

Revisiting Stream
Restoration EPR:
An Update from the USWG

Tom Schueler and David
Wood
Chesapeake Stormwater
Network

March 11
WQGIT Meeting



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Contest At-A-Glance

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A rapidly growing BMP for the urban sector

- Considered a cost-effective urban BMP (\$/lb removed)
- Hundreds of miles of stream restoration built or in the pipeline
- High use by large MS4s and in MD, VA, PA and DC
- Rapidly evolving market for both the public and private sector
- Regulators and the restoration industry seek better standards of practice
- No pre-existing methods to verify projects after permits expire



History of CBP Stream Restoration Crediting

- Expert Panel Report approved in 2013
- Report was revised after a “test-drive” period
- Changes in how streams and sediment are simulated in Phase 6 watershed model
- CSN work on Protocol FAQ document in 2018

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



Prepared by:
Tom Schueler, Chesapeake Stormwater Network
and
Bill Stack, Center for Watershed Protection

A quest for perfection

- Two Regional Stream Restoration Forums
- Defining Functional Uplift (SHWG)
- Stream Restoration Science Meeting
- Major changes in how streams and sediment are simulated in Phase 6 watershed model
- Requests for Legacy Sediment Removal Credits
- Requests for Outfall Stabilization Credits

EXPLANATION

ECOREGIONS

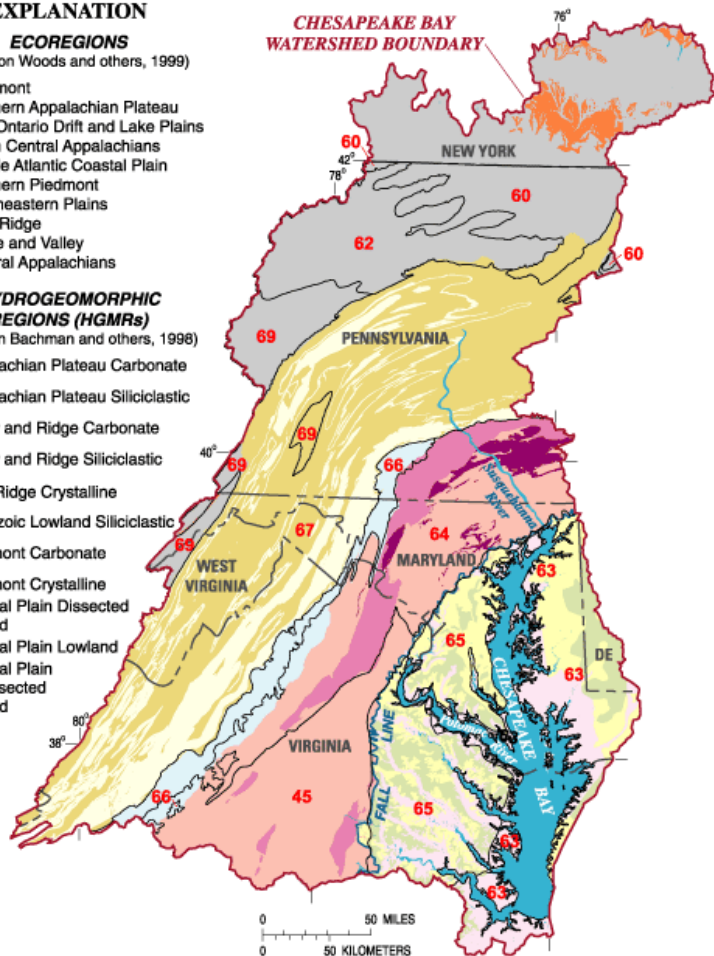
(based on Woods and others, 1999)

- 45 - Piedmont
- 60 - Northern Appalachian Plateau
- 61 - Erie/Ontario Drift and Lake Plains
- 62 - North Central Appalachians
- 63 - Middle Atlantic Coastal Plain
- 64 - Northern Piedmont
- 65 - Southeastern Plains
- 66 - Blue Ridge
- 67 - Ridge and Valley
- 69 - Central Appalachians

HYDROGEOMORPHIC REGIONS (HGMRs)

(based on Bachman and others, 1998)

- Appalachian Plateau Carbonate
- Appalachian Plateau Siliciclastic
- Valley and Ridge Carbonate
- Valley and Ridge Siliciclastic
- Blue Ridge Crystalline
- Mesozoic Lowland Siliciclastic
- Piedmont Carbonate
- Piedmont Crystalline
- Coastal Plain Dissected Upland
- Coastal Plain Lowland
- Coastal Plain Undissected Upland



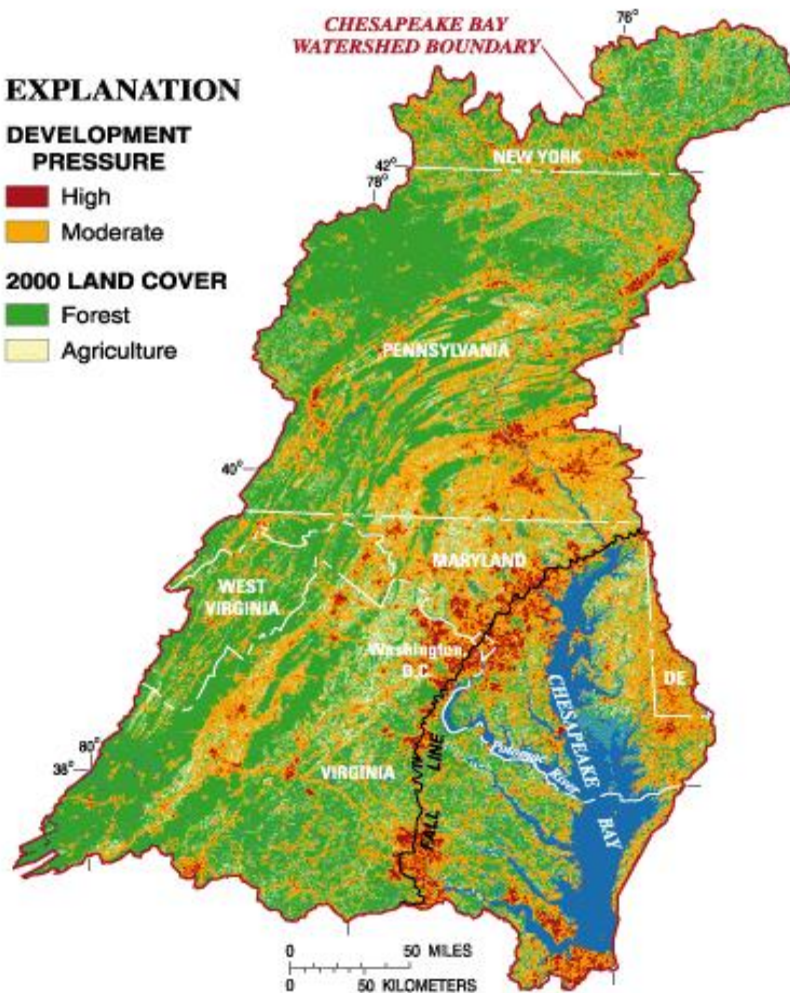
EXPLANATION

DEVELOPMENT PRESSURE

- High
- Moderate

2000 LAND COVER

- Forest
- Agriculture



Revisiting Stream Restoration: 2018/2019

The USWG formed four groups to revisit the stream restoration EPR

- Group 1: Verifying Stream Restoration Practices
- Group 2: Crediting Outfall Stabilization Practices
- Group 3: Establishing Standards for Applying Protocol 1 (Prevented Sediment)
- Group 4: Adjusting Protocol 2/3 to Capture Floodplain/Stream Reconnection

65 outstanding stream experts

(and a few divas)

Group 1 (Verification)		
Name	Affiliation	E-mail
Rich Starr	Ecosystem Planning and Restoration	rstarr@eprusa.net
Kathy Hoverman	KCI	Kathy.hoverman@kci.com
Tim Schueler	Hazen and Sawyer	tschueler@hazenandsawyer.com
Kip Mumaw	Ecosystem Services	kip@ecosystems-services.us
Neely Law	Center for Watershed Protection	nll@cwpp.org
Meghan Fellows	Fairfax County, DPWES	meghan.noefellows@fairfaxcounty.gov
Sandra Davis	US Fish and Wildlife Service	Sandra_davis@fws.gov
Jennifer Rauhofer	Stormwater Management Consulting	jr@mdswm.com
Josh Burch	DOEE	Josh.burch@dc.gov
Scott Cox	PADEP	sccox@pa.gov

Group 3		
Name	Affiliation	E-mail Address
Drew Altland	RKK	daltland@rkk.com
Lisa Fraley-McNeal	Center for Watershed Protection	lfr@cwpp.org
Joe Berg	Biohabitats	jberg@biohabitats.com
Rich Starr	Ecosystem Planning and Restoration	rstarr@eprusa.net
Josh Running	Stantec	Josh.running@stantec.com
Matt Meyers	Fairfax County, VA DPWES	Matthew.meyers@fairfaxcounty.gov
Jim Morris	JMT	jmorris@jmt.com
Bill Brown	PADEP	Will.brown@pa.gov
Jeff White	MDE	Jeff.white@maryland.gov
Josh Burch	DOEE	Josh.burch@dc.gov
Reid Cook	RES consultants	rcook@res.us
Ralph Spagnolo	EPA Region 3	spagnolo.ralph@epa.gov
Tess Thompson	Virginia Tech	thwynn@vt.edu
Joseph Sweeney	Water Science Institute	joe@waterscienceinstitute.org

Group 2. Outfall Stabilization Crediting Group		
Name	Affiliation	E-mail Address
Ray Bahr (S. Comstock)	MDE	Rbahr@mde.state.md.us
Stephen Reiling	DOEE	Stephen.reiling@dc.gov
Tracey Harmon	VDOT	tracey.harmon@vdot.virginia.gov
Brock Reggi	VADEQ	Brock.reggi@deq.virginia.gov
Karen Coffman	MD SHA	KCOffman@sha.state.md.us
Ryan Cole	MD SHA (alternate)	rcole@sha.state.md.us
Elizabeth Ottinger	US EPA Region 3	Ottinger.elizabeth@epa.gov
Carrie Traver	US EPA Region 3	Traver.carrie@epa.gov
Alison Santoro	MD DNR	Alisona.santoro@md.gov
Ted Brown	Biohabitats	Tbrown@biohabitats.com
Chris Stone	Loudoun County, VA	Chris.Stone@loudoun.gov
Erik Michelsen	Anne Arundel County	pwmich20@aacounty.org
Neil Weinstein	LID Center	nweinstein@lidcenter.org
Nick Noss (James Kaiser)	PA Turnpike Commission	Nnoss@paturnpike.com

Table 4. Roster for Group 4 (Adjusting Protocols for Floodplain Reconnection)		
Name	Affiliation	E-mail Address
Joe Berg	Biohabitats	jberg@biohabitats.com
Drew Altland	RKK	daltland@rkk.org
Bill Stack	CWP	bps@cwpp.org
Scott Lowe	McCormick Taylor	sblowe@mcormicktaylor.com
John Hottenstein	Ecosystem Planning and Restoration	Jhottenstein@eprusa.net
Jeremy Hanson	Virginia Tech	jchanson@vt.edu
Sujay Kaushal	University of Maryland	Skaushal@umd.edu
Joel Moore	Towson University	moore@towson.edu
Jens Geratz	Anne Arundel County DPW	pwgera00@aacounty.org
Sean Crawford	Bayland Consultants	scrawford@baylandinc.com
Josh Burch	DOEE	Josh.burch@dc.gov
Jeff Hartranft	PADEP BWEW	jhartranft@pa.gov
Denise Clearwater	MDE Wetlands and Waterways	denise.clearwater@maryland.gov
Paul Mayer	EPA Region ORD	mayer.paul@epa.gov
Durrelle Scott	Virginia Tech	dscott@vt.edu
Greg Noe	USGS	gnoe@usgs.gov
Chris Becraft	Underwood and Assoc	chris@ecosystemrestoration.com

Group 1: Verifying Stream Restoration Projects

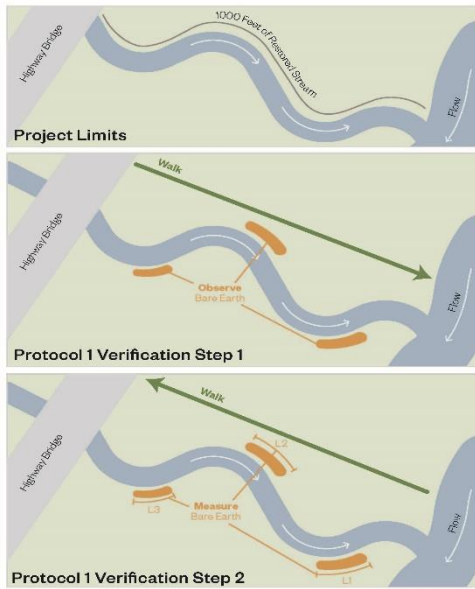
Focus: Develop a system to cost-effectively verify individual projects every five year

Status: Expect to finish up in April

Product: Memo on methods, with visual indicators

Visual Indicators to Inspect for Stream Projects





Defining Loss of Pollutant Reduction Function for Protocol 1

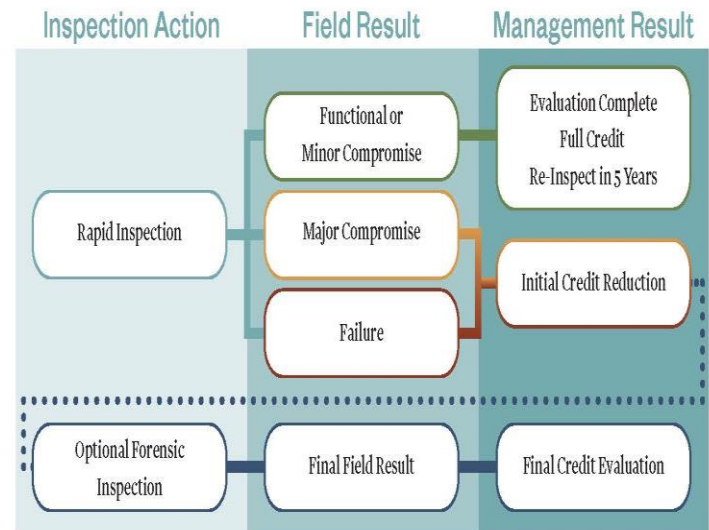
Criteria for Loss

Evidence of bank or bed instability such that the project delivers more sediment downstream than designed,

Key Visual Indicators

- Severe bank undercutting (bare earth exposed)
- Incising bed (bed erosion evident)
- Flanking or downstream scour of channel structures
- Failure or collapse of bank armoring practices

Status	% Failing *
Functioning	0 to 10% of reach
Showing Major Compromise	20 to 40% of reach
Project Failure	50% or more of reach



Group 2: Crediting Outfall Restoration Projects

Focus: Decide whether to establish a new crediting protocol for this class of projects

Status: Expect to finish up in April or May

Product: New Protocol “5” along with supporting technical memo

Eroding Outfalls as an Urban Sediment Delivery Hotspot



Outfall Restoration Practices



Stone step pools below outfall: courtesy Anne Arundel County DPW

Group 3:

Revisiting the Prevented Sediment Protocol

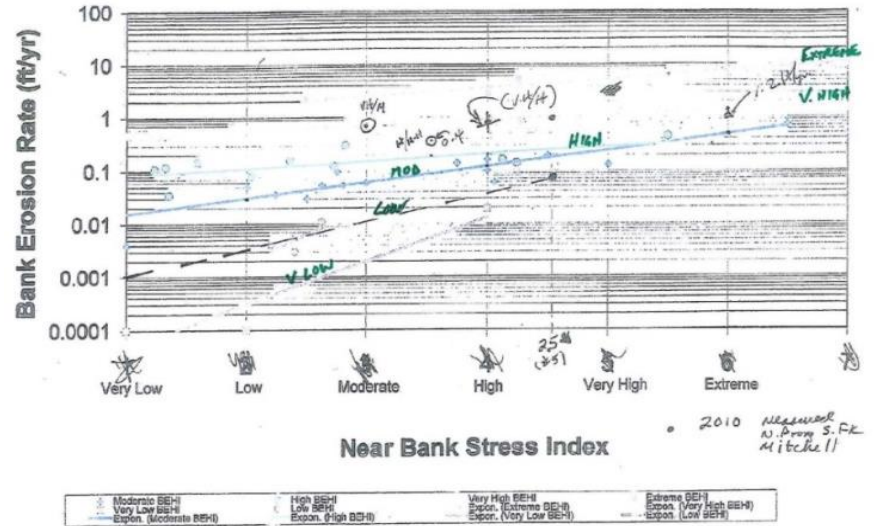
Focus: Agreement on best practices for applying the protocol in the field and office, and setting limits on the degree of armoring allowed

Status: Expect to finish up in May or June

Product: Technical memo with revised protocol and incentives for better on-site data collection



North Carolina Stream Bank Erodibility (Rev. 3-31-09)
(Erosion from Bankfull Events)



Bulk Density	(lbs/ft ³)
Expert Panel Report Case Study Example (Schueler and Stack 2014)	125
Carroll County Average of 5 sites and 39 samples	56
James Madison University Arboretum, Virginia (Mumaw 2015)	80
Paxton Creek, PA range of 9 samples	67 - 76
Case Study Projects in North Carolina (Doll et al. 2018)	52 - 88



Three Armoring Categories

<i>Non-Creditable Armoring</i>	<i>Creditable w/ Limits</i>	<i>Creditable Armoring</i>
<ul style="list-style-type: none"> • Concrete retaining walls • Gabions • Dumped rip-rap • Sheet piling/planking • Block walls • Geogrid/concrete/gabion mattresses • Non-biodegradable soil stabilization mats/systems 	<ul style="list-style-type: none"> • Angular riprap stone installed for bank protection • Imbricated rip rap • Berm/pool cascades • Boulder revetments 	<ul style="list-style-type: none"> • Rocks used for localized toe protection • Root-wad revetments? • Any soft-armoring bioengineering practices such as live stakes, coir logs etc. • Riffle weir series



Group 4: Floodplain Reconnection and Hyporheic Exchange (Protocol 2 and 3)

Focus: updating the protocols to reflect new research and design approaches for this class of projects

Status: Still in research phase, expected to run to Fall, 2019

Product: Technical memo and possibly revised protocols 2 and 3

Sediment and nutrient dynamics in the floodplain



Courtesy of Greg Noe, USGS



Streambank erosion and floodplain deposition dominate the watershed sediment budget, especially in urban areas

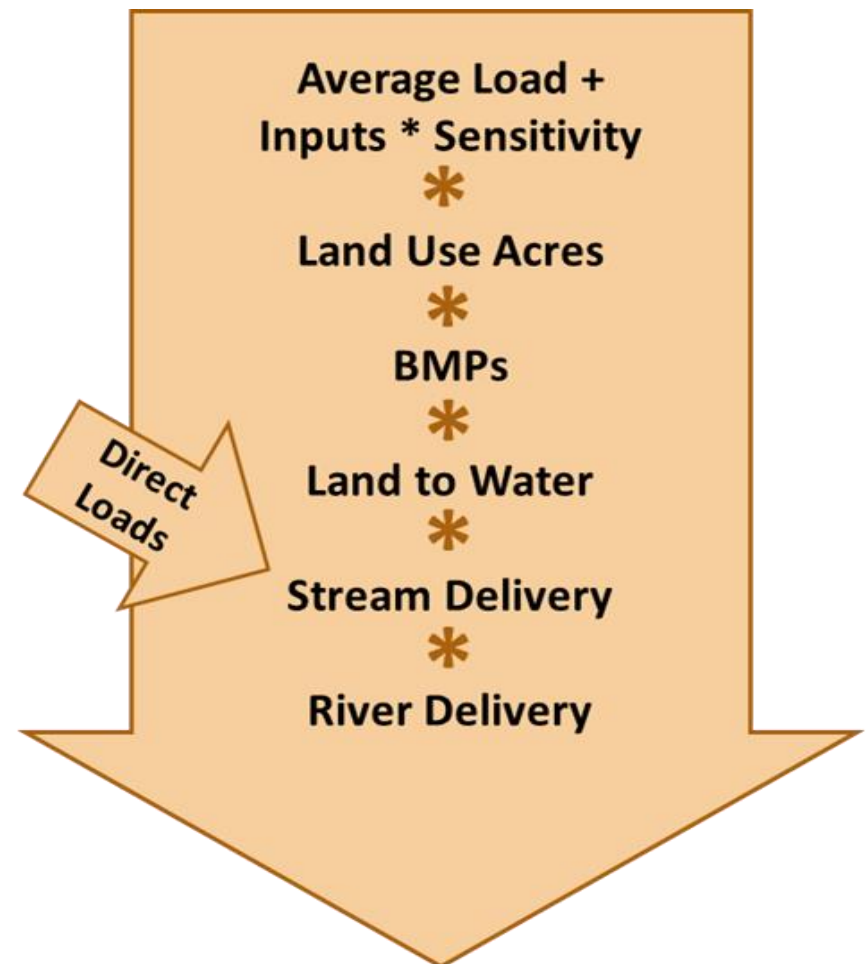
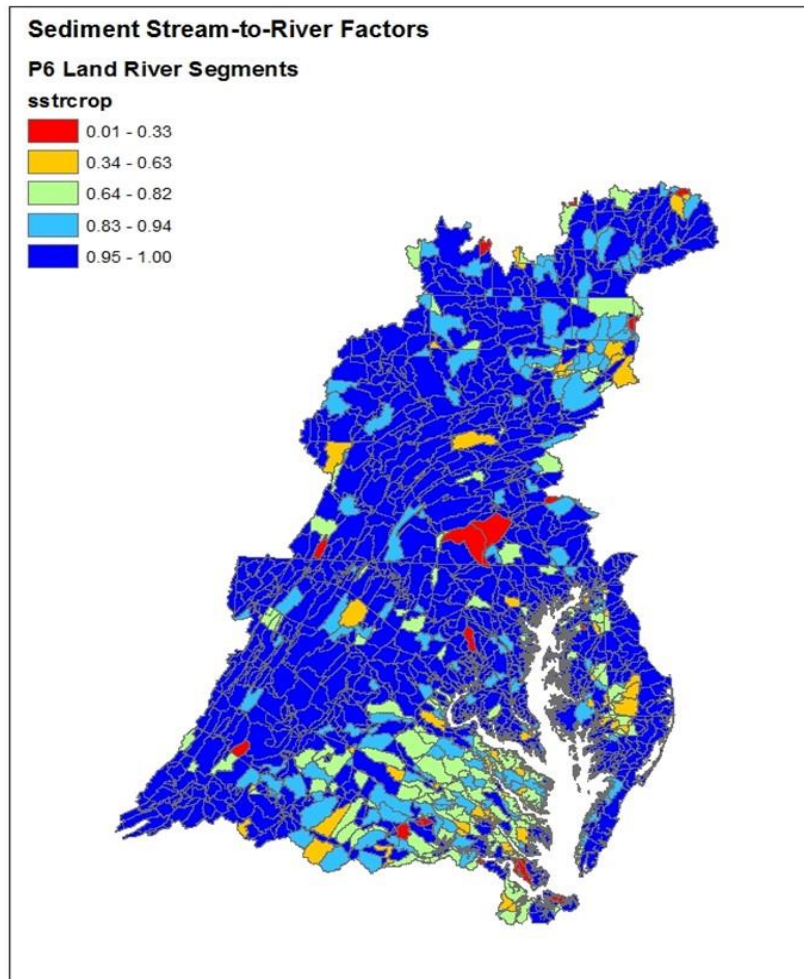


High erosion rates



Long term storage

Streams and Sediment in Phase 6 Watershed Model



No WTWG approval needed as the P6 model already vetted, but still need to invite modelers to speak to the four groups on how the changes potentially impact the crediting process

CBP STREAM FEEDBACK LOOP



Photo Credit: Severn Riverkeeper

- Extensive state and EPA involvement in all four groups
- Expect extensive additional review and comment at USWG phase
- Goal is to compile an updated guidance document for crediting stream restoration projects by end of 2019