Comment Response Document for the Port Tobacco TMDL

Introduction

The Maryland Department of the Environment (MDE) has conducted a public review of the proposed Total Maximum Daily Load (TMDL) to limit nitrogen and phosphorus loadings to the Port Tobacco River. The public comment period lasted from April 24, 1998 through June 19, 1998. MDE received three sets of written comments. Below is a list of commenters, their affiliation, the date they submitted comments, and the numbered references to the comments they submitted. In the pages that follow, comments are summarized and listed with MDE's response.

List of Commenters

Author	Affiliation	Date	Comment No.
Andris Bilmanis, Sr.	Citizen	5/25/98	1, 2, 3
Douglas Miller	Town of La Plata	5/26/98	4,5,6
William J. White, and James R. May	Earthjustice Legal Defense Fund, and Widner University School of Law, respectively.	6/19/98	7,8,9,10,11,12

Comments & Responses

1. Include in the document the water quality standards that apply to the Port Tobacco River. Indicate the present levels of nitrates, phosphorus, chlorophyll *a* and dissolved oxygen in the water column.

   Response: The levels of the referenced parameters vary in the water column; however, a summary of summer-time values, which typically represent the poorest water quality conditions for dissolved oxygen and chlorophyll *a*, is provided in the technical appendix to the report (See Attachment I).

   In regard to relevant water quality standards, the section of the document entitled, "Targeted Water Quality Goal" states the dissolved oxygen goal of 5 mg/l, which is the relevant numeric water quality standard. As a general narrative guideline for chlorophyll *a*, the TMDL document cites a limit of less than 100 µg/l, with a desired goal of less than 50 µg/l. The TMDL documentation has been revised to cite the following sources of these chlorophyll goals (See excerpt, attachment II):

   Thomann, Robert V., John A. Mueller "Principles of Surface Water Quality Modeling and Control," HarperCollins Publisher Inc., New York, 1987.

   The Thomann book is cited as the original source in:

U.S. EPA, "Technical Guidance Manual for Developing Total Maximum Daily Loads, Book2: Streams and Rivers, Part 1: Biochemical Oxygen Demand/ Dissolved Oxygen and Nutrients/ Eutrophication," Office of Water, Washington D.C., March 1997.

The final document establishes a chlorophyll *a* level of 52 µg/l as the final goal, which is within the acceptable range for this indicator of eutrophication.

2. The proposed loading limits in the draft TMDL will cause excessive algal blooms and exceedance of the dissolved oxygen standard.

Response: Based on the analysis documented in the draft TMDL, the proposed nutrient limits are expected to be protective of the water quality. After implementation of the TMDL, MDE will monitor the waters to evaluate the effectiveness of the loading limits. MDE may revise the TMDL in the future if it is determined that the water quality problems persist.

3. It appears that no consideration is given to the increased nutrient flow from rapid development in the estuarine portion of the watershed.

Response: Loads to the estuarine portion of the watershed are considered in the TMDL and are documented in the technical appendix of the report (See excerpt, Attachment III). At present, the TMDL establishes a cap on the annual nonpoint source load projected to occur in the year 2000. This estimate is based on projected changes in land uses. The annual loading limit is being established as an interim goal until further study is conducted. Based on the judgment of state water quality managers and limited monitoring information, there is some concern that potentially nutrient-laden sediments being deposited at the head of the estuary might cause eutrophication problems. Given the current technical limitations of proving the validity of this concern, the Department is establishing the annual TMDL as a stabilizing upper bound on nonpoint sources. These annual TMDLs will be revised when refined data and analytical tools are developed.

4. The La Plata Wastewater Treatment Plant (WWTP) is planned to have an ultimate capacity of 2.5 million gallons per day (MGD). The Town is concerned that the draft TMDL would cap plant flows at 1.5 MGD. This would limit development in La Plata, which could be seen as contrary to Smart Growth policies.

Response: MDE is committed to working closely with local governments to ensure that all options are considered for integrating the goals of Smart Growth and water quality protection. MDE is required by the federal Clean Water Act to ensure that all TMDLs are established to be protective of water quality. In establishing the TMDL for the Port Tobacco River, MDE accounted for information that is contained in the relevant comprehensive water and sewer plan. The TMDL does not impose a flow restriction for future growth beyond 1.5 MGD; however, it implies that stricter nutrient controls or a different discharge location might be necessary to accommodate an increased flow. When the Town of La Plata seeks to amend its water and sewer plan, the Department will

work closely with the Town to identify options for meeting the mutual goals of Smart Growth and water quality protection.

5. The draft TMDL changes the effluent limits of the plant s NPDES permit and thus the design parameters under which the La Plata Wastewater Treatment Plant (WWTP) will be upgraded. These changing limits could result in a WWTP that will be prematurely obsolete.

Response: The original proposed TMDL was based on the assumption that the new La Plata WWTP, which is currently being designed, will operate biological nutrient removal (BNR). Because BNR is a biological process, which is more effective in the warmer months, the effluent concentrations of nitrogen are expected to be higher than 8 mg/l in the winter, and lower than 8 mg/l in the summer. Eutrophication problems, which are also temperature dependent, are most prevalent in the summer months. Hence, the period of time when BNR is most effective in reducing nitrogen concentrations in the WWTP effluent is the same period when it matters most for protecting water quality. Still, the commenter questioned MDE's assumption that the plant would achieve a summer-time nitrogen concentration of 4 mg/l. In response, MDE assessed the water quality impact of an assumed 6 mg/l concentration and found that the results remained protective of both the numeric dissolved oxygen criteria and the chlorophyll *a* water quality goal. The latter goal was subsequently revised from 50 µg/l to 52 µg/l, which remains within the acceptable range (Please see the response to comment #1).

6. The La Plata Wastewater Treatment Plant WWTP will have to do more than its fair share to meet the TMDL cap. TMDLs were created to spread the responsibility for clean water to both point and nonpoint sources. We are concerned that this may not happen.

Response: The most apparent water quality problem in Port Tobacco occurs in the summer, during low flow periods when nonpoint sources are of limited influence. During this critical season, the La Plata WWTP is the dominant influence on the water quality. Thus, strict controls on the La Plata WWTP are necessary, regardless of the degree to which the nonpoint sources would be controlled to affect the annual nutrient loading. The fact that the Department is proposing to establish an annual loading cap on nonpoint source loads is an important measure, which establishes a strict framework for future activities that affect nutrient loads in the Port Tobacco watershed. The Department judges this to be a reasonable balance in the allocation of allowable nutrient loads.

7. Section 303(d) of the Clean Water Act requires the establishment of total maximum <u>daily</u> loading limits for waters not meeting water quality standards. Because the proposed load limits are merely annual and (during low flow) monthly, they are factually inconsistent with the terms of the statute. Annual and monthly limits can and should be established in conjunction with daily limits, but cannot substitute for them.

Response: The term "Total Maximum Daily Load" is a misnomer, intended to convey a concept rather than be interpreted literally. The Code of federal Regulations (40 CFR 130.2(i)) states that "TMDLs can be expressed in terms of either mass per time, toxicity,

or other appropriate measure." No explicit time period is required by federal statute or regulation.

From a technical standpoint, nutrient loads are highly variable. Most of the load is generated during a small number of storm events. Thus, it is essentially infeasible to establish a meaningful daily load for nutrients. To do so, in view of the large daily variability, would require the daily loading cap to be very large to accommodate the large natural peak loading events. More importantly, nutrients do not have an impact on the temporal scale of a day; rather, they act over long periods of time. In the case of nutrients, it does not matter if a large quantity goes in one day, and a small amount goes in the next; rather, it is the accumulation over a time scale of weeks that is significant. For these reasons, the Department has elected to establish the TMDL on the timeframe that it has.

8. Despite the fact that Port Tobacco is already impaired, the proposed annual load limits represent an increase above existing loads for both pollutants. The commenter questions how this can be consistent with the water quality goal. In addition, the proposed TMDL focuses on reductions in point source loads and fails to recognize nonpoint source runoff as a contributor to the River's nutrient loading problem. The proposed TMDLs, by permitting total loads to increase, utterly fail to account for the effect of the accumulation of nonpoint source loads on the water quality problems experienced during the summer months.

Response: In order to understand how the TMDLs protect water quality in the Port Tobacco River, one must consider the conditions under which the loads are delivered to the stream. If the nutrient load was delivered steadily to the river, flowing at average streamflow, there would be no immediate water quality problems. This is because the flushing effect of the average streamflow (compared to low flow) prevents stagnation thereby avoiding water quality problems. The problems occur only during low flow conditions, which are now addressed by the low flow TMDLs. The annual TMDLs, which apply during average flow conditions, are intended to stabilize nonpoint source loads, thereby making an initial effort to address possible nutrient-laden sedimentation problems while the situation is further evaluated. These annual TMDLs will be revised when refined data and analytical tools are developed (Please see the response to comment # 3 for further discussion of the annual TMDLs).

9. The base case loadings from both point and nonpoint sources were calculated using 1984 data rather than data reflecting present conditions of the River. MDE should first attempt to obtain current information. Only if such information is unobtainable or inadequate should it be excluded from the calculations, in which case the 1984 data should be adjusted in a manner that specifically accounts for estimated changes in the loading.

Response: The 1984 base flow data represents the best readily available data. Its use is reasonable and justifiable for several reasons. First, this data was used in calibrating the model to replicate the observed water quality associated with that data. It is not critical that those observed conditions be the present conditions, provided that the stream's form and structure has not changed significantly since that time, which it has not. Second, the

following three observations indicate that the quality of the data is sufficient for the purpose estimating low flow nonpoint source nutrient loads: (1) The data represent nutrient concentrations in base flow, that is ground water, which tends to have stable properties over long periods of time. The Port Tobacco watershed is highly forested (60%), which increases the confidence in the temporal stability of the data. (2) The data are actual measured values from the water body of interest, which is deemed better than the commonly accepted practice of using representative values from the research literature or data from similar streams. (3) The data was reviewed to be sure it fell within a range that has been observed elsewhere and was found to be reasonable. For these reasons, the data are of sufficient quality for the intended uses.

10. MDE's use of a 3% margin of safety for the final case scenario is insufficient to account for the use of 1984 information.

Response: MDE believes the limited use of the 1984 base flow data was reasonable and justifiable as discussed in the response to comment #9. Given that a high percentage of the watershed is forested (60%), and the land use change is relatively slow in this rural area, significant confidence can be placed in the 1984 data. These considerations justify the margin of safety MDE has adopted.

11. The document does not describe any enforceable measures that will be used to implement the proposed TMDLs. The document states that point source controls will be executed through NPDES permits, but does not indicate that the River's point source dischargers will receive individual allocations. The document should be revised to make clear that the NPDES permits of each of the River's point sources will be revised to include a specific wasteload allocation. With regard to nonpoint sources, the document does not identify a single method of implementation. The document makes general reference to "Tributary Strategy efforts" at nonpoint source controls, but these "efforts" do not constitute enforceable requirements. MDE should set forth how loads will be allocated among the existing nonpoint source dischargers and how it will ensure that those allocations are met.

Response: The commenter's questions refer to detailed implementation issues. Federal regulations do not require states to develop a detailed implementation plan as part of the TMDL development and approval process. Nevertheless, Maryland has begun to consider the many potential implications of the referenced TMDLs.

The primary requirement of the TMDL documentation is to establish a technically sound framework (the loading limit) within which to conduct future implementation activities. As a secondary requirement, states must document the gross allocation of the allowable load between point sources and nonpoint sources and demonstrate the viability of eventual implementation. One rationale for not requiring a detailed implementation plan within the TMDL documentation is that doing so in the context of the TMDL might infringe on the roles of other government programs and stakeholders. Detailed implementation issues, like those raised in the comment, will be addressed in the future with the participation of appropriate stakeholders.

With regard to the Port Tobacco TMDL the documentation gives assurances that the TMDL goal and allocations are reasonable. The proposed TMDL goes further by documenting the allowable loads for each of the four existing point source discharges in the Port Tobacco watershed. The proposed annual nonpoint source nutrient loading caps were established as stabilizing limits until they can be re-evaluated using refined data and analytical tools (See the response to comment #3). These caps are technically reasonable, which gives sufficient assuredness of their implementation. The alternative would have been to forego the establishment of annual loading caps until such time when refined analytical tools are available. MDE elected to pursue the more environmentally conservative approach proposed in the Port Tobacco TMDL document.

12. For the reasons set forth in the previous comments, MDE needs to revise the TMDLs for Port Tobacco, and recirculate the new draft for public review.

Response: The public review process for the Port Tobacco TMDL has been extensive. In addition to the typical notice and comment procedures, MDE met with interested parties, and extended the review period to accommodate additional comments. Given that the process was substantial and thorough, MDE will not be conducting a second public review period. Nevertheless, MDE invites and encourages future dialogue with interested parties concerning the implementation of this draft TMDL.

Results of the Calibration of the Model

Figure 10A: Chlorophyll *a* vs. River Kilometers

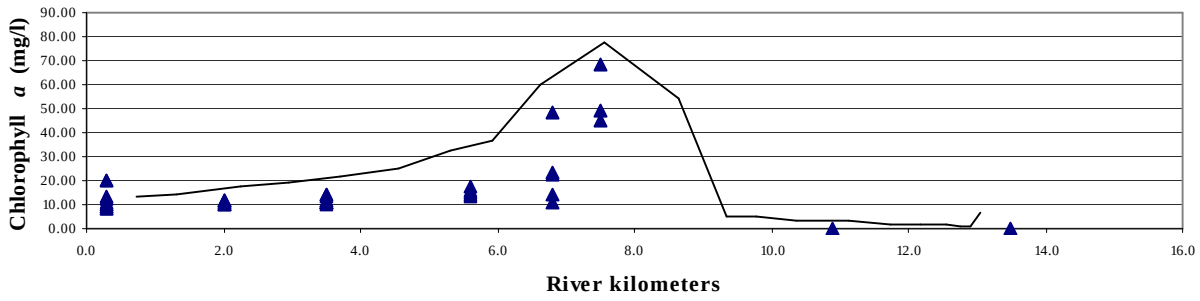


Figure 11A: Dissolved Oxygen vs. River Kilometers

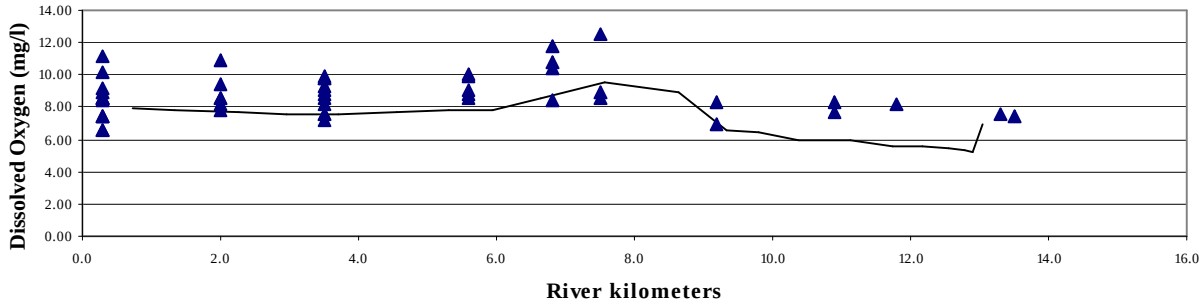


Figure 12A: Ortho-Phosphate vs. River Kilometers

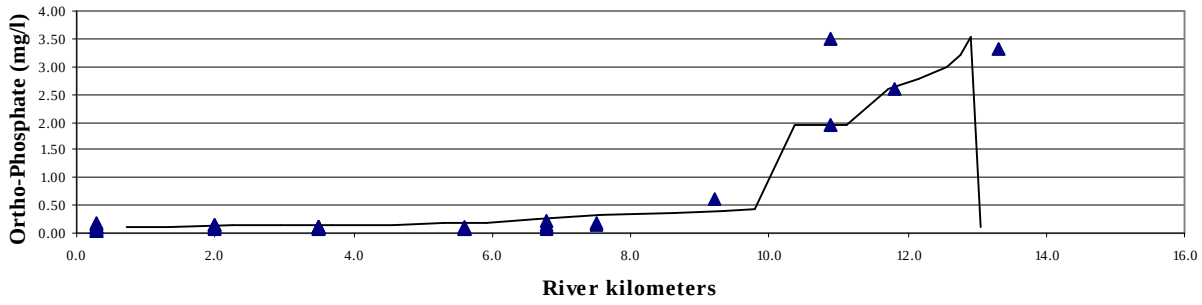


Figure 13A: Organic Phosphorus vs. River Kilometers

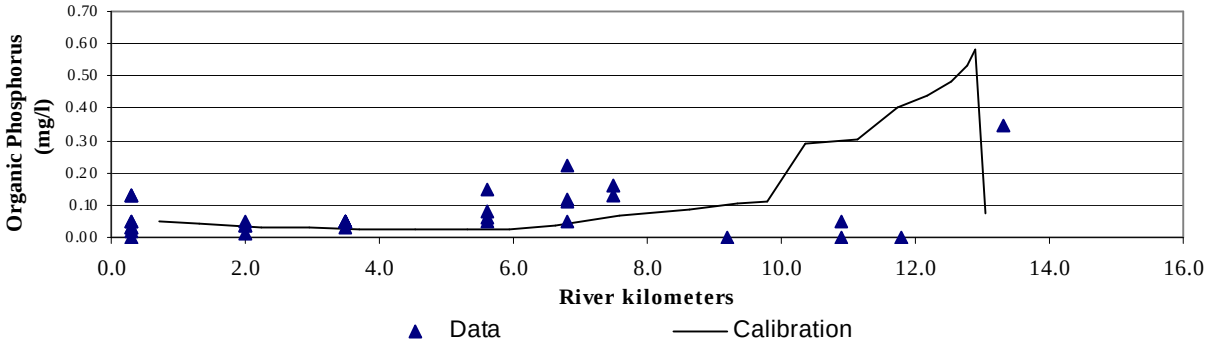


Figure 14A: Ammonia vs. River Kilometers

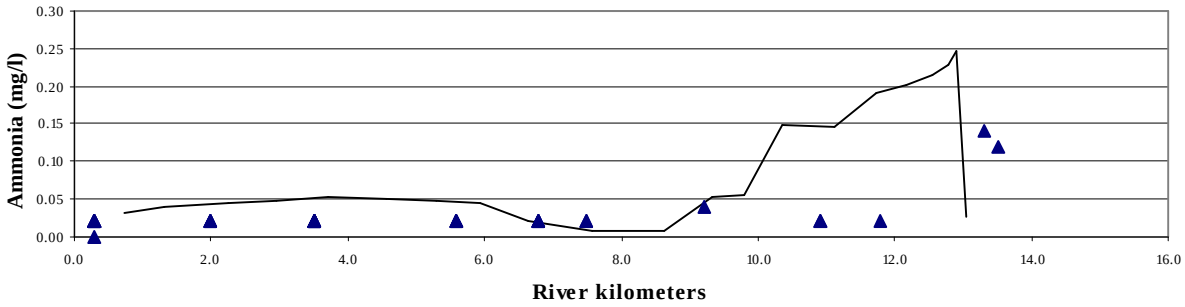


Figure 15A: Nitrite/ate vs. River Kilometers

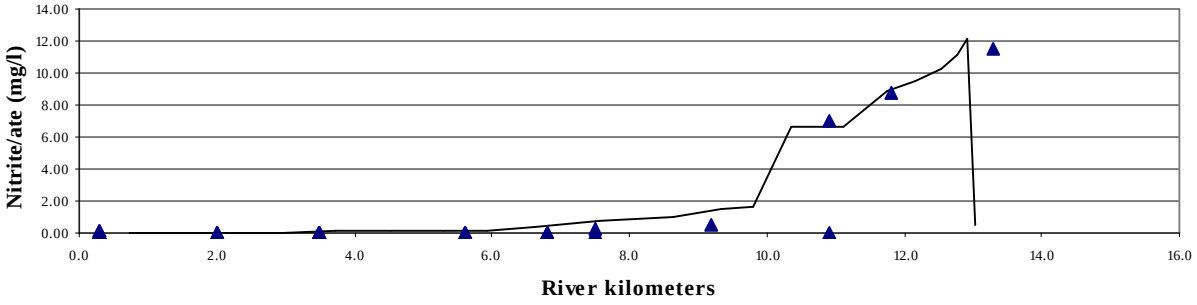


Figure 16A: Organic Nitrogen vs. River Kilometers

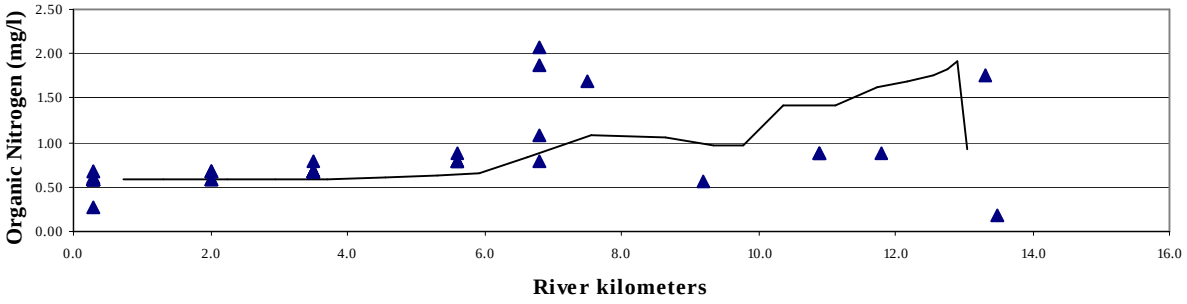
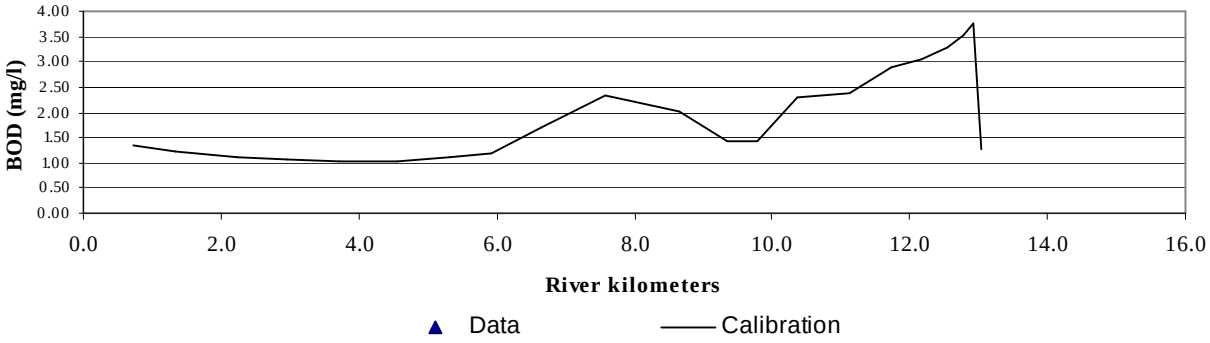


Figure 17A: BOD vs. River Kilometers



Attachment II

desirable water uses of aesthetics, recreation, fish maintenance and water supply.

The condition of a water body is then described in terms of its trophic state, i.e. its degree of eutrophication or lack thereof. For lakes, three designations have been used:

1) Oligotrophic - clear, low productivity lakes
2) Mesotrophic - intermediate productivity lakes
3) Eutrophic - high productivity lakes relative to a basic natural level.

The level of eutrophication due to excessive amounts of phytoplankton can be measured using several criteria:

a) Counts (Number/ml) of specific phytoplankton species, e.g. Asterionella formosa. This is the most direct count of species trends but requires a considerable effort by trained specialists in phytoplankton identification. Also, conversion to biomass measures is difficult because of variations in cell sizes for given species.

b) Cell volume ($\mu m^3/\mu\ell$) of species. An excellent measure permitting ready conversions to biomass as dry weight or carbon and grouping of data into different categories (e.g. "diatoms" and "others"). However, this measure requires an extensive analytical and data reduction effort.

c) Chlorophyll a concentrations ($\mu g/\ell$). A measure of the gross level of phytoplankton, easily obtained without extensive effort in laboratory. However, chlorophyll does not provide information on species levels nor does it permit grouping into classes of phytoplankton. Chlorophyll a is the most common measure used in eutrophication studies.

"Undesirable" levels of phytoplankton vary considerably depending on water body. For example, the following levels represent present levels which, in some way, are considered undesirable:

Open Lake Michigan - 2-5 µg chlorophyll/ℓ

Open Lake Ontario - 5-10 µg chlorophyll/ℓ

Western Lake Erie - 30 µg chlorophyll/ℓ

Sacramento, San Joaquin Delta - 50-100 µg chlorophyll/ℓ

Potomac Estuary - >100 µg chlorophyll/ℓ

Objectives for "Desirable" levels of chlorophyll vary widely depending on the type of problem and the nature of the water body. Figure 8-2 illustrates the range in present observed chlorophyll concentrations and that level considered desirable in some sense. In general, lakes and reservoirs tend to have lower desirable levels of phytoplankton. Chapra and Tarapchak (1976) have summarized several objectives for North Temperate lakes as follows:

Segment Number	Flow m^3/s	Total Nitrogen *kg/d*	Total Phosphorus *kg/d*
2	0.126	25.84	1.765
3	0.003	4.60	0.314
4	0.006	2.22	0.151
5	0.009	6.82	0.466
6	0.194	11.66	0.796
7	0.054	7.94	0.542
8	0.054	7.94	0.542
9	0.037	9.22	0.629
11	0.055	12.48	0.853
12	0.059	14.50	0.991
16	0.068	22.62	1.544
19	0.011	16.23	1.108
21	0.044	6.06	0.414
22	0.009	1.21	0.083
23	0.009	1.21	0.083
24	0.009	1.21	0.083
25	0.009	1.21	0.083
27	0.009	1.21	0.083
28	0.259	49.89	3.407
35	0.125	20.93	1.430
41	0.132	24.78	1.692
Totals	**1.281**	**249.806**	**17.060**

Table A10: Model Run 2, Year 2000 Average Annual Nonpoint Source Flows and Loads plus a 3% MOS

Port Tobacco
Modeling Domain