

**Comment Response Document
Regarding the Water Quality Analysis (WQA) of Nutrients (Phosphorus) for the
Lower Gunpowder Falls Watershed, Baltimore County, Maryland**

The Maryland Department of the Environment (MDE) has conducted a public review of the proposed Water Quality Analysis (WQA) of Nutrients (Phosphorus) in the Lower Gunpowder Falls Watershed. The public comment period was open from September 6, 2011 through October 5, 2011. MDE received two sets of written comments, both from the same author.

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

Author	Affiliation	Date	Comment Number
Theaux M. Le Gardeur	Gunpowder RIVERKEEPER[®]	9/23/2011	1
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Comments and Responses

Comment 1: The commentor expressed the understanding that the Water Quality Analysis (WQA) will be used to support a revision of the 2010 Integrated Report nutrient listing for the Lower Gunpowder Falls watershed from Category 5 to Category 2 when MDE proposes the revision of the Integrated Report in 2012 and requested a 90 day extension of the public comment period, beyond the October 5, 2011 closing date.

Response: For the TMDL/WQA program, the legal requirement is a 30 day public comment period under the Clean Water Act Amendments. Since this is a WQA, the report supports a revision of the phosphorus listing for the Lower Gunpowder Falls Watershed, from Category 5 ("waterbody is impaired, does not attain the water quality standard, and a TMDL is required") to Category 2 ("waterbodies meeting some [in this case nutrients-related] water quality standards, but with insufficient data to assess all impairments").

MDE staff arranged a conference call with the commentor to explain the TMDL/WQA public participation process and how the public comment period fits in. The TMDL/WQA process includes the following: 1) a data solicitation of all known data sources within the watershed, 2) a notice of intent letter sent to all interested parties in the watershed, 3) preparation of the study and the document, 4) an internal MDE and EPA staff review of the document, 5) a second letter (known as the Notice of Availability letter) sent to all interested parties in the watershed, 6) a 30 day public comment period announced in local papers, on MDE's website and available in libraries; the public comment period results in a Comment Response Document containing the comments and

Nutrient Water Quality Analysis (WQA) submission schedule, supplemental comments received after the end of the WQA public comment period, cannot be included in the Lower Gunpowder Falls Nutrient Comment Response Document, since these comments would be received outside of the public comment period.

Comment 4: The commentor states that the draft WQA ignores the intent of the state-wide WIPs to reduce N and P inputs to Chesapeake Bay. Removing a TMDL requirement based on a nuance of the interpretation of the impairment to be related to biological communities instead of phosphorus specifically, is counter to bay-wide nutrient reductions.

Response: The requirements of the statewide Phase II WIP are clearly accounted for in the WQA, Executive Summary, p. v; “Although the waters of the Lower Gunpowder Falls Watershed do not display signs of eutrophication, the State reserves the right to require future controls if evidence suggests that nutrients from the watershed are contributing to downstream water quality problems. For instance, reductions will be required to meet allocations assigned to the Gunpowder River Oligohaline Bay Water Quality Segment by the Chesapeake Bay TMDL, established by EPA on December 29, 2010.”

Comment 5: The commentor states that no scientific information is presented in the narrative related to background levels of DO, temperature (which would allow variable to plot DO saturation), pH, reference sites and seasonality, (including dry and flood conditions). Additionally, chlorophyll a and water clarity, both commonly accepted measures of nutrient impacts, are not presented in the draft nor is the previous science related to the original listing for phosphorus impairment described for comparison.

Response: The purpose of this water quality analysis is to present information that could be applied to make an objective decision. In non-tidal streams, the water quality endpoint for the non-tidal nutrients impairment is biological integrity. The first step of the assessment is to determine if the aquatic life is impaired. If the biological listing methodology determines that aquatic life is impaired, the assessment continues by looking at additional data (please note that the original 1996 non-tidal nutrients impairments listings for this watershed, were not based on the current biological listing methodology or as a result of the biological stressor identification analysis (BSID)). As explained in the WQA report, Maryland uses the BSID analysis to identify the most probable cause(s) of the biological impairment in 1st through 4th order streams, by using a systematic approach with a dataset that was sampled consistently for all parameters. Relevant to nutrient impacts, the analysis evaluates excess levels of nitrogen, phosphorus, dissolved oxygen, water clarity and pH. For dissolved oxygen the regulatory criterion is applied and for nitrogen, phosphorus, water clarity and pH, targets are set using reference sites. Chlorophyll *a* is not collected in the MBSS dataset and thus is not included in the stressor identification.

If the BSID determines that nutrients are not causing biological impairments, as is the case of the Lower Gunpowder Falls, MDE still continues to look at dissolved oxygen data due to independent applicability of numeric criteria. In this WQA, dissolved oxygen concentrations from all available datasets were evaluated against the regulatory criterion.

Regarding chlorophyll *a*, there are no numeric criteria for chlorophyll *a* in Maryland. There is a narrative criterion and historical target values have been applied in lakes, reservoirs and tidal areas. The rationale for the application of chlorophyll *a* criteria in lakes, reservoirs and tidal areas is that these waterbodies are sufficiently wide and deep and flow velocities are slow enough to allow algal cells to accumulate and create eutrophic conditions. These are not physical attributes of lower order non-tidal stream systems and therefore chlorophyll *a* was not included in the analysis. Also, if chlorophyll *a* was used as an indicator of eutrophication in non-tidal lower order streams, MDE would not have a scientifically defensible target to objectively apply.

The commentor also indicated that the previous science related to the original listing for phosphorus impairment is not presented in the draft document. The original 1996 listing for nutrients was not based on the current and more formal biological assessment methodology or BSID results, rather the nutrients listing was based on the water quality assessment found in the 1996 305(b) report developed by the Maryland Department of Natural Resources (DNR). The 1996 305 (b) report states the following: “water quality in Segment 02-13-08-02 (Gunpowder River – Lower Gunpowder Falls) is Good; elevated bacteria and nutrient levels are due to agricultural and urban/suburban runoff and upstream sources. Elevated bacteria, nitrate and total phosphorus levels were observed at a CORE station in Gunpowder River below Loch Raven dam (GUN 0125).”

In addition, the nutrients listing was supported by the earlier Chesapeake Bay Tributary Strategy efforts to reduce nutrient pollution contributing to the Chesapeake Bay water quality problems. The 1996 305(b) report states “The challenge to continue to reduce the excess nutrients coming into the tributaries and entering the Bay can be achieved by reducing nitrogen and phosphorus pollution to the Bay’s tributaries. Efforts to reduce nutrients to the Bay must move "upstream" to farm fields, factory floors, suburban streets, municipal sewage treatment plants, household septic systems, and new construction sites, sometimes far from the mainstem of the Bay.” Based on this information from the 305(b) report, MDE included the Lower Gunpowder Falls MD 8 digit basin 02-13-08-02 as impaired by nutrients in the 1996 303(d) list. See also the response to comment 4 regarding the Bay TMDL.

Comment 6: The commentor states that the WQA draft also lacks both trend analysis showing marked biological improvement of the waterway and a rigorous assessment of historical condition and quantities of nutrients from industrial sources of Phosphorus, (Waste Water Treatment Plants) conveying into the watershed and that the science presented in the WQA does not prove that phosphorus conditions have improved in the Lower Gunpowder Watershed since it was listed in 1996.

Response: The intent of the WQA is not to show improvement over time, but solely to present analysis of current water quality. In the case of this WQA, current water quality is represented by the most recent data, the MBSS Round 2. The WQA also shows long term (1996 – 2010) DO, TN, and TP data in Figures 4 – 6 and DNR Core/Trend data in Table 4. Based on the conclusion of the BSID analysis that the Lower Gunpowder Falls Watershed was not impaired by nutrients, no further evaluation of point source phosphorus loads was necessary. All regulated point sources, including WWTPs, listed in the narrative will continue to be held accountable to their current NPDES permit requirements.

Comment 7: The commentor states that the methodology used in the draft WQA is not informative, i.e. using dissolved oxygen as an indicator of nutrient concentration is not necessarily appropriate. If dissolved oxygen concentrations are low, it may suggest that nutrient concentrations are problematic. The converse is not necessarily true though; dissolved oxygen (DO) concentrations may be relatively high in streams and rivers where extensive mixing is present, even if phosphorus concentrations are high. Therefore it is not valid to use DO concentration to show reduced phosphorus inputs.

Response: This water quality analysis does not use DO as indicator of phosphorus concentrations, it includes DO concentrations analysis due to the independent applicability of DO numeric criteria. Since DO criteria for Maryland’s waters are independent of their biological assessment, the WQA also demonstrates that the DO criterion for the Lower Gunpowder Watershed is met and therefore rules out the possibility that excess nutrients are causing the violation of the DO criterion. Phosphorus impact to biological communities is evaluated through the BSID analysis. The BSID analysis is used to determine if there is an association between the levels of observed nutrient concentrations and biological impairments. See also response to comment 5.

Comment 8: The commentor states that the Benthic Index of Biotic Integrity (BIBI) trends presented in the draft WQA are static and do not prove that phosphorus conditions have improved in the Lower Gunpowder since it was listed in 1996. While most scientists agree that Benthic Index of Biotic Integrity (BIBI) results are a good overall indication of stream health. The trends presented for the BIBI in this WQA for the Lower Gunpowder are static and do not appear to be evidence that conditions have improved, specifically in regards to phosphorus.

Response: See response to comment 6.

Comment 9: The commentor states that no information is presented in the narrative to further characterize the watershed using Maryland’s narrative standard including effects of nutrient pollution goals for chlorophyll, water clarity and suspended sediment influence. The commentor stresses the importance of a narrative standard description, argues that the current narrative lacks information related to physical and chemical effects of nutrient pollution and argues that the description lacks commonly accepted markers to identify nutrient pollution. The commentor also argues that there is a causal relationship between nutrient and sediment stressors such that further characterization

and sampling of sediment types in the waterway is needed to rule out the presence of phosphorus as an impairing substance.

Response: As explained above, the effects of nutrients, water clarity, and sediments on biological communities have been evaluated using the BSID analysis, which is also the means by which it is determined that the narrative standards are met. Similarly, the absence of explicit nutrient criteria for free-flowing streams is not an impediment to evaluating whether nutrients are responsible for a failure to support designated uses. As mentioned above, the BSID methodology has been developed to identify which potential stressors, such as nutrients, may be responsible for aquatic life impairments. The BSID analysis is used to identify whether nutrients are associated with aquatic life impairments. The BSID analysis results did not identify nutrients as stressors in this watershed. This does not remove the biological listing from Category 5 (impaired waters), but rather, indicates that nutrients (both nitrogen and phosphorus) are not the source of degradation to biological communities. Regarding sediments, the BSID analysis did identify sediment as a stressor in the Lower Gunpowder Falls, primarily because of its impact on habitat and not because of any phosphorus associated with them. Therefore, it cannot be inferred from the sediment impacts on biological communities that there is a phosphorus impact on biota. See also answer to comment 5 and 7 above.

Comment 10: The commentor states that there is a historical impairment of impacts to biological communities. The commentor then quotes a number of sections of the Lower Gunpowder BSID Report and from the draft Lower Gunpowder Nutrient (Phosphorus) WQA to make the point that the BSID analysis for the Lower Gunpowder Falls watershed shows that 85% of stream miles have poor to very poor biological conditions due to sediment, in-stream habitat, and water chemistry impacts.

Response: MDE agrees with the commentor that the BSID report indicates that the watershed is impaired for biology and that the causes identified were sediment, in-stream habitat, and water chemistry (inorganics, not nutrients).

Comment 11: The commentor states that while MDE has stated (in the WQA) that the “WQA addresses the total phosphorus impacts to the protection of nontidal warmwater aquatic life, nontidal coldwater aquatic life and recreational trout waters designated uses”, “the listing for impacts to biological communities will be addressed separately at a future date.” The commentor asserts that by not assessing impacts to biological communities as part of this WQA, even though MBSS trend analysis data is available for the watershed, the Department fails to utilize an important, accepted tool to gauge impacts of nutrient impairment.

Response: The quoted statement refers to MDE’s addressing of two separate listings on the Integrated Report, one for phosphorus and one for impacts to biological communities. The BSID analysis, which uses MBSS trend analysis data, will help to refine the biological listing in the Integrated Report and associate specific pollutants to the degradation of the watershed’s biological communities. The results of the BSID are presented in the WQA.

Comment 12: The commentor states that while there are four Waste Water Treatment Plants listed in the narrative, no phosphorus level amounts or calculations from these point sources are included in the determination and there is no data related to these facilities outputs or their relative compliance record included in the draft WQA.

Response: Based on the conclusion of the BSID analysis that the Lower Gunpowder Falls Watershed was not impaired by nutrients, no further evaluation of point source phosphorus loads was deemed necessary. All regulated point sources (including Waste Water Treatment Plants) listed in the narrative will continue to be held accountable to their current NPDES permit requirements.

Comment 13: The commentor states that Prettyboy and Loch Raven Reservoirs, both source waters for the main stem, are on the 303d list but are not included in the narrative or calculations. The narrative also fails to mention that the source waters are impaired for phosphorus. Both waterbodies were subject to individual TMDLs in 2007 for impairments for nutrients including phosphorus.

Response: The Prettyboy and Loch Raven Reservoirs are man-made reservoirs, built to provide drinking water for the City of Baltimore and parts of Baltimore County. It is correct that Prettyboy and Loch Raven Reservoirs were listed for nutrient impairments. MDE has already developed phosphorus TMDLs to address the nutrient impairments in those reservoirs and the TMDLs have been approved by EPA. However, the scope of this WQA is the phosphorus impairment of the Aquatic Life Use in the Lower Gunpowder Falls 8-digit watershed, which is located downstream of the Loch Raven dam. The reservoirs are outside the scope of the WQA and therefore do not need to be included in the data analysis or narrative.

Most importantly, the analysis of benthic monitoring data from mainstem Lower Gunpowder Falls shows that it is supporting its Aquatic Life Use. Phosphorus loads upstream of Lower Gunpowder Falls are captured in the analysis, because they are consistent with supporting aquatic life in the mainstem.

In addition, it is generally recognized that lakes and reservoirs are more sensitive to nutrient impacts than free-flowing waters because of physical factors such as longer residence time and reduced mixing. The Gunpowder Falls watershed above Loch Raven dam is subject to phosphorus TMDLs to protect water quality in the impoundments, not in the free-flowing portions of Gunpowder Falls or its tributaries.

Comment 14: The commentor states that the Department has not shown enough variables to characterize the waterbody using the criteria. The commentor then quotes EPA guidance to the effect that “EPA developed a set of recommendations for two causal variables (total nitrogen and total phosphorus) and two early indicator response variables (chlorophyll a and some measure of turbidity)”...”and that these four are considered to be the best suited for protecting designated uses.”

Response: See answer to comments 5, 7, 9 and 11.

Comment 15: The commentor states that the analysis by MDE of Benthic Index of Biotic Integrity (BIBI) and DO in the WQA is not exacting enough as compared to two other similar, recent reclassification requests to characterize the waterbody as not being impaired for phosphorus.

A similar WQA for the Little Gunpowder Falls Watershed submitted by MDE in 2009 presented both low chlorophyll a levels and high dissolved oxygen (DO) and was deemed to present sufficient data to be acceptable for reclassification by the EPA. However, no chlorophyll a information is presented in the current WQA draft for the Lower Gunpowder River.

Another WQA submitted by MDE also in 2009, described the Bird River and used DO, temperature and chlorophyll as a basis for reclassification. This analysis engendered the following response and subsequent reclassification from EPA, “As stated in the aforementioned report, Maryland’s water quality standards presently do not impose a limit on the concentration of nutrients in the water column. Rather Maryland manages nutrients indirectly by limiting their effects in terms of excess algal growth and dissolved oxygen (DO)...Since DO concentrations are typically collected during daylight hours when primary producers are producing oxygen, relying on DO concentrations alone may not be enough to determine if eutrophication is occurring...A DO saturation rate documents whether the waterbody is holding a DO concentration greater than its capacity. The DO concentrations and water column temperatures were plotted on a DO monogram to determine the DO saturation rate.”

Yet no monogram showing DO and temperature were plotted in the tables or discussed in the narrative in the current WQA for the Lower Gunpowder River. Showing DO in this context, without temperature or a reference for background DO using reference sites is not informational.

Response: The commentor is correct in stating that nutrients WQAs for non-tidal streams developed by MDE in 2009 (such as the Little Gunpowder River) included chlorophyll *a* monitoring data analysis along with the DO data analysis. A decision was made to remove the chlorophyll *a* analysis section for the reasons stated in the response to comment 5. For similar reasons, temperature data analysis is not included in the assessment; the analysis would not be able to apply a scientifically defensible target for temperature in free-flowing streams. The commentor’s reference to the Bird River WQA is not relevant to this WQA, because it was developed for the tidal Bird River

(submitted and approved by EPA in 2005, not in 2009) for which there are historical target values for chlorophyll *a* that can be objectively applied. Temperature analyses were not included in any of the WQAs referenced by the commentor.

Comment 16: The commentor presents the opinion that the methodology and science presented in the draft shows a preference of the Department to reclassify the watershed from Category 5 to Category 2 without sufficient evidence that the watershed has improved from the initial listing in 1996 and therefore does not properly safeguard aquatic uses of the waterbody.

Section 303(d) of the Federal Clean Water Act (CWA) and the U.S. Environmental Protection Agency's (USEPA) implementing regulations direct each state to identify and list waters, known as water quality limited segments (WQLSs), in which current required controls of a specified substance are inadequate to achieve water quality standards. For each WQLS listed on the Integrated Report of Surface Water Quality in Maryland (Integrated Report), the State is to either establish a Total Maximum Daily Load (TMDL) of the specified substance that the waterbody can receive without violating water quality standards, or demonstrate via a Water Quality Analysis (WQA) that water quality standards are being met.

The commentor recommends strongly that MDE provide more science to better characterize the Lower Gunpowder Falls Watershed by providing clarification of all the concerns presented herein and by providing substantive proof that the Lower Gunpowder Falls watershed is not impaired and meets all requirements for classification as a Category 2 watershed or undertake a TMDL for Phosphorus for the watershed pursuant to Section 303(d).

Response: As mentioned in the response to comment 6, the intent of the WQA is not to show an improvement in water quality over time, but to present analysis of current water quality. This was accomplished within the WQA through the BSID analysis results. Given the results of the BSID, which indicated no nutrient stressors, MDE will reclassify the nutrient listing on the Integrated Report from Category 5 to Category 2. This does not signify that the watershed is not impaired, but only that it is not impaired by nutrients. The biological listing remains Category 5 (impaired waters). The Integrated Report process will use the BSID report to refine the biological listing which should help to associate the degradation of the watershed's biological communities to specific pollutants.