

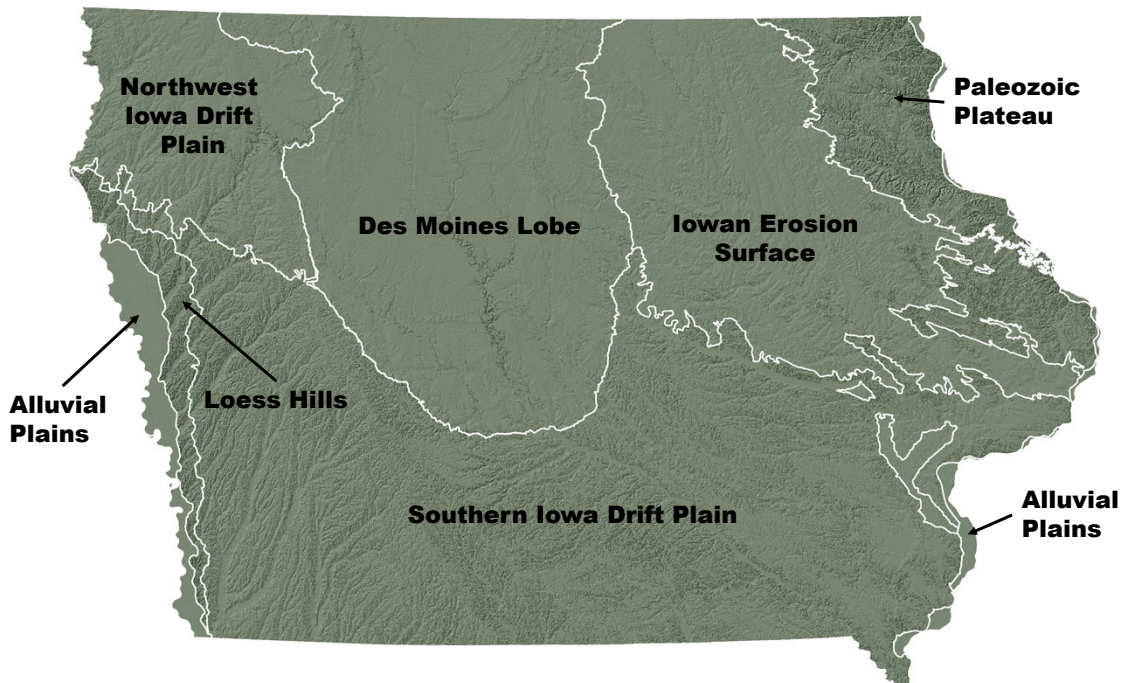


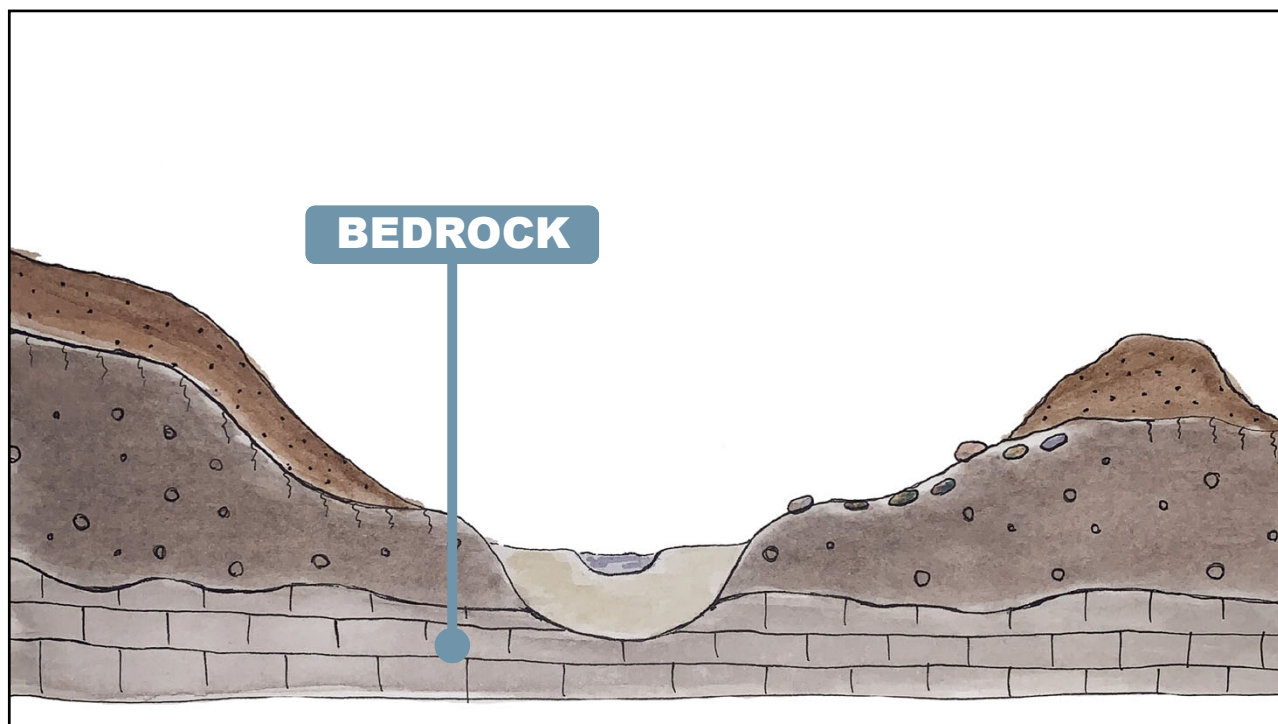
**master**  
conservationist

IOWA STATE UNIVERSITY  
Extension and Outreach

# Module 1: Part 2

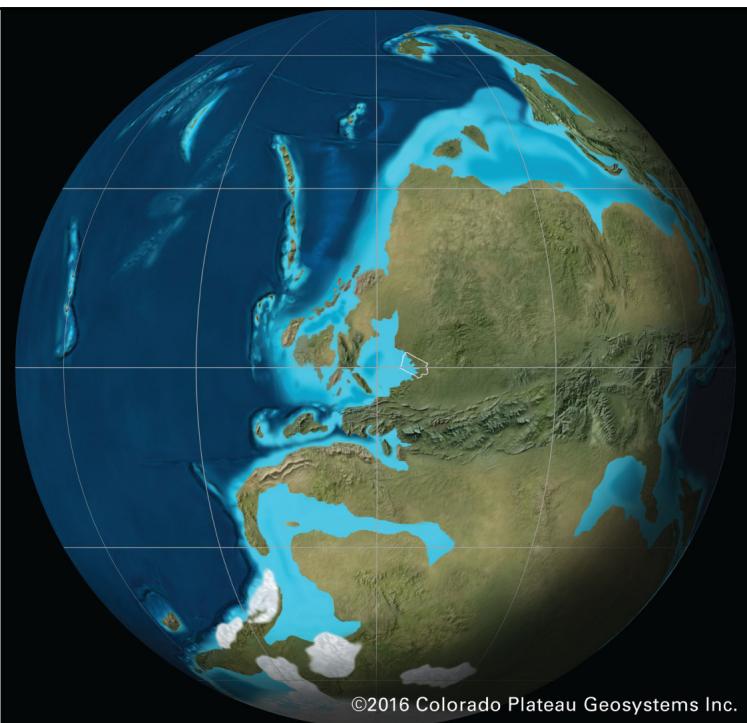
## Iowa's Lands and Waters



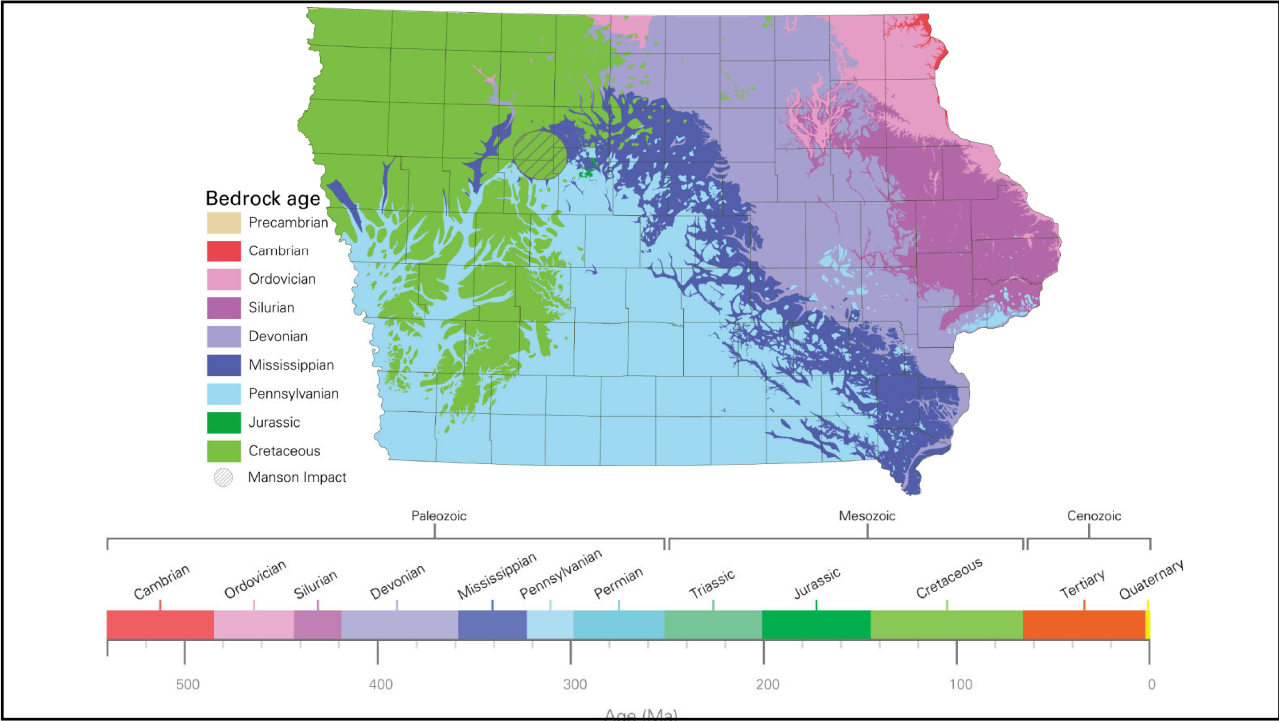


Paleogeographic map showing the position of Iowa and the North American continent straddling the equator during the *Pennsylvanian Period*, around 300 million years ago.

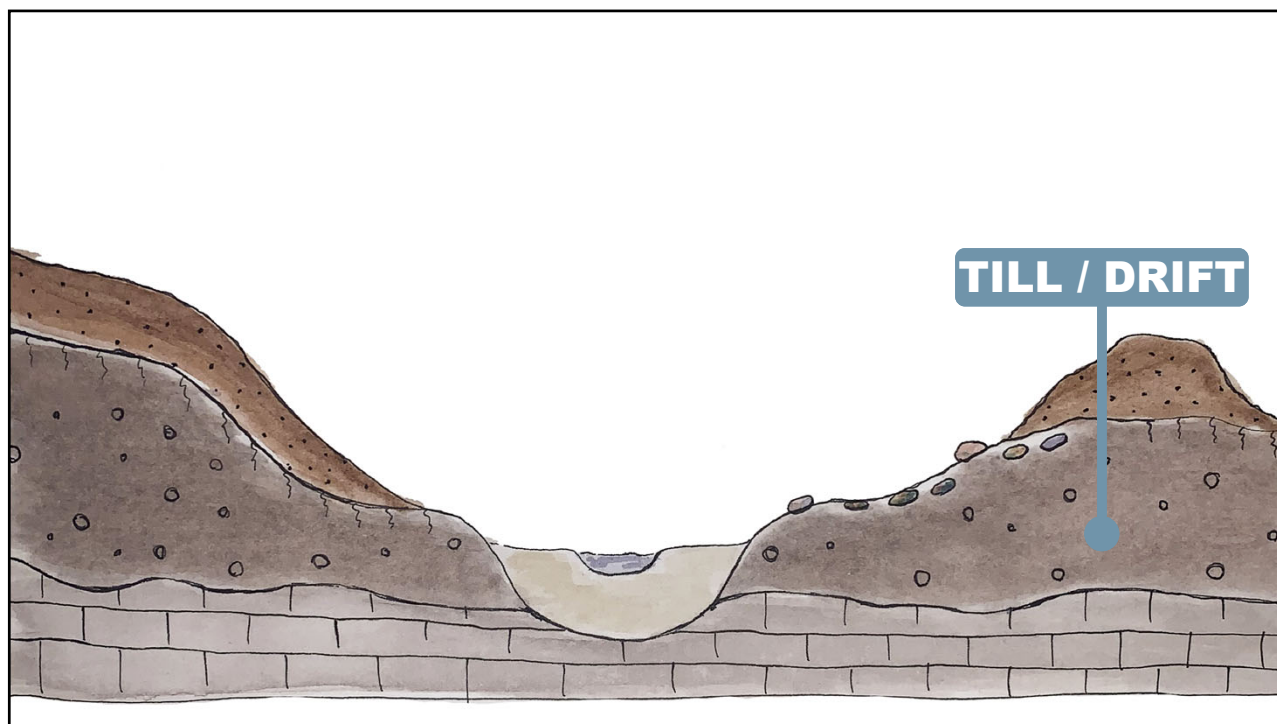
Source: Iowa's Nature, map produced by Ron Blakey, *Global Paleogeography and Tectonics in Deep Time* © 2016 Colorado Plateau Geosystems Inc.



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## Glacial till

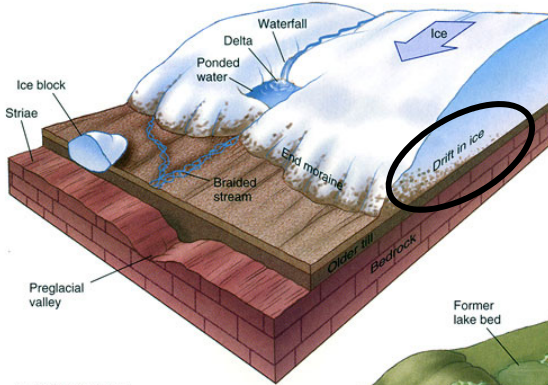
“Unsorted” sediment with variable sizes (from silt to boulders).



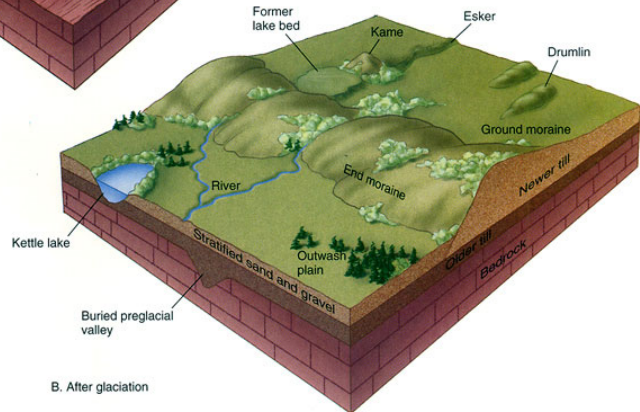
Photo courtesy of Peter Moore



# Glacial forces



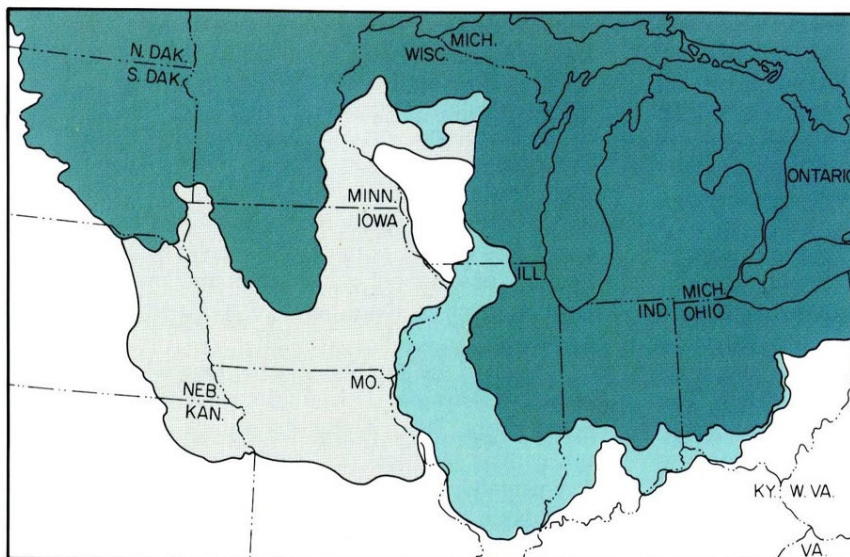
A. During glaciation



B. After glaciation

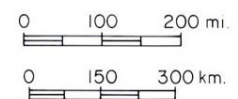
Source: <https://www3.nd.edu/~cneal/planetearth/Lab-Glaciation/10.5.jpg>

# Glacial episodes

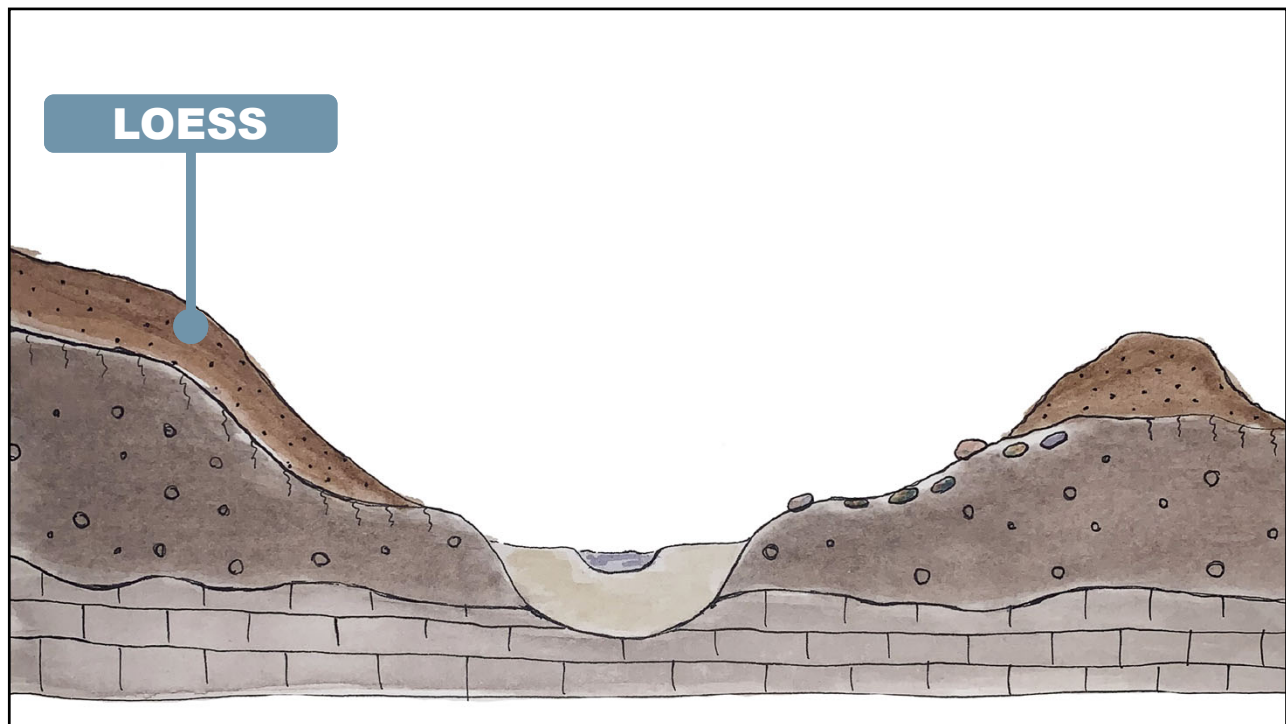


## EXPLANATION

- Wisconsinan  
(10,500 to 30,000 years ago)
- Illinoian  
(130,000 to 300,000 years ago)
- Pre-Illinoian  
(500,000 to over 2,500,000 years ago)



Source: Prior 1991 Landforms of Iowa



## Loess

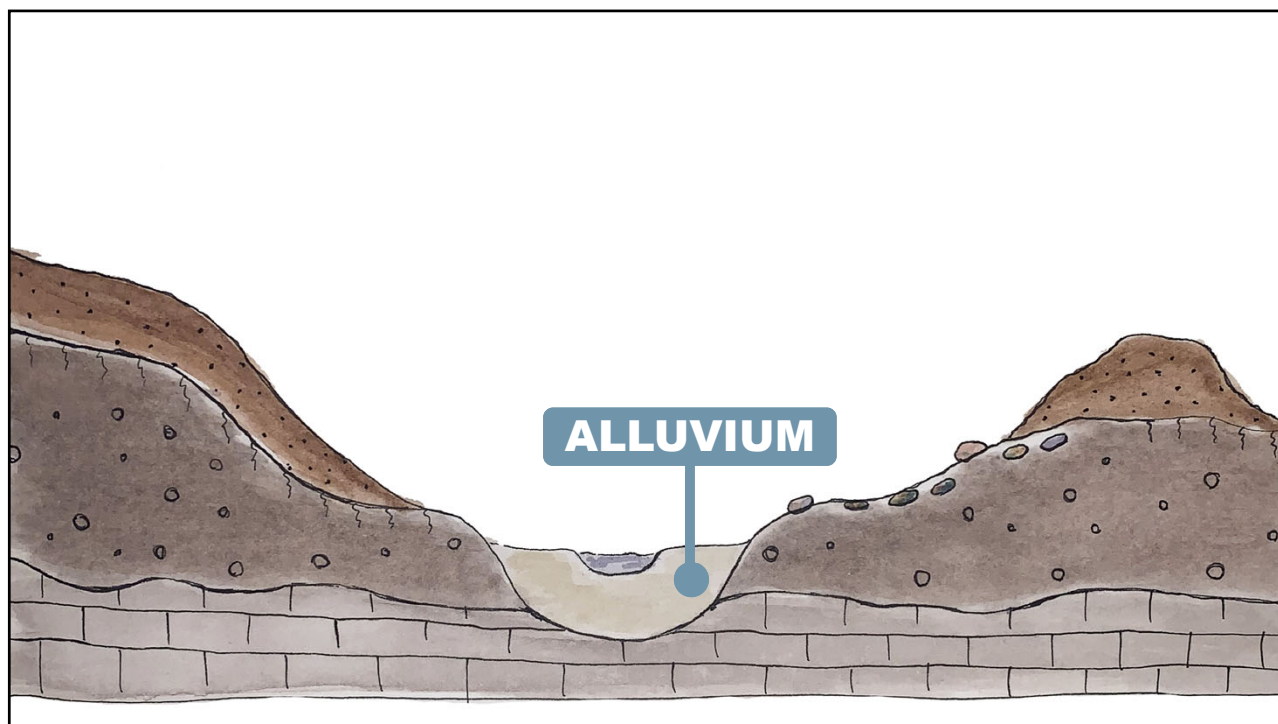
Fine, wind-blown sediments

Originate largely from glacial rivers



Photo courtesy of John Thomas





## Alluvium

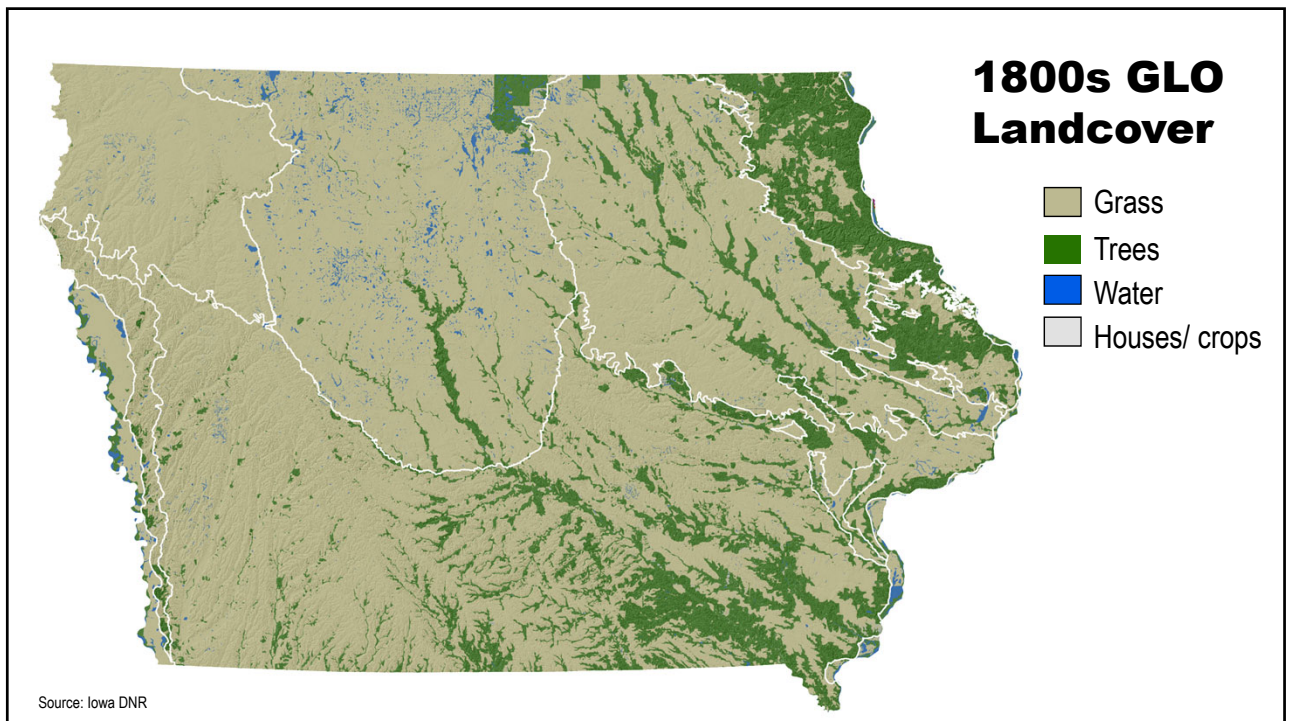
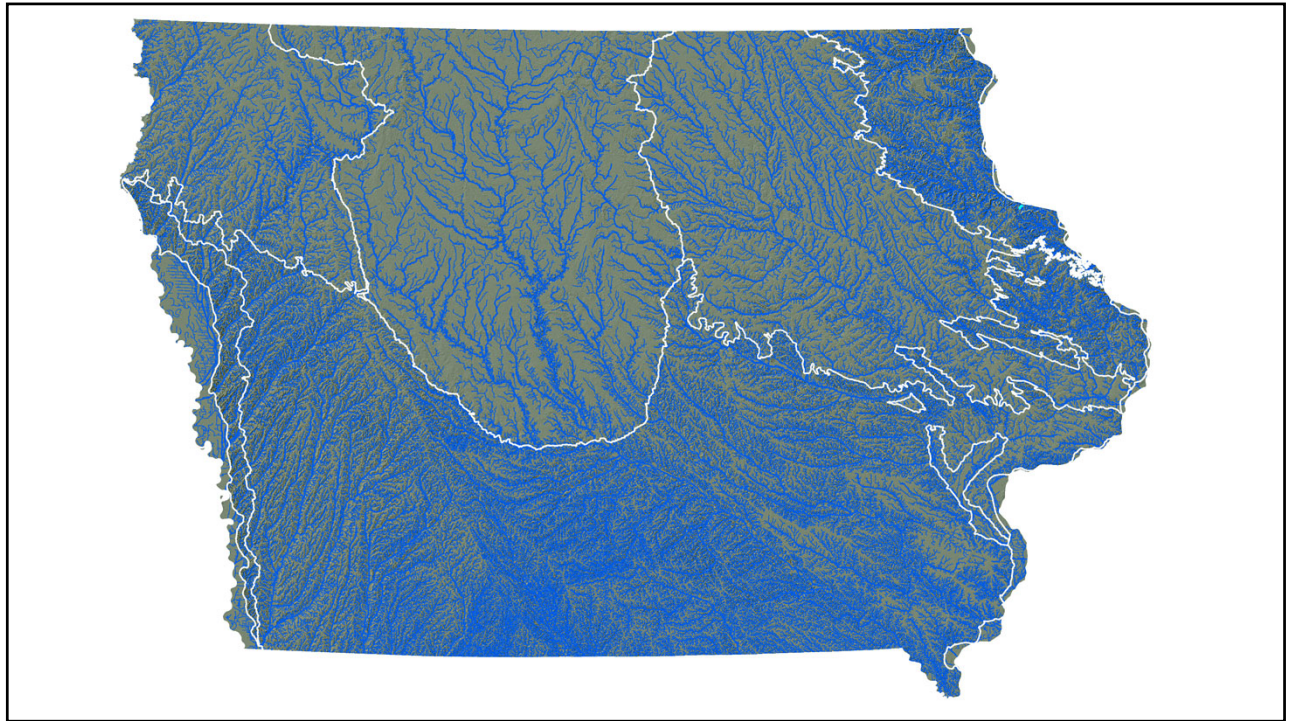
Sorted sediments

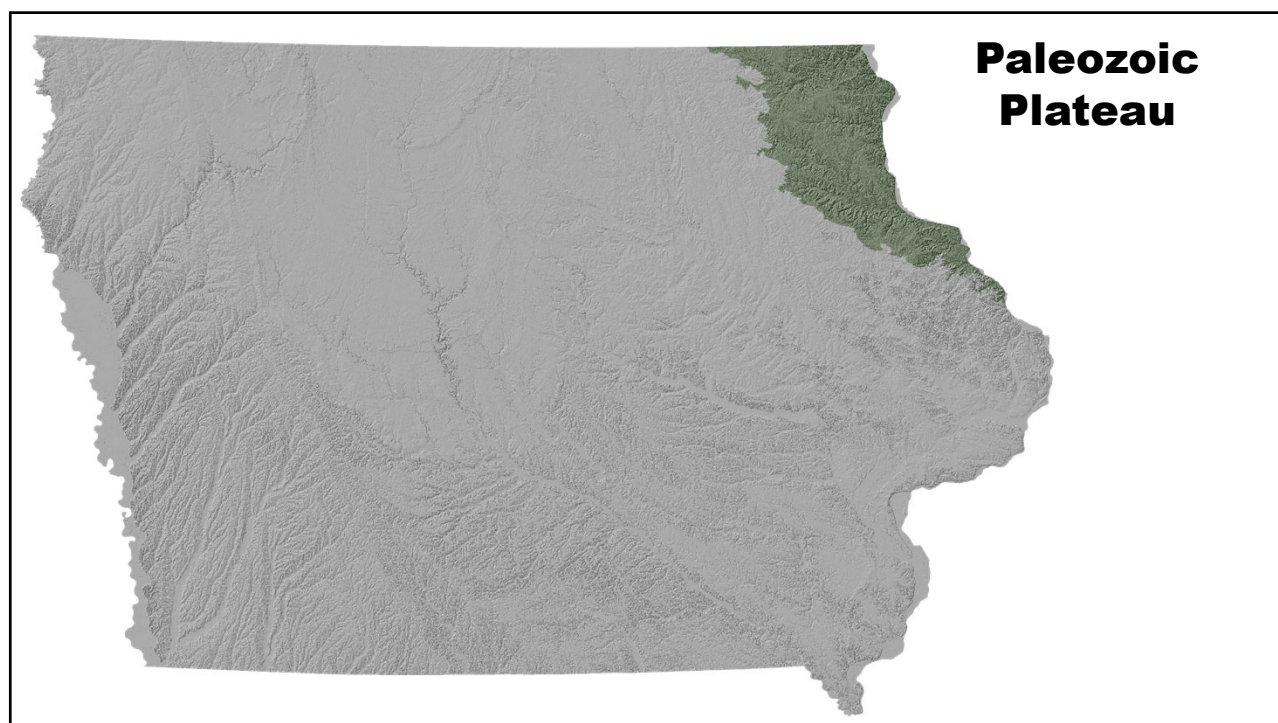
Deposited in layers by moving water



Photo courtesy of Peter Moore







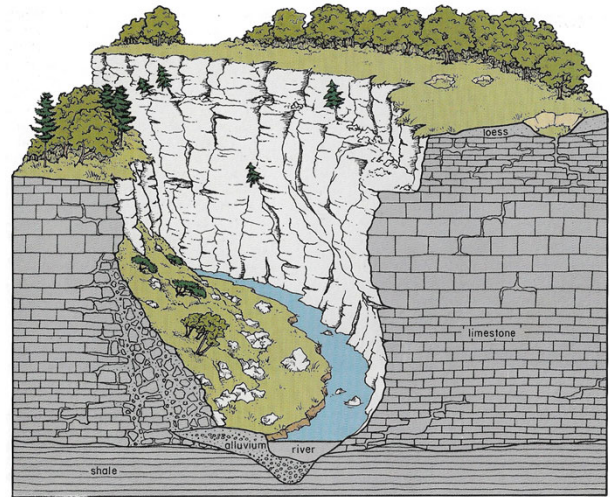




## Paleozoic Plateau

### Key Characteristics

- Patchy evidence of Pre-Illinois glaciation >500K years ago.
- Shallow bedrock shapes land surface.
- Karst topography creates sinkholes, springs, and caves.



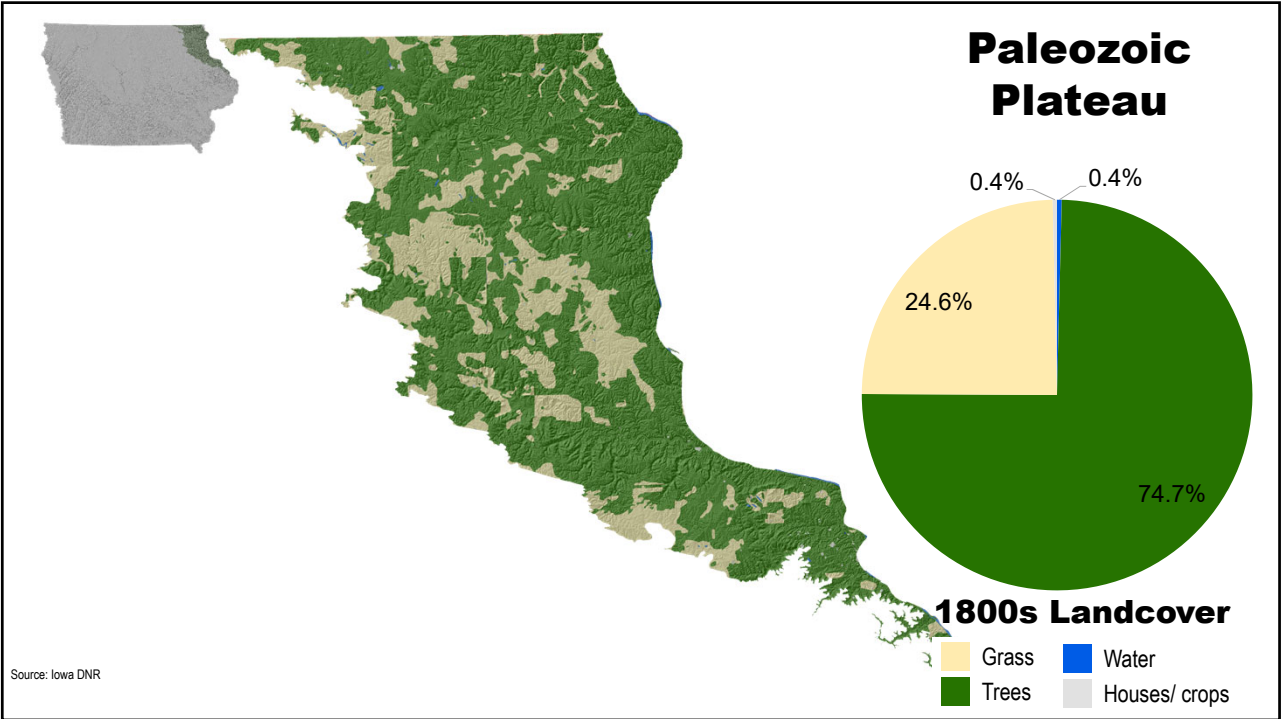
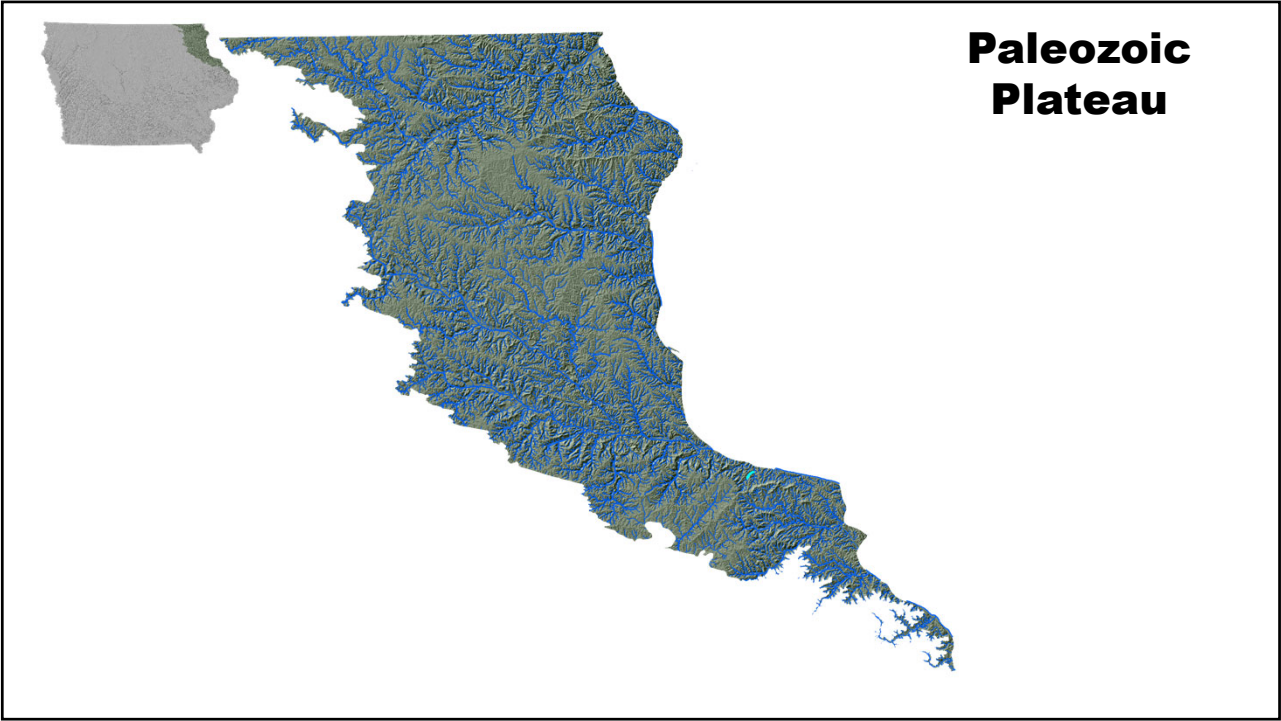
Source: Prior 1991 Landforms of Iowa

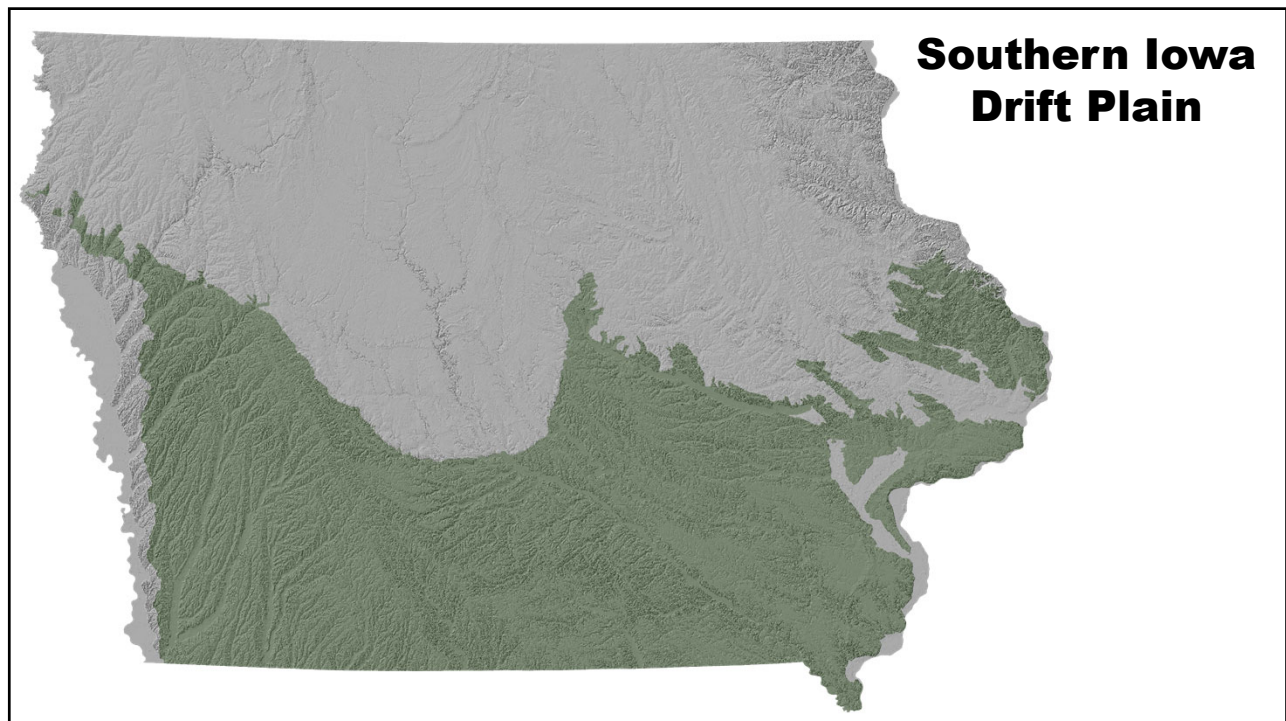
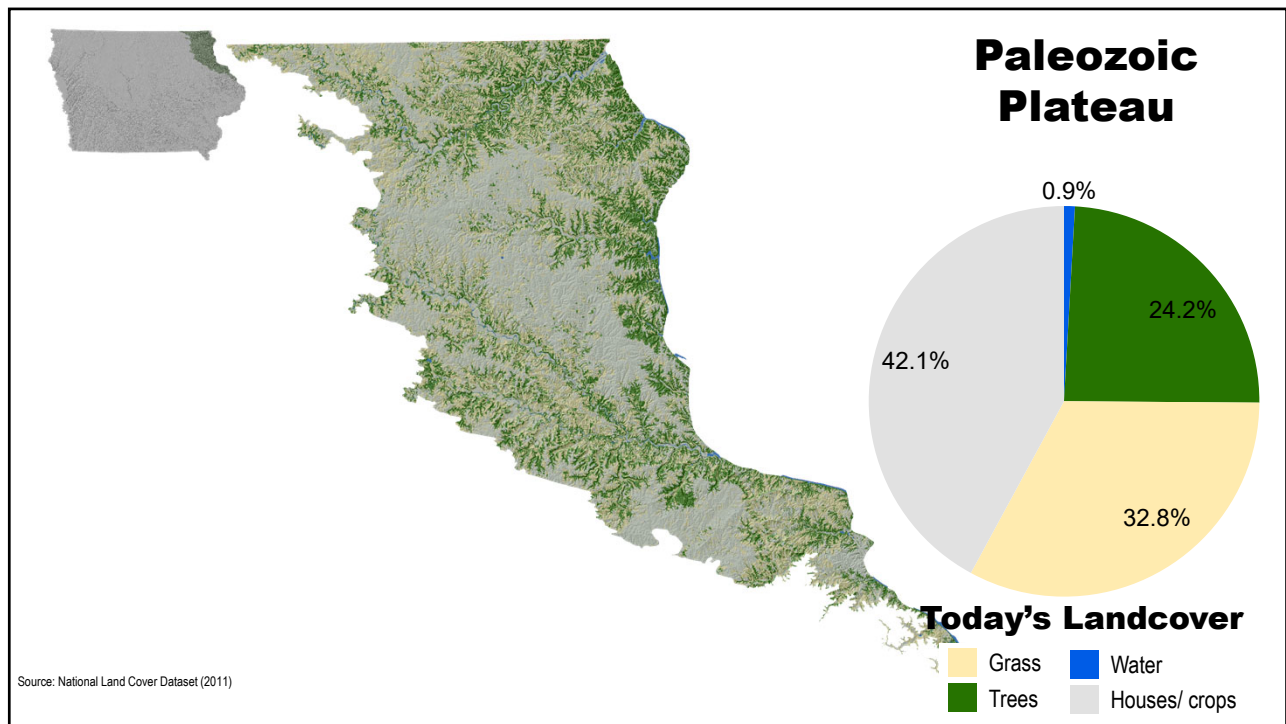


## Paleozoic Plateau







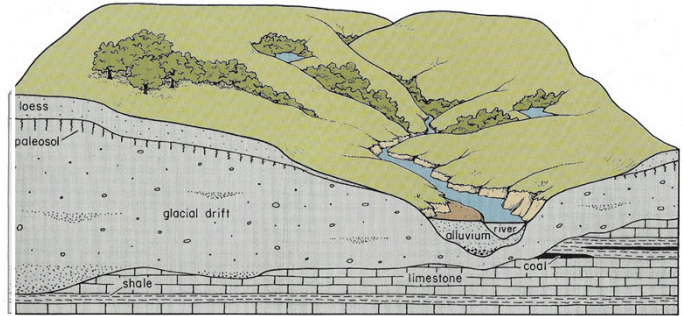




## Southern Iowa Drift Plain

### Key Characteristics

- Pre-Illinoian glaciations (>500K years ago)
- Highly eroded, well developed drainage.
- More gradual slopes from west to east.
- "Loess mantle" over till on ridges.



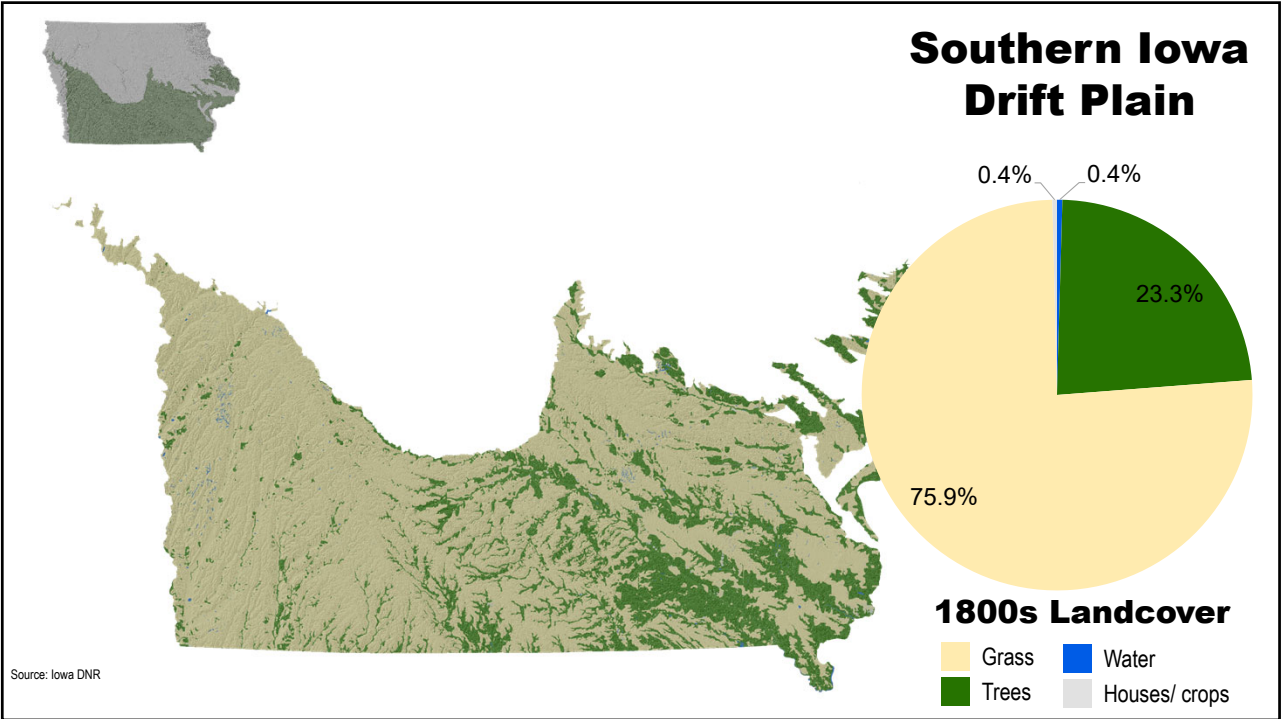
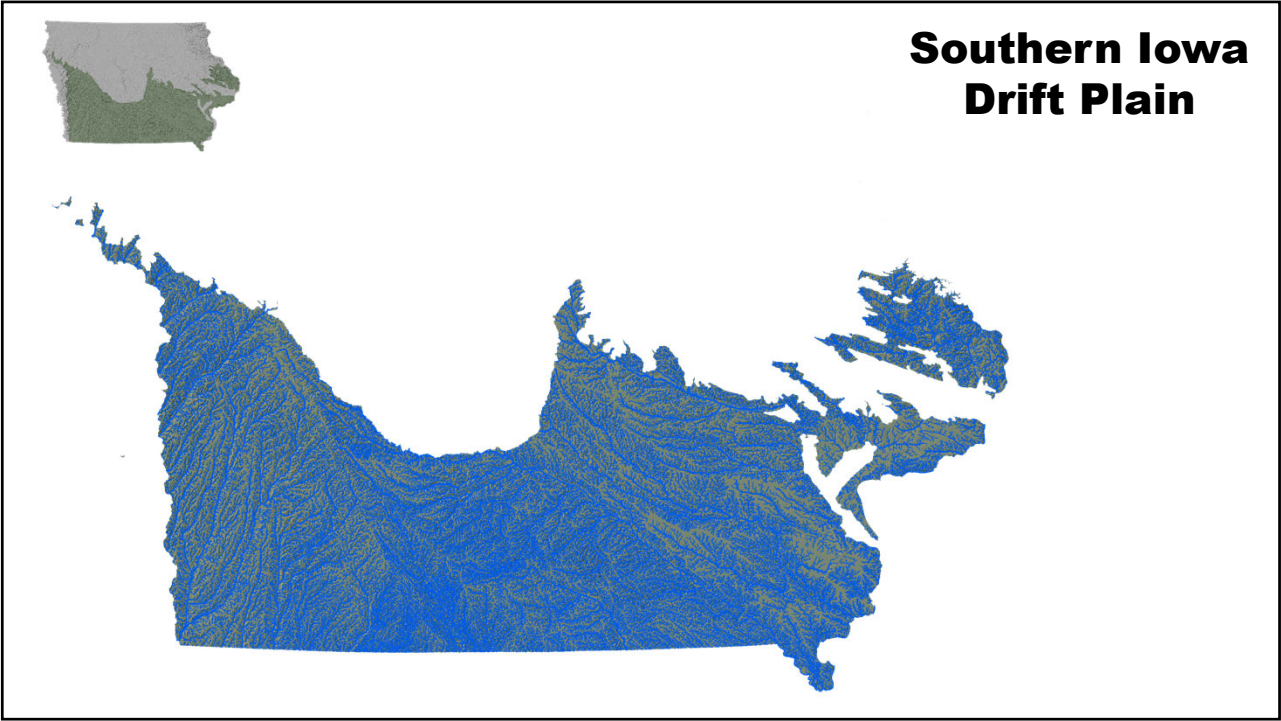
Source: Prior 1991 [Landforms of Iowa](#)

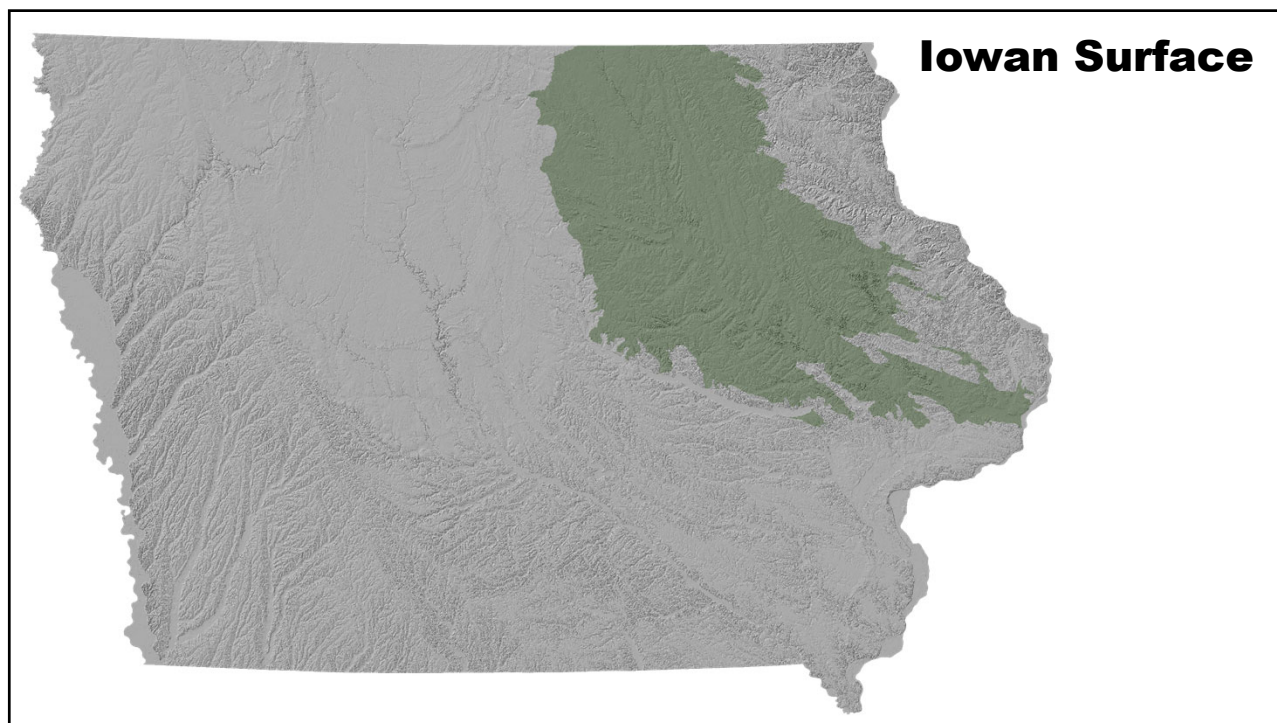
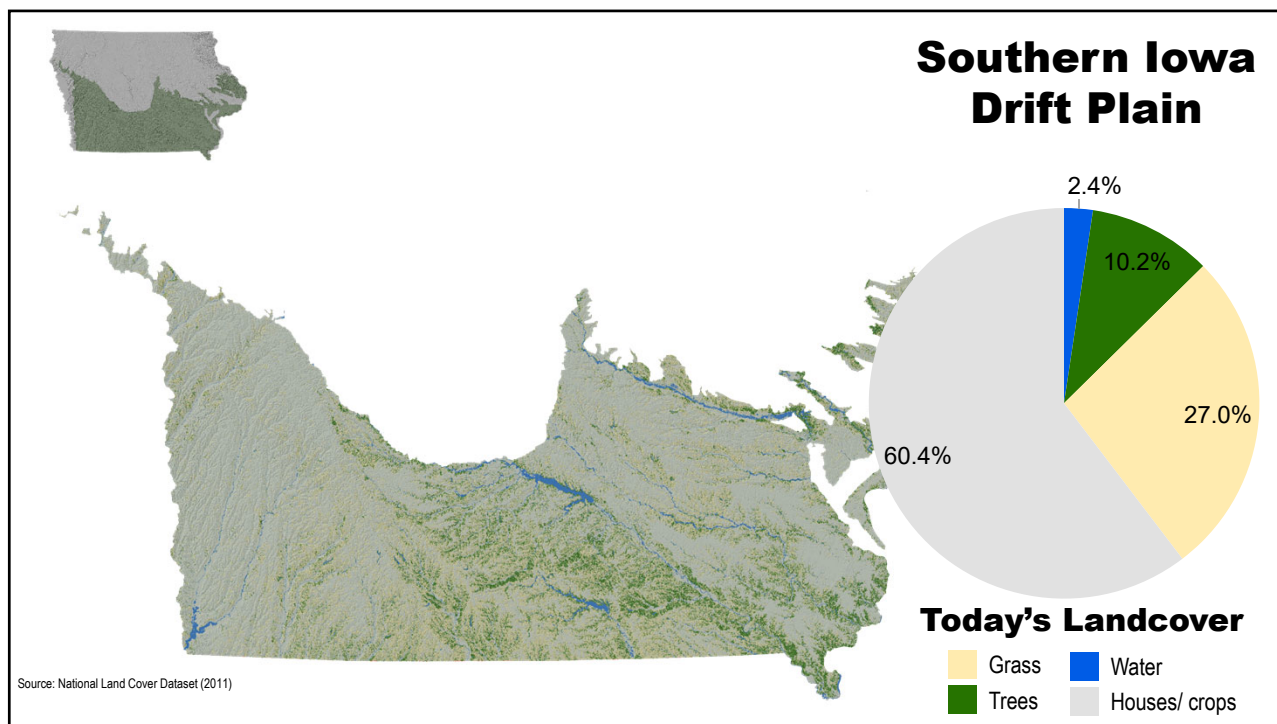


## Southern Iowa Drift Plain







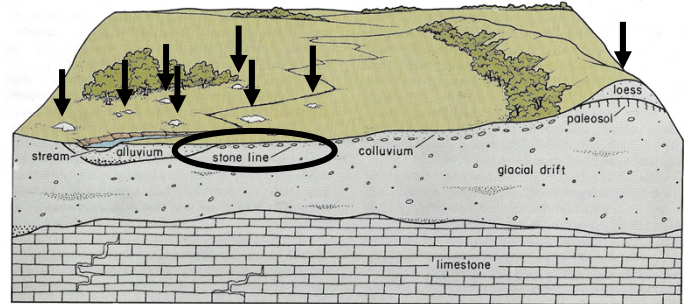




## lowan Surface

### Key Characteristics

- Pre-Illinoian glaciation, late Wisconsin erosion.
- Loess remaining only in paha ridges.
- Long slopes with low relief.
- Glacial erratics (field stones) common.



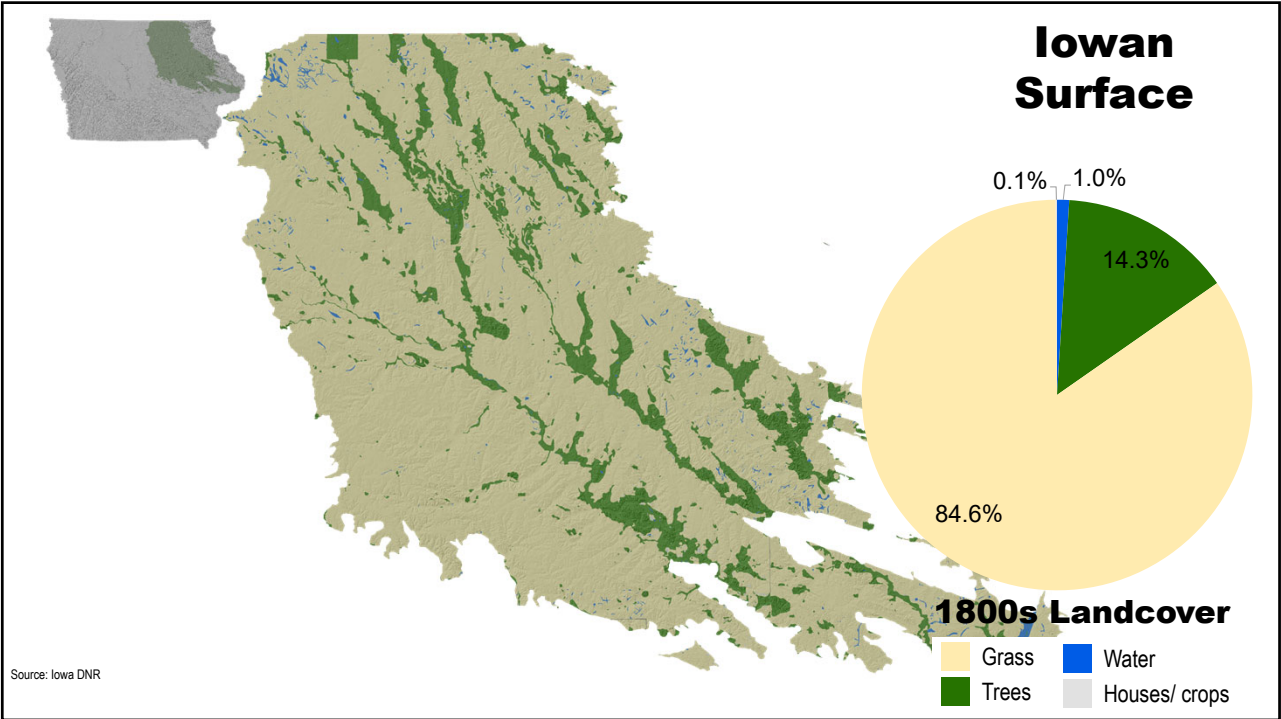
Source: Prior 1991 Landforms of Iowa

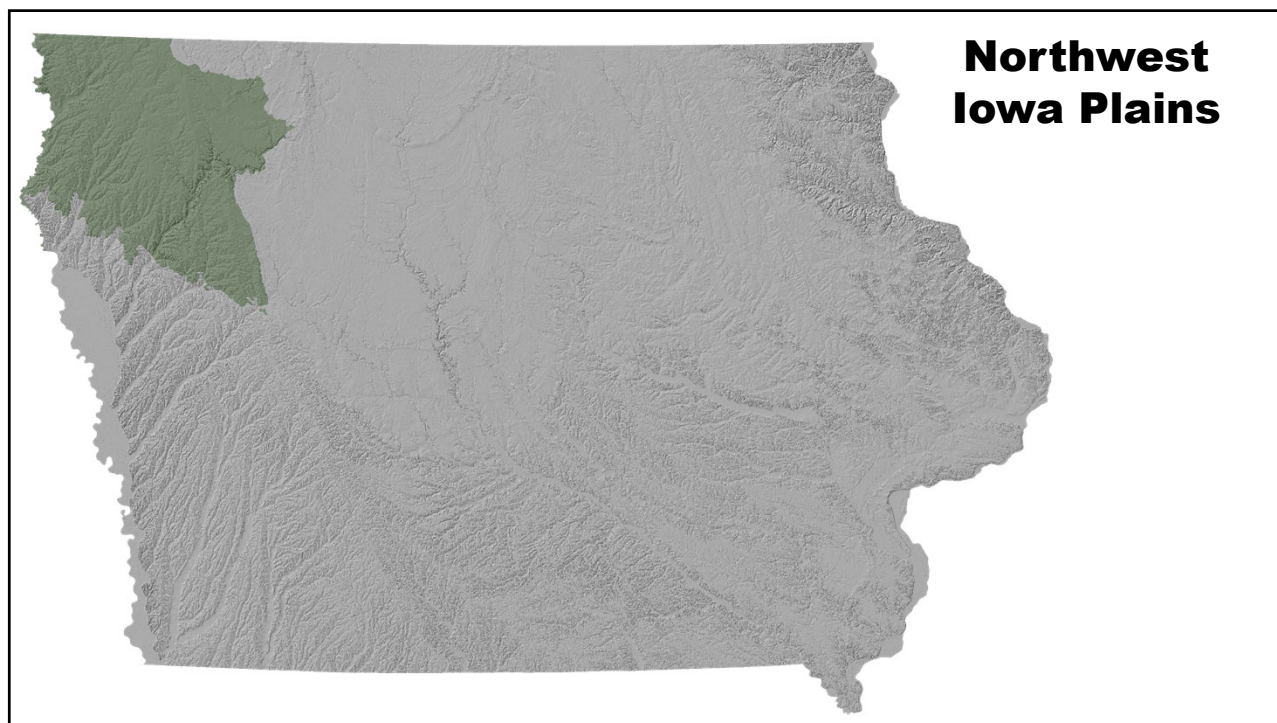
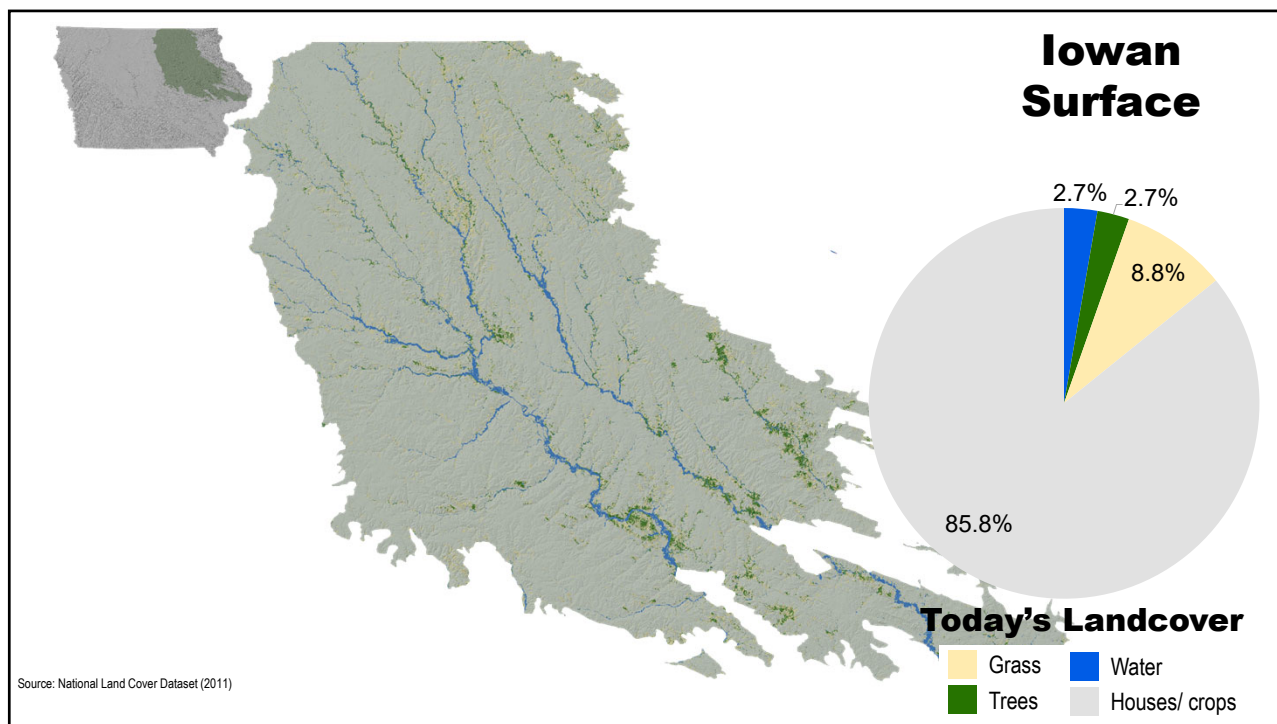


## lowan Surface







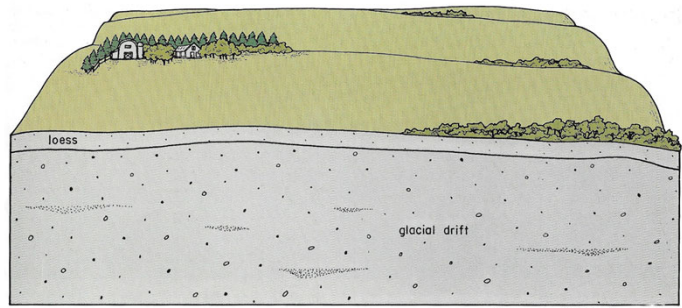




## Northwest Iowa Plains

### Key Characteristics

- Mid-Wisconsinan glaciation (~30K years ago)
- Long, gradual slopes.
- Highest elevation, step to northern high plains.
- Well developed drainage but arid.
- Thick loess cover throughout.



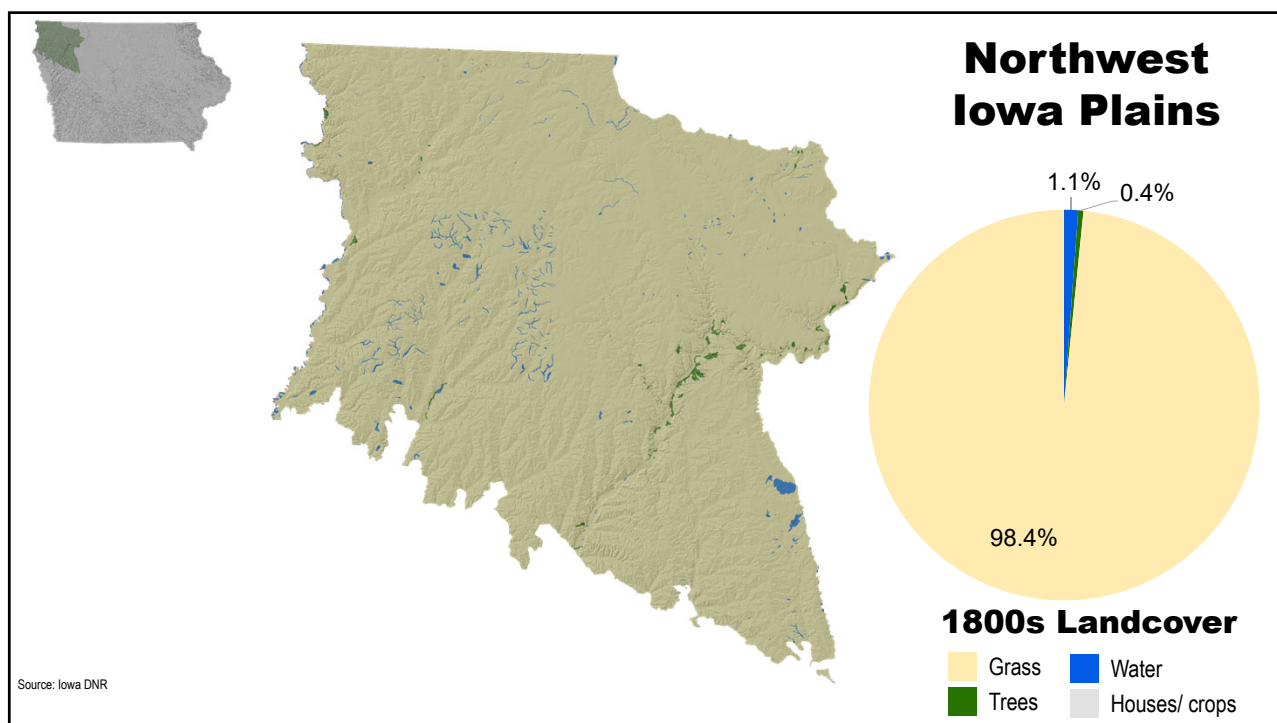
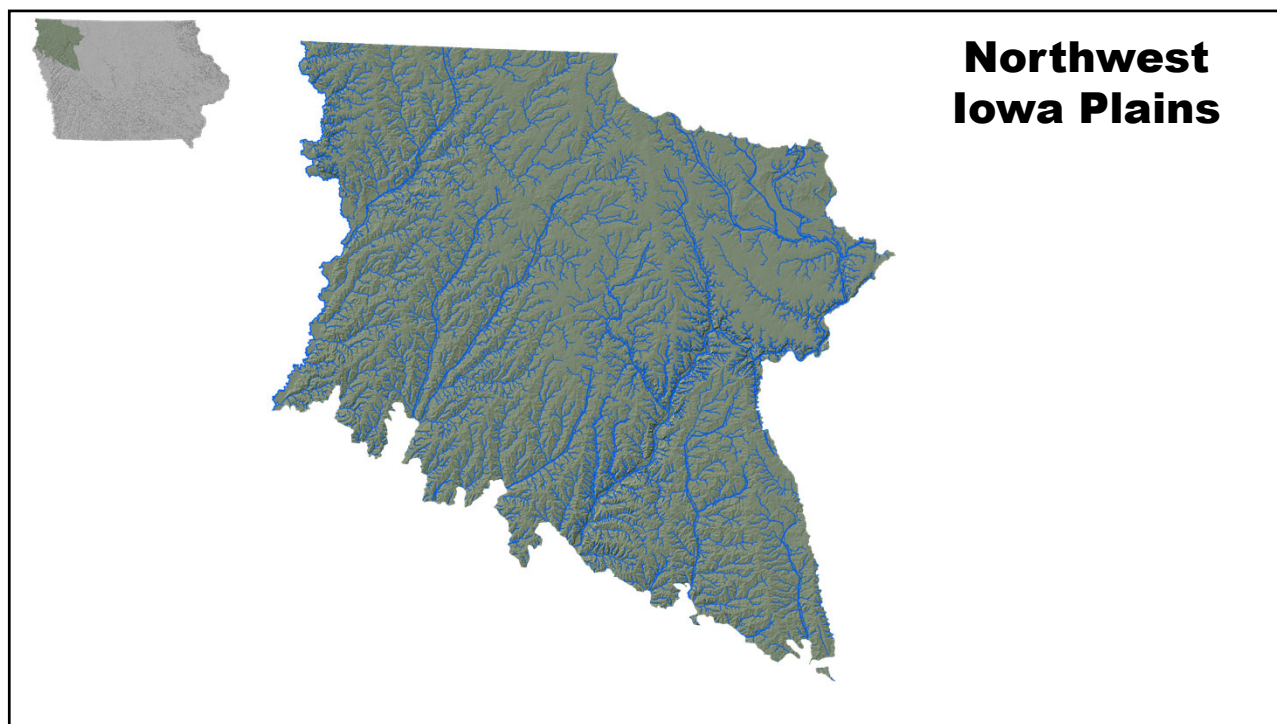
Source: Prior 1991 *Landforms of Iowa*

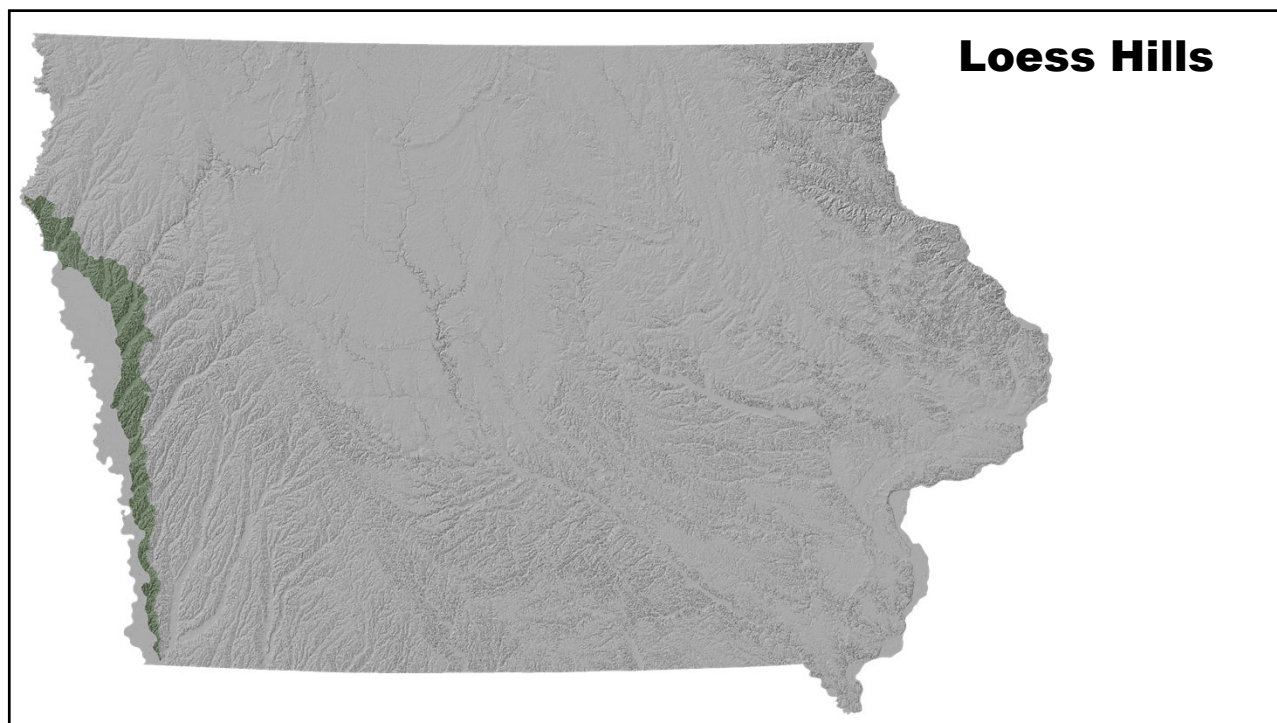
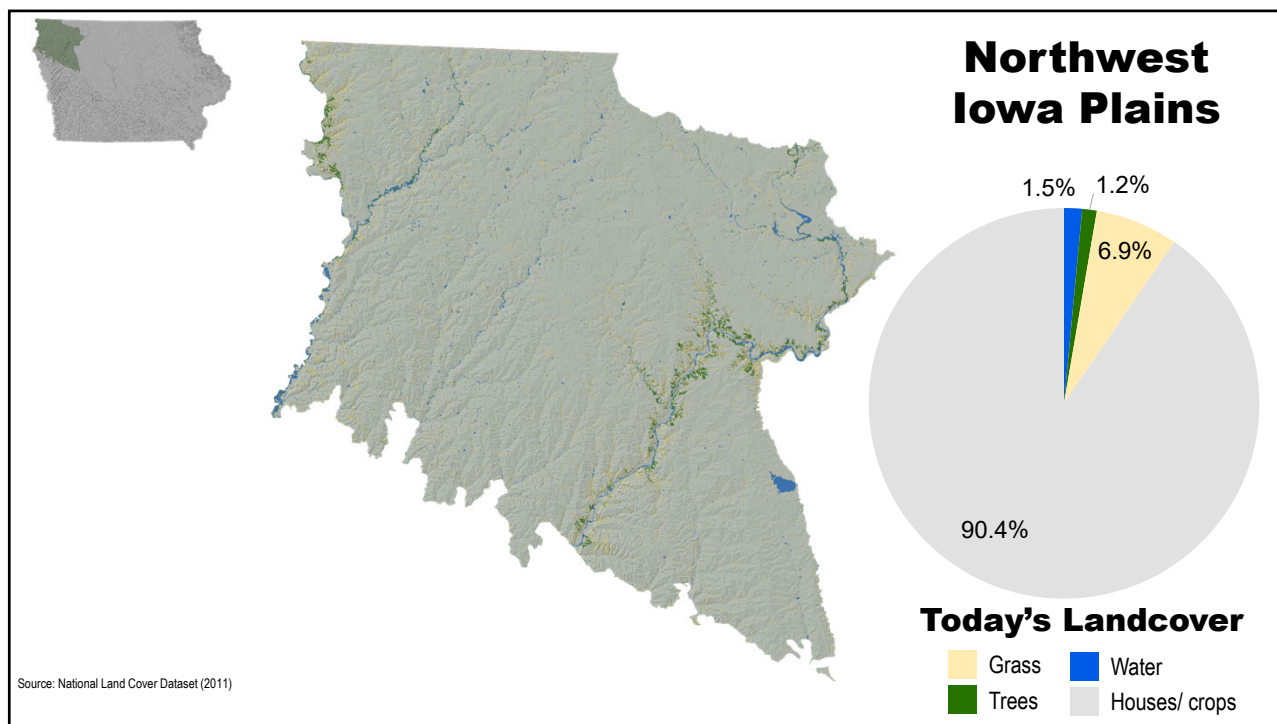


## Northwest Iowa Plains







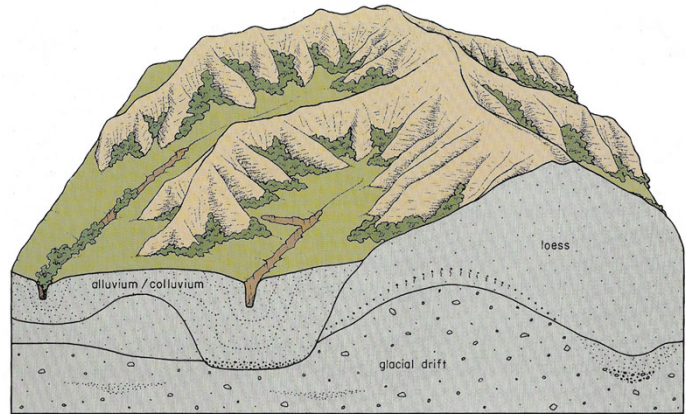




## Loess Hills

### Key Characteristics

- Deep, rugged loess deposits.
- Western boundary well-defined with floodplain.
- Loess originates in river valleys and accumulates down-wind (east).
- High erosion and drainage development.



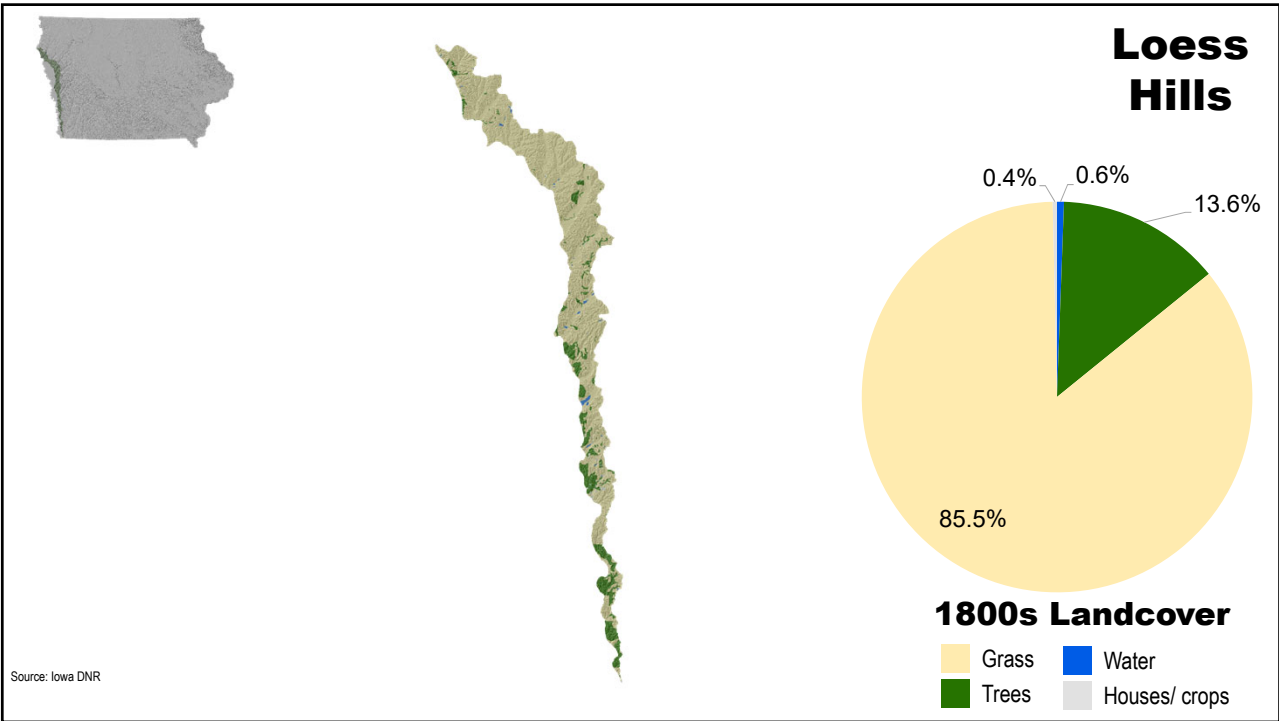
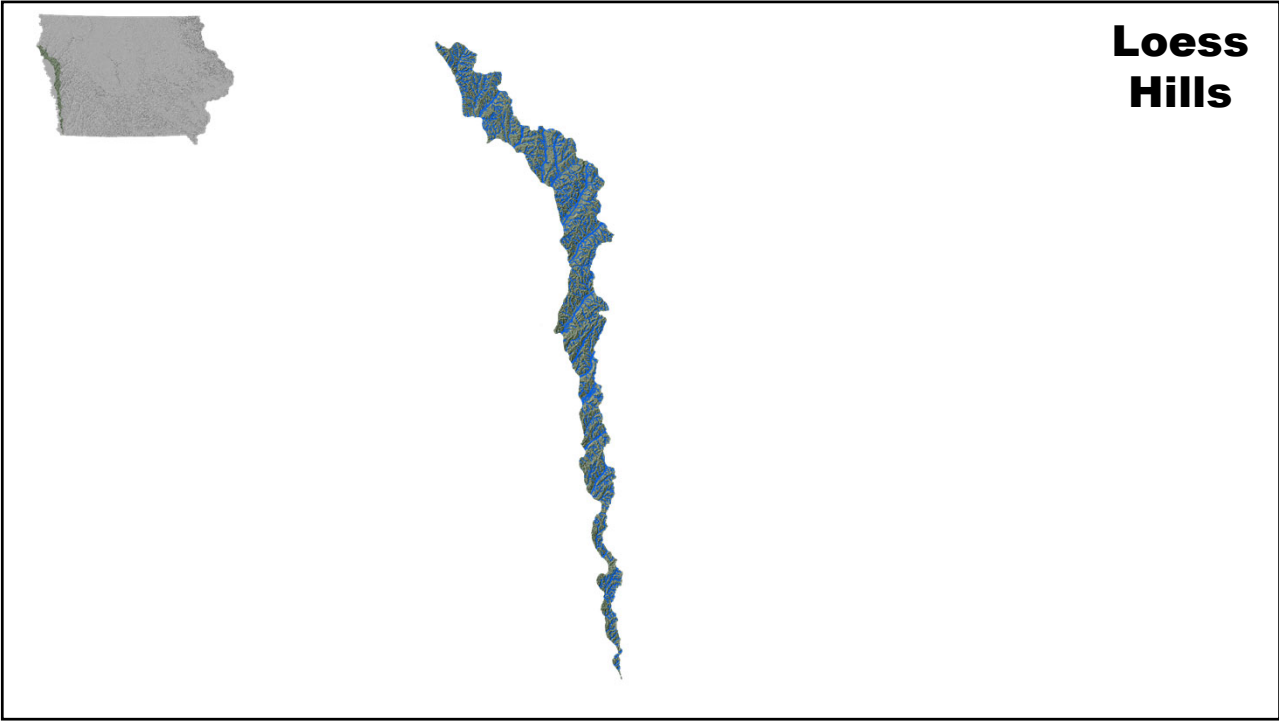
Source: Prior 1991 Landforms of Iowa

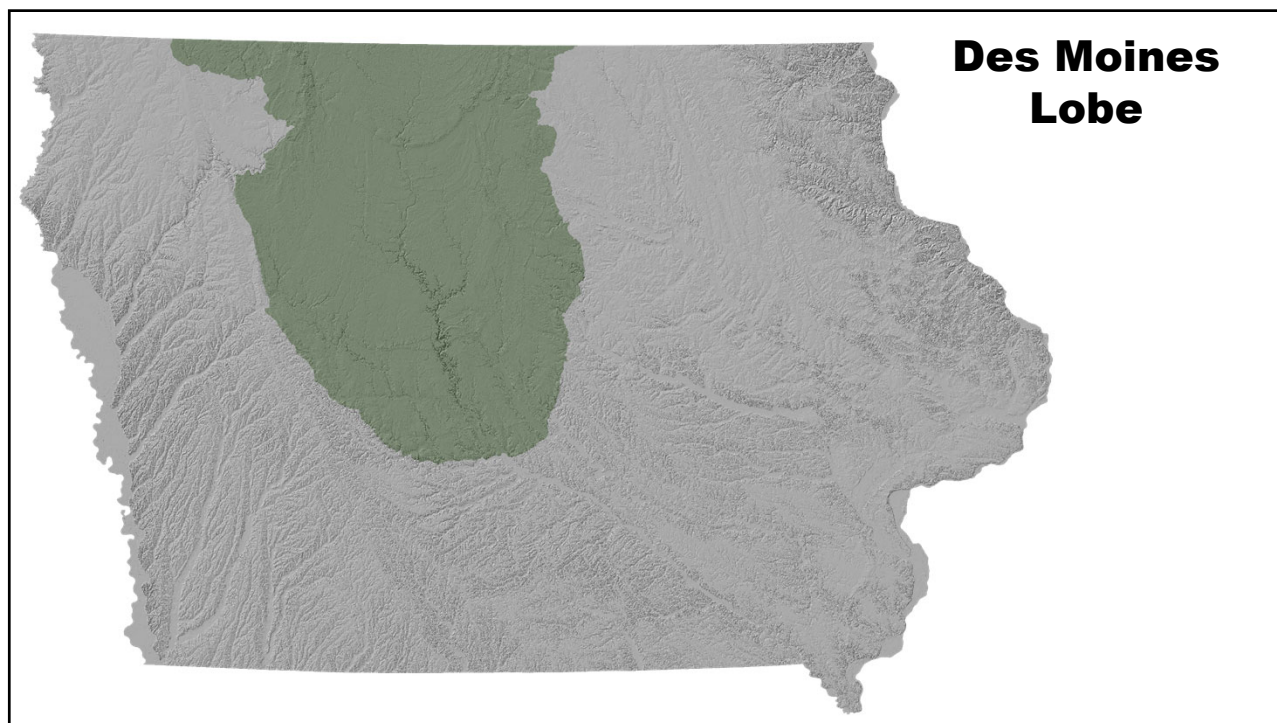
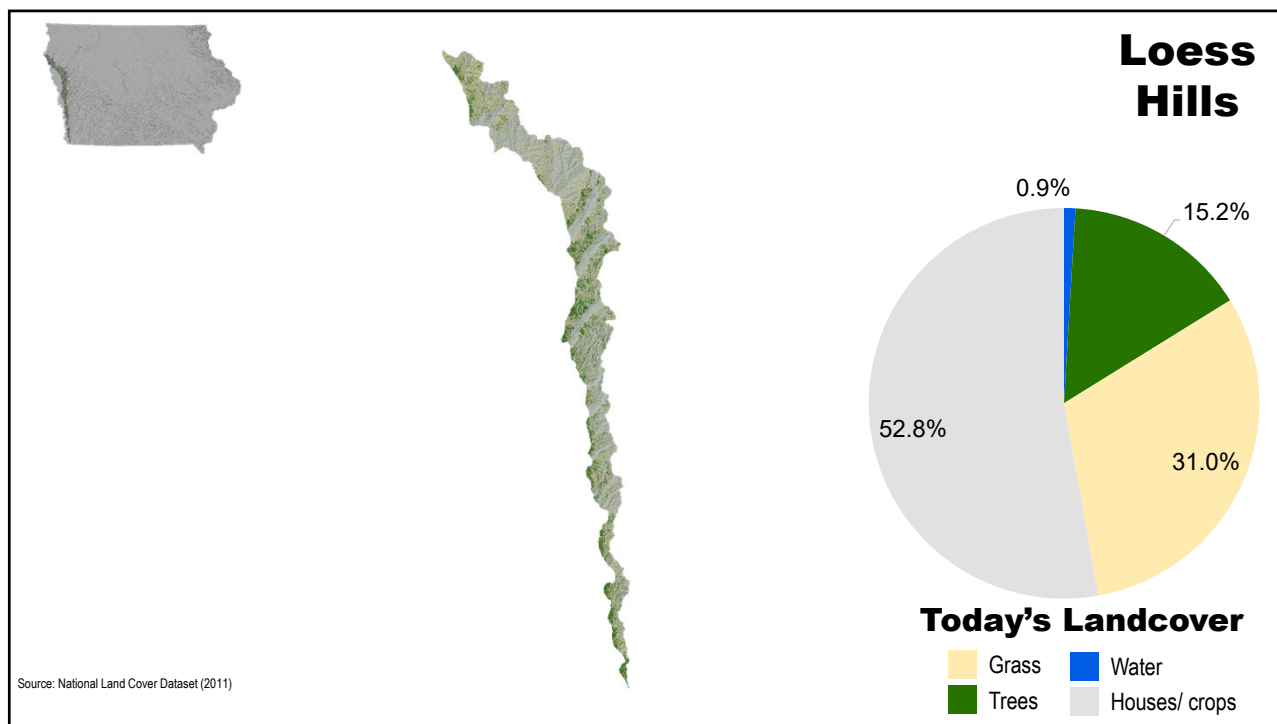


## Loess Hills







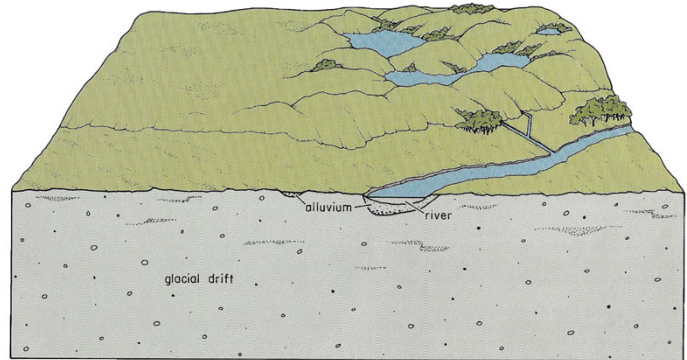




## Des Moines Lobe

### Key Characteristics

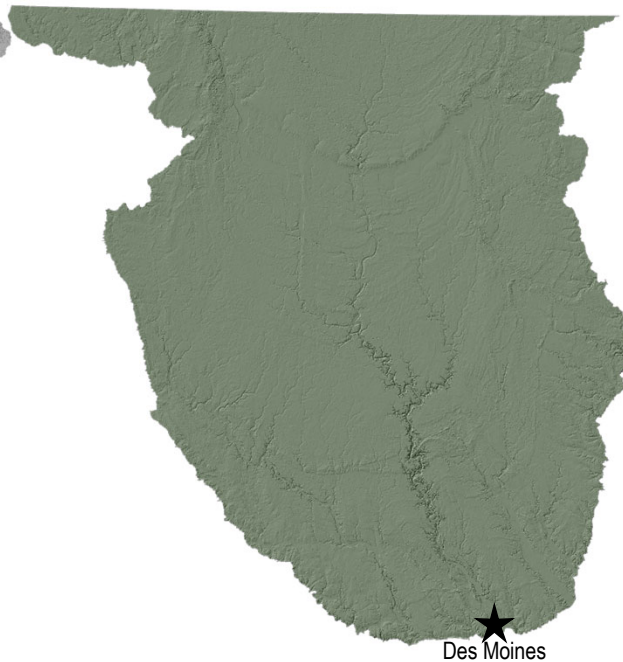
- Only area covered by Wisconsin glacier (10-30K years ago)
- No loess deposition
- Flat, rolling terrain except at moraines.
- Pothole depressions throughout.
- Little drainage development.



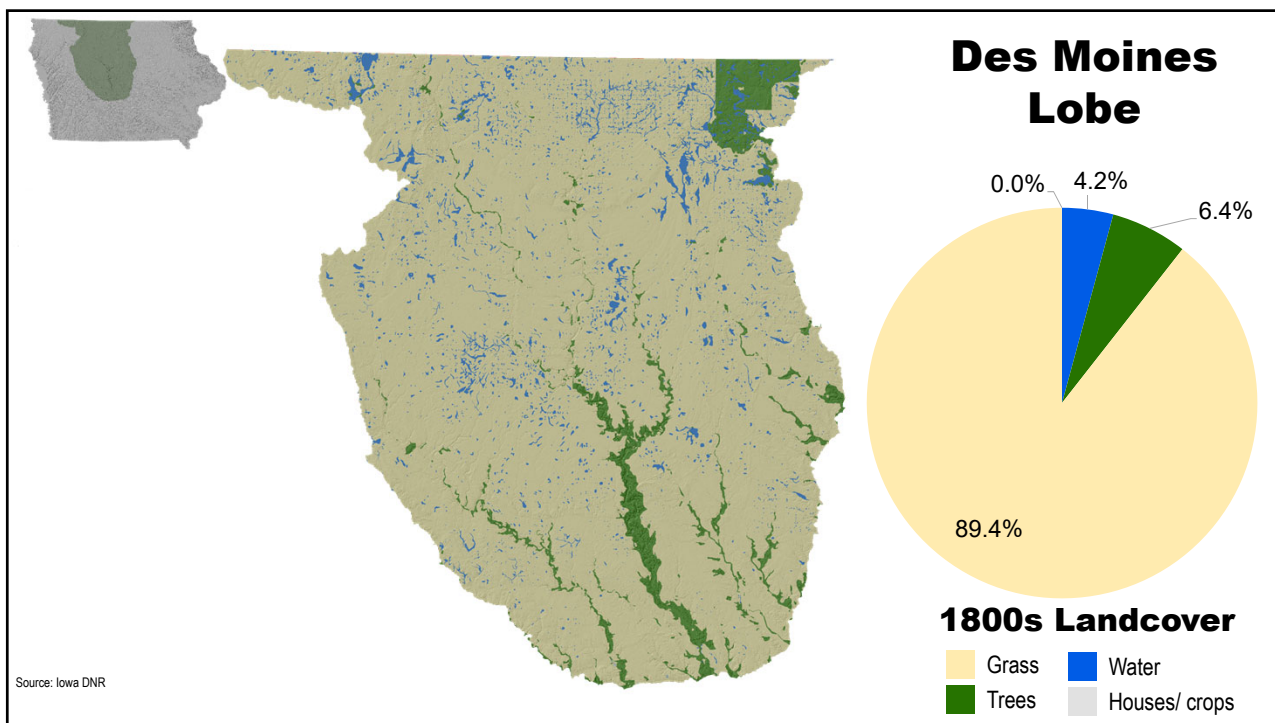
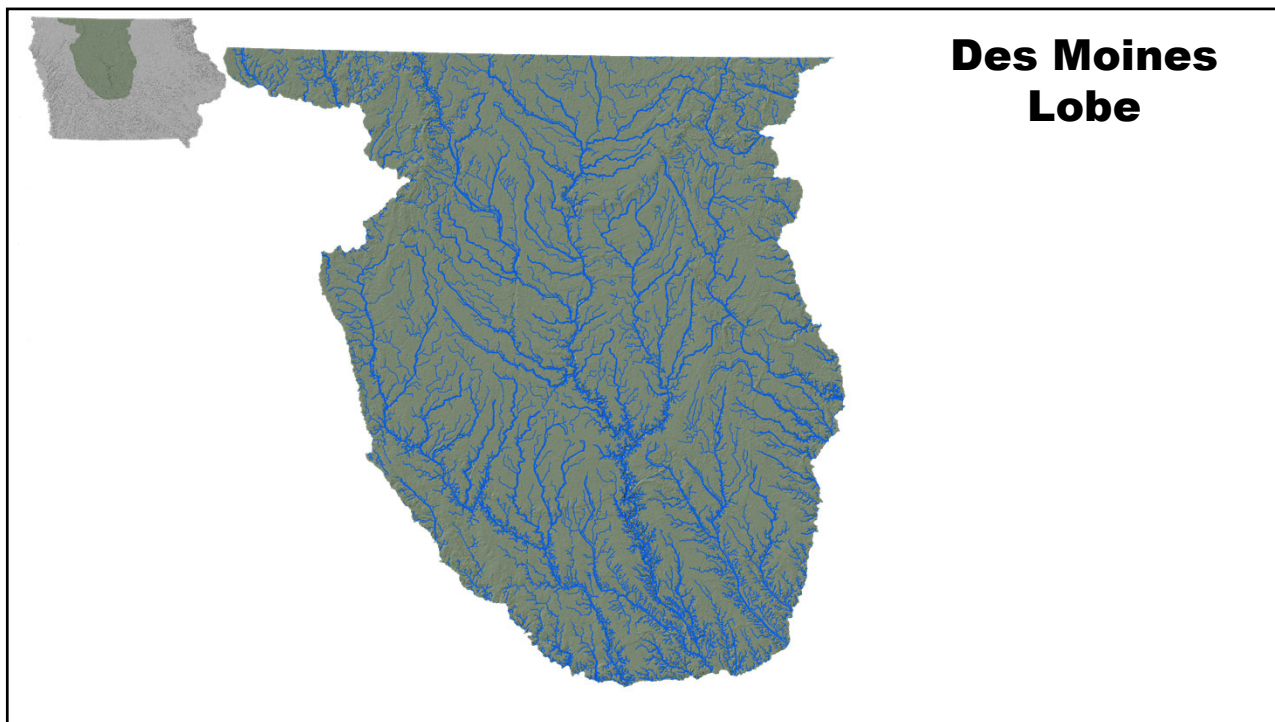
Source: Prior 1991 [Landforms of Iowa](#)

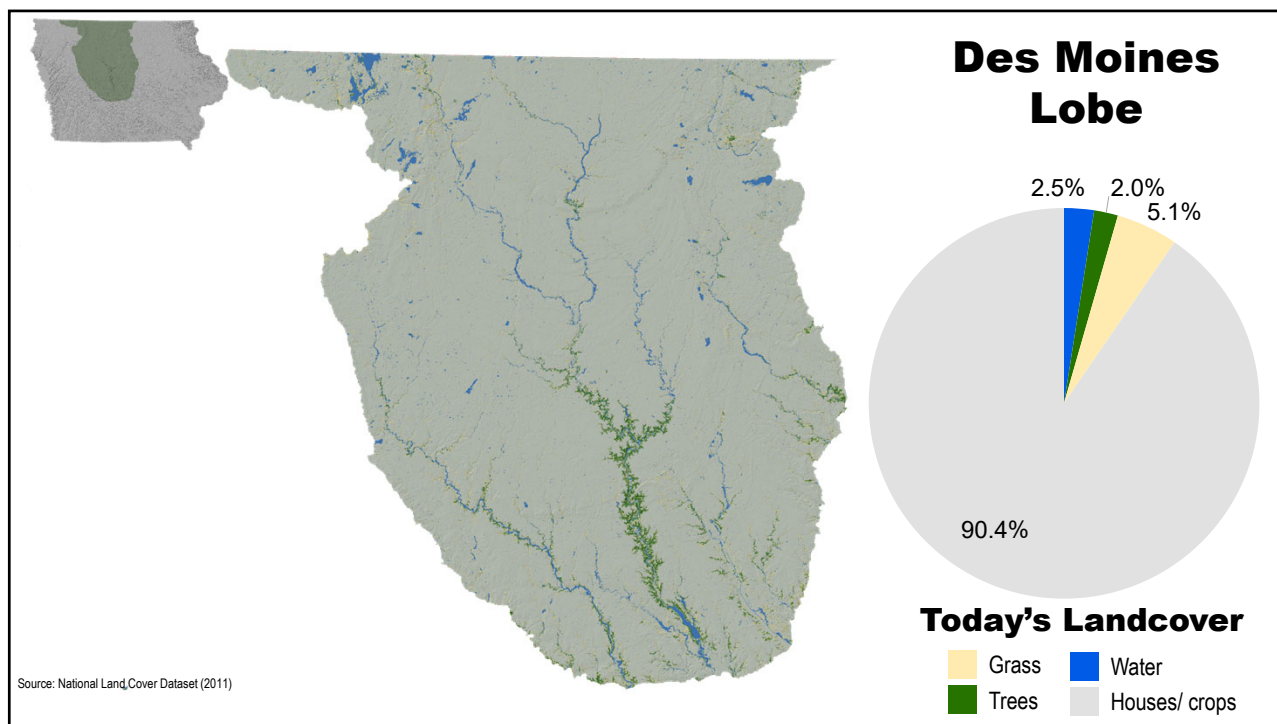


## Des Moines Lobe







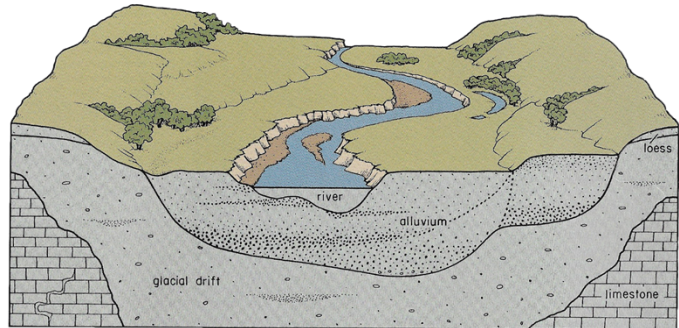




## Alluvial Plains

### Key Characteristics

- Frequent redistribution of alluvium with floods.
- Flat, little natural drainage integration.
- Bound by “bluffs”.



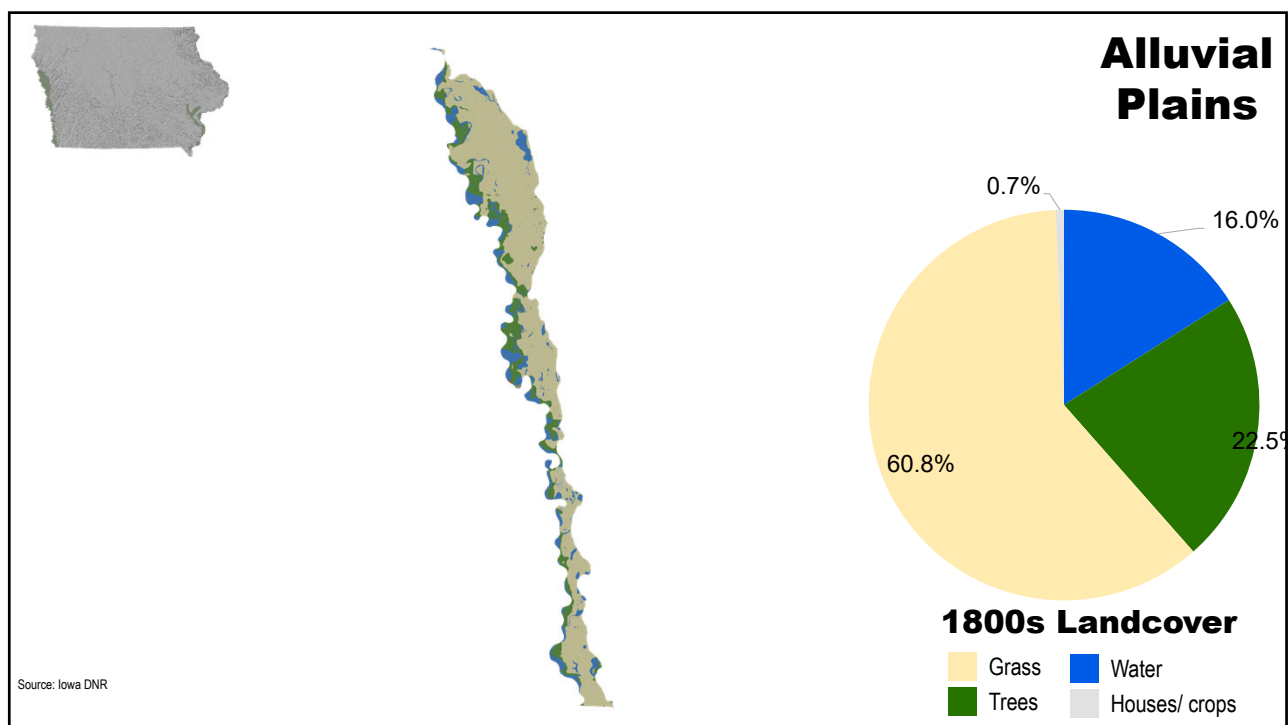
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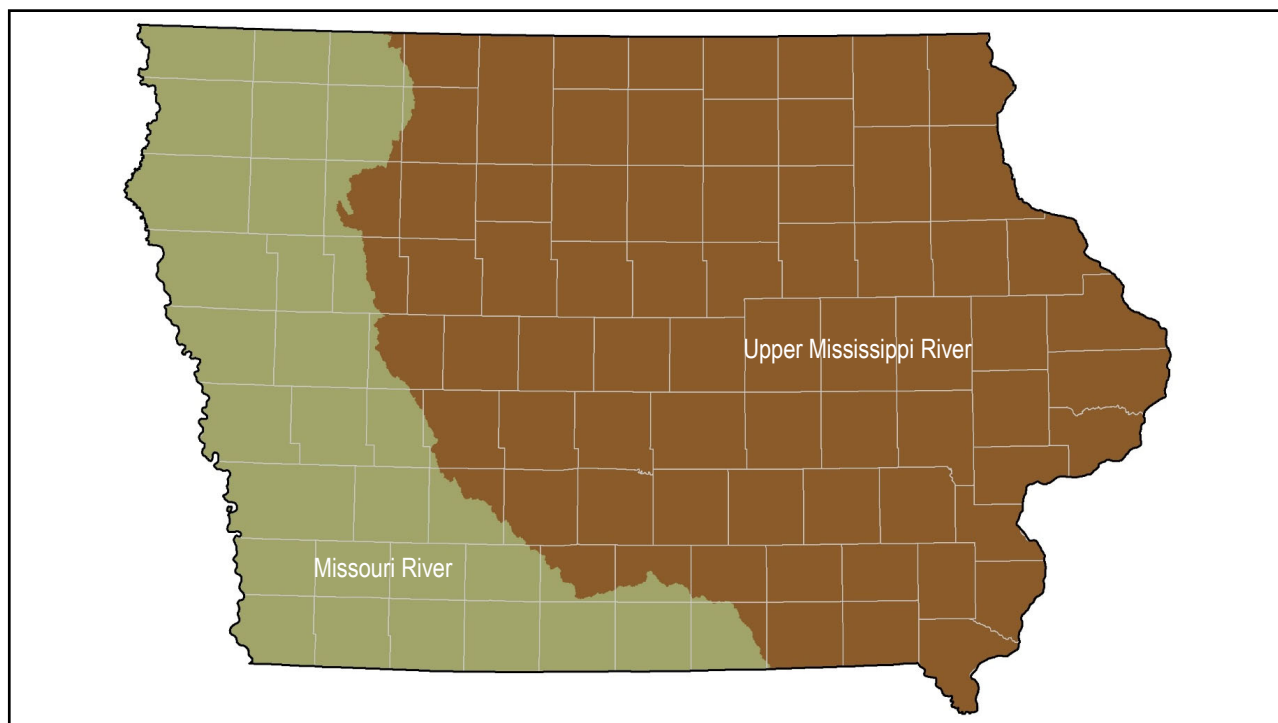
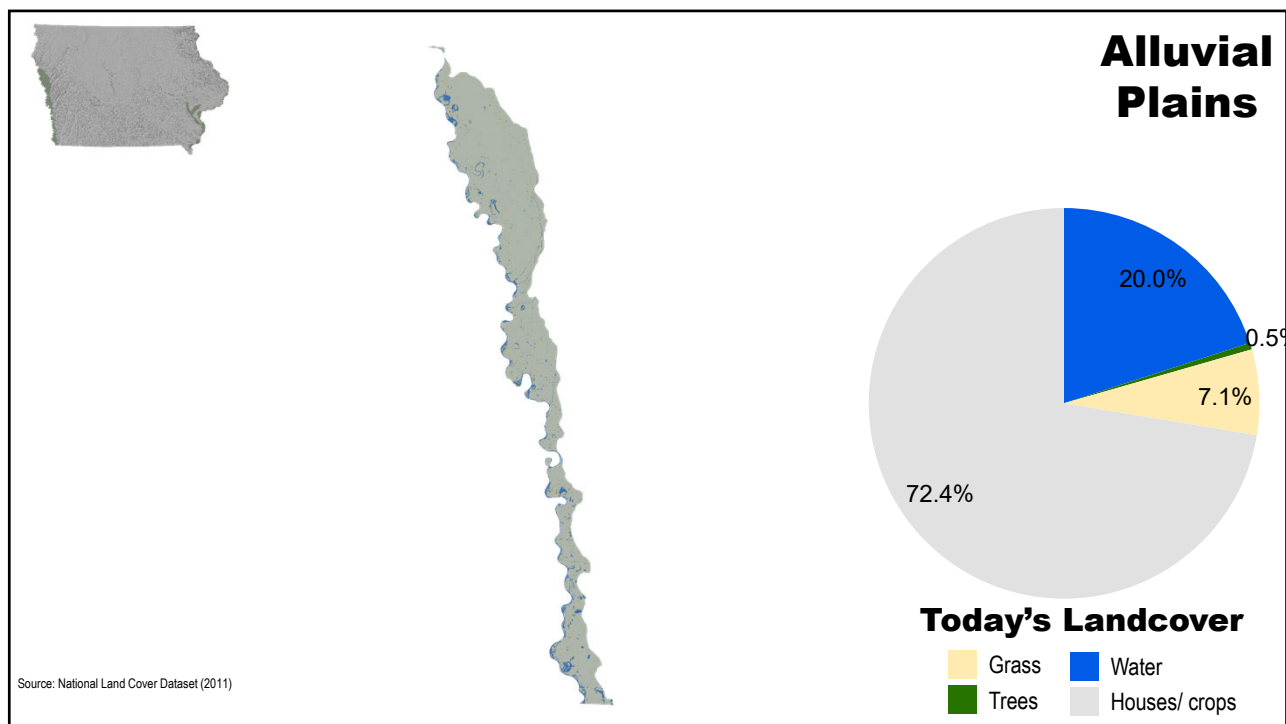


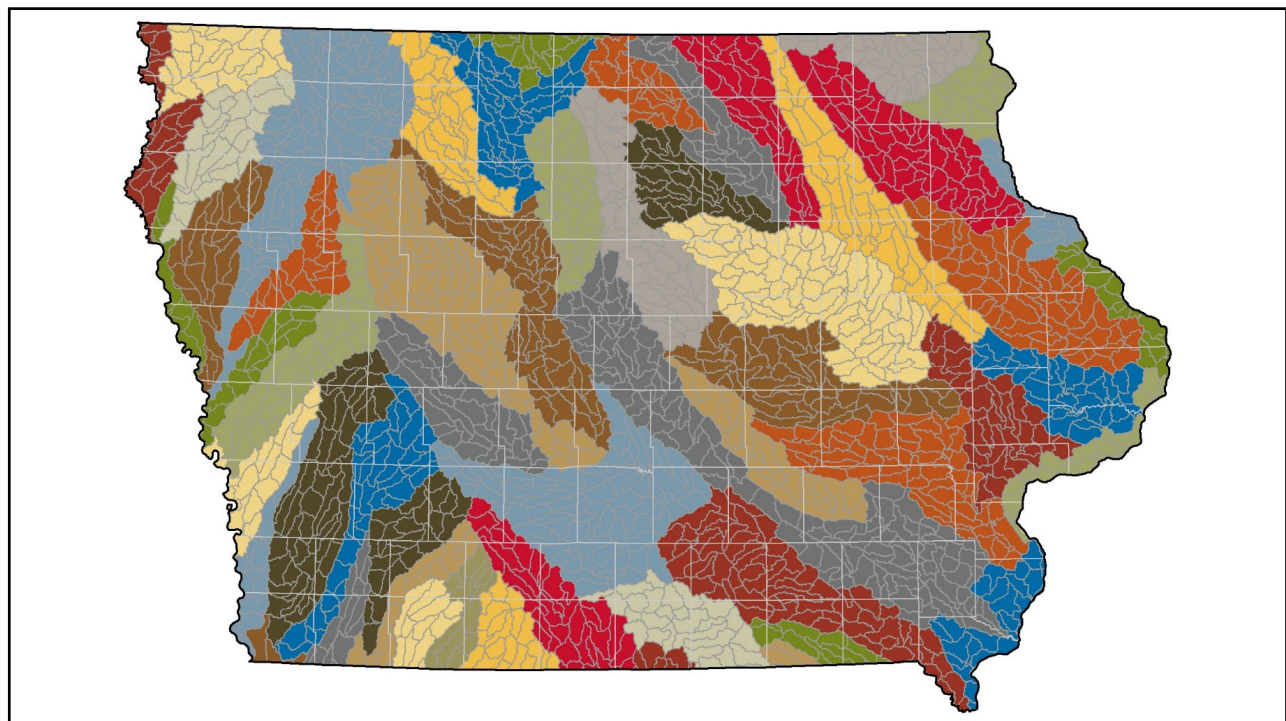
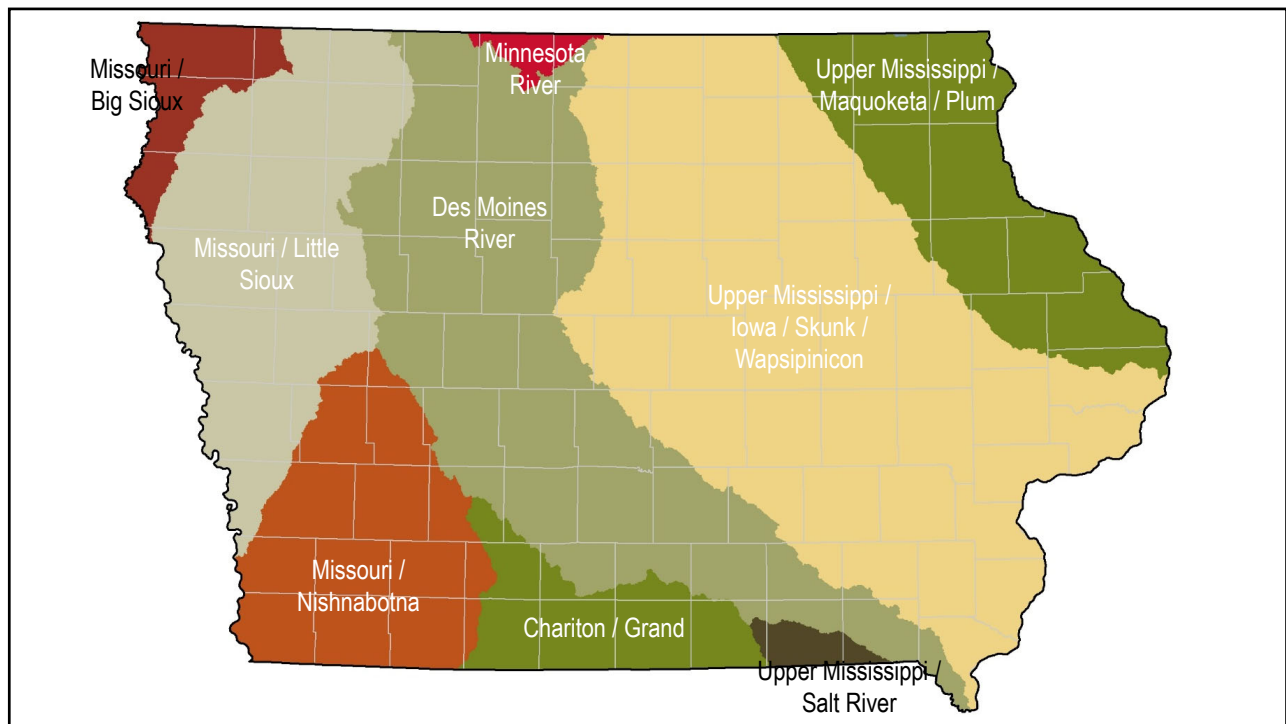
## Alluvial Plains





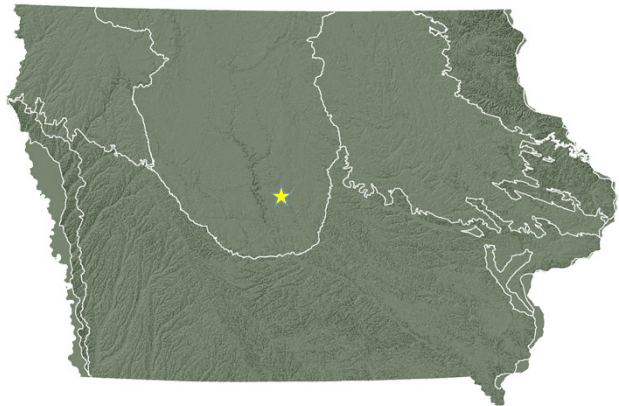
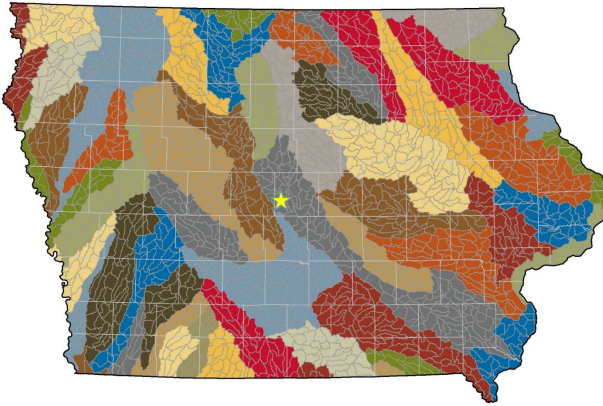








# What landform and watershed do you call home?



## Learn more!

**Iowa's NATURE SERIES** **SOILS**

*Albion County*

"The soil is deep, of extraordinary fertility... there is no place on the continent where the soil is more certain to yield an ample reward for the labor bestowed upon it, than in Iowa."

Iowa Board of Immigration, 1890

Soil, like air and water, is an essential natural resource. Iowa's deep, black topsoils are famously called "black gold" due to their fertility and ability to grow crops. Iowa's soils do it all. They store carbon, filter water of impurities, provide habitat for many organisms, store and provide water and nutrients to plants, support food production, archive human history, and provide the very foundation for our everyday activities, including supporting the buildings in which we live and work. Despite soil's importance to all life, we typically don't pay attention to what is happening under our feet. Fascinating processes are happening right under us in Iowa's soil every day.

**SOIL PROPERTIES**

Soils are not uniform. Both gradual and rapid processes have created them over time. Across a landscape, even within a single field, soil properties can change over very small distances. For example, a prairie farmer may have created a narrow band of sandy soil by depositing sediment trapped in fast-moving flood waters just inches from a more clay-rich soil derived from glacial deposits. A Middlesex expert in the various properties of rain, wind, and gravity could have half the topsoil thickness at a location just a few feet downslope. The soil particles (sand, silt, or clay) that are present, how those particles were brought to Iowa, the dominant vegetation and weathering organic matter, or even recent human activities in the area, can all impact how soil looks and functions.

**Soil Texture**

One way to describe soil is by using the size of the mineral soil particles, called soil texture. To describe a soil's texture, soil particles are typically sorted by their size into three categories: sand is the largest, silt is intermediate, and clay is the smallest. Sand is perhaps the most familiar soil mineral particle, generally ranging from 0.05-2 mm in diameter. Because of its size, sand particles are typically found in the upper layers of the soil profile.

Horizon	Horizon Description	Color	Clay Content	Structure	Organic Matter Content
O	Organic				
A	Mineral				
E	Mineral area of low				
B	Zone of clay accumulation				
C	Parent material				
R	Bedrock				

*Soil properties by horizon.*

**Iowa's NATURE SERIES** **LANDFORMS and GEOLOGY**

*Blackhawk County*

When you pass over a deep river valley from a rocky Iowa bluff, do you wonder why that valley is so deep? Do you wonder what the shallow ridges on the rock tell us about ancient oceans? These are the kinds of questions that geologists and geomorphologists ask every day as they unravel the story of how Iowa's geology and landforms came to be. Understanding Earth's past provides valuable insight into Earth's prospects for the future. Recognizing patterns in the distribution of different landforms and rock layers guides exploration for mineral and water resources and determines their sustainability. This guide to Iowa's Landforms and Geology presents an overview of the story. The story is organized roughly by age, beginning with the state's oldest features and rocks and ending with the youngest sediments, landforms, and water resources. Emphasis is placed on the formations and features that you can see directly along the trails in some of our state's public lands. Where possible, specific locations where you can visit rocks or features of interest on public land are mentioned. These locations are all compiled in a map in the accompanying website.

**Thinking and Talking Like a Geologist**

Before we dig in, let's agree on a few core concepts and terms. Looking at the drawing on this page, we see the ground surface represented on one side by solid rock, while on the other side it's a collection of loose particles. **Bedrock** is the solid rock, firmly attached to the underlying crust on which it formed. Places where bedrock is exposed at the ground surface, like in this drawing, or along a river bluff are outcrops. The loose particles on top of the bedrock are no longer referred to as bedrock because they have been detached from the source and transported to where it currently resides. This **unconsolidated sediment** is simply described according to the way it was transported and deposited: by wind, flowing water, or sliding glacier ice. Often, new rocks or sediments are formed on top of older rocks or sediments, leading to a sequence of geological materials that appears in a certain, systematic order. The order of layers stacked on top of one another is referred to as **stratigraphy**, and is often illustrated with a **stratigraphic column**.

Special thanks to Dr. Peter Moore for help developing this lecture and material.