

# Future Soil Survey Data, Users, and Producers

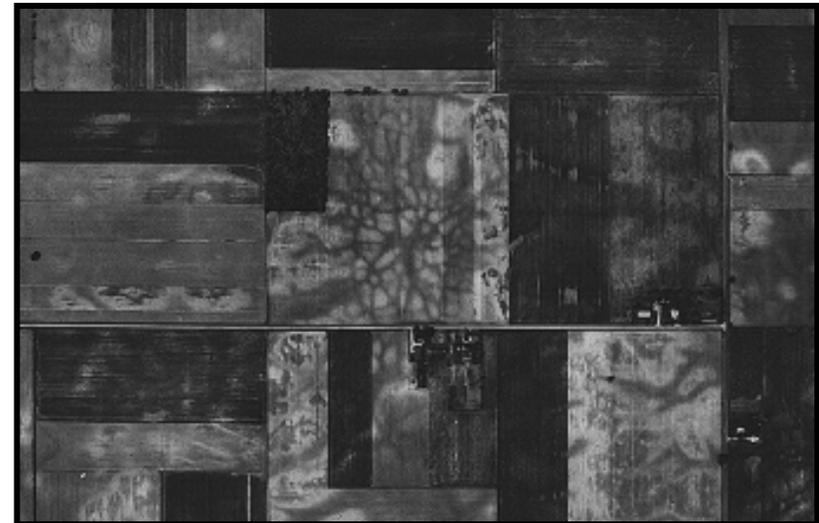
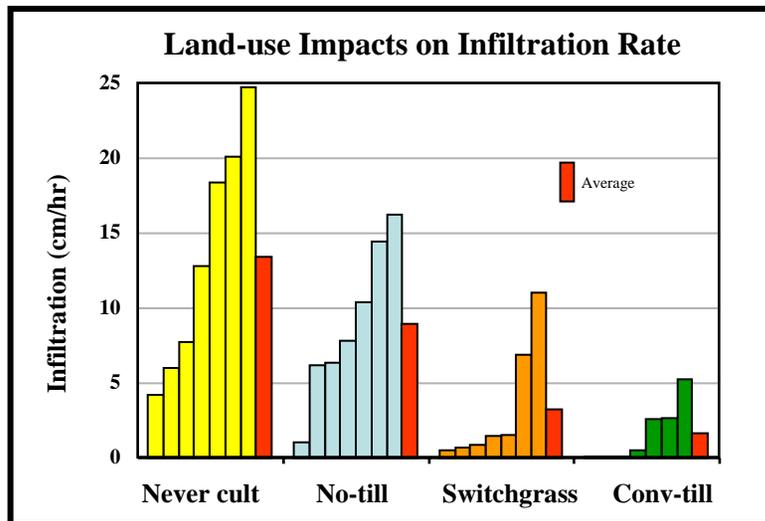
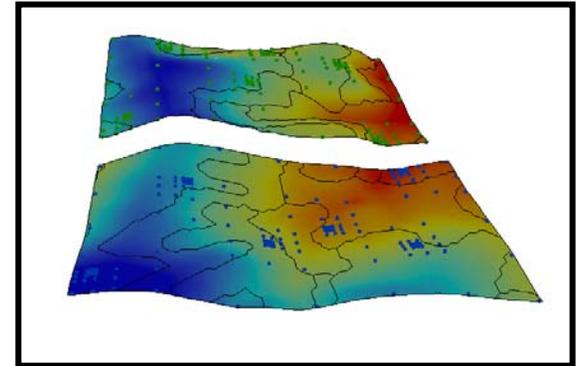
“Thoughts, ideas, & observations from low-relief glacial landscapes”

Mike Konen, PhD, CPSS, CPSC

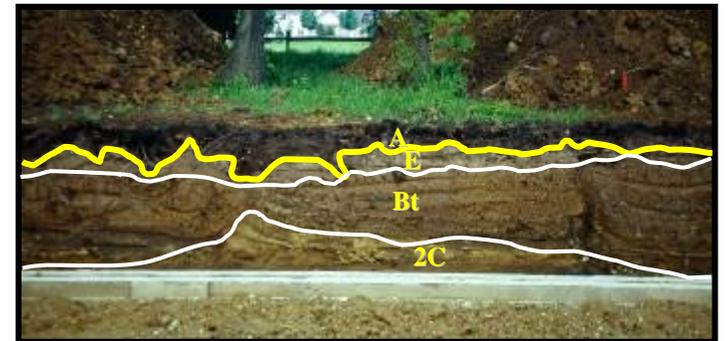
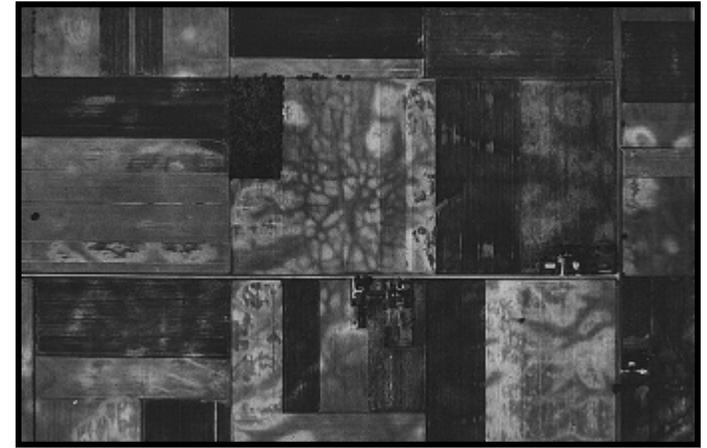
Northern Illinois University

Department of Geography

[mkonen@niu.edu](mailto:mkonen@niu.edu)



As in many of the natural sciences, it is difficult to assess the problems without an initial appreciation of the available field evidence. What does one see in nature? What requires explanation? Even with a good grasp of the tools of mathematics, chemistry, physics, and botany, it is not easy to frame fundamental problems in an understandable context unless one begins with a feeling for relations as observed in the natural setting. *So we begin here, not with the tools nor even with the processes, but rather with some field observations.*

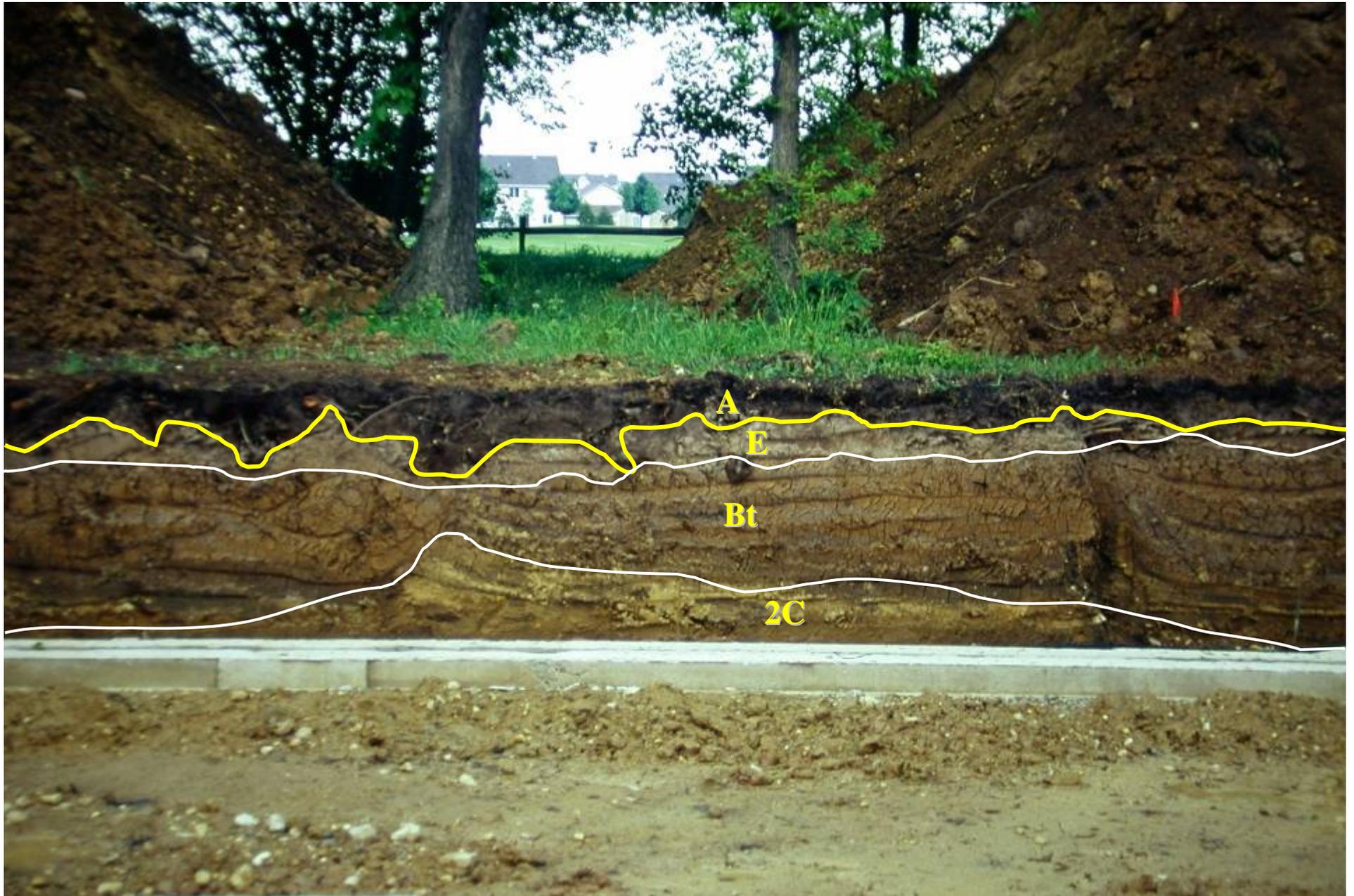


From “Fluvial Processes in Geomorphology” by Leopold, Wolman, and Miller, 1964.

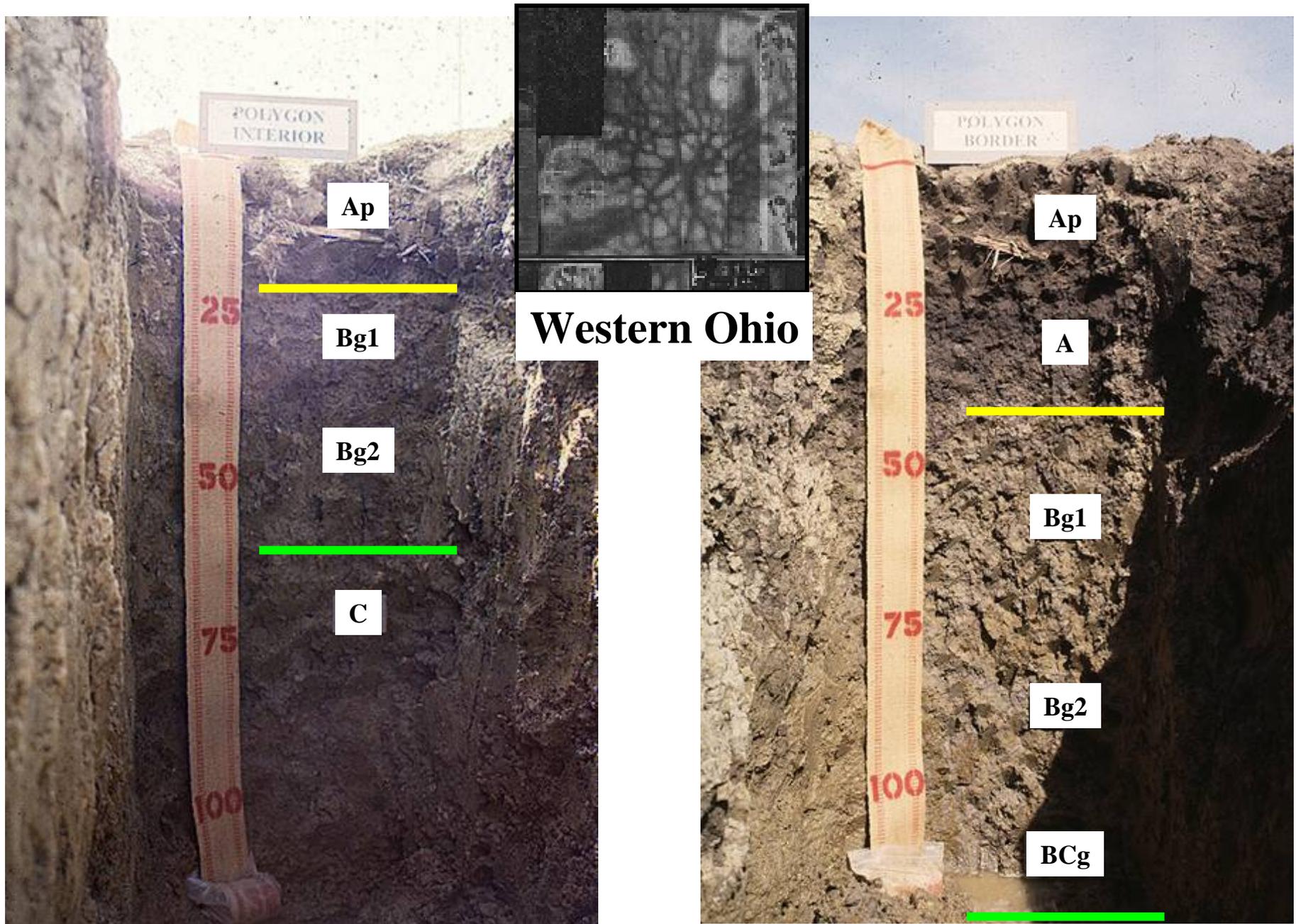
# Northern Illinois



# Never Cultivated Savanna, NE Illinois



Two profiles separated by 2 meters on landscape – no elevation difference



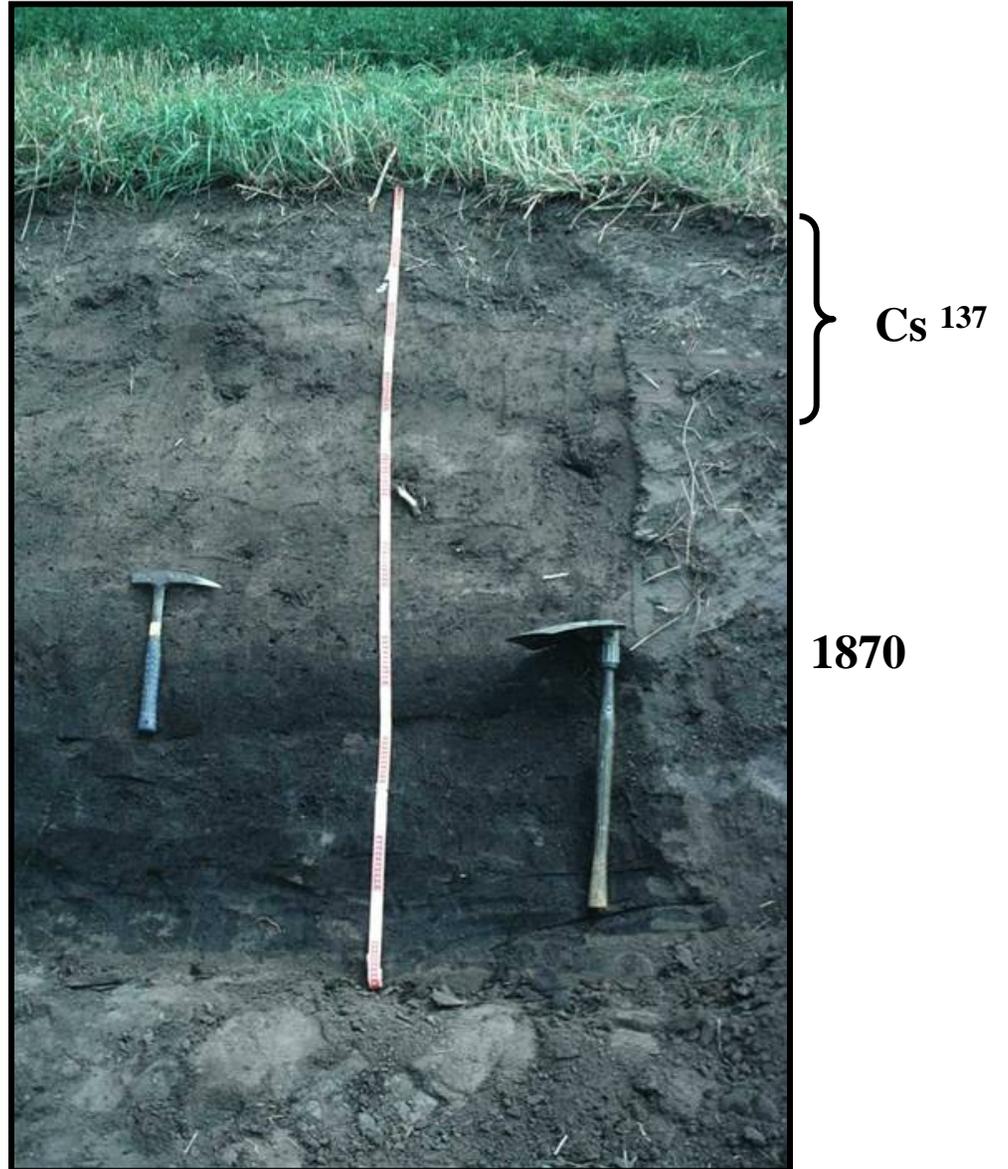
# Human Impacts

## Shoulder



## Central Iowa

## Footslope



**Central Iowa**



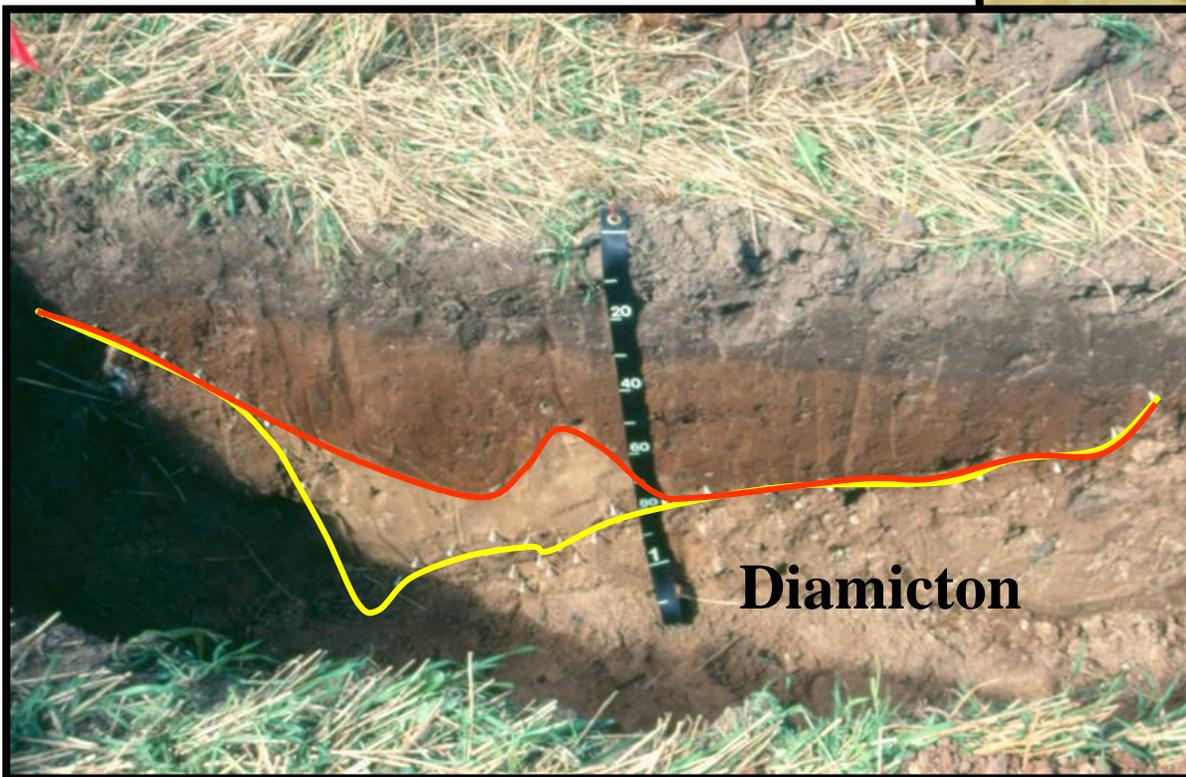
**Northern Illinois**



**Cryoturbation features  
Ohio**



**Eolian sand filled ice-wedge cast  
Wisconsin**



# Ice-Walled Lakes Northern Illinois



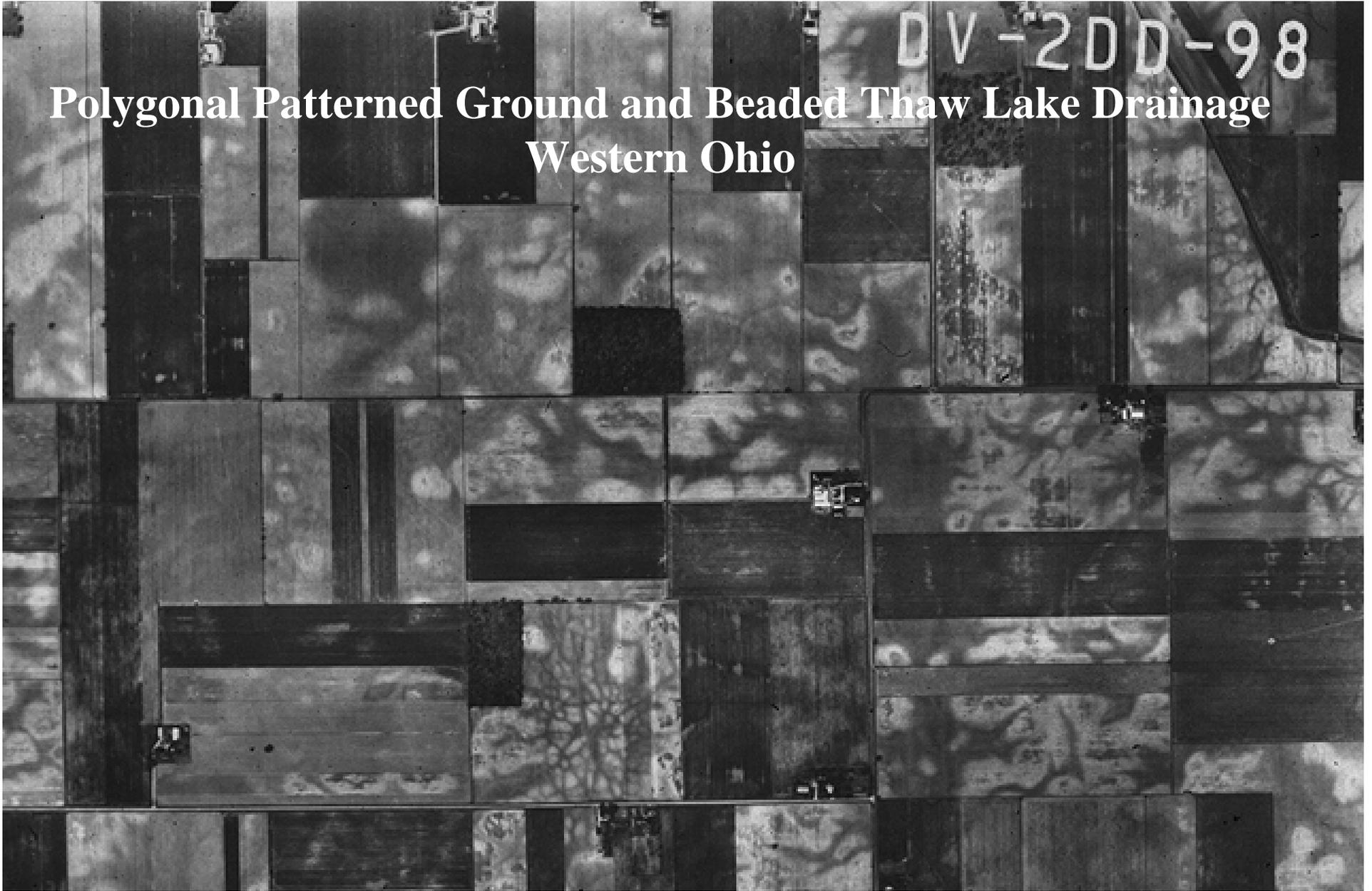
1 mile



DeKalb SE, IL

DV-2DD-98

# Polygonal Patterned Ground and Beaded Thaw Lake Drainage Western Ohio



1 mile



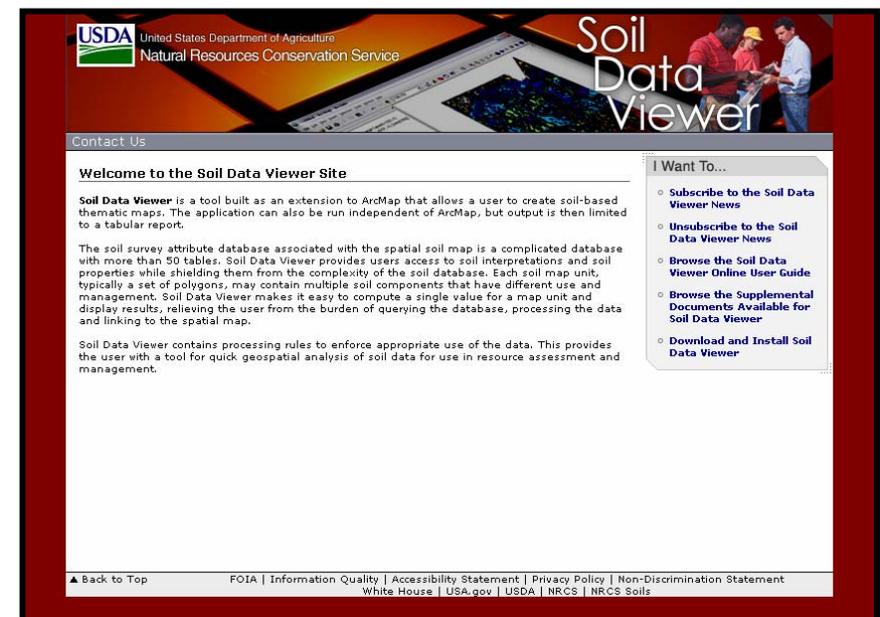
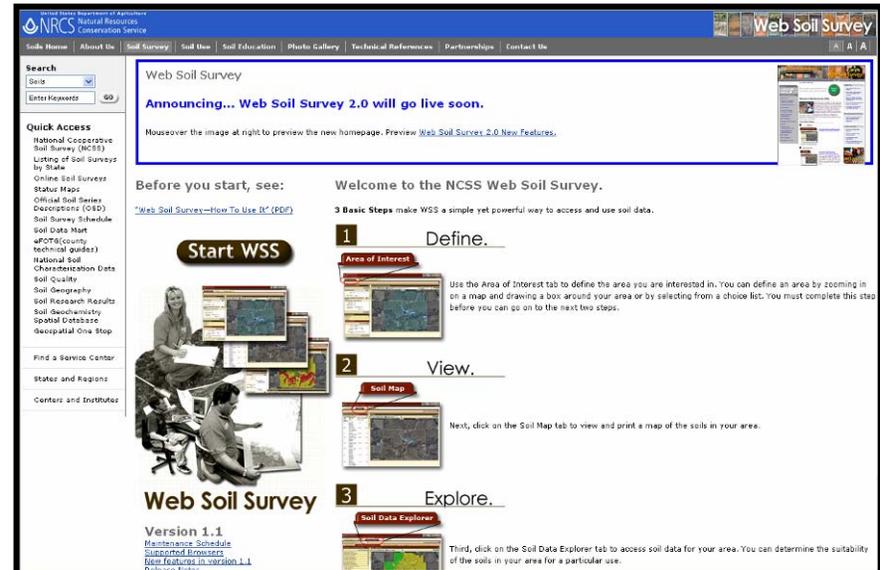
Piqua, OH

Data

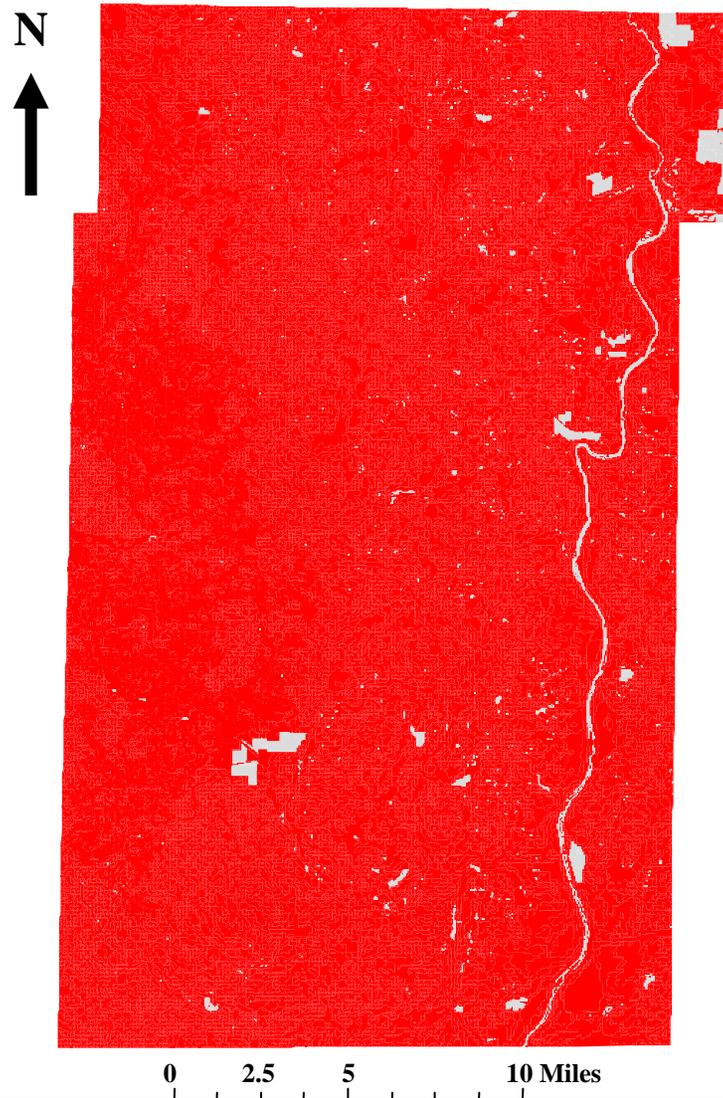
Users

Producers

- Societal relevance
- Useful & meaningful
- Accessible
- Scale limitations
- Human impacts
- Uncertainty
- Variability
- Geovisualization
  - “Benchmark catenas”
  - 3-d & 4-d animation
  - Soil-landform
  - Soil-hydrologic
  - Soil-geologic
  - Interactive



## Kane County, Illinois - Septic Suitability



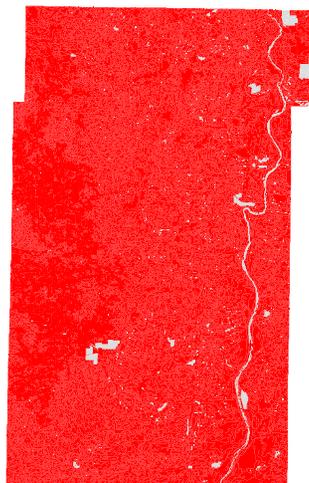
### Septic Tank Absorption Field Suitability

- Very limited
- Somewhat limited
- Not limited
- Not rated or not available



*"Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected. **NOT TRUE – conventional systems typically installed in many of these soils.***

- **Users see maps and ratings like this and it reduces credibility and the perceived usefulness of soil survey information.**
- **There are 1000's of conventional systems functioning properly in and around this map area.**
- **Class rating needs to mean something.**



**Septic Tank Absorption Field Suitability**

- Very limited**
- Somewhat limited**
- Not limited**
- Not rated or not available**

- The rating system has been improved in the past few years but is still lacking.

### Sewage Disposal

Kane County, Illinois

[The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The table shows only the top five limitations for any given soil. The soil may have additional limitations]

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
59A:					
Lisbon	92	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.99
		Slow water movement	1.00	Seepage	0.53
62A:					
Herbert	92	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Seepage	0.53

# Loading Rates – Illinois State Code, Section 905, Appendix A

Note - table has been reformattd by Mike Konen to make reading it easier. No guarantee is made for accuracy. Consult the current code at: <http://www.ilga.gov/commission/jcar/admincode/077/07700905ZZ9996amR.html>

**Section 905.APPENDIX A Illustrations and Exhibits**

**Section 905.EXHIBIT B Key for Determining Sewage Loading Rates (Gallons/Square Feet/Day)**

Structure and Parent Material	Single grain, Granular, Platy <sup>2</sup>	Angular and Subangular Blocky, Prismatic										Structureless or Massive			
		Loess, Outwash					Till, Lacustrine					Loess, Outwash		Till <sup>3</sup> , Lacustrine	
		Weak		Moderate		Strong		Moderate, Strong							
Moist Consistence	lo vfr fr	lo vfr	fr fi	fr	fi	fr	fi	fr	fi	vfi	vfr	fr	vfr fr	fi vfi	
Texture	A	B	C	D	E	F	G	H	I	J	K	L	M	N	
1	Fragmental Ext. or Very gravelly sand Gravelly sand Coarse sand Gravelly loamy sand	> 1.00 <sup>4</sup>	N/A <sup>5</sup>	N/A	N/A	N/A									
2	Medium sand Sand Loamy coarse sand Loamy sand Coarse sandy loam	1.00	1.00	N/A	1.00	N/A	N/A	N/A							
3	Fine sand Loamy fine sand	0.84	0.91	0.84	N/A	N/A	N/A	N/A	N/A	N/A	0.91	0.84	N/A	N/A	
4	Sandy loam Fine sandy loam Gravelly sandy loam Gravelly loam Gravelly silt loam	0.75	0.84	0.75	0.75	N/A	N/A	N/A	N/A	N/A	0.84	0.75	0.75	0.52	
5	Loam Silt loam Very fine sandy loam Sandy clay loam Silt Very fine sand Loamy very fine sand	0.62	0.75	0.69	0.75	0.69	N/A	N/A	0.62	0.52	0.45 <sup>6</sup>	0.69	0.52	0.45 <sup>6</sup>	0.27 <sup>6</sup>
6	Silty clay loam (< 35% clay) Clay loam (< 35% clay)	0.52	N/A	0.45 <sup>6</sup>	0.62	0.52	0.69	0.52	0.45 <sup>6</sup>	0.40 <sup>6</sup>	0.27 <sup>6</sup>	0.52	0.45 <sup>6</sup>	0.27 <sup>6</sup>	0.00 <sup>6</sup>
7	Silty clay loam (> 35% clay) Clay loam (> 35% clay) Sandy clay (< 40% clay)	0.45 <sup>6</sup>	N/A	N/A	0.45 <sup>6</sup>	0.40 <sup>6</sup>	0.45 <sup>6</sup>	0.40 <sup>6</sup>	N/A	0.27 <sup>6</sup>	0.20 <sup>6</sup>	0.27 <sup>6</sup>	0.20 <sup>6</sup>	0.00 <sup>6</sup>	0.00 <sup>6</sup>
8	Sandy clay (>40% clay) Silty clay	0.40 <sup>6</sup>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.20 <sup>6</sup>	0.00 <sup>6</sup>	N/A	N/A	N/A	0.00 <sup>6</sup>
9	Clay Organics Fragic Fragipan Lithic Paralithic	—SOIL PROPERTIES HAVE VERY SEVERE LIMITATIONS; SUBSURFACE DISPOSAL NOT RECOMMENDED—													

**FOOTNOTES:**

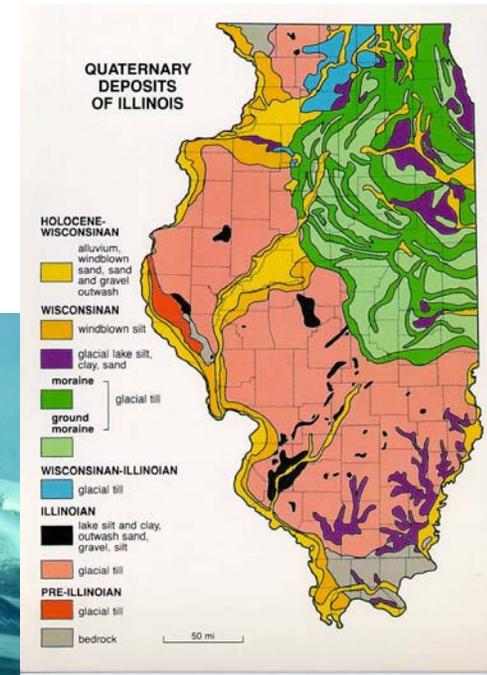
- Disturbed soils are highly variable and require special on-site investigations.
- Moderate or strong platy structure for the soil textures in Group 5 have a loading rate of 0.40 g/d/ft. Platy structure having firm or very firm consistency and/or caused by mechanical compaction has a loading rate of 0.0 g/d/sq. ft.
- Weakly structured BC horizons and basal glacial tills structured by geogenic processes have the same loading rates as structureless glacial till.
- This soil group is estimated to have very rapid permeability and exceeds the maximum established rate in Section 905 Illustration H, Exhibit A of this Part.
- N/A means not applicable.
- These soil groups are estimated to have moderately slow to very slow permeability and are less than the minimum established rate in Section 905 Illustration H, Exhibit A of this Part.

(Source: Section repealed, new Section added at 20 Ill. Reg. 2431, effective March 15, 1996)

# Quantification and Communication of Variability

## 1) Geologic Systems

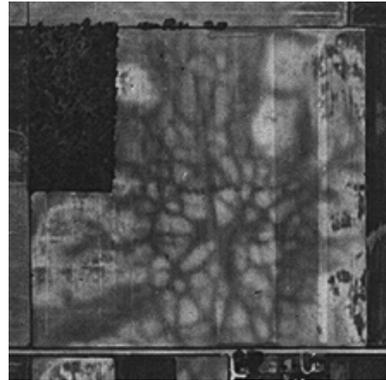
### Ice-marginal sedimentation



# Quantification and Communication of Variability

## 2) Post depositional Modification

### Periglacial processes



Western Ohio

North Slope, Alaska



### Bioturbation

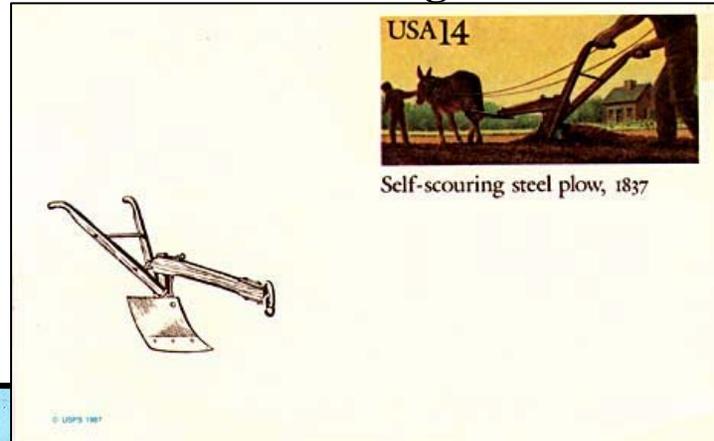
Mima Mounds  
Northcentral Iowa



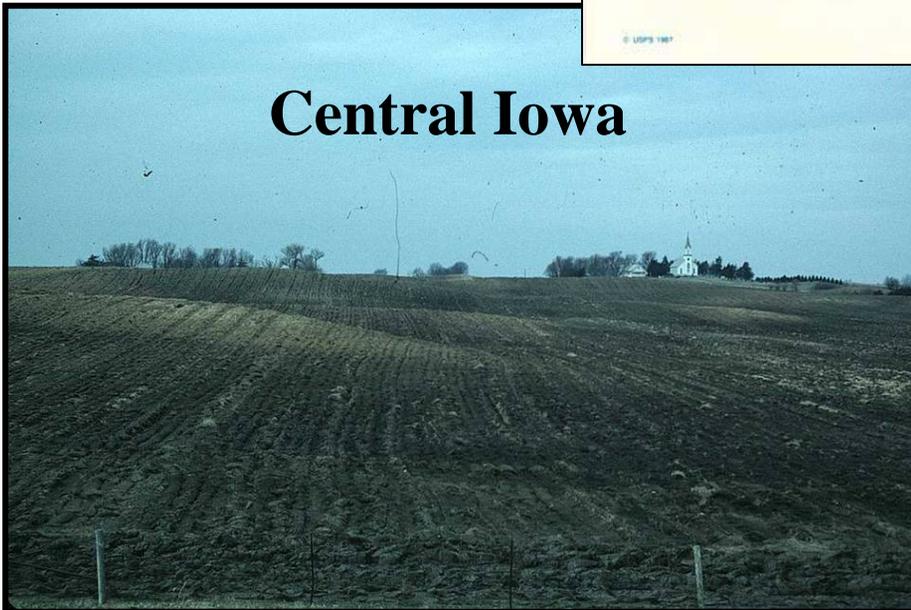
# Quantification and Communication of Variability

## 3) Human Impacts

### The Tool that Changed the World



Central Iowa



Northern Illinois



# Central Iowa



Cs <sup>137</sup>

1870

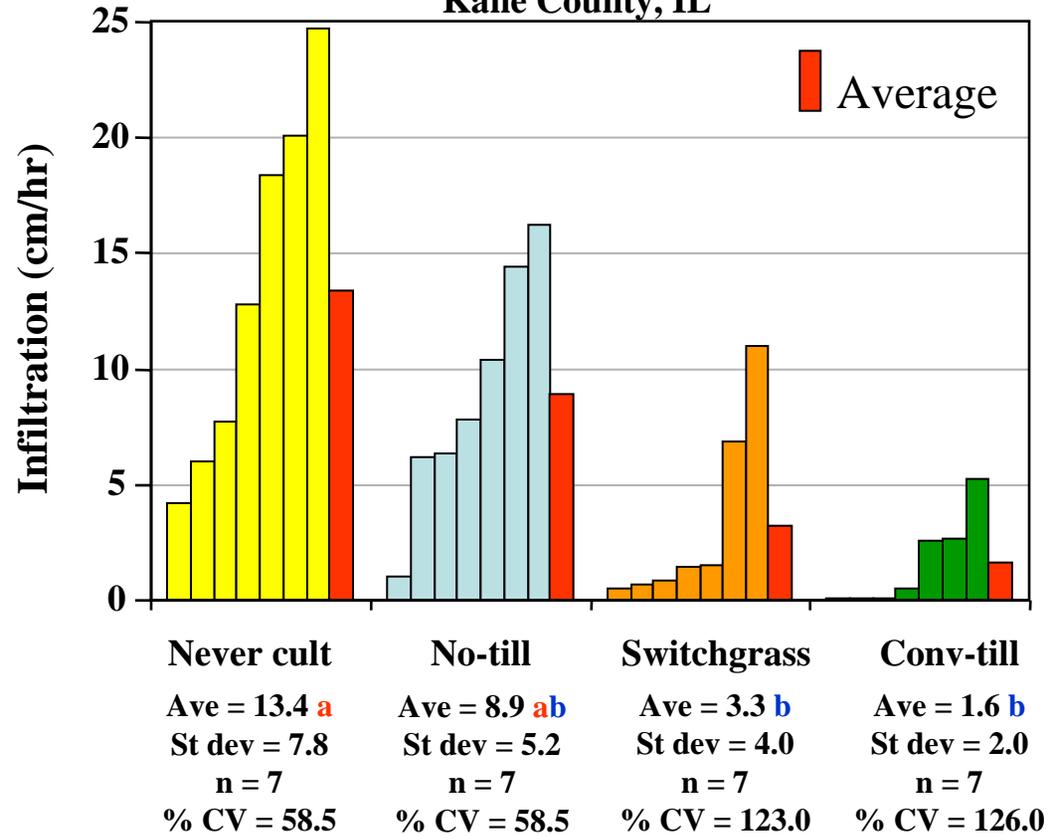


# Human Impacts

Dynamic  
or  
Anthrodynamic?



**Land-Use Impacts on Infiltration Rate**  
Summit – Dunteman, Boerger, Konen, and Boecker sites  
Kane County, IL



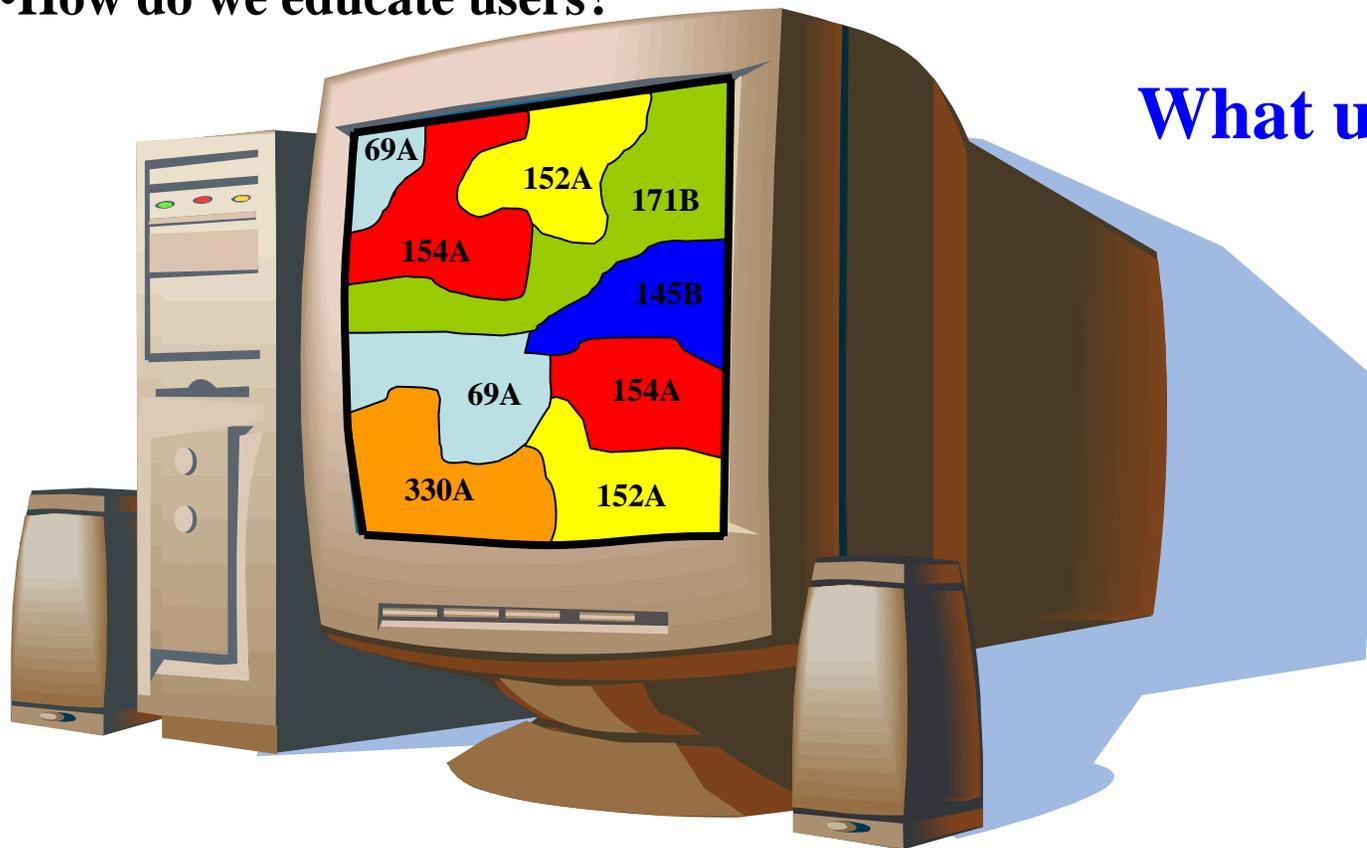
Values followed by same letter are not different at the P = 0.05 level

Data

Users

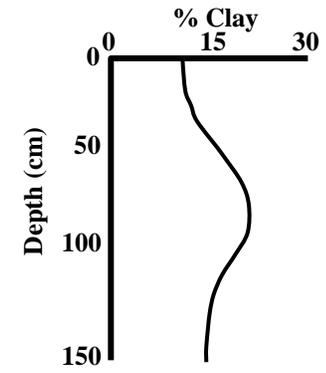
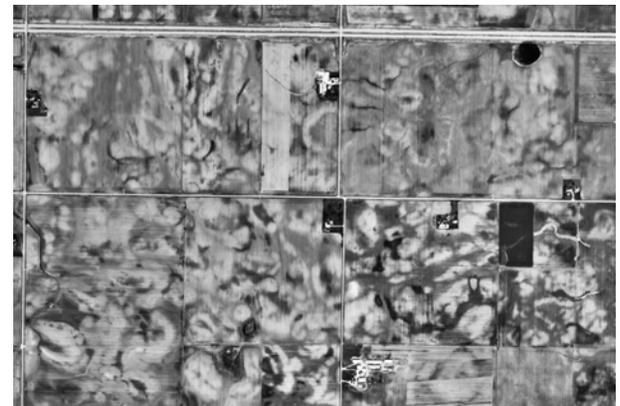
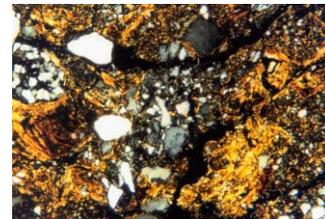
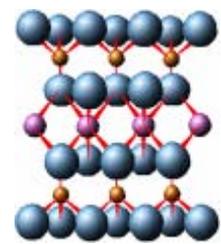
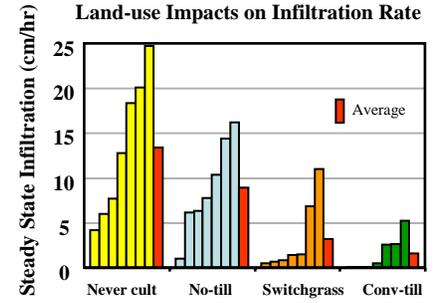
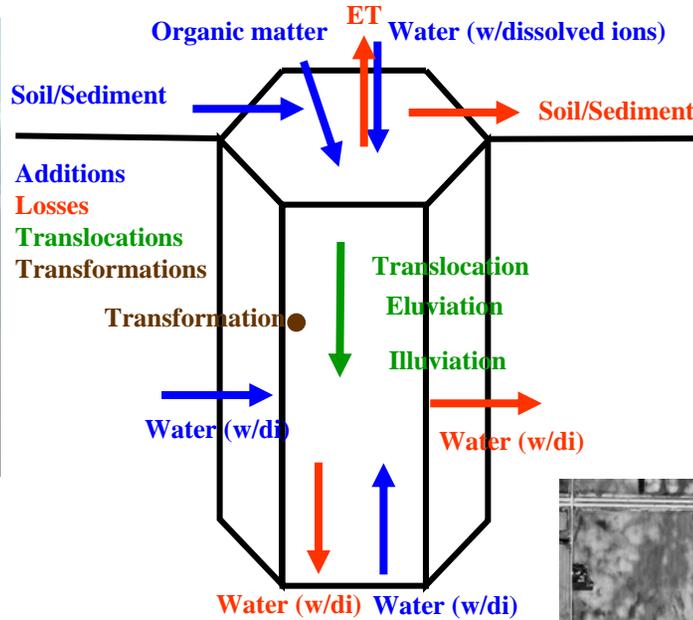
Producers

- Hooray – use of Soil Survey is increasing!
- With use comes abuse, misuse, and misunderstanding... download frenzy.
- Who are the users?
- What are they using the information for?
- Do they understand the limitations of the data?
- How do we educate users?



What users see.

# A sliver of what the user should see



Data

Users

Producers

---

**The usual suspects we see listed:**

**Planners**

**Engineers**

**Architects**

**Appraisers and assessors**

**Farmers**

**Foresters**

**Sanitarians**

**Ecologists**

**Environmentalists**

**Educators**

**Realtors**

**Developers**

...

**Do we honestly think soil survey information in it's current form and scale are useful to all of these groups in a meaningful way? Much of it is but...**

**Have we done an adequate job of informing them of what the information means?**

**How do we educate these and other potential users?**

**How many of these users do we reach in university courses?**

**How can we reach them?**

## **Student Opportunities**

- **Internships**
  - **GIS**
  - **Cartography**
  - **Database management**
  - **Fieldwork**
    - **Mapping**
    - **Monitoring**
    - **...**
- **Grants**
  - **USGS EDMAP model**

## QUATERNARY DEPOSITS OF ILLINOIS

### HOLOCENE-WISCONSINAN

alluvium,  
windblown  
sand, sand  
and gravel  
outwash



### WISCONSINAN

windblown silt  
glacial lake silt,  
clay, sand



### moraine

glacial till  
ground  
moraine



### WISCONSINAN-ILLINOIAN

glacial till



### ILLINOIAN

lake silt and clay,  
outwash sand,  
gravel, silt



glacial till

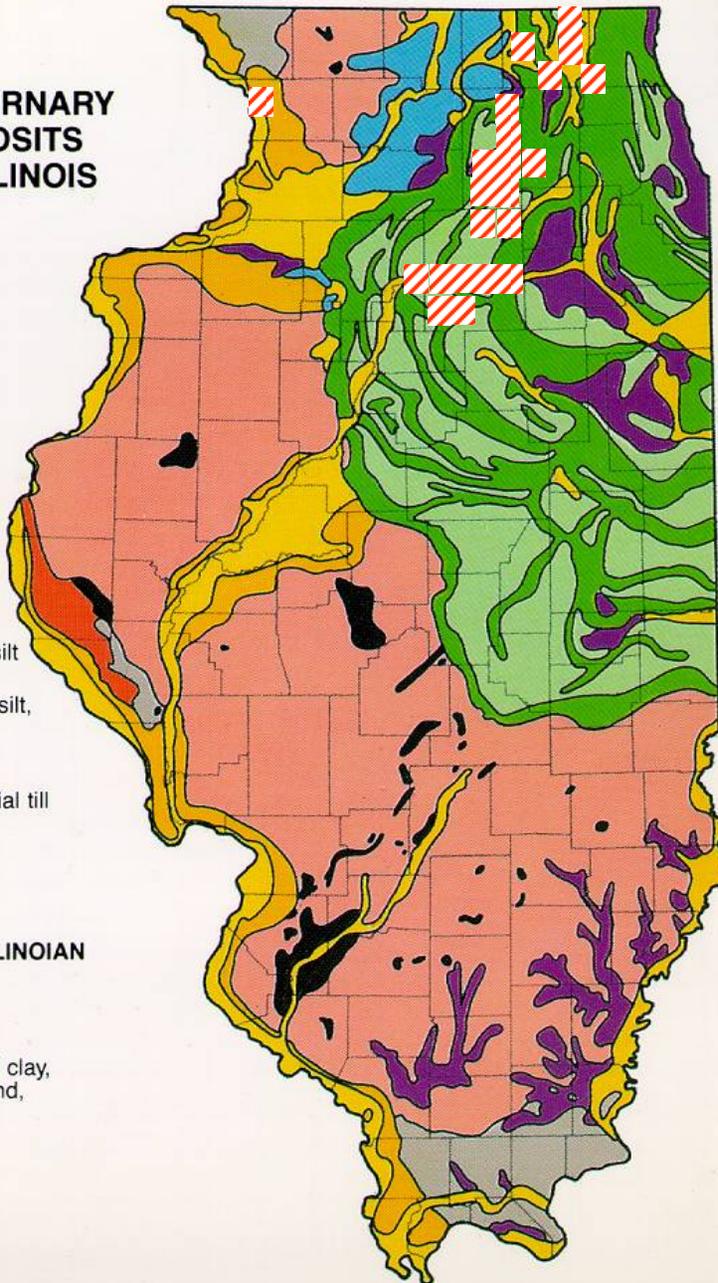


### PRE-ILLINOIAN

glacial till



bedrock



## EDMAP Projects

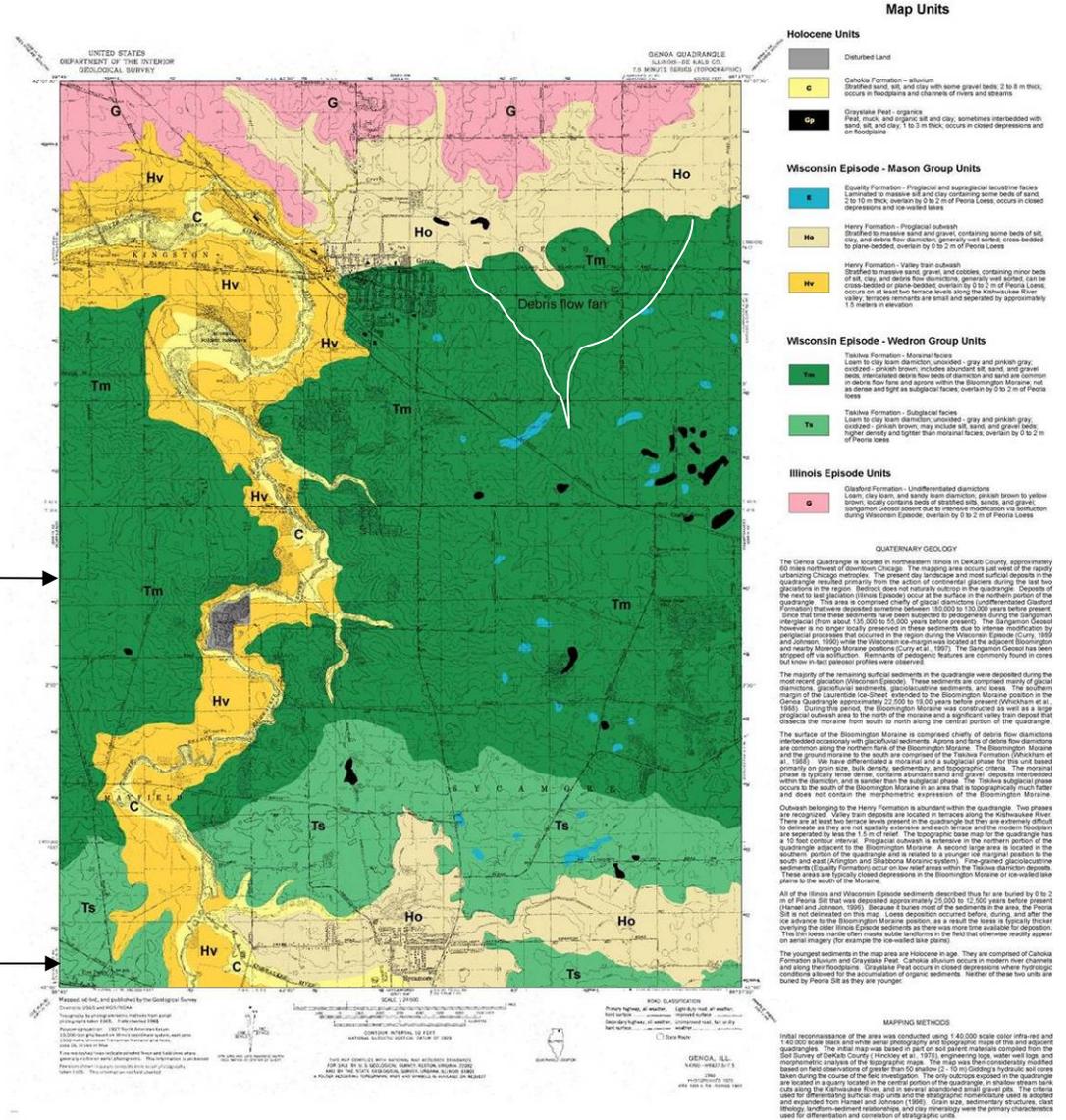
- USGS - “train the next generation of geoscientists”
- ISGS collaboration
- 1:24,000
- 1-2 year completion
- Competitive Grants – open to all
  - Societal relevance
  - Scientific merit
  - Graduate & undergraduate
- All phases of mapping covered
  - Preliminary lit. review
  - Field mapping
  - Laboratory analysis
  - Cartography
  - Remote sensing
  - GIS
  - Derivative/interpretive maps

# QUATERNARY GEOLOGIC MAP OF THE GENOA QUADRANGLE, NE ILLINOIS

Mike Konen, Craig Perciante, and Jay Stravers  
Northern Illinois University

**Ice-marginal debris flow diamictons**  
**Glaciofluvial inclusions abundant**  
**BD ~ 1.7 g/cm<sup>3</sup>**

**Subglacial diamicton (till)**  
**Glaciofluvial inclusions rare**  
**BD ~ 2.0 g/cm<sup>3</sup>**



**Data**

**Users**

**Producers**

---

**Fund student research/mapping projects similarly to EDMAP program**

**Societal relevance**

**Scientific merit**

**Research meets mission of NCSS and State/MLRA**

**Collaborative with NCSS and State/MLRA**

**Awards used to fund student**

**Assistantship**

**Travel**

**Field supplies**

**Cartographic supplies/production**

**Advertised and open to all**

Data

Users

Producers

---

## Curriculum Issues

**Much broader issue – Soil Science profession**

**What skills are needed?**

**What courses should be taken and what needs to be taught that is not?**

**Soil Science competency**

**Geoscience competency – do we understand depositional environments, landscape evolution, hydrologic processes...?**

**Field experience**

**Technology**

**GIS**

**Remote sensing**

**...**

Data

Users

Producers

---

**Posters and Presentations – “Landscape Analysis” theme**

**What courses would aid in doing this?**

**Soil Science**

**Pedology**

**Hydrology**

**Geomorphology**

**GIS**

**Remote Sensing**

**Field Methods**

**Soils and Land-Use Planning**

**Soil Geography**

**Spatial statistics and quantitative methods**

**Intro Geology or Physical Geography**

...

**What departments offer these courses?**