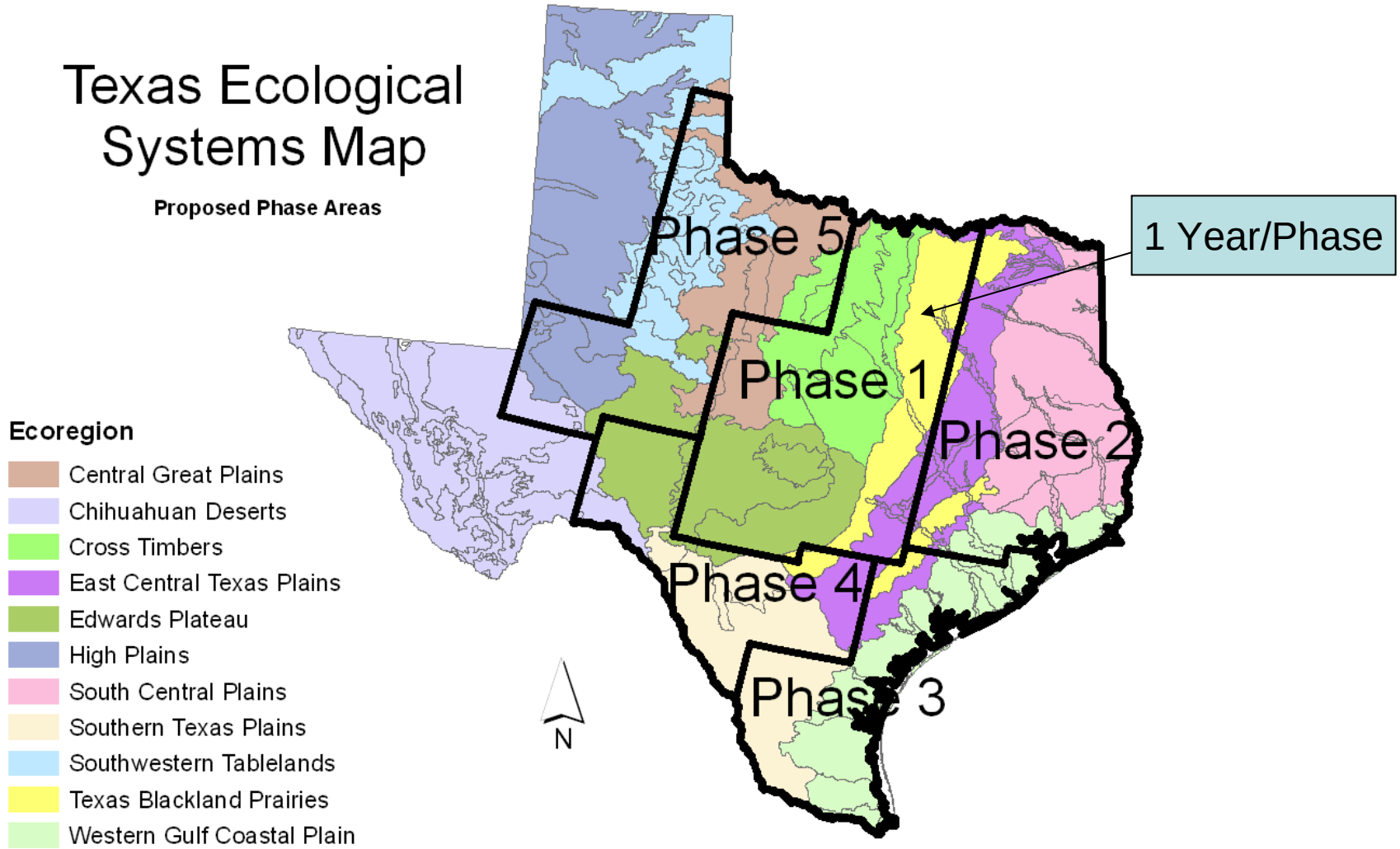
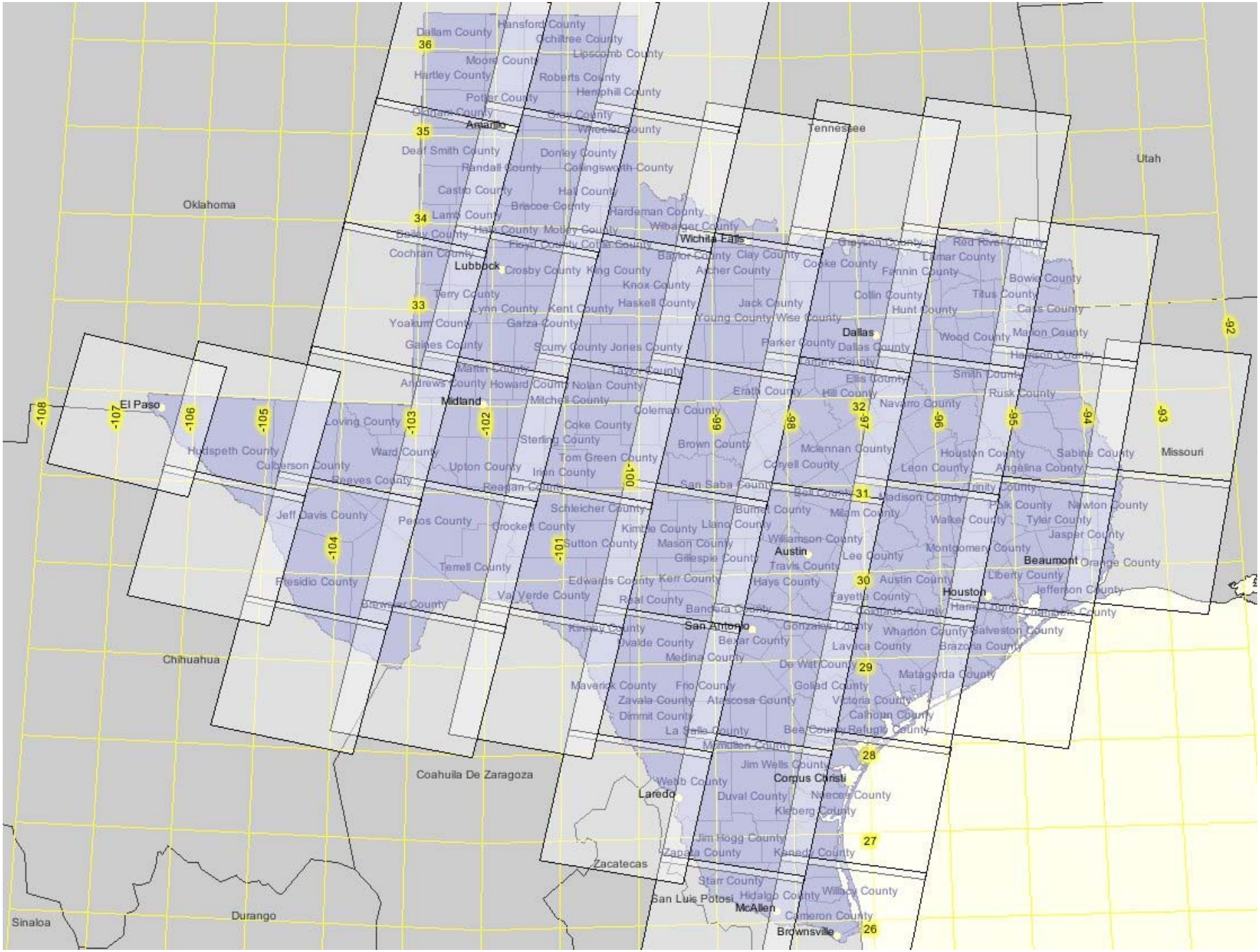
Ecological Systems Classification for Texas

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Ochiltree County
Lipscomb County
Moore County
Hartley County
Roberts County
Hemphill County
Potter County
Oldham County
Gray County
Amarillo
Wheeler County
Deaf Smith County
Donley County
Randall County
Collingsworth County
Castro County
Hall County
Briscoe County
Hardeman County
Lamb County
Wilbarger County
Hale County
Motley County
Floyd County
Cottle County
Cochran County
Wichita Falls
Baylor County
Clay County
Lubbock
Crosby County
King County
Archer County
Cooke County
Knox County
Terry County
Haskell County
Jack County
Lynn County
Kent County
Young County
Wise County
Yoakum County
Garza County
Dallas
Gaines County
Scurry County
Jones County
Parker County
Dallas County
Martin County
Mitchell County
Taylor County
Andrews County
Howard County
Nolan County
Ellis County
Midland
Erath County
Hill County
Navarro County
El Paso
Loving County
Coke County
Coleman County
Hudspeth County
Ward County
Sterling County
Brown County
McLennan County
Houston County
Culberson County
Upton County
Tom Green County
Coryell County
Leon County
Angelina County
Reeves County
Irion County
Reagan County
San Saba County
Bell County
Madison County
Jeff Davis County
Pecos County
Schleicher County
Burnet County
Milam County
Walker County
Tyler County
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Kimble County
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Sutton County
Mason County
Williamson County
Austin
Lee County
Montgomery County
Beaumont
Orange County
Terrell County
Gillespie County
Travis County
Liberty County
Presidio County
Edwards County
Kerr County
Hays County
Austin County
Houston
Val Verde County
Real County
Fayette County
Jefferson County
Brewster County
Bandera County
Kinney County
San Antonio
Gonzales County
Wharton County
Galveston County
Uvalde County
Bexar County
Lavaca County
Brazoria County
Chihuahua
Medina County
De Witt County
Matagorda County
Maverick County
Frio County
Goliad County
Zavala County
Atascosa County
Victoria County
Dimmit County
Calhoun County
La Salle County
Bee County
Refugio County
Jim Wells County
Corpus Christi
Coahuila De Zaragoza
Webb County
Laredo
Duval County
Nueces County
Kleberg County
Jim Hogg County
Zapata County
Kenedy County
Zacatecas
Starr County
Willacy County
San Luis Potosi
Hidalgo County
McAllen
Cameron County
Sinaloa
Durango
Brownsville
Oklahoma
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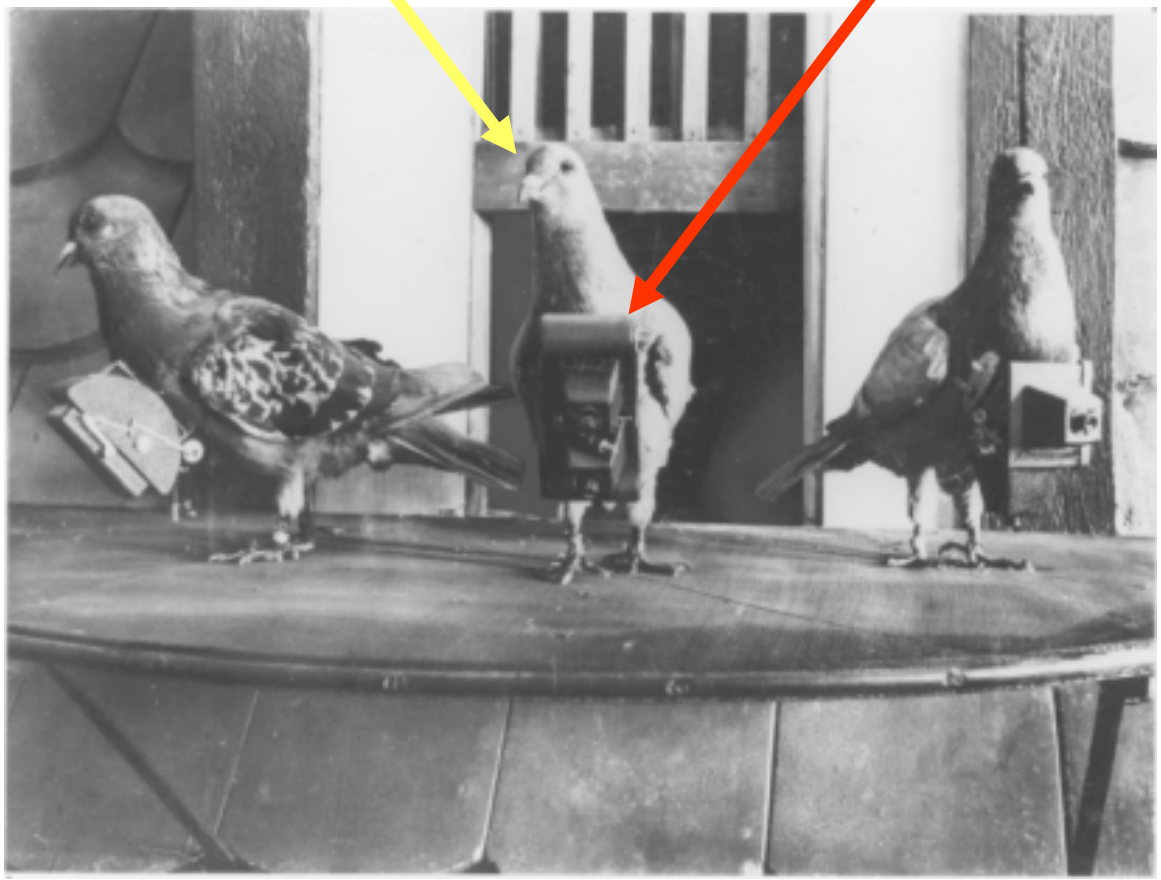
Background

- TPWD wants better land cover for Texas
  - Better thematic resolution (more land cover classes)
  - Better spatial resolution (approaching 1:24,000)
  - Better accuracy (overall 85%)
  - Better ecological interpretation (dynamics, management options, conservation opportunities)
- Partners Required!
  - Missouri Resource Assessment Partnership (MoRAP), University of Missouri
  - TNC, Texas
  - NatureServe, Southeast Region
  - TNRIS
  - TXFS
  - NRCS
  - Others
- Mailing list includes 15 members from 5 organizations

Outline of Presentation

- Land cover mapping basics
- Outline of methods
  - Increasing the thematic resolution (number of land cover classes) and accuracy
  - Improving the spatial resolution
- Products
- Questions

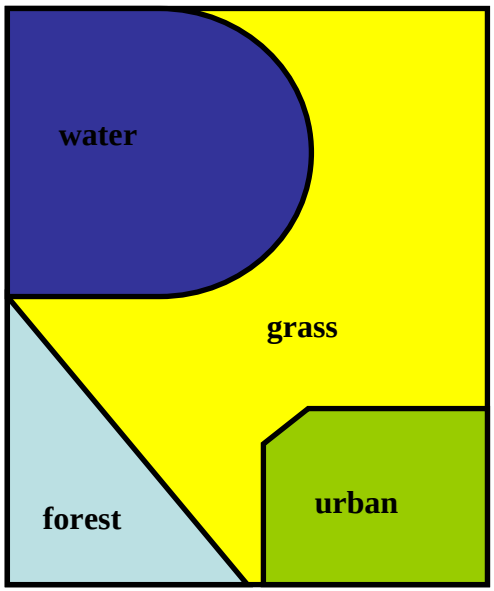
Platform and Sensor

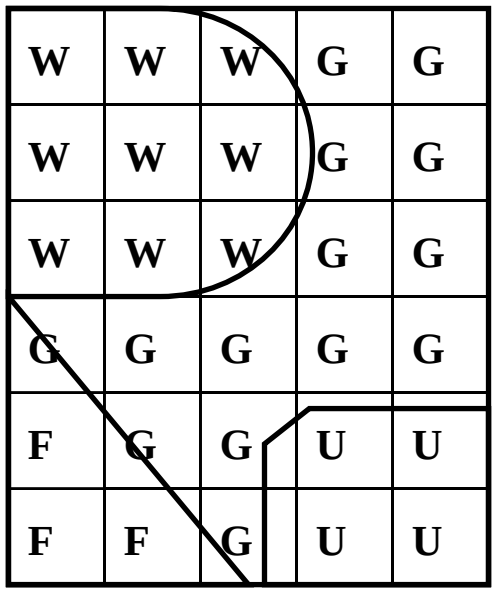


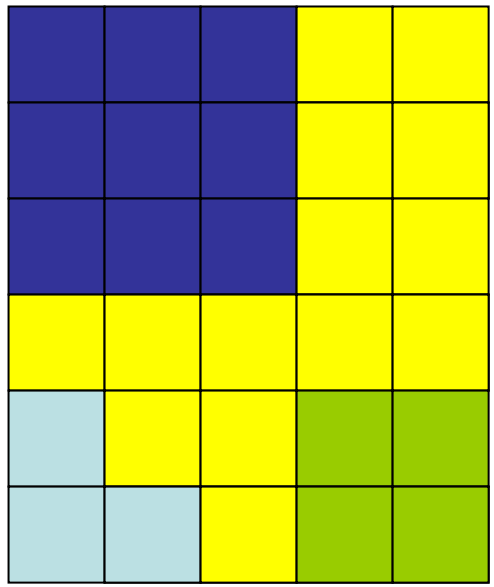
Remote Sensing in a Nutshell!

Mapping is Classification of Pixels

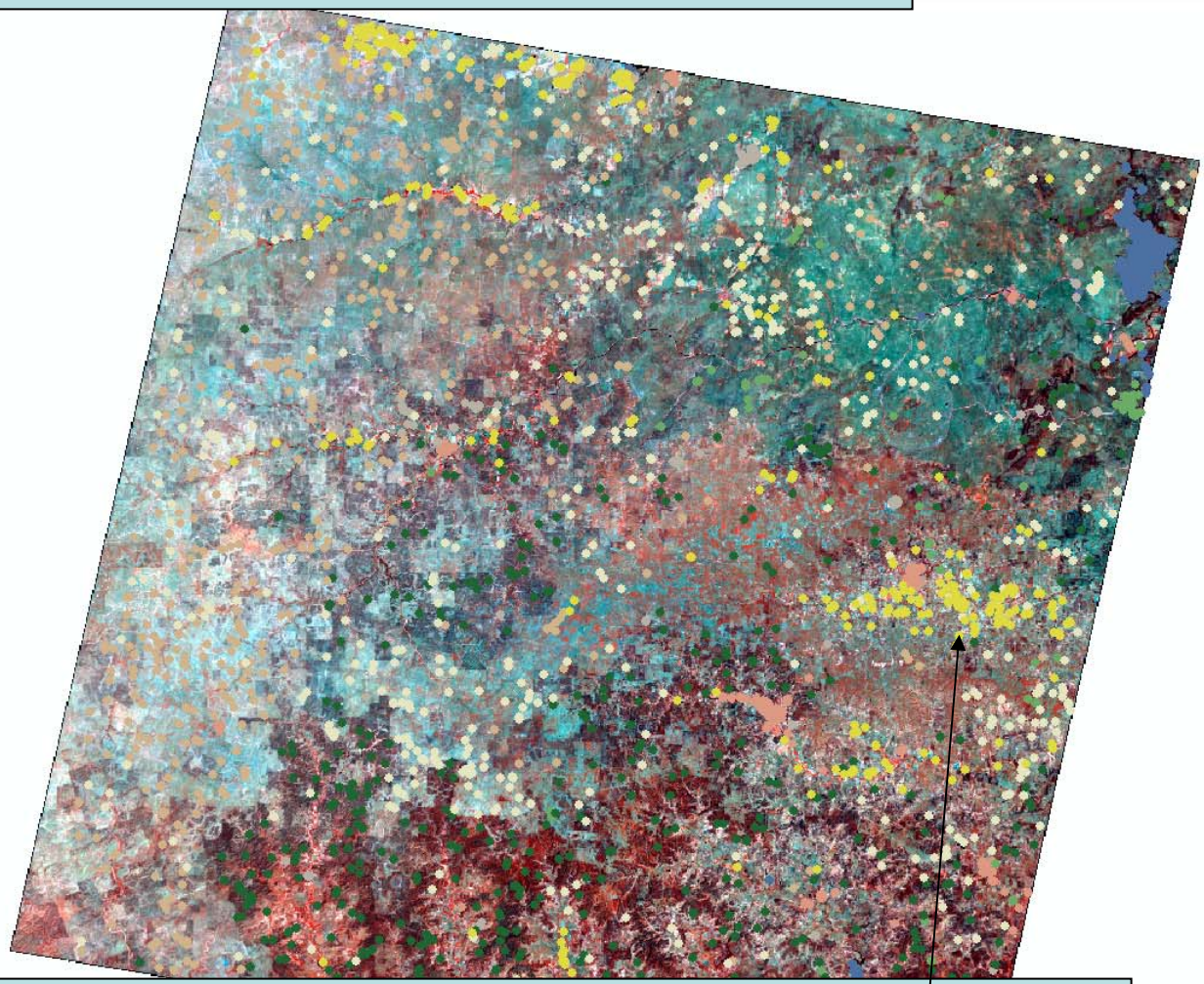
- Create a land cover raster by coding each pixel with a value that represents the land cover type over the majority of that cell's area
- When finished, every cell will have a coded value (**thematic resolution** depends on the number of land cover classes identified)
- Average TM scene is about 34.9 x10^6 pixels



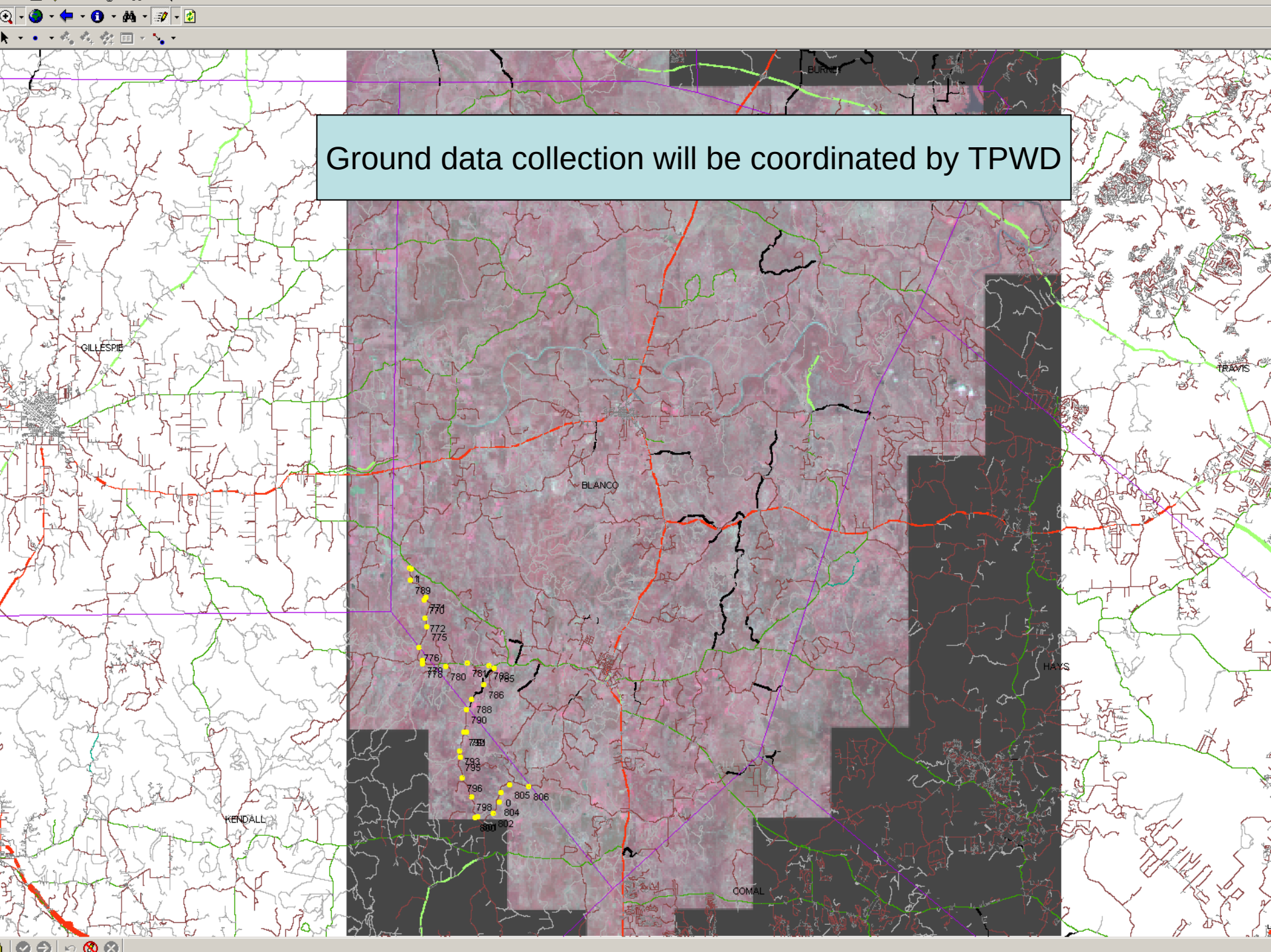




Remote Sensing Classification Approach: Decision Tree (See5).

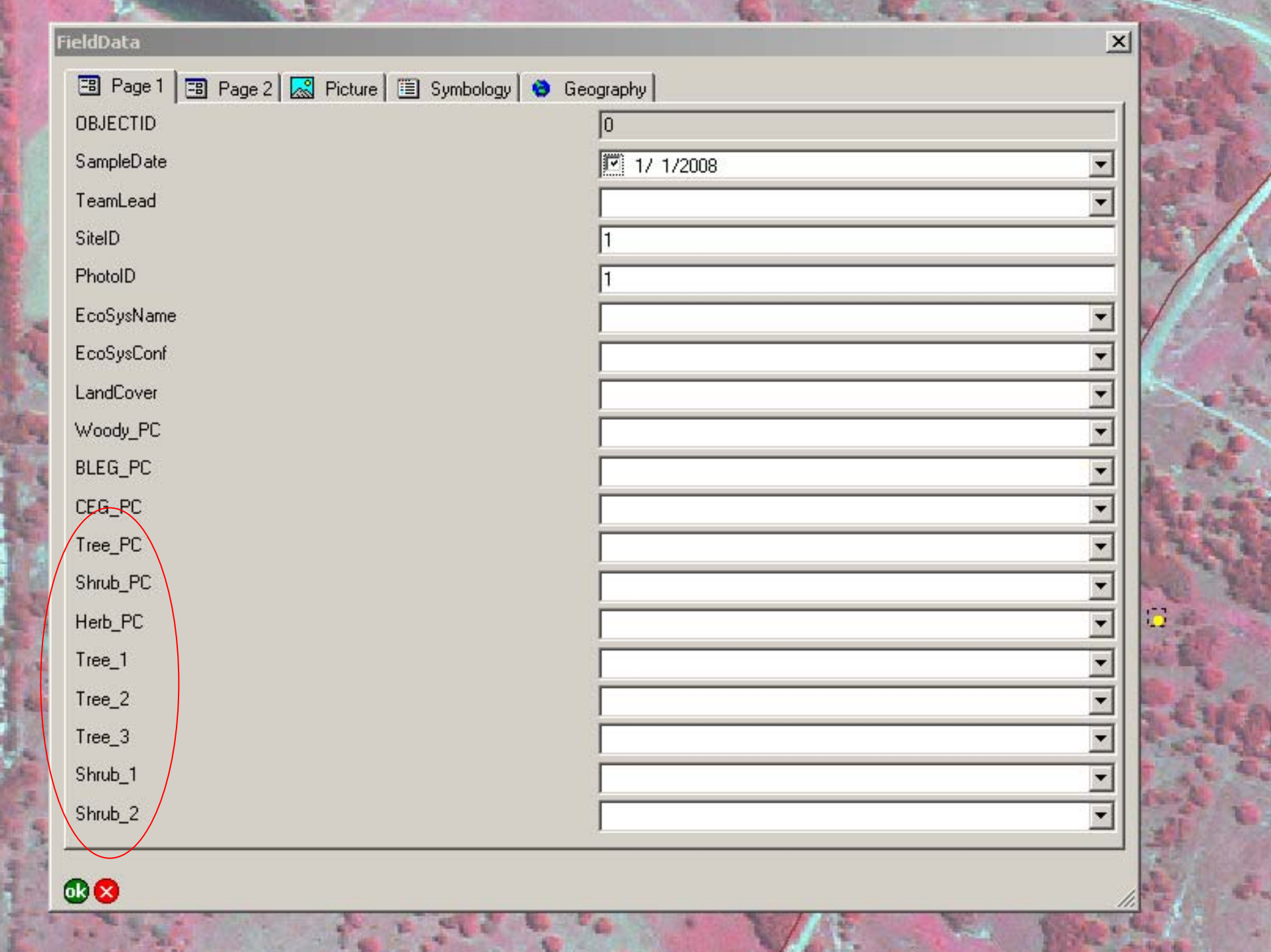


Ideally, the Decision Tree requires at least 150 samples of each target land cover class for each scene.


Ground data collection will be coordinated by TPWD
BURNET
GILLESPIE
BLANCO
TRAVIS
HAYS
KENDALL
COMAL


BLANCO


1500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Page 2
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Geography
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TeamLead
SiteID
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PhotoID
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EcoSysConf
LandCover
Woody_PC
BLEG_PC
CEG_PC
Tree_PC
Shrub_PC
Herb_PC
Tree_1
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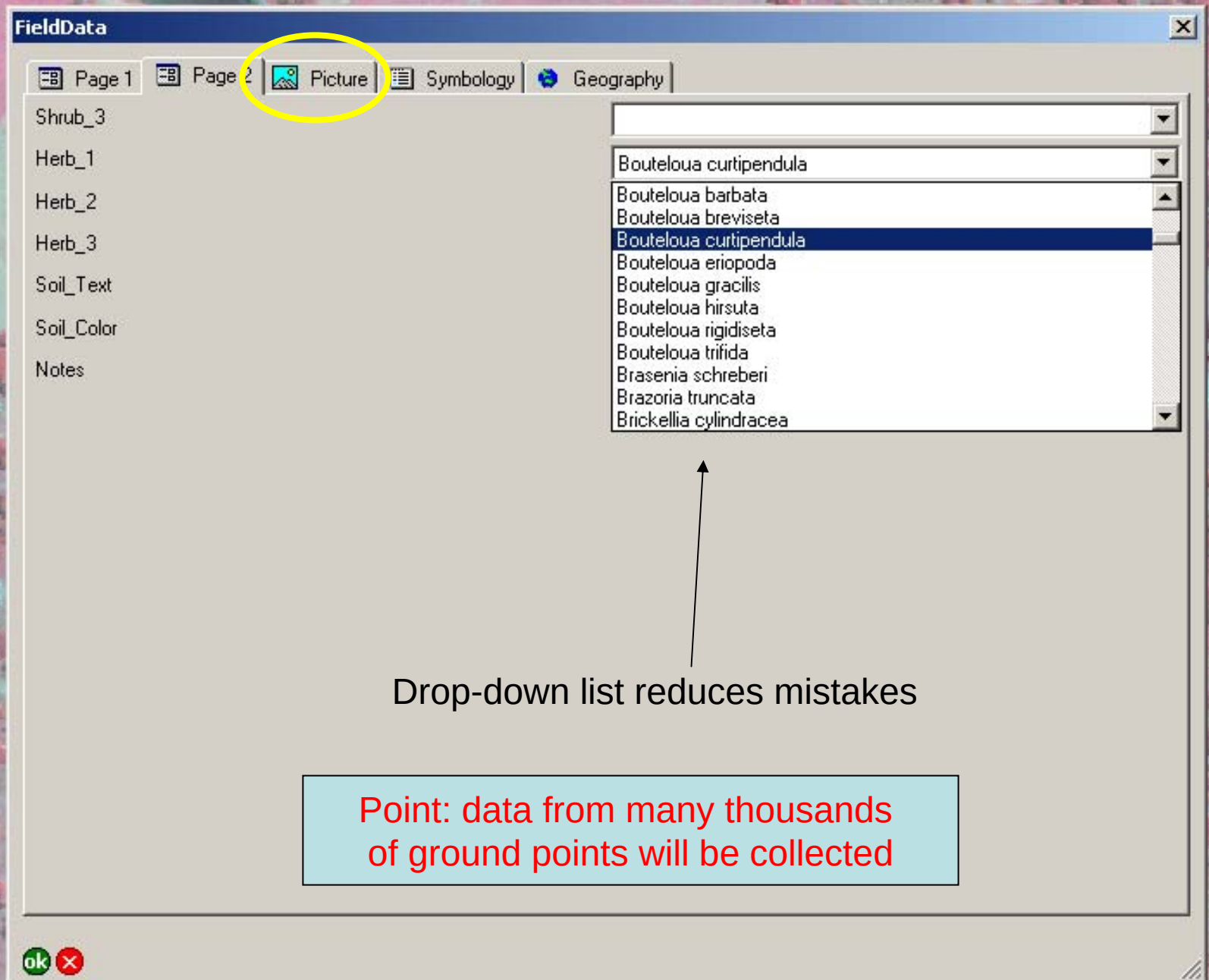
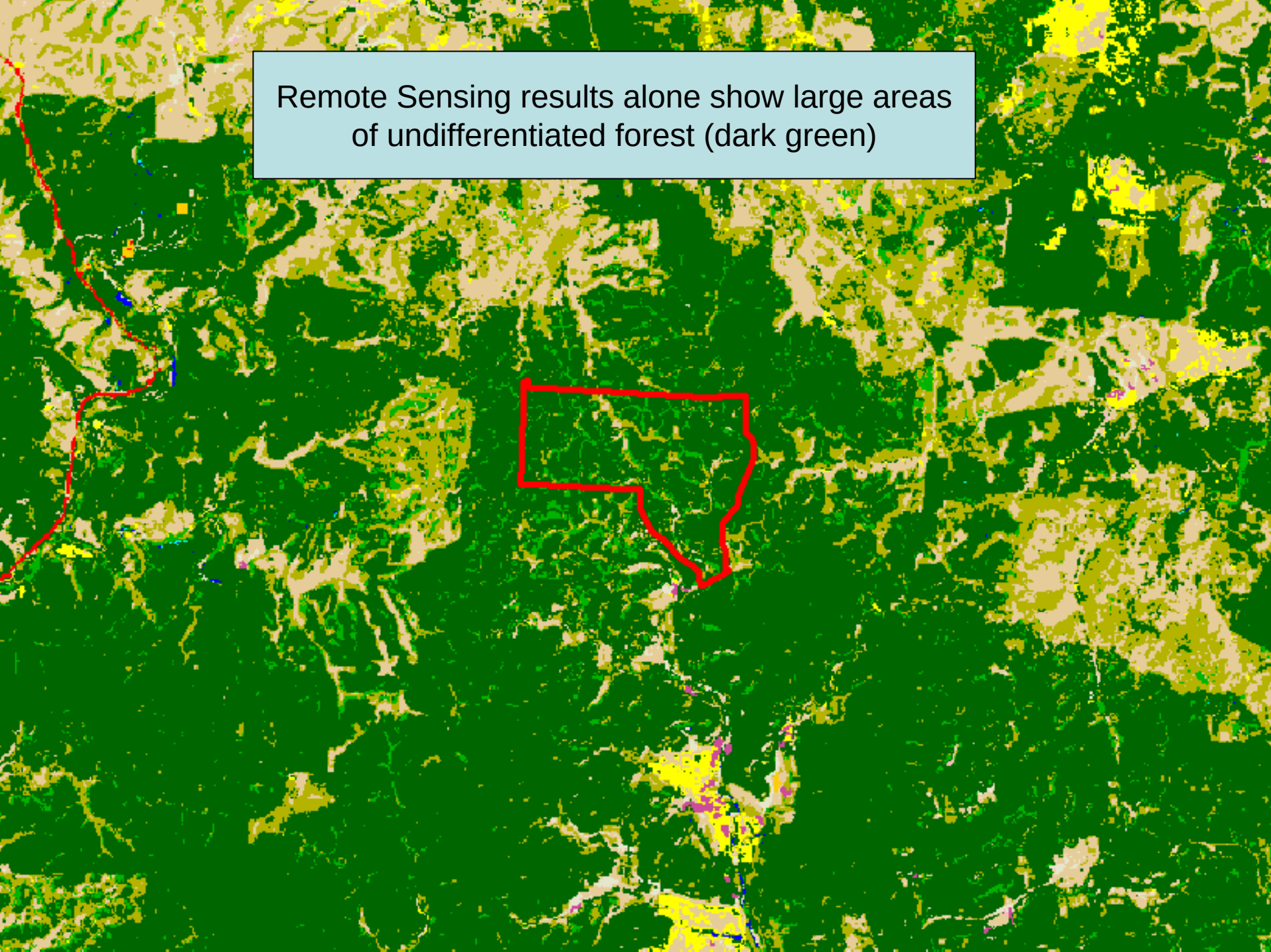
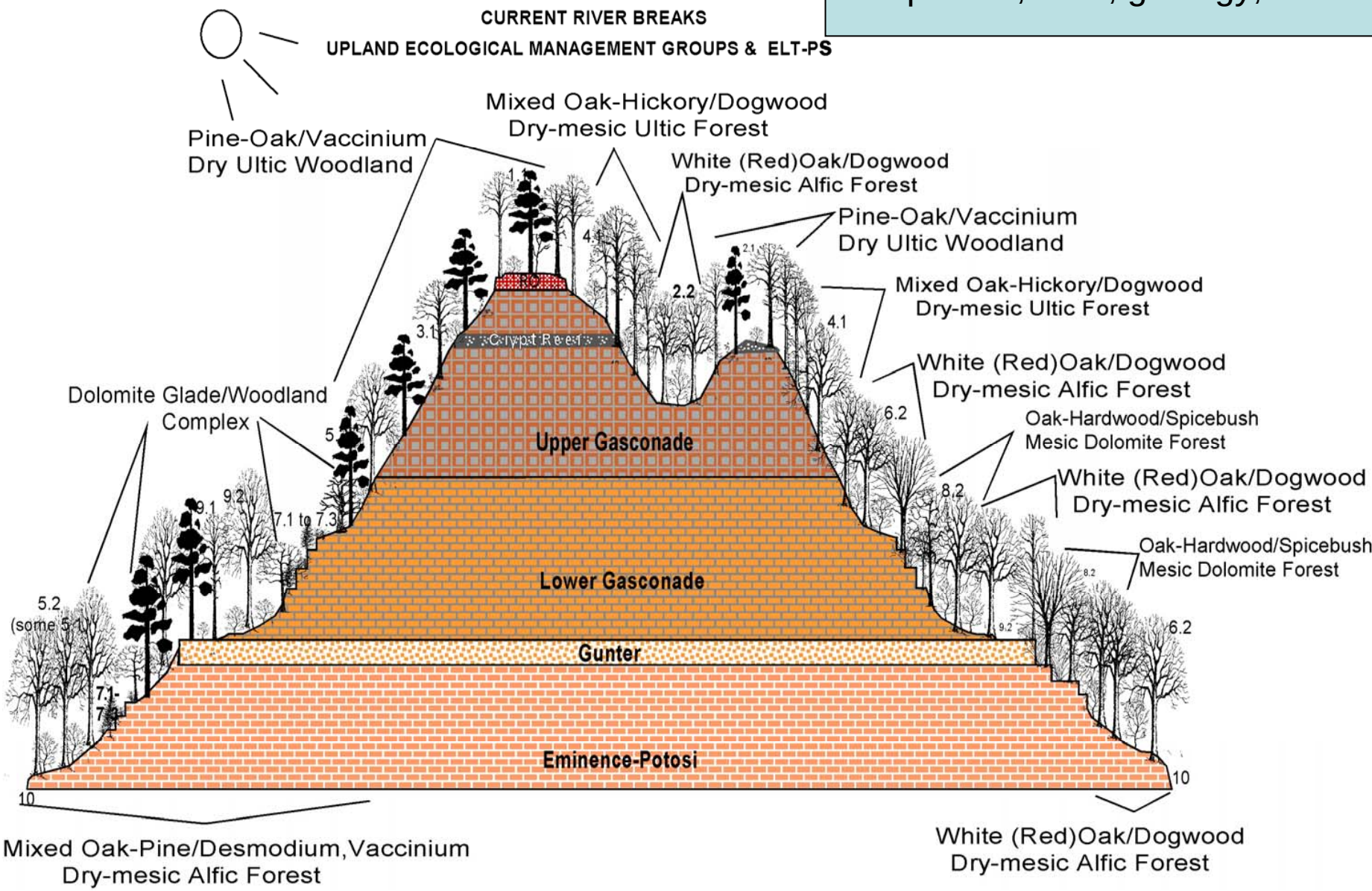
Tree_3
Shrub_1
Shrub_2
ok


FieldData
Page 1
Page 2
Picture
Symbology
Geography
Shrub_3
Herb_1
Herb_2
Herb_3
Soil_Text
Soil_Color
Notes
Bouteloua curtipendula
Bouteloua barbata
Bouteloua breviseta
Bouteloua curtipendula
Bouteloua eriopoda
Bouteloua gracilis
Bouteloua hirsuta
Bouteloua rigidiseta
Bouteloua trifida
Brasenia schreberi
Brazoria truncata
Brickellia cylindracea
Drop-down list reduces mistakes
Point: data from many thousands of ground points will be collected
ok


Remote Sensing results alone show large areas of undifferentiated forest (dark green)

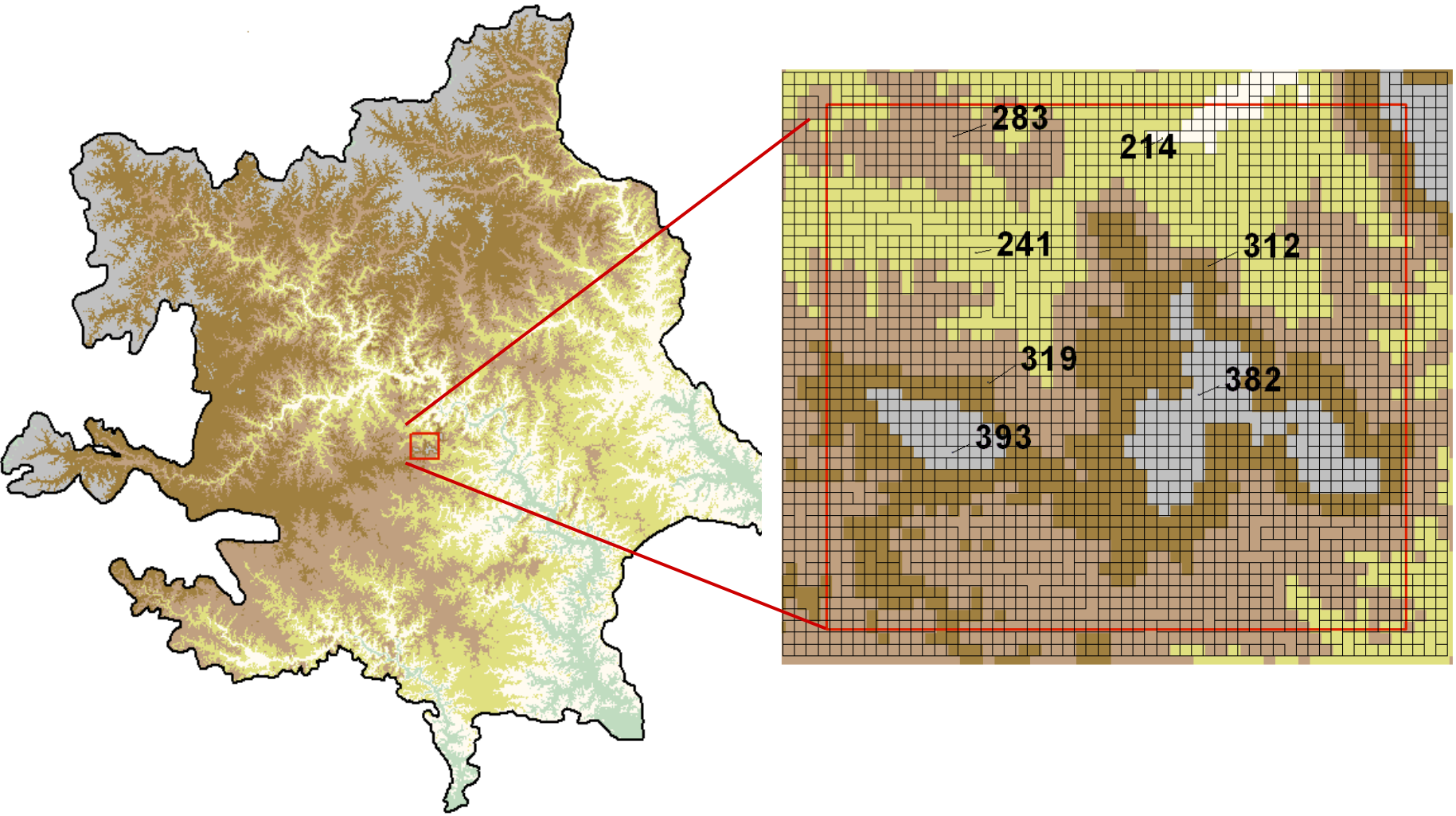
Vegetation is influenced by slope, exposure, soils, geology, etc.



Available Abiotic Data

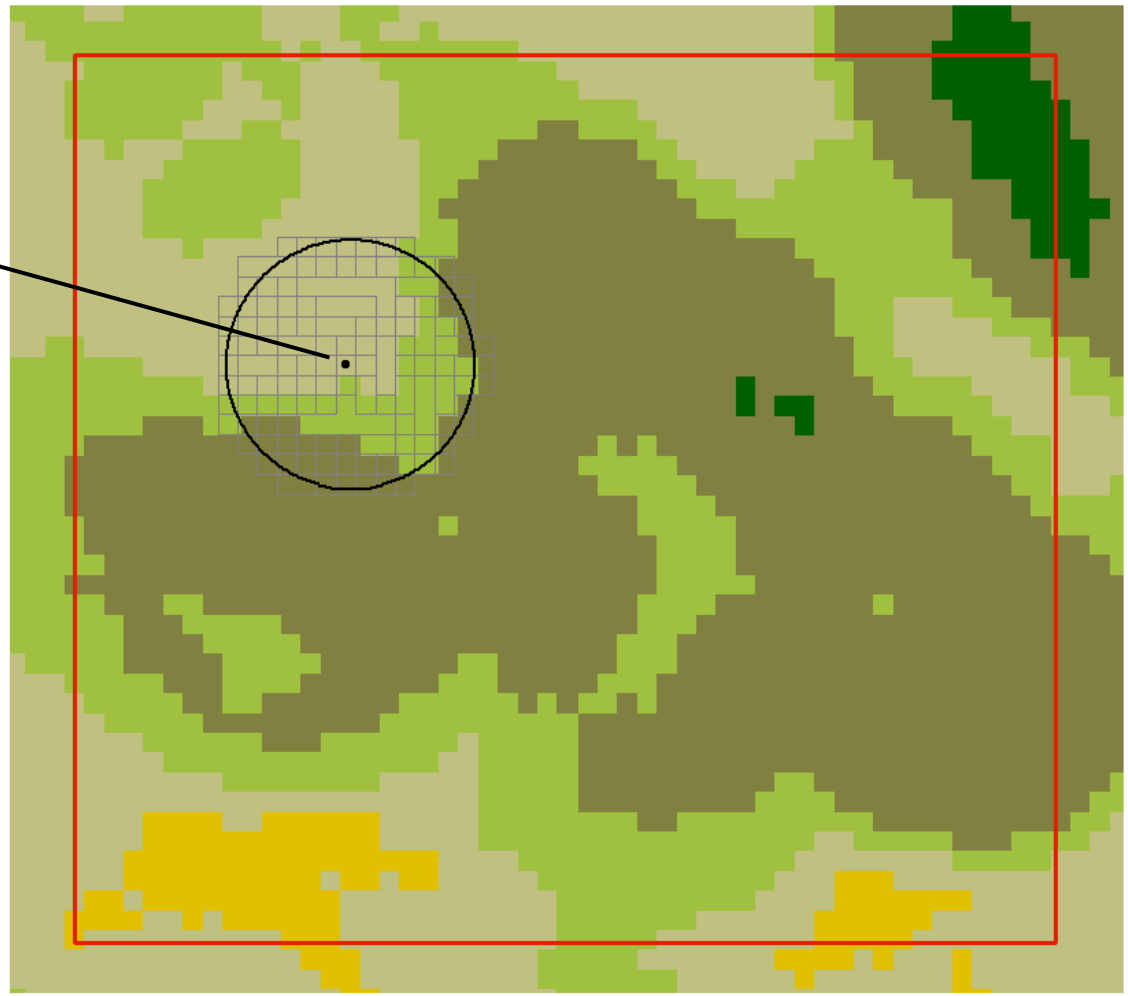
- Digital elevation model derivatives (slope, aspect, land position, relative moisture indices, solar insolation)
- SSURGO soils (digital county surveys)
- Geologic Atlas of Texas (250,000 scale)
- National Hydrologic Dataset (24,000 scale stream network)

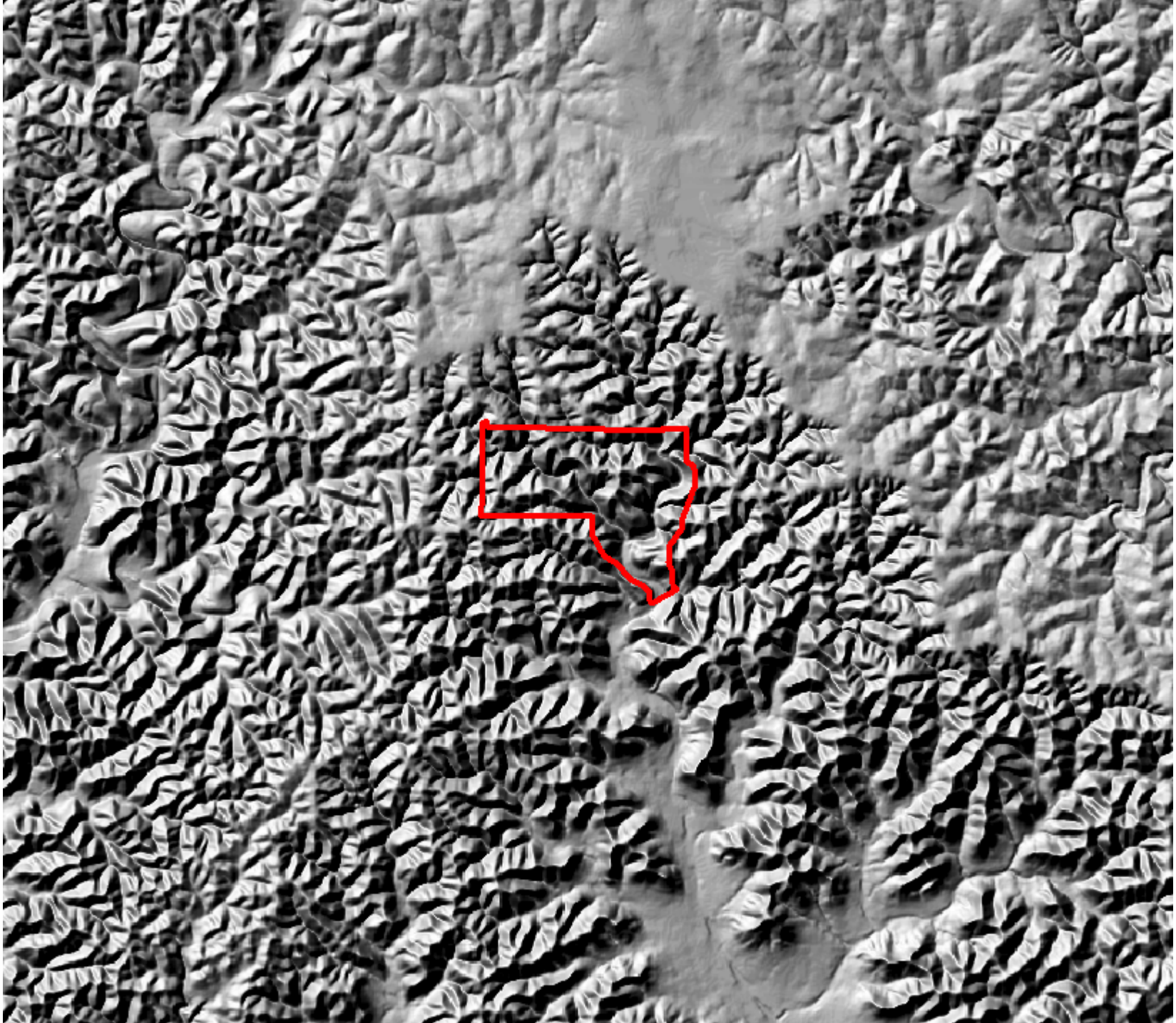
Digital Elevation Models (DEMs) - elevation is represented by a regular grid with elevation values

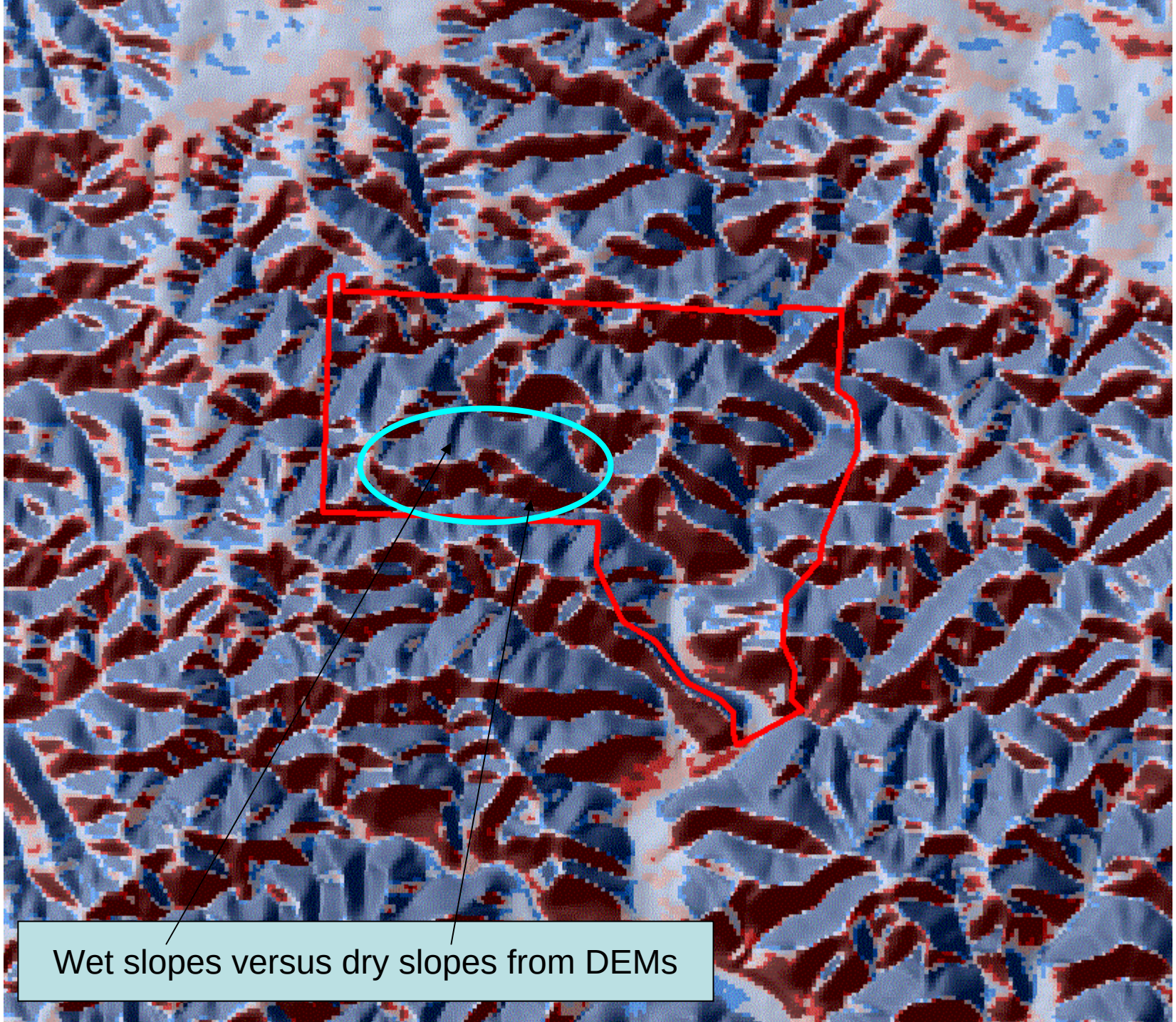


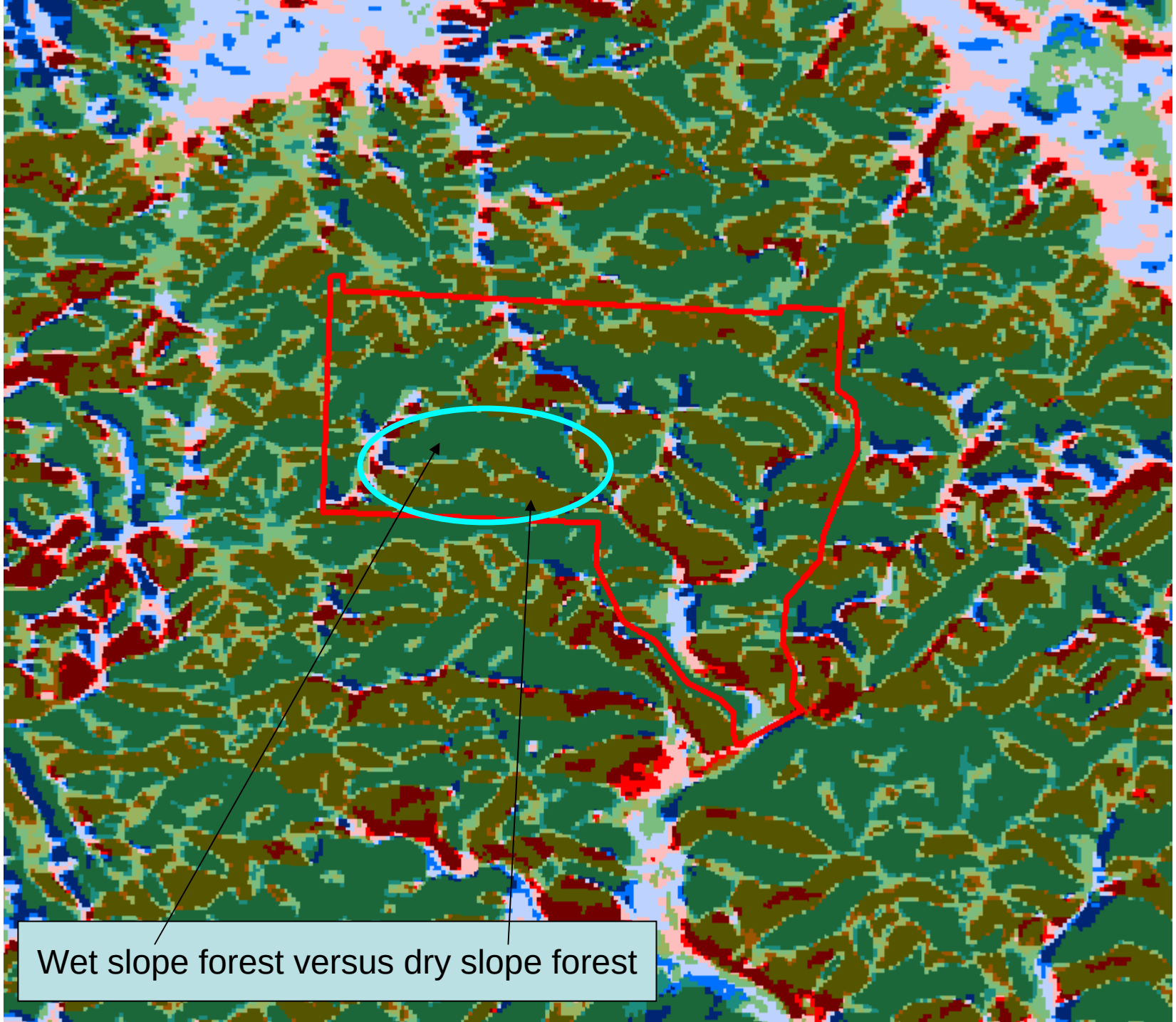
Neighborhood analysis of DEMs: the elevation range surrounding the center cell is relief

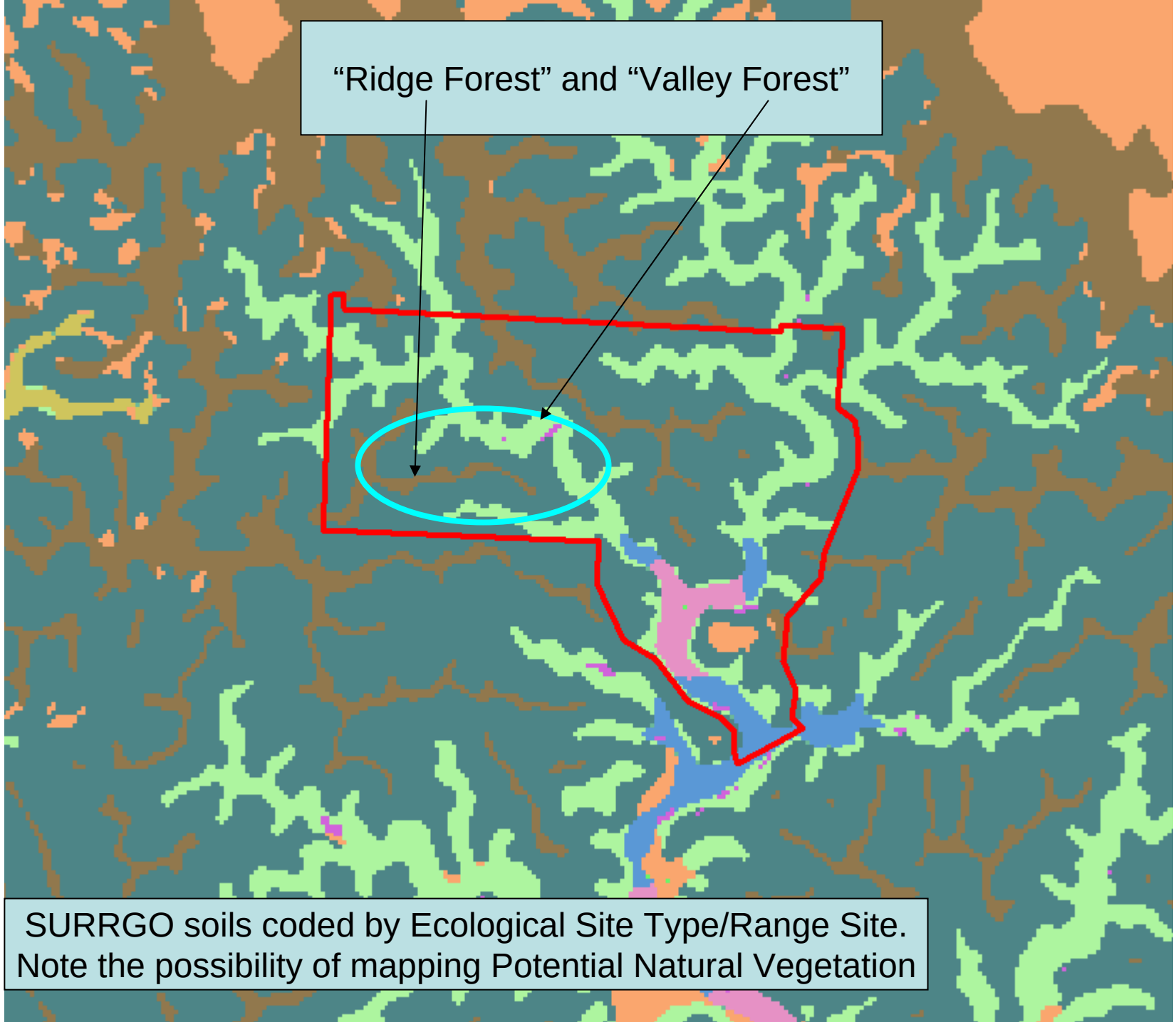
Example: Total relief within the circle is the difference between highest and lowest cell



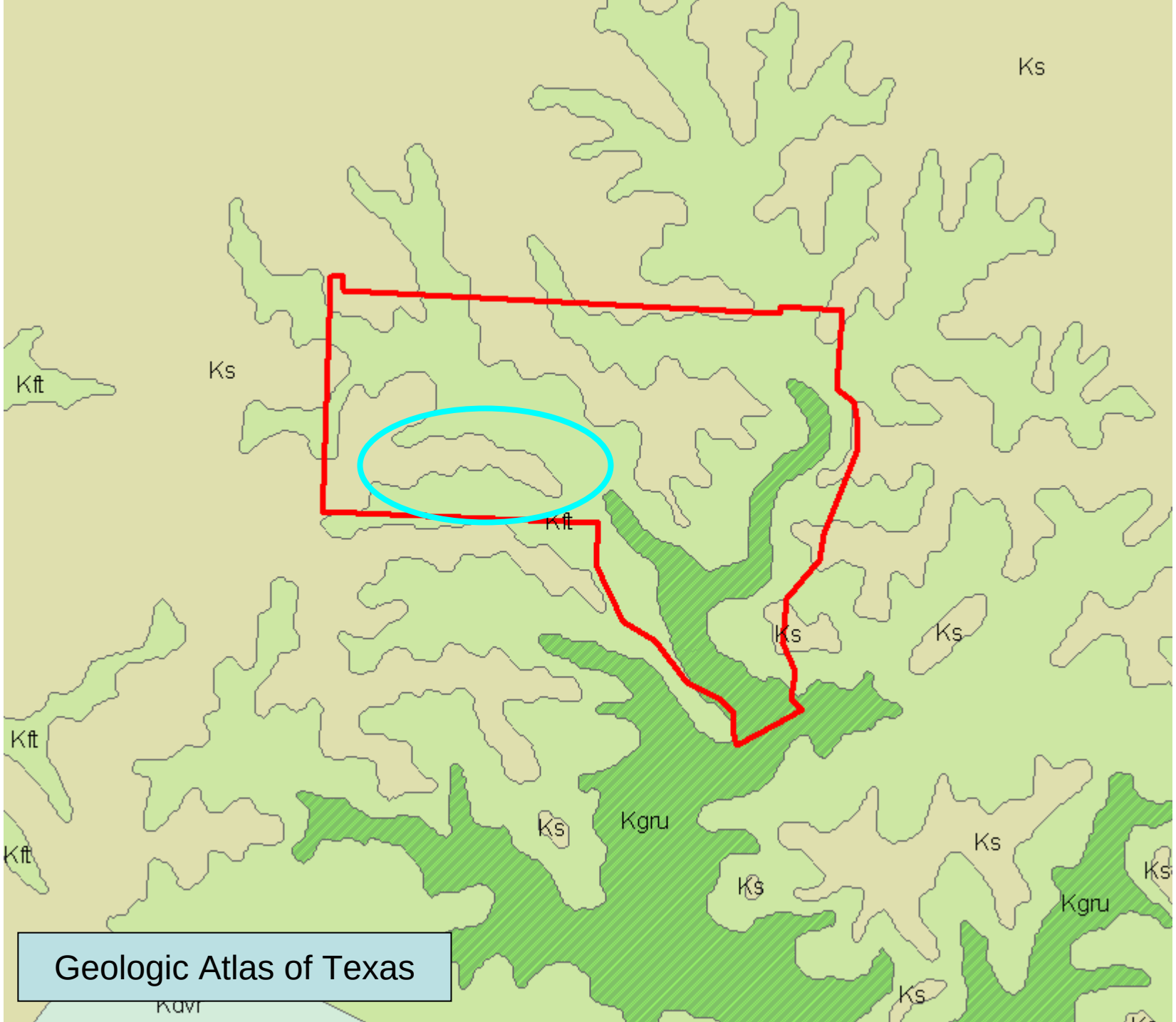



Wet slopes versus dry slopes from DEMs


Wet slope forest versus dry slope forest



SURRGO soils coded by Ecological Site Type/Range Site.
Note the possibility of mapping Potential Natural Vegetation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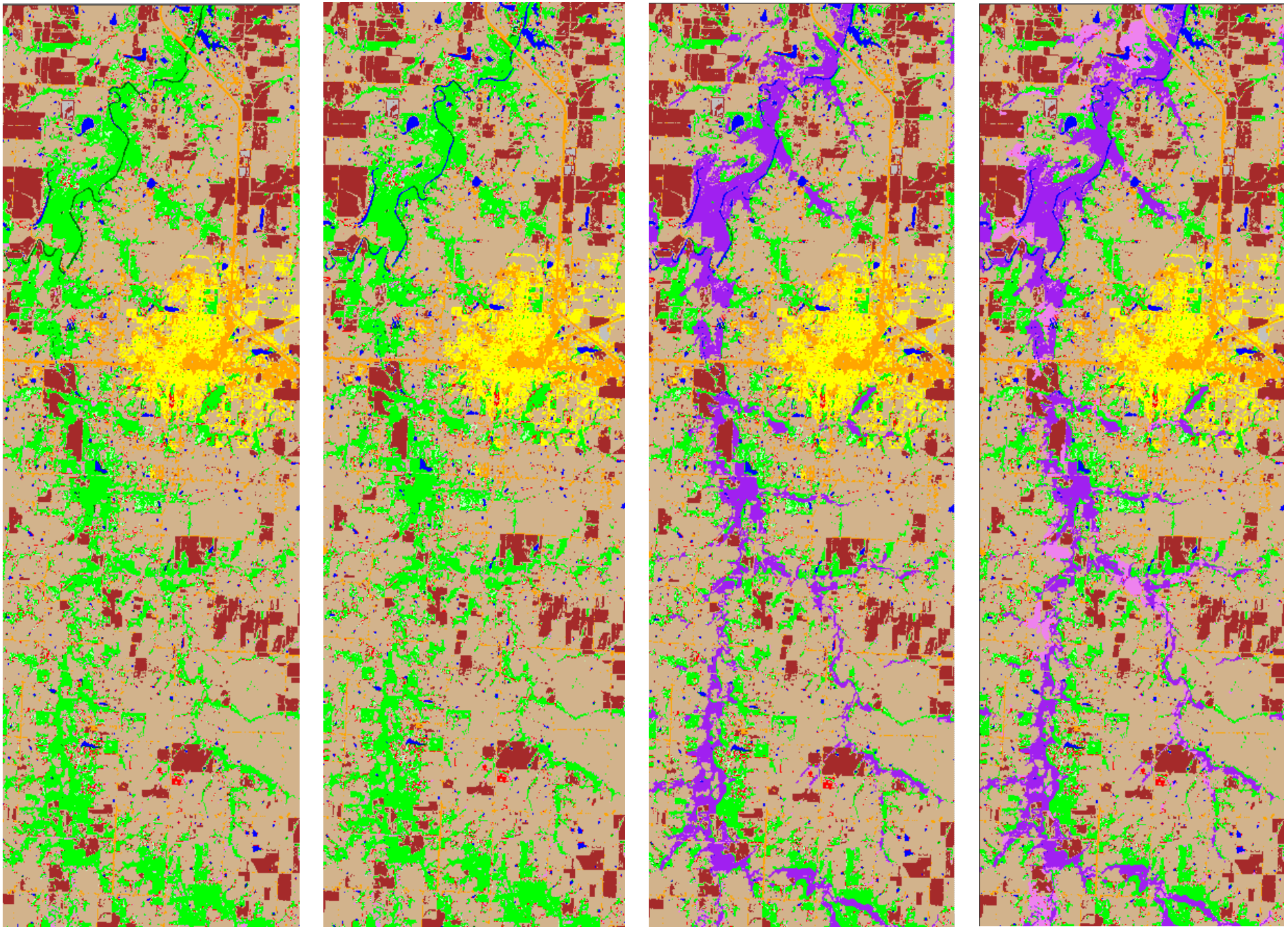
Geologic Atlas of Texas

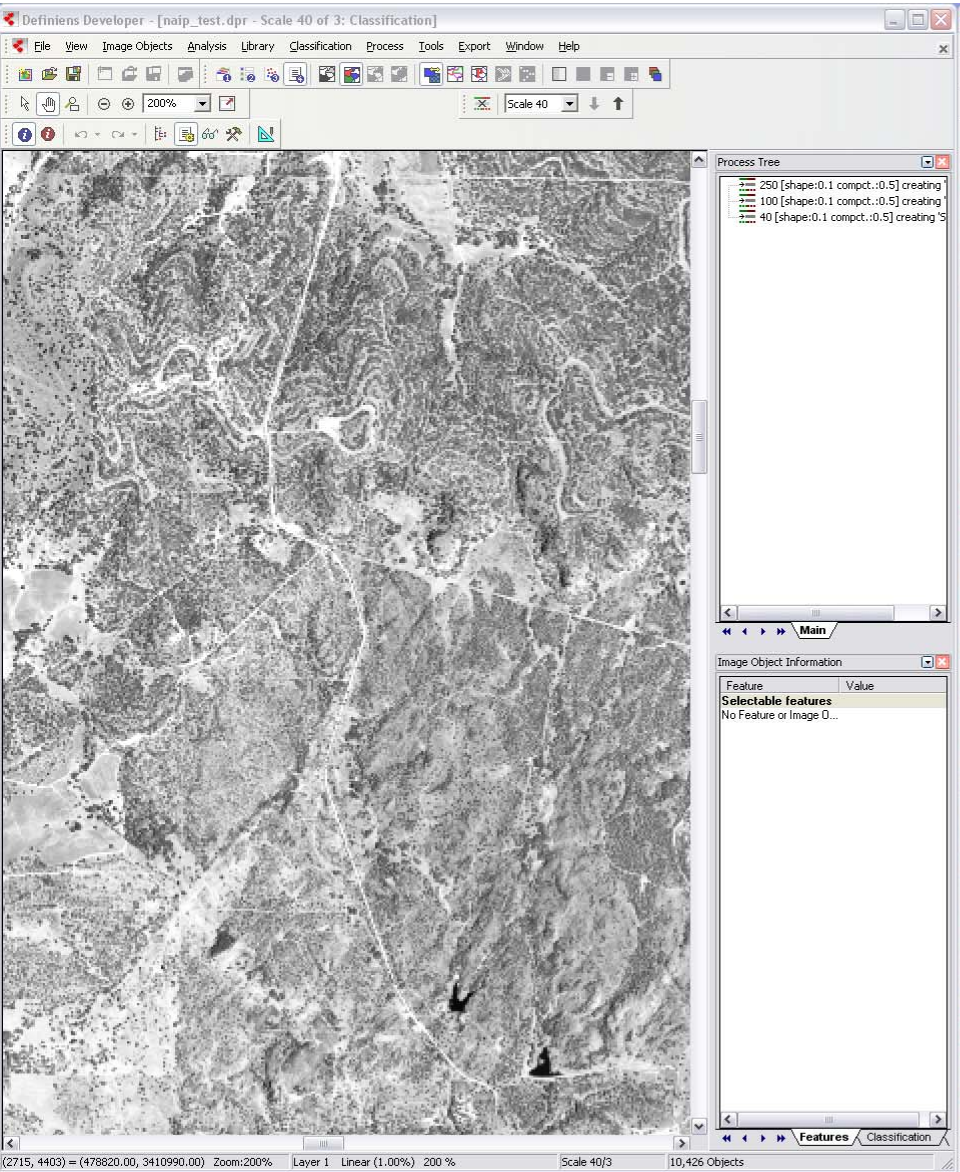


Review Methodology

- Classify satellite data using ground truth information and decision tree
- Overlay abiotic data (from DEM analysis, SSURGO soils, geology, hydrology) to improve thematic resolution and accuracy
- Map both potential and existing vegetation

Shelby Metcalf, former basketball coach at Texas A&M, recounting what he told a player who received four F's and one D: "Son, looks to me like you're spending too much time on one subject."

Air Photo versus Satellite (ETM++) Image



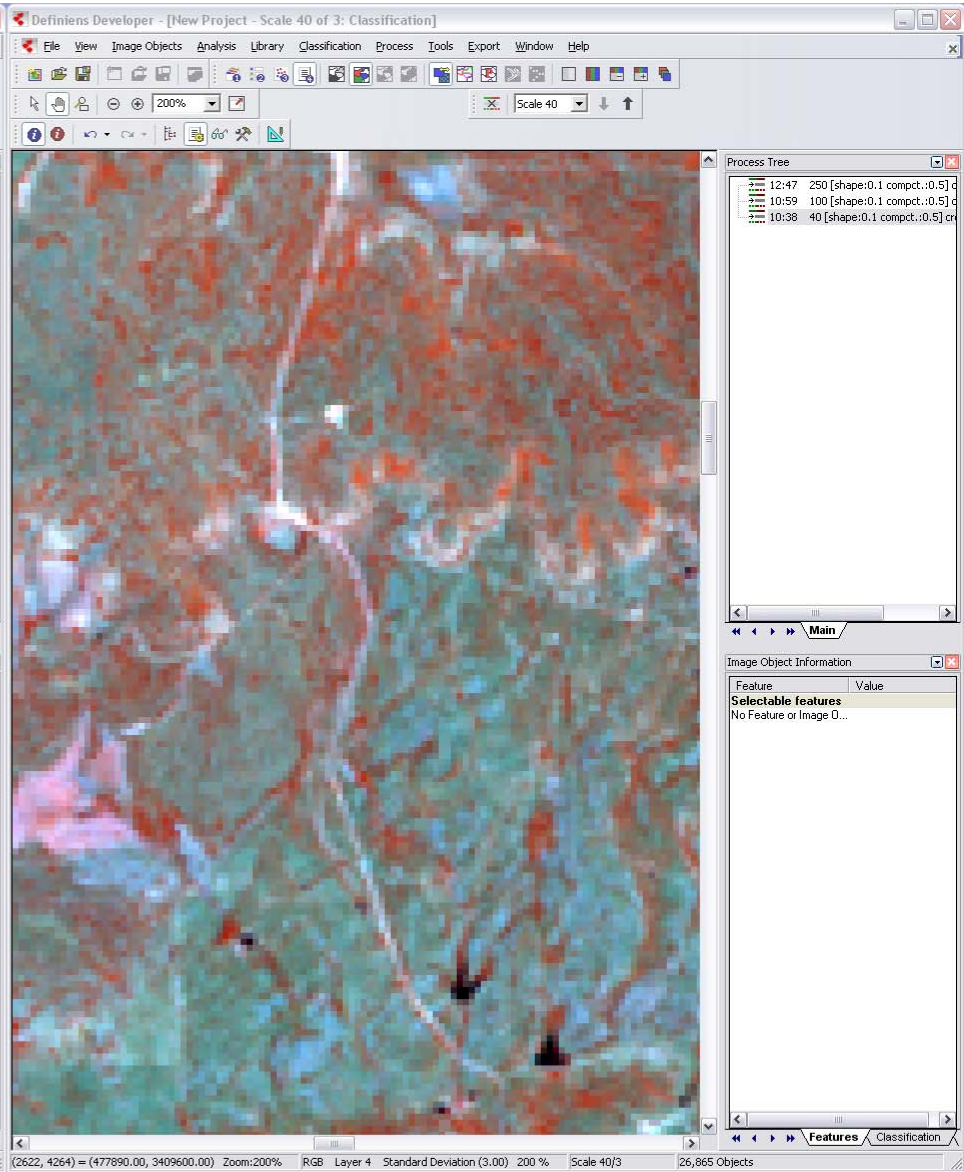
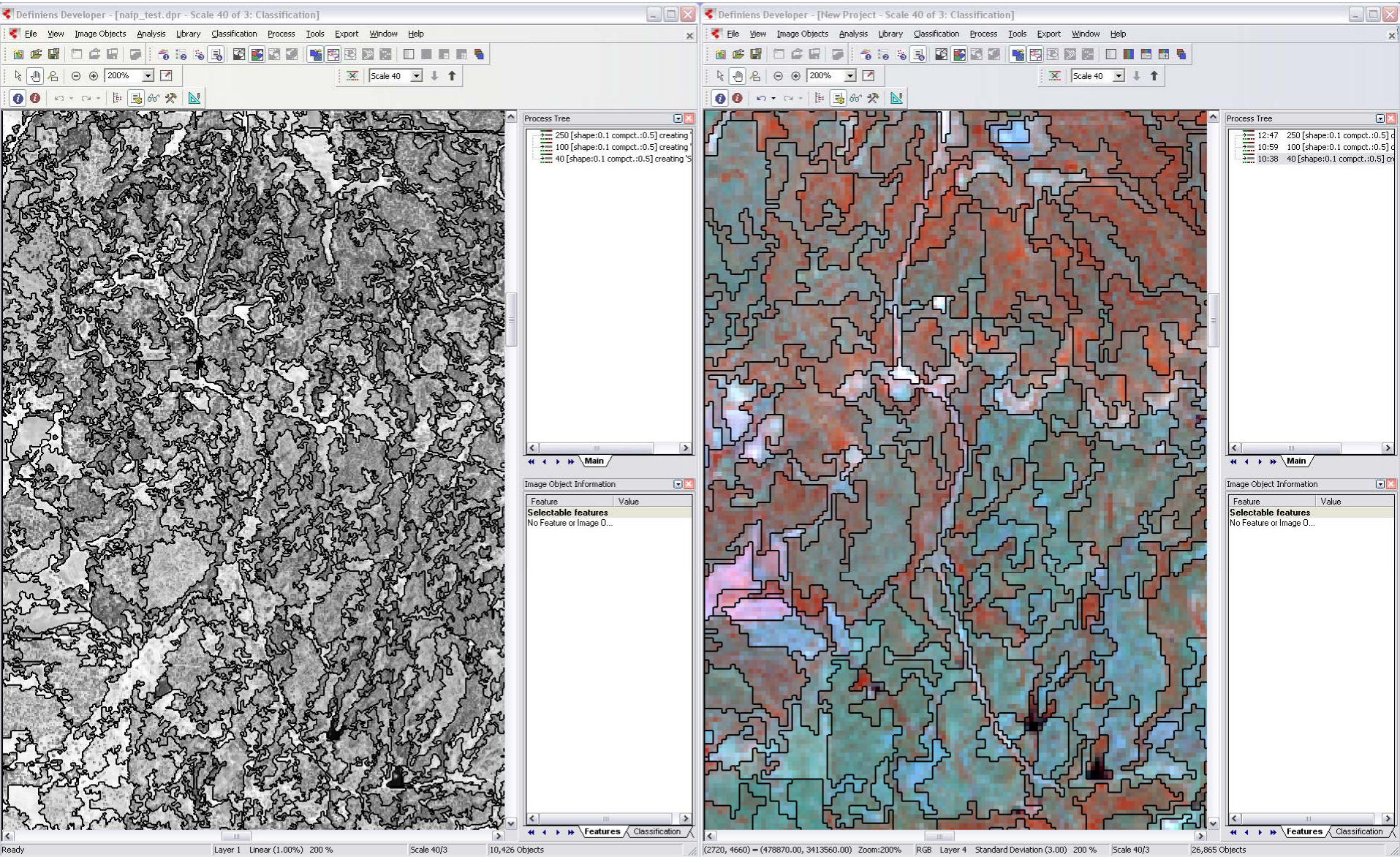


Image Objects – Improvement in Spatial Resolution



Products/Enduring Value

- Potential natural vegetation
- Existing vegetation using an improved classification (Lee Elliott's talk)
- Interpretive Booklet
  - Topo-sequences / landscape profiles of potential and existing vegetation
  - Percent conversion from potential (spatially explicit)
  - Narrative interpreting the current land cover (e.g. dynamics, management)
  - Photos
- Ground truth dataset (around 10,000 points)
- User will build their own added value:
  - Context (local, regional, statewide)
  - Management options
  - Conservation opportunity areas
  - Ecological significance and risk (aquatics as well)
  - Species habitat modeling
  - Development of educational and interpretive materials
  - Change detection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