Visualizing Texas Parent Materials

Julieta Collazo, Jonathan Gross, Cristine L. S. Morgan
Agrilife Research, Texas A&M University, College Station, TX

TEXAS A&M UNIVERSITY

TEXAS A&M AGRILIFE

INTRODUCTION

A soil parent material map for Texas was created to further the ISEE2 goal of better visualization for teaching soil science. Texas has a diverse depositional history which includes residuum, as well as water and wind transported materials (Fig. 1). The most difficultly was found in differentiating alluvial sediments in the Coastal Plains. While these materials were classified similarly by the United States Department of Agriculture, differentiation of the two processes is important for teaching purposes. Another problem that was encountered in the decision making process was delineating general categories that are instructive for land use decisions.

The **overall goal** of this project was to develop a decision tree to convert Official Series Descriptions (OSD) to parent materials, to aid teaching, as well as be congruent with neighboring states and the United States.
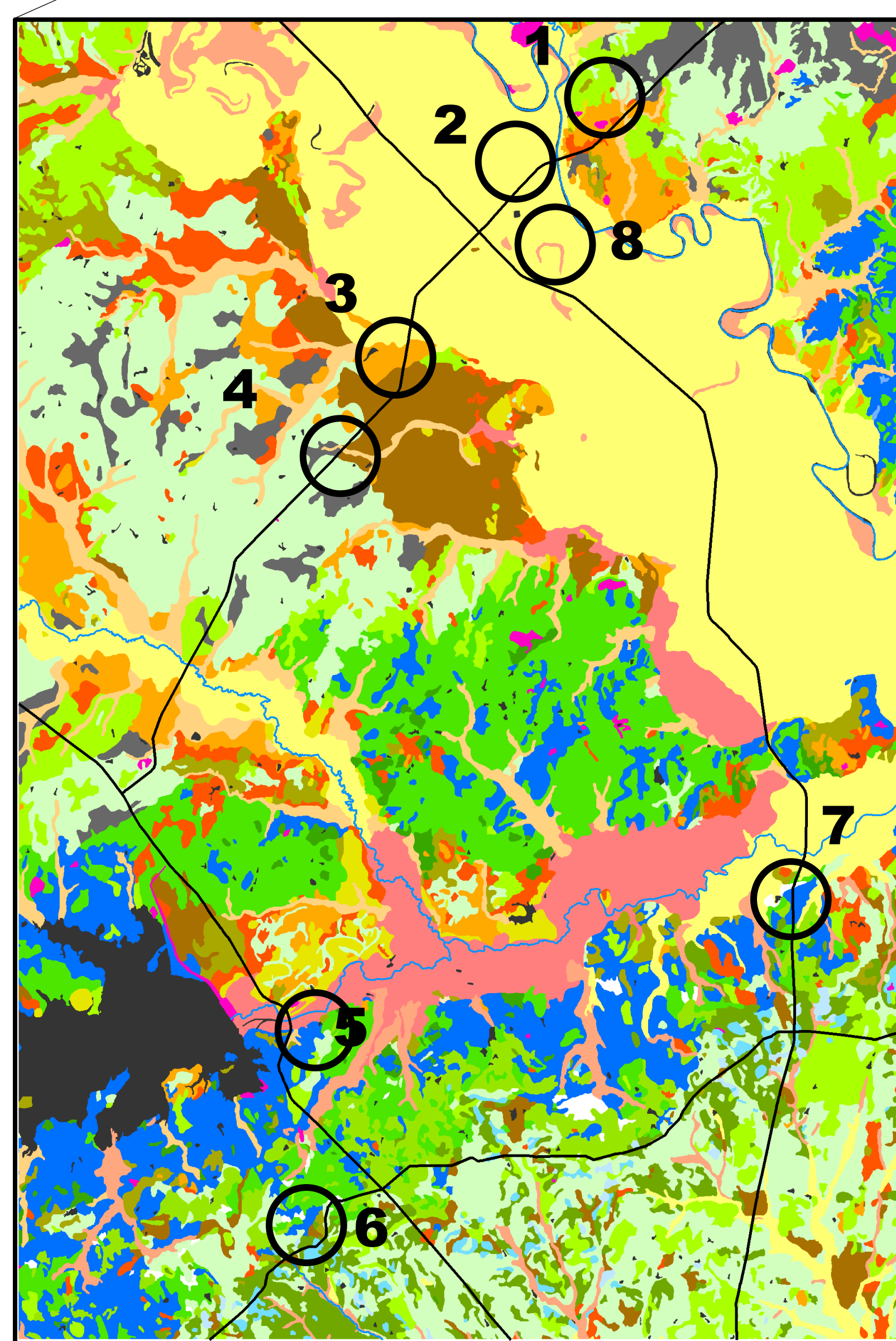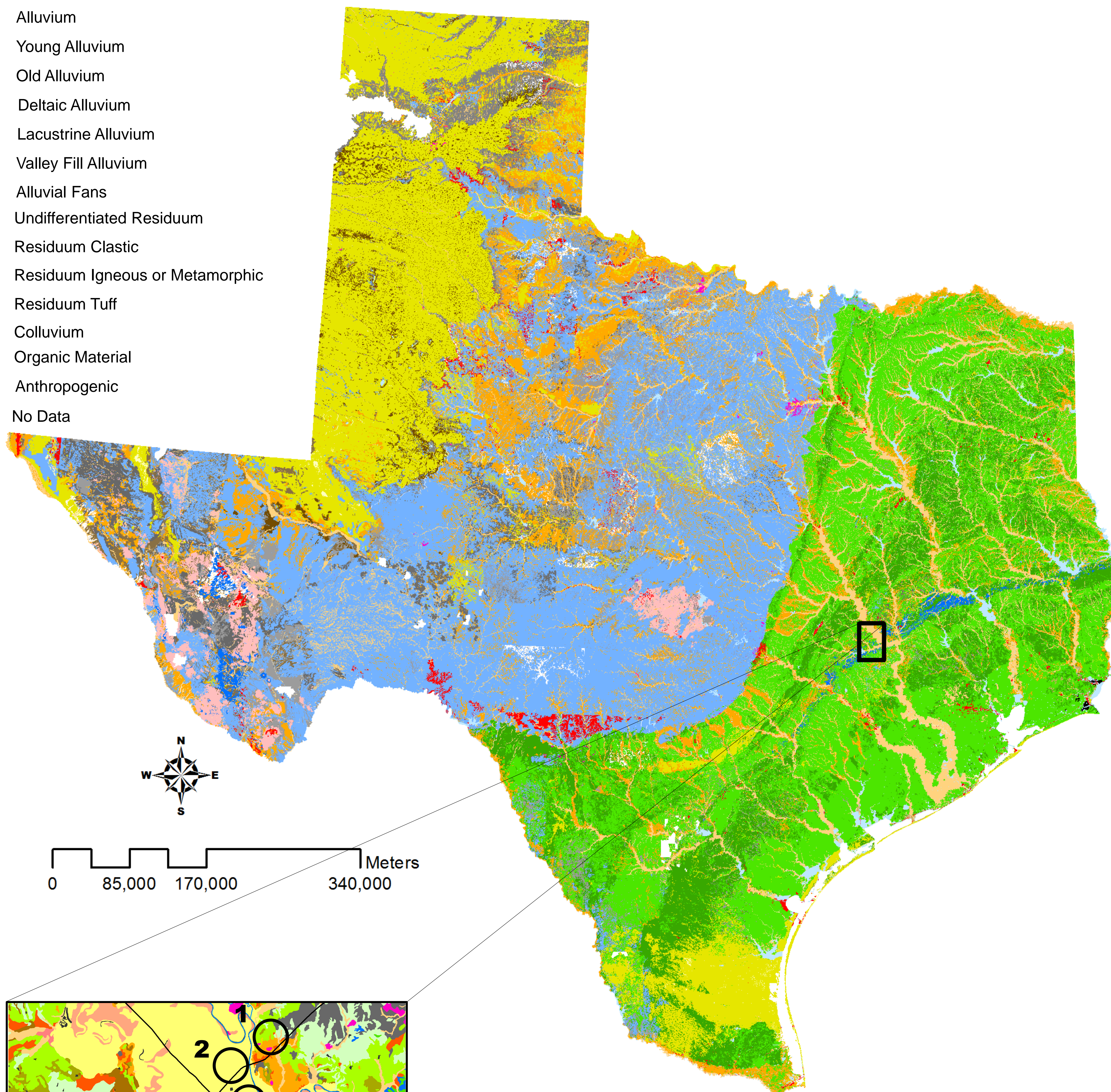
METHODS

➢ Texas has 1553 OSDs, and a diverse range in depositional history (Fig. 1).

➢ Texas has 15 Major Land Resource Areas (MLRA) (Fig. 2).

➢ First order classification of each OSD was based on the MLRA and series site description (Figs. 2 & 3).

➢ Second order classification refined the source of material (Fig. 4).

➢ Lastly, grain size (coarse or fine) and the chemistry (basic or acidic) were classed out.

Figure 1: TEXAS LITHOLOGY

Chert/Dolomite
Clastic
Clay/Mudstone
Evaporite
Igneous
Limestone
Metamorphic
Mudstone
Sand
Sandstone
Shale
Silt
Tuff

PARENT MATERIALS OF TEXAS SOIL

Water
Wind Blown
Aeolian Sand
Loess
Coastal Sediments
Coarse Coastal Sediments
Fine Coastal Sediments
Alluvium
Young Alluvium
Old Alluvium
Deltaic Alluvium
Lacustrine Alluvium
Valley Fill Alluvium
Alluvial Fans
Undifferentiated Residuum
Residuum Clastic
Residuum Igneous or Metamorphic
Residuum Tuff
Colluvium
Organic Material
Anthropogenic
No Data

Meters
0   85,000   170,000   340,000

Soil Morphology & Interpretations Class
Parent Material Field Trip

1. Stop to see 5th Terrace of Brazos river being mined for sand
   Old Alluvium Coarse Acidic
2. Stop to texture soil in the Brazos river floodplain
   Young Alluvium Fine Basic
3. Stop to see Vertisol of 3rd Brazos river terrace
   Old Alluvium Fine Basic
4. Transition from terrace to coastal sediments (vegetation change)
   Coastal Sediments Fine Uncemented Basic
5. Outcrop of sandstone, siltstone, and lignite from coastal sediments
   Coastal Sediments Fine Weakly Cemented Acidic
6. Volcanic ash, reworked by water
   Residuum Tuff Fine Acidic
7. Drop from terrace to floodplain
8. Oxbow from old river channel
   Young Alluvium Coarse Basic

Figure 2: MAJOR LAND RESOURCE AREAS
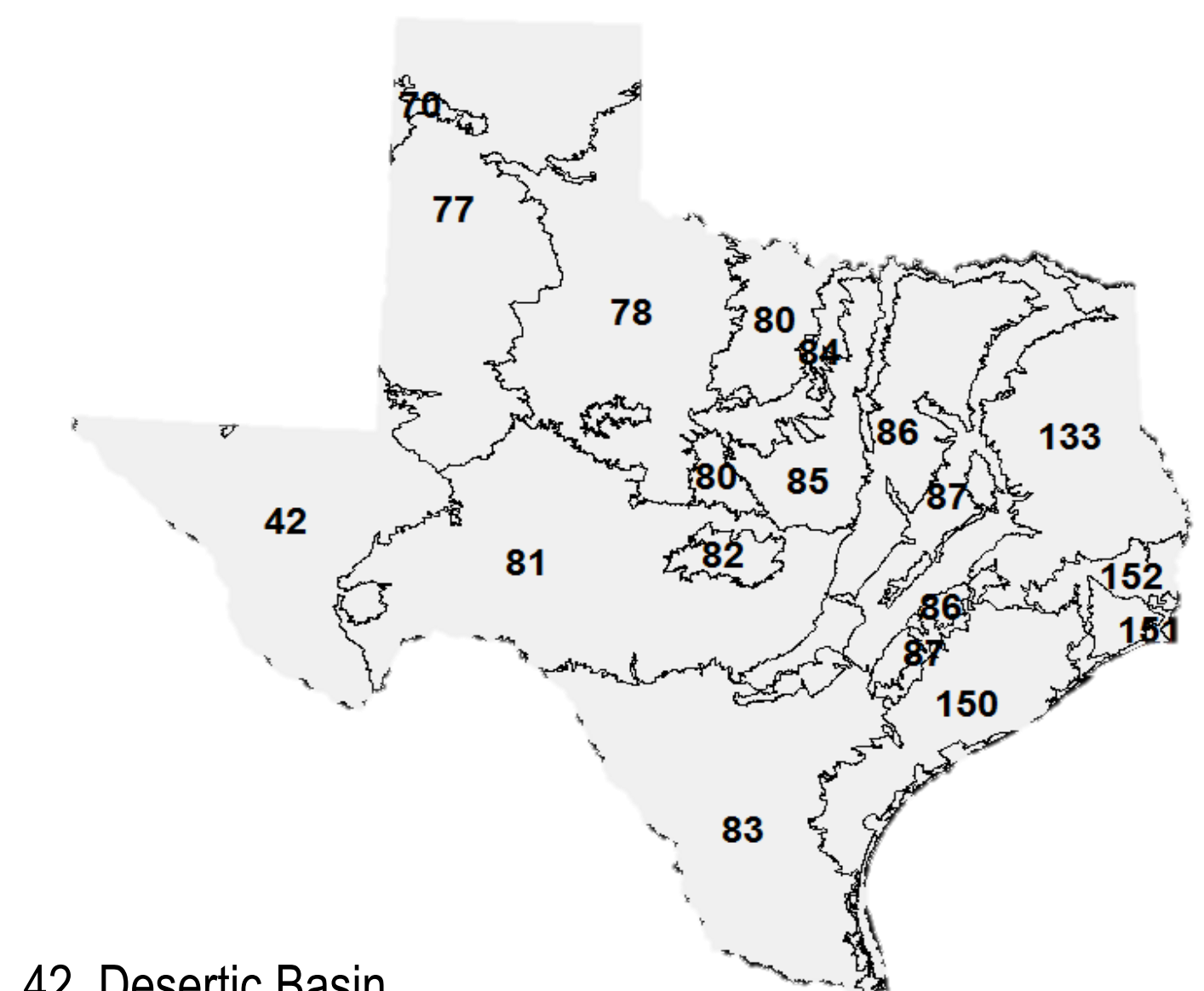
42 Desertic Basin
77 High Plains
78 Central Rolling Red Plains
80 Prairies
81 Edward Plateau
82 Central Basin
83 Rio Grand Plains and Valley
84 Cross Timbers
85 Grand Prairie
86 Blackland Prairie
87 Claypan
133 Coastal Plain
150 Gulf Coast Prairie
151 Gulf Coast Marshes
152 Gulf Coast Flatwoods

Figure 3: 1st ORDER CLASSIFICATION

Windblown material, reworked or deposited by wind? → AEOLIAN

In coastal MLRA 83, 86-87, 133, 150-152 and residuum, marine, or coastal terrace? → COASTAL SEDIMENTS

A terrace, floodplain, playa lake, bajada, valley, apron, escarpment, or fan? → ALLUVIUM

Contains R/Cr OR developed from residuum, limestone, chert, conglomerate, igneous or metamorphic rock, or ash non-crystalline tuff? → RESIDUUM

Does it state it is colluvium? Was it deposited by gravity? → COLLUVIUM

Is it a peat bog or Histosol OR have an O horizon? → ORGANIC MATERIAL

Mining, urban land, levee OR other man-made feature? → ANTHROPROGENIC

Figure 4: SECONDARY CLASSIFICATIONS

AGE, LANDFORM, LOCATION → Floodplain, Valley, Bajada, Escarpment, etc
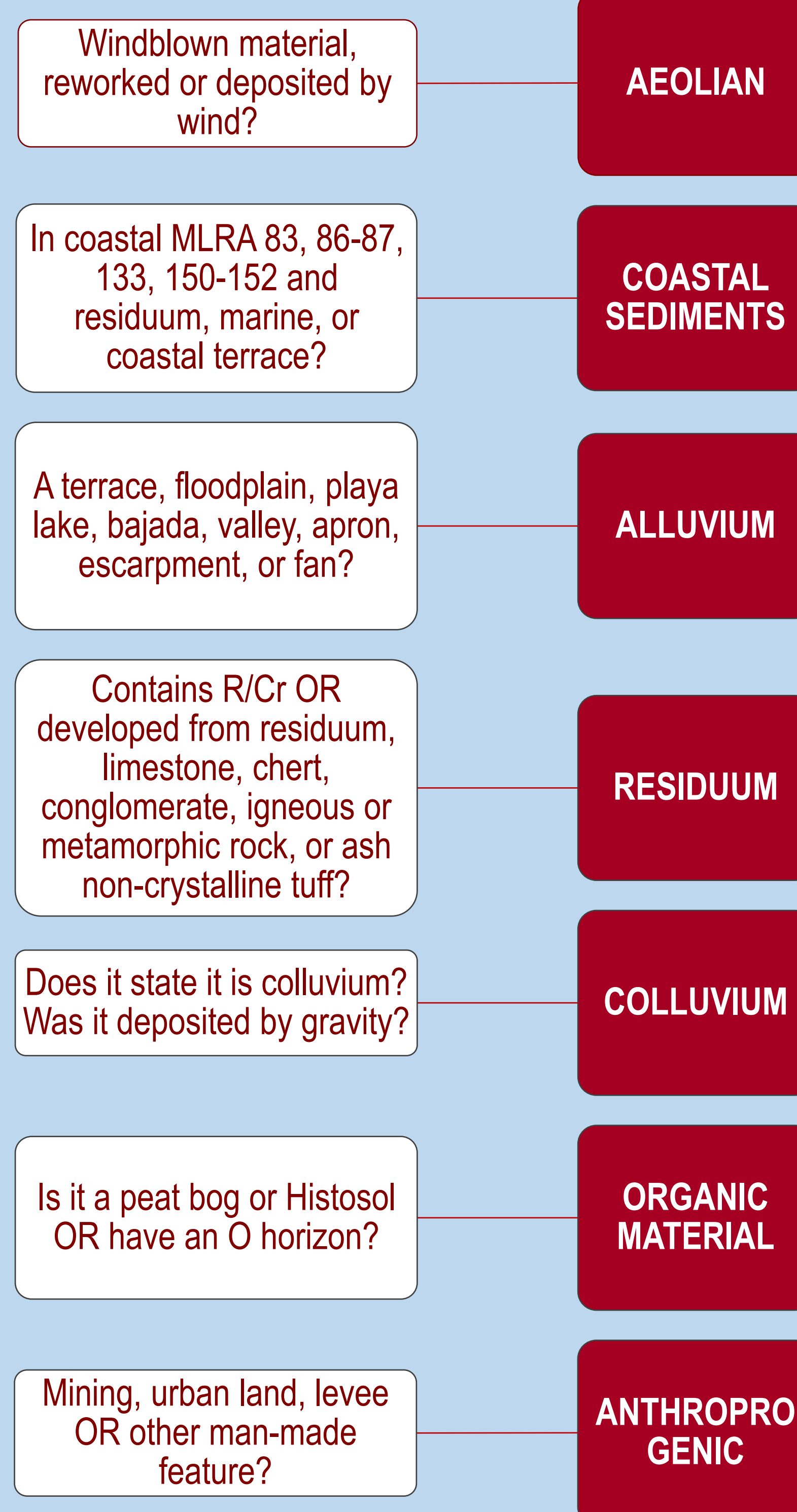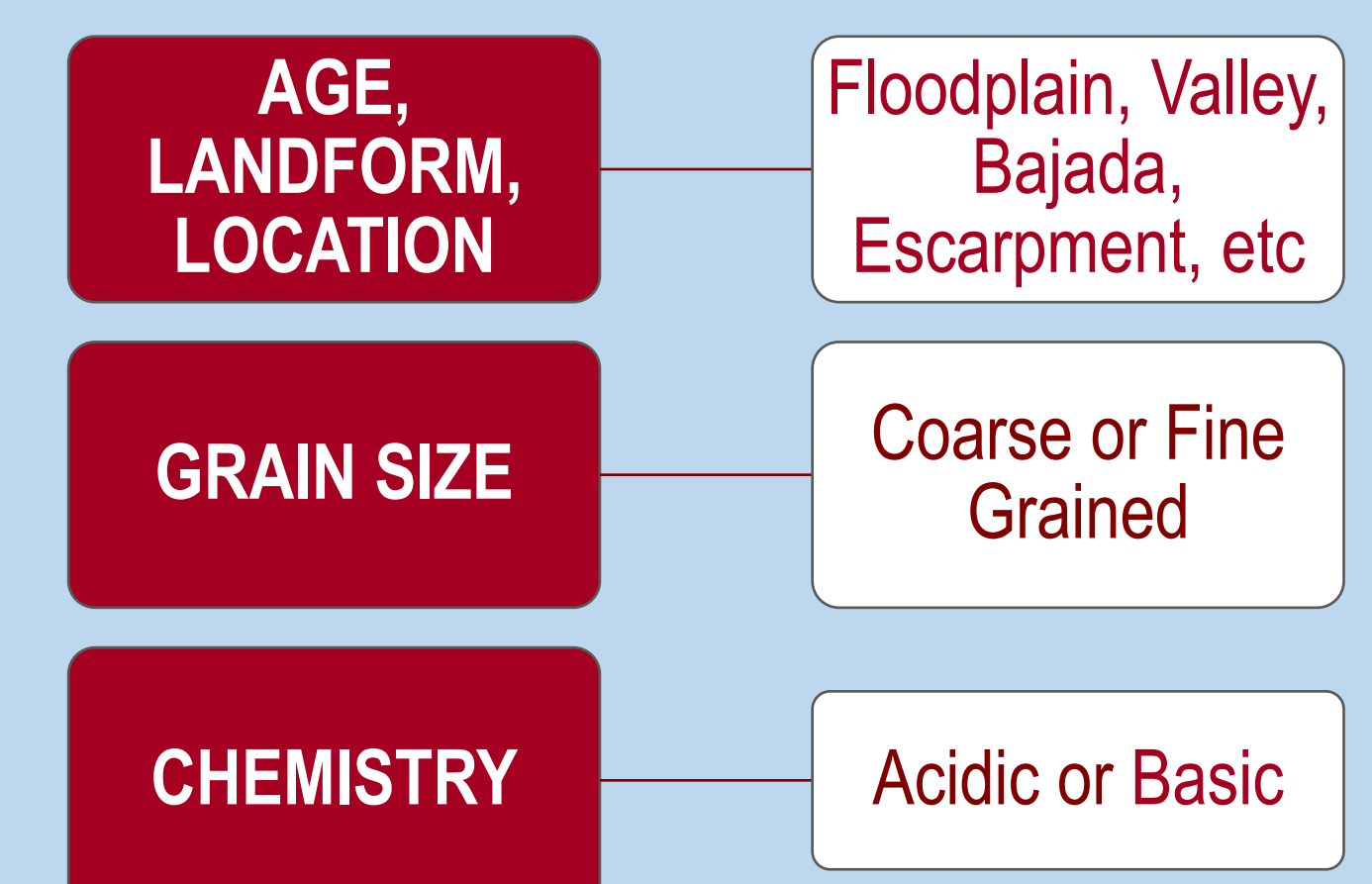
GRAIN SIZE → Coarse or Fine Grained

CHEMISTRY → Acidic or Basic

ACKNOWLEDGEMENTS

This project is funded by the Cooperative State Research, Education, and Extension Service, U.S.D.A. Award No. 2013-70003-20924. Special Thanks to Dr. C. Tom Hallmark for advice on setting up classifications and to Dr. Darrell G. Schulze for project leadership.