

Technical Memorandum

Significant Nutrient and Biochemical Oxygen Demand Point Sources and Nonpoint Sources in the Lower Wicomico River Watershed

EPA requires that Total Maximum Daily Load (TMDL) allocations account for all significant sources of each impairing pollutant. This technical memorandum identifies, in detail, the significant surface water discharges and significant nonpoint sources of nitrogen (TN), phosphorus (TP), and Biochemical Oxygen Demand (BOD) in the Lower Wicomico River and their distribution between different land uses. Modeling input information is provided for simulating all potentially significant point sources as discrete discharges. Details are provided for allocating nonpoint source loads for nutrients to different land use categories. These are conceptual values that are within the TMDL thresholds. They represent viable individual allocations to each point source. However, Maryland Department of the Environment (MDE) expressly reserves the right to allocate the TMDLs among different sources in any manner that is reasonably calculated to achieve water quality standards.

TMDLs are being established in the Lower Wicomico River watershed for both low-flow and average annual conditions. The nonpoint source loads that were used in the model account for both “natural” and human-induced components. Low-flow nonpoint source loads were based on in-stream monitoring data. Insufficient data are available to distribute the low-flow nonpoint source load among different land use categories.

The average annual nonpoint source loads were determined using land use loading coefficients. The land use information was based on 1997 Maryland Office of Planning data. The total nonpoint source load was calculated by summing all of the individual land use areas and multiplying by the corresponding land use loading coefficients. The loading coefficients were based on the results of the Chesapeake Bay Model¹, which was a continuous simulation model. The Chesapeake Bay Program nutrient loading rates represent loads delivered to the stream, for the year 2000 assuming Best Management Practice (BMP) implementation at levels consistent with current Maryland’s Tributary Strategy progress, and account for atmospheric deposition, loads from septic tanks, and loads coming from urban development, agriculture, and forestland.

Tables 1A, 1B, and 1C provide point source modeling information for low-flow TMDLs for TN, TP, and BOD respectively. This is supplemented by Table 1D, which provides additional information attributed to each point source for the low-flow calculations.

¹ U.S. EPA Chesapeake Bay Program, “Chesapeake Bay Program: Watershed Model Application to Calculate Bay Nutrient Loadings: Final Findings and Recommendations,” and Appendices, 1996.

Table 1A
Loads Attributed to Significant Point Sources for
the Low-Flow Nitrogen TMDL^a

Source Name	Permit Number	TN Load <i>lb/month</i>	Flow <i>mgd</i>	Concentration <i>mg/l</i>
Fruitland Wastewater Treatment Plant	MD0052990	2,002	1.0	8
Salisbury Wastewater, Treatment Plant	MD0021571	14,036	10.2	5.5

Table 1B
Loads Attributed to Significant Point Sources for
the Low-Flow Phosphorus TMDL^a

Source Name	Permit Number	TP Load <i>lb/month</i>	Flow <i>mgd</i>	Concentration <i>mg/l</i>
Fruitland Wastewater Treatment Plant	MD0052990	500	1.0	2
Salisbury Wastewater, Treatment Plant	MD0021571	5,104	10.2	2

Table 1C
Loads Attributed to Significant Point Sources for
the Low-Flow BOD TMDL^a

Source Name	Permit Number	BOD Load <i>lb/month</i>	Flow <i>mgd</i>	Concentration <i>mg/l</i>
Fruitland Wastewater Treatment Plant	MD0052990	7,506	1.0	30
Salisbury Wastewater, Treatment Plant	MD0021571	61,249	10.2	24

Table 1D
Additional Assumptions for Low Flow TMDLs^{a,b}

		Fruitland Wastewater Treatment plant	Salisbury Wastewater Treatment Plant
CBOD	<i>kg/d</i>	189.5	1546
DO	<i>kg/d</i>	18.95	193
NH₃	<i>kg/d</i>	1.61	11.3
ON	<i>kg/d</i>	17.1	120
NO₂	<i>kg/d</i>	11.5	80.9
PO₄	<i>kg/d</i>	3.68	37.5
OP	<i>kg/d</i>	3.89	39.7
Flow	<i>m³/s</i>	0.0438	0.447
Total Nitrogen	<i>kg/d</i>		242
Total Phosphorus	<i>kg/d</i>		84.8

^a These loadings correspond to model scenario 3 in the Draft TMDL *Total Maximum Daily Loads of Nitrogen, Phosphorus, and BOD for the Wicomico River Wicomico County, Maryland*, September 2000.

^b 1 Kg = 2.2 lb

Tables 2A and Table 2B provide point source modeling information for average annual flow TMDLs for TN and TP respectively. This is supplemented by Table 3, which provides additional information attributed to each point source for the low-flow and average annual TMDL calculations.

Table 2A
Loads Attributed to Significant Point Sources for
Average Annual Nitrogen TMDLs^c

Source Name	Permit Number	TN Load <i>lb/year</i>	Flow <i>mgd</i>	Concentration <i>mg/l</i>
Fruitland Wastewater Treatment Plant	MD0052990	36,530	1.0	12
Salisbury Wastewater, Treatment Plant	MD0021571	372,600	10.2	12

Table 2B
Loads Attributed to Significant Point Sources for
Average Annual Phosphorus TMDLs^c

Source Name	Permit Number	TP Load <i>lb/year</i>	Flow <i>mgd</i>	Concentration <i>mg/l</i>
Fruitland Wastewater Treatment Plant	MD0052990	6,090	1.0	2
Salisbury Wastewater, Treatment Plant	MD0021571	62,100	10.2	2

The loadings, concentrations, and flows represented in the tables above are for illustrative purposes only. Actual effluent limits and related permit conditions will be established at the time of permit issuance or renewal and will be based upon conditions present at that time, as reflected in population projections, infrastructure needs as defined in County Comprehensive Water and Sewer Plans, and appropriate concentrations and loadings needed to address impairments of the water quality limited segments identified by this TMDL and the applicable 303(d) list. The total of load reductions from all sources will, however, remain the same as the subtotals and grand totals reflected on the charts. Point source loadings, flows, and concentrations placed in permits will be based upon the information listed above as well as that provided during the permit adjudication process.

Table 3A and Table 3B provide one possible scenario for the distribution of average annual nitrogen and phosphorus nonpoint source loads between different land use categories.

^c These loadings correspond to model scenario 4 in the Draft TMDL *Total Maximum Daily Loads of Nitrogen and Phosphorus for the Wicomico River Wicomico County, Maryland*, September 2000.

Table 3A
Nonpoint Source Nitrogen Loads
Attributed to Significant Land Uses for Average Annual TMDLs

Land Use Category	Percent of Nonpoint Source Load	Nonpoint Source Load (lb/yr)
Mixed Agricultural	34.7	288,600
Forest and Other Herbaceous	25.3	210,260
Urban	36.7	305,350
Atmospheric Deposition ²	3.4	28,250
Total	100	832,460

Table 3B
Nonpoint Source Phosphorus Loads
Attributed to Significant Land Uses for Average Annual TMDLs

Land Use Category	Percent of Nonpoint Source Load	Nonpoint Source Load (lb/yr)
Mixed Agricultural	56.2	19,020
Forest and Other Herbaceous	15.3	5,170
Urban	24.7	8,360
Atmospheric Deposition ²	3.8	1,300
Total	100	33,850

It must be noted that these loads are based on broad-scaled estimates. Efforts are underway to update the Chesapeake Bay model, and MDE anticipates that better estimates of land use and loading rates will be available in the future.

² The atmospheric deposition load is attributable to deposition only to surface water, atmospheric deposition to land surfaces is included in the loads attributed mixed agriculture, forest and other herbaceous, and urban land uses.