FINAL

Comment Response Document Regarding the Water Quality Analysis (WQA) of Phosphorus in Deep Creek Lake and the Deep Creek Watershed, in Garrett County, Maryland

The Maryland Department of the Environment (MDE) has conducted a public review of the proposed TMDL of Phosphorus for Deep Creek Lake and the Deep Creek Watershed in Garrett County, Maryland. The public comment period was open from August 19, 2010 through September 17, 2010. MDE received one set of written comments.

Below is a list of commentors, their affiliation, the date comments were submitted, and the numbered references to the comments submitted are identified below. In the pages that follow, comments are summarized and listed with MDE's response.

List of Commentors

Author	Affiliation	Date	Comment Number
Barbara Beelar	Friends of Deep Creek Lake	9/13/2010	1-14

Comments and Responses

1. Regarding Section 2.1 (General Setting, Location), the commenter states the following: "The description of the watershed as "characterized by forested mountain slopes, rich river valleys and abundant wildlife" sounds more like a tourist brochure than an appropriate descriptor for a WQA report. The description is contradicted by subsequent maps and analysis in the report. A brief study of the Land Use map on page 6 shows this to be an inaccurate statement. In truth the Watershed is characterized by mixed uses. In the southern area of the Watershed much of the land near the tributaries is open space in crop land, pasture and residential uses. The actual development around the lake includes large areas of "urban" development which may constitute 16% of the overall watershed but is the primary found along the lake shoreline. There is 20% agriculture use with most concentrated in the area south of Glendale Bridge along tributaries which feed the lake, and this figure may be understated. These uses have direct impact on the Lake and the Watershed and should be assessed."

Response: MDE has revised the description to read "The watershed drains an area of 41,435 acres and is mostly forested with significant agricultural acreage and urban areas generally along the lake's shoreline". The map is included so the reader can see the distribution of land use types throughout the watershed. Lastly, the document describes near-shore monitoring planned for the southern area of the lake, which is being done in order to assess the impact of these land uses on southern lake cove water quality.

2. Regarding Point Sources, the commenter states the following: "We would like to know more about the "one municipal and two mining point source facilities with permits to discharge into the Watershed." (Page 5). While the WTTP is regulated under NPDES, there has been repeated, small spills from this 25 year old system. One such spill in July was 42,000 gallons and another of 6,200 gallon spill just recently. This is an on-going problem which neither the County nor MDE appears to be able to stop. This point source should not be discounted as a potential pollution source. The 2009 DNR water monitoring data shows the area where the sewer system runs along the lake shoreline is one characterized by higher levels of nitrogen. Is there a connection?"

Response: The Deep Creek Lake wastewater treatment plant (WWTP)—National Pollution Discharge Elimination System (NPDES) # MD0054348—discharges to Deep Creek below the Deep Creek dam. The sanitary sewer service area is primarily above the dam in the watershed draining to Deep Creek Lake. The 2008 Garrett County Comprehensive Plan has a map of the service area and an extended discussion of current and potential future utilization of the WWTP. The plan can be obtained from the Garrett County government website at:

http://www.garrettcounty.org/planningland/PlanningZoning/documents/2008GarrettCountyAdoptedPlan-FULL.pdf

The two mining operations in the Deep Creek watershed are quarries: Maryland Materials – Thayerville Quarry (NPDES # MDG499845), and Fairfax Materials – Deep Creek (NPDES # MDG499895). Neither facility is permitted to discharge phosphorus in process water. Both facilities have Phase I Industrial Stormwater permits.

The municipal WWTP is the only facility discharging phosphorus, making it the only one relevant to the WQA. Since it discharges outside the lake (below the dam), any impacts are not manifested in the lake. Information provided in the document is consistent with that provided in other WQAs and TMDLs.

The sewage spills are understandably a source of concern, but they are a small part of the total load. MDE takes sewage spills seriously. MDE's Water Management Administration maintains a permitting program that considers the effect of any relevant discharge when authorizing or renewing permits. Sewage spills are a matter of public health concern and are addressed in that capacity via reporting and regulatory actions.

3. Regarding Section 3.1 (Water Quality Characterization, Water Quality Monitoring Programs), the commentor states the following: **"**The report references on the MDE and DNR testing but omits the Maryland Department of Health and Mental Hygiene water quality monitoring data collected on a monthly basis from May through September since 1990. Some of the DHMH sites are in the southern coves, providing data on additional sites not tested by MDE and DNR. Some of the DHMH sites are sampled for phosphorous, directly relevant to this report. This data set was provided to MDE TMDL staff for their use on June 3, 2010 by Friends of Deep Creek Lake, a product of their work funded by the Chesapeake Bay Trust and in partnership with UMd/CES/ EcoCheck. The algal bloom data developed by the DNR Lab is not referenced in the report. There is 3 years of data on algal blooms in several coves in the southern end of the Lake. Comment on notation style. The data as presented is confusing. When dates are listed as 4/2000-9/2008, as in Table 3, it is read as April, 2000 **through** September, 2008. Yet, in the report it is used to mean 4/2000 **and** 9/2009-- just two points in time. Though this may be standard notation for WQA reports, it is confusing to the public, making it appear more sampling has been done than is the fact."

Response: The commentor is referring to water quality monitoring performed by the Garrett County Health Department and analyzed by the DHMH laboratory. Samples are analyzed for phosphate and nitrate, which are not necessarily comparable to the TN and TP concentrations used in the WQA analysis. These data were not used in the WQA analysis because the detection limits are too high; the detection limit for phosphate is 0.2 mg/l and the detection limit for nitrate is 0.1 mg/l (sometimes 0.2 mg/l). Of the 70 phosphate samples collected at three locations from 2004 through 2010, only one sample had a measureable concentration (0.3 mg/l) above the detection limit. Garrett County Health Department is interested in working with MDE and DNR to improve the usefulness of the data they collect (Glover, 2010) and is collaborating with MDE and DNR on planning for future sampling and analysis.

The algal bloom data developed by the DNR Lab contains cell counts of algal species, tabulated by DNR. Chlorophyll *a* concentrations from these samples have been included in the WQA analysis and are generally low. The cell count data is interesting and useful from a biological perspective, but cannot be used to determine whether Maryland's narrative criteria are met.

Regarding the comment concerning dates in the headings of columns in Table 3, the commentor is correct that the data are not continuous; however, they are not limited to the years 2000 and 2009 only. We have added a note to Table 3 indicating that specific sampling data are available in Appendix A.

4. Regarding Figure 3, the commentor states the following: "This map should show the DHMH sampling locations. A quick scan of this map shows only one sampling site is the upper reaches of a cove. It is in these upper sections of cove where eutrophic conditions will first be manifest and where impacts of poor water quality from tributaries will be

observed. If these areas are not sampled, then it is easy to report there are no eutrophic trends present. The only cove which was sampled is the Unnamed Cove (UGX0001) added to the DNR 2009 study through request from DNR Algal bloom expert Walter Butler. This is where the extremely high chloro*phyll a* levels were found. For some reason, this site is not being sampled by DNR in 2010. Similar high levels may be found in other coves—if they had been sampled. Specifically in the following areas:

- Deep Creek Cove (not the main stem location DPR0119),
- Pawn Run Cove north, upstream from PWC004,
- Pawn Run Cove south, upstream from PWC004,
- Blakeslee Cove, to west of DPR103,
- Green Glade upstream from GGC0015 and possibly tributary coves feeing this cove,
- North Glade, in the two branches above NGC0010,
- multiple coves upstream of UDC004, and
- Thayerville Cove, north and west of Glendale Bridge."

Response: DHMH sampling locations were not shown on Figure 12 because the data were not used in the Water Quality Characterization for the WQA. See the response to Comment #3 above for more explanation.

The chlorophyll *a* concentration observed at UGX0001 was 23 µg/l, which was indeed the highest concentration observed in Deep Creek Lake, but well below the 30 µg/l criterion for the 90th percentile chlorophyll *a* concentration applied in the Water Quality Analysis for Deep Creek Lake proper (these chlorophyll *a* concentrations are used for screening purposes in the context of the Deep Creek watershed). MDE is conducting additional water quality monitoring to determine the existence, magnitude, and geographical extent of any localized eutrophication problems. Should the results of this monitoring warrant, MDE may place localized areas of Deep Creek Lake as Category 5 waters impaired by nutrients at a 12-digit watershed scale or smaller, and to develop a formal TMDL for those areas in the future, to address any identified local nutrient impacts. It may also be the case that the monitoring reveals local nutrient sources that are better addressed using tools other than the TMDL process—e.g., technical or structural fixes.

5. Regarding Sections 3.2 (Temperature Stratification) and 3.3 (Dissolved Oxygen), the commentor states the following: "The site selected for the discussion on temperature stratification and dissolved oxygen is atypical of the lake. It is nearest to the dam, so has the highest turnover of water, is deep and tree lined on both shores and little impacted by tributary inputs. Using this site is misleading. There are problem areas in the lake due to low DO. As stated by DNR Lake specialist Sherm Garrison. "Last year (2009) anoxic conditions were found at the bottom throughout all lake stations in July but with slight increases in oxygen in August.. . ." (email July 23, 2010). The Deep Creek Lake Recreation and Land Use Plan also notes the problems of low DO in the lake. Areas in the shallow coves experience anoxic zones during the height of the SAV growing season.

We question the findings of the DNR "sampling cruise" around the perimeter of Deep Creep Lake in August 2008 to its accuracies in the southern coves. (Page 15) In the second week of July, 2008, DNR refused to take its boat into Deep Creek Cove for fear of getting stuck. What is meant by "perimeter"? DNR readily acknowledges they are not collecting near-shore (shoreline to 100 feet out)."

Response: The station the commenter references (DPR0021) is chosen to display stratification dynamics at a location most likely to be impacted by stratification—that is, a deep station. Lake water overturn occurs lake wide over a period of as little as a few days or even less; there is no evidence that overturn occurs differently at this station than at others. With respect to stratification, temperature and dissolved oxygen (DO) concentrations, data presented at the Deep Creek Lake Water Quality Working Group (WQWG) on September 16, 2010, by Mr. Garrison of DNR, indicate virtually uniform conditions throughout the main stem of the lake, when examined at the same point in time. The hypoxic/anoxic conditions described are typical of stratified impoundments, and, as demonstrated by the all-forest modeling scenario, would likely occur under natural conditions.

The DNR sampling cruise results are presented for informational purposes and are not intended to characterize conditions at any one point at the exact interface between land and water. As the commentor notes, depth prevented sampling by boat at the immediate shoreline. The use of the word "perimeter" in this case refers to the fact that the sampling occurred around the outer edge of the lake, as opposed to at specific stations within the main stem of the lake. The low chlorophyll *a* concentrations observed on the cruise indicate a lack of algal blooms or potential eutrophication problems in the portions of the lake that were sampled.

6. Regarding Watershed Water Quality Characterization, the commentor states the following: "There limitations on Watershed data collection, methodology and analysis do not support the broad conclusions on the state of the Deep Creek Lake Watershed in this report.

· The study and report findings are hindered by absence of State of Maryland criteria for free-flowing streams. In lieu of this, levels of dissolved oxygen and chloro*phyll a* are used.

· The new biological stressors identification methodology, a measure but for Deep Creek Lake Watershed, cannot be utilized because there needs to be sufficient BSID data collected concurrently with benthic or fish data.

· FIBI scores will be low, as compared with other watersheds, because the impoundment creates a condition which precludes brook trout and sculpins as well as the fact the majority of the streams are unlikely to support any fish population because of size. In short the FIBI measure is inappropriate for application in this context.

The report states the technical team contacted the Chesapeake Bay Program. Since Deep Creek Lake is outside the Bay watershed, we are unsure why this resource was consulted.

While we know that MDE does not accept the findings of the DNR Stream Wader program for compliance work, the IBI data collected should have been referenced in the narrative.
Use of old data. The MBSS data from Round 1 is was collected in only three tributaries in 1995 and 1997. Given the major changes in the watershed in the past 13 to 15 years, this data should not have been incorporated into this report.
Findings on the south end of the lake are drawn from only on three monitoring stations—PAW0013, NGR0028 and GGR003 and the fixed station at Poland Run This is inadequate.
The MBSS monitoring stations for the Round 2 includes only 1 station at North Glade Run; data from Round 3 is incorporated in this report in some places, e.g. Table 6, page 20 but not into the BSID data.
The very limited data does not support the statement "Although all sites in the Deep Creek watershed are assessed as fair or poor on either FIBI or BIBI".
There is an internal contradiction in logic in this section. Page 21 "As the Table [7] shows, pH and sediment are leading causes associated with the impaired sites." But it is recognized that have the sites are taken from a known high pH source, Cherry Creek. By extension, if only Cherry Creek were sampled, one could say that 100% of the sites are high pH. This is a case of the very limited data selection biasing the findings in the report. It is a clear illustration of absence of adequate data on the Watershed to make any meaningful conclusions."

Response: The absence of explicit nutrient criteria for free-flowing streams is not a hindrance to evaluating whether nutrients are responsible for a failure to support designated uses. The Biological Stressor Identification (BSID) methodology has been developed to identify which potential stressors, such as nutrients, may be responsible for aquatic life impairments. BSID analysis is currently being used by MDE to identify if nutrients are associated with aquatic life impairments identified in 1st through 4th order streams by the Maryland Biological Stream Survey (MBSS) program. If the BSID analysis is applied, the MBSS data reports very low observed nutrient concentrations at the five stations sampled. As stated in other locations, this does not remove the biological listing from Category 5 (impaired waters), but, rather, indicates that nutrients are not the source of degradation to biological communities.

Regarding the low FIBI scores, the low scores observed in the Deep Creek watershed may reflect the presence of the impoundment, rather than the presence of stressors such as nutrients. This issue is discussed in more detail in the BSID report for the Deep Creek Lake watershed (MDE, 2010). Although the relation between the Deep Creek watershed and the impoundment may complicate the interpretation of the FIBI scores, it does not justify listing the Deep Creek watershed for not supporting its Aquatic Life Use.

Regarding IBI data from the Stream Wader program, nutrient data were not collected as part of the IBI sampling, so the IBI data do not address the question of whether or not nutrients contribute to the aquatic life impairment.

Regarding the use of 'old' data, MBSS Round 1 data are included in the report for two reasons. First, the data were used to assess the Deep Creek watershed and led to its being placed on the 2003 Integrated List because of impacts to biological communities; secondly, the data were used in the Deep Creek watershed BSID report.

Regarding data sufficiency for the assessment of watershed conditions surrounding the southern portion of Deep Creek Lake: The biological assessment of a Maryland 8-digit watershed, and the subsequent application of the BSID analysis to biologically-impaired 8-digit watersheds, is based on a quantitative assessment of stream miles, not sub-watersheds. Evaluations are made on the basis of the percent of total stream miles supporting aquatic life. MBSS sampling locations are chosen on the basis of stratified random sampling of stream miles in a watershed. If more stream miles are located in a particular sub-watershed, it is more likely to be sampled. Because the samples are selected randomly, there may not be an exact, proportional relationship between the frequency of sampling and the number of stream miles in a particular sub-watershed, but the application of the stratified sampling methodology permits drawing statistically valid conclusions about the watershed as a whole from the samples collected. The results show that stressors other than nutrients are more likely to be the cause or source of the biological impairments.

Regarding the commentor's assertion that "The very limited data does not support the statement 'Although all sites in the Deep Creek watershed are assessed as fair or poor on either FIBI or BIBI'..." The "sites" referred to here are sites at which MBSS data have been collected. This paragraph has been deleted because it has been superseded by the final BSID Report for the Deep Creek Lake watershed (MDE, 2010), referenced above.

7. Regarding Section 4.2.3.(MBSS Nutrient Water Quality Monitoring Data), the commentor states the following: "Table 8 shows the weakness of the narrative of this section. There are only 5 sites which should be used for data, the remainder are 13 to 15 years old. There have been substantial changes in the watershed in this period of time. The data covering the period for this report only comes from 3 tributaries, Cherry Creek, which is known to be impaired for pH, Meadow Mountain Run and North Glade Run. If we were to accept inclusion of the old data as well, there are only 4 tributaries in the dataset. Given there are more than 50 tributaries flowing into the lake these data do not provide the basis for drawing conclusions."

Response: The nutrient data from the five sites having nutrient data were used in the analysis. Since the Round 1 sites, which were sampled prior to 2000, did not have any nutrient data, they were excluded from the MBSS nutrient analysis.

The Deep Creek watershed assessment was designed for the 8 digit watershed scale based on a random sampling of stream miles in the watershed rather than at an individual sub-watershed scale. Recognizing that the total number of tributaries flowing into the lake can vary depending upon the scale under which particular streams are included as tributaries, the three tributaries monitored for the nutrient data (Cherry Creek, Meadow

Mountain Run, and North Glade Run) are the largest sub-watersheds in the Deep Creek Lake watershed and contain the majority of the perennial streams in the watershed (Simley and Carwell, 2009).

Because of the presence of the impoundment, sub-watersheds of Deep Creek Lake tend to be small in size with few stream miles and closely border the lake. For these reasons, it would be expected that most sub-watersheds would not be sampled through a randomized design. However, because of the hydrologic structure of the watershed, MDE has committed to a lake monitoring plan, focusing upon the southern coves of the lake, in which additional near-shore nutrient data samples have been collected in 2010 and will be collected in 2011. (See response to comment 12, which explains this monitoring plan.) This monitoring plan is intended to capture the effect or influence of multiple sub-watersheds in the near-shore area.

8. Regarding Section 4.2 (Dissolved Oxygen), the commentor states the following: "The first sentence in this section has two incorrect statements. "DNR samples were taken in the Deep Creek watershed from April 2009 through December 2009 . . ." The DNR Water Monitoring for 2009 only sampled the Lake, not the Watershed tributaries. "And MBSS samples were taken the summer of 2004, 2008 and 2009." This appears to correspond with the Stream Wader sampling dates of the tributaries. If this is true, the data is collected in the spring, not summer and it only samples for macro-invertebrates, not DO. Therefore, the data presented in Figure is 13 is misleading."

Response: DNR performed water quality monitoring in Cherry Creek and Poland Run in 2009. Both fish and benthic samples are collected at sites by MBSS, but not at the same times (benthic in the spring and fish in the summer). Field measurements of dissolved oxygen are usually made by the MBSS concurrently with fish monitoring in the summer when it is more likely to be a critical factor. The data presented in Figure 13 are correct.

9. Regarding Section 4.3 (Nutrients), the commentor states the following: "Though not clearly stated, it appears this section looking at nutrients, nitrogen and phosphorous data in Tables 13 through 15 relies on the DNR water monitoring of the lake during 2009. This does not cover sampling in the Watershed and thus conclusions about the watershed are not supported by this data. We are unclear what the term "growing season" of May through October means. If it refers to algal bloom growth, it is a longer season. Specifically, *Spirogyra*, was found in the Unnamed Cove (UGX001 before May this year because there was major release onto the shoreline on May 5. And, the DNR sampling team found massive spirogyra bloom covering the cove bed in the November, 2009 sampling. Algal blooms have been found and reported to DNR in various tributaries during our Stream Wading sampling in April 2009 and 2010. The concluding paragraph of this section on page 24 is confusing and it appears to state that this data is presented only for informational purposes. But if the data is draw from sampling from the Lake and not thee Watershed, it should not even be covered in this section."

Response: The data discussed in Section 4.3 was taken from the Deep Creek watershed. Section 4.3 (p. 24) explains that there are currently no nutrient criteria for free-flowing streams and that the BSID analysis is used to determine if nutrients are associated with biological impairments documented by MBSS.

Regarding the growing season, the commentor is correct that algal blooms can occur at any time of year. However, they are more likely to occur between May and October, and their effects are more likely to be environmentally deleterious at this time of the year. The assessment of chlorophyll *a* concentrations and other parameters related to eutrophication are restricted to that period to more conservatively assess (i.e., during the period in which there is the highest potential for environmental harm) their relative magnitude and potential for harm. For example, average annual chlorophyll *a* concentrations are likely to be smaller than average concentrations restricted to samples collected from May to October over the same time period. The May to October growing season also represents the period of the year in which aquatic life is more vulnerable to the negative impacts of eutrophication, like low dissolved oxygen from decaying plant material, because dissolved oxygen saturation is negatively correlated with temperature and aeration is positively correlated with stream flow; and high temperatures and low stream flow are both more likely to occur in the May to October period. This is also the time of year when the lake undergoes stratification; once overturn occurs (and, for that matter, before stratification sets in during late spring/early summer), low biological activity in the upper layers of the lake due to cold water would reduce the impact of excess nutrients upon aquatic life.

10. Regarding Section 4.4 (Chlorophyll a), the commentor states the following: "The report again indicates that data and methodology for analyzing this important indicator of impairment are only available in narrative form and provides difficulty for incorporation in WQA and TMDL analyses. There is no indication where the sampling points for chlorophyll are derived and whether in fact are Watershed and not Lake data points."

Response: The *criteria*, not the data themselves, are in narrative form. Chlorophyll *a* data are expressed numerically in units of µg/l, or parts per billion. In the watershed, as explained on p. 25, the same chlorophyll *a* metrics—a mean not to exceed 10 µg/l and a 90^{th} percentile not to exceed 30 µg/l—are used as in the impoundment, but in the case of analyzing watershed data, they are used as screening values (see also the response to Comment #4 above). In essence, these values are a quantitative implementation of the narrative standard that provide greater flexibility for site specific conditions. Because it is part of the analysis, it undergoes public review as part of the WQA. Since the watershed as a whole is assessed this way, the data are screened collectively and consistently. The watershed map (figure 12, p. 19) displays the location of the watershed stations. (See section 5.1 for Chorophyll *a* conclusions for the Deep Creek Watershed.)

11. Regarding Section 4.5 (Deep Creek Core Monitoring Stations), the commentor states the following: "There is only one station covered in this report, not multiple stations. It is at Cherry Creek Run. This station is down stream from the dowser and can not be used to characterize the many miles of tributaries which are up stream of this station. Further, Cherry Creek Run is seriously impaired by acid mine run off and all Stream Wader sampling in multiple sites above this station find the IBI in the poor to very poor range. It is possible the explanation of the difference above the station and at the station is a result of habitat supporting macro invertebrates coming from the lake into the tributary rather than the water quality found in the watershed."

Response: The analysis of the DNR Core/Trend data collected at station CCR0001 is presented because it is a long-term, established watershed station. The sub-heading of section 4.5 has been changed to reflect the fact that there is only one station. Regarding the issue of pH in Cherry Creek, a TMDL has been completed (and approved by EPA in 2003). The present WQA only addresses nutrients, and does not make conclusions about impairments to biological systems in Cherry Creek that may be related to pH or acid mine drainage. It is a requirement of the TMDL program to include all readily available and relevant data. Since this station has long-term nutrient monitoring, it was included.

12. Regarding Section 5.3 (Potential Localized Eutrophication Impacts in Deep Creek Lake), the commentor states the following: "The reports states that MDE will collaborate with DNR to determine the existence, magnitude and geographic extent of any localized eutrophication problems. (Page 30) However, DNR does not have adequate data or sampling sites to provide this collaboration. We question the methodology of using a dye study in septic systems proposed for the spring of 2011. Most of the lake homes are part-time residences, therefore a spring is questionable. Will the lack of use of the septic system for 5-7 months impact findings? Many of the homes will not be accessible in the spring; most are opened for the season in May and June and probably in full use in late June through mid-August. Further, we question how many people will be willing to participate in this sampling. Will those who do agree to the testing represent properties which are least likely to have septic system leaks, thus biasing the findings? How will the rental properties be included in the study? In short, other monitoring approaches must be adopted in order to obtain useful data on this issue. There are no plans for future sampling of the Watershed. This is a serious omission since it is known there is poor water quality in the streams and there appears to be a direct relationship between the areas with stream impairments and upper cove eutrophication, using various DNR datasets and direct observations, supported by photo-documentation. What we do know and is shown by the available data on the tributaries is that each tributary is unique and to assess eutrophication sampling and other measures must be conducted to draw conclusions."

Response: Regarding future sampling, monitoring by MDE is to be conducted in coordination with DNR so as not to duplicate efforts, and to facilitate data exchange. The sampling stations in the 2010-2011 localized assessment study will include existing DNR

and Garrett County Department of Health stations. It is important to maintain consistency in the interest of making this sampling effort valuable for any potential future uses, and the stations must be reliably accessible. The study is designed to be representative, to the best extent possible, of localized conditions in areas where stakeholders have suggested that eutrophication concerns exist. Since late summer has been a time of concern, it was important to begin work as early as possible so as to document any issues during the particularly warm summer of 2010. Due to this immediate action, MDE was able to monitor in July (once), August (twice) and September (once) in this year, and plans to follow the same or a similar schedule in 2011.

While we cannot speak for DNR and state when they will next sample in any specific watershed, the next round of sampling for the MBSS will begin in 2013. Please see the response to Comment #6, regarding how MBSS assesses stream miles and not sub-watersheds, for an explanation of how the available data are applicable to the larger, 8-digit watershed, and how the analysis is statistically and scientifically valid in assessing the watershed. The TMDL program and MDE also apply a watershed cycling monitoring strategy, which is a mechanism to provide more detailed monitoring. While every tributary is indeed unique, it is beyond any agency's capabilities to assess each one individually; hence, appropriate measures such as the methodologies described in the WQA and BSID documents must be developed.

The commentor is correct that more consideration should be given to the development of the dye study methodology, if one is to be conducted. MDE is consulting with County Health Department staff to decide on the best approach, and the issue is in the early stages of planning. In coordination with the Garrett County Health Department, MDE will do the best possible to encourage citizen participation, should the study go forward. We are encouraged by the interest of the Friends of Deep Creek Lake, and we are hopeful that we can count on the organization's members not only to participate in the study, but to provide assistance in encouraging participation by others.

13. General Comment: The commentor states: "We recommend that the Draft Water Quality Analysis of Eutrophication for Deep Creek Lake and the Deep Creek Watershed Report not be forwarded to the U.S. Environmental Protection Agency at this time. There is outstanding, readily available data on the Lake and the Watershed which should be incorporated into this assessment. With regard to the section on the Lake, the Maryland Department of Health and Mental Hygiene has "readily available data" on the phosphorous which is not incorporated. Also, there is data from the DNR Lab on algal blooms which should be included as narrative data. With regard to the section on the Watershed, there are "readily available data" from the DNR Stream Wader program which should have been incorporated as narrative data. The report also does not include the Center for Watershed Protection data collected on water quality and soil in May, 2009. Justification for inclusion of 13 and 15 year old MBSS data should be made prior to submission of the Report. Overall, the report should there are insufficient existing datasets to measure eutrophication in the Lake or Watershed. To do this, data from the

upper portions of the coves is needed. Why? Eutrophication will first manifest in the upper reaches of coves, where sediment accretion leads to shoaling of the lake water and increases in water temperatures. If the tributaries feeding these coves have heavy nutrient loads and poor water quality, eutrophic conditions will emerge. If these upper coves are not sampled and tributary impacts not measured, de facto, the data will not show eutrophication. We are pleased MDE has decided to continue work at Deep Creek Lake. Nevertheless, there are flaws in the sampling sites selected. They do not cover some of the most impacted coves, and in the sites selected, are not sufficiently high enough in the coves. There is no near shore sampling planned which will assess turbidity in the light zone and there is no lake bottom sampling to assess internal loading of phosphorous in the sediment which can be released in water turnover, after the planned MDE dates. There is no sampling planned for the Watershed. This is a serious omission. We know that waters coming into many coves of Deep Creek Lake are impaired based on the IBI index and reports of algal blooms in these stream. To complete a WQA on the Watershed, the Department needs to develop a methodology and plan to assess these streams prior to issuing any findings. We would like to see the Department address the question whether there are additional criteria, methodologies and/or samplings needed to accurately conduct WQA on lakes and lake watersheds."

Response: MDE is required by EPA to address the Deep Creek Lake and Deep Creek watershed listings by 2011, using the best information available. MDE has made a number of modifications to the WQA in response to these comments, and is submitting it to EPA, with these comments and MDE's responses. It will then be EPA's decision as to whether to concur with the WQA or not. The Friends of Deep Creek Lake are free to ask EPA not to concur with the WQA; MDE staff specifically mentioned this at the Deep Creek Lake WQWG meeting on September 16, 2010. MDE has made a commitment to future monitoring of the lake on a smaller scale than the eight-digit scale of this water quality analysis, and will consider additional monitoring through the watershed cycling strategy. However, for this water quality analysis, MDE has confidence in the data and methods used, and in the conclusions drawn.

Regarding Stream Waders data, the biological assessments from the DNR Stream Wader Program corroborate the assessment that the Deep Creek watershed is not supporting its Aquatic Life Use. The IBI score at 60 of 63 sites assessed were rated either "Fair" or "Poor." The goal of this WQA, however, is not to assess whether the watershed is supporting aquatic life, but to determine whether nutrients are a cause of the "Fair" or "Poor" aquatic life assessment. After review, it was determined that the Stream Wader Program does not collect information that can be used to make that determination, so it was not incorporated into the report.

Regarding the results of the synoptic survey performed by the Center for Watershed Protection, they corroborate that nutrients are not a stressor of the biological community in the Deep Creek watershed. Out of 18 samples collected in May, 2009, no sample had a TN concentration greater than the 3.0 mg/l BSID threshold and only one sample had a TP concentration greater than the 0.06 mg/l BSID threshold. Thank you for bringing this corroborating evidence to our attention.

Regarding the assertion that there is no sampling planned for the watershed: While the timing cannot be pinpointed, MBSS sampling will occur in the sub-watersheds of Deep Creek in the future. The next round is slated to begin in 2013 (please also refer to the response to comment #12). The present WQA addresses eutrophication in the impoundment and the 1st through 4th – order streams in the watershed at the 8-digit scale, and this is made clear in the document.

The BSID analysis has demonstrated that sedimentation, among other stressors, is a likely contributor to impairment of biological systems. Future efforts are likely to address these stressors, and, while it is beyond the scope of this WQA (or the CRD) to make any such commitments, if needed, more sampling will be conducted in the watershed in this context via the cycling strategy of the MBSS. Also, MDE's localized sampling, designed to assess near-shore areas in specific coves, will give insight into watershed dynamics.

Lastly, in portions of this comment, the commentors appear to be describing the natural ecological development and succession of any lake or impoundment, natural or man-made. It would not be possible to halt this process completely, nor would it necessarily be desirable to attempt to do so. However, MDE will assess potential impacts to aquatic life or human health and take appropriate actions as directed by the science and supporting data.

14. General Comment: The commentor states the following: "Finally, for a study on eutrophication of Deep Creek Lake and the Lake Watershed, we need to be sure that methodologies are appropriate to lake dynamics, particularly man-made lakes with hydro-electric dams which are permitted to draw as much as 8 feet of water over the operating season, and more during work periods and emergencies. We are not certain the All Forest model used for the study is what is needed."

Response: The methodology MDE has developed to assess whether eutrophication is interfering with the designated uses is based on the application of Maryland's water quality standards to man-made impoundments: there are no natural lakes in Maryland. The modeling approach used in development of the WQA is based on CE-QUAL-W2 (W2) computer simulation model. W2 has been supported by the U.S. Army Corps of Engineers (ACE) and applied by ACE to the range of types of reservoirs they manage. The modeling approach based on W2 has been used successfully in TMDL development for four drinking-water reservoirs in Maryland—reservoirs that change in depth substantially, whether via anthropogenic withdrawal or as a consequence of drought. The all-forest scenario is an application of the Deep Creek Lake W2 model and is used for the specific purpose of assessing water quality under natural conditions, as required by the application of DO criteria to stratified impoundments, such as Deep Creek Lake. Please also refer to the response to Comment #5.

References:

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