Connecting Research to Policy

Environmental Assessments and Wetland Impairment Designations for Watersheds with Legacy Sediments

2025 Mid-Atlantic Wetland Workgroup
Canaan Valley Resort State Park Lodge - Davis, WV
September 23-25, 2025

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Overview

Purpose

Defining Legacy Sediment Alterations

Base Geospatial Data

Stratigraphic Investigations

What's Next

Then Lawsuits????

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Purposes

To provide an estimate of the type and extent of legacy sediment present in watersheds across PA

To establish a basis for estimating the extent of wetlands present prior to historic watershed alterations associated with legacy sediment presence

Combine the data with modeled wetland mapping and estimate the extent of wetlands historically lost

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Defining Legacy Deposits

2006 PA DEP Legacy Sediment Workgroup

“Sediment that was eroded from upland hill slopes after the arrival of early Colonial American settlers and during centuries of intensive land uses; that was deposited in valley bottoms along stream corridors, burying pre-settlement streams, floodplains, wetlands, and valleys; and that altered and continues to impair the hydrologic, biologic, aquatic, riparian, and chemical functions of pre-settlement and modern environments. Legacy sediment often accumulated behind ubiquitous low-head mill dams and in their slackwater environments, resulting in thick accumulations of fine-grained sediment.’’ PADEP Legacy Sediment Workgroup

This definition generally suits our needs. In some areas, the use of the term fin-grained sediment may be misleading. Deposits are not always fine-grained, they can also consist of sand, gravel and cobble material.

The important thing is they were anthropogenically generated due to significant landscape perturbations, not natural causes (i.e., landslides, debris flows, solifluction, etc.)

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Defining Legacy Deposits

Legacy Sediment (n.) Sediment that

(1) was eroded from upland slopes during several centuries of intensive land clearing, agriculture, and milling (in the eastern U.S., this occurred from the late 17th to late 19th Centuries);

(2) collected along stream corridors and valley bottoms, burying pre-settlement streams, floodplains, wetlands, and dry valleys; and that altered the hydrologic, biologic, aquatic, riparian, and chemical functions of pre-settlement streams and floodplains;

(3) accumulated behind ubiquitous low-head mill dams in slackwater environments, resulting in thick accumulations of fine-grained sediment, which distinguishes “legacy sediment’’ from fluvial deposits associated with meandering streams;

(4) can also accumulate as coarser grained, more poorly sorted colluvial (not associated with stream transport) deposits, usually at valley margins;

(5) can contain varying amounts of total phosphorus and nitrogen, which contribute to nutrient loads in downstream waterways from bank erosion processes

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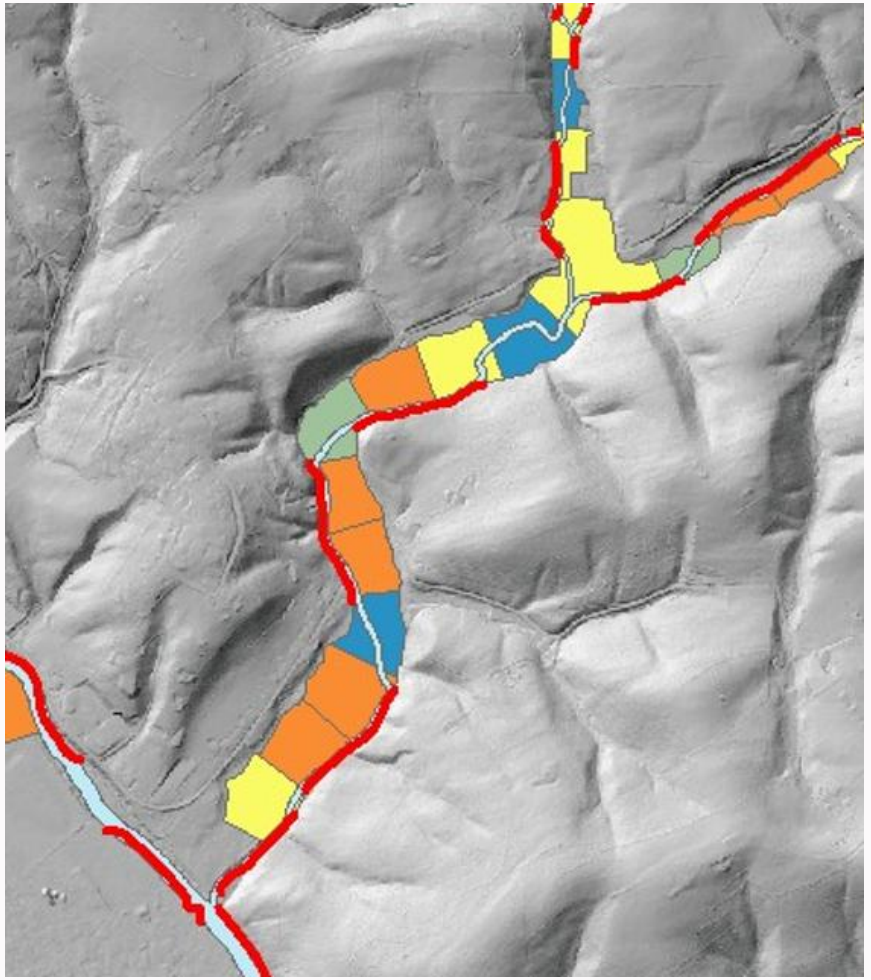
Geospatial Data

Valley Landforms Mapping

Valley bottoms are defined by geomorphon types Flat (FL-1), Footslope (FS-8), Valley (VL-9), and Pit (PT-10) within a buffer of 300 m on either side of the stream network in the dataset “Pennsylvania Stream Polygons 2019”



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Ge

Legacy Sediment Rem

Conewago Project

Legacy sediment ranged fror
over 5 feet in depth along th
mainstem and tributary. Carl
organic material constrained
settlement depth and provid
corroborating line of evidenc

Land Studies

Figure 4 - Trench #4
Valley Station 15+15

Depth BGS (ft)	Elevation	Matrix Color (Munsell)	Texture	Mottle Color (Munsell)	Mottle Abundance (%)	Coarse Fragments (%)	Notes
0-2.6		5 YR 4/4	Silty Clay Loam	--	--	0%	
			Legacy Sediment				
2.6-2.8		5 YR 3/3	Silty Sandy Clay	5 YR 4/6	20%	0%	
2.8-3.6	375.13 Leaf Pack See Point 2010	2.5 YR 4/1	Silty Clay	2.5 YR 4/8	20%	5%	Depleted matrix indicating historic wetland; leaf pack dated to 1,190 y/o
			Organic Layer - Wood and Grass Present				
3.6-4.5	Top Gravel 374.12	--	--	--	--	50%	See Point 2017
			Gravels - Small				
4.5-5.0		--	--	--	--	90%	
			Gravels - Large				

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Exploring the Data

What we have available

- Geospatial valley extent data
- 45 Mill dam related legacy sediment removal projects encompassing 150 miles of stream/floodplain restoration with over 200 acres of wetland restoration.
- 20 mitigation bank sites with mostly headwater related legacy sediment projects encompassing 60+ miles of stream/floodplain restoration with over 300+ acres of wetland restoration.

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Exploring the Data

What can be done with this data?

- Development of a programmatic Environmental Assessment
  - This is a pre-approved categorical environmental assessment that can be used if a project meets certain conditions.
  - Project would need to be restoration
- Development of a TMDL alternative (Alternative Restoration Plan) for watershed wetland impairment????

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Exploring the Data

Next Steps

- Compile locations of verified legacy sediment types (i.e., dam vs. mass erosion deposition) and extents
- Estimate the extent of lost or degraded wetlands at the sites
- Use valley mapping data to provide conservative estimate of legacy sediment and the amount of lost/degraded wetlands

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The Department of Environmental Protection's mission is to protect Pennsylvania's air, land and water resources and to provide for the health and safety of its residents and visitors, consistent with the rights and duties established under the Environmental Rights Amendment (Article 1, Section 27 of the Pennsylvania Constitution).