

US EPA ARCHIVE DOCUMENT

Fecal Coliform TMDL for North Prong Alligator Creek (WBID 2071) Responsiveness
Summary
EPA Region 4

March 2010

Commenter: Charlotte County Government

Comment 1: Section 2 (p.3) of the proposed TMDL states that high levels of fecal coliforms in a waterbody “indicate the presence of fecal material, and therefore the likely presence of other bacteria that are pathogenic”. This is incorrect, particularly for a waterbody such as Alligator Creek. Given these limitations [as discussed by the commenter], it is evident that fecal coliform counts alone should not be relied upon by EPA when developing TMDLs to address surface water quality. Additional information regarding sources of the fecal coliform bacteria detected in the surface waterbodies (e.g., whether the sources are human, pets, livestock, birds, other wildlife, aquatic sediments, or vegetation), and the risks those sources pose to human health, should also be collected and assessed to ensure that appropriate sources and management actions are identified and addressed through the TMDL process.

Response 1: While information regarding the sources of fecal coliform bacteria is an important part of the TMDL analysis, the TMDL must attain its applicable water quality criteria. As stated in the TMDL report, the North Prong Alligator Creek is a Class I waterbody and its applicable criteria as established by the State of Florida in the Florida Administrative Code (FAC), Section 62-302.530 is stated as “the most probable number (MPN) or membrane filter (MF) counts per 100 ml of fecal coliform bacteria shall not exceed a monthly average of 200, nor exceed 400 in 10 percent of the samples, nor exceed 800 on any one day. Monthly averages shall be expressed as geometric means based on a minimum of 5 samples taken over a 30-day period.

The geometric mean criteria reflect chronic or long-term water quality conditions, whereas the 400 and 800 values reflect acute or short-term conditions. To determine the impairment status of the streams, available data were assessed against both components of the acute criteria. It was not possible to assess against the geometric mean criteria in any WBID due to insufficient data. The 400 MPN/100 ml criterion was selected as the endpoint for the TMDL, since this resulted in more stringent reductions.

Comment 2: Section 5.3.1 (p. 13) of the proposed TMDL report states that “the Hazen formula was used to calculate the 95th percentile, as it is recommended in Hunter’s Applied Microbiology (2002) article on bacteria in water”. This statement is somewhat misleading, since Hunter (2002) actually drew the following conclusions:

"It is shown that the Hazen method gives the closest approximation to the parametric method for calculating 95th percentile values. However, the difference between 95th percentile results and percentage exceedance, as currently used, is trivial compared to uncertainty due to sample variation."

"It is concluded that a calculated 95th percentile... offers little advantage compared to percent exceedance, other than offering a false sense of certainty. Furthermore, the additional calculation needed in determining 95th percentile values will demand electronic calculation, increase the chance for calculation errors and make the results less understandable to beach managers and the general public."

Response 2: The purpose of using a statistical method such as Hazen to calculate the percentile was to base the TMDL on the "population" representing the quality of the water. It is not uncommon that no sample exactly equals the 95th percentile of the data distribution, especially when the sample size is not large. To estimate the 95th percentile, the choices are to pick the closest value from the dataset, interpolate between data values, or to use a statistical approach that regards the percentile as a characteristic of the population. We chose to use the statistical approach. The question then becomes which statistical approach is best to use to calculate percentiles for microbial data. The reference to the Hunter (2002) letter in Applied Microbiology was utilized to support the choice of statistical method.

The main focus of the Hunter (2002) letter cited in the TMDL report was to determine whether the 95th percentile or the percent exceedance would be a better way of expressing compliance of bacteria levels with recreational water standards in the United Kingdom. The author also compared different options for estimating the 95th percentile, including the Excel, Hazen, Blom, Tukey, and Weibull methods. In the Discussion section of the letter, the author concluded that "when testing bathing waters for compliance with microbial standards or for classification purposes, then the Hazen formula should be used if an estimate of the 95th percentile is required." It is for this reason that the letter was cited in the TMDL report in reference to the calculation of the 95th percentile using the Hazen method. The author did not conclude that use of the 95th percentile is an inaccurate way to characterize bacterial populations- just that the 95th percentile offers "little advantage over the current percent exceedance approach." The author recommended that the UK continue to use the percent exceedance approach primarily because the 95th percentile would "require additional calculation that in turn will require some form of electronic machine and will also increase the likelihood of error due to calculation" and because the author was of the opinion that "beach managers and the general public will understand the basis of the 95th percentile much less than a simple percentage exceedance rate".

Comment 3: The use of the large number of data points that failed to pass assurance checks appears to be inappropriate and technically indefensible.

Response 3: The fecal coliform measurements in North Prong Alligator Creek may have a remark code of B, L and J. Samples having the laboratory remark code B were outside

the acceptable range. However, the colony counts were considered to be an accurate count and are acceptable for use in the TMDL analysis. The fecal coliform measurement having the laboratory code L means that the sample was off-scale high, and the value is higher than what is reported. This measurement was included in the TMDL analysis because the actual concentration would have been at least as high if not greater than the reported value. The fecal coliform measurement having the remark code J was included in the TMDL analysis because the sample was estimated and was not the result of an analytical error.

Comment 4: When the data points that failed the basic QA checks are omitted from the data set shown in Table 6 of the TMDL report, the following numbers of observations remain:

- Station 21FLFTM 25010011 – 1 observation (from March 2007)
- Station 21FLFTM CHARHB0035FTM – 3 observations (from March, July and November 2007)
- Station 21FLFTM CHARHB0036FTM – 2 observations (from January and September 2007)

There does not appear to be a sufficient amount of data on which to base a proposed TMDL, particularly given the potential costs that may be imposed on local stakeholders if the TMDL were to be adopted and used as the basis for future permitting and resource management decisions.

Response 4: As stated in Response 3, the fecal coliform measurements with remark codes B, L and J are acceptable to use in the TMDL analysis. EPA believes that there is sufficient information to finalize the TMDLs.

Comment 5: A recent World Health Organization (WHO 2003; page 69) states that, in order to use the Hazen formula, a minimum of 10 observations is needed. This is further evidence that the proposed TMDL is based on an inadequate data set, and should not be adopted in its present form.

Response 5: There are 26 fecal coliform measurements in North Prong Alligator Creek. 10 of the 26 measurements exceeded the 400 MPN/100mL criterion, which were used in the Hazen formula to calculate the percent reduction in the TMDL.