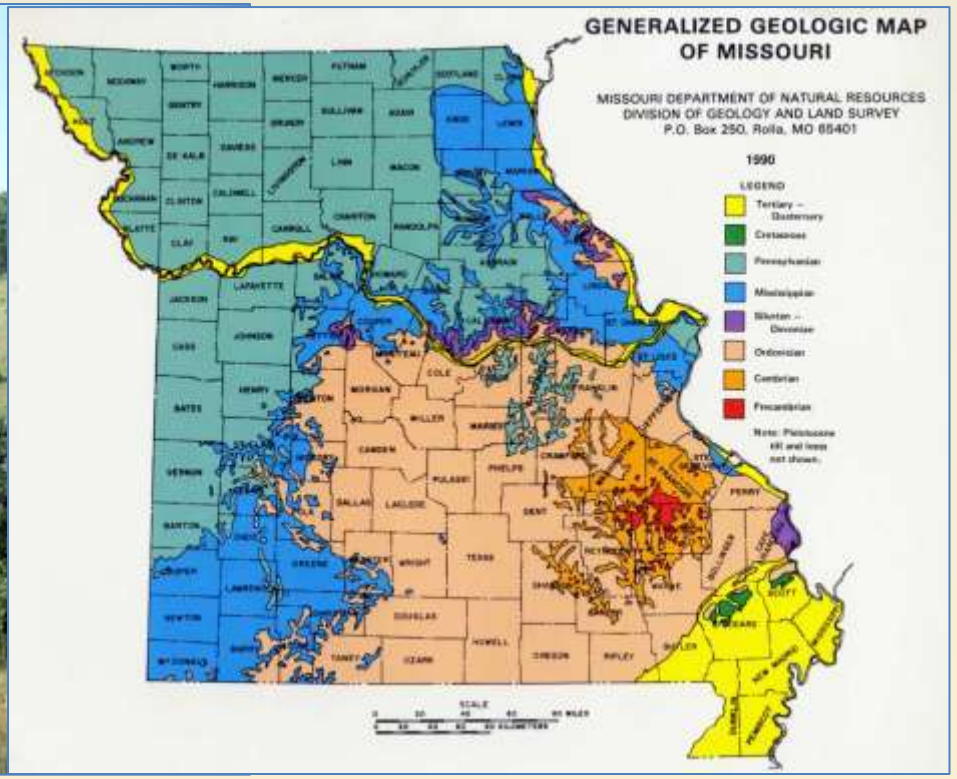
Missouri Geography, Vegetation, and Natural Regions

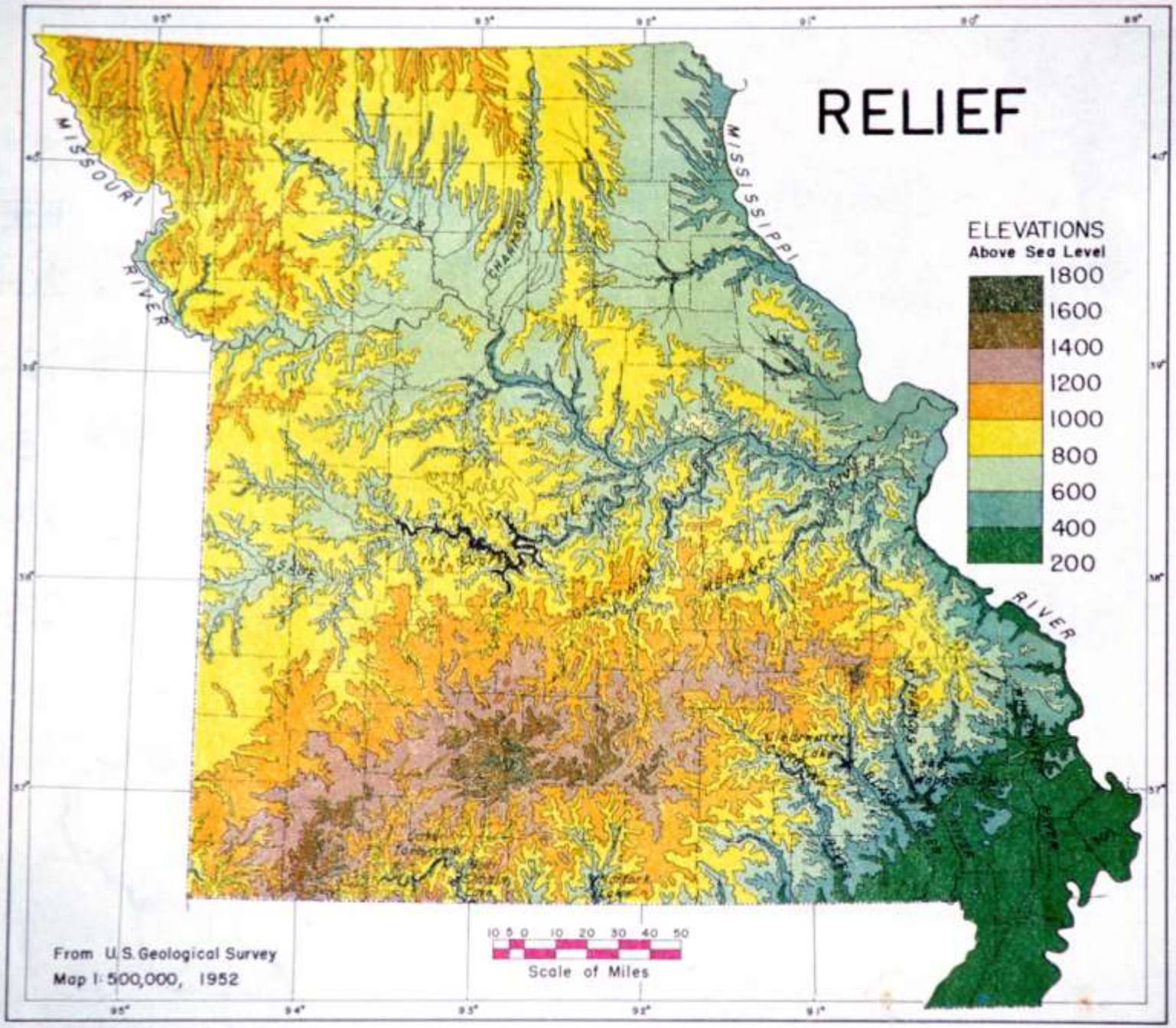
David Bogler



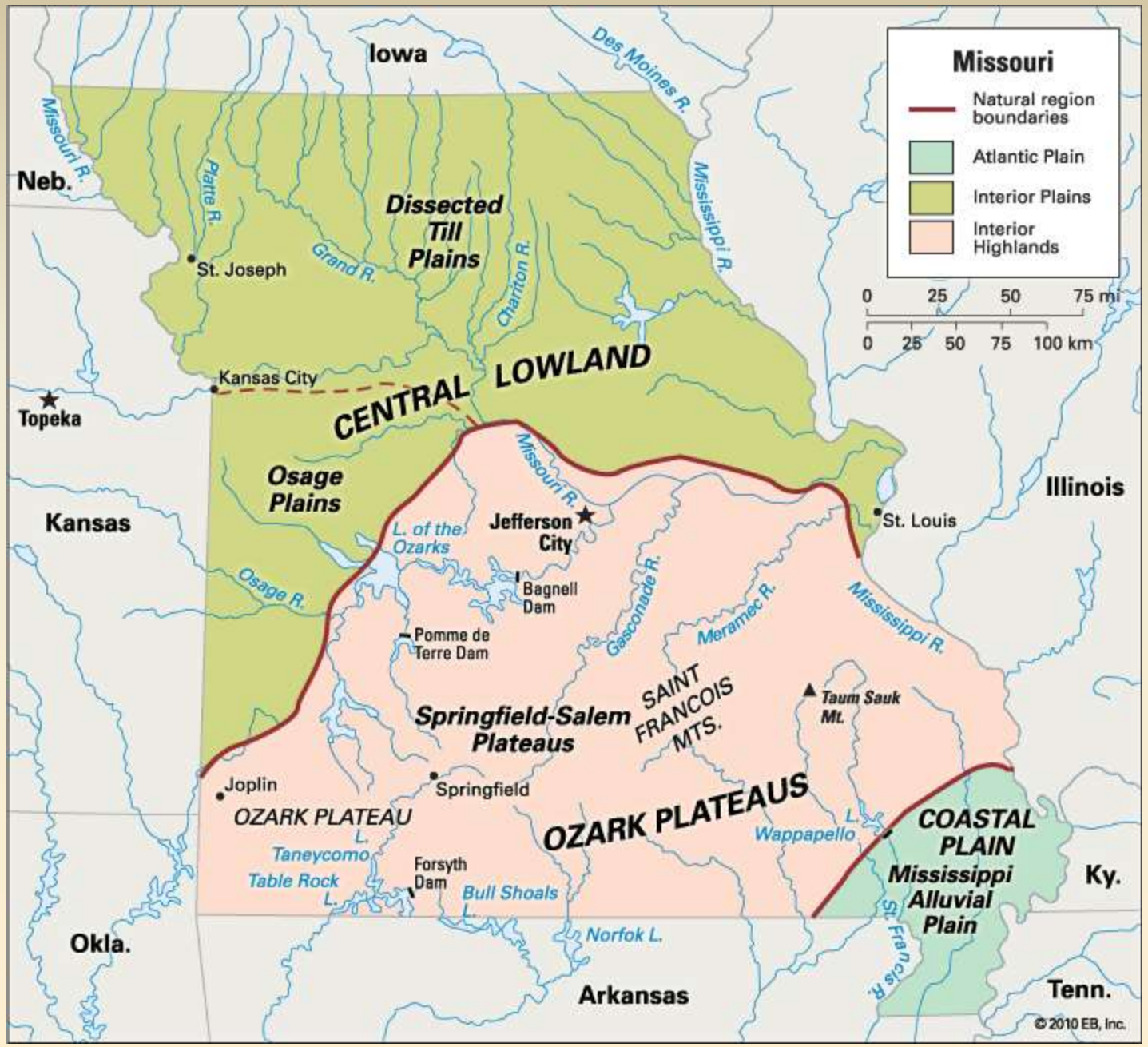

THE
MISSOURI WALTZ
MISSOURI
DAY

Some General Information about Missouri

- 19th largest state in area, 69,697 square miles.
- Population about 5.2 million, mostly in St. Louis and K.C.
- 114 Counties (St. Louis separate)
- Major Crops- soybeans, corn, wheat, cotton, sorghum, rice
- Highest point – Taum Sauk Mountain, 1,772 feet; Low point 230 feet


RELIEF
ELEVATIONS
Above Sea Level
1800
1600
1400
1200
1000
800
600
400
200
MISSOURI RIVER
MISSISSIPPI RIVER
From U.S. Geological Survey
Map 1:500,000, 1952
10 5 0 10 20 30 40 50
Scale of Miles

Natural Regions of Missouri


Missouri
Natural region boundaries
Atlantic Plain
Interior Plains
Interior Highlands
0 25 50 75 mi
0 25 50 75 100 km
Iowa
Des Moines R.
Missouri R.
Neb.
Platte R.
Dissected Till Plains
Grand R.
St. Joseph
Chariton R.
Mississippi R.
Kansas City
CENTRAL LOWLAND
Topeka
Osage Plains
Missouri R.
Illinois
Kansas
L. of the Ozarks
Jefferson City
St. Louis
Osage R.
Bagnell Dam
Gasconade R.
Meramec R.
Mississippi R.
Pomme de Terre Dam
SAINT FRANCOIS MTS.
Springfield-Salem Plateaus
Taum Sauk Mt.
Joplin
Springfield
OZARK PLATEAU
OZARK PLATEAUS
L. Wappapello
COASTAL PLAIN
Taneycomo L.
Table Rock L.
Forsyth Dam
Bull Shoals L.
Mississippi Alluvial Plain
Ky.
Okla.
Norfok L.
St. Francis R.
Arkansas
Tenn.
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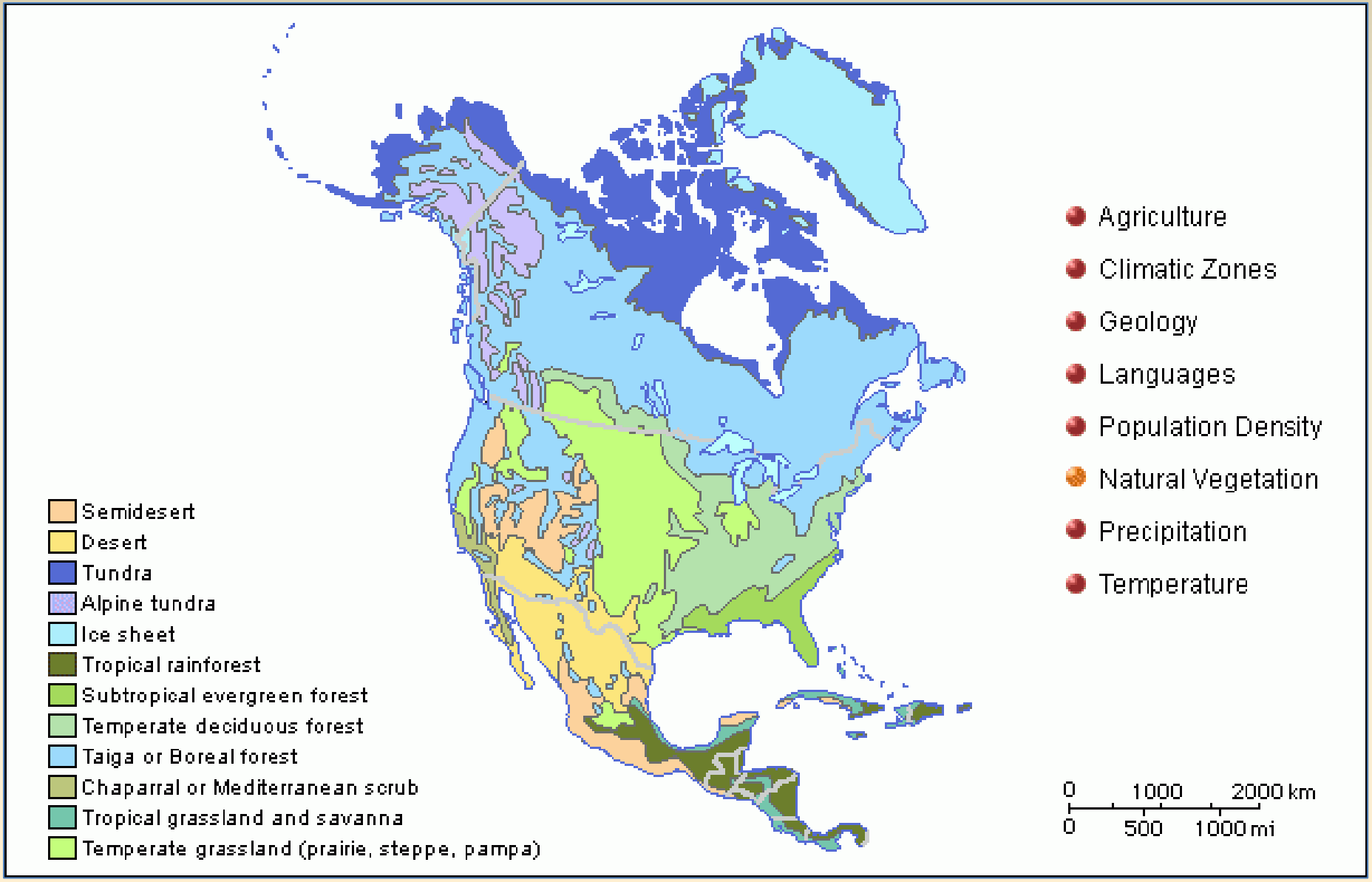
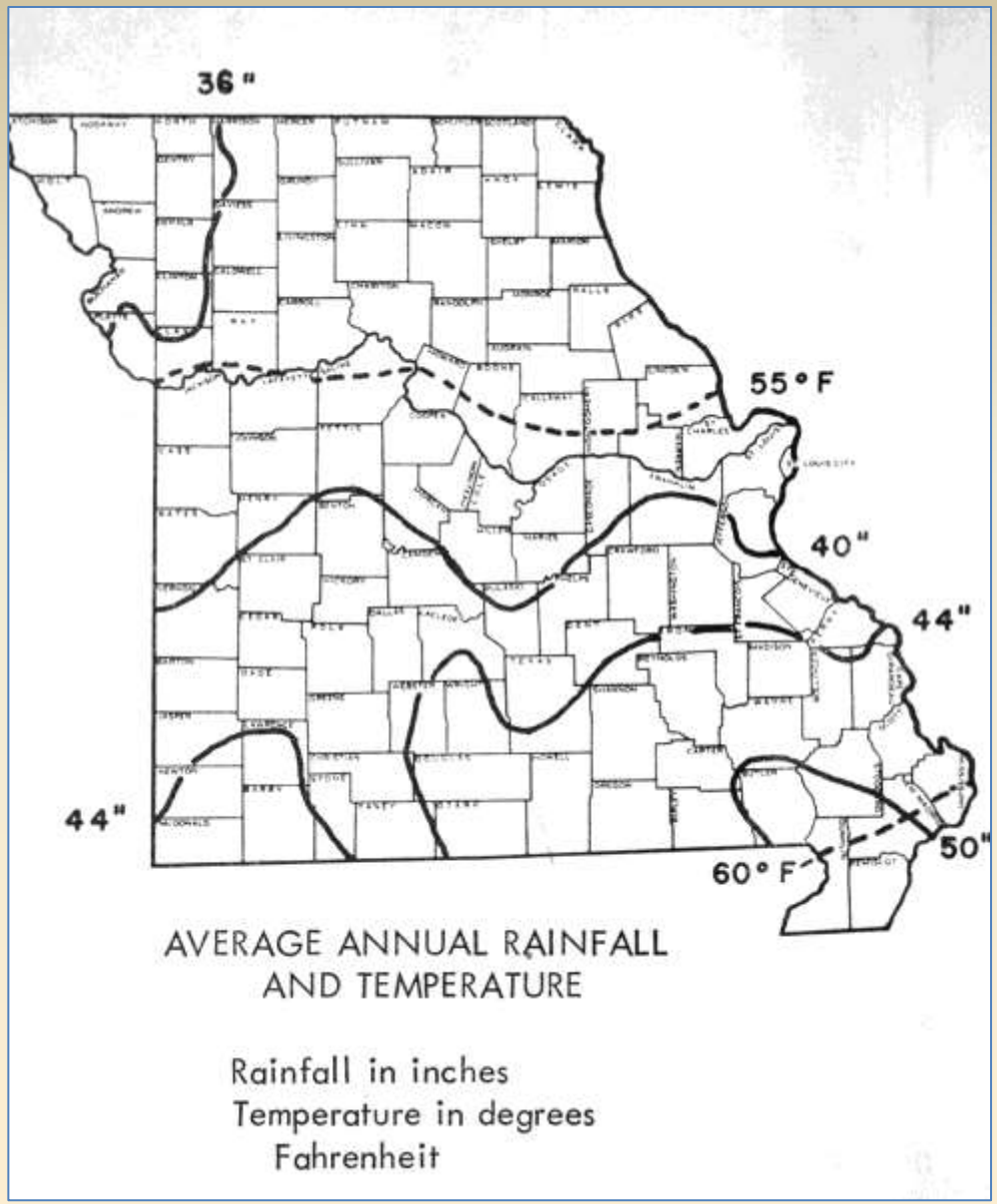
Part 1: Geography and Vegetation

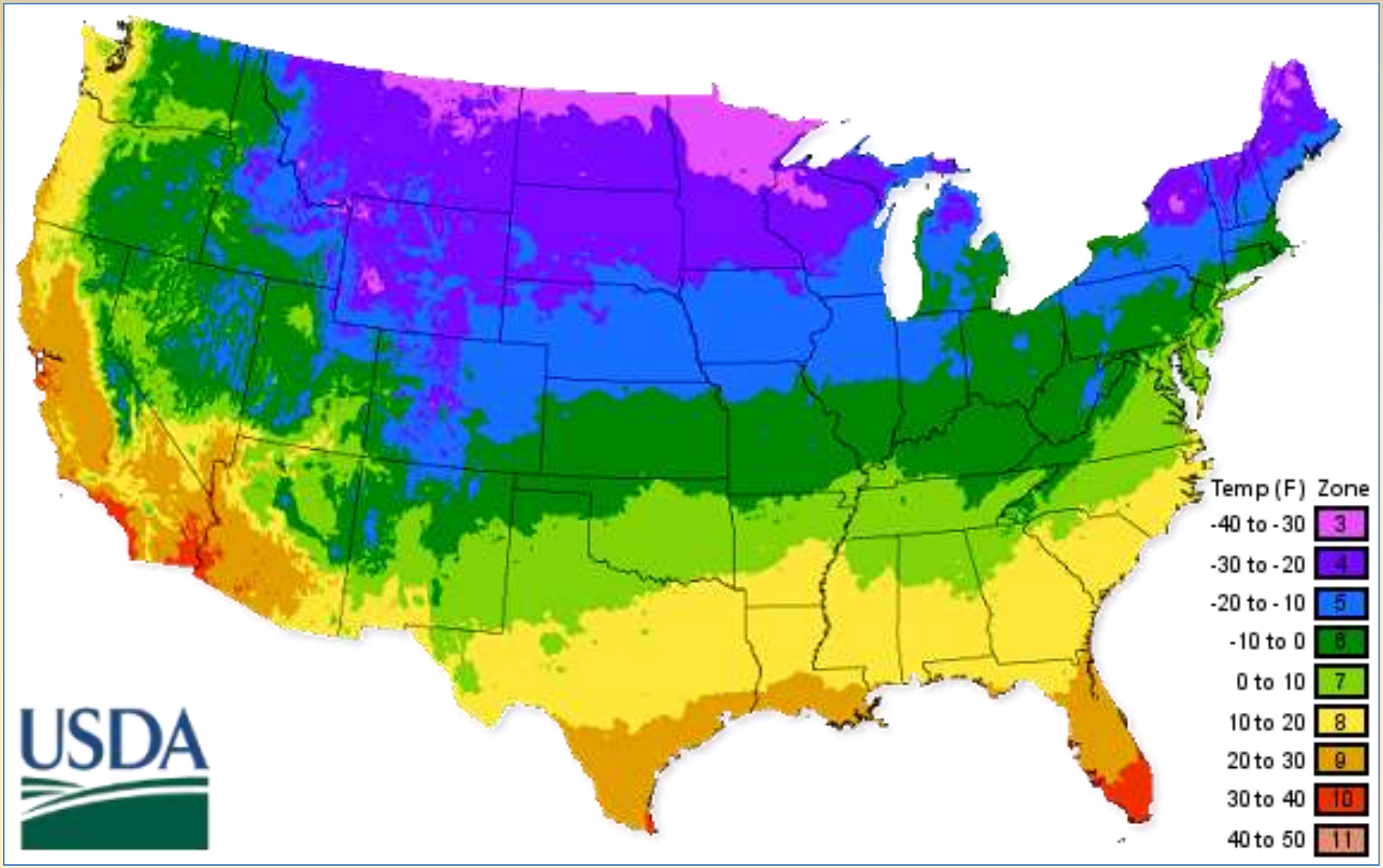


Missouri Climate:

- Somewhat harsh, mid-continental,
- Not tempered by oceans
- Summers hot, humid
- Winters cold, windy, light snow
- Pleasant Spring and Autumn



USDA Plant Hardiness Zones - 2012



Based on average annual lowest temperature

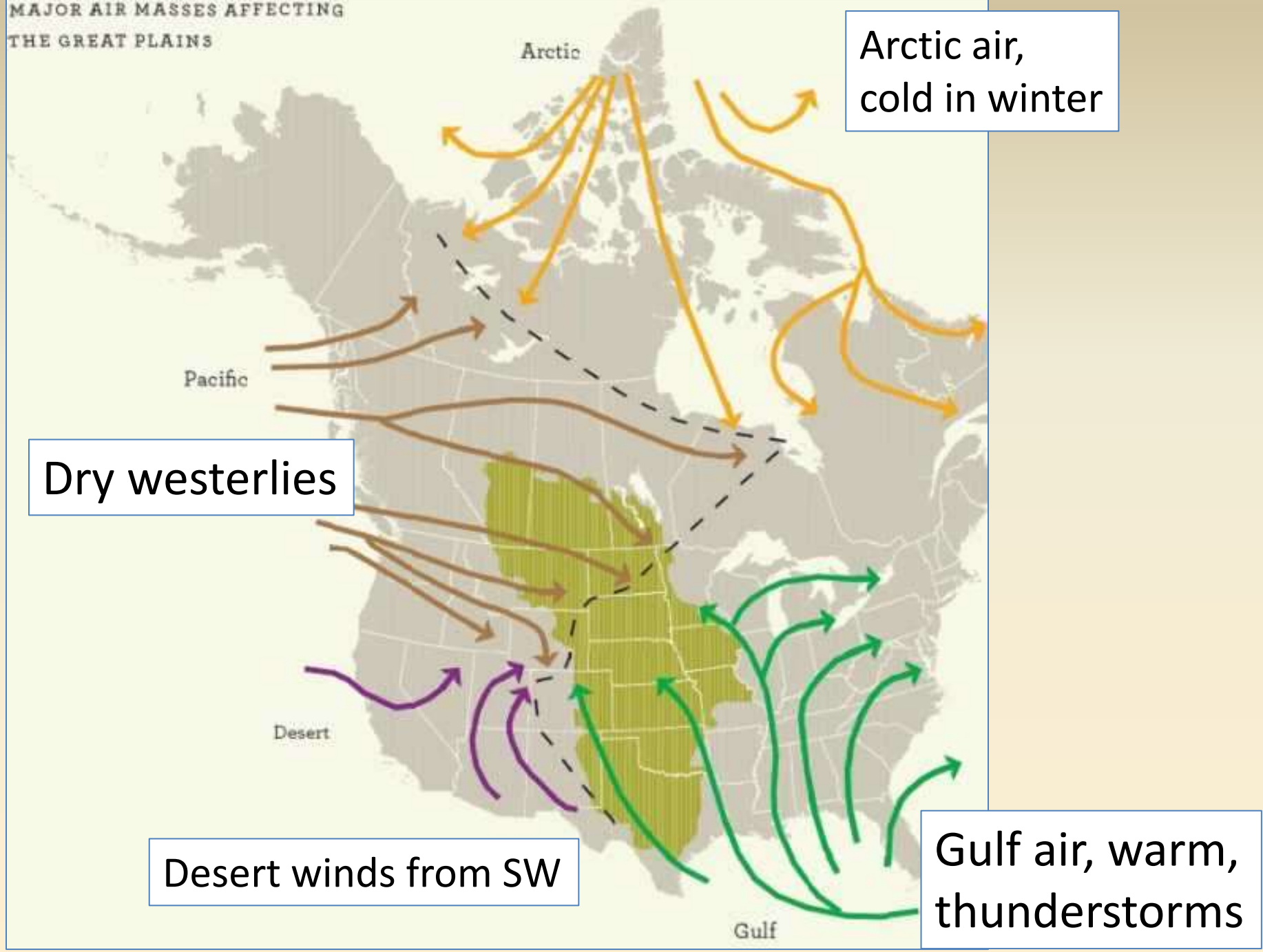
Hardiness Zones

- Average annual lowest temperature.
- Crucial factor in the survival of plants.

Climate Change?

- Zones 5 degrees warmer than in the 1996 map.
- St. Louis moved from 6a to 6b
- Kansas City and Columbia shifted from 5b to 6a.

2012 Updated Map

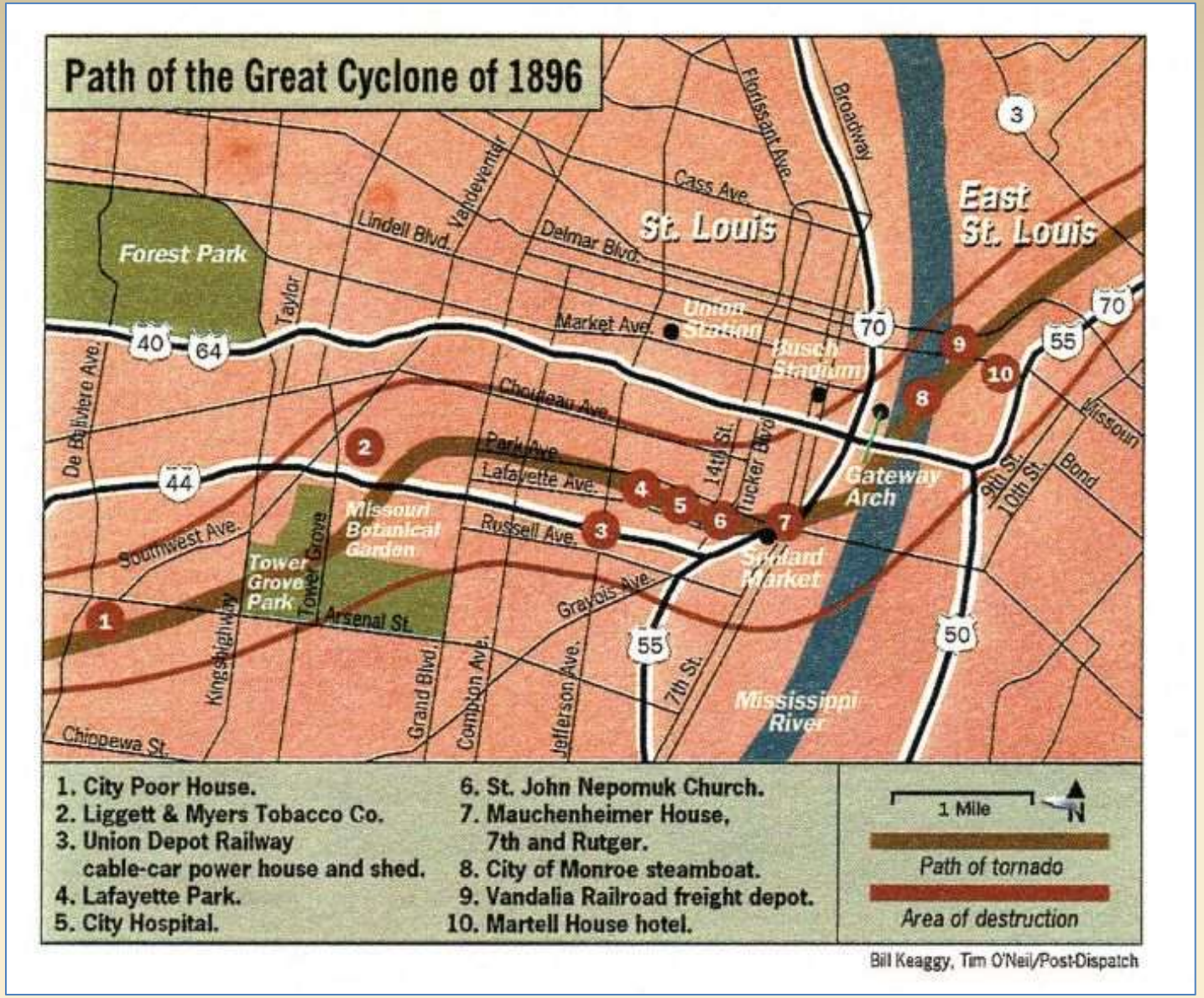

MAJOR AIR MASSES AFFECTING
THE GREAT PLAINS
Arctic
Pacific
Desert
Gulf
Arctic air,
cold in winter
Dry westerlies
Desert winds from SW
Gulf air, warm,
thunderstorms

Tornados

- Unstable air masses, shearing
- Rotating, funnel-shaped cloud, up to 300 mph

Joplin, Missouri, May 22, 2011, 158 fatalities

Tornado Hits MBG, 1946



The route of the Great Cyclone, a super tornado that killed 137 in St. Louis and 118 in East St. Louis on the late afternoon of May 27, 1896. The storm is the third-deadliest single tornado on record in the United States. (Post-Dispatch graphic produced in 1996)

Ecoregions of the U.S.

Missouri – mixture of dry temperate plains and mesic southern forests

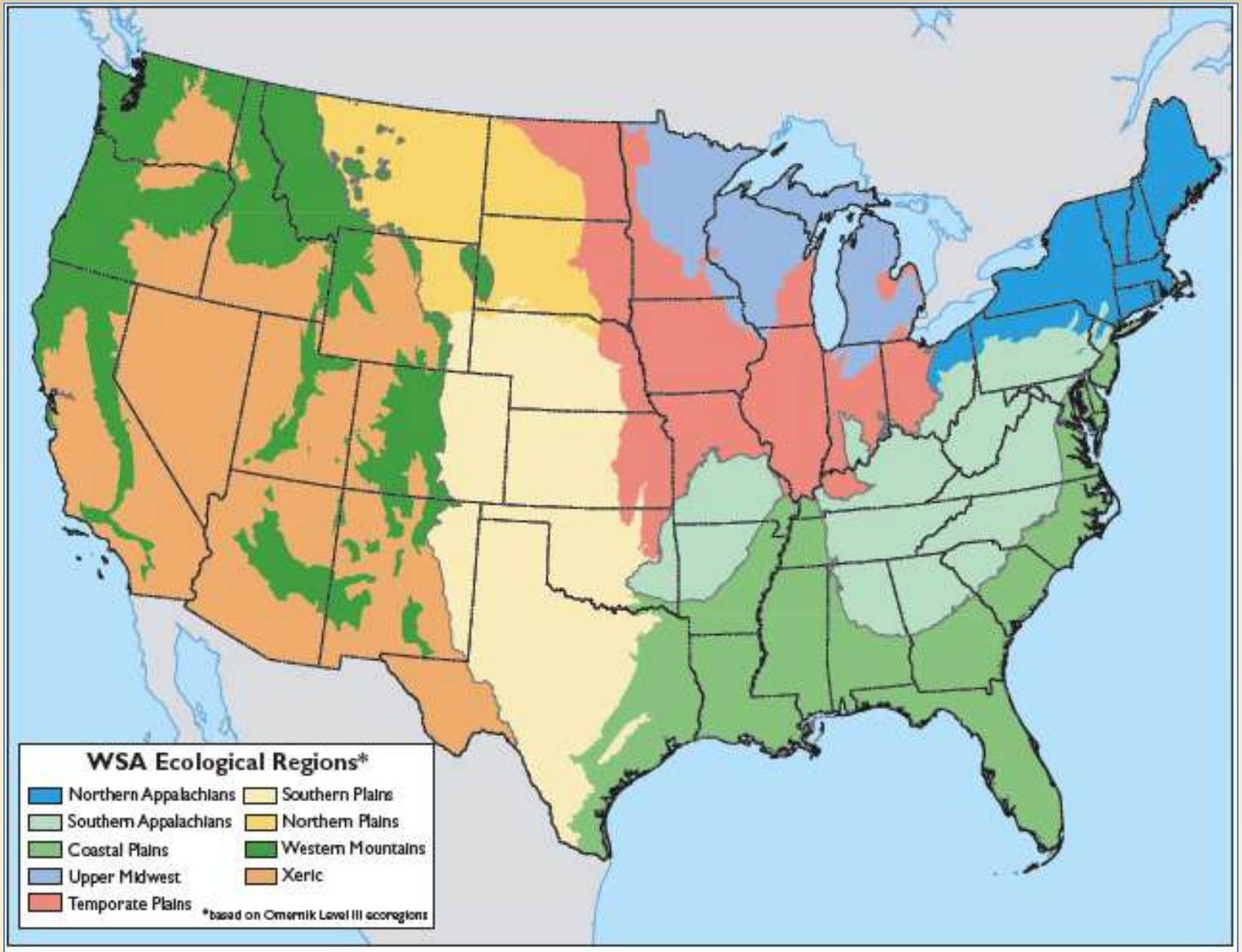
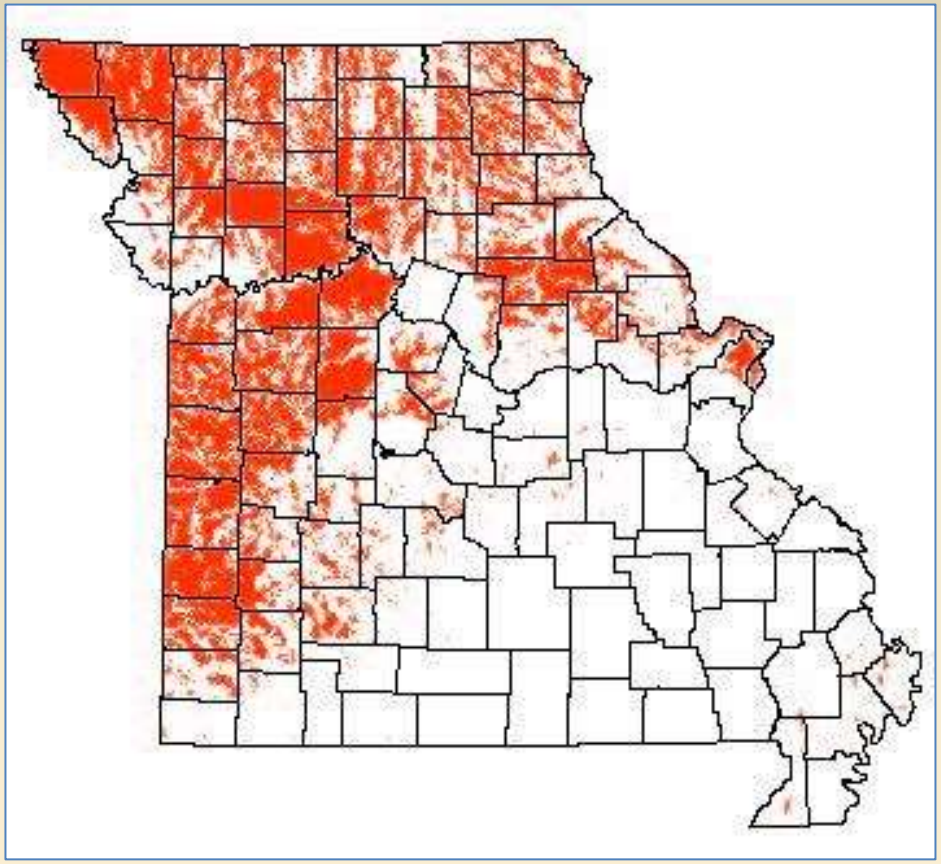


Figure 25. Ecoregions surveyed for the WSA (U.S. EPA/WSA).

Mo-Ka Prairie

Mesic Woods – Babler State Park

Pre-settlement Prairie



Pre-settlement Forest

Savannah – open forest with prairie/glade species

Forests—

- Relatively closed canopy
- Vertical structure :

  -canopy trees

  - medium to small trees

  -shrubs

  -ground flora

Taum Sauk State Park, Iron County

Wet Forests

Wolf Bayou Conservation Area, Pemiscot County

Big Oak Tree State Park, Mississippi County

From Swamps
to
Bottomland Forests

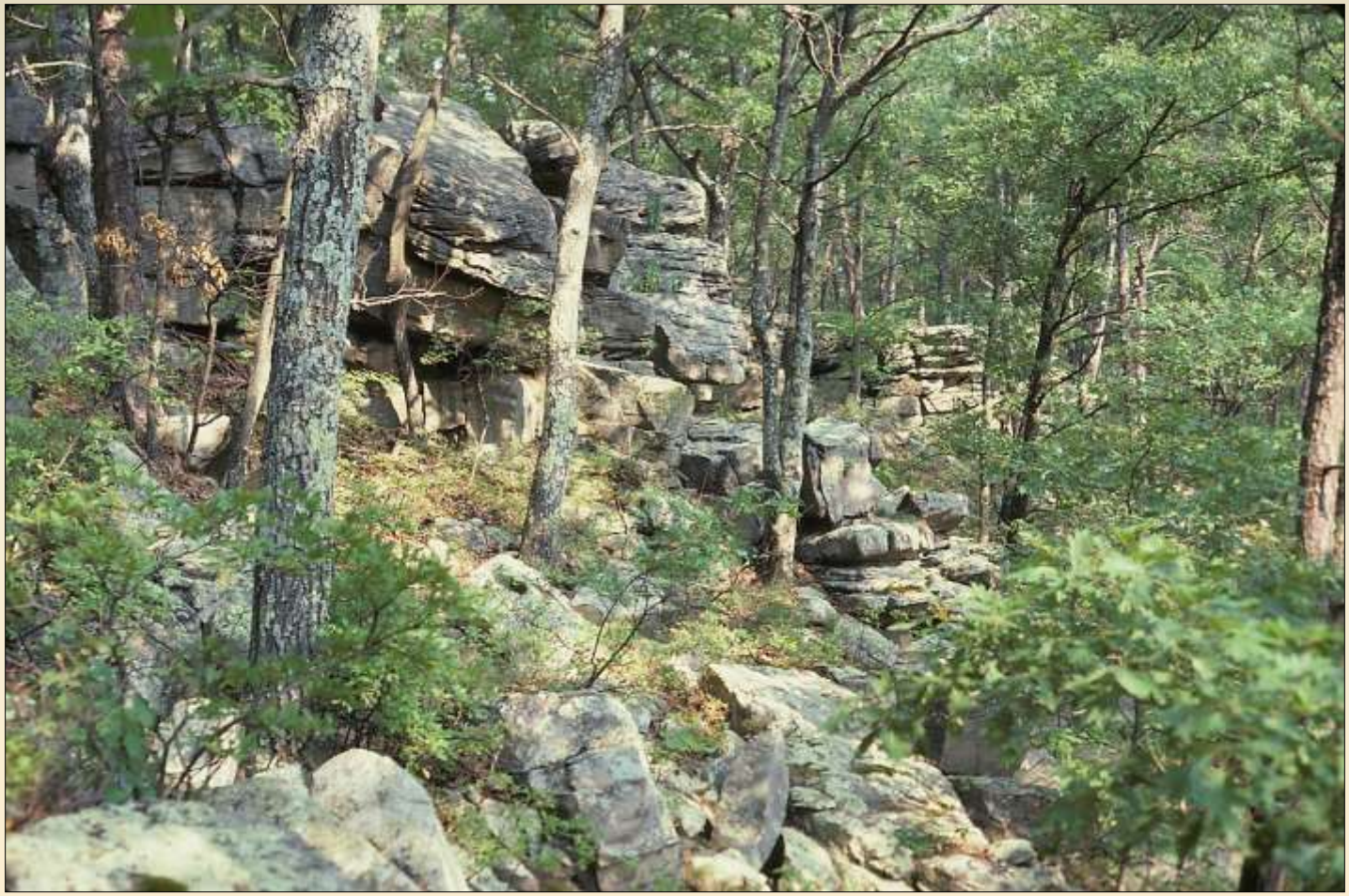
Castlewood State Park, St. Louis County

Hawn State Park, Ste. Genevieve County

Mesic Forests

Dry Forests

Hawn State Park, Ste. Genevieve County



Dry Forests

Luzula campestris (wood rush)

Antennaria parlinii (pussy toes)

Oxalis violacea (purple wood sorrel)

Dry Forests

Vaccinium arboreum (farkleberry)

Mesic Forests

Asarum canadense (wild ginger)

Uvularia grandiflora (common bellwort)

Stylophorum diphyllum (wood poppy)

Mesic Forests

Rhododendron prinophyllum (wild azalea)

Cornus canadensis (flowering dogwood)

Wet Forests

Iris fulva (copper iris)

Impatiens pallida (pale touch-me-not)

Savannas and Woodlands—

- An ecotone
- Incomplete canopy
- Less vertical structure :
  -canopy trees
  - few shrubs
  - ground flora

Echinacea paradoxa (yellow coneflower)

Ha Ha Tonka State Park, Camden County

Prairies—

No canopy (few trees)

Vertical structure :

- few shrubs
- ground flora

Pershing State Park, Linn County

Cook Meadow Preserve (TNC), Barton County

Helton Prairie Natural Area, Harrison County

Prairies on special substrates—

Loess Hill Prairie

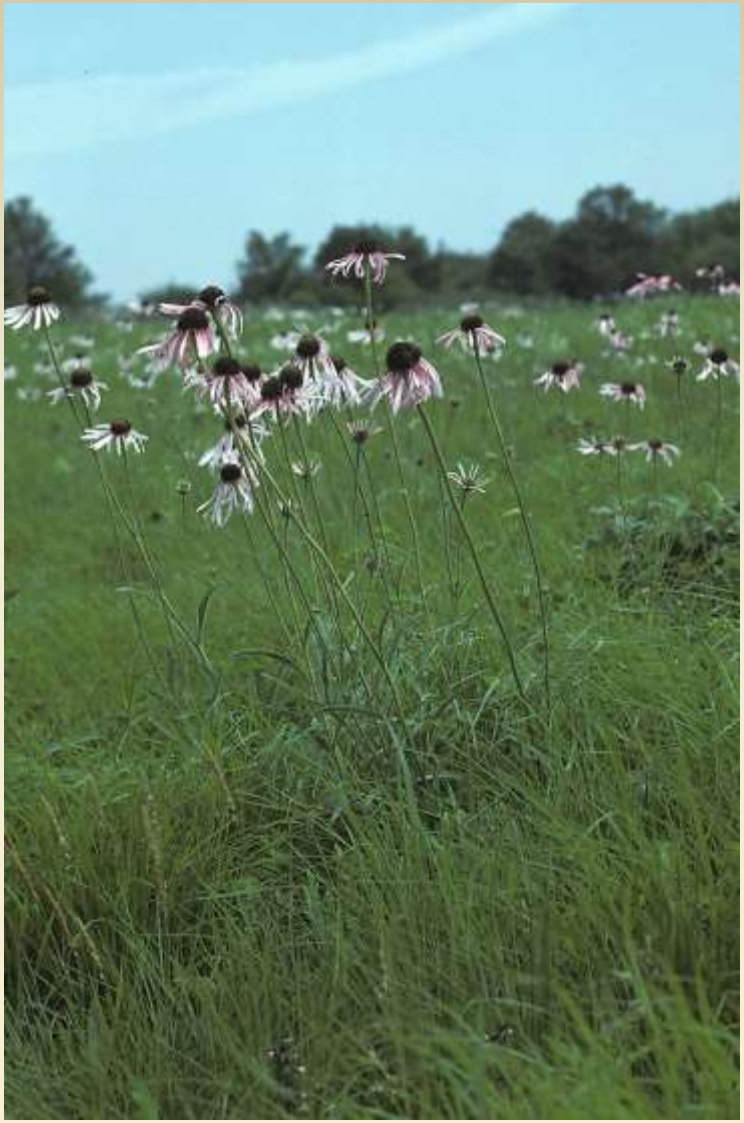
Near Sikeston (private property)
New Madrid County

Star School Hill Prairie Conservation Area
Atchison County

Sand Prairie

Prairies

left to right:
Rudbeckia hirta (common black-eyed Susan)
Asclepias tuberosa (butterfly weed)
Amorpha canescens (lead plant)



Echinacea pallida
(pale purple coneflower)

Prairies—
The top three families

Poaceae
Schizachyrium scoparium (little bluestem)

Fabaceae
Tephrosia virginiana (goat's rue)

Asteraceae
Helianthus mollis (ashy sunflower)

Prairies

Silene regia (royal catchfly)

Delphinium carolinianum
(prairie larkspur)

Camassia angusta (wild hyacinth)

Prairies

Penstemon digitalis (smooth beardtongue)

Dodecatheon meadia (shooting star)

Tucker Prairie – Controlled Burn

Clair Kucera

Prairie Burn Management

Tucker Prairie
Boone County

Missouri Prairie Foundation: Why Prairie Matters

https://www.youtube.com/watch?v=7gwVEnq20Mc

Glades—

Similar in some ways to upland prairies, but

thin soil/exposed bedrock; droughty vs. waterlogged

Valley View Glades Natural Area, Jefferson County

Lichen Glade Preserve (TNC), Dade County

Substrate important—
calcareous vs. acidic

Peck Ranch Conservation Area, Carter County

Glades – Shaw Nature Reserve

Glades

Glandularia canadensis
(rose verbena)

Oenothera macrocarpa
(Missouri evening primrose)

Lithospermum canescens
(hoary puccoon)

Glades

Opuntia humifusa
(common prickly pear)

Manfreda virginica (false aloe)

Tradescantia tharpii (wild crocus)

Glades

Ruellia humilis wild petunia)

Chionanthus virginicus (fringe tree)

Glades on uncommon substrates such as chert and shale

Wildcat Glade (chert), City of Joplin, Newton County

Cliffs (bluffs)—

Plants present influenced by substrate and exposure

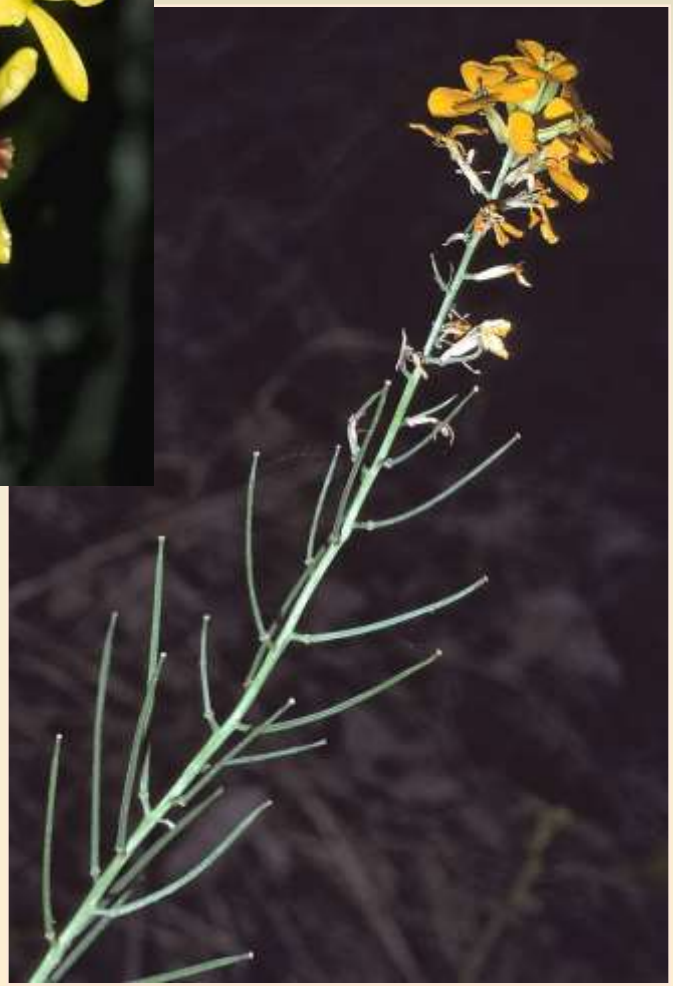
Bee Bluff, near Noel,
McDonald County

Calcareous vs. acidic

Hickory Canyons Conservation Area,
Ste. Genevieve County

Ribes odoratum (golden currant)

Cliffs



Erysimum capitatum (western wallflower)

Wetlands—

Plants present require continuous soil moisture

Standing Water

Wolf Bayou Conservation Area,
Pemiscot County

Ten Mile Pond Conservation Area
Mississippi County

Wetlands—
Running Water

Riverlands Environmental
Demonstration Area
St. Charles County

Blue Spring Natural Area
Shannon County

Jacks Fork River
Shannon County

Castlewood
State Park
St. Louis County

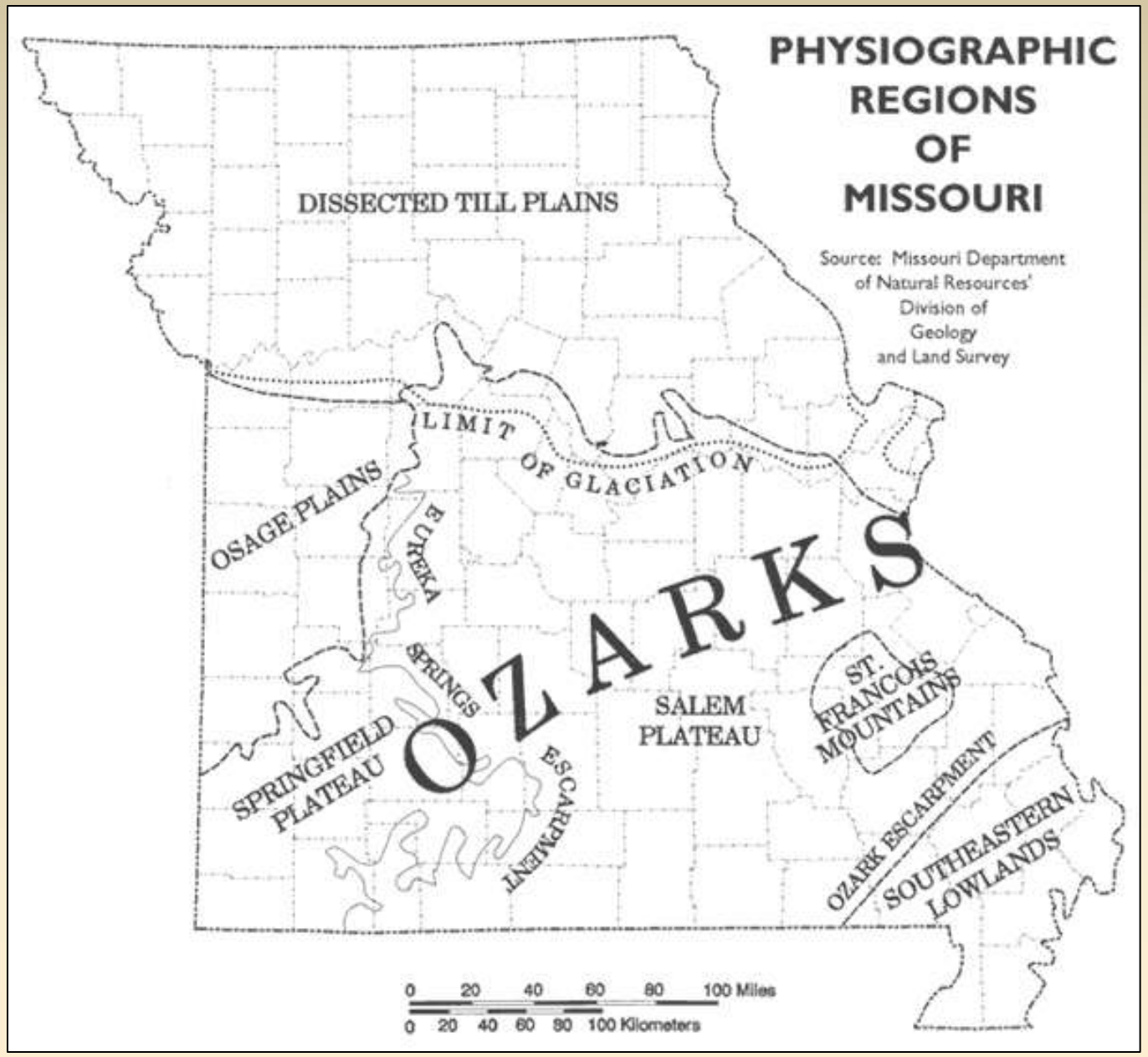
Wetlands—

Special types

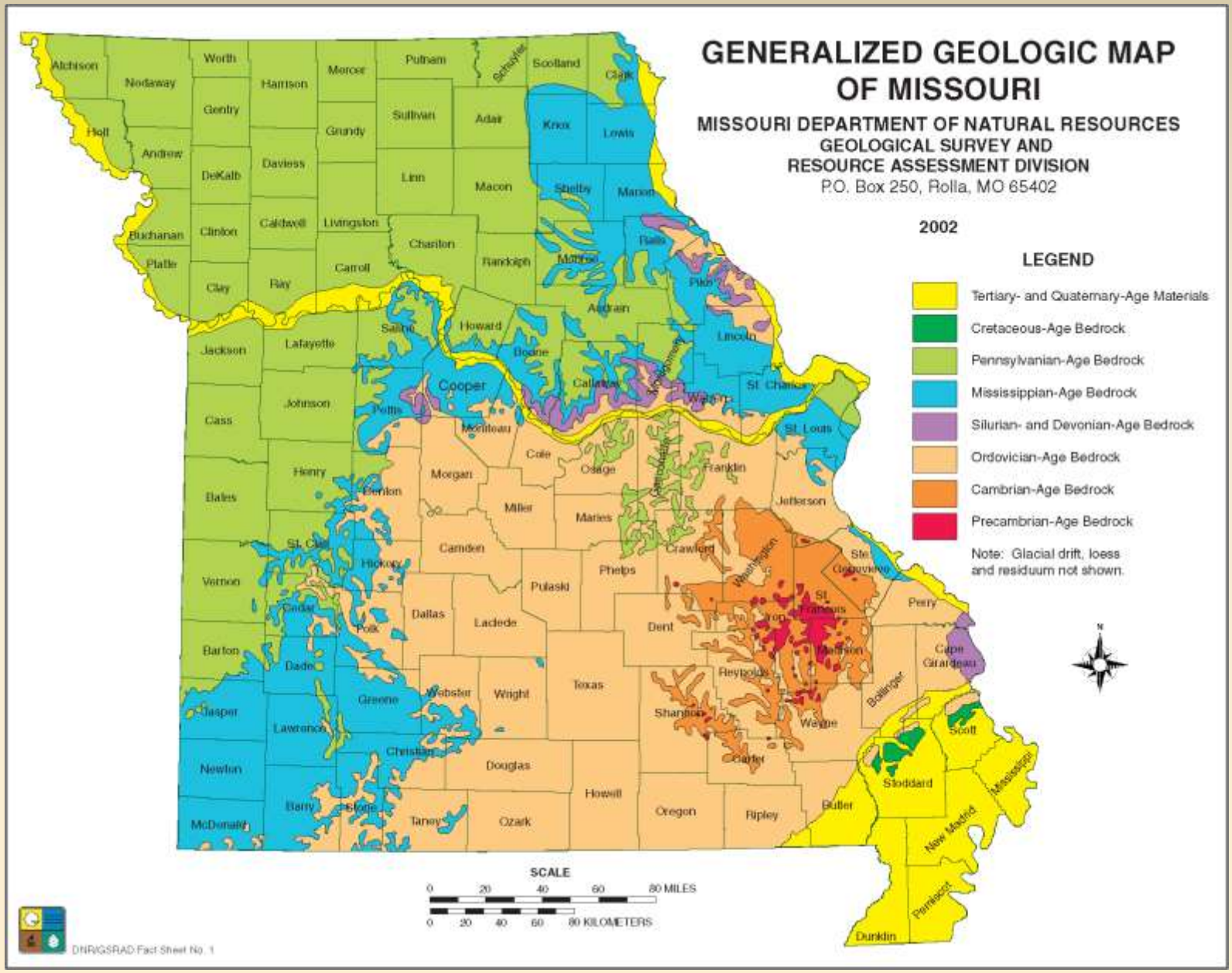
Coonville Creek Fen, St. Francois State Park Area
St. Francois County

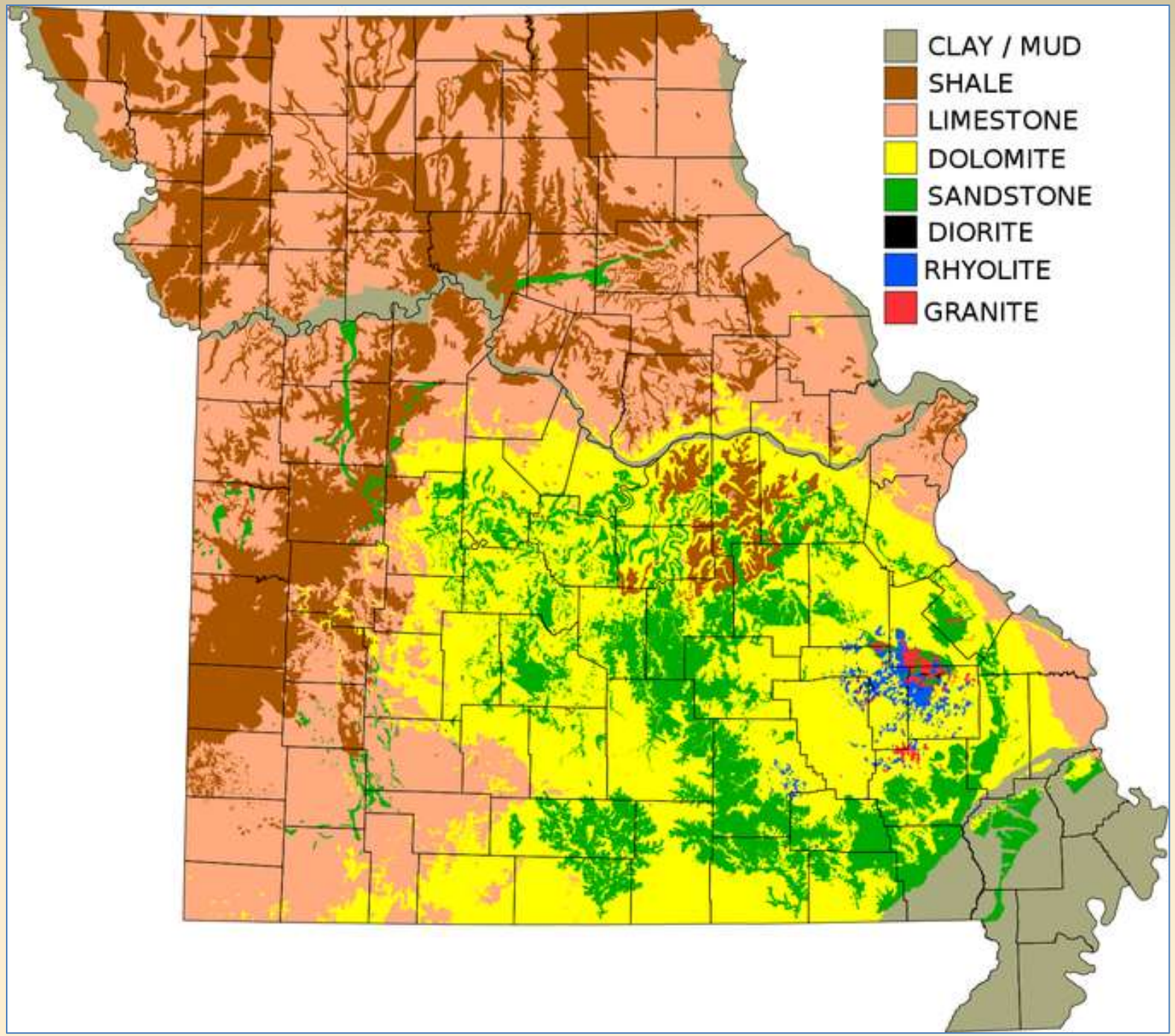
Spalding Salt Springs (private property)
Ralls County

Grassy Pond Natural Area, Carter County
(photo courtesy of MO Dept. of Conservation)

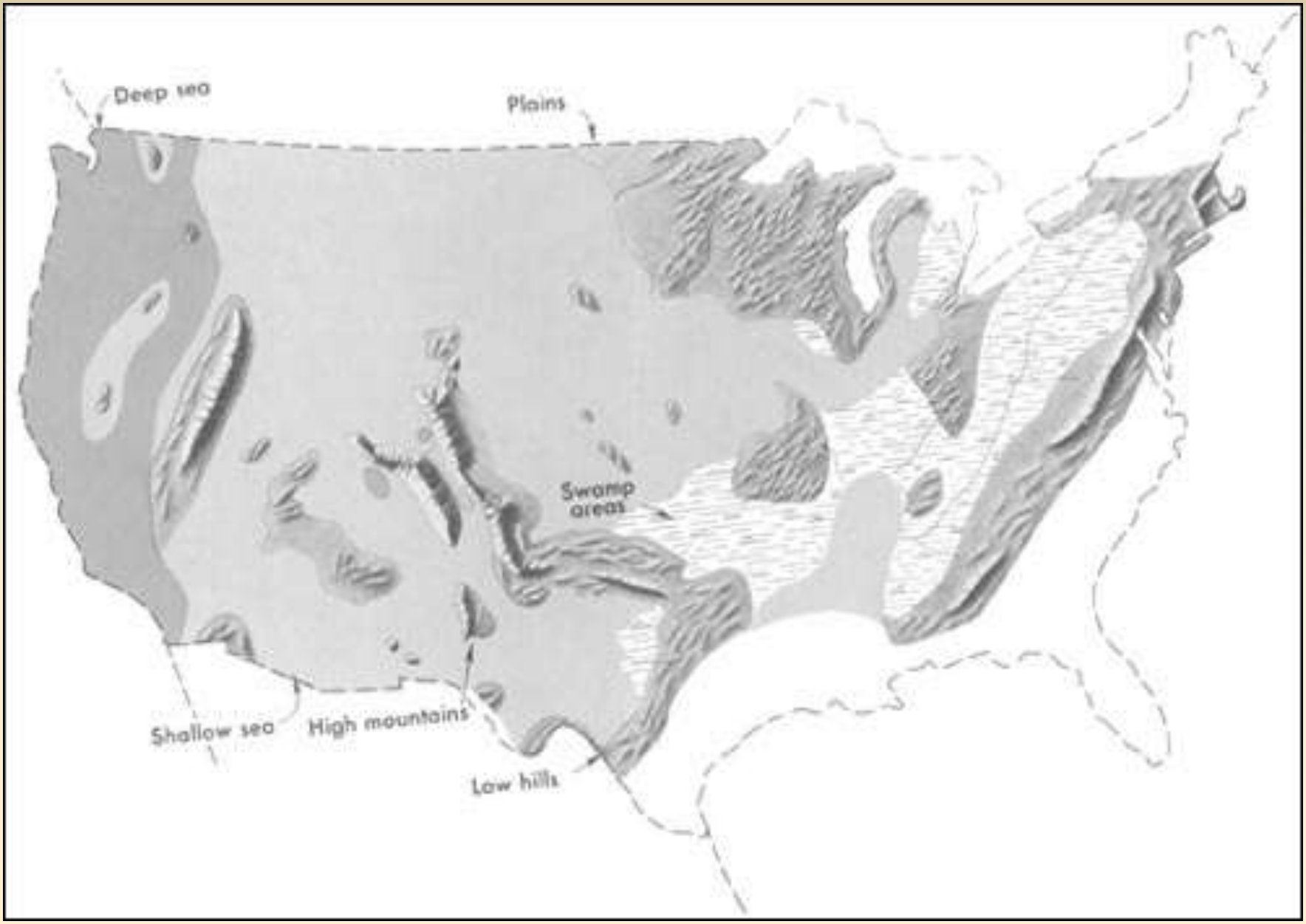

PHYSIOGRAPHIC REGIONS OF MISSOURI
Source: Missouri Department of Natural Resources' Division of Geology and Land Survey
DISSECTED TILL PLAINS
LIMIT OF GLACIATION
OSAGE PLAINS
EUREKA SPRINGS ESCARPMENT
OZARKS
SPRINGFIELD PLATEAU
SALEM PLATEAU
ST. FRANCOIS MOUNTAINS
OZARK ESCARPMENT
SOUTHEASTERN LOWLANDS
0 20 40 60 80 100 Miles
0 20 40 60 80 100 Kilometers

Rocks at the *surface* across Missouri



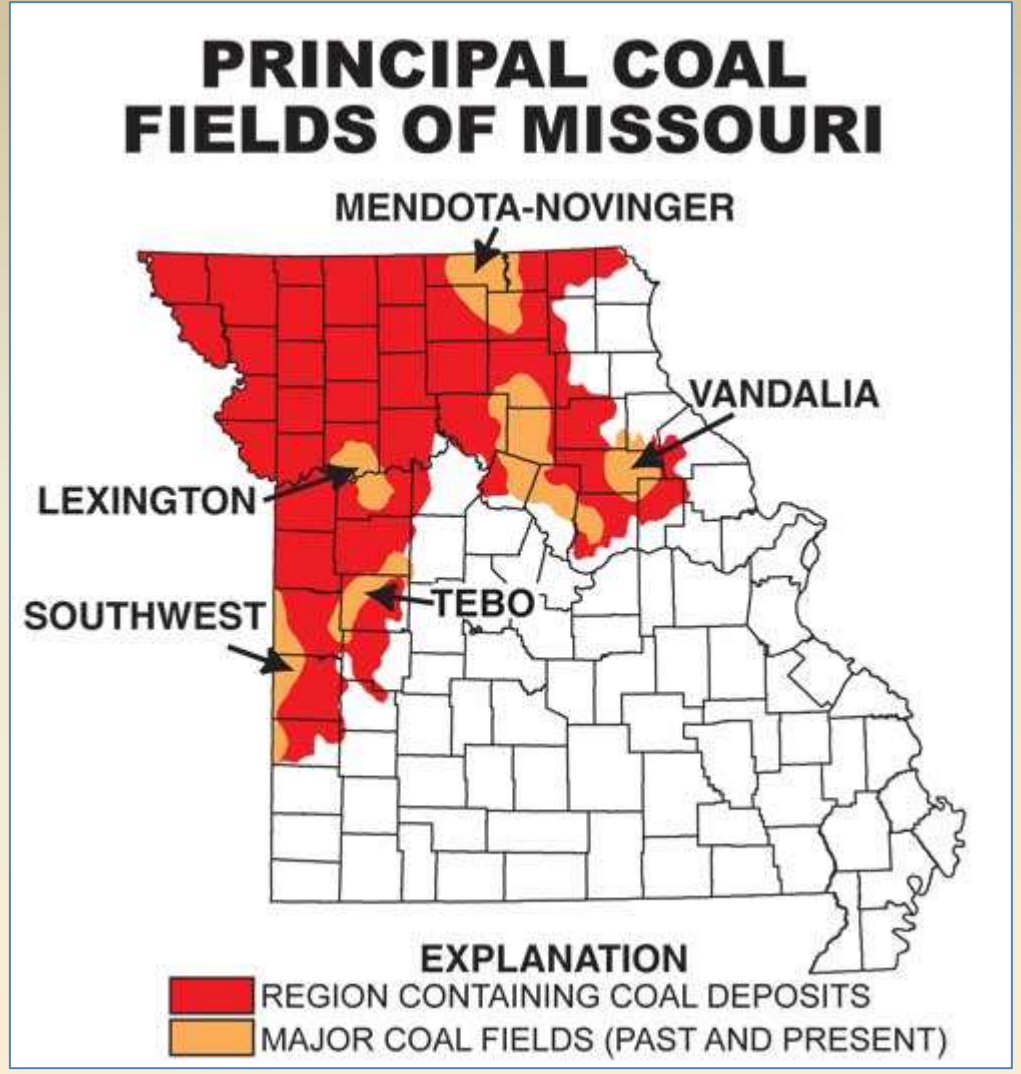

CLAY / MUD
SHALE
LIMESTONE
DOLOMITE
SANDSTONE
DIORITE
RHYOLITE
GRANITE

Pennsylvanian – 290 MY ago, Seas and Swamps



Limestone bluffs along the Missouri River, Pennsylvanian Age.
Courtesy USFWS

Carboniferous Forest – 300 mya (Field Museum)

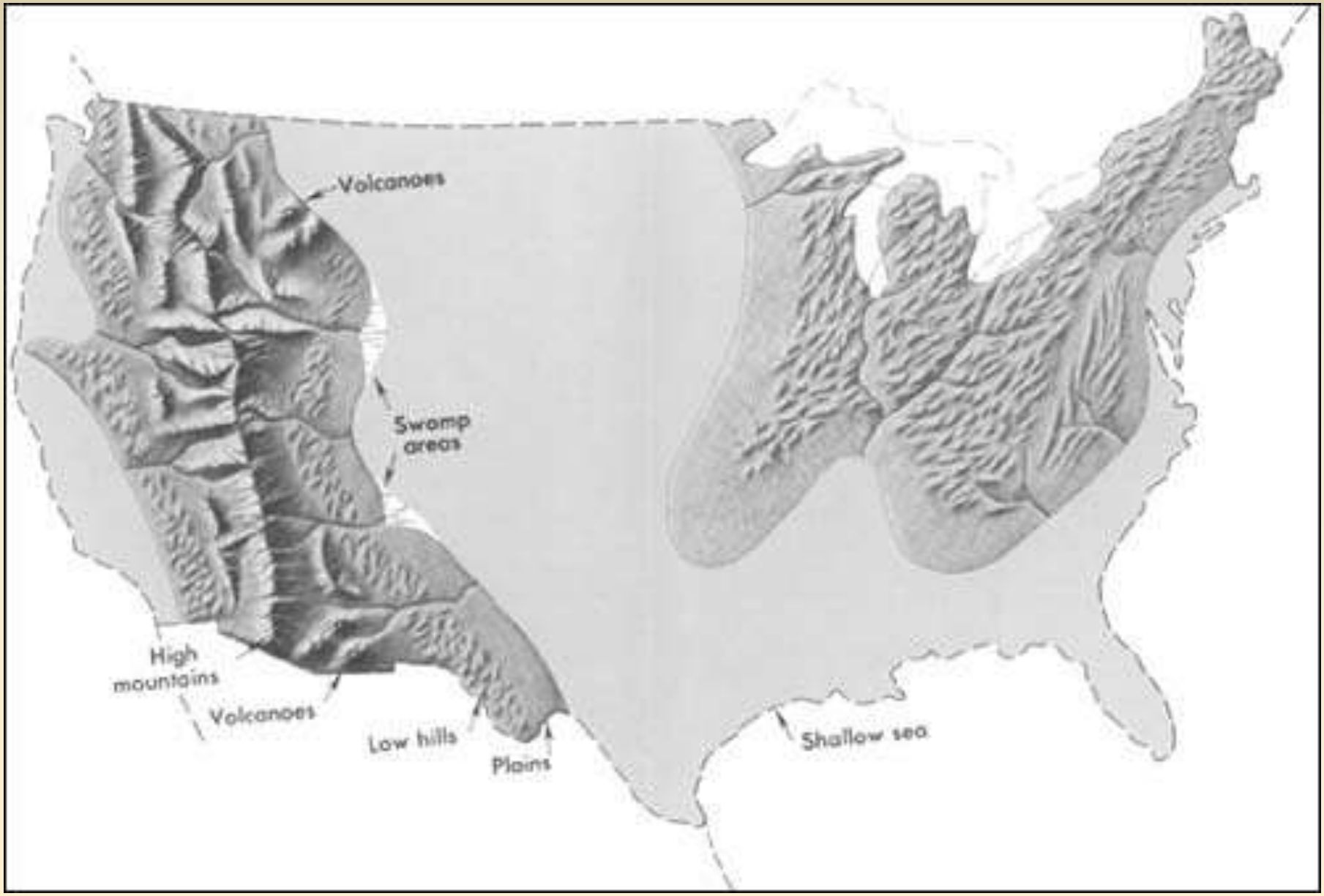


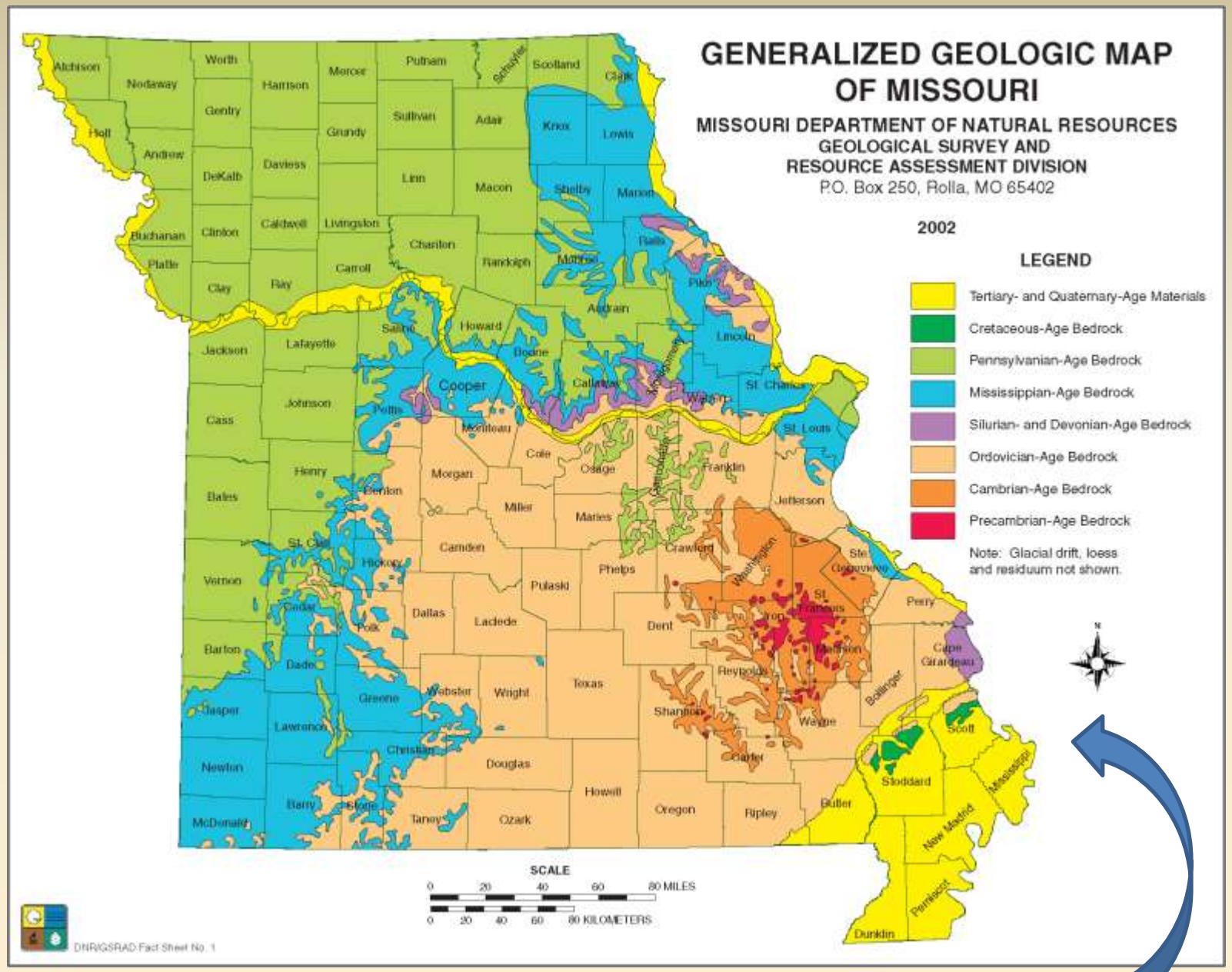
P&M Midway Mine. 110 cubic yard Memphis Queen dragline and horizontal drill, June 10, 1975.

The coalfields of northern and southwestern Missouri are large enough to produce local supplies. Not nearly as extensive as the coals of nearby Illinois. Missouri coal is bituminous, and high in sulfur (dirty).

Reclaimed strip mine

Cretaceous – 100 MY ago, Inland Seas

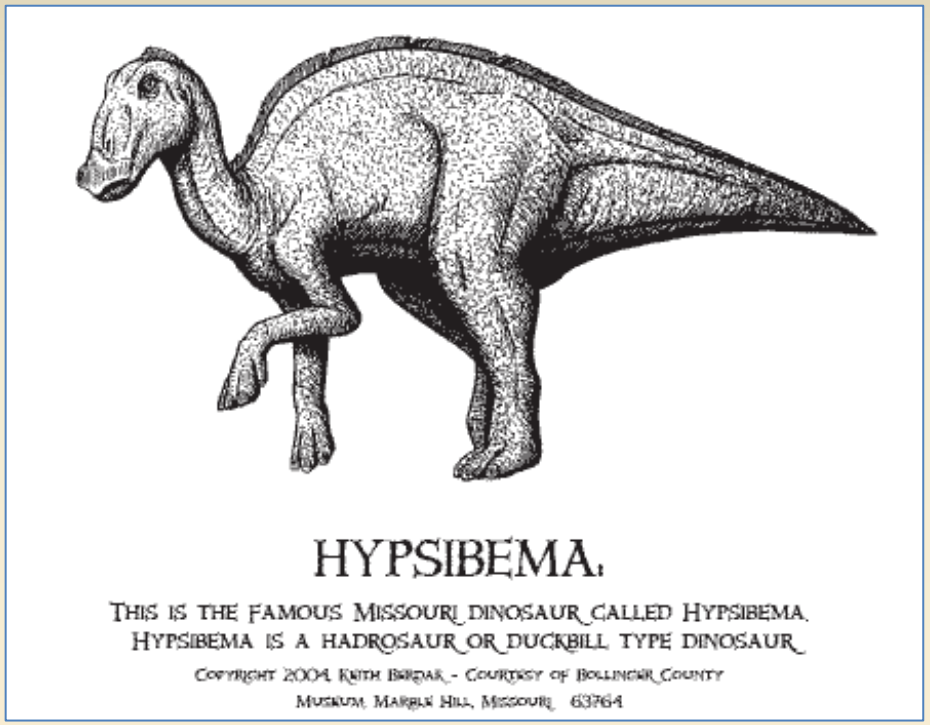




Cretaceous age rocks and fossils very rare in Missouri

Missouri State Dinosaur - *Hypsibema missouriense*

Hadrosaur discovered in 1942 by Dan Stewart, near the town of Glen Allen, MO

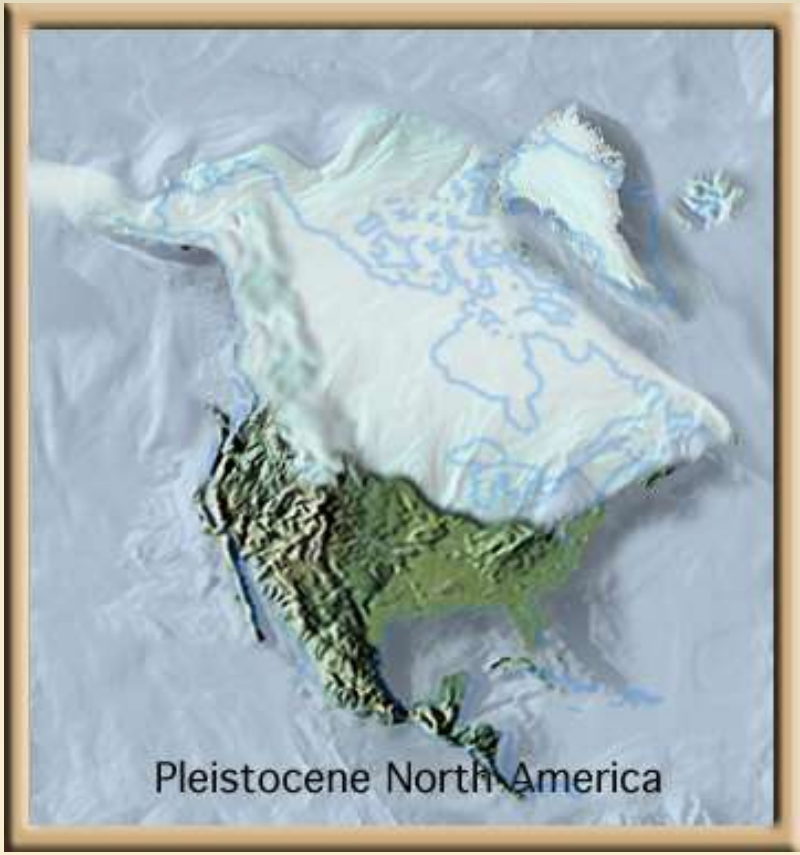


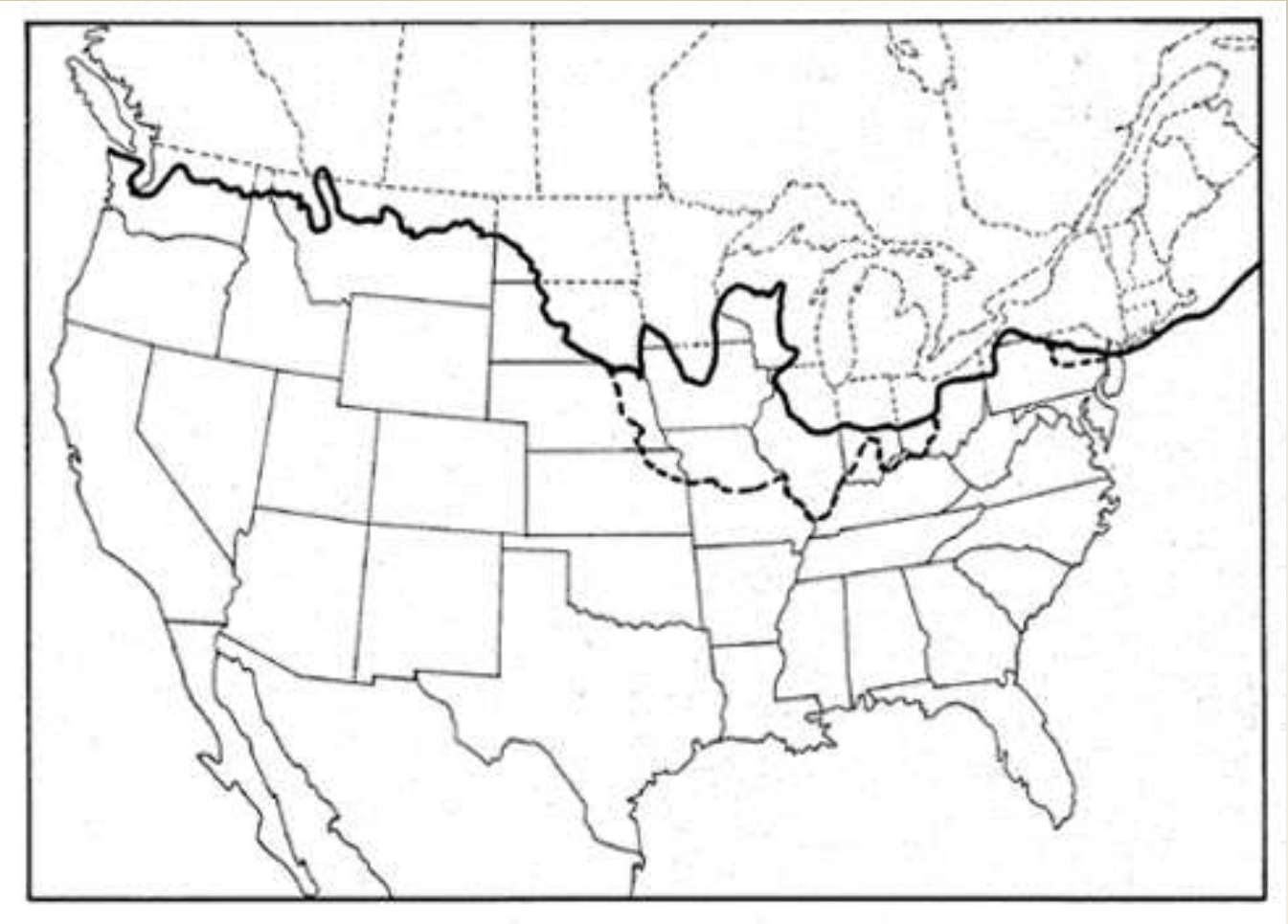
The hadrosaurs are known as the duck-billed dinosaurs due to the similarity of their head to that of modern ducks.

Pleistocene Glaciation

Advances of the Ice Sheets

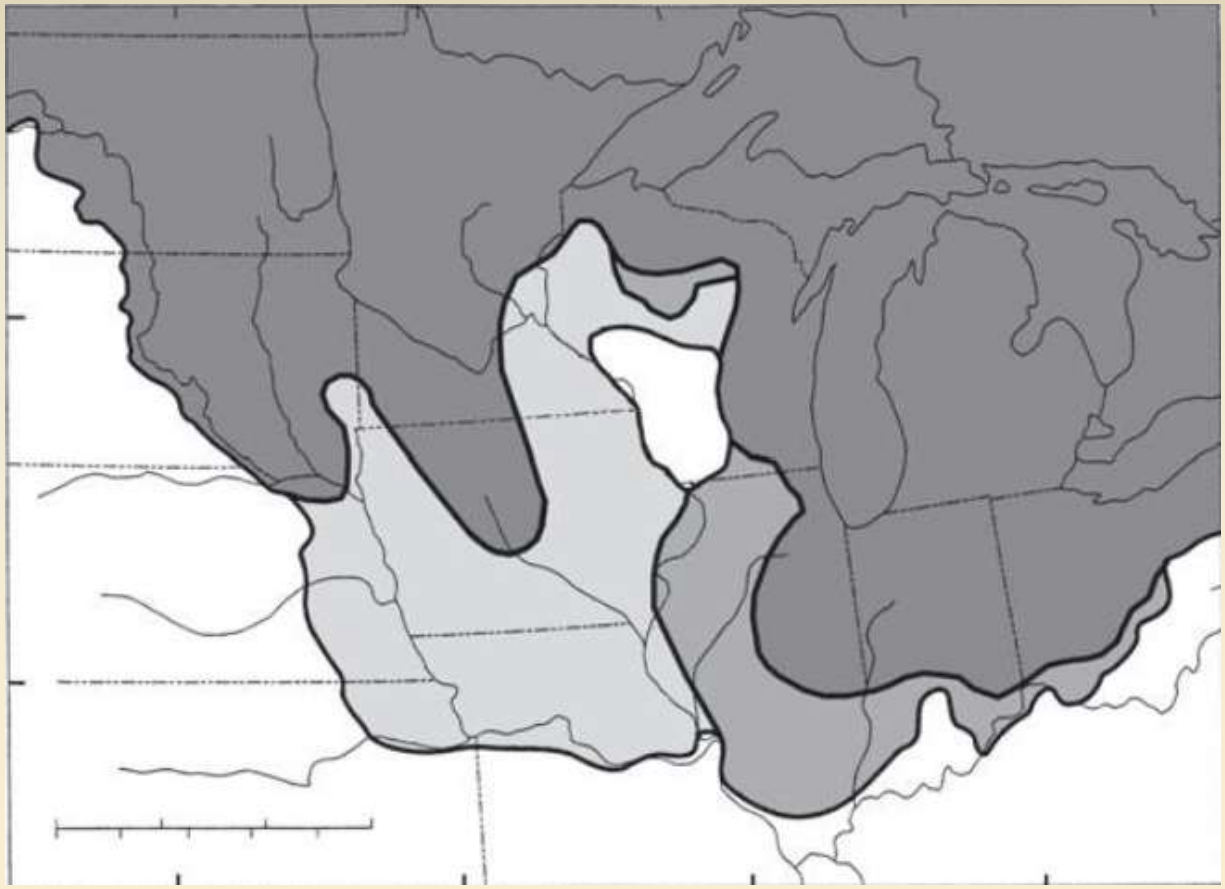
- Ice ages are characterized by **glacial expansions** separated by **warmer interglacial intervals**.
- Before the mid-1970's, the Pleistocene was divided into four glacial stages with intervening warmer interglacial stages.
- More recent investigations have shown that there may have been **as many as 30 glacial advances over the past 3 million years (roughly every 100,000 years.)**





Solid line: Approximate extent of glaciation during the last ice age.
Dotted line: Approximate extent of previous glaciation**.**
Above the black line, the area was covered with ice.
Below the line, people could have survived.

Map of the upper Mississippi River basin the estimated pre-Illinoian (light gray), the estimated Illinoian (gray) and the Wisconsinan maximum limits of glacial expansion (dark gray).



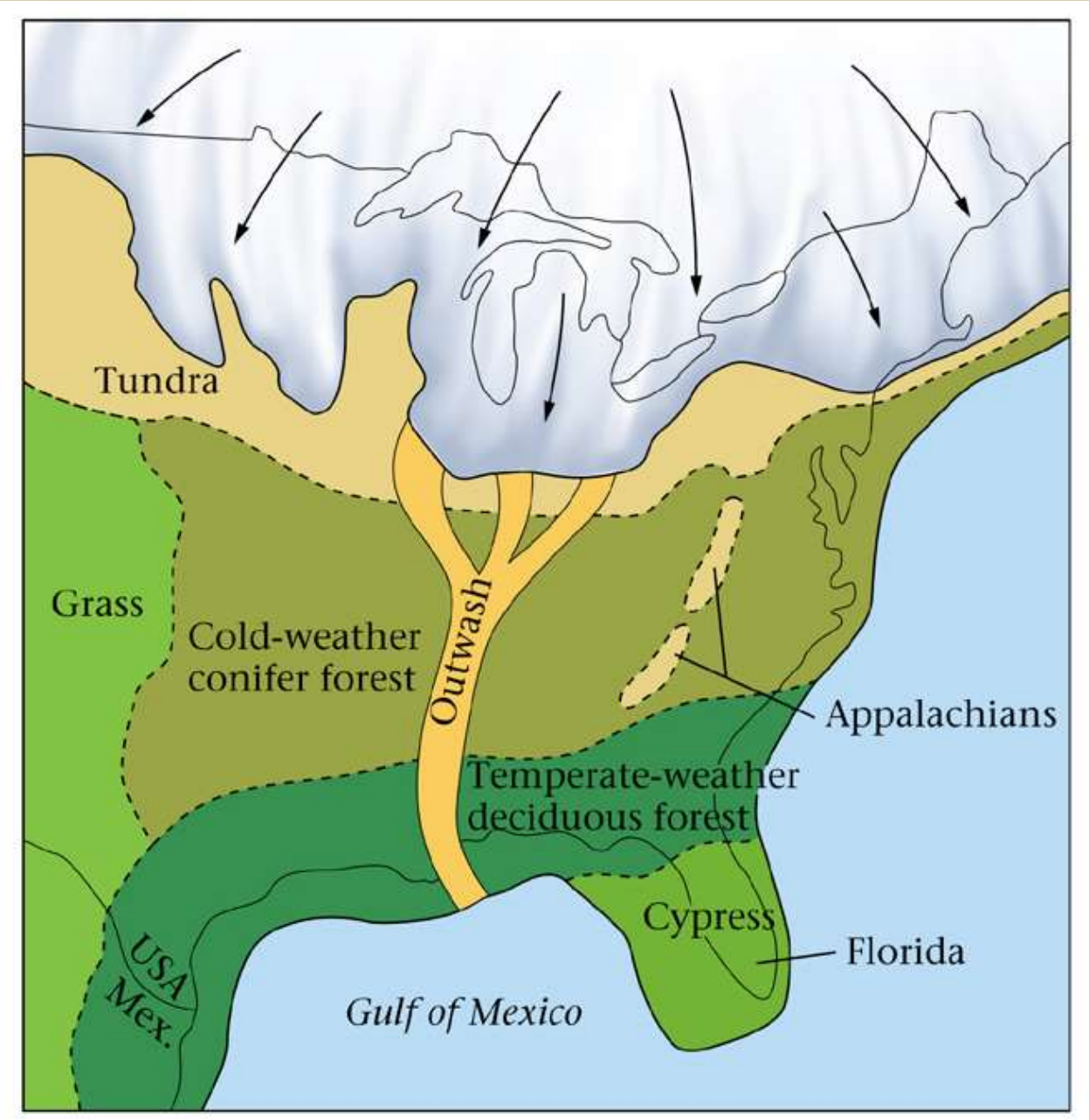
The pre-Illinoian was the most severe: amongst its legacy was the changing of the course of the Missouri River to its present location, the scouring and filling of Northern Missouri topography, and extensive outwash gravels left to the south of the present Missouri River

Iceland's Múlajökull Glacier with its surrounding drumlins

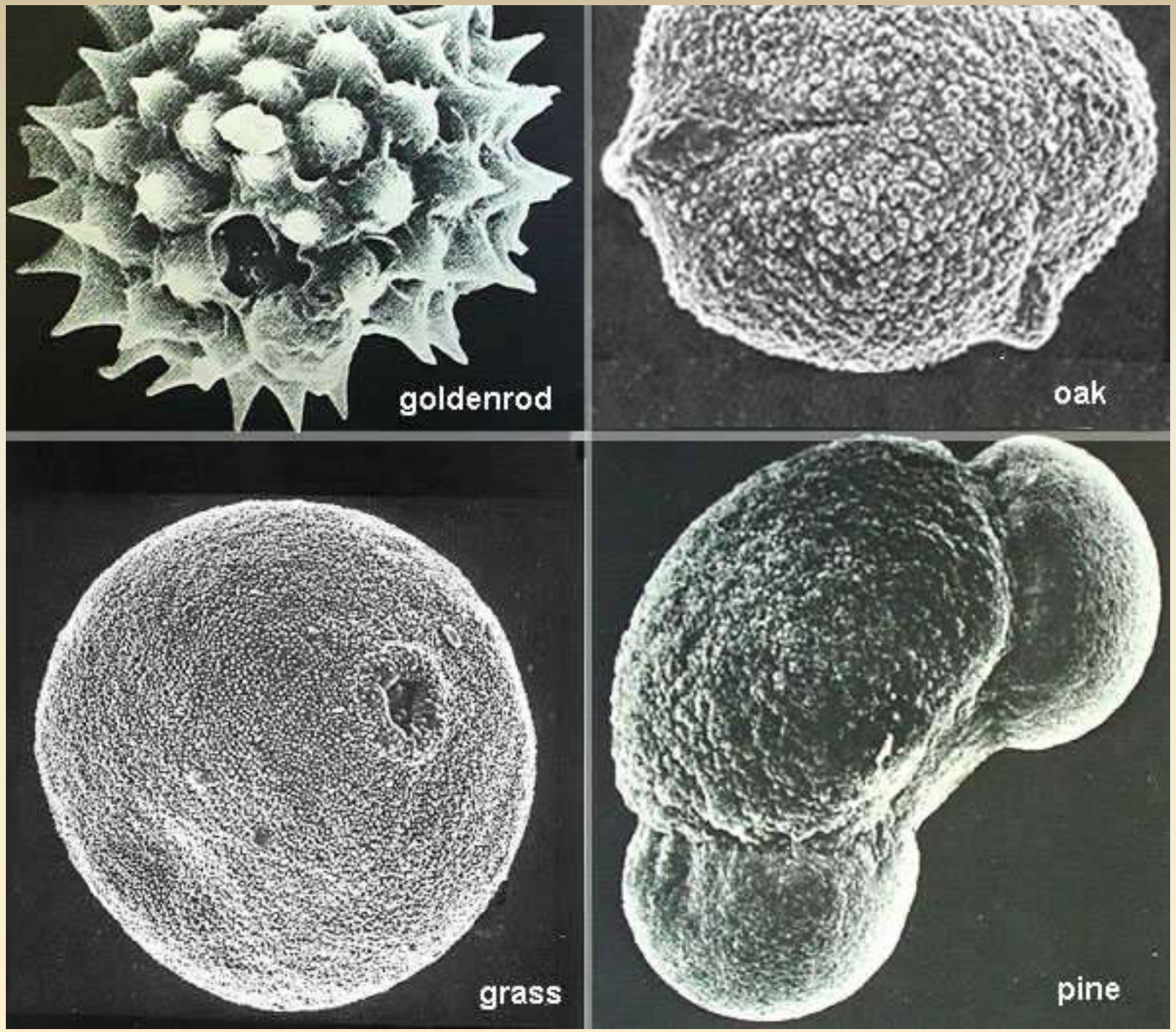
http://iowapublicradio.org/term/pleistocene-epoch

What St. Louis may have looked like in the Pleistocene

Pleistocene Glaciation – Climate/Vegetation Belts



Preparing Pollen Cores from Bogs and Springs


goldenrod
oak
grass
pine

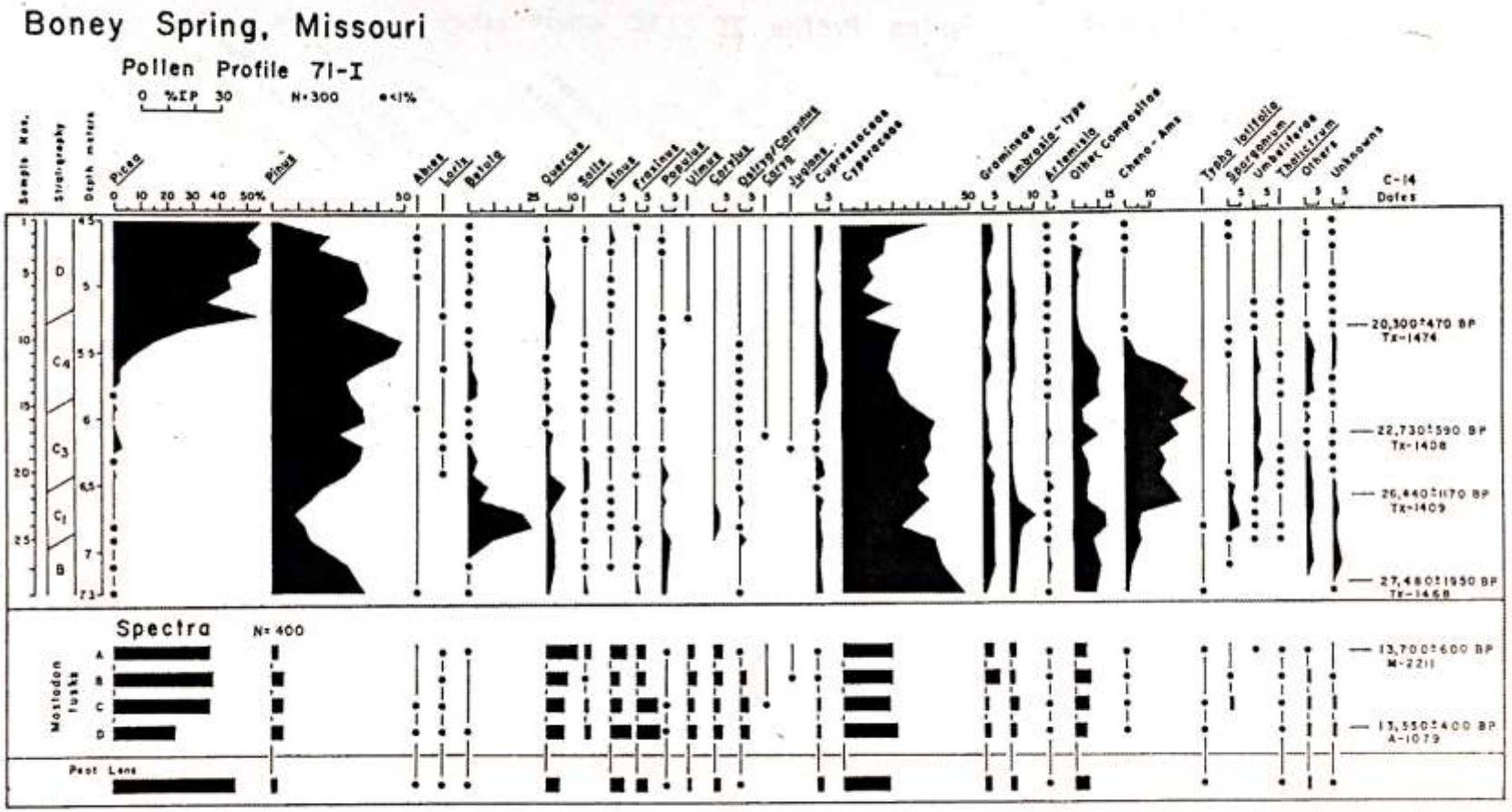
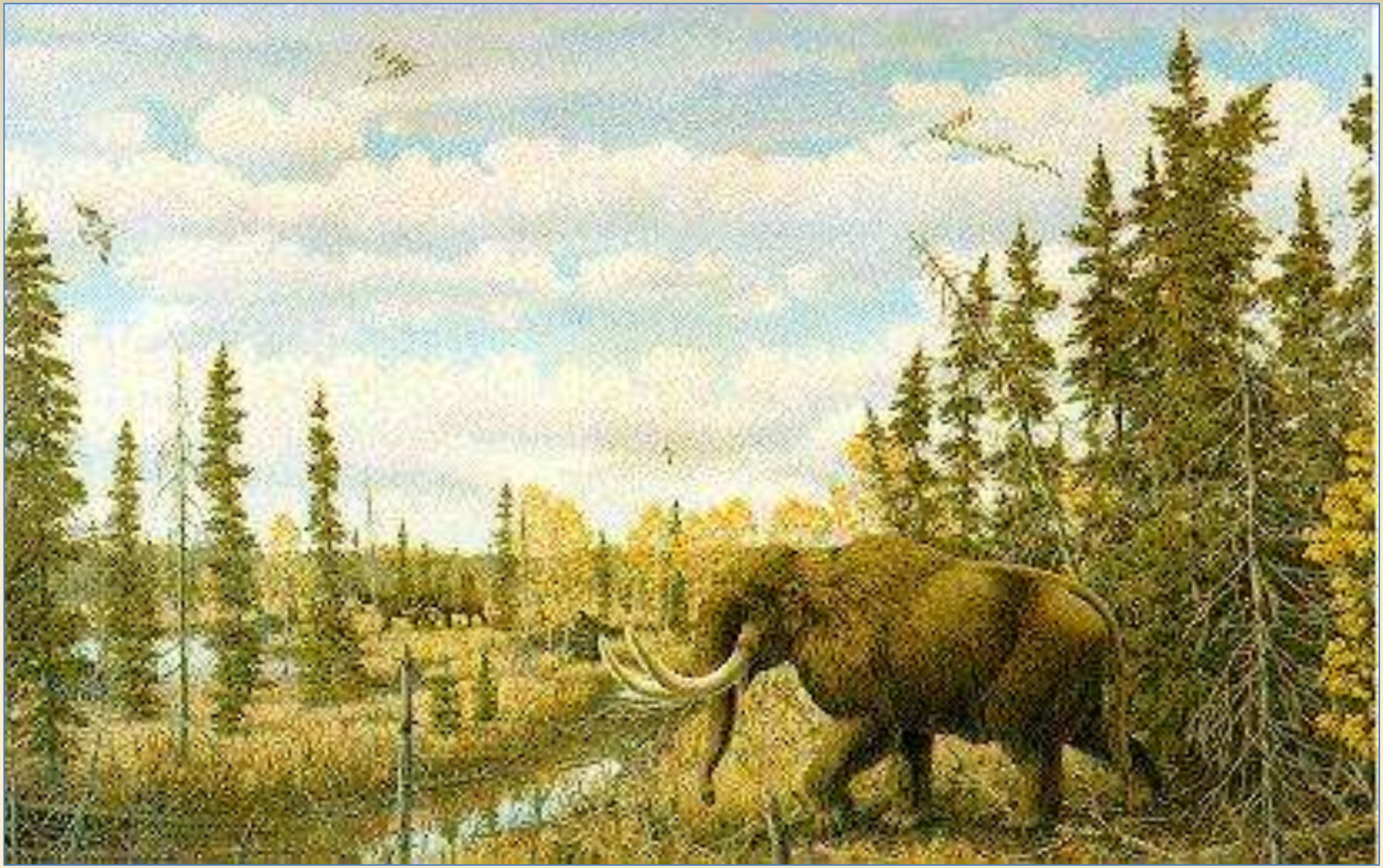


FIG. 16. Boney Spring pollen profile 71-I and miscellaneous pollen spectra. Only those radiocarbon dates associated with the profile are shown; the others are listed in Fig. 6 and 7. Other taxa include (sample 2) Polemoniaceae; (6) Polygonaceae; (9) Ranunculaceae; (10) Malvaceae, Onagraceae; (11) 3% Ranunculaceae; (12) *Myriophyllum*, Portulacaceae; (13) Liliaceae, Ranunculaceae, *Ribes*, Rosaceae; (14) *Myriophyllum*, Polygonaceae, *Potamogeton*, Ranunculaceae; (16) Leguminosae, Polygonaceae, Rosaceae; (17) Polygonaceae, Rosaceae; (18) Rosaceae; (19) Rosaceae; (20) *Potamogeton*, Rosaceae; (21) Leguminosae, Polygonaceae;

Dr. Jeffrey J. Saunders excavates two mastodon thigh bones (femora) at Boney Spring, Benton Co., MO. The 640 bones collected at Boney Spring were deposited between 17,000 and 13,000 years ago.

Missouri in the Pleistocene?



Pollen Record

40,000 BP – non-arboreal, Cyperaceae, *Pinus* – open pine parkland

25,000 BP – full glacial, pollen shifts to *Picea* (spruce)

18,000 BP – retreat of glaciers, shift to oak, maple, willow, ash, elm, sedges and grasses

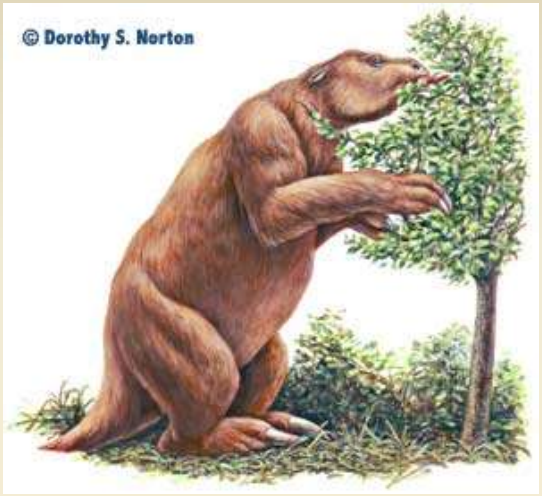
9,000 BP – oak-hickory forest

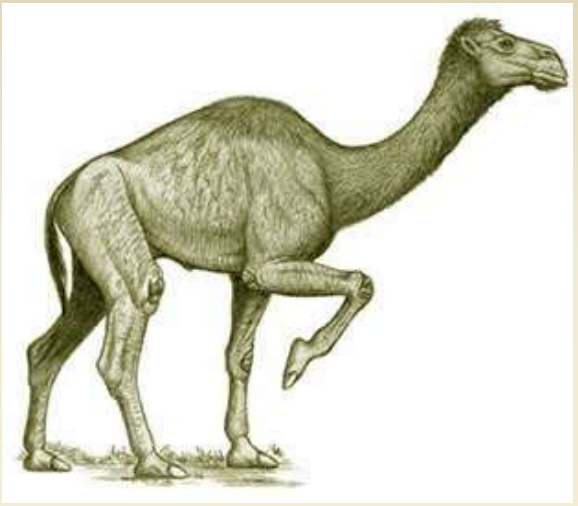
8,000 - 4,000 BP – Hypsithermal (Xerothermic), higher temperatures, prairie peninsula advances east

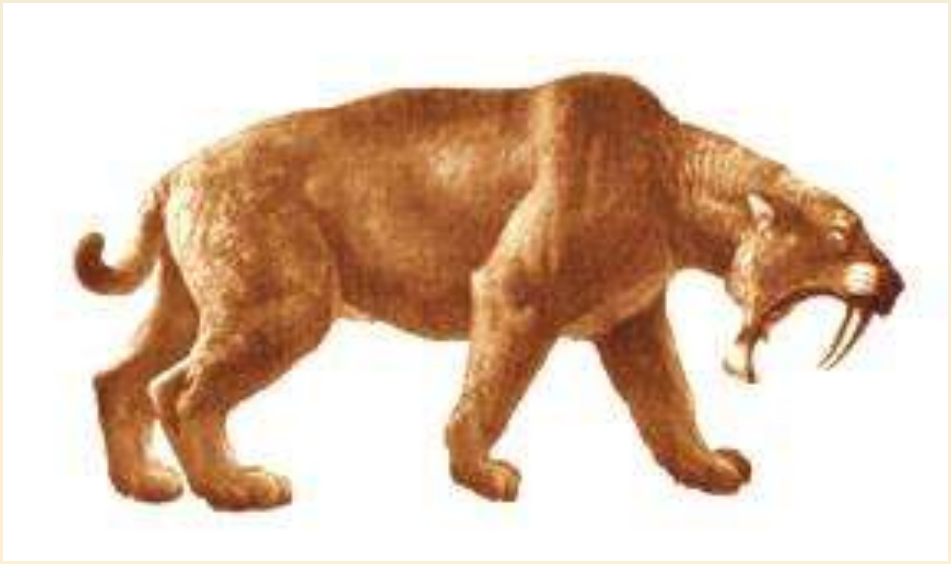
600-120 BP (1400-1880 AD) - Little Ice Age, wetter, cooler

Recent - oak-hickory again became dominant the Ozarks

North America supported a rich “megafauna” until about 11,000 years ago. Rivaled modern-day Africa







Mammoths

Mammuthus

Principia College

Mammoth Discovery

Discovering an Ice Age Mammal

For the past 17,000 years, an Ice Age mammoth, nicknamed “Benny,” has been hiding six feet below ground nestled between Rackham Court and Gehner, two Principia College campus dormitories. Benny’s presence was detected in 1999 when a backhoe uncovered one of his teeth

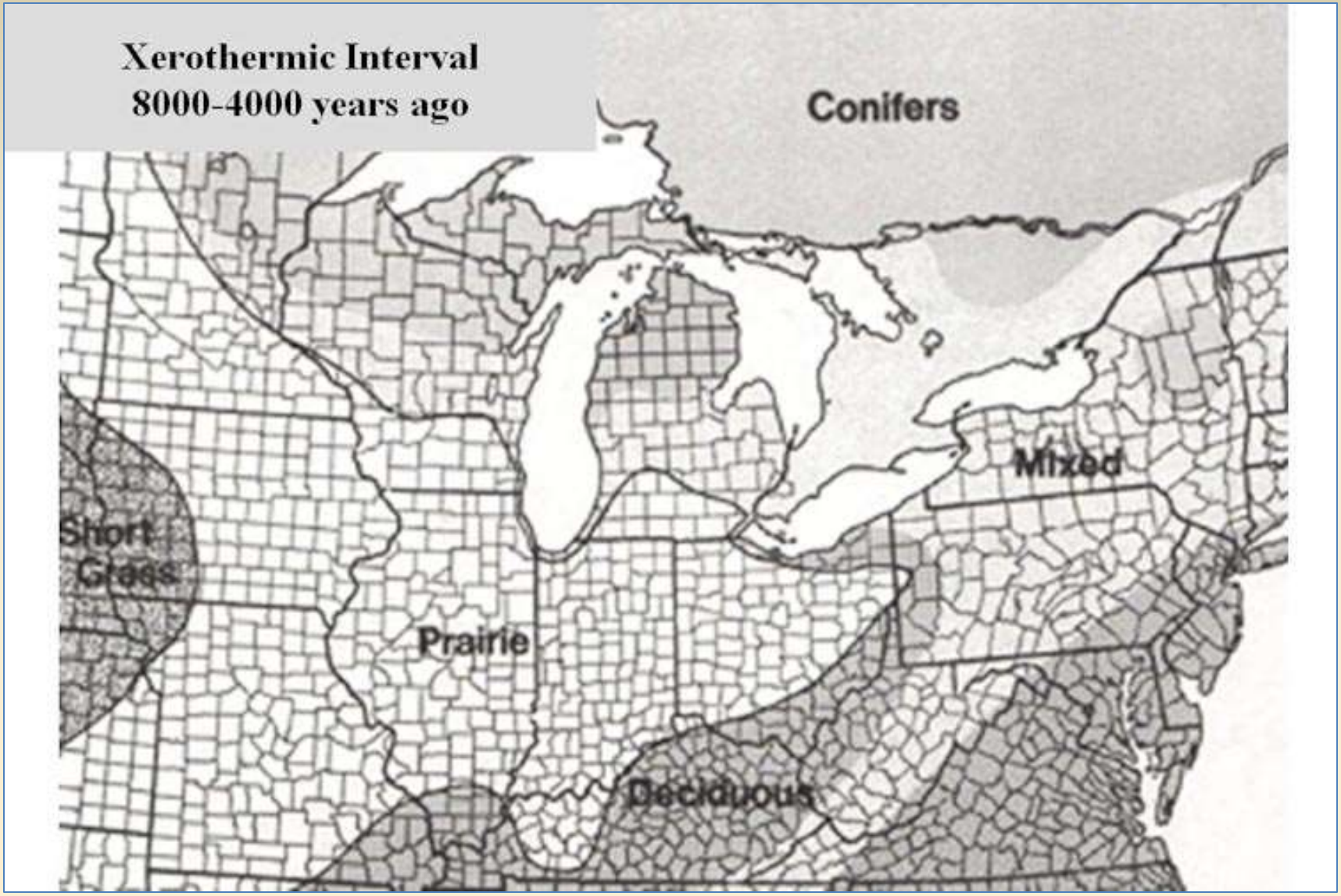
Pleistocene Plant Relicts in the Ozarks?

Jack's Fork River

Campanula rotundifolia

Trautvetteria caroliniensis

Prairie Peninsula – extension of prairie vegetation to the east



Missouri Glades, Prairies, Savannas

Savannah

Glades

Collared Lizard

Valley View Glades

June

December

Part 2: Natural Regions of Missouri

Glaciated Till Plains

Big Rivers

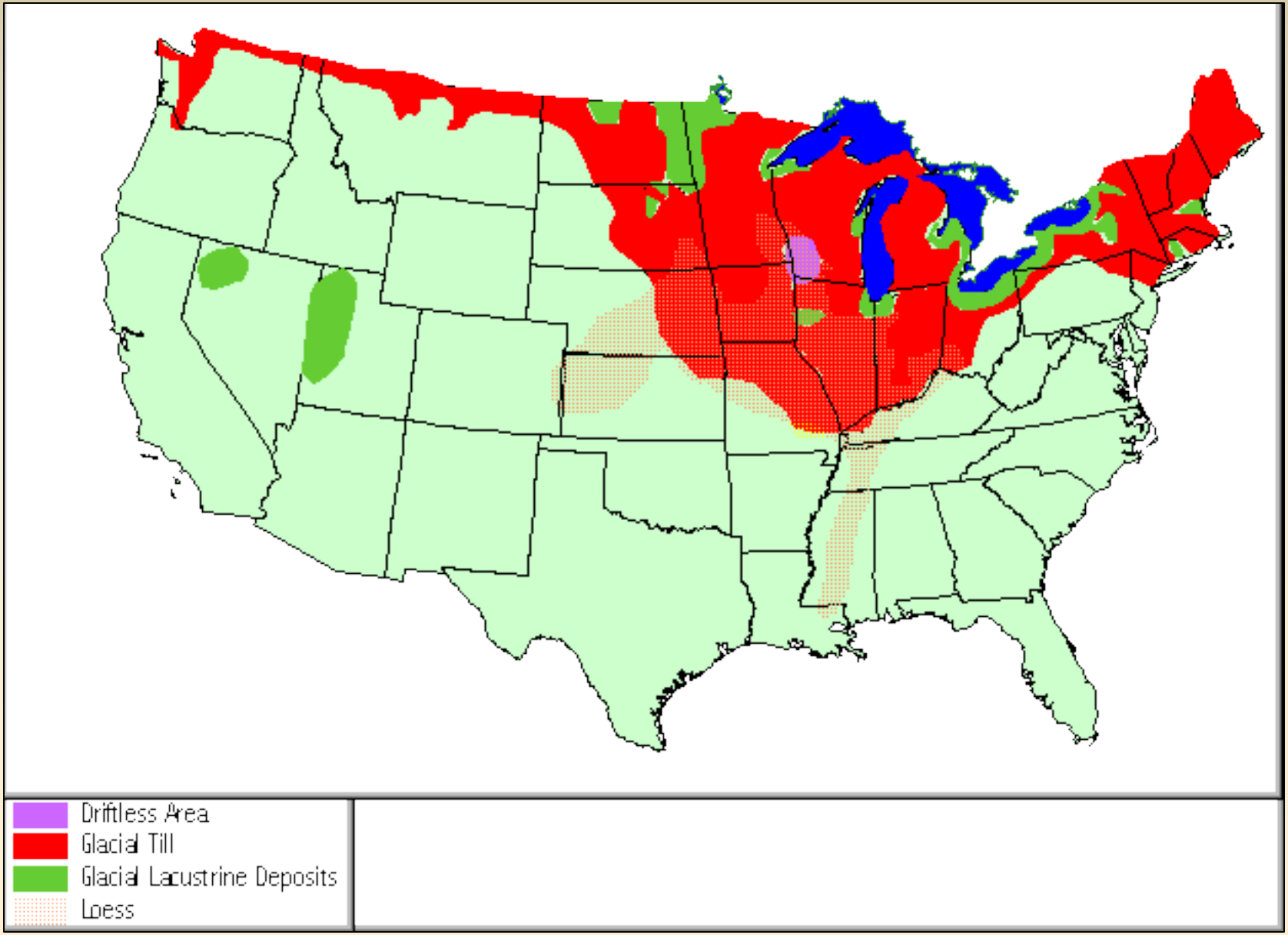
Ozark Border

Osage Plains

Ozark

Mississippi Lowlands

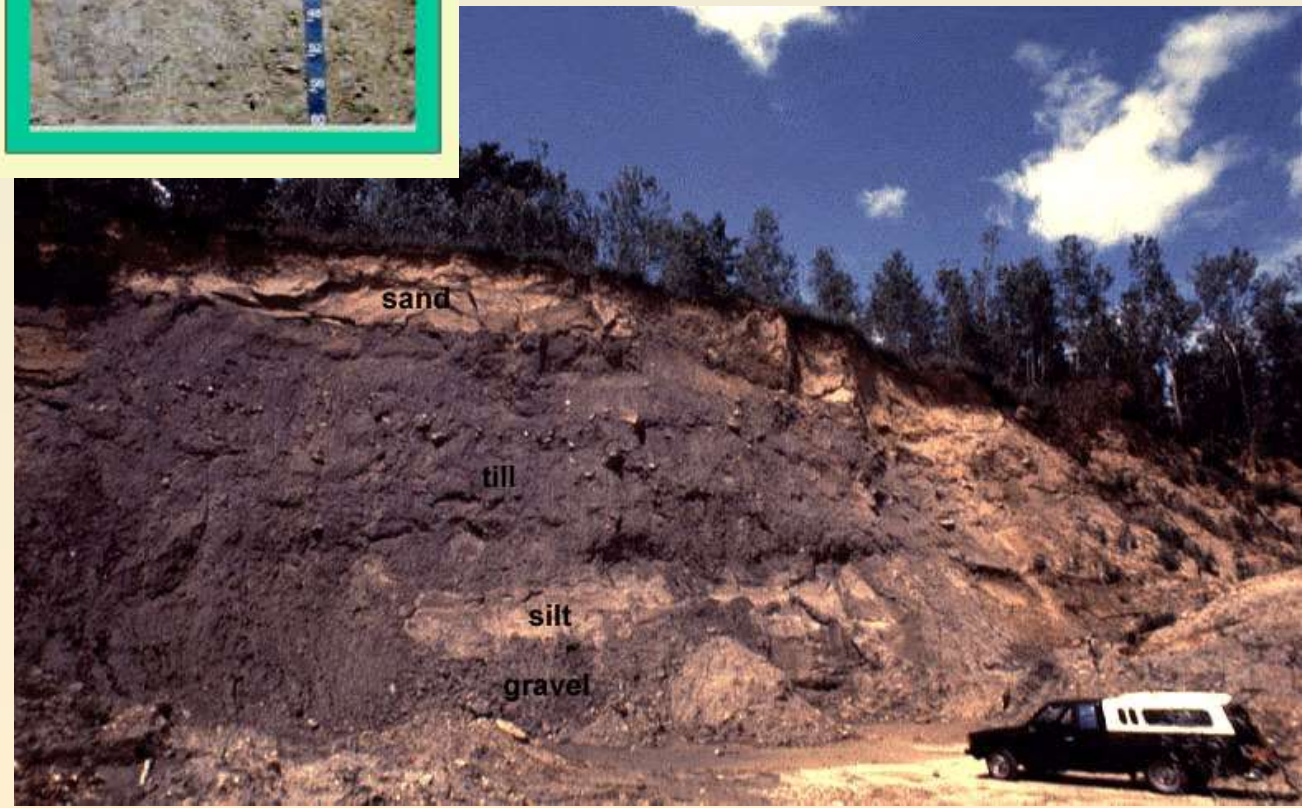
Areas in the U.S. Influenced by the Pleistocene Ice Age



Glacial Till

- Unsorted/stratified material deposited beneath and within glacial ice.
- Heterogeneous mixture of all particle sizes (boulder to clay).
- Oldest surficial deposit.

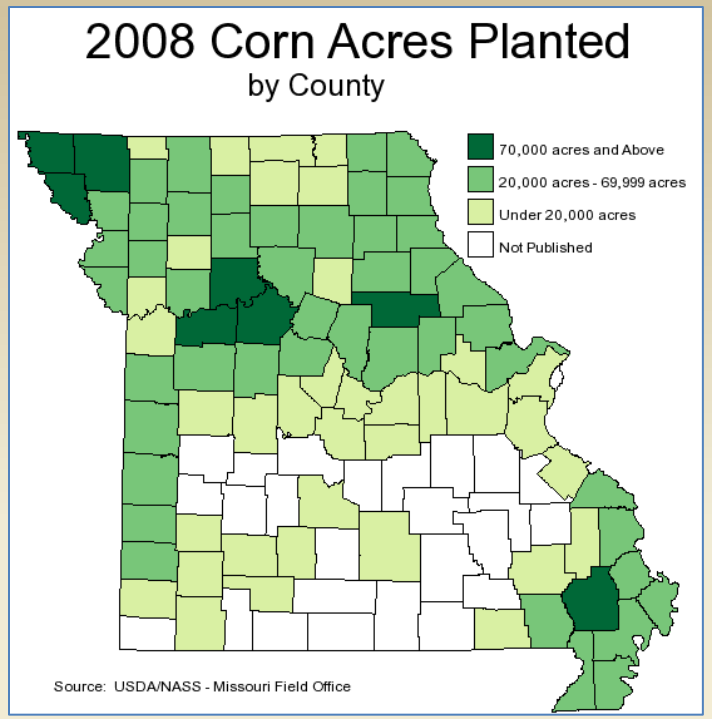
Northern Missouri Glaciated Till Plains

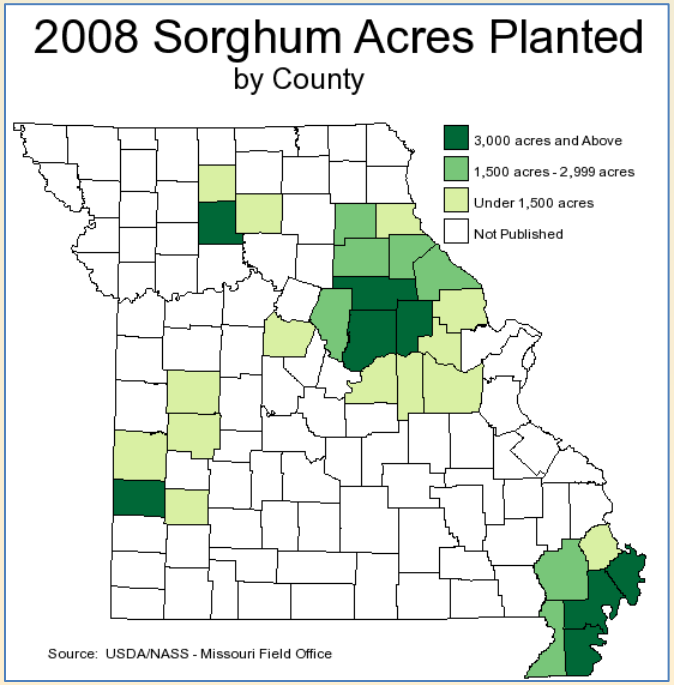


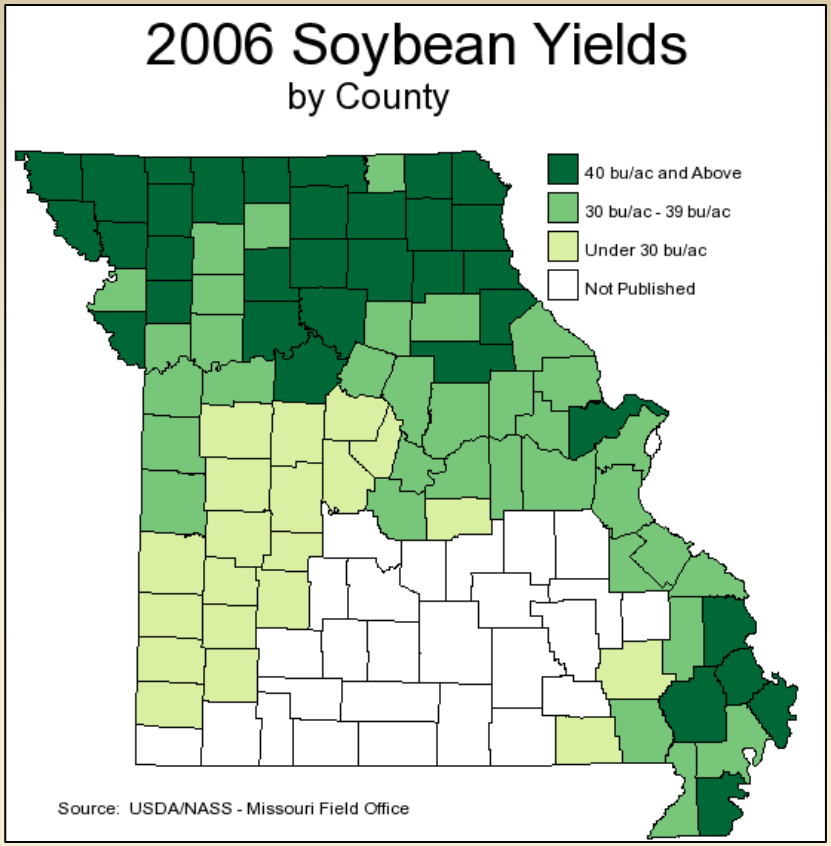
Northern Missouri
Glaciated Till Plains

- rolling hills
- sluggish streams
- farmland

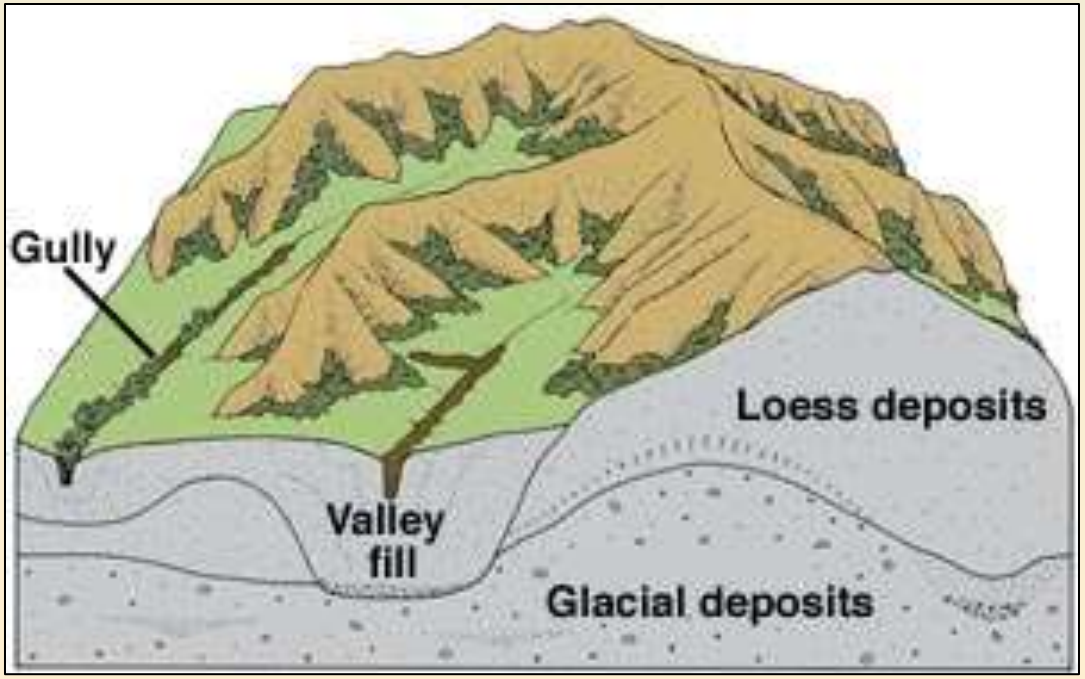
Tarkio Prairie
one of few remaining natural prairies in northern Missouri


2008 Corn Acres Planted
by County
70,000 acres and Above
20,000 acres - 69,999 acres
Under 20,000 acres
Not Published
Source: USDA/NASS - Missouri Field Office


2008 Sorghum Acres Planted
by County
3,000 acres and Above
1,500 acres - 2,999 acres
Under 1,500 acres
Not Published
Source: USDA/NASS - Missouri Field Office


2006 Soybean Yields
by County
40 bu/ac and Above
30 bu/ac - 39 bu/ac
Under 30 bu/ac
Not Published
Source: USDA/NASS - Missouri Field Office

Loess Prairies
Northwest Missouri



McCormick Loess Hill Prairies

Missouri River Country

Missouri River near New Haven, Missouri

Mississippi River, barge traffic

River Edges
Muddy banks, flooding
Flood forests

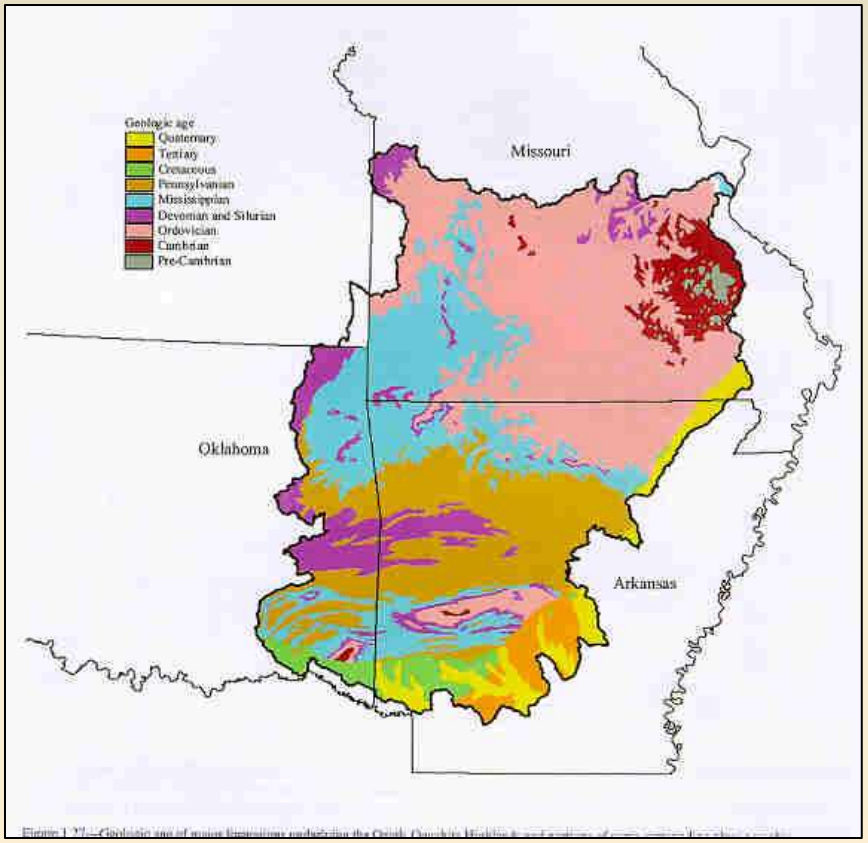
Flooding
Flood Control
Levees

Flood Forest - Pin Oak Forest

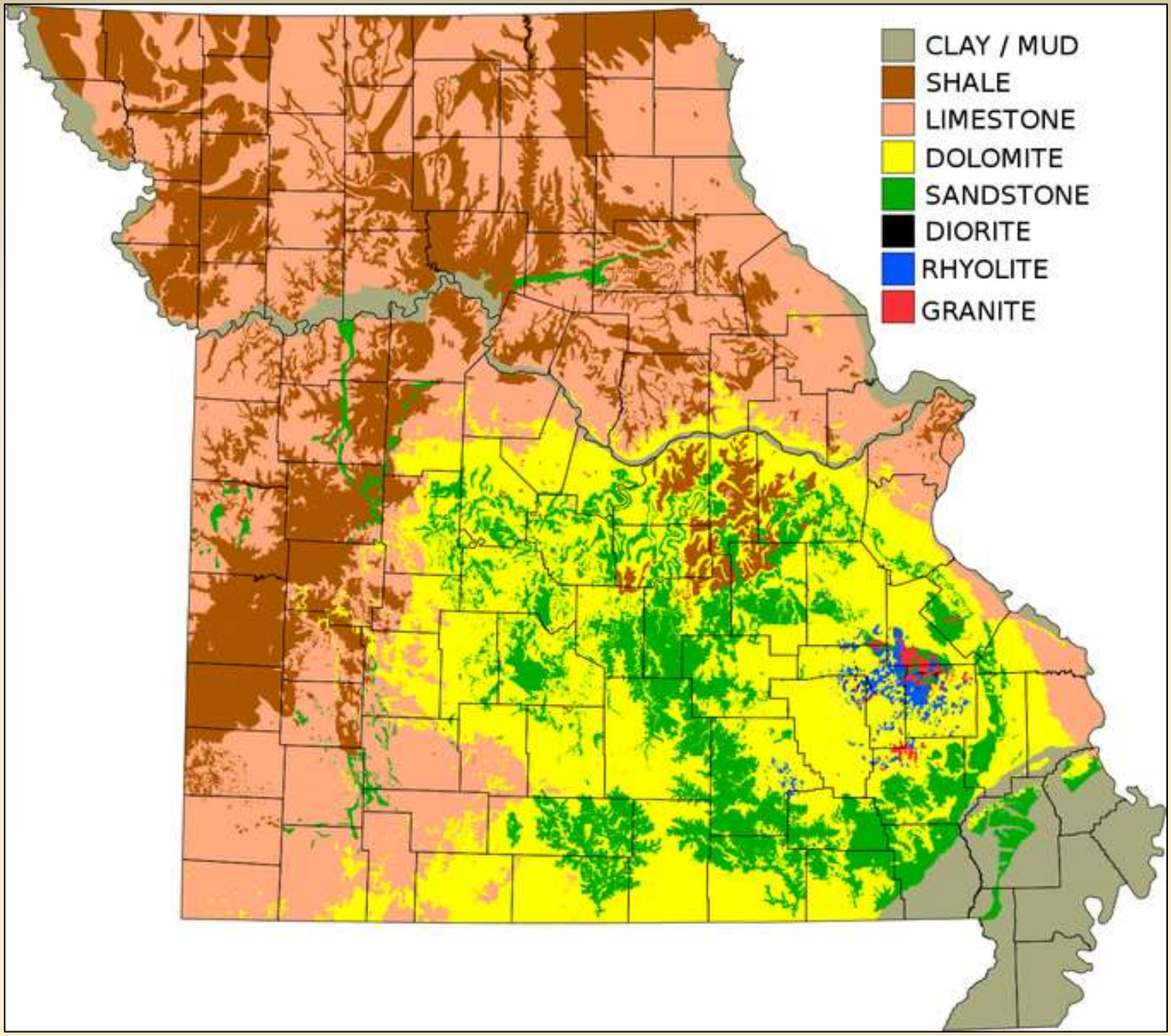
Crops in bottoms are often lost to flooding


PHYSIOGRAPHIC REGIONS OF MISSOURI
Source: Missouri Department of Natural Resources' Division of Geology and Land Survey
DISSECTED TILL PLAINS
LIMIT OF GLACIATION
OSAGE PLAINS
EUREKA SPRINGS ESCARPMENT
OZARKS
SPRINGFIELD PLATEAU
SALEM PLATEAU
ST. FRANCOIS MOUNTAINS
OZARK ESCARPMENT
SOUTHEASTERN LOWLANDS
0 20 40 60 80 100 Miles
0 20 40 60 80 100 Kilometers

Ozarks Eco-region
Central Highlands



Surface Geology of Missouri



Johnson’s Shut Ins
State Park

Granite outcrops

Elephant Rocks
State Park

Hugh's Mountain – Devil's Honeycomb

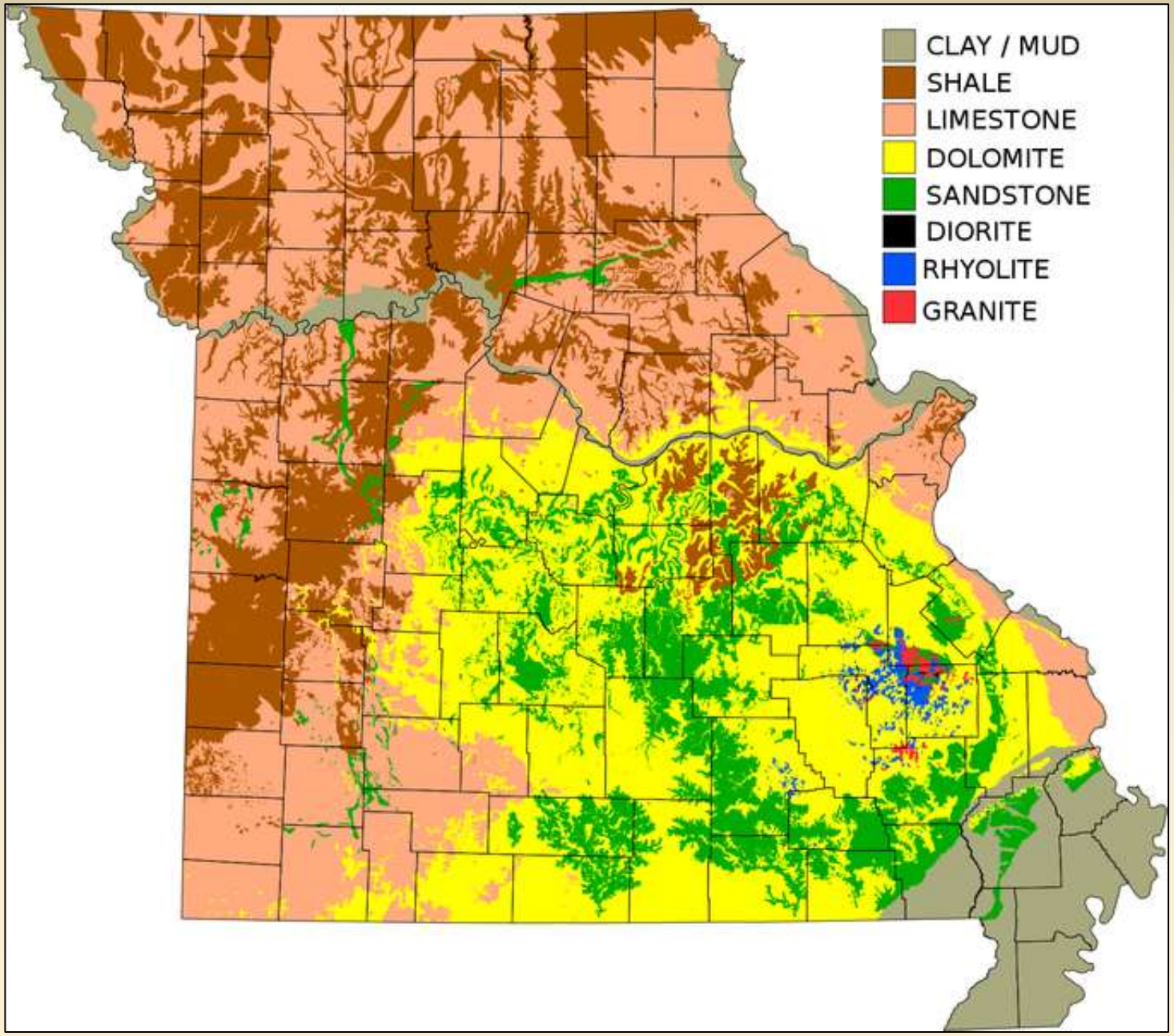
Granite outcrops

Granite Glades

Bell Mountain Glades

Hugh’s Mountain Glades

Sandstone Areas – LaMotte Sandstone



Hawn State Park – Sandstone Bluffs, Hoodoos, Glades

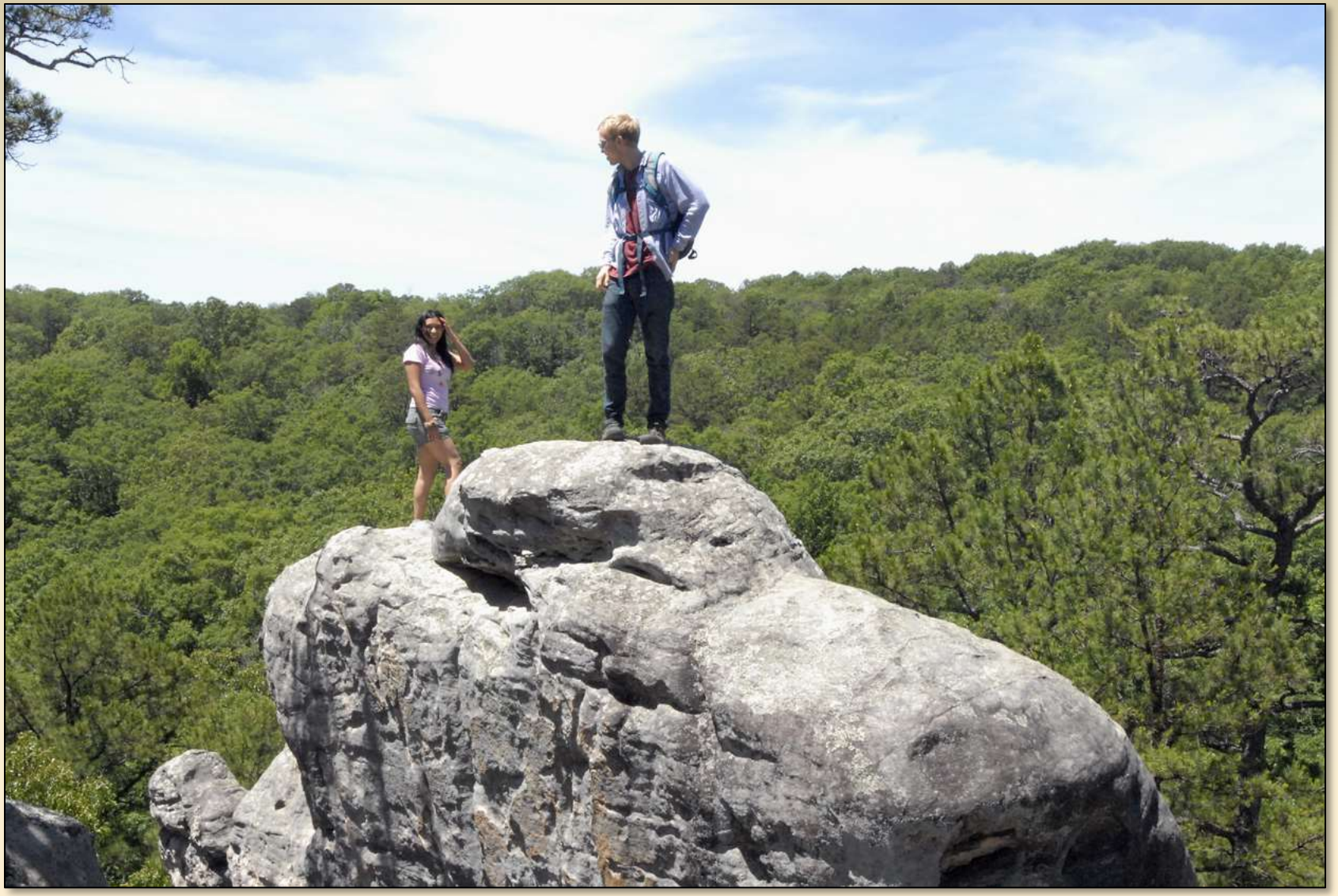
Pickle Springs Natural Area

REU 2014
Field Trip

Pickle Springs Natural Area

REU 2014
Field Trip

Pickle Springs Natural Area



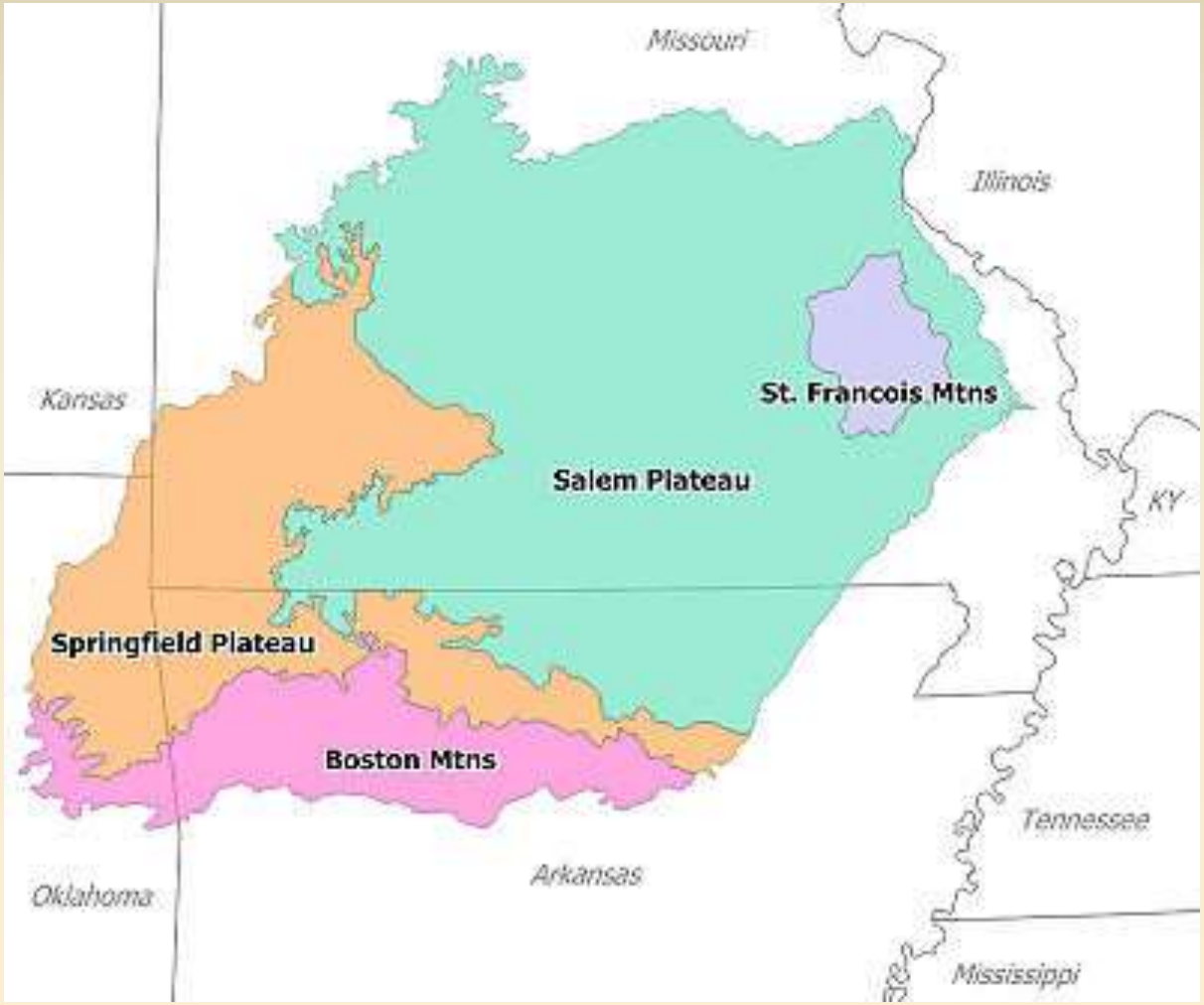
REU 2014
Field Trip

Creeks cutting through sandstone bedrock

Young Conservation Area
LaBarque Creek
Sandstone

Massas Creek Canyon, Warren County

Ozark Mountain Subregions

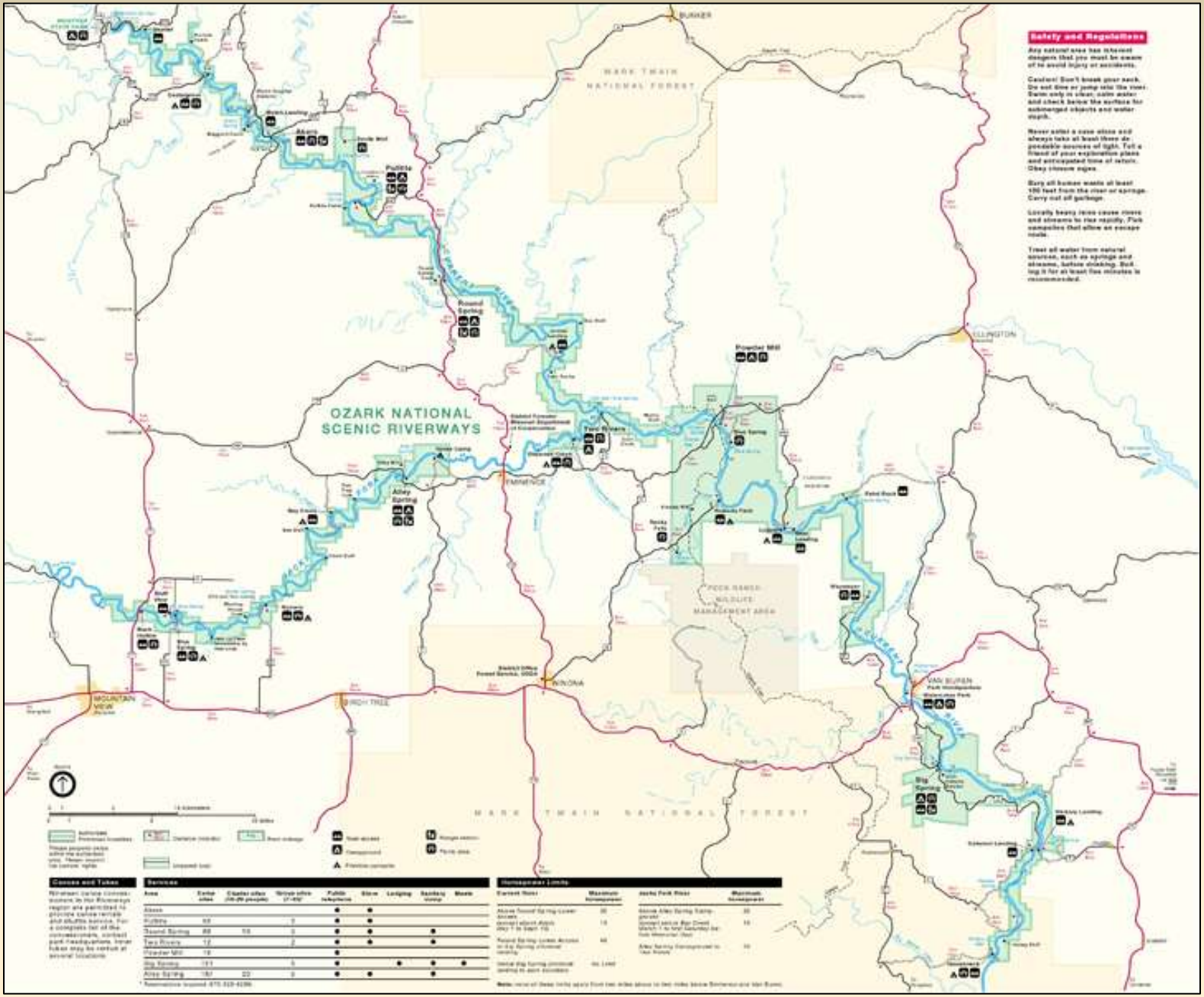


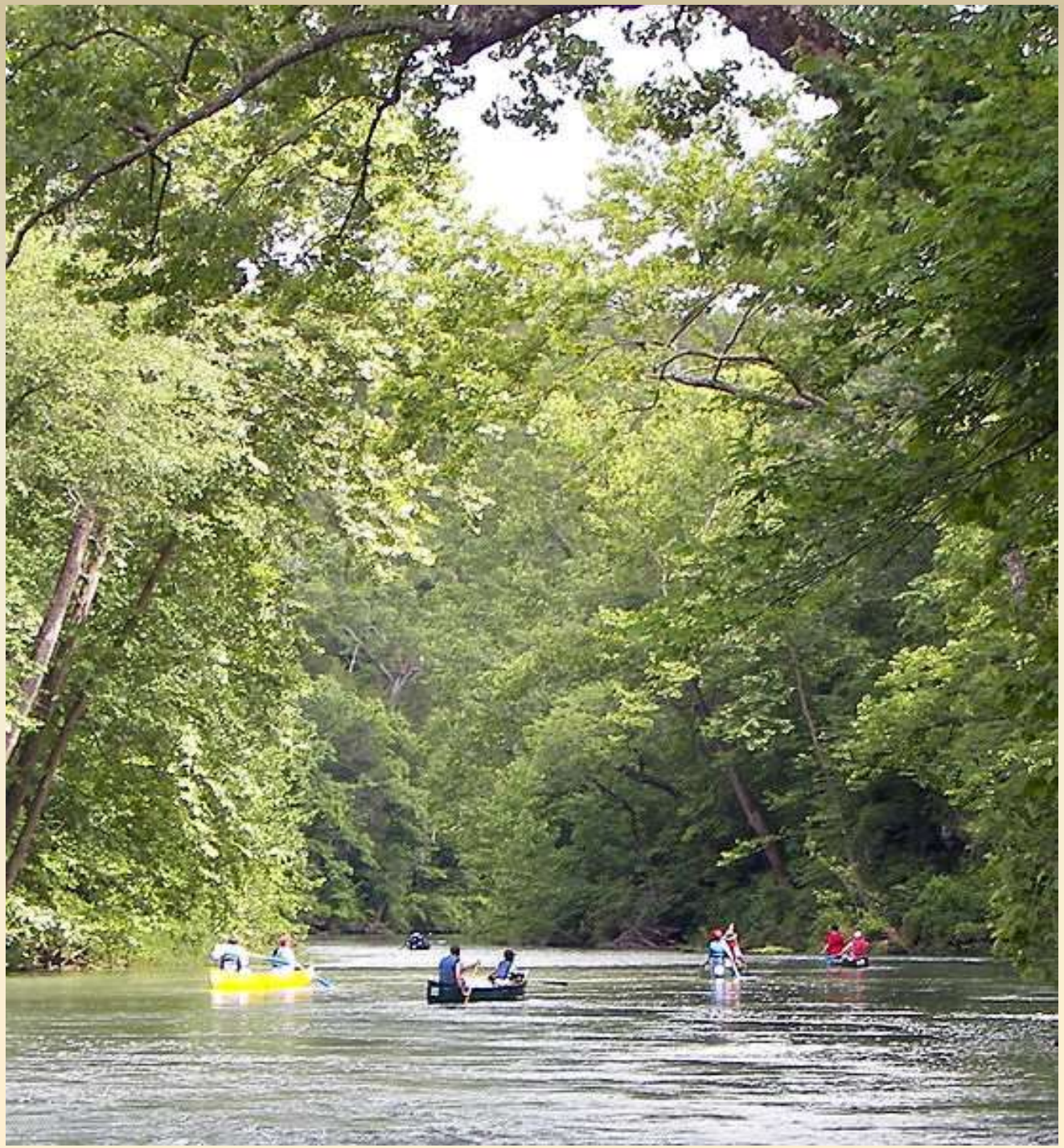
Ozark Highlands

Pinus echinata
Shortleaf Pine

Logging the Pine Forests – early 1900s

Ozark National Scenic Riverways



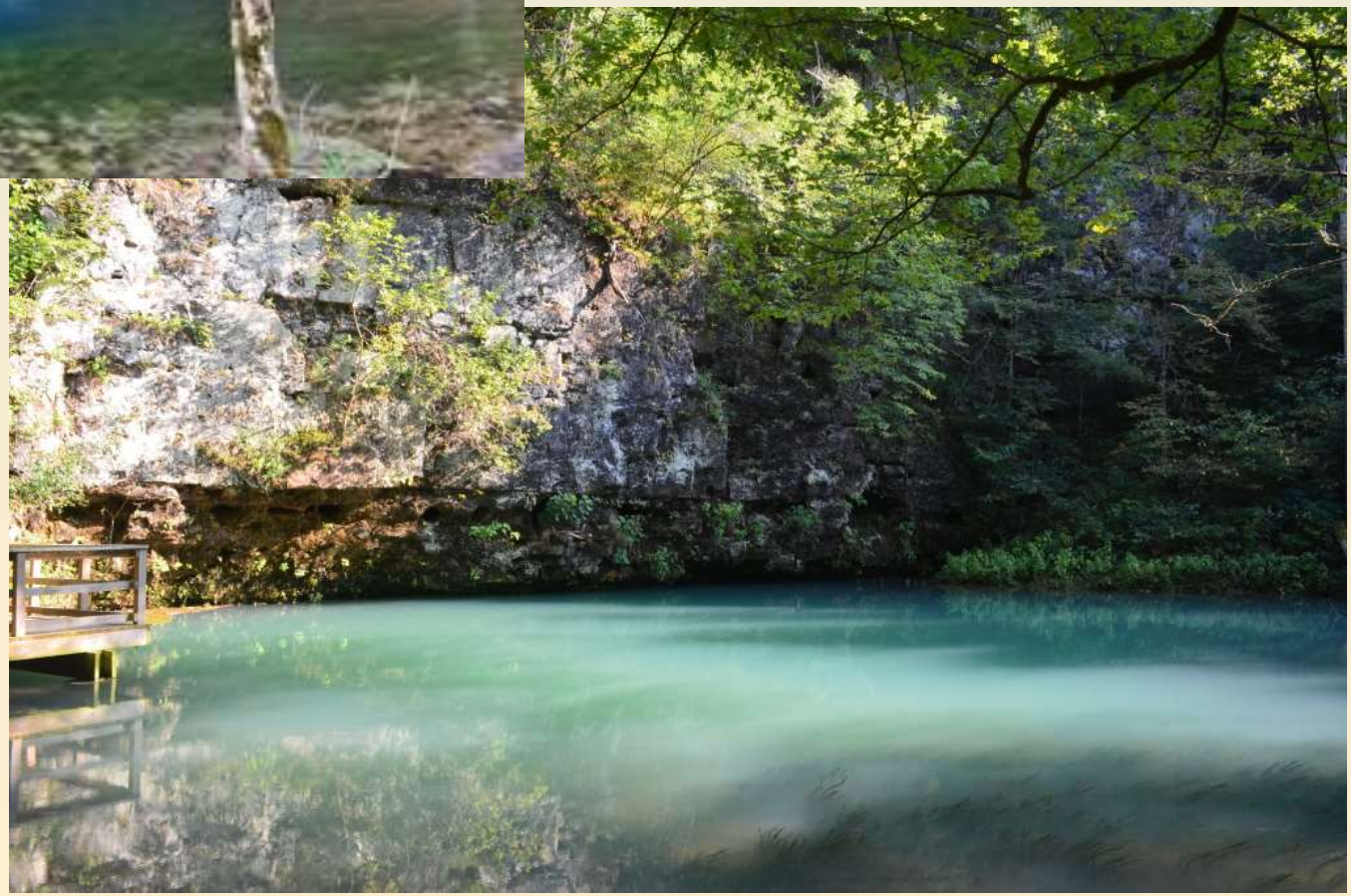


Huzzah Float Trip

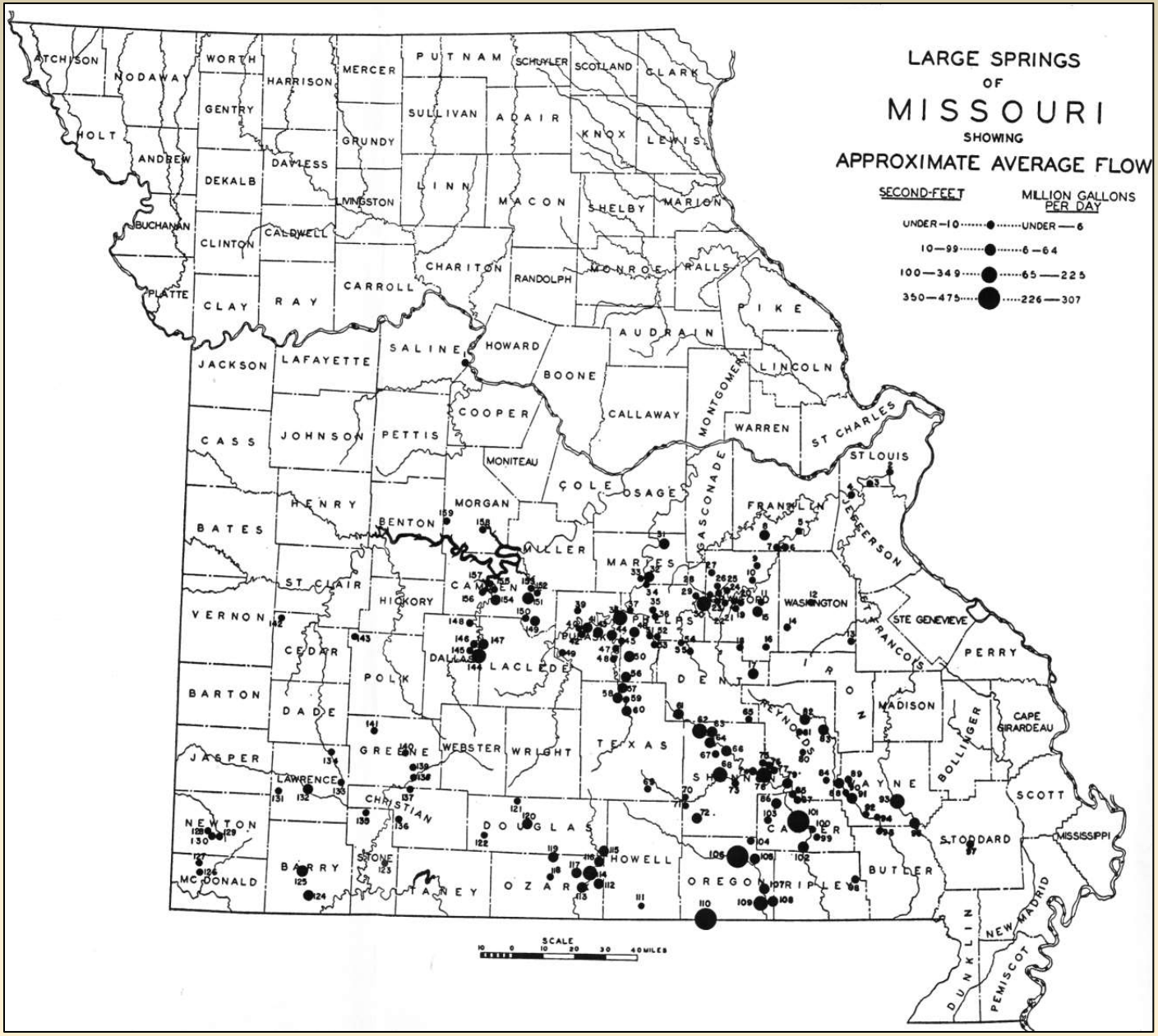
Huzzah Float Trip, REU 2014

Current River

Blue Springs
Natural Area
Current River



Big Springs in Missouri



Alley Springs

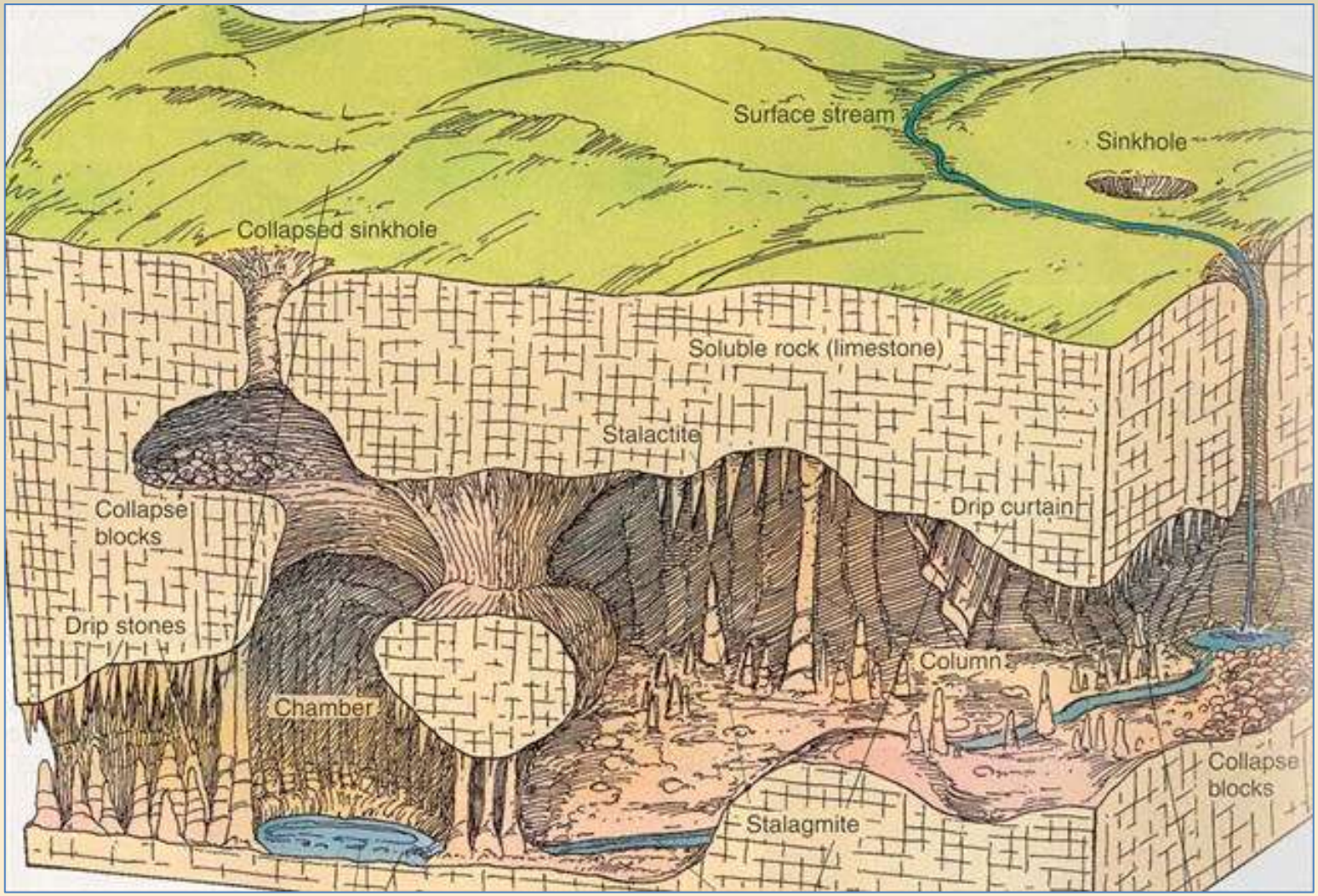
REU 2013

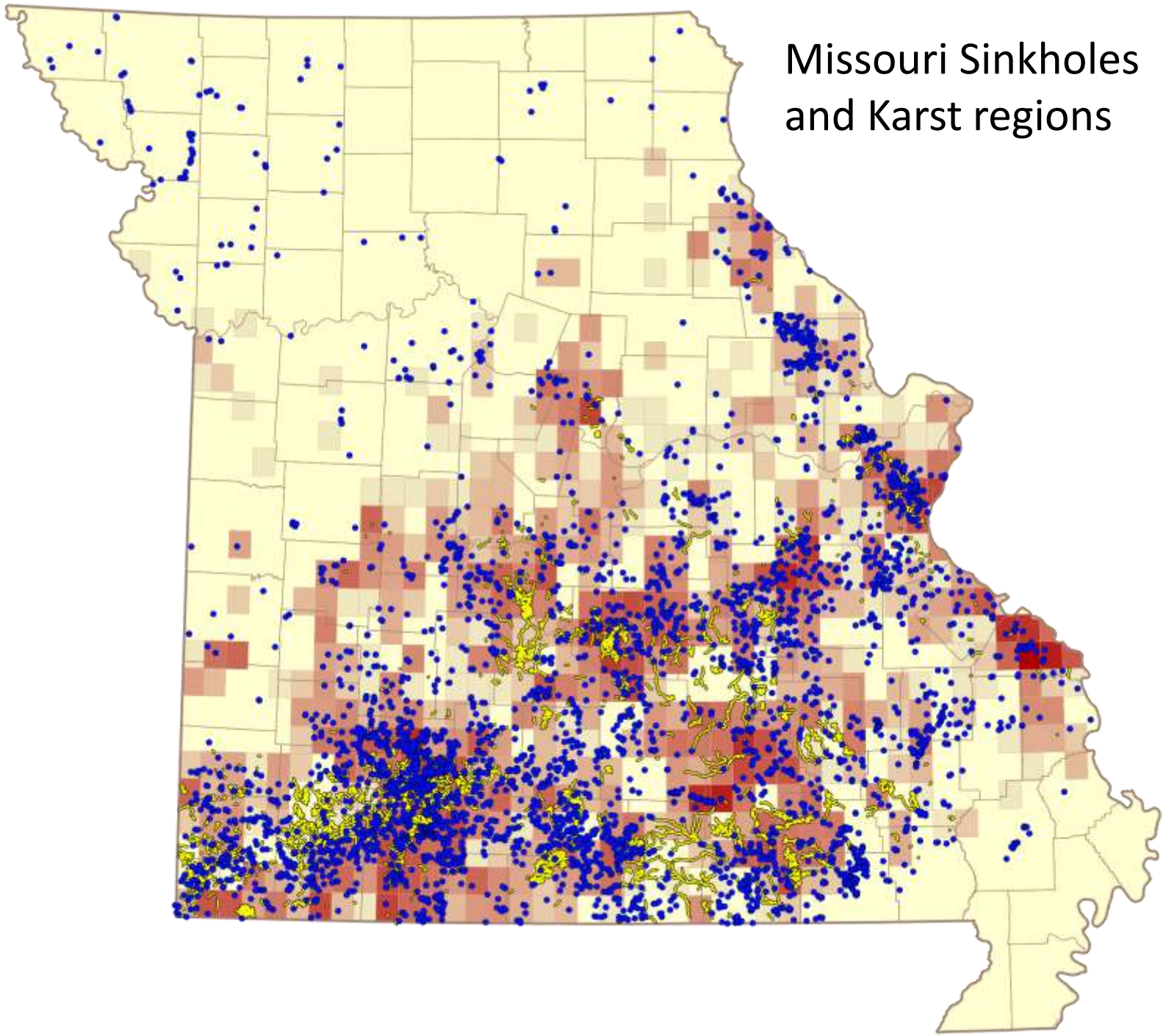
Caves

Jam-Up Cave,
Jack's Fork River
Shannon County

Onondaga Cave
Crawford County

Karst - an area of limestone terrain characterized by underground erosion, sinkholes, ravines, underground caves, caverns and streams




Missouri Sinkholes
and Karst regions

Onondaga Cave State Park

REU 2014

Onondaga Cave State Park – Cathedral Cave

REU 2014

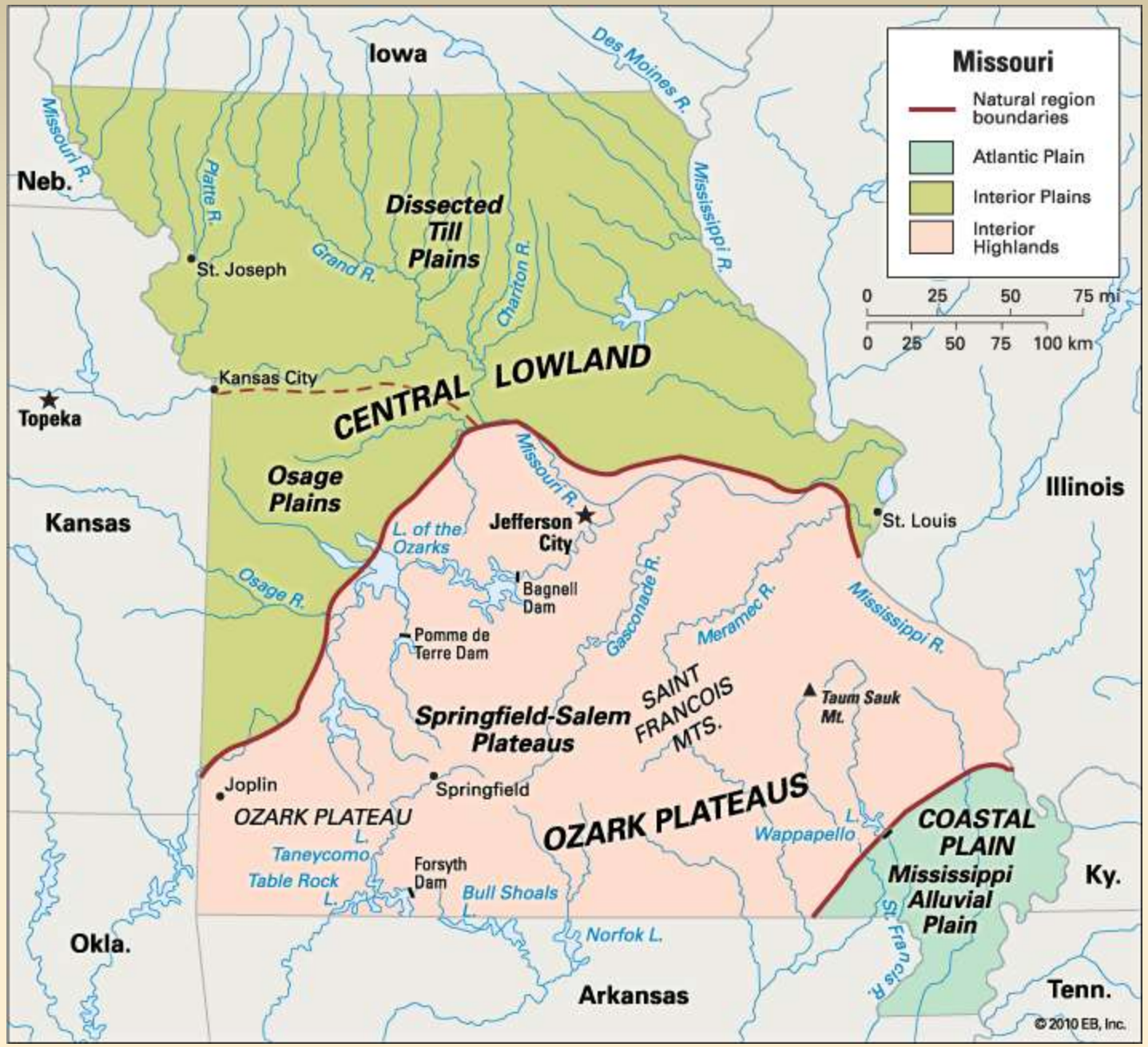
Cathedral Cave

REU 2014

Osage Plains – SW Mo.

- rolling hills
- prairie
- grazing land

Prairie State Park - Missouri's largest remaining tallgrass prairie landscape


Missouri
Natural region boundaries
Atlantic Plain
Interior Plains
Interior Highlands
0 25 50 75 mi
0 25 50 75 100 km
Iowa
Des Moines R.
Missouri R.
Neb.
Platte R.
Dissected Till Plains
Grand R.
St. Joseph
Chariton R.
Mississippi R.
Kansas City
CENTRAL LOWLAND
Topeka
Osage Plains
Missouri R.
Illinois
Kansas
L. of the Ozarks
Jefferson City
St. Louis
Osage R.
Bagnell Dam
Gasconade R.
Meramec R.
Mississippi R.
Pomme de Terre Dam
SAINT FRANCOIS MTS.
Springfield-Salem Plateaus
Taum Sauk Mt.
Joplin
Springfield
OZARK PLATEAU
OZARK PLATEAUS
L. Wappapello
COASTAL PLAIN
Taneycomo L.
Table Rock L.
Forsyth Dam
Bull Shoals L.
Mississippi Alluvial Plain
Ky.
Okla.
Norfok L.
St. Francis R.
Arkansas
Tenn.
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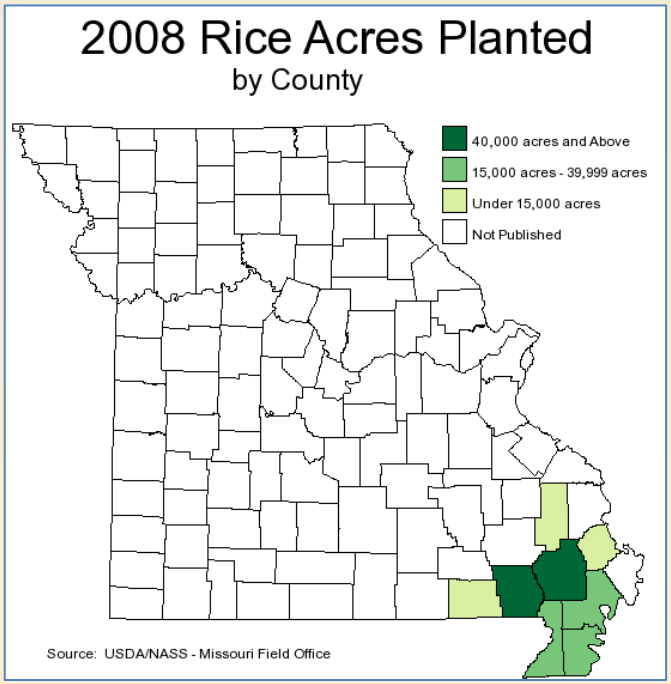
SE Lowlands - Mingo Swamp

Mississippi Lowlands

Allred Lake

Big Oak Tree State Park

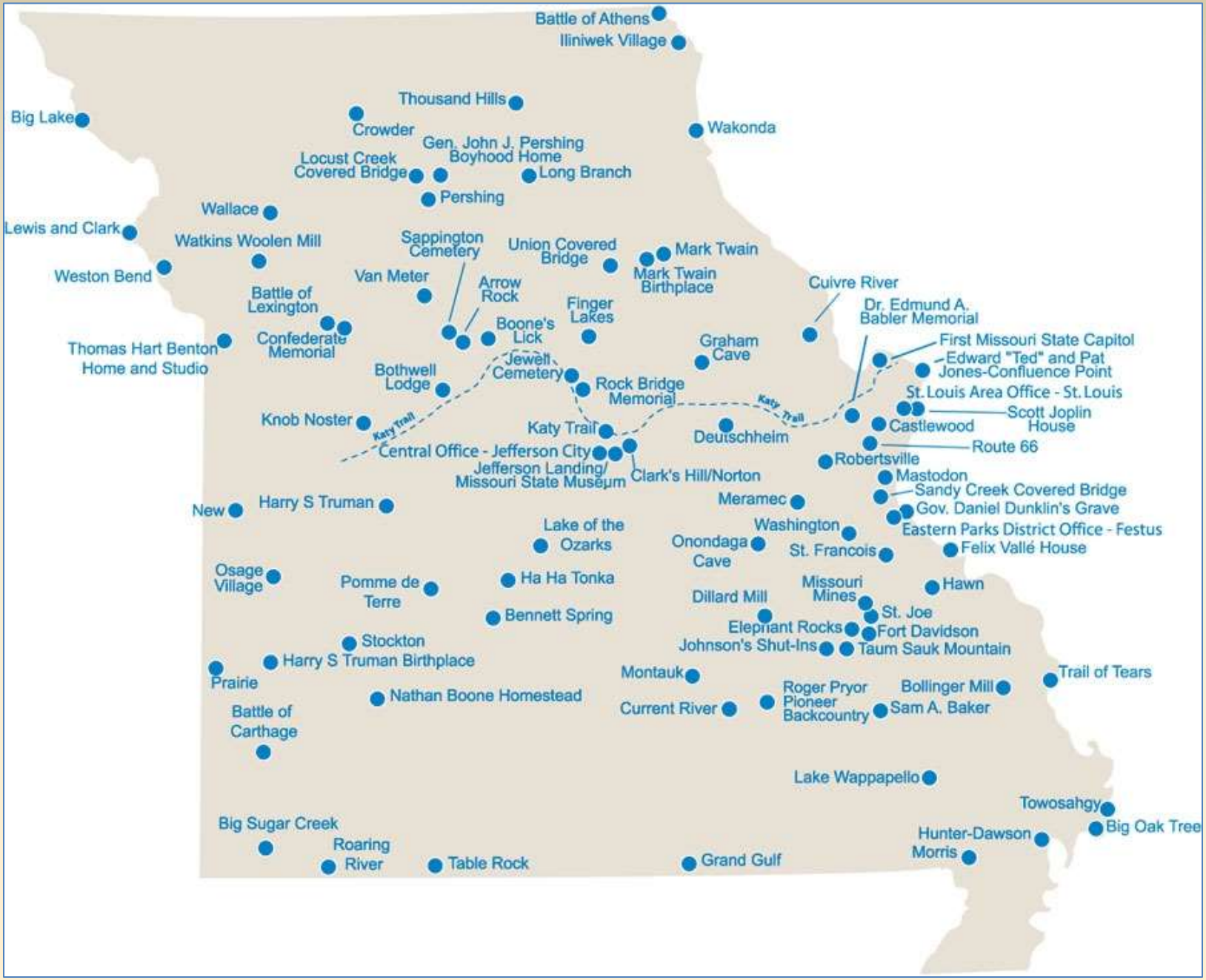
Southeast Missouri Agriculture



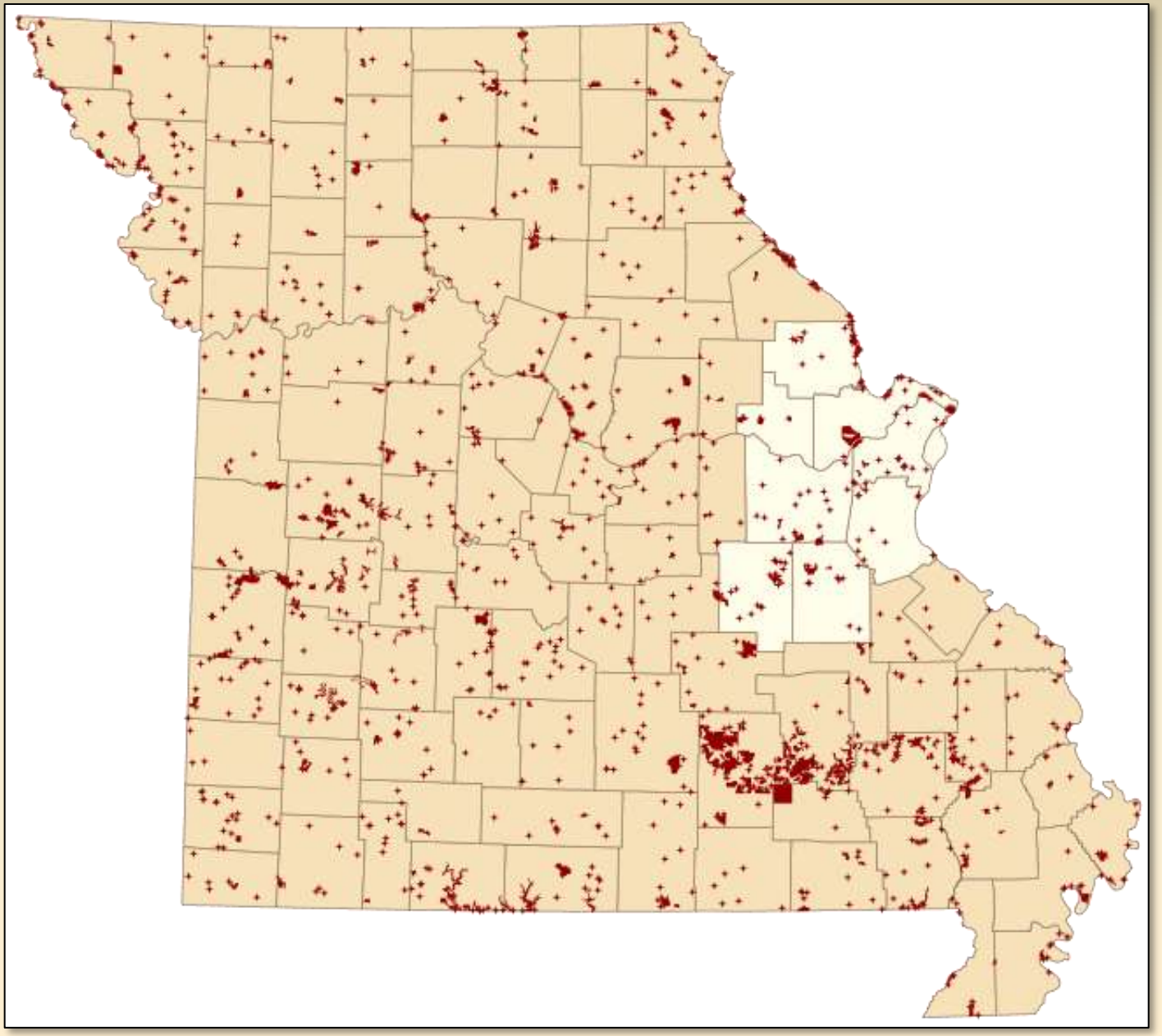
Sand Prairies

National Forest and Wilderness Areas

State Parks in Missouri - DNR



Missouri Department of Conservation Lands



End