Tomlinson Run Lake, West Virginia

Total Maximum Daily Load
for
Sediment

Established by
The Environmental Protection Agency, Region III

September 30, 1998

TOTAL MAXIMUM DAILY LOAD
TOMLINSON RUN LAKE, WEST VIRGINIA

Introduction

The West Virginia Division of Environmental Protection (DEP) listed the Tomlinson Run Lake (stream code #O(L)102-(1)) on its 1996 Section 303(d) list due siltation and organic enrichment from agriculture and construction activities. Since the time of the 1996 303(d) list, DEP has determined that the lake is not impaired due to organic enrichment and will not be including this pollutant on the 1998 edition of the 303(d) list. The Total Maximum Daily Load (TMDL) presented here addresses siltation, the sole remaining cause of impairment.

To develop this TMDL, EPA used two computer models. First, the Hydrologic Simulation Program Fortran (HSPF) was used to simulate the runoff of pollutants from the watershed, the delivery of those pollutants to the stream channels, and the routing of the pollutants to the lake. Second, the Environmental Fluid Dynamics Code (EFDC) was used to simulate the transport and fate of the pollutants once they were delivered to the lake. The models were then run with reduced pollutant load until water quality standards were met.

EPA is establishing a TMDL for the amount of sediment that enters the lake. Table 1 summarizes the TMDL and the component wasteload (WLA) and load allocations (LA) needed to meet the TMDL.

Table 1. Summary of TMDL (kg/day)[a]

PARAMETER	WLA[b]	LA[b]	MOS	TMDL
Sediment	1.44	4890.66	implicit	4892.10

TABLE NOTES:

a. The TMDL technical development report expresses the sediment loads on an annual basis. For the purpose of this table, and consistency with previous TMDLs, EPA has divided those values by 365 days to arrive at daily loads.

b. The load allocation is the sum of the loads from several categories of nonpoint sources. The separate allocations are shown below in the discussion of WLAs and LAs.

EPA developed this TMDL consistent with statutory and regulatory requirements and EPA policy and guidance. The Tomlinson Run Lake TMDL addresses the following seven regulatory elements:

1. Water quality standards.

This TMDL ensure that Tomlinson Run Lake will meet the applicable water quality criteria for siltation, thus ensuring that the water supports its designated use. West Virginia has only narrative criteria related to siltation.

Selecting an endpoint to represent attainment of standards is difficult in the case of siltation. Impoundments such as Tomlinson Run Lake, by their nature, are subject to siltation. The challenge is to select a rate of siltation that is reasonable, recognizing that a significant amount of siltation is inevitable. For this TMDL, EPA determined, based on best professional judgement, that an appropriate indicator of standards attainment was a sedimentation rate that would result in 30% of the average reservoir depth being preserved (70% reduced) after 40 years. At the existing rate of siltation (4.0 cm/yr at an inlet to the lake), 70% of the remaining capacity would be reduced in only 13.8 years. Because the lake is already severely impacted by siltation—the mean depth is a mere 0.59 meters—preserving 30% of the remaining depth would require reducing siltation by a full 66%. EPA is not confident that such a significant reduction is feasible and has therefore developed this sediment TMDL with the assumption that the sediment load reductions will be accompanied by lake-wide dredging. Assuming the lake is dredged to an average depth of 1.77 meters (as recommended by the Tomlinson Run Clean Lakes Study), the allocations included in this TMDL will ensure that the indicator of water quality standards attainment—preservation of 30% of the depth after 40 years—will be met.

EPA believes the TMDL and the associated pollutant reductions are reasonable and implementable. A number of best management practices—both structural and non-structural—can significantly reduce sediment loads. For instance, maintained vegetated buffer strips along stream channels (in this case, the tributaries draining to Tomlinson Lake) have been shown to capture a significant amount of sediment. The vegetation also helps reduce stream bank erosion. Recent estimates of the trap efficiency of buffer strips range from 70% to 90%.[1]

2. Waste load allocations and load allocations.

There are four point source dischargers in the watershed: (1) Oak Glen High School, Red Baron Trailer Court, Roma's Pizza, and Tomlinson Run State Park sewage treatment plant. The first three facilities do not discharge directly to the lake or any of its major tributaries. These three facilities were deemed to have an insignificant impact on the siltation of the lake and were not included in the analysis. This is consistent with EPA Region III's 1997 guidance which states that "the significant sources of the pollutant must be identified and factored into the calculations." The wasteload allocations for these facilities are not specifically set forth in this TMDL. The fourth point source facility, the Tomlinson Run State Park STP discharges directly to the lake and was included in the analysis. This facility has flow and monthly TSS limitations of 12,660 gpd and 30 mg/l, respectively, which were used to calculate the facility's wasteload allocation (WLA). This TMDL assumes no change in this point source's permit limits. Table 2 summarizes the WLA.

[1]Qui, Z. and T. Prato, 1998. Economic Evaluation of Riparian Buffers in an Agricultural Watershed. Journal of the American Water Resources Association, Vol. 34, No. 4, pp. 877-890.

Table 2. Wasteload Allocations and Needed Reductions (kg/day)

SOURCE	SEDIMENT	
	Allocation	% Reduction
Tomlinson Run State Park STP	1.44	0
TOTAL WLA	1.44	0

The TMDL also includes load allocations (LA) for nonpoint sources. The overall load allocation is broken down into allocations from the most significant categories of nonpoint sources. Table 3 summarizes the LAs.

Table 3. Load Allocations and Needed Reductions (kg/day)

SOURCE	SEDIMENT	
	Allocation	% Reduction
Residential	302.11	30
Commercial/Industrial	25.20	30
Forest	2136.10	30
Cropland/Pasture	2426.42	30
Barren	0.84	0
TOTAL LA	4890.66	30

3. Background pollutant contributions.
Natural background is included as a component of the load allocations. The sediment loads associated with each land use category include the naturally occurring as well as human-induced contributions. The model was calibrated (i.e., adjusted so that the model predictions matched measured values) to water quality data that represents the cumulative impact from all sources—naturally-occurring and human-induced combined.

4. Critical conditions.
The critical conditions for siltation are difficult to precisely define. In terms of the water quality impact of siltation, there is no single critical period. Siltation negatively impacts the lake regardless of when it occurs. In terms of sediment loading, the critical conditions occur during wet-weather events when the greatest amount of sediment is delivered to the lake. The use of a continuous simulation model in developing this TMDL accounts for all possible critical conditions, both in terms of loading and water quality.

5. Seasonal variations.
This TMDL appropriately consider seasonal variation. We have explicitly considered all seasonal variation by using a continuous simulation model that simulates loading and water quality throughout an entire year.

6. Margin of safety.
The Clean Water Act and federal regulations requires TMDLs to include a margin of safety (MOS) to take into account any lack of knowledge concerning the relationship between effluent limitations and water quality. EPA guidance suggests two approaches to satisfy the MOS requirement. First, it can be met implicitly by using conservative model assumptions to develop the allocations. Alternately, it can be met explicitly by allocating a portion of the allowable load to the MOS.

In this TMDL we used conservative assumptions in the analysis to provide a margin of safety. Most notably, the sediment loads predicted by the model are higher than those estimated in the Tomlinson Run Clean Lakes study. By using the higher load estimates predicted by the model we have provided an implicit margin of safety. Also, the analysis of the sedimentation rate assumes that the trap efficiency of the lake remains constant. In reality, the trap efficiency—and thus the rate of siltation—will decrease as the lake capacity and residence time decrease. This conservative assumption further bolsters the MOS. We note that 1995, the representative hydrologic year used to develop the allocations, appears to be a relatively low-load year (figure 3.2 in technical report). However, the model predictions for 1995 are very close (though still slightly higher) to the sediment load estimated by monitoring data during the earlier Clean Lakes Study.

7. Public participation
EPA published and requested comments on the proposed TMDLs on July 2, 1998 in the Charleston Gazette and six other newspapers across the state. EPA held a public meeting on July 16, 1998 in Parkersburg, West Virginia. In addition, EPA requested comments from United States Fish and Wildlife Service and no comments were received. EPA did not receive comments from any individuals and organizations specifically for Tomlinson Run Lake.

FINAL AGENCY ACTION

W. Michael McCabe
Regional Administrator
EPA Region III

OCT 0 1 1998
Date