

Expert Panel Report on Tidal Shoreline Management: Nutrient Loads Associated with Tidal Shoreline Erosion

Urban Stormwater Workgroup April 17, 2018

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Chesapeake Bay Program
Science, Restoration, Partnership



Estimated Tidal Shoreline Nutrient Loads

Protocol	Submitted Unit	Total Nitrogen (lbs per unit)	Total Phosphorus (lbs per unit)	Total Suspended Sediment (lbs per unit)
Protocol 1 - Prevented Sediment	Linear Feet	Project-Specific*	Project-Specific*	Project-Specific
Protocol 2 – Denitrification	Acres of re-vegetation	85	NA	NA
Protocol 3 - Sedimentation	Acres of re-vegetation	NA	5.289	6,959
Protocol 4 – Marsh Redfield Ratio	Acres of re-vegetation	6.83	0.3	NA
Non-conforming/Existing Practices	Linear Feet	0.04756/0.01218*	0.03362/0.00861*	164 /42 **

Table 1. Summary of shoreline management pollutant load reduction for individual projects.

*The WTWG recommended in 2015 that no reductions for TN and TP until the Modeling Workgroup had an opportunity to evaluate the availability of TN and TP in shoreline sediments. The WTWG approved the reductions following this analysis in June 2017 (p. 2-3). The analysis estimated **an average of 0.00029 lbs TN/ lb of TSS and 0.000205 lbs TP/ lb of TSS in eroded tidal shoreline sediment**. These values can be used directly by jurisdictions for their calculations in Protocol 1, and were adapted for non-conforming/existing practices by multiplying by the default TSS reduction for non-conforming projects by the average nutrient concentrations in sediment. The first number applies to MD, DE and DC and the second number applies to VA.

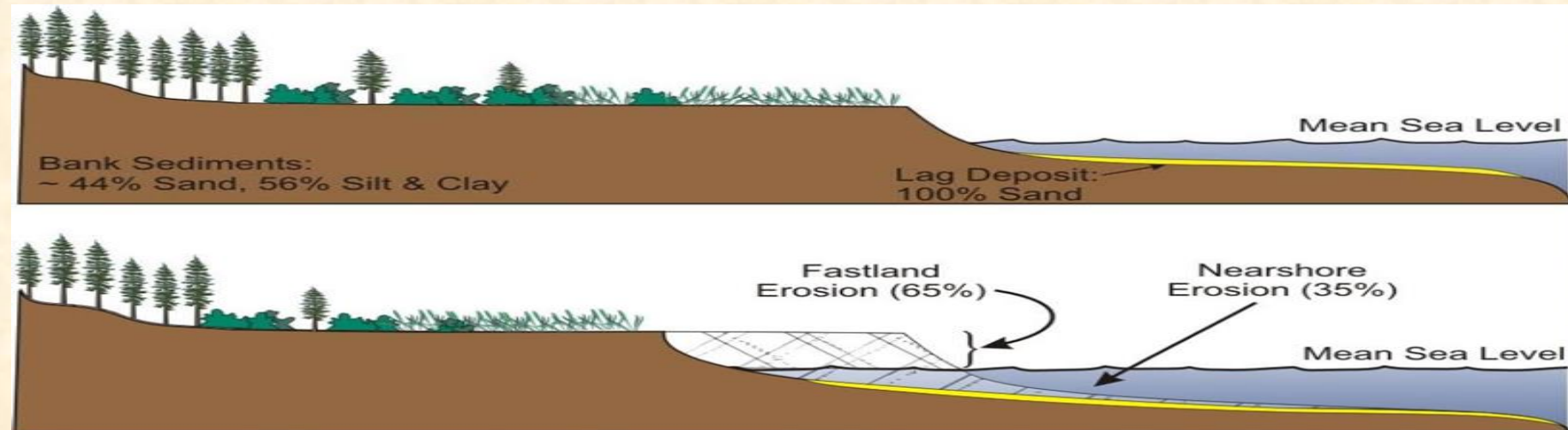


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Estimated nutrient content attributed to eroded sediments is 0.29 mg N g^{-1} solids and $0.205 \text{ mg P g}^{-1}$ solids. Using these values, the total nitrogen and total phosphorus shoreline erosion loads to the Bay are readily computed. Comparison to other watershed loads indicates the contribution of shoreline erosion to the Bay nitrogen budget is minor, less than 1% of the total watershed load. Total phosphorus loading from shoreline erosion is comparable in magnitude to alternate sources and comprises 11% of the decadal average total load.

2017 WQSTM Documentation (May 2015 draft)

Tidal shoreline erosion from unprotected lands for the fastland and nearshore represent 65% and 35% of the total tidal shore load, respectively (Cerco et al, 2010; Langeland and Cronin, 2003).



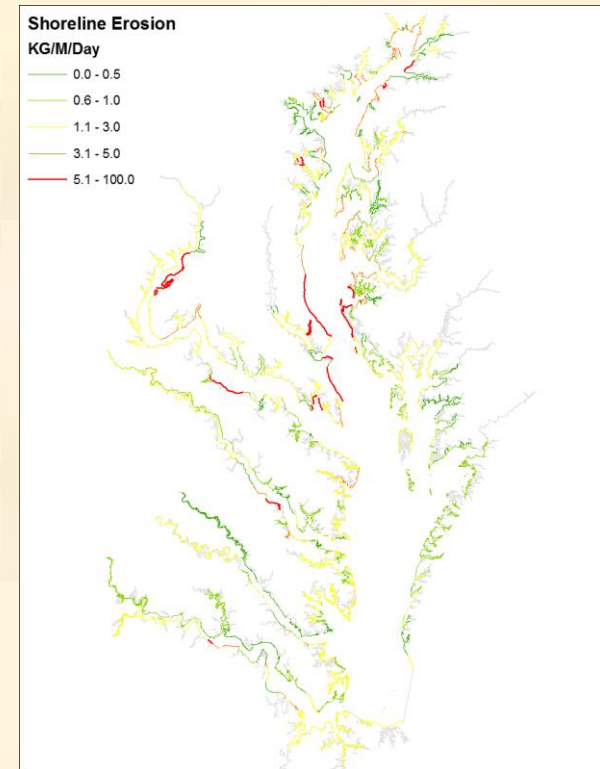


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Little guidance exists for partitioning the total nutrients into model state variables. The nitrogen content of sediments must be mapped into labile, refractory, and G3 organic particles. Sediment phosphorus must be mapped into particulate inorganic form as well as the three organic classes.

The final fractionation of shoreline erosion loads was:

- 50% of total phosphorus is in particulate inorganic form.
- 20% of total nitrogen and 10% of total phosphorus is in refractory particulate organic form.
- 80% of total nitrogen and 40% of total phosphorus is in G3 particulate organic form.





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