

Legacy Sediment - The “Dirt on Conventional Buffers” and Results From the Big Spring Run Restoration and Monitoring Project



Pennsylvania

Department of Environmental Protection

Pennsylvania Legacy Sediment Workgroup

Jeffrey Hartranft

Bureau of Waterways Engineering and Wetlands

&

Joseph V. Sweeney

Managing Partner – P-Three

Presentation Outline

- **Legacy Sediment Examples and Definition -
“Legacy Sediment 101”**
- **Conventional Wisdom**
- **Legacy Sediment Removal as a Best Management Practice**
- **Aquatic Resource Restoration Potential and Big Spring Run**



Conoy Creek in Elizabethtown – Lancaster County, PA



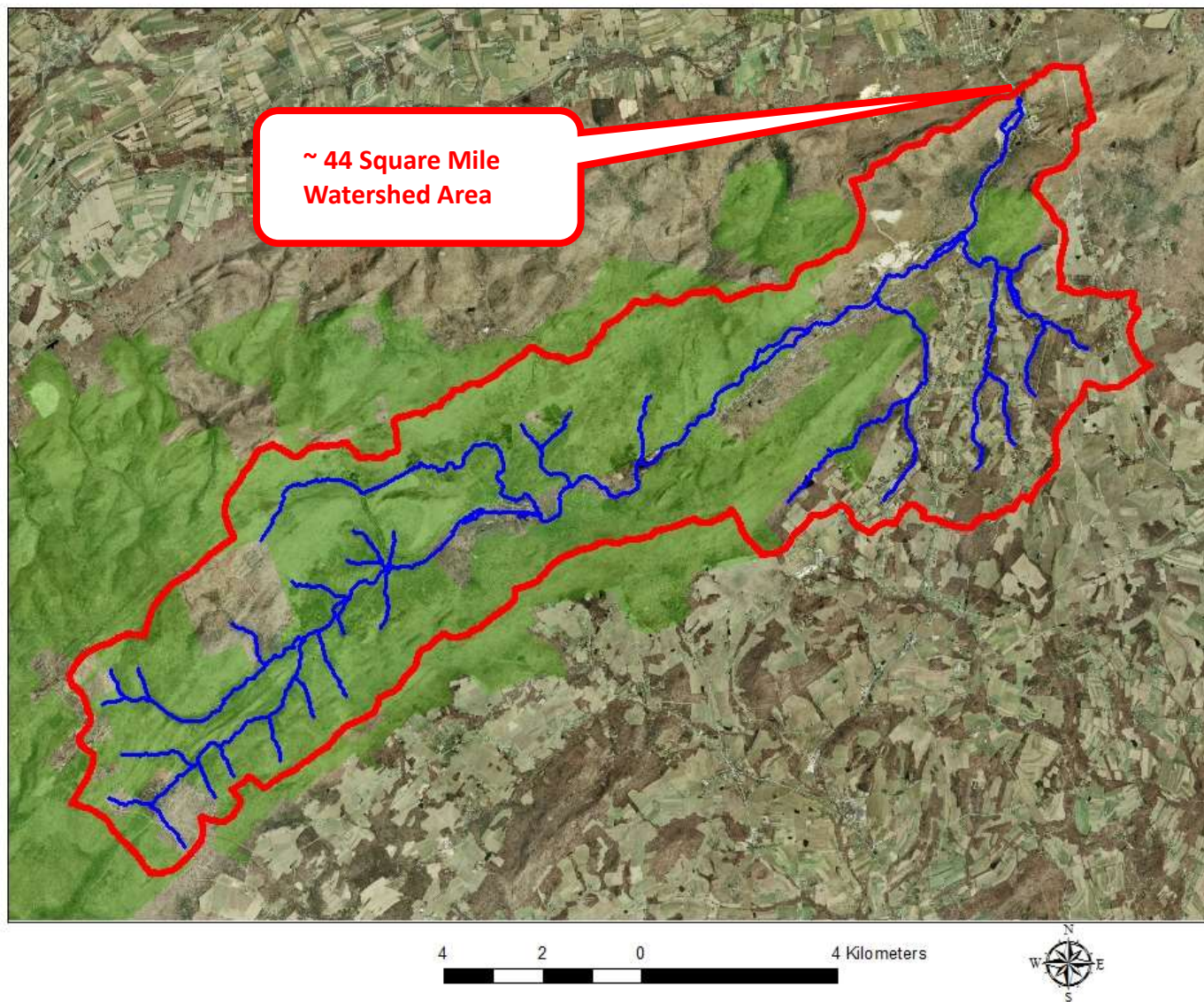
Photos Courtesy Franklin & Marshall College



Mountain Creek - Cumberland & Adams County, PA

Photo Courtesy Franklin & Marshall College

Mountain Creek Watershed Area





Seneca Creek, Maryland

Photo Courtesy Franklin & Marshall College

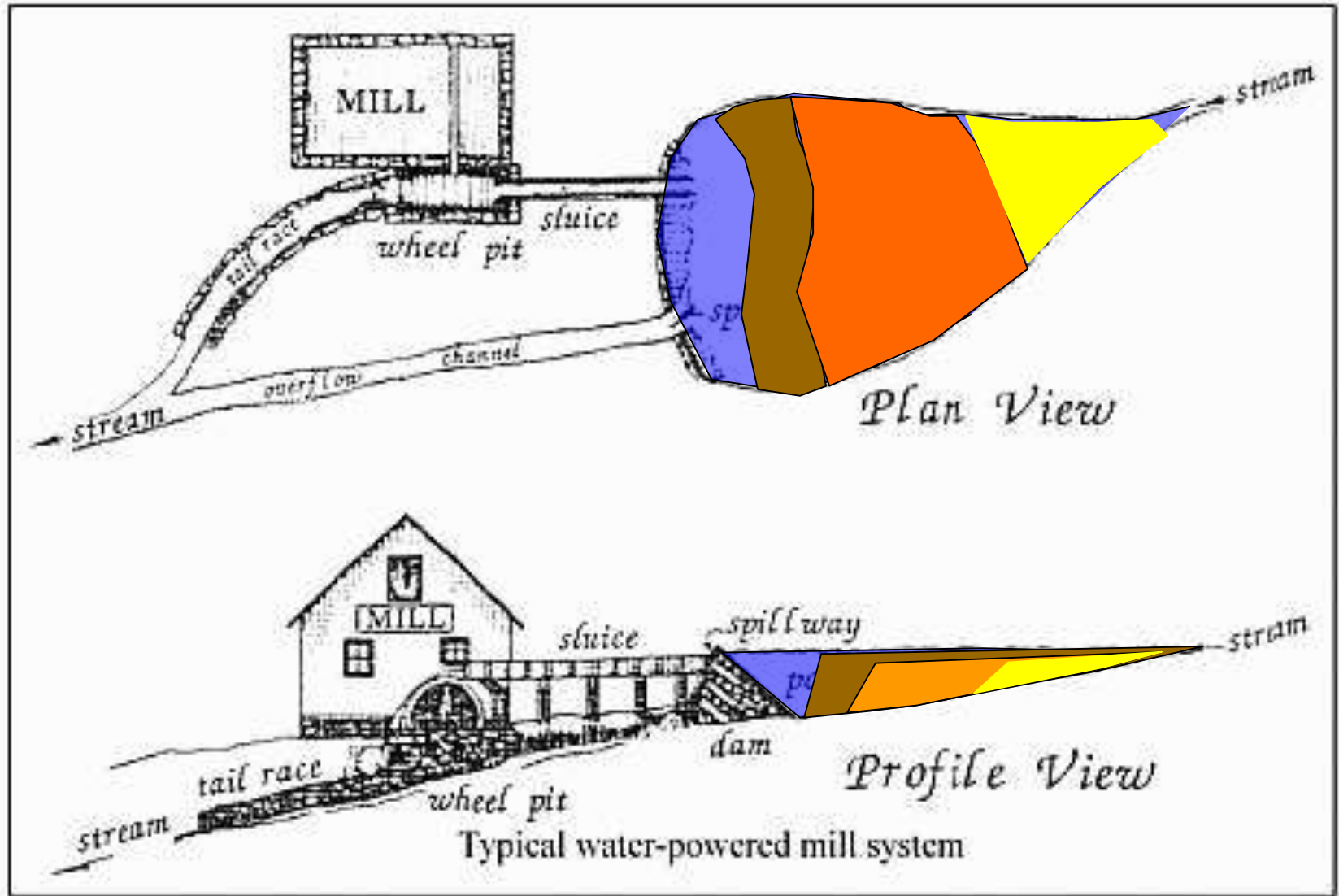
White Clay Creek near Avondale, Chester County



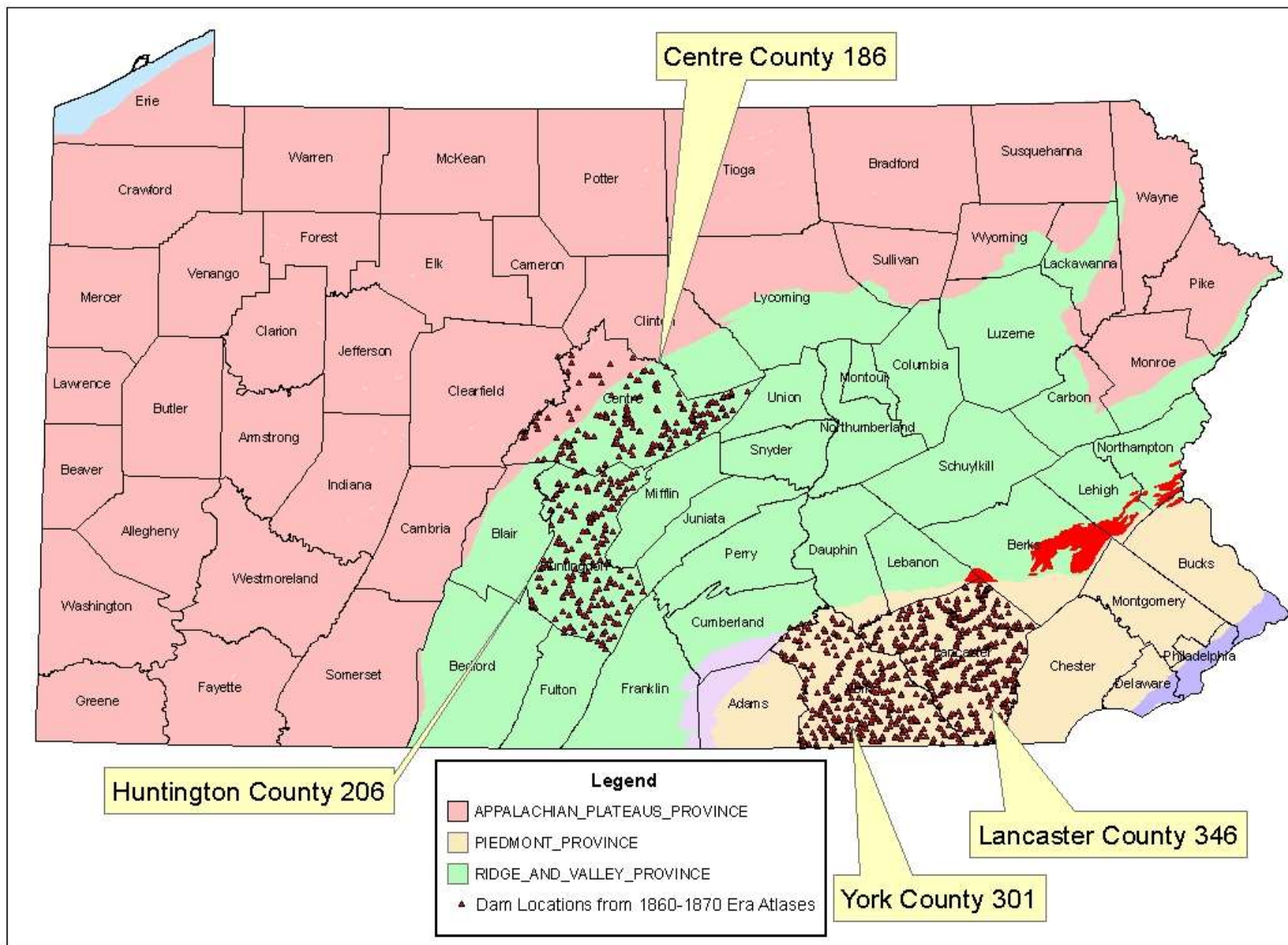
Photo Courtesy Franklin & Marshall College



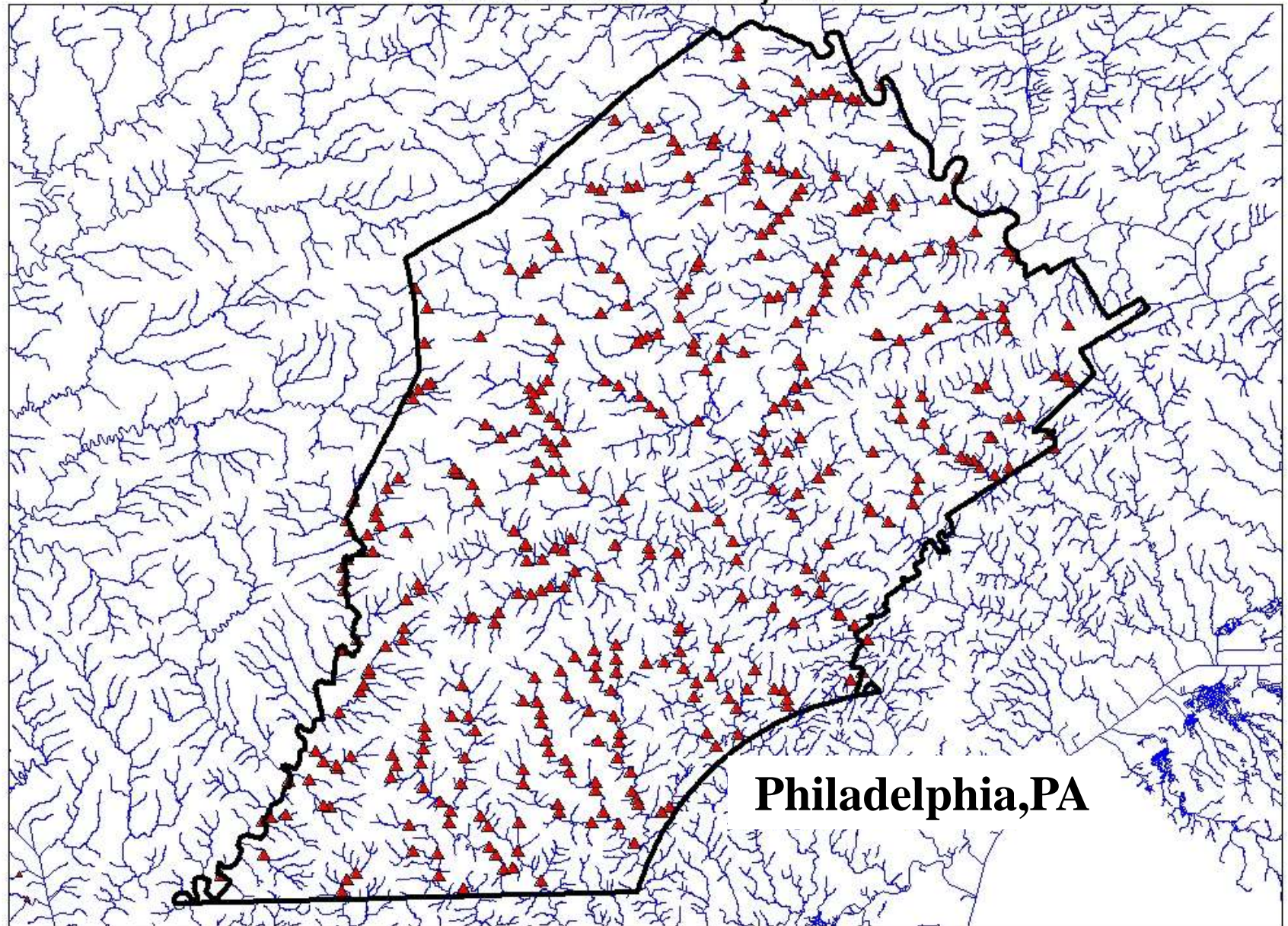
Impact of Water-Powered Mills on Sediment Storage



Dam Locations from 1860-1870 Era Atlases

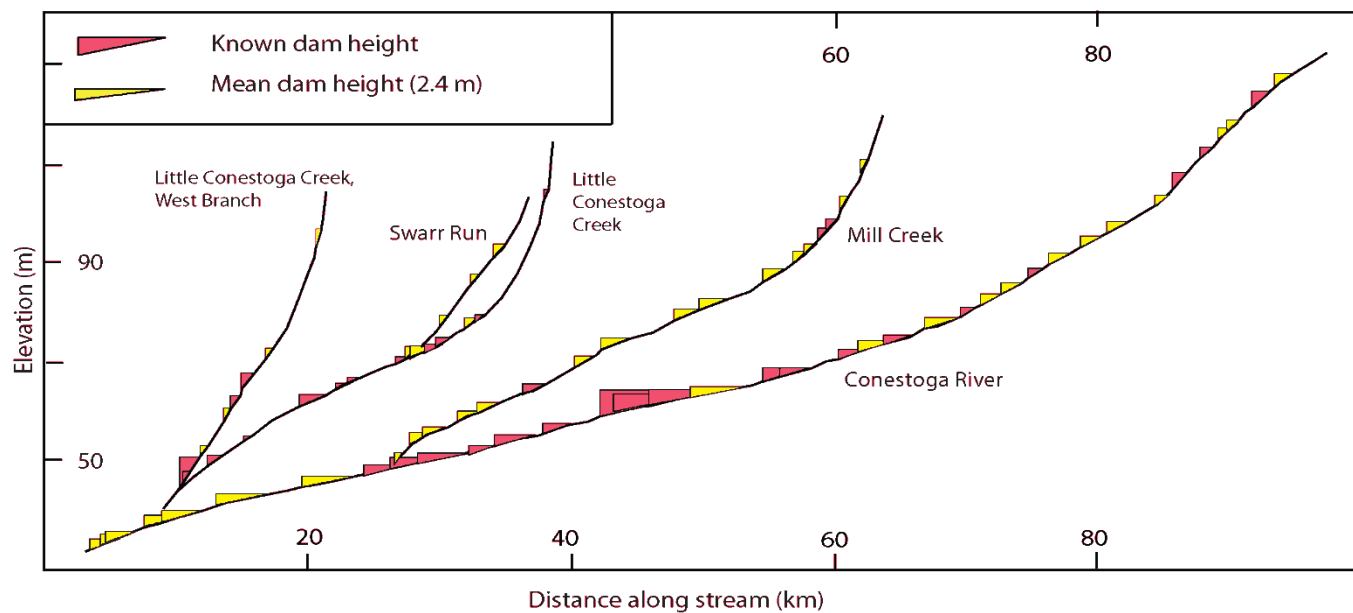
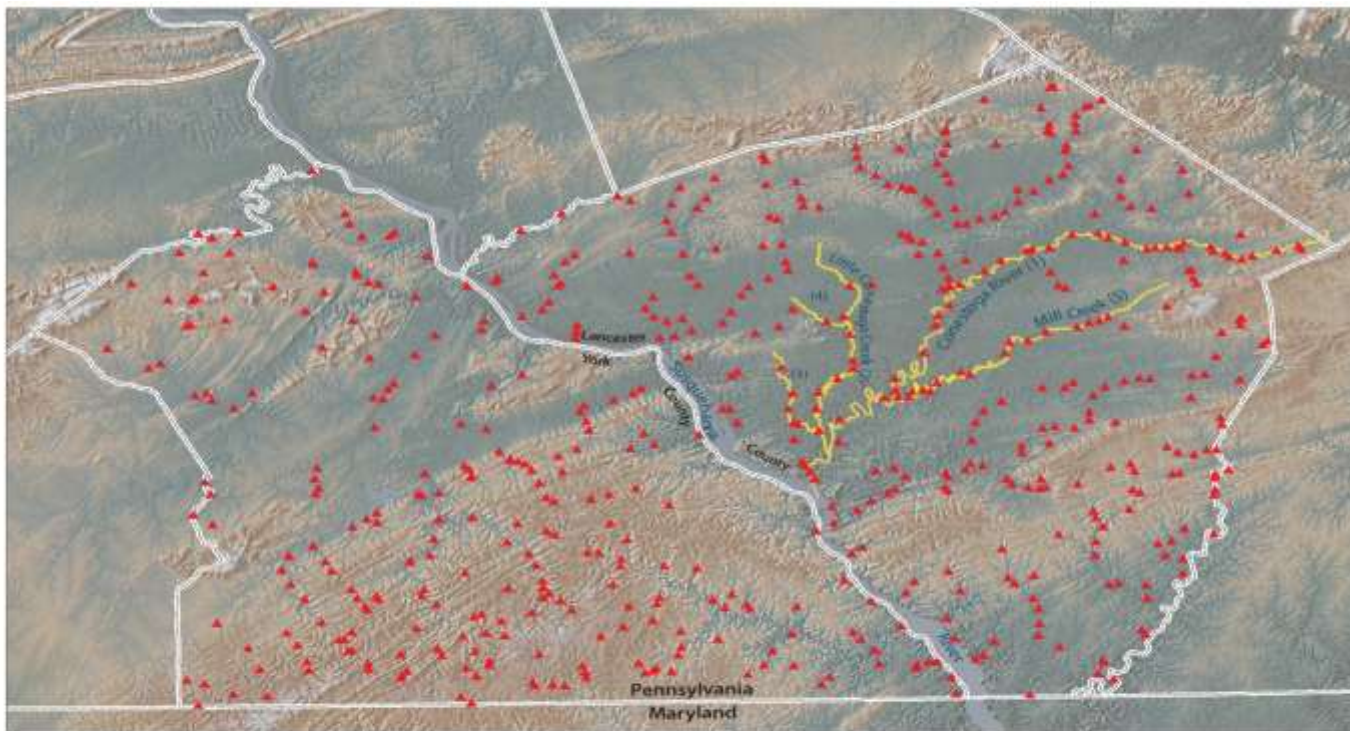


1846 Chester County Atlas

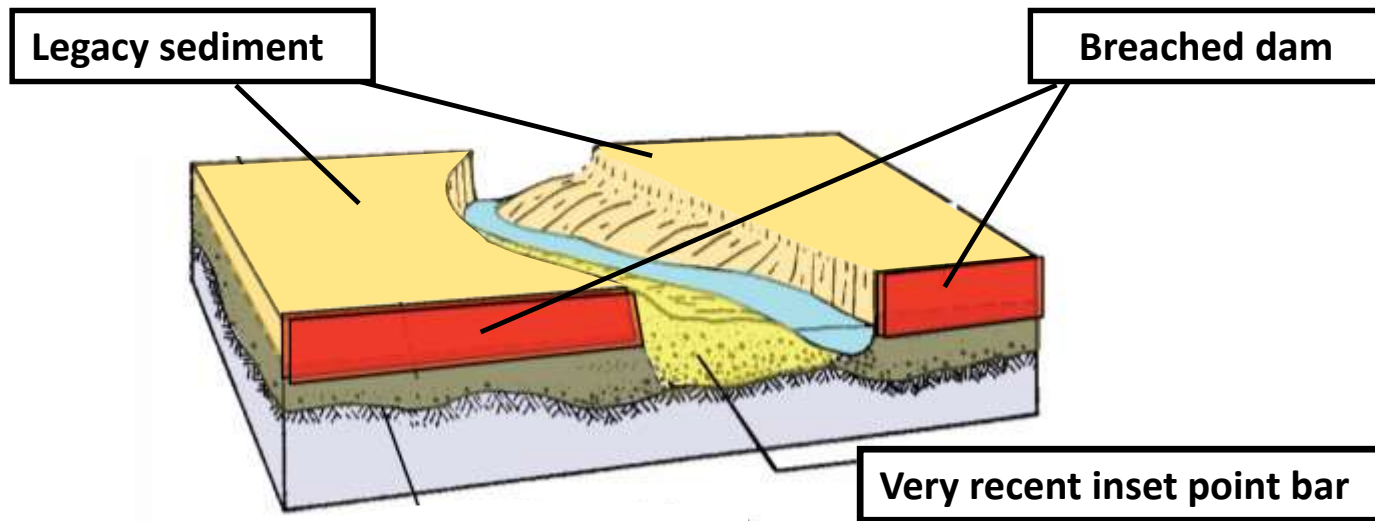


1
Miles

Courtesy Franklin & Marshall College



Valley base level controls matter!



Modified from Jacobson and Coleman, 1986 after Walter and Merritts, 2008



Riparian Zones With Incised Channels

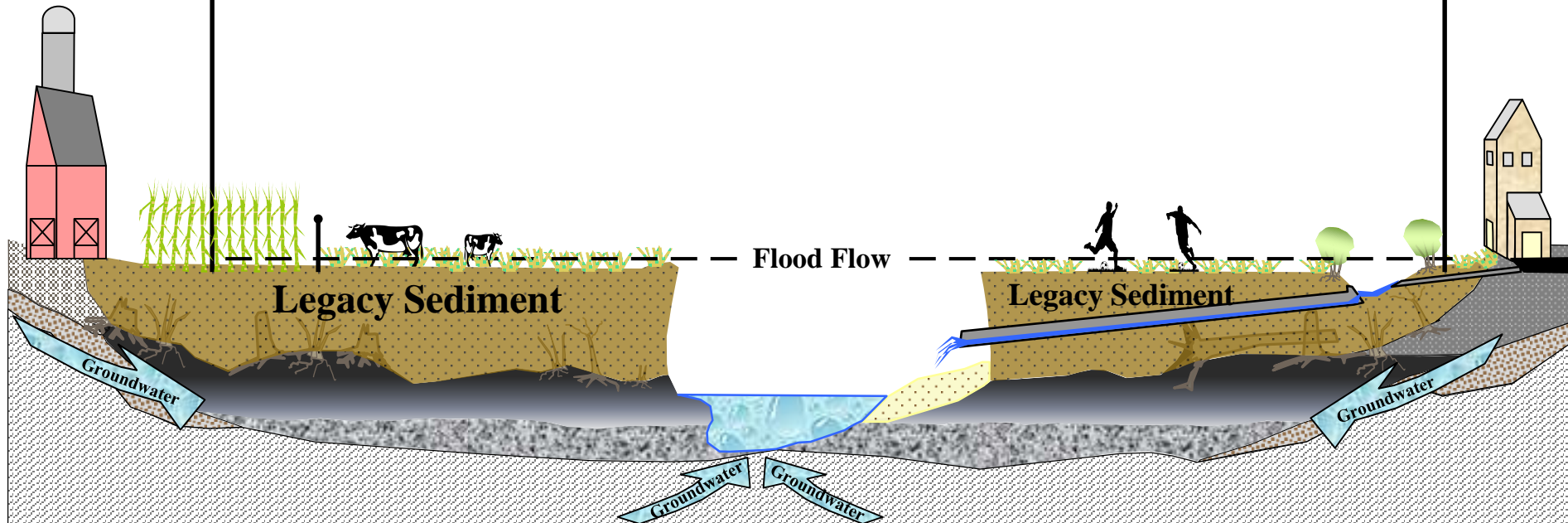
Riparian Zone

Rural
&
Agriculture

- Bank Trampling
- Tilled Soil Erosion
- No Forest Trees/Shrubs

- Impervious surfaces
- No Forest Trees / Shrubs
- Stormwater runoff

Sub-
Urban
&
Urban

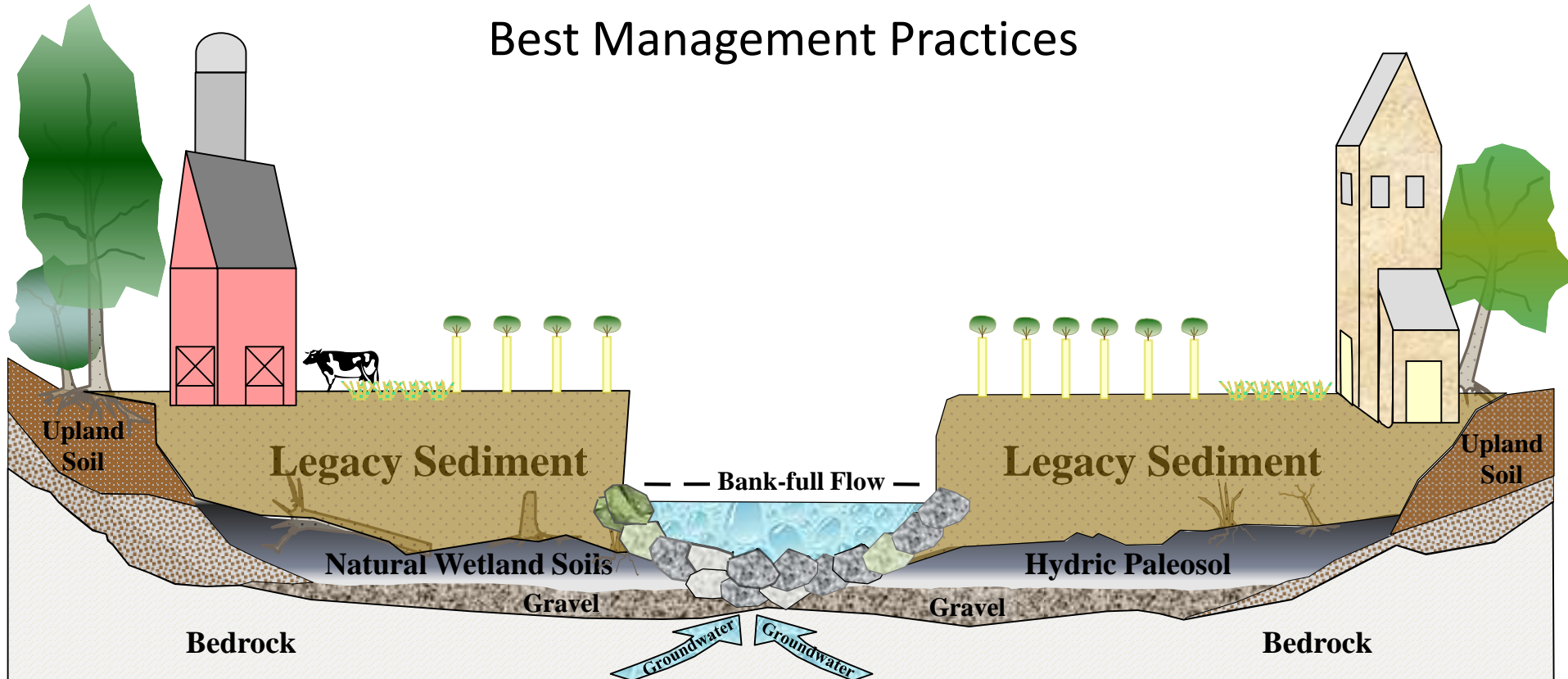


Conventional wisdom

Typical Reservoir and Valley Cross Section

Riparian Zone

Best Management Practices



Conventional wisdom

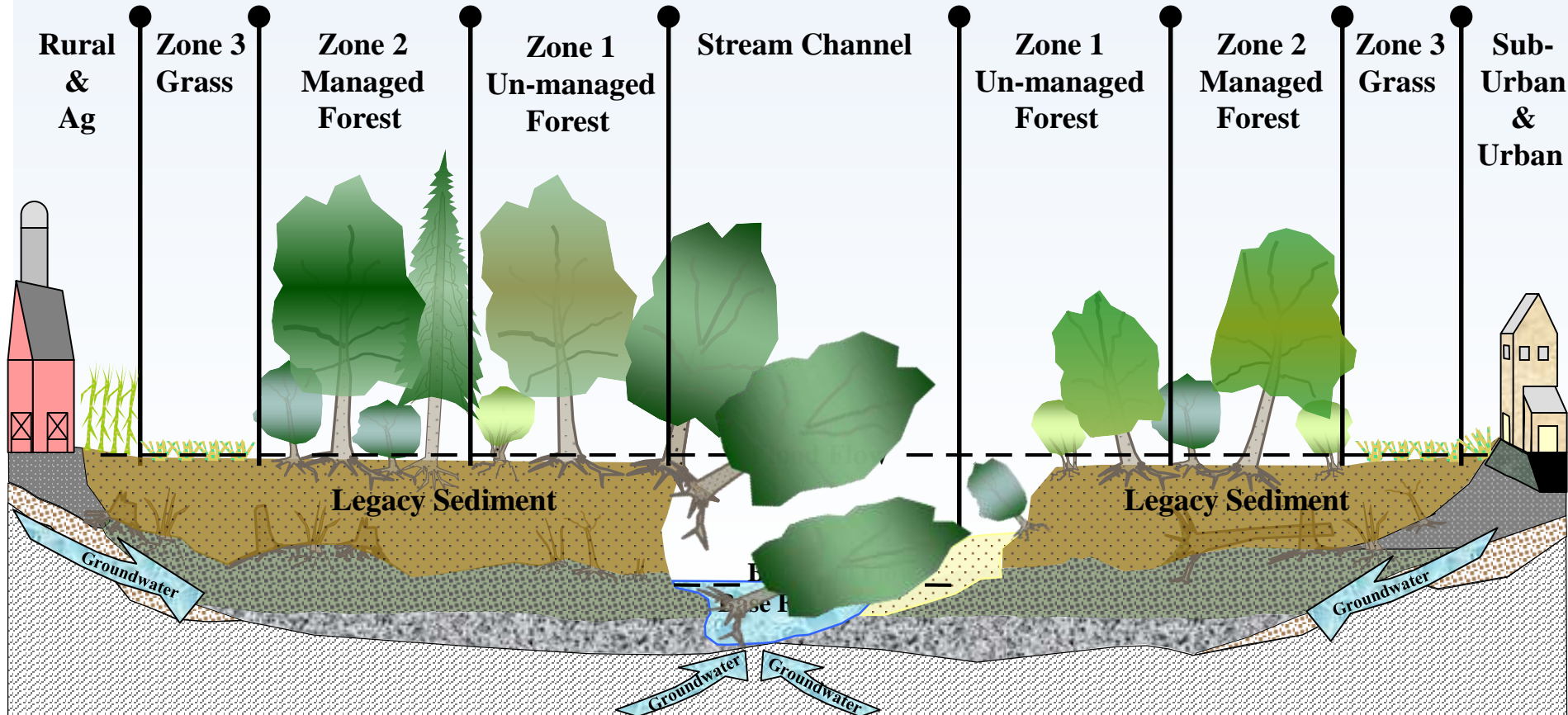
Big Spring Run - Type Section



Courtesy Franklin & Marshall College

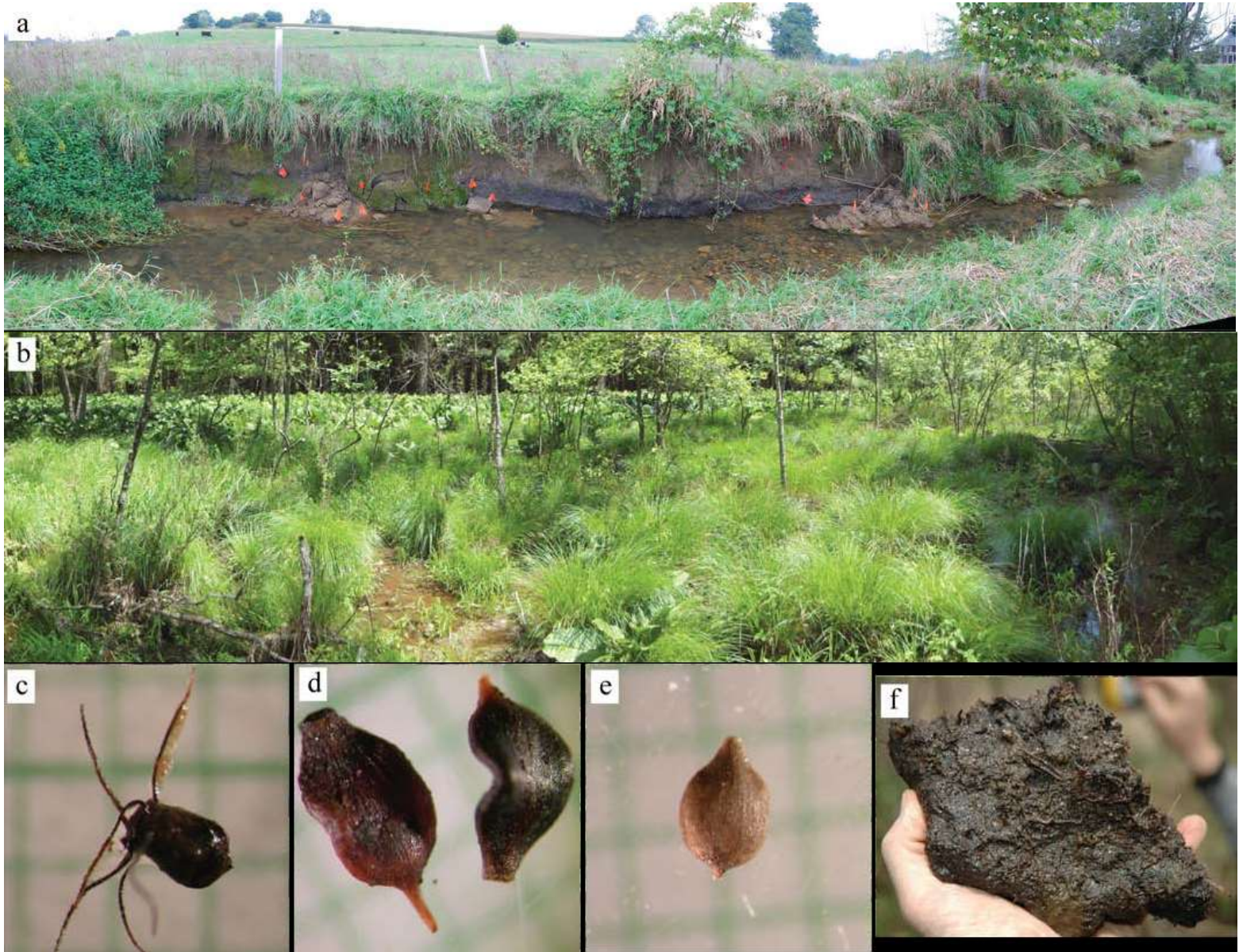
Riparian Forest Buffers - “Three-zone Concepts”

University of Maryland, Maryland Cooperative Extension, 1998.





Little Muddy Creek 2012

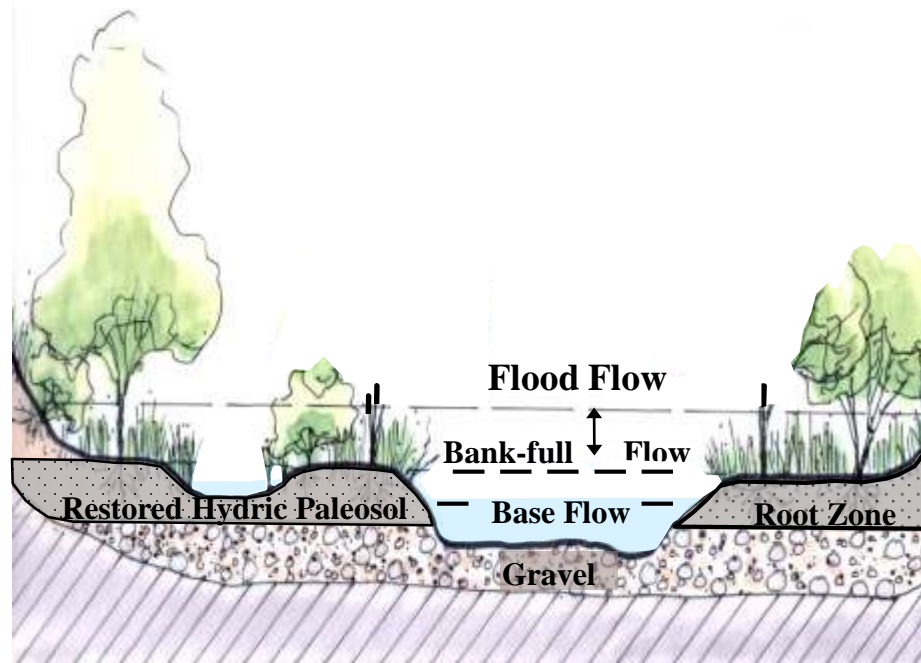
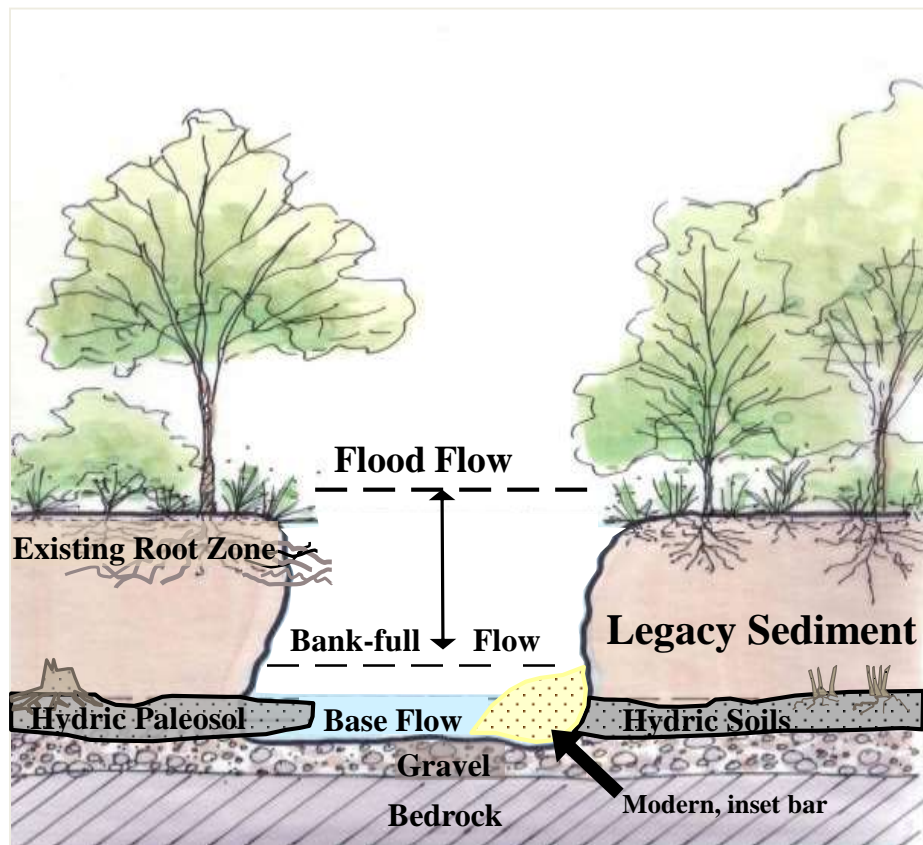


Adapted from Merritts, et al. 2011

Natural Floodplain, Stream and Riparian Wetland Restoration Best Management Practice

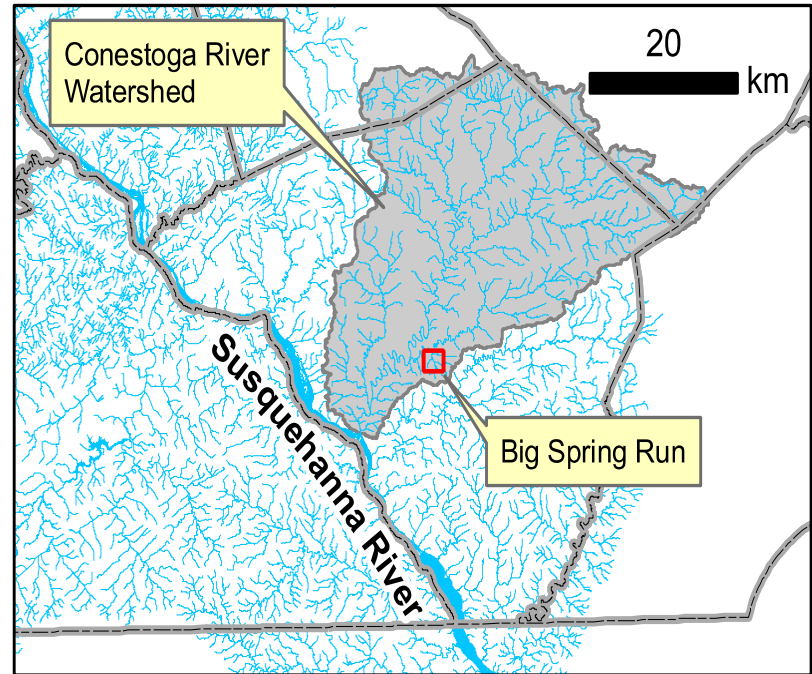
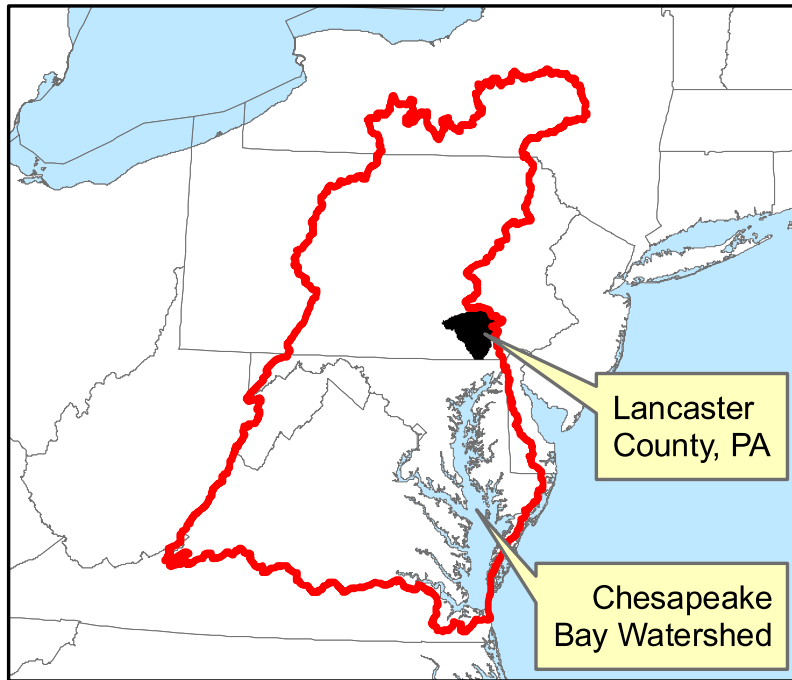
Conceptual Design

Typical Existing Conditions ➡ Proposed Restoration



➡ Natural Valley Morphology

Big Spring Run (BSR) Aquatic Ecosystem Restoration and Monitoring Project

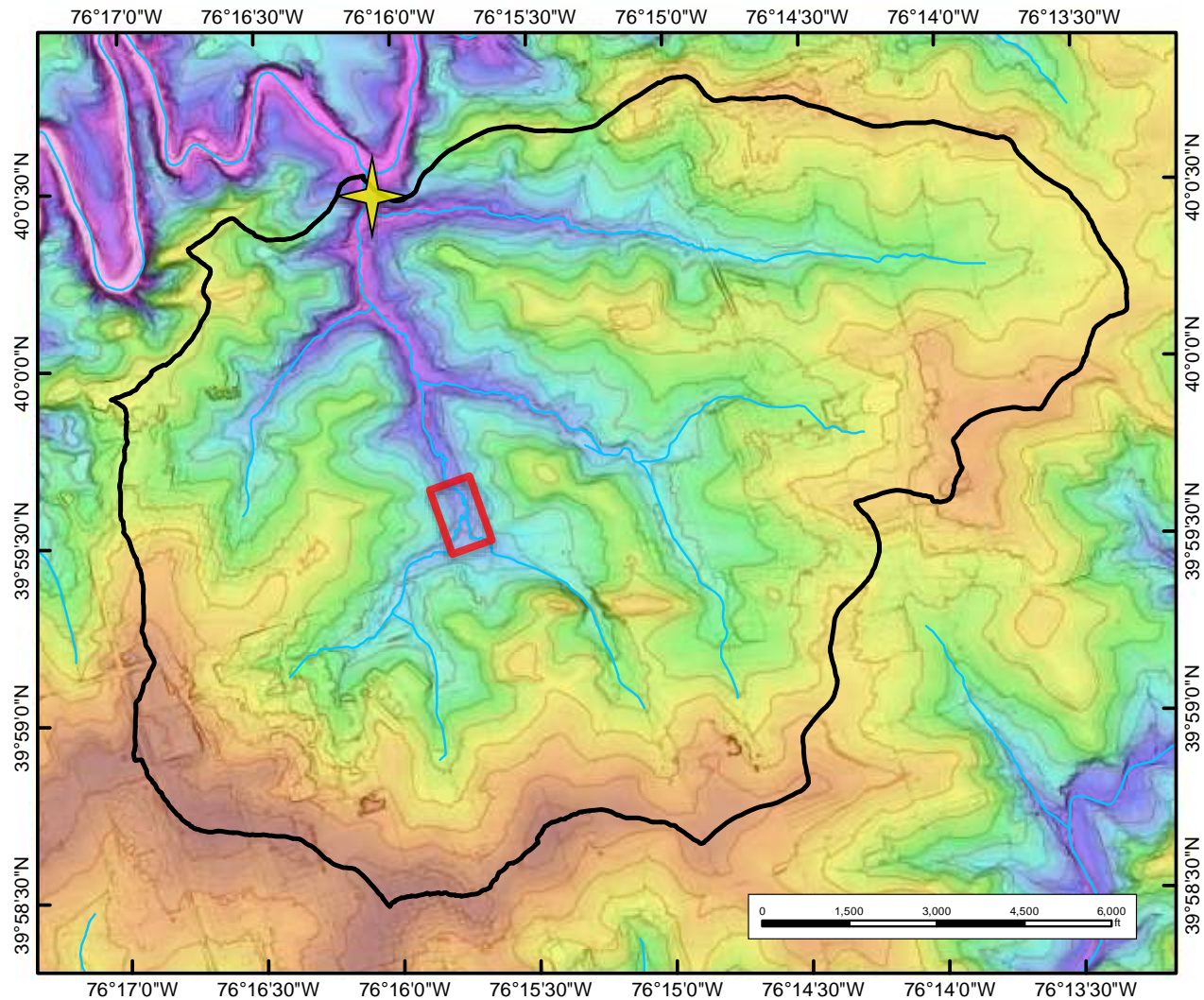


Walter, et al., 2013 PA DEP Report

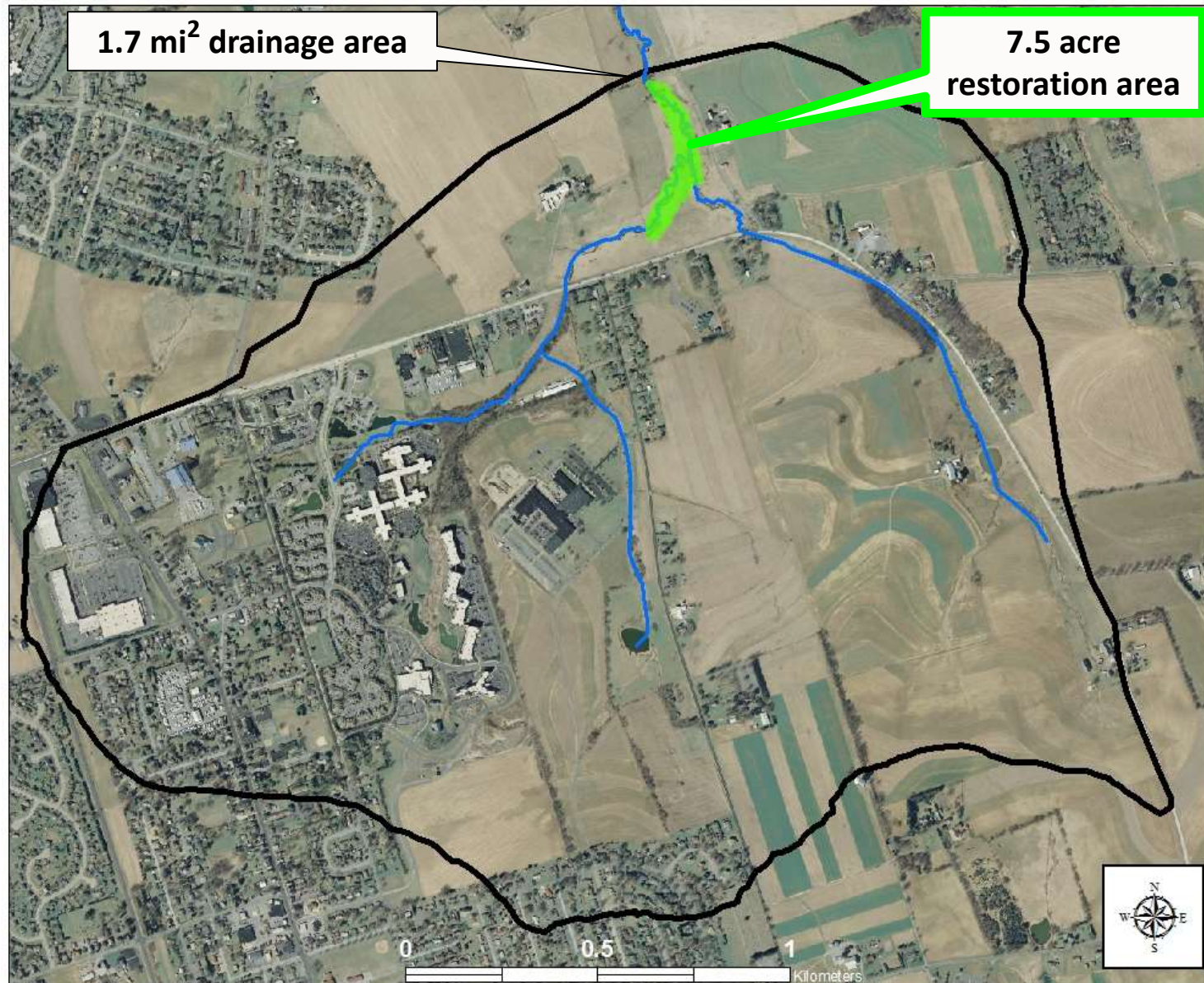
Available through ftp download

<http://www.bsr-project.com/>

Big Spring Run (BSR) Watershed



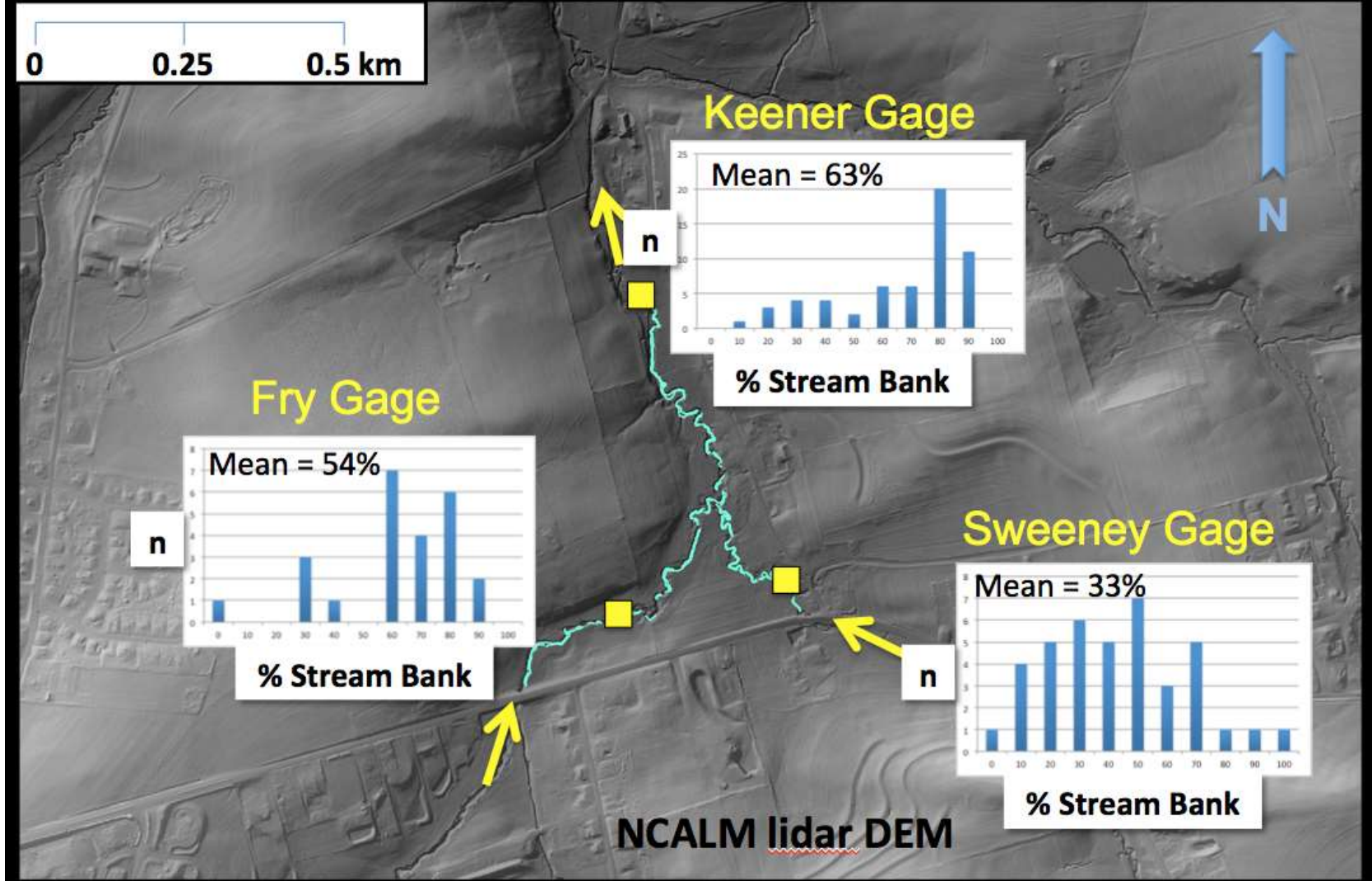
Project Watershed Characteristics



The ratio of restoration area to drainage area is 0.7%

Pre-restoration sediment source identification

% Contribution from Stream Banks - Chemical Fingerprinting



October 2011

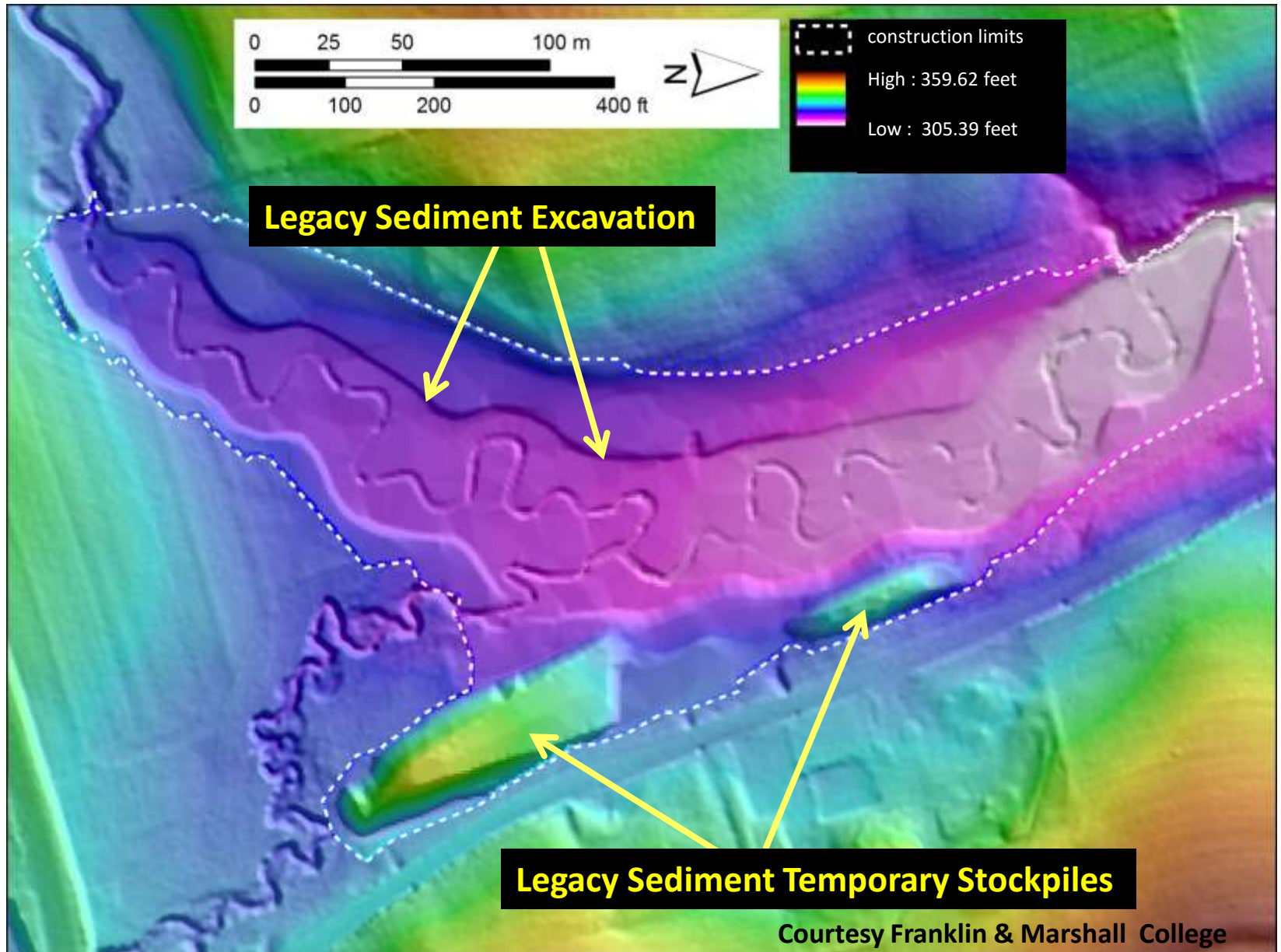


October 2011



Big Spring Run, Lancaster County PA

Post-Restoration 2012 - Hillshade Elevation Rendering



Big Spring Run, Lancaster County PA

Typical Existing Conditions

9/13/2011



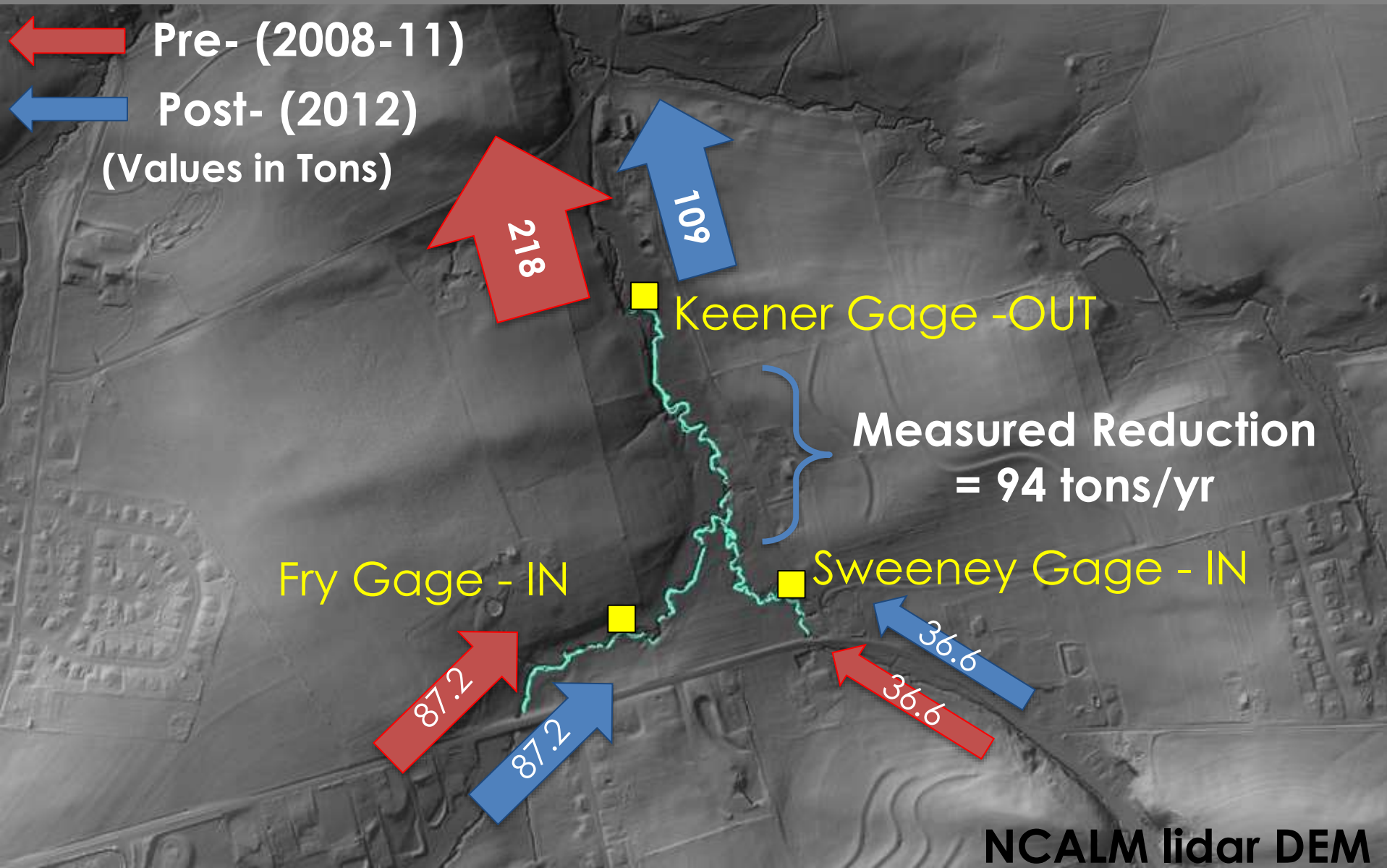
Restoration

07/27/2012



Biological and Bio-geochemical

BSR Pre- vs Post-Restoration Suspended Sediment Loads



August 2012 – 11 months after construction



August 2014 – ~ 3 years after construction



September 2015 – ~ 4 years after construction



Rosyside dace

Big Spring Run, Lancaster County PA



Courtesy Telemonitor, Inc.

September 18, 2012 @ 3:30 PM

Post-Restoration

Big Spring Run, Lancaster County PA



Courtesy Telemonitor, Inc.

September 18, 2012 @ 4:00 PM

Post-Restoration

Big Spring Run, Lancaster County PA



Courtesy Telemonitor, Inc.

September 18, 2012 @ 4:30 PM

Post-Restoration

Big Spring Run, Lancaster County PA



Courtesy Telemonitor, Inc.

September 18, 2012 @ 4:35 PM

Post-Restoration

Big Spring Run, Lancaster County PA



Courtesy Telemonitor, Inc.

September 18, 2012 @ 4:45 PM

Post-Restoration

Big Spring Run, Lancaster County PA



Courtesy Telemonitor, Inc.

September 18, 2012 @ 5:00 PM

Post-Restoration

Big Spring Run, Lancaster County PA



Courtesy Telemonitor, Inc.

September 18, 2012 @ 7:15 PM

Post-Restoration

Big Spring Run, Lancaster County PA



Courtesy Telemonitor, Inc.

September 18, 2012 @ 8:30 PM

Post-Restoration

Big Spring Run, Lancaster County PA



Courtesy Telemonitor, Inc.

September 20, 2012 @ 10:00 AM

Post-Restoration

Big Spring Run Numbers

- **TSS**
 - 44,000,000 lbs.
- **P**
 - 51,000 lbs.
- **N**
 - 66,000 lbs.
- **Wetlands**
 - 4.6 acres
- **“Stream Length”**
 - 3,000 LF
- **Riparian Buffer**
 - 3 Acres



<http://www.bsr-project.com/>

Courtesy Franklin and Marshall College

Jeffrey Hartranft

Bureau of Waterways Eng. & Wetlands

717-772-5320

jhartranft@pa.gov

Joseph V. Sweeney

Managing Partner, P-Three

717-579-2514

p-three@comcast.net