STAC Legacy Sediment Workshop
April 24-25, 2017
Brief overview

Andrew J. Miller, UMBC

Water Quality Implementation Goal Team Conference Call

May 22, 2017

While the scientific discussion of this topic has been ongoing for several years, states are now considering how to address in-stream sediment in their Phase III Watershed Implementation Plans (WIPs). With recent estimates that in-stream sources of sediment could contribute as much as 50 percent of the nutrient and sediment loads to Chesapeake Bay, incorporation of "legacy" sediment in the WIPs is likely to be a priority and may significantly alter a state's plan of action from the current Phase II version.

A STAC workshop, with presentations from various points of view and a free and rigorous scientific debate, would greatly assist policymakers in understanding how "legacy" sediment and its remediation fit within a suite of management activities to reduce nutrient and sediment loads to the Chesapeake Bay. A report of the proceedings will inform the states as they begin early consideration of their Phase III WIPs in 2017. For maximum benefit, the scope of the workshop should consider nutrient and sediment loads, methods of remediation, and direct and indirect costs of remediation, including conflicts with other ecosystem management goals.

Excerpt from letter by Ann Swanson, Executive Director, Chesapeake Bay Commission

Steering committee

- Andrew Miller, UMBC – Chair, STAC member
- Dorothy Merritts, Franklin & Marshall
- Sean Smith, University of Maine
- Kathy Boomer, The Nature Conservancy, STAC member
- Karen Prestegaard, University of Maryland College Park
- Matthew Baker, UMBC

- Staffed by Rachel Dixon, STAC Coordinator
- Assisted by Elaine Hinrichs, STAC Staff member

TECHNICAL BULLETIN No. 695 May 1940

SOME PRINCIPLES OF ACCELERATED STREAM AND VALLEY SEDIMENTATION

By
STAFFORD C. HAPP
Head, Stream and Valley Section
GORDON RITTENHOUSE
Associate Geologist
and
G. C. DOBSON
Acting Chief
Sedimentation Division
Office of Research
Soil Conservation Service

STANLEY W. TRIMBLE

MAN-INDUCED SOIL EROSION ON THE SOUTHERN PIEDMONT

[AMERICAN JOURNAL OF SCIENCE, VOL. 277, SUMMER, 1977, P. 876-887]

THE FALLACY OF STREAM EQUILIBRIUM IN CONTEMPORARY DENUDATION STUDIES

STANLEY W. TRIMBLE,

THE JOURNAL OF GEOLOGY

May 1982

SOURCES, SINKS, AND STORAGE OF RIVER SEDIMENT IN THE ATLANTIC DRAINAGE OF THE UNITED STATES[1]

ROBERT H. MEADE
U.S. Geological Survey, Denver, Colorado 80225, U.S.A.

Journal of Hydrology, 65 (1983) 209—237
Elsevier Science Publishers B.V., Amsterdam — Printed in The Netherlands

THE SEDIMENT DELIVERY PROBLEM

D.E. WALLING
Department of Geography, University of Exeter, Exeter EX4

(Accepted for publication July 13, 1982)

HYDRAULIC-MINING DÉBRIS IN THE SIERRA NEVADA

BY
GROVE KARL GILBERT

Gilbert, 1917. Hydraulic Mining Debris in the Sierra Nevada

B. A RIVER VALLEY FLOODED BY MINING DÉBRIS.

The locality is among the foothills of the Sierra Nevada, and the estimated thickness of the deposit is 70 feet. Only coarse débris is lodged here; the finer part of the tailings has been carried farther. Photographed in 1908.

HYDRAULIC MINING AND MINING DÉBRIS.

Lintner, S.F., 1983. The Historical Physical Behavior of the Lower Susquehanna River, Pennsylvania, 1801-1976.

- The Susquehanna River basin had its own hydraulic mining debris episode beginning in 1840.
- It took 30-40 years for large volumes of mining-related sediment to begin accumulating in the lower Susquehanna.
- Net accretion of islands and aggradation on floodplains occurred up through 1929; rates of island growth accelerated after closure of Safe Harbor Dam.

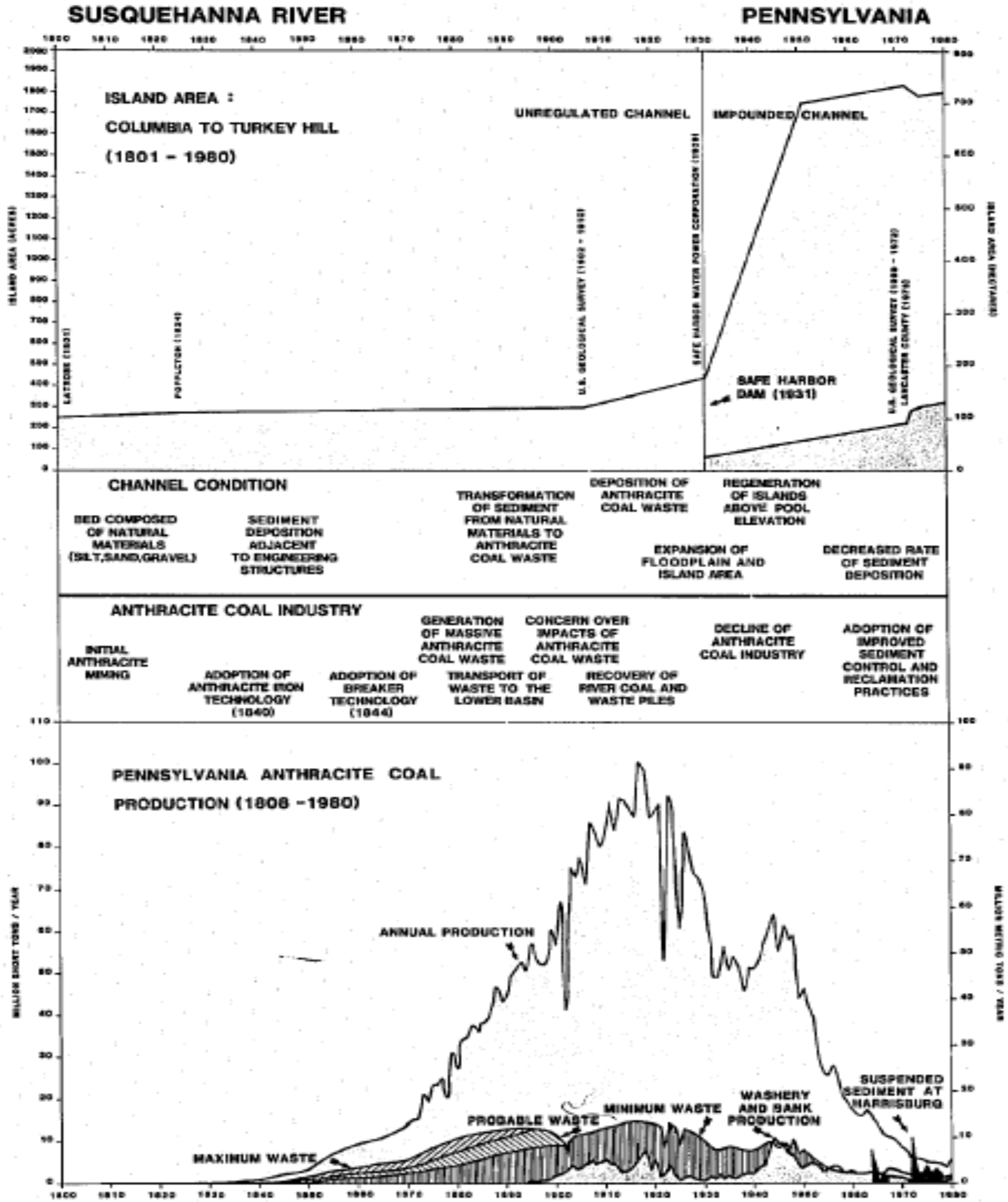


Figure 50.

72% increase in island area between 1801 and 1929

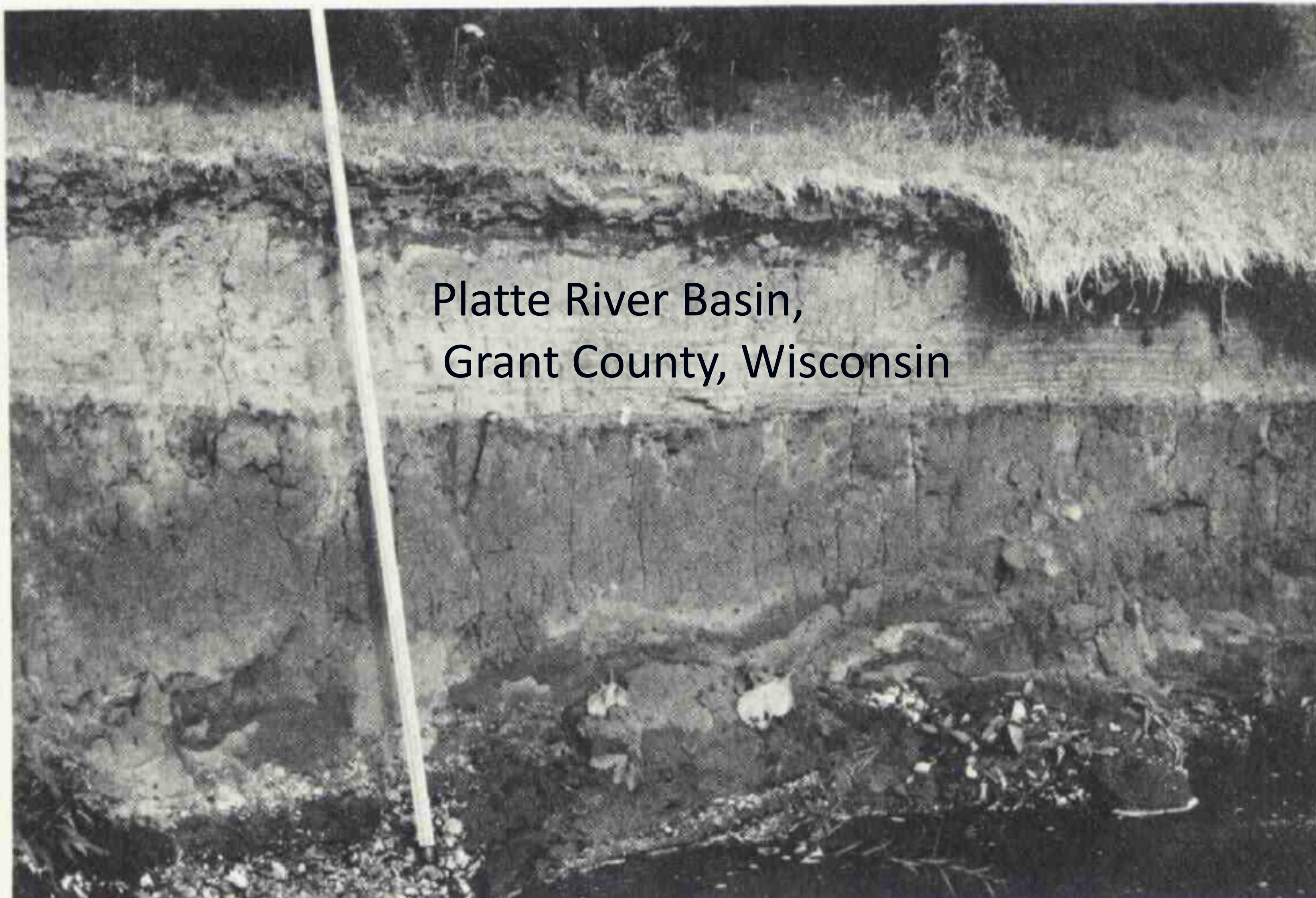
317% increase by 1973 after completion of Safe Harbor Dam

Marietta floodplain aggraded from 3 to 7 feet

Lintner speculates that with reduced coal production and improved sediment control, “the man-induced depositional trend of the last 130 years will be reversed by an erosional trend which will remove major amounts of material from storage in the channel, islands and floodplain.”

Happp, Rittenhouse and Dobson, 1940
Some Principles of Accelerated Stream and Valley Sedimentation

- Documents numerous examples of river and floodplain aggradation with depths up to 10 feet or more attributed to upstream culturally accelerated soil erosion
- Focuses on studies in the Gulf Coast Plain of Mississippi but cites other examples from Maryland to California and in the upper Mississippi and Ohio valleys as well as the southern Piedmont



HUMAN IMPACTS ON WISCONSIN STREAM CHANNELS*

JAMES C. KNOX

ANNALS OF THE ASSOCIATION OF AMERICAN GEOGRAPHERS Vol. 67, No. 3, September 1977

Wolman, 1967

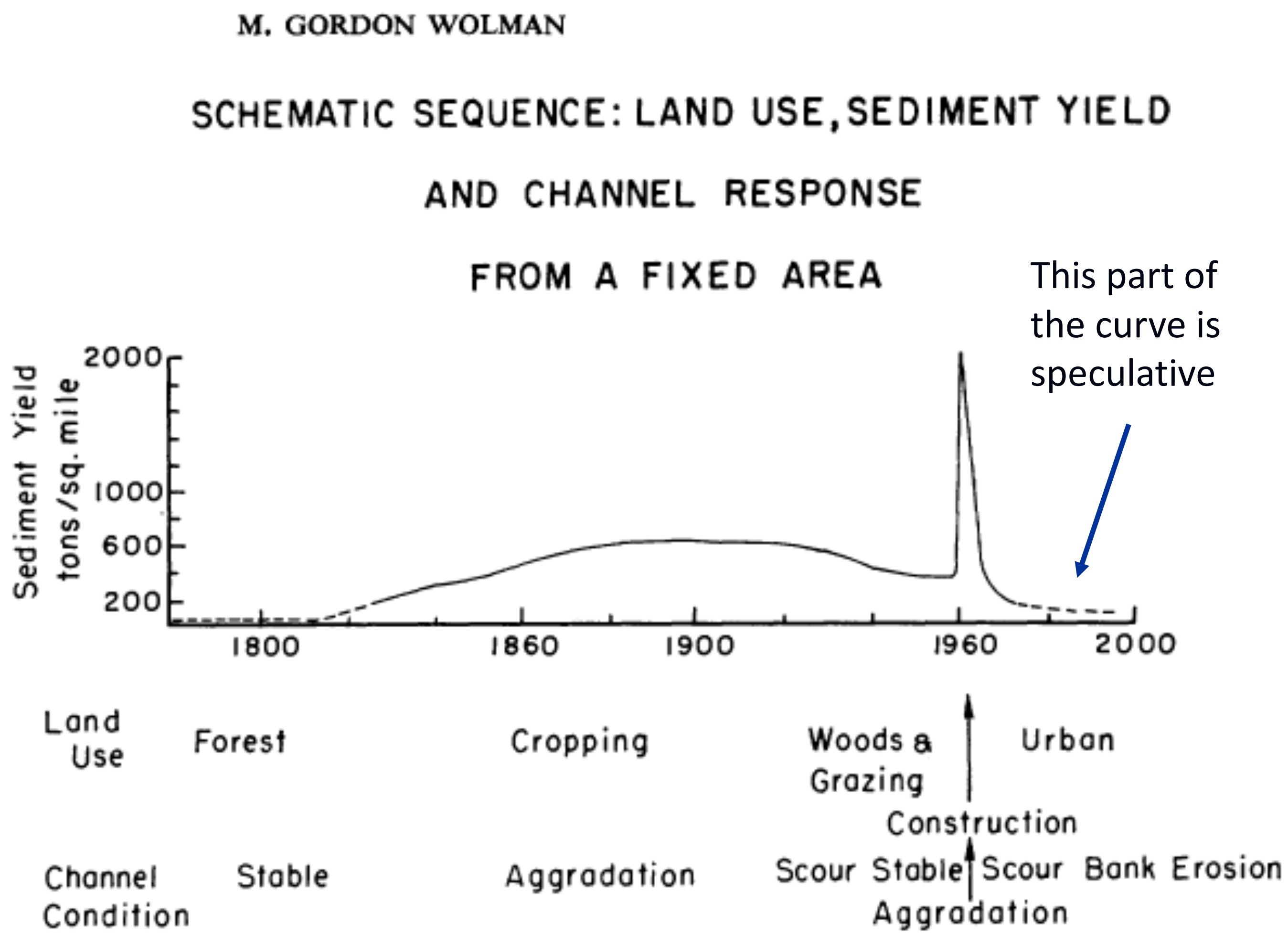
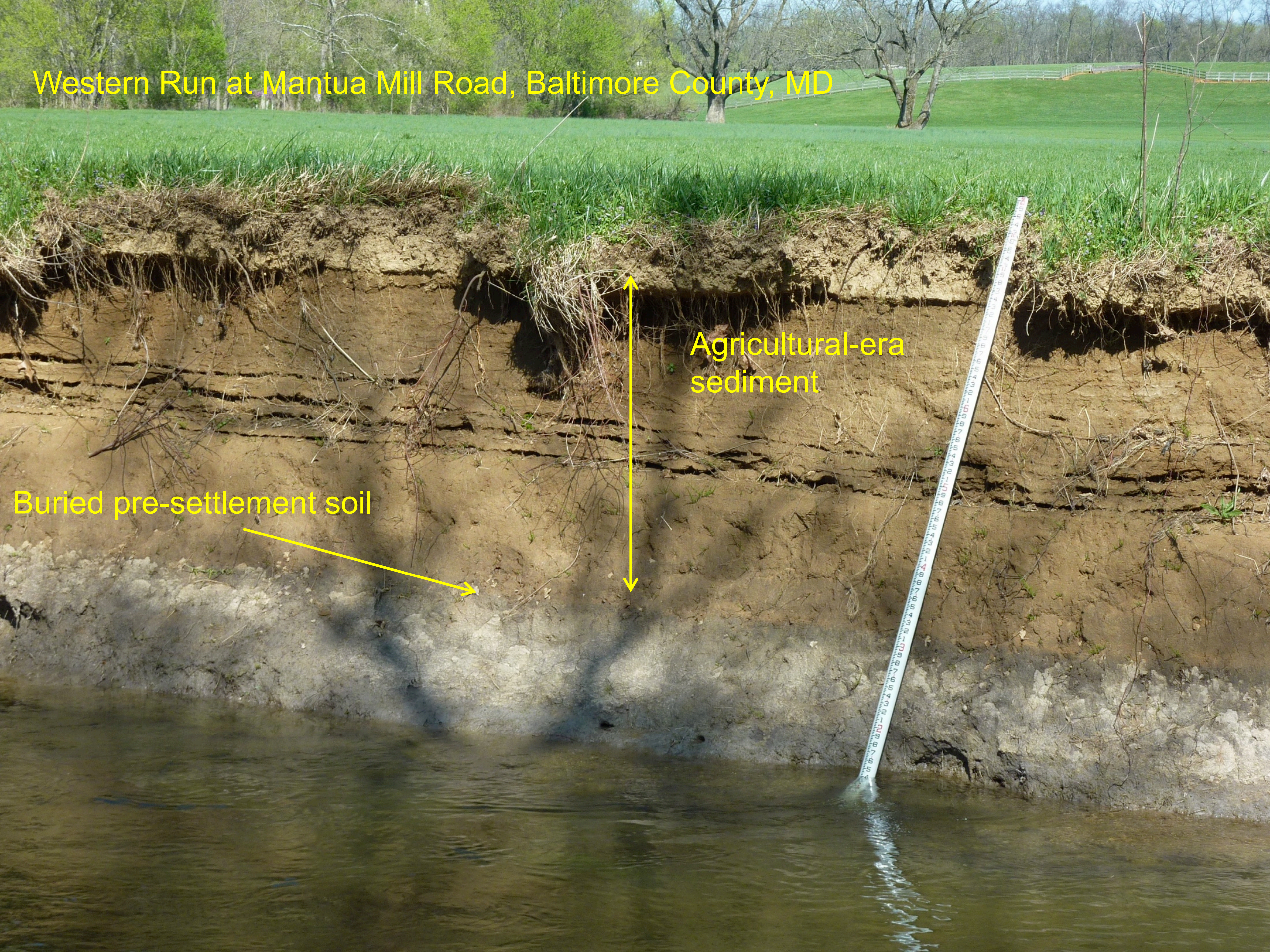


Figure 1. The cycle of land use changes, sediment yield, and channel behavior in a Piedmont region beginning prior to the advent of extensive farming and continuing through a period of construction and subsequent urban landscape.


Western Run at Mantua Mill Road, Baltimore County, MD
Agricultural-era sediment
Buried pre-settlement soil

Effects of Agriculture on Erosion and Sedimentation in the Piedmont Province, Maryland

JOHN E. COSTA *Department of Geography, University of Denver, Denver, Colorado 80210*

Figure 5. Excavation of agricultural dump in eroding bank of Western Run in Maryland Piedmont north of Baltimore. Alluvium 0.81 m thick overlies dump, which yielded license plates with dates of 1920 and 1924. Hammer stuck in bank is 30 cm long.

Costa, 1975

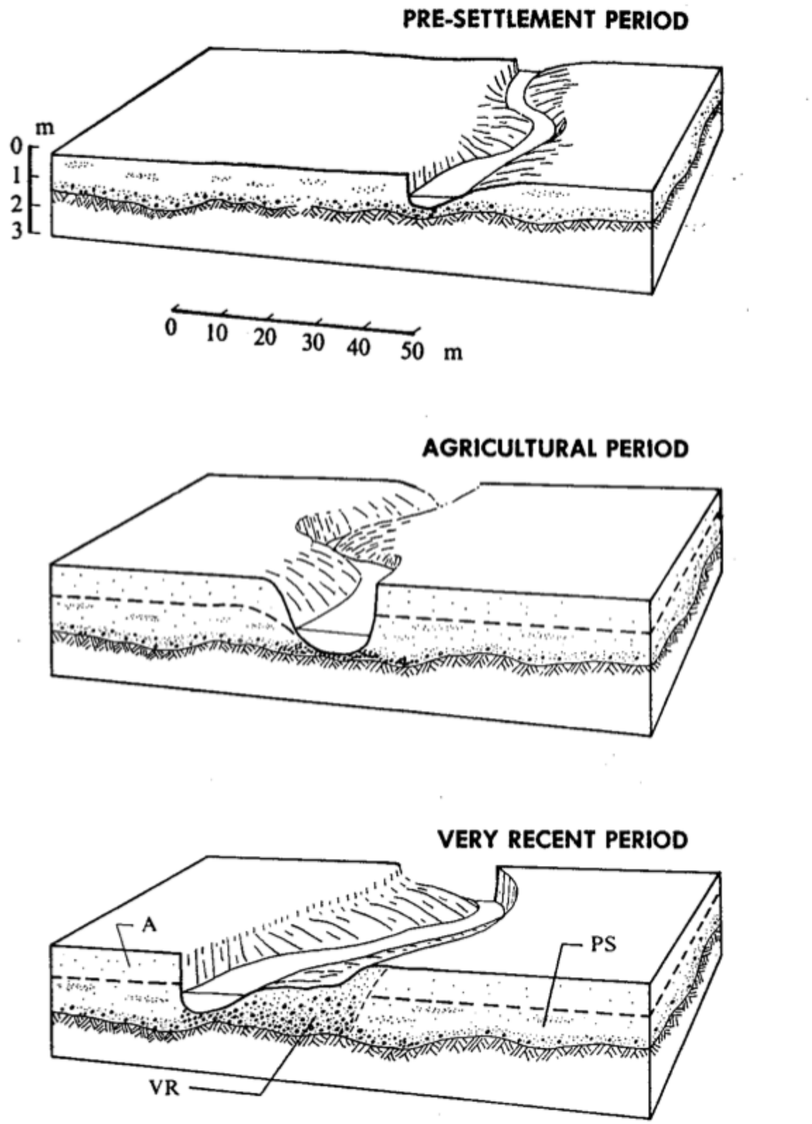


Fig. 7. Flood plain development model. Schematic representation of three-stage development of Maryland Piedmont flood plains. Pre-settlement period (PS): undisturbed stream in natural regime. Agricultural period (A): excessive upland erosion and flood plain sedimentation. Very Recent period (VR): reduced sediment load, reworking of flood plain sediment and redeposition of coarsest sediment as new, lower flood plain level

Jacobson and Coleman, 1986

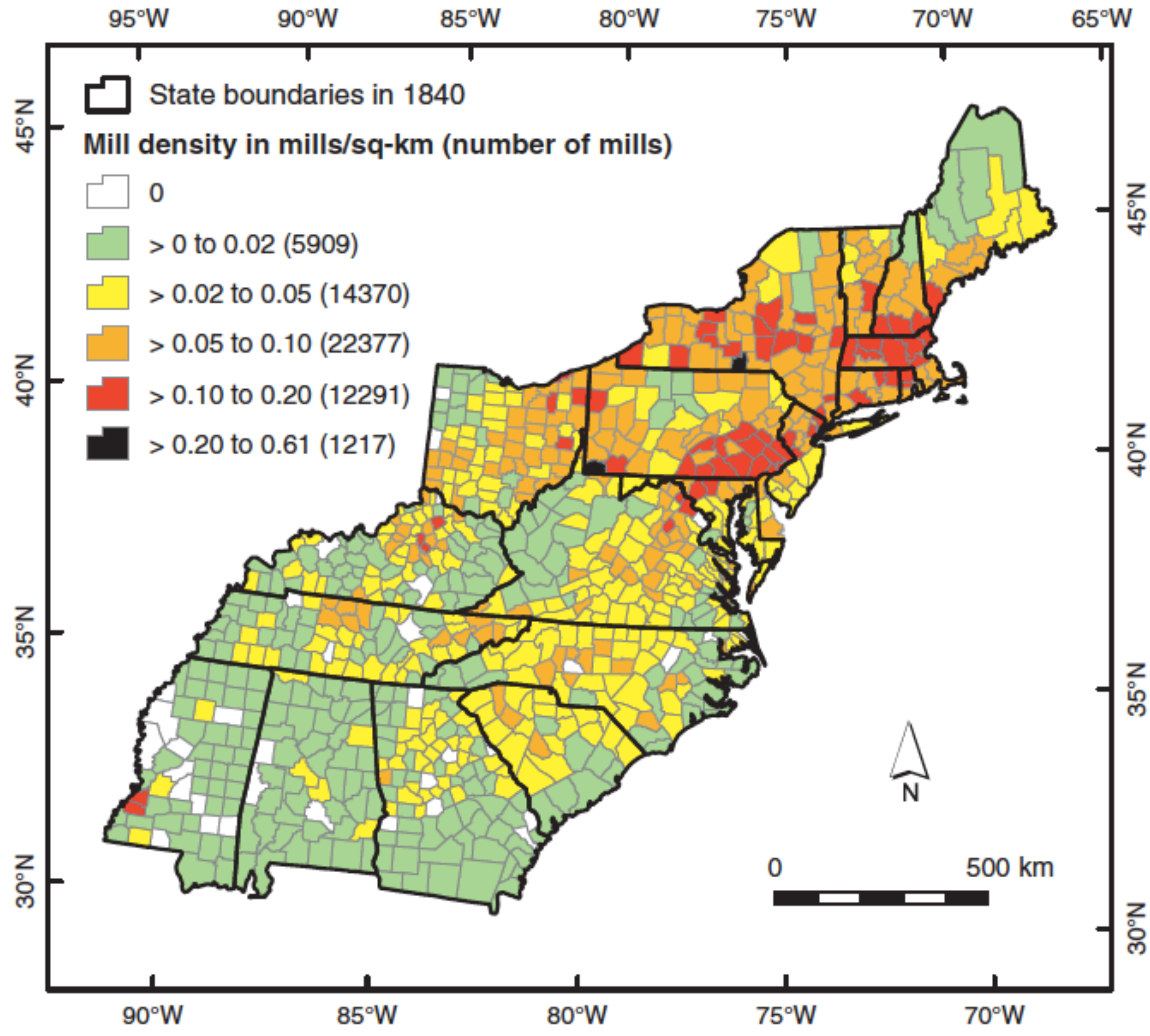
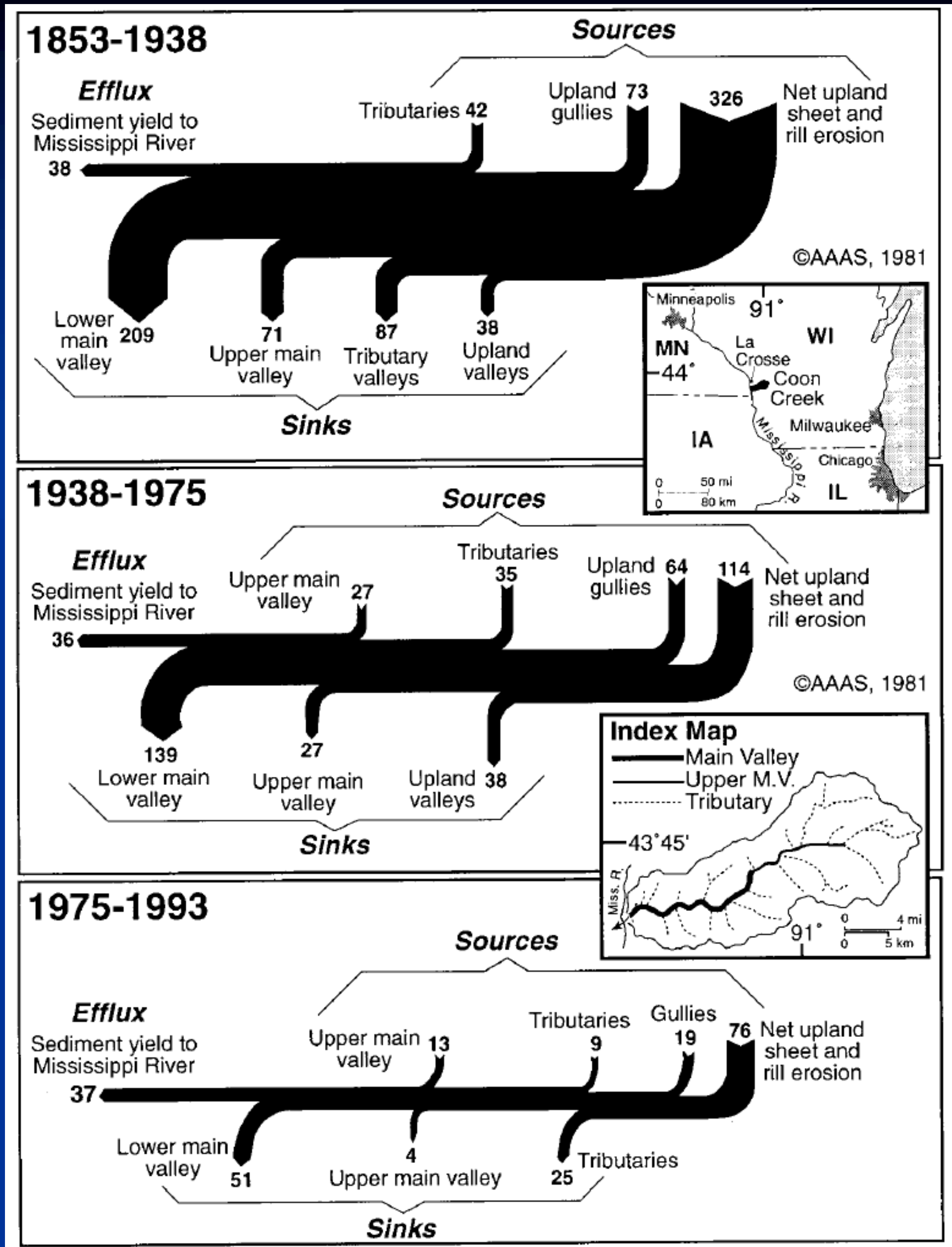


Fig. 1. Density of water-powered mills along eastern U.S. streams by 1840 by county (872 county boundaries are shown for 1840). The highest densities are in the Piedmont and the Ridge-and-Valley physiographic provinces of Maryland, Pennsylvania, New York, and central New England.

Walter and Merritts, 2008



Trimble, 1999

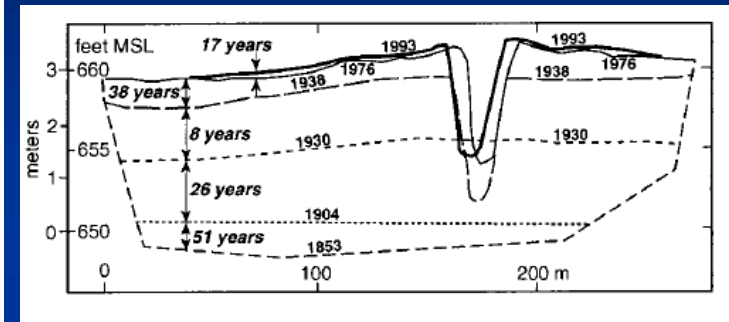


Fig. 2. A sediment sink. This is a cross-sectional profile in the lower main valley of Coon Creek showing succeeding, higher floodplain levels dated from 1853 to 1993. MSL, mean sea level. Such accretion accounts for most storage in the Coon Creek Basin. [Modified from (3)]

There are enormous volumes of legacy sediment stored in valleys of the Chesapeake Bay watershed

- How do we define and characterize these deposits?
- How much is out there and where is it?
- What kinds of nutrient concentrations are there?
- How much of this material is being removed from storage per year and where is it going?
- How does this amount compare with other (e.g. upland) sources?
- How much is redeposited, how much leaves the watershed per year, and how long does it take to reach Chesapeake Bay?
- Is this a problem for the Bay? If so, what should be done about it?

Panel A1: State of the Science

A1 Panelists: *Allan James (University of South Carolina), Sean Smith (University of Maine), Dorothy Merritts (Franklin and Marshall), Greg Noe (USGS)*
Synthesizers: *Mike Langland (USGS), Andy Miller (UMBC), Bob Walter (Franklin & Marshall)*

- How should legacy sediment be defined in the context of the Chesapeake Bay management effort?
- To what extent do legacy sediments provide an important source of nutrient contributions by comparison with other sources?
- What is the importance of legacy sediments compared to other sediment sources affecting Bay conditions? (also relevant to panel A2)

Panel A2: State of the Science

A2 Panelists: *Jim Pizzuto (University of Delaware), Cliff Hupp (USGS, retired), Allen Gellis (USGS), Karl Wegmann (North Carolina State University)*
Synthesizers: *John Brakebill (USGS), Katie Skalak (USGS), Dorothy Merritts (Franklin & Marshall)*

- What is the importance of legacy sediments compared to other sediment sources affecting Bay conditions?
- How do the distribution, characteristics and relative magnitude of legacy sediment vary with watershed scale or geographic location?
- To what extent are lag times for sediment delivery and intermediate floodplain storage processes relevant to our assessment of the problem?

Panel B1: Mitigation Strategies

B1 Panelists: *Art Parola (Stream Institute, U of Louisville), Solange Filoso (University of Maryland Center for Environmental Science), Drew Altland (RK&K), Tess Thompson (Virginia Tech)*
Synthesizers: *Scott Lowe (McCormick Taylor), Mike Trumbauer (Biohabitats, Inc.), Sean Smith (University of Maine), Jeff Hartranft (PA Department of Environmental Protection)*

- What do we know about the engineering reliability and water-quality effectiveness of practices designed to mitigate the potential downstream impacts of legacy sediment at the watershed scale?

Panel B2: Mitigation Strategies

B2 Panelists: *Don Weller (Smithsonian Environmental Research Center), Bern Sweeney (Stroud Water Research Center), Peter Kleinman (USDA-ARS), Kathy Boomer (The Nature Conservancy)*
Synthesizers: *Karen Prestegaard (University of Maryland), Matt Baker (UMBC), Tom Schueler (Center for Stormwater Protection)*

- What do we know about the relative effectiveness at the watershed scale of practices designed to retain or prevent mobilization of sediment and associated nutrients from sources other than legacy sediment?

Panel C: Management Issues

Panelists: *Kevin Smith (Maryland Department of Natural Resources), Stu Schwartz (UMBC), Erik Michelson (Anne Arundel County Dept. of Public Works), Gary Shenk (USGS/CBPO), Ryan Cole (MD State Highway Administration), Denise Clearwater (Maryland Dept of the Environment)*
Synthesizers: *Ann Swanson (Chesapeake Bay Commission), Lisa Wainger (University of Maryland Center for Environmental Science), Dave Goerman (PA Dept of Environmental Protection)*

- How do we decide on the appropriate combination of controls from Theme B (both in design and number) to reduce impacts on Chesapeake Bay?
- What are costs and constraints that influence ability to implement practices?
- What additional information do managers need to inform their choices?

Charge to panelists

- Provide a brief summary of key observations or conclusions from your experience in response to one or more of the questions posed
- Stay within the 10-minute limit
- Be prepared to answer questions and to ask your own
- Share your research findings through documents that can be made available to workshop attendees

Charge to synthesizers

- Take notes in order to summarize key findings and to synthesize the cumulative outcome of the panel discussion
- Goal is also to provide additional insights by identifying points that might have been overlooked or supporting information to enhance understanding
- Meet with other members of synthesizer team during breaks or in the evening
- Prepare a summary for presentation to/discussion with the group on Tuesday afternoon

Charge to all attendees

- Ask questions, engage in discussion during and outside of panel sessions
- Provide feedback in written form after the workshop (can also include documents, papers, reports for use by the steering committee in compiling the workshop report)
- Our goal is to capture as much of the relevant information from all parties as possible

Anticipated outcomes

- Our goals are to:
  - Identify areas of consensus
  - Identify areas where consensus does not yet exist
  - Identify where more information is needed
  - Provide useful feedback for managers and decision-makers at all levels that may help to inform policy and resource allocation for mitigation strategies

Timetable for workshop report

- The steering committee met at the end of the workshop and established a timetable for report preparation
- Each steering committee member was on one of the synthesizer teams and notes from those teams together with summary notes on individual presentations by panelists will be used in preparation of the workshop report
- We will be sharing drafts of individual sections through mid-June
- We will then confer to decide on recommendations
- Draft report will be completed for circulation by July 1, 2017
- Final report due by July 25, 2017

Questions?