Panel 4: Integrating Functional Uplift in TMDL Projects

Moderator and Facilitators:

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- Rich Staff, EPR

Panelists:

- Matt Myers (SHWG Co-Chair) & Emma Gutlzer, Fairfax County
- Joe Berg, Biohabitats

Designing Sustainable Stream Restoration Projects within the Chesapeake Bay Watershed

STAC Workshop Report, Publication 15-003

May 2014

Designing Sustainable Stream Restoration Projects within the Chesapeake Bay Watershed

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Workshop Recommendation

- It is recommended that the Urban Stormwater Workgroup and Stream Health Workgroup coordinate efforts to develop guidance (e.g., via an expert panel) to align how the restoration/enhancement of stream functions translates to nitrogen, phosphorus, and sediment ‘credit’. The CBP recently approved recommendations to credit stream restoration projects along with guidance to verify and report stream restoration as a best management practice(BMP). This guidance would discuss how stream restoration BMP protocols fit within a functional framework for stream restoration project design, as well as verification guidance such that post-construction assessments can verify that the project is meeting minimum performance standards to warrant use of either the general interim pollutant reduction rates or the reduction rates related to one of the four specific protocols approved by the expert panel.

Stream Health Workplan

Management Approach 1: Identify an appropriate suite of metrics to measure the multiple facets of stream health to complement the baywide Chessie BIBI
Management Approach 2: Provision of adequate funding and technical resources to support functional life in stream restoration projects, in addition to nutrient and sediment reductions.
Management Approach 3: Active and engaged participation by local communities with Federal and State partners is central to Bay restoration (See Management Strategy for full Approach).
Management Approach 4: Develop and Promote holistic stream restoration design guidelines that identify the level of degradation and improvement of stream functions and key stressors/factors limiting potential uplift.
Management Approach 5: Work with CB partners to include the Enhancing Partnering, Leadership and Management GIT to enhance the capacity of local governments, organizations and landowners of beneficial stream restoration and maintenance practices.

- **Management Approach 4**: Develop and Promote holistic stream restoration design guidelines that identify the level of degradation and improvement of stream functions and key stressors/factors limiting potential uplift.
  - Implement recommendations from the STAC workshop report to establish a joint SHWG and USWG work group to develop guidance (e.g., via an expert panel) to align the stream restoration BMP protocols for nutrient and sediment loads delivered downstream with approaches to optimize improvements in stream health and function (e.g., improve instream aquatic life to improve Chesapeake Bay BIBI). Include more consideration of existing habitat conditions so as to not degrade existing functions as a result of a BMP. Also use work group to address other technical issues identified in STAC Workshop on Sustainable Stream Restoration.

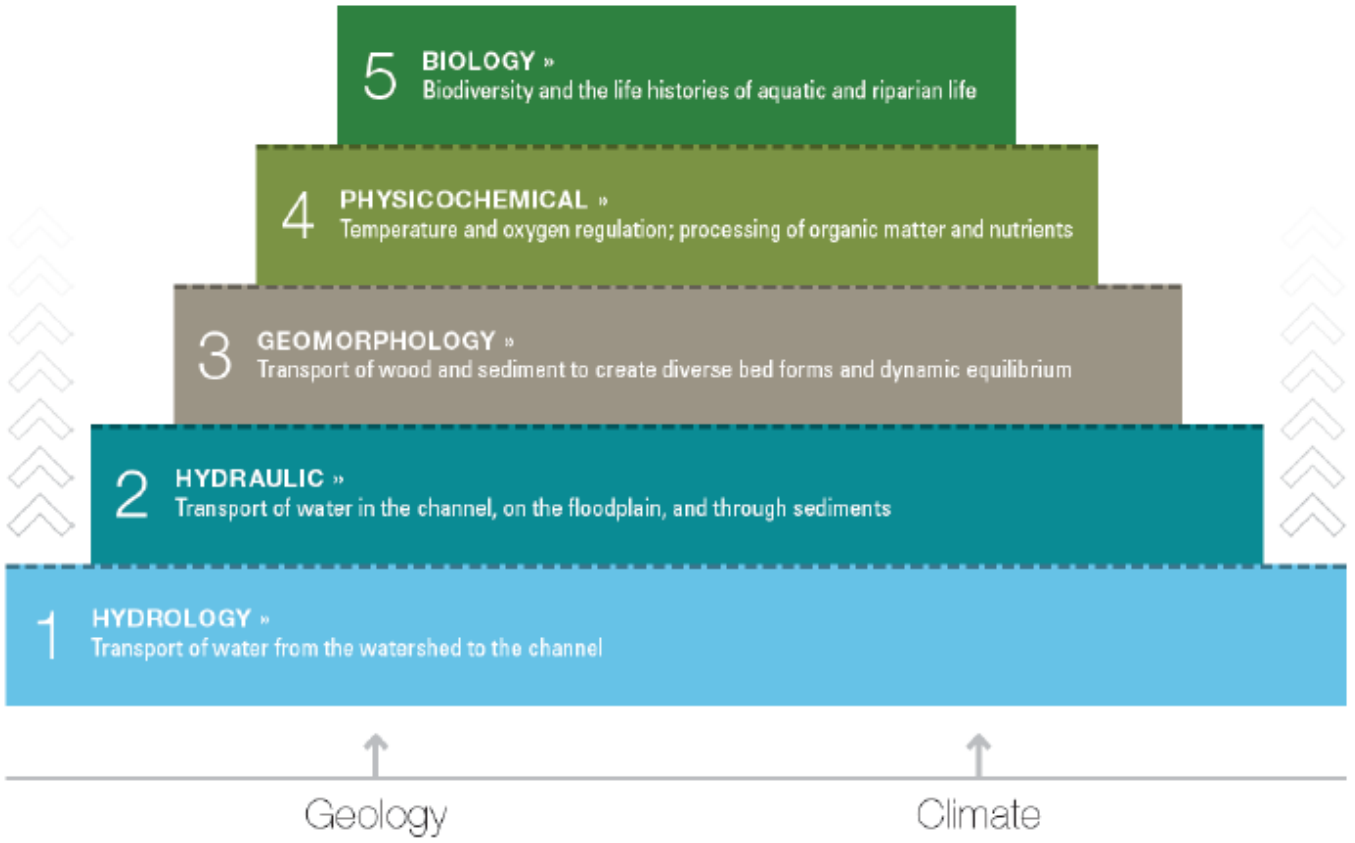
A Function-based Approach

- The endpoints of evaluating stream health focus on biological or water quality targets
  - Bay TMDL, local TMDLs and Stream Health Outcome; while monitoring permit requirements focus on geomorphology or channel stability

- Recognize that stream health inclusive of the physical, chemical and biological processes that support and sustain a stream's ecology
- Address functions critical to understanding stream processes supporting stream health

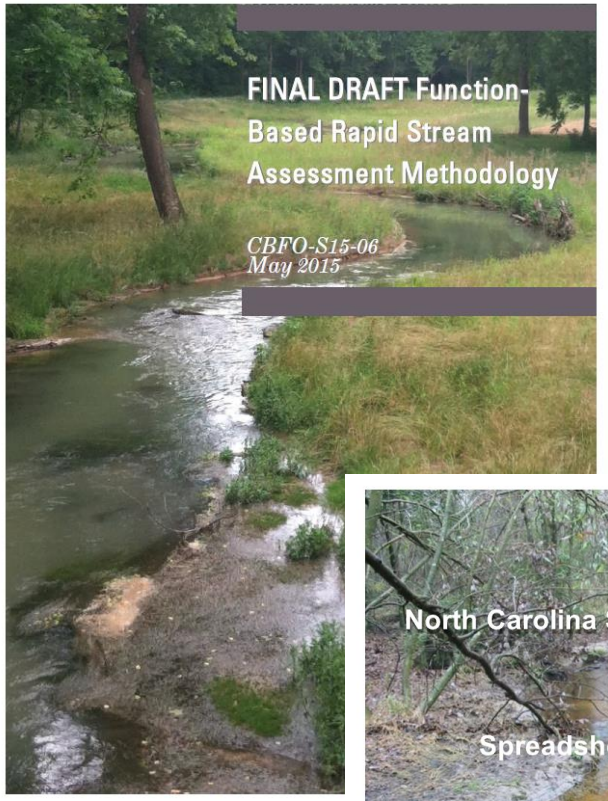
- SHWG work to create a more inclusive and comprehensive process to address stream health to demonstrate 'ecological uplift' occurring

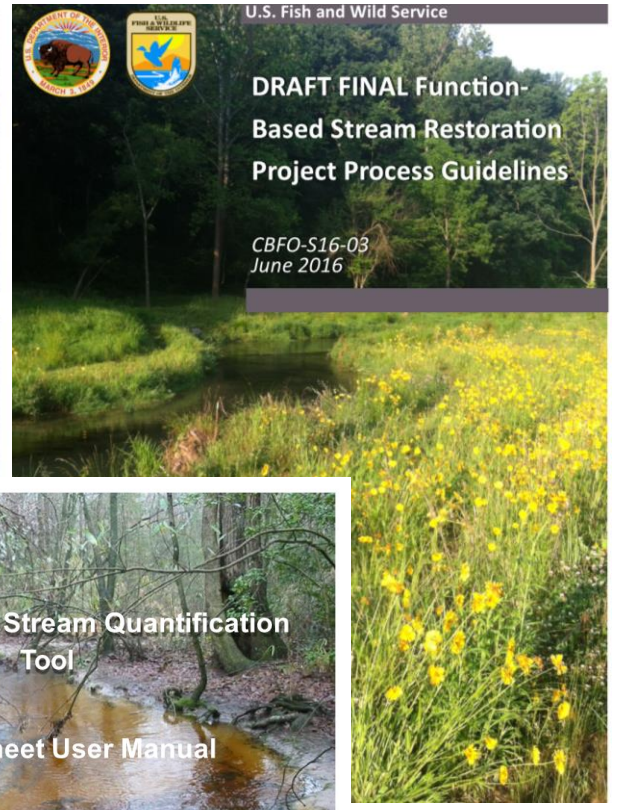
Stream Function Pyramid Framework (Harman et al 2012)



Function-Based Tools

- Rapid Function-based Stream Assessment (2015)
- Function-based Stream Restoration Project Process Guidelines (2016)
- Stream Quantification Tool (2017)
- Address functions critical to understanding stream processes





Level and Category	Parameter	Measurement Method	Pre-Restoration Condition	
			Value	Rating
1 - Hydrology	Channel-Forming Discharge	Regional Curves	N/A	N/A
2- Hydraulics	Floodplain Connectivity	Bank Height Ratio	1.5	Not Functioning
		Entrenchment Ratio	1.73	Not Functioning
		HEC-RAS	n/a	
3 – Geomorphology	Bed Form diversity	Pool-to-pool spacing	1.5 to 9	Not Functioning
		Pool Depth Variability	2.0 to 3.0	Functioning
		Riffle Length to Riffle Width	2.9 to 4.3	Functioning
		Riffle Slope to Reach Slope	1.2 to 3.9	FAR
		Pool Slope to Reach Slope	0.3 to 0.6	FAR
	Channel Evolution	Rosgen	F → C → E	FAR
	Riparian Vegetation	PFC	Not Functional	Not Functioning
		Buffer Width based on Beltwidth	0	Not Functioning
	Lateral Stability	BEHI/NBS	Mod / Low	FAR
		Lateral Erosion Rate	0.09 yr/ft	Functioning
		Confinement	0.69 to 1.14	Functioning
		MWR	2.4 to 4.0	Functioning
		W/D_{proj} /W/D_{ref}	1.4	FAR
		Wavelength to Riffle Width	9 to 14	Functioning

Functional Category	Function-Based Parameters	Existing Parameter	Proposed Parameter
Hydrology	Catchment Hydrology	0.8	0.8
Hydrology	Runoff		
Hydrology	Flow Duration		
Hydraulics	Floodplain Connectivity	0.80	1.00
Geomorphology	Large Woody Debris	0	0.60
Geomorphology	Lateral Stability	0.50	1.00
Geomorphology	Riparian Vegetation	0.50	0.85
Geomorphology	Bed Form Diversity	0.43	0.77
Geomorphology	Sinuosity		
Physicochemical	Temperature	0.30	0.70
Physicochemical	Salinity		
Physicochemical	Stream Metabolism		
Physicochemical	Organic Matter	0.70	0.90
Physicochemical	Nitrogen		
Physicochemical	Phosphorus		
Biology	Macros	0.90	1.00
Biology	Fish		

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StreamMechanics

Discussion Questions

- What are the design elements/features to address critical processes and functions
- What observations or measurements to monitor effect or progress towards ecologic lift?
- How do we incentivize “going beyond the regulatory endpoint”?