TMDL Credit for Wetlands: Incentives and Trade-Offs

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Chesapeake Bay Program **Approved** BMPs

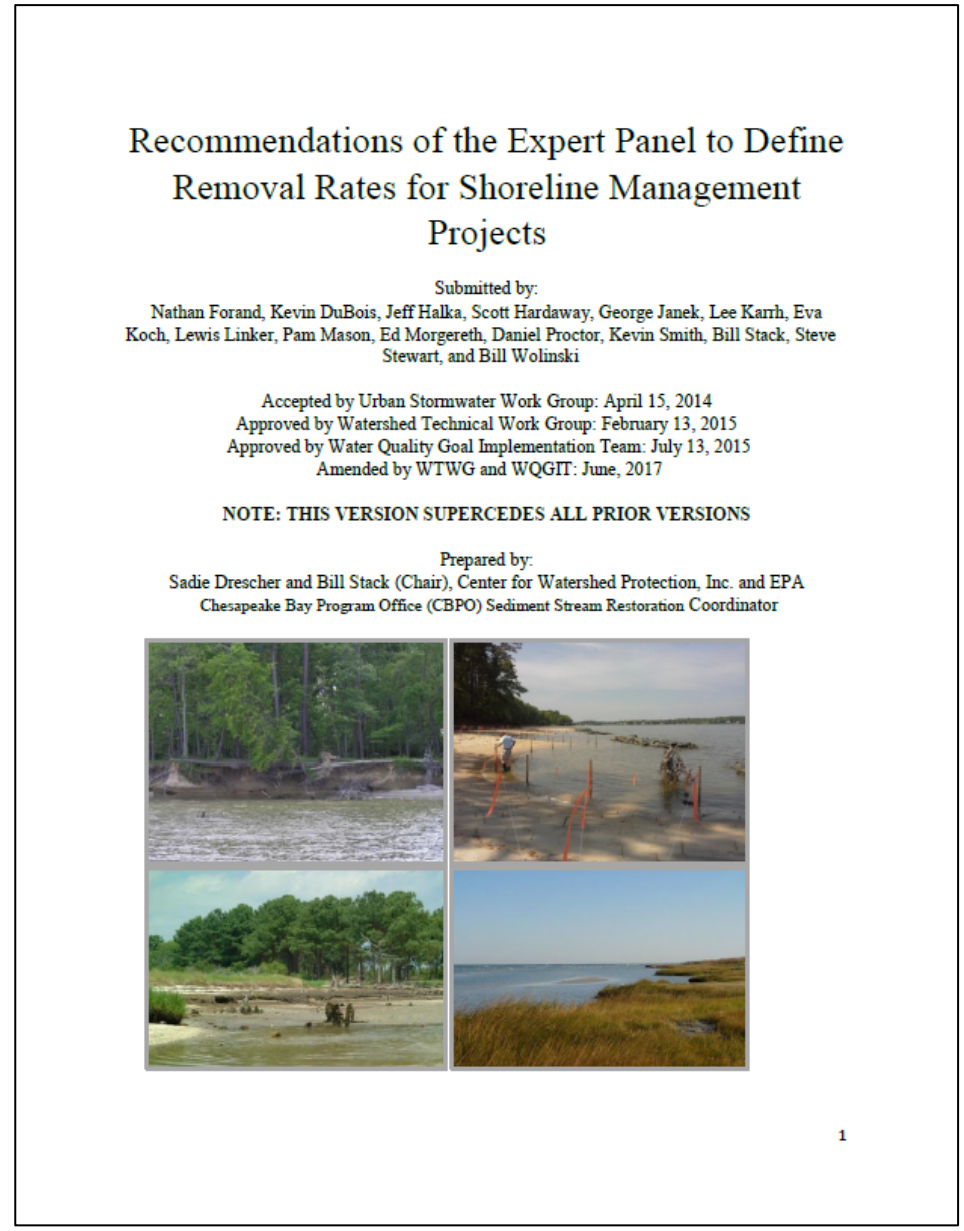
1. Shoreline Management / Tidal Marsh creation
2. Nontidal Wetlands Restoration

Chesapeake Bay Program Expert Panel Process

- Solicit/ Appoint Members
- Convene & Charge Panel
  - *Protocol for the Development, Review, and Approval of Loading and Effectiveness Estimates for Nutrient and Sediment Controls in the Chesapeake Bay Watershed Model*
- Conduct Scientific Review
- Draft Recommendations
- Review and Approval Process

Shoreline Expert Panel

- Convened by USEPA Chesapeake Bay Program
- Report approved 2015, revised 2017
- Review the science and published literature
- Develop protocols to estimate pollutant load reductions associated with different shoreline erosion BMPs
- Identified qualifying criteria



Recommendations of the Expert Panel to Define Removal Rates for Shoreline Management Projects

Submitted by:
Nathan Forand, Kevin DuBois, Jeff Halka, Scott Hardaway, George Janek, Lee Karrh, Eva Koch, Lewis Linker, Pam Mason, Ed Morgereth, Daniel Proctor, Kevin Smith, Bill Stack, Steve Stewart, and Bill Wolinski

Accepted by Urban Stormwater Work Group: April 15, 2014
Approved by Watershed Technical Work Group: February 13, 2015
Approved by Water Quality Goal Implementation Team: July 13, 2015
Amended by WTWG and WQGIT: June, 2017

NOTE: THIS VERSION SUPERCEDES ALL PRIOR VERSIONS

Prepared by:
Sadie Drescher and Bill Stack (Chair), Center for Watershed Protection, Inc. and EPA Chesapeake Bay Program Office (CBPO) Sediment Stream Restoration Coordinator

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Shoreline BMPs

- Protocol 1: Prevented Sediment

Annual mass sediment reduction credit. The pollutant loads are reduced for sand content and bank instability (based on the state's assessment).

- Protocol 2: Credit for Denitrification

Annual mass nitrogen reduction credit for practices that include vegetation.

- Protocol 3: Credit for Sedimentation

Annual mass sediment and phosphorus reduction credit for practices that include vegetation.

- Protocol 4: Credit for Marsh Redfield Ratio

One time nutrient reduction credit for practices that include vegetation.

- Default Rate

This protocol provides an annual mass sediment and nutrient reduction credit for qualifying shoreline management practices

Qualifying Criteria

Shoreline Management Practice	**The Practice Must Meet these Criteria for TMDL Pollutant Load Reduction[1]**
Living Shoreline – a) nonstructural; b)hybrid system including a sill; and c)hybrid system including a breakwater	1. The site is currently experiencing shoreline erosion or is replacing existing armor. The site was graded, vegetated, and excess sediment was removed or used.[2] **AND** 2. When a marsh fringe habitat (a or b) or beach/dune habitat (c) is created, enhanced, or maintained.
Revetment AND/OR Breakwater system without a living shoreline	1. The site is currently experiencing shoreline erosion, **AND** 2. A living shoreline is not technically feasible or practicable as determined by substrate, depth, or other site constraints. **AND** 3. When the breakwater footprint would not cover SAV, shellfish beds, and/or wetlands.
Bulkhead/Seawalls	1. The site is currently experiencing shoreline erosion. **AND** 2. The site consists of port facilities, marine industrial facilities, or other marine commercial areas where immediate offshore depth (e.g., depths deeper than 10 feet 35 feet from shore) precludes living shoreline stabilization or the use of a breakwater or revetment.

[1]Projects that impact the Chesapeake Bay Preservation Act protected vegetation without mitigation receive no Chesapeake Bay TMDL pollutant load reduction. Further, WQGIT agreed to allow States to determine, on a case-by-case basis, when the unintended consequences of negative impacts to wetlands and SAVs caused by these shoreline management techniques, outweigh the benefits, in which case the practice will not be reported to the Bay Program for model credit.

Shoreline BMP Protocols

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	MD = 0.04756 VA = 0.01218	MD = 0.03362 VA = 0.00861	MD = 164 VA = 42

Basic qualifying conditions for BMPs/sites

4 general protocols to define load reductions associated with specific BMPs

5-year BMP life, renewable upon field verification

Verification

1. Inspected and deemed ‘in compliance’
   – Inspection Date = BMP ‘Installation Date’
2. Not inspected, but visible via aerial imagery (desktop verification)
   – Date of Imagery = BMP ‘Installation Date’
3. Not inspected and not visible (field verification required)
   – Date of field visit = BMP ‘Installation Date’

Calculated Load Reductions Virginia

	# of Sites	Sites with Plants	Miles of Shoreline	N (lbs/yr)	P (lbs/yr)	S (lbs/yr)
Reported	481	9	17.7	3,750	2,630	6,410
Verified	514	12	20.0	4,975	3,395	8,259
Assessed	248	29	10.0	2,361	1,549	3,758
Total	1,243	50	47.7	11,086	7,574	18,427

- Reported to DEQ (and subsequently USEPA) in Nov. 2017
- Verified and Ready to Report to DEQ by Nov. 2018
- Assessed and Needs to be Verified either by Desktop or Field

Table from Aaron Wendt, VA department of Conservation and Recreation

Concerns for Marsh Creation BMP Incentive

- Review Processes for Qualifying Criteria: How and Who verfies
- Erosion as a natural process: Sand and sediment necessary for marsh and beach persistence. Significant credits from Protocol 1 : Non-vegetated approach
- Promoting shoreline management in locations with little or no risk. May promote unwarranted shoreline management and modification to natural processes

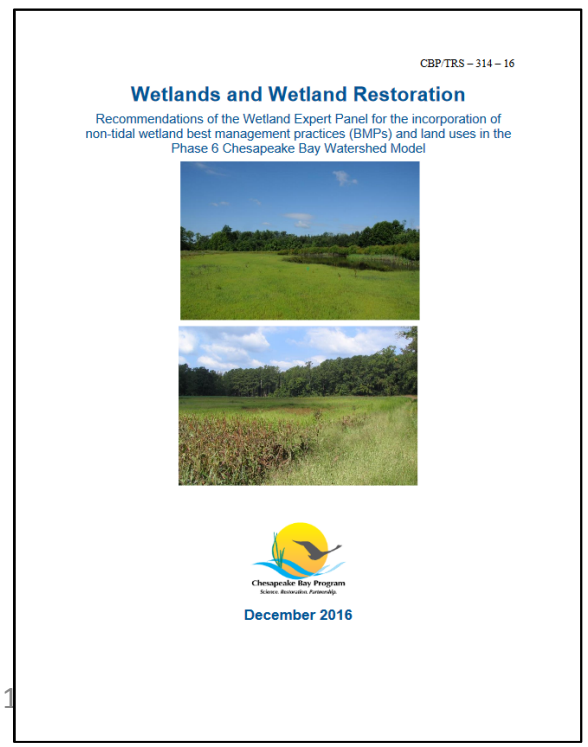
(Nontidal) Wetlands Expert Panel

- Convened 2014
- Charge:

  1. Refine wetland Restoration BMP definitions and Load reductions AND

  2. Recommendations for wetlands as separate land use class in Phase 6.0 model update

- Report approved 2016


CBP/TRS – 314 – 16

Wetlands and Wetland Restoration

Recommendations of the Wetland Expert Panel for the incorporation of non-tidal wetland best management practices (BMPs) and land uses in the Phase 6 Chesapeake Bay Watershed Model

Chesapeake Bay Program
Science. Restoration. Partnership.

December 2016

<u>Wetland Expert Panel</u>
Pam Mason (Co-Chair), Virginia Institute of Marine Science
Ralph Spagnolo (Co-Chair), US EPA Region 3
Kathy Boomer, The Nature Conservancy
Denise Clearwater, Maryland Department of Environment
Dave Davis, Virginia Department of Environmental Quality
Judy Denver, US Geological Survey
Jeff Hartranft, Pennsylvania Department of Environmental Protection
Michelle Henicheck, Virginia Department of Environmental Quality
Erin McLaughlin, Maryland Department of Natural Resources
Jarrod Miller, University of Maryland Extension
Ken Staver, Wye Research and Education Center
Steve Strano, US Department of Agriculture, Natural Resources Conservation Service –Maryland
Quentin Stubbs, US Geological Survey
Jeff Thompson, Maryland Department of Environment
Tom Uybarreta, US EPA Region 3

Definition Cross-walk for Panel Report

Proposed BMP Category	Proposed CBP Definition (for Phase 6 CBWM)	CBP will count the BMP acres as...	Practice and Project Examples
Restoration	Re-establish The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former wetland.	Acreage gain *(toward Watershed Agreement outcome of 85,000 acre wetland gain and in Phase 6 annual progress runs)*	Restore hydrology to prior-converted agricultural land (cropland or pasture); re-establishing needed vegetation on cropland with wetland hydrology; native wetland meadow planting; elevate subsided marsh and re-vegetate; ditch plugging on cropland; Legacy Sediment Removal
			NRCS Practice 657
Creation	Establish (or Create) The manipulation of the physical, chemical, or biological characteristics present to develop a wetland that did not previously exist at a site.	Acreage gain *(toward Watershed Agreement outcome of 85,000 acre wetland gain and in Phase 6 progress runs)*	Modifications to shallow waters or uplands to create new wetlands. Placement of fill material or excavation of upland to establish proper elevations for tidal wetland; Hydrologic measures such as impoundment, water diversion and/or excavation of upland to establish nontidal wetlands NRCS Practice 658
Enhancement	Enhance The manipulation of the physical, chemical, or biological characteristics of a wetland to heighten, intensify, or improve a specific function(s).	Function gain *(toward 150,000 acre outcome and Phase 6 annual progress runs)*	Flood seasonal wetland for waterfowl benefit; regulate flow velocity for increased nutrient uptake; NRCS Practice 659
Rehabilitation	Rehabilitate The manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded wetland.	Function gain *(toward 150,000 acre outcome and Phase 6 annual progress runs)*	Restore tidal flow to degraded wetland; ditch plugging in a forested wetland area; moist soil management*; invasive species removal, floodplain reconnection May include some NRCS Code 657 practices . *Moist soil management should only be counted if there are predominantly native wetland plants; and site can sustain itself as wetland without active management

Non-tidal Wetland Restoration

Stacking Benefits: Counts Twice

1. Restoration (returning function to former wetland) or Creation (construction of new wetlands from upland) qualifies for load source change from previous to wetland landcover Ag or Urban

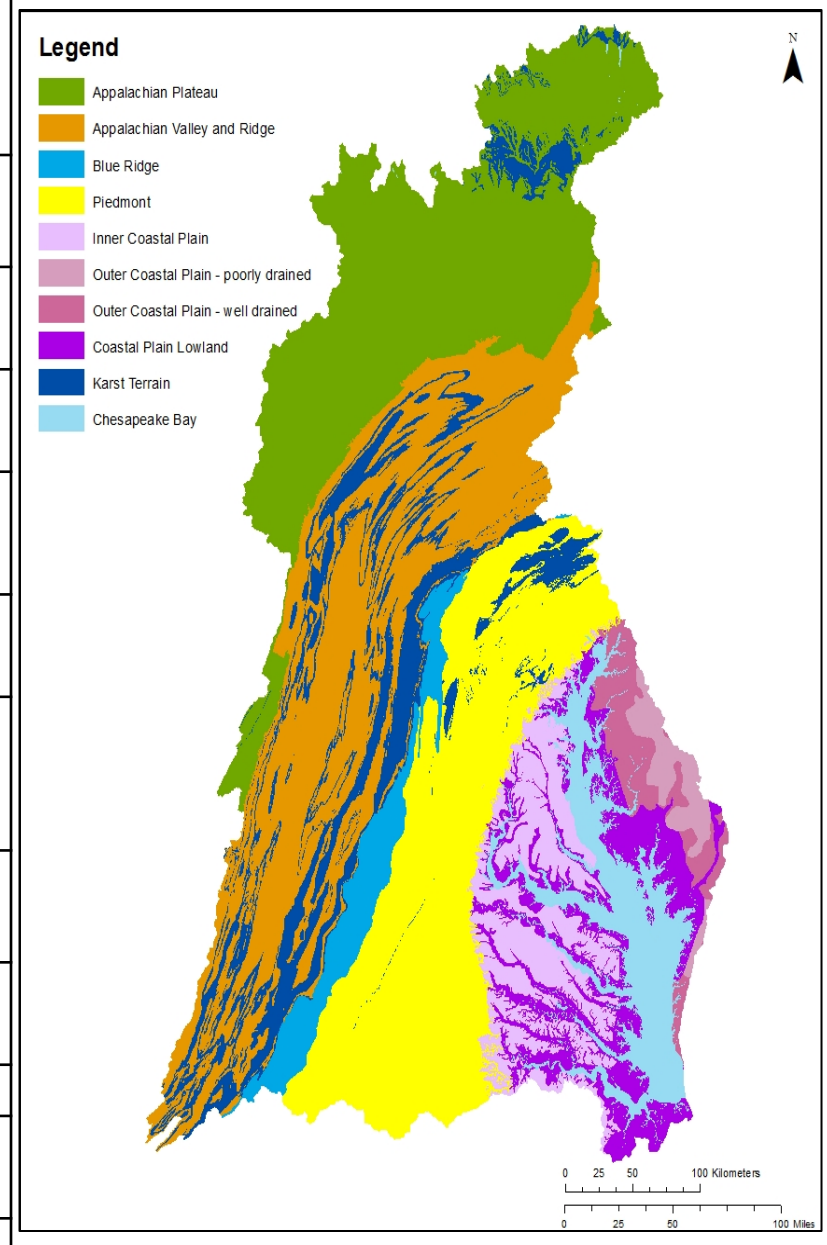
– Non-tidal Wetlands are modeled as a Forest Load Source in the CBP Model.

PLUS

2. Load Reduction Efficiencies (BMP)

Nontidal Wetlands Distribution by Physiographic Region

Physiographic Province	Other Wetland acreage[1](mean size)	Floodplain Wetland acreage (mean size)	Nontidal wetland % of total province area	Description
Appalachian Plateau	110,112 (2.5)	82,041 (1.8)	2	Diverse types including wet thickets, shrub bogs, seasonally flooded wet meadows and marshes
Ridge and Valley	12,408 (1.2)	36,472 (1.3)	1	Uncommon; located in topographic slopes and depressions
Blue Ridge	2,024 (1.2)	4,870 (1.3)	<1	
Piedmont	57,391 (1.4 to 2.6)	227,317 (2.1 to 2.3)	3	Mostly isolated palustrine & riverine in floodplains and depressional swamps
Inner CP	45,930 (1.9)	87,569 (2.05)	5	Located in riparian areas of stream valleys
Outer CP poorly drained	182,249 (7.7)	32,831 (3.8)	34	Located in depressions and flats near drainage divides and along low-gradient, poorly incised streams, channelized
Outer CP well-drained	108,302 (6.6)	51,396 (3.7)	15	Located in riparian zones of natural stream channels
Coastal Plain lowlands	187,977 (6.1)	262,190 (3.8)	16	Non-tidal wetlands located in broad swamps and riparian zones
Karst Terrain				
App. Plateau	7,555 (2.6)	4,400 (1.6)	3	
Ridge and Valley	5,102 (0.7)	18,844 (1.3)	1	
Piedmont	772 (1.1)	2,859 (1.5)	1	



Literature Review: Load Reduction Values

Wetland Type	Vegetation Type	TN % Reduction Mean Range Median (#)	TP % Reduction	TSS % Reduction
Headwater/ Depressional	ALL	33% -8-97 34% (9)	25% -15-94 10% (13)	28% -30-75% 37% (6)
Floodplain	ALL	44% -8-94 38% (24)	37% -41-100 29% (24)	32% -15-95 14% (7)
Tidal Fresh	Forest	62% 59-65% 62% (2)	32% -47-89% 44% (4)	--
All except constructed	Forest, mixed and unknown	47% -8-97 59% (16)	45% -47-100 43% (44)	37% -15-95 32% (8)
All except constructed	Emergent	39% -8-89 36% (20)	31% -15-100 30% (20)	25% -30-75 27% (7)
All	All	40% -8.4-97 36% (48)	40% -54-100 38% (95)	44% -30-98 50% (19)
Chesapeake Bay Only	All	22% -8-89 10% (10)	20% -41-81 17% (10)	24% -15-68 21% (8)
All except constructed	ALL	42% -8-97 39% (36)	40% -47-100 41% (64)	31% -30-95 27% (15)

Retention Efficiencies and Acres Treated

	Retention Efficiency			Upland Acres Treated	
Physiographic Subregion	TN	TP	TSS	Floodplain Wetlands	Other Wetlands
Appalachian Plateau	42	40	31	2	1
Appalachian Ridge and Valley	42	40	31	2	1
Blue Ridge	42	40	31	3	2
Piedmont	42	40	31	3	2
Inner Coastal Plain	42	40	31	6	4
Outer Coastal Plain- Poorly Drained	42	40	31	2	1
Outer Coastal Plain- Well Drained	42	40	31	3	2
Coastal Plain Lowland	42	40	31	3	2
Karst Terrain	42	40	31	3	2

***Other wetlands with low treatment potential due to small contributing area predominated by forest and/or strong potential for contaminated water to by-pass the wetlands: 1 ACRE**

****Other wetlands with high treatment potential, located in heavily impacted watersheds and having strong likelihood for hydrologic contact: 4 ACRES**

*****All other wetlands: 2 ACRES**

******Floodplain wetlands with additional overbank delivery: 150% of Other**

Incorporation of Water Quality Benefits into Coastal Resilience

Natural and Nature-based Features Co-Benefits

- NOAA Coastal Resilience Grant
- Flood mitigation + TMDL/ Stormwater Credits + Community Rating System Credits

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