Comment Response Document for the Phosphorus and Sediment TMDLs for Johnson Pond Wicomico County, MD

Introduction

The Maryland Department of the Environment (MDE) conducted a public review of the proposed Total Maximum Daily Loads (TMDLs) to limit phosphorus and sediment loadings to Johnson Pond in Wicomico County, MD. The public comment period lasted from October 18, 2000 through November 18, 2000. MDE received four 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, the sets of comments are summarized and listed with MDE's response.

List of Commenters

Author	Affiliation	Date	Comment No.
Annie Williams (commenting on TMDL document)	Davis Bowen and Friedel, Inc, Architects, Engineers and Surveyors	11/8/00	1,2
James Stuhltrager and Jack D. Smith (commenting on TMDL document)	Widener University Environmental and Natural Resources Law Clinic, on behalf of the Sierra Club and the American Littoral Society; Earthjustice Legal Foundation on behalf of the Chesapeake Bay Foundation	11/16/00	3 through 7
Newell W. Messick (commenting on TMDL document)	Deputy Director, Public Works Department, City of Salisbury	11/17/00	8 through 18
Mr. James R. Trader (commenting on TMDL document)	Citizen of Salisbury	11/18/00	19 through 26

Comments and Responses

1. One commenter states that the Draft TMDL acknowledges that an implementation plan for nonpoint source (NPS) controls is beyond the scope of the study, and asks whether there has been an effort to quantify potential phosphorus and sediment reductions on a per acre basis (10,247 agricultural acres) using Best Management Practices (BMPs) to see if NPS allocations are feasible.

   Response: Since the total phosphorus nonpoint source load was derived from available water quality data for the tributaries to Johnson Pond, per acre input from various land uses was not computed. However, the removal efficiencies of various agricultural BMPs (Table 2, Page 16 of the TMDL document) show that a large portion of total phosphorus could be removed by the treatment of highly erodible soils and other best management practices. Details of the expected NPS sediment reduction are given in the Section of Appendix A titled "Estimating the Sediment TMDL".

2. One commenter notes that the study assumes Johnson Pond will be dredged, and asks how realistic that assumption is and how it would impact future TMDLs for the Pond if it is not dredged.

   Response: The City of Salisbury's Department of Public Works, has indicated that the Pond will be dredged as soon as the funds are allocated by the Mayor and City Council. However, even if the Pond is not dredged, the sediment reduction recommended in the TMDL will still effectively slow the process of reducing the volume of the Pond. Even without dredging, reduction of total phosphorus loads will still improve the water quality of the pond.

3. One commenter states that the draft submission fails to establish a Total Maximum Daily Load (TMDL) for Johnson Pond as required by the CWA. Instead, it establishes maximum annual loads for phosphorus and sediment. The commenter continues that the TMDL does not address the effects that periodic large loading events, for example, from storm events during the summer, have on water quality in the days following the event (See comments submitted for Bradford Lake TMDL).

   Response: The EPA interprets the term "Total Maximum Daily Load" more broadly than the commenter, providing in its regulations (40 CFR 130.2(i)) that "TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure." Accordingly, no explicit time period is required. In this case, annual loads make more sense than daily loads. From a technical standpoint, nutrient and sediment loads are both highly variable. Most of the loads are generated during a small number of storm events. Thus, it is essentially infeasible to establish a meaningful daily load for nutrients and sediments. To do so, in view of the large daily variability, would require the daily loading caps to be very large to accommodate the large natural peak in loading events. More importantly, nutrients and sediments 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. In the case of sedimentation, it is the long-term accumulation of sediments—and the resultant loss in lake volume—that is significant. For these reasons, the Department has elected to establish the sediment and phosphorus TMDLs on the timeframe that it has. Nevertheless, the TMDLs are expressed within the TMDL documentation both as annual loads and average daily loads, in order to assist the reader in understanding the magnitude of the loads involved.

4. One commenter argues that the trophic status goal selected for this TMDL is not appropriate to meet water quality standards. Noting that the EPA guidelines suggest that a minimum of mesotrophic status is required for a lake to be swimmable and fishable, and that, for mesotrophic lakes and impoundments, a range of 10-20 μg/l total phosphorus and 4-10 μg/l chlorophyll-*a* is appropriate, the commenter strongly suggests that MDE set a more aggressive goal of trophic status and annual mean phosphorus concentration.

   Response: The TMDL for Johnson Pond sets as a goal a reasonable trophic status for an impoundment in a developed area in the Coastal Plain. EPA guidelines acknowledge significant variability in water quality as a function of geography, morphometry, lake origin and climate, as well as variations in user perceptions based on geography and land use. For these reasons, the EPA does not advocate the establishment of a single, national nutrient standard for lakes (U.S. EPA 2000).

   A chlorophyll *a* concentration of 20 μg/l corresponds approximately to 60 on Carlson's Trophic Status Index, which is within the lower range of eutrophic conditions (Carlson 1977). This is compatible with Johnson Pond's designated use and supports the Pond's warm-water fishery.

5. One commenter contends that the TMDL ignores DO water quality criteria for lower portions of the water column. The commenter also objects to the assumption that lowered DO levels in a hypolimnotic layer are due to natural conditions in Johnson Pond.

   Response: All stratified lakes in Maryland exhibit lowered DO in the hypoliminion in warm weather. However, the reduction proposed in the total phosphorus loading to the Pond will result in improved water quality conditions and reduce the size and duration of low DO in the Pond.

6. One commenter states that the TMDL requires no real reduction of phosphorus loads from point sources. Despite the impaired status of Johnson Pond, the TMDL will actually result in an increase in loading from point sources.

   Response: The total phosphorus load discharged from the two point sources during 4/98 through 8/98 is calculated to be 752 lbs/yr, while the current permitted total phosphorus loading is 2,222 lbs/yr. The WLA of 1,135 lbs/yr in the proposed TMDL results in a reduction of nearly half of the currently permitted load. Treatment plants must perform at a level better than their permitted limitations to avoid permit violations, therefore, increase in point source loadings should not occur.

7. One commenter states that the TMDLs fail to allocate loadings to specific nonpoint sources or even categories of nonpoint sources as, they allege, is required by the CWA regulations. The commenter asserts that it is the task of the TMDL process to conduct technical and economic tradeoff between pollution sources through the allocation of the TMDL to specific point and nonpoint sources. The mechanism or regulatory activity outside of the TMDL that would develop the missing allocations is not specified in the draft TMDL document.

   Response: The calculated NPS allocation is implicitly the sum of the individual load allocations. The sub-allocation of the allowable NPS load to individual sources is a detailed implementation issue, which is beyond the scope of the TMDL. A technical memorandum, entitled *Significant Nutrient Nonpoint Sources in the Johnson Pond Watershed,* describes

viable individual sediment load allocations to each land use category. The technical memorandum provides information that is intended to facilitate future stakeholder dialogue on implementation planning. Neither the Clean Water Act nor current EPA regulations require states to develop a detailed implementation plan as part of the TMDL development and approval process. Maryland's rationale for not including a detailed implementation plan within the TMDL documentation is to allow flexibility for those other government programs and stakeholders currently developing mechanisms to reduce nutrient and sediment loads to Johnson Pond and other waters of the state.

8. One commenter suggests that the data presented in the report does not clearly support the conclusion that low dissolved oxygen levels, algal blooms, and an impaired fishery in the Pond are due to sedimentation and nutrient enrichment. The commenter suggests that the applicability of bottom sample data is unclear due to lack of a bottom depth measurements at the sampling points.

Response: The data collected by Coastal Environmental Services, Inc in 1992-93 (see Table A-1, Appendix - A), and subsequently by MDE in 1998 (see Table A-5 through A-7, Appendix - A), shows chlorophyll *a* levels averaging 40 µg/l, well above the acceptable level of 20 µg/l. Also a survey of in-lake sediment accumulation was conducted by Coastal Environmental Services, Inc. in August 1989. From this survey data, it was determined that the average depth of accumulated sediment was about 1.1 meter, resulting in reduced volume of the Pond for fisheries. Although the total depth of the pond was not measured at the sampling points, the depth at which samples were taken was recorded. Considering that the current average depth of the Pond is 2.1 meters (current maximum depth is 6.2 meters), there are a few locations at less than 2 meters depth where the DO was well below the standard of 5.0 mg/l. Therefore, the lower depth sample data does indicate DO problems in the pond due to stratification and the oxygen demand exerted by the sediments on the water column.

9. One commenter states that both of the upstream treatment plants now provide a high level of phosphorus removal. It is not stated if this removal had pre-dated the previously made conclusions regarding use impairment. If this additional treatment is more recent, this commenter alleges, then the beneficial impacts associated with this phosphorus removal should be assessed and the need for further data collection considered.

Response: Phosphorus removal has been required at the upstream treatment plants since the 1980s. The TMDL recommends an additional lowering of the phosphorus limits beyond that previously required. Additional monitoring will be done in the future to observe the impact of the added reductions.

10. One commenter states that the data suggests that the Pond may function as a source, rather than a sink, of phosphorus. Under such conditions, the TMDL should evaluate the usefulness of various restoration strategies such as dredging or vegetation harvesting.

Response: From the data in Table A-2, it appears that in 1998 the Pond acted as a sink for sediments and a source of phosphorus. The phosphorus currently in Johnson Pond was brought in from point and non-point sources. Dredging of the Pond is a feasible alternative, and can proceed, pending the approval of funds by the Mayor and City Council of Salisbury. Even when the Pond has been dredged, the recommended phosphorus and sediment TMDLs must be maintained to prevent deterioration.

11. One commenter suggests that the detection limit for much of the phosphorus testing data was too high (0.2 mg/l) which limited its usefulness. Sampling should be re-conducted with appropriate detection limits. In this way, problems associated with Pond eutrophication and its causes can be better quantified.

Response: Although the detection level was too high to be useful for many samples, many others had much lower detection level. Sampling will be conducted in the Pond to assess the effects of the TMDL implementation.

12. One commenter suggests that the study provided very limited data from the 1993 pond investigation. However, these data were used to provide a significant input to this study. Since these data seem to represent some of the smaller tributaries, the location for these data and other relevant data from this study should also be included.

Response: The tributary data referenced by the commenter only has a baring on estimating the present loading rates. Because the TMDL is computed solely as a function of the size, depth, and retention time of the pond, it is independent of the loading rate estimation. The loading rate estimation is provided only as a preliminary estimate of the amount of necessary reduction needed to meet the TMDL, thereby giving a starting point for future dialogue on implementation. The sampling locations are in Middle Neck Branch, at intersection with U.S. Route 13 (North Salisbury Boulevard), Naylor Mill Branch at intersection with Naylor Mill Road, and in the Johnson Pond, about a quarter mile above the dam (See Appendix-A, Table A-1).

13. The underlying assumption of the Vollenweider approach is that the waterbody in question retains a portion of the input phosphorus. One commenter believes that the presence of higher phosphorus concentrations at the Pond's outlet would violate this assumption and suggests that these data need to be explained or better data should be obtained to justify the applicability of the this approach.

Response: At any given time, depending on the physical and chemical conditions, phosphorus in a lake may undergo deposition, resuspension or flux in either direction across the sediment-water interface. We believe that the observed higher phosphorus concentrations at the outlet of the Pond in 1998 reflect variations in those phenomenons. Additional monitoring of the Pond is required to confirm this assumption. Phosphorus in the sediment was deposited from point and non-point sources draining into Johnson Pond.

14. One commenter expresses concerns about MDE's use of chlorophyll *a* levels as a basis for TMDL development given the lack of "any promulgated chlorophyll *a* levels". This commenter recommends that more local data should be used in setting target goals to account for this climatic effect.

Response: Although Maryland does not have numeric water quality criteria for chlorophyll *a*, the narrative standards (COMAR§ 26.08.02.03B) apply, especially to eutrophic conditions. Narrative criteria are designed for exactly this purpose. Threshold values of chlorophyll *a* have been used for over a decade under authority of the State's narrative criteria, to evaluate eutrophic conditions and set water quality endpoints consistent with the designated uses of a waterbody. This has allowed the State to make water quality management decisions that support the mandatory water quality standards and are consistent among the regulated community. MDE must ensure that point and nonpoint source loads to waters of the State do

not impair the existing uses of that waterbody. See comment #4 with respect to the specific numeric goal for Chlorophyll *a* concentrations.

15. One commenter notes that in this study, phosphorus loadings for the tributaries were developed "based on limited 1992/1993 in-stream sampling data-data that may or may not

16. reflect the current level of phosphorus removal at the upstream treatment plants." The commenter further states that the use of observed data in the Volleweider approach suggests an in-pond phosphorus concentration of 0.081 mg/l. This result contrasts to the phosphorus data (MDE's first effort) that indicates an average pond output concentration of 0.060 mg/l only one of 6 samples had a concentration above 0.081 mg/l.

Response: Part of the phosphorus-input data was collected in 1992-93 (Middle Neck Branch) and part of the input data was collected in 1998 (Station WIW0241). So the 1998 data does reflect the current level of treatment at the larger Delmar Wastewater Treatment Plant.

16. One commenter notes that if the Trophic Status Index (TSI) is calculated based on the average Pond output concentrations (0.060 mg/l), a TSI of 63.2 and a chlorophyll *a* concentration of 27.8 μg/l are determined. The commenter suggests that this result actually comes closer to predicting the gross average pond chlorophyll *a* concentration of 31.4 μg/l (based on MDE's third attempt-surface samples) than the study's projected chlorophyll *a* concentration of 43 μg/l. This result underlines the uncertainty associated with this procedure, an uncertainty that should be reflected in the TMDL.

Response: The average concentration of chlorophyll *a* in the Pond for the boat stations- "A" through "E" for the period of 7/23/98 through 8/27/98 is calculated to be 40 μg/l, compared to the 43 μg/l projected by this study. The result shows that Carlson's Trophic Status Index method is reliable.

17. One commenter contends that the methodology used to project dissolved oxygen is suspect in that developing a single DO value to represent a 1.5 mile/136 acre pond is an extreme approximation. The commenter notes that a result of 5.2 mg/l is in sharp contrast to observed DO levels that are generally over 7.0 mg/l. Also, the commenter notes that the calculation of a diurnal DO range of 0.21 mg/l is simply wrong- it cannot occur in the presence of these observed chlorophyll *a* concentrations. This methodology should either be calibrated to the field data or a more sophisticated approach should be used.

Response: The diurnal DO range was calculated for a target chlorophyll *a* value of 20 μg/l. This resulted in a smaller diurnal DO range. For the projected chlorophyll *a* value of 43μg/l, the diurnal DO range will be around 0.46 mg/l. The 5.2 mg/l DO is an estimate of the lowest possible level expected only under the critical conditions described in the report. Maryland has also incorporated conservative assumptions that effectively constitute an additional, implicit, margin of safety. In calculating minimum DO levels, MDE assumes a water temperature of 30^{o} C; the highest temperature observed during monitoring was 29^{o}C.

18. One commenter states that the proposed sediment TMDL is not really a TMD- it is the calculated change in sediment loading that would be caused by the implementation of phosphorus BMPs (based on CBPO 1998). As such, this value is not connected with any water quality impact or stream standard/target value. Similarly, the underlying loading calculation is based on regional loading coefficients that may or may not have any validity in

this watershed.

Response: Selecting an endpoint to represent attainment of standards is difficult in the case of siltation. The challenge is to select a rate of siltation that is reasonable, recognizing that a significant amount of siltation is inevitable. Selecting the endpoint is influenced by the designated use of the impoundment (e.g., public water supply, flood control, power generation, or recreation), and the difference between costs of maintaining the designated use by either occasional dredging or preventing siltation. In the case of Johnson Pond, the use is limited to recreation.

It is commonly accepted that sediment-loading rates are reduced as a result of controlling phosphorus loads. This is because sediment controls are implemented to control phosphorus, which is bound to sediment. Upon establishing the phosphorus TMDL, we posed the question; "will the reduction in the sedimentation rate be reasonable for maintaining recreational uses of the lake?" The sedimentation rate will displace the lake capacity by 26.4% over a 56-year period. We deem this sedimentation rate to be reasonable, and generally consistent with sedimentation rates documented in other approved sediment TMDLs for lakes having recreational uses (e.g., 30% capacity displacement over 40 years in Tomlinson Run Lake in West Virginia).

19. Comments 1 through 4 in Mr. James Trader's letter to the MDE are related to the report prepared by Coastal Environmental Service, Inc during 1990 through 1993 and not the TMDL. These comments have been forwarded to the City of Salisbury.

20. A commenter states that the high sediment loading continues to increase because of inadequate control measures by the State, City, and County. Page A-20 of the draft TMDL notes the total sediment from point and nonpoint sources is 2,649 tons/year and the proposal is to allow 1,974 tons/yr.

    Response: The proposed TMDL reduces the current sediment load to the Pond by 25% and future TMDLs may require further cuts in the sediment load.

21. A commenter states that the draft TMDL proposes to only preserve 74% of the Pond's volume over 56 years, in effect to sacrifice the Pond to continued sedimentation over a long time span.

    Response: See **Response** to comment No. 18.

22. A commenter states that the draft TMDL assumes the lake will be dredged (by whom) to the 1933 era, however tree stumps and other obstacles, prevent cost effective dredging in the 1990 study.

    Response: See **Response** to comment No. 10.

23. One commenter asks what water sample monitoring has been done in streams (3 major tributaries) of the watershed and from the Pond since the 1990 study, and asks for the results of any such monitoring.

    Response: Extensive sampling was done in 1992,1993 and 1998. The data is shown in Table A-1 through A-8 of the Appendix-"A".

24. A commenter states that the entire 42 square mile watershed has not been field visited to determine the source of sediment, nitrogen and phosphorus and stormwater discharges and there is no plan to identify and correct such non-point source discharges in the 3 major tributaries by the State, County, or City other than the proposed limits for the 2 point source discharges to achieve a proposed 49% reduction in phosphorus loading.

Response: See **Response** to comment no. 7.

25. A commenter states that the proposed establishment of TMDLs and load allocations for phosphorus and sediment is merely a paper exercise with no effective plan of implementation and in effect will sacrifice the pond to death by eutrophication.

Response: Maryland has several well-established programs that will be drawn upon: the Water Quality Improvement Act of 1998 (WQIA), the Clean Water Action Plan (CWAP) framework, and the State's Chesapeake Bay Agreement's Tributary Strategies for Nutrient Reduction. Also, Maryland has adopted procedures to assure that future evaluations are conducted for all TMDLs that are established. Although implementation planning is beyond the scope of the TMDL, Maryland is committed to enforcing applicable laws and supporting voluntary initiatives necessary to implement this and other TMDLs. See TMDL text on page 15.

26. One commenter suggests that there are no specific plans to deal with the problems of seasonal algae blooms and excessive plant growth in the pond.

Response: This TMDL does set a goal of 20µg/l for chlorophyll *a*, cutting by more than half the current levels of chlorophyll *a* in the pond. Refer also to response to comment No. 25.

References:

Carlson, R.E. 1977. A trophic state index for lakes. *Limnol. Oceanogr.* 22(2):361-369.

United States Environmental Agency. *Nutrient Criteria Technical Guidance Manual—Lakes and Reservoirs*. First Edition. EPA-822-B00-001. April, 2000.