

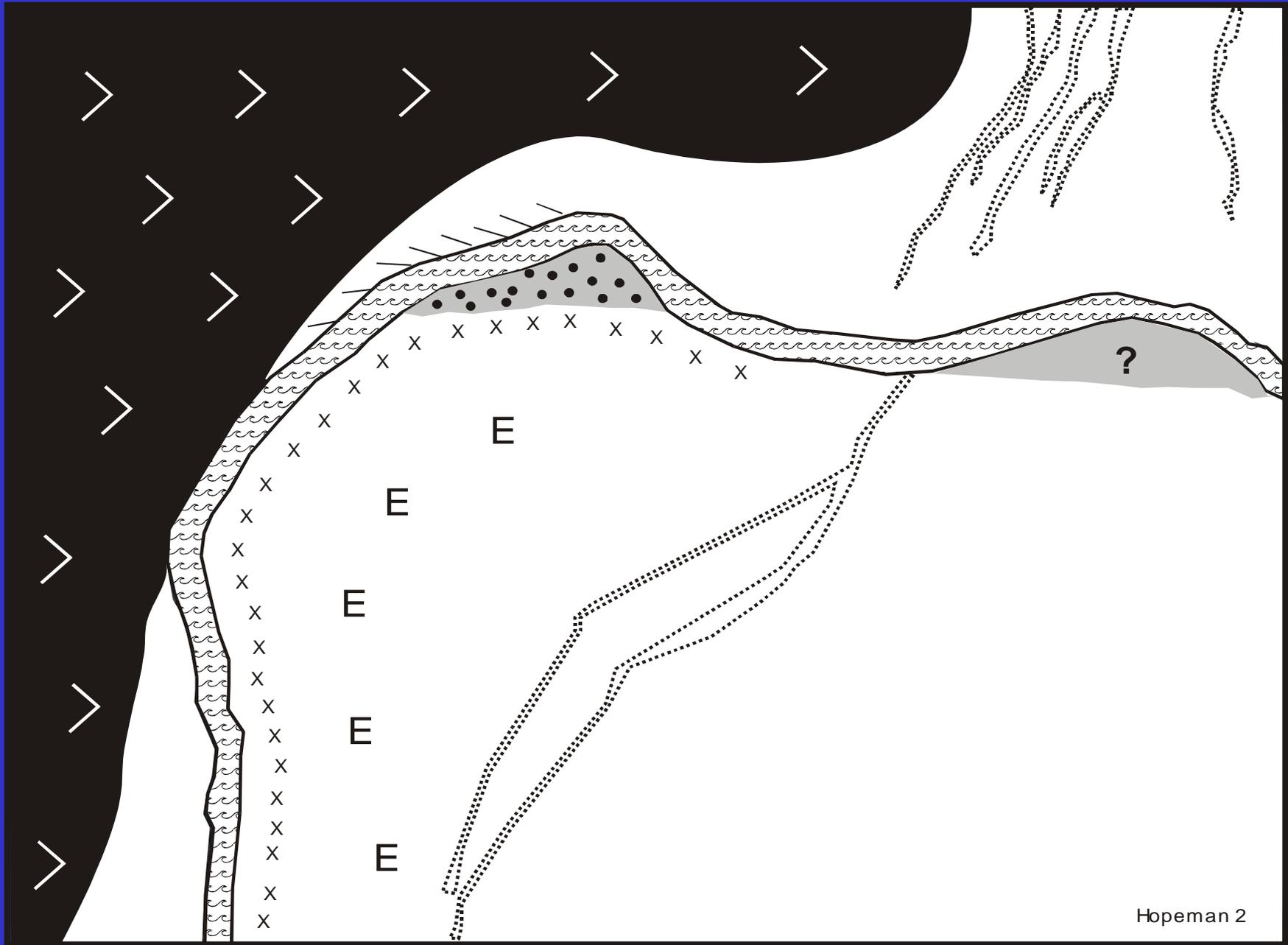
New Observations on the Geomorphology of the South River

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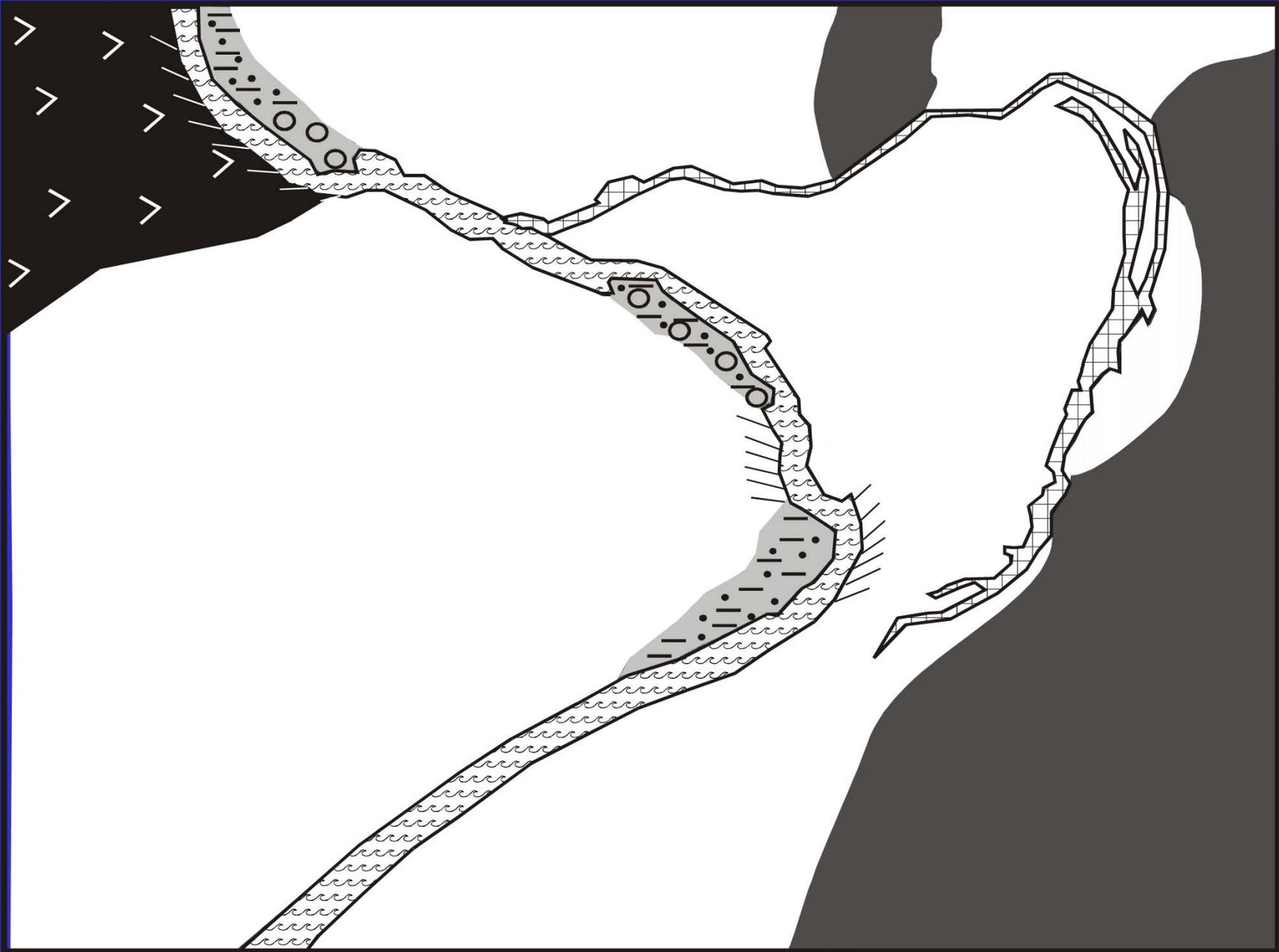
Status of Mapping

We now have “working versions” of geomorphic maps of the following reaches:

1. Upper reach of the river from the plant to below Genicom
2. Crimora Reach
3. Forestry Station
4. Grand Caverns



Hopeman 2



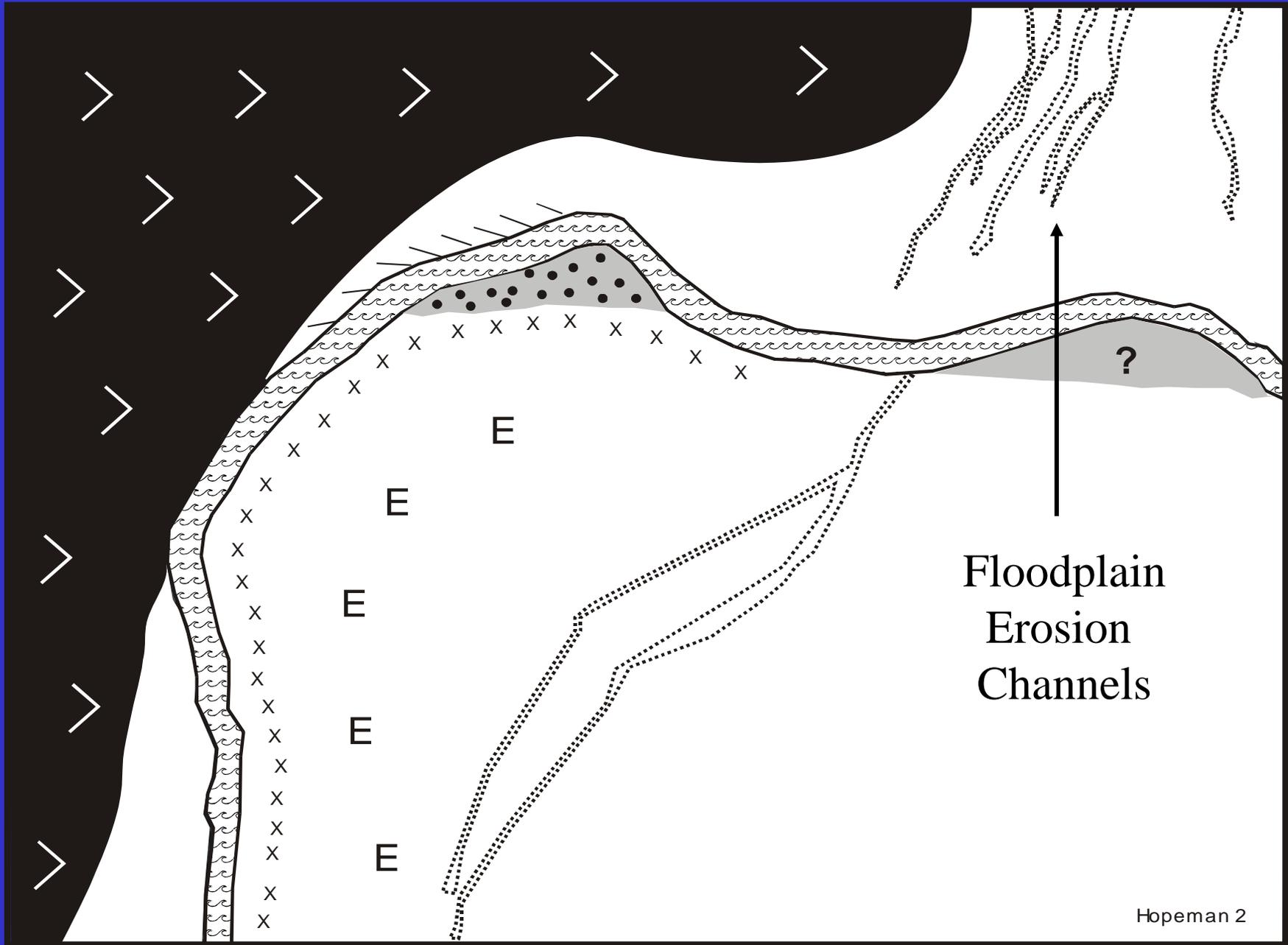
New observations of South River

1. Existence of floodplain erosion channels

- floodplain surface may be a source of Hg*
- need to assess the history of these using aerial photos to see if they are “active”*

2. Differences between upstream and downstream reaches

- upstream: above Forestry Station
- downstream below Forestry Station



Floodplain
Erosion
Channels

New observations of South River

1. Existence of floodplain erosion channels
 - floodplain surface may be a source of Hg
 - need to assess the history of these using aerial photos to see if they are “active”
2. *Differences between upstream and downstream reaches*
 - upstream: above Forestry Station*
 - downstream below Forestry Station*

3. Upstream reaches:

- less steep
- wider alluvial valley
- more silty floodplain deposits
- less bedrock

4. Downstream reaches:

- steeper
- narrow valley bordered by terrace and alluvial fan deposits
- bedrock
- sandy, gravelly floodplain
- anastomosing reaches

Slope Data for Reaches of South River

River Reach	Channel Slope
1. Lyndhurst - Waynesboro	0.0014
2. Waynesboro – Doods	0.0017
3. Doods – Crimora	0.0013
4. Crimora – Harriston	0.0019
5. Harriston – Port Republic	0.0022

Source: Engineering Feasibility Study of Rehabilitating the South River and South Fork Shenandoah River. Lawler, Matusky & Skelly Engineers.

Below Grand Caverns

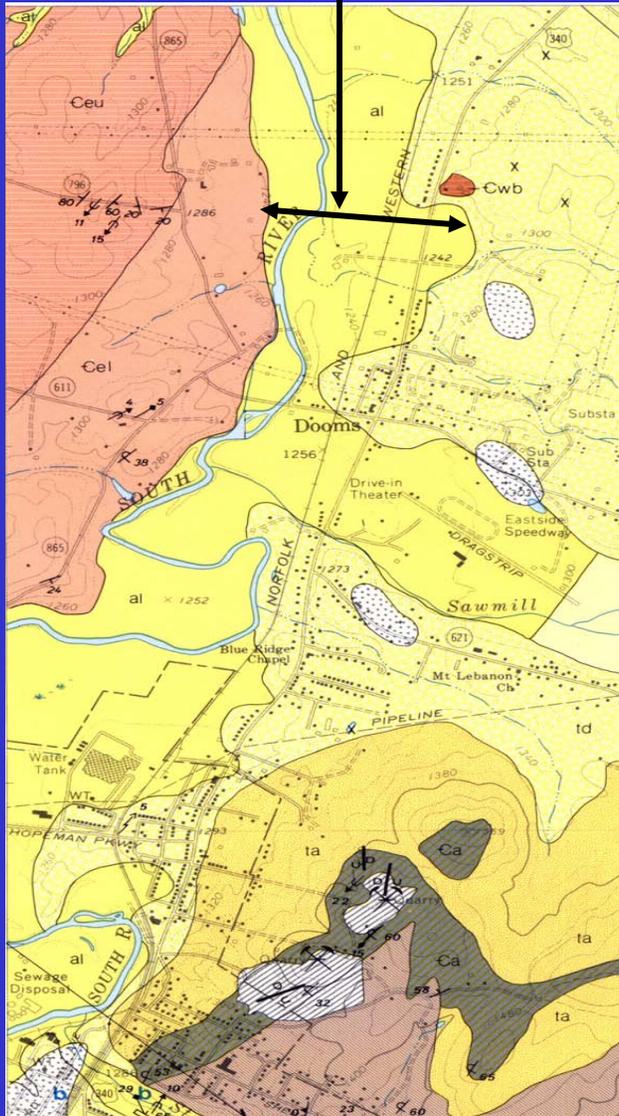


Bedrock appears to be a more important control in
“downstream” reaches

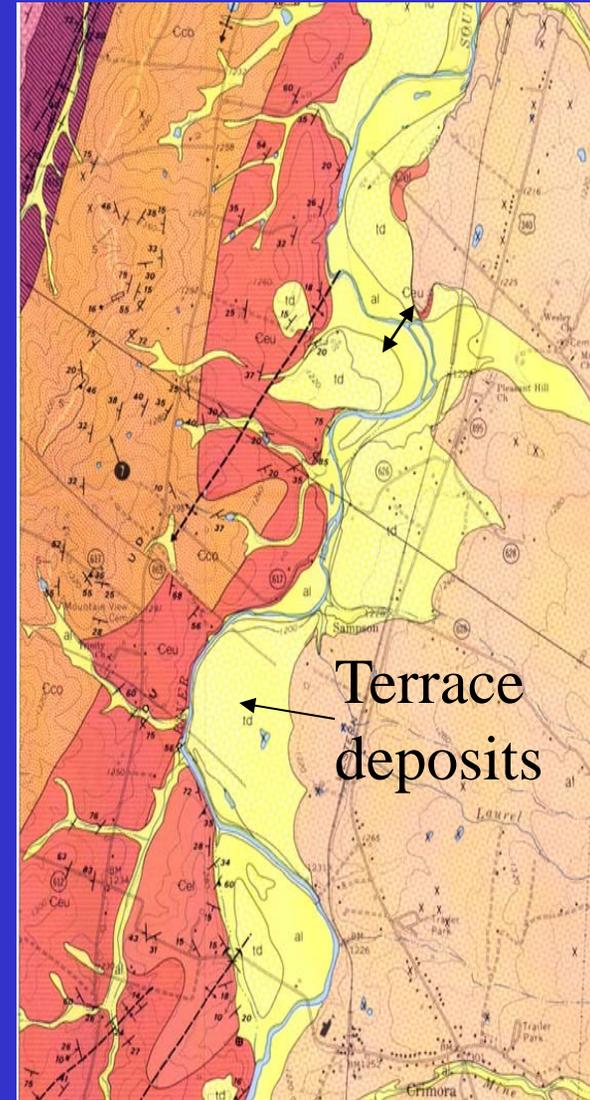
Bedrock above Grottoes Park



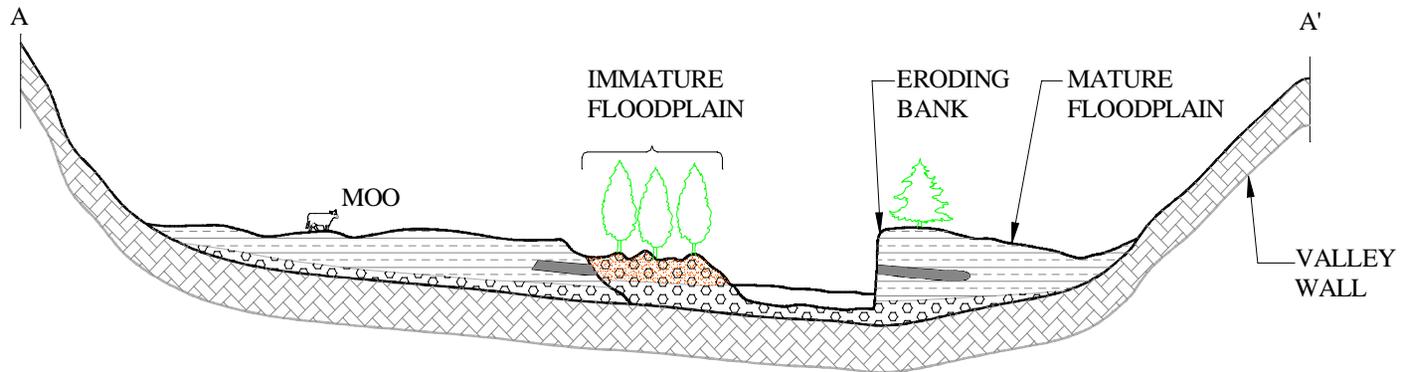
Upstream Geology: Wide alluvial deposits



Downstream Geology: Narrow alluvial deposits



Upstream Cross-Section: Alluvium is composed of SILT



ILLUSTRATIVE CROSS SECTION

LEGEND

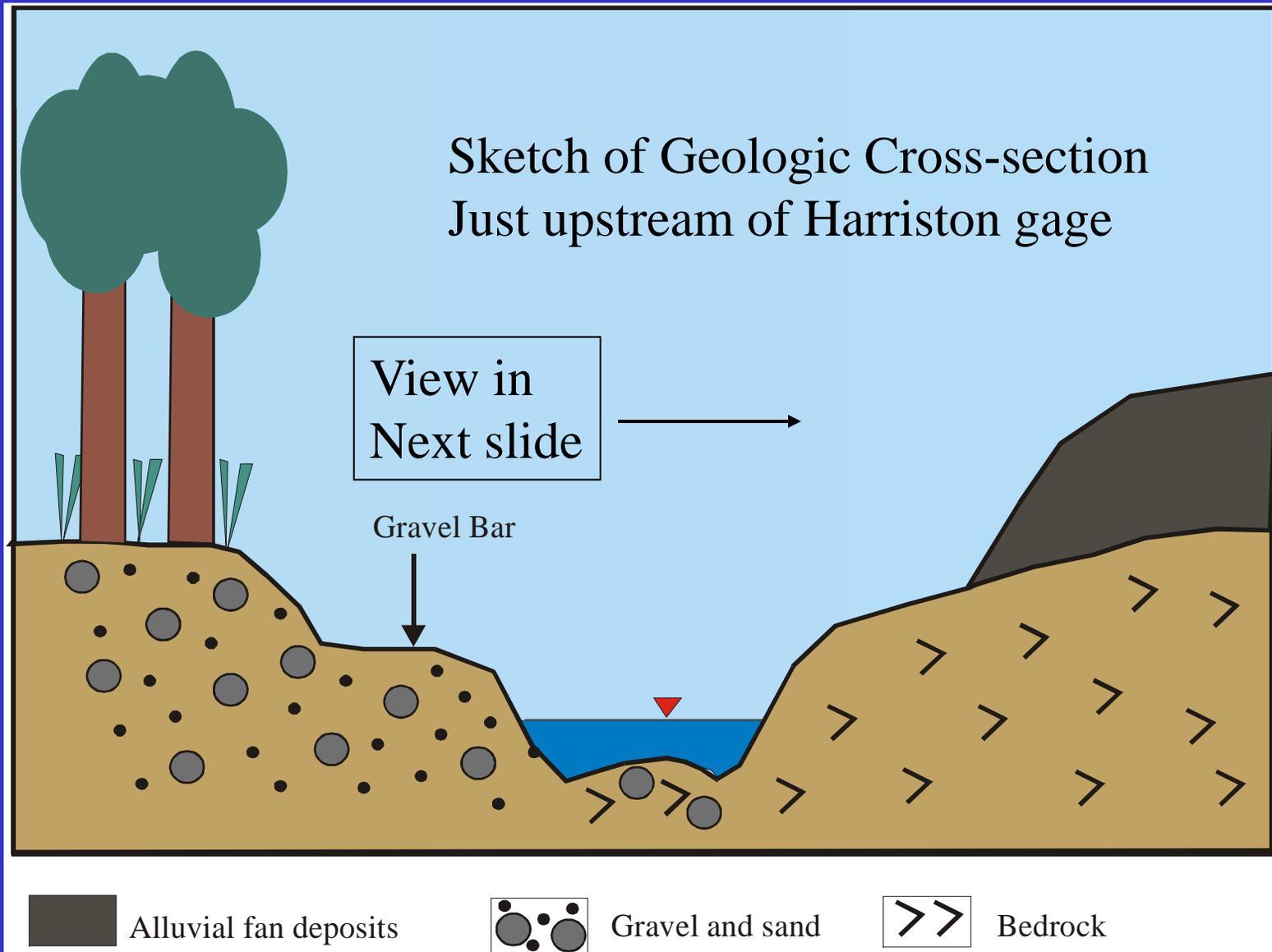
-  BEDROCK
-  GRAVEL
-  SAND
-  SILT (50% SILT, 30% SAND, 20% CLAY)
-  PRE-SETTLEMENT PALEOSOL

10X VERTICAL EXAGGERATION



DESIGNED	INITIALS	 <p>Corporate Remediation Group An Alliance between DuPont and URS Diamond</p>	CROSS SECTION A-A'		
DRAWN			SOUTH RIVER WAYNESBORO, VIRGINIA		
CHECKED					
APPROVED(DESIGN)					
APPROVED(CONSTRUCTION)					
Barley Mill Plaza, Building 27 Wilmington, Delaware 19805		SCALE	DATE	DWG FILE NO.	FIGURE
		N.T.S.	04/19/2004	PRJ-2	2

Downstream Cross-Section: Sediments are mostly gravel and sand: much less silty!



View along cross-section – above Harriston



Alluvial Fan Deposits – (little Hg storage)

Bedrock



Sinuuous: Genecom



Anastomosing: near Grottoes



Anastomosing reach below Forestry Center

5. Significance:

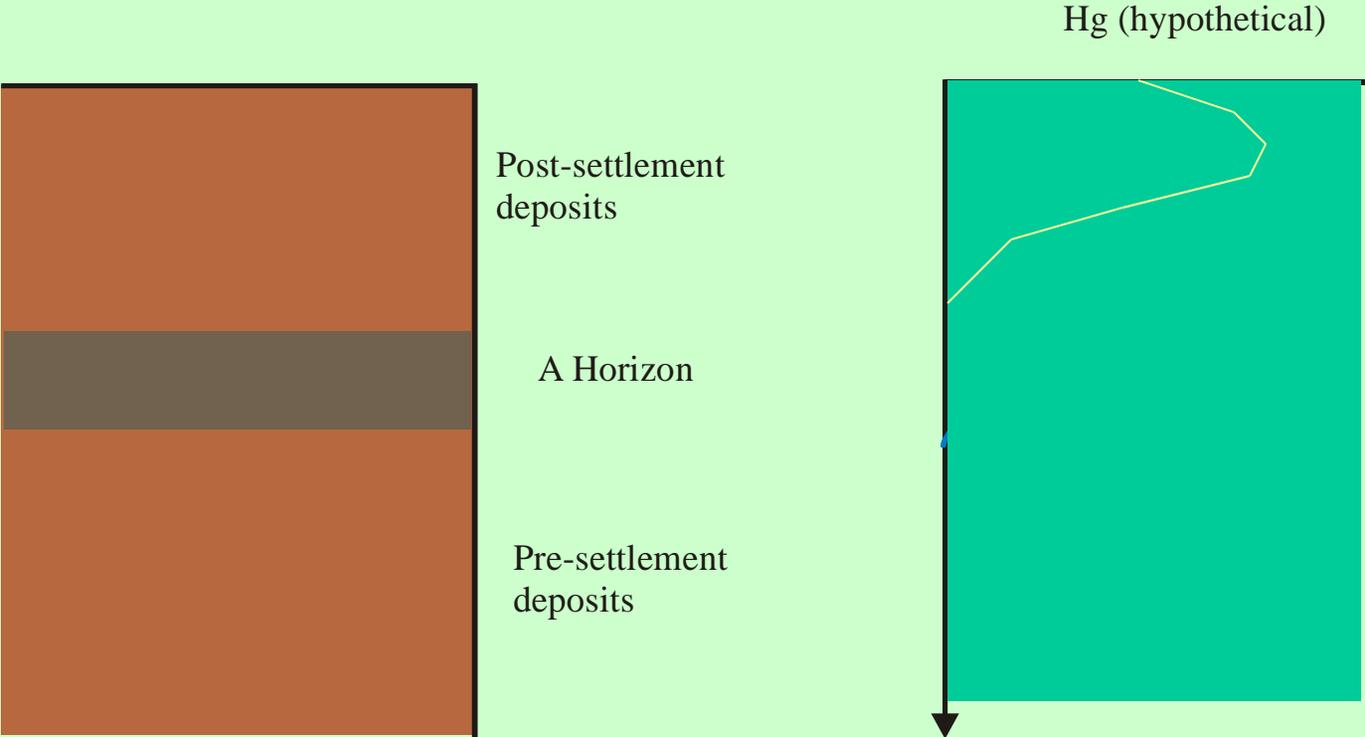
- upstream reaches likely to have Hg sediments stored, more likely to be a continuing source
- downstream reaches, more likely to be sediment and Hg pass through

Observations about bank erosion

1. Several eroding banks exist where depositional history is clear: Hg profiles should be “predictable”
 - Below Genicom
 - Above Doods Dam
2. Most erosion is very localized.
 - A small number of rapidly eroding banks
3. Rates of bank erosion appear to be controlled by curvature and vegetation
 - significance: if curvature is the control, bank erosion is likely predictable on multi-year timescales through modeling

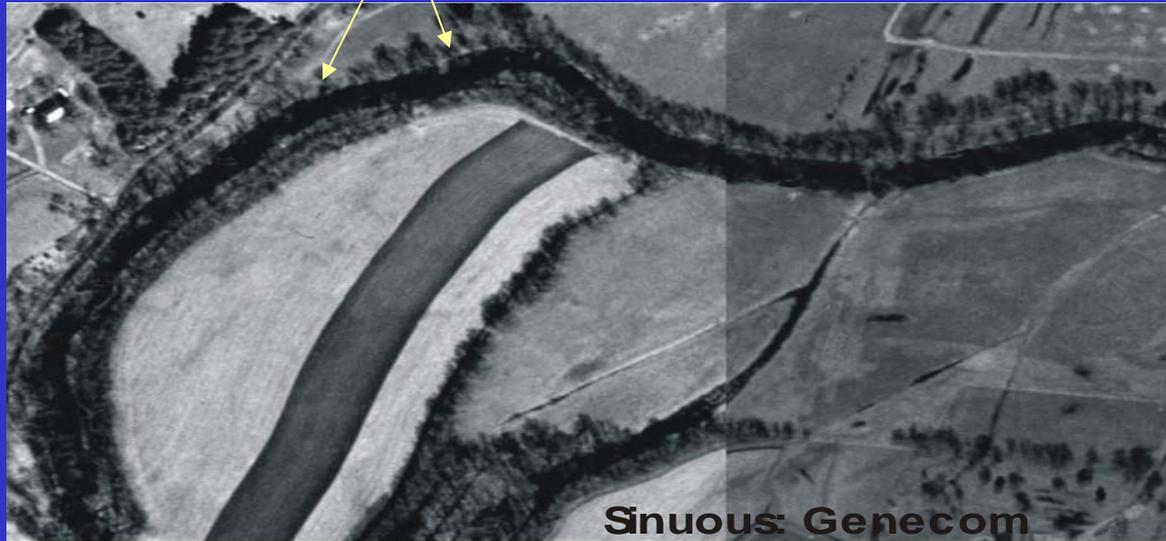
Eroding bank sources are easily located, erosion rates may be predictable

Typical Eroding Bank



Note: these banks are potential sources of Hg from the floodplain without storing recent Hg from upstream.

Eroding bank below Hopeman Pkwy



1. Only erosion occurs on this bank (not a site for storage of previously erosion sediment)
2. Floodplain here appears to have a simple history of floodplain accumulation (natural levees, etc)
3. *A clear Hg SOURCE!*

Eroding bank below Hopeman Pkwy



Future Work

1. Continue geomorphic mapping alluvial valley
2. Sample Hg profiles at localized eroding bank sources (probably in progress...)
3. Historical mapping from aerial photos (determine long term bank erosion rates)
4. Begin monitoring eroding banks with erosion pins (late spring?)(where?)
5. Measure bed and bank storage (summer?)

Future Work – Dynamics of fine-grained sediment storage

Observation 1: transport of fine-grained sediment (eroded from banks) in suspension is easy to predict, and very rapid

Observation 2: storage likely controls movement of particulates through the system

- longer time scales than transport in suspension
- the hydraulics of transport in suspension are not very

Important, so hydraulic models will not be very useful

Observation 3: high flow monitoring needed to understand storage
And resuspension ?

Further field observations, study of existing data needed to develop relevant theory, useful field tests