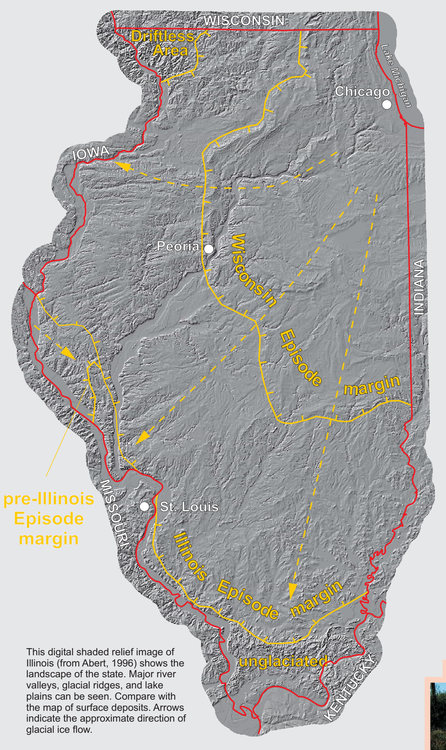
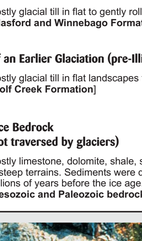
Geologic Road Map of Illinois:
Surface Deposits and Landscapes

David A. Grimley, Barbara J. Stiff, and Michael J. Andrew

Surface deposits compiled from Hansel and Johnson (1996), Lineback (1979), and Willman and Frye (1970)



This digital shaded relief image of Illinois (from Abert, 1996) shows the landscape of the state. Major river valleys, glacial ridges, and lake plains can be seen. Compare with the map of surface deposits. Arrows indicate the approximate direction of glacial ice flow.



A timetable of glacial and interglacial episodes during the last 1 million years in Illinois (modified from Killey, 1998).

glacial outwash

photo: David A. Grimley

Fast-flowing glacial meltwater streams deposited coarse sand and gravel (known as outwash) in front of glacier margins. This photo of outwash is from the margin of the next to last glaciation near Mt. Carroll in northwestern Illinois. Deposits such as this make excellent aquifers for groundwater supply when found below the water table. However, such aquifers are susceptible to contamination if not overlain by a fine-grained till or clay deposit to impede the infiltration of surface water contaminants.

river alluvium

photo: Leon R. Follmer

Postglacial river sediments range from clayey silt to sand and gravel. Faster flowing rivers deposited coarser layers of sand and gravel. During glacial times, many large, fast-flowing rivers carried large sediment loads. Today, the sand and gravel outwash deposited by these streams lies beneath more recent, finer-grained alluvium in many major river valleys, and below other glacial deposits elsewhere. These deposits are major sources of groundwater. In Illinois, about one-third of the total population and 90% of the rural population rely on groundwater for drinking.

sand dunes

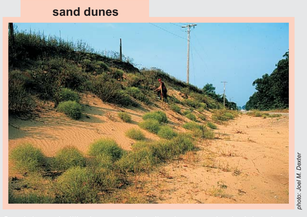


photo: Joel M. Dexter

Sand dunes in Illinois occur primarily where sandy glacial meltwater deposits were reworked by wind action. These dunes formed mainly towards the end of the last glaciation. Dune shape and orientation indicate prevailing winds from the west and northwest, just as the Midwest currently experiences during the late fall, winter, and early spring. This photo is from a dune field in northeastern Illinois near Kankakee; however, many dunes also occur in the western part of the state such as at Sand Ridge State Park. Agricultural fields in these areas generally require irrigation because the sandy soils are porous and thus do not retain water well.

dissected till plain (pre-Illinois Episode)

photo: Leon R. Follmer

On former till plains of the oldest glaciations, the landscape has been greatly eroded by streams cutting laterally and downwards into the earth. Wear and tear, over perhaps 450,000 years, has formed this hilly erosional landscape in Adams County, east of Quincy in western Illinois.

loess

photo: Leon R. Follmer

Loess deposits (windblown silt) were derived from fine-grained sediment that accumulated in major river valleys during glacial times. Strong winds picked up silts deposited by meltwater streams, forming large clouds of dust that settled out mainly to the east and southeast of the river valleys. Loess deposits, as much as 100 feet thick on bluffs proximal to major river valleys, quickly thin downwind to the east and southeast. Most of Illinois is covered by at least 2 feet of loessal silt, providing our state with some of the best agricultural soils in the world. This photo is from Calhoun County, west of Pere Marquette State Park.

Surface Deposits and Landforms

(Colors of map units match picture frames; map units in legend are grouped by age with oldest units at bottom and youngest units at top.)

Deposits of the Last Glaciation (Wisconsin Episode) and Recent Deposits

- Modern stream sediments in valleys (recent) and glacial outwash (last glaciation) on terraces and plains **[Cahokia and Henry Formations]**
- Lake silt and clay on flat plains or terraces (mainly last glaciation) **[Equality Formation]**
- Windblown sand in dune forms or thin sheets (last glaciation) **[Parkland Sand]**
- Windblown silt (loess) generally thicker than 20 feet blankets upland surfaces in these areas (last glaciation) **[Peoria and Roxana Silts]**
- Mostly glacial till (an unsorted mixture of clay, silt, sand, and gravel) in broad ridges (last glaciation) **[Wedron Group (in end moraines)]**
- Mostly glacial till in flat landscapes (last glaciation) **[Wedron Group (in till plains)]**

Deposits of the Next to Last Glaciation (Illinois Episode)

- Sand and gravel in outwash valleys and silt and clay in former glacial lake plains **[Pearl Formation and Teneriffe Silt]**
- Sand and gravel, with some till and clay, in glacial ridges **[Hagarstown Member of Pearl Formation]**
- Mostly glacial till in flat to gently rolling landscapes **[Glasford and Winnebago Formations]**

Deposits of an Earlier Glaciation (pre-Illinois Episode)

- Mostly glacial till in flat landscapes to rolling hills **[Wolf Creek Formation]**

Near-Surface Bedrock (in areas not traversed by glaciers)

- Mostly limestone, dolomite, shale, sandstone, and coal in hilly to steep terrains. Sediments were deposited and indurated millions of years before the ice age. **[Mesozoic and Paleozoic bedrock]**

Municipalities

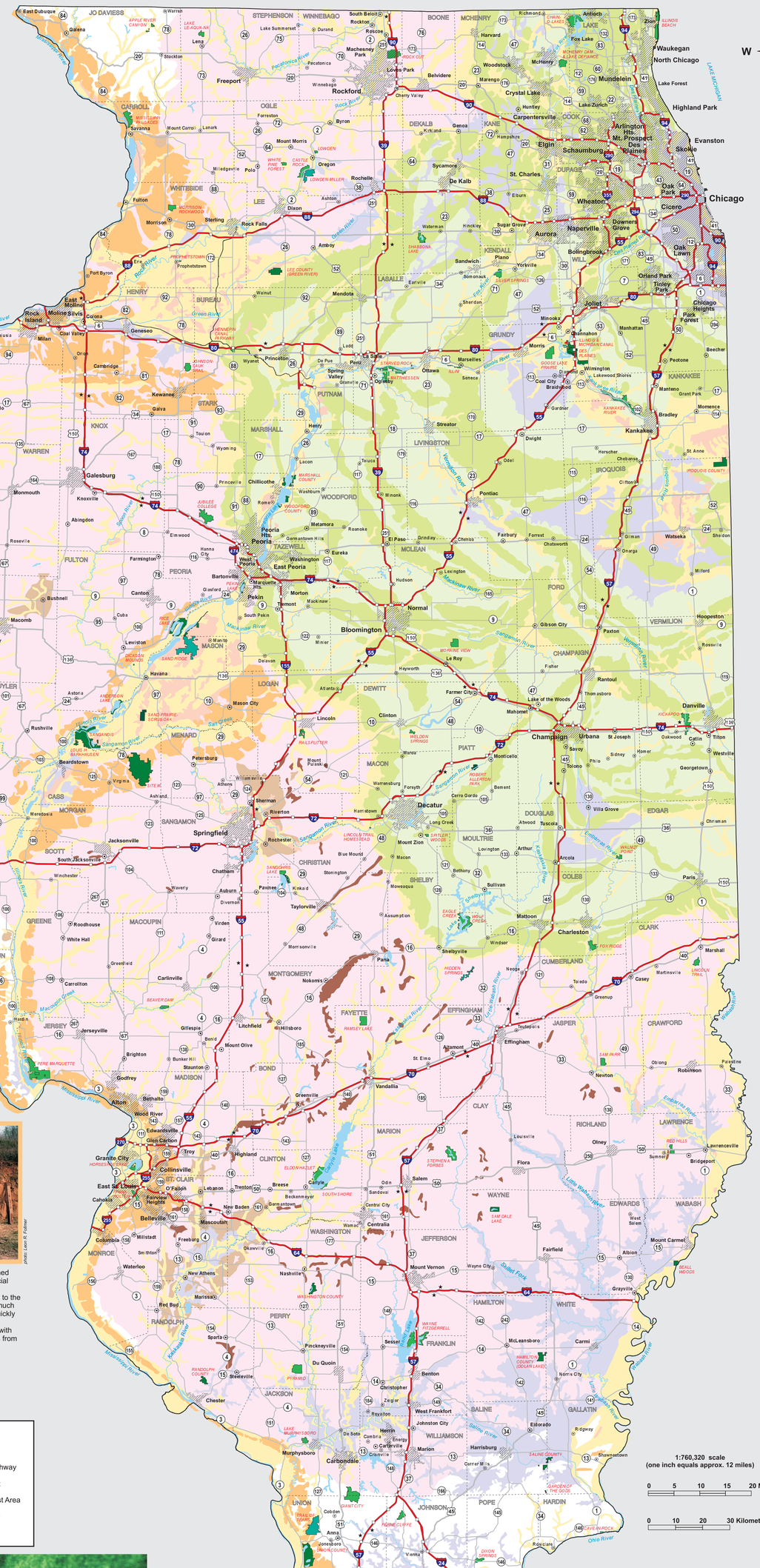
Chicago	Greater than 200,000
Champaign	50,000–200,000
Alton	20,000–50,000 (not shown in the Chicago Metro West Area)
Chillicothe	5,000–20,000 (not shown in Chicago Metro West or St. Louis Metro East Areas)
Galena	2,000–5,000 (not shown in Chicago Metro West or St. Louis Metro East Areas)
Warsaw	1,000–2,000 (not shown in Chicago Metro West or St. Louis Metro East Areas)

Parks and Recreational Areas

- MISSISSIPPI PALISADES — State Parks
- SAND RIDGE — State Forests
- ANDERSON LAKE — State Conservation Area
- SAND PRAIRIE-SCRUB OAK — Other Natural Areas

Roads

- 55 — Interstate Highway
- Interstate Exit
- Interstate Rest Area
- 50 — U.S. Highway
- 15 — State Route



1:760,320 scale
(one inch equals approx. 12 miles)

0 5 10 15 20 Miles

0 10 20 30 Kilometers

Illinois Map 10
2001

George H. Ryan, Governor

Department of Natural Resources
Brent Manning, Director
ILLINOIS STATE GEOLOGICAL SURVEY
William W. Shilts, Chief
Natural Resources Building
615 East Peabody
Champaign Illinois, 61820-6964

lake plain

photo: Leon R. Follmer

Downtown Chicago is built on the bed of a former glacial lake. During the latter phases of the last glaciation, Lake Michigan's outlet to the northeast was blocked at times by glaciers. Thus, on several occasions, the level of ancestral Lake Michigan near Chicago was many feet higher than today. The lake basin itself was originally formed and deepened during several glaciations by the scouring of ice flowing to the south.

moraine

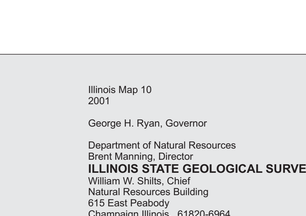


photo: Joel M. Dexter

This view looking north towards Moraine View State Park shows an end moraine (the ridge on the horizon). End moraines, such as this one east of Bloomington-Normal, mark places where an ice front has remained stationary for tens to hundreds of years. In Illinois, end moraines contain largely unsorted sediment (till), a mixture of clay, silt, sand and gravel, deposited by moving or melting ice. These ridges, which form transverse to the ice flow direction, outline the shape of former ice lobes.

till plain (Wisconsin Episode)

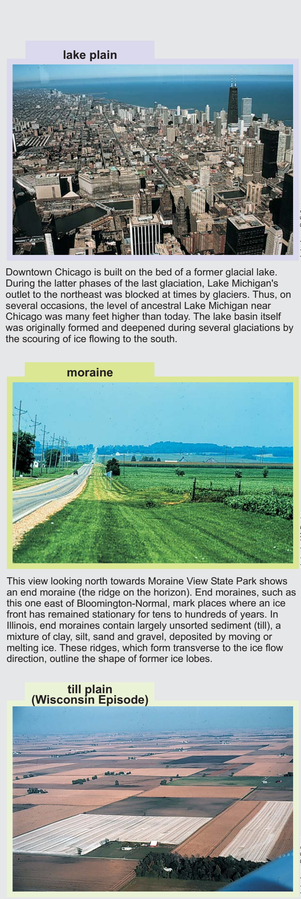


photo: Leon R. Follmer

This aerial view of a till plain of the last glaciation (Wisconsin Episode) is from Champaign County, east-central Illinois. Erosion of former hills by glaciers and filling in of valleys with glacial deposits contributed to the flatness of this landscape. Washing of sediment into former lakes and low areas during permafrost conditions also contributed to the flatness. The landscape has remained virtually unchanged because, from a geological standpoint, there has been little time for erosion (only 18,000 years since glaciation here).

ridged drift

photo: Leon R. Follmer

The low ridge in the distance is composed largely of sand and gravel, deposited by water flowing in crevasses or in channels beneath glaciers. When the ice melted away, elongate hills or ridges were left behind because of the immense quantity of stream sediment and other glacial sediments deposited here. These ridges, common in south-central Illinois, are oriented in the direction of ice flow. This photo is from Logan County northeast of Springfield.

till plain (Illinois Episode)

photo: Leon R. Follmer

The till plain of the next to last glaciation (Illinois Episode) is quite flat but has less extensive areas of flat land than the till plain of the last glaciation (Wisconsin Episode). More time for erosion by streams has led to a somewhat more dissected landscape. The last glacier in this area melted away approximately 130,000 years ago.

bedrock

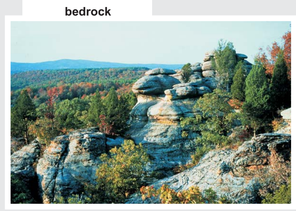


photo: Joel M. Dexter

Spectacular scenery in Garden of the Gods State Park where erosion of sandstone bedrock outcrops has created cliffs and steep canyons. Glaciers never reached this far south in Illinois, which explains the high relief of this area—more time (millions of years) has been available for weathering and stream erosion to carve the landscape. This photo also shows what much of Illinois may have looked like just prior to glaciation.

Data Sources

Near-surface geologic deposits were compiled from Hansel and Johnson (1996), Lineback (1979), and Willman and Frye (1970). Areal extents of municipalities, recreational areas, and roads were obtained from the Illinois GIS (Geographic Information System) database (1996). This GIS data can be aquired from *http://www.isgs.uiuc.edu/nsdihome.*

Acknowledgments

Many helpful suggestions for the text were provided by ISGS staff, particularly Ardith Hansel, Myrna Killey and Jon Goodwin. Leon Follmer and Joel Dexter provided many of the photos which surround the map. Pam Carrillo immensely helped in designing and drafting the layout. Don Luman and Jane Domier provided helpful cartographic advice.

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Abert, C.C. (1996), Shaded Relief Map of Illinois: Illinois State Geological Survey Illinois Map 6, Scale 1:500,000.

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Lineback, J.A. (1979), Quaternary Deposits of Illinois (Map): Illinois State Geological Survey, Scale 1:500,000.

Willman, H.B., and J.C. Frye (1970), Pleistocene Stratigraphy of Illinois: Illinois State Geological Survey Bulletin 94, 204 p.

For Further Reading

Killey, M.M (1998), Illinois' Ice Age Legacy: Illinois State Geological Survey GeoScience Education Series 14, 66 p.

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Back photo: unglaciated landscape in southernmost Illinois
Front photo: glaciated landscape east of Bloomington-Normal

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