Foushee Cavesnail (*Amnicola cora*) – G1S1

Steve Taylor

Benton County Cave Crayfish (*Cambarus aculabrum*) – G1S1, LE

Mike Slay

Hell Creek Cave Crayfish (*Cambarus zophonastes*) – G1S1, LE

Mike Slay

Ozark Cave Fish (*Ambylopsis rosae*) – G3S1, LT

Cave City Cave Amphipod (*Bactrurus speleopsis*) – G1S1

Dante Fenolio

Ozark Cave Silverfish (*Speleonycta ozarkensis*) – GNRSNR

Dante Fenolio

Buffalo River Cave Harvestman (*Crosbyella distincta*) – G1G2S1

Mike Slay

Blanchard Springs Cave Pseudoscorpion (*Apochthonius titanicus*) – G1G2S1

Steve Taylor & Mike Slay

Ozark Big-eared Bat (*Corynorhinus townsendii ingens*) – G3G4T1S1 , LE

Merlin Tuttle/Bat Conservation Intl.

Indiana Bat (*Myotis sodalis*) – G2S1, LE

Larry Master/www.masterimages.com

Gray Bat (*Myotis grisescens*) – G3S2S3, LE

Steve Taylor & Mike Slay

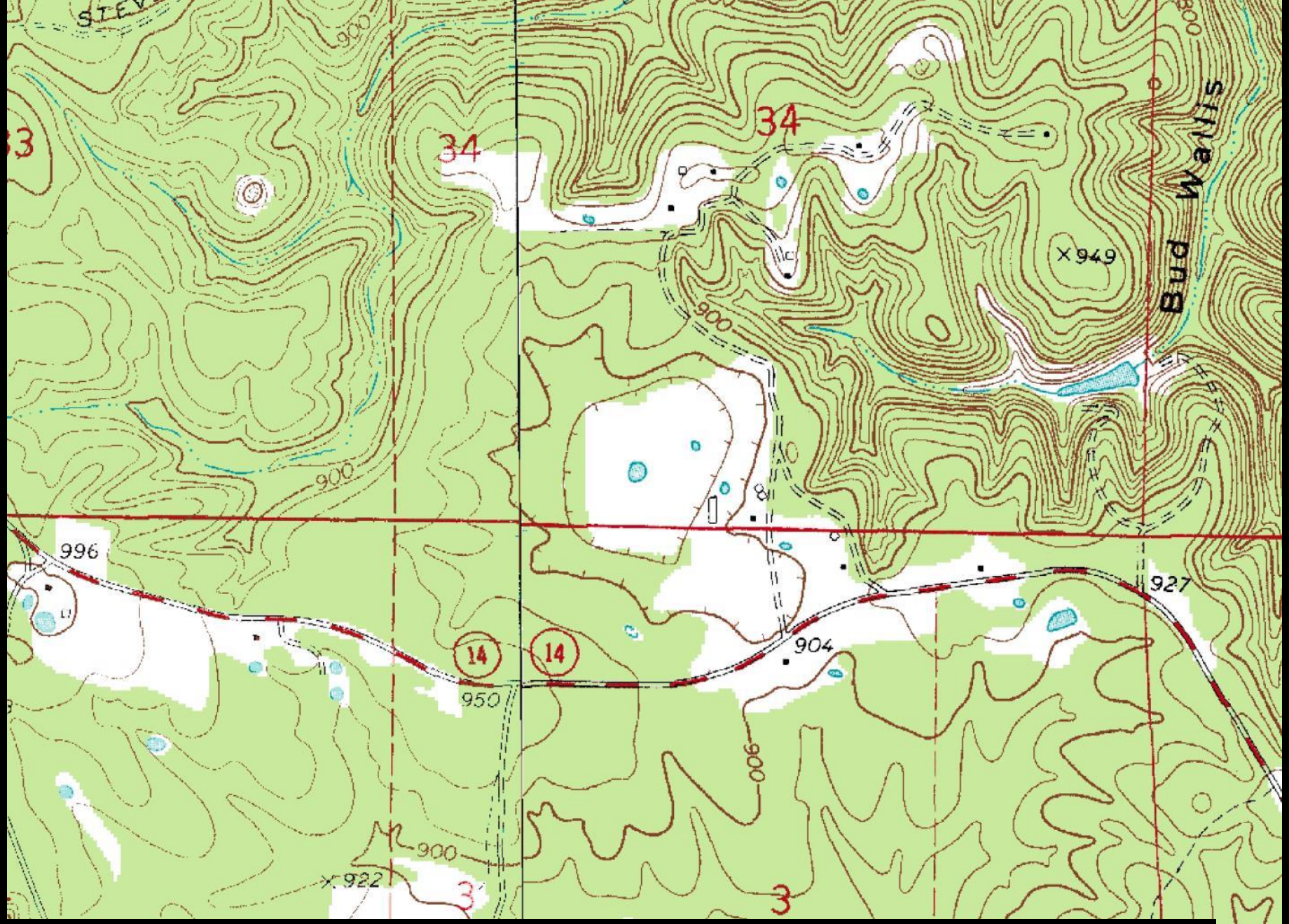
Grotto Salamander (*Eurycea spelaea*) – G4S3

Kory Roberts

Northern Long-eared Bat (*Myotis septentrionalis*) – G1G3S4, LT

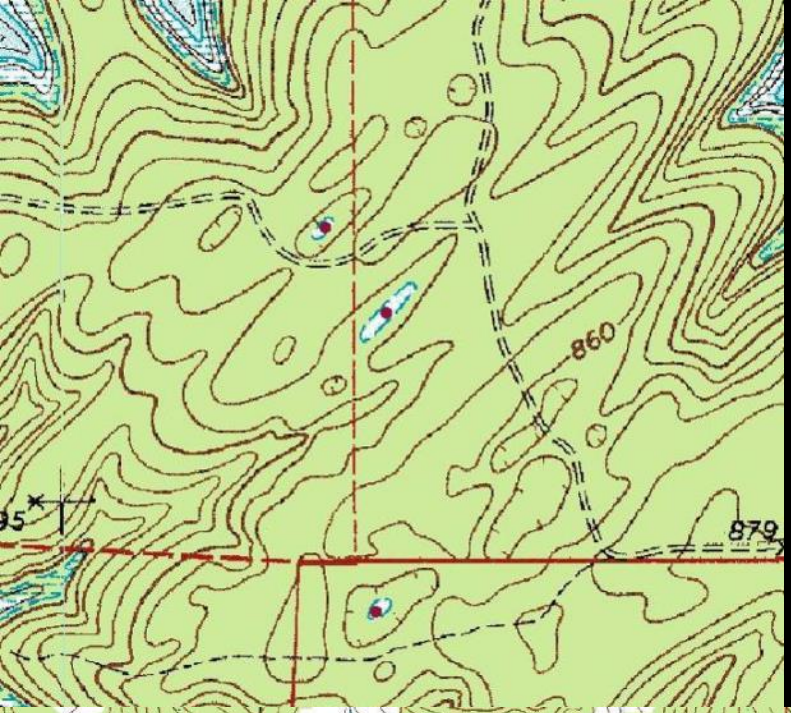
Al Hicks/NY Dept. Env. Cons.

Larry Master/www.masterimages.com



Sinkhole Pond Near Fifty-Six. Stone County.

Sinkhole Pond Near Fifty-Six. Stone County.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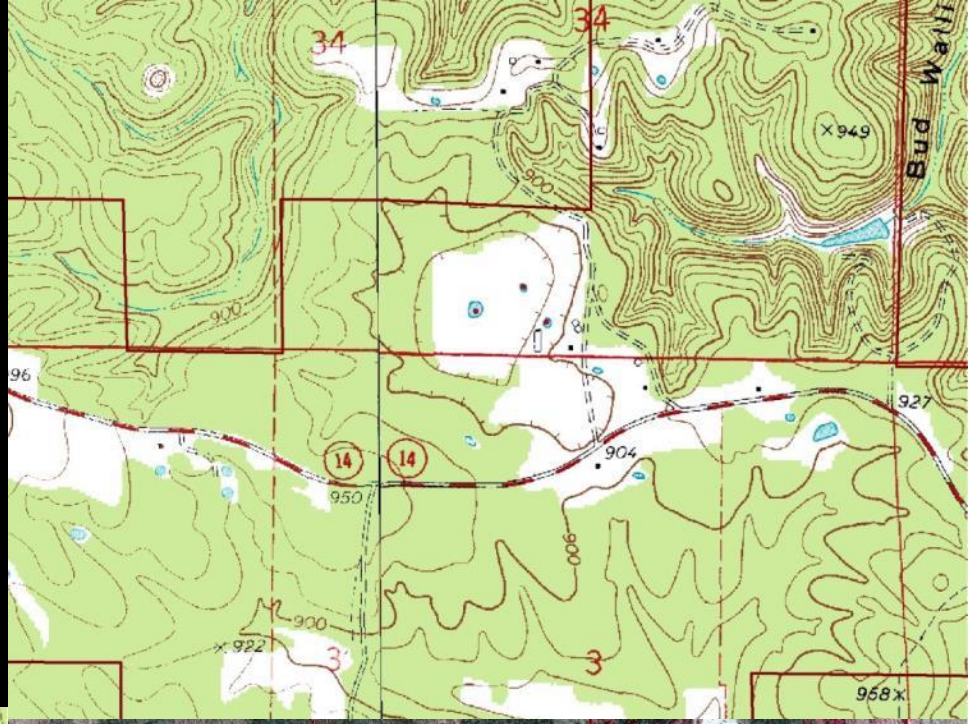
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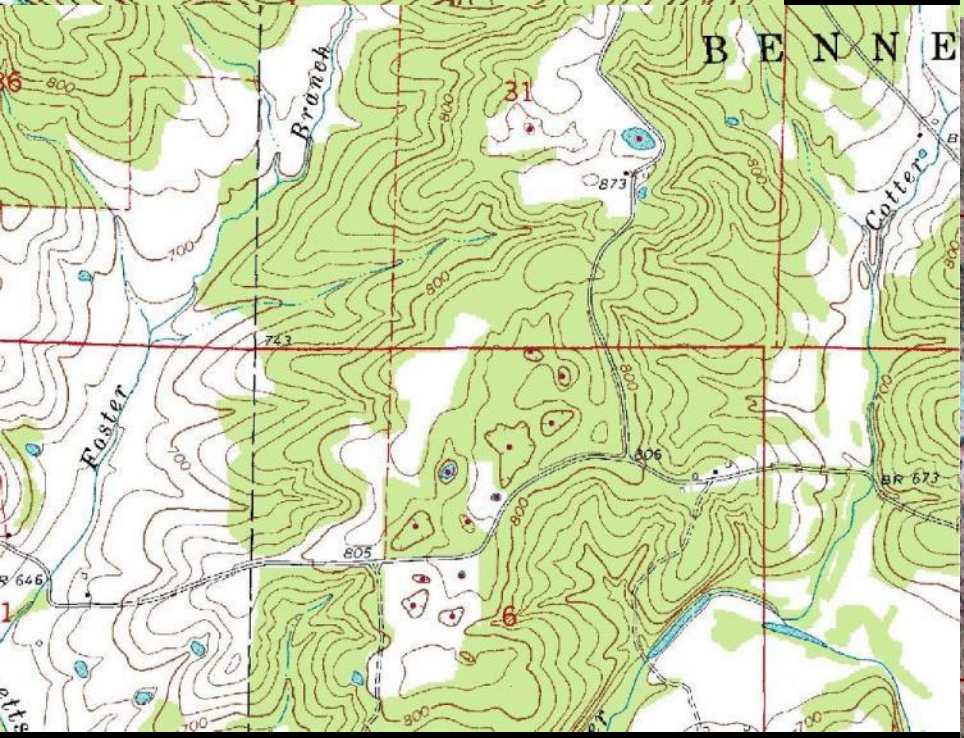

B E N N E
Branch
31
873
Foster
743
806
805
BR 673
6
646

Upland Karst Sinkhole Ponds

Photos: Theo Witsell

Sinkhole Pond and Sandstone Glades. Izard County.

Mammoth Spring on the Spring River. 9,000,000 gallons per hour. Fulton County.

Mammoth Spring Crayfish
(*Orconectes marchandi*) – G2S2

Chris Lukhaup

Arkansas Darter (*Etheostoma cragini*)

Ozark Hellbender
(*Cryptobranchus alleganiensis bishopi*)

Jill Utrip/USFWS

Streamside Fen. Boone County.

Streamside Fen. Rock Creek Natural Area. Sharp County.

Streamside Fen. Marion County.

Big Bluff. Buffalo National River. Newton County.

“The Nar’s”. Buffalo National River. Searcy County.

Photo: Craig Fraiser

Photo: Brent Baker/ANHC

Photo: Brent Baker/ANHC

Cliffs

Ledges

Glades

Talus

Photo: Craig Fraiser

Spray Cliff

Rockhouse

Trichomanes boschianum, G4S2S3

Photos: Don Crank

Primula (Dodecatheon) frenchii, G3S2

Photos: John Pelton

Woodland

Church's Wild Rye (*Elymus churchii*)

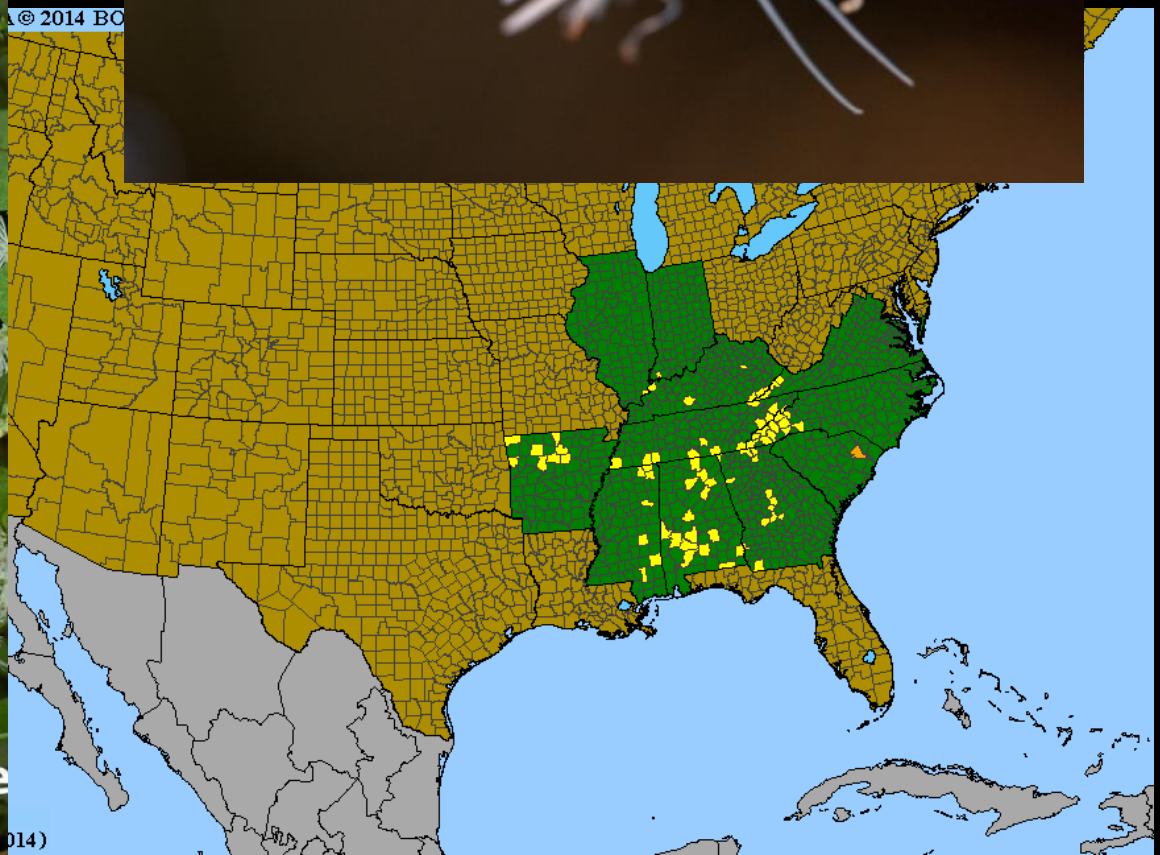
Ledge and Talus

Missouri Ground-cherry

(*Physalis missouriensis*)

Ovate-leaf Catchfly *(Silene ovata)*

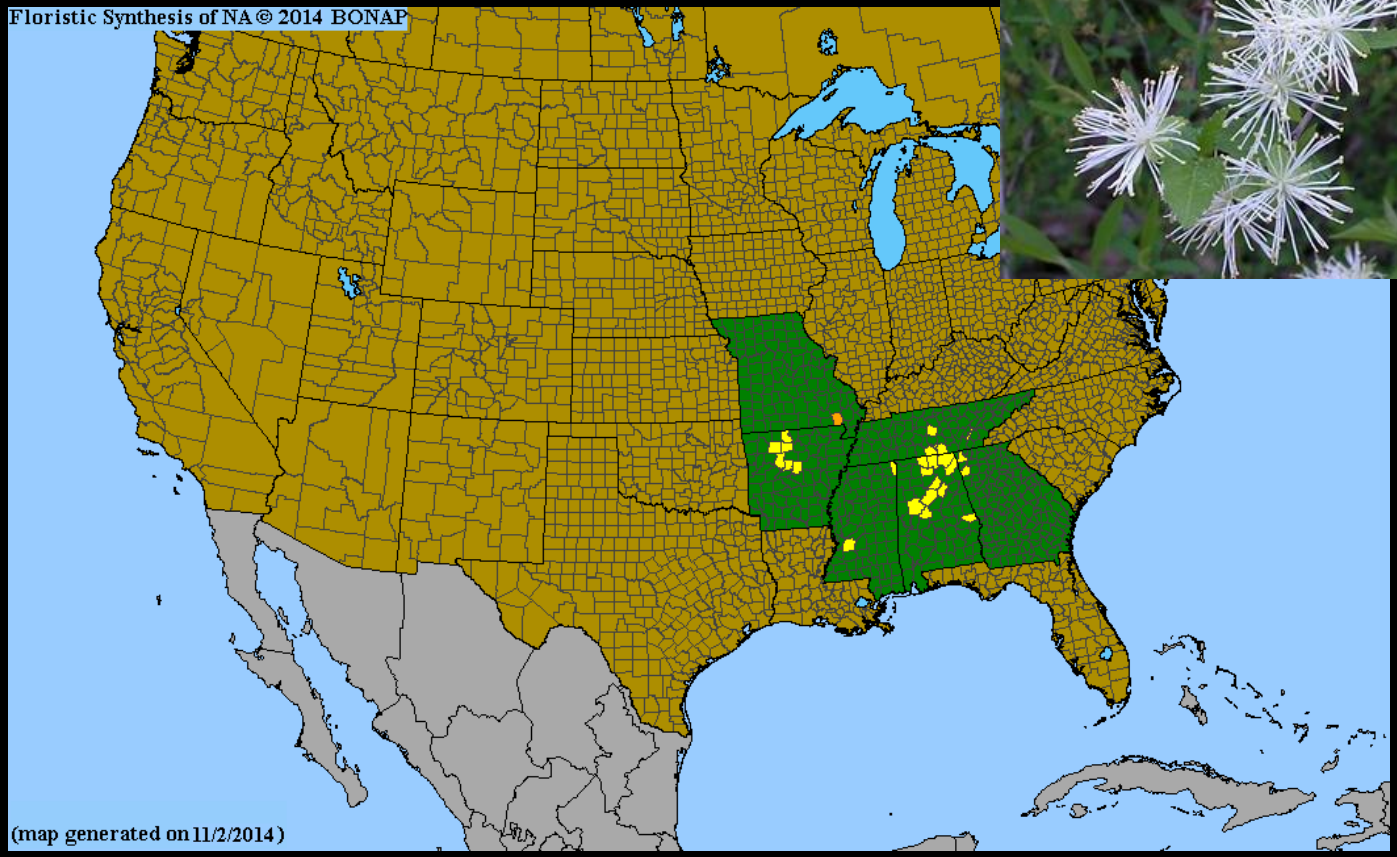
Habitat: Mesic bluffs and talus; ledges, stream banks in deep hollows



Alabama Snow-wreath *(Neviusia alabamensis)*

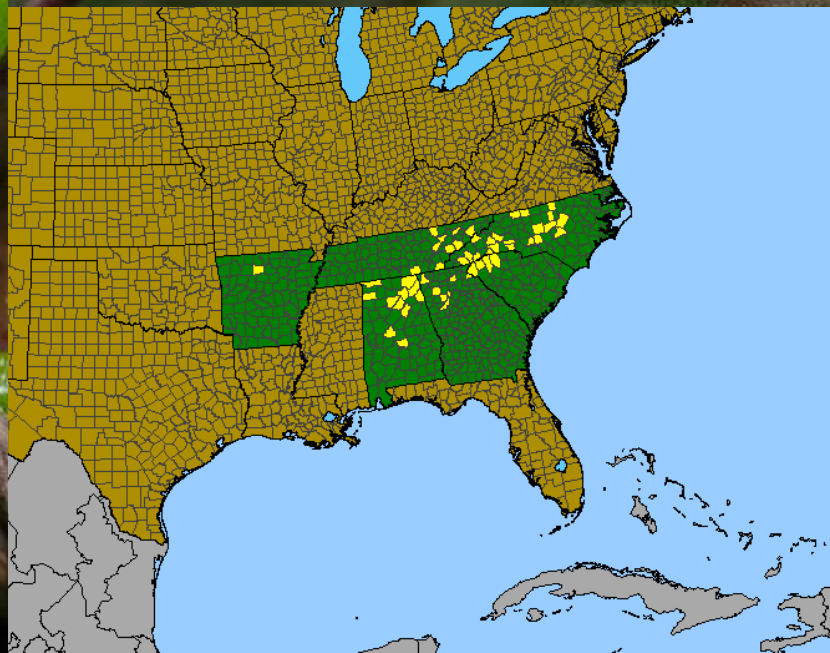
Habitat: Mesic bluffs and talus; steep, rocky slopes

Craig Fraiser



Witch-alder *(Fothergilla major)*

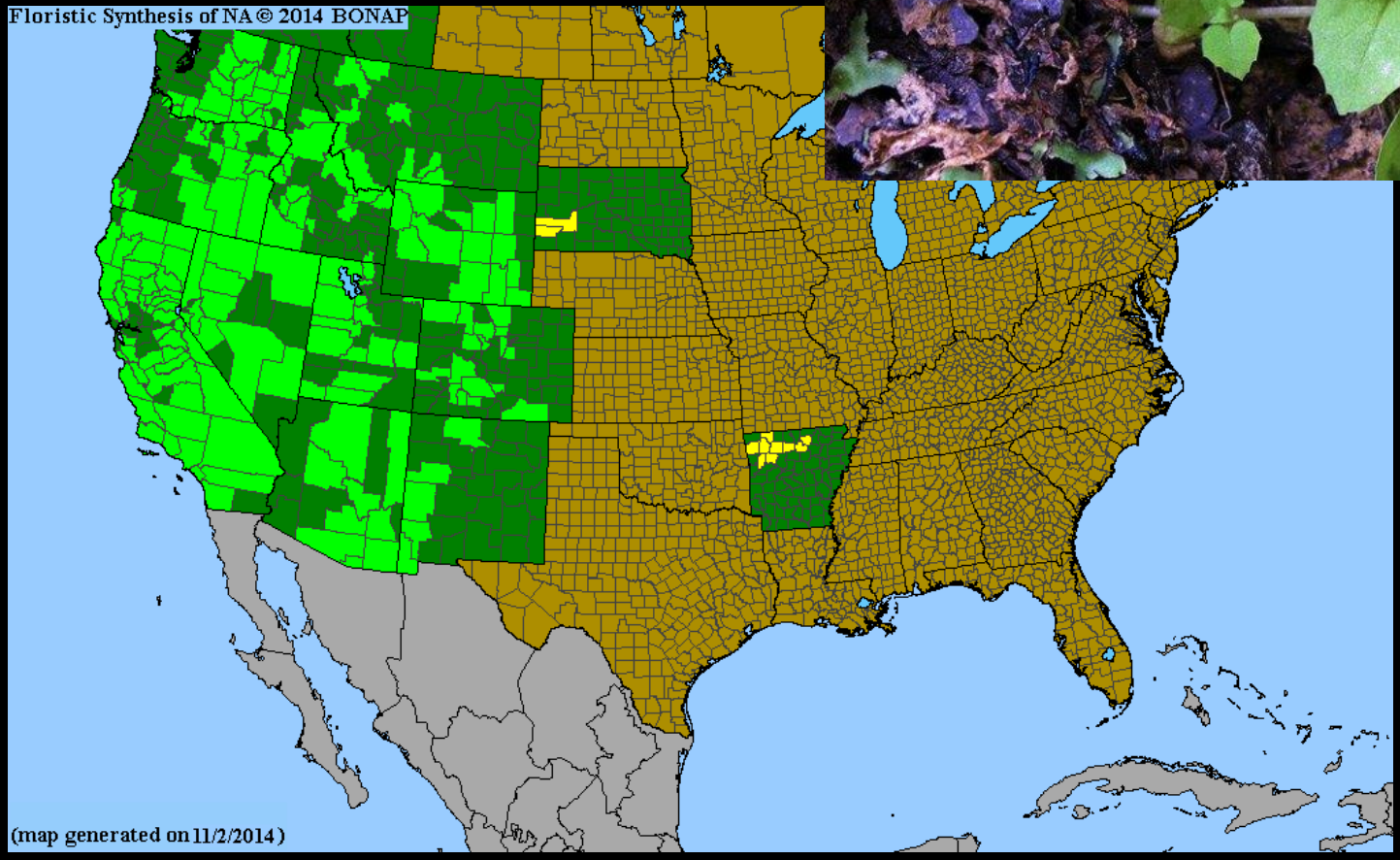
Habitat: Sandstone talus and woodlands



Yellow Monkey Flower *(Mimulus floribundus)*

Habitat: Wet or Mesic Bluffs on sandstone, shale, or limestone

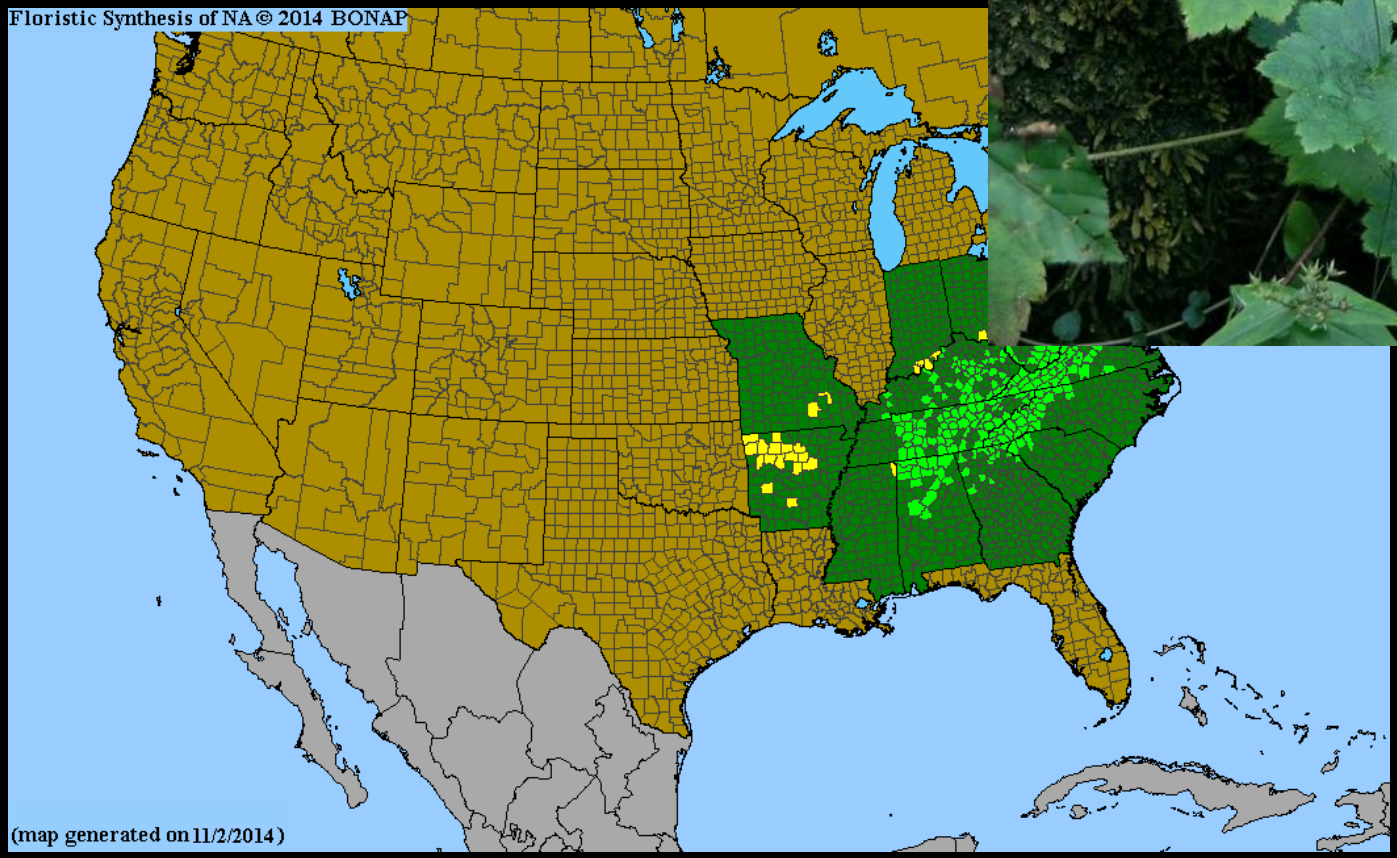
Craig Fraiser



Arkansas Alumroot *(Heuchera villosa* var. *arkansana)*

Habitat: Sandstone Bluffs (rarely limestone bluffs)

Craig Fraiser



A NEW NARROWLY ENDEMIC SPECIES OF *DIRCA* (THYMELAEACEAE) FROM KANSAS AND ARKANSAS, WITH A PHYLOGENETIC OVERVIEW AND TAXONOMIC SYNOPSIS OF THE GENUS

Aaron J. Floden[1], Mark H. Mayfield, and Carolyn J. Ferguson

abaxially pubescent leaves and sessile flowers and fruits and from *D. mexicana* and *D. occidentalis* by differences in perianth morphology and in its possession of trichomes on the apex of the ovary and fruit. A comparative study of the phenology and habitat of the new species highlights its distinction from *D. palustris*: *D. decipiens* occupies a more isolated, xeric limestone habitat and begins flowering about a week later than the nearest populations of *D. palustris*. Phylogenetic relationships among the species of the genus were also assessed using sequence data from the internal transcribed spacer (ITS) region of the nuclear ribosomal DNA and two chloroplast DNA intergenic spacer and intron regions (*trn*D-*trn*T and *trn*L-*trn*F). The phylogenetic data support 1) the monophyly of the widespread eastern North American *D. palustris*, 2) a close relationship between *D. mexicana* and *D. decipiens*, and 3) a well-supported monophyletic group of these three eastern species that is sister to the Californian endemic *D. occidentalis*. Early divergence of the western *D. occidentalis* from the remaining species is consistent with previous biogeographic interpretations.

RESUMEN

Dirca decipiens A. Floden, nueva especie, es descrita de Kansas y el noroeste de Arkansas, y se presenta una sinopsis taxonómica revisada y una clave para el género. La nueva especie es distinguida fácilmente de *D. palustris*, su vecina geográfica más cercana, por sus hojas pubescentes en el lado abaxial, y flores y frutos sésiles, y de *D. mexicana* y *D. occidentalis* por la morfología del perianto y su posesión de tricomas en el ápice del ovario y el fruto. Un estudio de la fenología y el hábitat de la nueva especie clarifica más la distinción entre *D. decipiens* y *D. palustris*: *D. decipiens* ocupa un hábitat más aislado de piedra caliza, y empieza floreciendo aproximadamente una semana después que las poblaciones más cercanas de *D. palustris*. Las relaciones filogenéticas del género fueron evaluadas basadas en datos de secuencia de ADN (ITS; y regiones del cloroplasto, *trn*D-*trn*T y *trn*L-*trn*F). Estos datos sustentan 1) la monofilia de la especie de amplio rango en el este de Norteamérica, *D. palustris*, 2) una relación cercana entre *D. mexicana* y *D. decipiens*, y 3) un grupo monofilético bien apoyado de estas tres especies orientales que tiene una relación de hermana con la especie endémica de California, *D. occidentalis*. La divergencia temprana de la especie occidental, *D. occidentalis*, de las demás especies está de acuerdo con interpretaciones biogeográficas anteriores.

KEY WORDS: Arkansas, *Dirca*, *decipiens*, Kansas, phylogeny, Thymelaeaceae

The genus *Dirca* L. is the only extant native North American temperate element within the largely tropical family Thymelaeaceae. This genus has most recently been considered to include three similar but geographically isolated species of North American shrubs (Nesom & Mayfield 1995). *Dirca palustris* L. occurs infrequently over most of eastern North America (from southern Ontario and northern Florida west to eastern North Dakota, eastern Oklahoma, and central Louisiana). *Dirca occidentalis* A. Gray and *D. mexicana* G.L. Nesom & M. Mayfield are both narrowly endemic species, the former occurring locally in the San Francisco Bay and Central Coast floristic provinces of California (Berman 1993; Schrader & Graves 2008) and the latter at a single locality in montane northeastern Tamaulipas, Mexico (Nesom & Mayfield 1995; Graves 2008). In the present study, we describe a fourth species of *Dirca* from Kansas and Arkansas populations that have heretofore been identified as the broadly distributed eastern species *D. palustris*.

Morphological taxonomic work on the genus *Dirca* has been extensive despite the small size of the

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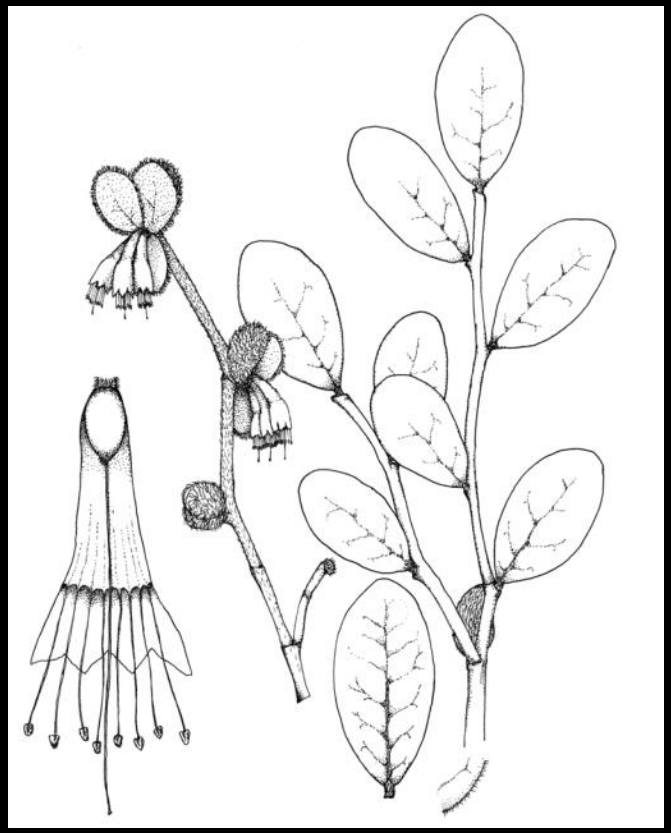
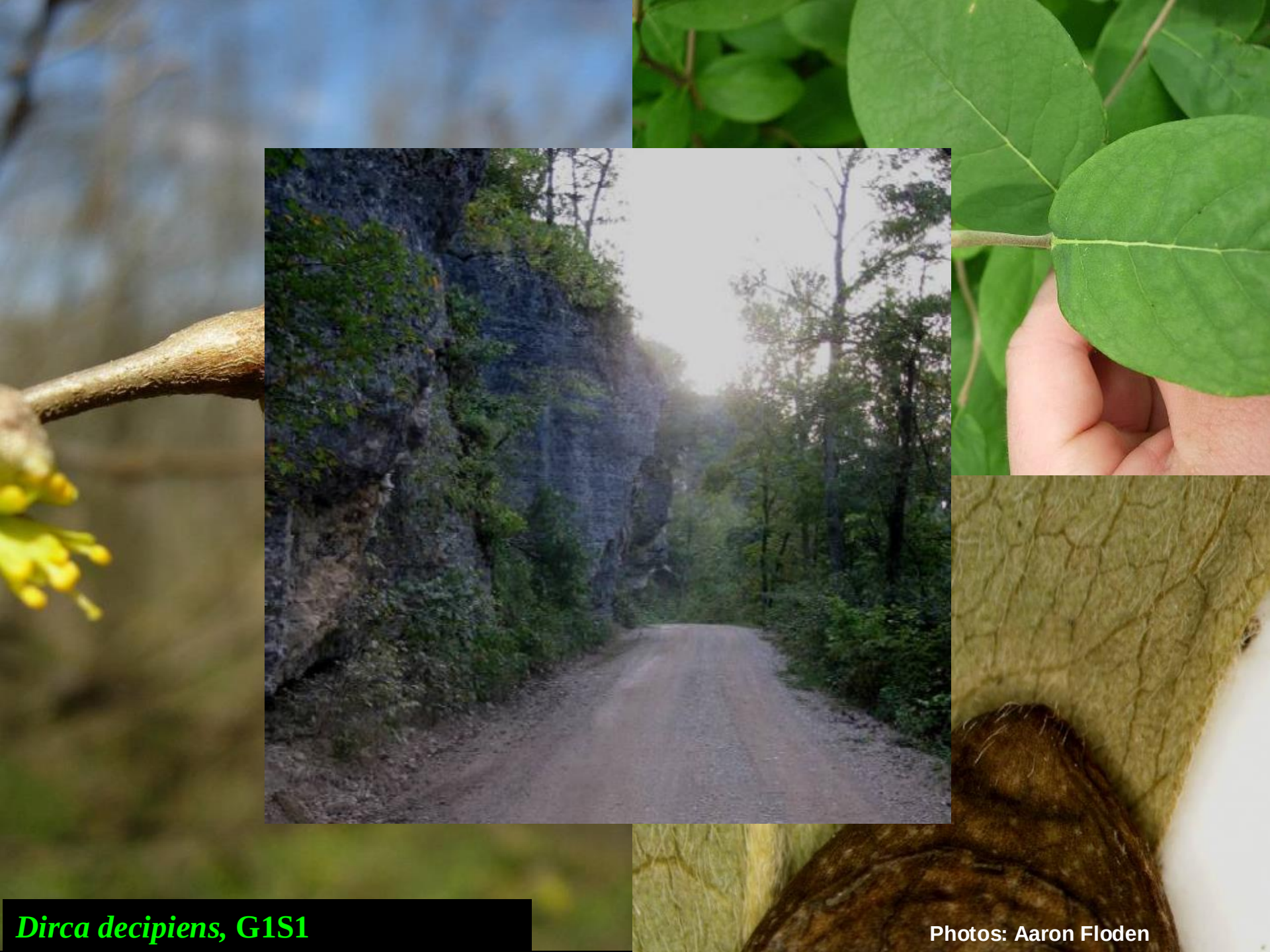
J. Bot. Res. Inst. Texas 3(2): 485 – 499. 2009





Dirca decipiens, G1S1

Photos: Aaron Floden

Photos: Brent Baker/ANHC

Claytonia arkansana G2S2

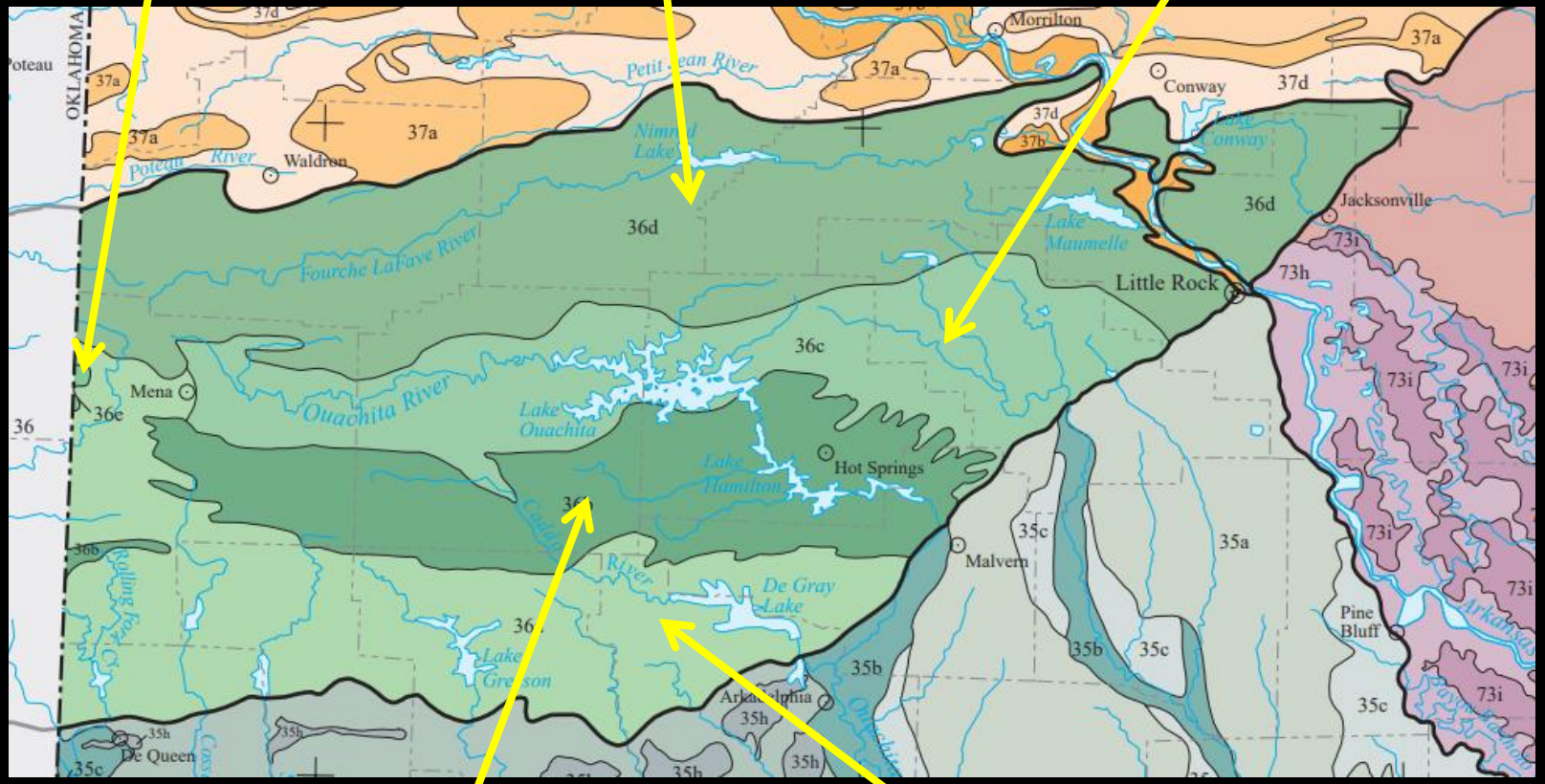
OUACHITA MOUNTAINS

Brent Baker/ANHC

Western Ouachitas

Fourche Mountains

Central Hills, Ridges, and Valleys



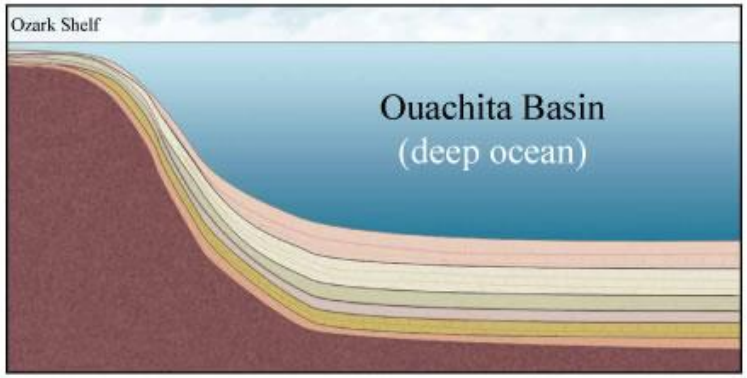
Central Mountain Ranges

Athens Plateau

EPA Level IV Ecoregions of the Ouachita Mountains

Formation of the Ouachita Mountains 1

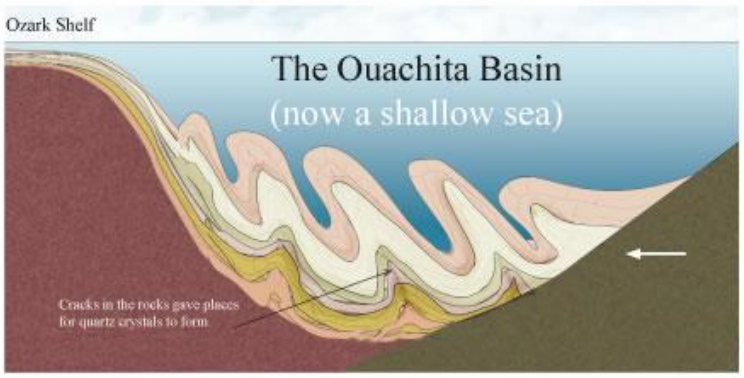
500 - 290 Million Years Ago



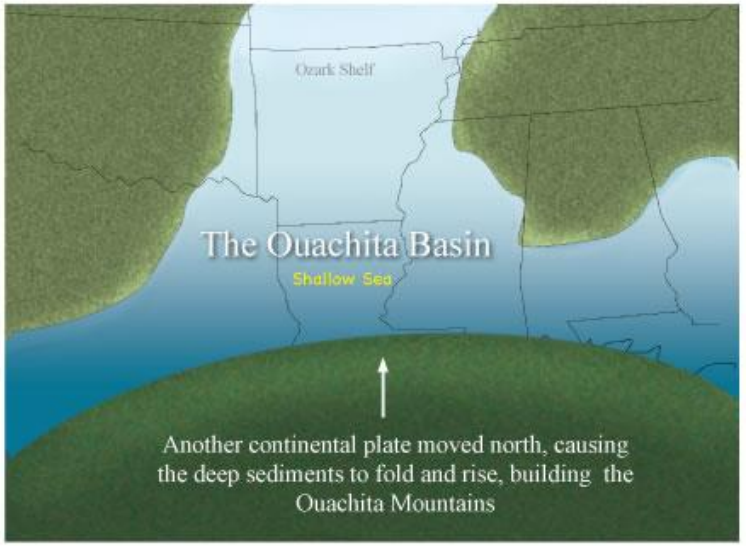
Sediment layers built up over millions of years, becoming sedimentary rock layers

Formation of the Ouachita Mountains 2

500 - 290 Million Years Ago



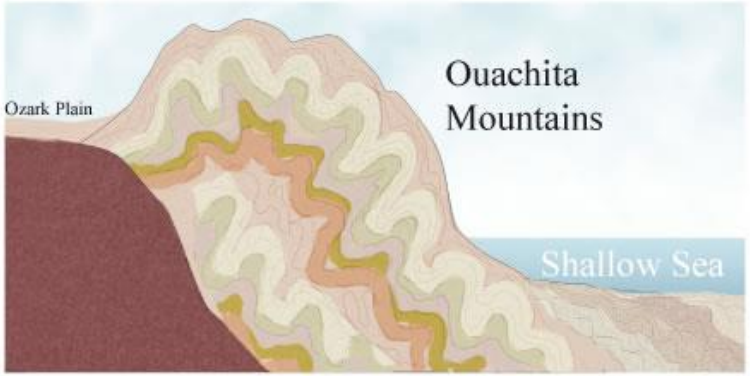
Continental Movement Forced Sediment Layers to Fold, Buckle, and Rise



J. Michael Howard / rockhoundingar.com

Formation of the Ouachita Mountains 3

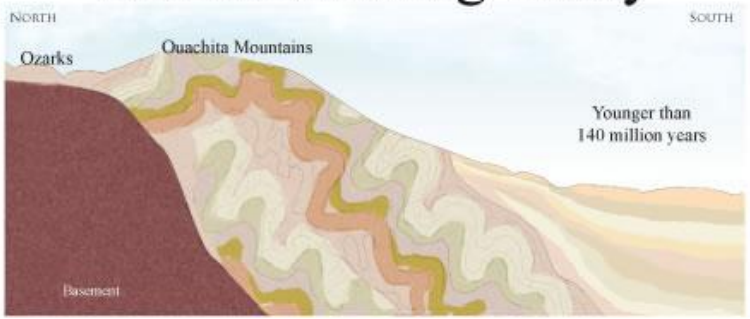
245 Million Years Ago



The Ouachita Mountains reached a height of 5,000 to 10,000 feet before mountain building processes ended and erosion began wearing away.

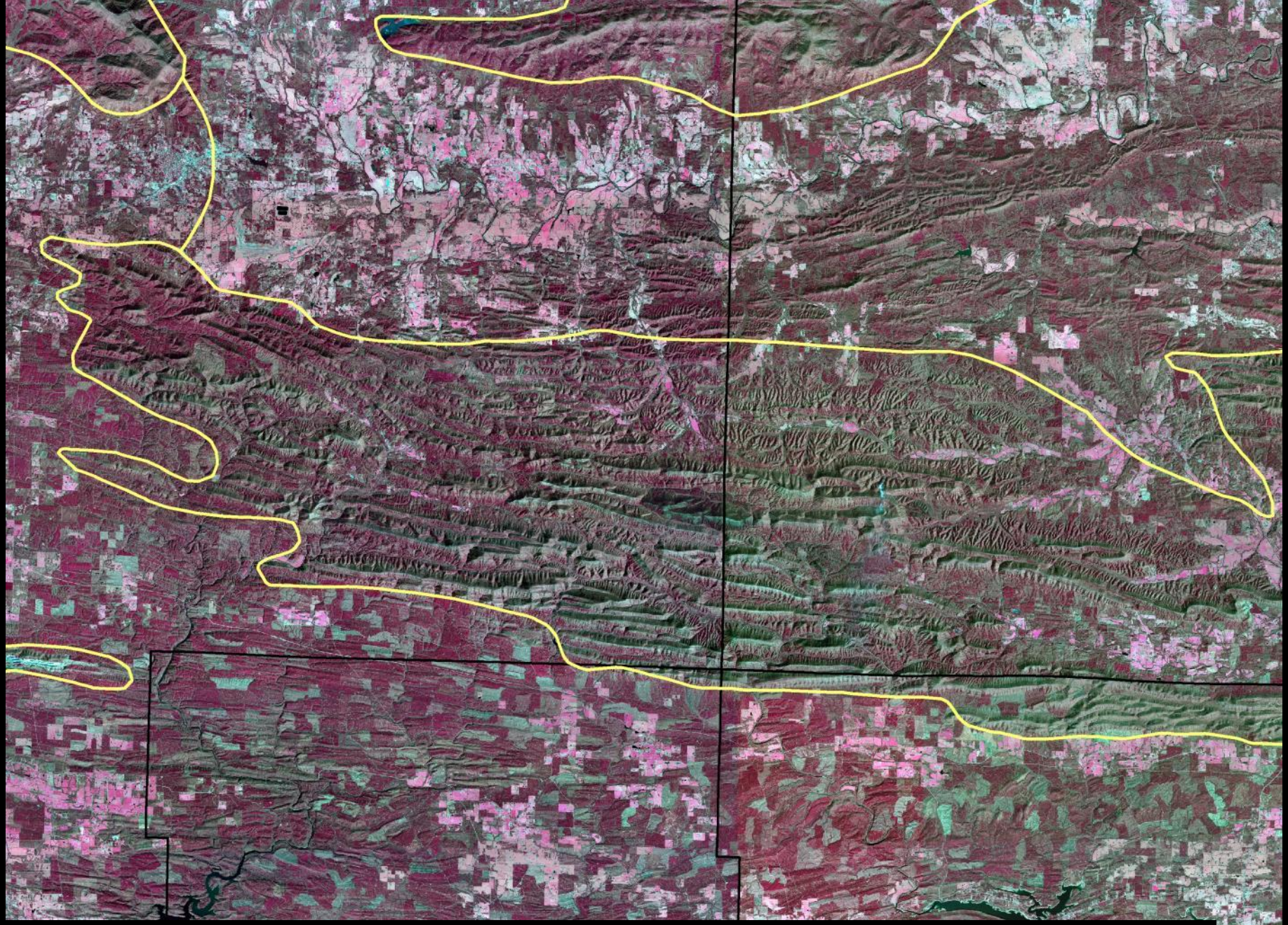
Formation of the Ouachita Mountains 4

Over Millions of Years and Continuing Today



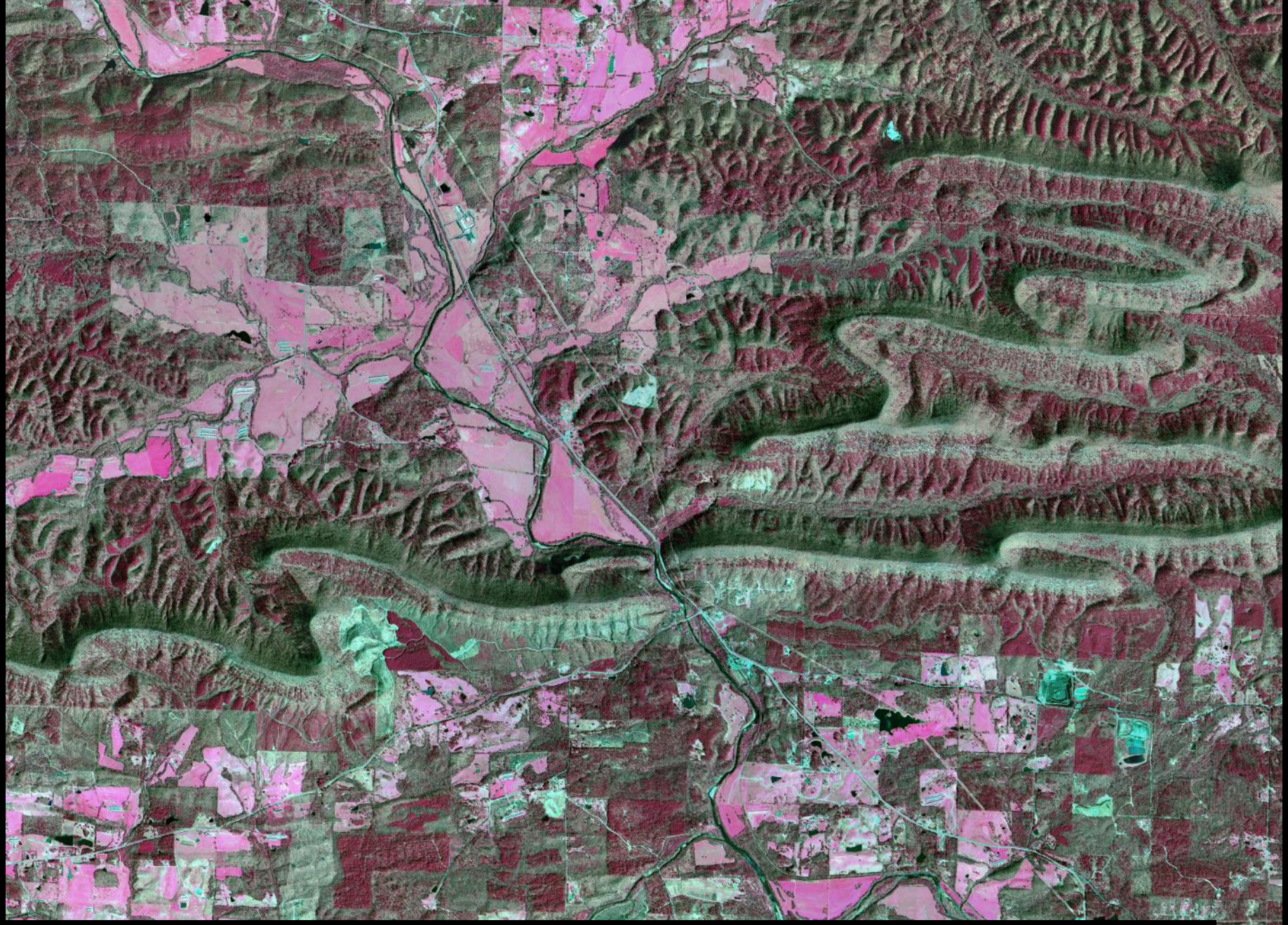
The Ouachita Mountains eroded to less than 3,000 feet. Those sediments filled in the shallow sea and created the delta land of east Arkansas.

J. Michael Howard / rockhoundingar.com



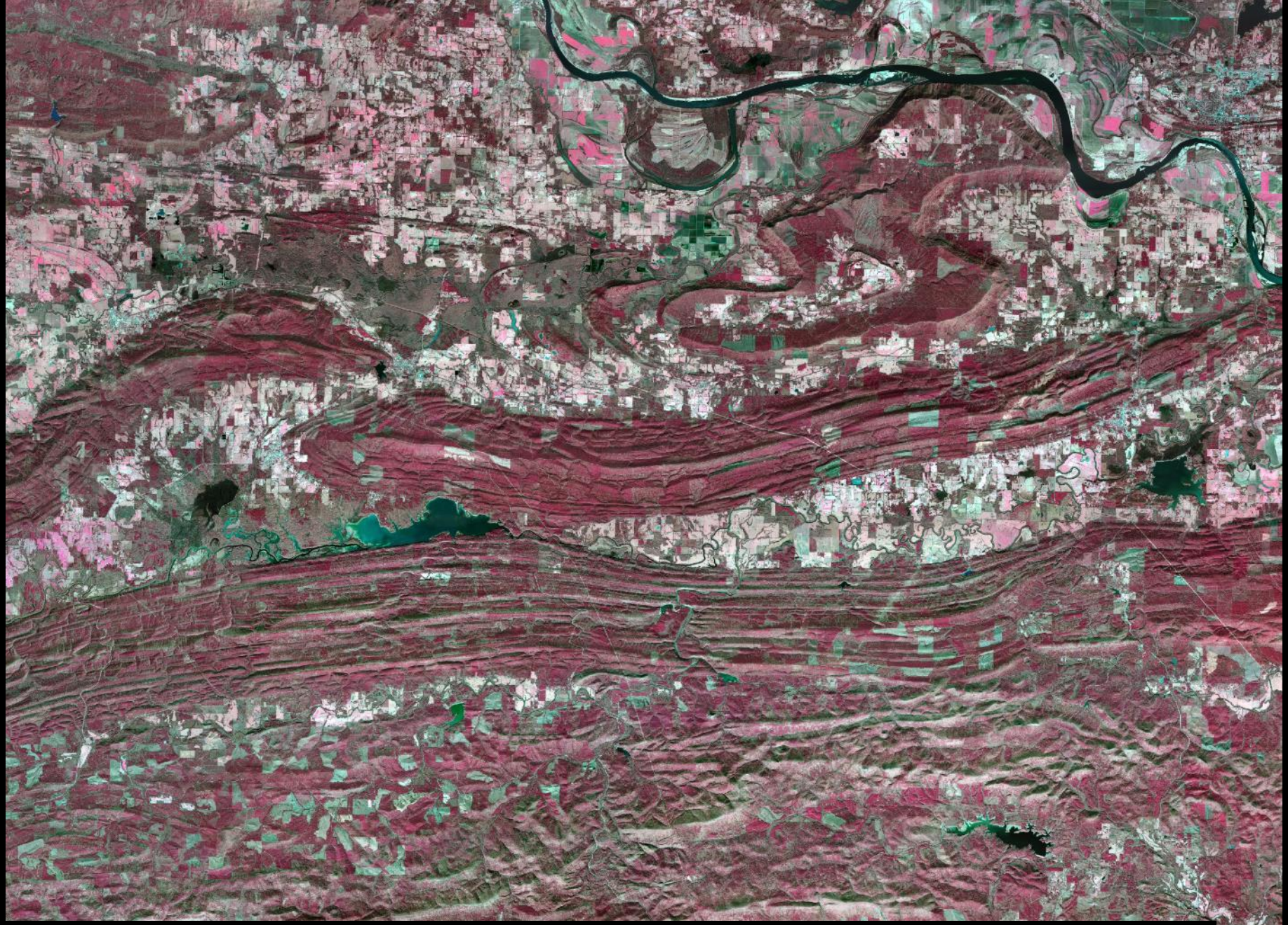
Cossatot Mountains/Hanna Range. Polk, Montgomery, Howard, & Pike Counties.

Cossatot Mountains/Hanna Range. Polk & Montgomery Counties.

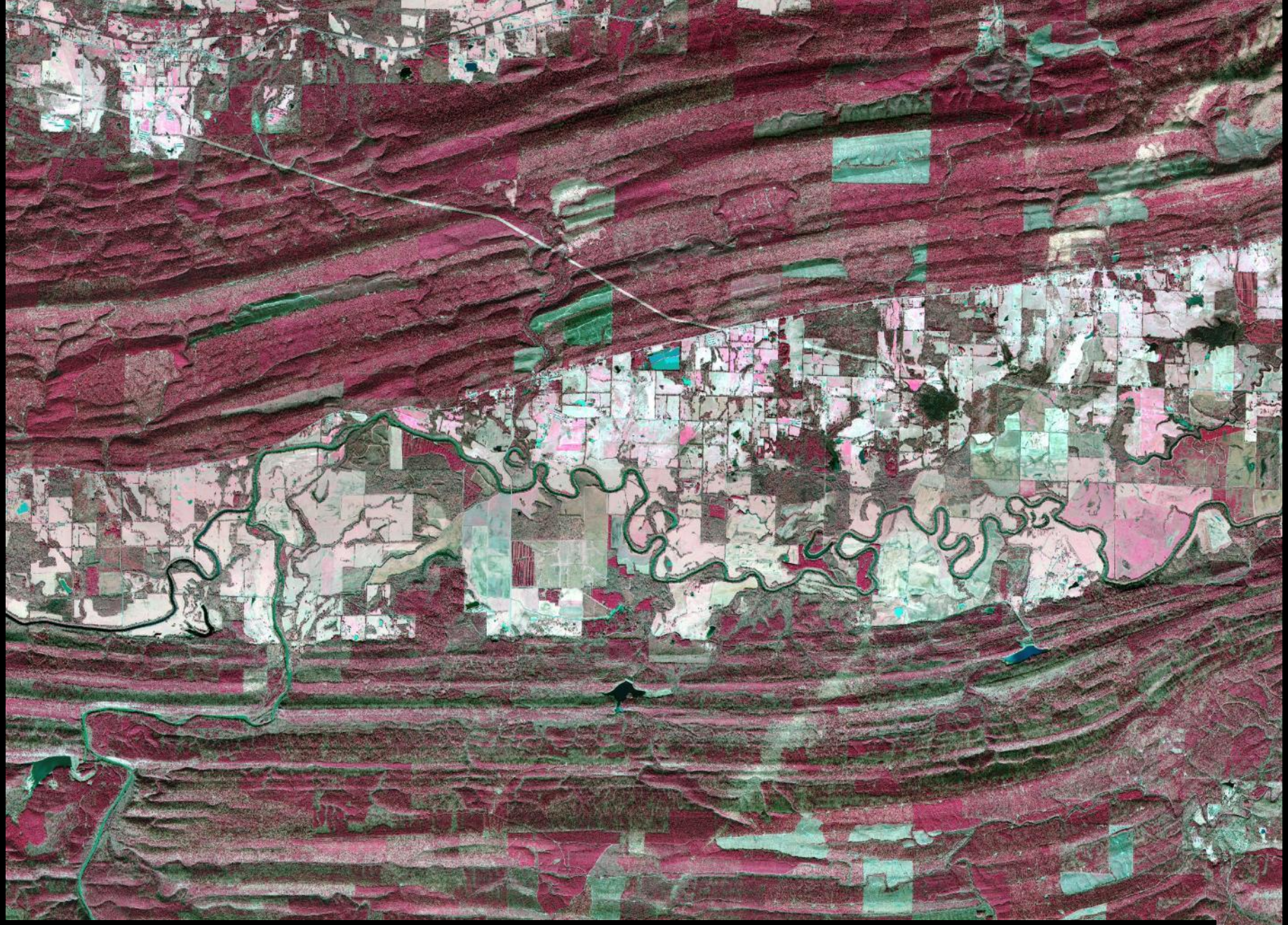


Caddo Mountains. Montgomery County.

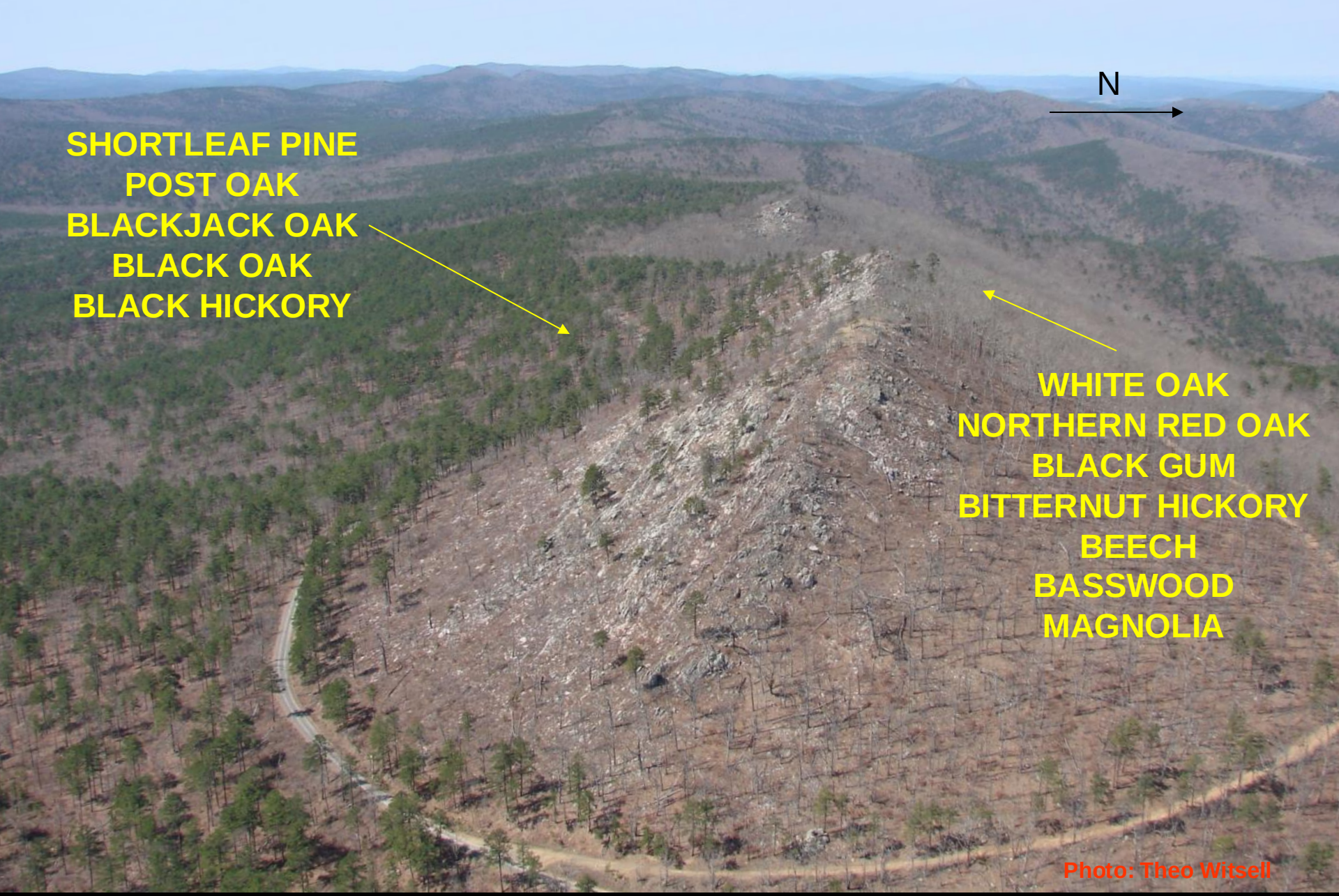
Zigzag Mountains. Garland County.



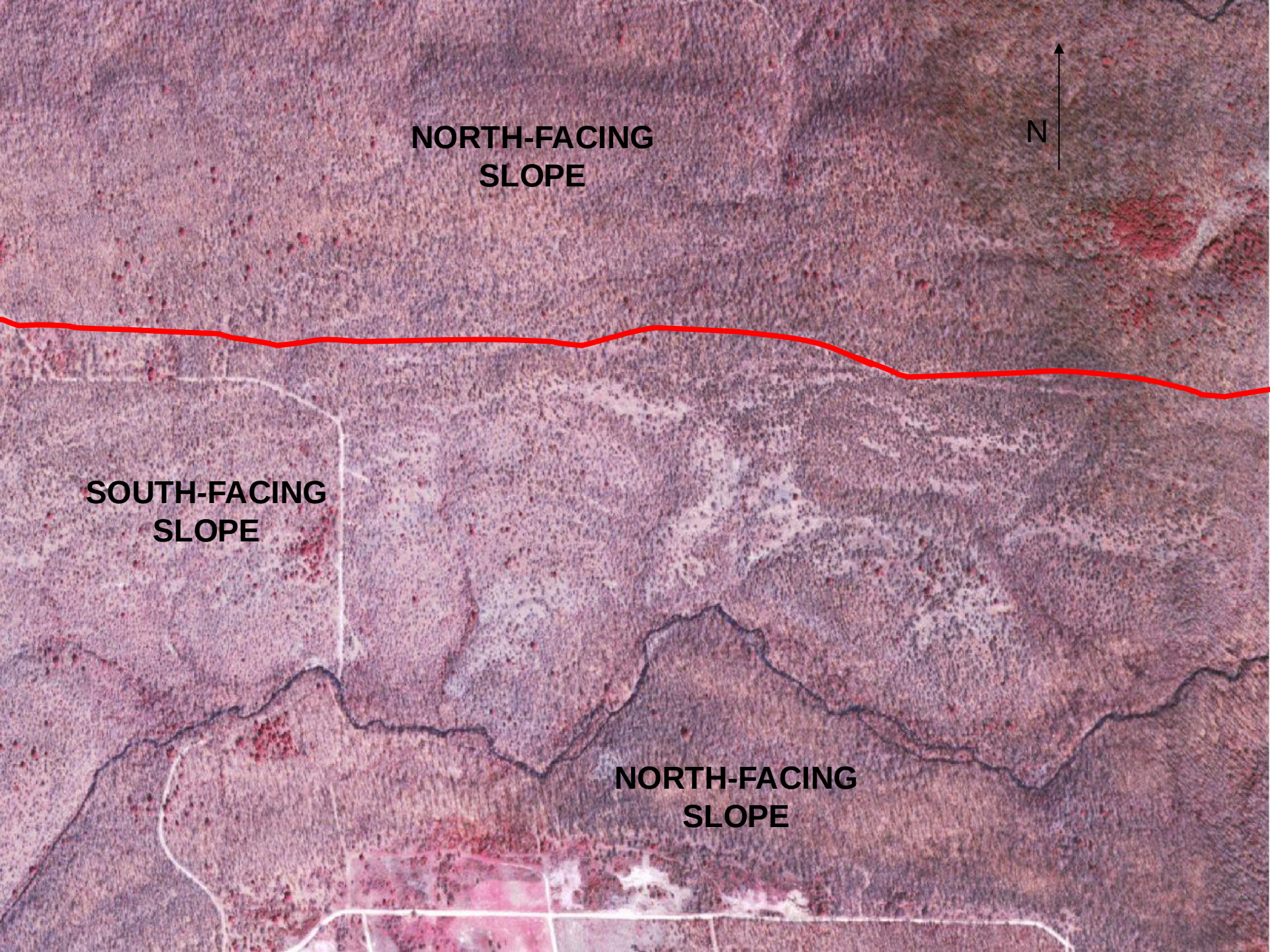
Fourche Mountains. Perry & Saline Counties.



Fourche Mountains. Perry County.



North Fork Pinnacle – Ouachita National Forest


NORTH-FACING
SLOPE
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SOUTH-FACING
SLOPE
NORTH-FACING
SLOPE

Dry Sandstone Glade and Woodland

Novaculite Glades (Jack Mountains, Hot Spring County)

Photo by John Pelton

Shale Barrens with *Echinacea pallida & Thelesperma filifolium*

Wet Shale Barrens (Middle Fork Barrens Natural Area, Saline County)

Paronychia virginica

Photos by Craig Fraiser


Valerianella nuttallii
Craig Fraiser


Sabatia arkansana
John Pelton


Draba aprica
© USC Herbarium Photo by Linda Lee

Liatris compacta

John Pelton

Nemastylis nuttallii

John Pelton

Amorpha ouachitensis

Amsonia hubrichtii

John Pelton

Craig Fraiser

Walnut Creek Seeps, Ouachita National Forest. Garland County

Theo Witsell

Ouachita Mountain Wooded Acid Seep. Saline County.

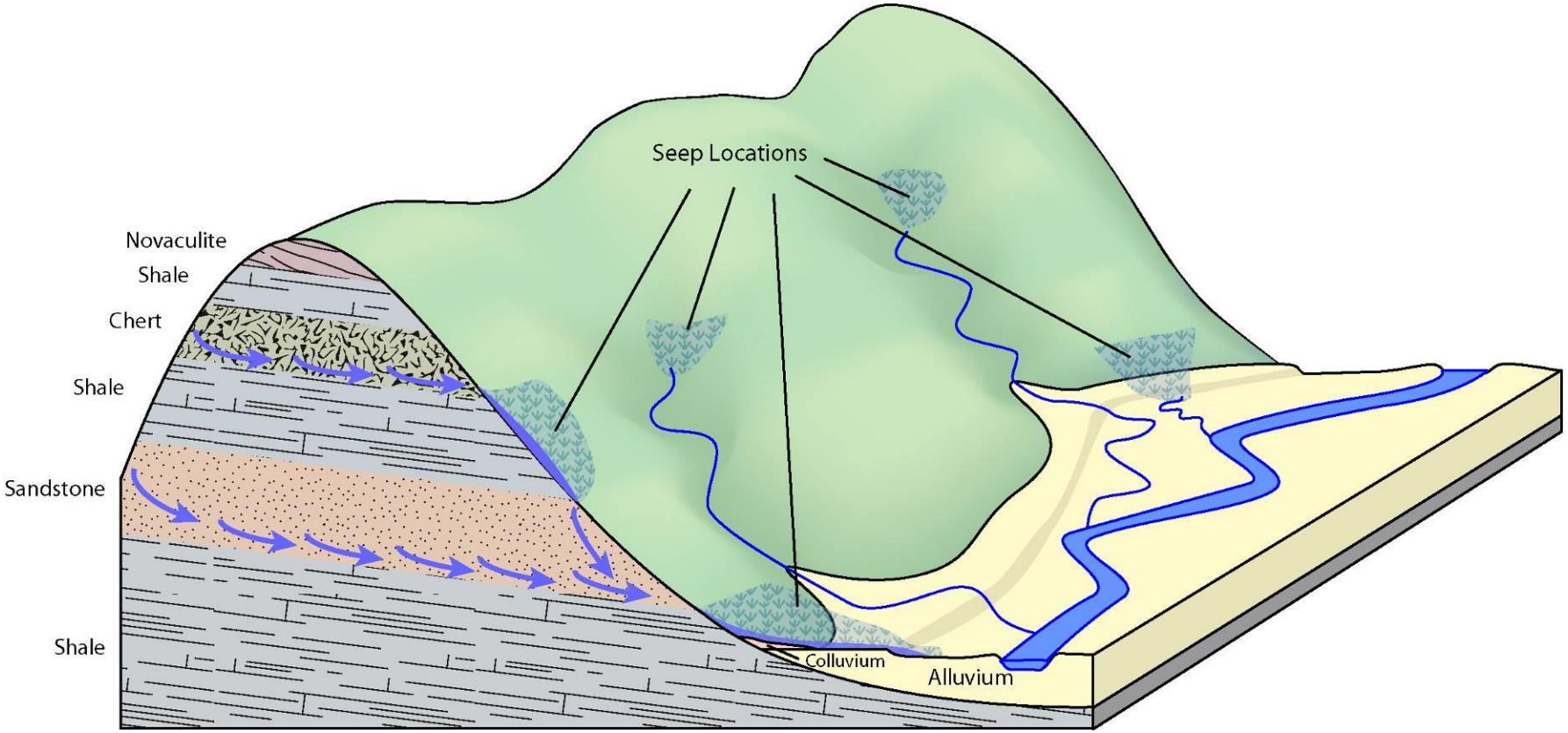
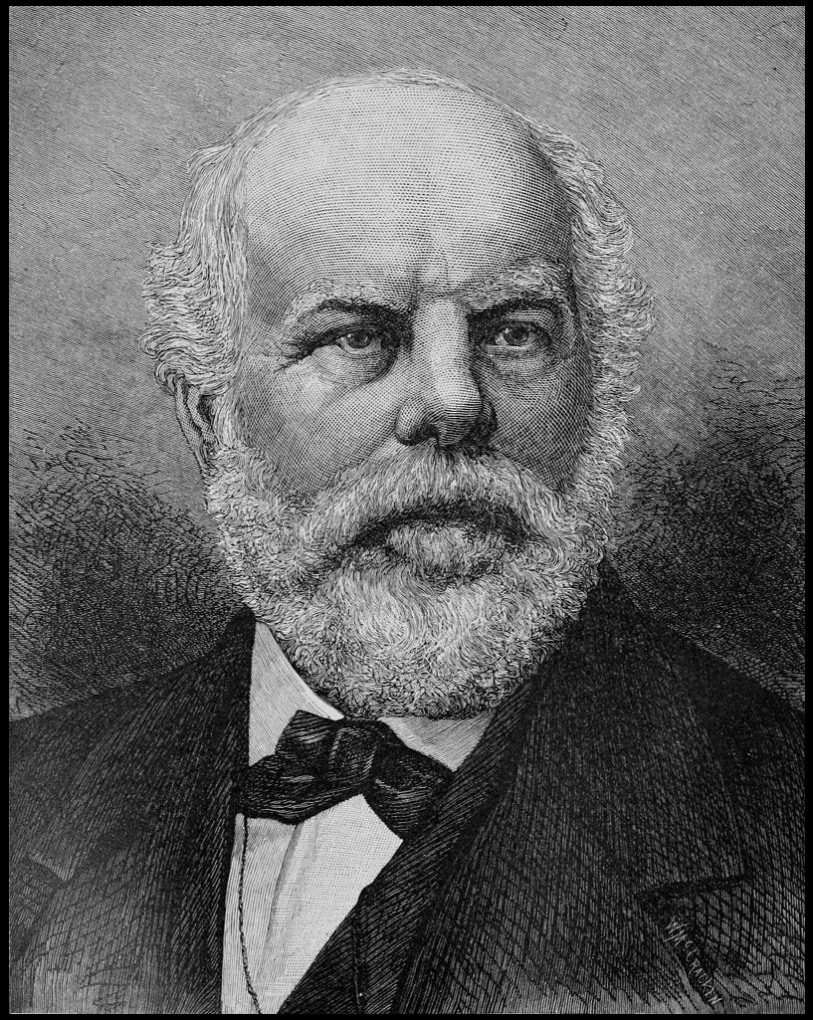


Illustration courtesy of Elizabeth Murray, Arkansas Multi-Agency Wetlands Planning Team, Used with permission.



George Engelmann

1835 trip to

“The Hot Springs of Arkansas”

For the first time and with great pleasure our eyes light upon the majestic foliage of the magnolia, and the shiny green American cherry laurel; between them are stands of dwarf chestnuts and the strange-looking Aralia, clambering over the trunks of the trees and even out to the tips of the branches, where it bears its dark berries. The holly, with its dark green thick foliage, out of which smile the red berries, prevents successfully any penetration into this thicket. On the left a mountain rises up, and between the dry strands of scree thick bushes of wax myrtle grow. We are in another land: the breath of the South blows over this valley; nature grabs the spirit, the sadness wanes, our expectations rise, and after a sudden turn to the south the valley of the hot springs lies before us.

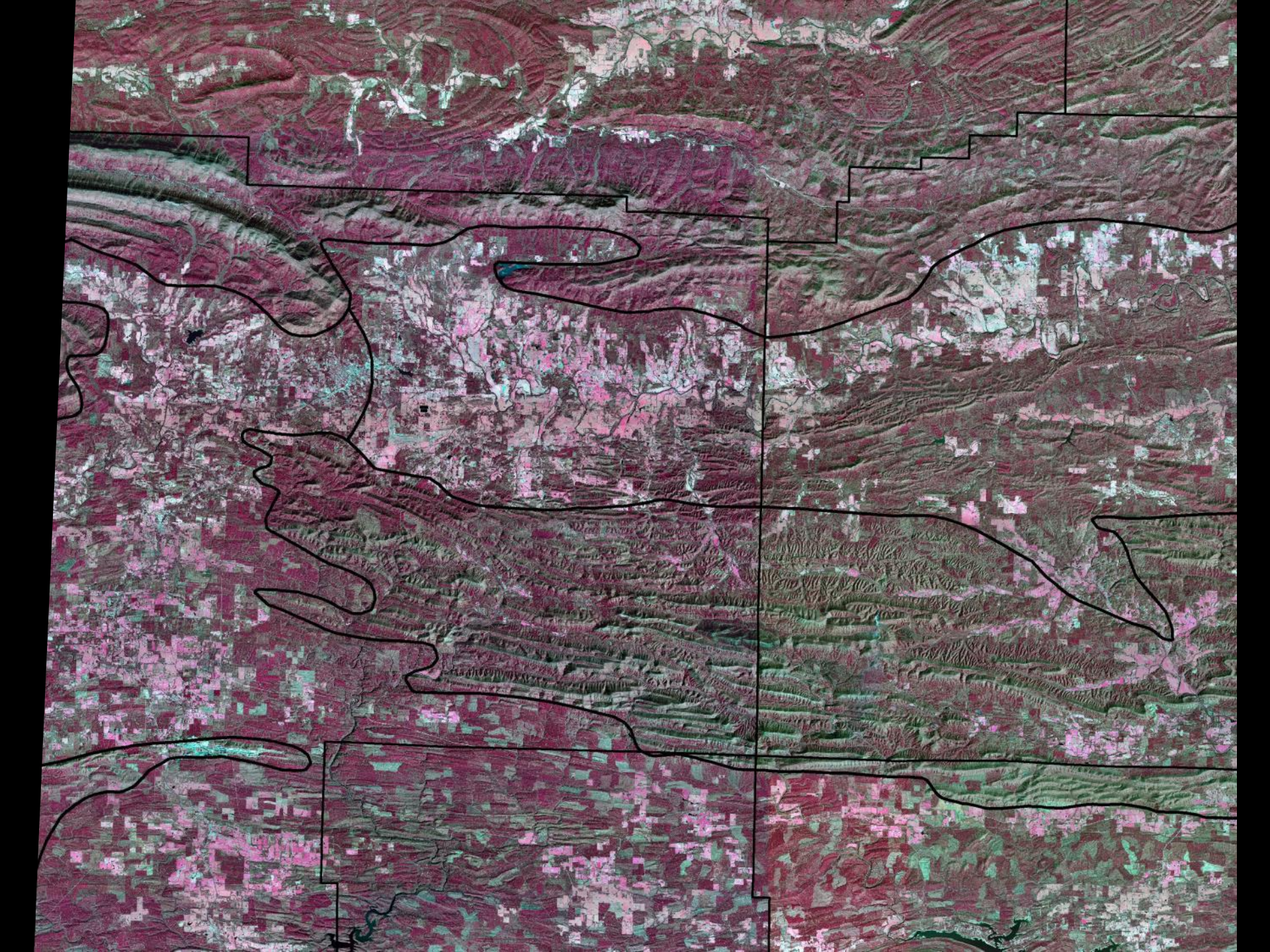
- George Engelmann, 1835

Blackfork Mountain. Polk County.

Blackfork Mountain. Polk County.

Boulder Field. Rich Mountain. Polk County. Photo: Brent Baker.ANHC

Blackfork Mountain. Polk County.



Plethodon ouachitae

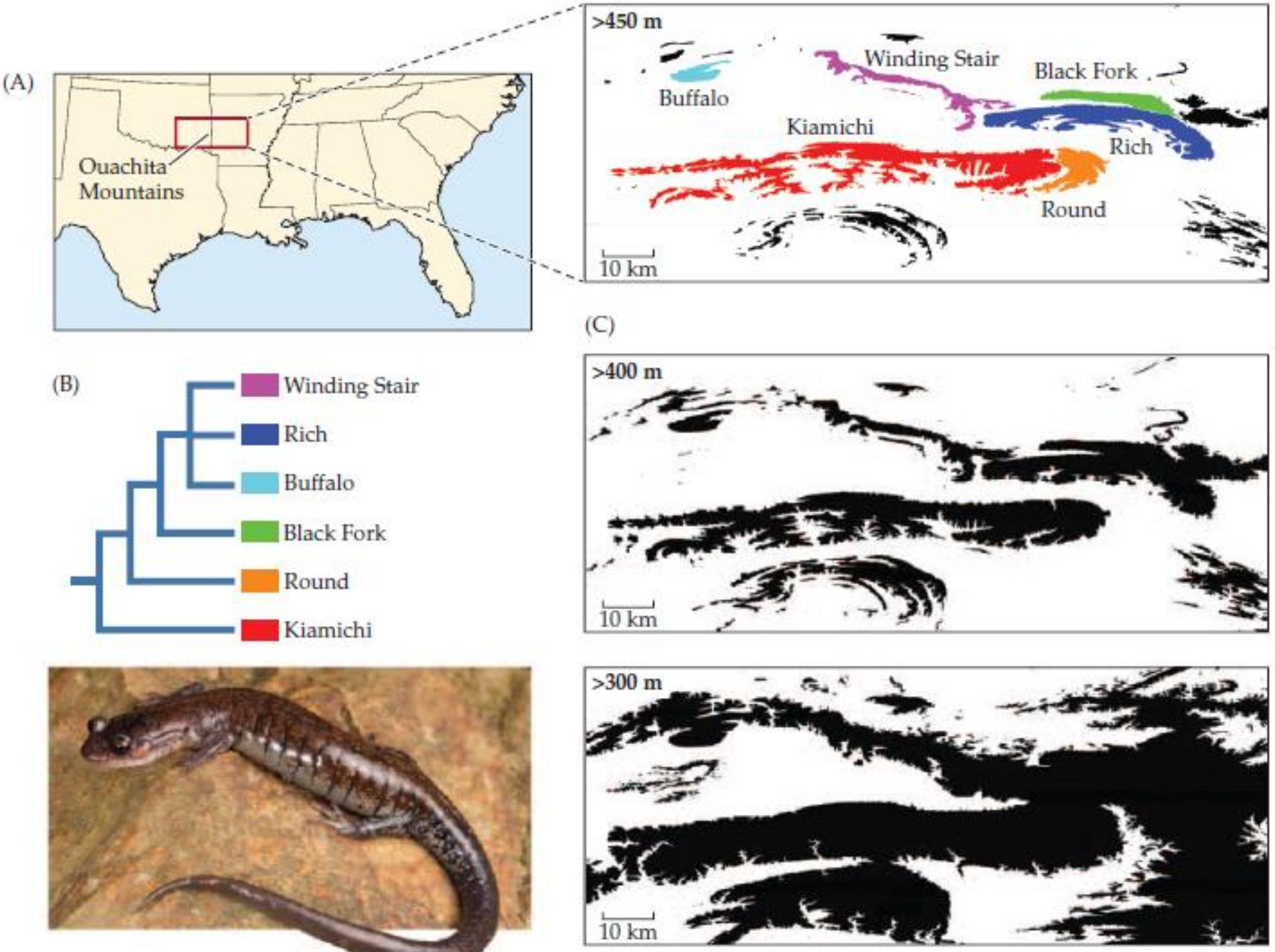
Don Shepard

Plethodon fourchensis

Don Shepard

Plethodon caddoensis

Don Shepard



: http://www.sinauer.com/herpetology.html


Means' Giant Earthworm (Diplocardia meansi)
Bruce Means

Theo Witsell/ANHC

John O'Dell/ANHC

Riverscour. Cossatot River State Park Natural Area. Howard County.

Riverscour. Cossatot River State Park Natural Area. Howard County.

Scour Prairie (Cossatot River State Park Natural Area, Howard County)