

# Evidence-Based Restoration

PA Aquatic Resource Restoration Conference

State College, PA

March 3-4, 2026

Reservoir sediment

Holocene marsh soil

Pleistocene periglacial rubble

Reservoir sediment  
(Fill terrace)

Technical Session 3: Design Considerations – 1. Evidence-Based Approach

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Source: Franklin and Marshall College

# ▶ Foundation of Process

## *EPA's Principles for the Ecological Restoration of Aquatic Resources*

- Understand the potential of the watershed
- Address ongoing causes of degradation
- Work within the watershed/landscape context
- Develop clear, achievable, and measurable goals
- Focus on feasibility
- Preserve and protect aquatic resources
- Restore ecological integrity
- Restore natural structure
- Restore natural function
- Use reference sites or onsite evidence
- Anticipate future changes
- Involve a multi-disciplinary team
- Design for self-sustainability
- Use passive restoration, when appropriate
- Restore native communities and dominant species
- Use natural fixes and bioengineering
- Monitor and adapt where changes are necessary

Source: USEPA, 2000. *Principles for the Ecological Restoration of Aquatic Resources*. EPA841-F-00-003. Office of Water (4501F), United States Environmental Protection Agency, Washington, DC. 4 pp.

Photo 4: 2018

Photo 5: 2019

Photo 6: 2020

# ► Evidence-Based Process

## *Four Core Elements of and Evidence-Based Process*



Identify Alterations

Paleo Environment

Modern Constraints

Design/Modeling

# Evidence-Based Process Addresses

## *EPA's Principles for the Ecological Restoration of Aquatic Resources*

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## ► Foundation of Process

# Identifying Constraining Alterations



**Look beyond traditional water quality impairments**

**Focus on historic alterations that changed base level controls and hydrologic connections**

**Don't necessarily focus on where the channel is today!**

**Don't confuse symptoms for underlying alterations**

## ► Foundation of Process

# Verify Unaltered Paleo Environment



**Historical Searches**

**System or Valley Basis not Channel Centric**

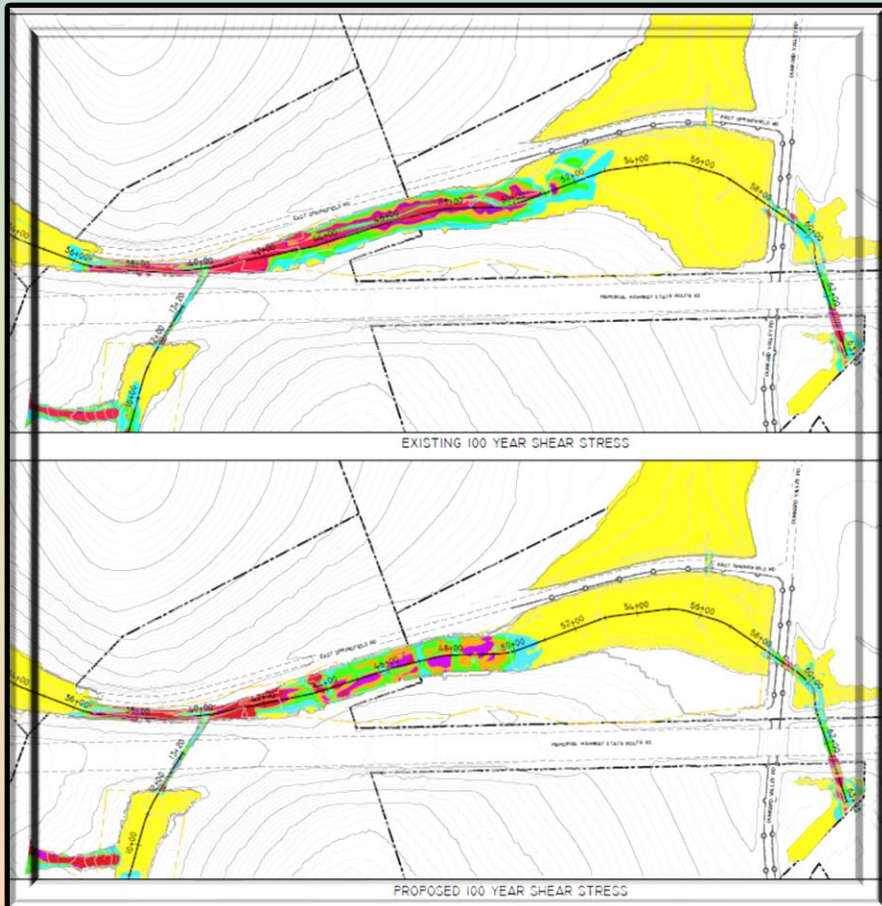
**Soil Stratigraphic Investigations – Trenches, Pits, Cores, Probes**

**Carbon Dating / Magnetic Susceptibility**

**Build Multiple Lines of Evidence**

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## Modern Constraints



**Infrastructure**

**Landowner(s)**

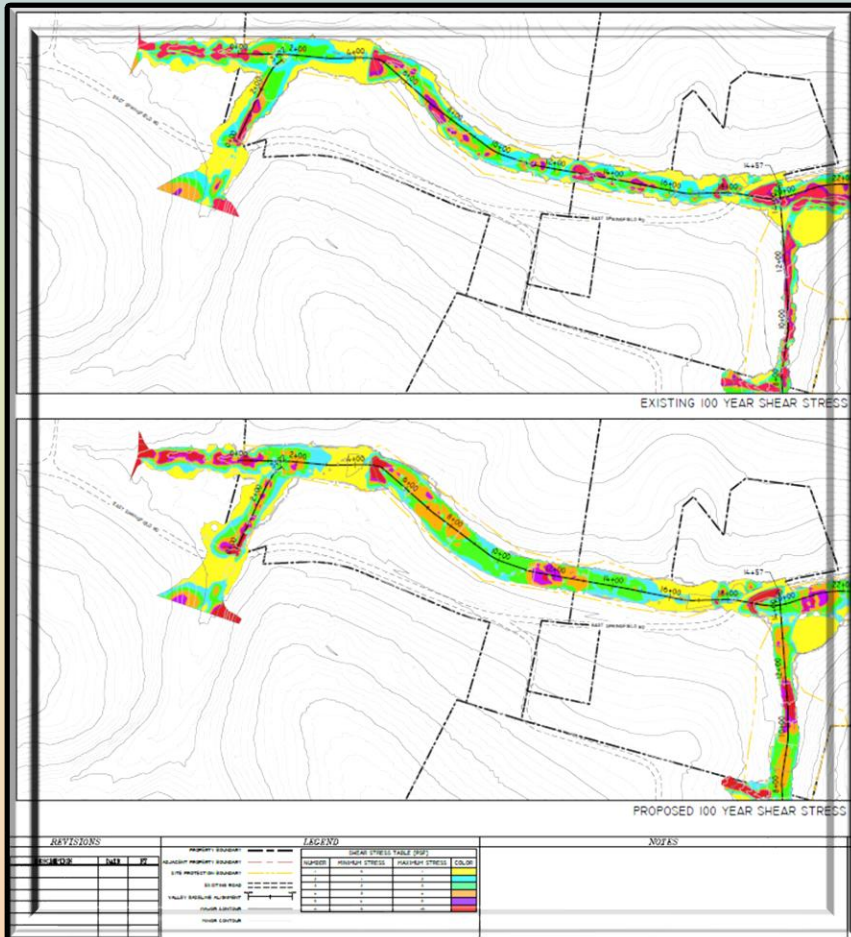
**Scope of Alteration**

**Bedload Transport**

**Stormwater Flows**

# ► Foundation of Process

## Restoration Design and Modeling



Utilize Iterative 2-D Modeling Design

Base Level Control and Scour Protection

Depth of Channel and Valley Width

Retentive System

Hydrodynamic Reconnection

QUESTIONS?