

# The Foundation for Stewardship: Understanding the Opportunities

ESA 2011

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**Map Abiotic Site Types**

**Map Current Vegetation  
Types**

Potential + Existing

**Opportunity 1**

**Opportunity 2**

**Opportunity 3**



# Texas Ecological Systems Classification Project



**Kim Ludeke, Duane German,  
Amie Treuer-Kuehn**



**Jim Scott**



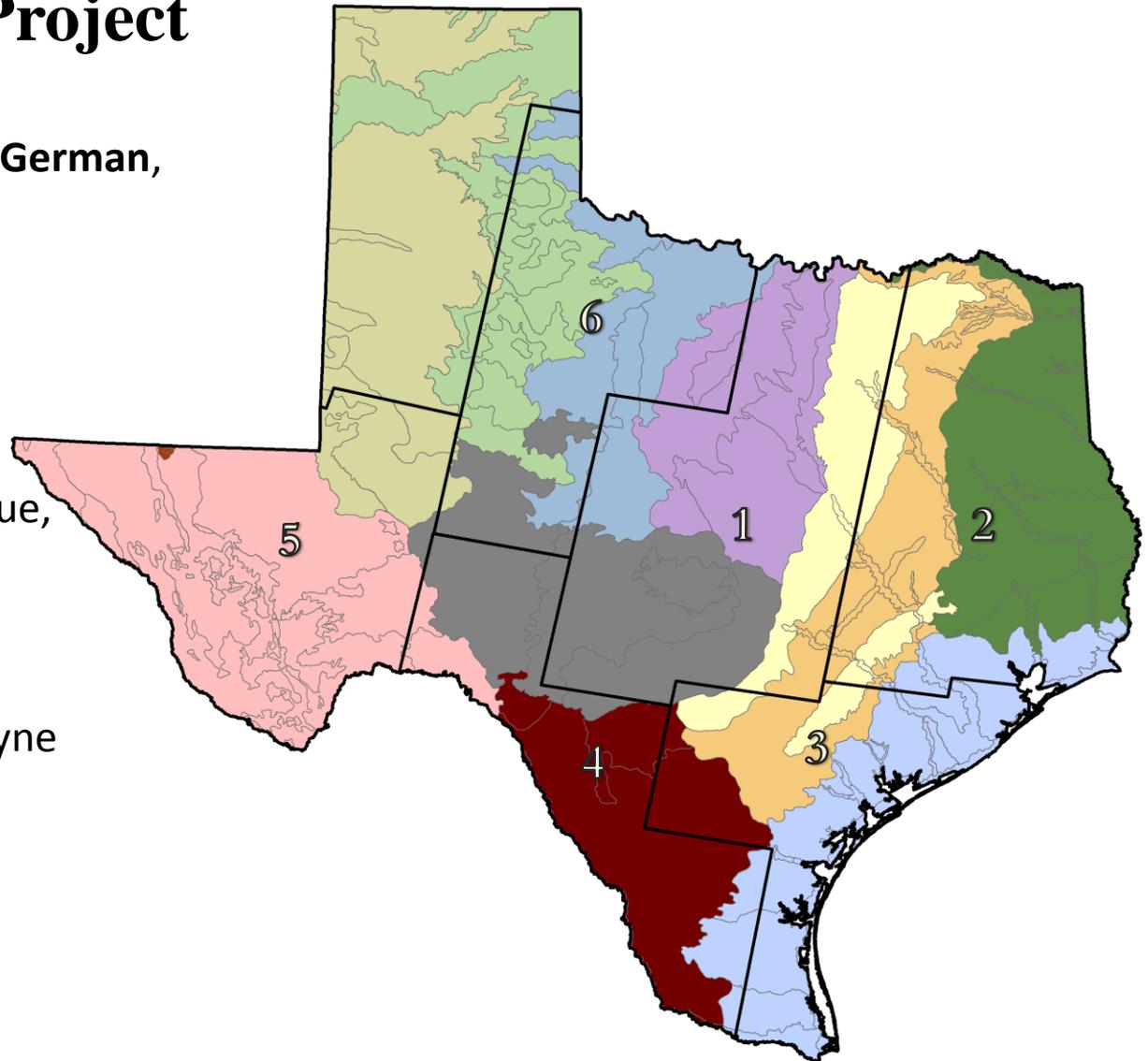
**David Diamond,  
Lee Elliott, Diane True,  
Clayton Blodgett,  
Dyanna Pursell**



**Judy Teague, Milo Pyne**



**Bill Carr**



# Key Improvements Desired for Current Vegetation Type Maps in Texas

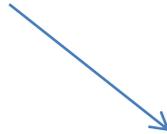
- Increased thematic resolution (more land cover classes)
- Increased spatial resolution
- More use of ground-based data
- Nationally-recognized classification system to define current vegetation type mapping targets



**Classify Land Cover**  
(15 classes – specific to Phase)



Satellite TM Data for 3 Dates (30 m)  
Environmental Variables  
NAIP Photos for “objects” (10 m)



**Abiotic Site Types**  
(Potential Vegetation)



SSURGO Soil Groups  
Solar Insolation, %Slope  
Land Position  
Hydrology



Modeling: Map final current vegetation  
types from land cover and abiotic site type



**Mapped Current  
Vegetation Types**  
(304 classes – Phases 1 - 4)

# A Conceptual Edwards Plateau Landscape

Representative Edwards Plateau Mapped Vegetation



Abiotic Site Types are required to model & map current vegetation

## Classify Land Cover

(15 classes – **specific to Phase**)

## Abiotic Site Types

(Potential Vegetation)

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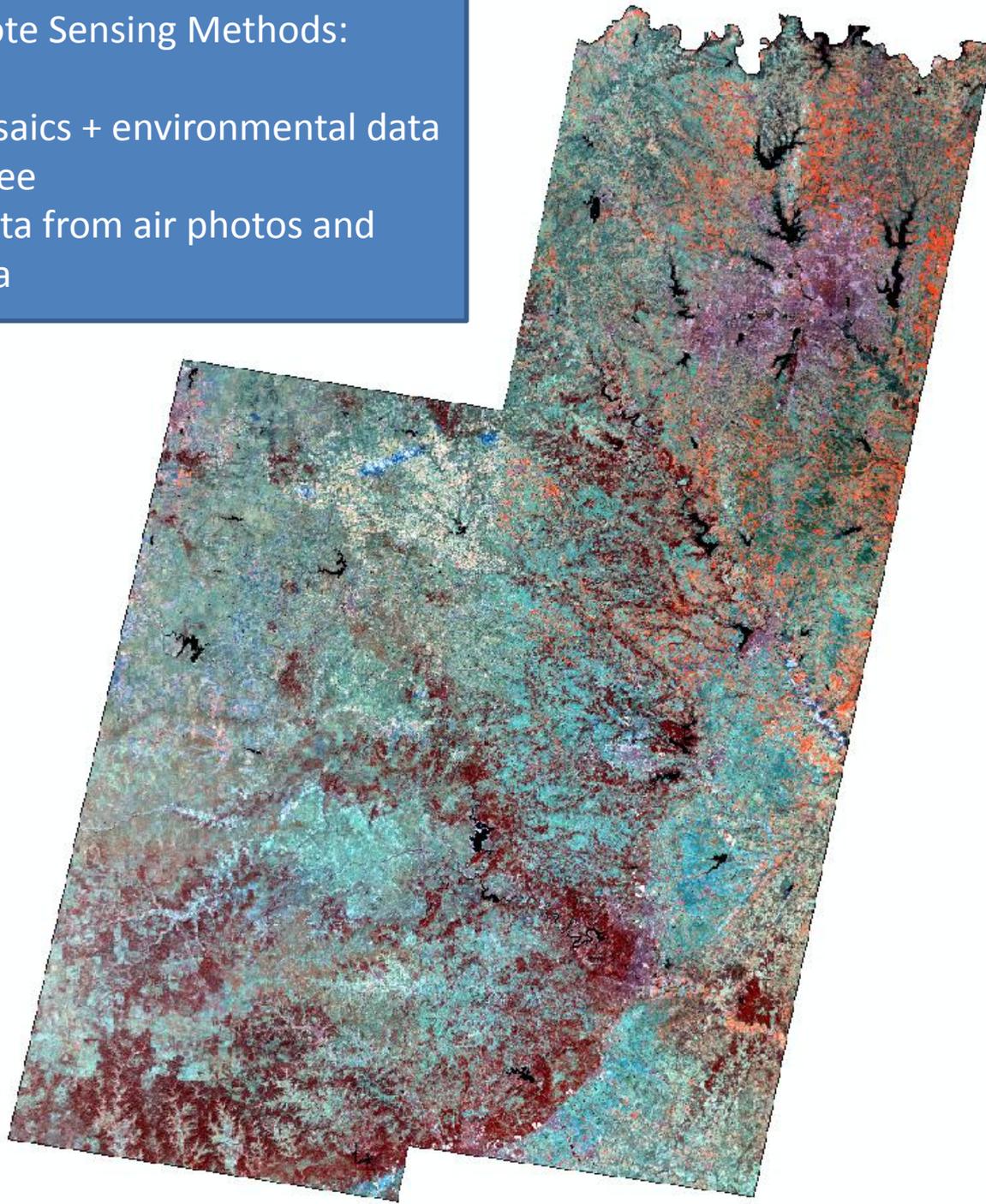
## Final Mapped Current

## Vegetation Types

(304 classes)

## Remote Sensing Methods:

- 3-date mosaics + environmental data
- decision tree
- training data from air photos and ground data



# Quantitative Field Data Collection

- top 3 dominant species in tree, shrub, and herbaceous strata
- total percent cover by strata
- land cover, ecological system/subsystem
- reference photo
- 9000 samples to date



Improving spatial resolution by  
use of image objects

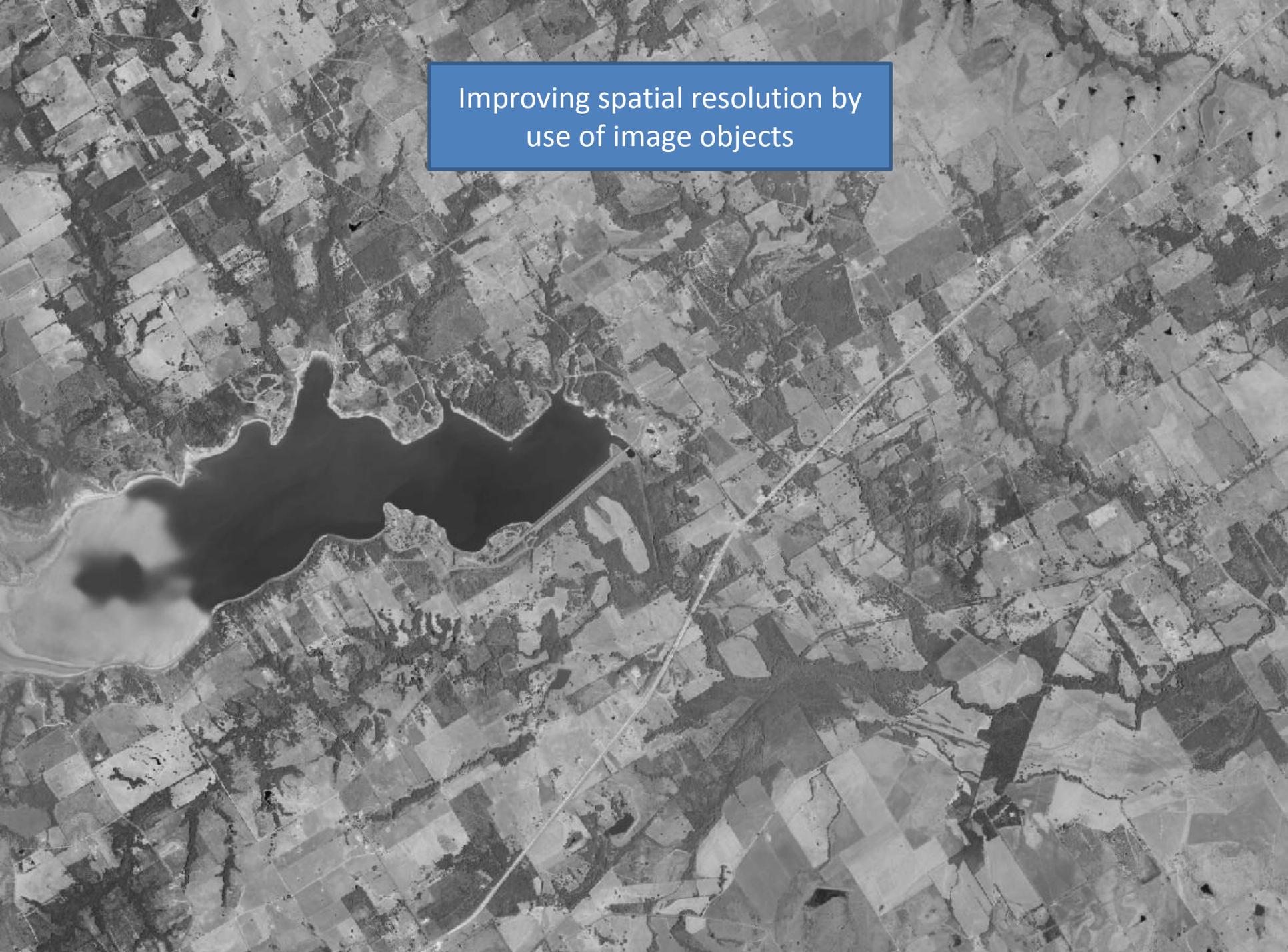


Image objects generation at 10 m



Pixel-based vs object-based land cover



Pixel-based vs object-based land cover



**Classify Land Cover**  
(15 classes – specific to Phase)

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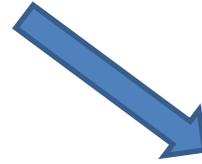
Modeling: Map final current vegetation types from land cover and abiotic site type

**Final Mapped Current Vegetation Types**  
(304 classes)

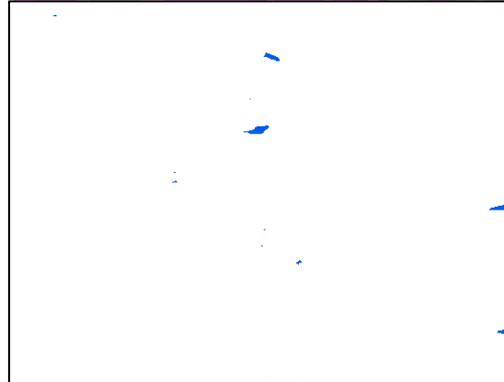
# Current Vegetation Type Modeling: Attribution of Image Objects & Application of Rules



Land Cover



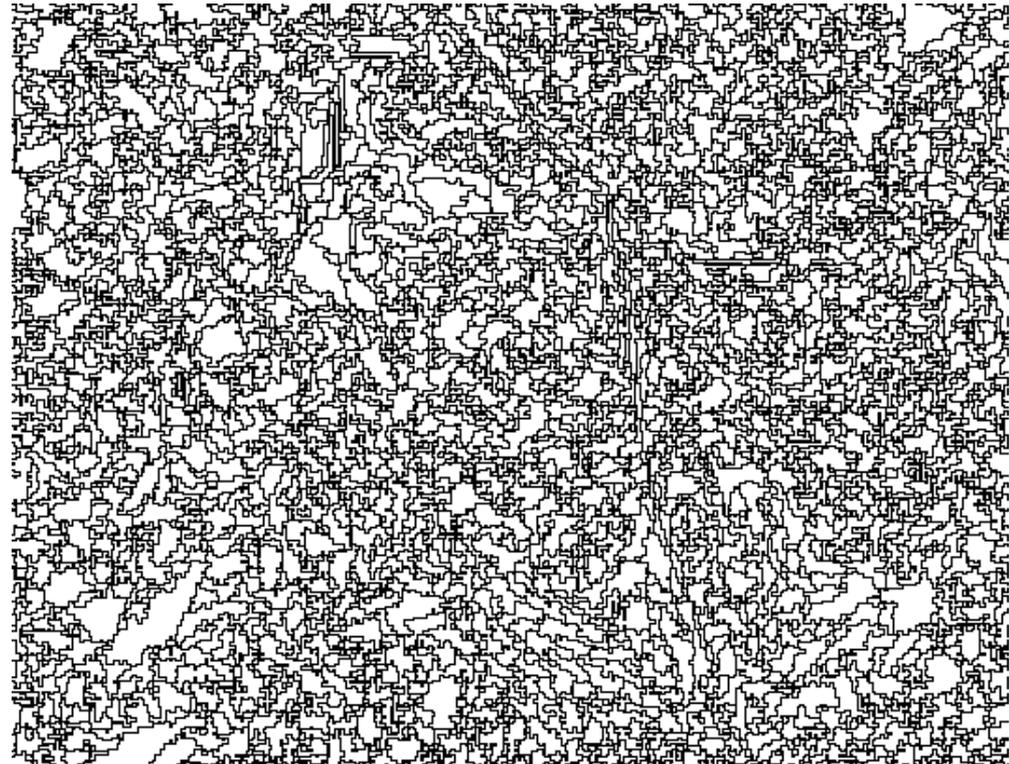
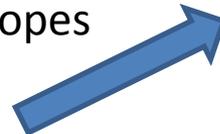
Soils



Extreme  
Land  
Positions



Steep  
Slopes



Allows "extension" of land cover classification

## Land Cover (15 classes): Deciduous Forest



### **Mapped Current Vegetation Types (109 for Texas Phase 1)**

Post Oak Savanna: Post Oak Motte and Woodland

Central Texas: Floodplain Hardwood Forest

Crosstimbers: Post Oak Woodland

Edwards Plateau: Texas Oak/Hardwood Slope Forest

Edwards Plateau: Oak/Hardwood Motte and Woodland

Edwards Plateau: Floodplain Hardwood Forest

Edwards Plateau: Riparian Hardwood Forest

Edwards Plateau: Post Oak Motte and Woodland

Native Invasive: Deciduous Woodland

Native Invasive: Mesquite Woodland and Shrubland

Bastrop Lost Pines: Hardwood Slope Forest

High Plains: Riparian Hardwood Forest

# Texas Vegetation Classification Project: Interpretive Booklet for Phase I

Texas Parks and Wildlife  
Department and Texas  
Natural Resources  
Information System

Contacts: Kim Ludeke, Duane  
German, and Jim S

Representative Edwards Plateau Mapped Vegetation

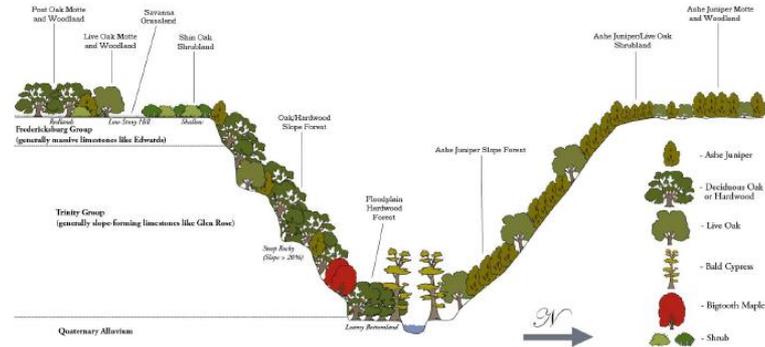


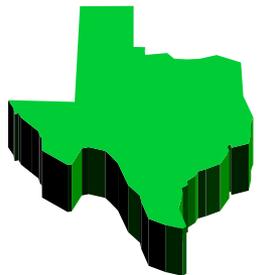
Figure 5. Screen-capture of ground verification data collection database schema, overlay of data collection plots on satellite image, and photograph take at one data plot.

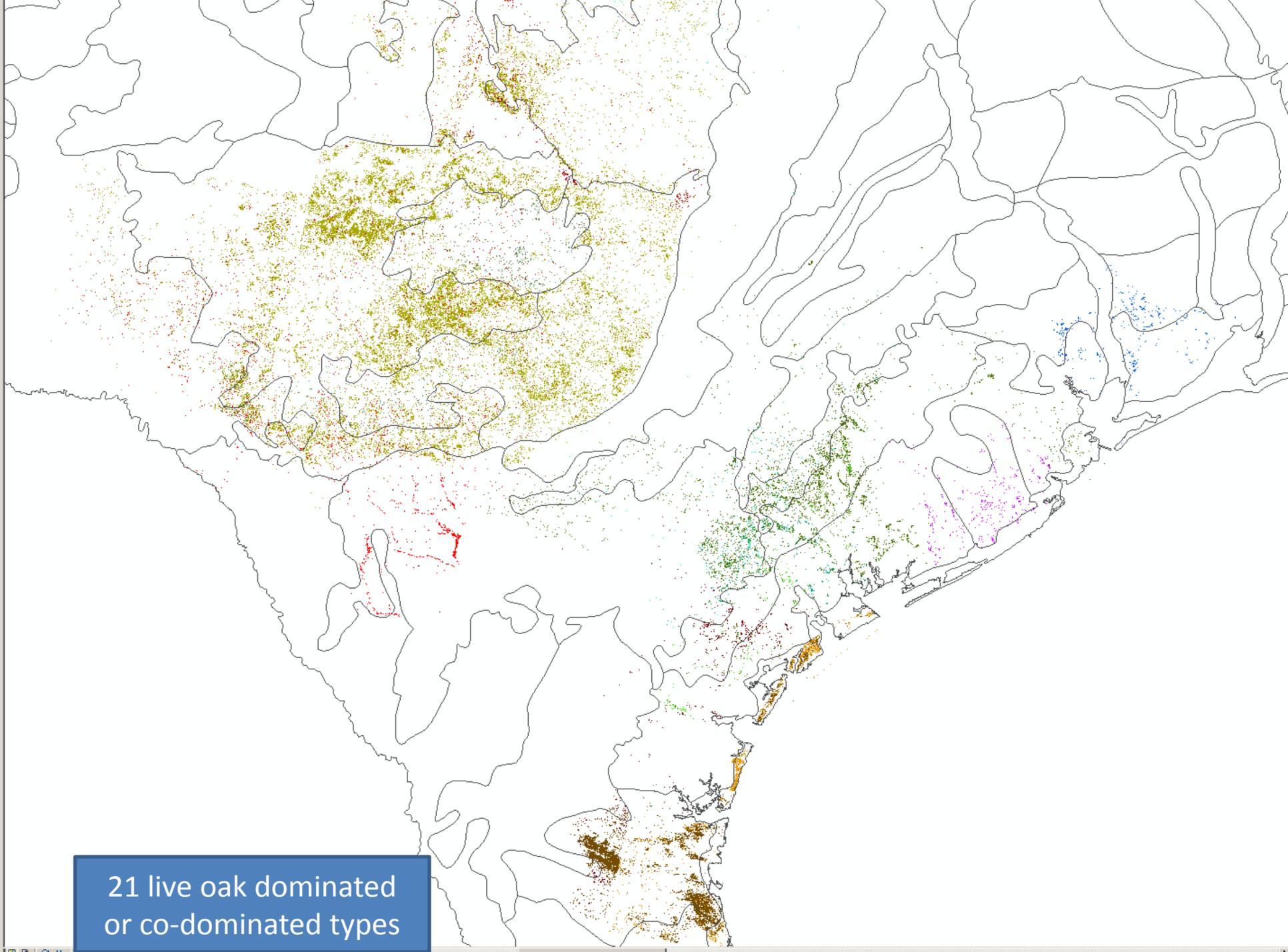
Property	Value
OBJECTID	2762
SampleDate	2/14/2003
TransLat	Annie Treaner
SHAPE	1302
PhotoID	1302
EcosystemName	Edwards Plateau: Riparian/Herbaceous Vegetation
EcosystemConf	Very High
LandCover	Grassland
Woody_PC	6-25
BLEG_PC	
CEG_PC	0-5
Tree_PC	0-25
Shrub_PC	6-25

<http://morap.missouri.edu/Projects.aspx?ProjectId=57>  
<http://www.tpwd.state.tx.us/landwater/land/maps/gis/tescp/index.phtml>

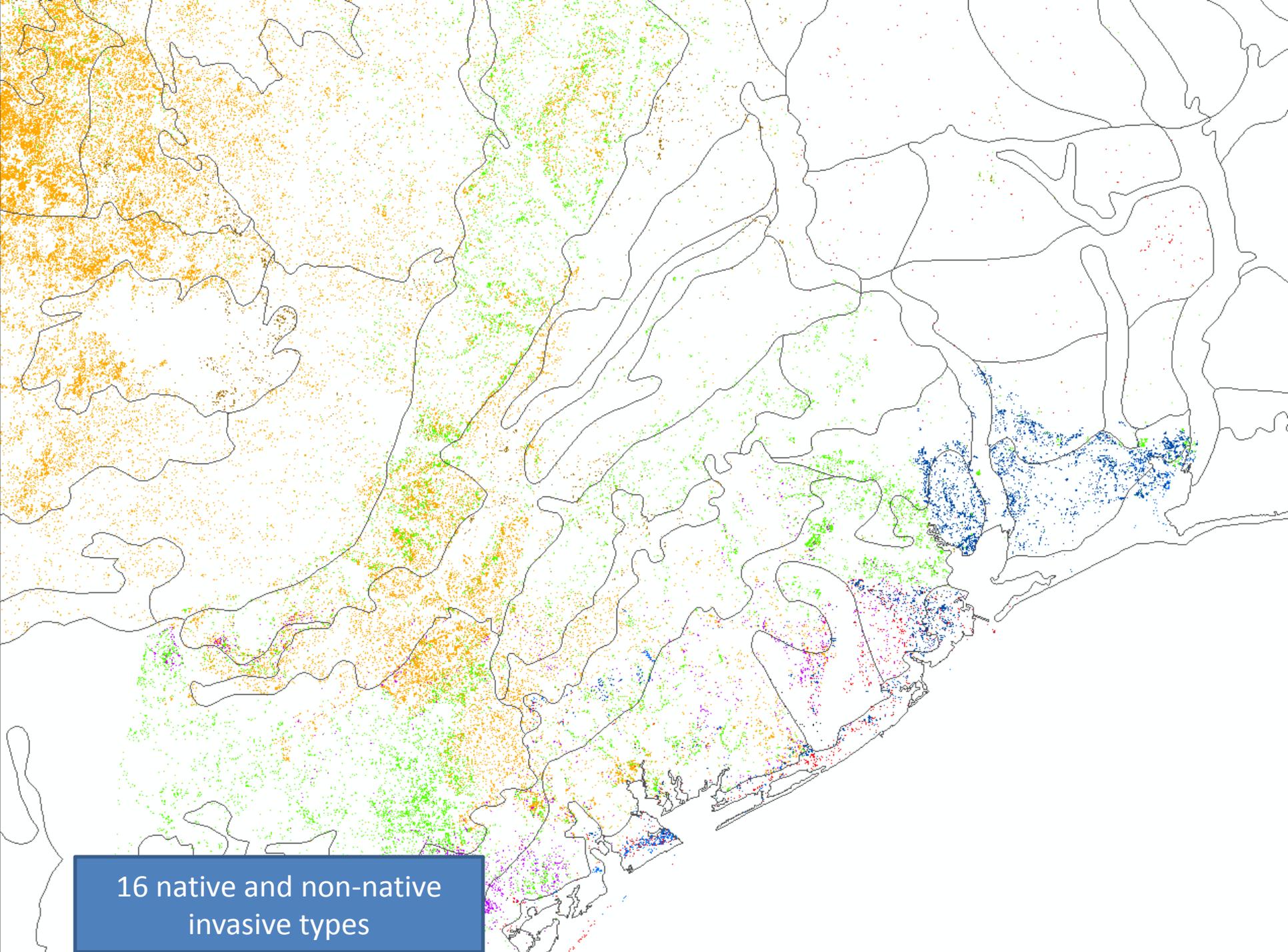
# Results & Added Value to Date

- Mapped 304 current vegetation types through Phase 4 (NLCD has 15; NatureServe VegMap has 96)
- Minimum 74% to 90% map match with ground data for 210 sampled types (excluding urban & row crops)
- 210 types comprise 88% of the area
- 10 m resolution objects can be manipulated
- Ground-based data collected & summarized
- GIS data, interpretive materials, input to Nation Vegetation Classification

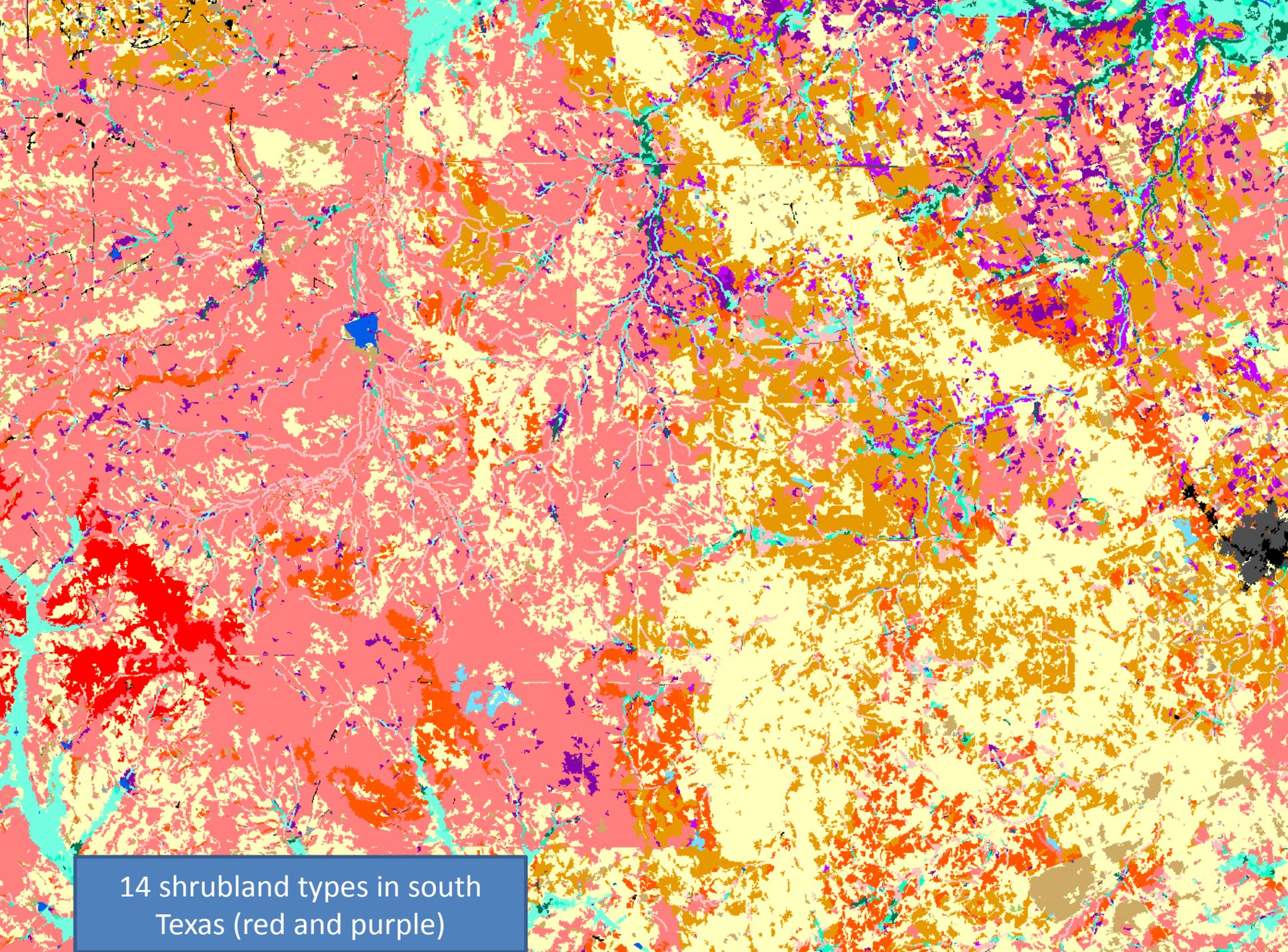




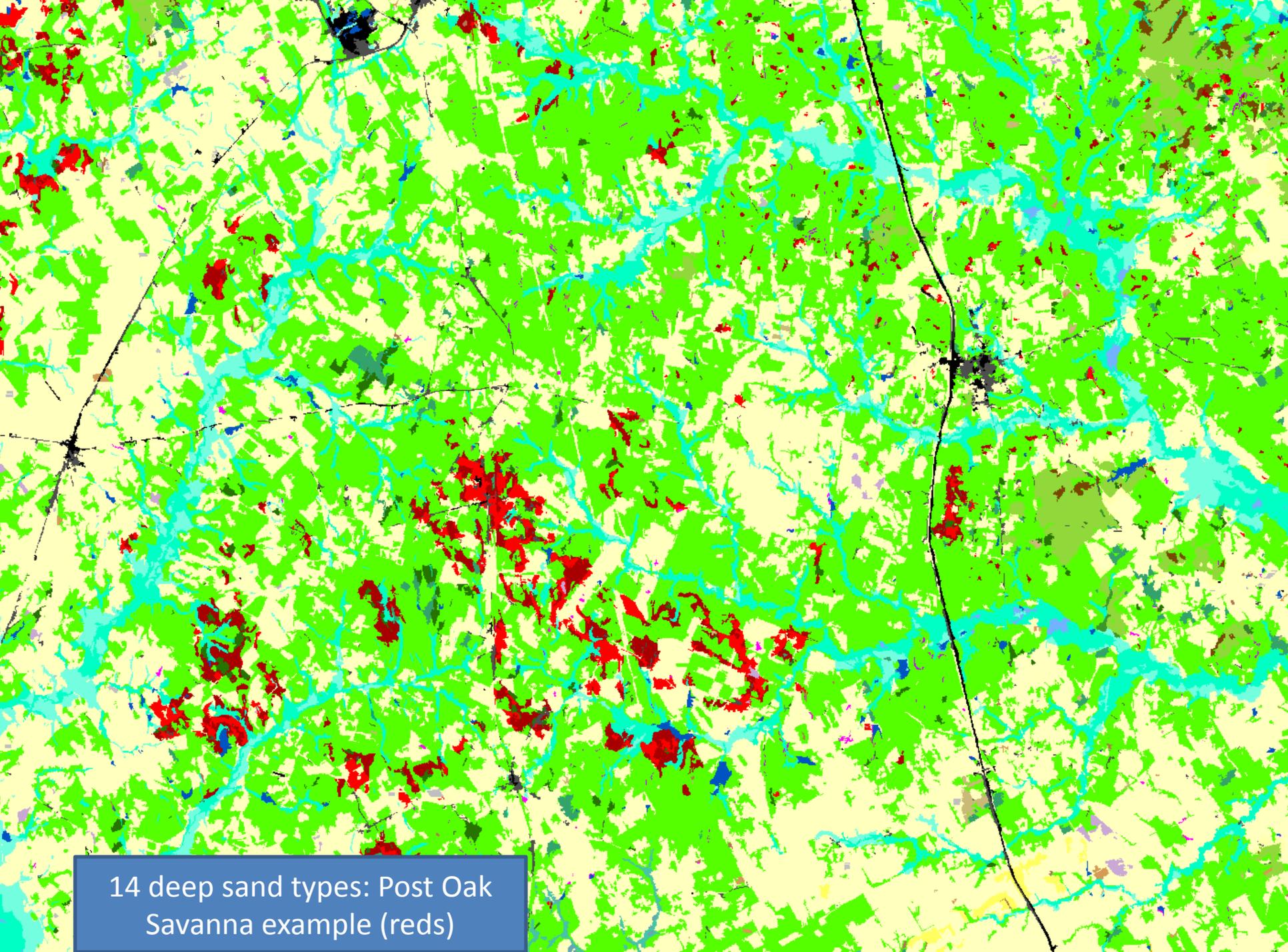
21 live oak dominated  
or co-dominated types



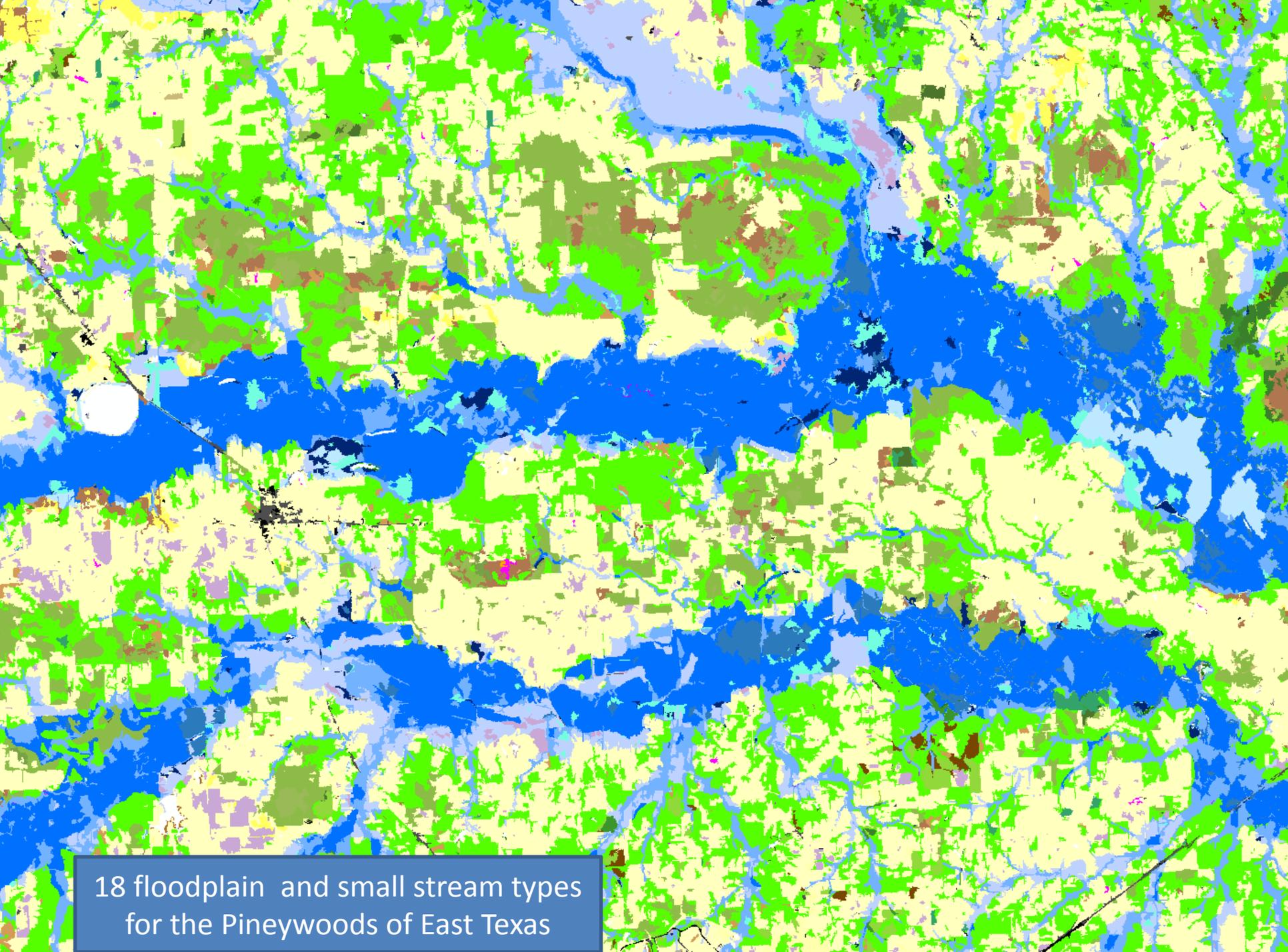
16 native and non-native  
invasive types



14 shrubland types in south Texas (red and purple)

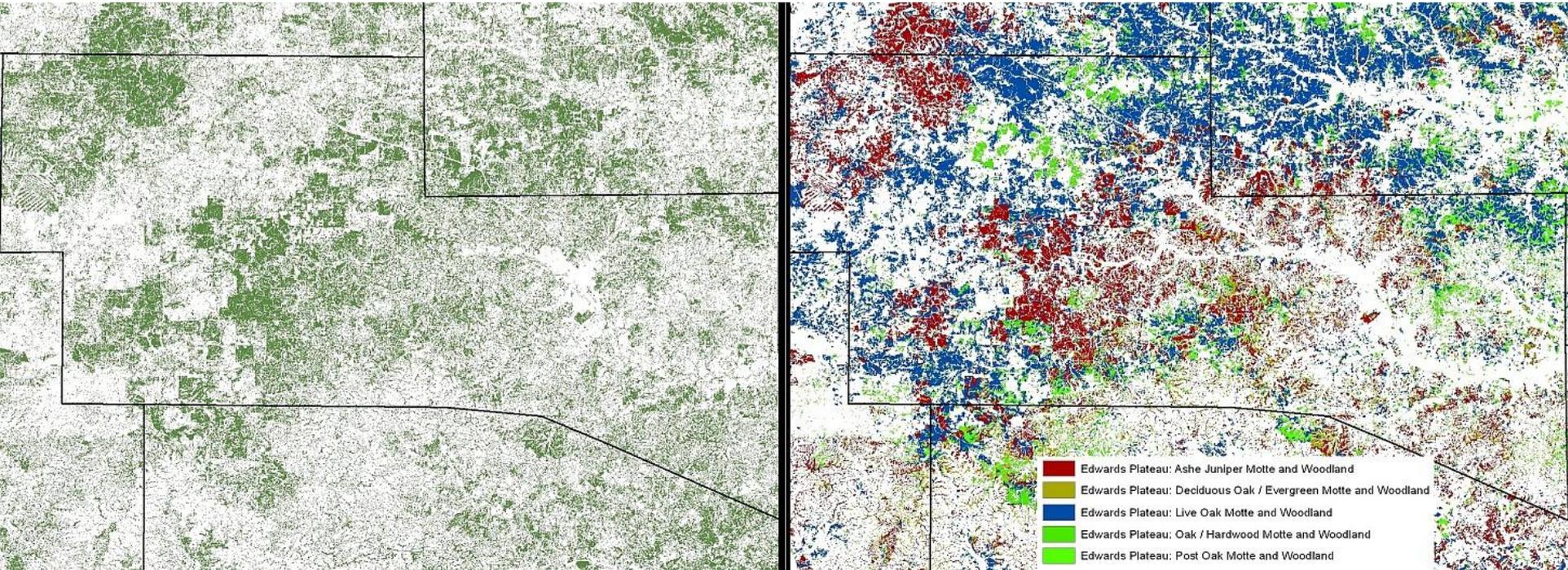


14 deep sand types: Post Oak Savanna example (reds)



18 floodplain and small stream types  
for the Pineywoods of East Texas

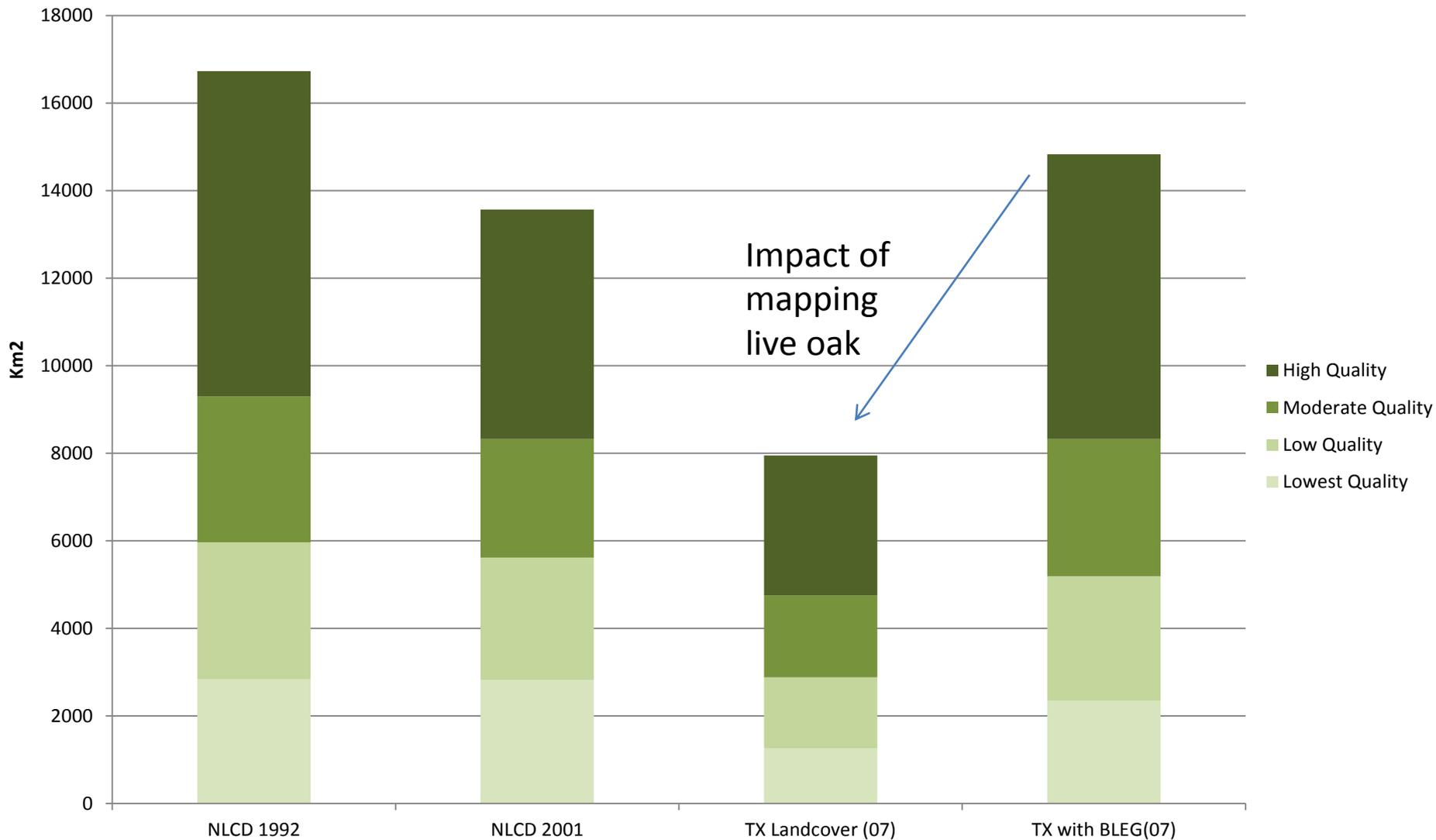
# Increased Thematic Resolution on the Edwards Plateau



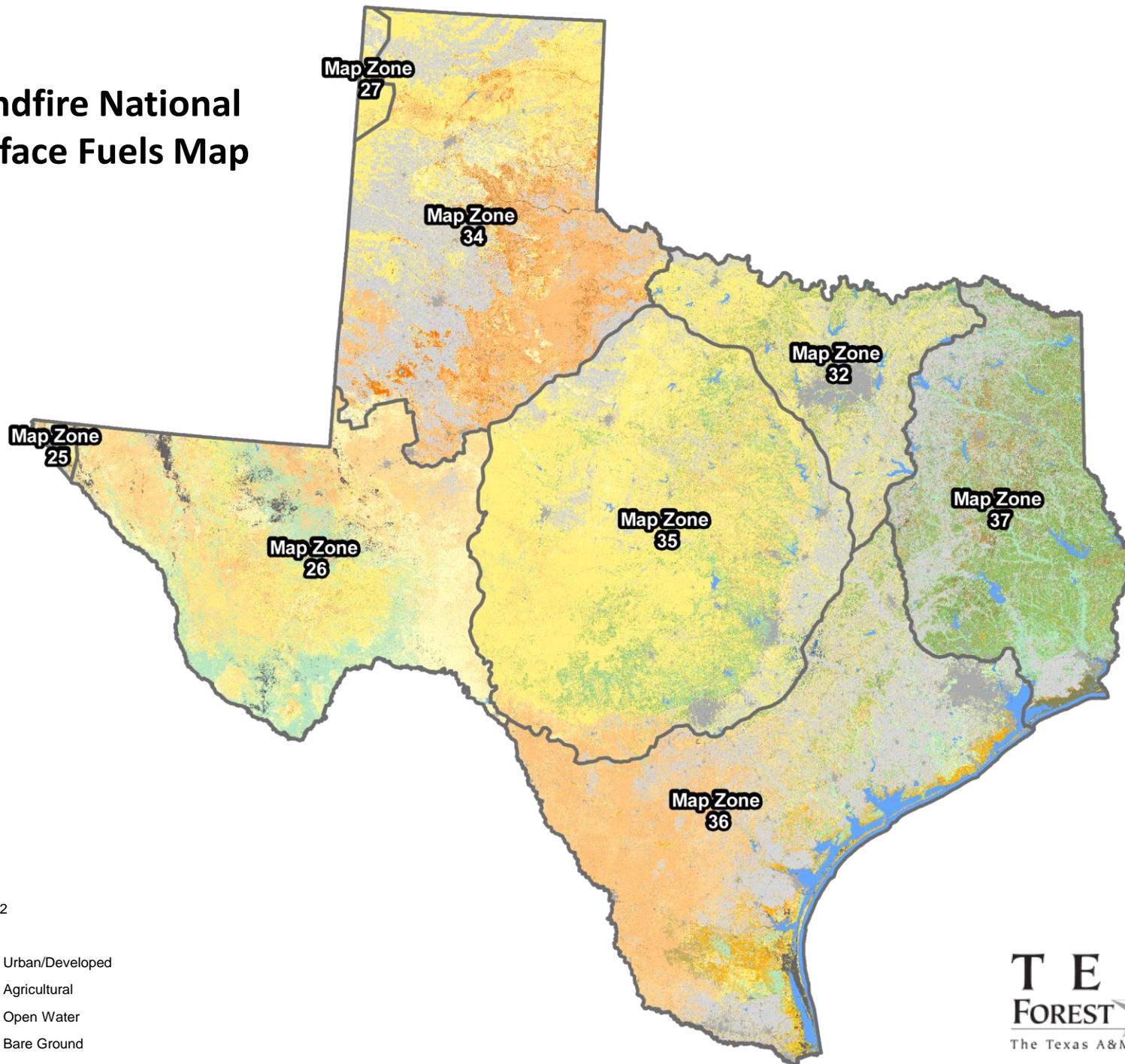
NatureServe VegMap

TPWD Current  
Vegetation Types

# Golden-cheeked Warbler Habitat Comparing Model using Different Data

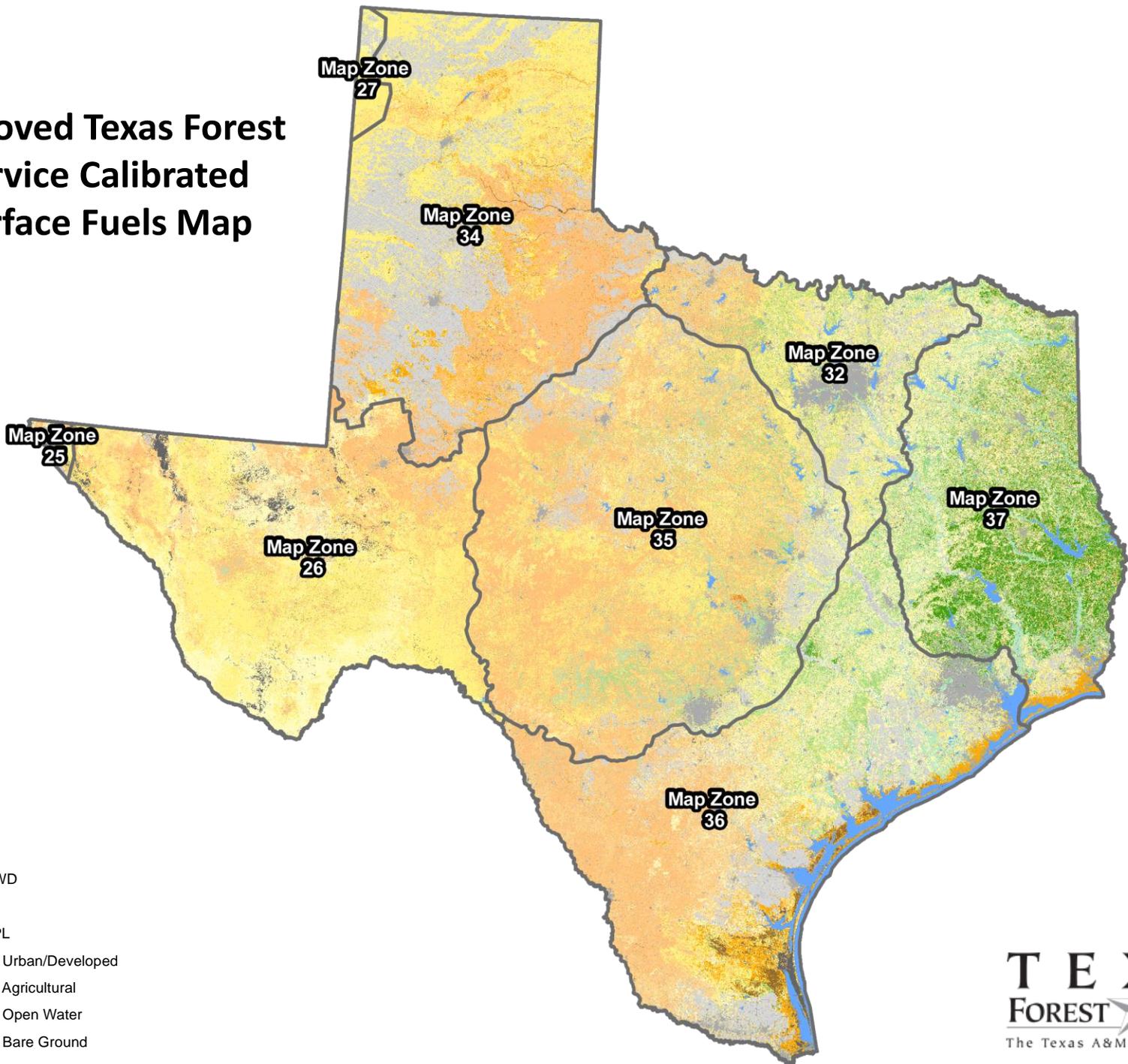


# Landfire National Surface Fuels Map



- GR 1
- GR 2
- GR 3
- GR 4
- GS 1
- GS 2
- GS 3
- SH 2
- SH 5
- SH 6
- TL1, TL2
- TL6
- NB 91 - Urban/Developed
- NB 93 - Agricultural
- NB 98 - Open Water
- NB 99 - Bare Ground

# Improved Texas Forest Service Calibrated Surface Fuels Map



# Summary & Lessons Learned

- Improved, useful abiotic site type and current vegetation type maps produced to help define opportunities
- Process is conceptually straight-forward but challenging
- Requires right mix of staff – ecologists are key
- Primary limitations
  - Soils mapping
  - Remote sensing land cover mapping (LiDAR promising)
- Primary enduring values
  - Methods and processes worked through
  - Geo-referenced, ground-collected, quantitative data
  - Map with descriptions of current vegetation types
  - Information useful to the National Vegetation Classification





**Contact: David Diamond, MoRAP  
Duane German, TPWD**

<http://morap.missouri.edu/Projects.aspx?ProjectId=57>

<http://www.tpwd.state.tx.us/landwater/land/maps/gis/tescp/index.pht>