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Environmental and
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Materials will be available at:
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The Tennessee River

Resilient and Healthy Rivers Series

Wednesday, December 11, 2024

About EESI



Non-partisan Educational Resources for Policymakers

A bipartisan Congressional caucus founded EESI in 1984 to provide non-partisan information on environmental, energy, and climate policies



Direct Assistance for Equitable and Inclusive Financing Program

In addition to a full portfolio of federal policy work, EESI provides direct assistance to utilities to develop “on-bill financing” programs



Commitment to Diversity, Equity, Inclusion, and Justice

We recognize that systemic barriers impede fair environmental, energy, and climate policies and limit the full participation of Black, Indigenous, people of color, and legacy and frontline communities in decision-making



Sustainable Solutions

Our mission is to advance science-based solutions for climate change, energy, and environmental challenges in order to achieve our vision of a sustainable, resilient, and equitable world.

Polycymaker Education

Briefings and Webcasts



Live, in-person and online public briefings, archived webcasts, and written summaries

Climate Change Solutions



Bi-weekly newsletter with everything policymakers and concerned citizens need to know, including a legislation and hearings tracker

Fact Sheets and Issue Briefs



Timely, objective coverage of environmental, clean energy, and climate change topics

Social Media (@EESIOnline)



Active engagement on Twitter, Facebook, LinkedIn, and YouTube



Upcoming Briefings in this Series



Resilient and Healthy Rivers Series

4

The Mississippi River | Recording Available

The Tennessee River | Wednesday, December 11, 2-3:30 PM

The Columbia River | Wednesday, January 15, 2025, 2-3:30 PM

The Colorado River | Wednesday, February 19, 2025, 2-3:30 PM

The Hudson River | Wednesday, March 19, 2025, 2-3:30 PM

The Ohio River | Wednesday, April 16, 2025, 2-3:30 PM

“Small But Mighty” Rivers | Wednesday, May 21, 2025, 2-3:30 PM

Signup for our COP newsletter here: eesi.org/signup

Briefing RSVP here: eesi.org/rivers-briefings



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Wednesday, December 11, 2024

The Tennessee River's Aquatic Biodiversity

Bernie Kuhajda



TENNESSEE
AQUARIUM

CONSERVATION INSTITUTE

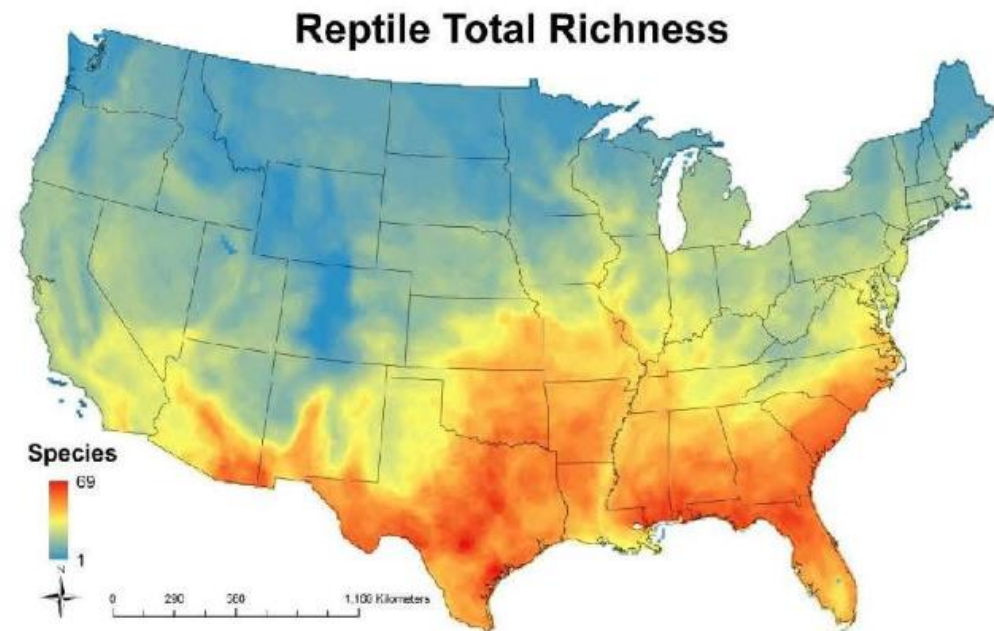
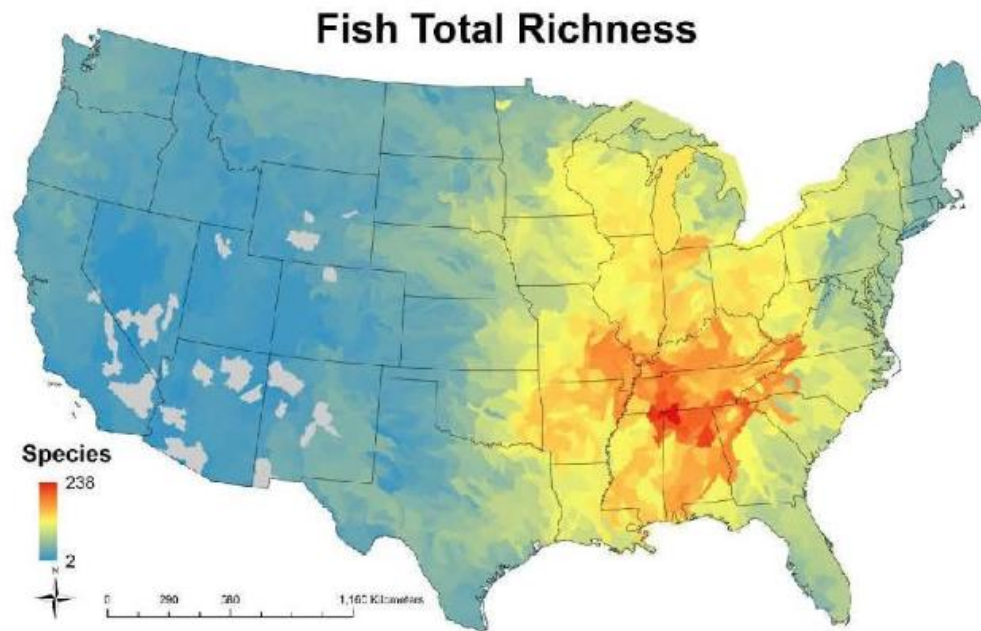
Fresh Water Is Life!

- We depend on 0.01% of Earth's water for our existence
- Roughly 25% of all vertebrate species are found in these same freshwater habitats



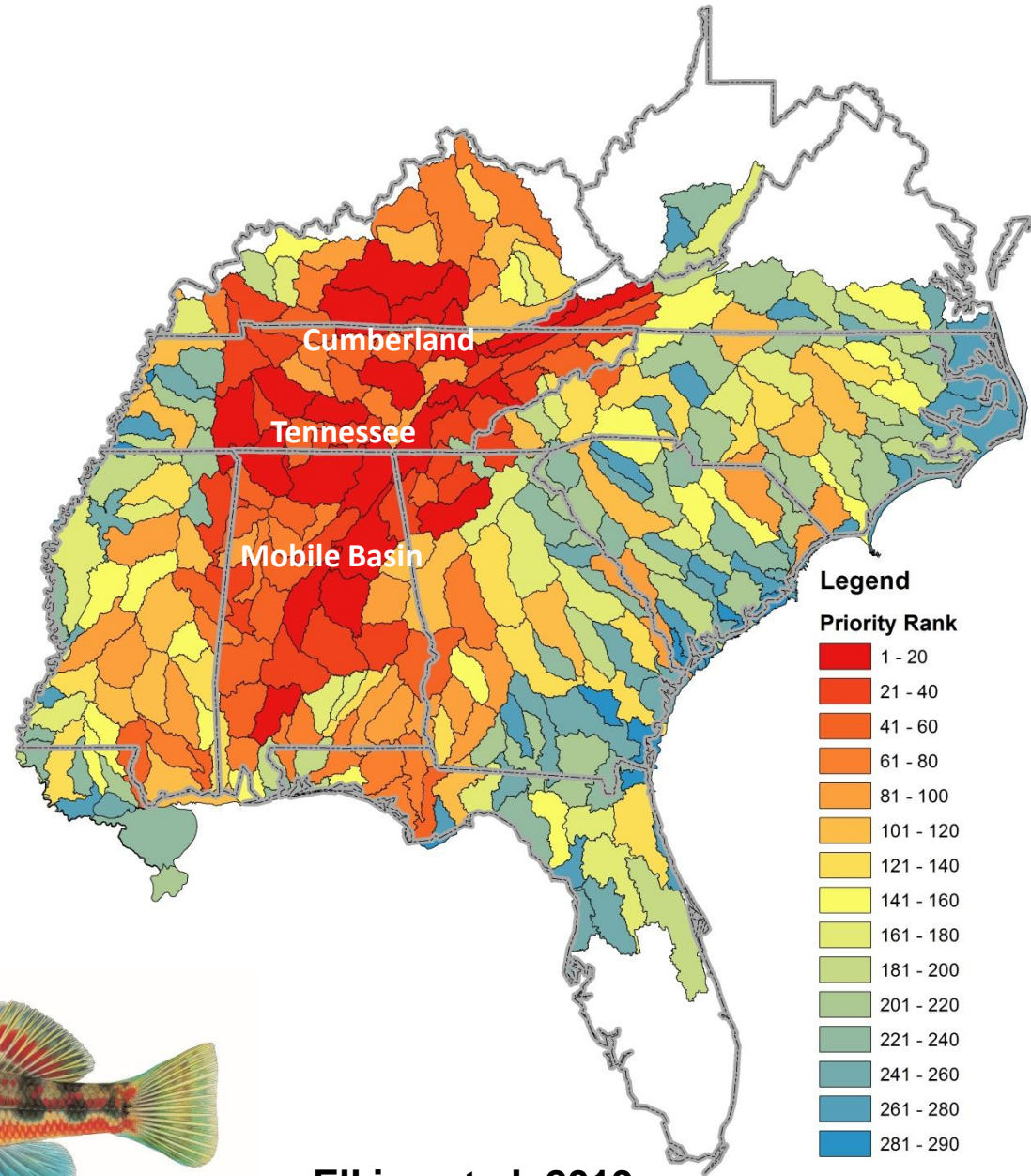
Southeastern Biodiversity

Rich diversity of freshwater fishes, mussels, snails, crayfishes, turtles, salamanders, & others



HUC 8 Priority Watersheds

1. Wheeler Lake
2. Pickwick Lake
3. Upper Clinch River
4. Lower Duck River
5. Cahaba River
6. Caney Fork
7. Lake Cumberland
8. Middle Coosa River
9. Etowah River
10. South Fork Cumberland



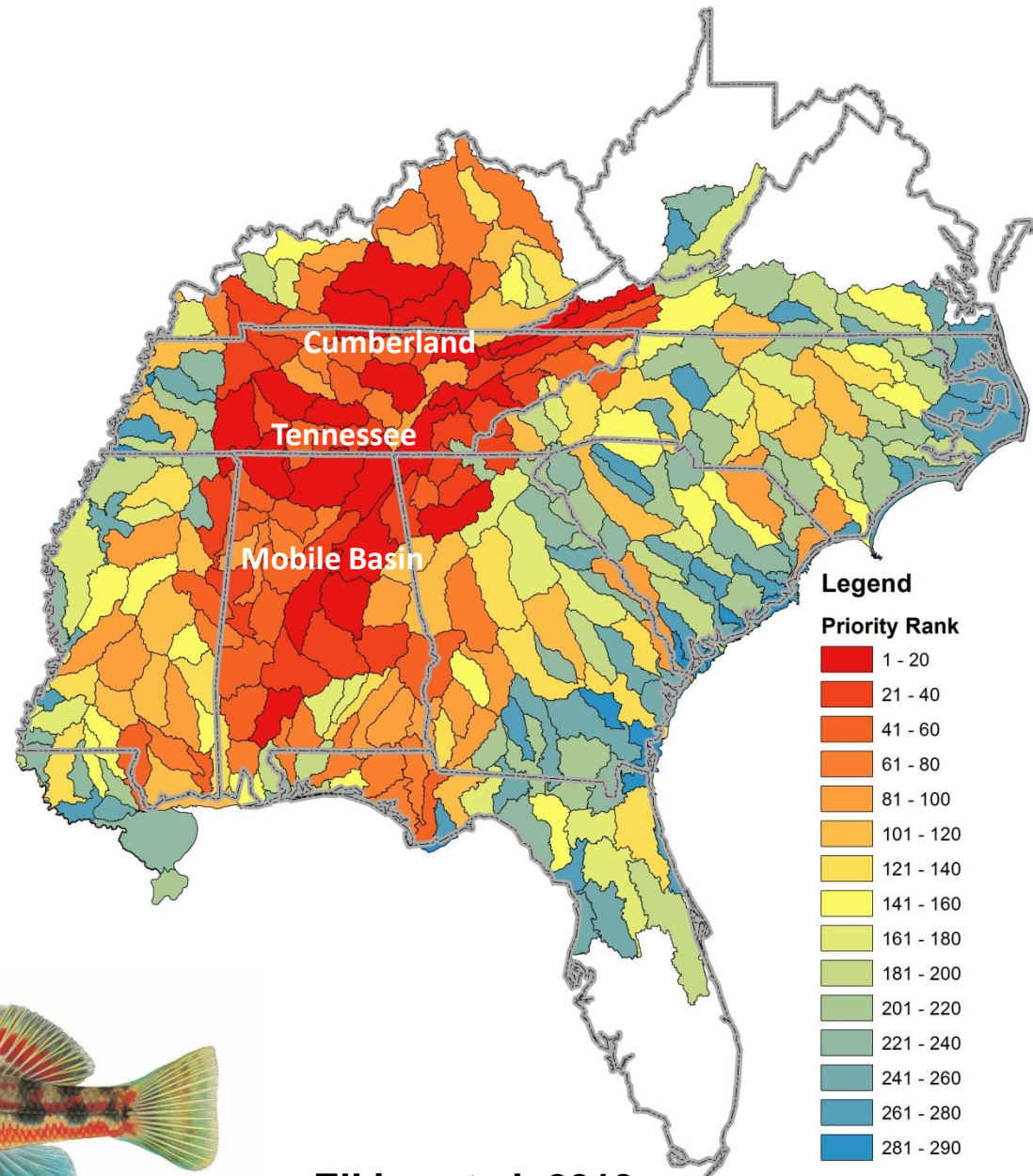
Elkins et al. 2019



Over 400 fish species
Cumberland, Tennessee,
and Mobile Basin

48% of fish diversity in U.S
& Canada

1.4% of area

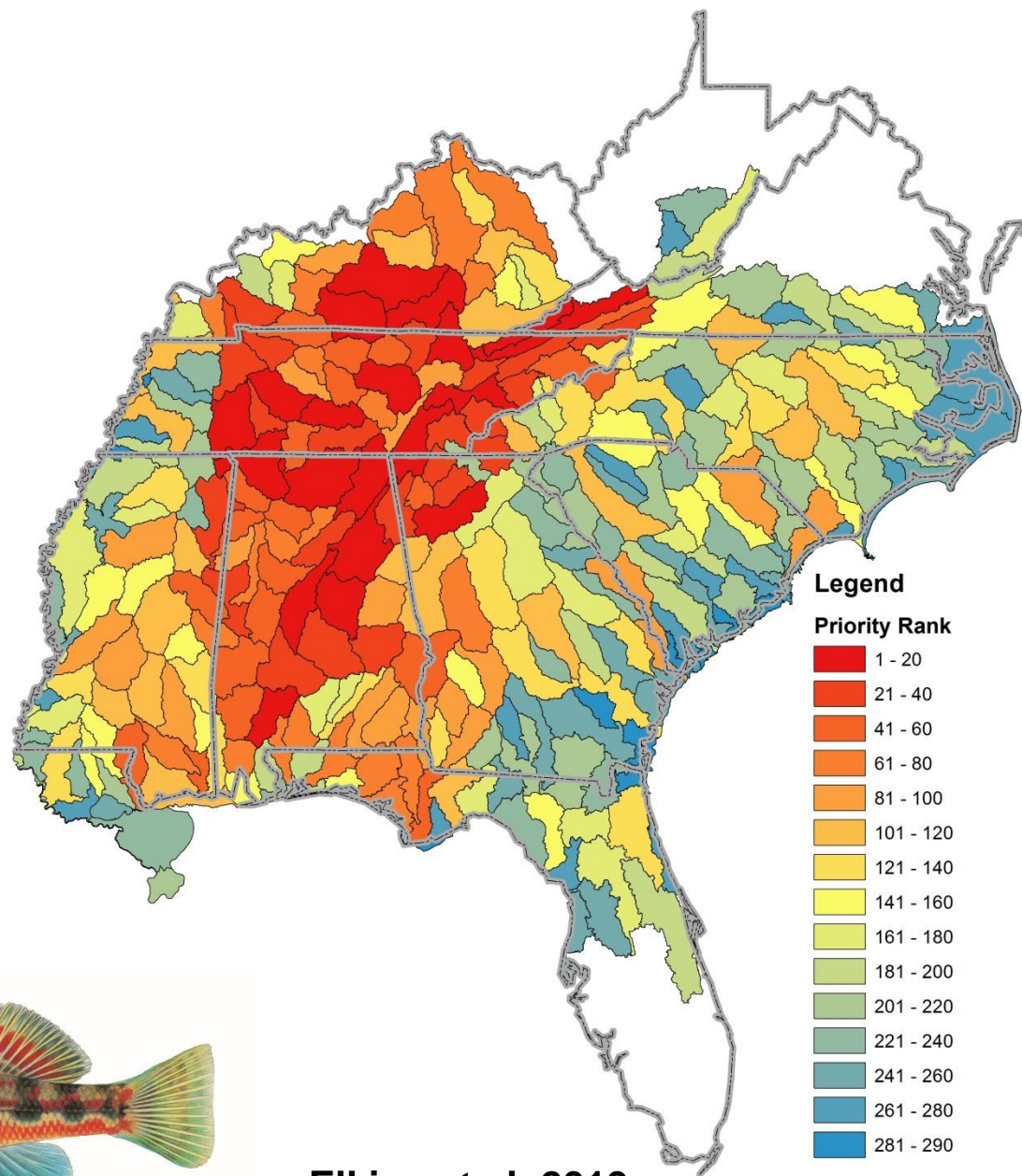


Elkins et al. 2019



HUC 8 Priority Watersheds

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Elkins et al. 2019

**263 species of fishes
Tennessee River**







B. Peoples

58 species of fishes only in Tennessee River



**16 species of fishes listed
Tennessee River**





125 species of mussels
Tennessee River

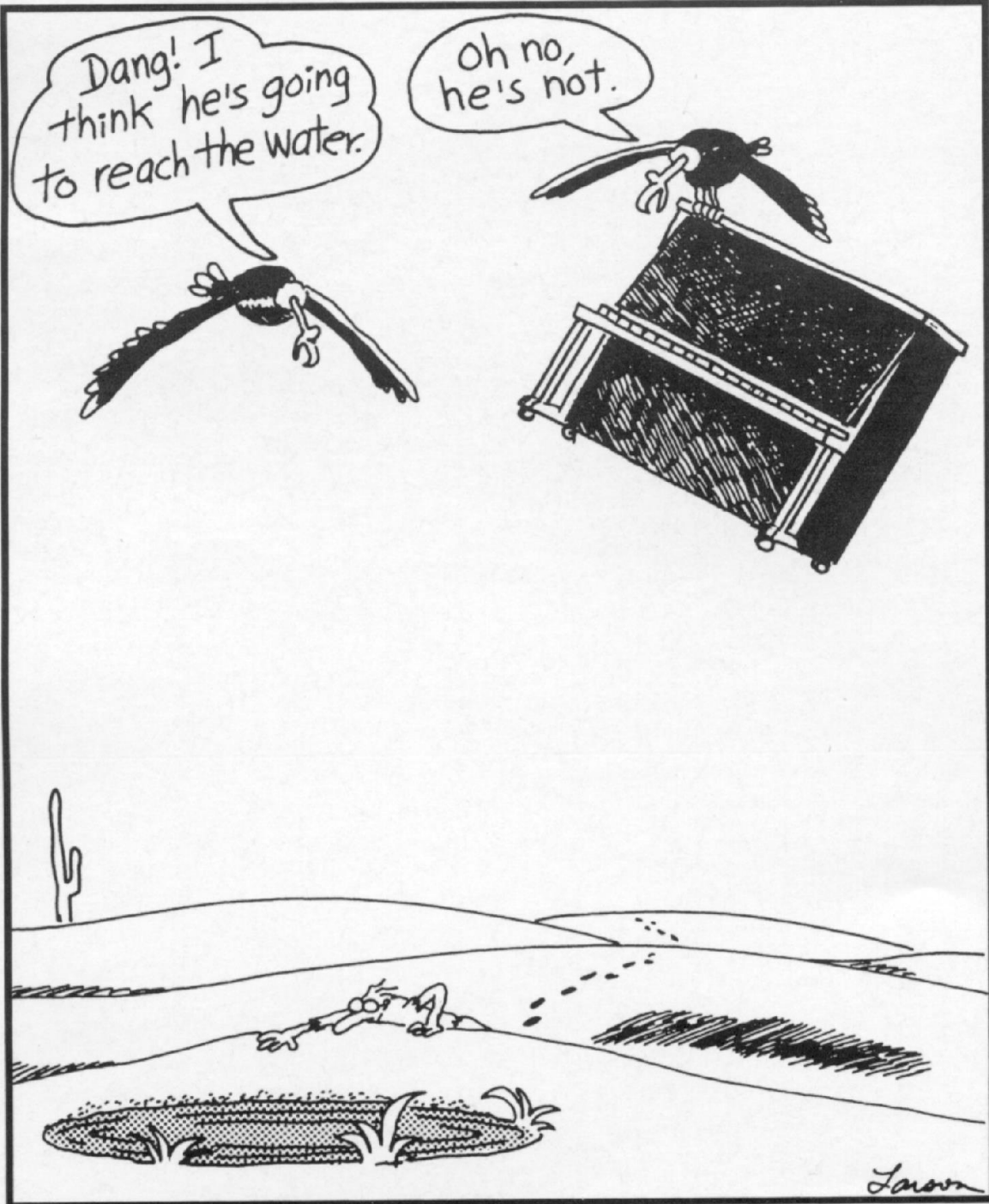


75 species of crayfishes Tennessee River



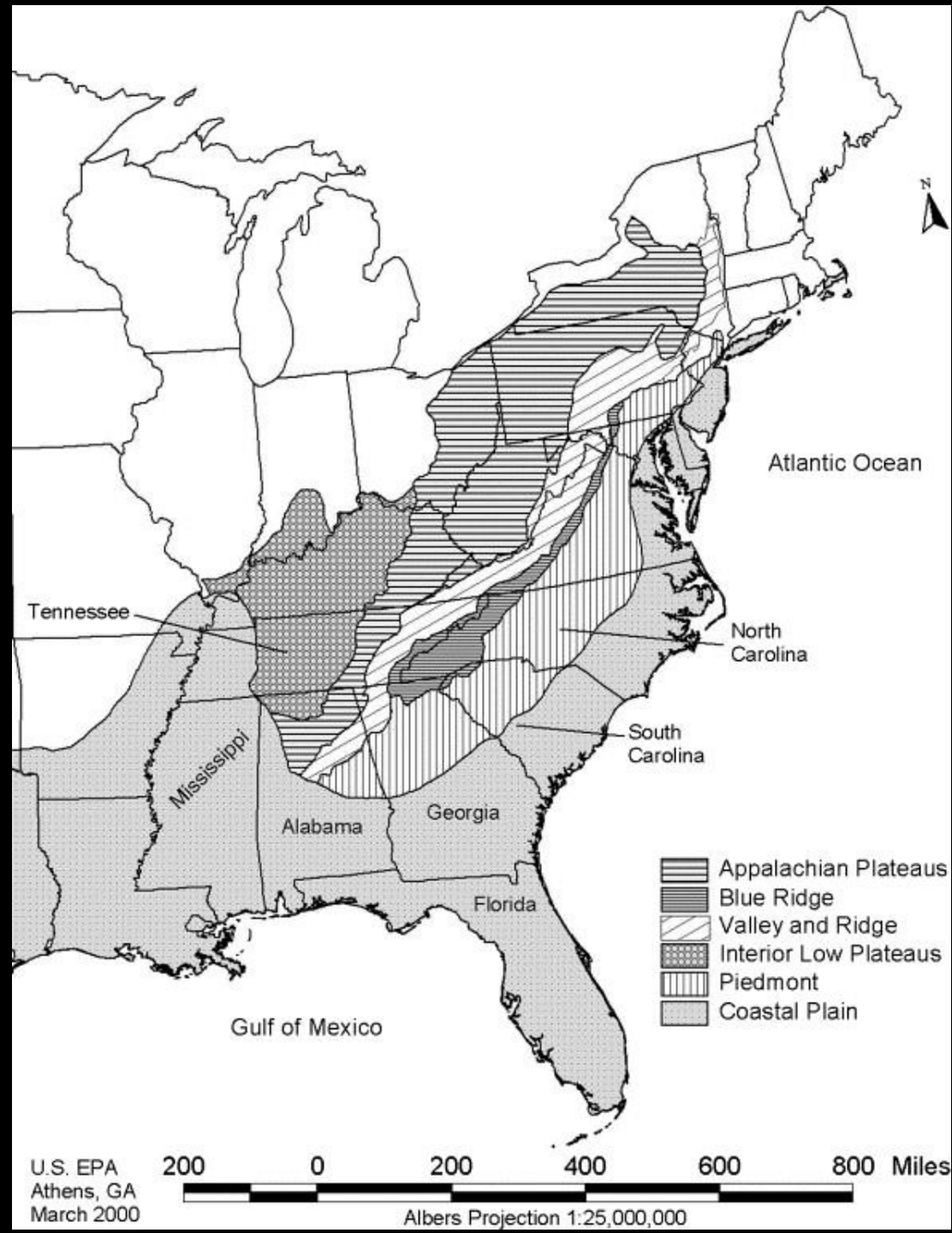
Dang! I think he's going to reach the water.

Oh no, he's not.

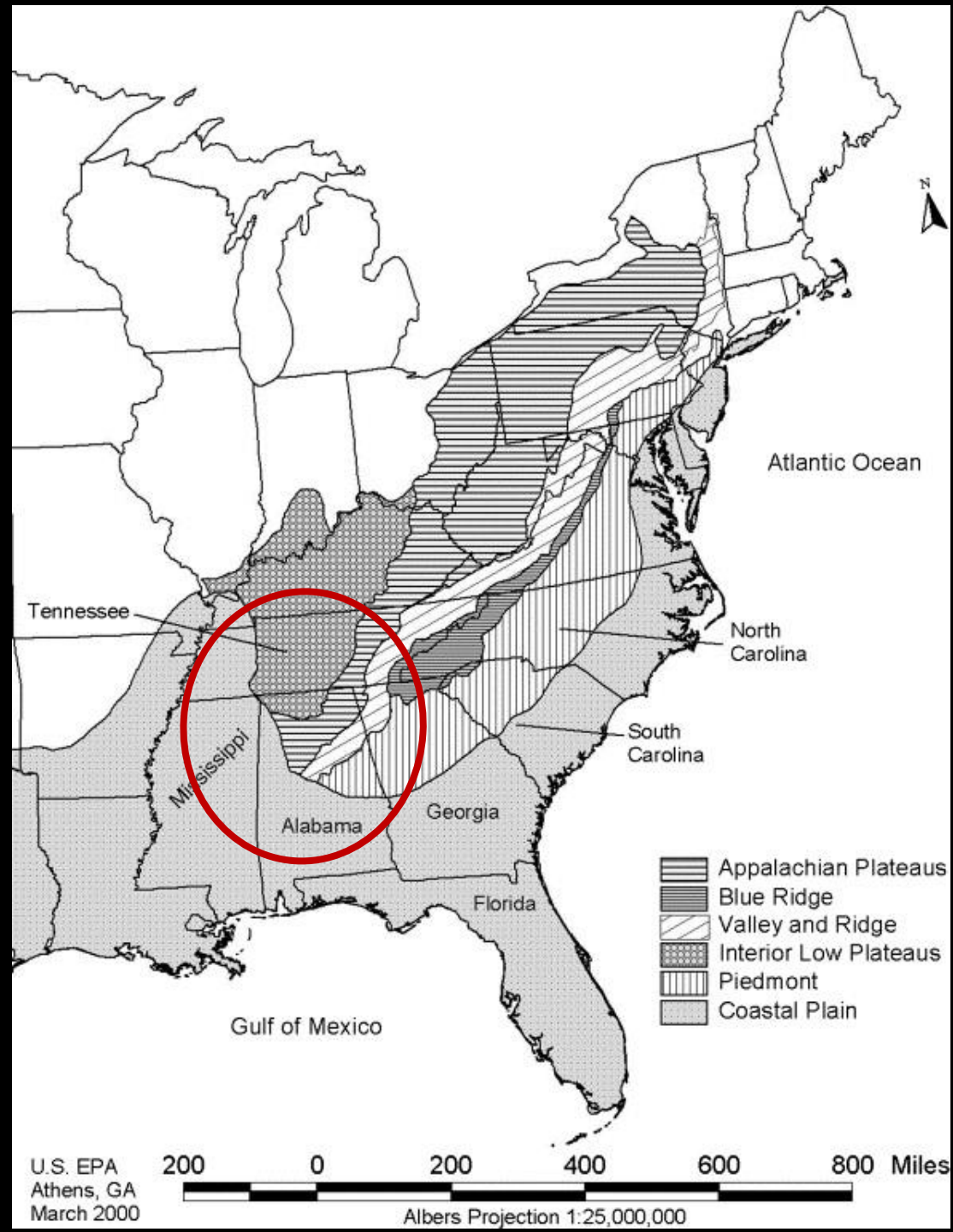


Larson

Physiographic Provinces of Southeastern U.S.



Physiographic Provinces of Southeastern U.S.

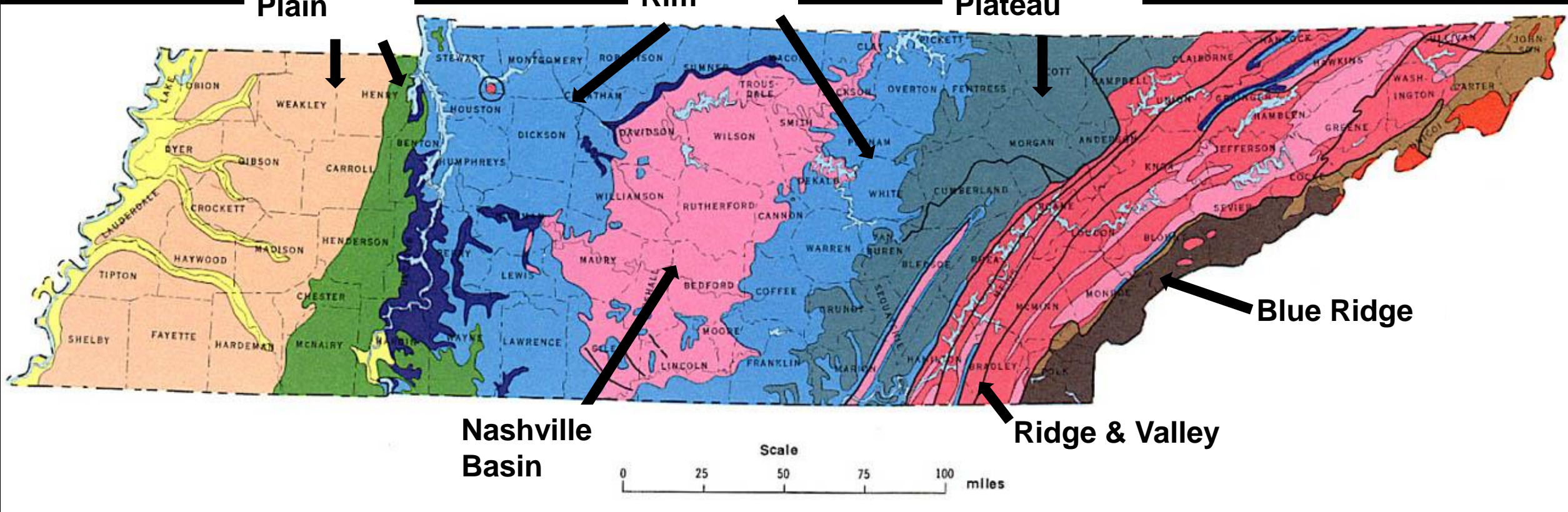


Physiographic Provinces of Tennessee

Coastal
Plain

Highland
Rim

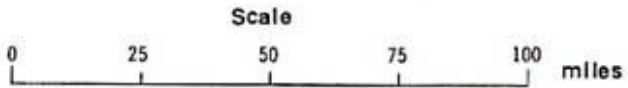
Cumberland
Plateau

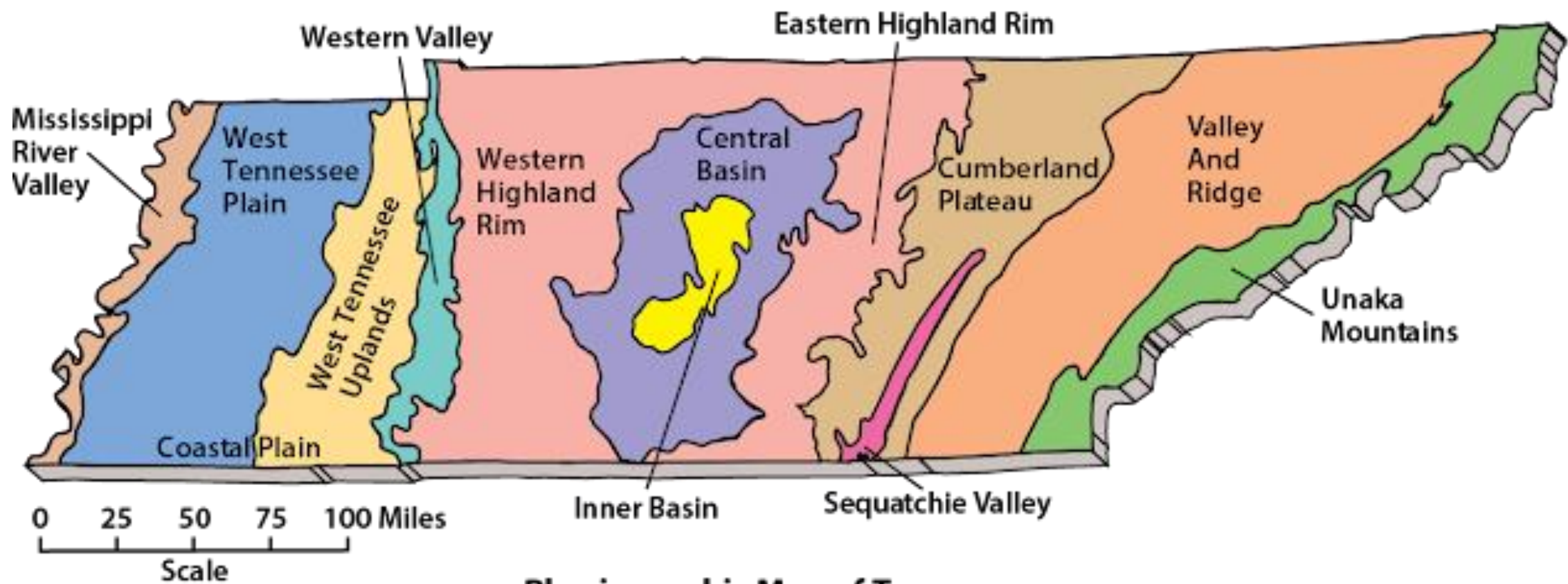


Blue Ridge

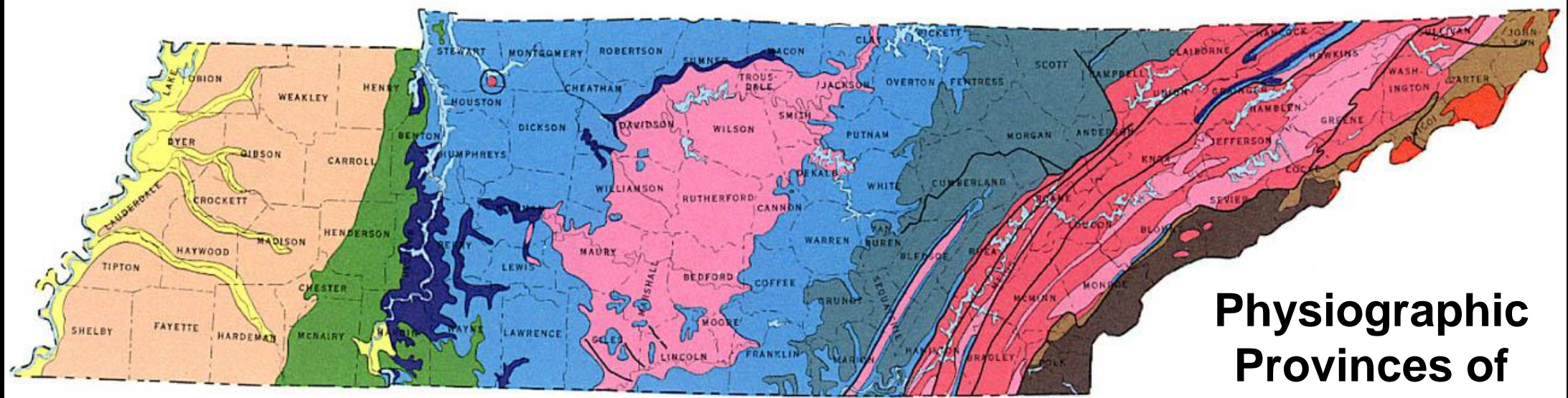
Nashville
Basin

Ridge & Valley

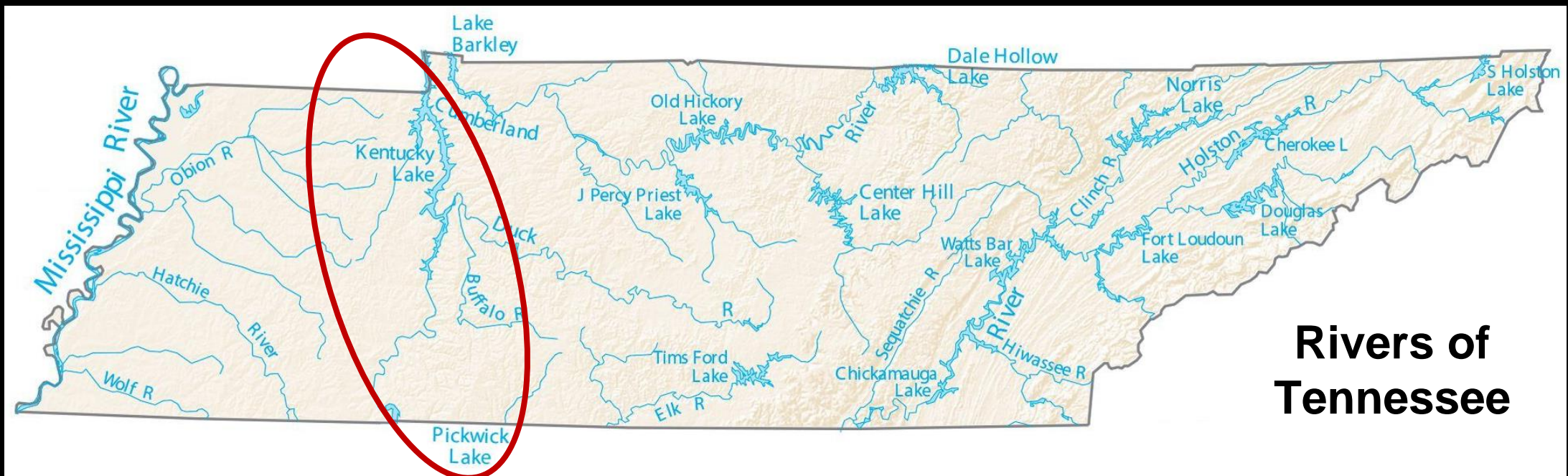
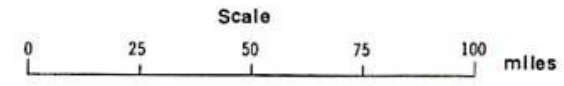




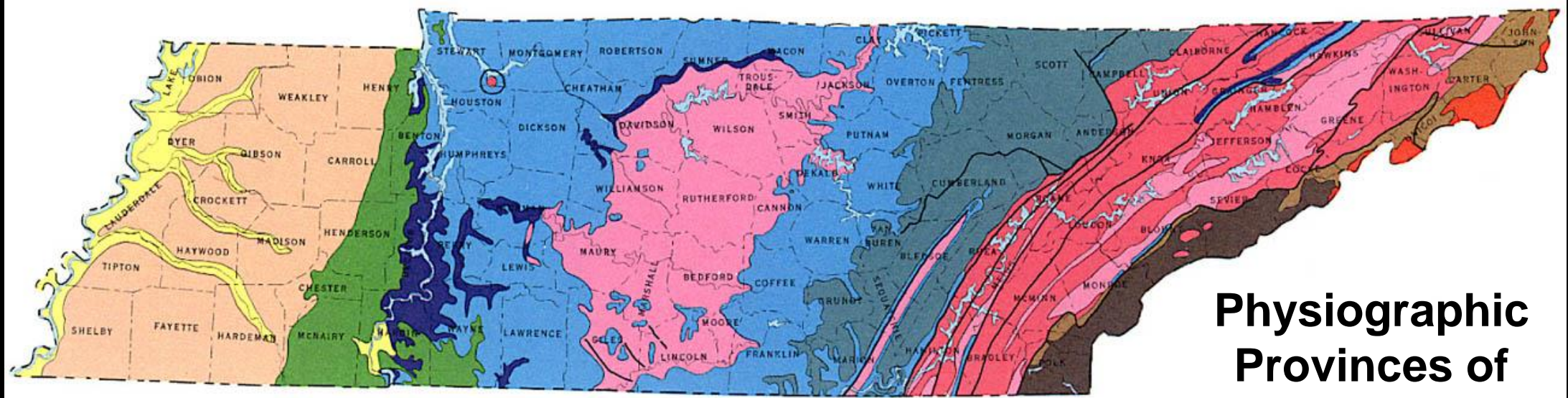
Physiographic Map of Tennessee



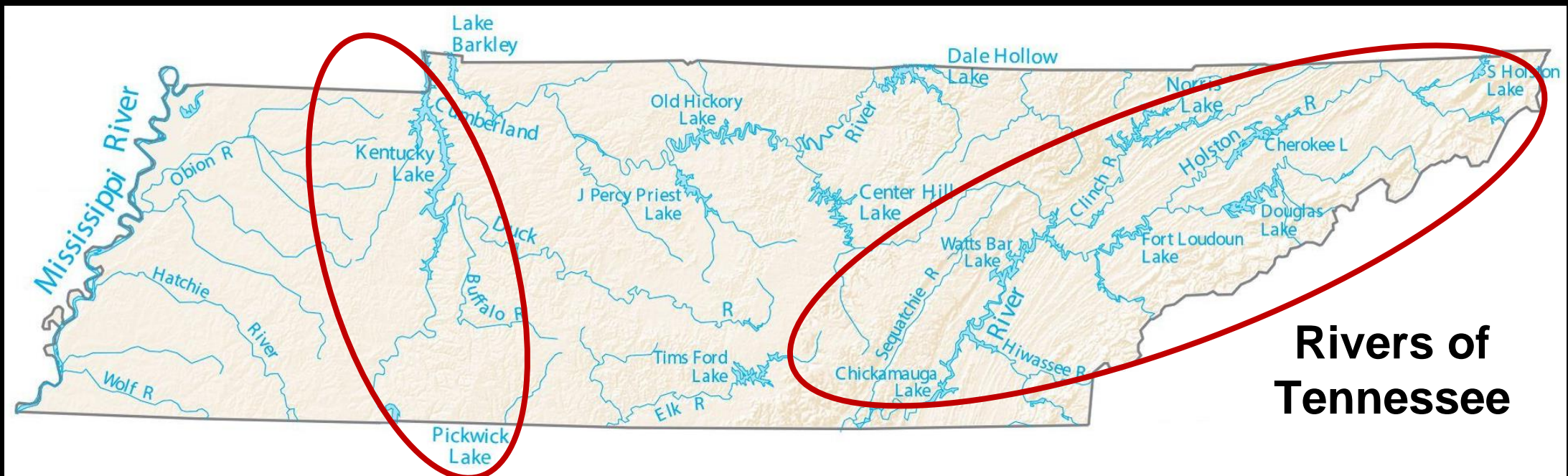
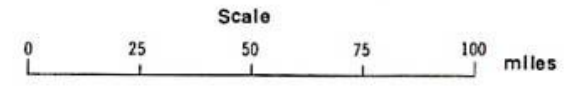
Physiographic Provinces of Tennessee



Rivers of Tennessee



Physiographic Provinces of Tennessee



Rivers of Tennessee

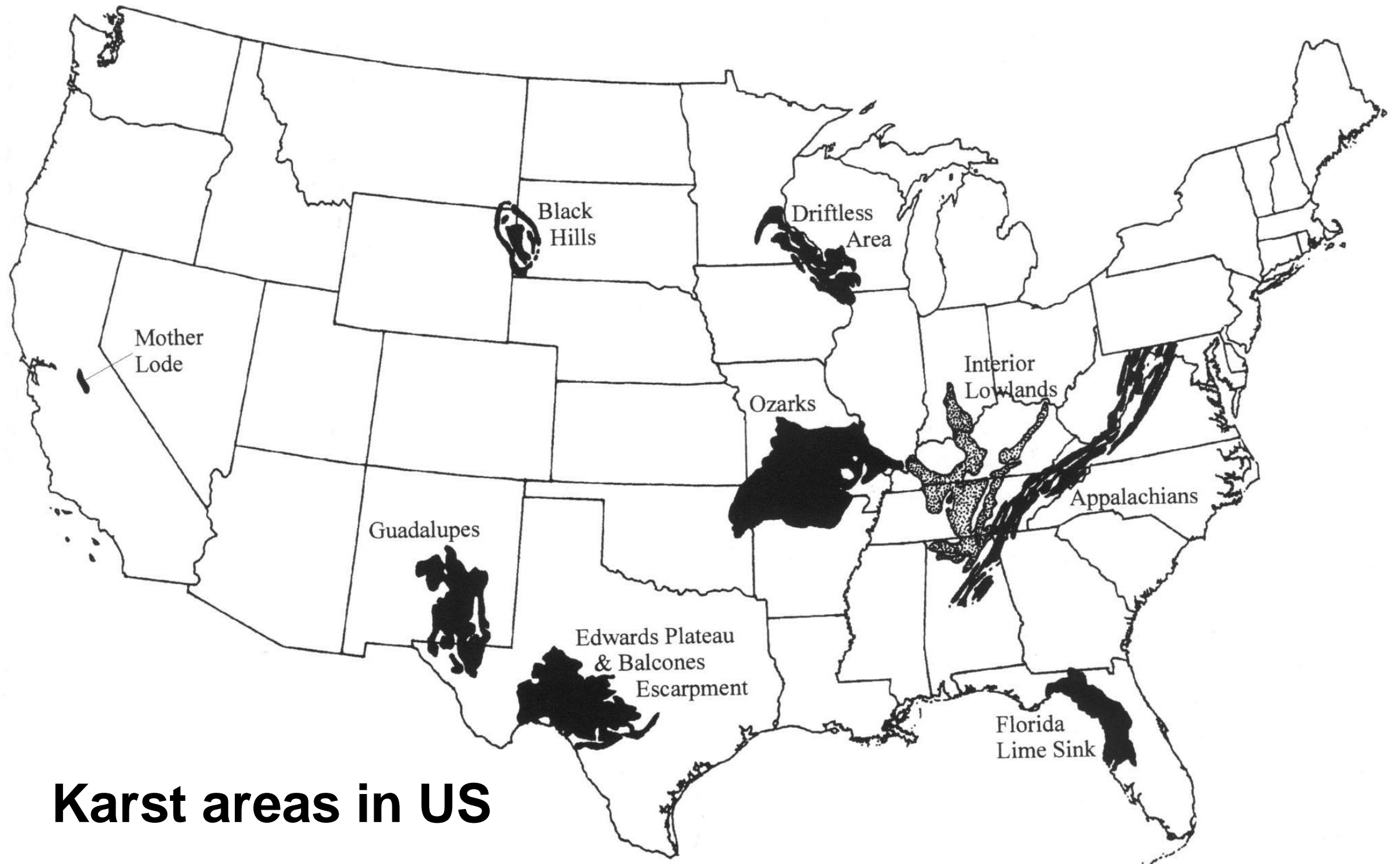


Guenter Schuster



Stream & River Species

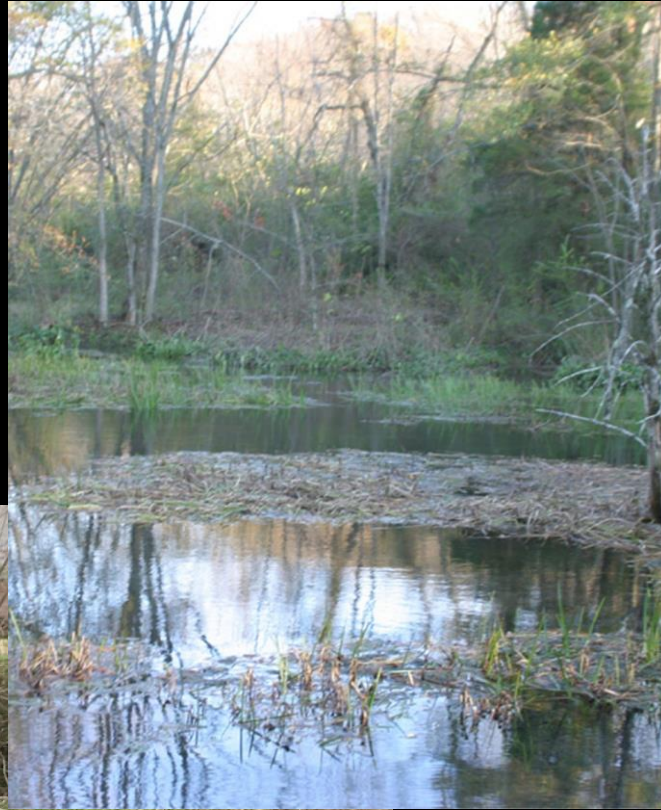




Karst areas in US

Groundwater Habitats

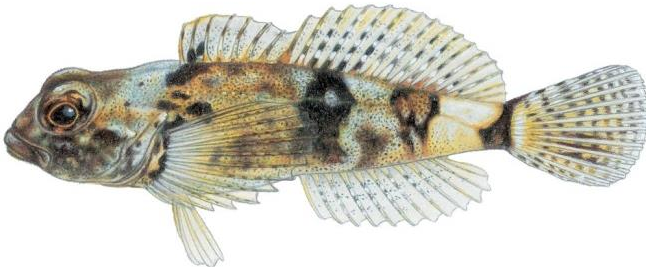
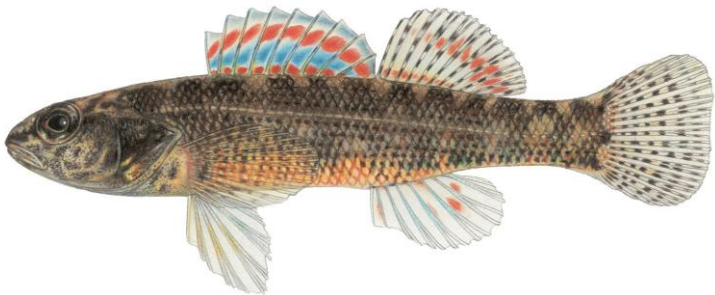
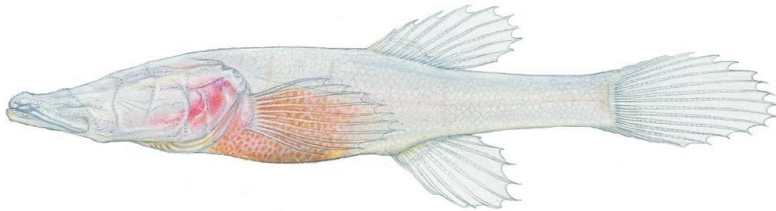
Springs



Caves

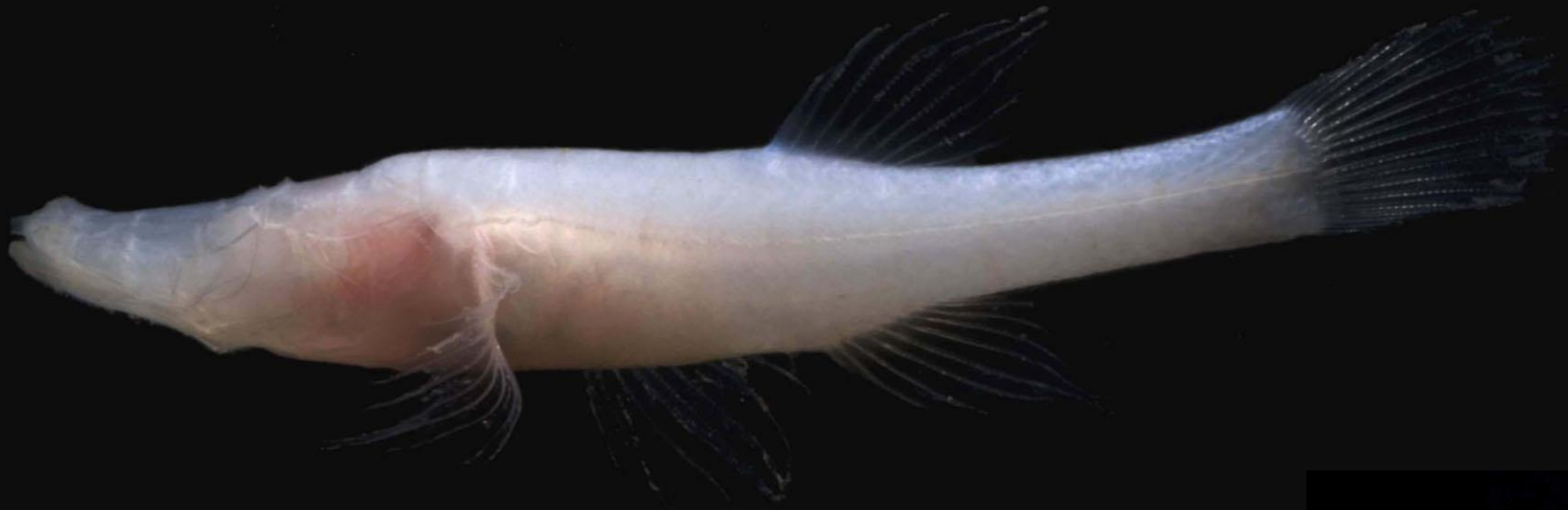


Groundwater-dependent Species



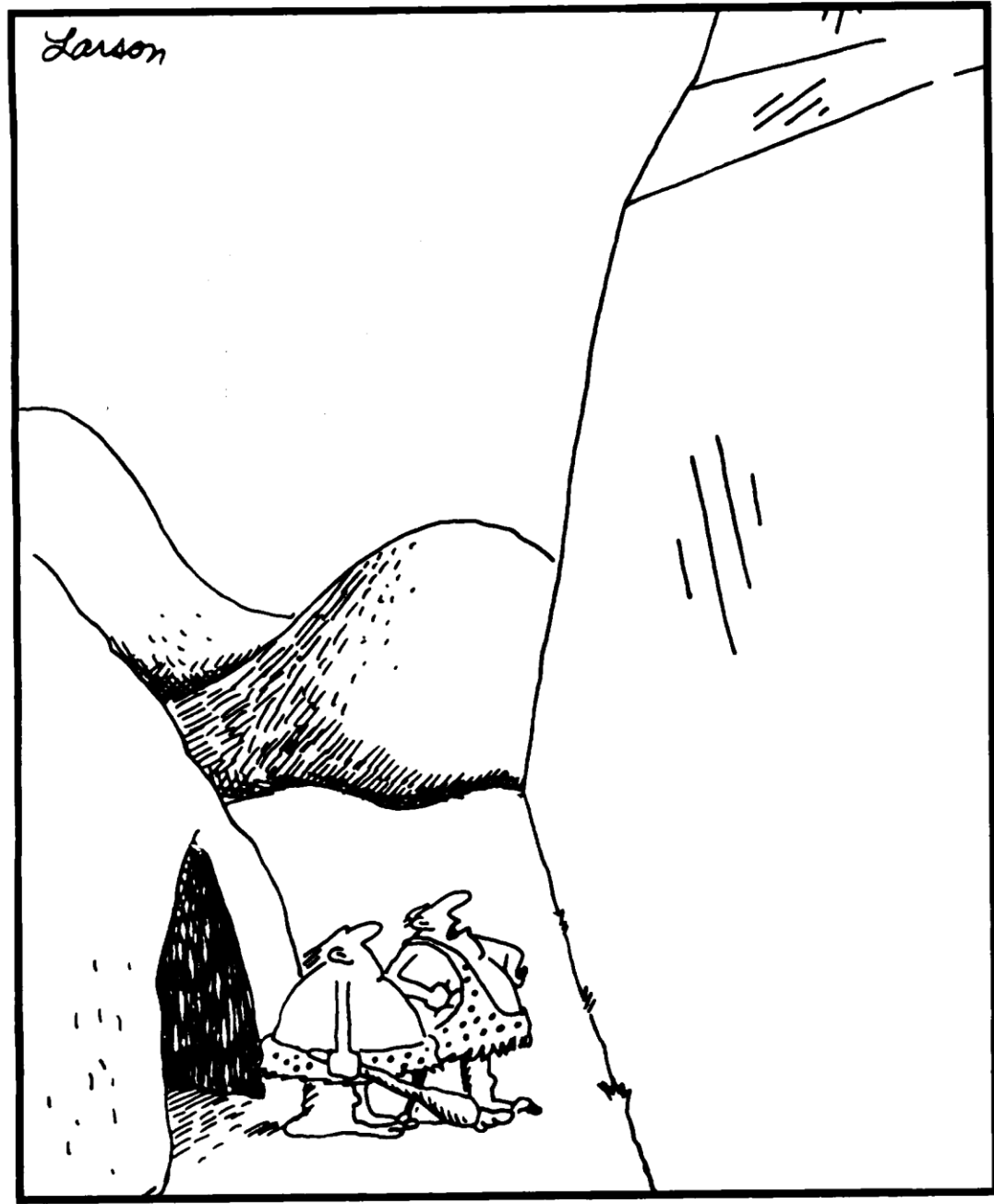
Joe Tomelleri





Alabama Cavefish
Speoplatyrhinus poulsoni

Photos by Danté Fenolio



"Say, Thag ... wall of ice closer today?"

Preglacial Watersheds

- 8. Old Mississippi River
- 9. Old Teays River
- 10. Old Kentucky River
- 11. Old Licking River
- 12. Old Big Sandy River
- 13. Kanawha River
- 15. Wabash River
- 16. Green River
- 17. Old Ohio River
- 18. Old Cumberland River
- 19. Old Duck River
- 20. Old Tennessee River
- 21. Appalachian River
- 22. Old Tallapoosa River
- 23. Mobile Basin



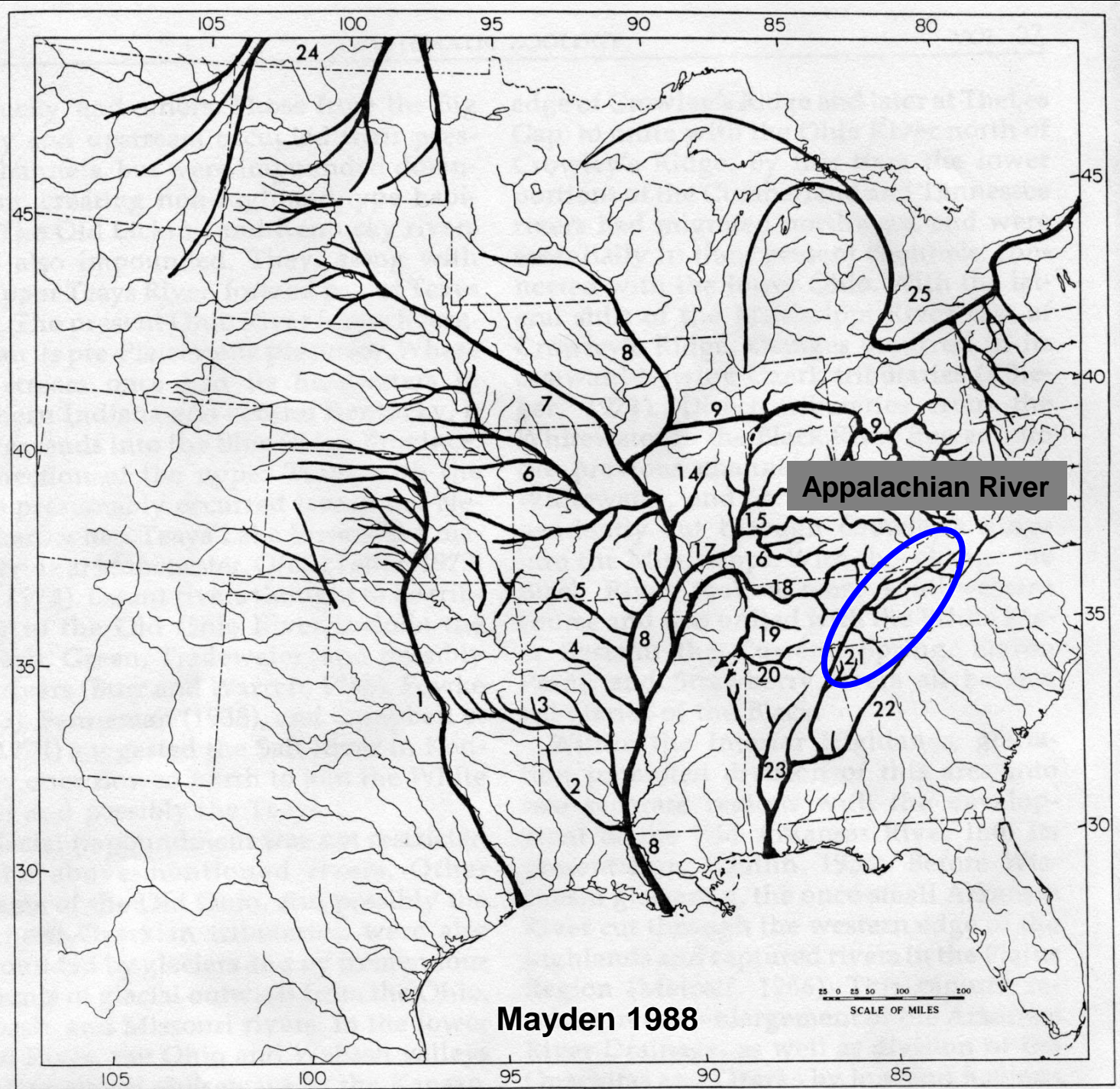
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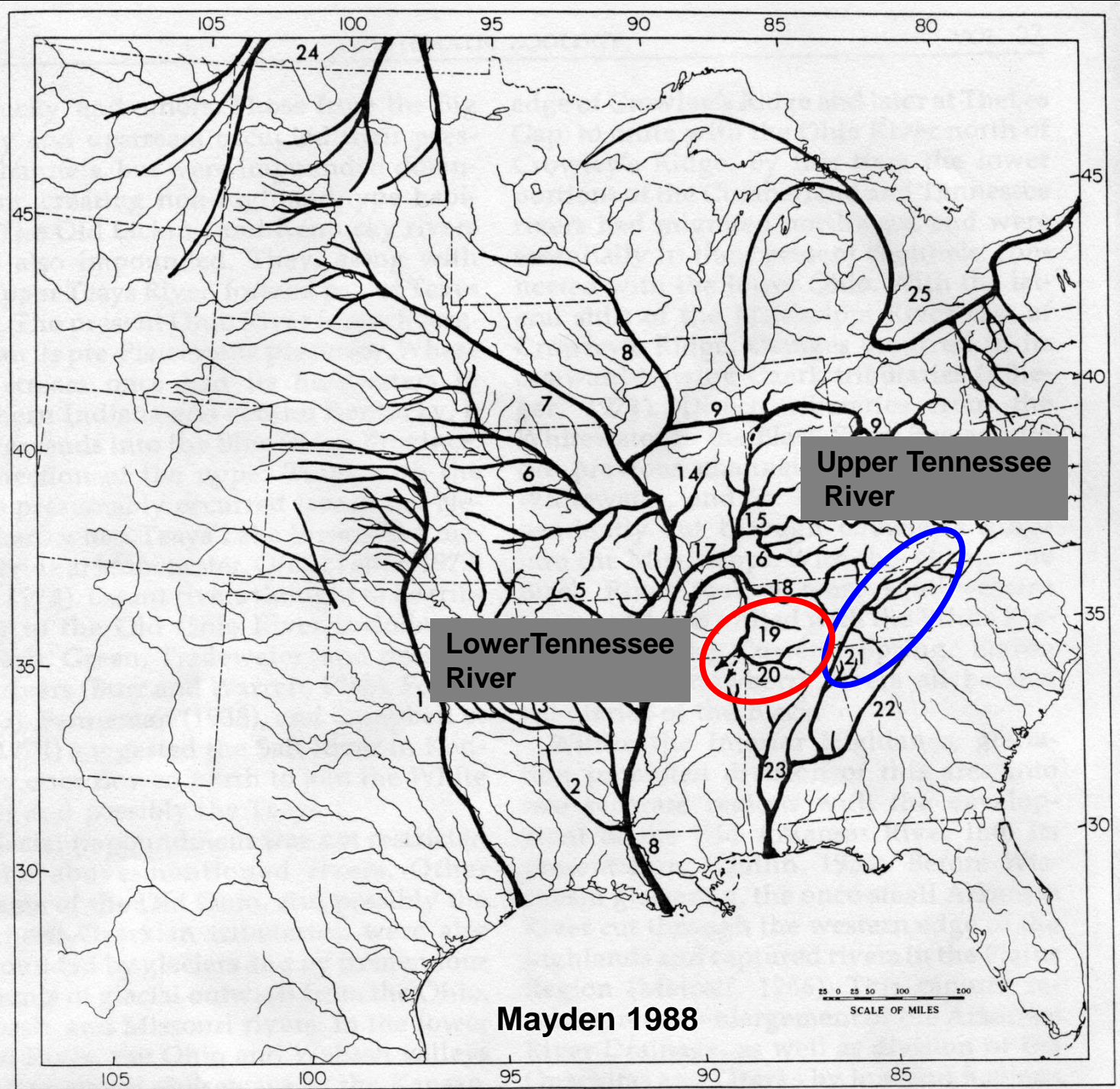
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Preglacial Watersheds

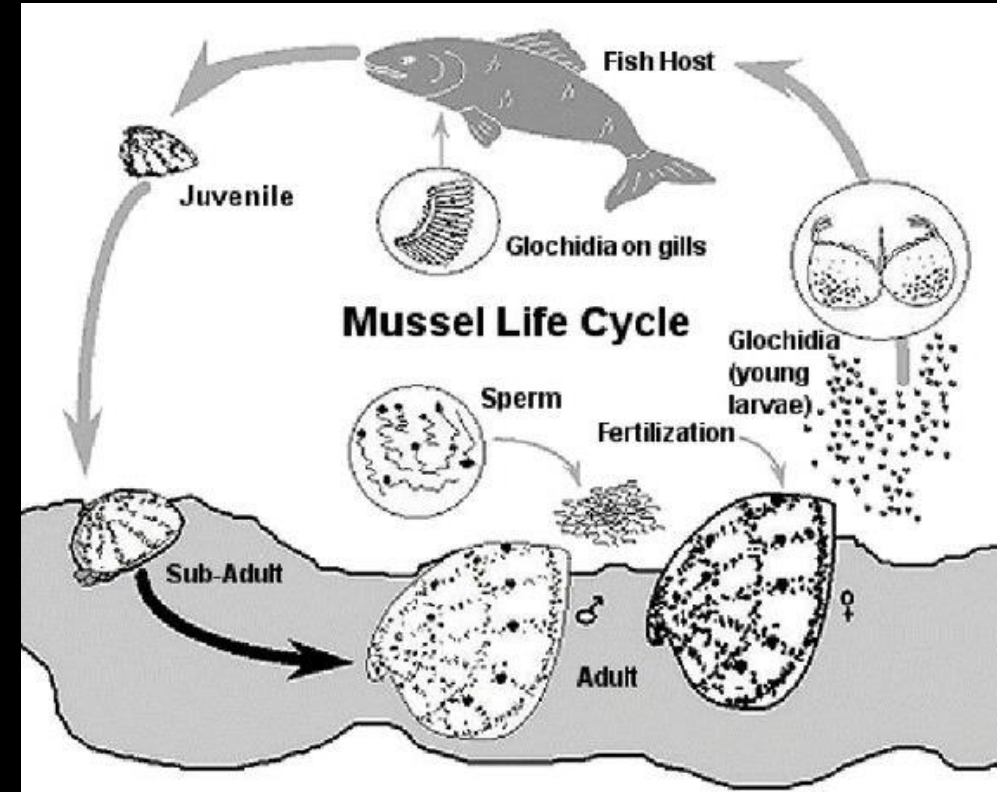
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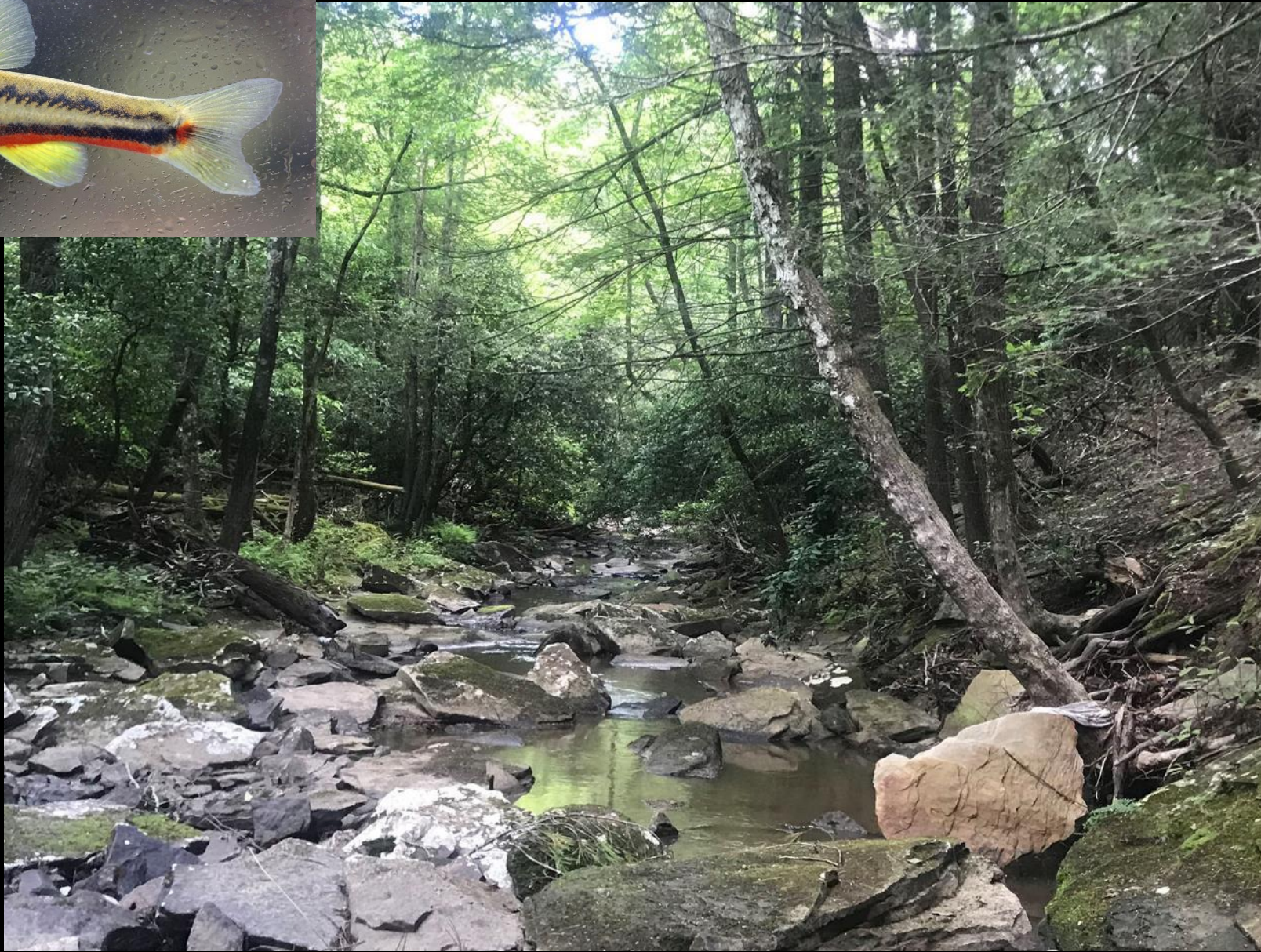












Bumbee Creek – occupied Laurel Dace habitat



Historical localities, but no longer suitable habitat

Other Recovery Challenges





Bumbee Creek – 2024 Drought



Regional Conservation Partnership Program



- **National Resource Conservation Service**
- **Regional Conservation Partnership Program**
 - **\$10 million over 5 years**
 - **Through 2018 Farm Bill**





Cover crops, stream buffer zones



Exclusion fencing
Alternate water source
Rotational grazing

**Tennessee River
Lake Sturgeon
Reintroduction
Program**



Clean Water Act 1972



Tennessee Aquarium Conservation Institute



TVA Dam Improvement Program



**2,000+ Lake Sturgeon
early June**

About 1/2 inch long





Over 250,000 Lake Sturgeon released since 2000 by Tennessee Aquarium and its many partners



Over 250,000 Lake Sturgeon released since 2000 by Tennessee Aquarium and its many partners







\$46 to \$1



**30% T&E fishes
0.9% funding**





Clementine



**TENNESSEE
AQUARIUM**

Microplastics in Pickwick Lake

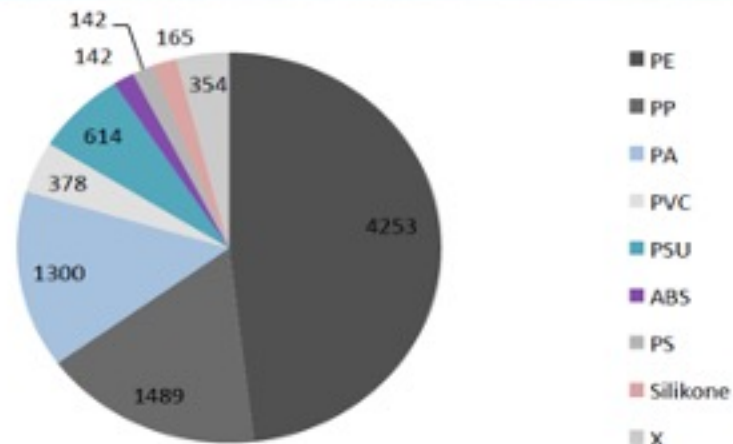


Abb. 5: MP Typenverteilung der 17674 Partikel aus der Tennessefilterprobe T8 (Meile 219)in %

[Tenneswim]



Ohio River

Tenn.
River

**32 million
Particles/sec**

Littering is likely part of our microplastic problem



Above: Chattanooga Creek

Above: Third Creek, Knoxville

Left: Tennessee roadside





We save fish.



Conservation Fisheries, Inc. is a 501(c)(3) nonprofit dedicated to the preservation of aquatic biodiversity in our streams and rivers.



Smoky Madtom, *Noturus baileyi*
Endangered



Yellowfin Madtom, *Noturus flavipinnis*
Threatened



86
SPECIES
1ST
& ONLY
PRIVATE
CONSERVATION
HATCHERY

12/23
N=10

12/23
N=10

System: 02
Preparation and Grow Out
Largemouth Bass
Partial production

Dixie Mountain Park, OK





Almost 300,000
fishes released since 1986.

Conservation.



- Propagation
- Reintroduction
- Monitoring
- Assurance Colonies - Arks

Environmental Sensitivity

- Chemicals
- Sediment
- Disturbance



Blue Shiner Environmental Sensitivity

- Chlorine
- Copper
- PFAS
- Others?



- Stream School
- Volunteer Program
- International Student Internships
- Maryville College
- University of Tennessee
- Published Science
- Social Media



Education.

Connection.

- Broad Coalition
- Community
- Systemic Solutions
- Global Vision



The Fragmented Tennessee River Watershed

- 48 TVA Dams
- 9,296 inventoried dams
- 207,814 road/stream crossings and other barriers

National Aquatic Barrier Inventory and Prioritization Tool -<https://aquaticbarriers.org/>

National Aquatic Barrier Inventory & Prioritization Tool

Regions | Explore & Download | Prioritize | Survey | Restoration | FAQ

Tennessee Region
HUC2: 06

Show networks for: dams road-related barriers both by state / county hydrologic unit

This area contains:
9,296 inventoried dams, including:
• 8,668 that were analyzed for impacts to aquatic connectivity in this tool
• 65 that have been removed or mitigated, gaining **1,819 miles** of reconnected rivers and streams

207,814 or more road/stream crossings (potential aquatic barriers), including:
• 5,713 that have been assessed for impacts to aquatic organisms.
• 3,077 that are likely to impact aquatic organisms
• 1,575 that were analyzed for impacts to aquatic connectivity in this tool
• 52 that have been removed or mitigated, gaining **118 miles** of reconnected rivers and streams
• 202,049 that have not yet been surveyed

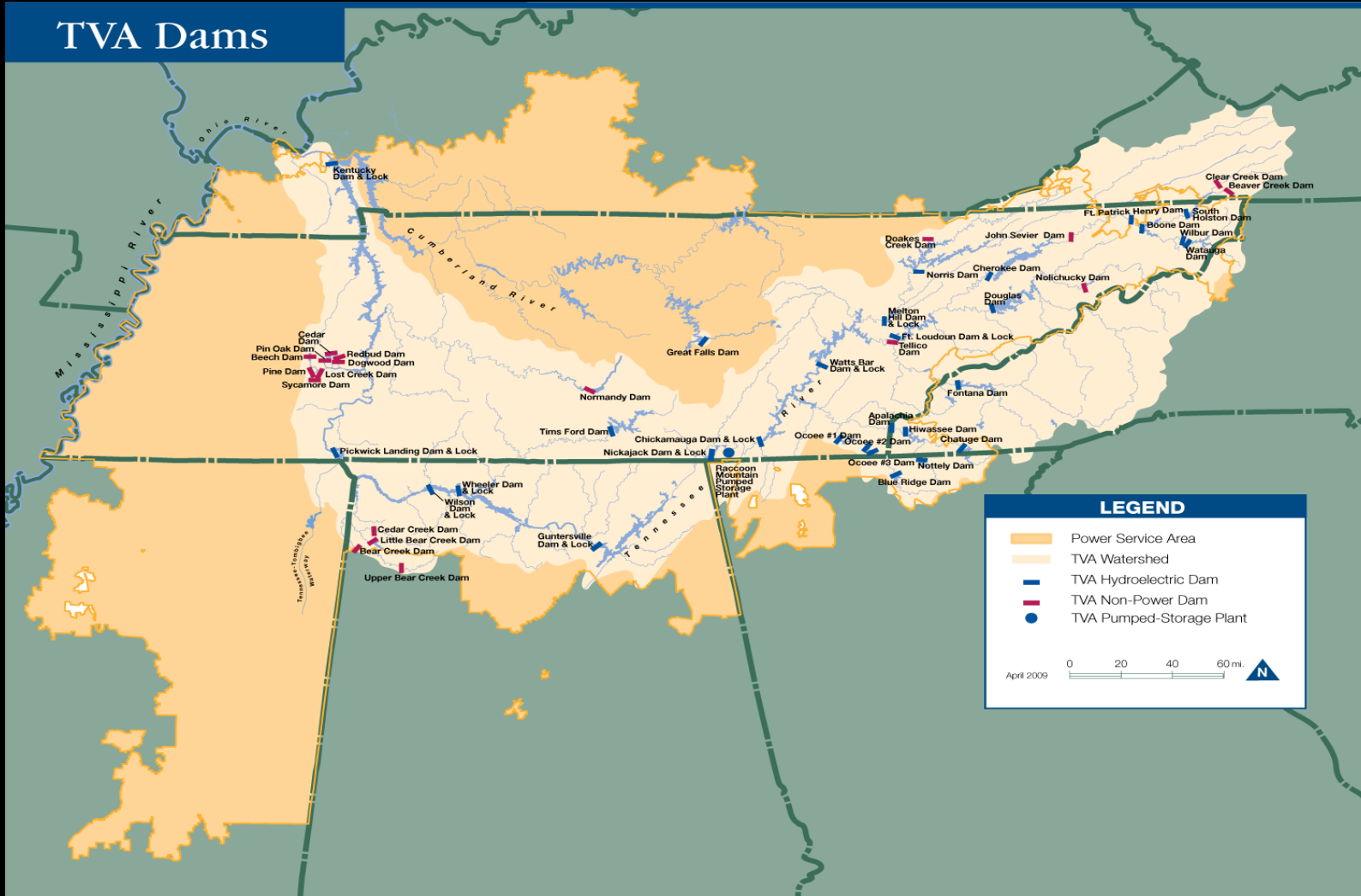
Select additional hydrologic units by clicking on them on the map or searching by name. You can then download data for all selected areas.

Search for hydrologic unit:
Download: dams & road-related barriers

Mapbox 35.98506° N, -83.996° E

© Mapbox © OpenStreetMap Improve this map
Data version: 3.13.0 (10/15/2024)
Created by Astute Spruce, LLC

TVA Dams



TVA Reservoir Release Improvements – 1991

- 180 miles of streams improved

TVA Reservoir Operations Study – 2004

- Large change to operation of the entire TVA system

TVA Biodiversity Policy - 2021



Candy Darter



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