



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4  
ATLANTA FEDERAL CENTER  
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ATLANTA, GEORGIA 30303-8960

SEP 21 2012

Ms. Kathy Stecker  
Supervisor, Modeling and TMDL Unit  
Division of Water Quality  
North Carolina Department of Environment  
and Natural Resources  
P.O. Box 29535  
Raleigh, North Carolina 27699-1617

Dear Ms. Stecker:

The U.S. Environmental Protection Agency has completed its review of the Low pH Total Maximum Daily Load (TMDL) Addendum for the Great Smoky Mountains National Park (Waterbody IDs [2-79(24)ut4] and [7-10]; TMDL ID 42373 ) in Jackson and Mitchell Counties, North Carolina, that was submitted to the EPA on August 22, 2012. Based upon our review, we have determined that the statutory requirements of the Clean Water Act, Section 303(d) have been met and hereby approve this TMDL.

The enclosed Decision Document summarizes the elements of the review which were found to support the EPA's approval of the TMDL. If you have any questions or comments, please feel free to contact Mrs. Alya Singh-White of my staff at (404) 562-9339.

Sincerely,

A handwritten signature in black ink, appearing to read "James D. Giattina".

James D. Giattina  
Director  
Water Protection Division

Enclosure

**TMDL Review Checklist**

***Final TMDL***

<b>TMDL Document Name:</b> Total Maximum Daily Load Addendum for Low pH in the Great Smoky Mountains National Park	<b>County/State:</b> Jackson and Mitchell Counties, North Carolina
<b>Reviewer:</b> Alya Singh-White	<b>HUC:</b> 0601020301 and 0601010806
<b>Date of Submittal:</b> August 22, 2012	<b>Use Classification:</b> Class C Waters
<b>Pollutant(s):</b> Acid Neutralizing Capacity (ANC)	<b>ESA / EJ Issues?</b> No
<b>Type of TMDL(Point / Nonpoint /Both):</b> Nonpoint	
<b>Waters Addressed By TMDL:</b>	

Waterbody Name [Assessment Unit]	Description	Water Quality Classification	Miles
Unnamed tributary to Tuckasegee River [2-79-(24)ut4]	Source to Tuckasegee River	C	1.3
Hollow Poplar Creek [7-10]	From source to Nolichucky River	C; Tr	5.6

***Additional National TMDL Tracking System Entry Parameters***

<b>TMDL doc ID:</b> 42373	<b>EPA Developed?</b> No	<b>TMDL Target:</b> Site specific minimum acid neutralizing capacity concentration necessary to maintain pH in the range of 6.0 to 9.0 standard units.
<b>303(d) List ID:</b> see table above	<b>Lead State:</b> TN / NC	
<b>303(d) List Cycle (Yr):</b> 2010	<b>Pollutant ID:</b> 86	

**Impacted PCS NPDES Permit IDs:** None

**Impacted Non-PCS Permit IDs:** None

## TMDL Review Checklist

Review Element	Required	Included ( <i>check if yes</i> )
Submittal Letter	Yes	X
Scope of TMDL	Yes	X
Applicable Water Quality Standards and Numeric Targets*	Yes	X
Loading Capacity*	Yes	X
Wasteload Allocations (WLAs)*	Yes	X
Load Allocations (LAs)*	Yes	X
Margin of Safety (MOS)*	Yes	X
Seasonal Variation*	Yes	X
Public Participation	Yes	X
Other Considerations	As necessary	X
Recommended Action	APPROVAL	X

\*These elements are required by statute and implementing regulations.

## TMDL Review Checklist Supporting Rationale and Comments

Section 303(d) of the Clean Water Act (CWA) and EPA's implementing regulations at 40 CFR §130 describe the statutory and regulatory requirements for approvable TMDLs. The following information is generally necessary for EPA to determine if a submitted TMDL fulfills the legal requirements for approval under §303(d) and EPA regulations. When the information listed below uses the verb "*must*" or "*require*," this denotes information that is needed by EPA to review elements of the TMDL required by the CWA and by regulation.

*Submittal Letter*

### Considerations:

- Each final TMDL submitted to EPA should be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under §303(d) of the Clean Water Act for EPA review and approval. This clearly establishes the State/Tribe's intent to submit, and EPA's duty to review, the TMDL under the statute.

### Conclusions:

This final TMDL addendum was received by EPA for review and approval by letter on August 22, 2012 and signed by Kathy Stecker, Modeling/TMDL Unit Supervisor.

**Considerations:**

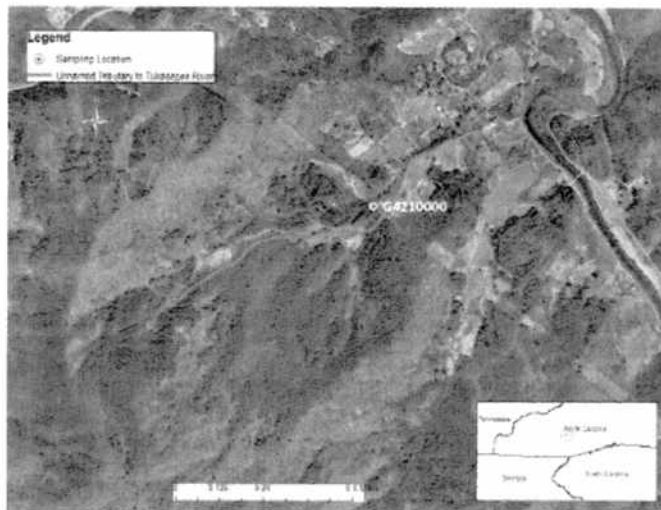
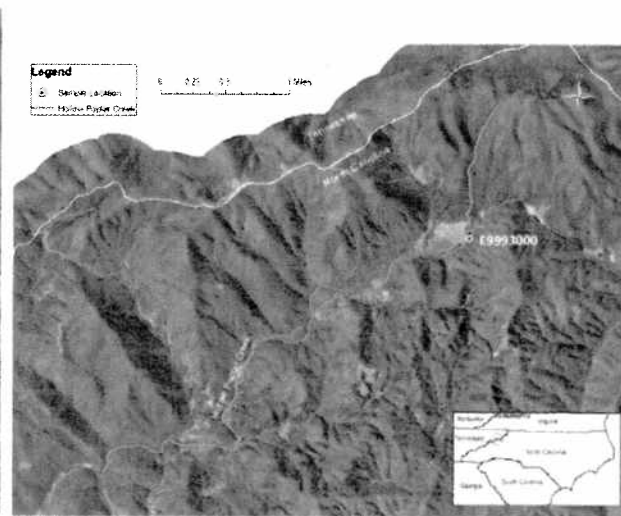
- The TMDL should describe the waterbody as it is identified on the State/Tribe's §303(d) list, the pollutant(s) of concern, and the applicable water quality criteria that led to impairment listing. The waters addressed by the TMDL must be identified and consistent with the 303(d) list.
- The TMDL should include a statistical evaluation of all readily available data that was used to place the waterbody on the 303(d) list.
- The TMDL submittal must include a description of the point, nonpoint, and natural background (where possible) sources of the pollutant of concern. **Such information is necessary for EPA's review of the load and wasteload allocations, which are required by regulation. The TMDL submittal should also contain a description of any important factors, such as: (1) the assumed distribution of land use in the watershed; (2) population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation, as applicable; and (3) present and future growth trends, if this is a factor that was taken into consideration in preparing the TMDL.**

**Conclusions:**

\*Note: The Great Smoky Mountains National Park (GSMNP) low pH TMDL was developed by the Tennessee Department of Environment and Conservation and approved by EPA on September 7, 2010.

The TMDL addendum addresses waterbody IDs 2-79-(24)ut4 and 7-10 located in the Blue Ridge Mountains of western North Carolina (maps below). These WBIDs are listed as impaired on the State's 2010 §303(d) list due to low pH values documented during the 2007-2008 sampling period. Appendices A and B in the TMDL addendum provide a summary of water quality monitoring data collected by both NC (at the impaired stations) and the U.S. National Park Service (at park monitoring stations).

Per the TMDL addendum, the impaired waterbodies are located in the Blue Ridge Mountains of western NC and drain high altitude ridges in predominantly forested watersheds. The tributary to the Tuckasegee River drains the northern slope of Cullowhee Mountain from an elevation of approximately 4,000 feet. Poplar Hollow Branch drains the southern slope of Unaka Mountain from an elevation of approximately 5,000 feet. There are no NPDES wastewater or stormwater permits in these watersheds, therefore there are no known point sources. The source of acidity in these watersheds is believed to be a result of atmospheric deposition of sulfur and nitrogen compounds from sources outside the TMDL area.

**Unnamed Tributary to Tuckasegee River****Hollow Poplar Creek**

**Considerations:**

- EPA regulations define loading capacity as the greatest amount of loading that a water can receive without violating water quality standards [40 CFR §130.2(f)]. The loadings are required to be expressed as either mass-per-time, toxicity or other appropriate measure [40 CFR § 130.2(i)]. **The TMDL submittal must identify the waterbody's loading capacity for the applicable pollutant. To the degree it is known, it should also describe the cause and effect relationship between the identified pollutant sources, the numeric target (narrative target if appropriate), and achievement of water quality standards.**
- **Supporting documentation for the TMDL analysis must also be contained in the submittal. This should include a description of the analytical process used, results from water quality modeling, assumptions, etc.** The TMDL submittal should also contain a description of other important factors, such as an explanation and analytical basis for expressing the TMDL through surrogate measures, if applicable.
- **Critical conditions must be considered as part of the analysis of loading capacity [40 CFR § 130.7(c)(1)].** Critical conditions are the combination of environmental factors (e.g., flow, temperature, etc.) that result in attaining and maintaining the water quality criterion and have an acceptably low frequency of occurrence. Critical conditions are important because they describe the factors that combine to cause a violation of water quality standards and will help in identifying the actions that may have to be undertaken to meet water quality standards.

**Conclusions**

NC and TN share the same water quality criteria for pH, a range of 6.0 – 9.0, which was set as the target for the TMDL. Per the original TMDL document, whenever sufficient monitoring data were available, a site-specific target ANC value was determined by means of regression analysis. If monitoring data were not available, an ANC of 50µeq/l, or 2.5 mg/l CaCO<sub>3</sub>, was selected as the default numerical target for this TMDL (See Appendix C of the TMDL document for site specific data). The concept of a maximum ANC load does not appropriately represent the desired target condition; instead ANC targets are given as minimum concentration under which it is expected the waterbody will attain a pH within the range of 6.0 – 9.0 standard units. ANC targets can be achieved by reducing acidity, increasing alkalinity or a combination of both. Allocation values and ANC minimum concentration target values are shown in Table 5 of the TMDL document.

Per the TMDL addendum, the 2010 GSMNP TMDL instream ANC of 6-50 µeq/L are also appropriate for the addendum assessment units and other forested high elevation streams in western North Carolina, in order for the streams to achieve and maintain the pH standard. Full implementation of the 2010 GSMNP TMDL and achievement of the ANC targets of 6-50 µeq/L is expected to achieve water quality standards in the addendum waters. DWQ may reevaluate the need for individual TMDLs for the addendum waters if the required targets are determined to be insufficient.

Water quality data collected over a period of 15 years for load duration curve analysis were used to assess the water quality standards representing a range of hydrologic and meteorological conditions.

**Wasteload Allocations (WLAs)****Considerations:**

- EPA regulations require that a TMDL include WLAs, which identify the portion of the loading capacity allocated to existing and future point sources [40 CFR §130.2(h)].
- **Wasteload allocations must be assigned to each point source discharging the pollutant of concern [40 CFR 130.2(i)]. WLAs can be expressed as lumped or aggregate allocations if appropriate.**
- **If no point sources are present or if the TMDL recommends a zero WLA for point sources, the WLA must be expressed as zero.**
- **The wasteload allocations should be sufficient, in consideration of nonpoint source loads, to ensure that the point sources will not cause or contribute to excursions of water quality standards [40 CFR §122.44(d)(1)].**

**Conclusions:**

The WLA has been set to zero since there are currently no point sources of acidity loading in the GSMNP. Any future point sources must meet instream water quality standards at the point of discharge as specified in their NPDES permit.

<p><b>Considerations:</b></p> <ul style="list-style-type: none"> <li>EPA regulations require that a TMDL include LAs, which identify the portion of the loading capacity allocated to existing and future nonpoint sources and to natural background [40 CFR §130.2(g)]. Load allocations may range from reasonably accurate estimates to gross allotments [40 CFR §130.2(g)]. Where it is possible to separate natural background from nonpoint sources, load allocations should be described separately for background and for nonpoint sources.</li> <li>If the TMDL concludes that there are no nonpoint sources and/or natural background, or the TMDL recommends a zero load allocation, the LA must be expressed as zero.</li> </ul>	<p><b>Load Allocations (LAs)</b></p>
<p><b>Conclusions:</b> Load allocations were assigned and presented in Table 5 of the TMDL document.</p>	
<p><b>Considerations:</b></p> <ul style="list-style-type: none"> <li>The statute and regulations require that a TMDL include a margin of safety to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality [CWA §303(d)(1)(C), 40 CFR § 130.7(c)(1)]. EPA guidance explains that the MOS may be implicit, i.e. incorporated into the TMDL through conservative assumptions in the analysis, or explicit, i.e. expressed in the TMDL as loadings set aside for the MOS.</li> <li>If the MOS is implicit, the conservative assumptions in the analysis that account for the MOS must be described. If the MOS is explicit, the loading set aside for the MOS must be identified.</li> </ul>	<p><b>Margin of Safety (MOS)</b></p>
<p><b>Conclusions:</b> For development of these TMDLs, an implicit MOS was incorporated through the use of conservative modeling assumptions. These include: 1) the use of a 14-year continuous simulation that incorporates a wide range of meteorological events, 2) the use of the load duration curve, which addresses pollutant loading over the entire range of flow, and 3) the use of a positive ANC target of 50 µeq/L (based on analysis of a literature search) or a site-specific ANC (when available).</p>	
<p><b>Considerations:</b></p> <ul style="list-style-type: none"> <li>The statute and regulations require that a TMDL be established with consideration of seasonal variations. The method chosen for considering seasonal variations in the TMDL must be described [CWA §303(d)(1)(C), 40 CFR §130.7(c)(1)].</li> </ul>	<p><b>Seasonal Variation</b></p>
<p><b>Conclusions:</b> The variability in this TMDL is accounted for by using water quality data collected over a 15 year period representing a range of hydrologic and meteorological conditions.</p>	
<p><b>Considerations:</b></p> <ul style="list-style-type: none"> <li>EPA regulations require public review [40 CFR §130.7(c)(1)(ii), 40 CFR §25] consistent with State or Tribe's own continuing planning process and public participation requirements. In guidance, EPA has explained that final TMDLs submitted to EPA for review and approval must describe the State/Tribe's public participation process, including a summary of significant comments and the State/Tribe's responses to those comments.</li> </ul>	<p><b>Public Participation</b></p>
<p><b>Conclusions:</b> The TMDL addendum was made available to the public for review and comment starting August 2, 2012 and ending August 21, 2012. Copies of comments received and responses to those comments are included in the TMDL addendum submittal package (Appendix C of addendum report). All comments were appropriately addressed by NCDENR.</p>	
<p><b>Considerations:</b></p> <ul style="list-style-type: none"> <li>This section may be needed in the TMDL review in order to describe unique factors or information specific to the TMDL under review, which help explain the basis for EPA's decision.</li> </ul>	<p><b>Other Considerations</b></p>
<p><b>Conclusions:</b> A partnership among state and Federal agencies and universities continues toward TMDL implementation, with efforts underway to quantify sources and emissions reductions needed to increase stream ANC in these higher elevations in Tennessee and North Carolina. Scenarios of pollution, climate trends, and resulting stream pH will be modeled. Results will let the Park, and state and federal regulators know what reductions in sulfate and nitrate emissions are needed.</p>	

**Final Recommendation/Comments**

The Pollution Control and Implementation Branch recommends that the TMDL be **APPROVED**.