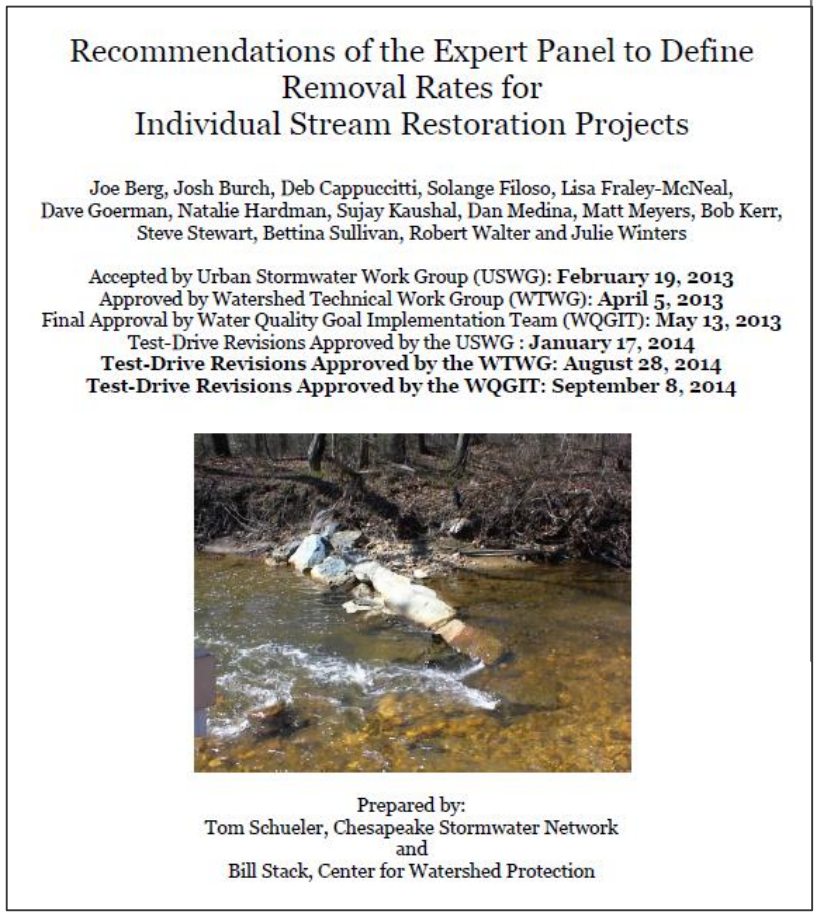
Revisiting Stream Restoration BMP on Ag Lands

December 19th, 2020

Background: 2013 Report & Approval Process



Recommendations of the Expert Panel to Define Removal Rates for Individual Stream Restoration Projects

Joe Berg, Josh Burch, Deb Cappuccitti, Solange Filoso, Lisa Fraley-McNeal, Dave Goerman, Natalie Hardman, Sujay Kaushal, Dan Medina, Matt Meyers, Bob Kerr, Steve Stewart, Bettina Sullivan, Robert Walter and Julie Winters

Accepted by Urban Stormwater Work Group (USWG): **February 19, 2013**
Approved by Watershed Technical Work Group (WTWG): **April 5, 2013**
Final Approval by Water Quality Goal Implementation Team (WQGIT): **May 13, 2013**
Test-Drive Revisions Approved by the USWG : **January 17, 2014**
Test-Drive Revisions Approved by the WTWG: August 28, 2014
Test-Drive Revisions Approved by the WQGIT: September 8, 2014

Dec 2012
Joint Meeting: AgWG, USWG, WTWG

Jan 2013
AgWG Discussion

Feb 2013
USWG approval (Intent to revisit in 2017)

April 2013
WTWG approval

May 2013
Water Quality GIT approval (WQGIT)
From Minutes:
Davis-Martin: Does this report apply to non-urban stream restoration until non-urban is considered separately?
Stack: Yes, the AgWG was supportive of these protocols until such time as an AgWG expert panel is convened to make recommendations for non-urban stream restoration specifically.

2014
"Test Drive Revisions" approved by USWG, WTWG, WQGIT

Section 4.5
Applicability to Non-Urban Stream Restoration Projects

As noted in Section 2.3, the CBP-approved removal rate for urban stream restoration projects has been extended to non-urban stream restoration projects. Limited research exists to document the response of non-urban streams to stream restoration projects in comparison to the still limited, but more extensive literature on urban streams. However, many of the papers reviewed were from rural streams (Bukaveckas, 2007; Ensign and Doyle, 2005; Mulholland et al., 2009; and Merritts et al., 2010).

The Panel was cognizant of the fact that urban and non-urban streams differ with respect to their hydrologic stressors, nutrient loadings and geomorphic response. At the same time, urban streams also are subject to the pervasive impact of legacy sediments observed in rural and agricultural watersheds (Merritts et al., 2011). The Panel further reasoned that the prevented sediment and floodplain reconnection protocols developed for urban streams would work reasonably well in rural situations, depending on the local severity of bank erosion and the degree of floodplain disconnection.

Consequently, the Panel recommends that the urban protocols can be applied to non-urban stream restoration projects, if they are designed using the NCD, LSR, RSC or other approaches, and also meet the relevant qualifying conditions, environmental considerations and verification requirements.

At the same time, the Panel agreed that certain classes of non-urban stream restoration projects would not qualify for the removal credit. These include:

- Enhancement projects where the stream is in fair to good condition, but habitat features are added to increase fish production (e.g., trout stream habitat, brook trout restoration, removal of fish barriers, etc.)
- Projects that seek to restore streams damaged by acid mine drainage
- Riparian fencing projects to keep livestock out of streams

Limited research for non-urban stream restoration

Urban and non-urban streams are different, but developed protocols should work reasonably well

Protocols can be used for non-urban projects if all relevant conditions are met

NCD = Natural Channel Design
LSR = Legacy Sediment Removal
RSC = Regenerative Stormwater Conveyance

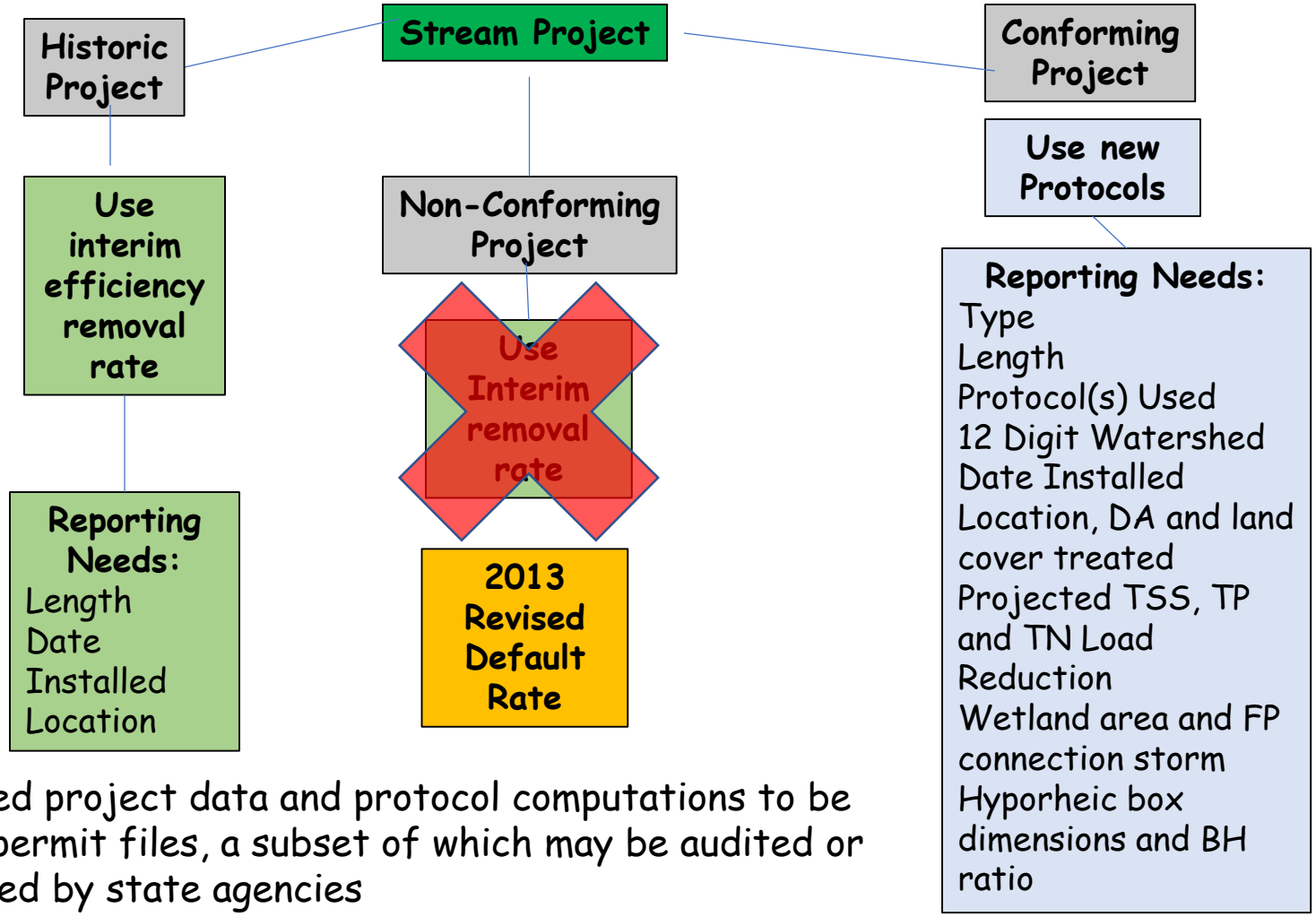
Additive

Summary of Stream Restoration Credits for Individual Restoration Projects [1, 2]

Protocol	*Name*	*Units*	*Pollutants*	*Method*	*Reduction Rate*
1	Prevented Sediment (S)	Pounds per year	Sediment TN, TP	Define bank retreat using BANCS or other method	Measured N/P content in streambed and bank sediment
2	Instream Denitrification (B)	Pounds per year	TN	Define hyporheic box for reach	Measured unit stream denitrification rate
3	Floodplain Reconnection (S/B)	Pounds per year	Sediment TN, TP	Use curves to define volume for reconnection storm event	Measured removal rates for floodplain wetland restoration projects
4	Dry Channel RSC as a Retrofit (S/B)	Removal rate	Sediment TN, TP	Determine stormwater treatment volume	Use adjustor curves from retrofit expert panel

[1] Depending on project design, more than one protocol may be applied to each project, and the load reductions are additive.
[2] Sediment load reductions are further reduced by a sediment delivery ratio in the CBWM (which is not used in local sediment TMDLs)
S: applies to stormflow conditions, B: applies to base flow or dry weather conditions

Reporting Requirements



More detailed project data and protocol computations to be archived in permit files, a subset of which may be audited or cross-checked by state agencies

Default Rates

2013 Report

Table 3. Edge-of-Stream 2011 Interim Approved Removal Rates per Linear Foot of Qualifying Stream Restoration (lb/ft/yr)			
Source	**TN**	**TP**	**TSS***
Interim CBP Rate	0.20	0.068	56.11
Revised Default Rate	**0.075**	**0.068**	**44.88** non-coastal plain **15.13** coastal plain

Derived from six stream restoration monitoring studies: Spring Branch, Stony Run, Powder Mill Run, Moore's Run, Beaver Run, and Beaver Dam Creek located in Maryland and Pennsylvania

*To convert edge of field values to edge of stream values a sediment delivery ratio (SDR) was applied to TSS. The SDR was revised to distinguish between coastal plain and non-coastal plain streams. The SDR is 0.181 for non-coastal plain streams and 0.061 for coastal plain streams. Additional information about the sediment delivery ratio is provided in Section 2.5 and Appendix B.

At its January 25, 2012 research workshop, the **Panel concluded that there was no scientific support to justify the use of a single rate for all stream restoration projects** (i.e., the lb/ft/yr rates shown in Tables 2 and 3). Sediment and nutrient load reductions will always differ, given the inherent differences in stream order, channel geometry, landscape position, sediment dynamics, restoration objectives, design philosophy, and quality of installation among individual stream restoration projects. Instead, the Panel focused on predictive methods to account for these factors, using various watershed, reach, cross-section, and restoration design metrics.

Credit Duration?

Duration of Stream Restoration Credit

- Max duration for the removal credits is 5 years
- Can be renewed based on a field performance inspection that verifies the project still exists, is adequately maintained and operating as designed.
- Duration of the credit is shorter than other structural urban BMPs, as these projects are:
  - subject to catastrophic damage from extreme flood events
  - have requirements for 3 to 5 years of post-construction monitoring to satisfy permit conditions

NEIEN Appendix 2019

BMP_NAME	DEFAULT_SB_LAND_USI	TARGET_U	CREDIT_DURATION
Stream Restoration Ag	StreamBedAndBank	Protocol 1	10
Stream Restoration Ag	StreamBedAndBank	Protocol 1	10
Stream Restoration Ag	StreamBedAndBank	Protocol 1	10
Stream Restoration Ag	StreamBedAndBank	Protocol 2	10
Stream Restoration Ag	StreamBedAndBank	Protocol 3	10
Stream Restoration Ag	StreamBedAndBank	Protocol 3	10
Stream Restoration Ag	StreamBedAndBank	Protocol 3	10
Stream Restoration Urban	StreamBedAndBank	Protocol 1	5
Stream Restoration Urban	StreamBedAndBank	Protocol 1	5
Stream Restoration Urban	StreamBedAndBank	Protocol 1	5
Stream Restoration Urban	StreamBedAndBank	Protocol 2	5
Stream Restoration Urban	StreamBedAndBank	Protocol 3	5
Stream Restoration Urban	StreamBedAndBank	Protocol 3	5
Stream Restoration Urban	StreamBedAndBank	Protocol 3	5

Documentation?

AgWG Jan 2013 Minutes

- Urban Stream Restoration cont.
  - NGO comment on short length of credit life span based on value of investments
  - Response: renewal available via inspections for longer crediting period

NRCS Code	NRCS Practice	Definition	Shape	Units	Effective	Lifespan
395	Stream Habitat Improvement and Management	Improve, restore, or maintain the ecological fu...	Polygon	Ac	1/23/2019	5
396	Aquatic Organism Passage	Modification or removal of barriers that restri...	Line	Mi	11/13/2019	5
580	Streambank and Shoreline Protection	Treatment(s) used to stabilize and protect bank...	Line	Ft	11/6/2018	20
584	Channel Bed Stabilization	Measure(s) used to stabilize the bed or bottom ...	Line	Ft	11/7/2018	10

2013 Expert Panel USWG presentation to Joint Meeting Dec 2012

- Panel acknowledges that while we have a lot more science than we had ten years ago, there are still gaps in our understanding of urban stream nutrient dynamics
- Recommendations and associated protocols were developed with the notion that they could be improved/refined over time as better data becomes available
- Many research and management recommendations provided to increase confidence in the methods and the implementation of stream restoration practices
- Protocols should be revisited in 2017 when more stream restoration research, better practitioner experience, and an improved CBWM model all become available to Bay managers

REVISITING STREAM RESTORATION

The USWG formed 4 groups to revisit the stream restoration EPR:

- Group 1: Verifying Stream Restoration Practices
- Group 2: Outfall and Gully Stabilization Practices
- Group 3: Establishing Standards for Applying Protocol 1
- Group 4: Adjusting Protocol 2/3 to Capture Floodplain Restoration

Technical Groups to Improve Stream Restoration Protocols (USWG)

Summary of Stream Restoration Credits for Individual Restoration Projects [1, 2]

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Sept 2018 USWG Memo: **Formation of Technical Groups to Improve Stream Restoration Protocols**

The Stream Restoration expert panel report … continues to generate controversy among practitioners, researchers, managers and regulators… Both the public and private sector have struggled to properly apply the new protocols, given the fast pace by which this new nutrient credit has been implemented across the Bay watershed.

Group 3: Establishing Standards for Applying Protocol 1 (Prevented Sediment)

BACKGROUND – NEED FOR GROUP 3

- One of the fastest growing BMPs – hundreds of miles in the pipeline
- Several key concerns based on past 5 years of implementation experience:
  - Over-reliance on default rates
  - Need for a clear "bank armoring" definition
  - Need for guidance on monitoring and modeling methods to improve consistency across practitioner community

A FEW REMINDERS

- These are Bay guidelines… final authority on any and all regulatory/permitting issues remains with the appropriate local/state/federal agency
- Grandfathering Clause: Any new recommendations would not need to be in place until July 2021
  - This aligns with CBPO model "lock-down" period and prevents disruption of projects already under contract.

USWG presentation to WQGIT 12/9/19

DEALING WITH THE DEFAULTS

Original EPR

- Nutrient Concentration Default Rates
- Bulk Density Example Being Used as Default
- Over-Use of Default Nutrient and Sediment Reductions

Group 3 Memo

- Site Specific Monitoring for Bulk-Density and Nutrient Concentration
- Recommended Field and Lab Methods
- Stronger language on need to use the Protocols
- Separate section on recommendations for planning level estimates

DEFAULT RATES HISTORY

"At its January 25, 2012 research workshop, the Panel concluded that there was no scientific support to justify the use of a single rate for all stream restoration projects (i.e., the lb/ft/yr rates shown in Tables 2 and 3). Sediment and nutrient load reductions will always differ, given the inherent differences in stream order, channel geometry, landscape position, sediment dynamics, restoration objectives, design philosophy, and quality of installation among individual stream restoration projects." (SR EPR 2013)

- WTWG made decision to add default rates for "historic and non-conforming practices"

"The Panel recommends that the urban protocols can be applied to nonurban stream restoration projects, if they are designed using the NCD, LSR, RSC or other approaches, and also meet the relevant qualifying conditions, environmental considerations and verification requirements.

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- Projects that seek to restore streams damaged by acid mine drainage
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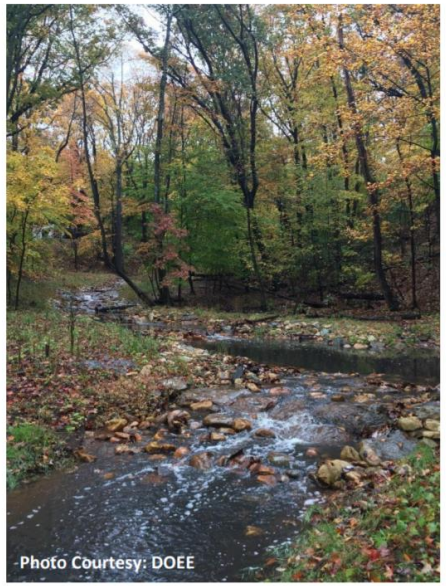
WQGIT December 9th

- **Decision:** The WQGIT **approved the Stream Restoration Prevented Sediment Memo** as long as PA and the projects leads meet to resolve PA's concerns and present their solution at the next WQGIT meeting.

- **Action:** The project leads of the Stream Restoration Prevented Sediment Memo will add clarifying language that indicates the memo is **only for urban stream restoration**, with the understanding that **the AgWG will create their own expert panel regarding non-urban stream restoration BMPs.**

FINAL REVIEW DRAFT
USWG Approved: 10/15/19

Consensus Recommendations
for Improving the Application
of the Prevented Sediment Protocol
for Stream Restoration Projects Built for Pollutant Removal Credit



Drew Altland, Joe Berg, Bill Brown, Josh Burch,
Reid Cook, Lisa Fraley-McNeal, Matt Meyers,
Josh Running, Rich Starr, Joe Sweeney,
Tess Thompson, Jeff White and Aaron Blair

October 15, 2019

Prepared by:
David Wood,Chesapeake Stormwater Network

Some questions to be answered…

- Appropriate load reductions rates for non-urban stream restoration?
- Appropriate verification protocols?
- Appropriate credit duration?
- Appropriate crosswalk with NRCS state standards?

https://aeroleads.com/blog/how-to-shorten-b2b-sales-cycle/next-steps/

Stream Restoration in the Phase 6 Watershed Model

CAST BMP SUMMARY
(retrieved and truncated
Dec. 18, 2019)

			Chesapeake Bay Watershed	Chesapeake Bay Watershed	Chesapeake Bay Watershed	Chesapeake Bay Watershed
Agriculture Practices	**Duration**	**Unit**	2018 Progress	WIP 3 Final	2018 Progress	WIP 3 Final
Non Urban Stream Restoration	cumulative	Feet	1170267.02	2152307.63	0.30%	0.60%
Non Urban Shoreline Management	cumulative	Feet	35010.41	70962.96	0.10%	0.10%
			Chesapeake Bay Watershed	**Chesapeake Bay Watershed**	**Chesapeake Bay Watershed**	**Chesapeake Bay Watershed**
Urban/Suburban Practices	**Duration**	**Unit**	2018 Progress	WIP 3 Final	2018 Progress	WIP 3 Final
Urban Stream Restoration	cumulative	Feet	235518.62	2608476.24	0.10%	0.70%
Urban Shoreline Management	cumulative	Feet	242090.29	712456.37	0.40%	1.20%

CAST Source Data
12/18/19

Sector	ReductionType	BMPGroup	BMPFullName	BMPShortName	BMPDescription
Natural	Pound Reduction	Stream Bmps	Non Urban Stream Restoration	nonurbstrmrest	Stream restoration is a change to the stream corridor that improves the stream ecosystem by restoring the natural hydrology and landscape of a stream, and helps improve habitat and water quality conditions in degraded streams. Use this BMP if the specific project design is not known. Feet must be specified.
Natural	Pound Reduction	Stream Bmps	Non Urban Stream Restoration Protocol	nonurbstrmrestpro	Stream restoration is a change to the land stream corridor that improves the stream ecosystem by restoring the natural hydrology and landscape of a stream, and helps improve habitat and water quality conditions in degraded streams. Multiple protocols are defined to characterize different pollutant load reductions associated with individual projects. Feet must be specified. To receive credit for a specific protocol, also specify the pounds reduced for TN, TP, and/or TSS.
Natural	Pound Reduction	Stream Bmps	Urban Stream Restoration	urbstrmrest	Stream restoration is a change to the stream corridor that improves the stream ecosystem by restoring the natural hydrology and landscape of a stream, and helps improve habitat and water quality conditions in degraded streams. Use this BMP if the specific project design is not known. Feet must be specified.
Natural	Pound Reduction	Stream Bmps	Urban Stream Restoration Protocol	urbstrmrestpro	Stream restoration is a change to the land stream corridor that improves the stream ecosystem by restoring the natural hydrology and landscape of a stream, and helps improve habitat and water quality conditions in degraded streams. Multiple protocols are defined to characterize different pollutant load reductions associated with individual projects. Feet must be specified. To receive credit for a specific protocol, also specify the pounds reduced for TN, TP, and/or TSS.