Landslide mapping and research at the Kentucky Geological Survey

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William M. Andrews Jr.

Geohazards In Transportation in the Appalachian Region

Charleston, WV 2008

KGS activities

- Landslide inventory

- Surficial geologic mapping

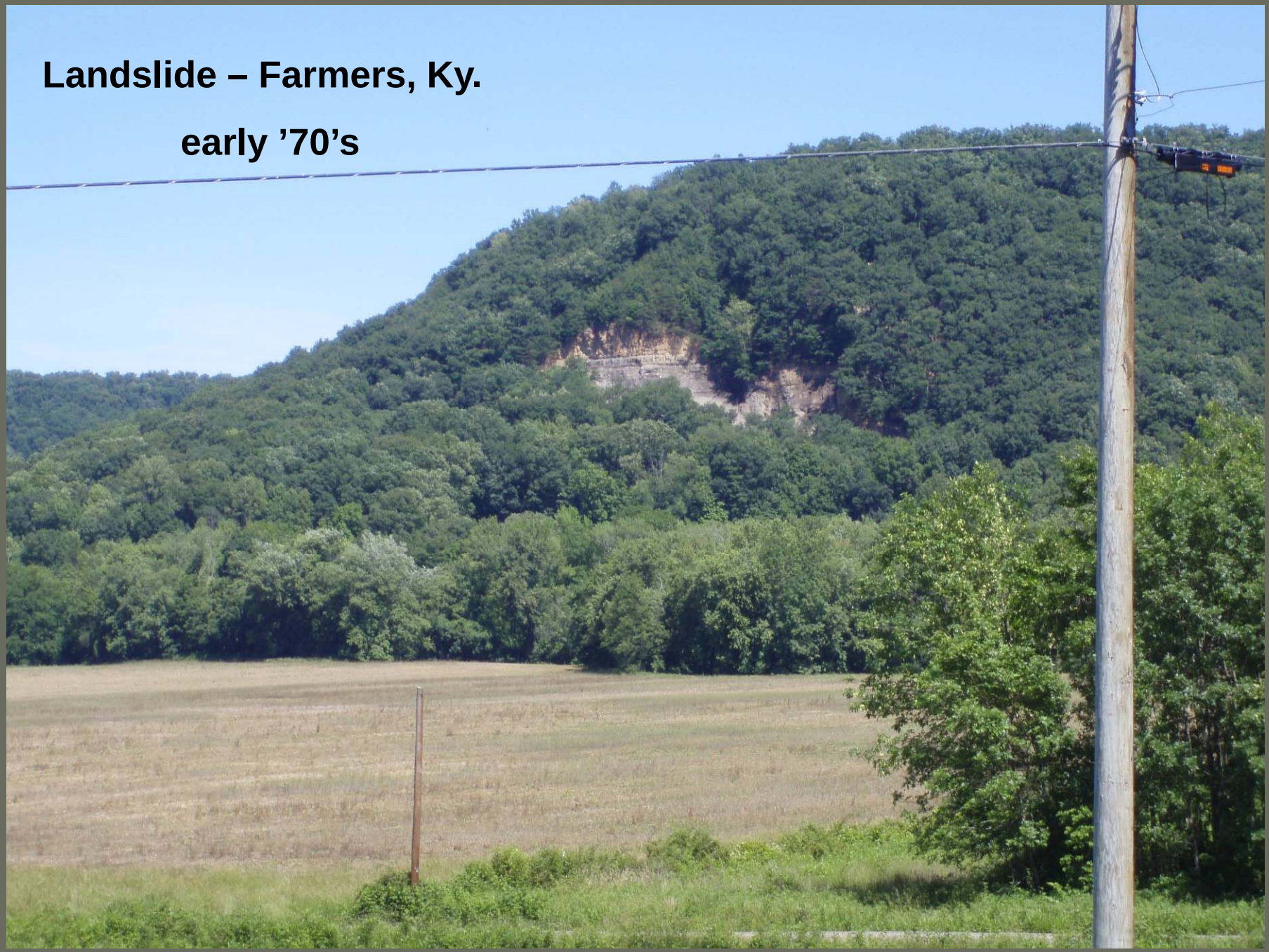
✓ New geologic maps

✓ Surficial geology database

✓ Landslide susceptibility maps

✓ Landslide database

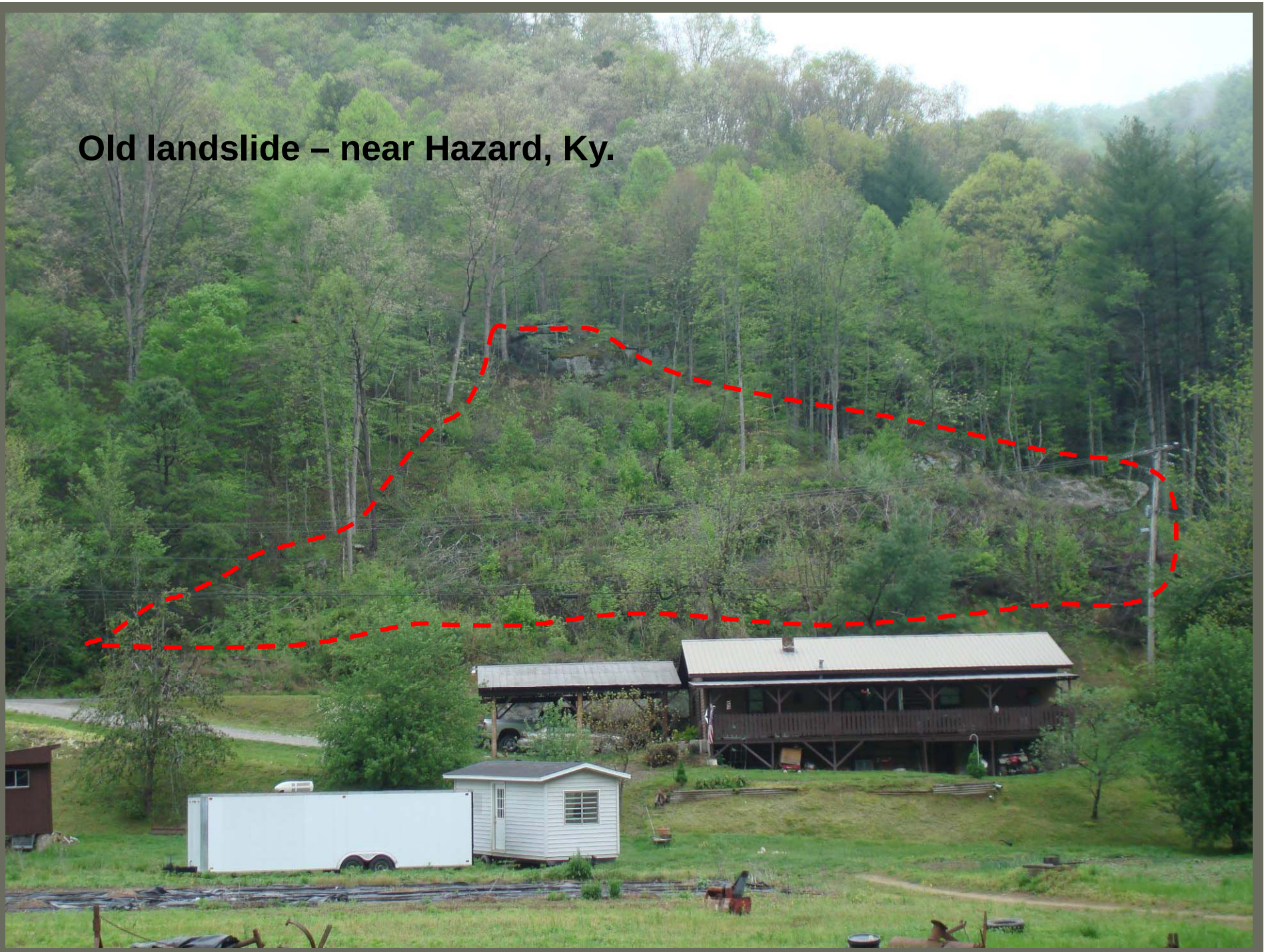
✓ Adding to existing online map services


Landslide – Farmers, Ky.
early ’70’s


Mudslide – Covington, Ky.
2008


Landslide – near
Owensboro, Ky.

Landslide - April 2006 Perry County


Old landslide – near Hazard, Ky.

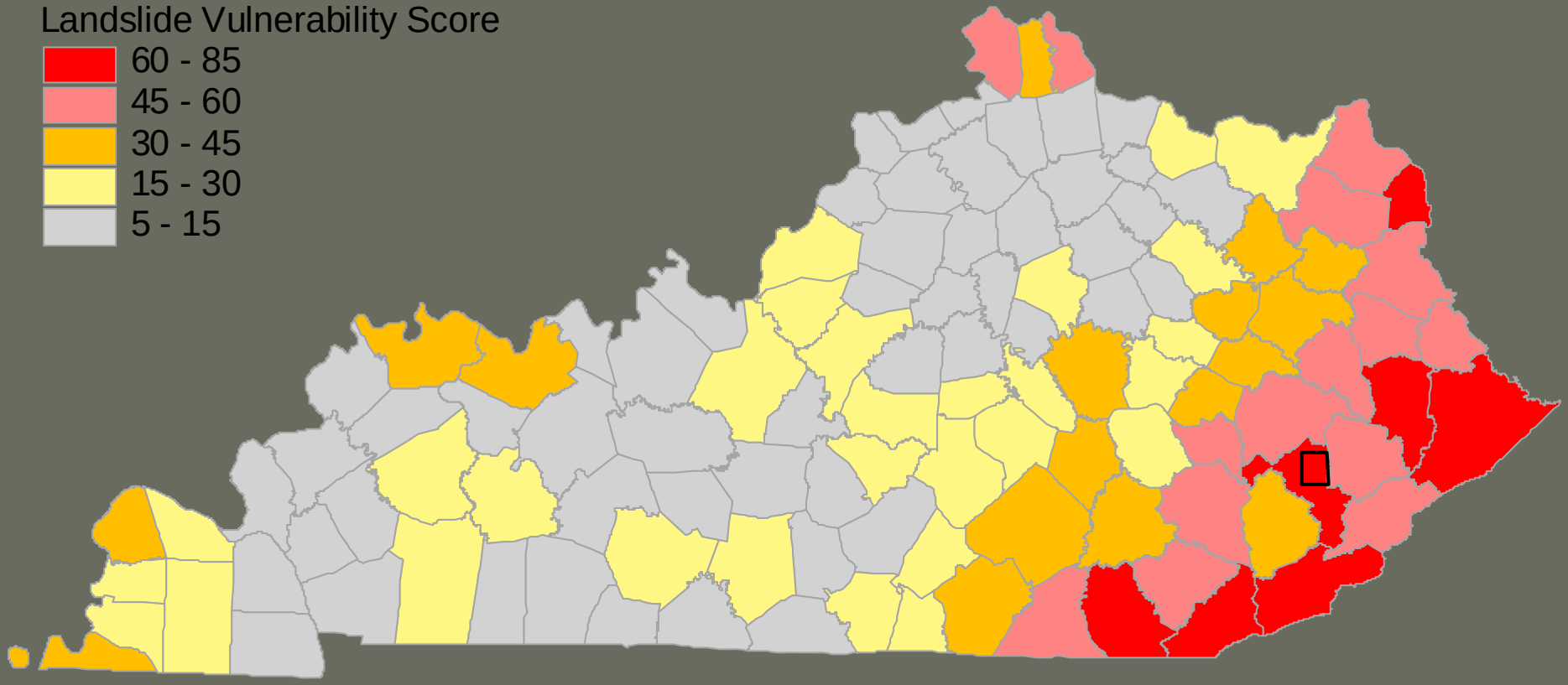

Old landslide – near Hazard, Ky.


Landslide – near Hazard, Ky.


Mudslide – Bedford, Ky.
2008

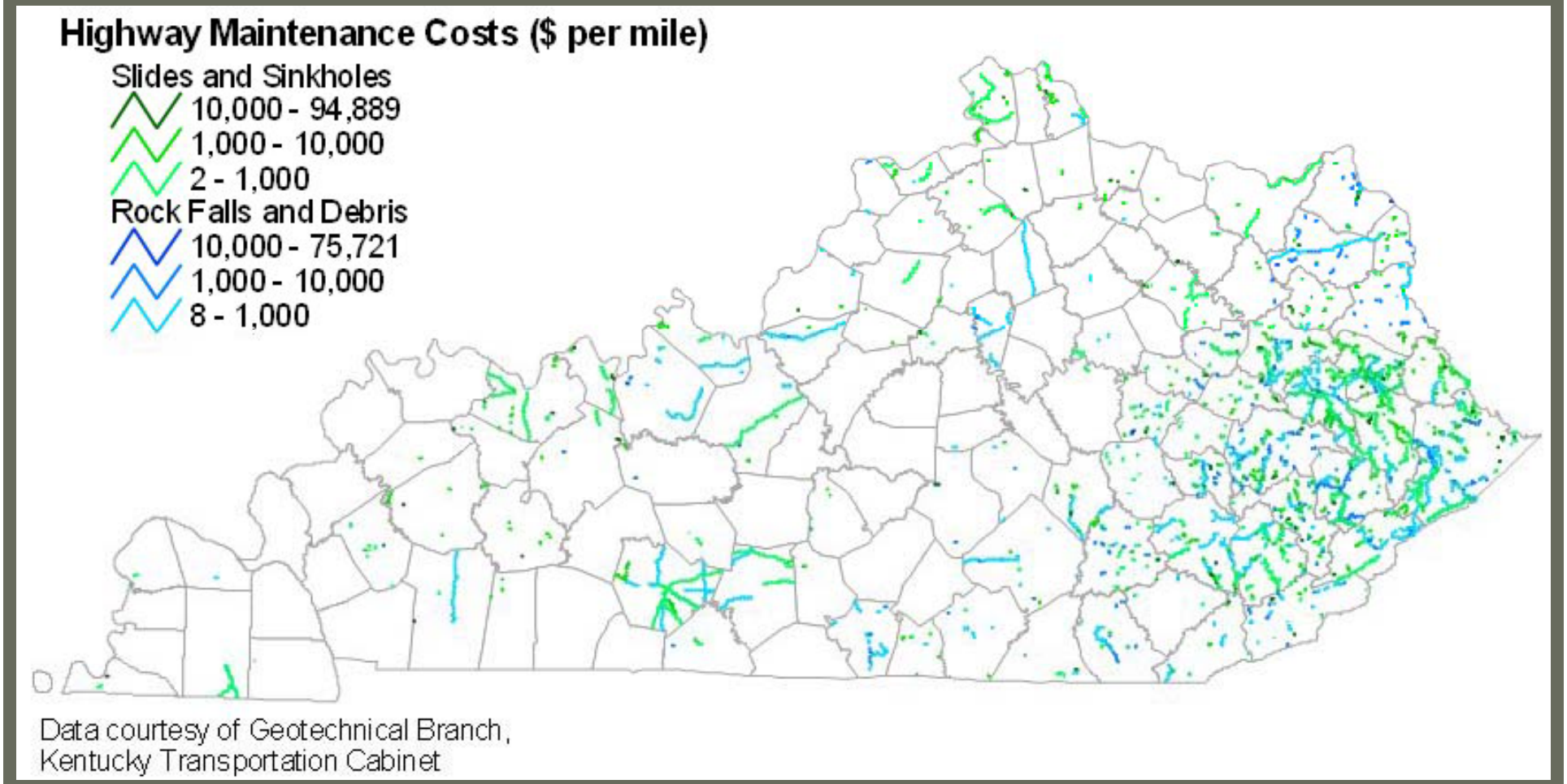
Old debris flow – near Hazard, Ky.

Landslide Hazards
Kentucky State Hazards Mitigation Plan



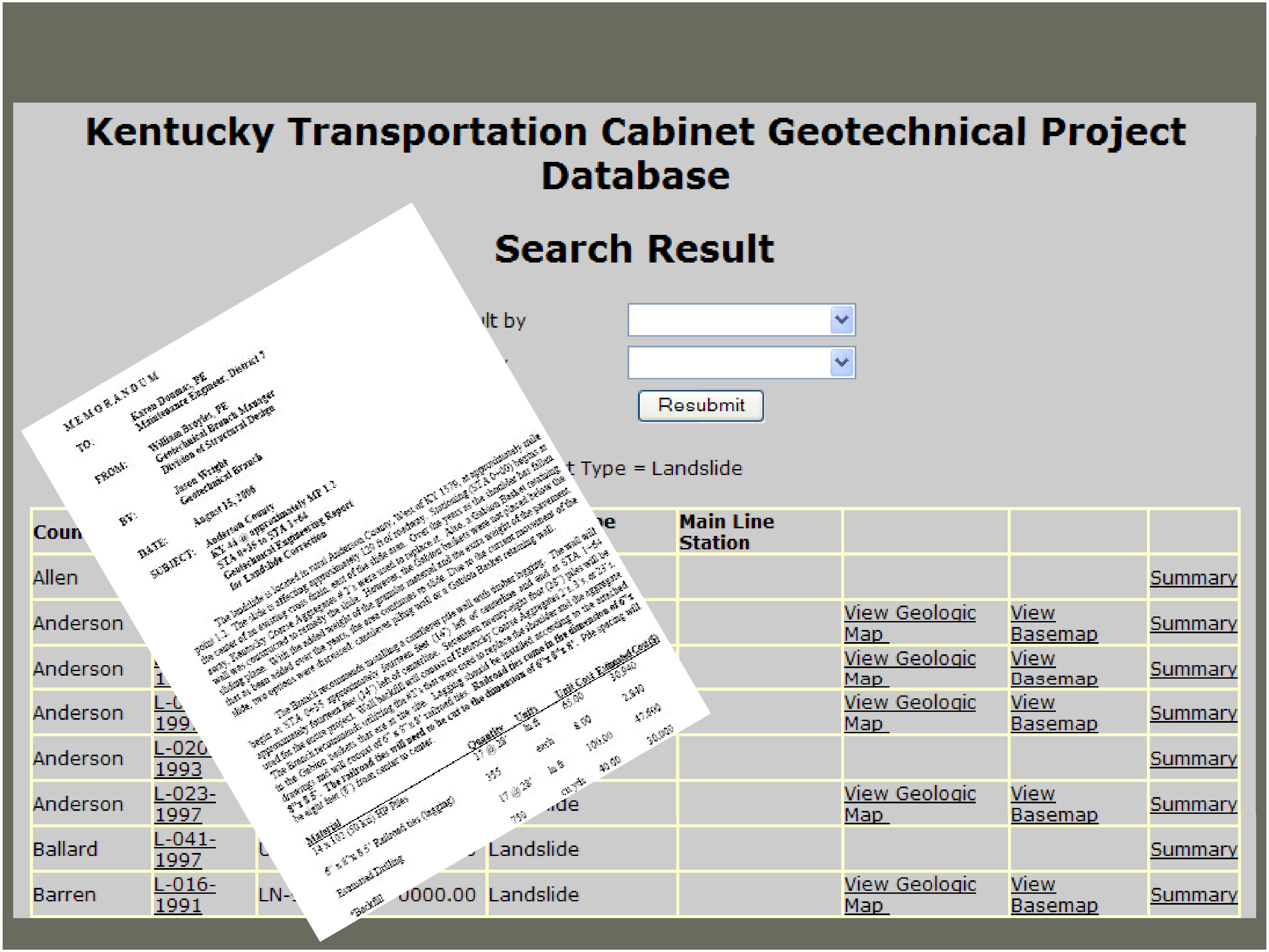
Data courtesy of R.J. Human, University of Louisville,
Center for Hazards Research And Policy Development

Locations of Kentucky Transportation Cabinet landslide and rock fall projects and FY06 cost per mile of landslide-related maintenance costs in Kentucky.



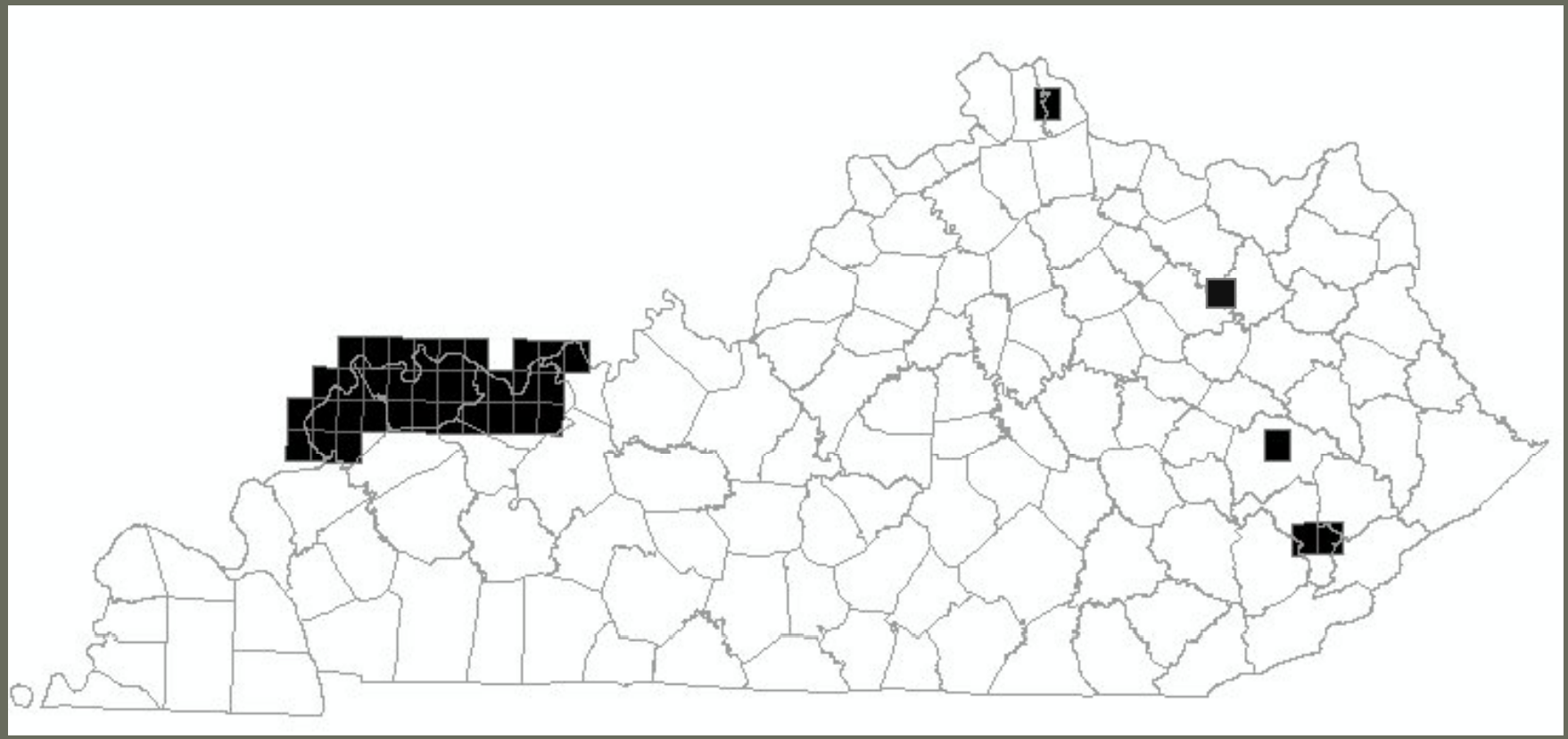
Gathering from data sources

- Existing maps
  - Landslide maps
  - Geologic maps
- Existing reports
  - KYTC
  - Division of Natural Resources, Mining Reclamation
- Field work / mapping
- Anecdotal info
- Harvesting other state's inventory attributes
  - North Carolina
  - Oregon
  - Washington
  - California

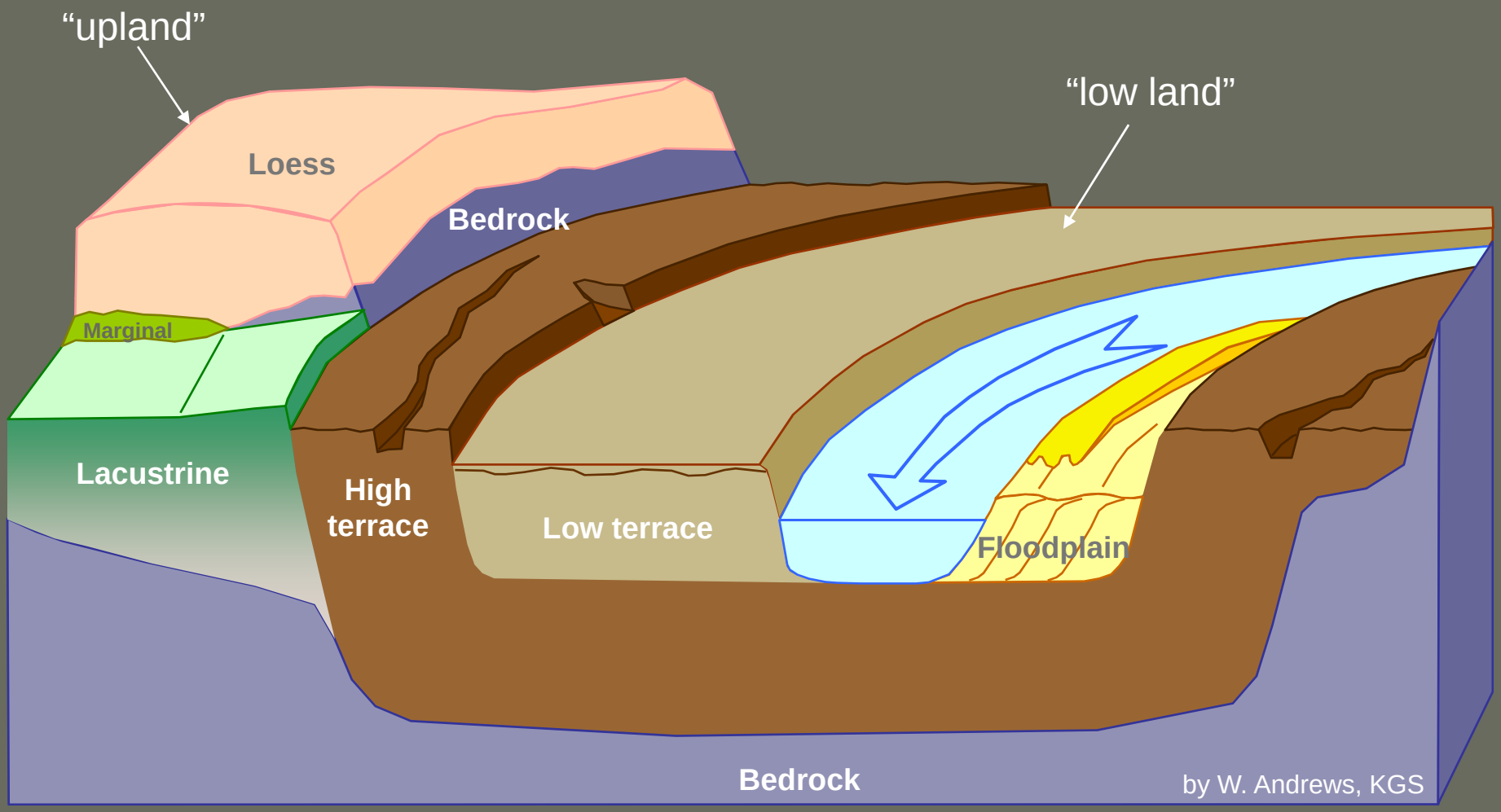

Kentucky Transportation Cabinet Geotechnical Project Database
Search Result
Resubmit
t Type = Landslide
Main Line Station
Allen
Anderson
Ballard
Barren
L-023-1997
L-041-1997
L-016-1991
Landslide
View Geologic Map
View Basemap
Summary
MEMORANDUM
TO:
FROM:
BY:
DATE:
SUBJECT:

Surficial Geologic Mapping Program

- 2004-present

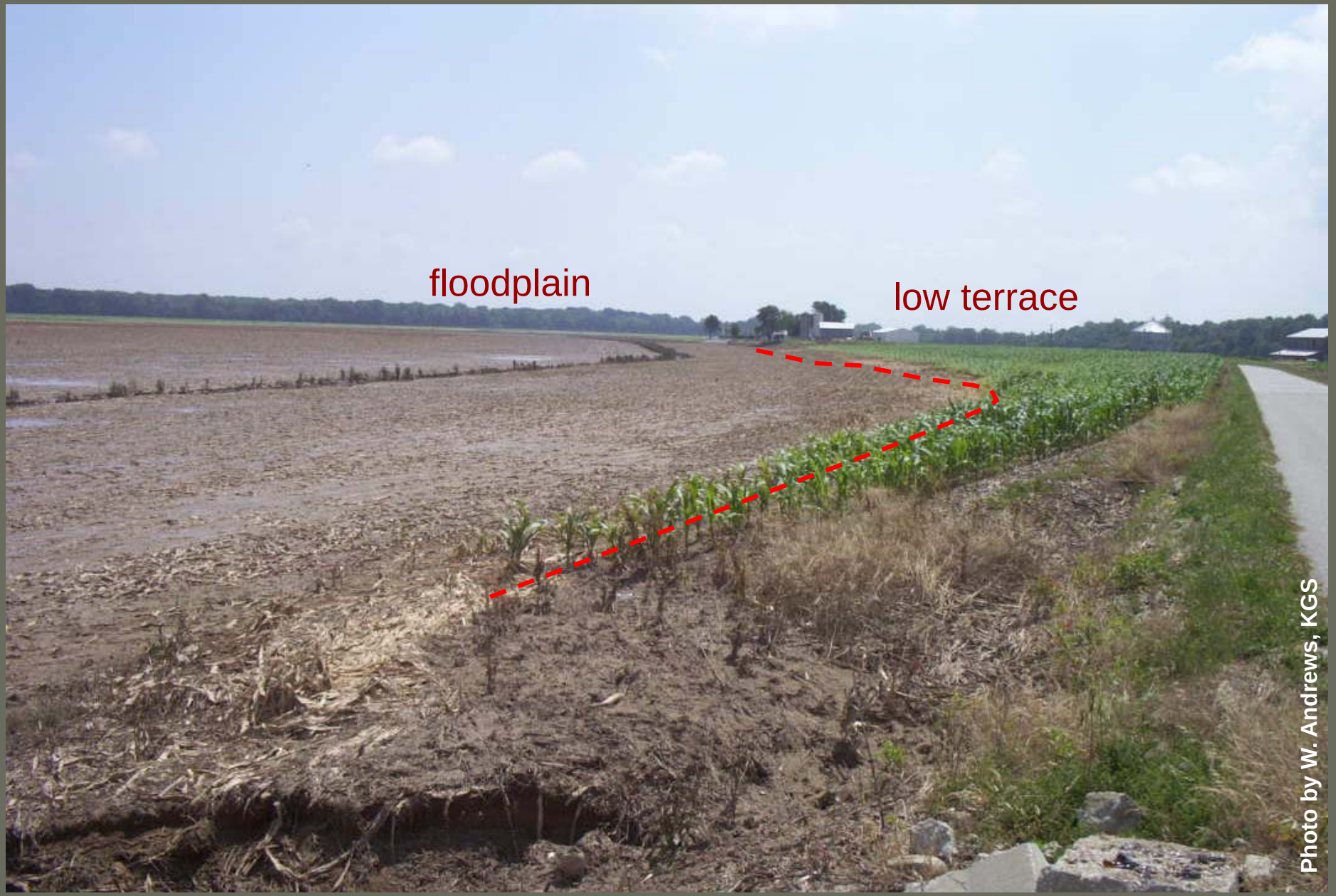


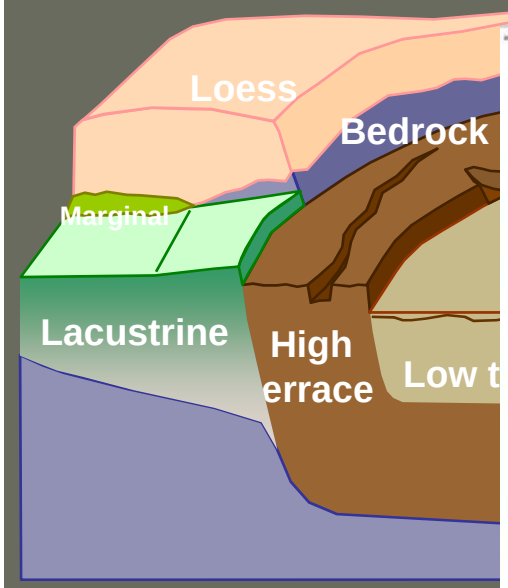
Ohio River Valley Model



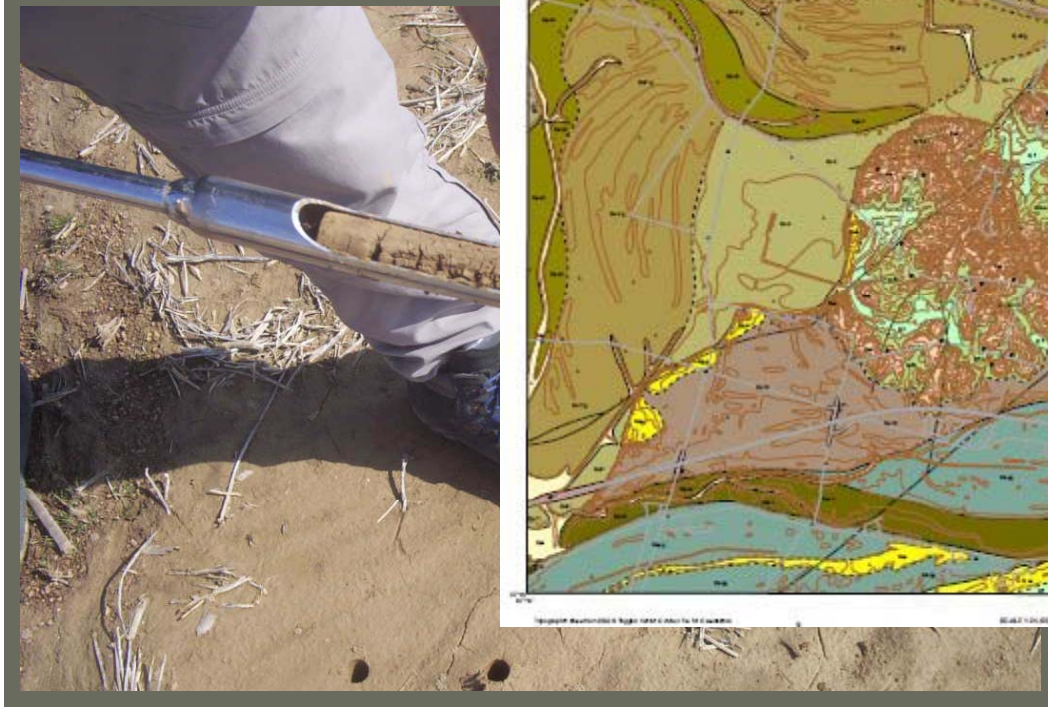
Generalized model for the Ohio River valley in the mapping area

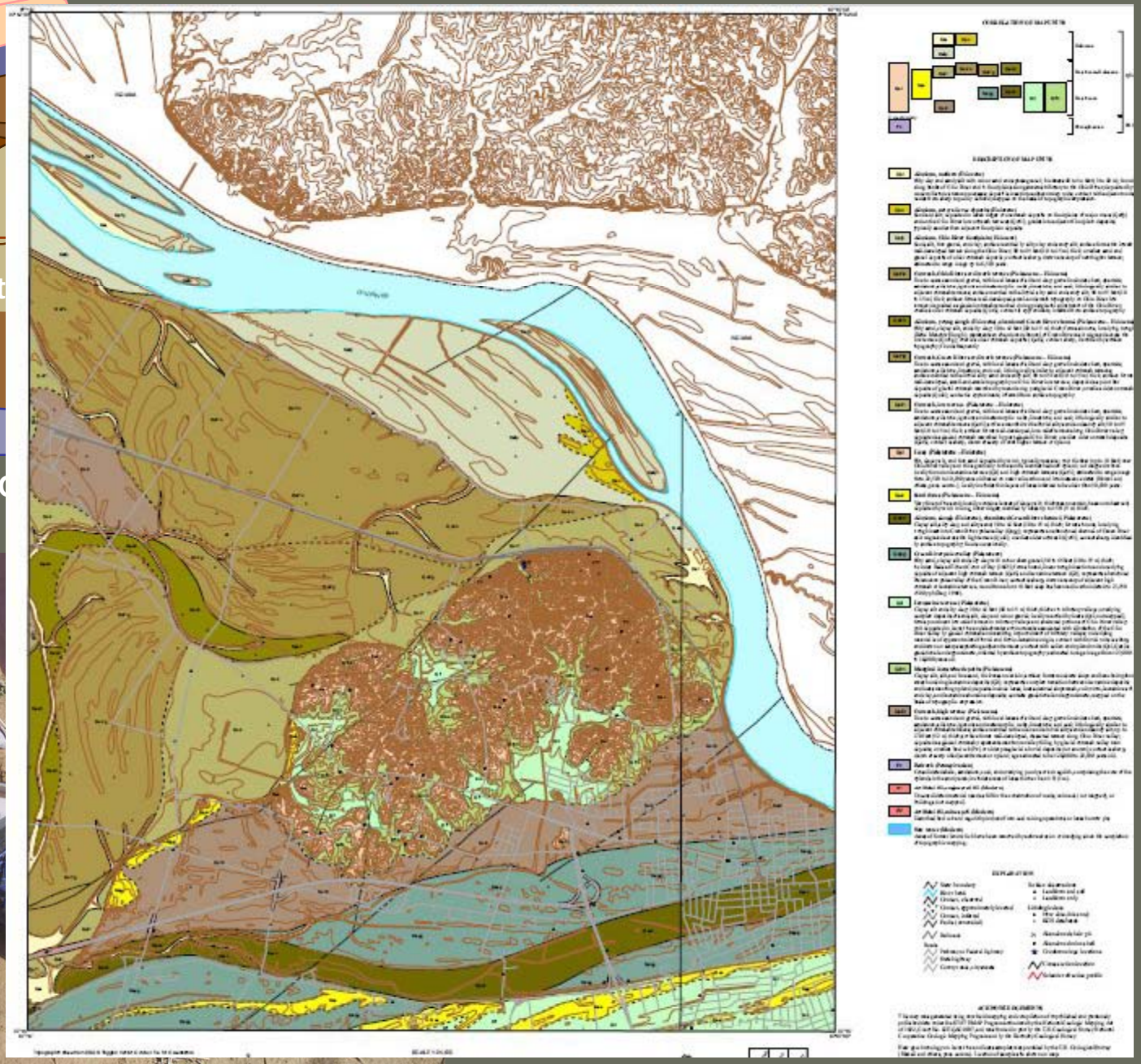
Subtle terrace scarp, following May 2004 flood



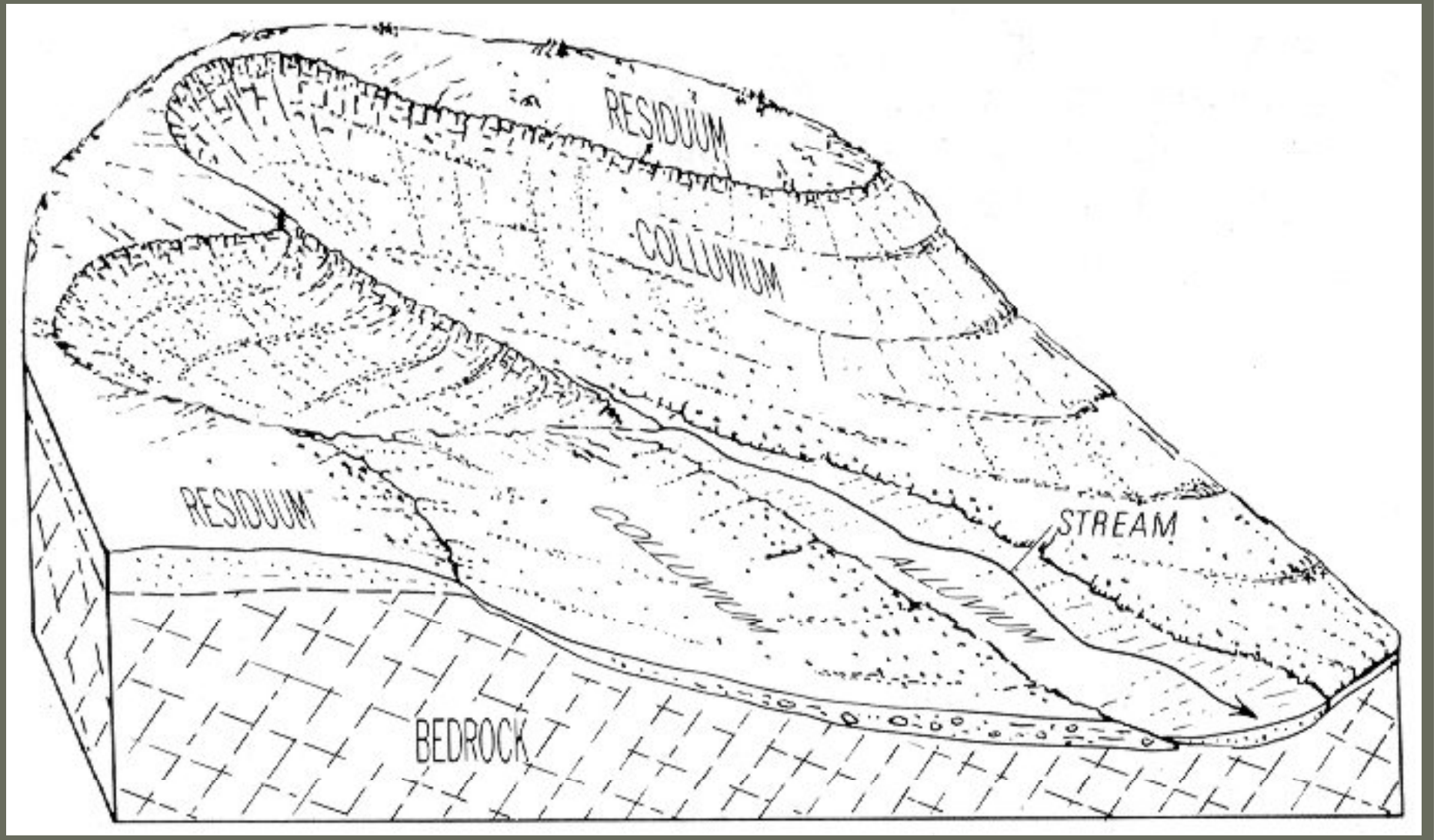


Generalized model for the

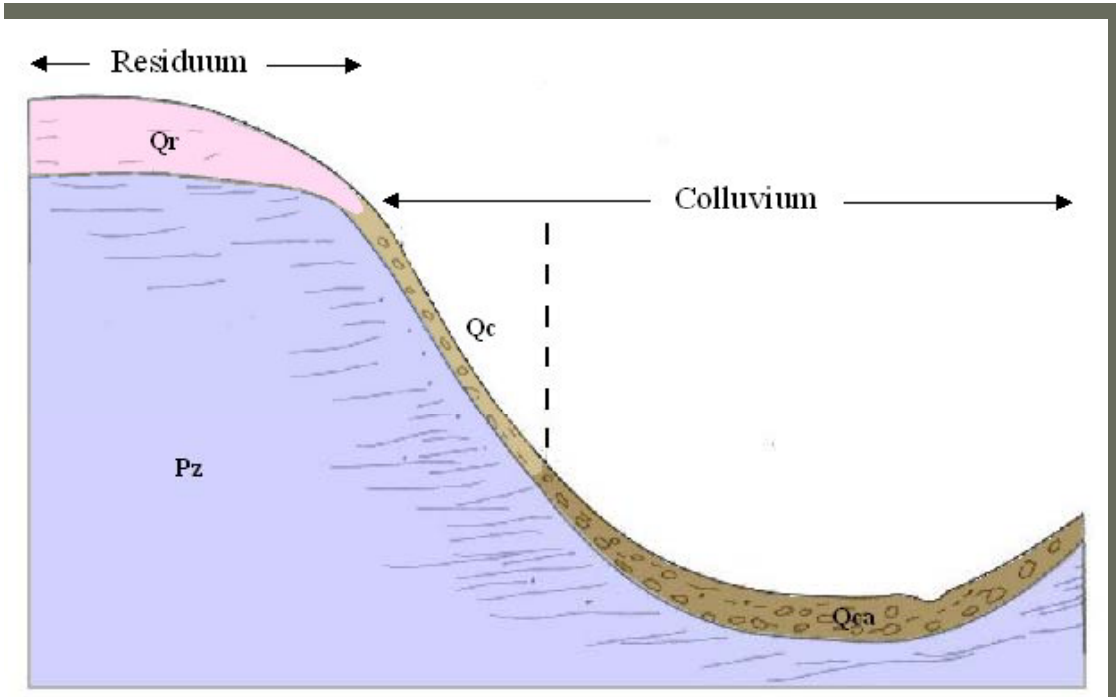




Eastern Kentucky Model

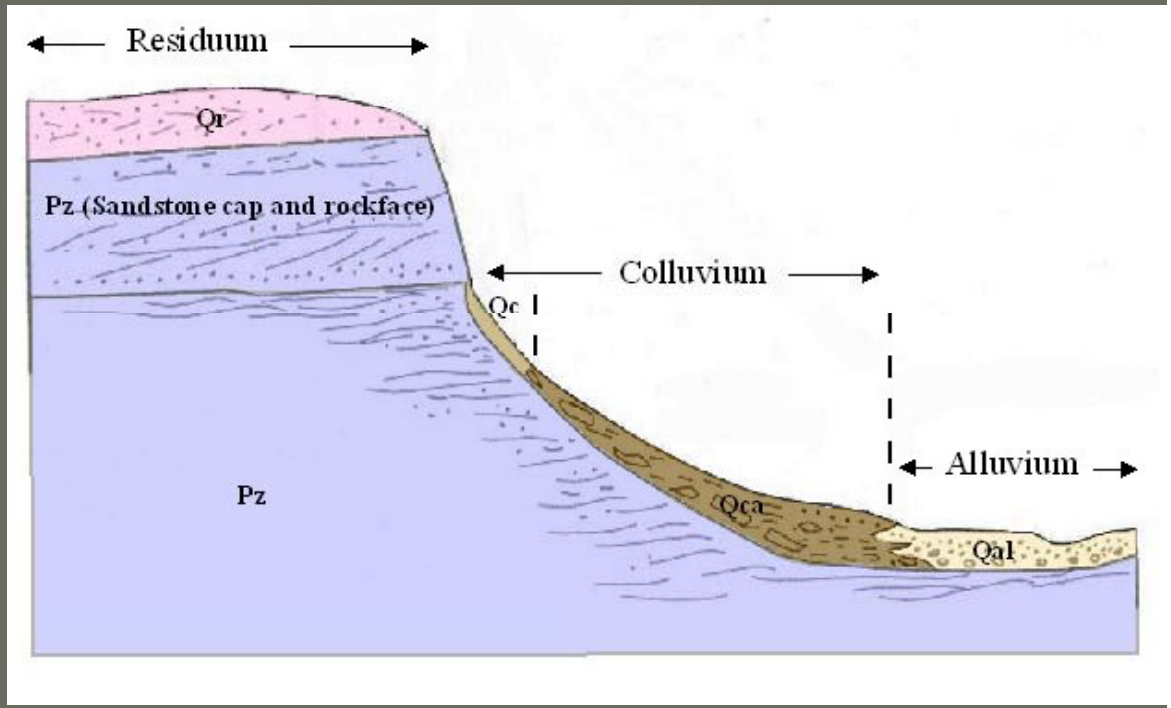


From Newell, 1978

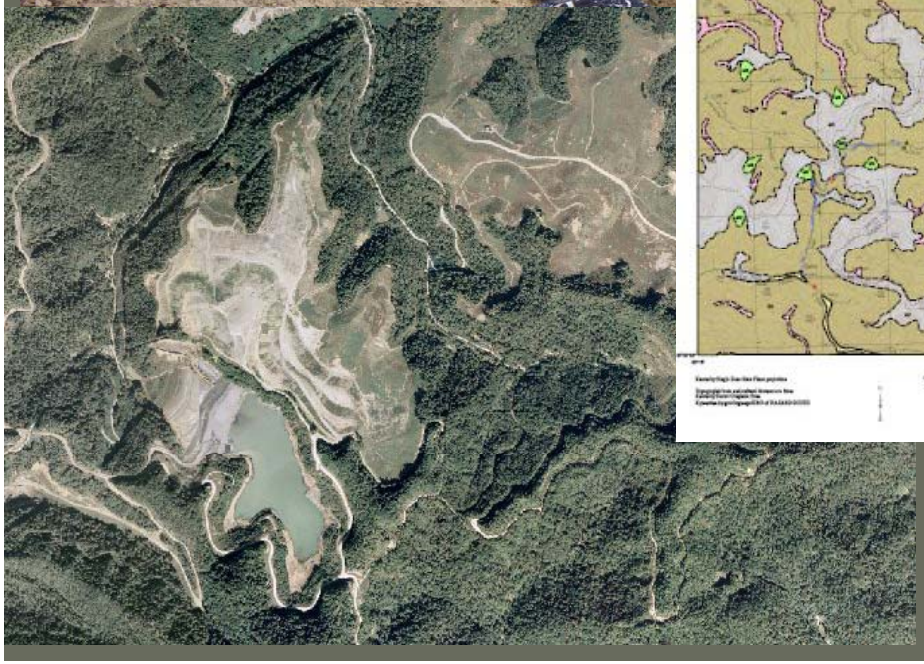


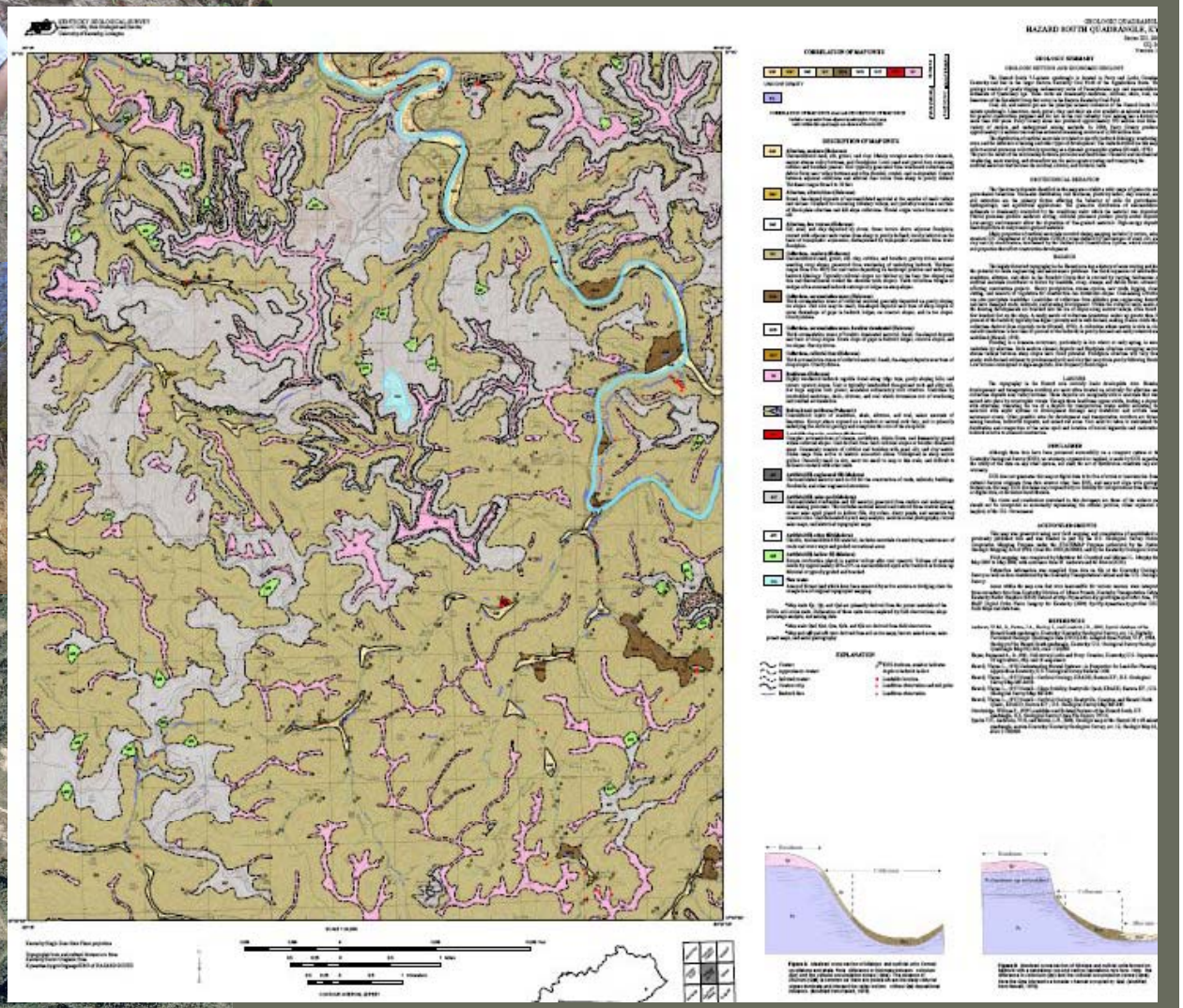
Hillslope profile formed on siltstone and shale.
From Newell, 1978.

Hillslope profile formed on controlled by sandstone cap.
From Newell, 1978.




colluvium





Mapping Criteria / Methodology

- How to take the both models and delineate surficial deposits?
- Reclassification of soils maps
- Utilizing well data, depth to bedrock
- Utilizing DEM’s, slope maps, aerial photography mine map data, and geology
- Landform observation
  - Alluvial fans, terraces, landslides, other accumulation zones, disturbed areas
- Soil descriptions
  - Thickness, genetic origin, and USDA - USCS classifications

Research questions…

Is the surficial geology picking up the necessary units?

How much can we rely on landforms?

Can we differentiate colluvium into more useful units?

Are the right elements being acquired for derivative geologic maps >>>> landslide potential

Kentucky Geological Survey
Field Data Entry Tool

Current User: CRAWFORD, MATT | Not this user? Please start over: http://kgsmap.uky.edu/website/KGSfieldTool/main.asp

KY MAPS Map Scale: choose a map scale Enter a Custom Map Scale: zoom

Map Legend Map Layers Field Data Outcrop/Ob

- uploaded waypoints:

- click the "upload a waypoint file" button to l locations and assignment of profile id's

upload a waypoint file

- outcrops & observations ( ):

limit records:

- only list records entered by current scribe (
- only list records within the current extent (d

*click header to sort by that field
*click profile id to view all data for a profile
*yellow highlighted profile id's are profiles within t

key to icons:

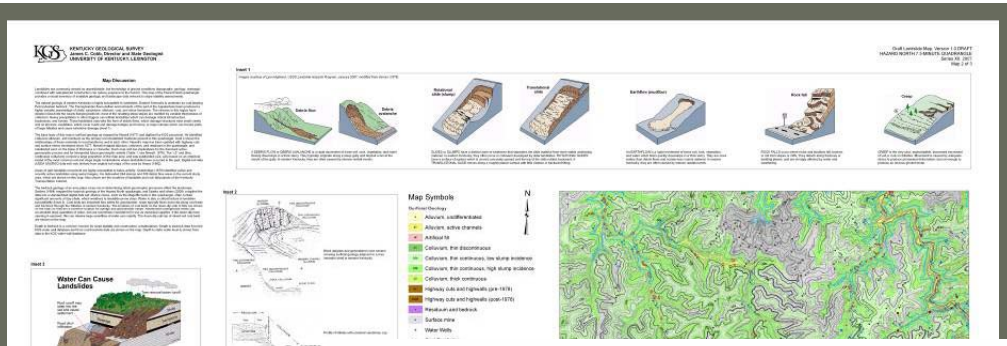
- yellow icon highlight indicates images profile.
- left-side superscript = total number
- right-side subscript = total number o
- depth to bedrock (1 per profile):

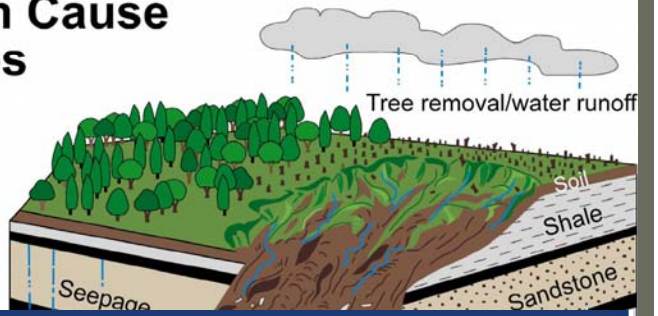
Data Entry Frame

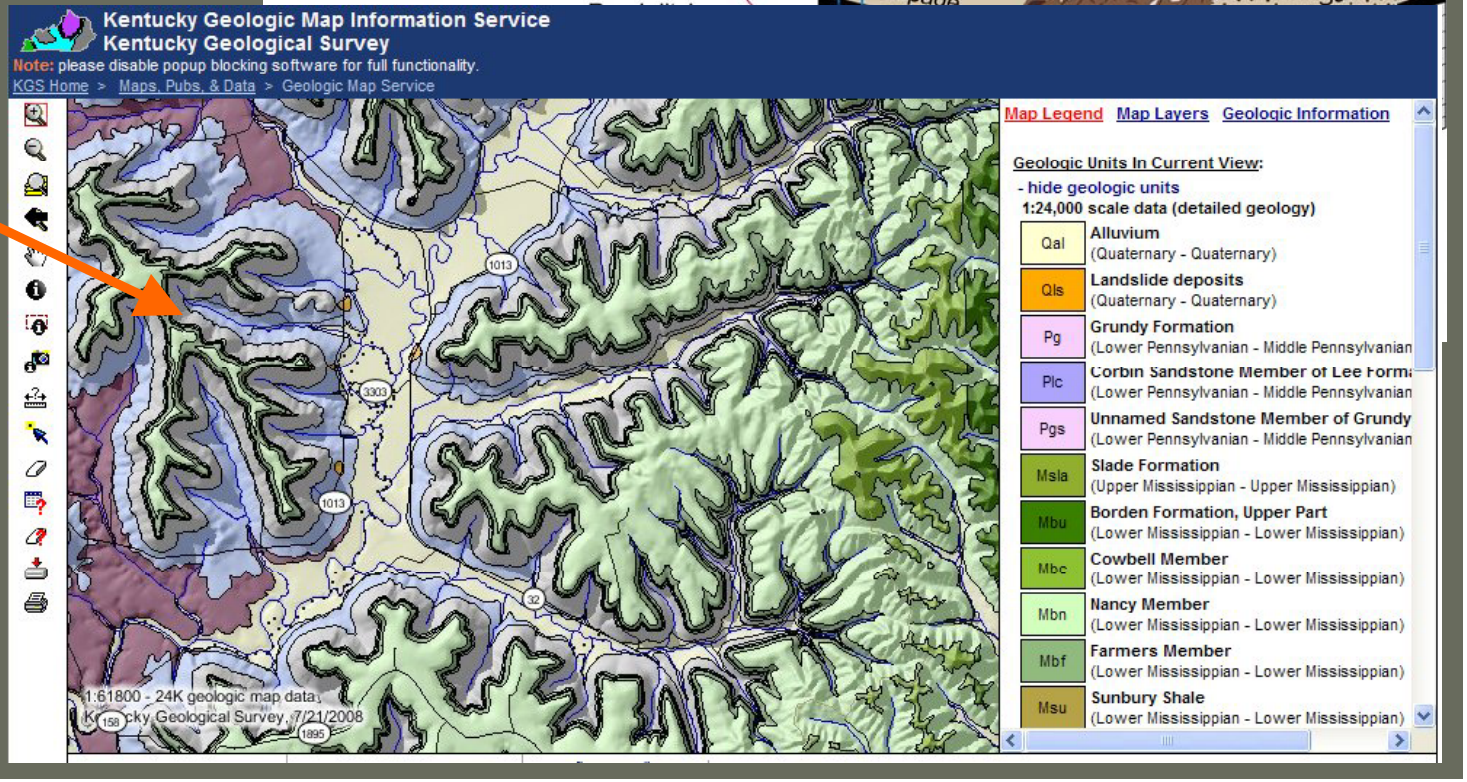
Either use the "define field point" tools: or to initiate data entry for a site, or select a previously defined site from the right frame to edit.

KGS

Landslide database



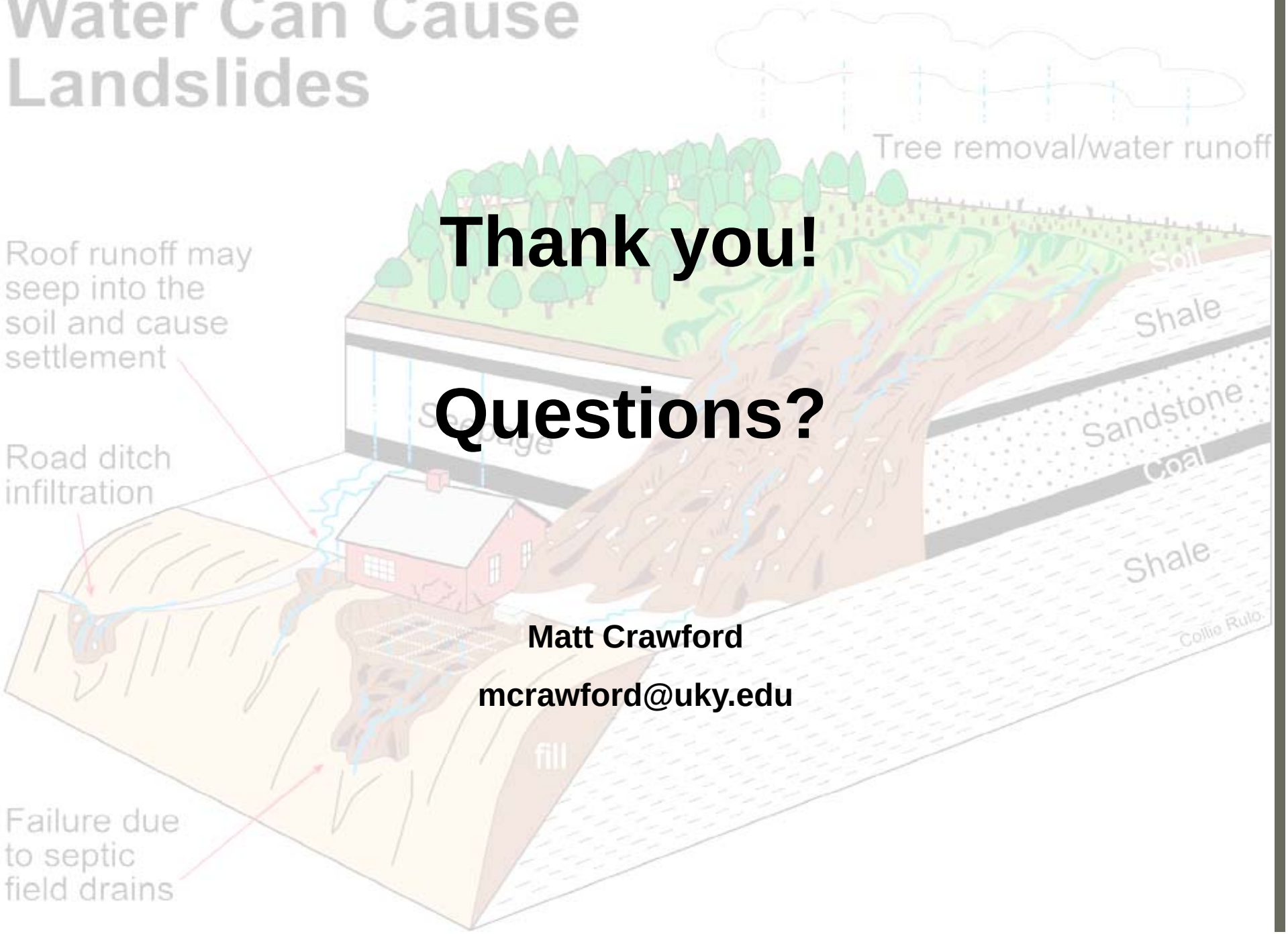




Conclusions / future work

- New surficial geologic mapping
- Landslide inventory
- Building more robust databases of surficial and engineering geology properties
- Derivative maps for hazard mitigation
  - Landslide potential, seismic hazards
- Additions to existing geologic map services

Water Can Cause Landslides



Thank you!

Questions?

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