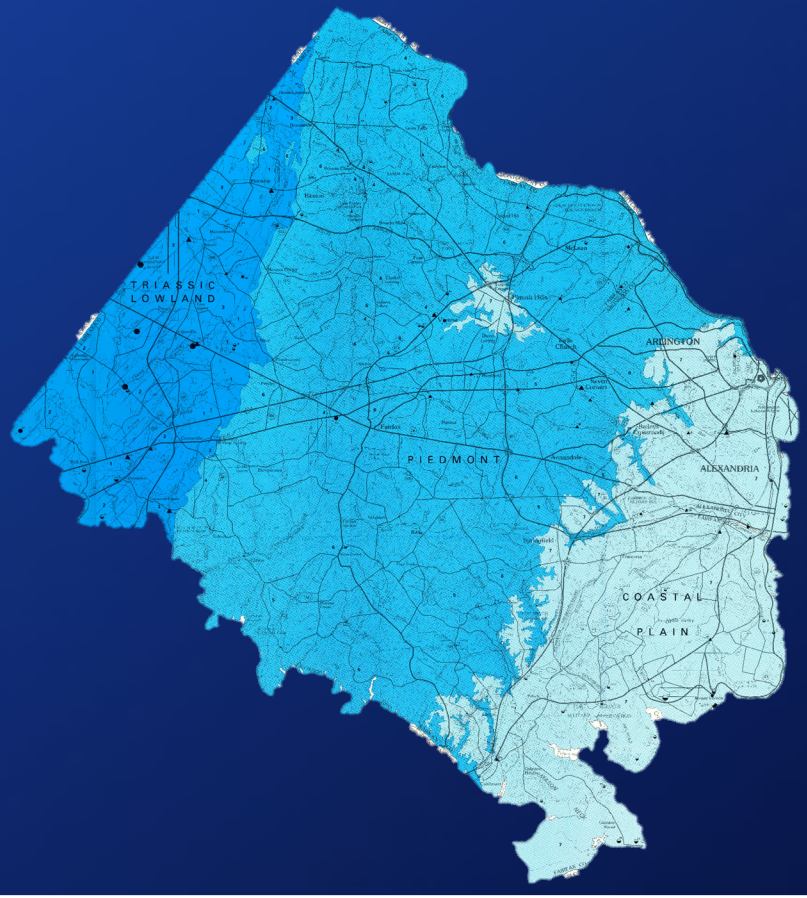
Triassic Lowlands, a unique region in the Piedmont:

implications for stream restoration, bioassessment and stormwater management



Department of Public Works and Environmental Services

Working for You!

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TRIASSIC WORLD

Outline

- About Triassic basins
- The Culpeper Basin
- Triassic streams differ from Piedmont streams
  - Geomorphically/Geochemically/Hydrogeologically
  - We have data!
- Stream channel responses to urbanization also differ
  - Anecdotally this has been “known” for a while
- Ecology of Triassic streams also differ – not well studied
  - Benthos, WQ, habitat, riparian vegetation
  - We have data!
- Do Triassic Lowlands require special consideration in stream restorations? Bioassessments? Stormwater management?

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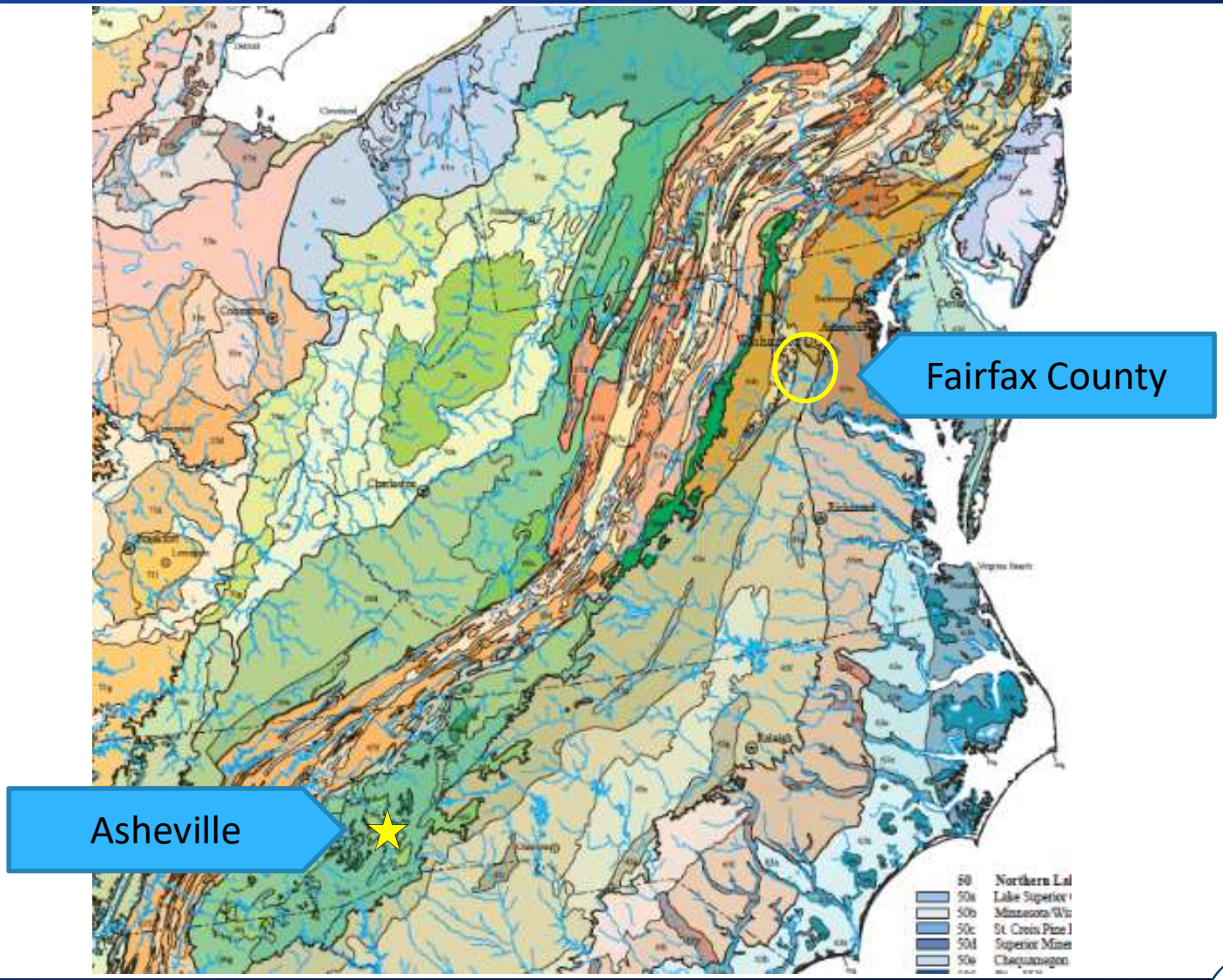
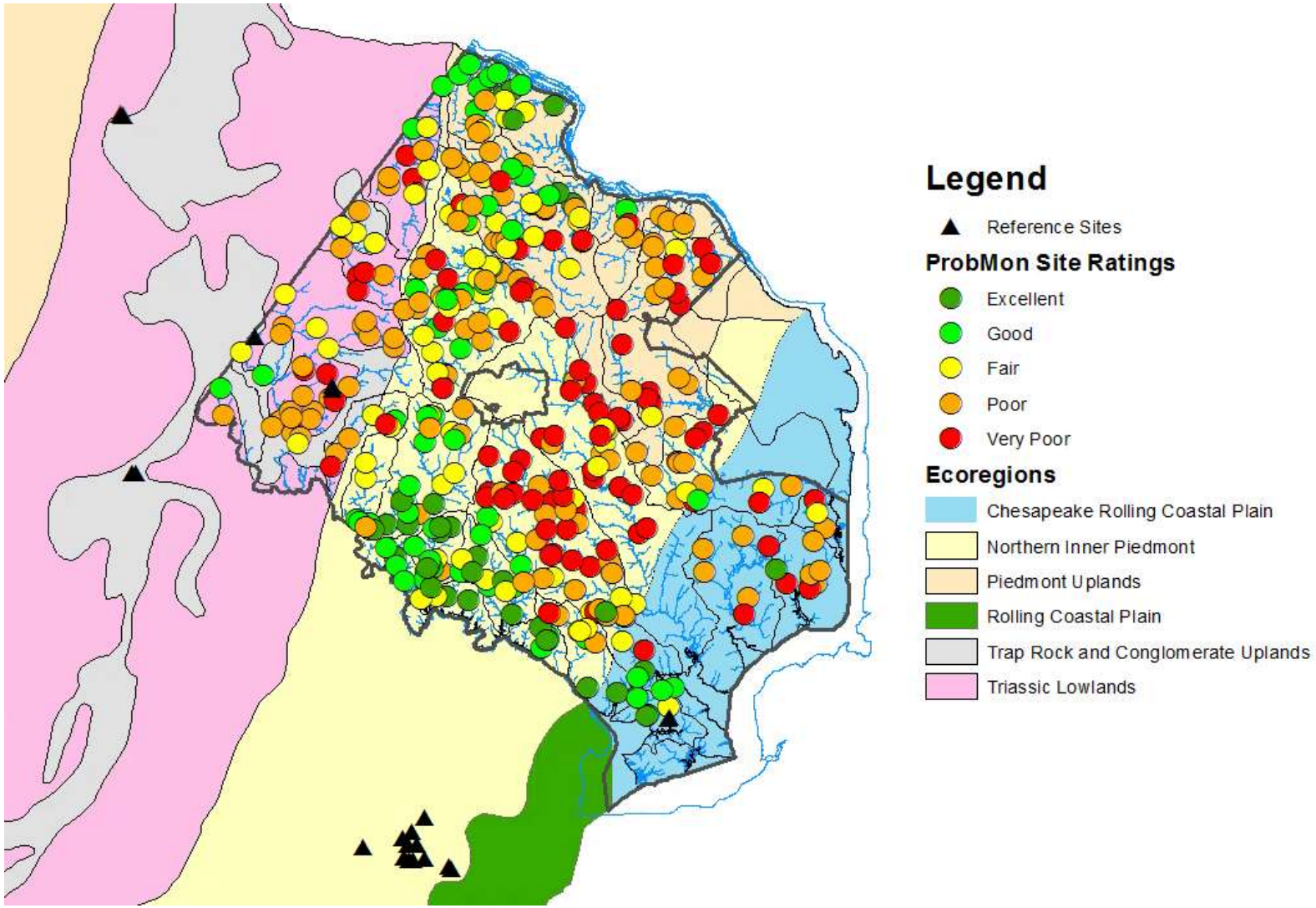
Where We Are



The Culpeper Basin

- One of the largest Mesozoic sedimentary basins in Eastern North America
- Part of two Level IV subregions of the Level III Northern Piedmont (64) ecoregion
  - Triassic Lowlands (64a)
  - Diabase & Conglomerate Uplands (64b)

Biological Monitoring



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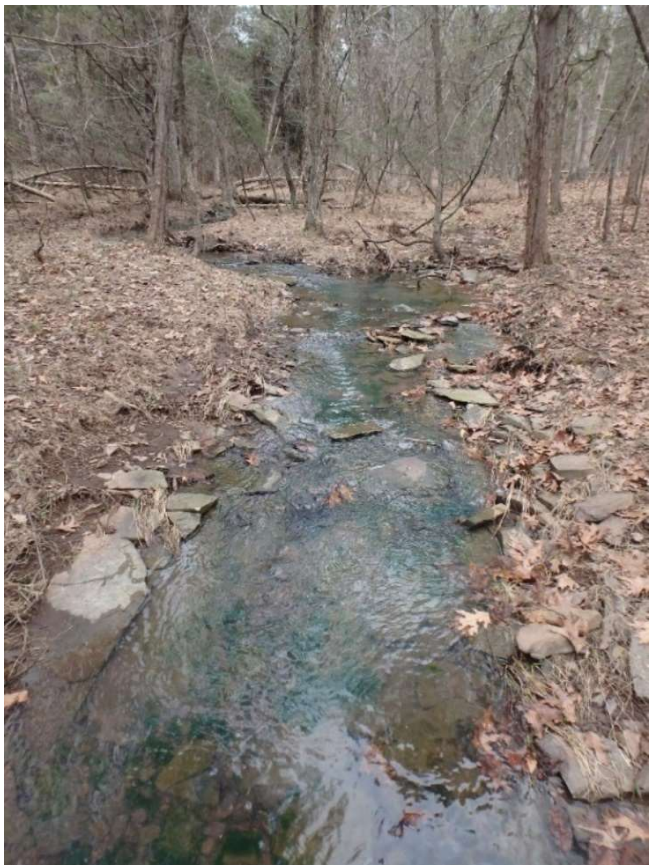
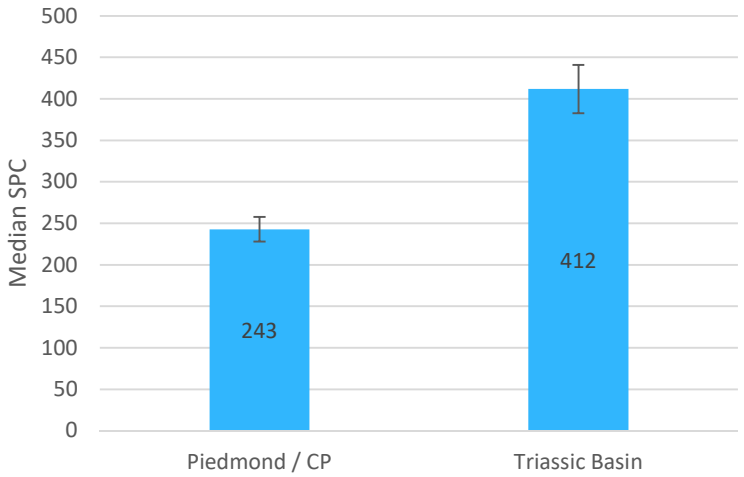
Fairfax County Triassic Reference Streams

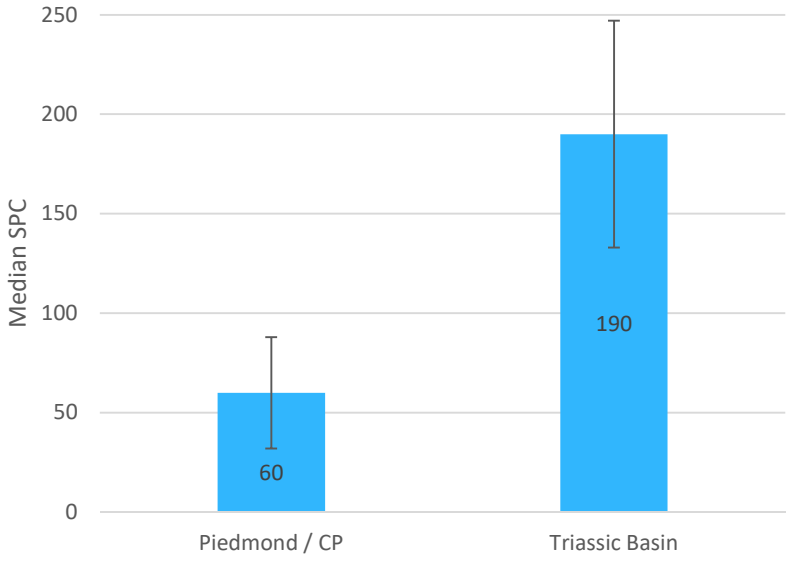


Water Quality – Specific Conductance

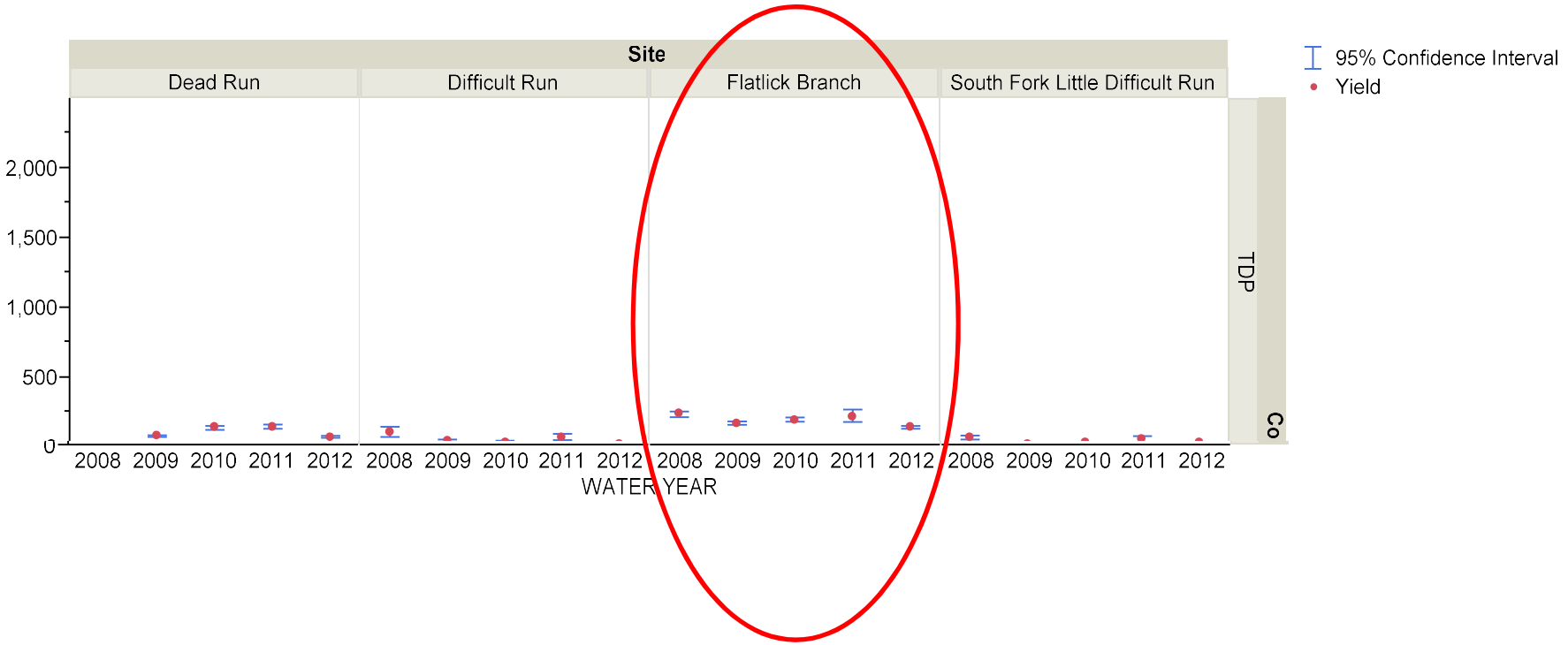
Probmon + refs



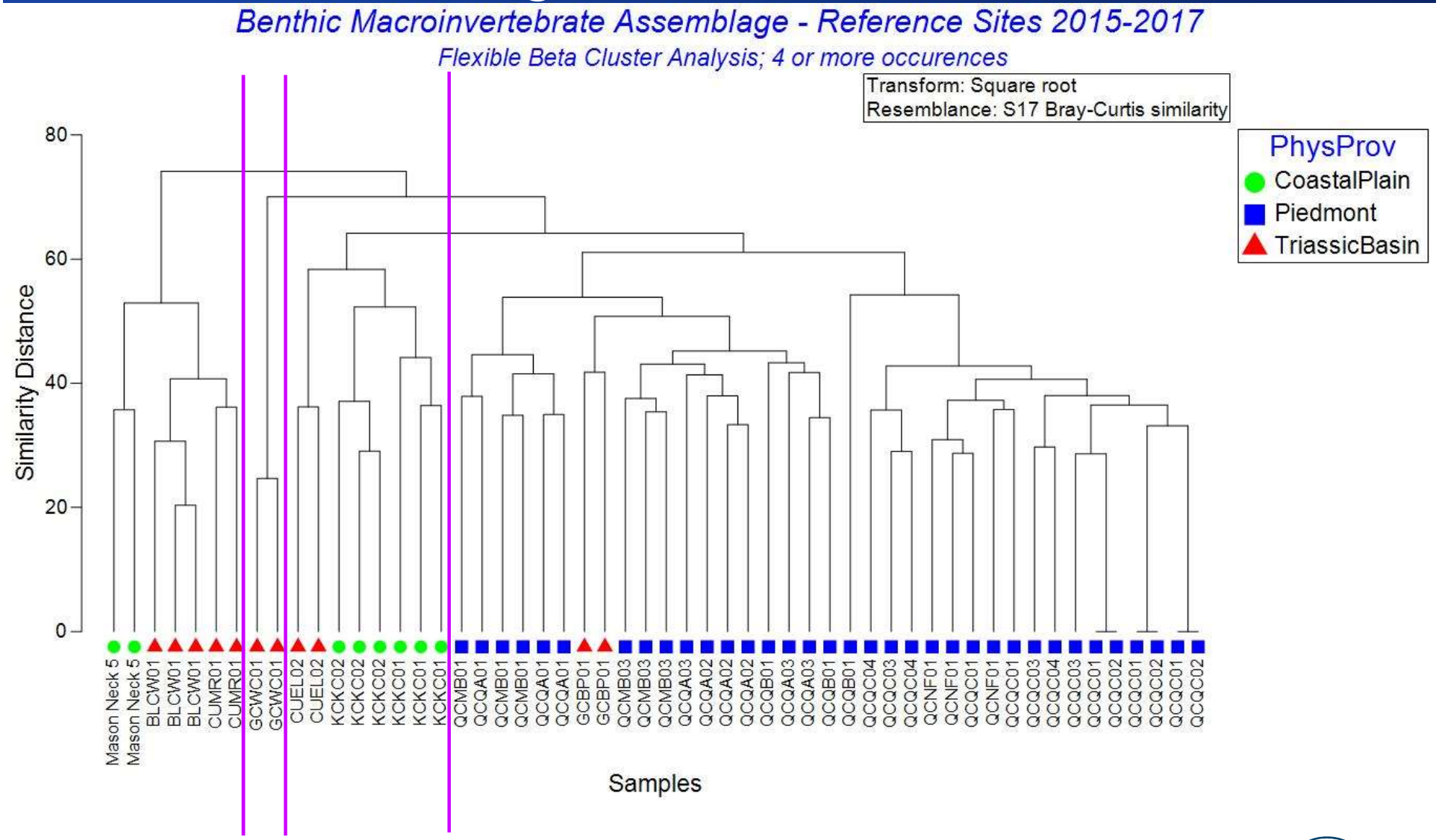
Reference sites



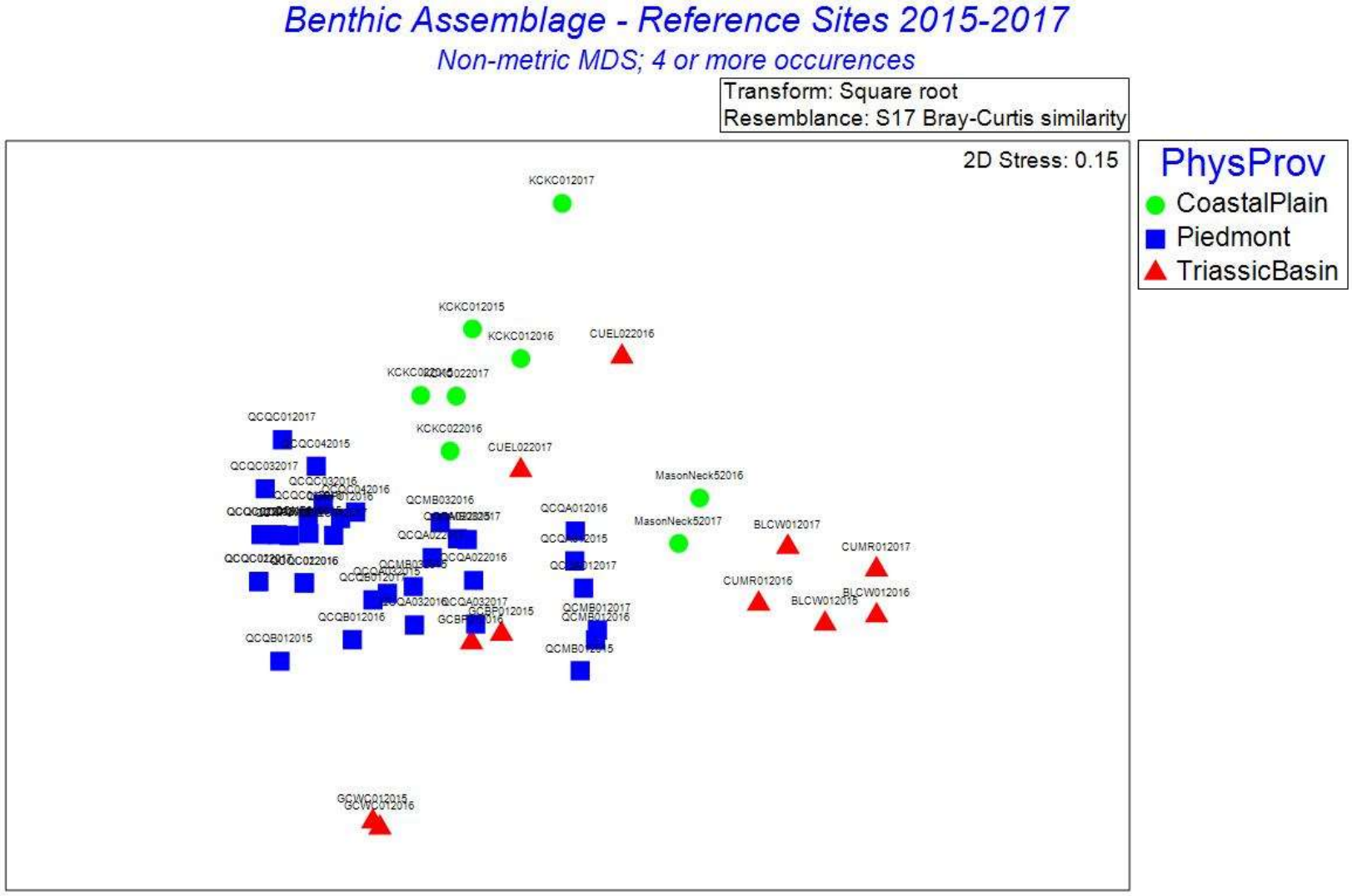
Water Quality – Dissolved Phosphorus



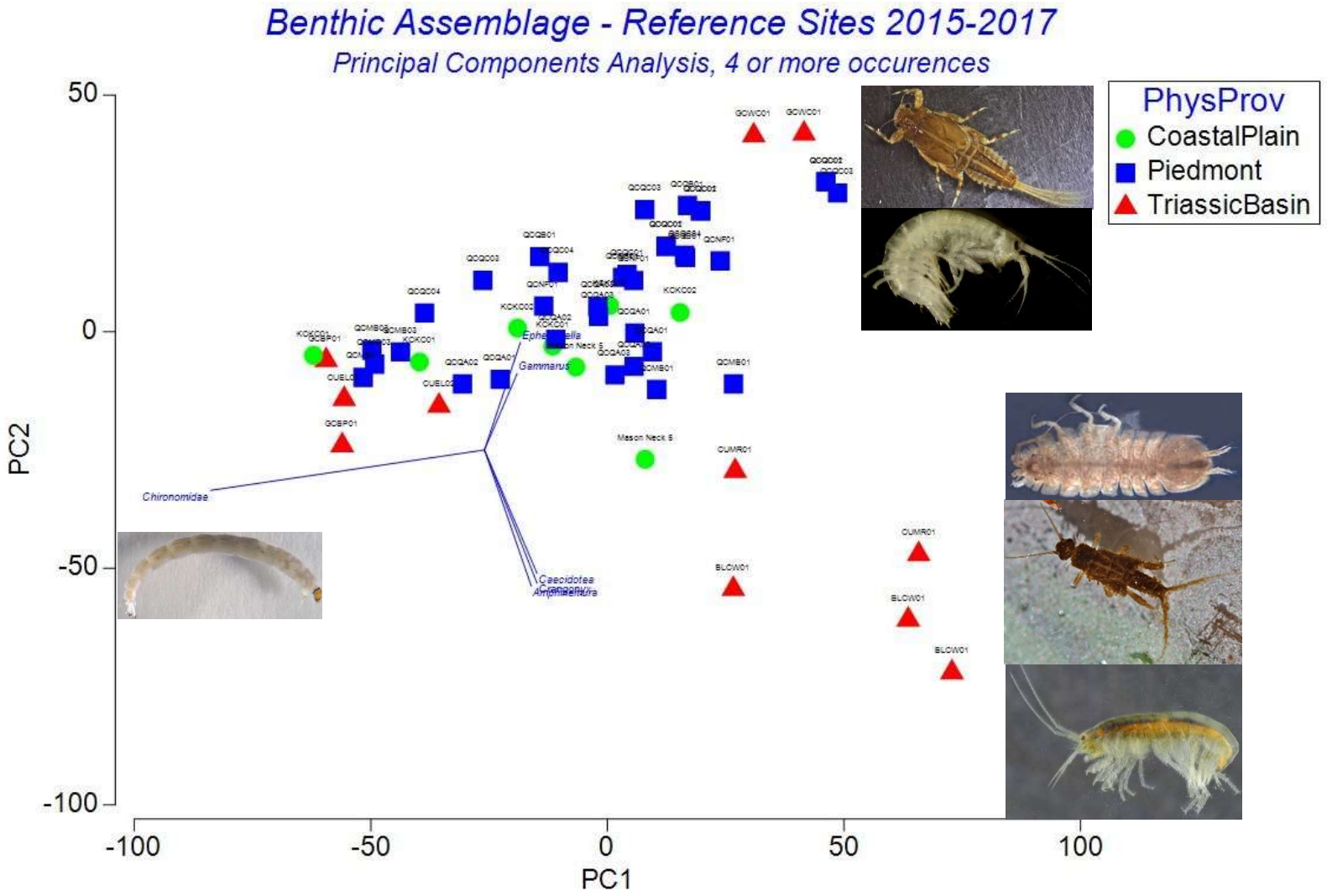
Benthic Assemblages



Benthic Community Composition



Benthic Community Composition



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Effects of Urbanization

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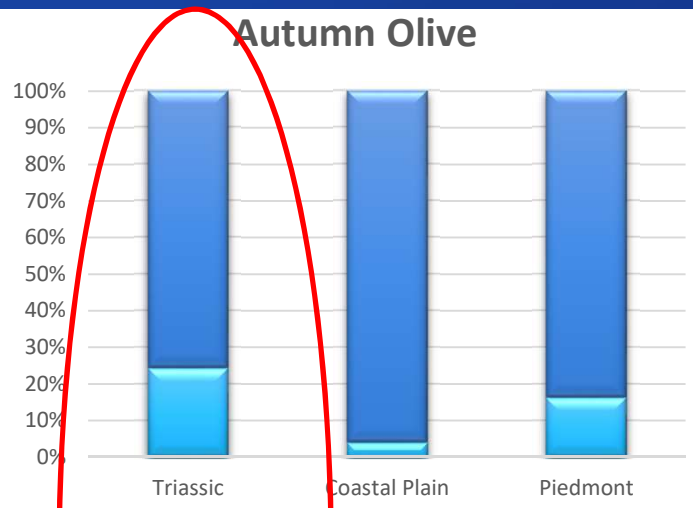
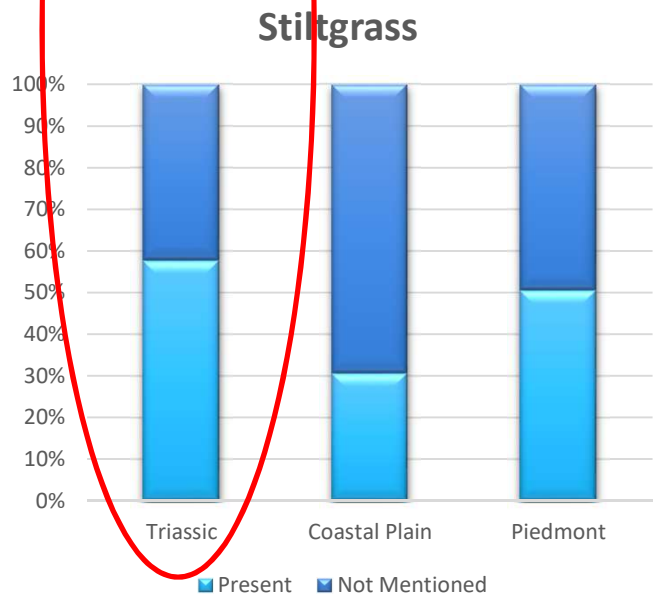
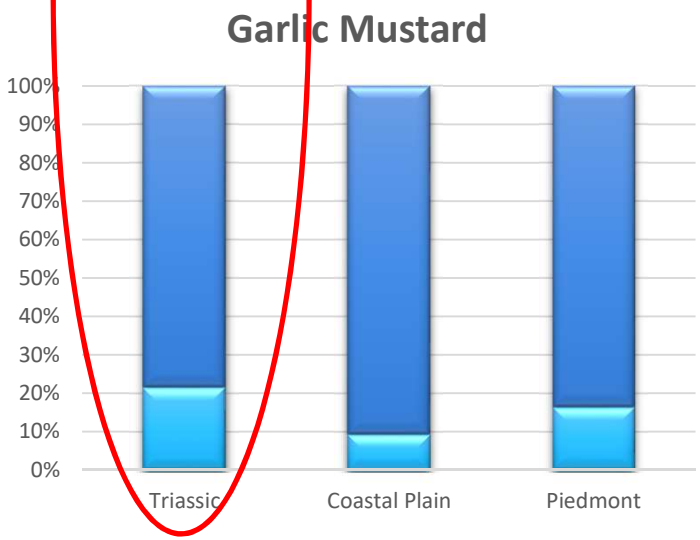
NNIAP Results 2010-2016 - Invasives







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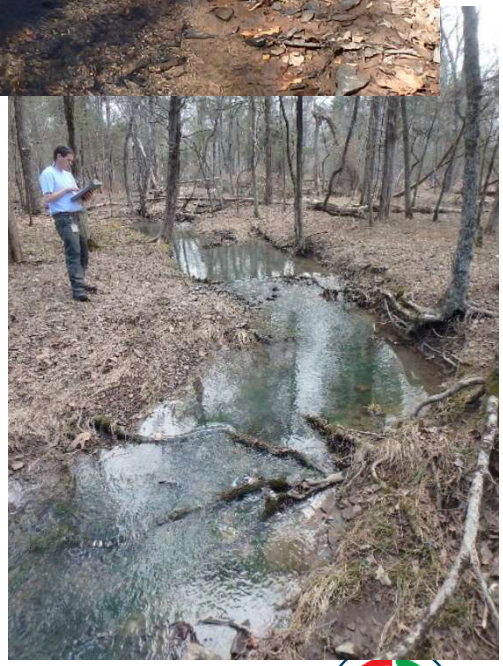
Stormwater Management & Stream Restoration Considerations

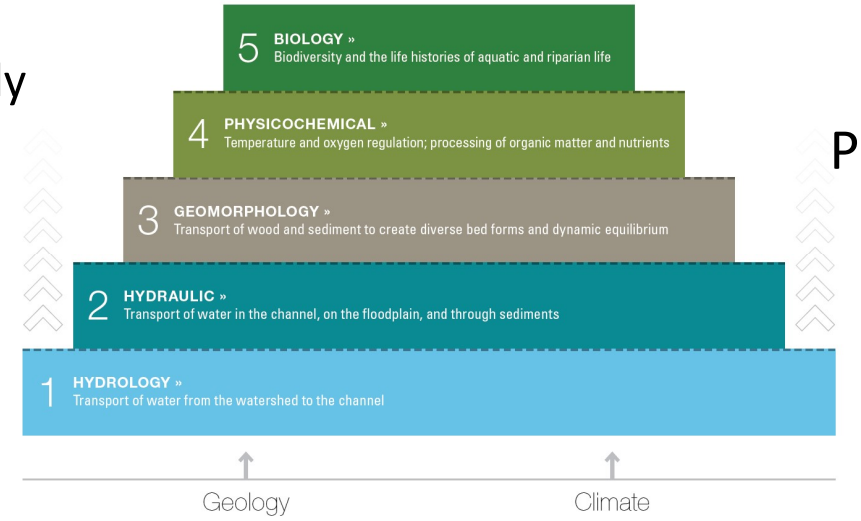
- Traditional BMPs designed to encourage/increase infiltration may be less effective due to gradient, soils
- Reconnection with floodplain should be a restoration priority
- Need to rethink "Natural Channel Design" – conventional step/pool complex perhaps not appropriate for Triassic
- Standard RBM may not be the "right" substrate
  - More woody debris, gravel/small cobble, channers
  - Protect aquatic mosses, other native SAV where found
- Replant riparian buffer with fac-wet plants appropriate for soil types and conditions



Functional Lift – Better Outcomes

Instream

- Pool, Riffle, Run
- Bed Material
- Channel Size/Baseflow
- Side Channels/Oxbow
- Organics
  - Leaf Packs
  - Large Woody Debris



Floodplain

- Protection
- Plant Community
- Living Soil
- Organics
  - Large Woody Debris
  - Buried wood
- Wetlands/Vernal Pools

Protect What is Good!

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Flatlick Phase I Restoration

Dry Pond retrofit @ Flatlick Phase I

Flatlick Phase II Restoration: Riffle-Glide Woody Debris Installation

Triassic Lowlands, a unique region in the Piedmont

Flatlick Phase II Restoration: Riffle-Glide Woody Debris (3 weeks)

Takeaways

- Triassic streams aren't inherently "bad"…but they ARE different
- Local conditions (higher SC, P levels, highly erodible soils) should be considered in the development of regulatory standards
- Stormwater management practices and stream restoration approaches should factor geomorphological, hydrological, sedimentological and biological characteristics of Triassic streams
- Piedmont BIBI not appropriate to assess benthic health of Triassic streams

Additional Information