Modifications to the Expert Panel on Shoreline Management Practices

Presented to the
Water Quality Goal Implementation Team

January 12, 2015

Chesapeake Bay Program
Science. Restoration. Partnership.

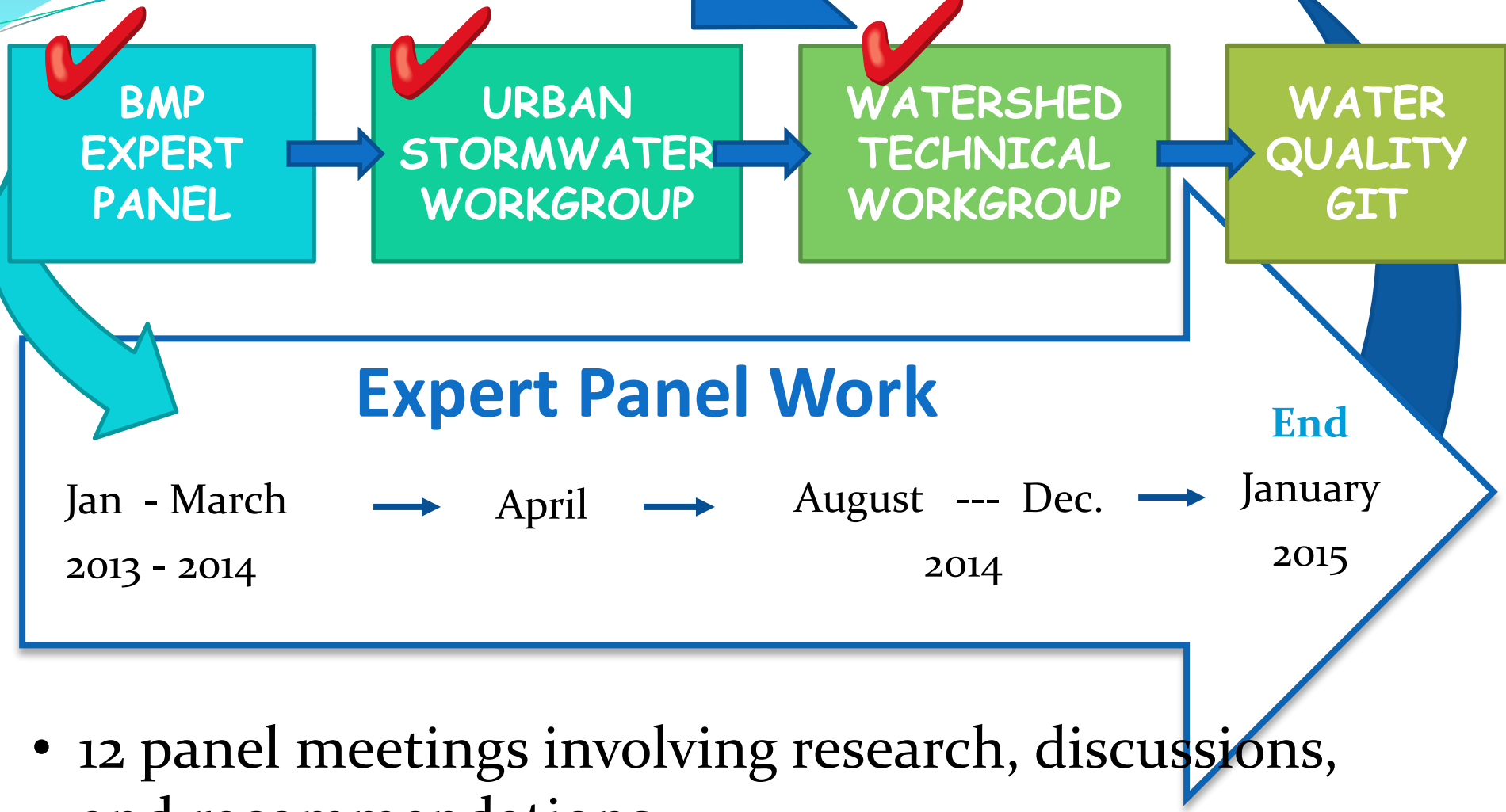
Bill Stack, P.E.
Shoreline Management Expert Panel Chair

CENTER FOR WATERSHED PROTECTION

EPA CBPO Sediment Reduction and Stream Restoration Coordinator
Center for Watershed Protection, Inc.

Shoreline Management Panel Members

Panelist	Affiliation
Jana Davis, Ph.D.	CBT/HGIT
Kevin DuBois, PWS, PWD	City of Norfolk, VA
Jeff Halka	MD Geologic Survey, retired
Scott Hardaway, P.G.	VIMS Shoreline Studies Program
George Janek	USACE, Norfolk District
Lee Karrh	MD DNR
Eva Koch, Ph.D.	UMCES
Lewis Linker	CBPO
Pam Mason	VIMS Center for Coastal Resource Management
Ed Morgereth, MS ISS	Biohabitats
Daniel Proctor, P.E.	Stantec (formerly Williamsburg Environmental Group)
Kevin Smith	MD DNR
Bill Stack, P.E.	CWP, CBPO
Steve Stewart/Nathan Forand	Baltimore County Dept. of Environmental Protection and Sustainability
Bill Wolinski, P.E.	Talbot County Dept. of Public Works



- 12 panel meetings involving research, discussions, and recommendations
- WTWG issues related to model resolved

Expert Panel Definition

"Shoreline management" is defined as any tidal shoreline practice that prevents and/or reduces tidal sediments to the Bay.

Living Shorelines

Structural practices

low structure ◄——————————————————————————► high structure

Non-structural living shorelines: Projects that include natural habitat elements only, such as vegetation, oyster reef, coarse woody debris, and sand.

Non-structural living shoreline

Hybrid living shorelines: Projects that include natural habitat elements such as vegetation, oyster reef, and sand, as well as some hard structures such as stone sills or breakwaters

Low-structure hybrid living shoreline

Medium-structure hybrid living shoreline

Projects that include the following practices without a natural habitat component:

- Bulkheads/Seawalls
- Revetments
- Breakwaters
- Groins/jetties

Structural erosion control practice

Why there is the need for new reduction rates

- The current shoreline management pollutant load reduction is based on the previous (2010) CBPO approved stream restoration rate.
- Shoreline management practices were "lumped together" and reported with stream restoration practices. Consequently, states reported no shoreline management projects to CBPO through National Environmental Information Exchange Network (NEIEN).
- Shoreline erosion is one of the greatest sources of sediment and turbidity to the Chesapeake Bay and tributaries. Because there is no lag time associated with transport and delivery of sediment, the benefits of shoreline management practices in reducing turbidity are immediate.
- The literature review (over 200 papers) by the Expert Panel supports development of protocols for estimating pollutant shoreline management rates that can be tailored using locally available data.

Comparing the Numbers: Shoreline Erosion Loading Rates

Source	TN (lb per foot per year)	TP (lb per foot per year)	TSS (lb per foot per year)
Ibison, 1990	1.65	1.27	7,000
Ibison, 1992	0.81	0.66	2,800
Proctor, 2012 (WEG)	na	0.38 or 0.29	1,300
MDE, 2011*	0.16	0.11	451
BaCo (mean)	0.36	0.23	974
→ CBP (2010)	0.02	0.0025	2
CBP (July 2013)	0.075	0.068	44.8 (non-coastal plain)

*MDE data based on Baltimore Co. DEPS analysis of 23 individual shoreline restoration projects completed by Baltimore Co. DEPS Capital Projects and Operations. Median values were used. (Nathan Forand presentation to the SEC panel on 2/25/13)

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

Protocol	Name	Units	Pollutants	Reduction Rate
1	Prevented Sediment	Pounds per year	Sediment TN, TP	• Measured TSS, TN and TP content in sediment prevented. • Calculated based on shoreline erosion with reductions for sand content and bank instability
2	Denitrification	Pounds per year	TN	• Measured TN removal for denitrification rate associated with vegetated area. • 85 lbs TN/acre/yr
3	Sedimentation	Pounds per year	Sediment and TP	• Measured TSS and TP removal rates associated with vegetated area. • 6,959 lbs TSS/acre/yr • 5.289 lbs TP/acre/yr
4	Marsh Redfield Ratio	Pounds	TN, TP	• Measured TN and TP removal rates associated with vegetated area. • 6.83 lbs TN/acre/yr • 0.3 lbs TP/acre/yr
5	Non-conforming/Existing Practices	Linear Feet	Sediment, TN and TP	• 137 lbs TSS/lf/yr (MD) • 84 lbs TSS/lf/yr (VA) • 0.075 lbs TN/lf/yr • 0.068 lbs TP/lf/yr

Basic qualifying conditions for Chesapeake Bay TMDL pollutant load reduction for shoreline management practices.

Shoreline Management Practice	The Practice Must Meet these Criteria for TMDL Pollutant Load Reduction
Living Shoreline – **a) nonstructural;** **b) hybrid system including a sill; and** **c) hybrid system including a breakwater**	The site is currently experiencing shoreline erosion or is replacing existing armor. The site was graded, vegetated, and excess sediment was removed or used. AND 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	The site is currently experiencing shoreline erosion. The site was graded, vegetated, and excess sediment was removed or used.[2] AND A living shoreline is not technically feasible or practicable as determined by substrate, depth, or other site constraints. AND When the breakwater footprint would not cover SAV, shellfish beds, and/or wetlands.
Bulkhead/Seawalls	The site is currently experiencing shoreline erosion. AND 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.

Dissenting View Regarding Protocol 1

- Dissenting view: Protocol 1 should be removed because it will result in sand (which is beneficial) to be prevented along with fine sediments and the potentially high nutrient load reductions associated with Protocol 1 will encourage a high number of these practices.

- Majority view: Protocol 1 does not allow credit for sand and uses default values (55% MD, DE, DC, 34% VA)

Note: WTWG recommended to eliminate the nutrient credit for Protocol 1 pending further study.

Dissenting View Regarding Protocol 1

- Dissenting view: Projects involving armoring should not receive any credit because of negative impact to aquatic life
- Majority view: Qualifying conditions only allow credit if:
  - 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.

Concerns raised by WTWG at August 28th meeting

- Concerns raised about the availability/reactivity of TP and TN associated with shoreline sediments and the impact that nutrient crediting might have on TMDL accounting at the river segment.
- VA raised concern that the calculated loading reductions determined at a site specific scale could create a situation where calculated loadings reductions exceed available simulated loadings.
- The Modeling workgroup agreed to test the WQSTM with the shoreline erosion loads to determine the impact and report back to WTWG.

Modifications to the report

- Protocol 1 will be approved for TSS only at this time pending an evaluation of the availability/reactivity of TP and TN associated with shoreline sediments and the impact that nutrient crediting might have on TMDL accounting at the river segment.

- After this evaluation, the WTWG may be asked to approve a revised nutrient reduction credit for this practice.

- The WTWG recommends that sediment reductions from all shoreline management practices within a river segment should not exceed the total fine sediment shoreline erosion load estimated to enter adjacent Water Quality Sediment Transport Model (WQSTM) tidal water cells.

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

Protocol	Name	Units	Pollutants	Reduction Rate
1	Prevented Sediment	Pounds per year	Sediment TN and TP to be determined	• Measured TSS, ~~TN and TP~~ content in sediment prevented. • Calculated based on shoreline erosion with reductions for sand content and bank instability
2	Denitrification	Pounds per year	TN	• Measured TN removal for denitrification rate associated with vegetated area. • 85 lbs TN/acre/yr
3	Sedimentation	Pounds per year	Sediment and TP	• Measured TSS and TP removal rates associated with vegetated area. • 6,959 lbs TSS/acre/yr • 5.289 lbs TP/acre/yr
4	Marsh Redfield Ratio	Pounds	TN, TP	• Measured TN and TP removal rates associated with vegetated area. • 6.83 lbs TN/acre/yr • 0.3 lbs TP/acre/yr
5	Non-conforming/Existing Practices	Linear Feet	Sediment. TN and TP to be determined	• 137 lbs TSS/lf/yr (MD) • 84 lbs TSS/lf/yr (VA)

MD Example

Pollutant	Protocol 1 Pollutant Load Reduction (lb/yr)	Protocol 2 Pollutant Load Reduction (lb/yr)	Protocol 3 Pollutant Load Reduction (lb/yr)	Protocol 4 Pollutant Load Reduction (lb)[1]	Total Pollutant Load Reduction (lb/yr)[2]
TN	NA	153	NA	12.3	165.3
TP	NA	NA	9.520	0.54	10.6
TSS	450,070	NA	12,526	NA	462,596

[1]Marsh Redfield Ratio pollutant load reduction if a one-time credit.

[2]This practice was 2,610 linear feet, had an erosion rate of 1 and 1.5 ft/yr, had a bank height of 4 and 7 feet, and had 1.8 acres of vegetation.

Accountability

- Reporting, tracking, and verification
  - Name, location, permit number, county, location, practice type, and vegetation area
  - Initial performance verification – responsible crediting party provide post construction documentation to the reporting agency
- Duration of shoreline management credit
  - 5 years
  - Can be renewed, future verification principles

Questions/Comments

Bill Stack, P.E.

bps@cwp.org or wstack@chesapeakebay.net

410.461.8323 xt 222 or 410-267-5717