

Technical Memorandum

Significant Nutrient Nonpoint Sources in the Baltimore Harbor (Patapsco River Mesohaline) Watershed

The U.S. Environmental Protection Agency 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 nonpoint sources (NPS) of total nitrogen (TN) and total phosphorus (TP) in the Baltimore Harbor watershed and their distribution between different land uses. Details are provided for allocating NPS loads for nutrients to different land use categories. These are conceptual values that are within the TMDL thresholds. The 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 Baltimore Harbor watershed for both growing season and average annual conditions. The NPS loads that were used in the model account for all sources including both natural and human-induced components. The growing season NPS loads and the average annual NPS loads were both estimated using the Hydrological Simulation Program Fortran (HSPF) model. As explained in the main document, the simulation of the Baltimore Harbor Watershed used the following assumptions: (1) variability in patterns of precipitation were estimated from existing National Oceanic and Atmospheric Administration (NOAA) meteorological stations; (2) hydrologic responses of land areas were estimated for a simplified set of land uses in the basin; and (3) agricultural information was estimated from the Maryland Department of Planning (MDP) land use data, the 1997 Agricultural Census Data, and the Farm Service Agency (FSA). The nutrient loads account for contributions from atmospheric deposition to land, septic tanks, cropland, pasture, feedlots, and forest. Urban land contributions are included in the point sources technical memorandum. The land use information was based on 1997 MDP data. These percentages were then applied to the TMDL loads estimated from MDE observed data.

The nutrient reductions for nonpoint sources, reflected in the TMDL analysis, are designed to protect water quality in the Baltimore Harbor and the Chesapeake Bay. It is likely, however, that future Chesapeake Bay Agreement goals may entail more ambitious nonpoint source nutrient reductions to protect the water quality of the Bay.

Tables 1a and 1b provide one possible scenario for the distribution of the growing season nitrogen and phosphorus NPS loads between different land use categories. Tables 2a and 2b provide one possible scenario for the distribution of average annual nitrogen and phosphorus NPS loads between different land use categories. Tables 3a and 3b present the agricultural and forest loads distributed by jurisdictions for the growing season TMDLs. Tables 4a and 4b present the agricultural and forest loads distributed by jurisdictions for the Average Annual TMDLs. These distributions are based on percentages of each particular land use in each jurisdiction relative to the total area of that land use in the watershed.

Table 1a
Nonpoint Source Nitrogen Loads Attributed to
Significant Land Uses for Baltimore Harbor Growing Season TMDLs

Land Use Category	Percentage of Nonpoint Source Load	TN Nonpoint Source Load (lbs/growing season)
Mixed Agricultural	43.9 %	201,792
Forest and Other Herbaceous	15.5 %	71,502
Septics	40.6 %	186,618
Total	100.0 %	459,912

Table 1b
Nonpoint Source Phosphorus Loads Attributed to
Significant Land Uses for Baltimore Harbor Growing season TMDLs

Land Use Category	Percentage of Nonpoint Source Load	TP Nonpoint Source Load (lbs/growing season)
Mixed Agricultural	47.0 %	6,006
Forest and Other Herbaceous	53.0 %	6,768
Septics	0.0 %	0
Total	100.0 %	12,774

Atmospheric deposition to land surfaces is included in the loads attributed to mixed agriculture, forest and other herbaceous, and urban land uses.

Table 2a
Nonpoint Source Nitrogen Loads Attributed to
Significant Land Uses for Baltimore Harbor Average Annual TMDLs

Land Use Category	Percentage of Nonpoint Source Load	TN Nonpoint Source Load (lbs/yr)
Mixed Agricultural	53.8 %	670,730
Forest and Other Herbaceous	17.4 %	216,216
Septics	28.8 %	359,090
Total	100.0 %	1,246,036

Table 2b
Nonpoint Source Phosphorus Loads Attributed to
Significant Land Uses for Baltimore Harbor Average Annual TMDLs

Land Use Category	Percentage of Nonpoint Source Load	TP Nonpoint Source Load (lbs/yr)
Mixed Agricultural	46.0 %	15,929
Forest and Other Herbaceous	54.0 %	18,725
Septics	0 %	0
Total	100.0 %	34,654

Atmospheric deposition to land surfaces is included in the loads attributed to mixed agriculture, forest and other herbaceous, and urban land uses.

Table 3a
Agricultural Loads by Jurisdiction
for Baltimore Harbor Growing Season TMDLs

Jurisdiction	% of Agricultural Land within Watershed	Growing Season Agricultural TN Load (lbs/season)	Growing Season Agricultural TP Load (lbs/season)
Anne Arundel County	4%	7,720	230
Baltimore City	0.0024%	5	0
Baltimore County	26%	52,864	1,573
Carroll County	43%	87,539	2,605
Howard County	27%	53,664	1,597
Totals	100%	201,792	6,006

Table 3b
Forest Loads by Jurisdiction
for Baltimore Harbor Growing Season TMDLs

Jurisdiction	% of Forest Land within Watershed	Growing Season Forest TN Load (lbs/season)	Growing Season Forest TP Load (lbs/season)
Anne Arundel County	22%	15,710	1,487
Baltimore City	4%	3,169	300
Baltimore County	36%	26,062	2,467
Carroll County	15%	10,762	1,019
Howard County	22%	15,799	1,495
Totals	100%	71,502	6,768

Table 4a
Agricultural Loads by Jurisdiction
for Baltimore Harbor Average Annual TMDLs

Jurisdiction	% of Agricultural Land within Watershed	Annual Agricultural TN Load (lbs/year)	Annual Agricultural TP Load (lbs/year)
Anne Arundel County	4%	25,660	609
Baltimore City	0.0024%	16	0
Baltimore County	26%	175,712	4,173
Carroll County	43%	290,968	6,910
Howard County	27%	178,373	4,236
Totals	100%	670,730	15,929

Table 4b
Forest Loads by Jurisdiction
for Baltimore Harbor Average Annual TMDLs

Jurisdiction	% of Forest Land within Watershed	Annual Forest TN Load (lbs/year)	Annual Forest TP Load (lbs/year)
Anne Arundel County	22%	47,509	4,114
Baltimore City	4%	9,581	830
Baltimore County	36%	78,809	6,825
Carroll County	15%	32,542	2,818
Howard County	22%	47,775	4,137
Totals	100%	216,216	18,725