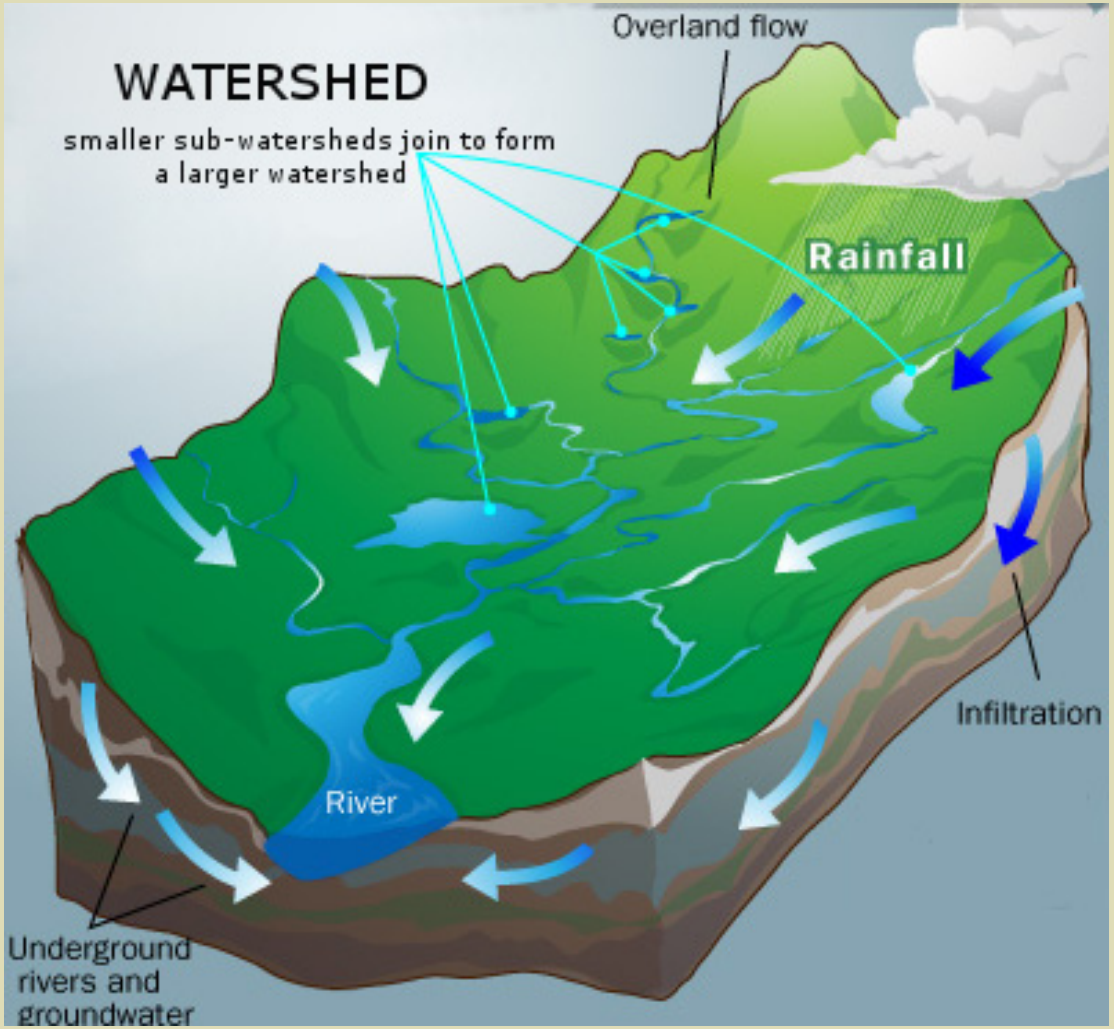
THE CHARACTERISTICS, COMPONENTS, AND VALUE OF HEALTHY WATERSHED ECOSYSTEMS

TEXAS PARKS & WILDLIFE

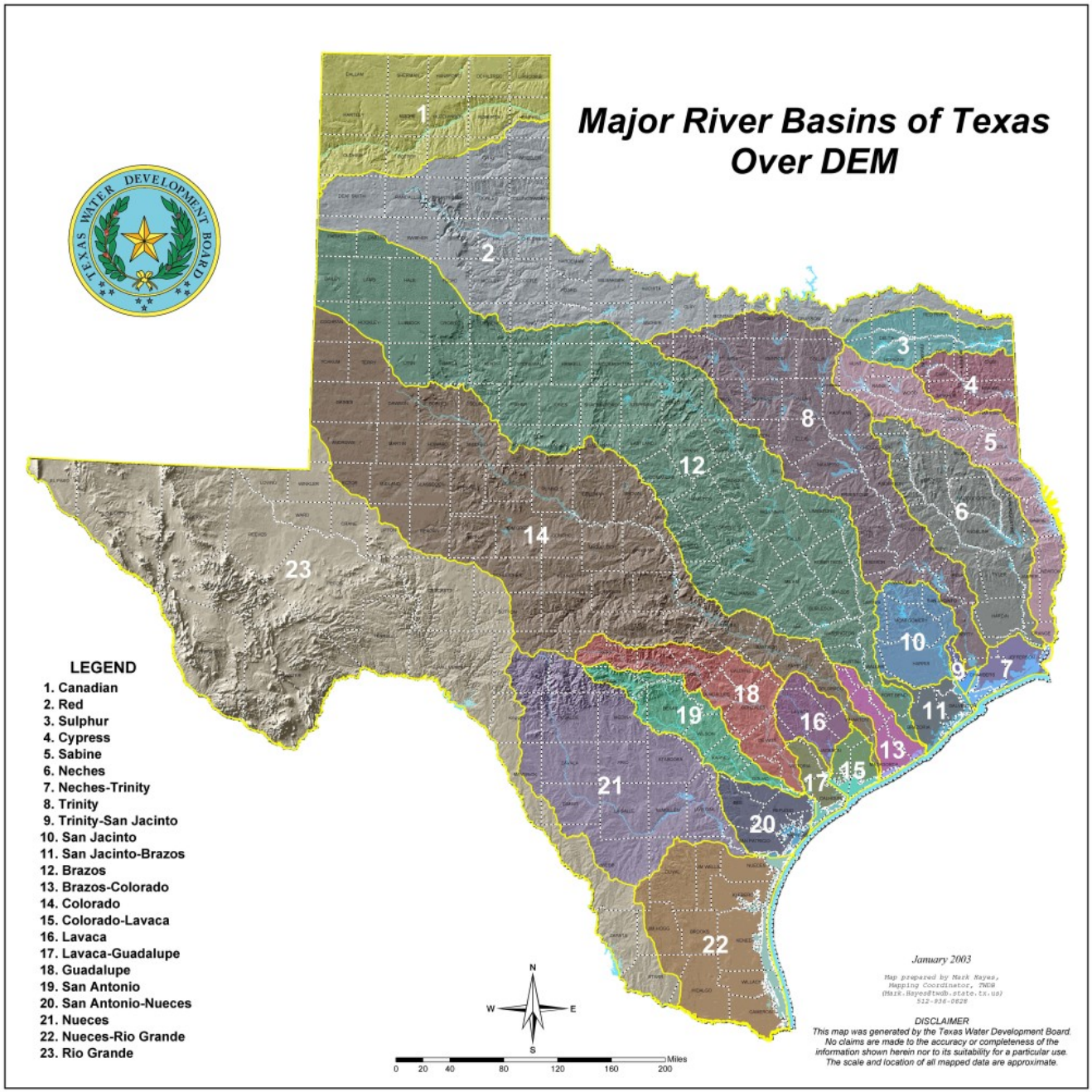
Megan Bean

WHAT IS A WATERSHED?

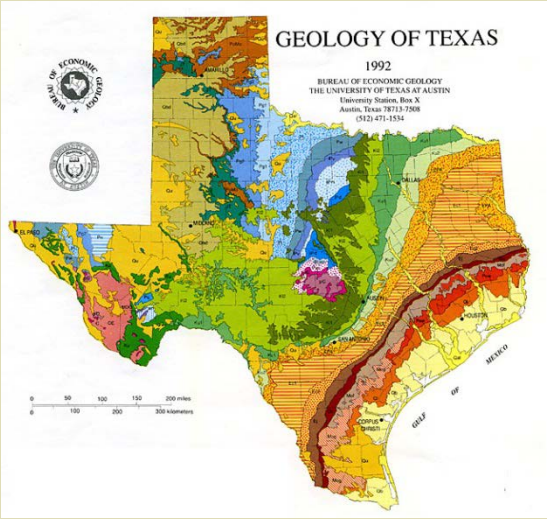
WHAT IS A WATERSHED?



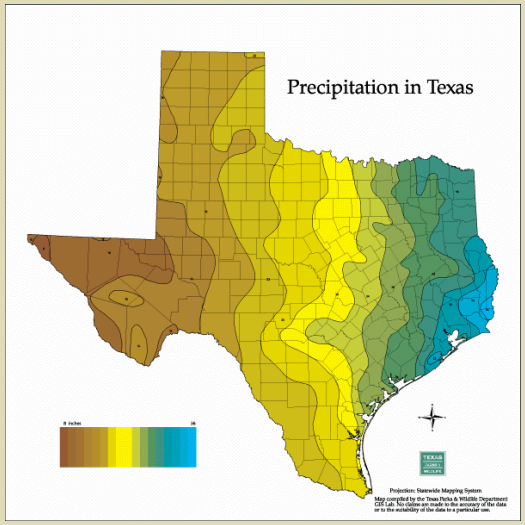
www.wheatlyriver.ca


Major River Basins of Texas
Over DEM
TEXAS WATER DEVELOPMENT BOARD
LEGEND
1. Canadian
2. Red
3. Sulphur
4. Cypress
5. Sabine
6. Neches
7. Neches-Trinity
8. Trinity
9. Trinity-San Jacinto
10. San Jacinto
11. San Jacinto-Brazos
12. Brazos
13. Brazos-Colorado
14. Colorado
15. Colorado-Lavaca
16. Lavaca
17. Lavaca-Guadalupe
18. Guadalupe
19. San Antonio
20. San Antonio-Nueces
21. Nueces
22. Nueces-Rio Grande
23. Rio Grande
N
W
E
S
0 20 40 80 120 160 200 Miles
January 2003
Map prepared by Mark Hayes,
Mapping Coordinator, TWDB
(Mark.Hayes@twdb.state.tx.us)
512-936-0826
DISCLAIMER
This map was generated by the Texas Water Development Board.
No claims are made to the accuracy or completeness of the
information shown herein nor to its suitability for a particular use.
The scale and location of all mapped data are approximate.

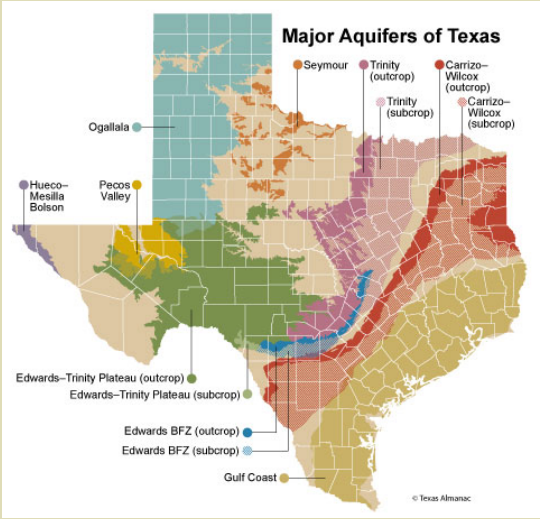
WATERSHED COMPONENTS



Geology



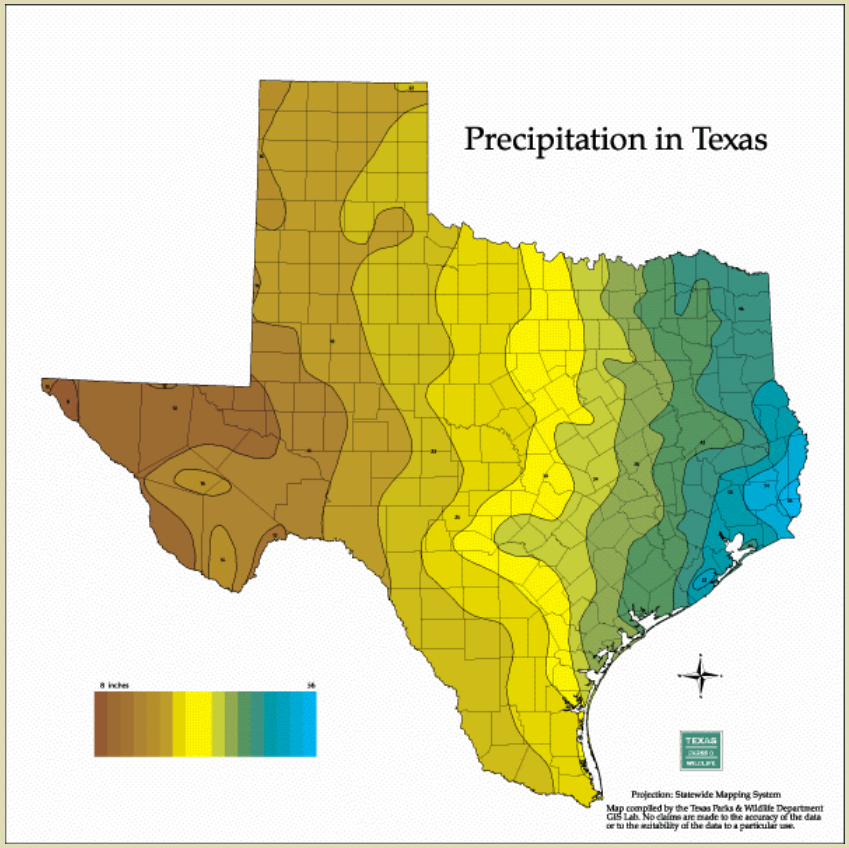
Climate



Hydrology

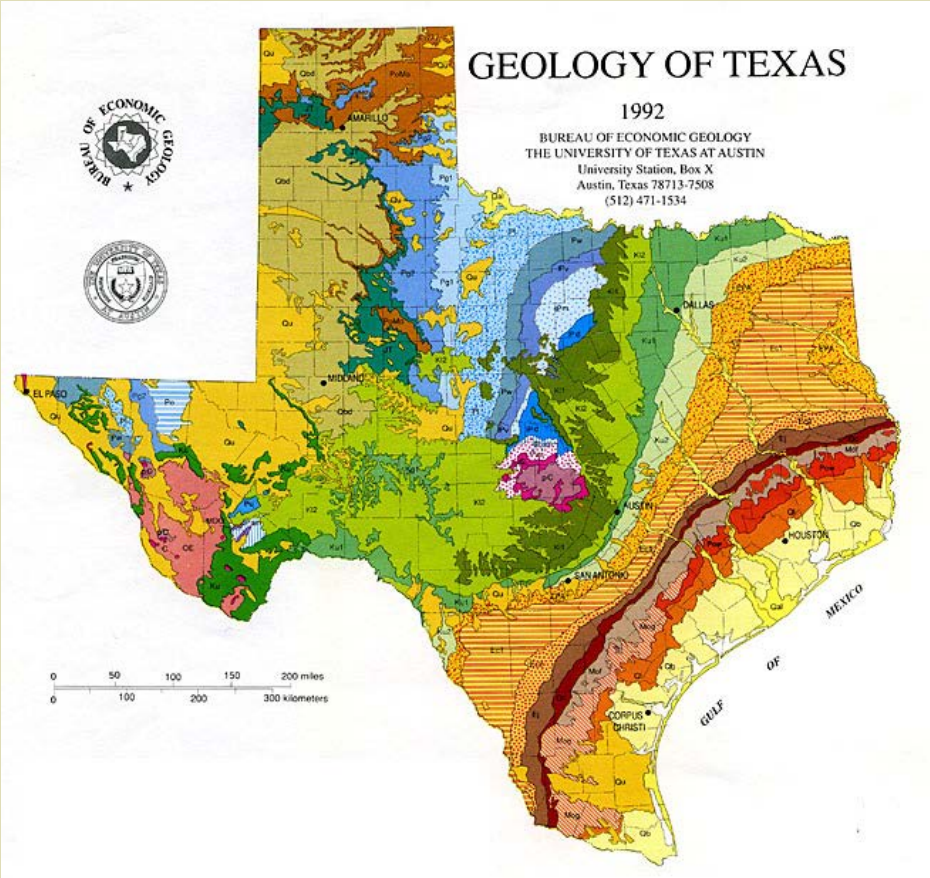
CLIMATE

- **Climatology** - the science of climate and its causes (atmospheric conditions over time)
- Atmospheric conditions include:
  - temperature
  - humidity
  - precipitation
  - winds
  - cloud cover
- Climate heavily influences:
  - vegetation and plant communities
  - magnitude and timing of streamflow
  - water temperature

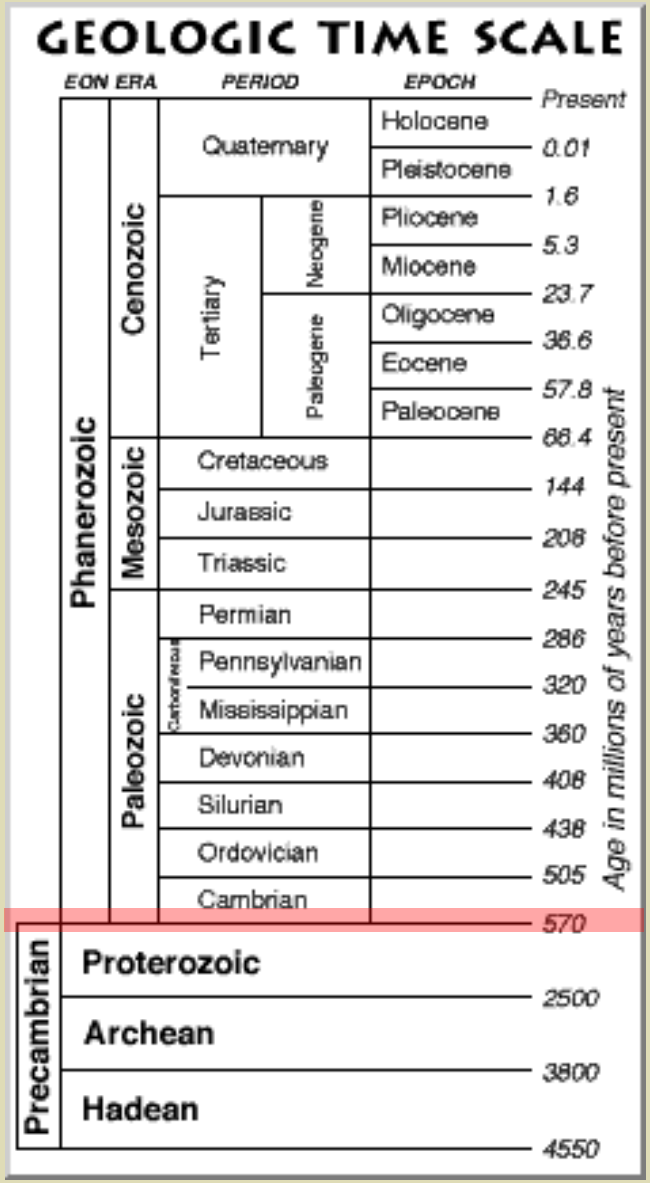


GEOLOGY

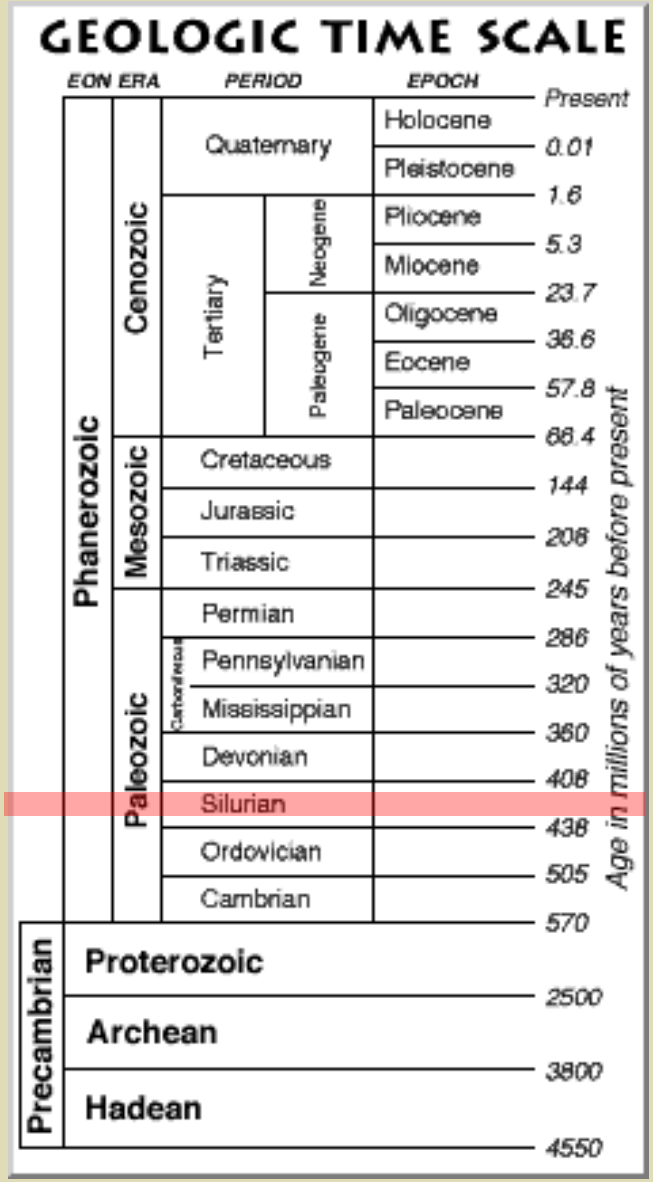
- **Geomorphology** is the study the earth's surface
  - structures and the processes that change them
- **Fluvial geomorphology**
  - stream and river channel formation
  - alteration
  - flood plains



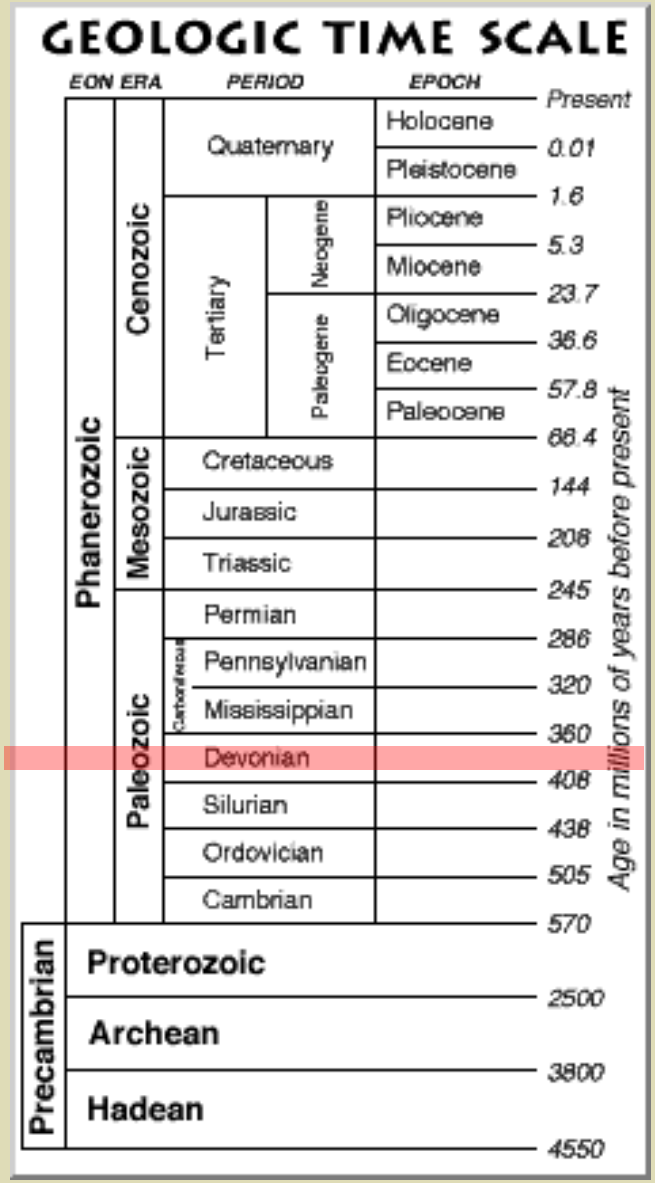

Texas
TIME TRAVEL



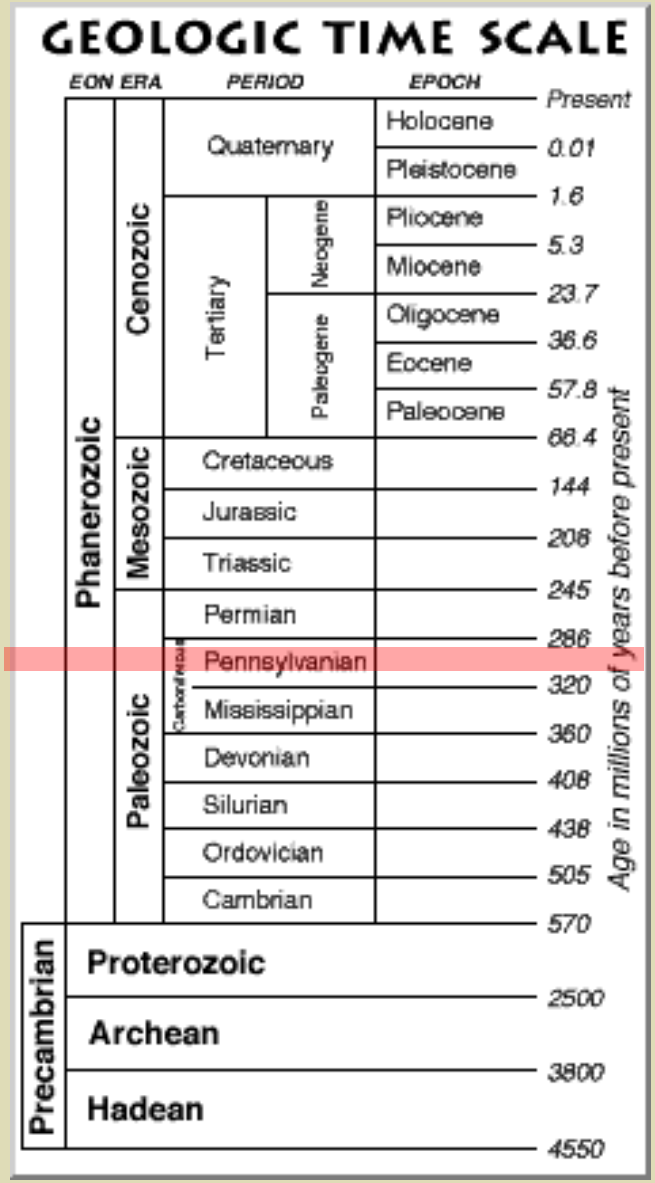
- Granite rock outcroppings near Llano
- Franklin Mountains

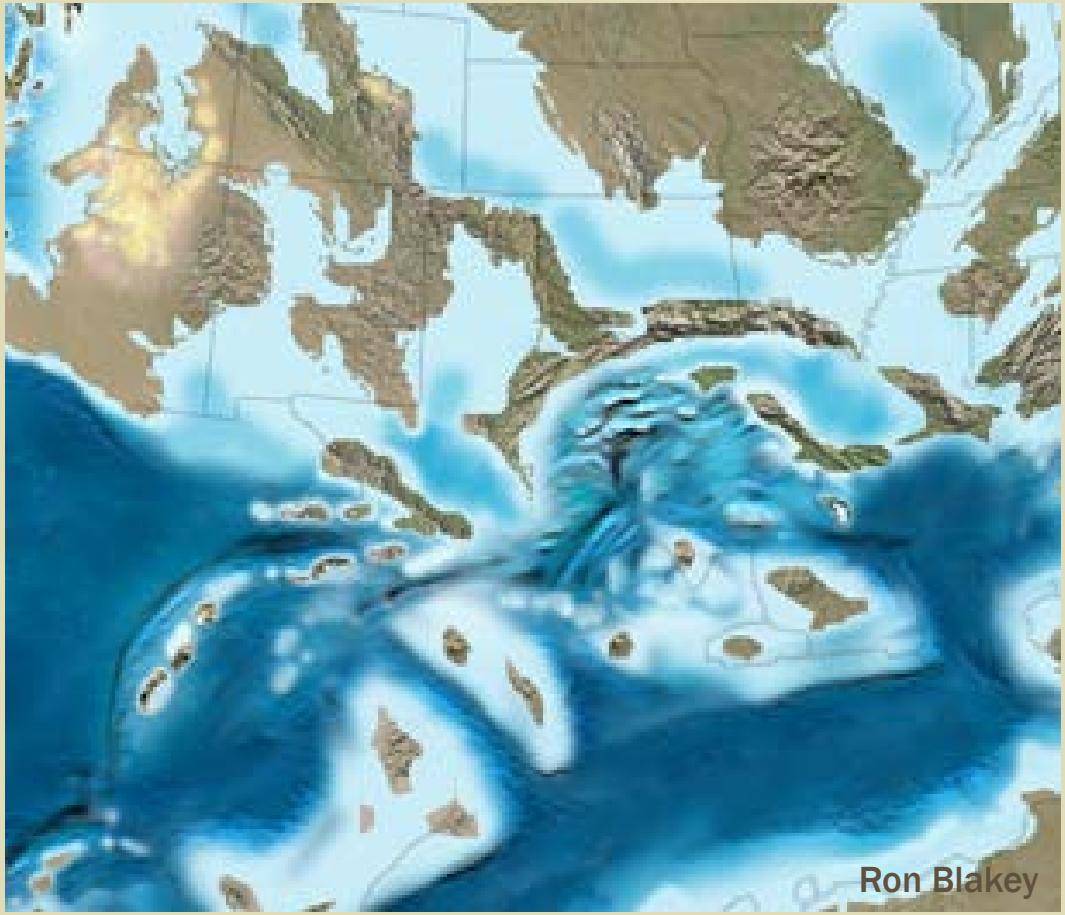


- Limestone, dolomite, chert rocks in West Texas
- First primitive land plants
- Corals taking off

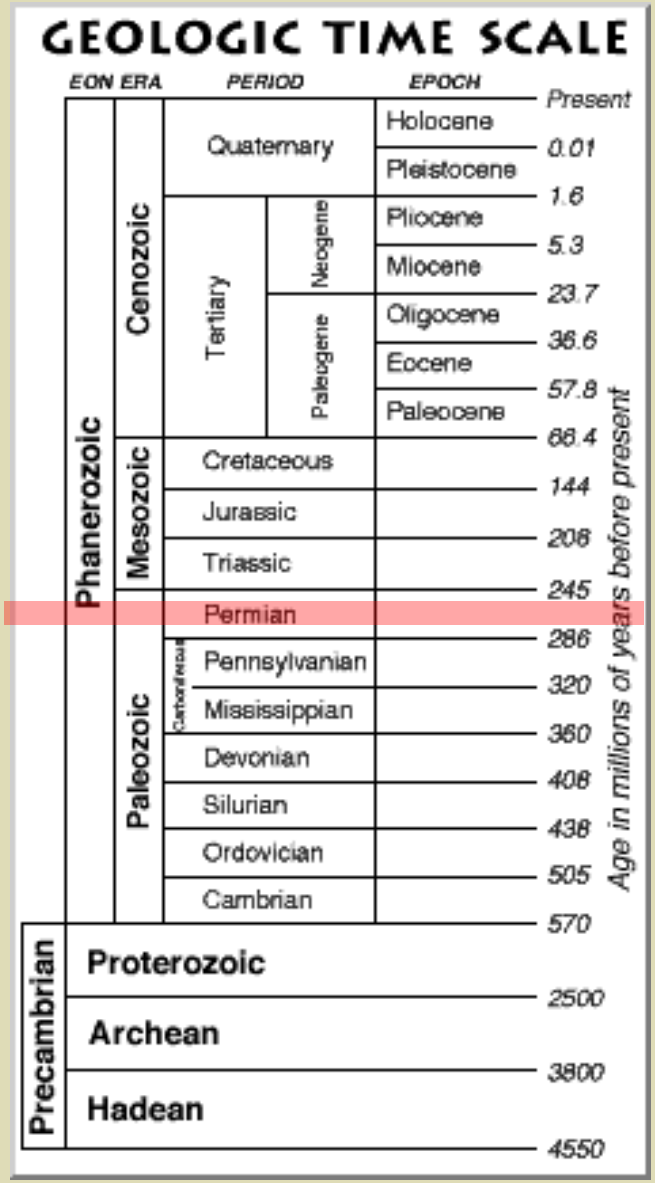


- Shale, sandstone, limestone, and chert near Llano and Marathon
- Amphibians
- Golden age for development of fish
- Development of ferns, seed ferns, and huge trees related to horsetail rushes

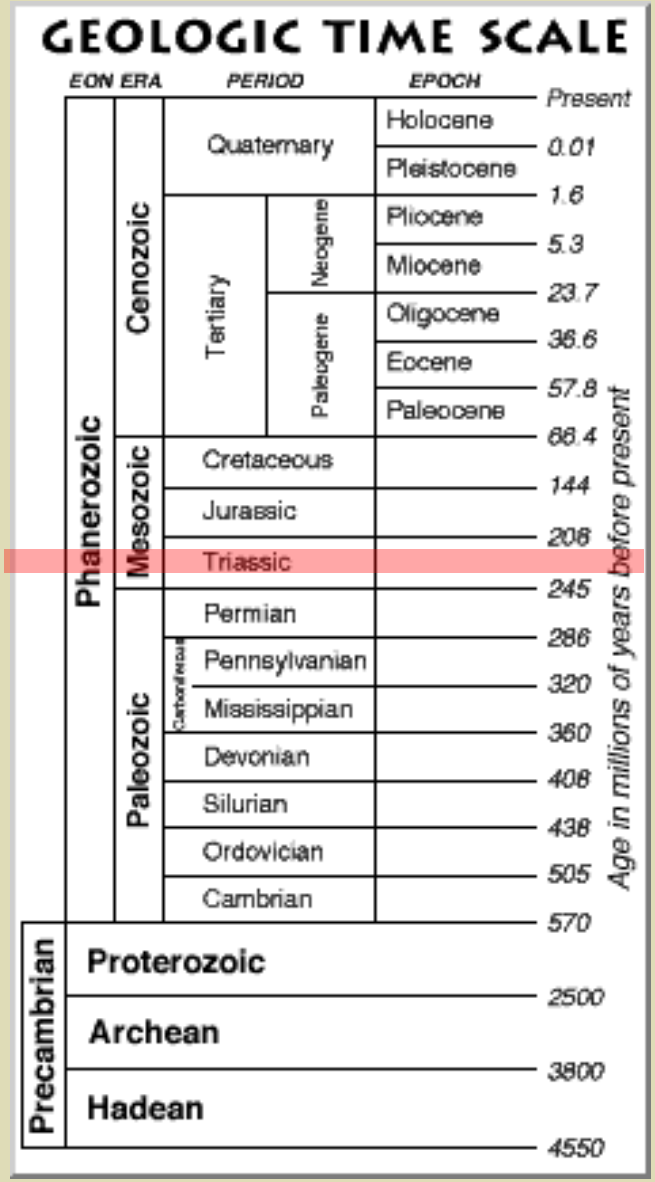


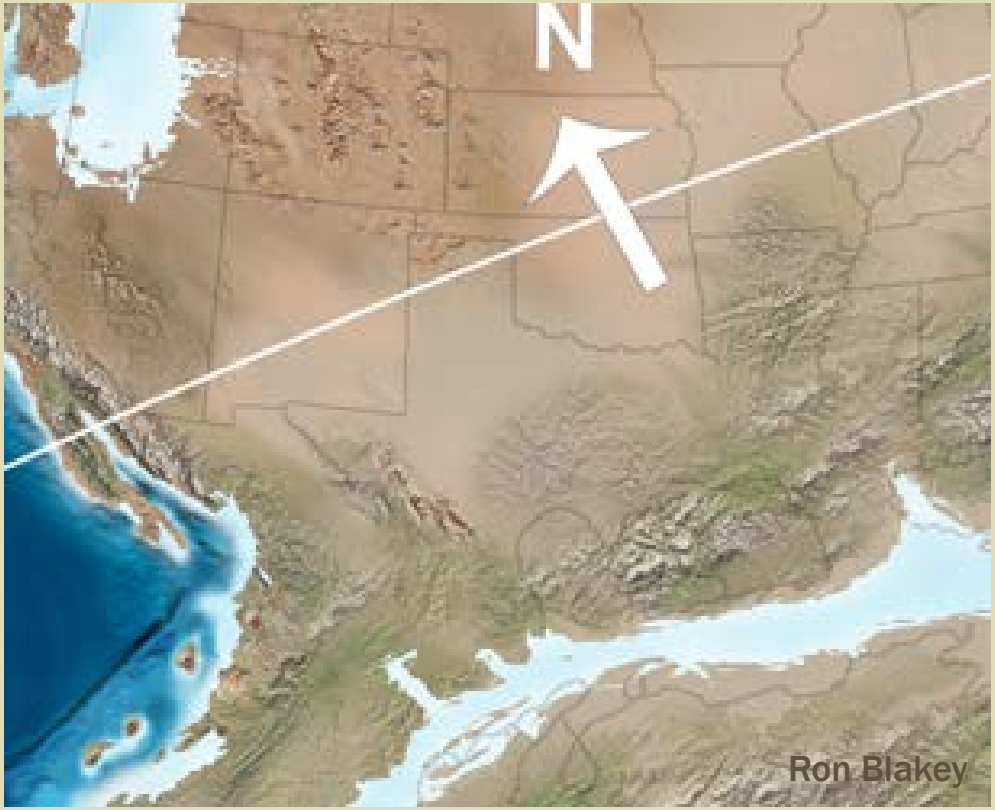


- Ouachita Mountain range formed
- Reptiles make an appearance

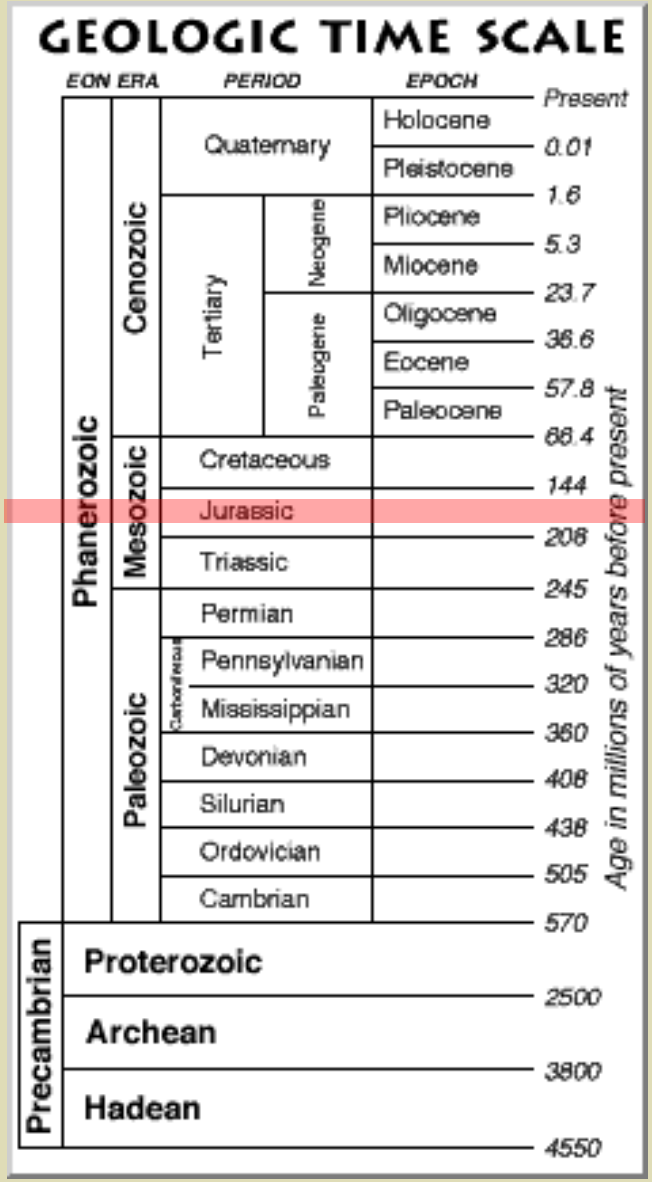


- Palo Duro State Park
- Limestone reefs on El Capitan
- Climatic shift
- Evaporation flats in the Panhandle produced shales, salt, and gypsum deposits

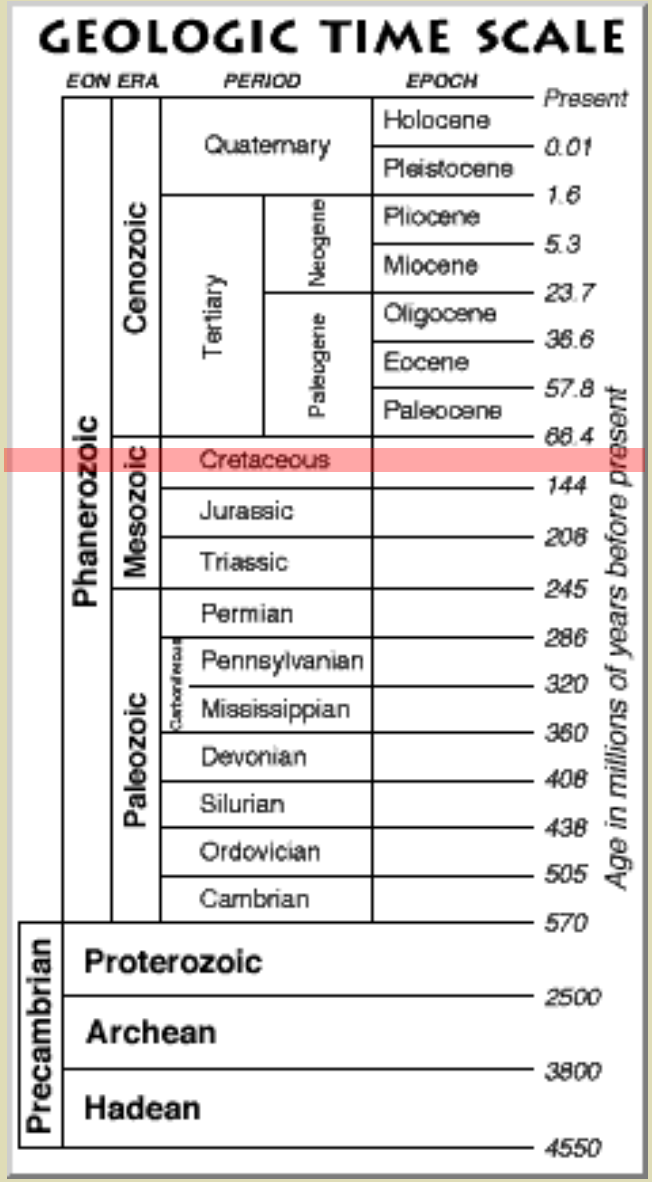


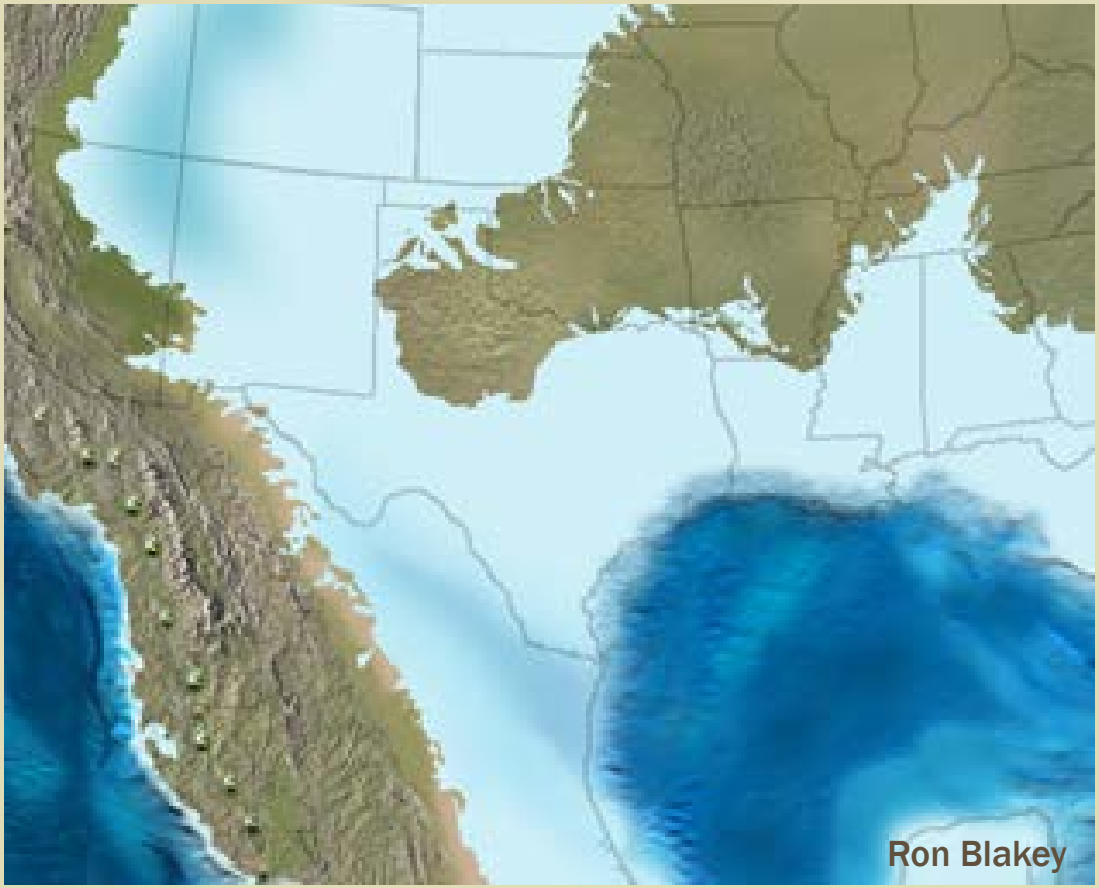


- Shales and sandstones
- Pangaea begins to split
- Gulf of Mexico begins to form
- Shale, siltstone, and sandstone deposits are shed into the down-warping Ouachita mountain line

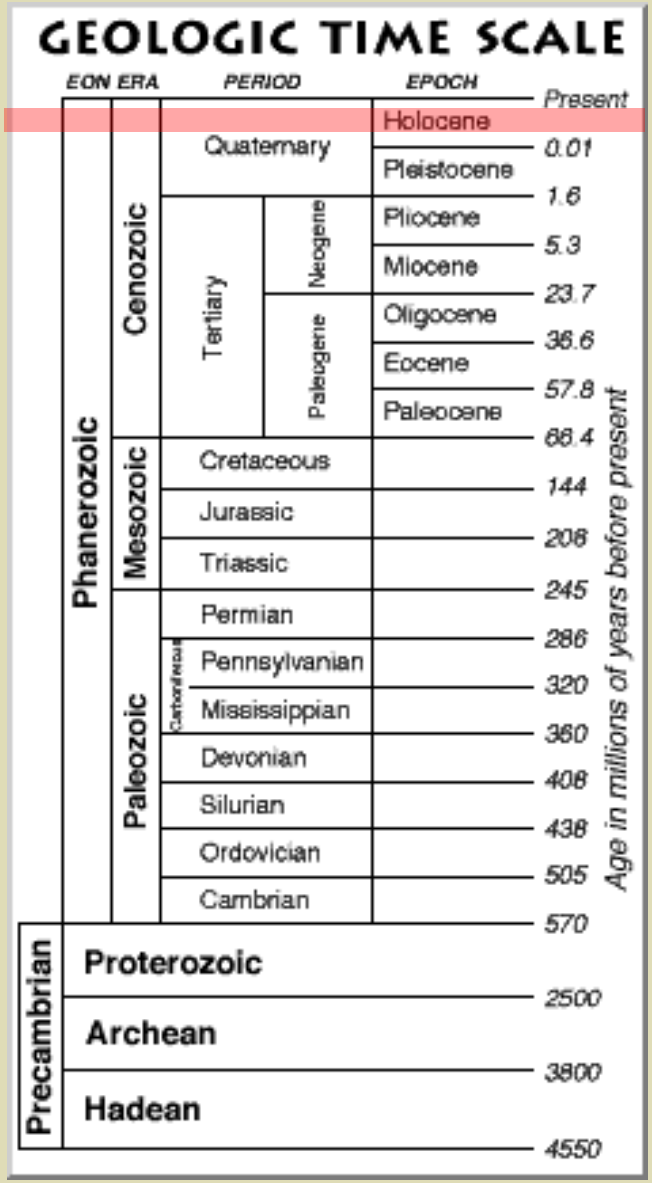


- Rocky Mountains begin to form
- Dinosaurs, flowering plants, early rodent-like mammals





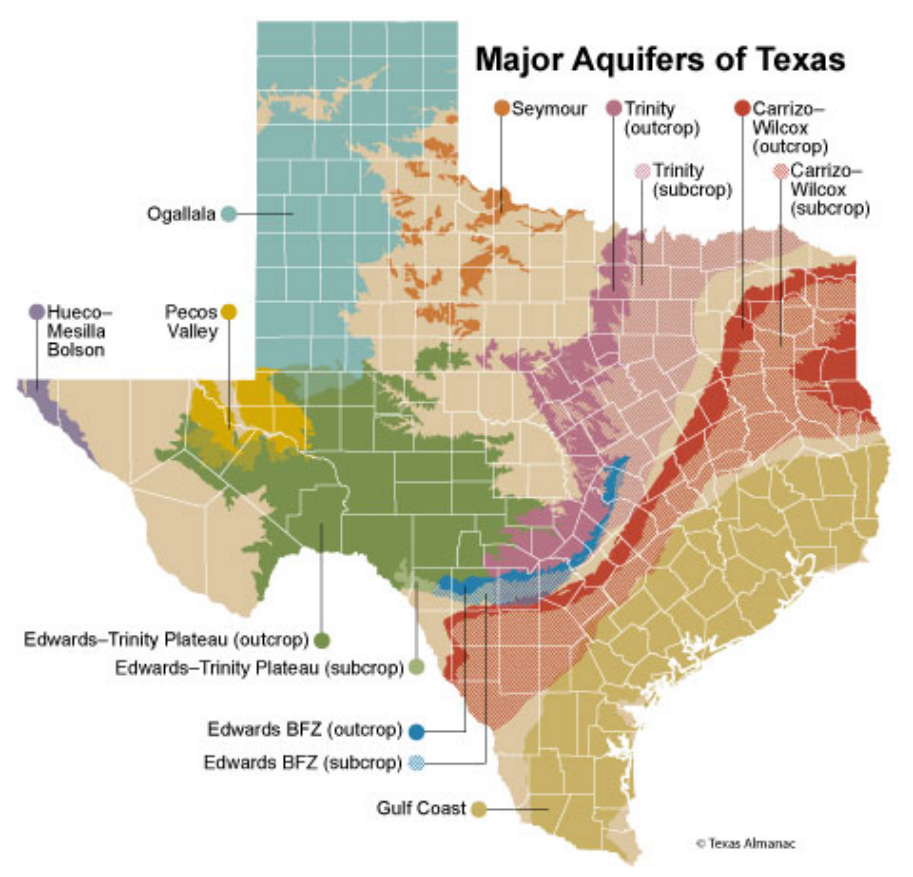
- Hill Country limestone, Santa Elena Canyon
- Dinosaur tracks
- Marsupials, bats, birds
- Dino mass extinction



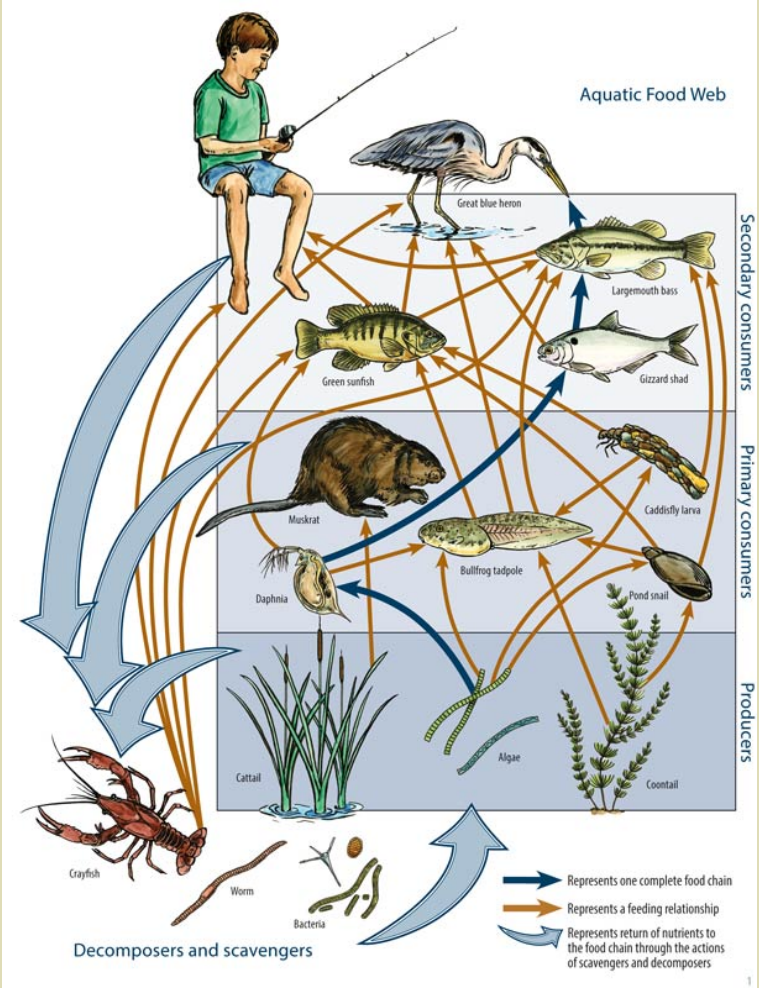
- High moisture period during Ice Age dissected High Plains and formed Palo Duro Canyon, breaks of Canadian River, entrenched major streams of Texas

HYDOROLOGY

- **Hydrology** is the study of water, including the movement, distribution and quality of water
  - distribution
  - circulation
  - behavior
  - chemical properties
  - physical properties



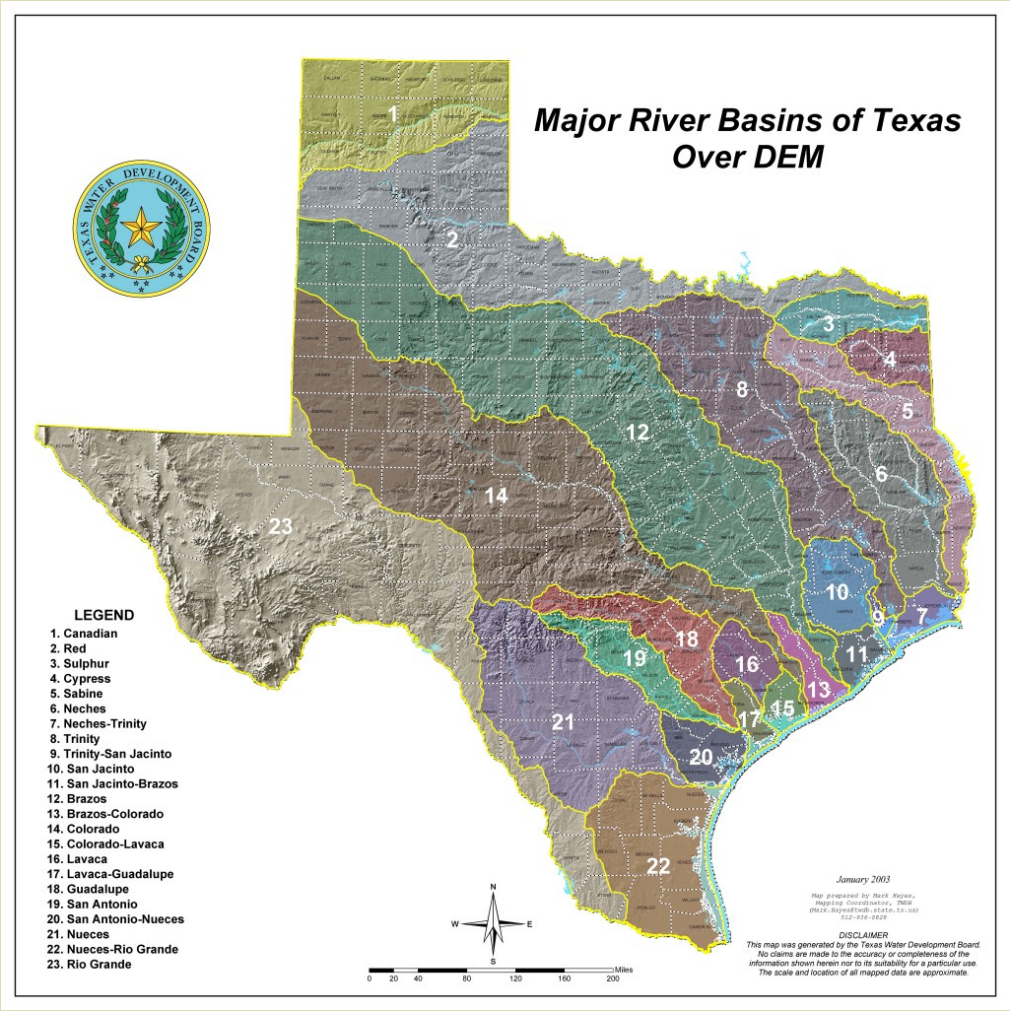
WATERSHED COMPONENTS



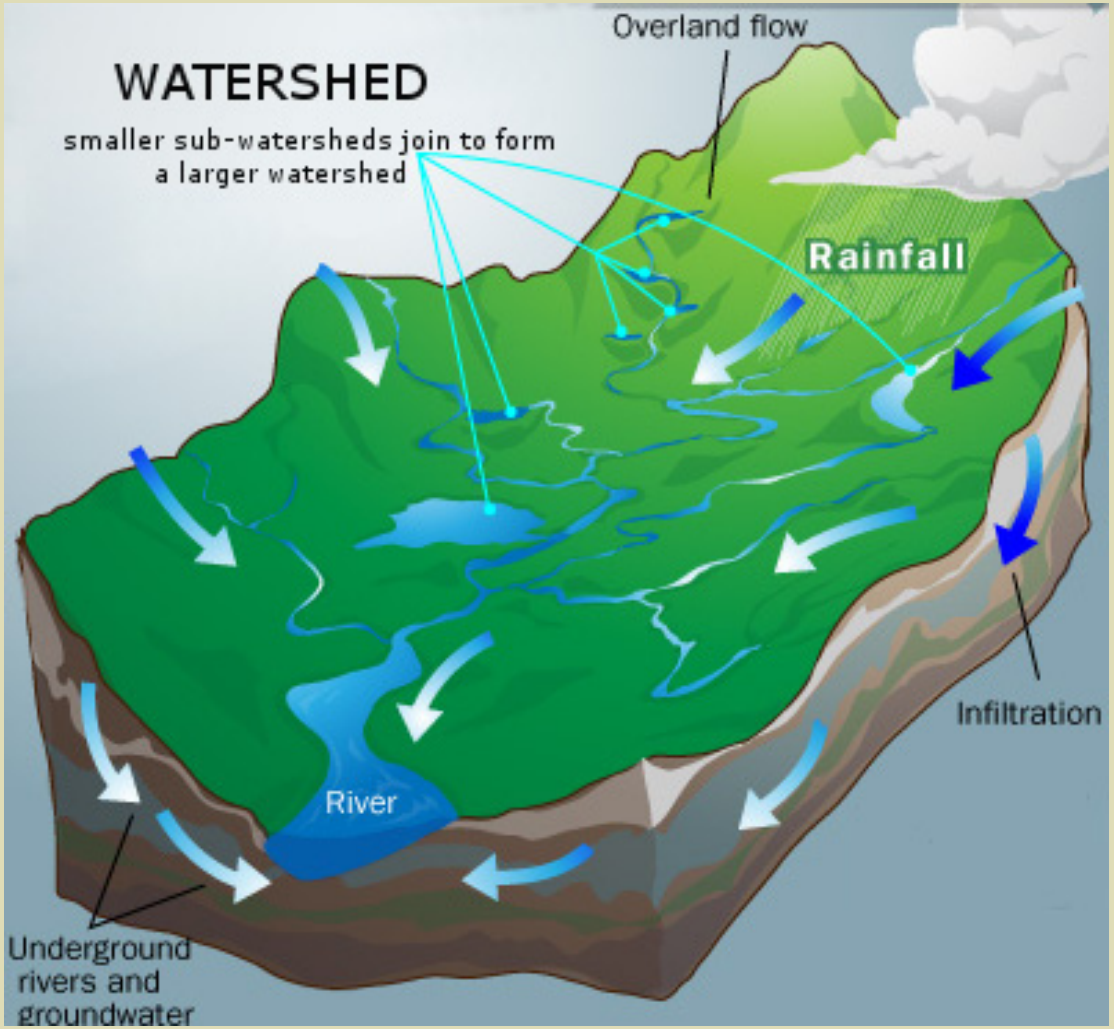
NATURAL SYSTEMS CONCEPT

- The interactions of biotic and abiotic factors
  - **perform work** (e.g., transport sediment, water, and energy)
  - **generate products** (e.g., form new physical structures like floodplains or channels, and form biological communities and new energy outputs)

TEXAS WATERSHEDS



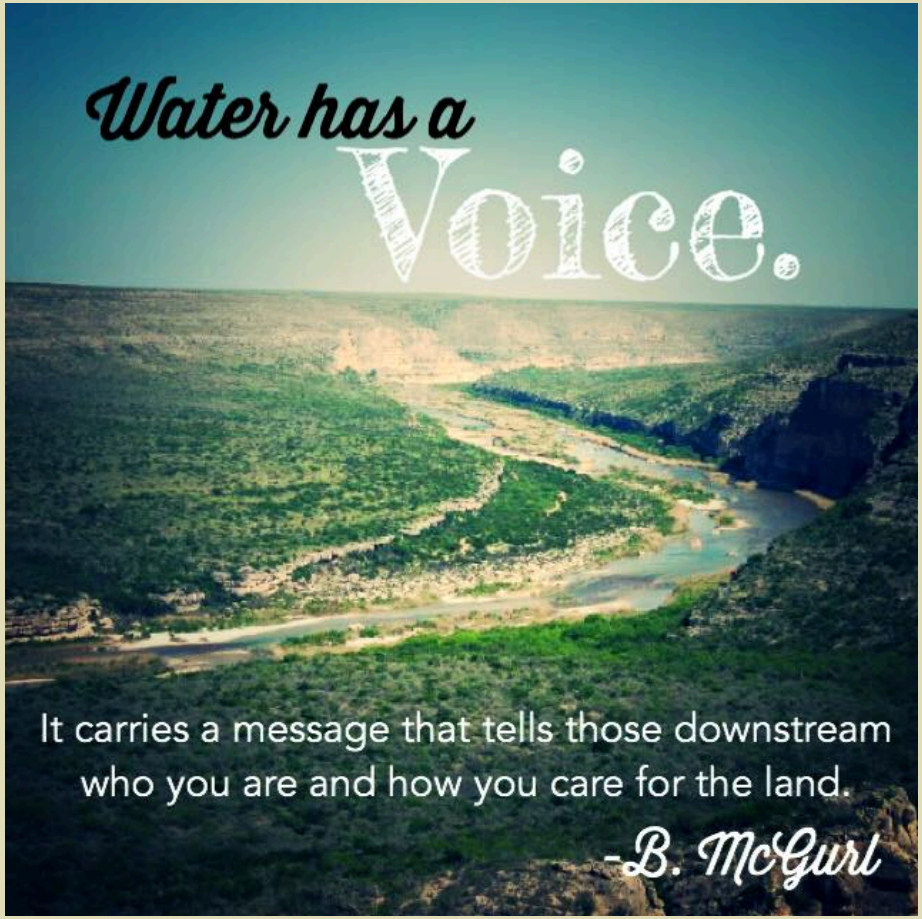
WATERSHED STRUCTURE



WATERSHED CONNECTIONS

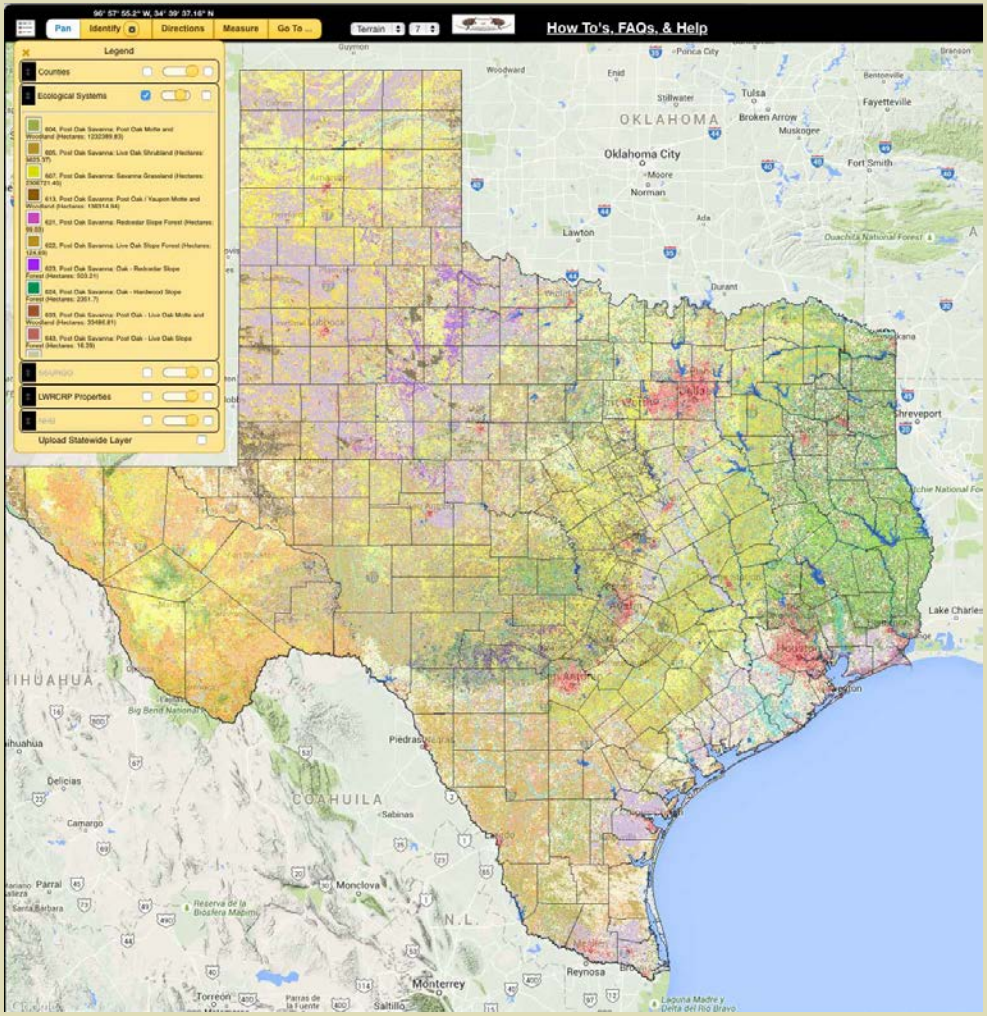
UPLANDS

- Landscape patterns – combines the distribution of vegetation and land use



UPLANDS

- Vegetation distribution
  - Patches and corridors
  - Patterns
- Use by animals
- Diversity
- Land Use patterns



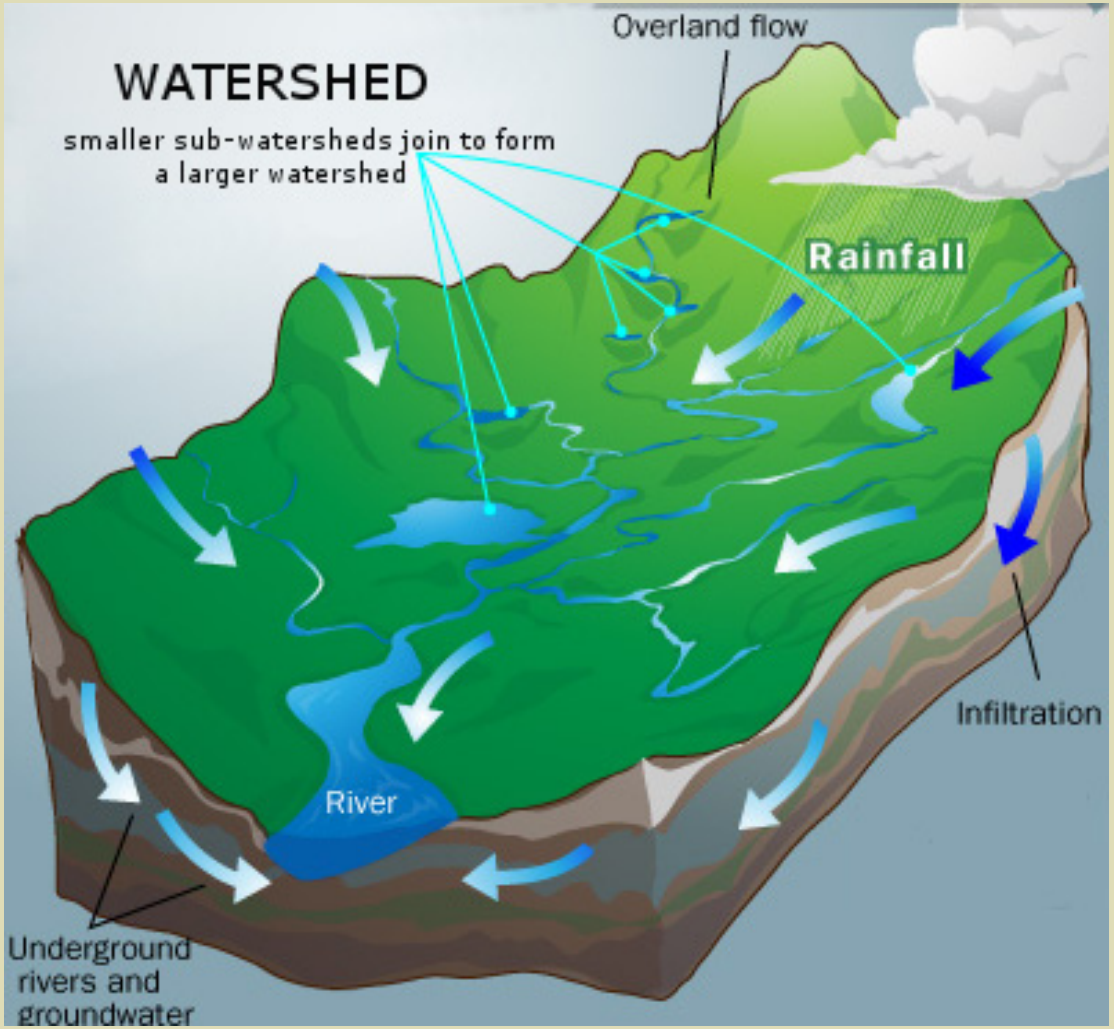
Fall 2011

Summer 2013

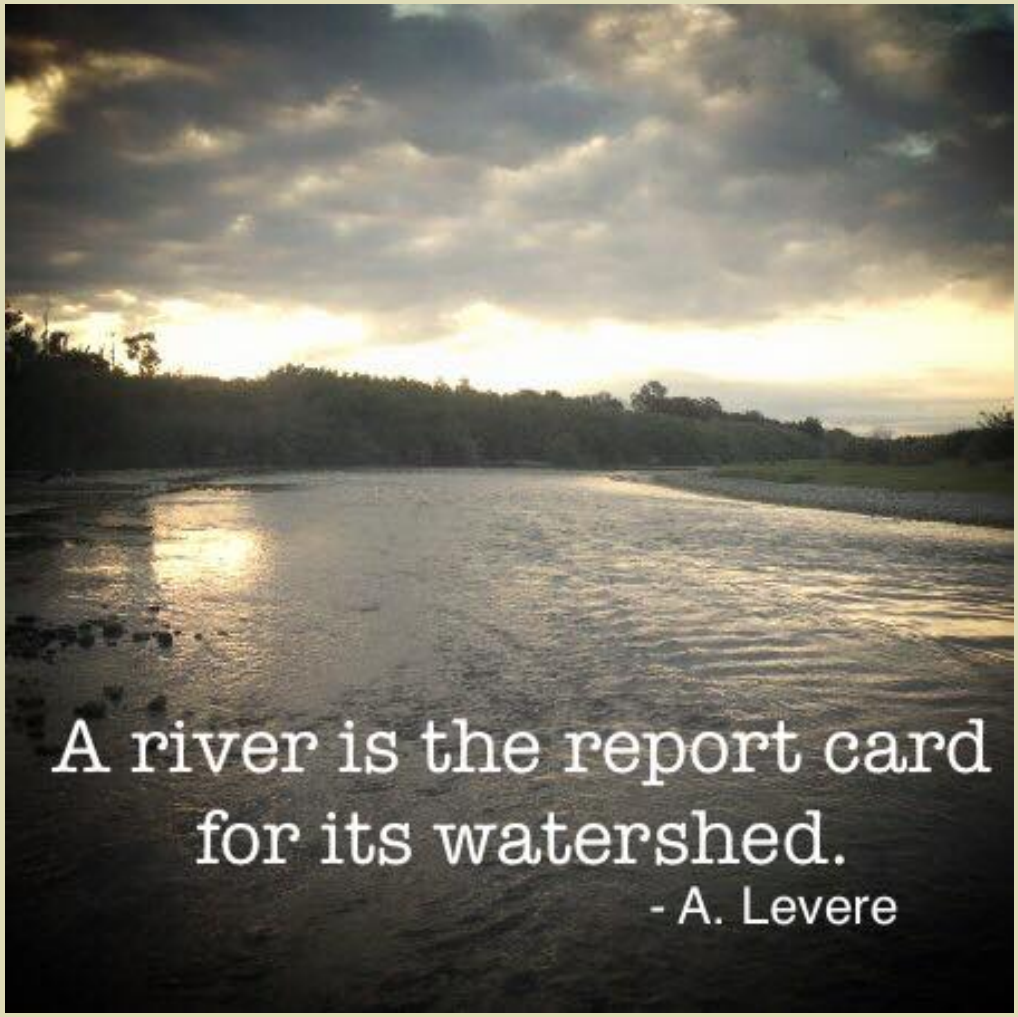
RIPARIAN AREAS

- Buffer size
- Diversity
- Density
- Recruitment
- Connectivity to the aquatic environment

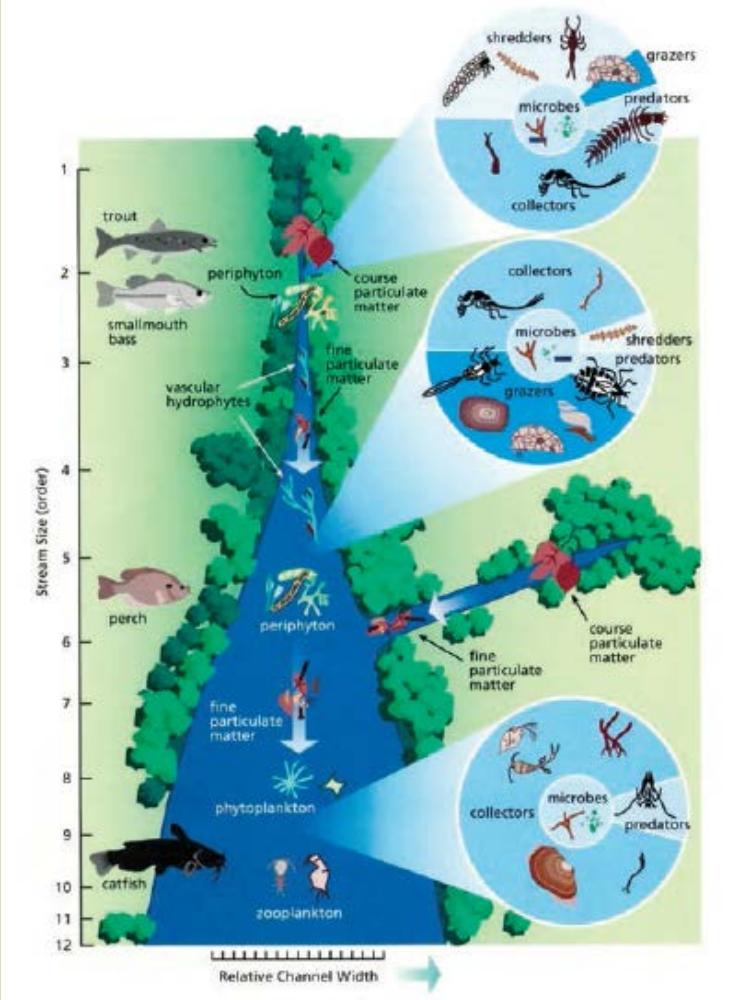
WATERSHED STRUCTURE



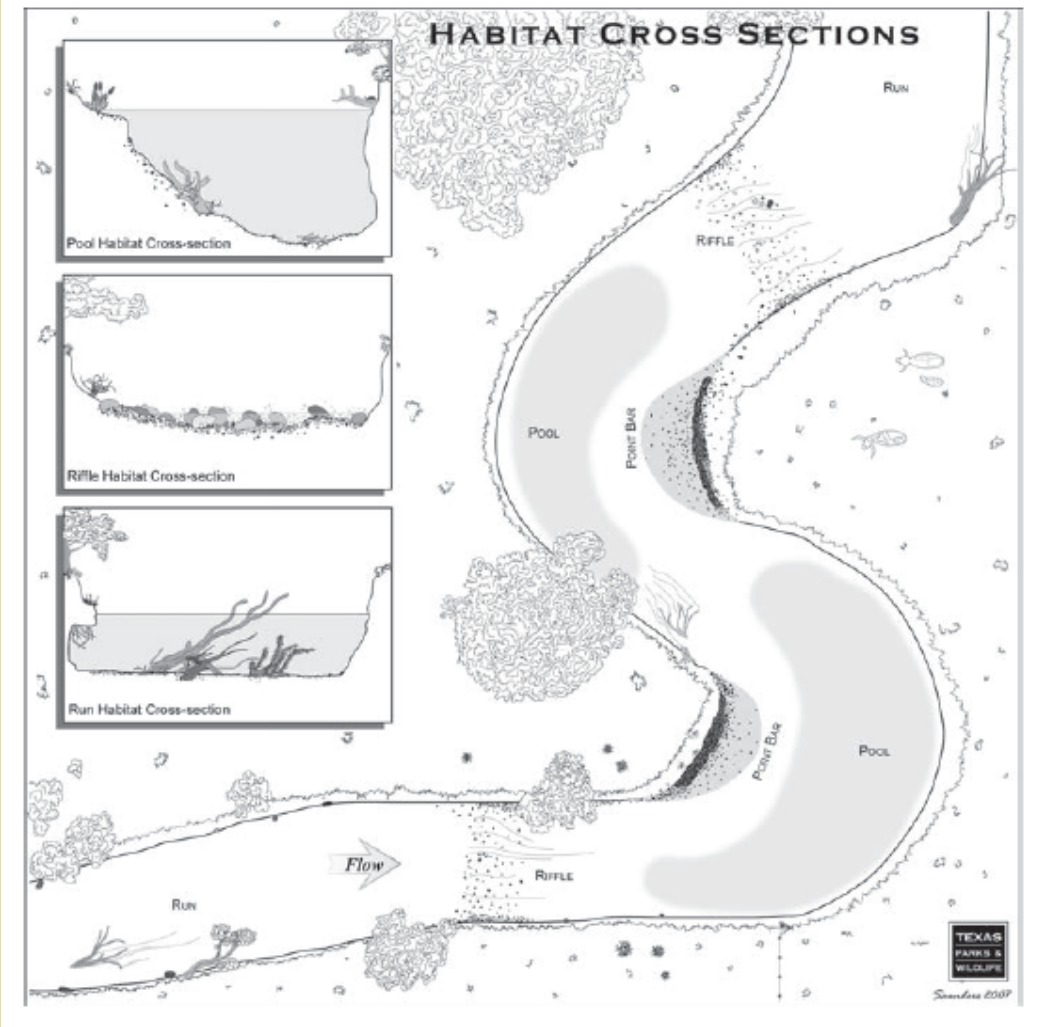
STREAM STRUCTURE



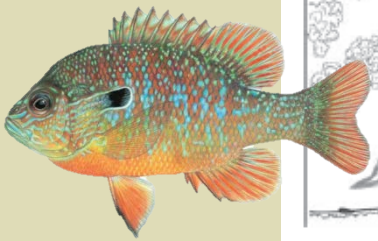
STREAM STRUCTURE

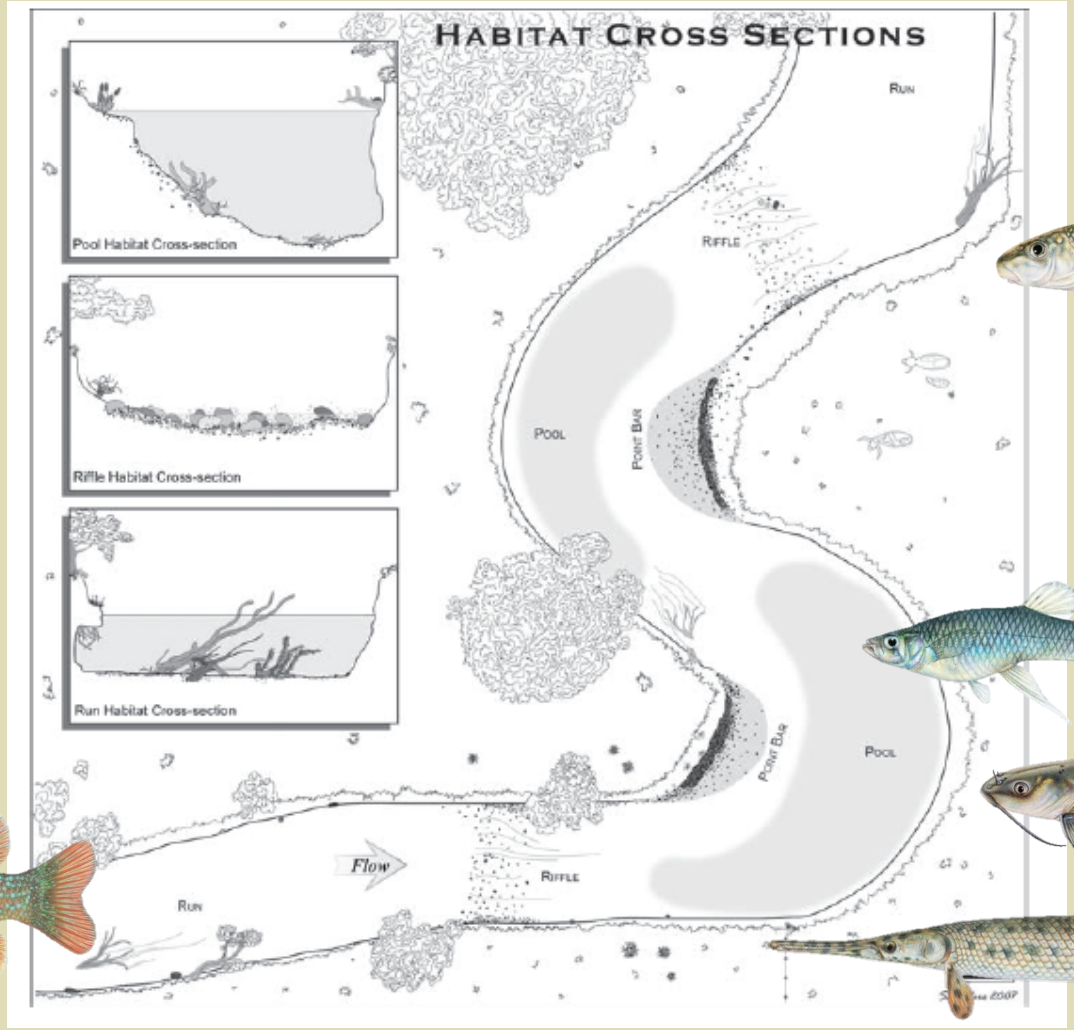


STREAM STRUCTURE

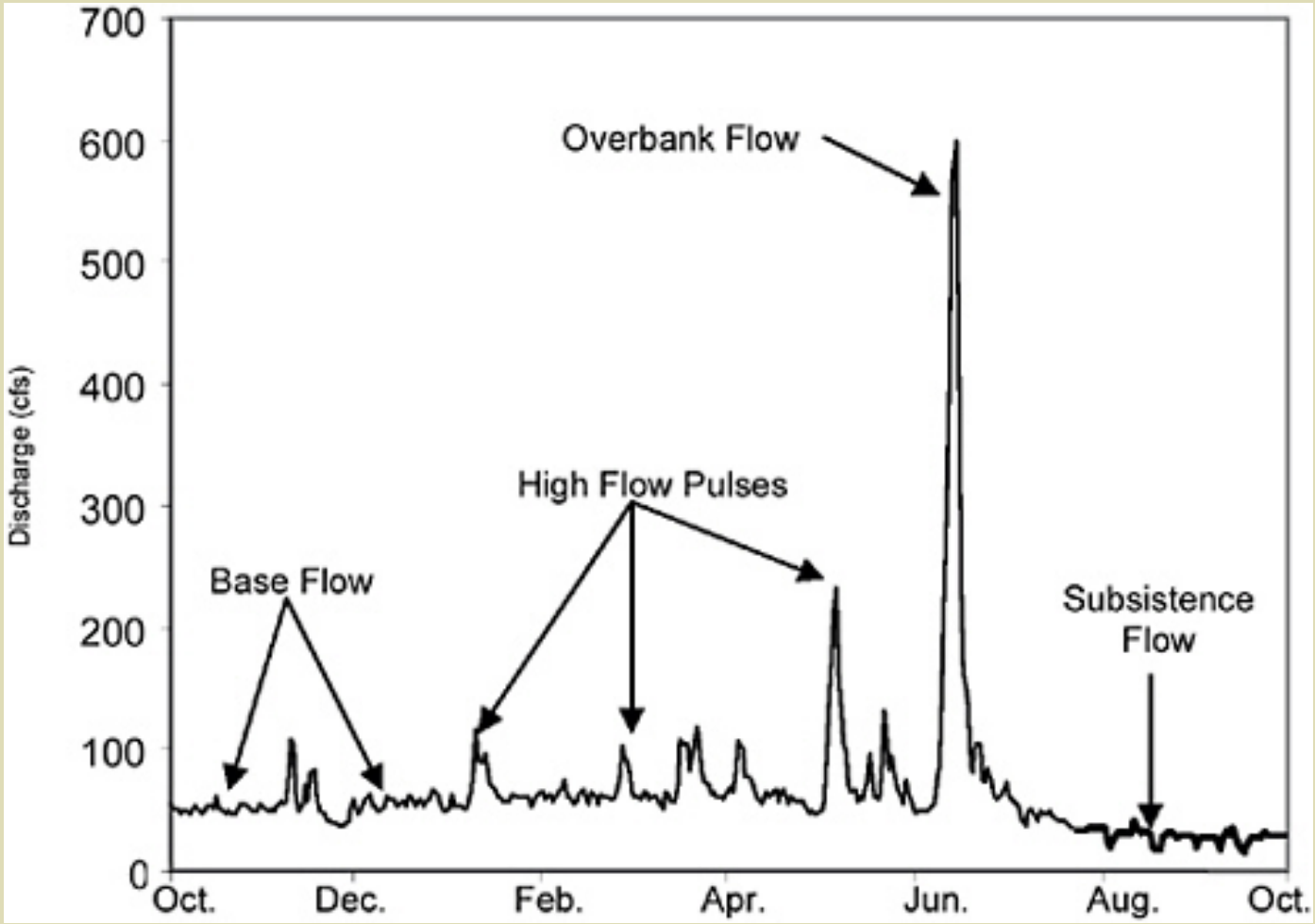


DIVERSITY




Habitat Cross Sections
Pool Habitat Cross-section
Riffle Habitat Cross-section
Run Habitat Cross-section
Run
Riffle
Pool
Point Bar
Point Bar
Pool
Flow
Riffle
Run

HABITAT MAINTENANCE - HYDROLOGY

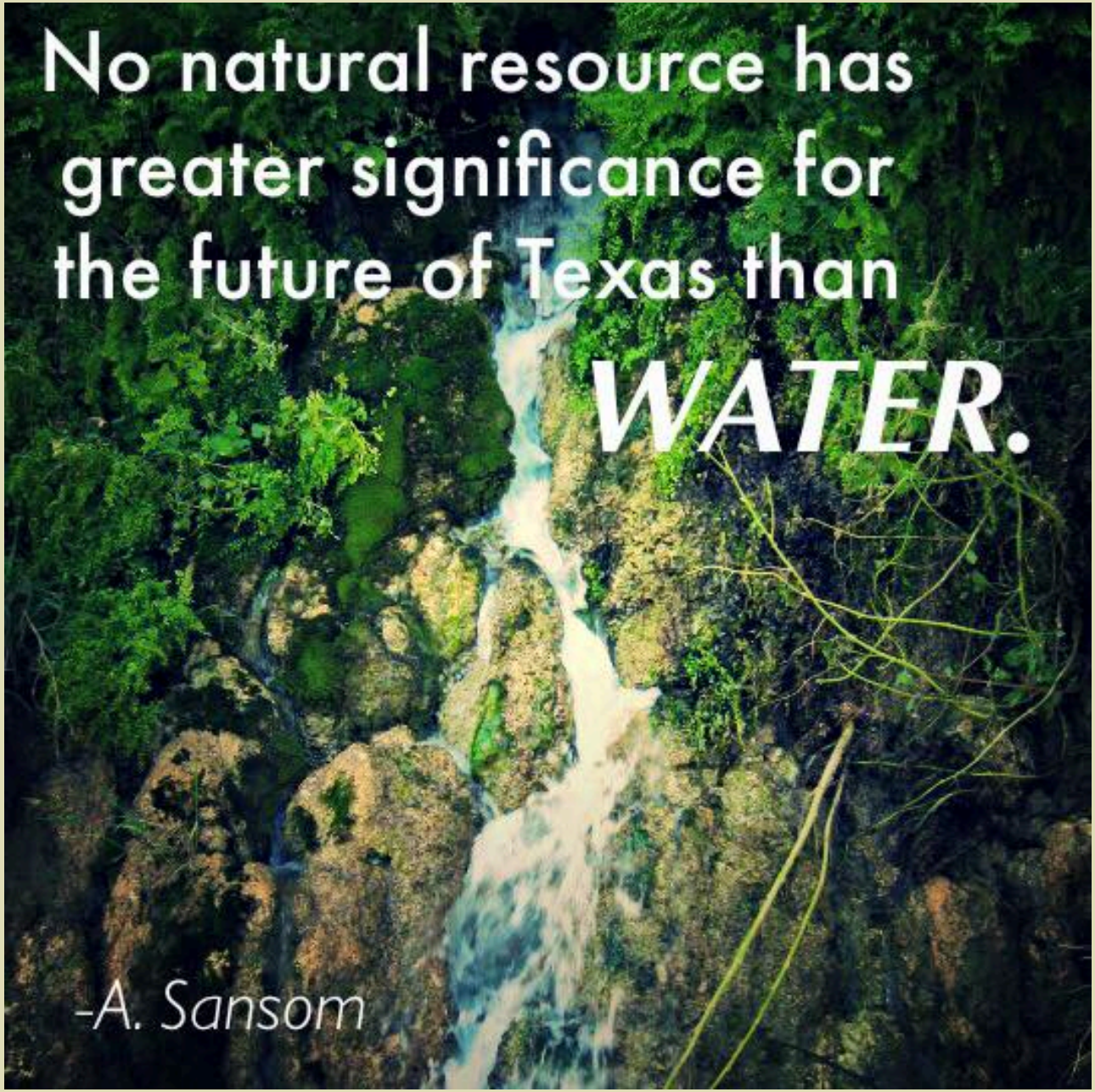


PHANTOM SPRING

1938

2000

PHANTOM SPRING


No natural resource has greater significance for the future of Texas than
WATER.
-A. Sansom

Megan Bean
Texas Parks and Wildlife Department
megan.bean@tpwd.texas.gov