Technical Memorandum

Significant Phosphorus Nonpoint Sources in the Broadford Lake Watershed

An annual TMDL for phosphorus is being proposed in the Broadford Lake watershed. EPA requires that TMDL allocations account for all significant sources including both "natural" and human-induced components. This technical memorandum identifies the distribution of maximum allowable nonpoint source (NPS) loads among different source categories. These load contributions are conceptual values that are within the proposed TMDL threshold. They represent viable individual allocations to each source category. 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.

The NPS loads were determined using land use loading coefficients and information about atmospheric deposition. The land use information was based on 1994 Maryland Office of Planning data and 1997 Agricultural Census data. The total NPS 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 Program Phase IV Model (Segment 160), which is a continuous simulation model. The Chesapeake Bay Program nutrient loading rates account for atmospheric deposition[1], loads from septic tanks, and loads coming from urban development, agriculture, and land covered by forest or other herbaceous growth. Direct atmospheric deposition of the water is from "Water Quality Modeling of the St. Martin River, Assawoman and Isle of Wight Bays," MDE, 1994. The loading rates account for both "natural" and human-induced sources. The current total NPS phosphorus load is estimated to be 1,771 lb/yr.

The computation of the phosphorus TMDL is presented in the report *Total Maximum Daily Load of Phosphorus for Broadford Lake,* MDE, December 1999. The annual TMDL for phosphorus is 1,217 lbs/yr. Table 1 provides one possible scenario for the distribution of phosphorus NPS loads between different source categories. The TMDL allocation to nonpoint sources is 1,095 lbs/year.

The NPS load distribution under the TMDL is based upon estimated reductions needed to achieve the target NPS goal. For the purpose of illustrating one possible scenario, the percent reductions needed to achieve the NPS goal are applied equally to each nonpoint source category within the watershed. The percent reduction can be calculated by dividing the difference between the NPS target load and the current NPS load by the current NPS load (Target Load - Current Load)/(Current Load).

1 Atmospheric deposition to the land surface is accounted for in the land use loading coefficients.

Table 1
Phosphorus Loads Attributed to Significant Nonpoint Sources
For Average Annual Phosphorus TMDL

Source Category	Percent of Nonpoint Source Load	Nonpoint Source Load (lbs/yr)
Agriculture	72 %	791
Forest and Herbaceous Cover	5 %	49
Urban	19 %	210
Direct Atmospheric Deposition to Water Surface	4 %	45
TOTAL	**100 %**	**1,095**

MDE anticipates that, when considering detailed implementation, opportunities and priorities for nonpoint source reductions will vary throughout the watershed. For example, giving consideration to transport losses from different parts of the watershed could suggest more cost-effective means of achieving the overall goal. In addition, cost-effectiveness will be considered in meeting the load reductions as part of any detailed implementation strategy. Any implementation strategy that might shift reductions among the land uses would be done in a manner that involves stakeholders and would be consistent with the TMDL goal.

The current load estimates are based on broad-scale simulation of land use loading rates. Efforts are underway to update the Chesapeake Bay Watershed model, and MDE anticipates that better estimates will be available in the future.