Appendix K.

Responses to Public Comments

Contents

The draft lower Grand River Watershed Total Maximum Daily Load report was available for public comment from October 12 through November 14, 2011. This appendix contains the comments received and responses to those comments.

Four sets of comments were received on the draft report. The initials in parentheses following each comment denote the specific commenter, as listed in the following table:

Initials	Date Received	Name	Organization
PH	October 13, 2011 (via email)	Phil Hillman	Ohio Department of Natural Resources
RB	November 9, 2011 (via email)	Randy Bruback	City of Painesville
GW	November 14, 2011 (via email)	George Warnock	Western Reserve Land Conservancy
AS	January 6, 2012 (via email)	Anthony Sasson	The Nature Conservancy

In order to avoid repetition of responses, the comments are grouped into six general areas: general comments, permit-related issues, TMDL issues, comments about impacts of altered hydrology and low levels of development, comments about mussels and stream crossing issues.

Please note that location references to the draft report may not correspond to the same page numbers in the final report.

General

Comment (PH):
Overall, it is quite comprehensive and thorough in content. One section that I found on page 14 likely is in error reference to muskellunge. That section is copied below:

> The Grand River upstream of the Harpersfield Dam flows through the lacustrine deposits of a former glacial lake. The river is a classic swamp-wetland type stream with low gradient (< 1 foot per mile), fine sediments (typically small gravels to clay), and few riffles. Large woody debris, rootwads, rootmats, undercut banks and deep pools characterize the habitat. The fish fauna in this reach resembles a swamp-stream association and commonly includes trout-perch, silver redhorse, sunfish and blackside darters. The wetland environment also provides spawning habitat for the Great Lakes muskellunge and northern pike. A native population of walleye also exists.

The muskellunge found upstream of Harpersfield Dam are in all likelihood Esox masquinongy ohioensis, or the Ohio River strain of muskellunge. I am confident of this since the Division of Wildlife prior to start of employment with them in 1980 released this strain of muskellunge into the this section of the Grand River in 1970, 1975, and 1977. There is no way that Great Lakes muskellunge are migrating upstream of Harpersfield Dam. Although it is possible that Great Lakes muskellunge were native to this section of the river prior to the construction of the dam, I believe this to be a very remote possibility. Below the dam, muskellunge found could either be Great Lakes strain, Ohio River strain, or a mix between the two. There is no way to know for sure without genetic (DNA) analyses performed.

Response
Both subspecies of muskellunge have been identified upstream from Harpersfield Dam by Ohio EPA. The Great Lakes subspecies found upstream from the dam is more important from a conservation standpoint.

Comment (RB)
Page 29, Metals. All nine of the copper detections on the Grand River occurred at OH-84 in Painesville (site 502530).

- Question – Did OEPA follow up the analysis results by identifying the source of the copper exceedences at this site?
- Question – How many samples were collected at this site during the review period?

Response
The reported exceedance for total copper on page 29 of the draft TMDL report refers to a single sample collected from the Grand River at State Route 84 on May 6, 2003 (15 µg/l). A total of 69 sample results for this station were evaluated in the Ohio EPA water quality report, spanning the time period of January 19, 1999 through December 7, 2004. The May 6, 2003 sample was the only sample that exceeded the water quality criterion for total copper out of this data set (1.5 percent of the samples). The likely cause of the elevated total copper on May 6, 2003 was the high amount of total suspended solids (734 mg/l) resulting from extremely high flows on that day. The U.S. Geologic Survey estimated the flow in the Grand River on May 6, 2003 to be 3,090 cubic feet per second at the gage located at the SR 84 crossing. This flow rate exceeds the 90th percentile for flow in the Grand River. Other metal constituents were also elevated in the May 6, 2003 sample, including aluminum, arsenic, barium, cadmium, iron, lead and manganese, although none of these constituents exceeded the water quality criteria.

Ohio EPA considers this single sample result sample to be an outlier related to flood conditions at the time (with associated bank and channel erosion) rather than an ongoing pollution threat within the watershed. Copper is typically not detectable in samples from the Grand River or is present at only trace concentrations. For the entire data set evaluated in the Ohio EPA TMDL report, copper was not detectable in 79.7% of the samples, and the average copper concentration for samples with detectable amounts of copper was 4 µg/l, well below the water quality criterion for this pollutant.

Comment (GW):
Document page # x (PDF page # 12) – paragraph 6 - spelling – systems (sysems)
Document page # 10 (PDF page # 22) – paragraph 1 – Table2-9**Error! Reference source not found.**

Response
The errors are corrected in the final report.

Comment (GW):
Document page # 66 (PDF page # 78) – paragraph 2 - Some assessment units in the watershed have been determined to be impaired by natural limits (Table 1-1).

Response
The correct reference is for Table 2-9; the error is corrected in the final report.

Comment (GW):
Document page # 178 (PDF page # 190) – paragraph 1- At the upstream site, impairment is due to natural causes (flow or habitat) and natural sources. Table 1-1 reflects the new findings.

Response
The correct reference is for Table 2-9; the error is corrected in the final report.

Comment (AS):
The Conservancy supports the emphasis on present and potential development impacts in this TMDL. We support adequate and effective subsequent actions that would implement protective measures, especially those related to development impacts and flow regimes. The Grand River TMDL and subsequent actions must recognize the significant threat of development and consequent altered hydrology, which is a major threat to the survival of streams, including in this watershed.

The Conservancy appreciates the effort Ohio EPA has taken to include the impacts and issues of hydrologic alteration due to urbanization in Section 7 of this draft TMDL…

We especially appreciate the Ohio EPA's literature review on impervious surface impacts and altered hydrology and encourage further investigation and strategy implementation in this area. It is important to note that recent reviews (e.g., King and Baker (see references in end notes), Cuffney et al/USGS) have pointed out the significant reduction in stream health that occurs at relatively low levels of urbanization. These levels are even lower than those cited in the Agency's literature review documents in the draft TMDL…

We agree with your statement on Page X *[sic]*, "The impact of development can be lessened by retaining storm water on-site or allowing it to infiltrate the ground and by adopting better site design practices." First, however, we note this statement should emphasize that the impact is lessened and not eliminated or necessarily reduced to a level that achieves the use designations, preserves rare and sensitive species, or preserves communities such as mussels. Second, while the concept of lessening impacts through infiltration into the ground might be true, we encourage the Agency to look beyond this issue and these practices, and consider additional factors that also might contribute to degradation. Also, inadvertent consequences of stormwater management must be considered, such as increased temperatures and hydrologic alteration due to stormwater BMPs.

Response
Ohio EPA appreciates the comments. The TMDL did acknowledge review of the Cuffney *et al.* study and mentioned that biological responses have occurred at varying magnitudes of development (Section 7.1.1 of the final TMDL report).

Permit-related Issues

Comment (RB):
Page 29, Metals. Are there metals not listed, that will be regulated in point source NPDES permit renewals?

Response
While the TMDL did not address them because they are not causing impairment, metals are evaluated as part of the NPDES permit renewal process. Monitoring and limits are included in permits consistent with Ohio EPA rules.

Comment (RB):
Page 168, Point Sources (11.1). In table 11-1 the City of Painesville is not listed. Will the City of Painesville's NPDES Permit phosphorus effluent limit, for the Water Pollution Control Plant, of 1 mg/l remain in effect for the NPDES permit renewal in 2013?

Response
The Painesville Water Pollution Control Plant discharges to a segment of the Grand River that is in full attainment of its designated aquatic life use (i.e., warmwater habitat) and was not found to be impaired by

phosphorus. Therefore, a change to the facility's permit limit for phosphorus is not recommended at this time.

TMDL Issues

Comment (RB):
Load Allocations – USEPA regulations require that a TMDL include Load Allocations (LA's), which identify the portion of the loading capacity attributed to existing and future non-point sources and to natural background.

Question 1 – In section 9.2 Load Allocation, Existing flow conditions are described in Section 7.3.2 and are based on land cover data in the 2001 NLCD. First what does NLCD represent? Has there been consideration to updating this report to accurately reflect 2011 land cover data?

Question 2 – What is the portion of loading capacity attributed to existing and future non-point sources and to natural background that was used in modeling the TMDL's for nutrients? Was there a numeric value?

Response
The 2001 National Land Cover Dataset was developed by the Multi-Resolution Land Characteristics Consortium (a group of federal agencies) using Landsat satellite data; additional information is available at their website: http://www.mrlc.gov/. The selection of this land cover dataset is discussed in Section 3.2. To summarize, the 2001 NLCD is the most representative land cover and land use dataset available for the time period that Ohio EPA field staff sampled water quality in the watershed (2003 and 2004). The 2006 NLCD was released in 2011 after TMDL modeling was completed; an evaluation showed that the 2006 NLCD only varied slightly from the 2001 NLCD.

The allocations for the total phosphorus TMDLs (Red Creek and Mill Creek in Ashtabula County) are presented in Section 9.7. The load allocation (identified as "LA" in the tables in Section 9.7) represents existing nonpoint sources, for example runoff from crop fields. For both phosphorus TMDLs, 3 percent of the loading capacity (i.e., the TMDL) was allocated to future growth (identified as "FG" in the tables in Section 9.7). The total phosphorus target was selected from statewide recommendations in *Association Between Nutrients, Habitat, and the Aquatic Biota in Ohio Rivers and Streams* (Ohio EPA 1999); natural background levels were considered in those target recommendations.

Comment (RB):
Margin of Safety (MOS) – Section 9.4, A 10 percent explicit MOS has been applied to the nutrient TMDL's. Would a 5 percent implicit MOS, as used in the E. Coli MOS, be a sufficient safety factor for nutrients? In the case of the City of Painesville's Water Pollution Control Plant, the actual flow vs. design flow is less than used in modeling the flow within the Grand River Watershed.

Response
The *E. coli* TMDLs received a 5 percent explicit MOS in addition to an implicit MOS. The implicit *E. coli* MOS is the conservative assumption of applying the seasonal geometric mean numeric criterion as a daily target. Additionally, *E. coli* bacteria die-off provides a higher implicit MOS than what is known about the assimilation of nutrients. Therefore, since the selection of the total phosphorus target was not as conservative as the selection of the *E. coli* target, a larger explicit MOS was assigned to the total phosphorus TMDLs.

The design flow of Painesville's Water Pollution Control Plant was used during modeling because the NPDES permit allows the facility to discharge at that flow rate. The wasteload allocation is based on the design flow to allow the facility to discharge the maximum permitted pollutant load when needed.

Comment (AS)
The Conservancy requests that Ohio EPA review and consider other hydrologic regime conditions or parameters, including seasonality, frequency, duration, magnitude, and rate of change.

Response
Ohio EPA reviewed a number of hydrologic regime conditions and parameters in the TMDL. Ohio EPA may explore further hydrologic regime conditions or parameters in future TMDLs as resources allow.

Impacts of Altered Hydrology and Low Levels of Development

Comment (AS)
The Nature Conservancy has expertise in analyzing stream flows that might be useful to the Agency if further detail on this issue is required…We ask that the Agency consider these reports in its actions related to hydrologic alteration in the Grand River watershed.

Response
Ohio EPA appreciates the references and may consider them, as resources allow, during implementation of the TMDL.

Comment (AS)
Page 90 of the document states:

> "In addition to those TMDLs, flow regime protection strategies will be developed to protect and preserve existing conditions on streams that are in attainment of their ALU but are threatened from encroaching development."

We support this statement and encourage the Agency to ensure that rare and sensitive species are protected…

As noted above, the Conservancy recommends that lower impervious cover goals be set to protect rare and sensitive species.

Response
Ohio EPA appreciates the comment and aims to protect all aquatic life.

Comment (AS)
Also, it is not clear in this section [10.1.1] how "effective (connected) impervious cover" would be determined, and it notable *[sic]* that the references we have cited rely on total impervious cover to determine thresholds or gradients. We are concerned that there is little evidence that "effective impervious cover" is adequately protective, and ask that the Agency show evidence, including long-term, of this effectiveness for protective rare and sensitive species.

Response
A definition of effective impervious cover was added to this section of the final report.

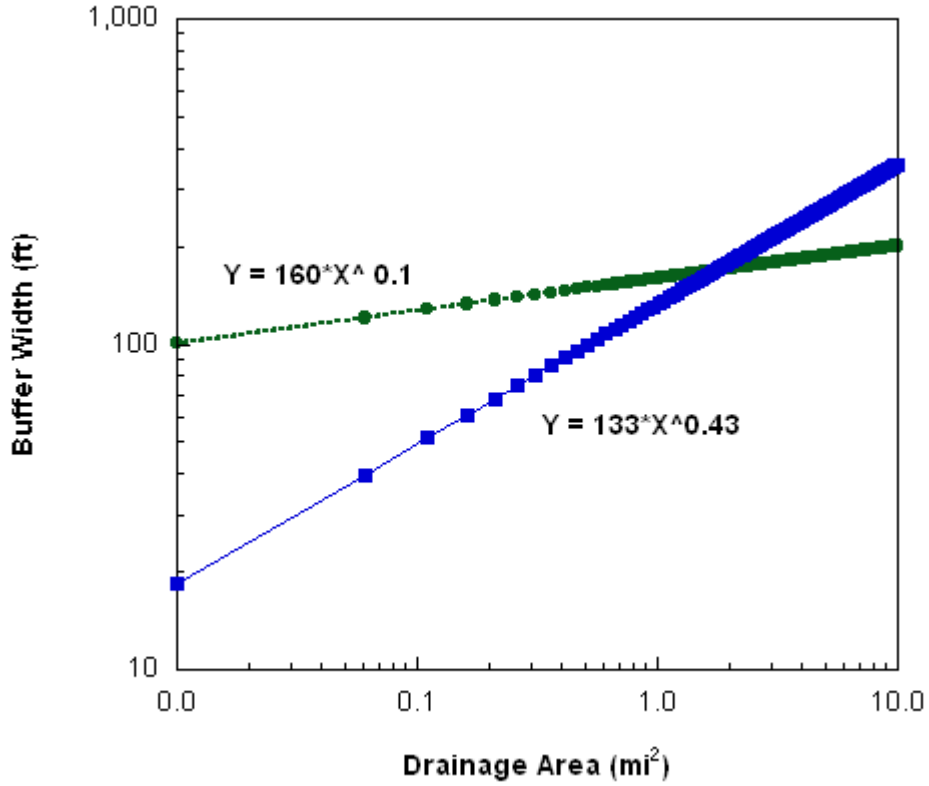
Comment (AS)
Section 10.1.2. Riparian Width and Vegetation states: "Two riparian buffer targets were set: 70 percent forest in a 200-foot buffer and the targeted riparian width (as defined in the draft stream mitigation rule, OAC-3745-1-56." We are concerned that this buffer will be inadequate. We recommend a minimum of a 100-foot buffer on each side. Is this the recommendation that Ohio EPA is making? The Conservancy recommends the buffers be classified as "setbacks" and be comprised of native vegetation, as is the case in the 2006 Big Darby Creek general permit for stormwater:

> The setback distance shall be sized as the greater of the following:
>
> 1. The regulatory 100 year floodplain based on FEMA mapping;
> 2. A minimum of 100 feet from the centerline of the stream on each side; or
> 3. A distance calculated using the following equation:
>
> $W = 133DA^{0.43}$
> where:
> DA = drainage area (mi^2)
> W =- total width of riparian setback (ft)

Response
The riparian width targets set as a protective strategy in Section 10.1.2 of the TMDL report are based on a formula developed to estimate the amount of wooded riparian cover necessary to protect aquatic life use attainment. The analysis provided in the Section 10.1.3 and Figure 10-2 of the report indicate a very clear transition point between attaining and non-attaining sites in the Grand River watershed with respect to the combination of impervious cover and riparian buffer (with the percent of forest cover within a 200-foot riparian used as a surrogate for buffer width). Although there is no direct comparison of actual riparian buffer width versus attainment status available, based on the data provided in Figure 10-2, it is clear that forested riparian cover is an important factor in protecting water quality.

The commenter suggests that the requirements from the Big Darby watershed stormwater permit be used as target riparian buffer widths for the protective strategy presented in the Lower Grand River TMDL. Although the setback distances from the 2006 Big Darby stormwater permit are protective, as noted in the comments there are three approaches that must be evaluated in order to determine the setback distance at any given locale. However, for sites with larger watersheds, application of the equation noted as item #3 of the comments would ultimately drive the buffer target requirement. At these large watershed sites the result of the equation will often provide extremely broad riparian setbacks that are may be unrealistic for many communities. The equation presented in the draft stream mitigation rule was developed in order to provide the following: 1) a single calculated target buffer width that is scalable at varying watershed size; 2) buffer widths that are protective across the range of watershed size; and 3) buffer widths comparable to those commonly enacted within riparian setback ordinances across the state.

The results of the buffer calculations using item #3 and the equation from the draft mitigation rule are compared in Figure 1. The equation provided in the TMDL report provides a target buffer of 100 feet per bank at the lowest watershed scale (see item #2 of the comment) and provides significantly greater buffer widths for small streams than the equation provided in item #3 of the comment. At the larger watershed scale (streams > 1 square mile) the equation provided in the TMDL report provides a much more realistic riparian buffer width calculation when viewed in light of the maximum buffer widths mandated by local riparian protection ordinances, which typically use a maximum of 300 feet per bank for large streams (CRWP 2011). Ohio EPA does endorse the use of the regulatory 100 year floodplain as the basis for setting minimum riparian buffer widths where it is greater than the calculated setback (item #1 of the comment).



Literature Cited

CWRP, 2011. Summary of Riparian and Wetland Setback Regulations in Ohio. Chagrin river Watershed Partners, Willoughby, Ohio. 12 pp.
http://www.crwp.org/pdf_files/riparian_regulation_summary_ohio_january2011.pdf).

Mussels

Comment (AS)

We encourage the Agency to include coverage of the status and protection of mussels in the lower Grand River in the TMDL…

Among the rare and sensitive species mentioned above are many mussels. We encourage the Agency to emphasize mussel protection in the TMDL and any subsequent permits…

While we offered the following to Ohio EPA as part of our comments on the Ohio EPA's draft 2008 Integrated Report, we request that you also consider specific strategies for Grand River mussels in the TMDL, such as wastewater discharge limits, other water quality, flow regime and stream habitat goals…

Through analysis of the Water quality, flow regime and habitat quality needs of mussels, the Agency could help significantly advance knowledge on Ohio's and the Grand River's mussel community and its protection. We encourage you to work with The Ohio State University and others to develop this information.

Response
Ohio EPA agrees that mussels have the potential to provide valuable information in that many species are very sensitive to environmental perturbations. Ohio EPA records and those from the Ohio State University Museum of Biological Diversity are being actively used to aid in the selection of candidate streams and rivers for higher antidegradation tiers in Ohio (Superior High Quality Waters and Outstanding State Waters).

Wastewater discharge limits and other water quality, flow regime and stream habitat goals are based on attainment of aquatic life use. Because no aquatic life use assessment involving mussels exists, it would be difficult to determine impairment based on mussels. However, Ohio EPA will incorporate more information about mussels into its actions as resources permit.

U.S. EPA has been working on revisions to its 1999 ammonia criteria for nearly eight years and the new recommended criteria are expected to be released fairly soon. U.S. EPA believes it has addressed the underlying issues associated with the freshwater mussel data it is using and has added new toxicity data for freshwater snails from a 2010 U.S. Geological Survey study. States will be able to modify the criteria values they adopt into their water quality standards to better reflect the species and uses they are trying to protect. The new criteria values expected to be released in early 2012 are: 3.2 acute and 0.28 chronic (at pH 8 and 25°C; in mg/L of total ammonia nitrogen). U.S. EPA intends to release the criteria along with a guidance containing information on the existing tools available to state regulators to assist in implementation, including variances, use attainability analyses, compliances schedules and dilution allowances.

Stream Crossing Issues

Comment (AS)
We encourage the Agency to address stream crossings (i.e., culverts and bridges) in the draft TMDL report and subsequent actions as another source of impact. The Agency should address standards and ensure adequacy for stream crossing design through the Agency's stormwater permit and through the 401/404 certification. The language in these requirements needs to be clear and specific enough to ensure that design is adequate.

Response
Ohio EPA acknowledges the impacts that stream culverts can have on aquatic environments within the state of Ohio. The Agency will continue to work with the Ohio Department of Transportation on the identification of improved stream crossing methods and work to incorporate those methods into permitting activities. It should be noted, however, that there are insufficient staff resources available to develop a specific initiative to address this issue at this time.

Comment (AS)
In 2007, the Conservancy provided comments to Ohio EPA on the above standards for culverts. The standards in the Agency's 2007 Nationwide Permit appear to recognize the issue and be based on similar standards established elsewhere, such as the State of Washington's "Design of Road Culverts for Fish Passage." This is a positive step, especially since there are limited standards elsewhere in Ohio EPA rules or permits for stream crossings.

Response
Ohio EPA appreciates the comment.

Copies of comment letters and emails, in order received.

Hi, George:

I will copy Beth Risley on my comments of the draft. Overall, it is quite comprehensive and thorough in content. One section that I found on page 14 likely is in error reference to muskellunge. That section is copied below:

The Grand River upstream of the Harpersfield Dam flows through the lacustrine deposits of a former glacial lake. The river is a classic swamp-wetland type stream with low gradient (< 1 foot per mile), fine sediments (typically small gravels to clay), and few riffles. Large woody debris, rootwads, rootmats, undercut banks and deep pools characterize the habitat. The fish fauna in this reach resembles a swamp-stream association and commonly includes trout-perch, silver redhorse, sunfish and blackside darters. The wetland environment also provides spawning habitat for the Great Lakes muskellunge and northern pike. A native population of walleye also exists.

The muskellunge found upstream of Harpersfield Dam are in all likelihood Esox masquinongy ohioensis, or the Ohio River strain of muskellunge. I am confident of this since the Division of Wildlife prior to start of employment with them in 1980 released this strain of muskellunge into the this section of the Grand River in 1970, 1975, and 1977. There is no way that Great Lakes muskellunge are migrating upstream of Harpersfield Dam. Although it is possible that Great Lakes muskellunge were native to this section of the river prior to the construction of the dam, I believe this to be a very remote possibility. Below the dam, muskellunge found could either be Great Lakes strain, Ohio River strain, or a mix between the two. There is no way to know for sure without genetic (DNA) analyses performed.

Phil Hillman

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November 9, 2011

Beth Risley
Ohio Environmental Protection Agency
Division of Surface Water
P.O. Box 1049
Columbus, Ohio 43216-1049

Dear Ms. Risley:

The City of Painesville is in receipt of the draft, "Grand River (lower) Watershed TMDL Report public noticed by Ohio EPA on October 12, 2011. The City of Painesville is respectfully submitting written comments and questions upon the draft before the deadline of November 14, 2011.

Comments

1. Page 29, Metals. All nine of the copper detections on the Grand River occurred at OH-84 in Painesville (site 502530).
    a. Question – Did OEPA follow up the analysis results by identifying the source of the copper exceedences at this site?
    b. Question – How many samples were collected at this site during the review period?
2. Page 29, Metals.
    a. Question – Are there metals not listed, that will be regulated in point source NPDES permit renewals?
3. Page 168, Point Sources (11.1)
    a. In table 11-1 the City of Painesville is not listed. Will the City of Painesville's NPDES Permit phosphorus effluent limit, for the Water Pollution Control Plant, of 1 mg/l remain in effect for the NPDES permit renewal in 2013?
4. Load Allocations – USEPA regulations require that a TMDL include Load Allocations (LA's), which identify the portion of the loading capacity attributed to existing and future non-point sources and to natural background.
    a. Question – In section 9.2 Load Allocation, Existing flow conditions are described in Section 7.3.2 and are based on land cover data in the 2001 NLCD. First what does NLCD represent? Has there been consideration to updating this report to accurately reflect 2011 land cover data?
    b. Question – What is the portion of loading capacity attributed to existing and future non-point sources and to natural background that was used in modeling the TMDL's for nutrients? Was there a numeric value?

5. Margin of Safety (MOS) – Section 9.4, A 10 percent explicit MOS has been applied to the nutrient TMDL's.
    a. Question – Would a 5 percent implicit MOS, as used in the E. Coli MOS, be a sufficient safety factor for nutrients? In the case of the City of Painesville's Water Pollution Control Plant, the actual flow vs. design flow is less than used in modeling the flow within the Grand River Watershed.

Thank you for providing the comment period and we will continue to work with OEPA in maintaining the Grand River watershed's improved water quality.

Sincerely,

Randy Bruback, Supt. WPCP

cc: Rita McMahon, City Manager

Beth,

I appreciate the opportunity to comment on the draft Grand River (lower) watershed draft TMDL report.

The few items I noticed:

Document page # x (PDF page # 12) – paragraph 6 - spelling – systems (sysems)

Document page # 10 (PDF page # 22) – paragraph 1 – Table2-9**Error! Reference source not found.**

Document page # 66 (PDF page # 78) – paragraph 2 - Some assessment units in the watershed have been determined to be impaired by natural limits (Table 1-1). – ***is this the correct table number?***

Document page # 178 (PDF page # 78) – paragraph 1- At the upstream site, impairment is due to natural causes (flow or habitat) and natural sources. Table 1-1 reflects the new findings. – ***is this the correct table number?***

The information and data is very succinct, well written and presented in an organized manner for such a complicated report.

George Warnock

The Nature Conservancy
Protecting nature. Preserving life.™

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January 5, 2012

Beth Risley
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Re: Comments on draft Lower Grand River TMDL

Dear Ms. Risley:

Thank you for the opportunity to review the "Draft Report for Public Review" dated October 11, 2011, for the "Total Maximum Daily Loads for the Grand River (lower) Watershed." While the time for public comments is past and was very brief at only 30 days, the Conservancy asks that the Agency still consider these comments and include them in any collection of comments that would be prepared.

The Conservancy supports the emphasis on present and potential development impacts in this TMDL. We support adequate and effective subsequent actions that would implement protective measures, especially those related to development impacts and flow regimes. The Grand River TMDL and subsequent actions must recognize the significant threat of development and consequent altered hydrology, which is a major threat to the survival of streams, including in this watershed.

The Conservancy appreciates the effort Ohio EPA has taken to include the impacts and issues of hydrologic alteration due to urbanization in Section 7 of this draft TMDL. The threat to the Grand River and its tributaries has been apparent in the data gathered by Ohio EPA. We recognize the degradation that has occurred in Kellogg and Red Creeks and other tributaries. Ellison, Cutts and Jordan Creeks also are among those at risk. This same degradation pattern, at levels of development considered "low levels of impervious surface" by some, is well documented, predictable and common across Ohio and the U.S. We especially appreciate the Ohio EPA's literature review on impervious surface impacts and altered hydrology and encourage further investigation and strategy implementation in this area. It is important to note that recent reviews (e.g., King and Baker (see references in end notes), Cuffney et al/USGS[i]) have pointed out the significant reduction in stream health that occurs at relatively low levels of urbanization. These levels are even lower than those cited in the Agency's literature review documents in the draft TMDL. Comparable to streams in other parts of Ohio and across the U.S., the tributaries of the lower Grand River have shown this same pattern of decline and nonattainment or partial attainment due to urbanization's hydrologic alteration and water quality impacts. Cuffney et al state: "Threshold analysis showed little evidence for an initial period of resistance to urbanization. Instead, assemblages were degraded at very low levels of urbanization and response rates were either similar across the gradient or higher at low levels of urbanization."

We agree with your statement on Page X, "The impact of development can be lessened by retaining storm water on-site or allowing it to infiltrate the ground and by adopting better site design practices." First, however, we note this statement should emphasize that the impact is lessened and not eliminated or necessarily reduced to a level that achieves the use designations, preserves rare and sensitive species, or preserves communities such as mussels. Second, while the concept of lessening impacts through infiltration into the ground might be true, we encourage the Agency to look beyond this issue and these practices, and consider additional factors that also might contribute to degradation. Also, inadvertent consequences of stormwater management must be considered, such as increased temperatures and hydrologic alteration due to stormwater BMPs.

Impacts of altered hydrology and low levels of development

Hydrology is a key factor that largely has been missing from most stormwater analyses and corrective requirements, particularly those in Ohio. It is the Conservancy's position that use attainment and protection of rare and sensitive species will not be achieved without significantly improving stormwater hydrology. We encourage the Agency to adopt an approach that effectively and adequately addresses altered hydrology.

> In the 2009 report Urban Stormwater Management in the United States, the National Research Council states: "A more straightforward way to regulate stormwater contributions to waterbody impairment would be to use flow or a surrogate, like impervious cover, as a measure of storm water loading ... Efforts to reduce stormwater flow will automatically achieve reductions in pollutant loading. Moreover, flow is itself responsible for additional erosion and sedimentation that adversely impacts surface water quality."[ii]
>
> In addition, "The full distribution and sequence of flows (i.e., the flow regime) should be taken into consideration when assessing the impacts of stormwater on streams. Permanently increased stormwater volume is only one aspect of an urban-altered storm hydrograph. It contributes to high in-stream velocities, which in turn increase streambank erosion and accompanying sediment pollution of surface water. Other hydrologic changes, however, include changes in the sequence and frequency of high flows, the rate of rise and fall of the hydrograph, and the season of the year in which high flows can occur. These all can affect both the physical and biological conditions of streams, lakes, and wetlands. Thus, effective hydrologic mitigation for urban development cannot just aim to reduce post-development peak flows to predevelopment peak flows." (NRC, Executive Summary, pg 6)

As noted above, the Conservancy emphasizes that the flow regime is complex, as the draft TMDL recognizes on page 102. Analyses comparing natural hydrology to post-development predictions will have to address a number of hydrologic factors other than base flow. The Conservancy's, and many others', experience has found that "The entire flow regime, including natural variability, is important to maintaining the diversity of biological communities in rivers."[iii]

The Conservancy requests that Ohio EPA review and consider other hydrologic regime conditions or parameters, including seasonality, frequency, duration, magnitude, and rate of change. The hydrologic regime is the pattern of variation in the amount and movement of water in the system over time. These regimes include surface-groundwater exchange/recharge, local surface runoff, peak flow integrity, low flow integrity, overbank flooding integrity, mean magnitude and degree of inter-annual and seasonal

variation, frequency of particular flow magnitudes, duration, and or other aspects of hydrograph shape. Some of these issues were addressed in Section 5.0 of the "Total Maximum Daily Loads for the Chagrin River Watershed" of May 15, 2007.

The Nature Conservancy has expertise in analyzing stream flows that might be useful to the Agency if further detail on this issue is required. See the description for the Ecological Limits of Hydrologic Alteration (ELOHA) at http://conservationonline.org/workspaces/eloha. In addition, the Conservancy specifically analyzed flow impacts for the Great Lakes Compact, including determining the impacts of water withdrawals on low flows in the Lake Erie basin of Ohio. We have attached to this email the June 2011 draft report "Ecological Low Flow Protection Process for Ohio Streams and Rivers of the Lake Erie Basin," prepared by the Midwest Biodiversity Institute for The Nature Conservancy. We expect the final report in 2012. Also, the Conservancy collaborated to produce the 2010 report (attached to this email) "Ecosystem Flow Recommendations for the Susquehanna River Basin: Report to the Susquehanna River Basin Commission and U.S. Army Corps of Engineers,"[iv] in order "to determine ecosystem flow needs for the Susquehanna River and its tributaries. The project outcome is a set of recommended flows to protect the species, natural communities, and key ecological processes within the various stream and river types in the Susquehanna River basin." In 2006, the Conservancy developed the report "Developing Methods to Analyze, Protect and Restore Flow Regimes in Great Lakes Tributaries."[v] This document (attached to this email) addressed Black River watershed land cover impacts and water withdrawals effects on flows. The project's goals were to: "1) describe the range of flows that comprise a freshwater ecosystem's natural flow regime; and 2) quantify the impact of past and future water management practices on flow regimes in riverine systems." We ask that the Agency consider these reports in its actions related to hydrologic alteration in the Grand River watershed.

We emphasize that the Grand River watershed includes not only high biotic index scores (such as the Index of Biotic Integrity/IBI), but as noted on page 1 of this draft TMDL, also rare and sensitive species that deserve protection. While the Agency's review of the impact of urbanization emphasized aggregate indicators through declines in biotic indices, it did not include some recent and important reports that show individual taxa declines and degradation of sensitive species, which should generally include rare species, occurs at some very low levels of urbanization, such as near 2%. For an explanation, see references below by King and Baker.[vi,vii,viii,ix] Even "low" levels of urbanization can greatly reduce viability of many species (see King and Baker citations in "References" below). For example, Hilderbrand et al (2010) showed that in the Potapsco River watershed of Maryland urbanization "could result in the loss of nearly 60% of the benthic macroinvertebrate taxa by the time impervious surface cover reaches 15% of the watershed."[x] Urbanization or impervious surface levels are already above, at or near these levels in tributary subwatersheds of the lower Grand River. Consequently, sensitive species already are likely impacted before changes might be seen in aggregate indices such as the IBI (see King and Baker, and Stranko et al[xi], citations in the "References" below).

Consequently, because of the above and those references discussed in Section 7, the Agency is well justified to focus on stormwater impacts, and in particular altered hydrology, to address impacts of urbanization in this TMDL and subsequent actions. Our position is that altered hydrology and flow regimes have not been adequately addressed in previous Ohio TMDL reports or subsequent actions, such as stormwater permits. These streams need to be protected by stormwater management measures that are effective and adequate to maintain designated uses and to protect rare and sensitive species.

Page 90 of the document states:

> "In addition to those TMDLs, flow regime protection strategies will be developed to protect and preserve existing conditions on streams that are in attainment of their ALU but are threatened from encroaching development."

We support this statement and encourage the Agency to ensure that rare and sensitive species are protected. Use attainment does not necessarily ensure this protection, and many examples may be found in Ohio EPA's data where there are high IBI scores, but few or no rare or sensitive species. As stated by King and Baker in reference 2 above:

> "The goal of this paper is to help managers better understand implications of using aggregate community metrics, such as taxon richness or Indices of Biotic Integrity (IBI), for detecting threshold responses to anthropogenic environmental gradients. … We recommend an alternative analysis framework that begins with characterization of the responses of individual taxa and uses aggregation only after distinguishing the magnitude, direction, and uncertainty in the responses of individual members of the community."

Section 10.1.1. Impervious Cover, of this draft TMDL states that "The impervious cover target is 6 percent effective (connected) impervious cover and is recommended for individual stream subwatersheds and WAUs."

As noted above, the Conservancy recommends that lower impervious cover goals be set to protect rare and sensitive species. Also, it is not clear in this section how "effective (connected) impervious cover" would be determined, and it notable that the references we have cited rely on total impervious cover to determine thresholds or gradients. We are concerned that there is little evidence that "effective impervious cover" is adequately protective, and ask that the Agency show evidence, including long-term, of this effectiveness for protecting rare and sensitive species.

Section 10.1.2. Riparian Width and Vegetation states: "Two riparian buffer targets were set: 70 percent forest in a 200-foot buffer and the targeted riparian width (as defined in the draft stream mitigation rule, OAC-3745-1-56)." We are concerned that this buffer will be inadequate. We recommend a minimum of a 100-foot buffer on each side. Is this the recommendation that Ohio EPA is making? The Conservancy recommends the buffers be classified as "setbacks" and be comprised of native vegetation, as is the case in the 2006 Big Darby Creek general permit for stormwater:

> The setback distance shall be sized as the greater of the following:
>
> 1. The regulatory 100 year floodplain based on FEMA mapping;
>
> 2. A minimum of 100 feet from the centerline of the stream on each side; or
>
> 3. A distance calculated using the following equation:
>
> $W = 133DA^{0.43}$
> where:
> DA = drainage area (mi^2)
> W = total width of riparian setback (ft)

Mussels

Among the rare and sensitive species mentioned above are many mussels. We encourage the Agency to emphasize mussel protection in the TMDL and any subsequent permits. The report prepared by The Ohio State University in 2004 and attached to this email showed losses of mussel species in the watershed.

We encourage the Agency to emphasize mussel protection in the TMDL. At least twenty-four species of freshwater mussels were found in the Grand River during three surveys (Huehner 1997, 1998; Huehner et al 2005[xii]), ten of which are state listed species.[xiii] These include: the state endangered snuffbox (*Epioblasma triquetra*) and elephant-ear (*Elliptio crassidens*); the state threatened black sandshell (*Ligumia recta*) and fawnsfoot (*Truncilla donaciformis*); and the state Species of Concern wavy-rayed lampmussel (*Lampsilis fasciola*), round pigtoe (*Pleurobema sintoxia*), salamander mussel (*Simpsonaias ambigua*) and deertoe (*Truncilla truncata*). Huehner (2005) has said "The Grand River undoubtedly provides the most important source of unionid diversity present in the region following the loss of unionids from Lake Erie."[xiv] In Flaute and Watters (2004) review of records of mussel distribution in the watershed,[xv] referring to the lower Grand River, they stated "Mussel diversity was roughly correlated with QHEI, IBI, and ICI metrics in the downstream reach."

We encourage the Agency to include coverage of the status and protection of mussels in the lower Grand River in the TMDL. As you know, the health of many species of freshwater mussel species is at risk throughout Ohio (e.g., see ODNR's listed species, available at http://dnr.state.oh.us/tabid/5664/Default.aspx, http://ohiowatersheds.osu.edu/toolshed/mussels.html) and North America. ODNR's listed mollusk species include 24 endangered mussel species, four threatened and nine species of concern. As noted above, ten of these have been recorded in the Grand River. About 69% of freshwater mussel species are at risk in the U.S.[xvi] Mussel richness in the neighboring Chagrin River watershed is "depauperate," and appears to be at significant risk, where "the current passive conservation efforts may be insufficient to protect these small isolated populations of remaining species.[xvii]

While we offered the following to Ohio EPA as part of our comments on the Ohio EPA's draft 2008 Integrated Report, we request that you also consider specific strategies for Grand River mussels in the TMDL, such as wastewater discharge limits, other water quality, flow regime and stream habitat goals. Because of their sensitivity to pollution and habitat alteration, freshwater mussels have been recommended as indicators of water quality (Hoggarth, M.A. 2006. Freshwater mussels (Unionidae) as indicators of water resource integrity. Presented at the NABS Annual meeting, Anchorage, Alaska, http://www.benthos.org/database/allnabstracts.cfm/db/Anchorage2006abstracts/id/734)
The Ohio State University Museum of Biological Diversity maintains an extensive database for mussel species distributions in Ohio (http://www.biosci.ohio-state.edu/~molluscs/OSUM2/OFMA.htm).

Mussels can be good indicators of quality because they are stationary, must filter the water passing around them and integrate conditions over a long period of time. Given the digitization of and extensive stream and related biological data in Ohio, Ohio EPA is well-equipped to analyze large amounts of data related to other biota such as fish and mussels. Through analysis of the water quality, flow regime and habitat quality needs of mussels, the Agency could help significantly advance knowledge on Ohio's and the Grand River's mussel community and its protection. We encourage you to work with The Ohio State University and others to develop this information.

Stream crossings

Tributaries in the Grand River watershed are frequently crossed by roads. These road crossings are supported by bridges and culverts, and inadequately designed stream crossings impair passage of fish and other aquatic organisms. Inadequate design commonly results in loss of connectivity above the crossing, and consequently lower diversity and biotic index scores, lack of attainment, and losses of rare and sensitive species. The problem has been well documented across the U.S., and is addressed by many states and by federal agencies such as the U.S. Forest Service and the Federal Highway Administration. We encourage the Agency to address stream crossings (i.e., culverts and bridges) in the draft TMDL report and subsequent actions as another source of impact. The Agency should address standards and ensure adequacy for stream crossing design through the Agency's stormwater permit and through the 401/404 certification. The language in these requirements needs to be clear and specific enough to ensure that design is adequate. The following references provide some useful and relevant examples of appropriate designs.

Federal Highway Administration:

> HEC 26 Culvert Design for Aquatic Organism Passage
> HIF-11-008
> http://www.fhwa.dot.gov/engineering/hydraulics/pubs/11008/index.cfm

U.S. Forest Service:

> Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings
> http://www.fs.fed.us/eng/pubs/pdf/StreamSimulation/index.shtml

Below are some examples of how this issue is addressed elsewhere. Many states have or are considering establishing stream crossing standards. Our comments on the Agency's draft 2008 Integrated Report encouraged Ohio EPA to conduct a general review of these potential sources of impairment. Such an effort would not only help improve the quality of Ohio's streams, but also would help establish the degree of impact in Ohio and provide clear and effective expectations for mitigation standards, 401 certifications, permits and other actions. The Conservancy supports statewide establishment of improved standards for stream crossings in such actions as Nationwide Permits, 401 certifications and mitigation. In our comments on the draft 2008 Integrated Report, the Conservancy encouraged Ohio EPA to build on the stream crossing (culvert) standards under the recently adopted Clean Water Act Section 401 Certifications for Nationwide Permits program (http://www.epa.state.oh.us/dsw/401/ NationwideCertification_final_jul07.html). However, the Conservancy's position is that the Ohio NWP needs more specificity for the design of stream crossings.

In 2007, the Conservancy provided comments to Ohio EPA on the above standards for culverts. The standards in the Agency's 2007 Nationwide Permit appear to recognize the issue and be based on similar standards established elsewhere, such as the State of Washington's "Design of Road Culverts for Fish Passage." This is a positive step, especially since there are limited standards elsewhere in Ohio EPA rules or permits for stream crossings. The need for and progress in stream crossing standards is very evident, and local governments (http://www.etowahhcp.org/research/documents/tech_rpt_stream_crossings_4-30-07.pdf), other states (e.g., Massachusetts poster at

http://www.streamcontinuity.org/pdf_files/stream_crossings_poster.pdf; http://streamcontinuity.org/, http://www.fishpassage.wsu.edu/related-links/) and the federal government (e.g., U.S. Forest Service - http://stream.fs.fed.us/fishxing/, U.S. Department of Transportation http://www.fhwa.dot.gov/engineering/hydraulics/envirohyd/fishback.cfm) are advancing similar standards.

Application of stream crossing standards to the Grand River watershed could correct problems at existing crossings undergoing maintenance, and would help avoid future problems.

Thank you for this opportunity to comment. We appreciate your attention to altered hydrology and other issues in this draft TMDL and we encourage their implementation. Keep in mind that the Conservancy is recommended a flow-related approach for the Great Lakes Compact, and the concepts in that approach could be useful to parts of the analysis in the Grand River and other watersheds. We would appreciate being included in future communications concerning this and related issues. If there are any questions, please feel free to contact Anthony Sasson at 614-339-8123, asasson@tnc.org.

Sincerely,

Anthony Sasson
Freshwater Conservation Manager

Attachments (via email)

cc: Karen Adair, TNC

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