The Importance of Bankhead National Forest to Freshwater Mussels

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Geological Survey of Alabama

What good are mussels?

- They are the proverbial 'Canary in the coal mine.'
- They act as natural filters, removing and processing suspended particulate matter from waterbodies and bioaccumulating waste
- They serve as a food resource for many animals, including wading birds, otters, muskrats, raccoons, and man
- Some species are commercially valuable

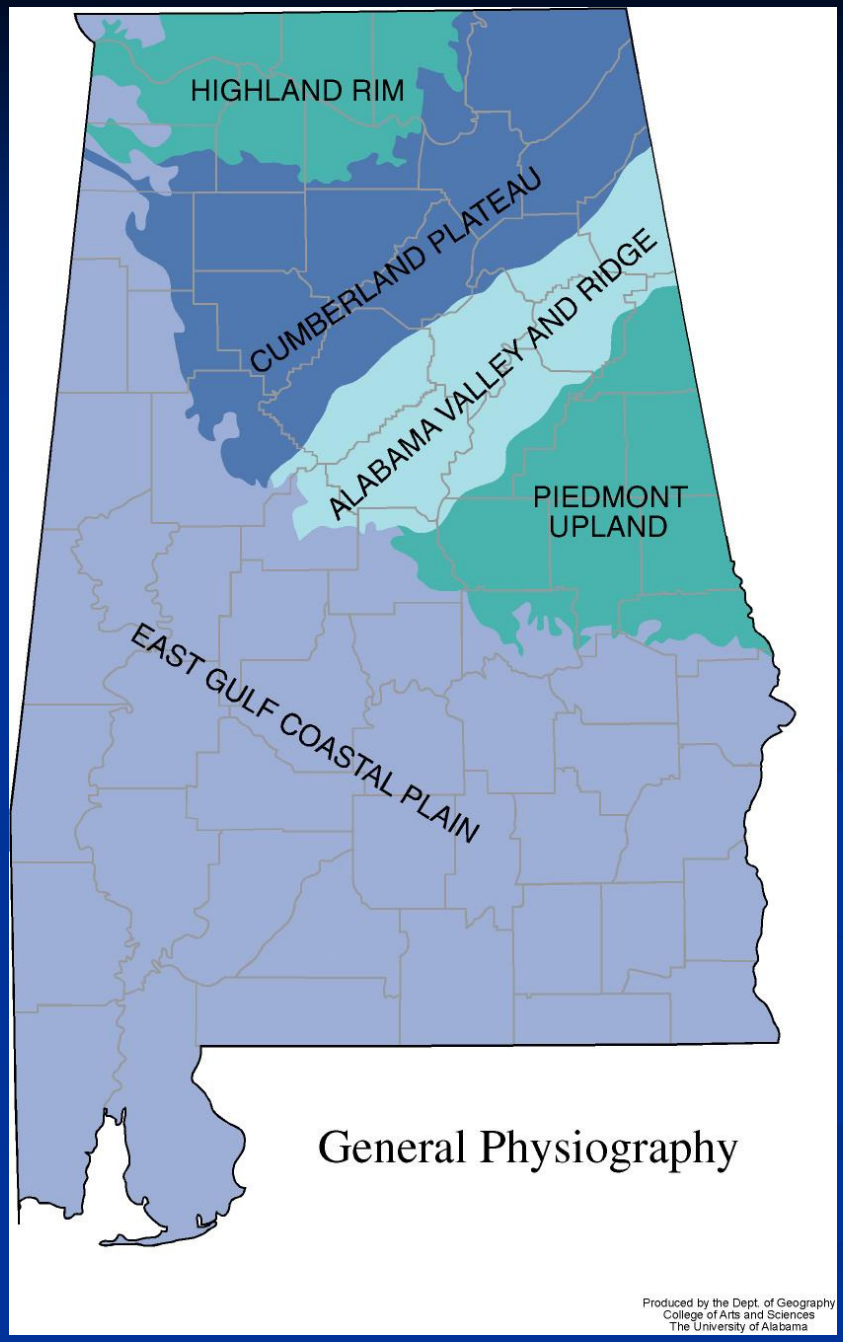
Stepdown diversity of freshwater mussels

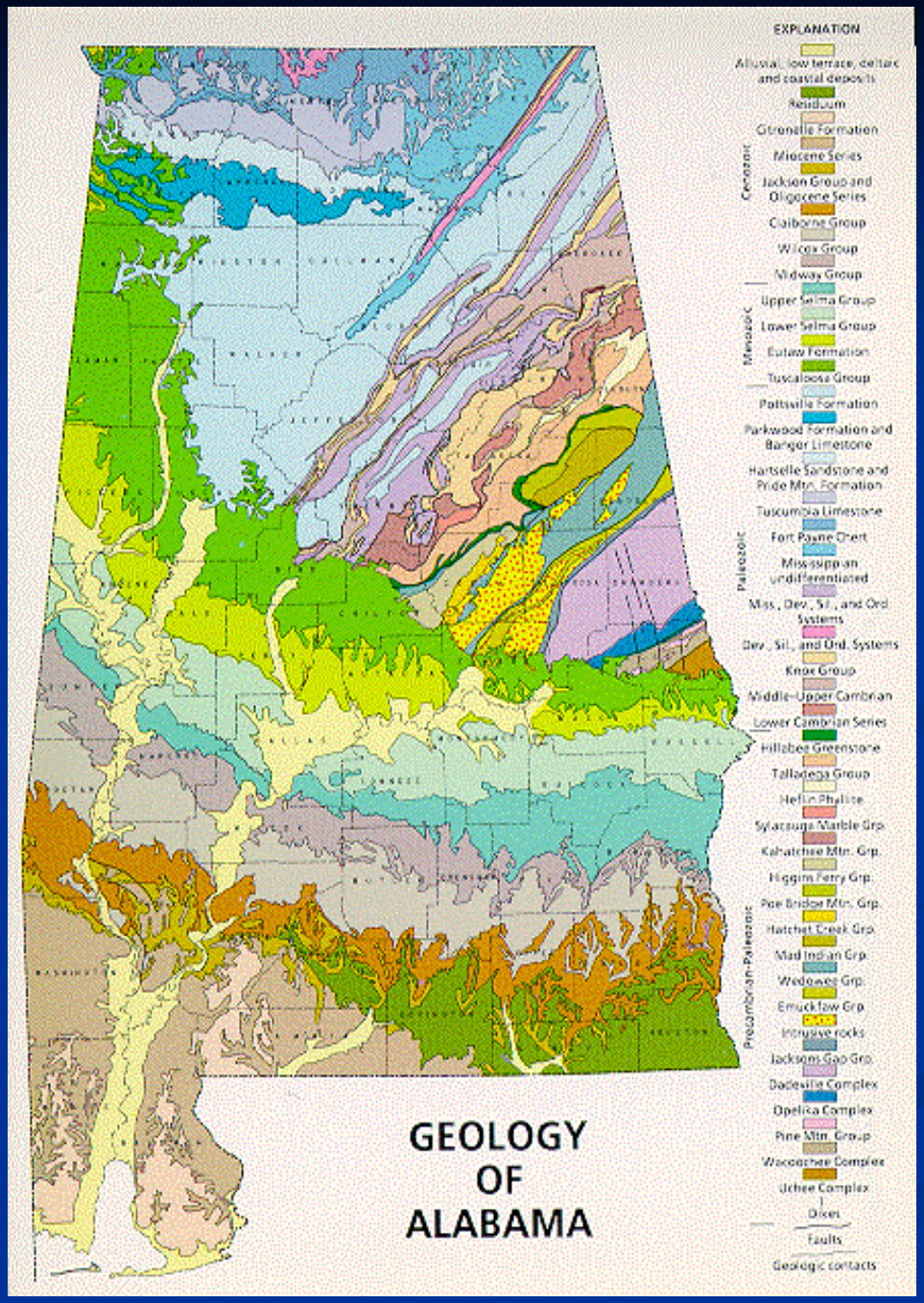
About:

- 840 species are known worldwide
- 300 species (36%) are known from North America
- 180 species (21%) are known from Alabama
- 73 species (9%) are known from the Mobile River basin
- 51 species (6%) are known from the Black Warrior system
- 16 species (2%) are known from Bankhead NF

Reasons for High Biodiversity in Alabama

- Ancient geology providing ample time for speciation
- Absence of glacial activity, which rendered large areas of North America fairly bereft of diversity

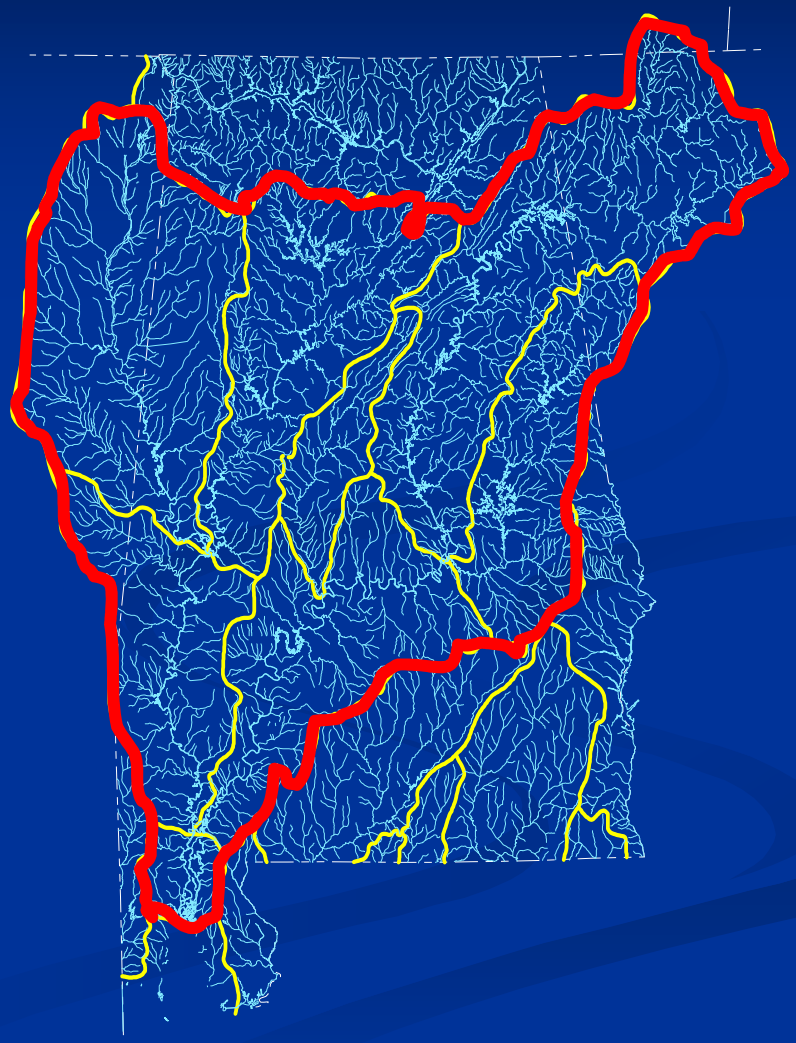

HIGHLAND RIM
CUMBERLAND PLATEAU
ALABAMA VALLEY AND RIDGE
PIEDMONT UPLAND
EAST GULF COASTAL PLAIN
General Physiography
Produced by the Dept. of Geography
College of Arts and Sciences
The University of Alabama

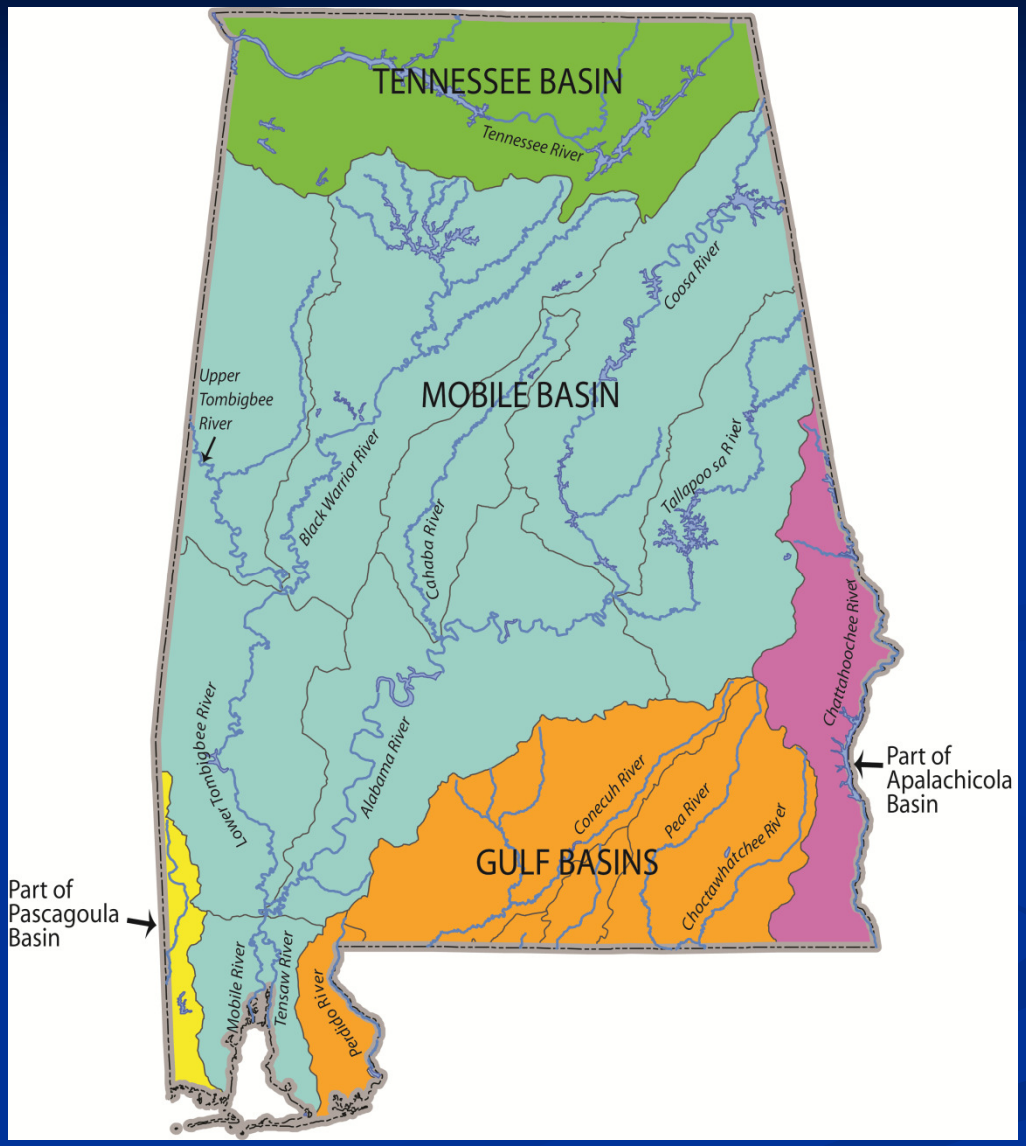

EXPLANATION
Alluvial, low terrace, deltaic and coastal deposits
Residuum
Citronelle Formation
Miocene Series
Jackson Group and Oligocene Series
Claiborne Group
Wilcox Group
Midway Group
Upper Selma Group
Lower Selma Group
Eutaw Formation
Tuscaloosa Group
Pottsville Formation
Parkwood Formation and Bangor Limestone
Hartselle Sandstone and Pride Mtn. Formation
Tuscumbia Limestone
Fort Payne Chert
Mississippian undifferentiated
Miss., Dev., Sil., and Ord. Systems
Dev., Sil., and Ord. Systems
Knox Group
Middle-Upper Cambrian
Lower Cambrian Series
Hillabee Greenstone
Talladega Group
Heflin Phyllite
Sylacauga Marble Grp.
Kahatchee Mtn. Grp.
Higgins Ferry Grp.
Poe Bridge Mtn. Grp.
Hatchet Creek Grp.
Mad Indian Grp.
Wedowee Grp.
Emuckfaw Grp.
Intrusive rocks
Jacksons Gap Grp.
Dadeville Complex
Opelika Complex
Pine Mtn. Group
Wacoochee Complex
Uchee Complex
Dikes
Faults
Geologic contacts
Cenozoic
Mesozoic
Paleozoic
Precambrian-Paleozoic
GEOLOGY
OF
ALABAMA

Reasons for High Biodiversity in Alabama

- Abundant supplies of high quality fresh water
- Favorable climate
- Arbitrary state boundaries that crossed several major river basins

- *14 major river basins*
- *77,242 miles streams and rivers*
- *490,472 ac. of ponds, lakes, and reservoirs*
- *3,600,000 ac. of freshwater wetlands*
- *27,600 ac. of coastal wetlands*
- *553 tr. gal. ground water*
- *33.5 tr. gal. surface water*



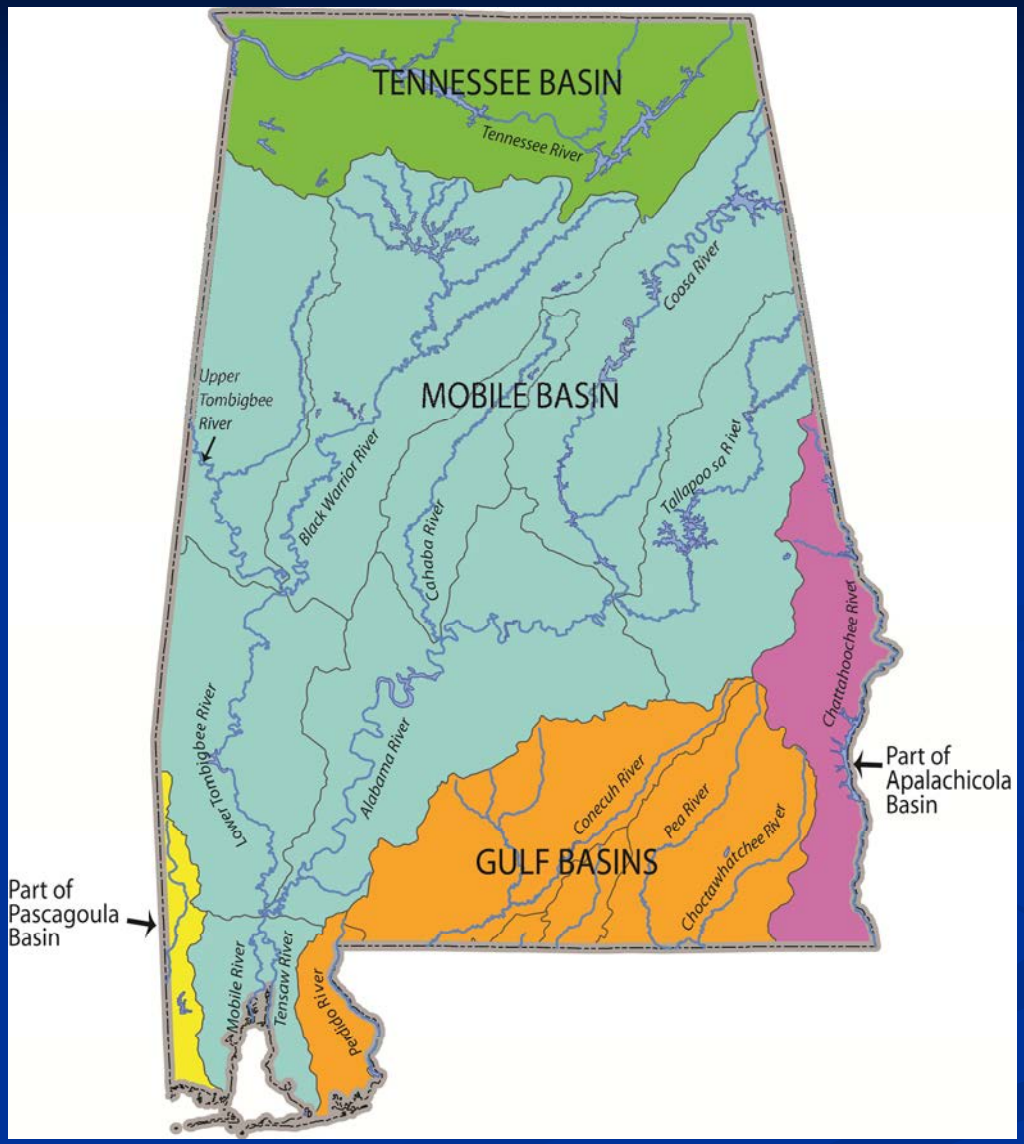

TENNESSEE BASIN
Tennessee River
MOBILE BASIN
Coosa River
Upper Tombigbee River
Black Warrior River
Cahaba River
Tallapoosa River
Chattahoochee River
Lower Tombigbee River
Alabama River
Part of Apalachicola Basin
Conecuh River
Pea River
GULF BASINS
Choctawhatchee River
Part of Pascagoula Basin
Mobile River
Tensaw River
Perdido River

Reasons for the Decline of Alabama's Freshwater Mussel Diversity

- Impoundment of streams changing hydrology and water quality characteristics and fragmenting populations

Jordan Dam - Coosa River

"Putting loafing rivers to work"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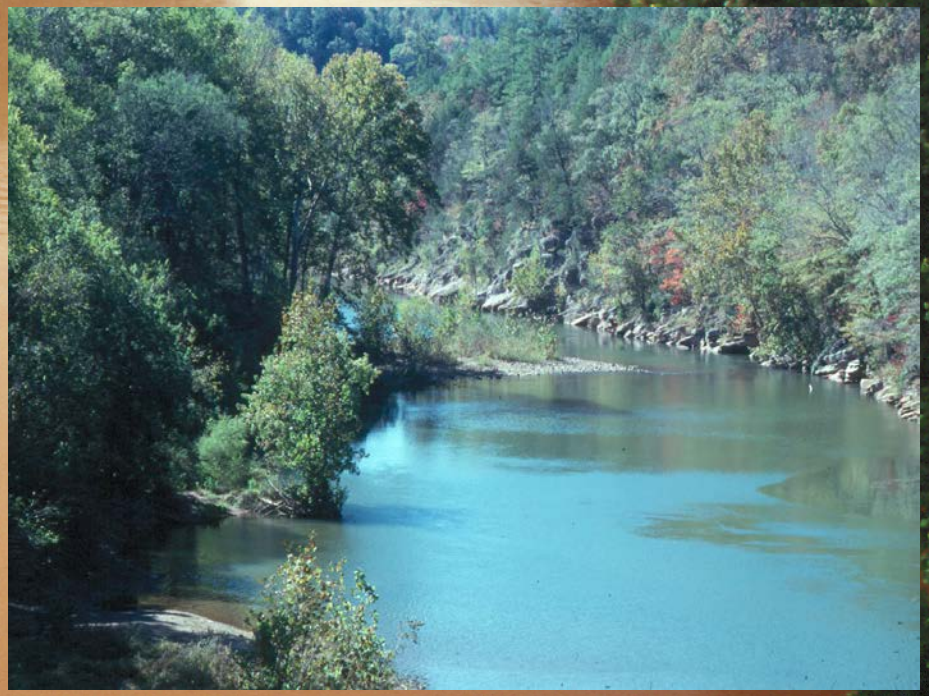
Choctawhatchee River
Perdido River
Mobile River
Tensaw River
Part of Apalachicola Basin
Part of Pascagoula Basin

Reasons for the Decline of Alabama's Freshwater Mussel Diversity

- Other alterations to streams such as channelization, removal of streamside cover, dredging, etc.

Sediment is a major contributor to water-quality degradation

>2 billion tons per year in Alabama



How much dirt is too much dirt in the creek ?

TMDL process

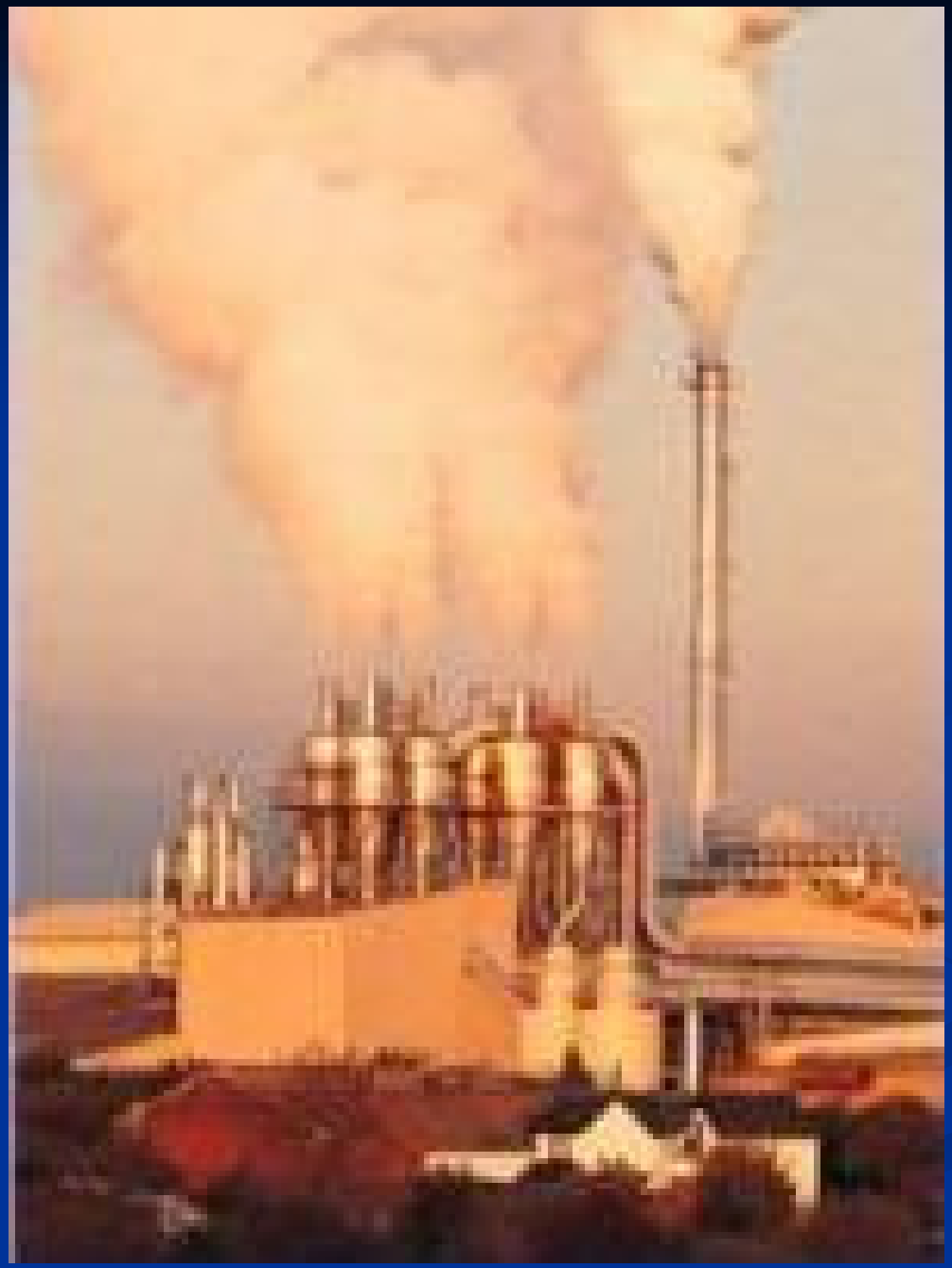
Cahaba at River Bend

Reasons for the Decline of Alabama's Freshwater Mussel Diversity

- Point- and nonpoint-source pollution

Examples of point source pollution

- Any single identifiable source from which pollutants are discharged, such as a pipe, ditch, ship, or factory smokestack
- Examples include wastewater treatment plants, oil refineries, pulp and paper mills, and chemical, electronics, and automobile manufacturers



Examples of non-point source pollution

- Excess fertilizers, insecticides, etc., from agricultural and residential areas
- Oil, grease, and toxic chemicals from urban runoff and energy production
- Sediment from improperly managed construction sites, crop and forest lands, and eroding streambanks
- Bacteria and nutrients from livestock, pet wastes, and faulty septic systems
- Atmospheric depsition and hydromodification (acid rain)

Reasons for the Decline of Alabama's Freshwater Mussel Diversity

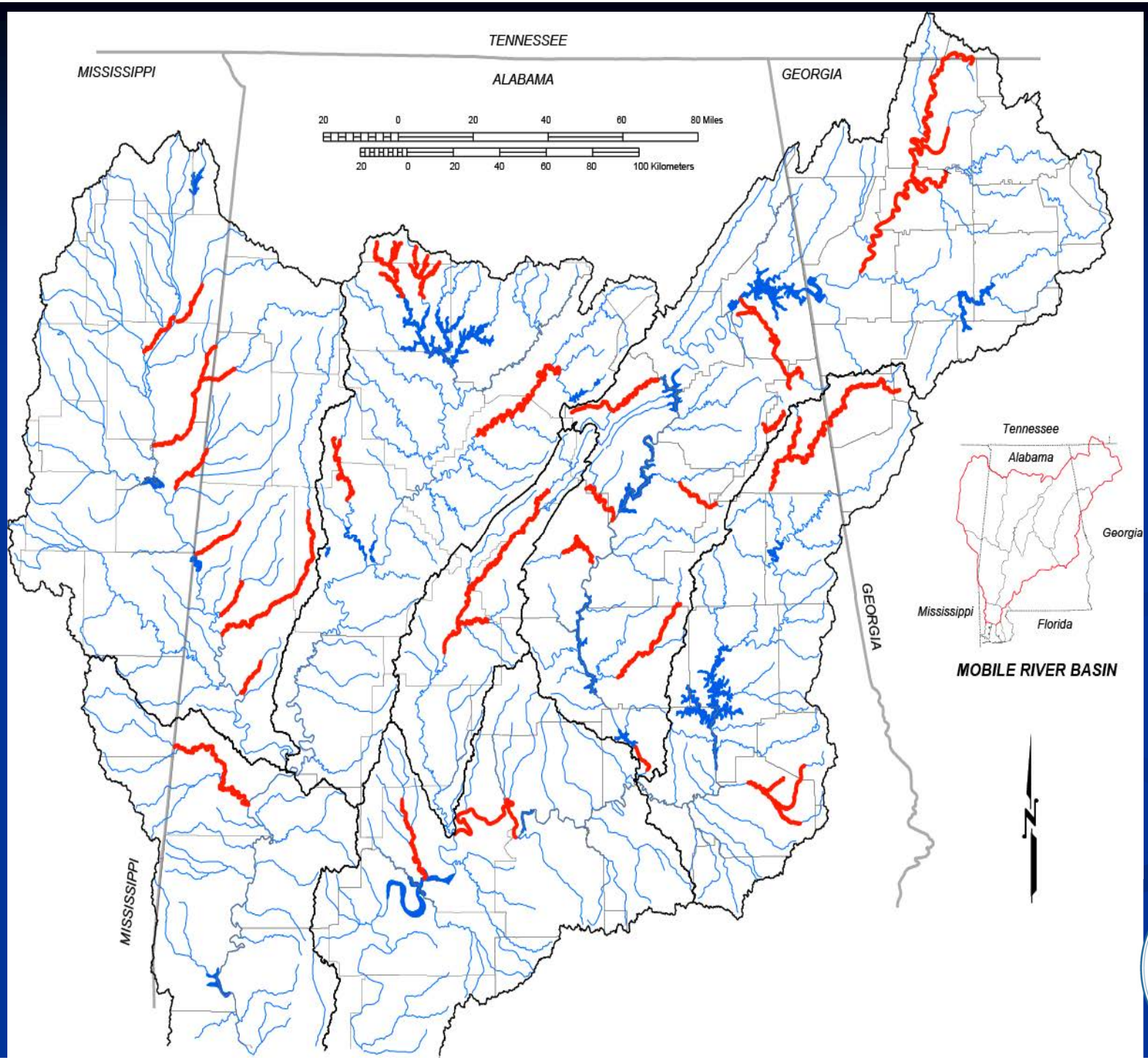
- Introduction of competitive exotics, including Asian Clams, Zebra Mussels, and various predatory fishes

Why Bankhead National Forest is such an important refugium for freshwater mussels

- Maintenance of streamside cover protects the integrity of streams
- Rural setting minimizes point and non-point source pollution

Relevance of Bankhead NF for freshwater mussels

- It supports a globally important fauna including four federally listed endangered or threatened species, including one of only two populations remaining for one species, and one of very few for several others
- It contains one of the few intact Mobile Basin faunas remaining



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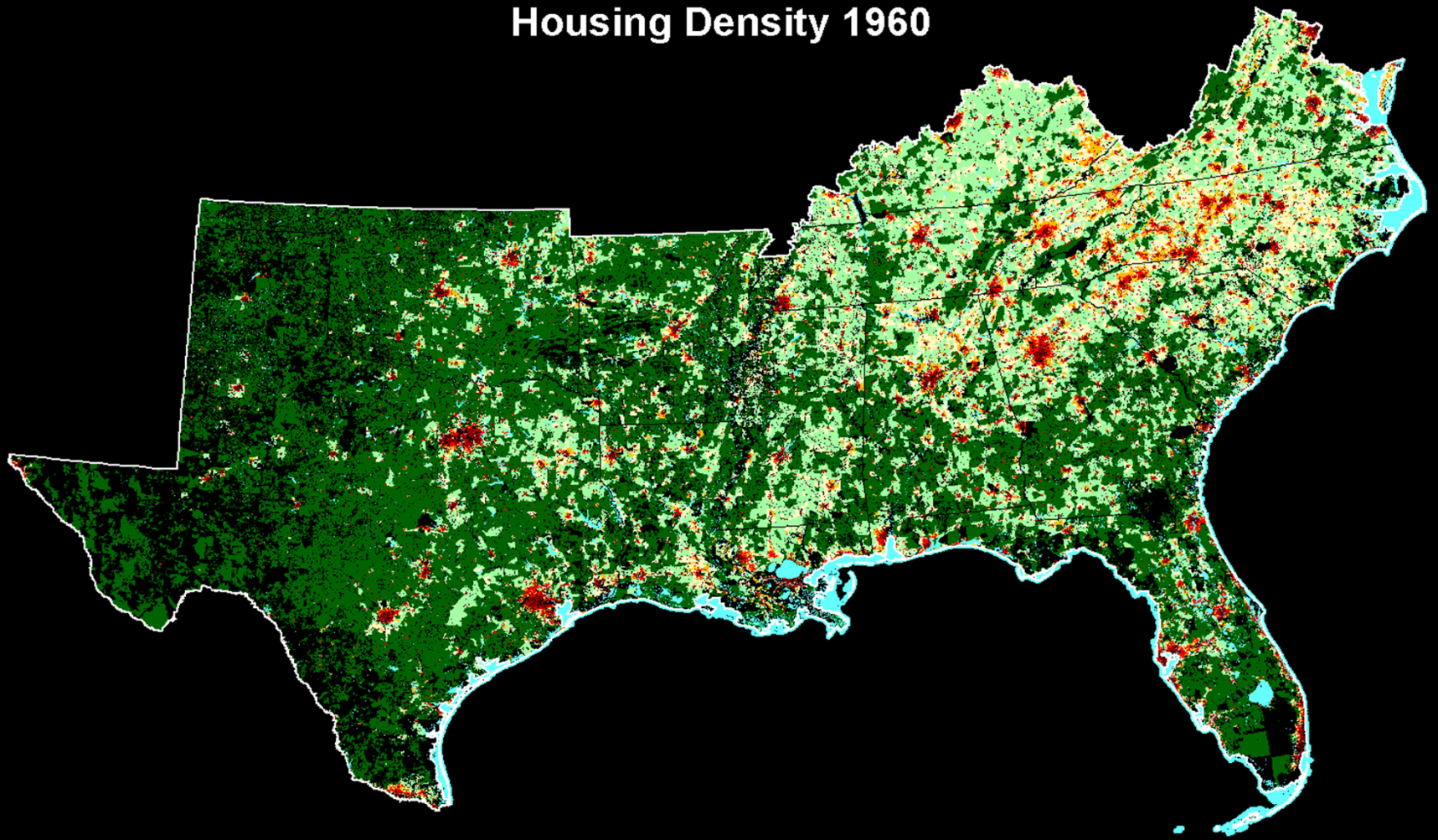
Why does it matter?

- "For if one link in nature's chain might be lost, another might be lost, until the whole of things will vanish by piecemeal." ~ *Thomas Jefferson*
- "To keep every cog and wheel is the first precaution of intelligent tinkering." ~ *Aldo Leopold*

Southern Region

Housing Density 1960

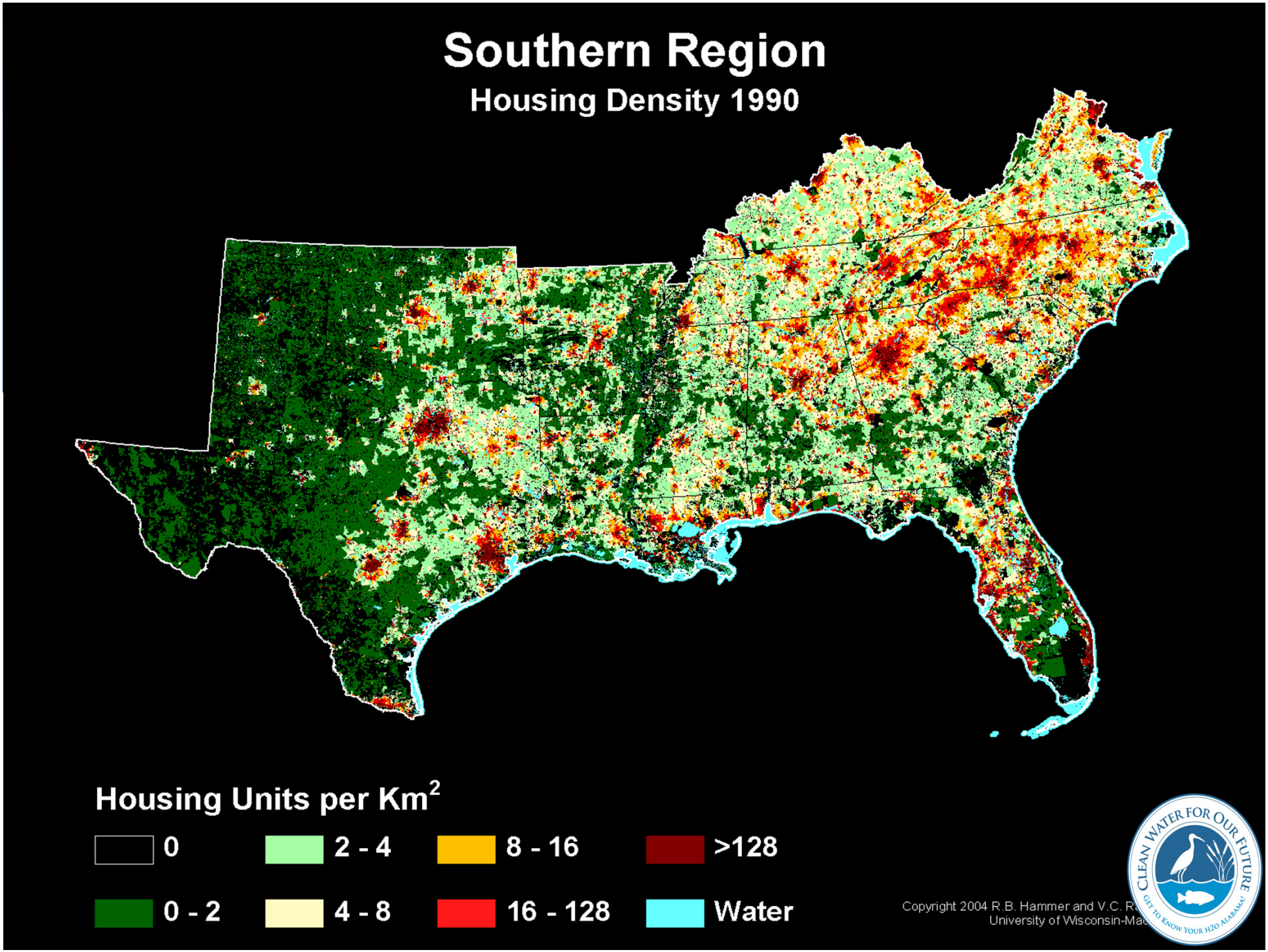


Housing Units per Km^2

0	2 - 4	8 - 16	>128
0 - 2	4 - 8	16 - 128	Water

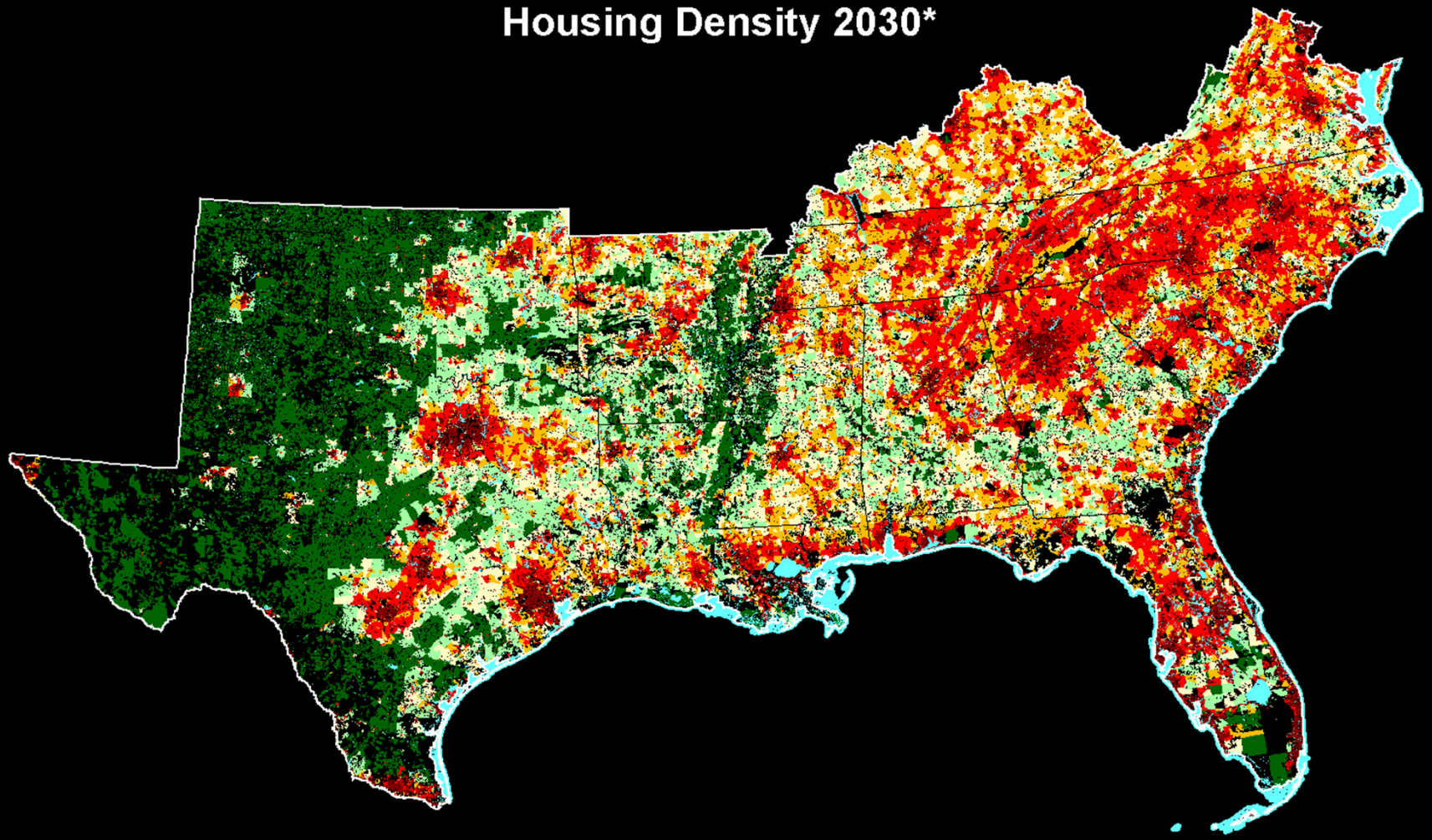
Southern Region

Housing Density 1990



Southern Region

Housing Density 2030*



Housing Units per Km^2

0	2 - 4	8 - 16	>128
0 - 2	4 - 8	16 - 128	Water

*Linear projection of 1990s growth

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Thanks

- Pat O'Neil – GSA
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