Communicating the Challenges of Urban Streams Through Better Biological Assessments

Will Isenberg
Virginia Department of Environmental Quality
Virginia’s changing view on Urban Streams

- Urban Streams Workgroup
  - Focus on biological impairments

- Urban Stream Aquatic Life Use impairments
  ~75% benthic

- MS4 Feedback:
  - Benthic TMDLs have a high bar for success
  - Huge cost for little gains
  - Public doubt/skepticism
Urban Stream Syndrome

- **Urban Stream Syndrome**: flashier flows, elevated concentrations of contaminants, altered channel morphology, and reduced biotic richness with increased dominance of tolerant species. (Walsh et al., 2005)
  - That is a lot of stress
  - Biological assessments will support USS diagnosis but that’s it
Stream Functions Pyramid

A Guide for Assessing & Restoring Stream Functions

1. HYDROLOGY » Transport of water from the watershed to the channel

2. HYDRAULIC » Transport of water in the channel, on the floodplain, and through sediments

3. GEOMORPHOLOGY » Transport of wood and sediment to create diverse bed forms and dynamic equilibrium

4. PHYSIOCHEMICAL » Temperature and oxygen regulation; processing of organic matter and nutrients

5. BIOLOGY » Biodiversity and the life histories of aquatic and riparian life
Problems with Biological Assessments and TMDLs

• Biological Assessments in VA
  – Benthic metric based on a reference community
  – Impairment = pass/fail

• Benthic TMDLs in urban environments
  – Data driven
  – Pollutant driven
  – High bar for success
Potential Solutions

- Tiered Aquatic Life Use
- Biological Condition Gradient
- Better Use of Assessment Subcategories
Tiered Aquatic Life Use

• Tiers based on incremental goals
  – Tiers can be based on biological goals
  – Tiers can also be based on functional goals
  – It’s all about attainable increments

• Attainable goals with anti-degradation protections

• Tiered = you can climb
  – Not a lower bar
  – A more practical bar that can move up with progress

• Communicate incremental progress
Biological Condition Gradient

- The BCG describes a biological condition related to increasing levels of stress on a scale from 1-6
- Built off of organism stressor response relationships
- Quantifies BPJ
Biological Condition Gradient (cont.)

• Benefits for urban streams
  – Provides measurable, incremental goals
  – Can be used for TALU based on stressors as opposed to a reference community
  – Shows biological progress or regress as the score changes in response to changes in stress
Better Use of Assessment Subcategories

• Current assessment in VA:
  – 5A or 4A for Benthic Scores

• TMDL/TMDL-alt use 4A or 5R for restoration goals
  – Category 4A for Sediment
  – Category 5R (5-alt) for non-pollutants:
    • Flow
    • Lack of Riparian Vegetation
    • Habitat modification

• Absent TMDL-alt:
  – Category 4C for non-pollutants

• Gives a more detailed implementation goals

• Better communicates challenges to public and permittees

Example benthic stressor analysis
Most probable Stressors:
• Flow
• Lack of Riparian Vegetation
• Habitat modification
• Sediment
Conclusion

• Biological goals in urban environments are hard to attain

• Costs to meet goals are high

• May promote the perception that goals are unattainable leading to lack of support

• Better communication on progress, goals, and objectives
  – TALU, BCG, and better use of assessment categories
  – All communicate in greater detail what needs to be done, while allowing for progress to be shown on interim goals