

Bacteria Indicator Supplement
Satilla River Basin – 2011 Fecal Coliform TMDL
Action ID: GAR4_22_07_34

As part of the 2019 Water Quality Standards Triennial Review, Georgia proposed *E. coli* and enterococci criteria for waters designated as fishing, coastal fishing, and drinking water to protect recreators who may inadvertently ingest water. Enterococci is the bacterial indicator for estuarine water, while *E. coli* is the bacterial indicator for all other waters. *E. coli* and enterococci have a better correlation with gastrointestinal illness than fecal coliform, and the *E. coli* and enterococci criteria are as protective of the fecal coliform criterion. Georgia EPD adopted the primary contact criteria for the recreational months, May through October, when immersion is expected to occur, and there is a higher likelihood of water ingestion. For non-recreational months, November through April, EPD adopted secondary contact criteria based on the estimated incidental water consumption rate from the 2019 update to Chapter 3 of the EPA Exposure Factors Handbook, Ingestion of Water and Other Select Liquids. Prior to these changes, fecal coliform was the bacterial indicator for the designated uses described above.

This supplement was developed to document the translation of the fecal coliform calculations to the new bacteria indicator, either *E. coli* or enterococci, for segments listed in the existing approved Total Maximum Daily Load (TMDL) document. To the extent that the existing approved TMDL document makes specific permitting recommendations based on fecal coliform, those recommendations will be translated to the approved bacteria indicator in all permits.

The loading curve approach was used to determine the allowable summer and winter seasonal loads. For waterbodies designated as recreational waters, a single curve represents the TMDL and is the 30-day recreational geometric mean criteria for the various bacterial indicators. For waterbodies designated as fishing, coastal fishing, and drinking water, two curves represent the TMDL. One curve represents the summer TMDL for the period May through October when the 30-day geometric mean water quality criteria are equal to the primary contact recreation bacteria criteria for the various indicators, and the second curve represents the winter TMDL for the period November through April when the 30-day geometric mean criteria are higher and are equal to the secondary contact recreation bacteria criteria.

The TMDL also has a single sample maximum criterion for fecal coliform or a Statistical Threshold Value (STV) for *E. coli* and enterococci. The single sample maximum applies for the months of November through April; whereas, the STV applies year round. The STV shall not be exceeded more than 10% of the time in a 30-day period. If a single sample exceeds the maximum criterion or the STV and a geometric mean criterion was also exceeded, then the TMDL is based on the criteria exceedance requiring the largest load reduction. The difference between the critical load and the TMDL curve represented the load reduction required for the stream segment to meet the appropriate instream standard.

The TMDL calculation is given using the following equation:

$$\text{TMDL} = C_{\text{standard}} \times Q$$

Where: TMDL = Total Maximum Bacteria Load either as a 30-day geometric mean or a single sample maximum
 C_{standard} = applicable state water quality standard
Q = stream flow

The applicable water quality standard for fecal coliform was:

- May-October 200 counts/100 mL (as a 30-day geometric mean)
- November-April 1,000 counts/100 mL (as a 30-day geometric mean)
- November-April 4,000 counts/100 mL (as a single sample maximum)

The applicable water quality standard for *E. coli* is:

- May-October 126 counts/100 mL (as a 30-day geometric mean)
- May-October 410 counts/100 mL (as a STV)
- November-April 265 counts/100 mL (as a 30-day geometric mean)
- November-April 861 counts/100 mL (as a STV)

The applicable water quality standard for enterococci is:

- May-October 35 counts/100 mL (as a 30-day geometric mean)
- May-October 130 counts/100 mL (as a STV)
- November-April 74 counts/100 mL (as a 30-day geometric mean)
- November-April 273 counts/100 mL (as a STV)

TMDLs are the sum of all wasteload allocations (WLA) plus load allocation (LA) plus a margin of safety (MOS), or, stated as an equation, $TMDL = \sum WLA + \sum LA + MOS$. The MOS can be either implicit or explicit. For bacteria TMDLs, the practice has been to allocate an explicit ten percent MOS. TMDLs have given WLAs for all point sources equivalent to the recreational 30-day geometric mean criteria. The LA has also been given as the appropriate seasonal 30-day geometric mean criteria.

The wasteload allocation (WLA) is the portion of the receiving water's loading capacity that is allocated to existing or future point sources. WLAs were provided to the point sources with municipal wastewater treatment systems and to point sources with sanitary waste streams. Industrial wastewater treatment systems may also receive a WLA if they discharge bacteria because of the type of treatment processes employed or due to commingled sanitary waste streams.

For permitted point sources identified in the original TMDL, the WLAs were calculated based on permitted or design flow and primary recreation season bacteria criteria and are expressed as an accumulated load over a 30-day period and presented in units of counts per 30 days. If a facility expands its capacity and the permitted flow increases, the WLA for the facility would increase in proportion to the flow. If there is a new facility, the WLA would be the design flow times the summertime bacteria criteria. The established WLAs will meet the applicable water quality criteria. In addition, the permits may include routine monitoring and reporting requirements.

The reasonable assurance language included in the original TMDL in Section 6.3 shall be considered superseded and replaced by the following language.

The GA EPD is responsible for administering and enforcing laws to protect the waters of the State. Reasonable assurance ensures that a TMDL's wasteload and load allocations are properly distributed to meet the applicable water quality standards. Without such distribution, a TMDL's ability to serve as an effective guidepost for water quality improvement is significantly diminished. Federal regulations implementing the CWA require that effluent limits in permits be consistent with "the assumptions and requirements of any available [WLA]" in an approved

TMDL [40 CFR 122.44(d)(1)(vii)(B)]. NPDES point source permits will be given effluent limits in the permit consistent with the individual WLAs specified in the TMDL.

The GA EPD is the lead agency for implementing the State's Nonpoint Source Management Program. Regulatory responsibilities that have a bearing on nonpoint source pollution include establishing water quality standards and use classifications, assessing and reporting water quality conditions, and regulating land use activities that may affect water quality. Georgia works with local governments, agricultural and forestry agencies, such as the Natural Resources Conservation Service, the Georgia Soil and Water Conservation Commission, and the Georgia Forestry Commission, to foster the implementation of best management practices to address nonpoint sources. In addition, public education efforts will be targeted to individual stakeholders to provide information regarding the use of best management practices to protect water quality.

Table 12a. *E. coli* WLAs Required

Facility Name	Permit No.	Receiving Stream	Listed Stream Segment	Bacteria Indicator	WLA (counts/ 30 days)
Alma WPCP	GA0032328	Hurricane Creek	Alabaha River	<i>E. coli</i>	1.08E+11
Milliken & Company	GA0024619	Little Hurricane Creek	Alabaha River	<i>E. coli</i>	3.34+10 ^a

a Note: This facility has no permit limits for flow or fecal coliform bacteria. The flow used to calculate the WLA was the estimated average flow provided in an attachment to the permit. The fecal coliform bacteria concentration used for the calculation was 200 cnts/100 ml, which is the standard limit given in the majority of NPDES permits.

Table 13a. *E. coli* Loads Required

Stream Segment	Location	Bacteria Indicator	Current Load (counts/30 days)	TMDL Components					Percent Reduction
				WLA ¹ (counts/30 days)	WLASw (counts/30 days)	LA (counts/30 days)	MOS (counts/30 days)	TMDL (counts/30 days)	
Alabaha River GAR030702011004	Tan Trough Creek to Satilla River (Pierce Co.)	<i>E. coli</i>	2	1.10E+11		1.68E+14	1.86E+13	1.86E+14	Undetermined ³
Big Satilla Creek GAR030702020302	Sweetwater Creek to Colemans Creek (Appling, Pierce, Brantley Co.)	<i>E. coli</i>	2			3.34E+13	3.70E+12	3.70E+13	Undetermined ³
Buffalo Creek GAR030702011102	Little Buffalo Creek to Satilla River (Brantley Co.)	<i>E. coli</i>	2			8.38E+13	9.32E+12	9.32E+13	Undetermined ³
Dry Creek GAR030102020406	Headwaters to Boggy Creek (Wayne Co.)	<i>E. coli</i>	2			1.03E+13	1.15E+12	1.15E+13	Undetermined ³
Dry Creek GAR030702010606	Headwaters to Hurricane Creek (Coffee Co.)	<i>E. coli</i>	2			3.81E+09	4.23E+08	4.23E+09	Undetermined ³
Hurricane Creek GAR030702010603	Bear Creek to Dry Creek (Coffee Co.)	<i>E. coli</i>	2			3.01E+09	3.35E+08	3.35E+09	Undetermined ³
Little Satilla Creek GAR030702020407	Dry Branch to Boggy Creek (Dry Creek) (Wayne Co.)	<i>E. coli</i>	2			5.83E+13	6.49E+12	6.49E+13	Undetermined ³
Little Satilla Creek GAR030702020401	Boggy Creek to Little Satilla River near Screven (Wayne Co.)	<i>E. coli</i>	2			9.39E+11	1.05E+11	1.05E+12	Undetermined ³
Satilla River GAR030702010204	Reedy Creek to Indian Creek (Coffee Co.)	<i>E. coli</i>	2			1.03E+11	1.14E+10	1.14E+11	Undetermined ³
Seventeen Mile River GAR030702010503	Twentynine Mile Creek to Satilla River (Coffee, Atkinson, Ware Co.)	<i>E. coli</i>	2			6.36E+11	7.06E+10	7.06E+11	Undetermined ³

Notes:

- (1) The assigned bacteria load from the NPDES permitted facility for WLA was determined as the product of the *E. coli* permit limit and the facility average monthly discharge at the time of the critical load.
- (2) Samples were not analyzed for *E. coli*, therefore critical load calculation not possible
- (3) Percent reduction could not be determined due to absence of current load calculation