Recommendations for Crediting Outfall Restoration Projects

Tom Schueler
Chesapeake Stormwater Network

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USWG Meeting

Revisiting Stream Restoration: 2018/2019

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

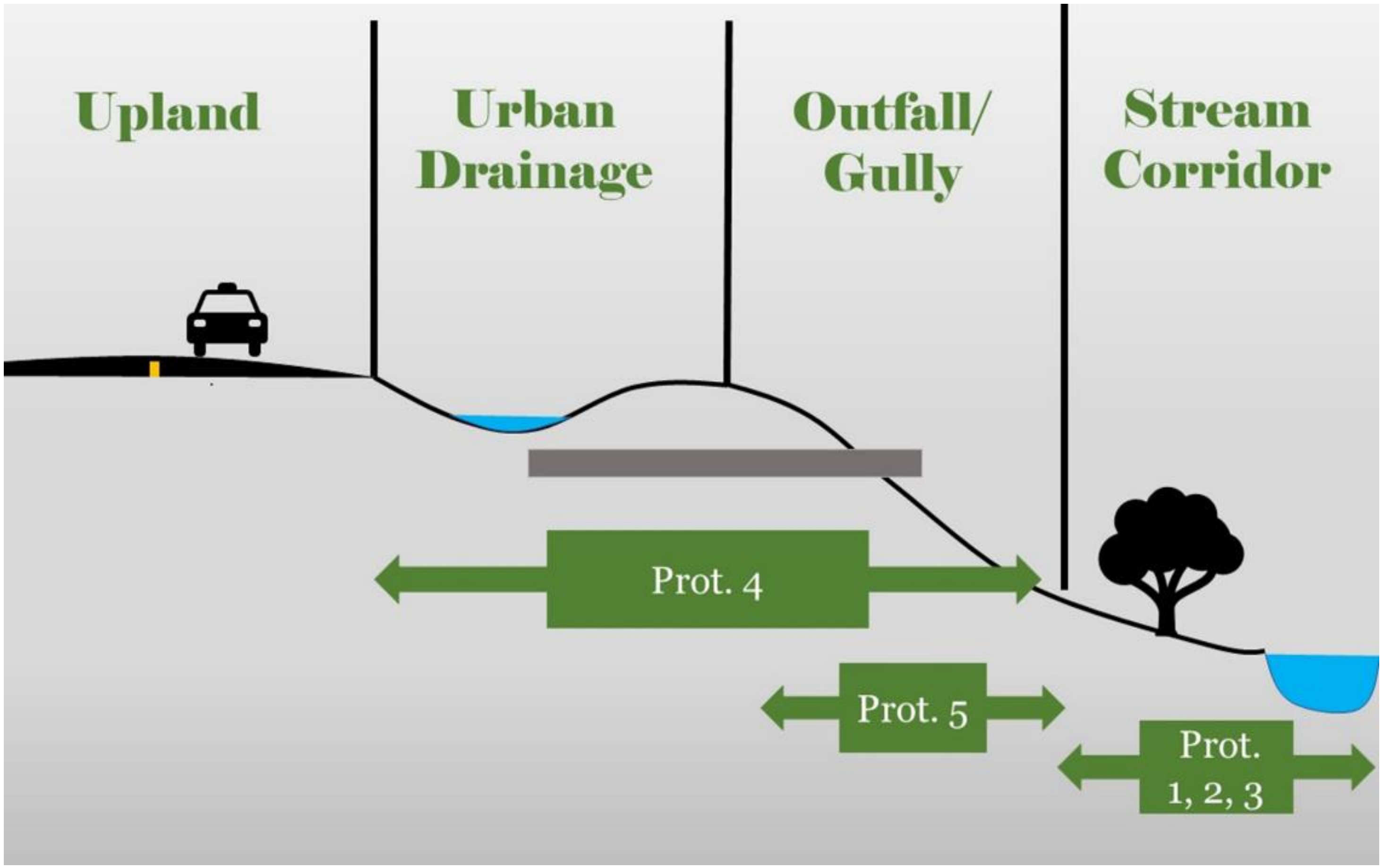
- Group 1: Verifying Stream Restoration Practices
- **Group 2: Crediting Outfall Stabilization Practices**
- Group 3: Establishing Standards for Applying Protocol 1 (Prevented Sediment)
- Group 4: Adjusting Protocol 2/3 to Capture Floodplain/Stream Reconnection

Group 2
Crediting Outfall Restoration Practices*

Name	Affiliation
Ray Bahr (S. Comstock)	MDE
Stephen Reiling	DOEE
Tracey Harmon	VDOT
Brock Reggi	VADEQ
Karen Coffman	MD SHA
Ryan Cole	MD SHA (alternate)
Elizabeth Ottinger *	US EPA Region 3
Carrie Traver *	US EPA Region 3
Alison Santoro *	MD DNR
Ted Brown	Biohabitats
Chris Stone	Loudoun County, VA
Erik Michelsen	Anne Arundel County
Neil Weinstein	LID Center
Nick Noss (James Kaiser)	PA Turnpike Commission

Does not support current version of memo for reasons outlined in their dissent letter

The Headwater Transition Zone



Def: the transition from upland land uses into altered urban drainage (swales, ditches and storm drain pipes) that discharges stormwater into the beginning of the urban stream network. Zone experiences higher rates of vertical and lateral erosion and deliver high sediment loads to downstream reaches.

Eroding Outfalls as an Urban Sediment Delivery Hotspot

Causes of Outfall Erosion

- Uncontrolled stormwater runoff from upstream development
- Inadequate energy dissipation structures below the outfall
- Nick points migrating upstream that reach the outfall
- Poor slope stabilization or fill spoils present below the outfall
- Extreme storm events that exceed design capacity of the channel.

Outfall stabilization vs. restoration

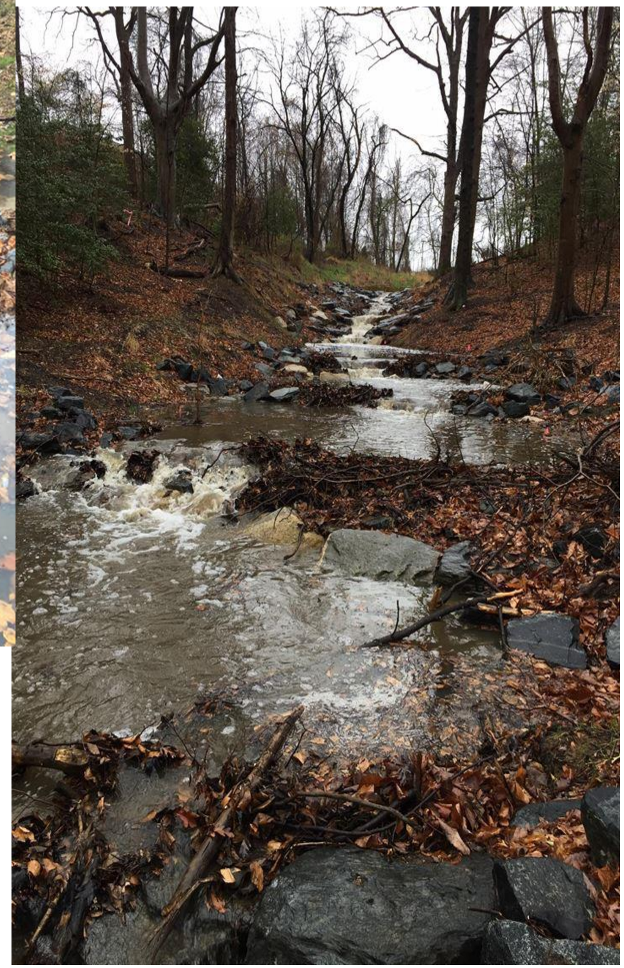
- **Outfall stabilization** uses traditional methods to repair outfall erosion problems that typically involve regrading and placement of stone rip-rap to temporarily stabilize the eroding channel and temporarily protect the outfall.

- **Outfall restoration** is a newer method to design a stable channel to dissipate energy that extends from the storm drain outfall to the stream channel. The new channel is re-constructed and armored to achieve an equilibrium state where future sediment loss is minimized or eliminated altogether.

- **Acceptable outfall restoration** can include elements such as: drop structures, storm drain enclosure, natural channel design, channel grading, step pools, boulder revetments, rock cascades, root wads and bioengineering techniques.

Outfall Restoration Practices

Stone step pools below outfall: courtesy Anne Arundel County DPW


ORP Qualifying Conditions

- The channel or gully below the outfall must exhibit **predictive indicators** for severe erosion or hill-slope failure and be actively enlarging or degrading (as demonstrated through equilibrium slope analysis or comparable method).

- ORP projects must:

  - Utilize a comprehensive approach to stream channel design, addressing long-term stability of the channel, banks, and floodplain, if present.
  - Comply with all state and federal permitting requirements, including 404 and 401 permits,
  - Meet post-construction stability criteria and successfully establish riparian vegetation
  - Compensate for any losses of forest, wetlands and sensitive habitats within project work areas.

Relaxing other qualifying conditions contained in the original EPR *

- Practices that armor or harden the outfall channel are acceptable when needed for channel stability
- Project can be shorter than the 100 feet minimum reach length.
- Typically restricted to zero order stream channels that lack perennial or seasonal flow (but no hard exclusion)
- No requirement for stream function uplift in ORP project reach

Relationship to other Protocols and BMPs

- **Protocol 5** cannot be combined with **Protocol 1** within the same project reach.
- **Protocol 5** can be combined with **Protocols 2 and 3** in the same project reach, but this will be uncommon.
- Wet-channel RSC practices can be credited using either **Protocol 1 or 5** but the two credits c*annot* be combined together in the same project reach.
- Dry-channel RSC practices can be credited as both a stormwater retrofit **(Protocol 4)** and an outfall restoration practice (**Protocol 5).**
- The pollutant reduction of **Protocol 5** projects is *independent* of any reduction achieved by upstream retrofits or other approved BMPs in the same watershed

Protocol 5 – a 5 Step Process

1. Define the Existing Channel Conditions
2. Define the Equilibrium Channel Conditions
3. Calculate Total Volume of Prevented Sediment Erosion
4. Convert Total Sediment Volume to Annual Prevented Sediment Load
5. Determine Annual Prevented Nutrient Loads

Step 1: Define the Existing Channel Conditions

Measure existing headwater channel:

- Length of Proposed Project Reach (ft)
- Channel Slope (ft/ft)
- Bank Height (ft)
- Bottom Width (ft)
- Top Width (ft)
- Bulk Density (lb/ft^3)

Step 2: Define the Equilibrium Channel Conditions

Define the following:

- Base Level Control
- Equilibrium Bed Slope (ft/ft)
- Equilibrium Bank Slope (ft/ft)
- Future Channel Width (ft)

Steps 3/4: Calculate Total Prevented Sediment Volume and Convert to Annual Load

- Calculate difference between existing and equilibrium channel condition
- Can be done by 3D surface modeling programs or 2D computations
- Convert the total volume of prevented sediment erosion to an annual load, by dividing it by 30
- Use the same 50% efficiency rate used for stream restoration practices
- Step 5 is same as Protocol 1 (nutrients)

Protocol 5 is a very generous credit

Comparison of Sediment Reduction Potential for the Three Protocols					
Sediment Reduction Protocol	Typical Reach Length ft	*Default*	*Min*	*Mean*	*Max*
		lbs of sediment per linear ft restored			
Protocol 1	**1000 to 4000**	**248**	**3**	**375**	**3,750**
Protocol 4	**100 to 300**	**NA**	**5**	**7**	**8**
Protocol 5	**50 to 500**	**NA**	**40**	**1,060**	**17,300**
See memo for important notes:					

ORP Reporting, Tracking and Verification

- Same reporting info as other SRPs + outfall diameter and armoring category
- Same verification procedures as recently outlined for Protocol 1 by Group 1
- 5 year inspection cycle
- No functional assessment of project

EPA ORP AND MD DNR DISSENT MEMO

Cannot support current version of memo. Issues include:

- Adverse and unintended consequences
- Limits on where ORP can be located in the stream network
- Limitations on hard engineering and armoring for ORPs
- Lack of project monitoring requirements
- Use of predictive indicators for outfall erosion

Resolving the Impasse

If the parties can develop compromise proposals and show progress towards consensus, CSN will facilitate one final meeting to attempt to resolve remaining issues

Otherwise, the USWG can decide to modify, adopt, table or reject the proposed outfall credit proposal