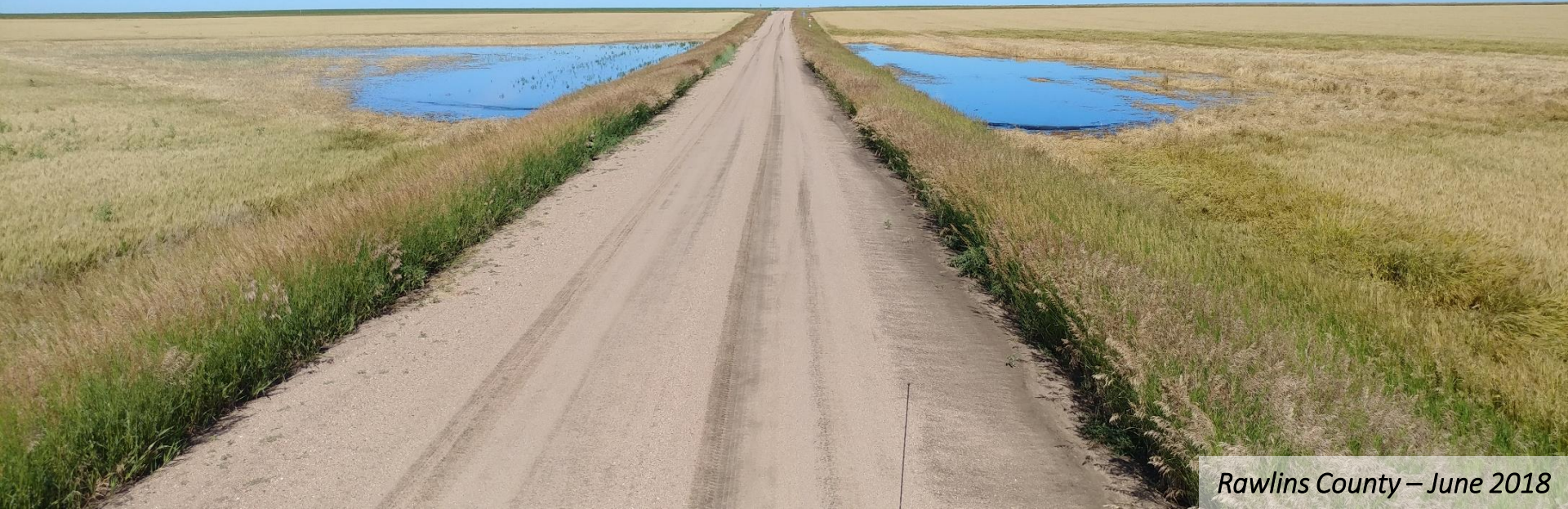


New Tools for Playa Mapping & Reconnaissance

Jude Kastens | Kansas Biological Survey

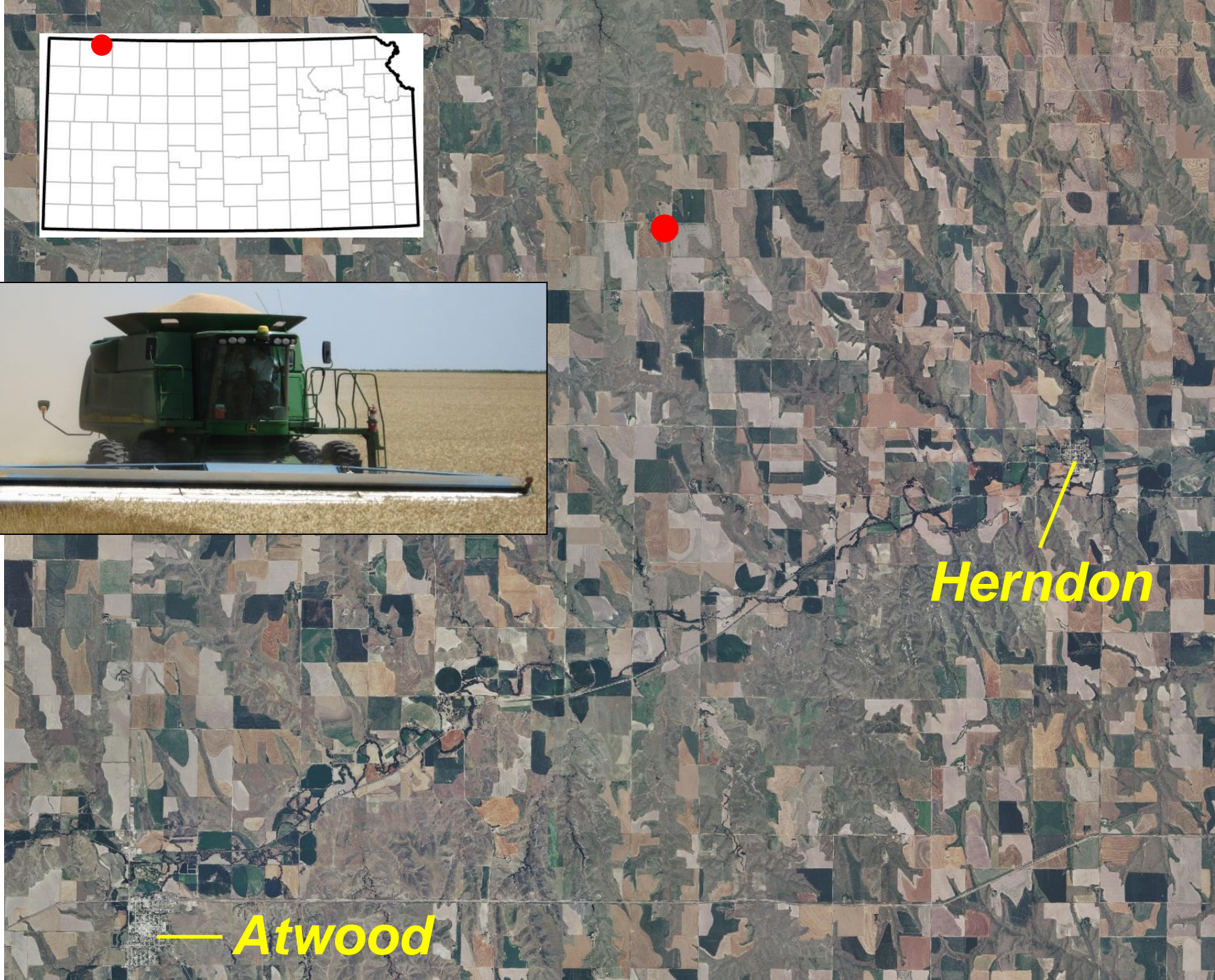
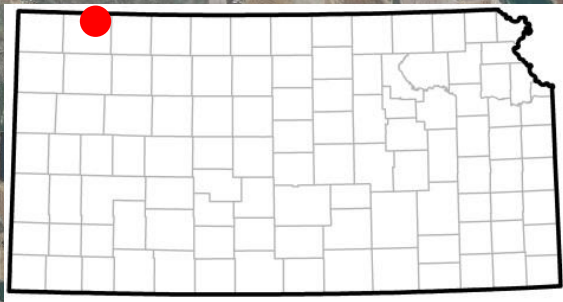
Upper Arkansas RAC Meeting | April 29, 2022



Rawlins County – June 2018



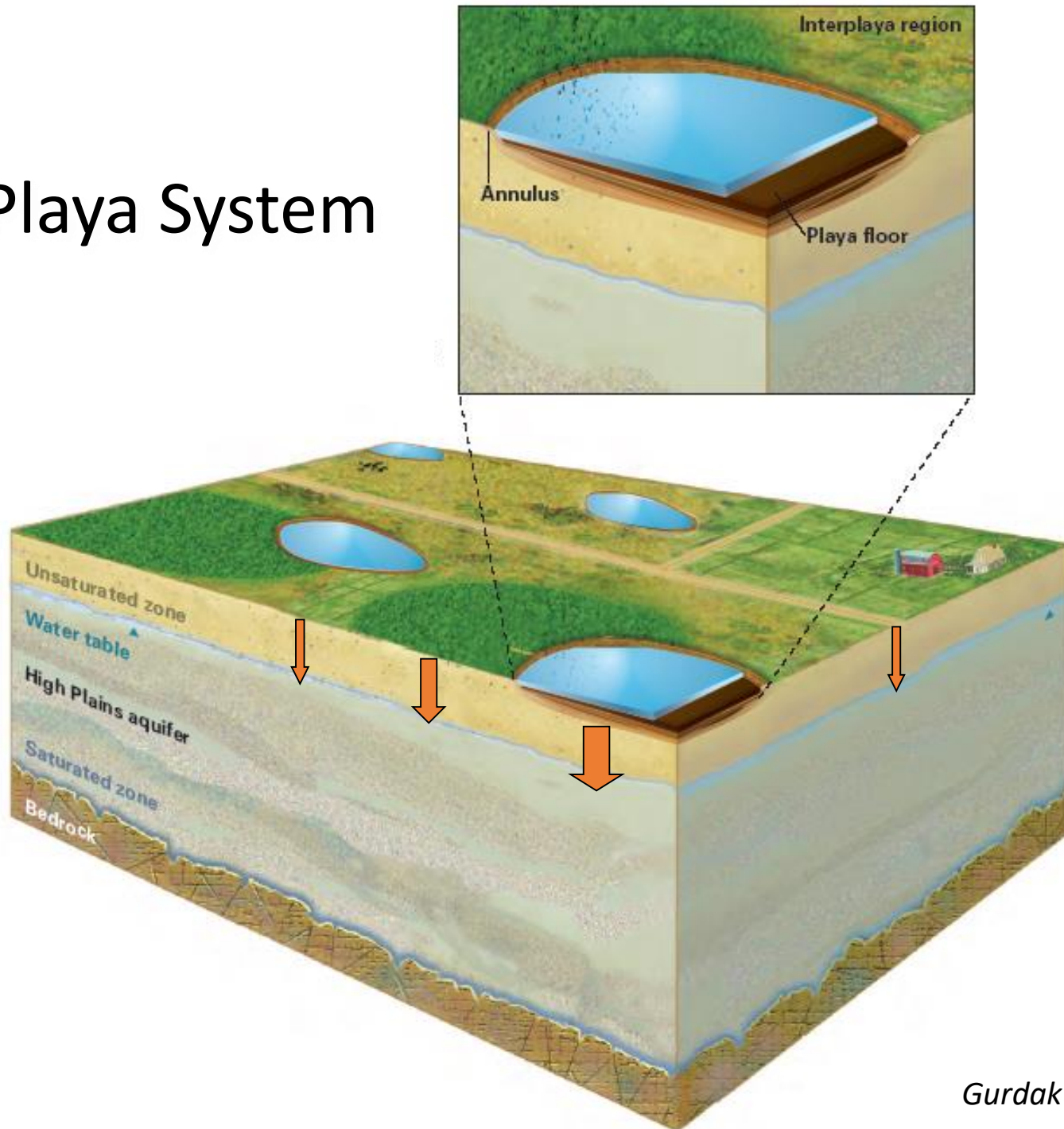
jkastens@ku.edu



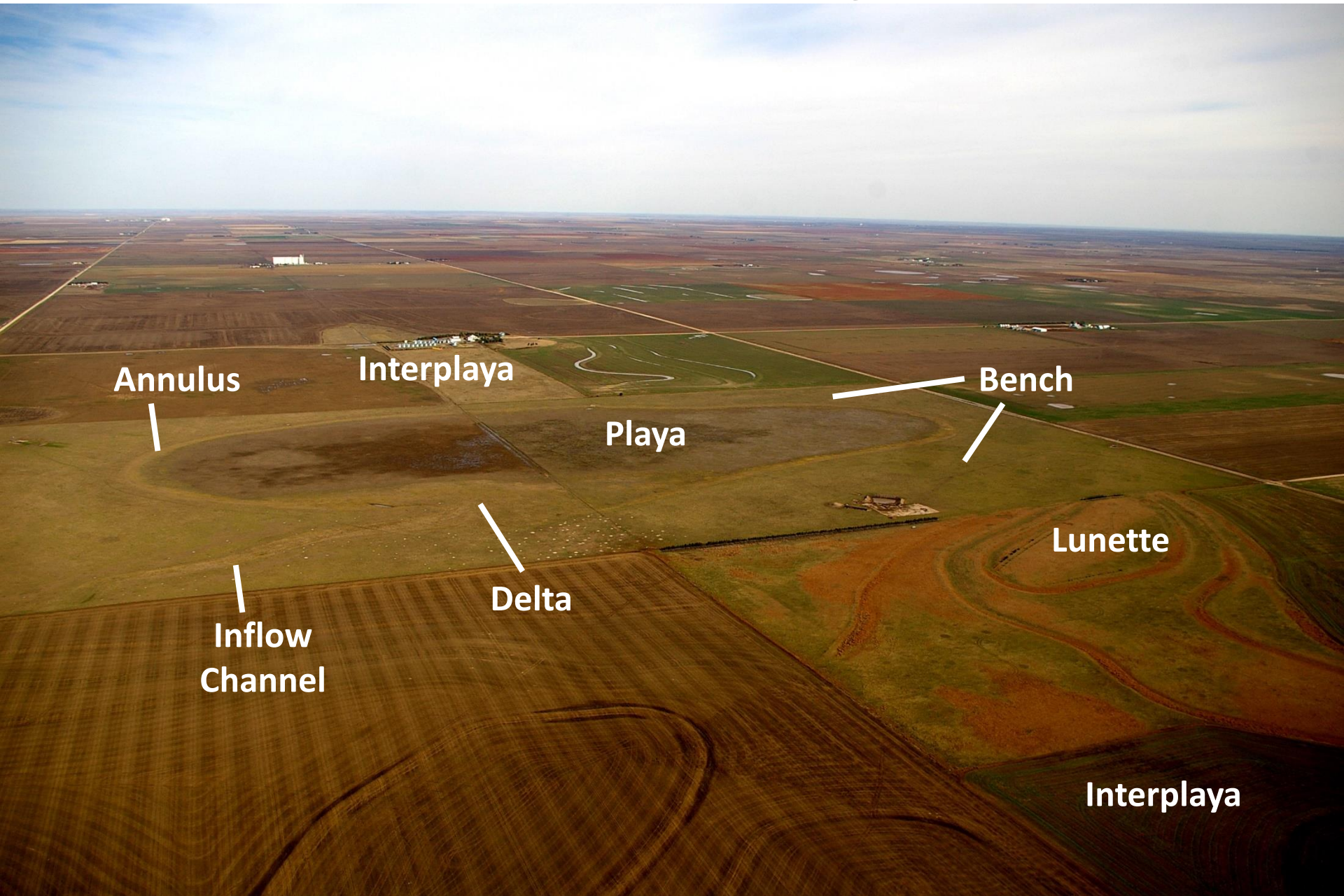
Herndon

Atwood

The Playa System



The Ehmke Playa



Annulus

Interplaya

Bench

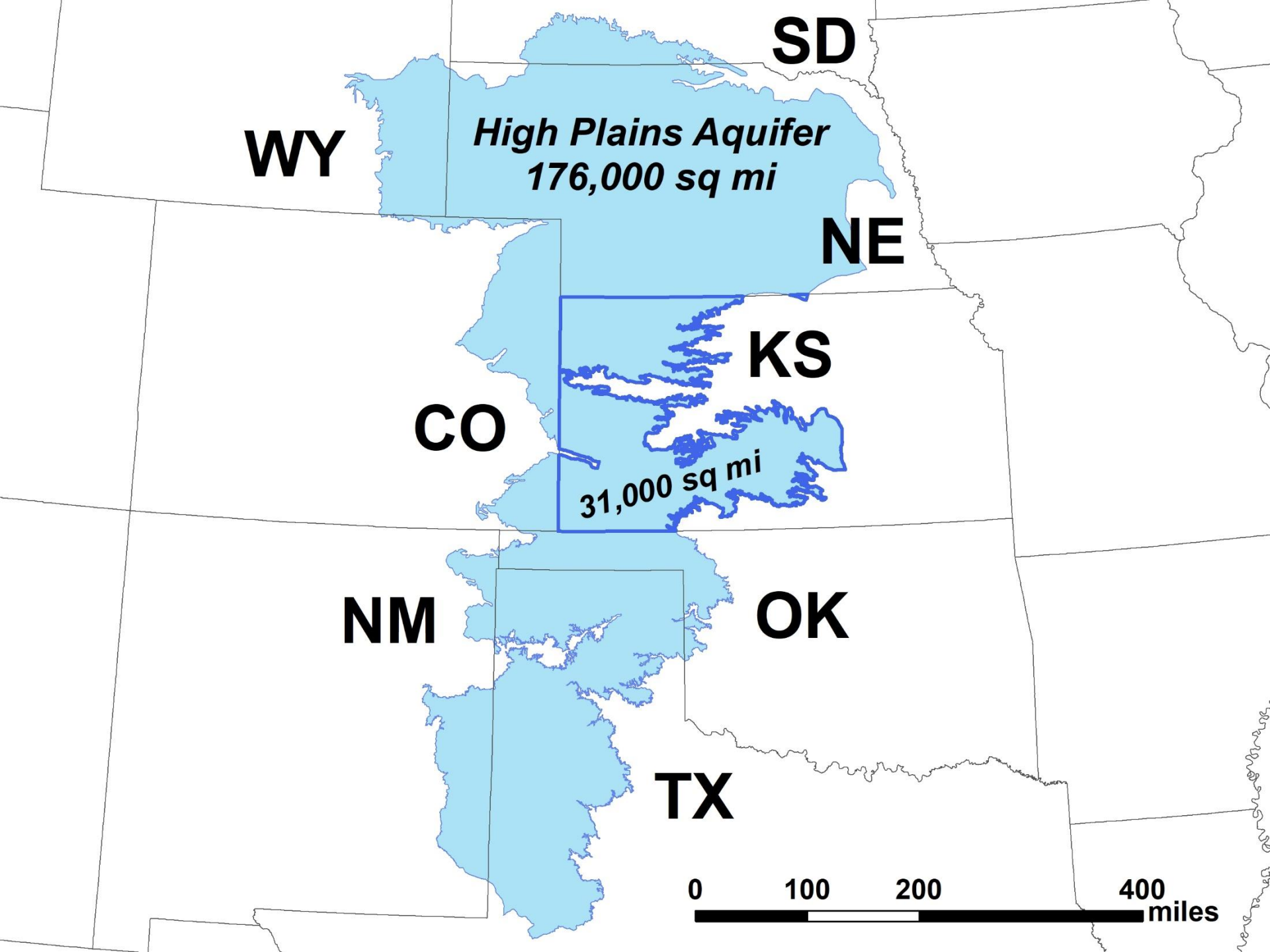
Playa

Lunette

Inflow
Channel

Delta

Interplaya



WY

SD

High Plains Aquifer
176,000 sq mi

NE

CO

KS

31,000 sq mi

NM

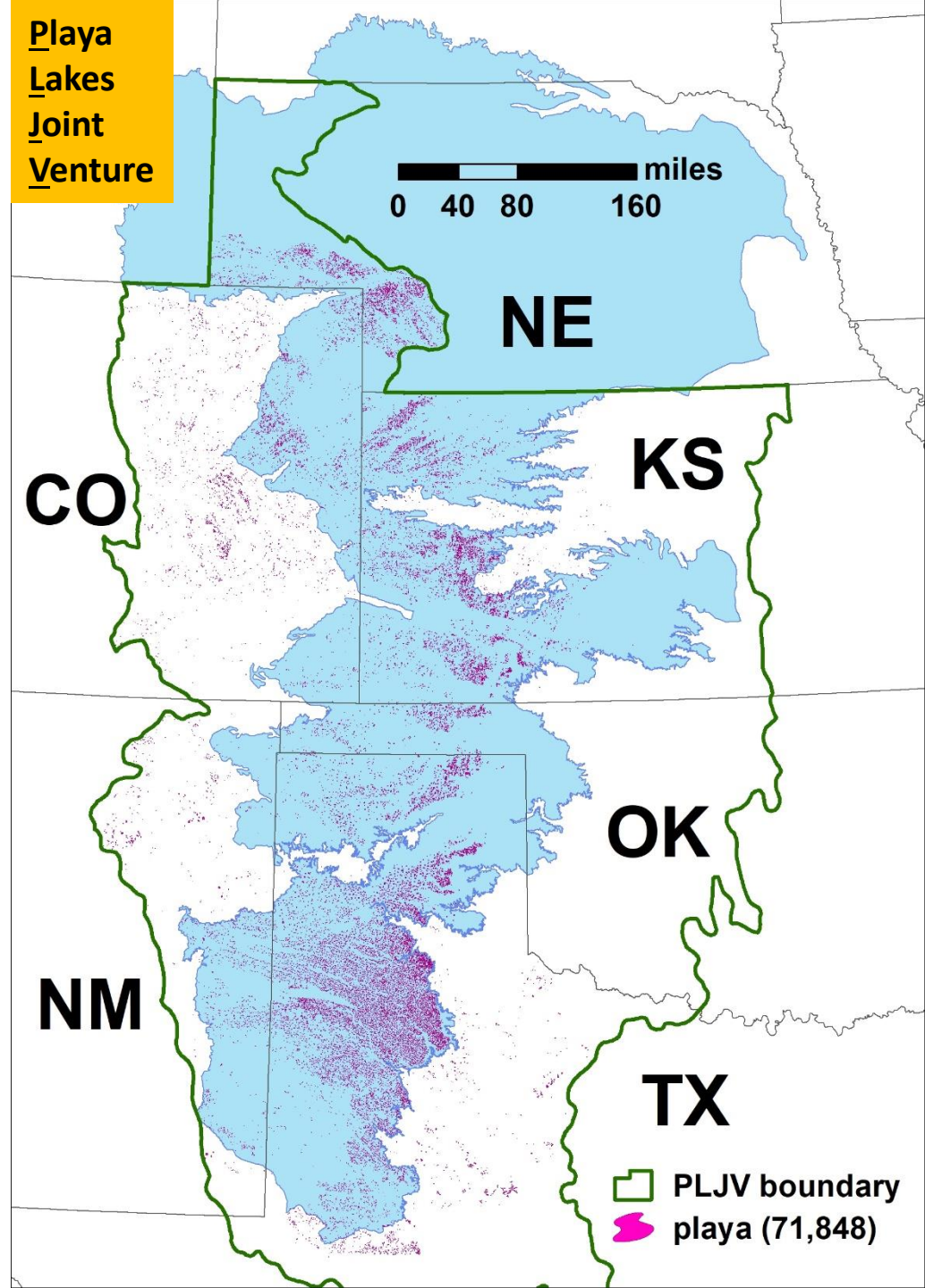
OK

TX

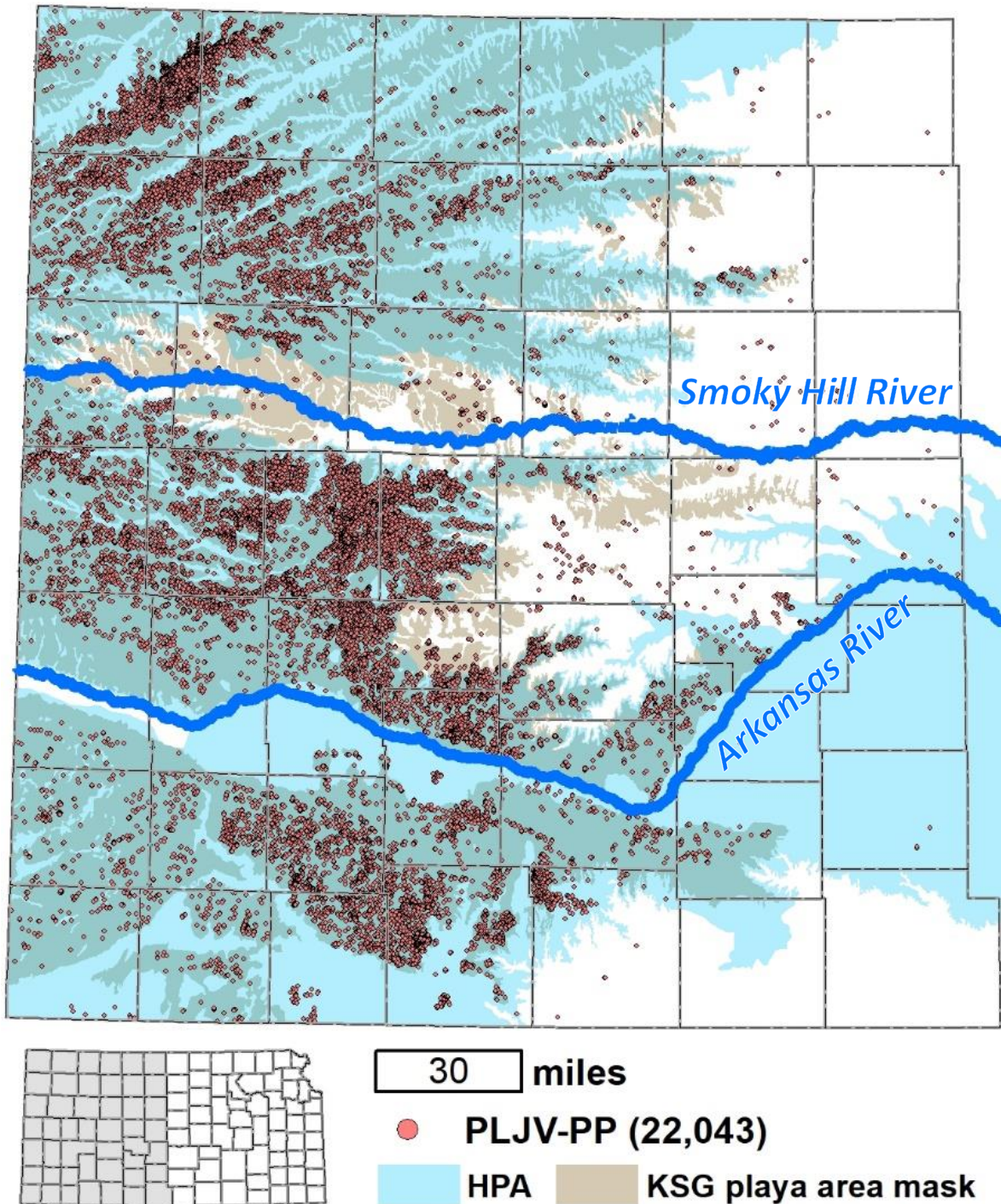
0 100 200 400 miles

Playa
Lakes
Joint
Venture

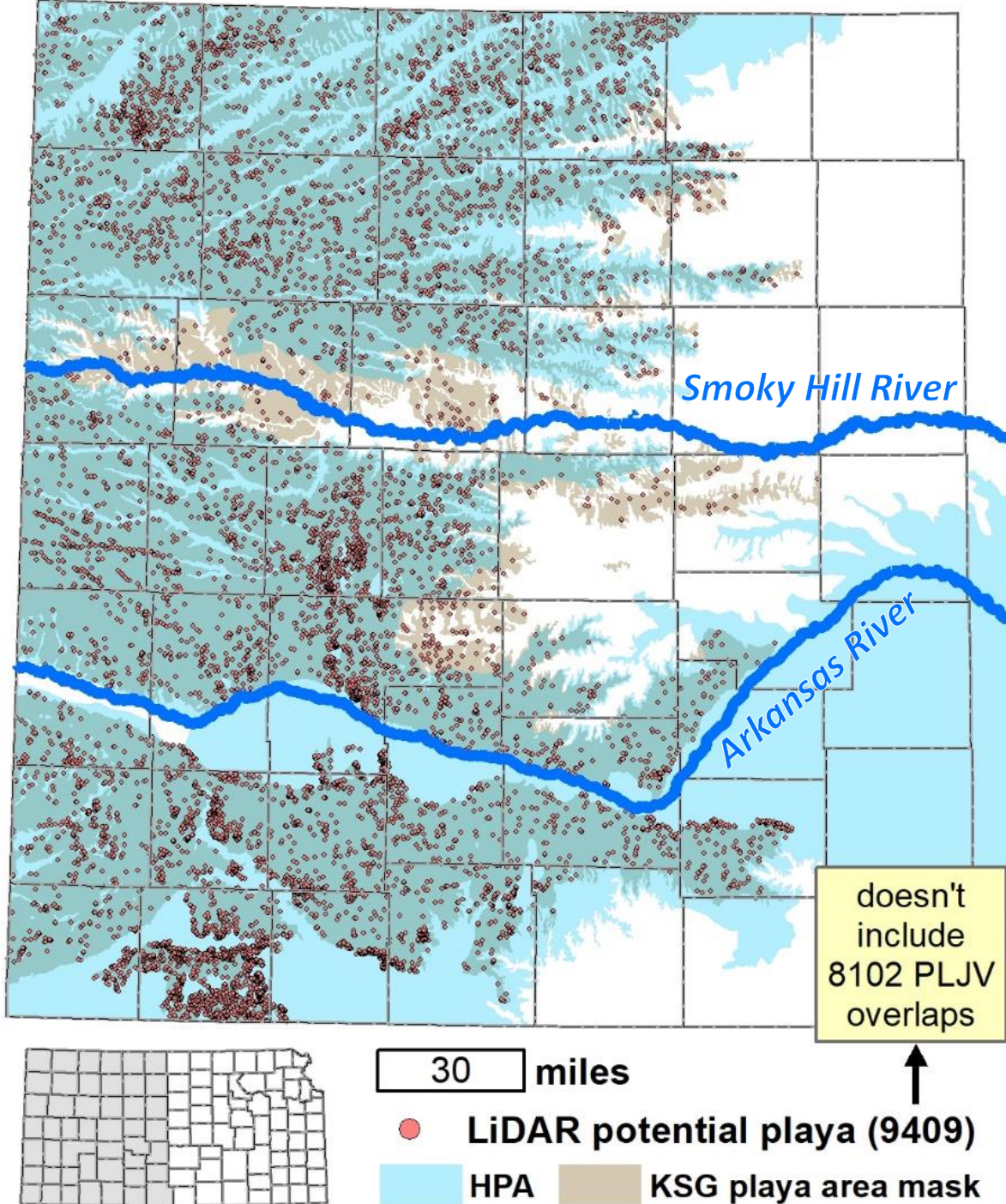
- Playas often referred to as lagoons, sloughs, buffalo wallows
- PLJV region: ~72,000 Probable Playas (PLJV-PP), totaling ~580,000 ac
- Playa formation somewhat a mystery (hundreds to thousands of years old)
- Typically small, shallow, and frequently dry; fed by rainfall & runoff (sit above the water table)
- Closed basin; often the only surface water to be found (biodiversity hotspot)
- Hydric, clayey floor supports infiltration (aquifer recharge hotspot), then retention (wetland formation)



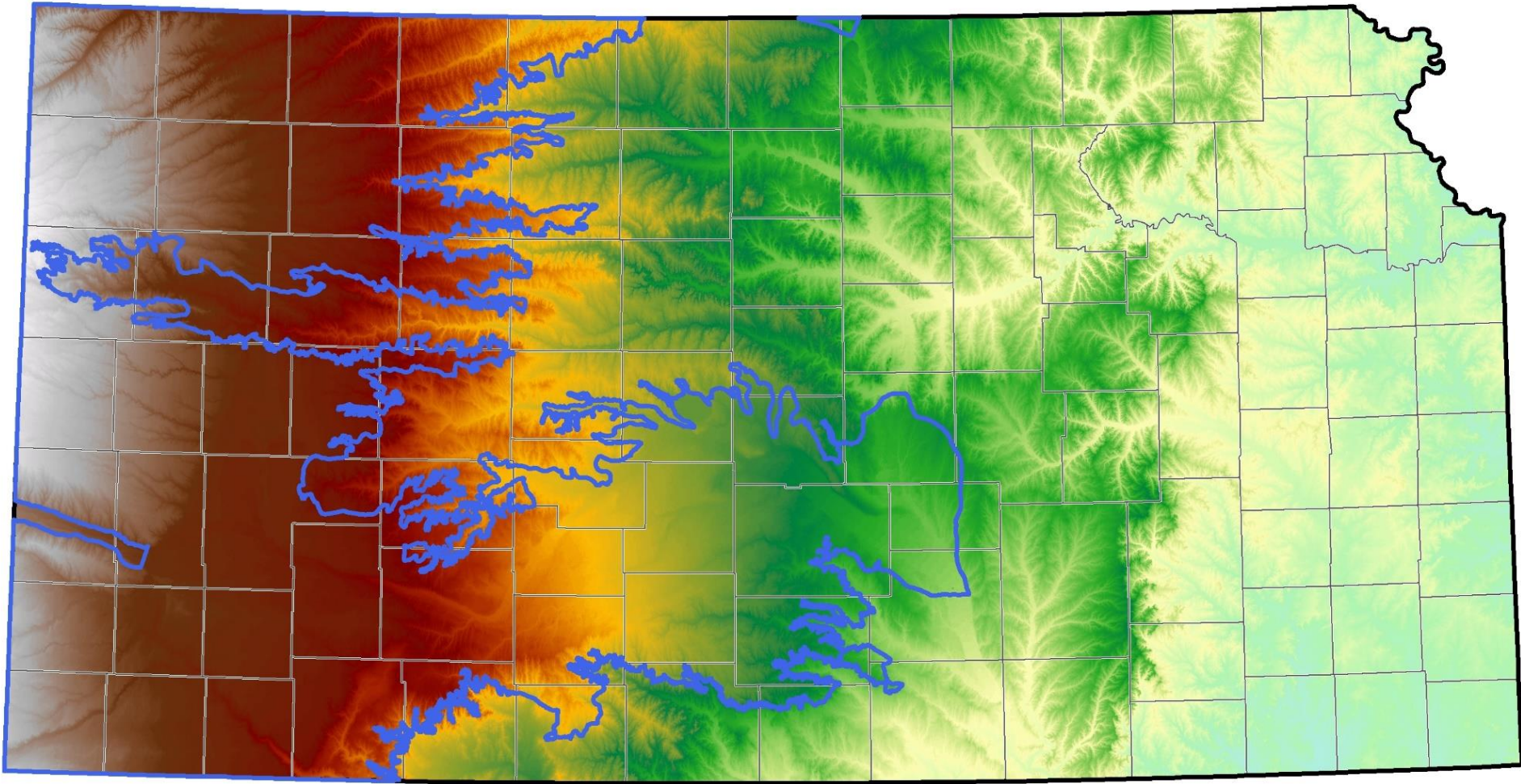
- Kansas has three primary clusters of playas, located in the major inter-basins of western Kansas
- PLJV-PP dataset for Kansas contains ~22,000 playa-like features covering ~81,000 acres
- Thousands of additional potential playas mapped using LiDAR, with catchments estimated for these & PLJV-PP
(EPA funding to KWO & KBS)



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(EPA funding to KWO & KBS)



Elevation



Feet

4036

3500

3000

2500

2000

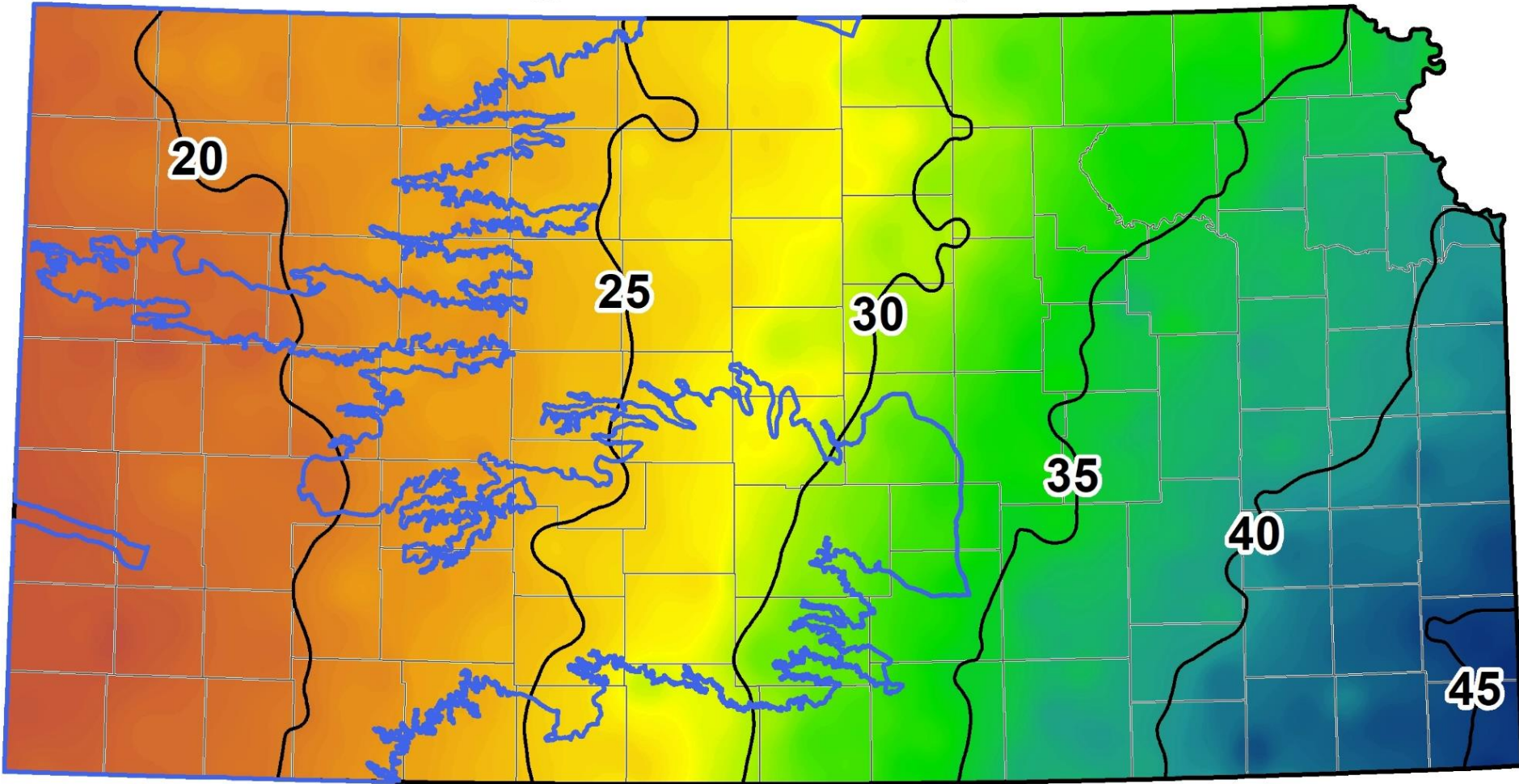
1500

1000

675

Large majority of KS PLJV-PP occur in High Plains uplands at elevation 2500 ft or greater

Average Annual Precipitation



Inches

16

20

24

28

32

36

40

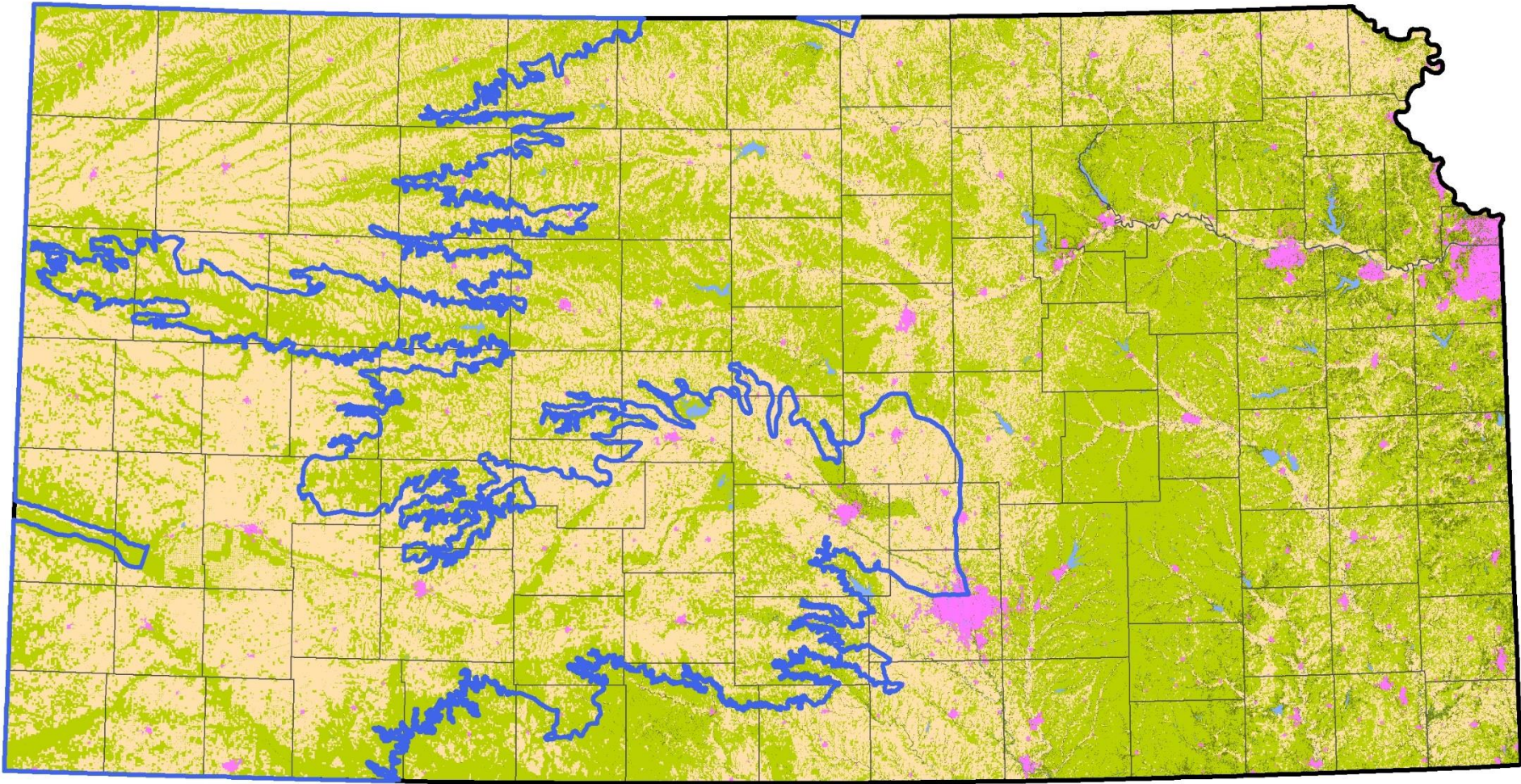
44

46

Large majority of KS PLJV-PP receive about 16-22 inches annual precipitation (semi-arid)

Almost all occur in a negative water balance environment – more pan evaporation than precipitation

Land Cover / Land Use



Legend



Grassland



Cropland



Water



Woodland

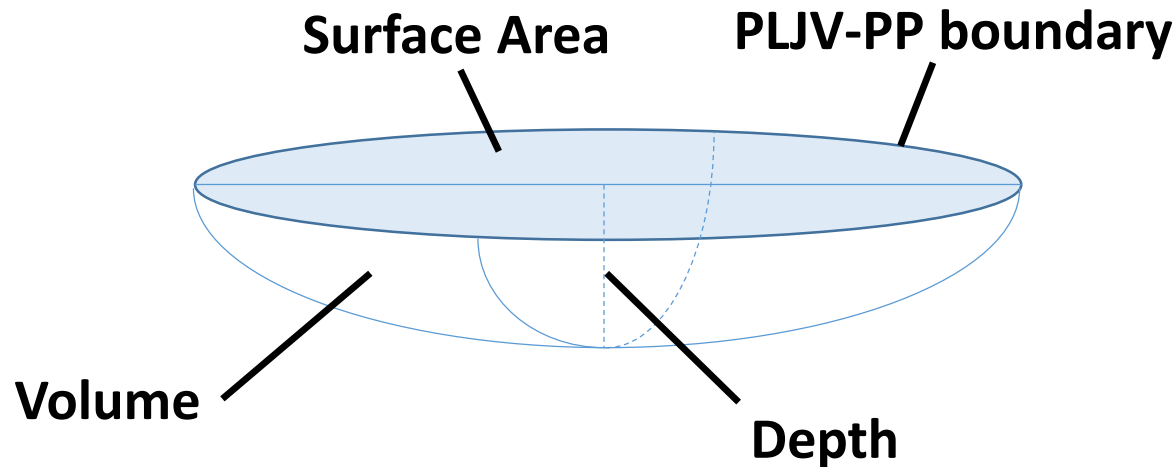


Urban

About 84% of KS PLJV-PP are completely farmed through, while about 10% are grassland

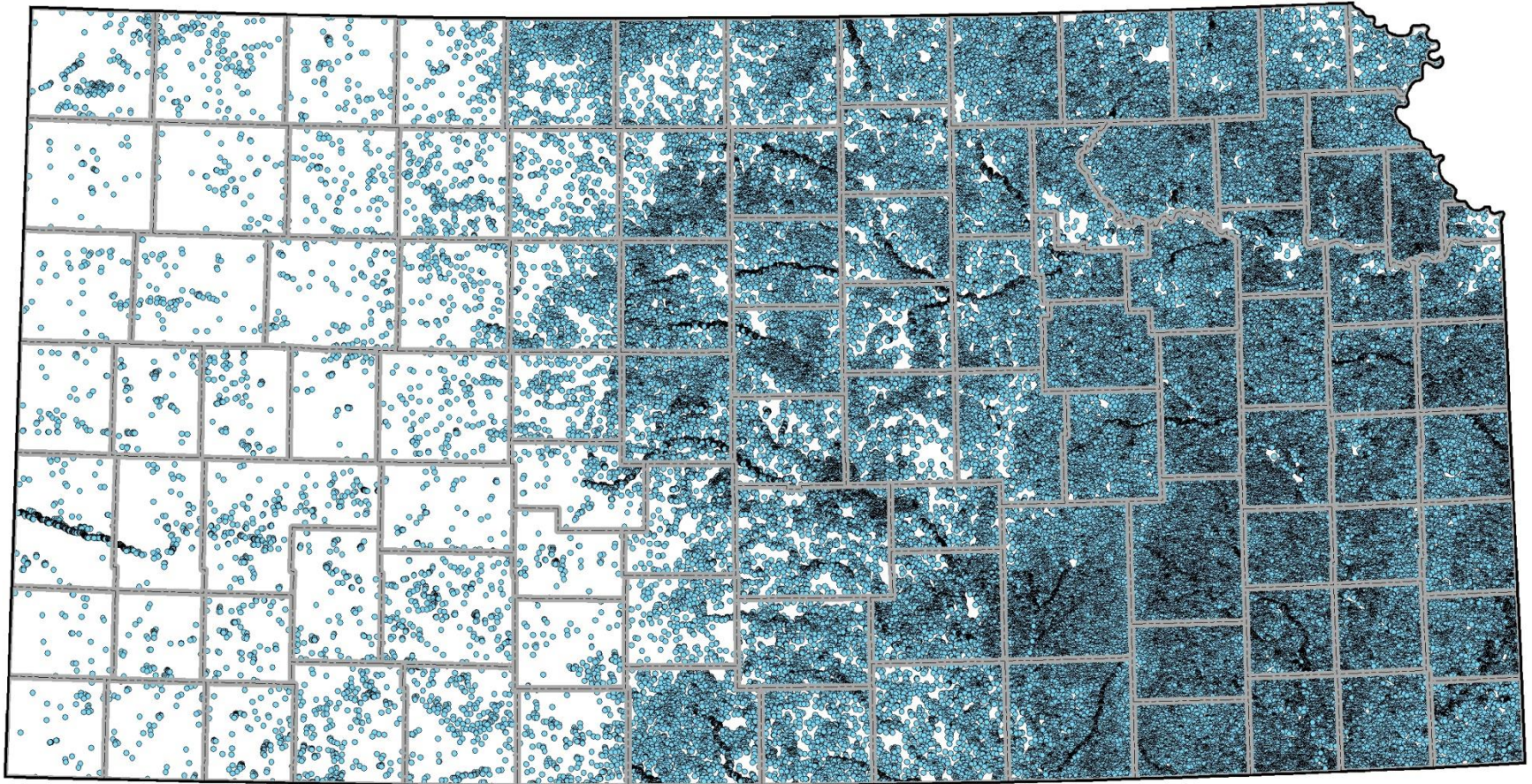
PLJV-PP vertical statistics (from KS LiDAR)

Statistic	Area (m ²)	Area (ac)	Volume (m ³)	Volume (ac-ft)	Depth (m)
Mean	14,938	3.69	1502	1.22	0.21
Median	6169	1.52	145	0.12	0.14
minimum	324	0.08	0	0	0
maximum	1,879,227	464	1,618,465	1312	8.75
25 th percentile	2725	0.67	36	0.03	0.09
75 th percentile	15,056	3.72	567	0.46	0.22



There are >150,000 water bodies in Kansas

Includes private farm ponds, state & local lakes, federal reservoirs, other



Good thing there are playas in western Kansas

Source: USGS National Hydrography Dataset

(count includes water bodies > 0.25 ac)



Waterfowl

- Central Flyway
- Mississippi Flyway
- Pacific Flyway
- Atlantic Flyway

Source:
USFWS





**84% of PLJV-PPs are cropland
10% are non-cropland**



Split playa, Haskell County

(visited on the KAWS 4th Annual Playa Tour & Workshop in January, 2020)

east side of road



west side of road











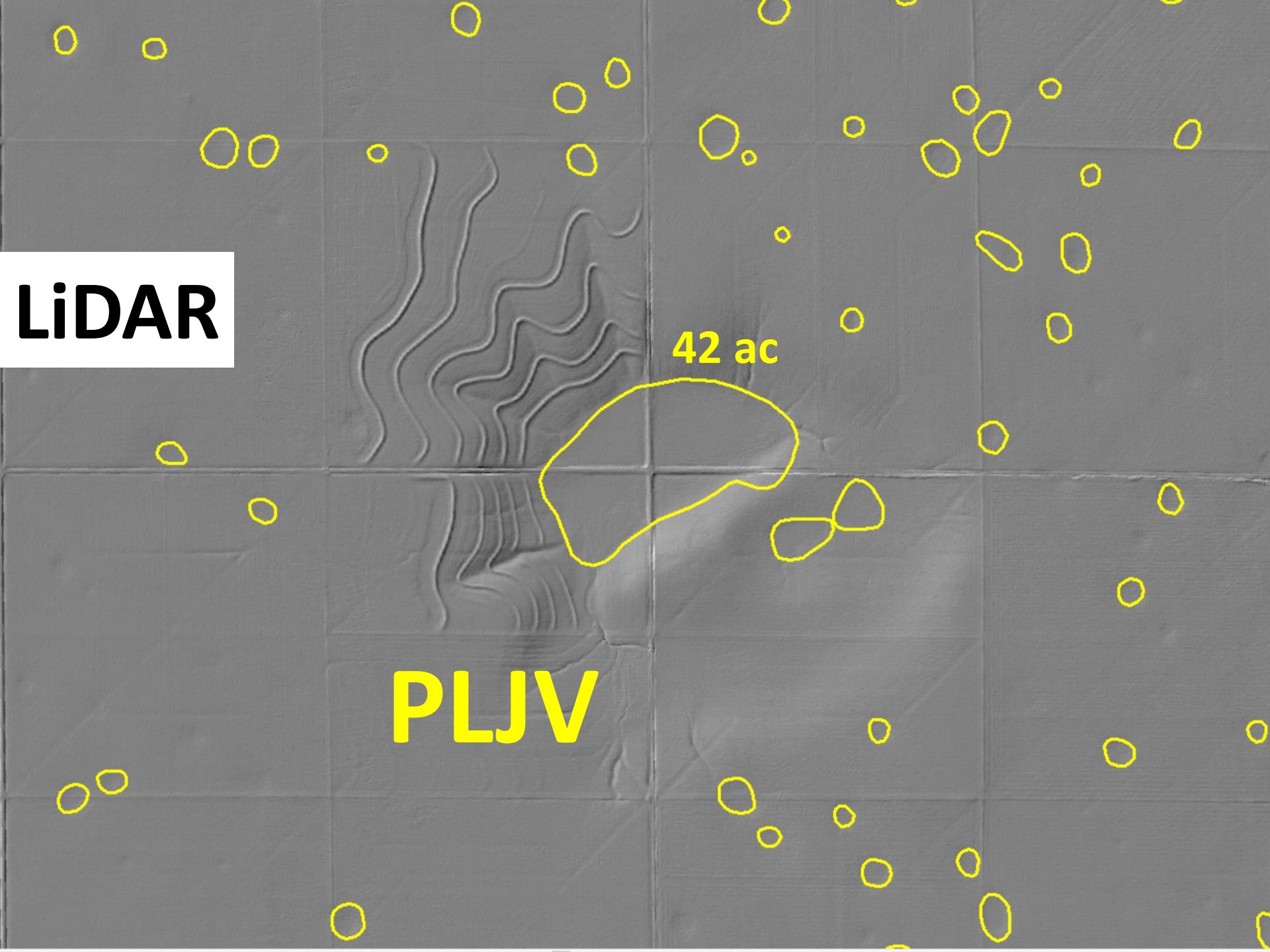
2018



LiDAR

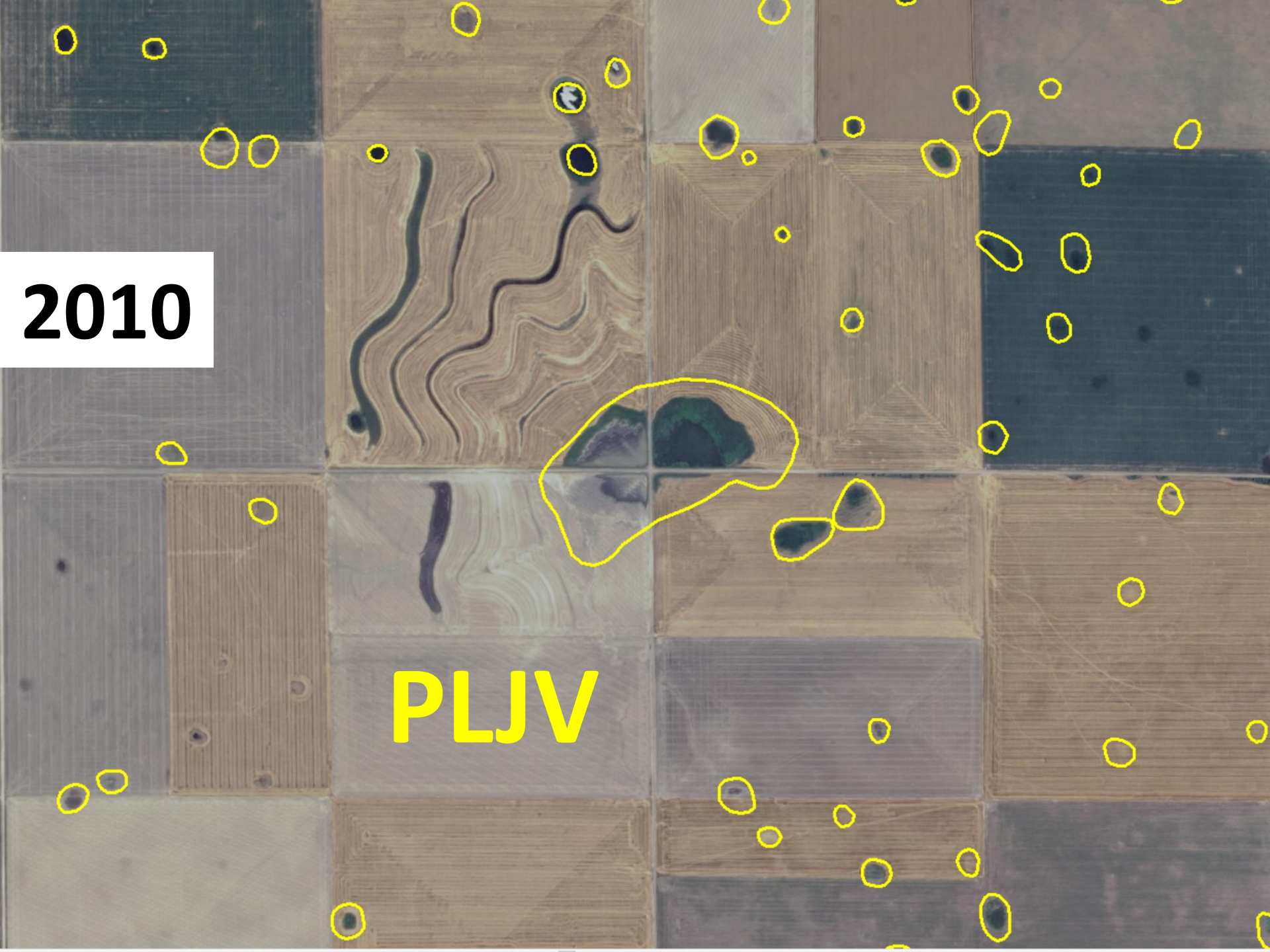
42 ac

PLJV



2010

PLJV



Example – playas around Ehmke playa

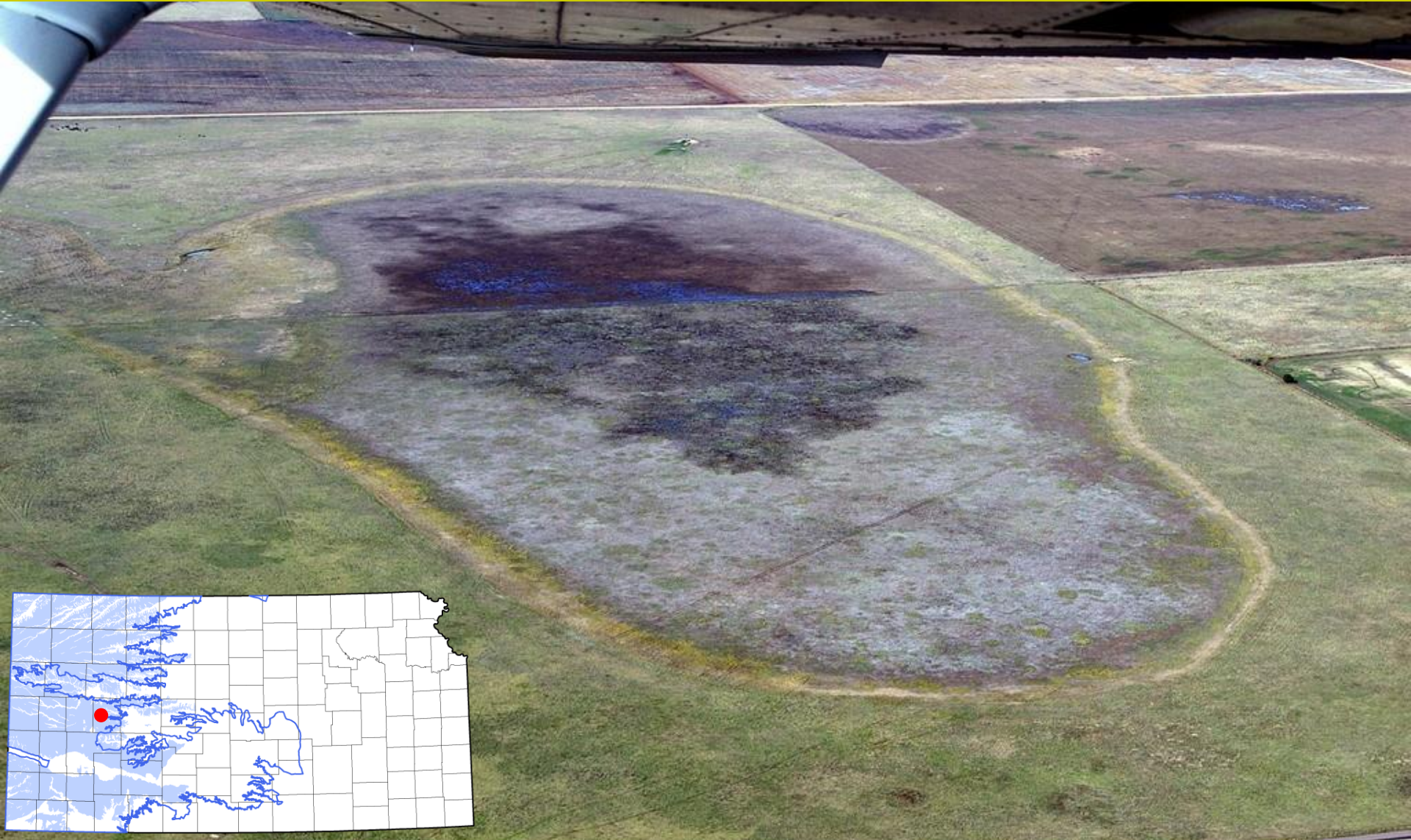
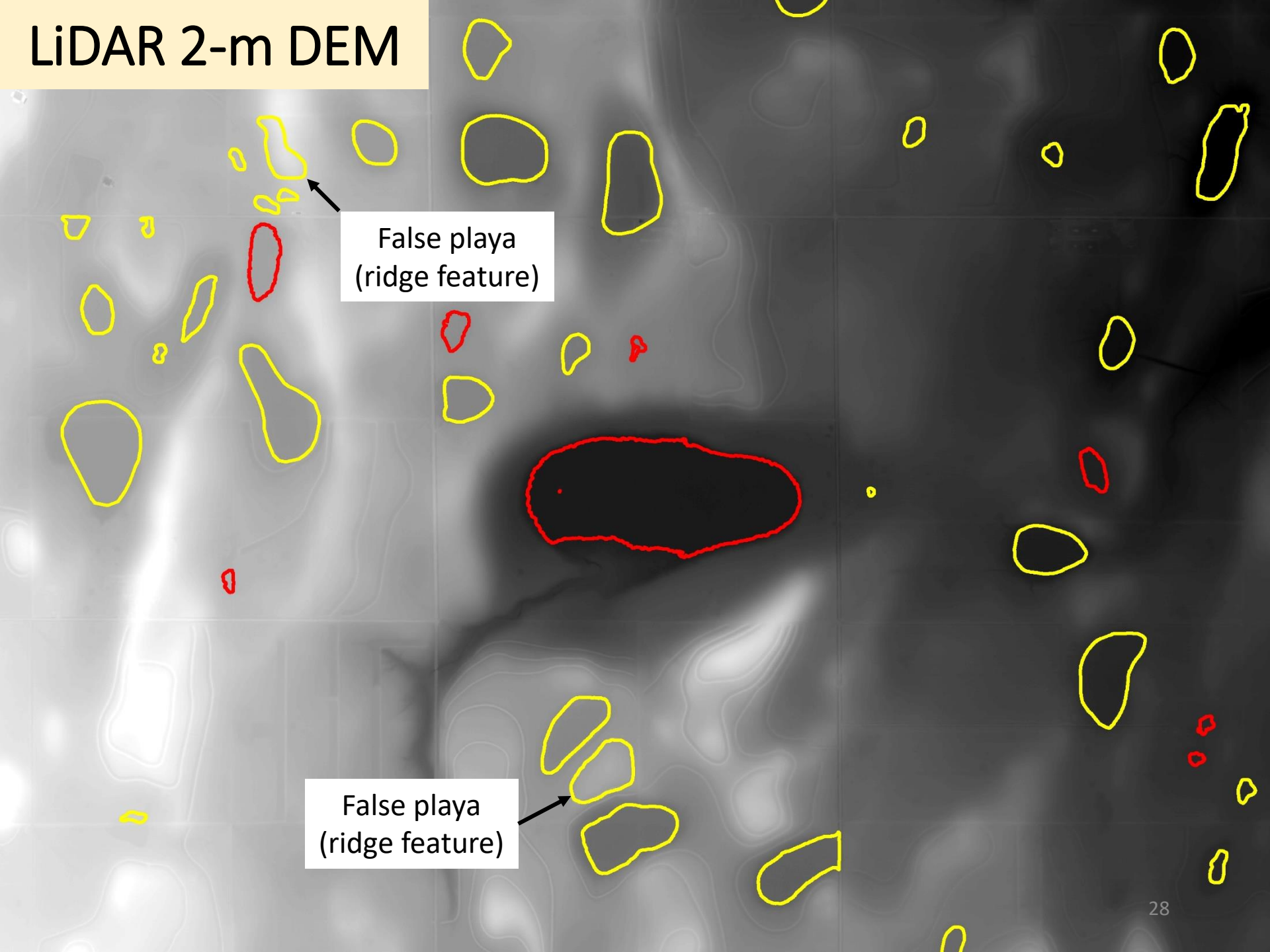


Image source: <http://www.uwosh.edu/facstaff/bowenm/Ehmkeplane.JPG/view>

NAIP 2010 (PLUV – yellow, LiDAR – red)



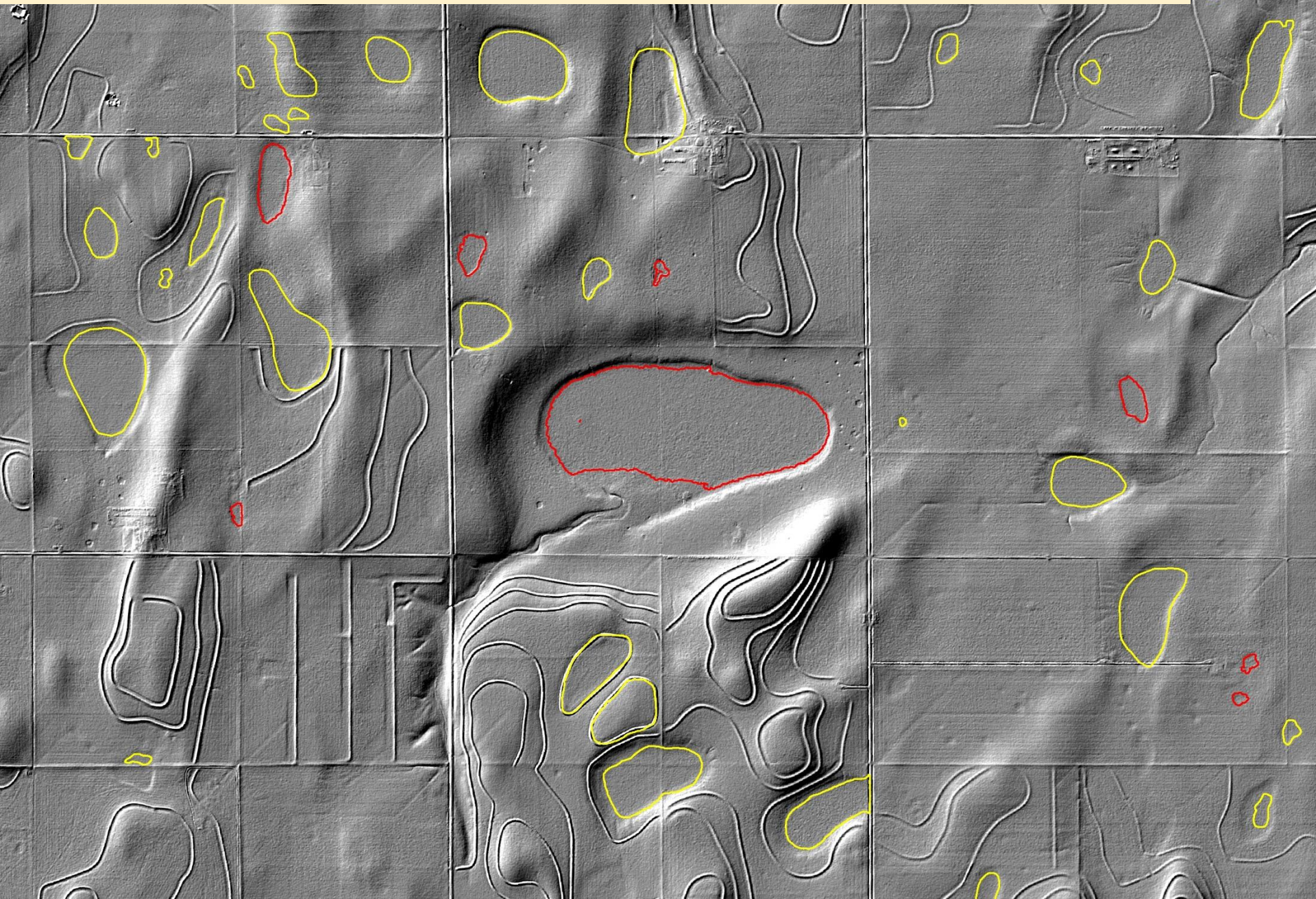
LiDAR 2-m DEM



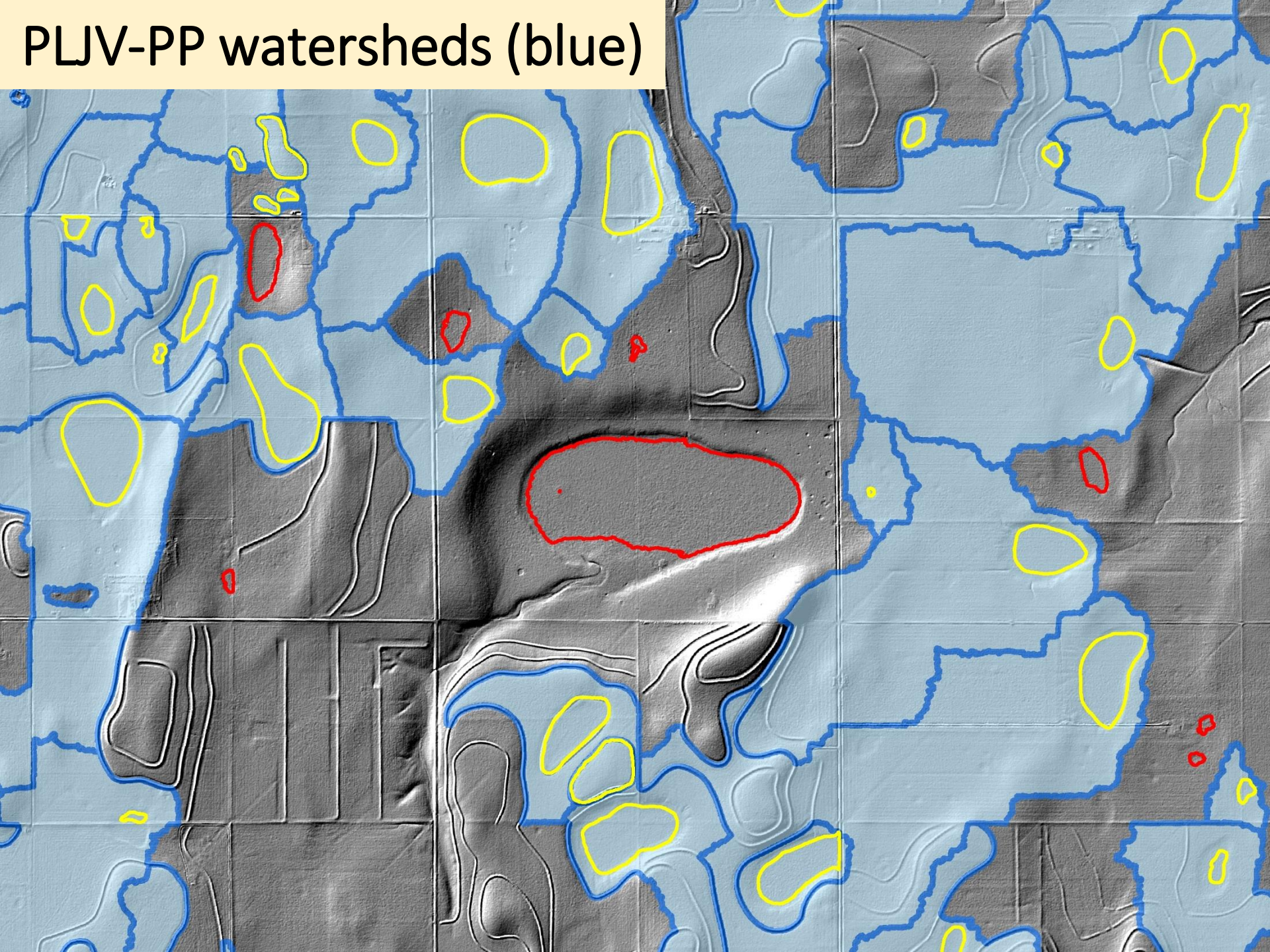
False playa
(ridge feature)

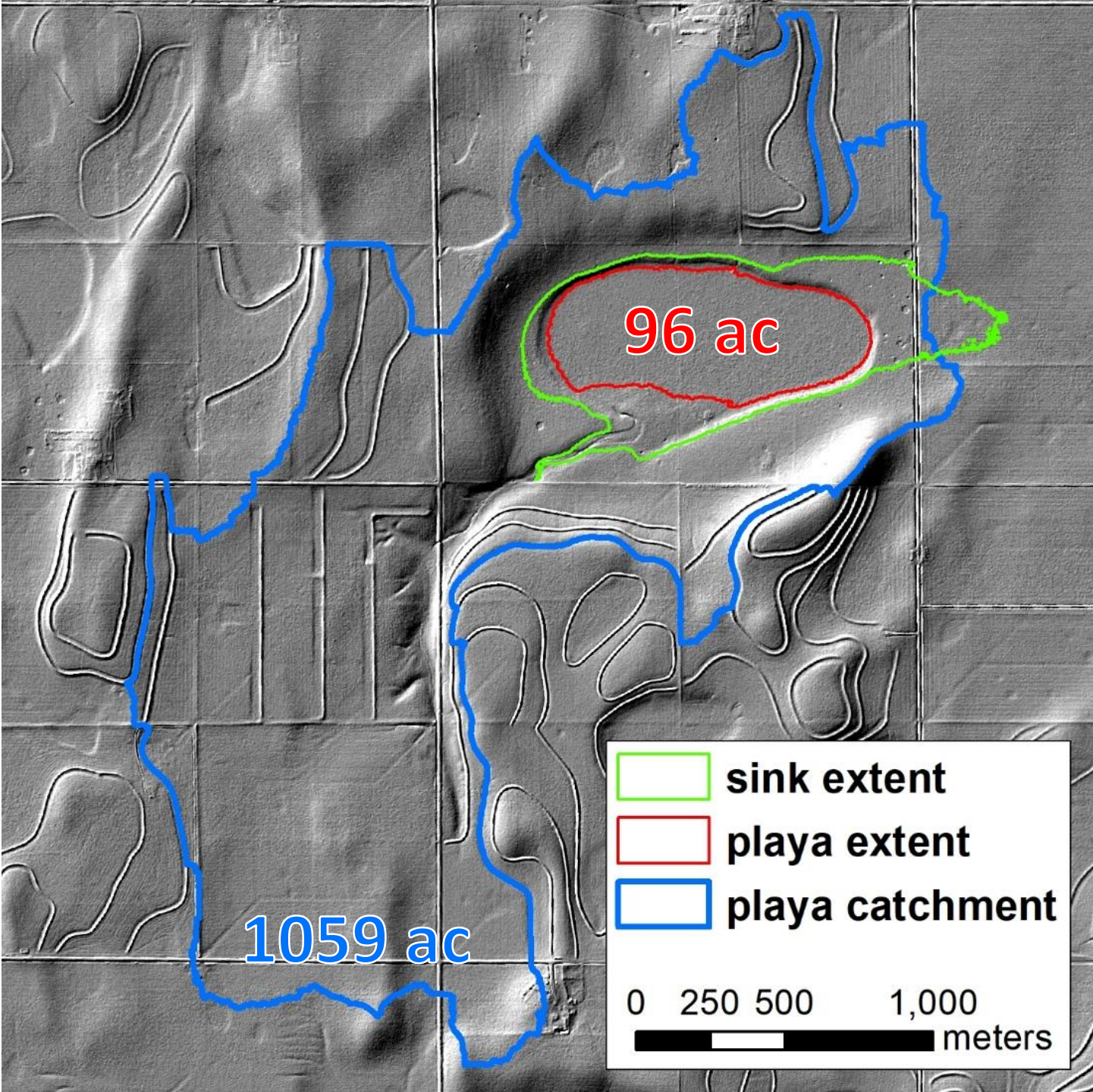
False playa
(ridge feature)

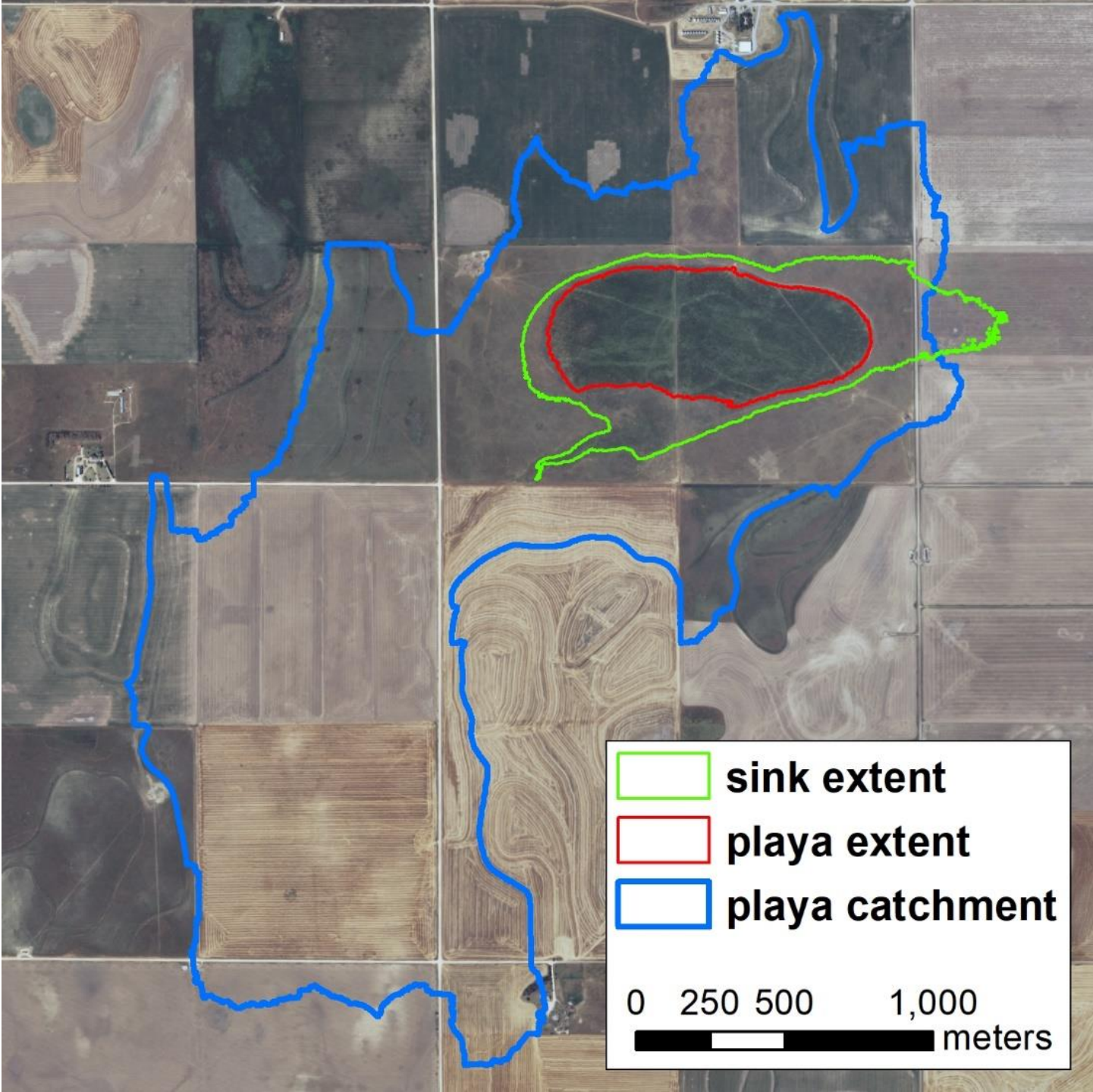
LiDAR shaded relief (PLJV – yellow, LiDAR – red)



PLUV-PP watersheds (blue)

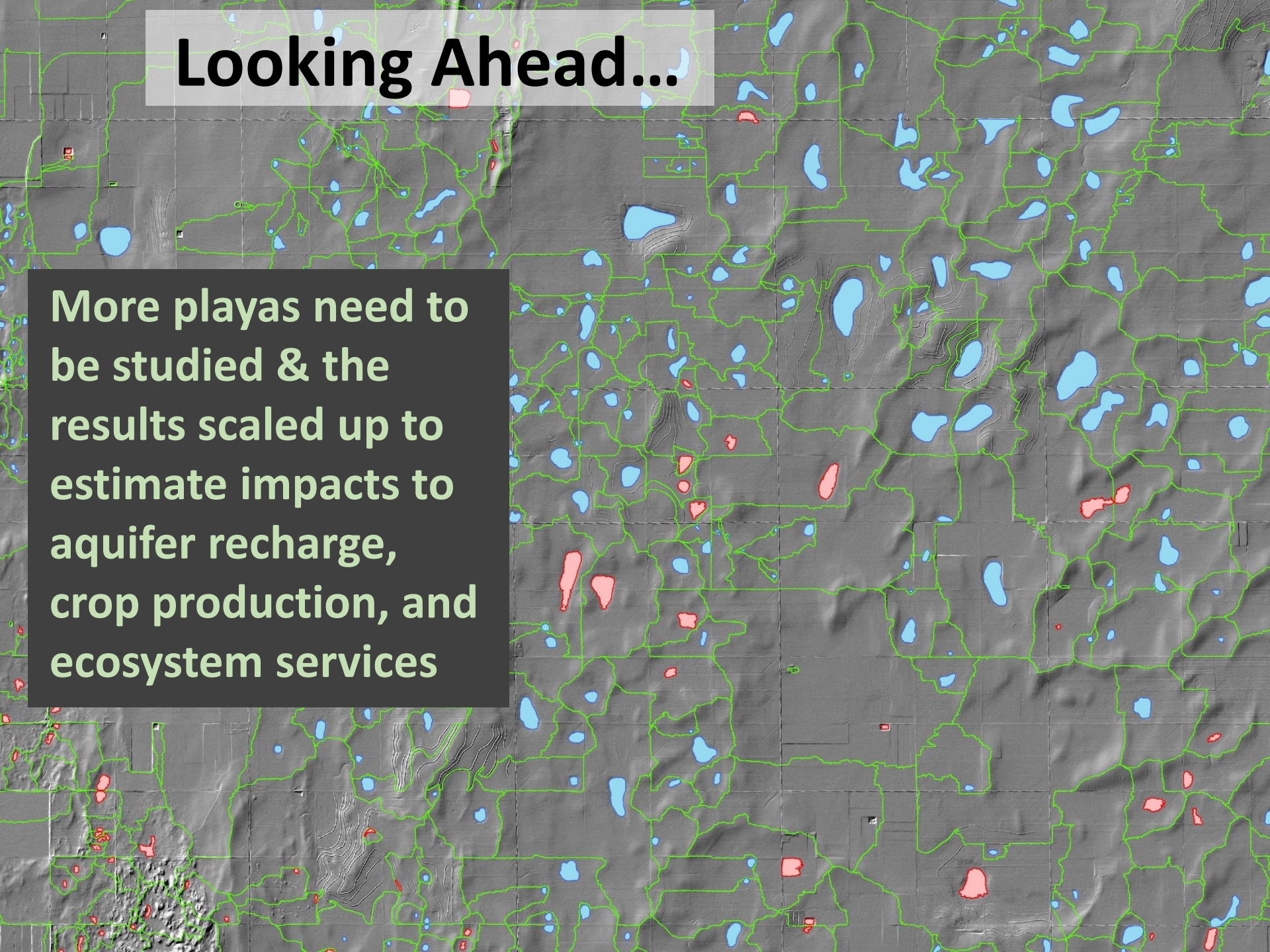




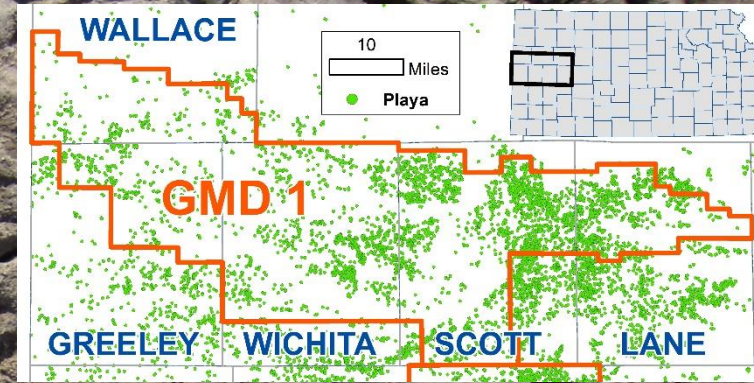


Looking Ahead...

More playas need to be studied & the results scaled up to estimate impacts to aquifer recharge, crop production, and ecosystem services



Ongoing Project with KWO (EPA WPDG 2019)

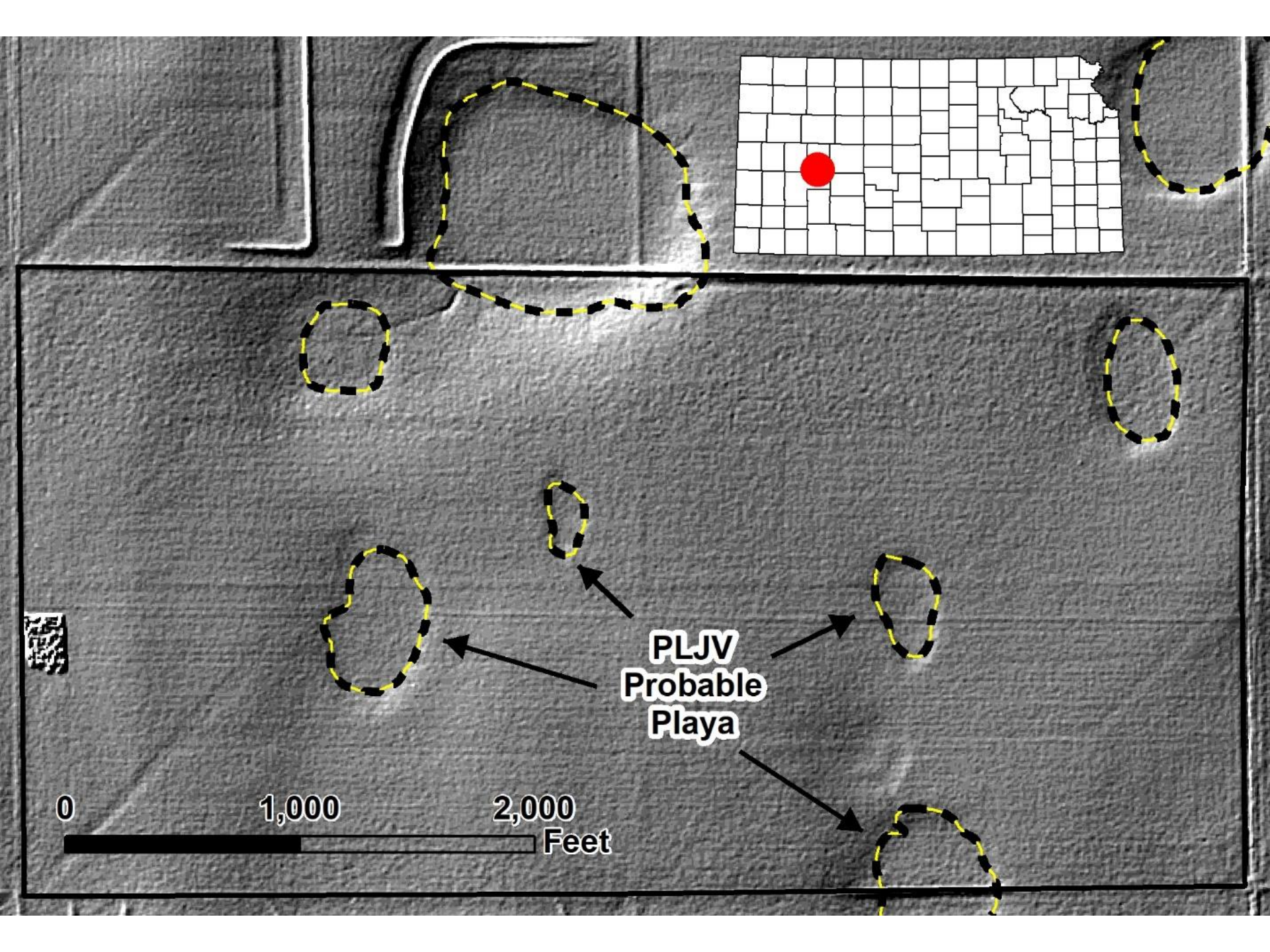


Do playas provide a conduit for aquifer recharge? *(GMD 1 testbed)*

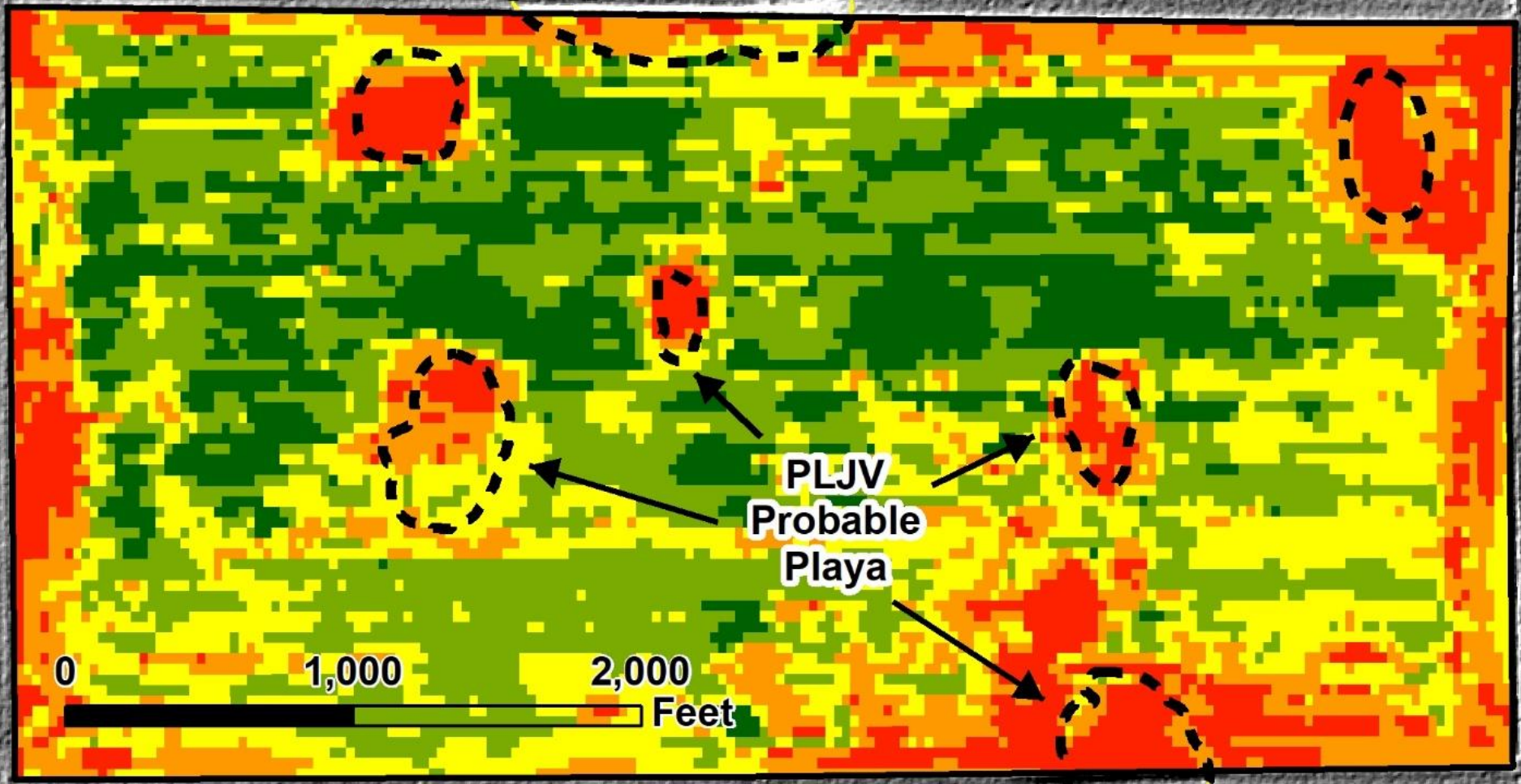
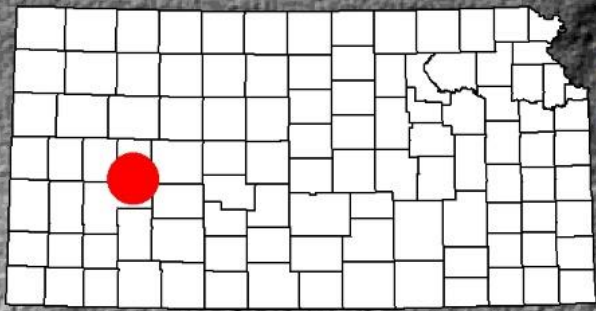
Ongoing Project with KWO (EPA WPDG 2019)

**Does it make financial sense to
farm through playas?**





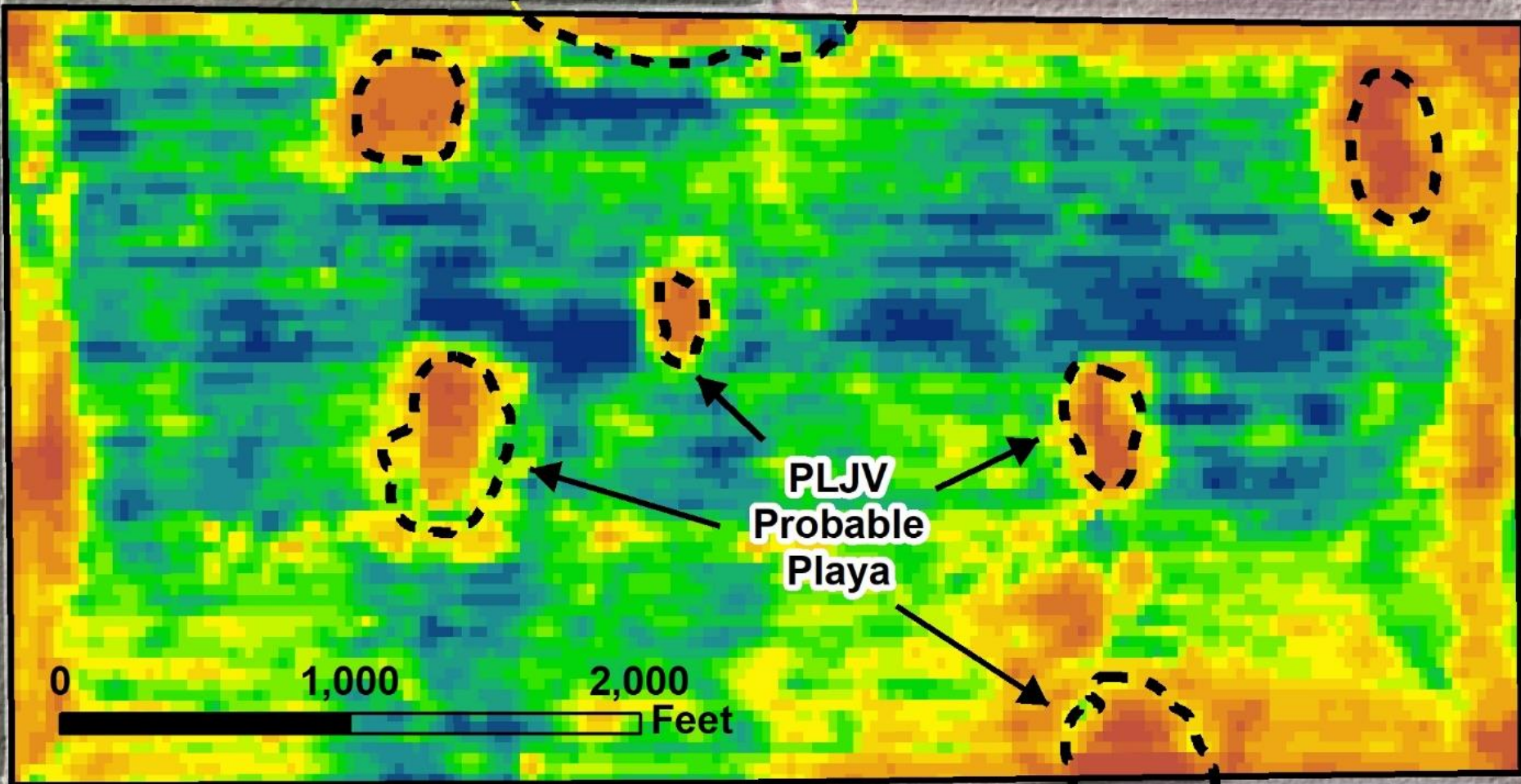
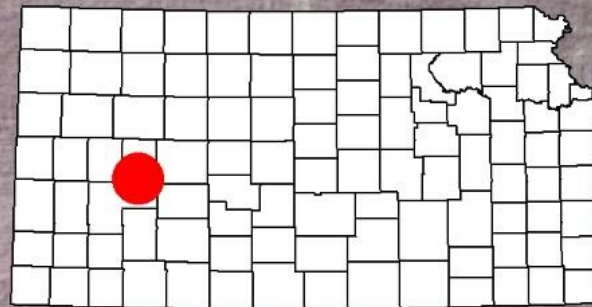
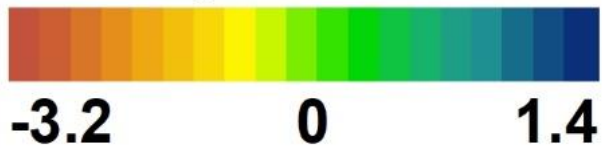
Years with below-average yield during 2015-2018



PLJV
Probable
Playa

0 1,000 2,000 Feet

Yield Z-score
average 2015-2018



Thanks for Listening...

Any Questions?



Else on to the demo we go...

<https://www.arcgis.com/home/item.html?id=9aa21af3fd244c7d9fc076826f390eac>

Kansas Applied Remote Sensing

<https://kars.geoplatform.ku.edu>

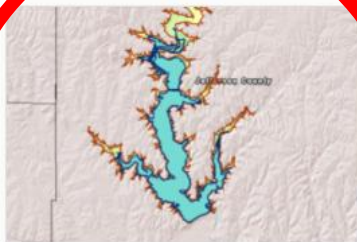
- Website built in ESRI ArcGIS Hub platform
- ArcGIS Online is a tremendous resource

Kansas Applied Remote Sensing KARS

Welcome to the Kansas Applied Remote Sensing (KARS) Program. KARS is a research program of the **Kansas Biological Survey & Center for Ecological Research** at the University of Kansas that conducts research on environmental and agricultural applications of remote sensing technology. In cooperation with its commercial partner, TerraMetrics Agriculture, Inc., KARS facilitates technology transfer of products and services derived from remote sensing technologies to commercial, governmental, and other end users.



KARS Applications and
Projects



Open Data and Research



KARS People



About KARS

Q playa

All

Data

Filter Reset 1 - 12 of 12 results Relevance

Content Type

- Feature Layer
- Web Map
- Hub Page
- Web Mapping Application

Source

- The University of Kansas
- U.S. Fish and Wildlife Service

Tags

Last Updated

Data

Catchments for PLJV Probable Playas (v5) - Kansas

The University of Kansas | ks_biosurvey

This dataset contains 22,004 features, which are a subset of features found in "Micro Watersheds - Western Kansas", that delineate potential catchments for features found in "Playa Lakes Joint...

Type: Feature Layer **Rows:** 22,004
Last Updated: February 2, 2022 **Tags:** boundaries, catchment, dataset, environment, Kansas,...

Data

KBS Potential Wetland Areas & Possible Playas - Western Kansas

The University of Kansas | ks_biosurvey

This dataset contains 69,086 Potential Wetland Area (PWA) polygons from all or part of 956 HUC-12s located in western and central Kansas. 13,876 of the PWAs have been further attributed as...

Type: Feature Layer **Rows:** 69,086

This one is for Abe Lollar



Map

Western Kansas Wetland Layers

The University of Kansas | jkastens_KU

Type: Web Map
Uploaded: February 2, 2022

Tags: Kansas, playa, water, wetland

Document

Kansas Playas

The University of Kansas | ks_biosurvey

Kansas Playas The Kansas Applied Remote Sensing (KARS) Program at the Kansas Biological Survey (KBS) has been involved in multiple recent efforts with the Kansas Water Office (KWO) to...

Type: Hub Page
Publish Date: October 28, 2021

Tags: KARS Site for Web Applications, Water Resources

Data

Chase County Wallow-Like Features

The University of Kansas | jkastens_KU

All features have a surface area between 6 and 200 square meters, a size range estimated to capture most bison wallows. The lower bound was selected to eliminate extremely small features...