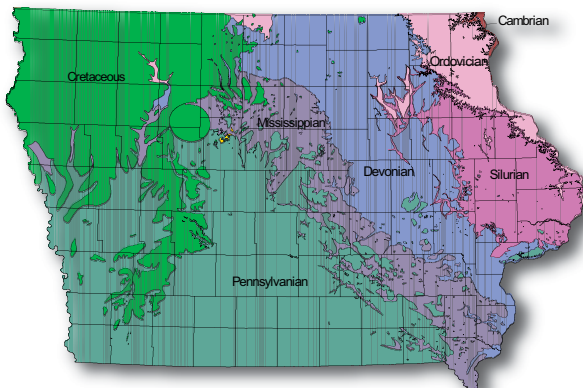


## Iowa's Bedrock Geology

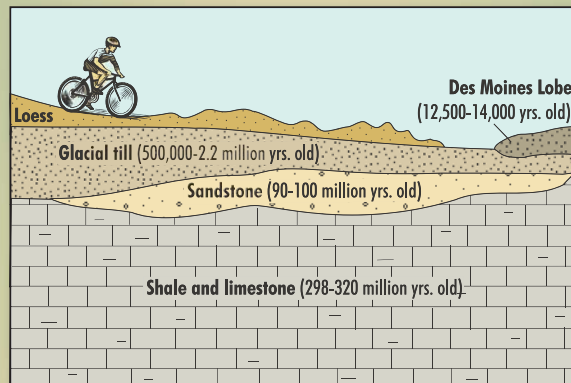


It might be hard to fathom now, but most of Iowa's geologic history was spent as part of a vast interior sea. That same sea covered much of the American Heartland and occurred in a warm environment. Iowa has not only been inundated with sea water. During other periods Iowa has also been dry land, a coastal swamp, and a vast river delta. This rich history is evident within the bedrock of Iowa, giving it alternating units of **limestone, coal, shale, and sandstone**.

A majority of Iowa's bedrock is limestone deposited during the Paleozoic (i.e., ancient life) Era from 251-542 million years ago. Geologists have divided the Paleozoic Era into seven periods. From oldest to youngest they are: the **Cambrian, Ordovician, Silurian, Devonian, Mississippian, Pennsylvanian, and Permian periods**. Iowa has extensive bedrock deposits from all of these periods except Permian, during which Iowa was mostly dry land.

Iowa was mostly dry land during the "Age of the Dinosaurs," a period which geologists refer to as the Mesozoic (i.e., middle life) Era, from 65-251 million years ago. Geologists have divided the Mesozoic Era into three periods. From oldest to youngest they are the **Triassic, Jurassic, and Cretaceous**. There are two significant Mesozoic deposits in the state: the Jurassic Period's gypsum deposits in Fort Dodge and the Cretaceous Period's Dakota Sandstone in north-west Iowa.

## Day 2 Milestones



**Start:** Harlan

**West Nishnabotna River:** 5.7 miles

**East Nishnabotna River:** 26 miles

**Middle Raccoon River:** 55.9 miles

**So. Iowa Drift Plain/Des Moines Lobe Boundary:**  
56 miles

**Dunbar Slough:** 64.5 miles

**North Raccoon River:** 78 miles

**Finish:** Jefferson – 83 miles

## For more information...

The USGS streamflow gaging network is an online, real-time network for stream stage information. There are over 140 of these gages in Iowa alone. The USGS stream gages work by recording stream stage data and transmitting it to nearby USGS offices. This information is then uploaded to the web to be viewed online. You can see the up-to-date river stages by visiting the USGS website at <http://waterdata.usgs.gov/ia/nwis/sw>.

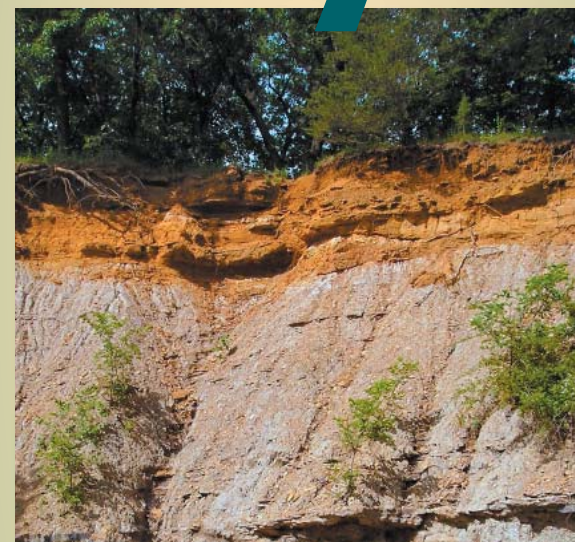
A more detailed version of the **Bedrock Geologic Map of Iowa** seen on the inside flap of this brochure is available online at: [www.igsb.uiowa.edu/gsbpubs/pdf/EM-19.pdf](http://www.igsb.uiowa.edu/gsbpubs/pdf/EM-19.pdf).

# R A G B R A I 2008

## Learn about the Land

# Day 2

Monday, July 21



## Iowa DNR – Geological and Water Survey

109 Trowbridge Hall  
Iowa City, IA 52242-1319  
(319)-335-1575  
[www.igsb.uiowa.edu](http://www.igsb.uiowa.edu)

## US Geological Survey

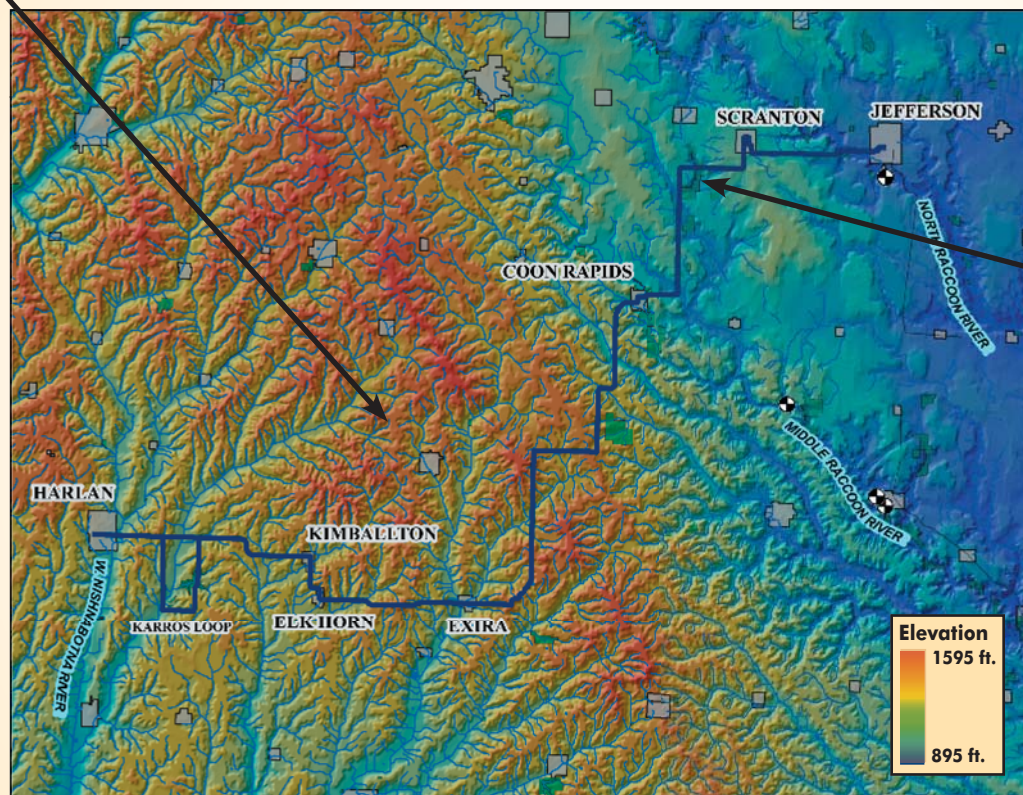
Iowa Water Science Center  
400 S. Clinton St.  
Iowa City, IA 52240  
(319) 337-4191  
<http://ia.water.usgs.gov>



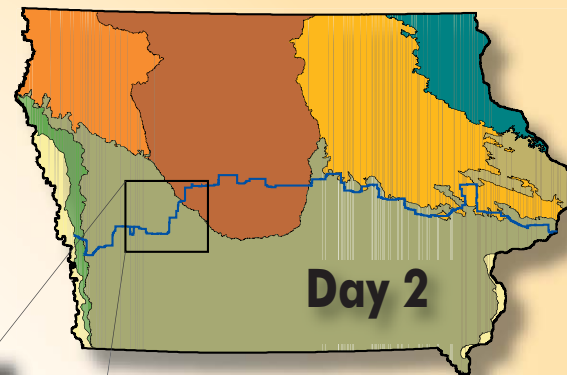
On today's ride we continue riding across the **Southern Iowa Drift Plain**. This landform region covers over 40% of the state and comprises most of southern Iowa. Over the last several million years Iowa was subjected to at least seven glacial advances. The last of these older advances occurred approximately 500,000 years ago. Since then the landscape has been subjected to stream erosion and from 12,500-24,000 years ago was mantled with a thick blanket of loess before being further eroded.

Exposures of the **Dakota Sandstone**, a unit from the "Age of Dinosaurs" (Cretaceous Period), can be seen at Coon Rapids. This sandstone can be seen along the Middle Raccoon River at Riverside Park as well as along Highway 141 a mile southeast of town. Similar sandstone exposures can be found southward along the river, particularly in the beautiful valley of the Whiterock Conservancy (photo on front cover).

Later today we will start our traverse of the **Des Moines Lobe** at Coon Rapids. Approximately 15,000-16,000 years ago a large glacial ice sheet split into several lobes that flowed south from Canada. One of these ice lobes, the Des Moines Lobe, rapidly advanced into the mid-continent about 14,000 years ago and halted at what is now the city of Des Moines. The Des Moines Lobe advanced into Iowa during a relatively warm period of time and likely slid along water at the base of the ice. As the glacier halted, rivers formed near the ice margins. These rivers are called **valley train river systems** and carried sediment laden meltwater away from the ice margin. Before you ride into Coon Rapids you will cross the Middle Raccoon River valley which drained the western flank of the Des Moines Lobe.



● USGS streamflow station  
■ Parks and Preserves



North of Coon Rapids you will turn right and head east on County Rd. E53. You will be riding through an area of hummocky topography as you approach **Dunbar Slough Management Wildlife Area**. This low-lying area functions as a **linked depression system** which is a highly permeable, preferential pathway for shallow groundwater movement to larger streams. These underground tunnel systems developed in stagnating glacial ice and served as an internal drainage system for massive amounts of meltwater, and still do today even after the glaciers have gone. During early settlement many of these interconnected systems of sloughs and wetlands were tiled and drained for conversion to productive farmland.

Today's route passes near Grand Junction where a future **ethanol plant** is being planned. Currently there are about 30 ethanol plants in Iowa that produce 2.2 billion gallons of ethanol each year. Fifteen new plants are being designed that would add another 1.4 billion gallons to Iowa's ethanol production. Most people don't realize how much water is needed to produce ethanol – four gallons of water for each gallon of ethanol. In Iowa almost all ethanol plants rely on groundwater for their source of water.