

Alabama's Diverse Geology and its Impact on Topography, Soils, and Water Quality

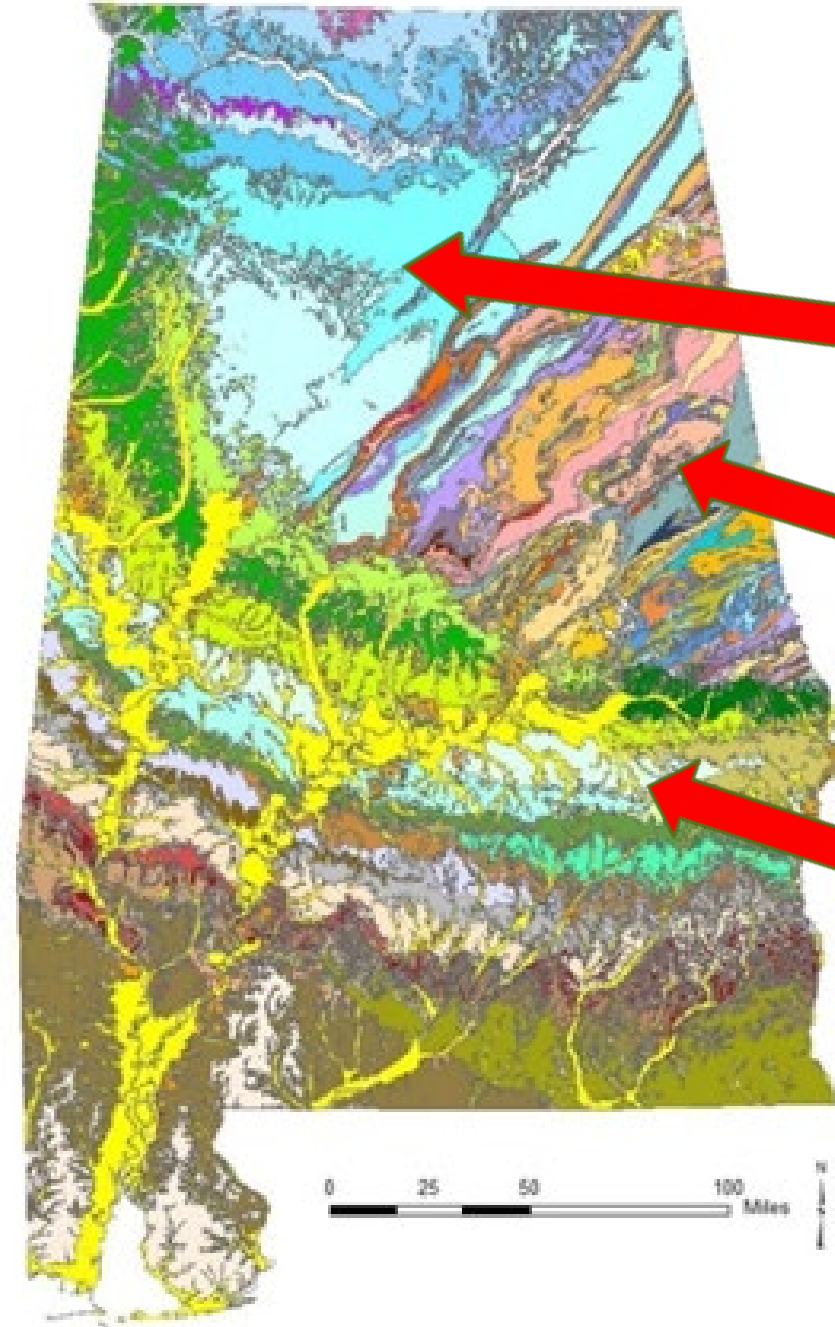
**Clearwater Alabama Conference
Pell City Civic Center
September 24, 2025**

Dr. Bill Deutsch

Objectives

- How did Alabama get such diverse rock formations, topography, and soils?
- How do these varied landscapes affect water quantity and quality?
- How can complex physical and chemical processes be made understandable for practitioners and the public to enhance the success of stormwater projects?

Geology & Ancient Life

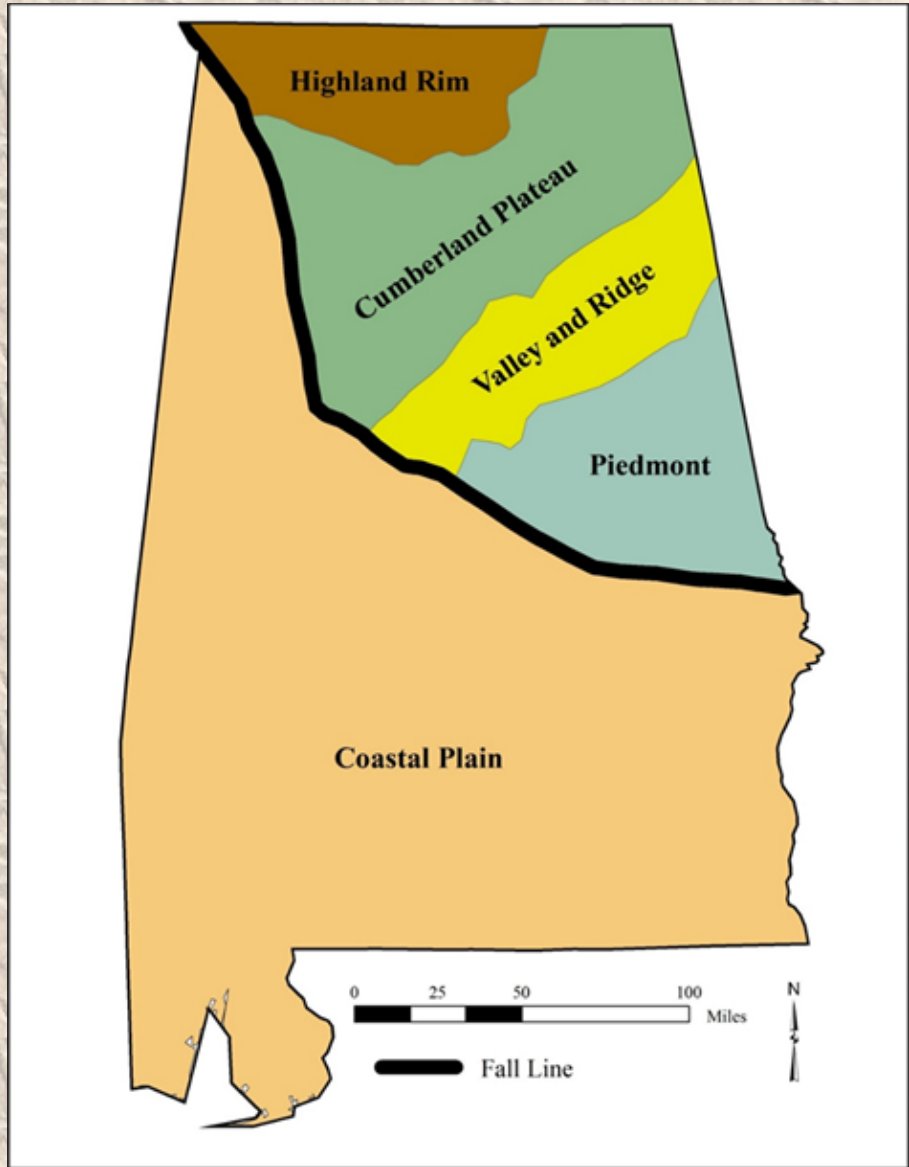
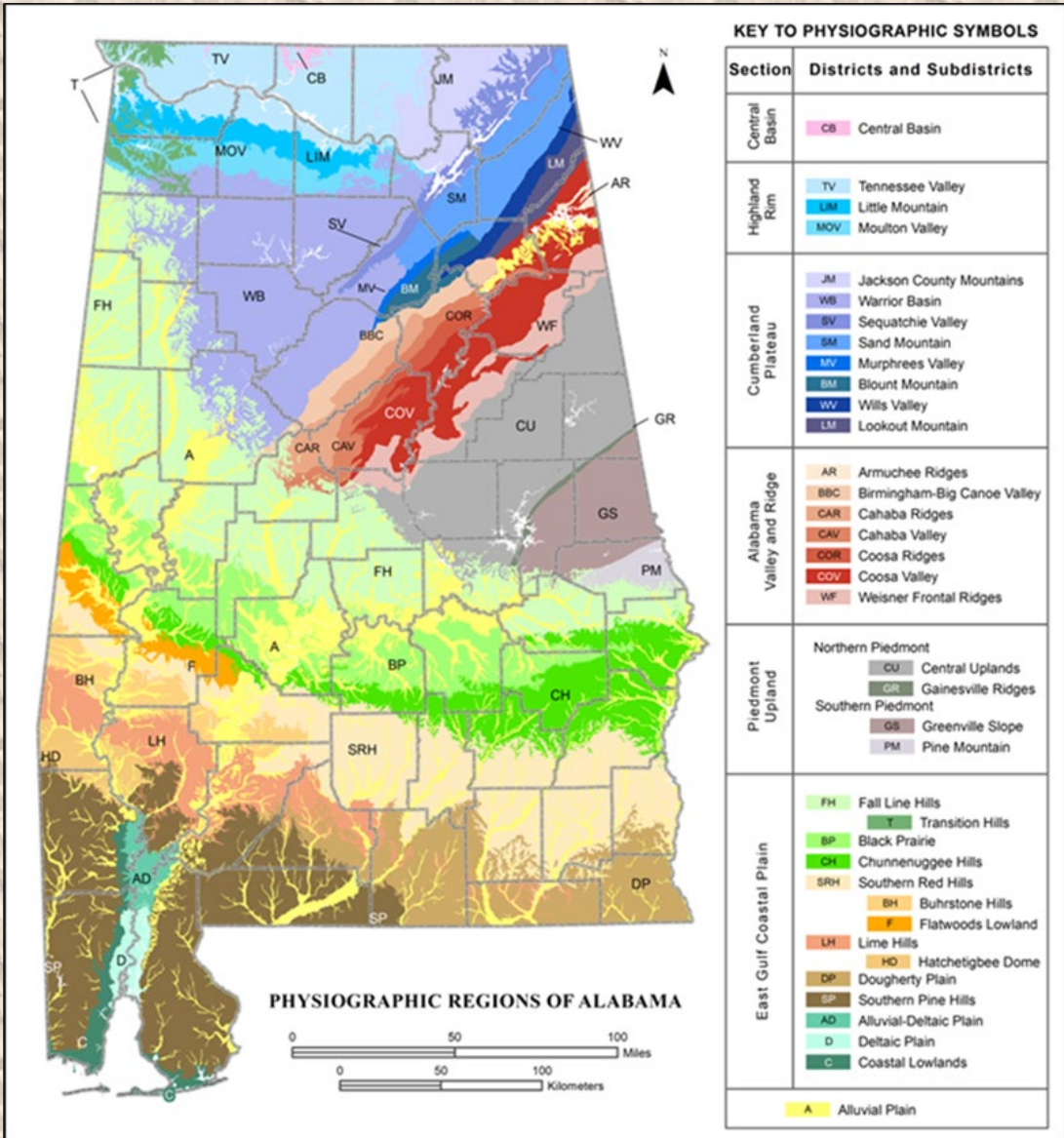


Sedimentary Rock

(Limestone, Sandstone, Shale, Coal)

Igneous and Metamorphic Rock
(Granite, Gneiss, Shist, Quartzite)

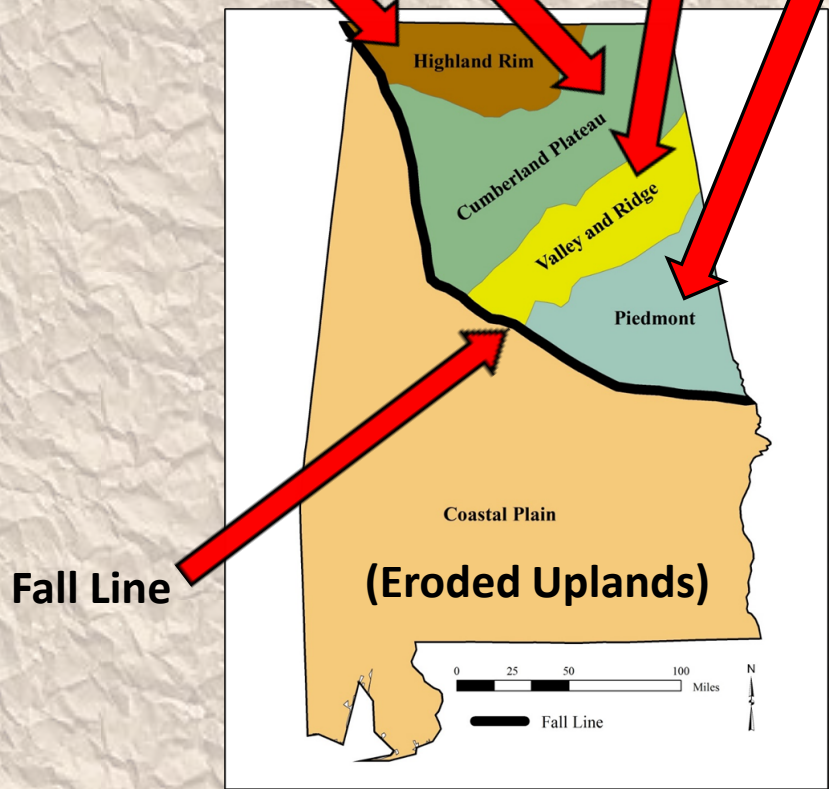
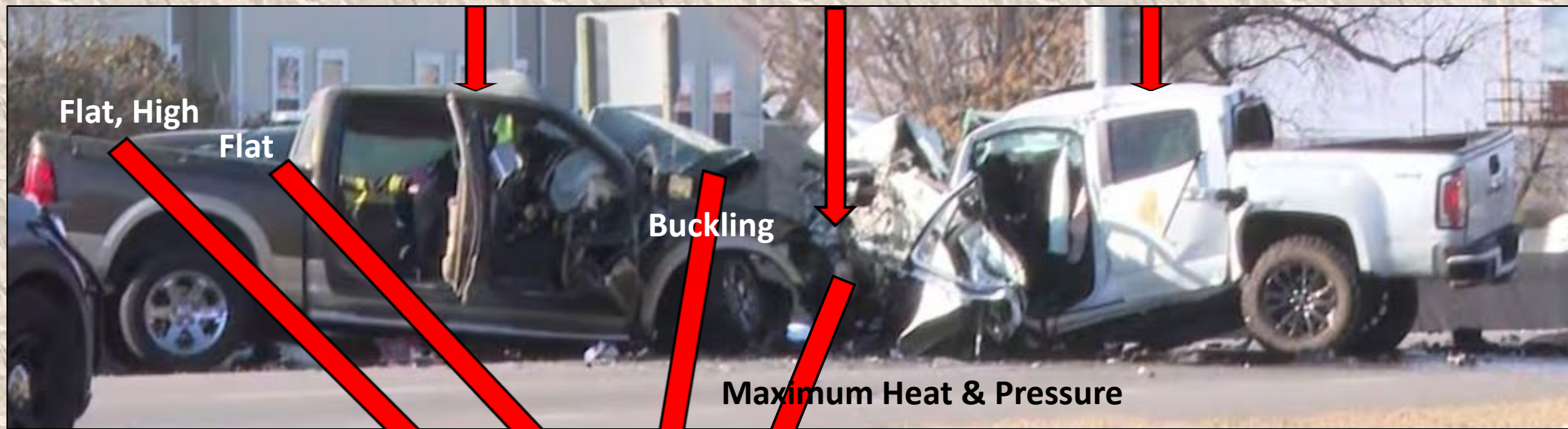
Kinda Rock
(Chalky Soils, Marl, Sand and Gravel)

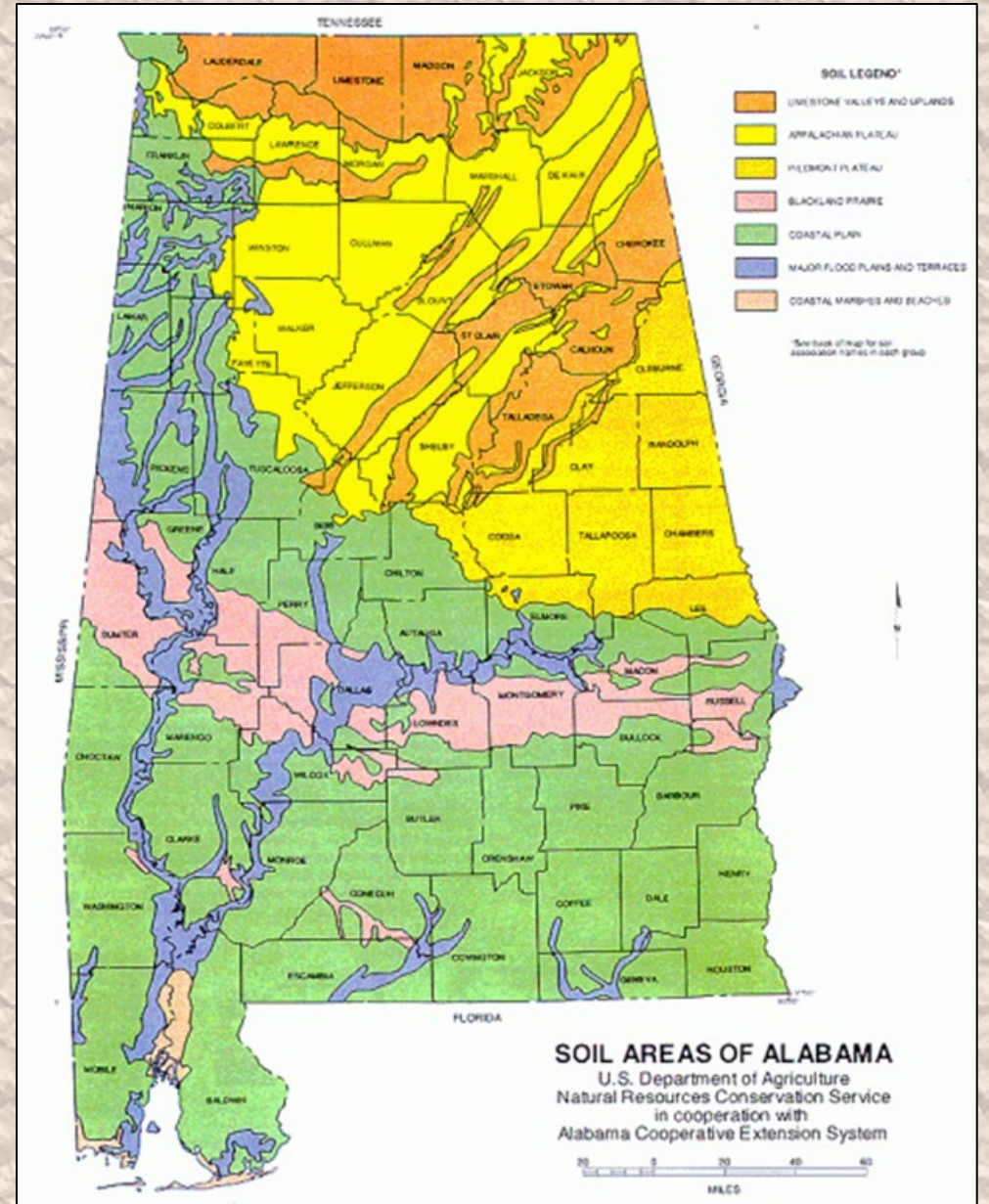
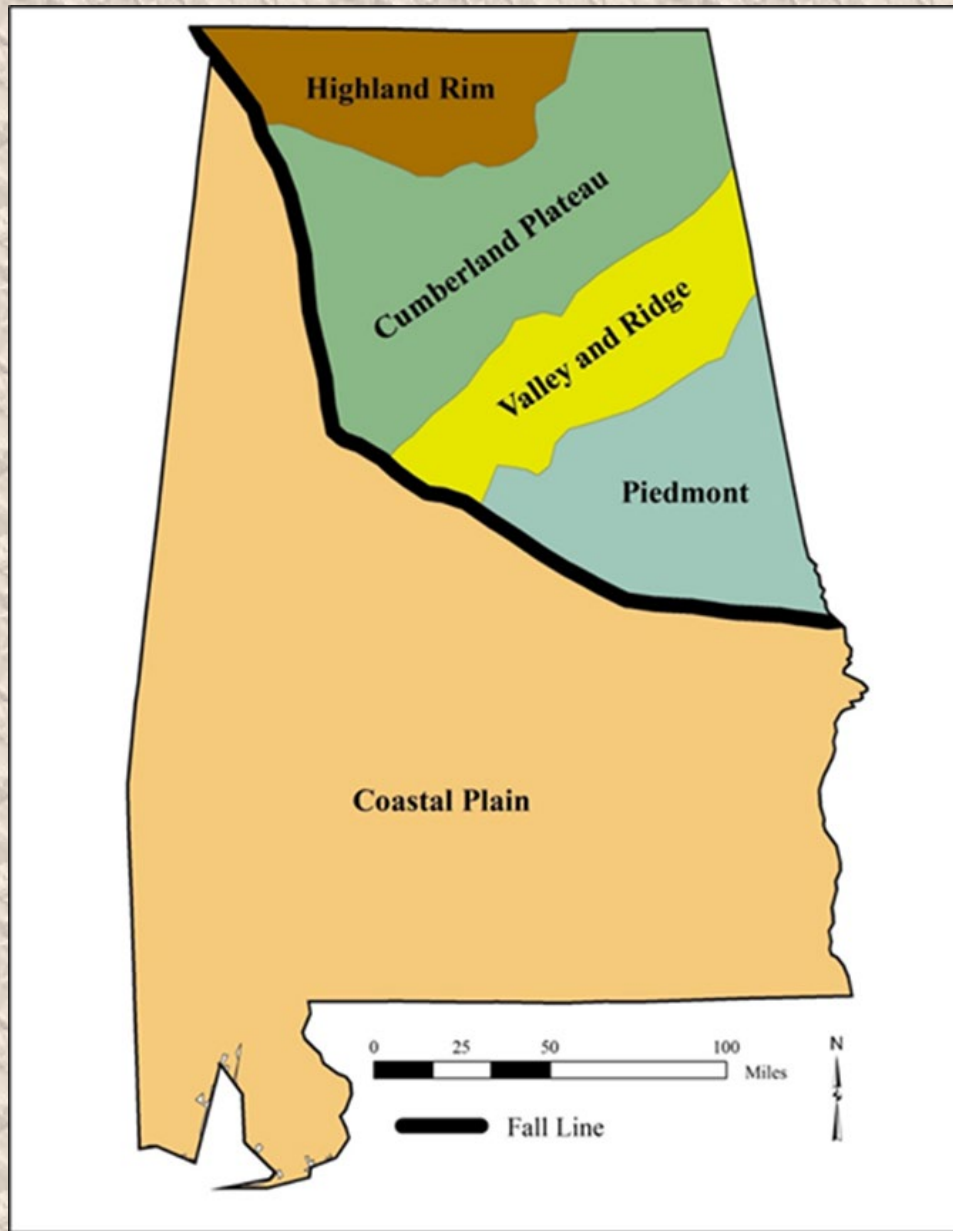


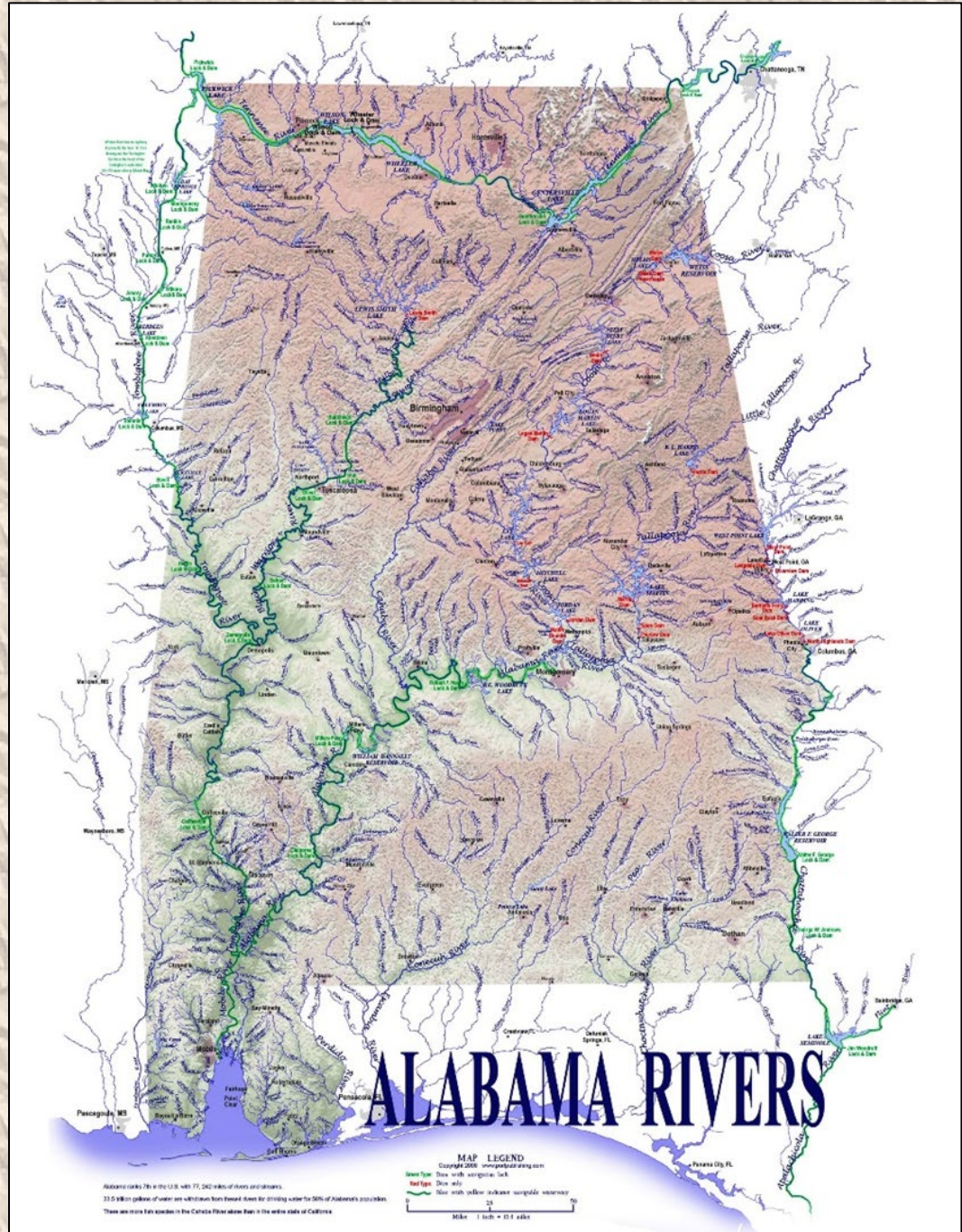
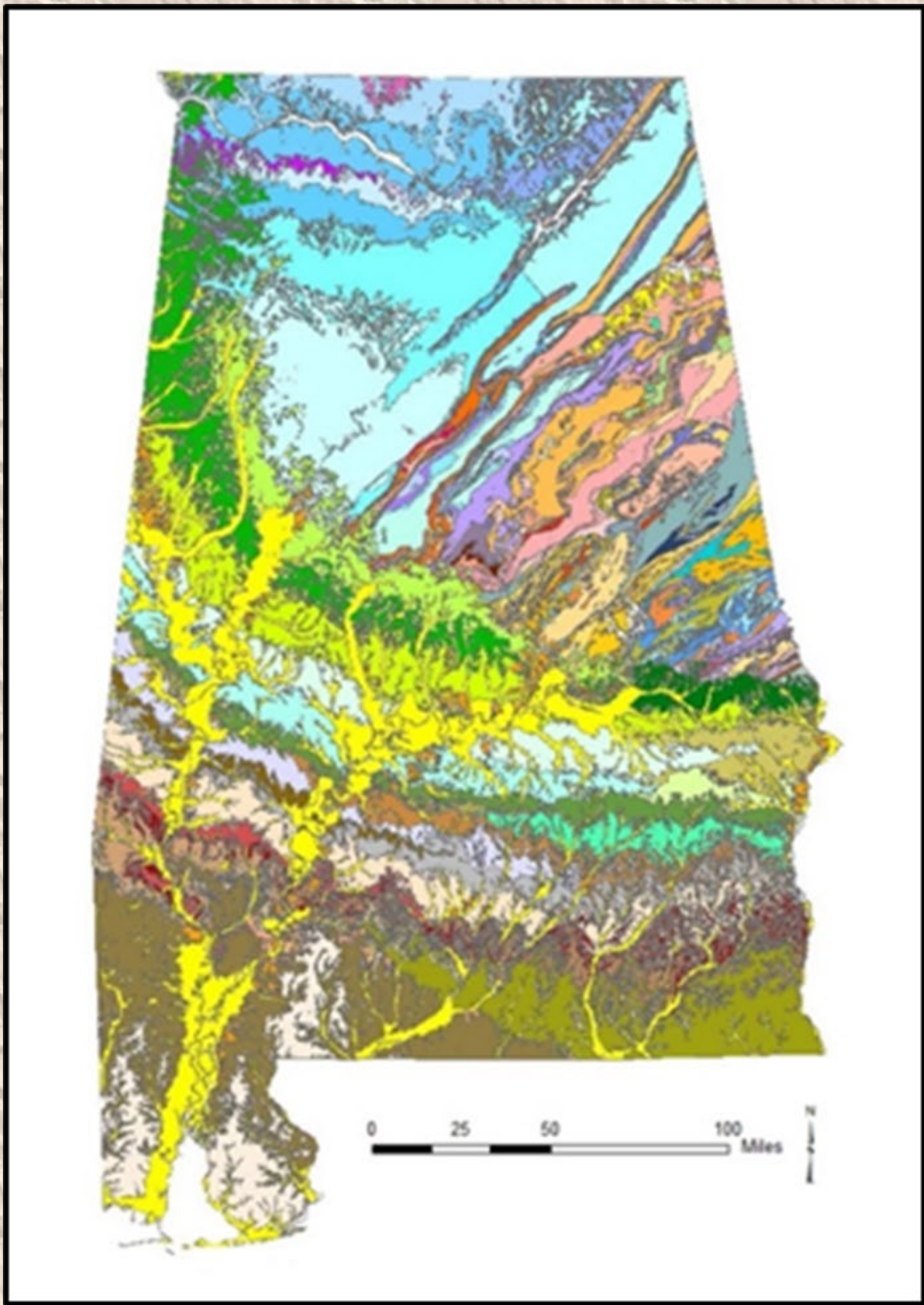
North America

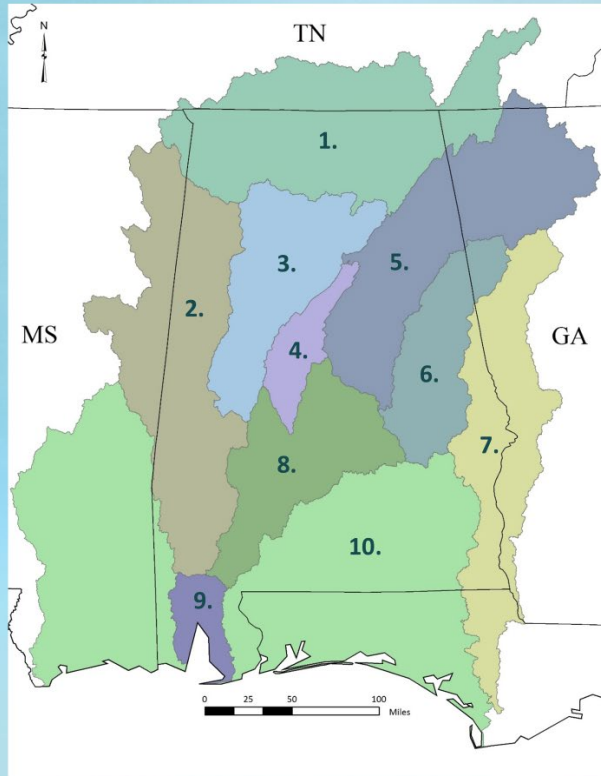
Future Atlantic Ocean

Africa

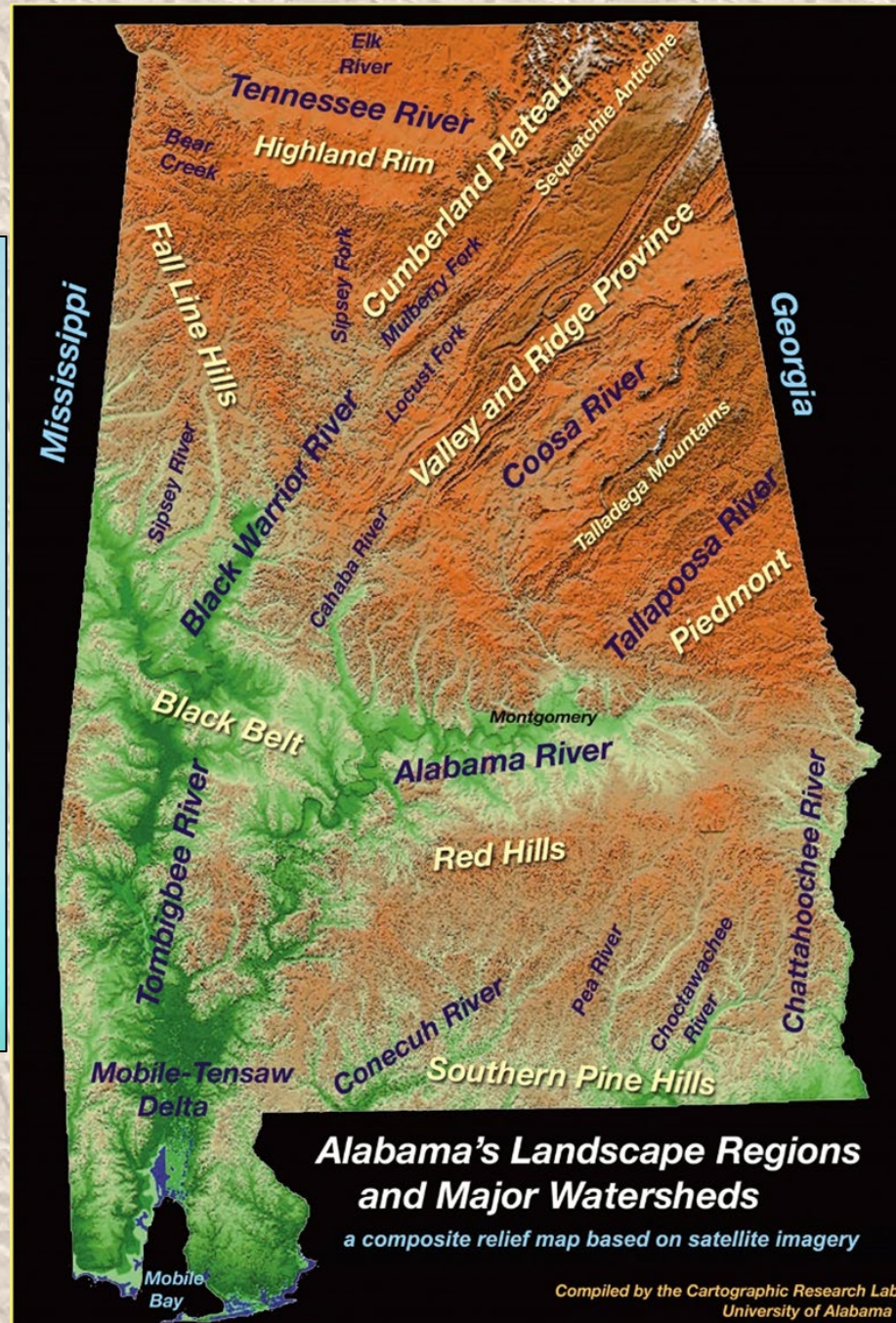








1. Tennessee
2. Tombigbee
3. Black Warrior
4. Cahaba
5. Coosa
6. Tallapoosa
7. Chattahoochee
8. Alabama
9. Mobile Delta
10. Coastal Plain Streams



Alabama's Landscape Regions and Major Watersheds

a composite relief map based on satellite imagery

Compiled by the Cartographic Research Lab
University of Alabama



ALABAMA WATER WATCH



ALABAMA EXTENSION

A program dedicated to facilitating community-based volunteer water monitoring of Alabama's lakes, streams, and coasts.

Water Chemistry Monitoring

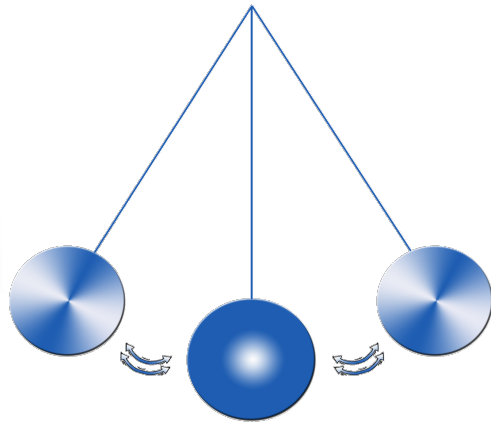
- Air Temperature
- Water Temperature
- pH
- Hardness
- Alkalinity
- Dissolved Oxygen
- Turbidity
- Secchi Disk Depth
- Salinity





AWW's Quest for Credible Data

Emphasis on science-based information led to EPA-approved Q/A Plans



**NOT
MEANINGFUL**

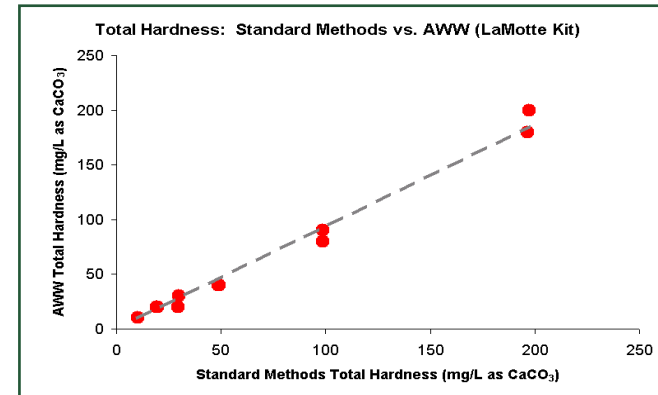
Too lax
Low standards
Stopy data

**DO-ABLE &
MEANINGFUL**

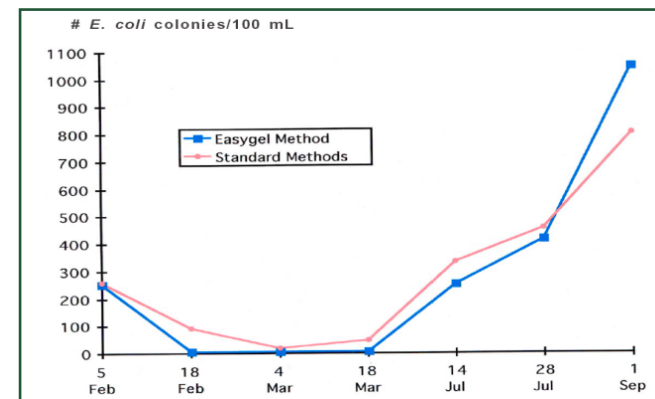
Affordable
Easy to learn and
conduct

**NOT
DO-ABLE**

Too stringent
Complicated
Expensive
Intimidating



Water Chemistry Data



Bacteriological Data



EPA and ADEM do not have specific **alkalinity** or **hardness** standards directly tied to recreational water use.

The recommended alkalinity range for **drinking water** is typically 20-200 mg/L as CaCO₃.

Freshwater Recommendations

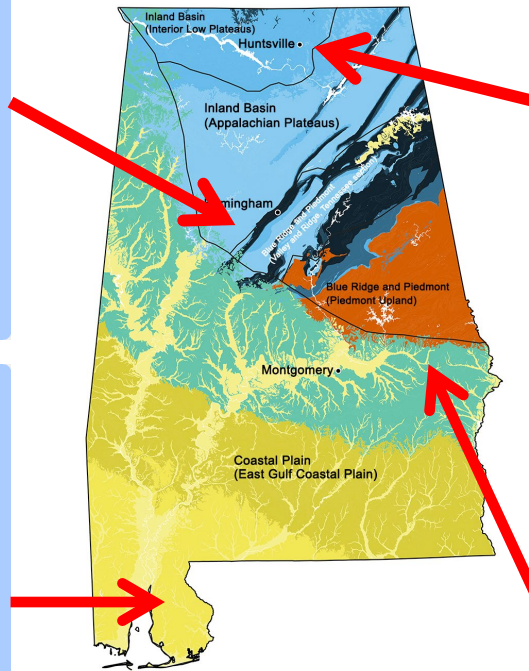
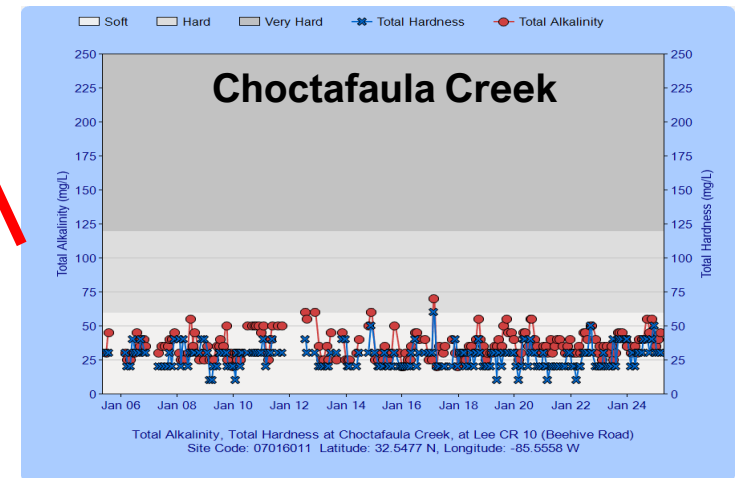
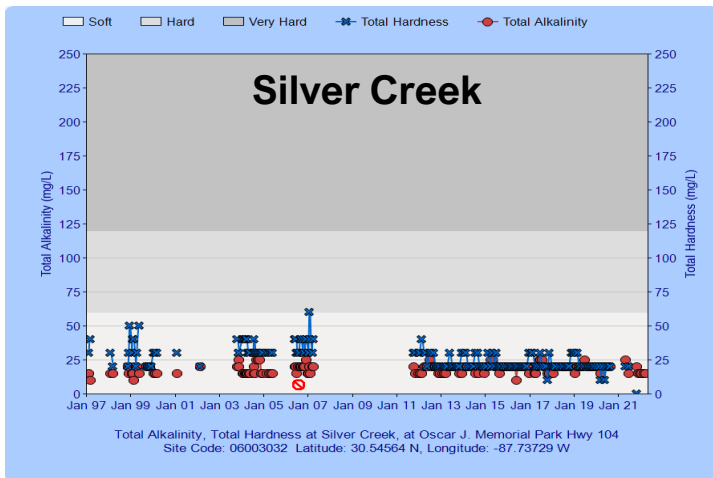
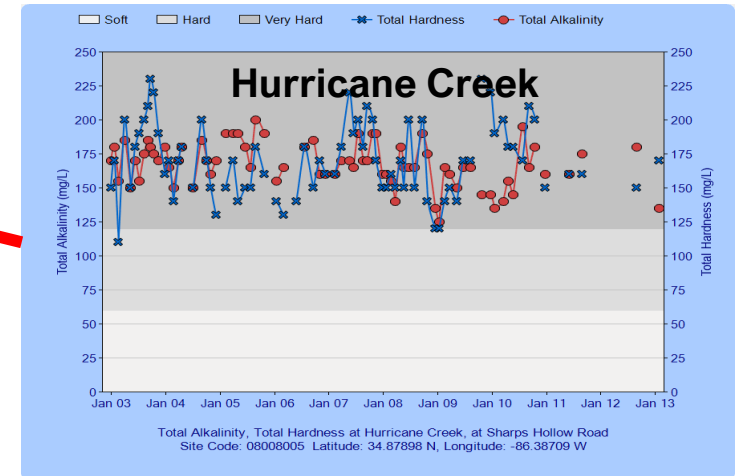
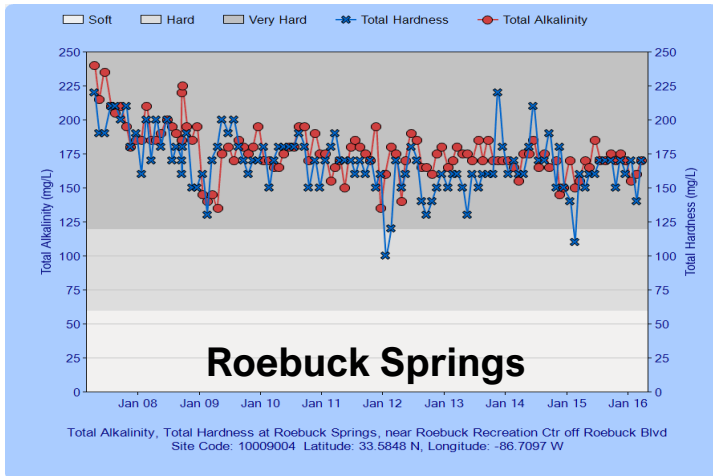
Water Classification	Total Alkalinity
Low	0 - 50
Moderate*	51 - 150
High	151 - 300
Very high	> 300

Water Classification	Total Hardness
Soft	0 - 60
Moderately Hard*	61 - 120
Hard*	121 - 180
Very hard	> 180

**Recommended for aquatic life, but some species can tolerate lower or higher levels.*

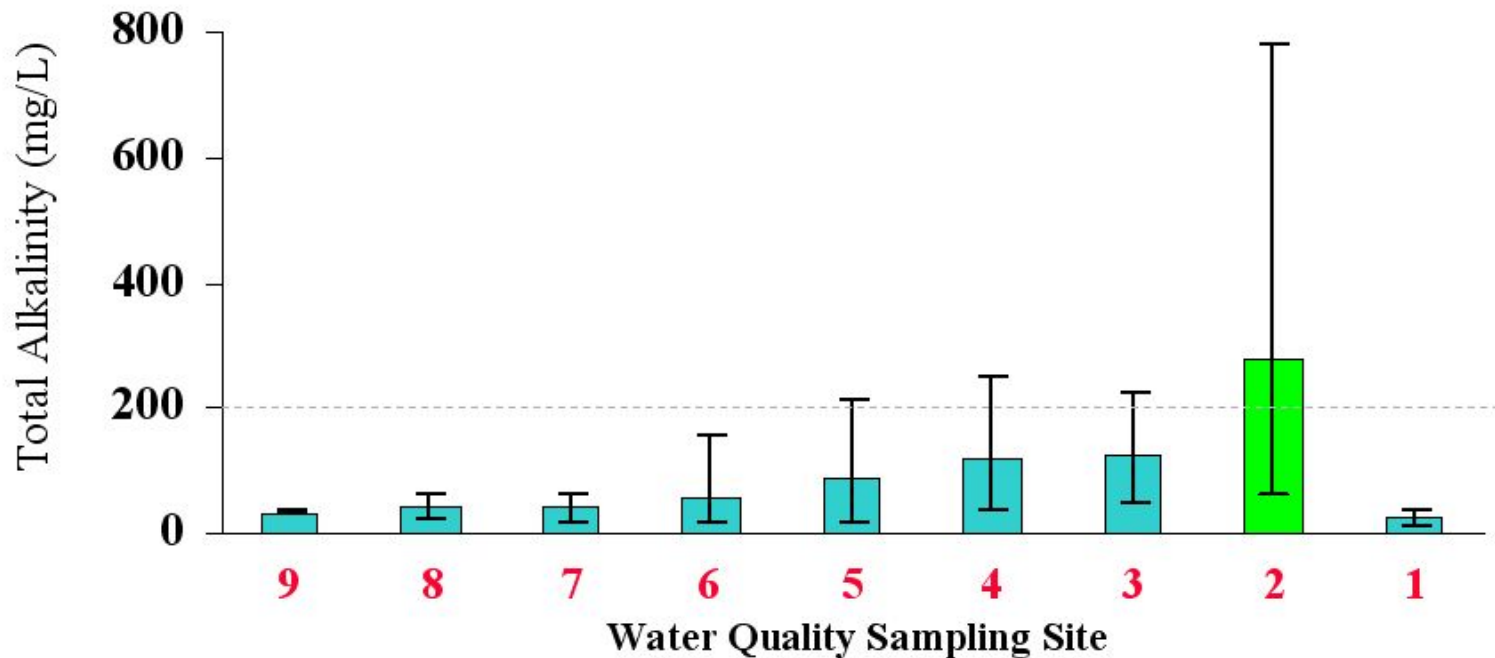
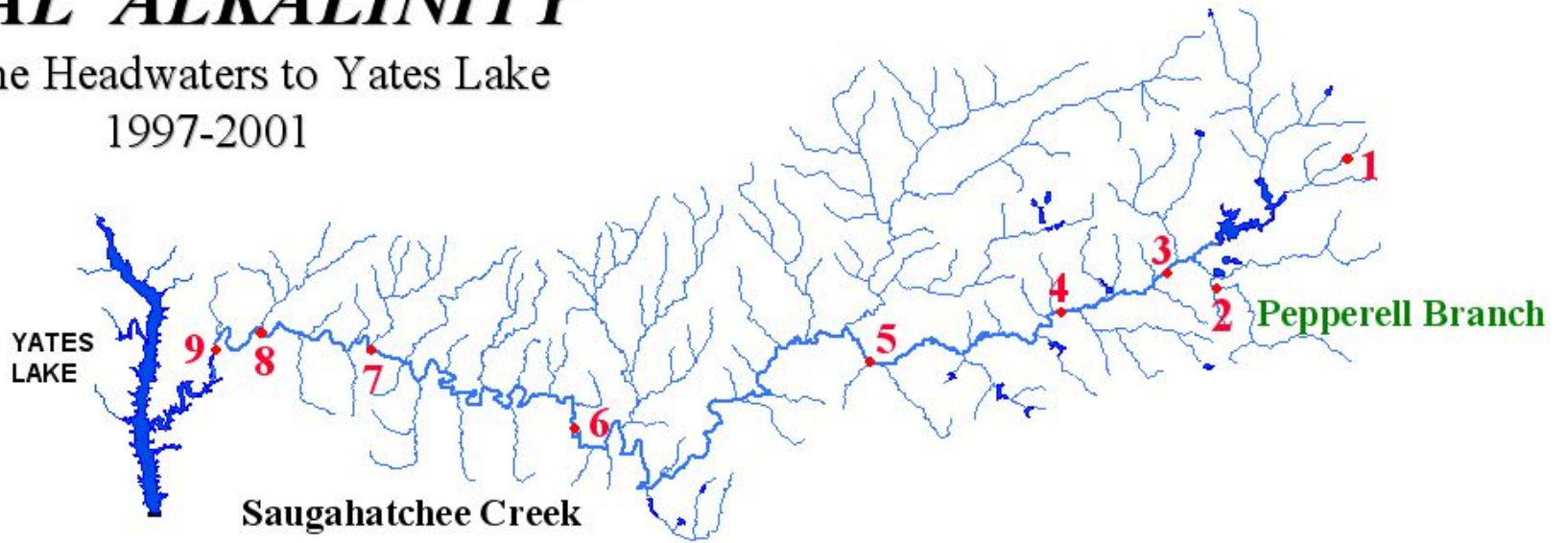


What is a Typical Alkalinity & Hardness?



TOTAL ALKALINITY

from the Headwaters to Yates Lake
1997-2001

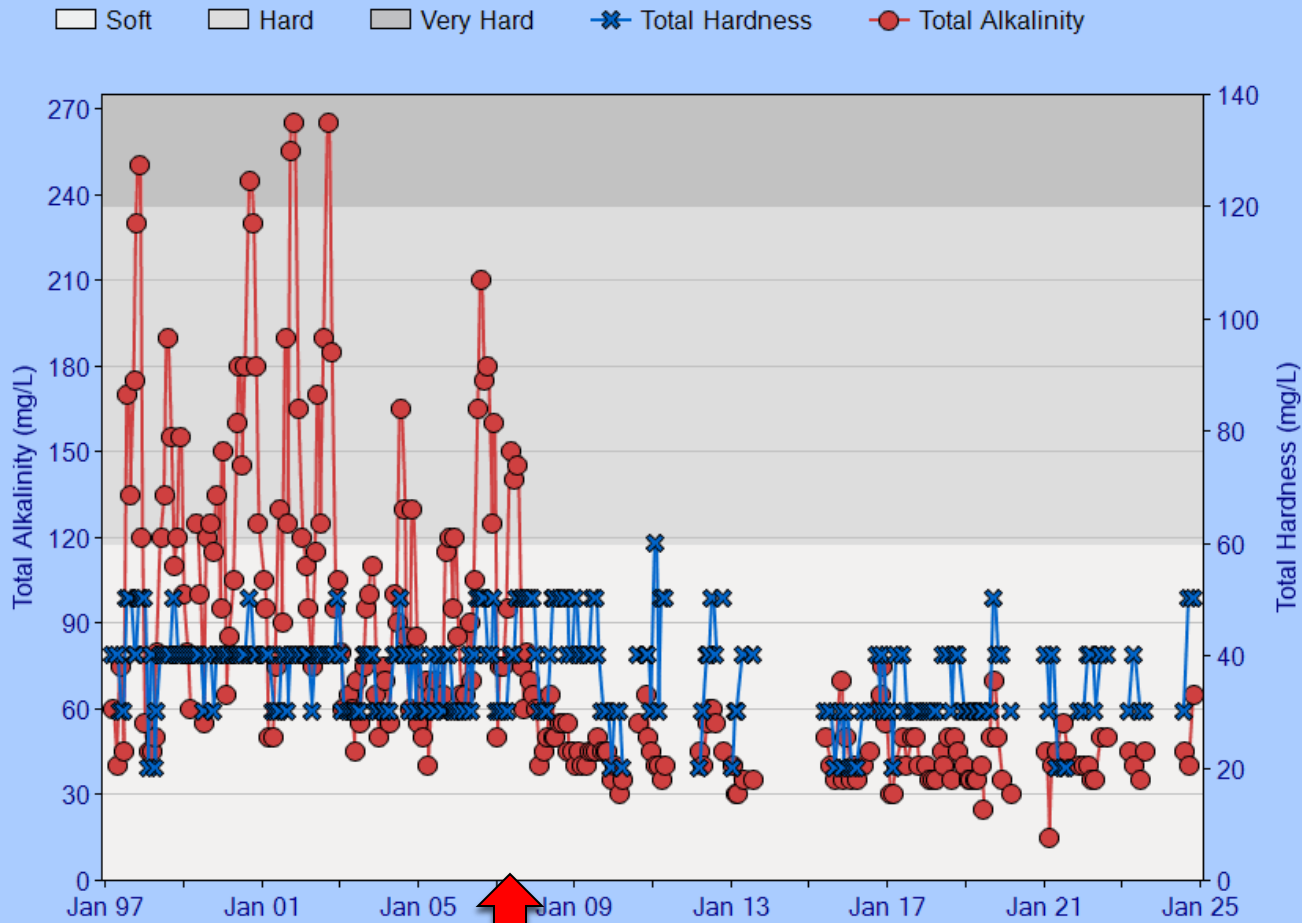


*Bars are averages of all data measured at each site from 1997 through August 2001, number of readings = 220. Brackets within bars are ranges.

AWW Data Graphs: Water Chemistry

Y1: Y2: HUC 12 AVG

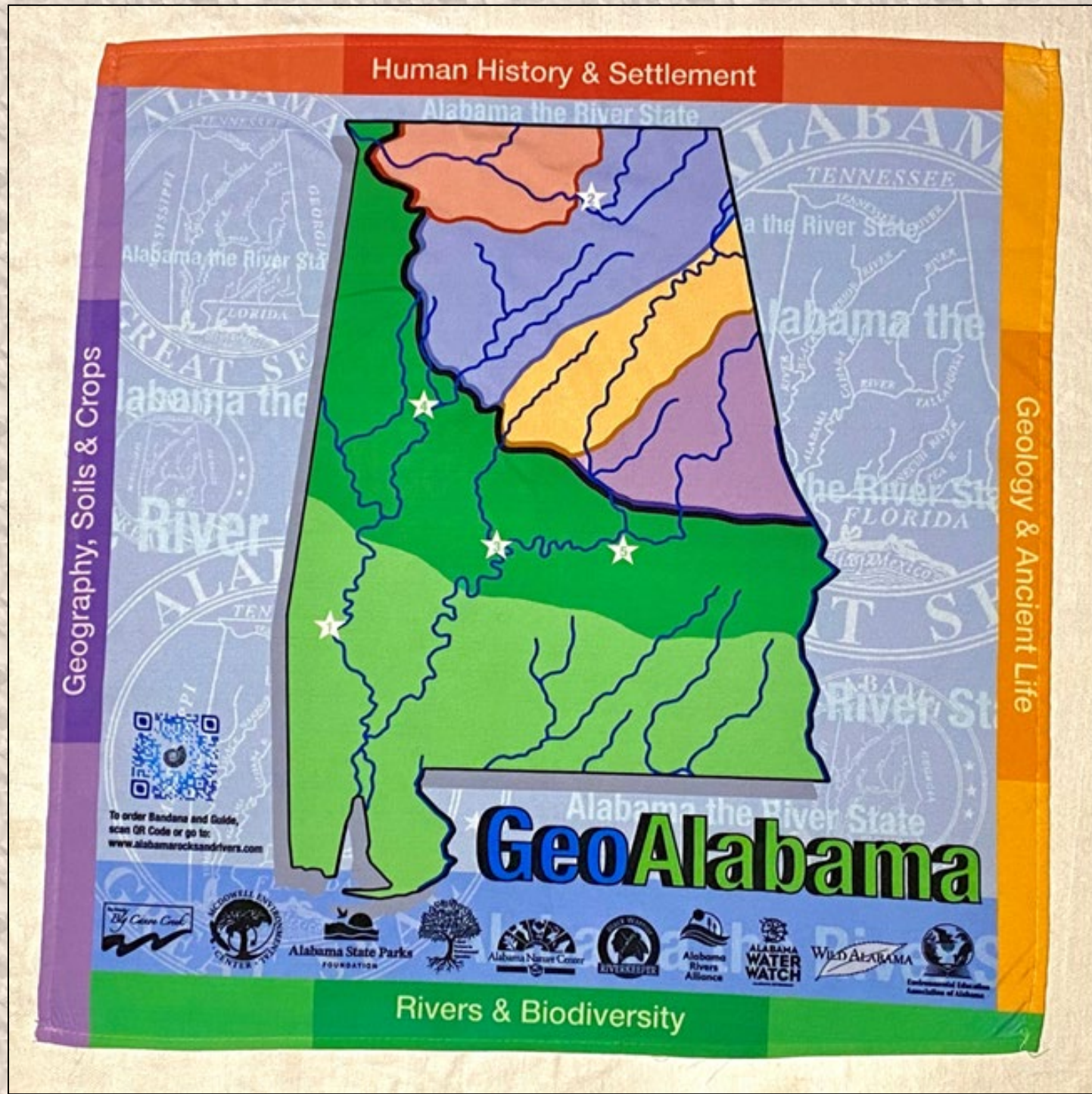
From: To: 

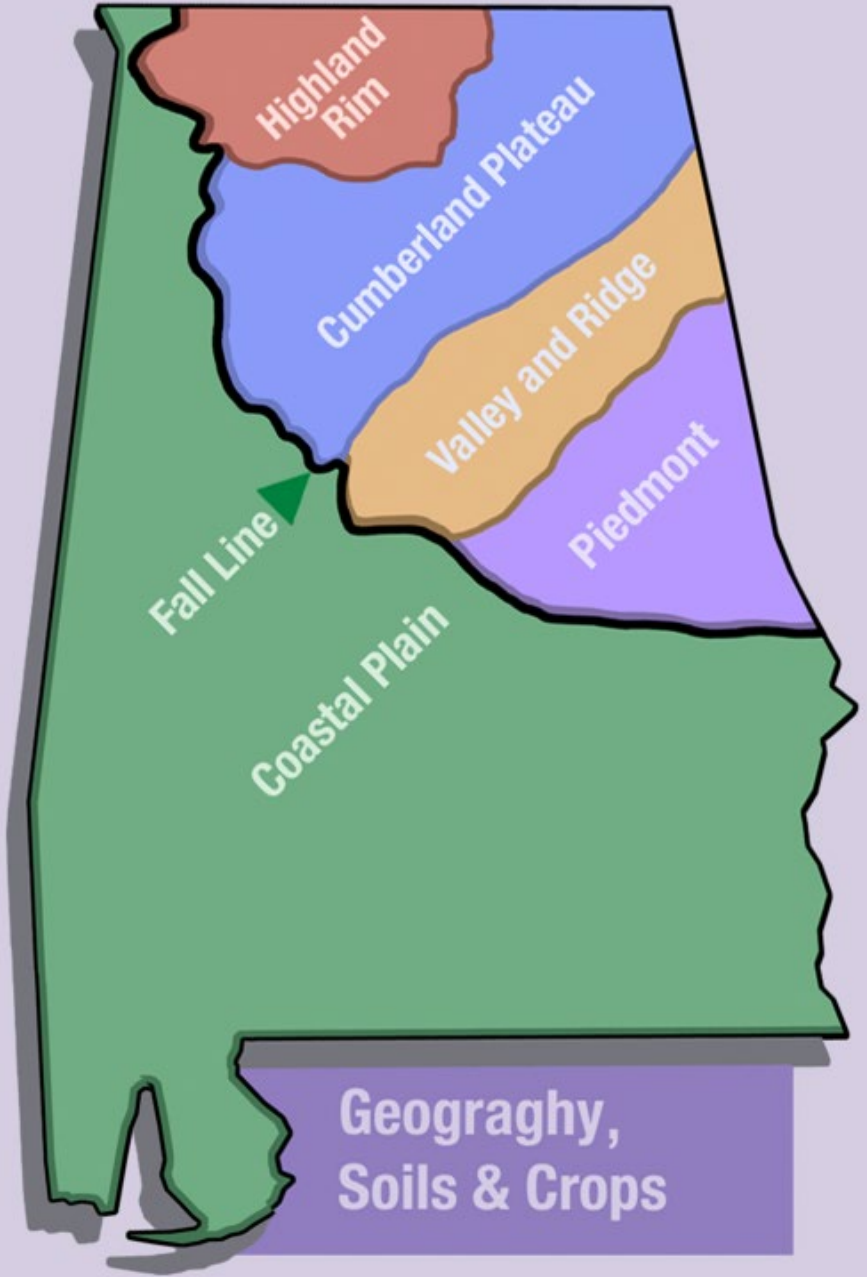


Total Alkalinity, Total Hardness at Saugahatchee Creek, North Donahue St.
Site Code: 07011002 Latitude: 32.6425 N, Longitude: -85.50413 W

AWW Site 07011002
Saugahatchee Creek
N. Donahue St.
Auburn, AL

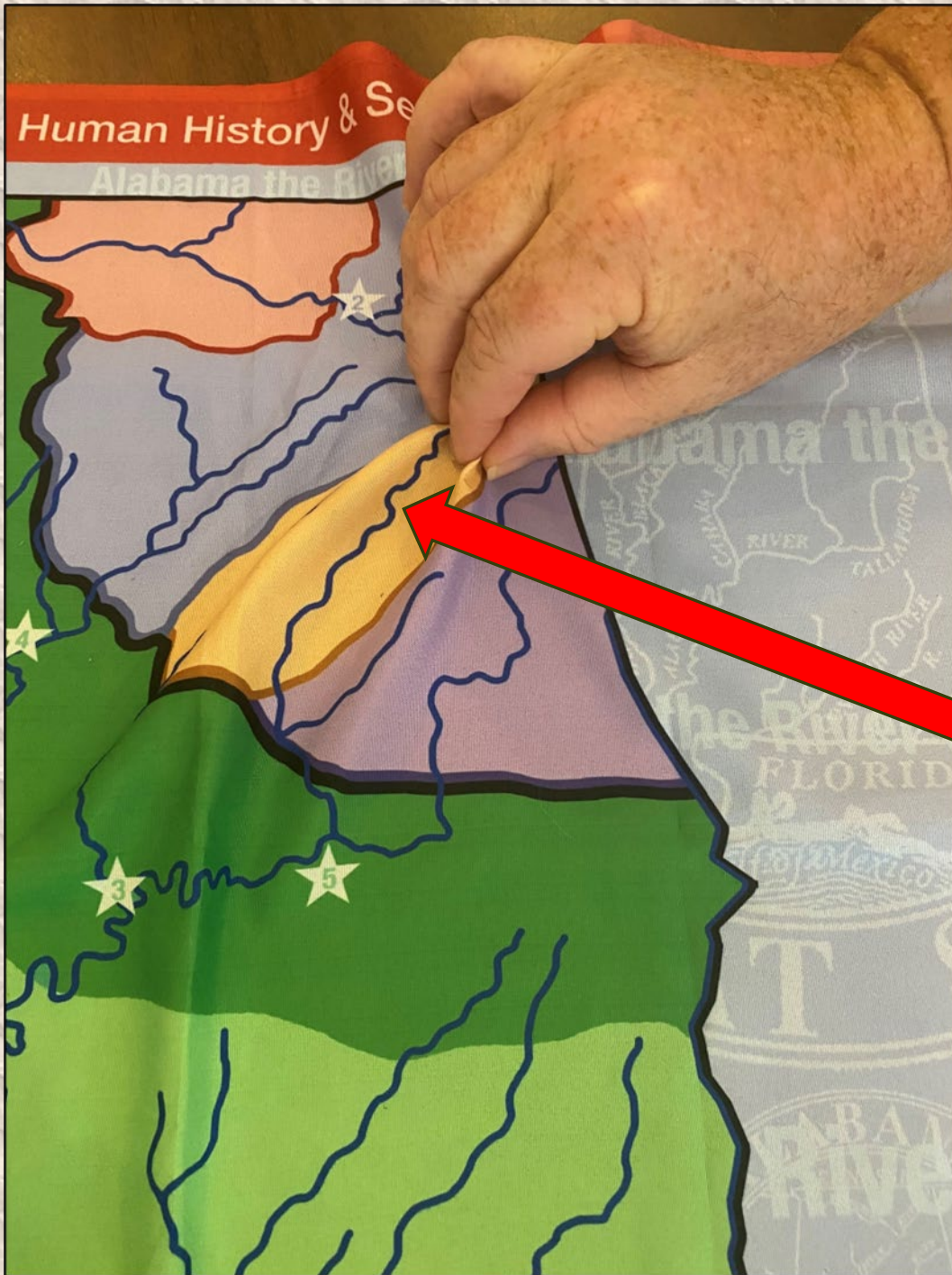
Red Arrow indicates
approximate date of
Westpoint Pepperell
Textile Mill
closure





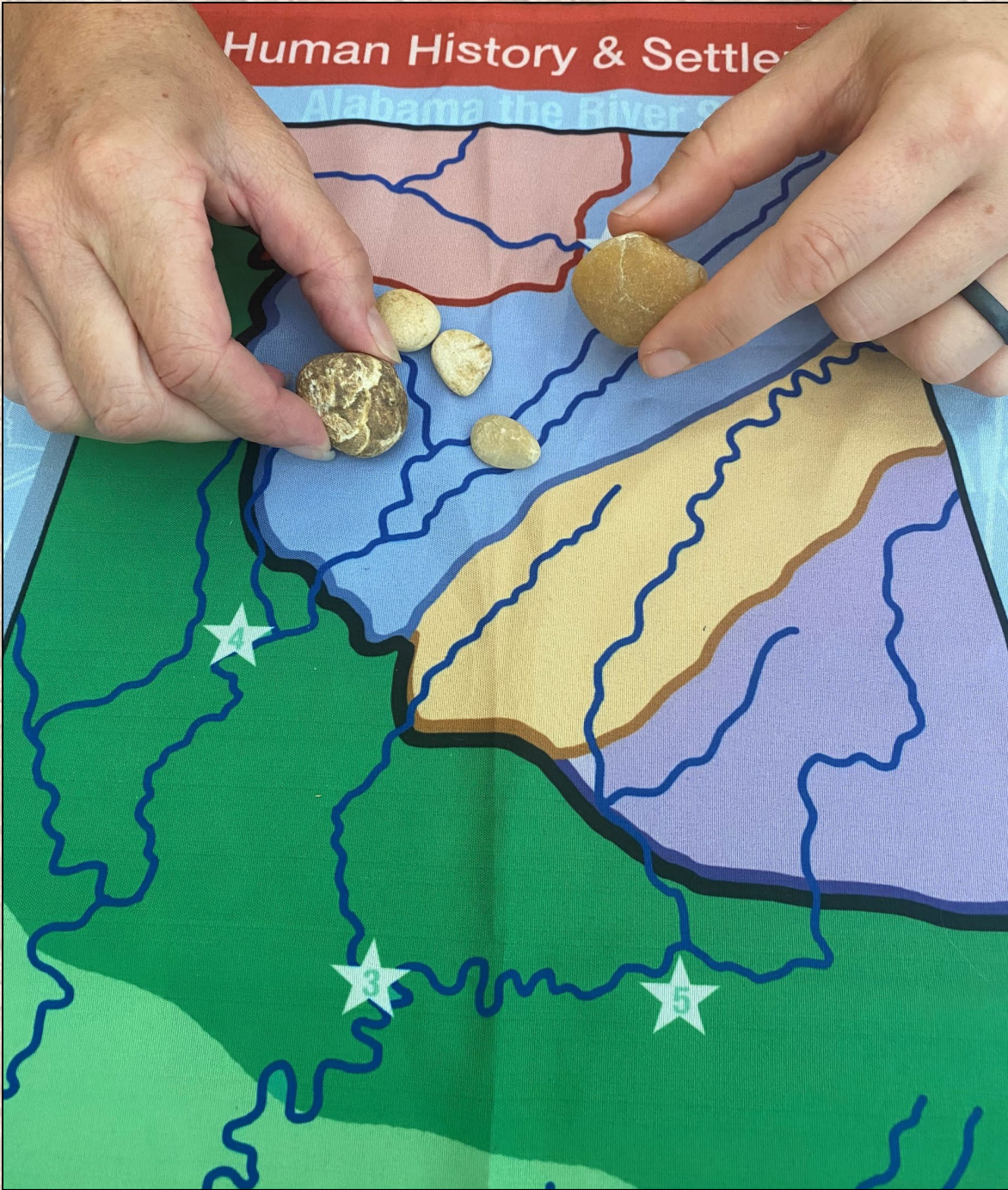
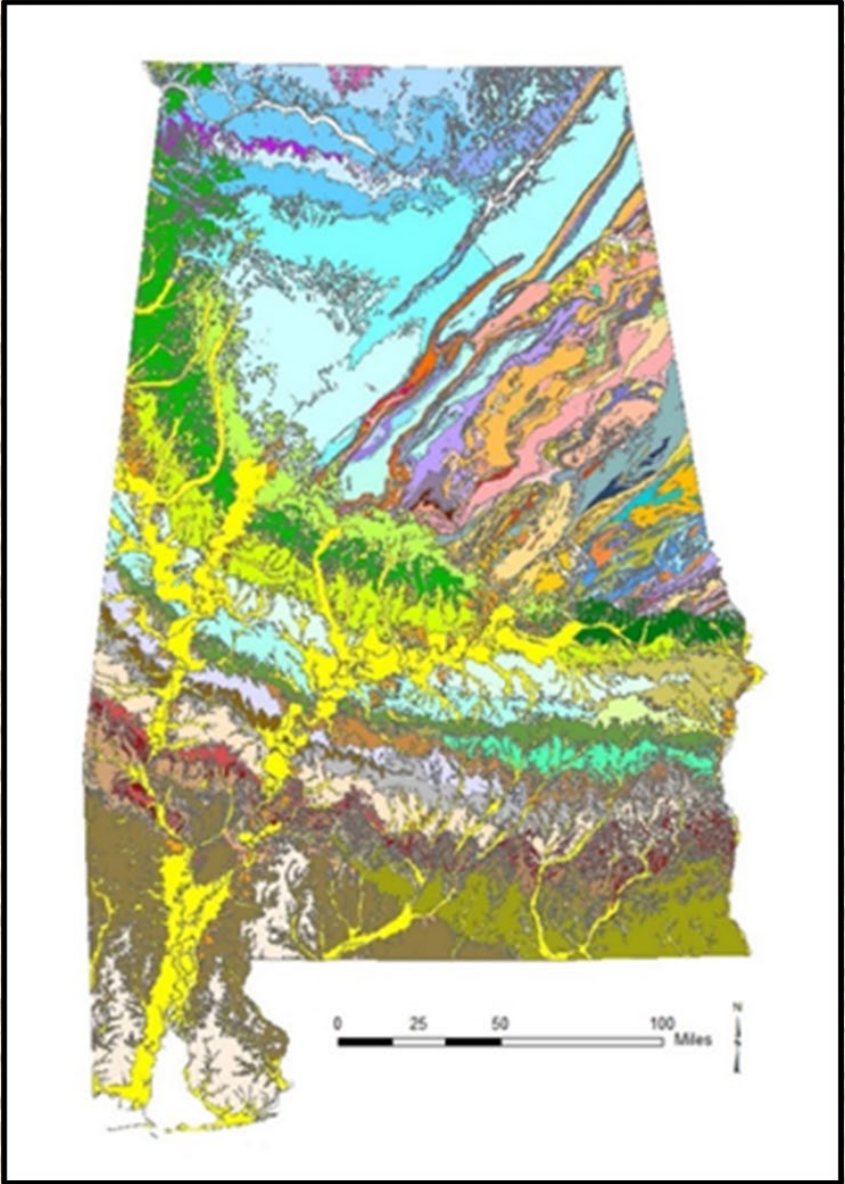
Geography,
Soils & Crops

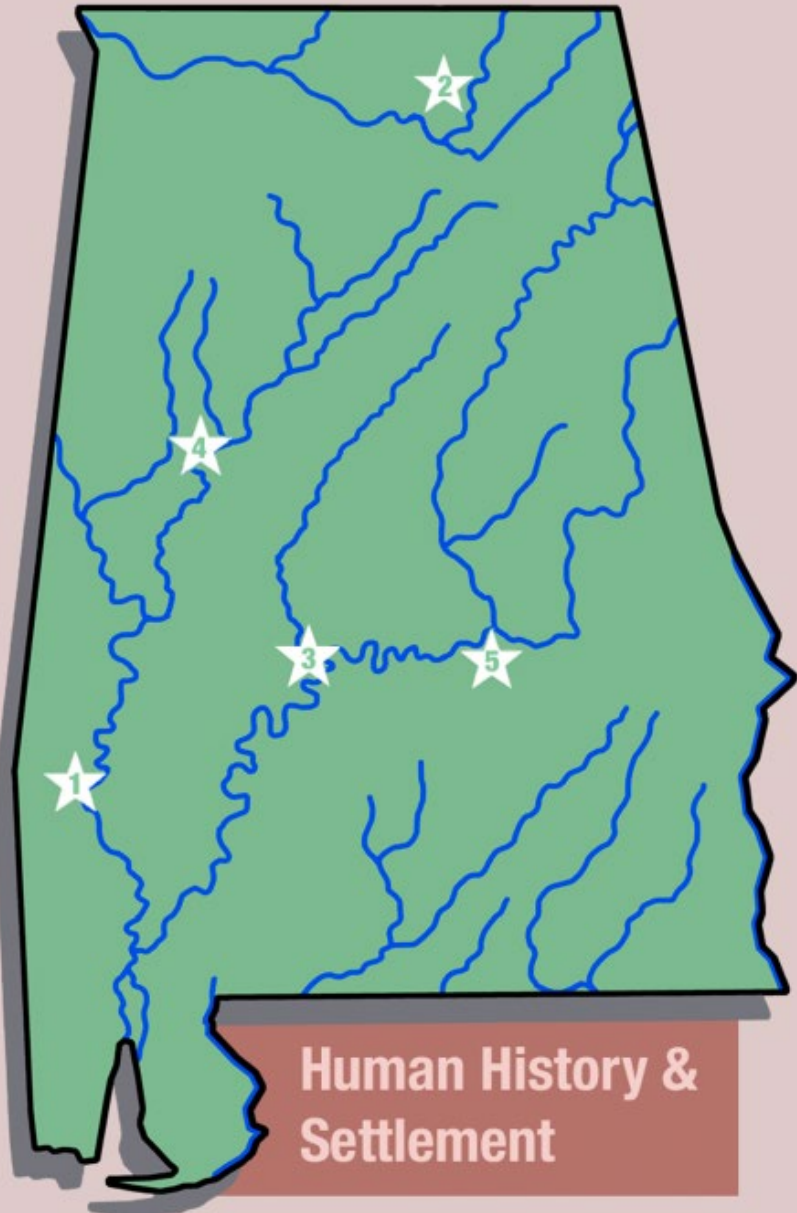




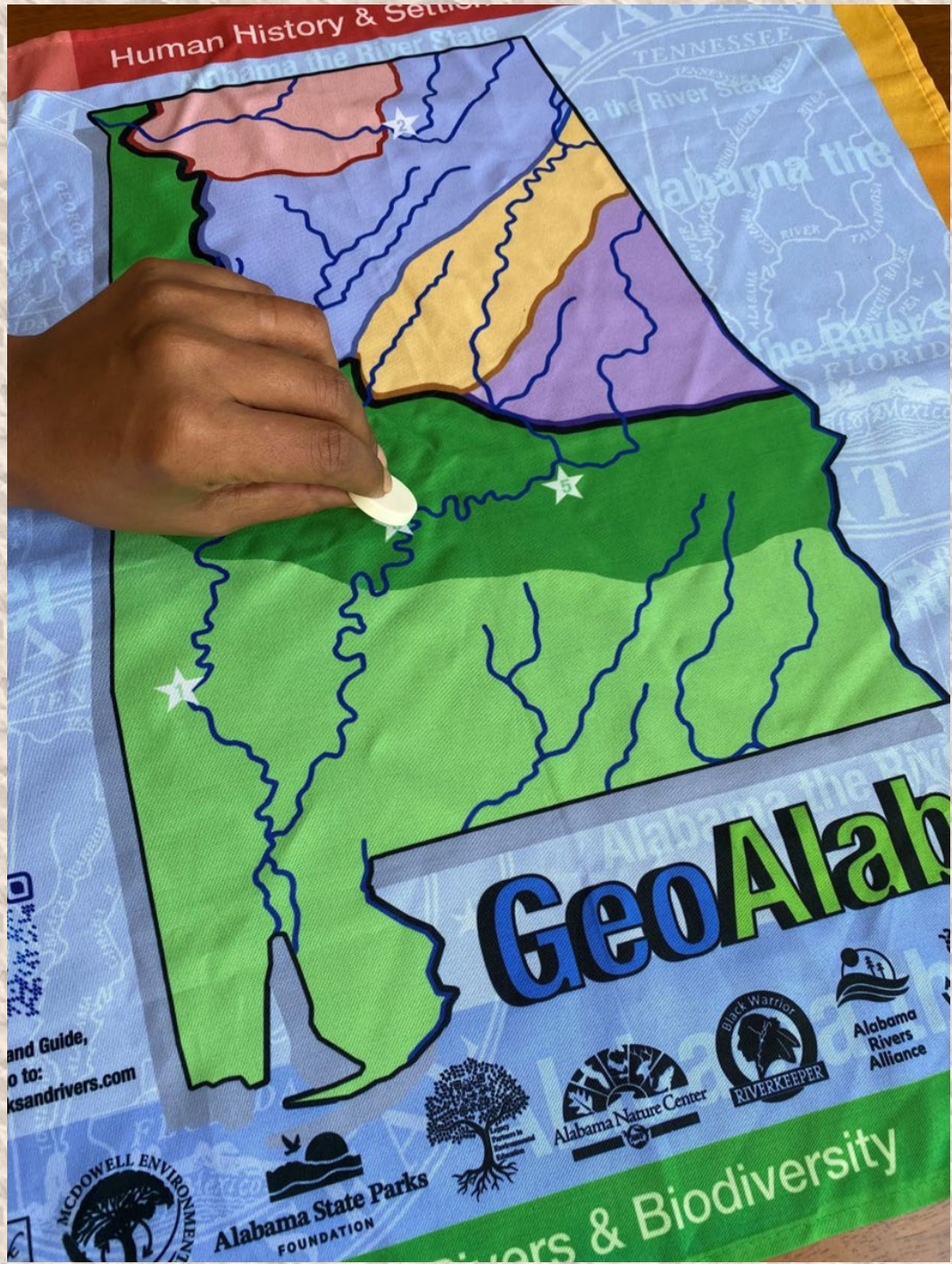
YOU ARE HERE!

Pell City, in the Valley and Ridge Province of the middle Coosa River Basin. Streams with moderate-high alkalinity and hardness, and human-caused, high nutrient levels, etc.



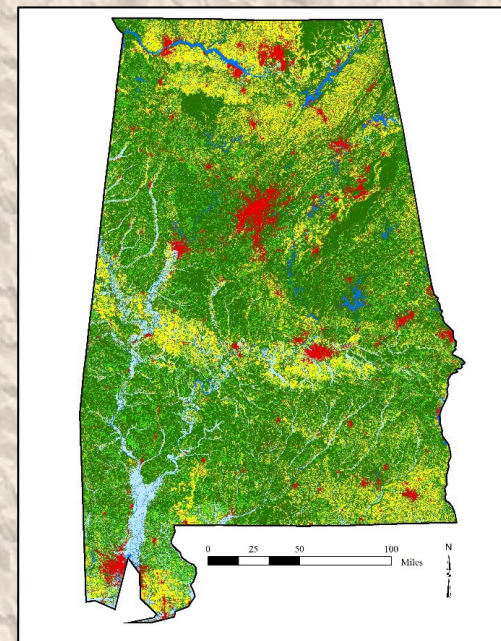
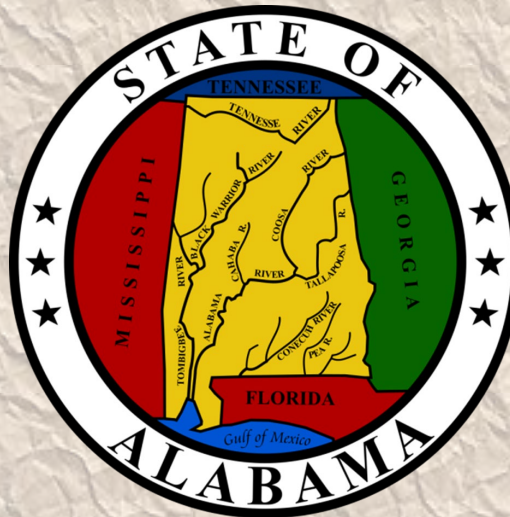
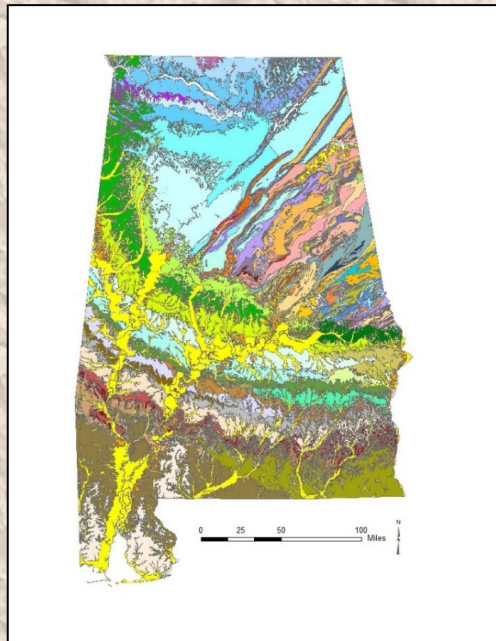
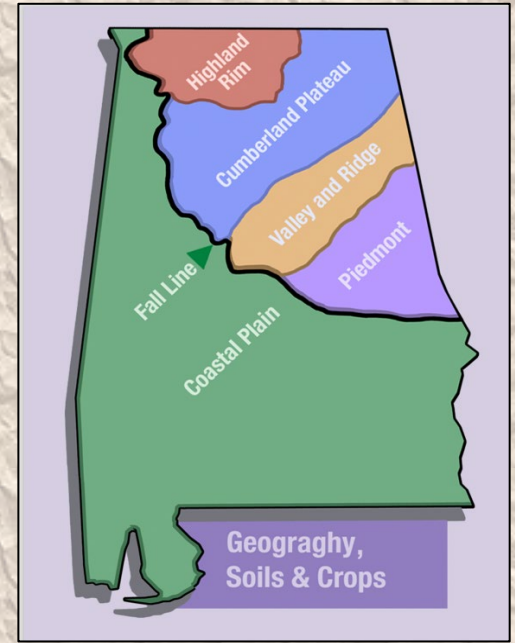
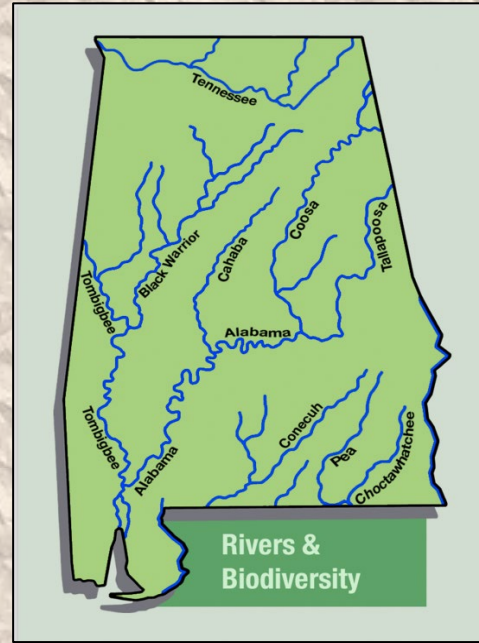
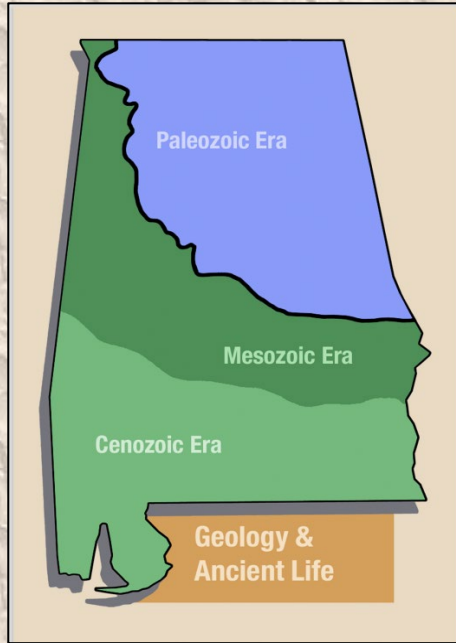
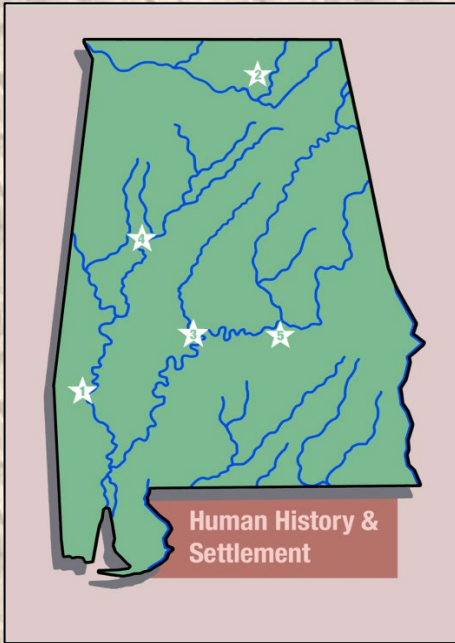


Human History & Settlement





Views of Alabama



Conclusion

- **Appreciate** Alabama's geological history and diversity.
- **Understand** how water takes on attributes of surrounding rocks and soils.
- **Distinguish** natural variation of WQ from pollution.
- **Adapt** stormwater management to specific sites.
- **Involve** an educated public to help your stormwater project succeed!