Recommendations for Stream Restoration Protocols 2 & 3

URBAN STORMWATER WORKGROUP
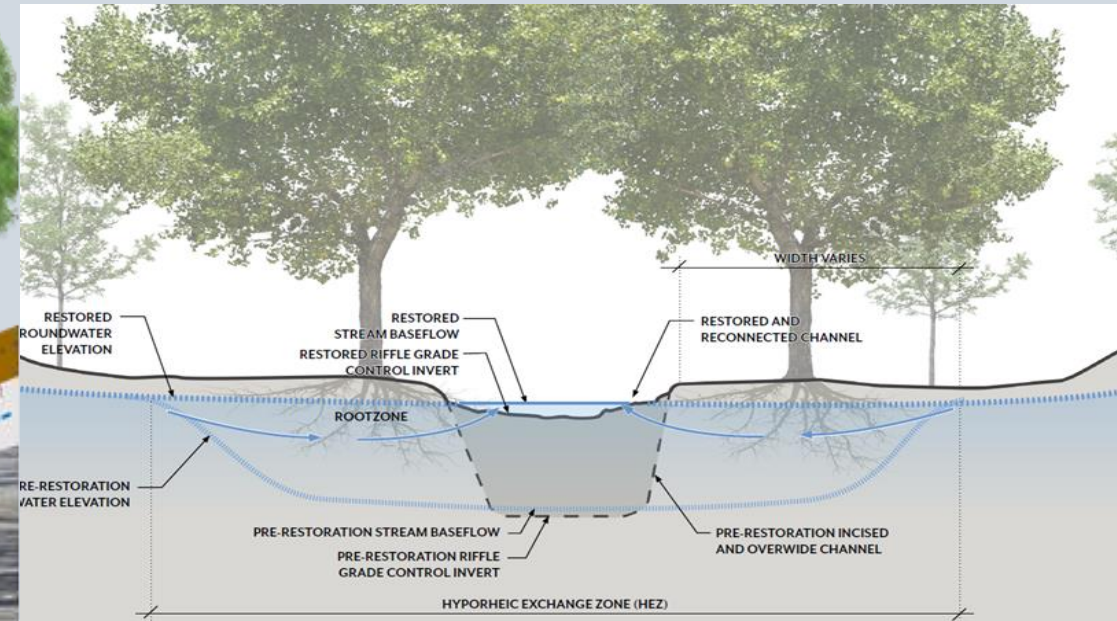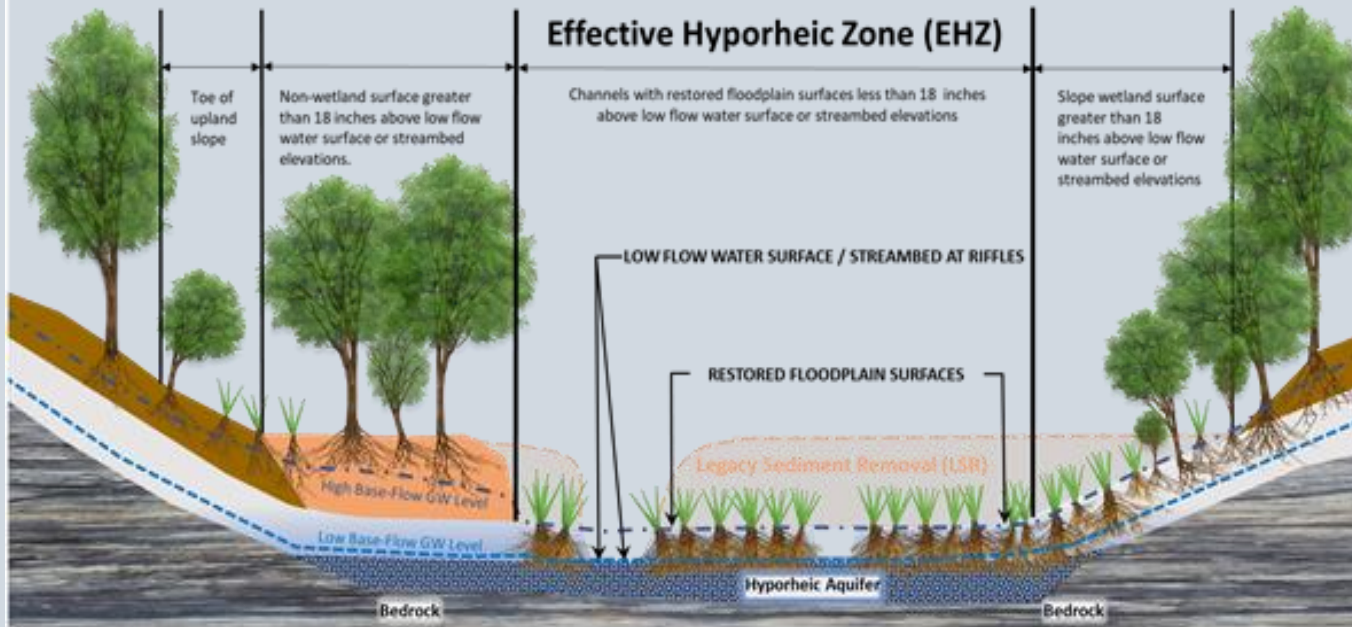
SEPTEMBER 15, 2020

Agenda

➢ Quick Refresher

➢ Overview of Comments and Revisions

➢ Call for Approval

The Recommendations

➢ Definitions and qualifying conditions for two flavors of floodplain restoration: LSR and RSB

The Recommendations

Protocol 2:

- Replace the existing Hyporheic Box with an area-based "Effective Hyporheic Zone".

- Replace the existing denitrification rate (1.95×10^{-4} lbs/ton/day) with a new rate (2.69×10^{-3} lbs NO_3/sq ft/year) and adjust it based on site factors, such as seasonal streamflow, floodplain soil saturation and the underlying materials in the hyporheic aquifer (i.e., the Parola Equation).

- Eliminate the bank height ratio (≤ 1) requirement, since these don't typically apply to most low-bank FR projects.
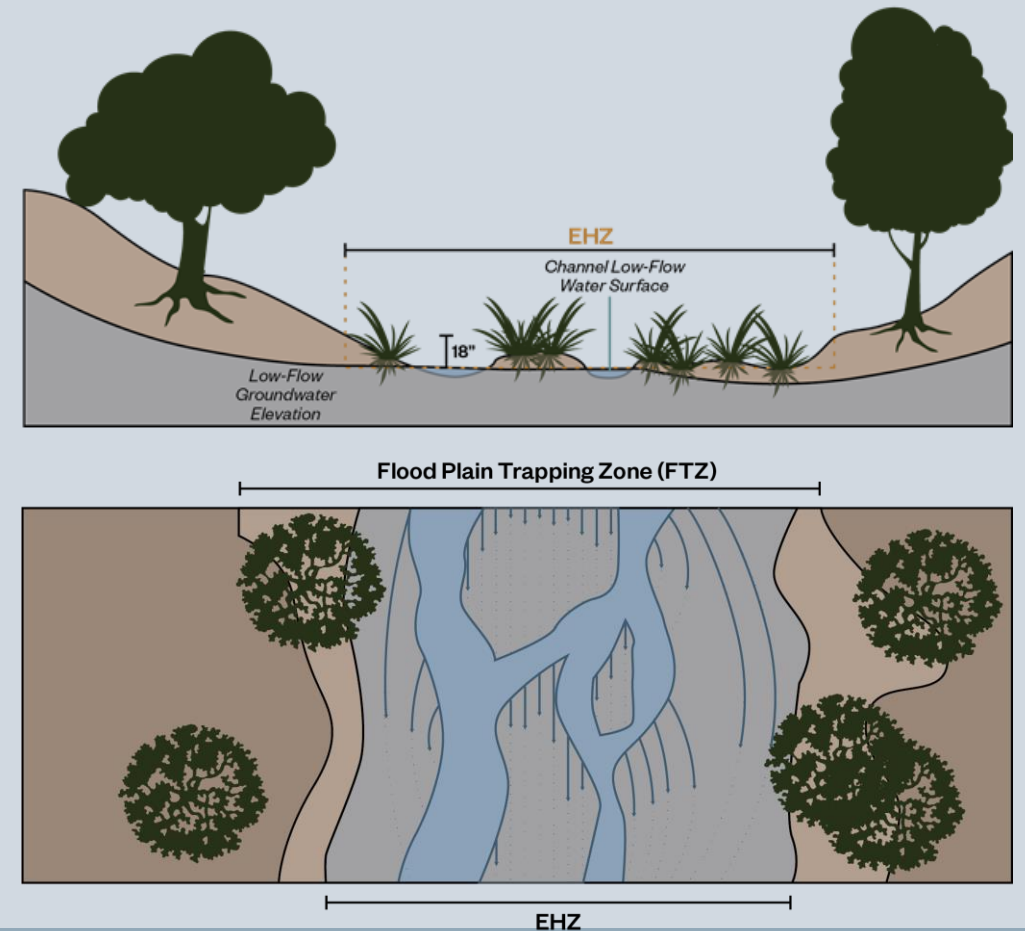
The Recommendations

Protocol 3

- Replace the "upstream" method of using rainfall-runoff models to determine the amount of stream flow that is diverted into the floodplain, with a "downstream" method that uses scaled, representative USGS gauge stations to calculate overbank flow.

- Use updated non-tidal wetland BMP removal rates to determine % efficiency

- Remove the upstream watershed to floodplain surface area ratio reduction.

Overview of Comments

Comments were generally lumped into a few distinct categories:

➢ More details on calculations, tracking, and reporting

➢ Technical questions about the Protocols

➢Policy/scope questions

Calculations/Tracking/Reporting

➢ New section on tracking and reporting requirements (for Bay Program modeling)

➢ New P3 design example, improved P2 design example

➢ New appendix on using CAST to determine load delivered to the reach

➢ New summary table for P3

➢ Clarification on when to report Wetland BMPs vs P3

Technical Questions/Comments

➢ Fixed nitrate -> TN "conversion" in P2

➢ Clarified P2 EHZ definition to remove confusion about LSR/RSB differences

➢ New Table 10 (denitrification rate adjustment factors) and supporting paragraphs

➢ Clarifying EHZ and HEZ (text and improved figures)

➢ More clarification on where the P3 removal efficiencies were derived

Table 10: Site Specific Discount Factors for Adjusting the Denitrification Rate (Parola et al, 2019)

Effective Hyporheic Zone N credit = (Base Rate) (EHZ area) (B_f) (S_f) (A_f)

Baseflow Reduction Factor (B_f)		Floodplain Height Factor [1] (S_f)		Aquifer Conductivity Reduction Factor [2] (A_f)	
Perennial baseflow	1.0	0 – 0.75 ft	1.0	Gravel, Sandy Gravel, Sand, and Peat	1.0
Baseflow in all but late summer/fall	0.75	0.76 ft – 1.00 ft	0.75	Silty gravel, Silty Sand **or** Loamy Sand, Sandy Loam, and Organic Silt with no coarse grain layer in connected to channel	0.6
Baseflow in winter/spring	0.50	1.01 ft – 1.25 ft	0.50	Clayey Gravel, Sandy Silt **or** Sandy Clay Loam, Loam, Silt Loam, Silt	0.4
Baseflow only during wet seasons	0.25	1.26 ft – 1.50	0.10	Sandy Clay, Clay Loam, Silty Clay Loam, Organic Clay with no coarse grain layer in connected to channel	0.1
Flow only during runoff events	0.10	>1.50	0.00	Silty Clay and Clay with no coarse grain layer in connected to channel	0.01

[1] The floodplain height factor is determined by the height of the floodplain surface above the riffle crest (high point in the channel profile). While most gravel bed streams should have a riffle that can be used, sand bed channels or silty clay beds may use the high points in their profiles that would maybe be considered a run. Low base-flow (lowest 10% of flows) could also be used as a suitable alternative.

[2] This refers to a hyporheic aquifer capacity factor based on the dominant materials immediately below the floodplain soil (see Figure 4). Soil texture based on NRCS standard soil classifications (Schoeneberger et al., 2012).

"Base Rate" is the mean areal floodplain denitrification rate (lbs/sq ft/yr), as recommended by Group 4.

Policy Questions

➢ Language added throughout to clarify states/regulatory agency authority

➢ Clarification on Ag vs Urban stream restoration

➢ Keeping the unintended consequences section

Questions?

Stop	Hold	Stand Aside	Agreement with Reservations	Endorsement
"I do not agree and feel the need to stand in the way of this decision"	"I believe more work is needed before we make a decision"	"I trust the group and will not block this decision but need to register my disagreement"	"I can live with it"	"I like it"

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