Test Drive Results and Revisions of the New Stream Restoration Crediting Protocols



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Protocol 1: Credit for Prevented Sediment during Storm Flow

This protocol provides an annual mass nutrient and sediment reduction credit for qualifying stream restoration practices that prevent channel or bank erosion that would otherwise be delivered downstream from an actively enlarging or incising urban stream.

- Estimate stream sediment erosion rates
- Convert erosion rates to nitrogen and phosphorus loadings
- Estimate reduction efficiency attributed to restoration

Recommended Methods

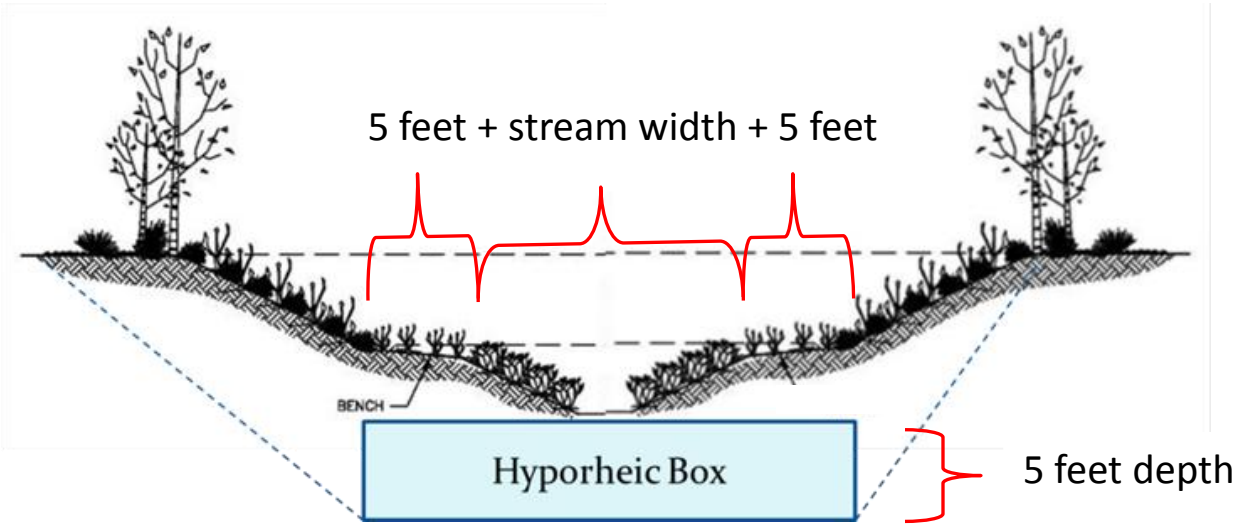
- Monitoring
  - Surveyed cross sections, bank pins…
- BANCS method
  - With validation
- Alternative modeling approach
  - Or other methods with validation (e.g., CONCEPTS, BSTEM, stepwise regression)

Protocol 2: Credit for Denitrification in the Hyporheic Zone during Base Flow

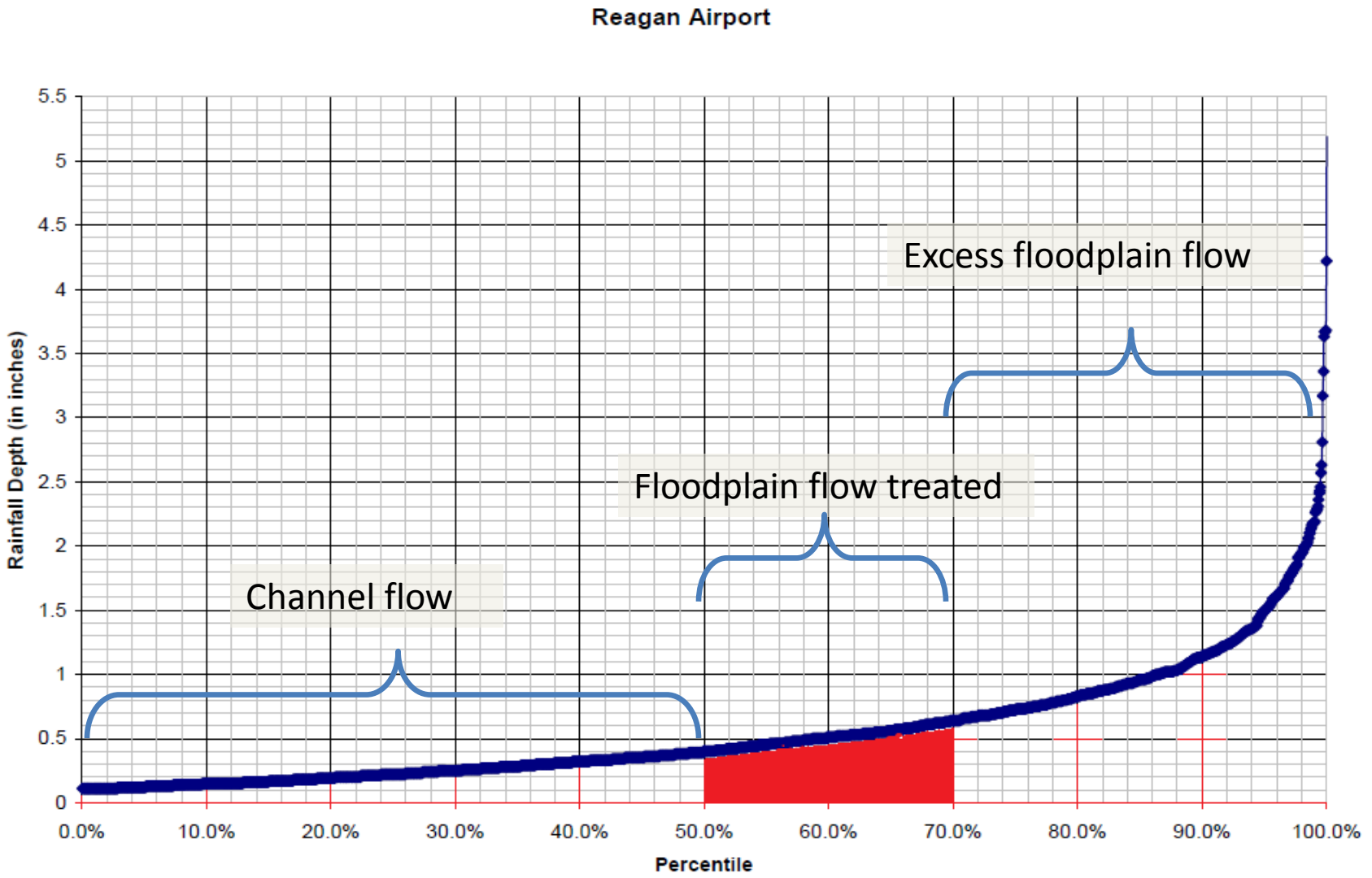
Step 1. *Determine the total post construction stream length that has been reconnected using the bank height ratio of 1.0 or less (for NCD) or the 1.0 inch storm (other design approaches that do not use the bank full storm)*

Step 2. *Determine the dimensions of the hyporheic box*

Step 3. *Multiply the hyporheic box mass by the unit denitrification rate*



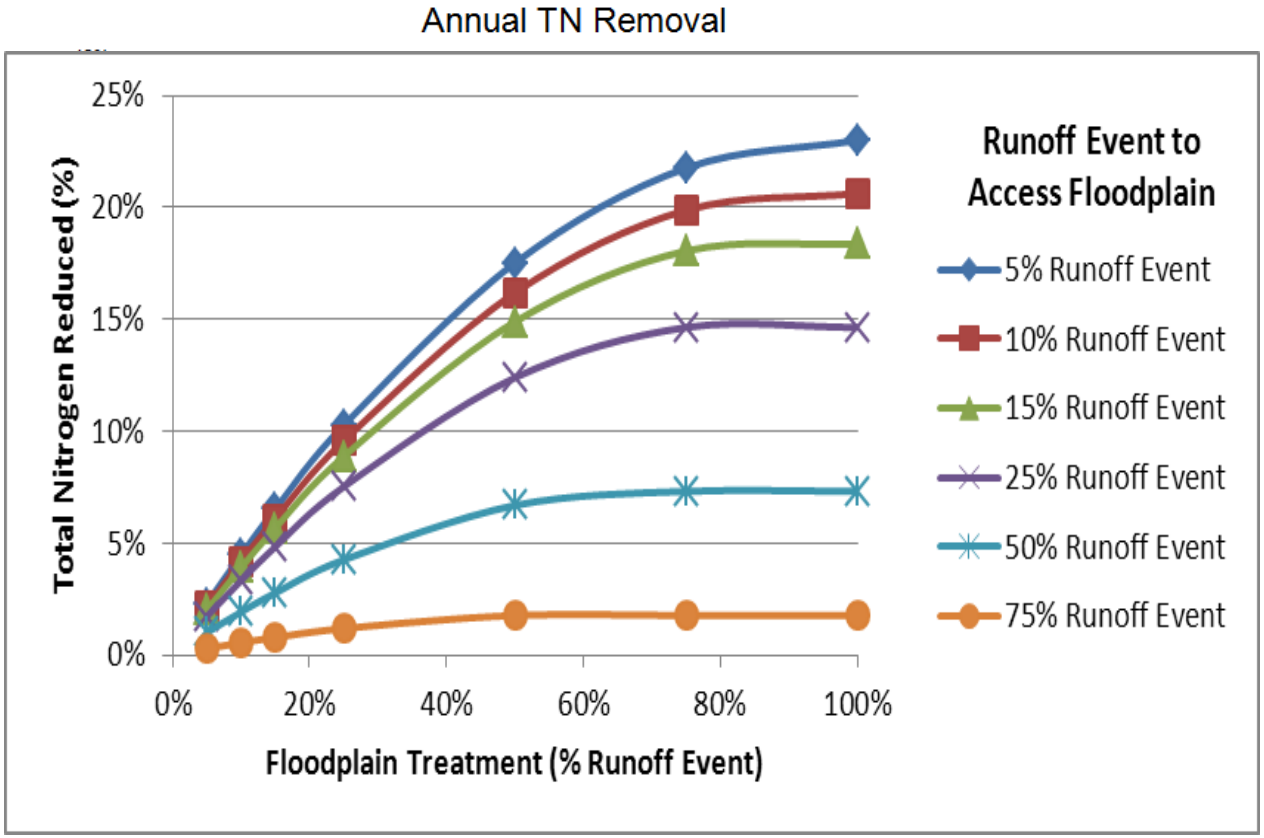
Protocol 3: Credit for Floodplain Reconnection



Protocol 3: Credit for Floodplain Reconnection Volumes

Step 1. *Estimate the floodplain connection volume*

Step 2. *Estimate the N and P removal rate attributable to floodplain reconnection (using Jordan 2007 study)*



The "Test-Drive" Process

- Recommended protocols are new, somewhat complex and will require project-based interpretation on the part of practitioners and regulators alike.

- Four consulting firms and one local government applied the protocols to ten different projects over the 6-month test drive period.

Main Concerns Identified during the "Test-Drive" Process

- **General Concerns**
  - The protocols are too complicated and difficult to use for planning purposes.
  - The interim rate leads to load reductions that can exceed watershed loading rates and may preclude the use of more robust protocols.
- **Protocol 1 Concerns**
  - The BANCS method may not be accurate and regional curves have not been developed.
  - The 50% efficiency requirement is too low.
  - Confusion over application of the sediment delivery factor.
- **Protocol 2 Concerns**
  - Certain types of projects result in load reductions that can exceed watershed loading especially for Protocol 2.
- **Protocol 3 Concerns**
  - The curves used to develop Protocol 3 are not accurate enough for design purposes.
  - The pre-restoration condition was not accounted for.
  - Confusion over how upstream BMPs will affect load to the project and subsequently the credit received.
  - Confusion over why the baseflow TN credit from Protocol 2 is not added to the credit from Protocol 3.

General Protocol Revisions

Changes in Blue Require Panel Approval

Concern: The protocols are too complicated and difficult to use for planning purposes.

Solution: Make it clear in the report that the interim rate is used for planning purposes and to projects that do not conform to recommended reporting requirements.

General Protocol Revisions

Changes in Blue Require Panel Approval

Concern: The interim rate leads to load reductions that can exceed watershed loading rates. The interim rate may also preclude the use of more robust protocols.

Solution: The interim rate will be adjusted to account for application of reduction efficiencies to TN and TSS.

Justification: An analysis of the Baltimore City data upon which the interim rate was based, revealed that a 50% efficiency was applied to TP, but not for TN and TSS.

Protocol 1 Revisions
Changes in Blue Require Panel Approval

Concern: The BANCS method may not be accurate and regional curves have not been developed.

Solution: Clarify that states are encouraged to develop their own more robust methods for estimating streambank erosion rates.

Concern: Confusion over application of the sediment delivery factor (SDF).

Solution: Add in a better description of the SDF, how the average SDF can be applied for planning purposes, and that the loads should be reported without the SDF applied because that is done in Scenario Builder.

Protocol 1 Revisions

Changes in Blue Require Panel Approval

Concern: The 50% restoration efficiency may be too low and is based on only one study.

Solution: Allow greater than 50% restoration efficiency for projects that include monitoring to demonstrate higher rates such as Big Spring Run

Justification: A greater incentive for monitoring will be created to achieve higher restoration efficiencies. This change will benefit projects, such as Big Spring Run, which showed greater than 70% sediment reduction.

Protocol 2 Revisions
Changes in Blue Require Panel Approval

Concern: Load reductions from Protocol 2 can be high and in some cases exceed watershed loading rates.

Solutions:

- Add a qualifying condition that TN load reduced cannot exceed 40% of the total watershed TN load.
- Current denitrification rate (1.95×10^{-4} lbs N/ton/day of soil) is an average of the low bank restoration sites in Minebank Run. Revise the rate so it is an average of both the high and low bank restoration sites (0.96×10^{-4} lbs N/ton/day of soil).

Justification: Klocker (2009) found that 40% of the daily load of nitrate in Minebank Run could be removed. In addition, the lower denitrification rate would provide a more conservative estimate to account for the variability in measured denitrification rates.

Protocol 3 Revisions
Changes in Blue Require Panel Approval

Concern: The curves used to develop Protocol 3 are not accurate enough for design purposes.

Solution: Include a better description of how the curves were developed and how other methods can be used, such as an alternate method presented in Appendix G that uses the Soil Conservation Service Runoff Curve Number.

Concern: The pre-restoration condition was not accounted for in the Protocol.

Solution: Include pre-restoration assessment and qualifying conditions.

Protocol 3 Revisions

Changes in Blue Require Panel Approval

Concern: Confusion over how upstream BMPs affect load to the project and subsequently the credit received.

Solution: The CBP Modeling Team will provide further explanation in Appendix F, which addresses modeling concerns related to Scenario Builder.

Protocol 3 Revisions

Changes in Blue Require Panel Approval

Concern: Confusion over why the baseflow TN credit from Protocol 2 is not added to the credit from Protocol 3.

Solution: Add an explanation of why Protocol 3 accounts for baseflow and stormflow (i.e., pervious and impervious loading to the project). Protocols 2 and 3 will also be allowed to be additive.

Justification: After a review of Protocol 3, it was found that the baseflow load reduction was not adequately represented.

Next Steps

- Jeff Hartranft from PA DEP will present monitoring results from a legacy sediment removal project at Big Spring Run to the Panel. Refinements to the protocols for legacy sediment removal projects will be considered.
- Protocol revisions will be complete by the end of December.
- Appendix F to be completed this winter that addresses modeling concerns.
- Key protocol improvements will be presented to the Water Quality Goal Implementation Team early 2014 for final approval. (TBD)
- User Training?