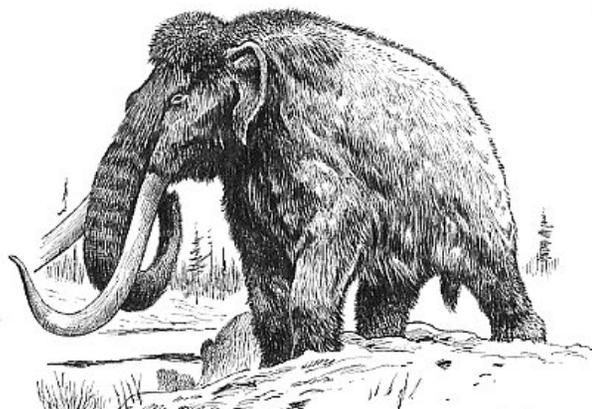
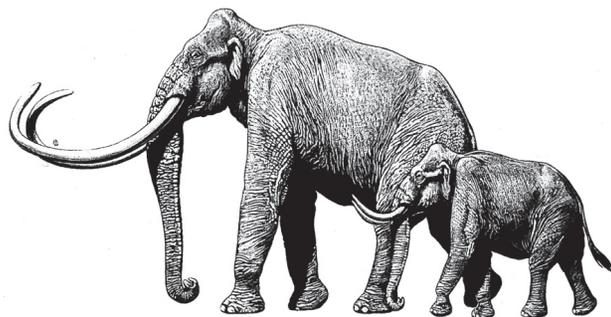


RAGBRAI Geo-pedia
Iowa Mammoths

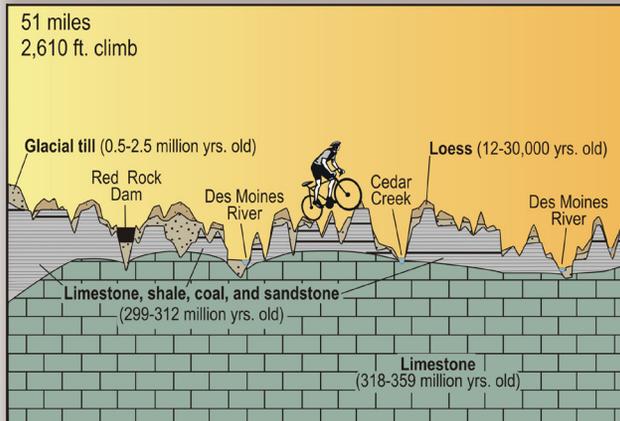


A variety of fossil bones from both a **woolly mammoth** (photo above) and a **Columbia mammoth** (photo below) were recently discovered and are currently being excavated near Oskaloosa. These early elephants, not directly related to modern elephants, lived during the most recent (Wisconsinan) glacial advance into Iowa (about 14,000 years ago) in a late glacial spruce parkland environment of boreal evergreen conifers, sedges, and steppe forbs. They were herbivores, with diets consisting of grasses, sedges, shrubs, and herbaceous plants (the Columbia mammoth probably also browsed on trees). The Columbia was the larger of the two, reaching heights of up to 13 feet and weights of as much as 9 tons, compared to the woolly which stood about 11 feet tall and weighed about 7 tons.



COVER PHOTO: The dam holding back Red Rock Lake is one mile long and is along today's route.

Day 5 Milestones



- Start:** Knoxville
- Red Rock Lake Dam:** 8.5 miles
- Des Moines River:** 18 & 42 miles
- Limestone Quarry:** 20 miles
- Wilcox Wildlife Area:** 26 miles
- Finish:** Oskaloosa – 51 miles



For More Information...

The IOWATER program is a statewide volunteer effort to help sample and keep tabs of Iowa's streams and rivers. If you would like to find out more on how to become a volunteer, visit:

www.iowater.net

Geology of the Red Rock Dam and Visitor Center Area, Marion County, Iowa

<https://programs.iowadnr.gov/igspubs/listPubs.aspx>

Water Quality Summary Data - Red Rock Reservoir

http://limnology.eeob.iastate.edu/lakereport/chemical_report.aspx?year=2012&lake_ID=100&bk=97#97

Books about Iowa's Land:

Iowa's Geologic Past - Three Billion Years of Change

by Wayne Anderson, University of Iowa Press, 1998

Landforms of Iowa

by Jean C. Prior, University of Iowa Press, 1991

RAGBRAI

Day 5

Thursday, July 25

2013

Learn about the Land



Iowa DNR - Geological and Water Survey

109 Trowbridge Hall

Iowa City, IA 52242

www.igsb.uiowa.edu

US Geological Survey - IA Water Science Center

400 S. Clinton St.

Iowa City, IA 52240

<http://ia.water.usgs.gov>

Iowa Limestone Producers Association

5907 Meredith Dr., Suite A

Des Moines, IA 50322

www.limestone.org



With an area of 19,000 surface acres, **Red Rock Reservoir** is Iowa's largest lake. The reservoir is operated by the U.S. Army Corps of Engineers on the Des Moines River. At over 50,000 acres, Red Rock Reservoir and associated lands constitute Iowa's largest single expanse of public lands. The Red Rock Dam was authorized by Congress for flood control purposes. After nine years of construction, the U.S. Army Corps of Engineers completed the mile-long earthen dam in 1969.

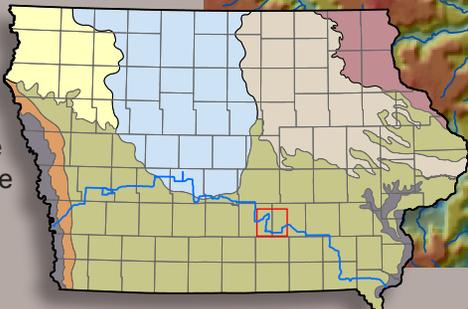
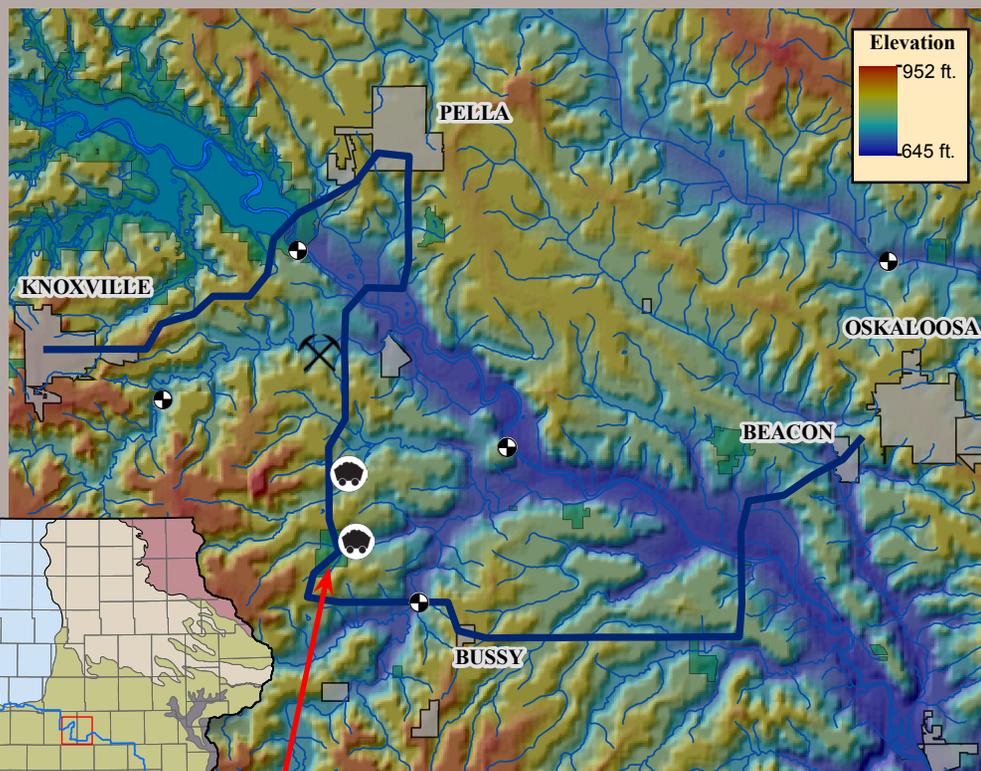


Iowa has a volunteer water monitoring network called **IOWATER**. Many teachers, classes, and citizens independently sample Iowa's water to help us discover more about water quality in our state. The main purpose of this program is to protect and improve Iowa's water quality by raising citizen awareness about Iowa's watersheds, supporting and encouraging the growth of Iowa's volunteer water monitoring communities, and promoting water monitoring activities as a means of assessing and understanding Iowa's aquatic resources.

While biking the road into Knoxville, be aware that the pavement aggregate is made of crushed limestone that came from deep underground limestone mines 400 feet below the ground. Marion County is the only county in Iowa that has two **underground limestone mines**, both in Mississippian age limestone of the Burlington and Gilmore City formations. The oldest mine is near Harvey and a newer mine is south of Knoxville. Entry into both mines is down a long sloping ramp to the rock layers that are blasted and conveyor belted to the surface. In central Iowa, limestone producers mine from these deep stone layers because suitable aggregate is not close enough to the land surface for conventional quarrying.

Iowa Limestone Producers Association

-  Quarry/Mine
-  Former Coal Mine
-  USGS streamflow station
-  Parks and Preserves



Today riders will pass through an area of Iowa where many **coal mines**, both underground and surface or strip mines, operated prior to regulations established in 1977. Along Co. Hwy T17 occasional eroded piles of gray shale, called spoil, are the most visible remnant of this once active

Iowa industry. The shale was removed in the process of strip mining the underlying coal, in some cases over sixty years ago. The acidity of the shale makes it difficult for plants to become established even over that lengthy period of weathering. Runoff from the exposed shale acidifies the water in remaining pits and ponds, yielding pH values as low as 2.0, making it impossible to establish normal aquatic biota. Any mining today would require extensive permitting and total **mine reclamation** would be required prior to permanent mine closure.

Many of the surface mines in this area have been reclaimed by leveling the site and filling the pits using materials that were stripped from the original mine site; beginning with shale and other rock materials, followed by glacial drift, and neutralizing the top portion of the spoil with about 40 bulk tons of ag-lime per acre. To complete the reclamation process, drainage control structures are added and cover plants are established. Post reclamation, the fragile land is managed for limited grazing or haying or wildlife habitat, like the Wilcox Wildlife Area northwest of the town of Bussy.



Before reclamation

After reclamation

