in Maryland's 2004 Section 303(d) list for water quality-limited segments. The Maryland Department of the Environment (MDE) submitted the report, *Total Maximum Daily Loads of Fecal Coliform for the Restricted Shellfish Harvesting Area in the Lower Choptank River Mainstem in Dorchester and Talbot Counties, Maryland* on September 26, 2006. The TMDLs in this report address one individual sub-basin of the Lower Choptank River Basin as identified on Maryland's Section 303(d) lists. The basin identification for the Lower Choptank River Basin is 02-13-04-03.

EPA's rationale is based on the information contained in the TMDL Report, information contained in the Appendix to the report, and MDE's Comment Response Document. EPA's review determined that the TMDLs meet the following eight regulatory requirements pursuant to 40 CFR Part 130.

- 1) The TMDLs are designed to implement applicable water quality standards.
- 2) The TMDLs include a total allowable load as well as individual waste load allocations (WLAs) and load allocations (LAs).
- 3) The TMDLs consider the impacts of background pollutant contributions.
- 4) The TMDLs consider critical environmental conditions.
- 5) The TMDLs consider seasonal environmental variations.
- 6) The TMDLs include a margin of safety.
- 7) There is reasonable assurance that the TMDLs can be met.
- 8) The TMDLs have been subject to public participation.

II. Summary

TMDLs specifically allocate the allowable fecal coliform loading to the restricted shellfish harvesting area within the Lower Choptank River mainstem. There is one permitted point source of fecal coliform bacteria which is included in the WLA. The fact that the TMDLs do not assign WLAs to any other sources in the watershed should not be construed as a

determination by either EPA or MDE that there are no additional sources in the watershed that are subject to the National Pollutant Discharge Elimination System (NPDES) program. In addition, the fact that EPA is approving these TMDLs does not mean that EPA has determined whether some of the sources discussed in the TMDLs, under appropriate conditions, might be subject to the NPDES program. TMDLs for each area were expressed as a median and a 90th percentile load, which is consistent with the format of Maryland’s bacteriological criteria, which assign numeric threshold criteria for fecal coliform based on the median and 10 percent of sample data.

Table 1 - Fecal Coliform Median TMDLs Summary for the Lower Choptank River Mainstem

Area	Rate	TMDL	Wasteload Allocation (WLA)	Load Allocation (LA)	Margin of Safety (MOS)
Lower Choptank River Mainstem Segment					
Lower Choptank River Mainstem	counts/day	1.22 x10 ¹¹	1.467 x10 ⁹	1.21 x10 ¹¹	Implicit

Table 2 - Fecal Coliform 90th Percentile TMDLs Summary for the Lower Choptank River Mainstem

Area	Rate	TMDL	Wasteload Allocation (WLA)	Load Allocation (LA)	Margin of Safety (MOS)
Lower Choptank River Basin Segment					
Lower Choptank River Mainstem	counts/day	3.07 x10 ¹¹	1.467 x10 ⁹	3.06 x10 ¹¹	Implicit

TMDLs are written plans and analyses established to ensure that a waterbody will attain and maintain water quality standards. TMDLs are scientifically based strategies that consider current and foreseeable conditions, the best available data, and account for uncertainty with the inclusion of a MOS value. The option is always available to refine the TMDLs for re-submittal to EPA for approval if environmental conditions, new data, or the understanding of the natural processes change more than what was anticipated by the MOS.

III. Background

The restricted shellfish harvesting area in the Lower Choptank River Basin addressed in this TMDL report is the Lower Choptank River mainstem. The Lower Choptank River Basin is located on Maryland’s eastern shore of the Chesapeake Bay in Dorchester and Talbot Counties. The Lower Choptank River has a length of 45 kilometers (km) with a width ranging from 700

meters (m) upstream to approximately 7 km at its mouth, where it flows southwest into the Chesapeake Bay. The Lower Choptank River mainstem restricted shellfish harvesting area is the section downstream of Hunting Creek and upstream of Warwick River. The Lower Choptank River mainstem has a length of 7.52 km and a drainage area of 387,496.9 acres (1,568.14 km²). A portion of this drainage area, approximately 16.2 percent, is in Kent County, Delaware.

The 2000 Maryland Department of Planning (MDP) land use/land cover data show that the watershed can be characterized as rural for the Lower Choptank River mainstem restricted shellfish harvesting area with 56 percent cropland and 23 percent forest land use. Section 2.0 of MDE's TMDL Report provides additional information about the Lower Choptank River mainstem, including land use information.

The Lower Choptank River Basin (02-13-04-03) was first identified on Maryland's 1996 Section 303(d) list of water quality-limited segments as impaired by nutrients, sediments, and fecal coliform in tidal portions, with listings of biological impacts in the non-tidal portions added in 2002. The 2004 Section 303(d) list refined the fecal coliform impairment with the identification of eleven specific restricted shellfish harvesting areas: Jenkins Creek, Tred Avon River, Tar Creek, Cummings Creek, Northeast Branch, Whitehall Creek, Indian Creek, Goose Creek, Warwick River, San Domingo Creek, and the Choptank River mainstem downstream of Hunting Creek and upstream of Warwick River. Fecal coliform TMDLs for the first ten of these restricted areas have been addressed in separate reports in 2004 and 2006. The nutrient, sediment, and biological impairments within other parts of the Lower Choptank River Basin will be addressed by MDE at a future date. The TMDLs described in this document were developed to address localized water quality impairments identified within the watershed, specifically excessive bacteria concentrations in the restricted shellfish area of the Lower Choptank River mainstem.

The monitoring and analysis for these bacteria TMDLs were performed using fecal coliform data. Fecal coliform is a bacterium that can be found within the intestinal tract of all warm-blooded animals. Fecal coliform in itself is generally not a pathogenic organism. However, fecal coliform indicates the presence of fecal wastes and the potential for the existence of other pathogenic bacteria. The higher concentrations of fecal coliform indicate the elevated likelihood of the presence of pathogenic organisms in shellfish that are harvested from polluted waters and subsequently consumed. Maryland's current water quality standards provide bacteriological criteria for Shellfish Harvesting (i.e., Use II) waters based on numeric criteria for fecal coliform.

The Surface Water Use Designation for these sub-basins of the Lower Choptank River Basin is Use II: *Shellfish Harvesting Waters* (Code of Maryland Regulations, COMAR, 26.08.02.08L). Maryland's water quality standards provide bacteriological criteria for Use II waters, stating that a public health hazard will be presumed if the most probable number (MPN) of fecal coliform organisms exceeds a median concentration of 14 MPN per 100 milliliters (mL) or if more than 10 percent of samples taken exceed 49 MPN per 100 mL (for a three-tube decimal dilution test).

Maryland's current standards provide a classification system for Use II shellfish waters. Use II waters may be classified as approved, conditionally approved, restricted, or prohibited. Maryland's listing methodology for shellfish waters provides that approved and conditionally approved shellfish waters are not placed on the Section 303(d) list of water quality limited segments. Shellfish waters may be classified as "Approved" if the median fecal coliform MPN of at least 30 water samples taken over a three-year period to incorporate inter-annual variability does not exceed 14 MPN per 100 mL, and, in areas affected by point source discharges, the 90th percentile of water samples does not exceed an MPN of 49 per 100 mL (for a three-tube decimal dilution test). The restricted shellfish area of the Lower Choptank River Basin was classified as such because it does not meet shellfish water quality standards for an approved classification. The Lower Choptank River Basin was placed on Maryland's Section 303(d) list because the shellfish area within this system, which is currently classified as restricted, violates Maryland's protective bacteriological criteria for Use II Waters. The most recent five-year dataset documenting the median and 90th percentile concentrations for these areas is shown in Table 2.3.1 of MDE's TMDL Report. The Lower Choptank River mainstem had shellfish monitoring stations that did not attain either the geometric median or the 90th percentile criteria.

CWA Section 303(d) and its implementing regulations require that TMDLs be developed for waterbodies identified as impaired by the state where technology-based and other required controls do not provide for attainment of water quality standards. The TMDLs submitted by MDE are designed to attain the bacteriological water quality criteria and support the Use II designation. Refer to Tables 1 and 2 above for a summary of allowable loads.

For this TMDL analysis, Maryland used fecal coliform data from three shellfish monitoring stations in the Lower Choptank River mainstem. Observations and data from the period spanning July 2000 to July 2005 were used. Maryland selected a five-year period for TMDL development because it covers a longer time span than the 30-sample minimum requirement and is consistent with MDE's shellfish program sanitary survey schedule. TMDL analyses utilized an inverse three-dimensional hydrodynamic and eutrophication model (HEM-3D) to estimate the existing load discharged from each subwatershed and the allowable load based on the median and 90th percentile concentrations in the Lower Choptank River mainstem restricted shellfish harvesting area. The HEM-3D model is a general eutrophication model for environmental studies. The model simulates density and topographically induced circulation as well as tidal and wind-driven flows, and spatial and temporal distributions of salinity, temperature, suspended sediment, conservative tracers, eutrophication processes, and fecal coliform. The inverse model incorporates influences of freshwater discharge, tidal and density-induced transport, and fecal coliform decay; thereby representing the fate and transport of fecal coliform in the Lower Choptank River and its corresponding restricted shellfish harvesting area. These values are used to derive the TMDLs (i.e., using the water quality criterion) and the current load (i.e., using the current median concentration). The differences between these loads are used to compute the percentage load reductions that are required to meet the TMDLs. Section 4.2 and Appendix A of the TMDL Report provides a thorough description of the HEM-3D model and calculations.

Maryland conducted a nonpoint source assessment by reviewing several sources of

population and land use data to estimate the contributions of fecal coliform by the following categories: wildlife, human, pets, and livestock. Any contributions from boat discharges, resuspension from sediments, and regrowth of fecal coliform were neglected due to insufficient data. The contributions from each of these four sources were derived by multiplying the population densities by fecal coliform production rates. For the wildlife contribution, the population density estimates for each major wildlife animal type was multiplied by the associated acreage or stream mile for that animal, and multiplied again by the estimated fecal coliform production rate for each animal type. For human contributions, Maryland used census coverage and estimated daily discharges of wastewater per person, fecal coliform concentration of the wastewater, and septic system failure rate to calculate the human loading for areas having no or partial public sewer system. Pet contributions were calculated using survey-based estimates of dogs walked per household, percentage cleaned up, and estimated fecal coliform production rate per dog. Livestock contributions were derived from livestock census data and estimated fecal coliform production rates and manure washoff rates. Detailed explanations of the nonpoint source assessment and estimated parameters for each category are described in Appendix B of the TMDL Report.

The results of the nonpoint source assessment allowed Maryland to calculate the percent contribution for each of the four major types of nonpoint sources. This method is further described in Section IV of this Decision Rationale. Maryland is conducting a one-year bacteria source tracking (BST) study for each shellfish harvesting area in order to verify the categorized nonpoint source estimates and LAs in the TMDLs.

IV. Discussion of Regulatory Conditions

EPA finds that MDE has provided sufficient information to meet all of the eight basic requirements for establishing fecal coliform TMDLs for the Lower Choptank River mainstem restricted shellfish area within the Lower Choptank River Basin. EPA therefore approves these TMDLs for fecal coliform in the Lower Choptank River mainstem. This approval is outlined below according to the eight regulatory requirements.

1) *The TMDLs are designed to implement applicable water quality standards*

Water Quality Standards consist of three components: designated and existing uses; narrative and/or numerical water quality criteria necessary to support those uses; and an anti-degradation statement.

The Surface Water Use Designation for this area of the Lower Choptank River Basin is Use II: *Shellfish Harvesting Waters* (Code of Maryland Regulations, COMAR, 26.08.02.08M). Use II waters may be classified as approved, conditionally approved, restricted, or prohibited. Maryland's listing methodology for shellfish waters provides that approved and conditionally approved shellfish waters are not placed on the Section 303(d) list of water quality limited segments. For Use II waters, Maryland's water quality standards provide bacteriological criteria of (1) fecal coliform organisms not to exceed a median concentration of 14 MPN per 100 mL; and (2) no more than 10 percent of samples taken may exceed 49 MPN per 100 mL (for a three-

tube decimal dilution test). Shellfish waters may be classified as approved if the median fecal coliform MPN of at least 30 water samples taken over a three-year period to incorporate inter-annual variability does not exceed 14 per 100 mL, and, in areas affected by point source discharges, the 90th percentile of water samples does not exceed an MPN of 49 per 100 mL (for a three-tube decimal dilution test). Recent monitoring data (2000-2005) document that the Lower Choptank River mainstem did not attain either the geometric median or the 90th percentile criteria, as shown in Table 2.3.1 of MDE's TMDL Report.

Maryland developed the bacteria TMDLs for the Lower Choptank River mainstem in terms of fecal coliform because Maryland's current water quality standards contain specific numerical criteria for bacteria in Use II waters that are based on the concentration of fecal coliform, as described above. The TMDLs therefore use these applicable numerical criteria as an endpoint. TMDLs were calculated and expressed as median TMDLs and 90th percentile TMDLs in order to meet the associated numerical criteria. EPA believes that this is a reasonable and appropriate water quality goal.

- 2) *The TMDLs include a total allowable load as well as individual waste load allocations and load allocations.*

Total Allowable Load

As described above, MDE used as endpoints a median concentration of 14 MPN per 100 mL and a 90th percentile concentration of 49 MPN per 100 mL. Separate TMDLs were developed for the restricted shellfish area of the Lower Choptank River mainstem based on these two endpoints. The TMDLs and allocations are presented as mass loading rates of counts/day. Expressing TMDLs as daily mass loading rates is consistent with Federal regulations at 40 CFR § 130.2(i), which state that TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure.

EPA regulations at 40 CFR § 130.2(i) state that the total allowable load shall be the sum of individual WLAs for point sources, LAs for nonpoint sources, and natural background concentrations. The TMDLs for fecal coliform for the Lower Choptank River mainstem are consistent with 40 CFR § 130.2(i) because the total loads provided by MDE equal the sum of the individual WLAs for point sources and the land-based LAs for nonpoint sources. See Tables 1 and 2 for a summary of allowable loads.

Waste Load Allocations

There are four permitted point source facilities in the watershed. However, only the Easton Wastewater Treatment Plant (WWTP) (MD0020273; 00DP0579A) has a fecal coliform discharge to the Lower Choptank River mainstem. The total permitted load is 1.467×10^9 counts/day and will be included as the WLA for the Lower Choptank River mainstem. The

Easton WWTP has an estimated 17.6 MPN/100 mL monthly median fecal coliform concentration and a flow of 2.204 million gallons per day (MGD) based on monthly data collected from August 2002 to January 2006. Other permits include two industrial stormwater permits: Easton WWTP (02SW0556) and Midshore Regional Solids (02SW0765). There is also a mineral mining permit for Barker's Landing Borrow Pit (00MM9812).

Load Allocations

The TMDL summary in Tables 1 and 2 contain the LAs for the restricted shellfish areas. As described above in Section III, Maryland conducted a nonpoint source assessment in order to estimate the contributions of wildlife, humans, pets, and livestock to the overall nonpoint source loadings. As stated above, Maryland developed two types of fecal coliform TMDLs for each Restricted Shellfish area consistent with the two numeric criteria for Use II waters that are based on median and 90th percentile data. The greater reduction required when comparing the median and the 90th percentile results was used for the source allocation. Tables 4.4.1 and 4.4.2 in MDE's TMDL Report show the geometric median and 90th percentile results, respectively. In this case, the 90th percentile requires the greater reduction for the area. For example, a reduction of approximately 36.21 percent or 6.95×10^{10} counts/day was required in order to meet the median TMDL of 1.225×10^{11} counts/day for the Lower Choptank River mainstem. In order to meet the 90th percentile TMDL, a reduction of approximately 65.53 percent or 5.837×10^{11} counts/day is required to attain the allowable load of 3.070×10^{11} counts/day for the Lower Choptank River mainstem. Therefore, although a larger load can be assimilated to meet the 90th percentile, it is more restrictive because the reductions are more stringent and will insure compliance with both criteria. Note that the percentage reductions are not strictly comparable between the two TMDLs because the baseline, or current, loads are different: the loads were calculated using the corresponding median concentration or 90th percentile concentration of the current condition.

According to Federal regulations at 40 CFR § 130.2(g), LAs are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading. Wherever possible, natural and nonpoint source loadings should be distinguished. MDE has used several sources of census, population, and land use coverage data in order to estimate and account for the major types of nonpoint, natural and background sources. Tables in Section 2.4 of the TMDL Report provide a breakdown of the existing bacteria load from the four nonpoint source categories (livestock, pets, wildlife and humans). A similar breakdown was not developed for the allocations, which instead were developed with a gross LA. This was done because the implementation will target anthropogenic sources and monitor the basins to determine if the TMDLs can be achieved through controls on pets, livestock and humans. Also, BST has not yet been completed within the basins to confirm the percent contribution from each of the four nonpoint source categories.

Federal regulations at 40 CFR § 122.44(d)(1)(vii)(B) require that, for an NPDES permit for an individual point source, the effluent limitations must be consistent with the assumptions and requirements of any available WLA for the discharge prepared by the state and approved by

EPA. EPA has authority to object to the issuance of an NPDES permit that is inconsistent with WLAs established for that point source. To ensure consistency with these TMDLs, if an NPDES permit is issued for a point source that discharges one or more of the pollutants of concern in the Lower Choptank River mainstem, any deviation from the WLAs set forth in the TMDL Report and described herein for a point source must be documented in the permit Fact Sheet and made available for public review along with the proposed draft permit and the Notice of Tentative Decision. The documentation should: 1) demonstrate that the loading change is consistent with the goals of the TMDL and will implement the applicable water quality standards; 2) demonstrate that the changes embrace the assumptions and methodology of the TMDL; and 3) describe that portion of the total allowable loading determined in the state's approved TMDL Report that remains for any other point sources (and future growth where included in the original TMDL) not yet issued a permit under the TMDL. It is also expected that Maryland will provide this Fact Sheet for review and comment to each point source included in the TMDL analyses as well as any local and state agency with jurisdiction over land uses for which LA changes may be impacted. It is also expected that MDE will require periodic monitoring of the point source(s) for fecal coliform and total suspended solids, through the NPDES permit process, in order to monitor and determine compliance with the TMDLs WLAs.

In addition, EPA regulations and program guidance provides for effluent trading. Federal regulations at 40 CFR § 130.2(i) state: "if Best Management Practices (BMP) or other nonpoint source pollution controls make more stringent LAs practicable, then WLAs may be made less stringent. Thus, the TMDL process provides for nonpoint source control tradeoffs." The state may trade between point sources and nonpoint sources identified in the TMDL as long as three general conditions are met: 1) the total allowable load to the waterbody is not exceeded; 2) the trading of loads from one source to another continues to properly implement the applicable water quality standards and embraces the assumptions and methodology of the TMDL; and 3) the trading results in enforceable controls for each source. Final control plans and loads should be identified in a publicly available planning document, such as the state's water quality management plan (see 40 CFR § 130.6 and § 130.7(d)(2)). These final plans must be consistent with the goals of the approved TMDLs.

Based on the foregoing, EPA has determined that the TMDLs are consistent with the regulations and requirements of 40 CFR Section 130.

3) *The TMDLs consider the impacts of background pollutant contributions.*

The TMDLs consider the impact of background pollutants by considering the bacterial load from natural sources such as wildlife.

4) *The TMDLs consider critical environmental conditions.*

EPA regulations at 40 CFR § 130.7(c)(1) require TMDLs to account for critical conditions for stream flow, loading, and water quality parameters. The intent of the regulations is to ensure that 1) the TMDLs are protective of human health, and 2) the water quality of the waterbodies is protected during the times when they are most vulnerable.

Critical conditions are important because they describe the factors that combine to cause a violation of water quality standards and will help in identifying the actions that may have to be undertaken to meet water quality standards¹. Critical conditions are a combination of environmental factors (e.g., flow, temperature, etc.), which have an acceptably low frequency of occurrence. In specifying critical conditions in the waterbody, an attempt is made to use a reasonable worst-case scenario condition. MDE modeled the 90th percentile current load and allowable load. The 90th percentile concentration is that which one would expect to see exceeded no more than 10 percent of the time. For each shellfish area, the actual 90th percentile concentration from the most recent data set (i.e., five years) was used in these calculations, thereby incorporating the critical condition. Further, Maryland compared the 90th percentile and median TMDLs to determine which value represented the critical condition and to determine the basis for the critical condition. Greater reductions in the median TMDL suggest that, on average, water column concentrations are very high with limited variation. Greater reductions in the 90th percentile TMDL suggest a less frequent occurrence of high fecal coliform concentrations due to the variation of hydrological conditions.

5) *The TMDLs consider seasonal environmental variations.*

Seasonal variations involve changes in flow as a result of hydrologic and climatological patterns. Generally, water column data for fecal coliform may sometimes exhibit seasonal trends. For example, bacteria levels tend to be lower during the colder months in some areas, but this is not always the case. In order to account for seasonal variation and inter-annual variability, Maryland's shellfish monitoring program collects samples on a monthly basis and a minimum data set of 30 samples over three years (in this case, five years) is used. The monitoring design and the statistical analysis used to evaluate water quality attainment therefore implicitly include the effect of seasonality. Further, Maryland's water quality standard itself reflects the need to account for seasonal variation in assigning both a median (i.e., average condition) criterion and 90th percentile criterion (i.e., to account for fluctuations around the median).

The BST study to be conducted by Maryland in conjunction with these TMDLs may generate additional information as to the seasonality of loadings by the types of nonpoint sources investigated in the study.

6) *The TMDLs include a margin of safety*

The requirement for a MOS is intended to add a level of conservatism to the modeling

¹EPA memorandum regarding EPA Actions to Support High Quality TMDLs from Robert H. Wayland III, Director, Office of Wetlands, Oceans, and Watersheds to the Regional Management Division Directors, August 9, 1999.

process in order to account for uncertainty. Based on EPA guidance, the MOS can be achieved through two approaches. One approach is to reserve a portion of the loading capacity as a separate term, and the other approach is to incorporate the MOS as part of the design conditions. MDE has adopted an implicit MOS for these TMDLs. In the tidal prism model, an implicit MOS was incorporated to account for the uncertainty of certain model parameters. For example, the decay rate was determined to be the most sensitive parameter, and was therefore, set at the conservative end of its known range (i.e., 0.7 per day) for the TMDL calculation.

7) *There is reasonable assurance that the TMDLs can be met.*

EPA requires that there be a reasonable assurance that the TMDLs can be implemented. WLAs will be implemented through the NPDES permit process. According to 40 CFR § 122.44(d)(1)(vii)(B), the effluent limitations for an NPDES permit must be consistent with the assumptions and requirements of any available WLA for the discharge prepared by the state and approved by EPA. Furthermore, EPA has the authority to object to issuance of an NPDES permit that is inconsistent with WLAs established for that point source.

Nonpoint source controls to achieve LAs will be implemented in an iterative process that places priority on those sources having the largest impact on water quality, with consideration given to ease of implementation and cost. BMPs can be implemented through a number of existing programs and funding sources, including: Maryland's Agricultural Cost Share Program, Environmental Quality and Incentives Program, State Water Quality Revolving Loan Fund, and Stormwater Pollution Cost Share Program. Low interest loans are available through MDE to address failing septic systems. Also, sources of fecal coliform stemming from boats and marinas can be addressed through the Clean Marina Program, no discharge zone program, and grant funds available through Maryland Department of Natural Resources to install a pumpout station. Under existing Maryland law, certain new and existing marinas are required to have a pumpout station.

Pursuant to the National Shellfish Sanitation Program, Maryland will continue to monitor shellfish waters and classify harvesting areas. In addition to water quality monitoring and shoreline surveys, MDE will be conducting a bacteria source tracking study that will be used to confirm the source estimates presented in the TMDL Report.

As mentioned above, Maryland and EPA acknowledge that while the TMDL does not promote changing natural background conditions due to wildlife, it is possible that implementation measures taken to reduce nonpoint controllable sources will also reduce wildlife loadings. In areas where wildlife is the dominant source of fecal coliform inputs to the shellfish waters and where water quality standards cannot be attained following TMDL implementation for controllable sources, then MDE would consider conducting either a risk-based water quality assessment or a Use Attainability Analysis to recognize these natural conditions.

8) *The TMDLs have been subject to public participation.*

MDE provided an opportunity for public review of and comment on the fecal coliform TMDLs for the restricted shellfish harvesting area within the Lower Choptank River Basin. The public review and comment period was open from July 28, 2006 through August 28, 2006 for the Lower Choptank River Basin TMDLs. MDE received two sets of comments for these TMDLs which were addressed in MDE's Comment Response Document.

Copies of the reports were sent to the U.S. Fish and Wildlife Service and National Marine Fisheries Service pursuant to Section 7(c) of the Endangered Species Act, requesting the Services' concurrence with EPA's findings that approval of these TMDLs does not adversely affect any listed endangered and threatened species and their critical habitats.