Wild Pig Impacts in Pecan Operations

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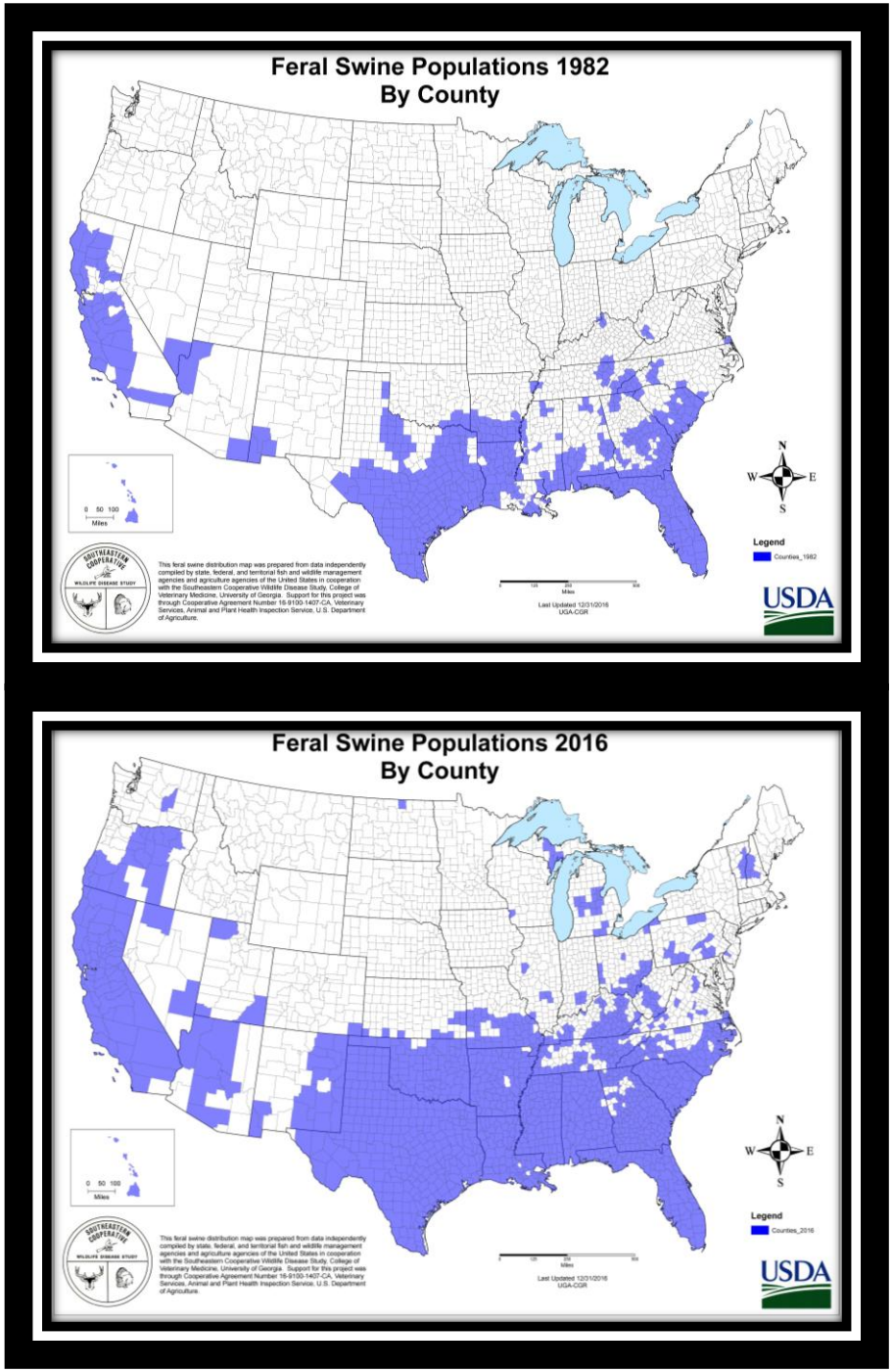
Wild Pigs:

Where did they come from?

- Early European settlers as a food source in the 15oo's
- Sportsmen in the 1930's
- Populations have converged and have continued to grow



Life History of Wild Pigs

- Not a Native Species
- Wild pigs are opportunistic omnivores
- Highly adaptable to varying environments
- Extremely high reproductive rates
- Have no natural predators

The Problem

- **D**amage
- **D**epredation
- **D**isease
- **D**isturbance

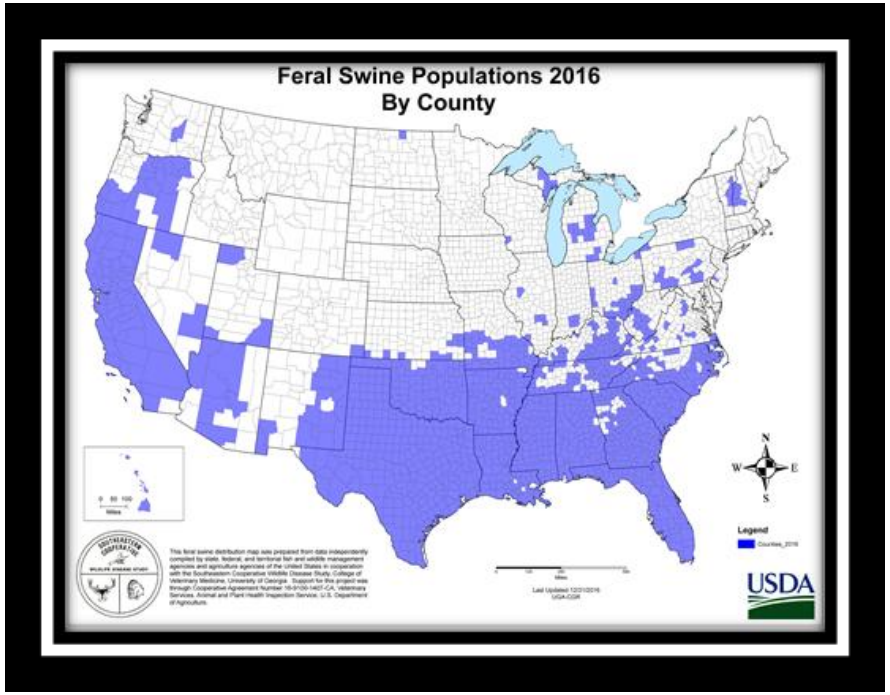
Why are they a problem?

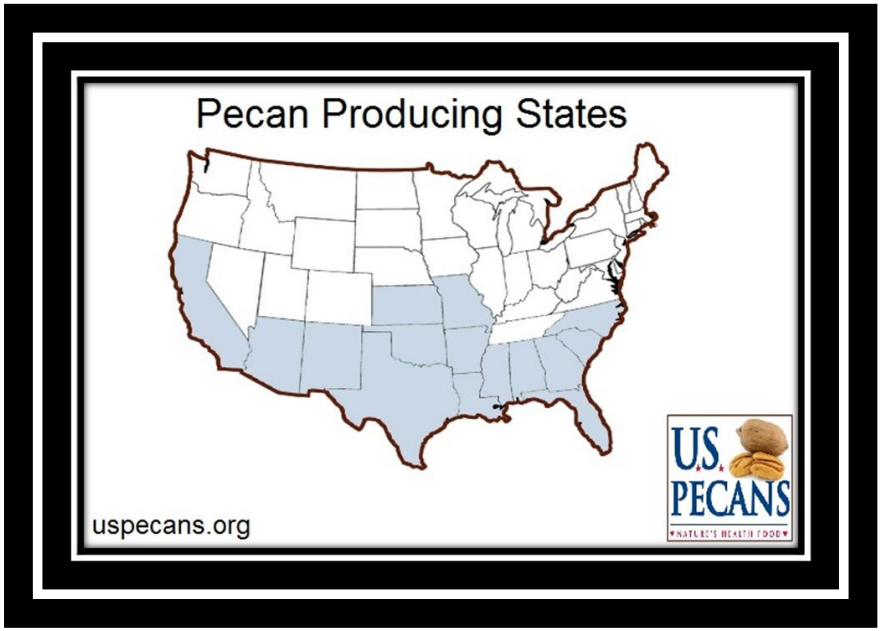
- General foraging behavior such as rooting, digging and wallowing causes damage to pasture land, livestock, lawns and agricultural crops

- USDA has reported a conservative estimate $2.5 Billion in damage and control directly attributed to wild pigs
  - With $1.5 billion in agricultural loss alone in 2016

Wild Pigs : Pecans

- Pecan orchards and groves are attractive resources for many wildlife species
- High caloric abundant food source in a season when food can be hard to find
- Geographic overlap of the two species, wild pigs and pecans
- Foraging behavior leads to damage of pecan operations as well as loss in yields as a result





Objectives:

- Determine resource selection by wild pigs in and around pecan orchards and groves in response to timing of pecan harvest

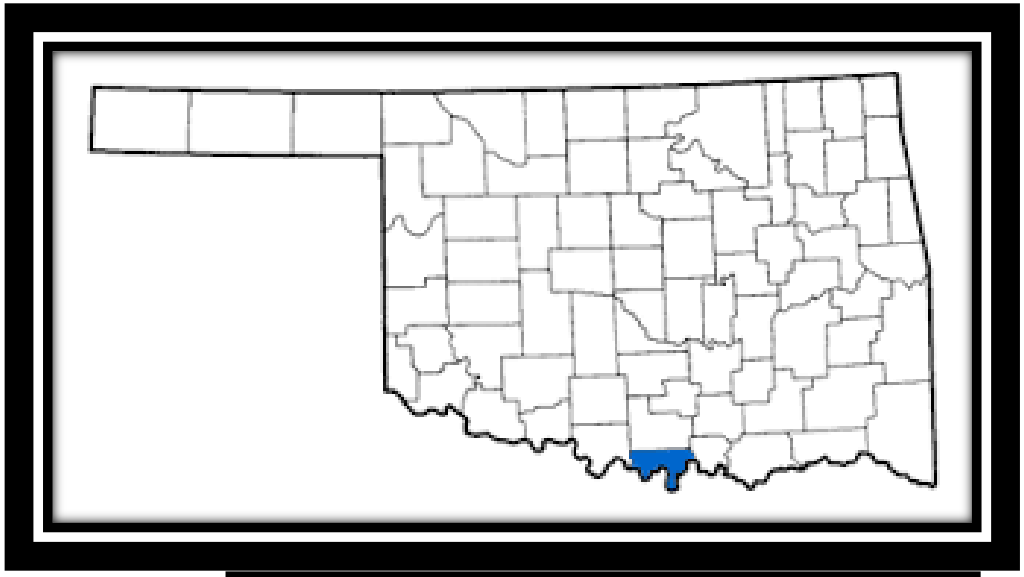
- Quantify loss of pecan yields due to wild pig damage

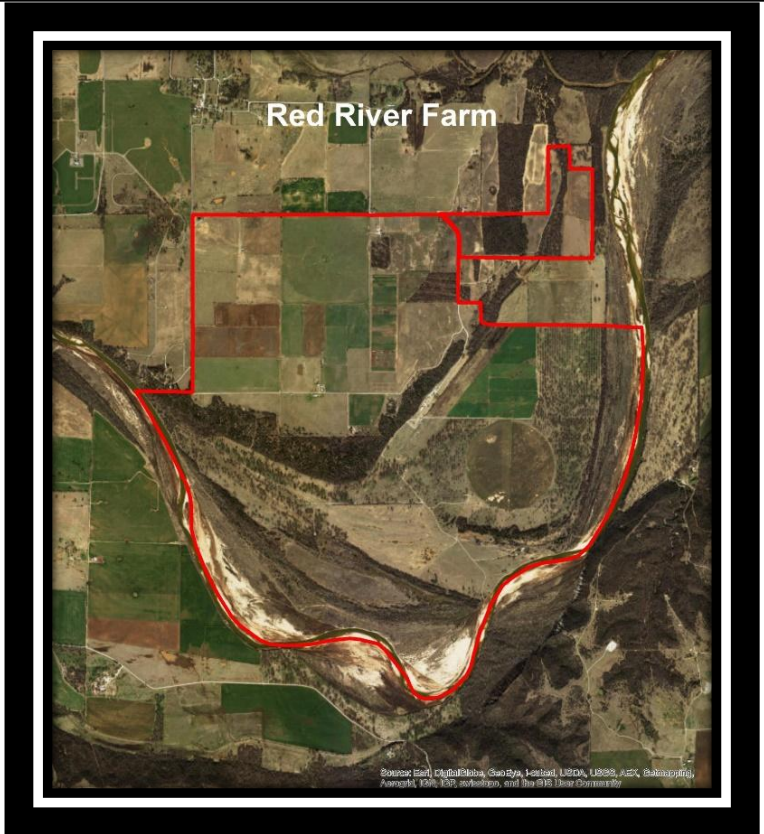
Study Area

- Noble Research Institute's Red River Farm in southern Love County, Oklahoma

- Approximately 3200-acre pasture and demonstration farm including 365 acres of harvested pecans

- Abundant wild pig population





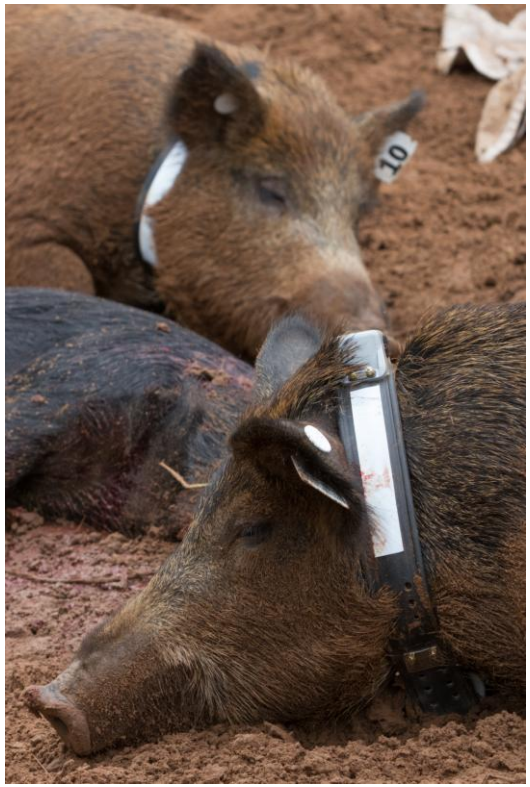
Methods:

Recourse Selection

- BoarBuster™ traps
- Captured, collared and released 29 individual adult sows over 2 seasons (n=16 in 2016, n=13 in 2017)
- Target was 2 individuals per sounder
- Vectronic Vertex Lite GPS collars with Iridium communication.
- Programmed to take 1 GPS location every 30 min

The Process

The Process



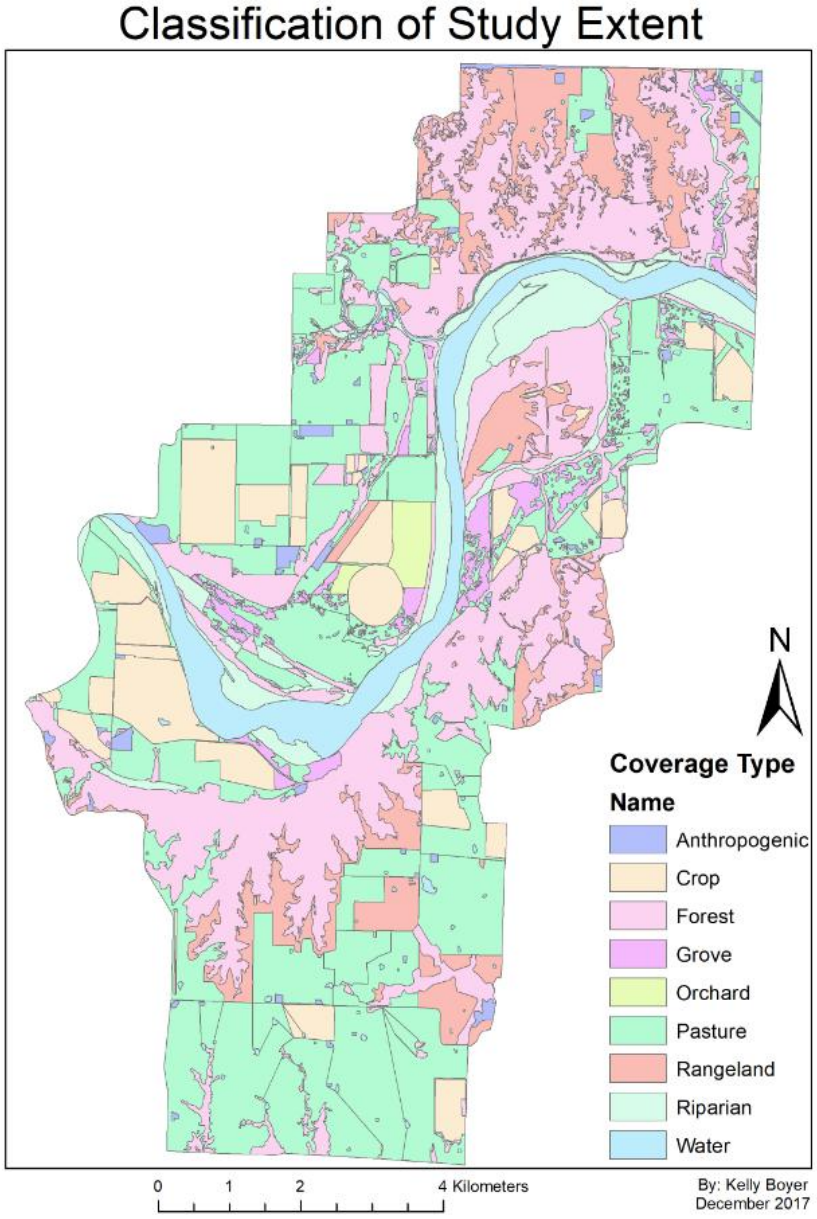
The Process

Methods:

Resource Selection

- High resolution imagery was heads-up digitized to represent 8 coverage classifications within the study area

- Resource selection analysis using generalized linear mixed modeling

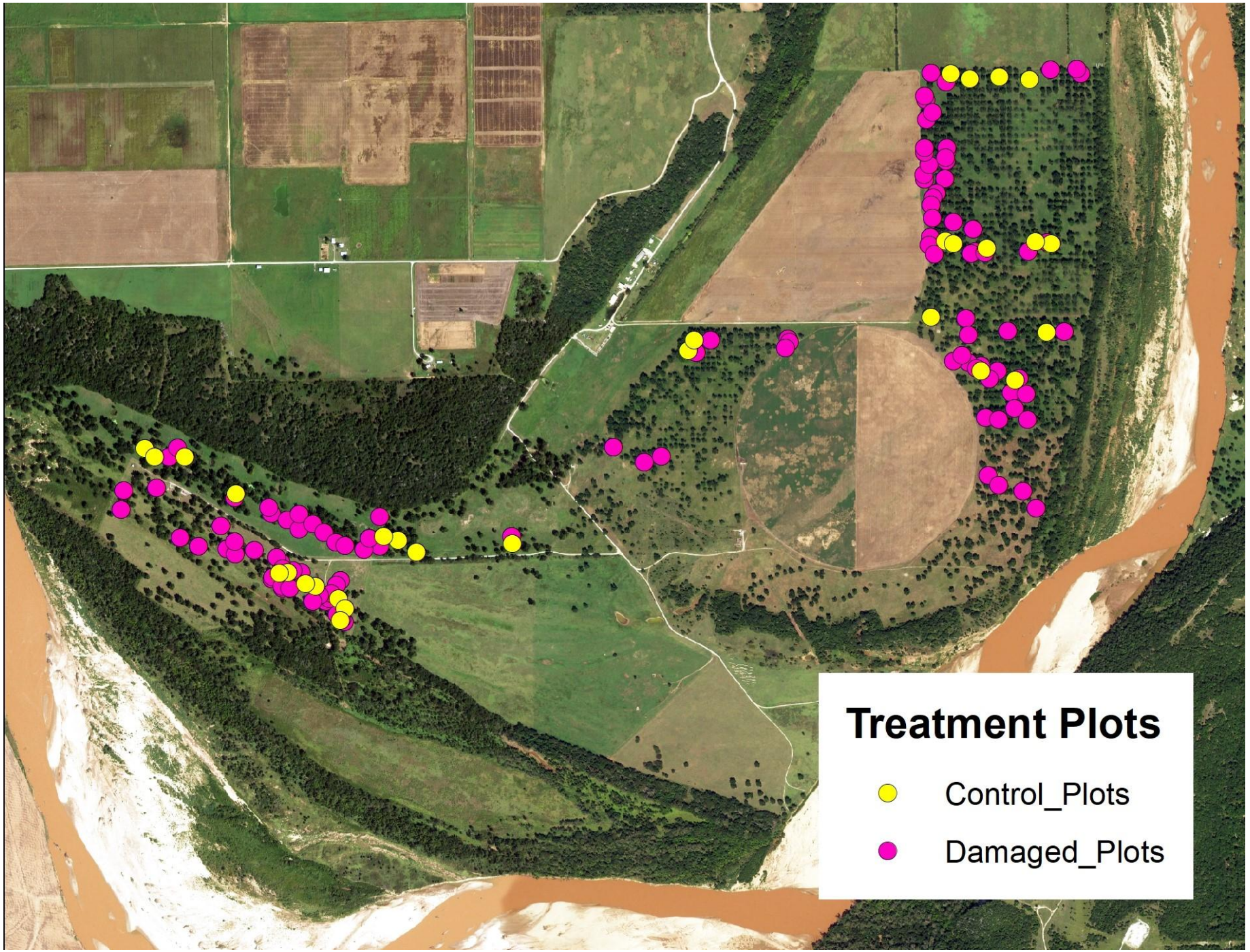


Depredation – Pecan Loss

Depredation – Pecan Loss

Methods:
loss of pecan

- Identified and measured areas of damage caused by wild pigs in pecan orchards and groves
- Sampled 0.33m² plots at random within damaged areas; recorded damage depth and number of pecans both pre and post-harvest
- Identical sampling in control areas with no damage caused by wild pigs


Treatment Plots
Control_Plots
Damaged_Plots

Results:

Pecan loss

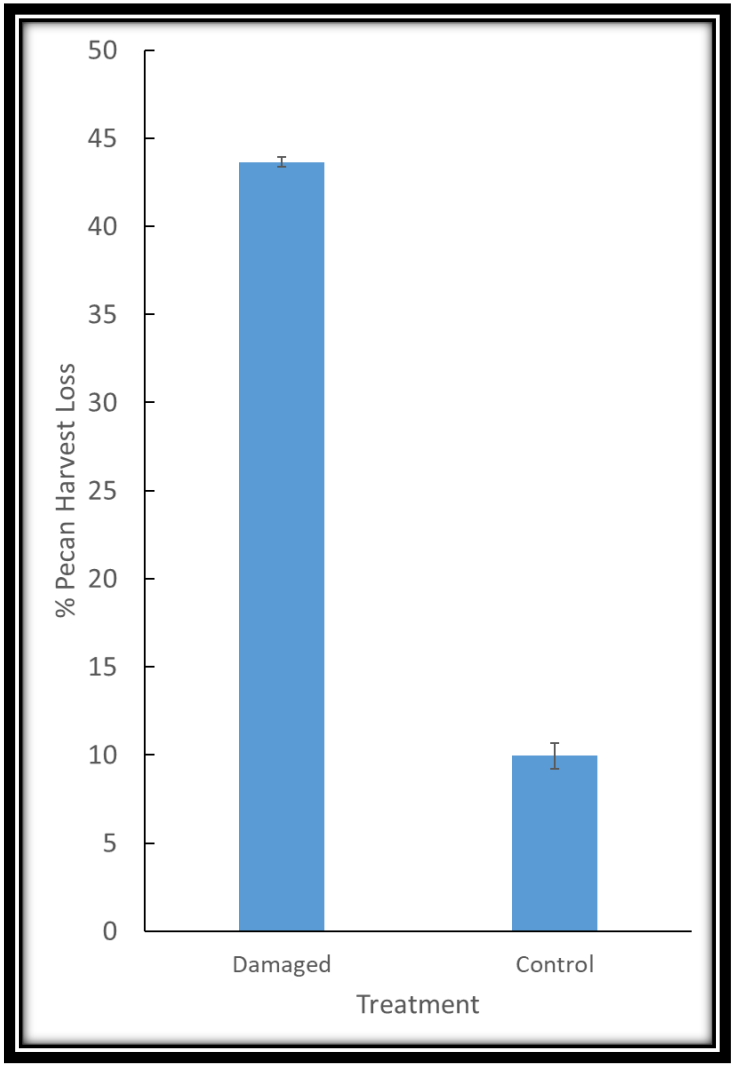
- We found that the treatment Damaged vs Control was the only significant predictor (F1, 133 = 5.21, P = 0.024) of harvest inefficiency

Treatment	F Value	PR>F
Orchard VS Grove (Damage)	0.05	0.8268
Orchard VS Grove (Control)	0.02	0.8823
Damaged VS Control	5.21	0.0241
Damage Depth	0.05	0.8281

Results:

Pecan loss

- Pecan harvest loss for damaged areas (n=111) was 43.65%
- Pecan harvest loss for control areas (n= 30) was 9.96%
- Net loss of 33.7% as the result of rooting damage



Results:

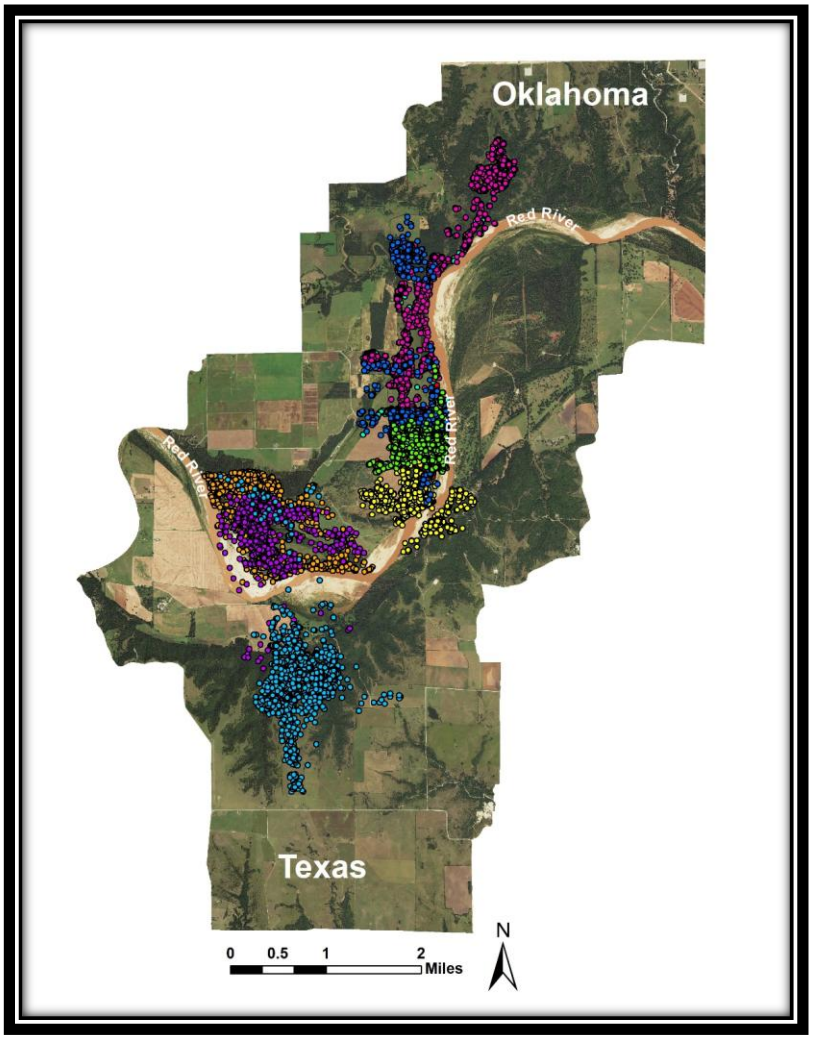
%Damage x % Loss x Operation Size x Production x Price = Loss in $$$

	% Damage	% Loss	Acres of Operation	Production	Price per Pound	Dollar Loss
Native	40	33.7	50	430	$ 1.60	$ 4,637.12
Improved	30	33.7	150	650	$ 2.25	$ 22,178.81
Total Loss to Hog Damage						$26,815.93

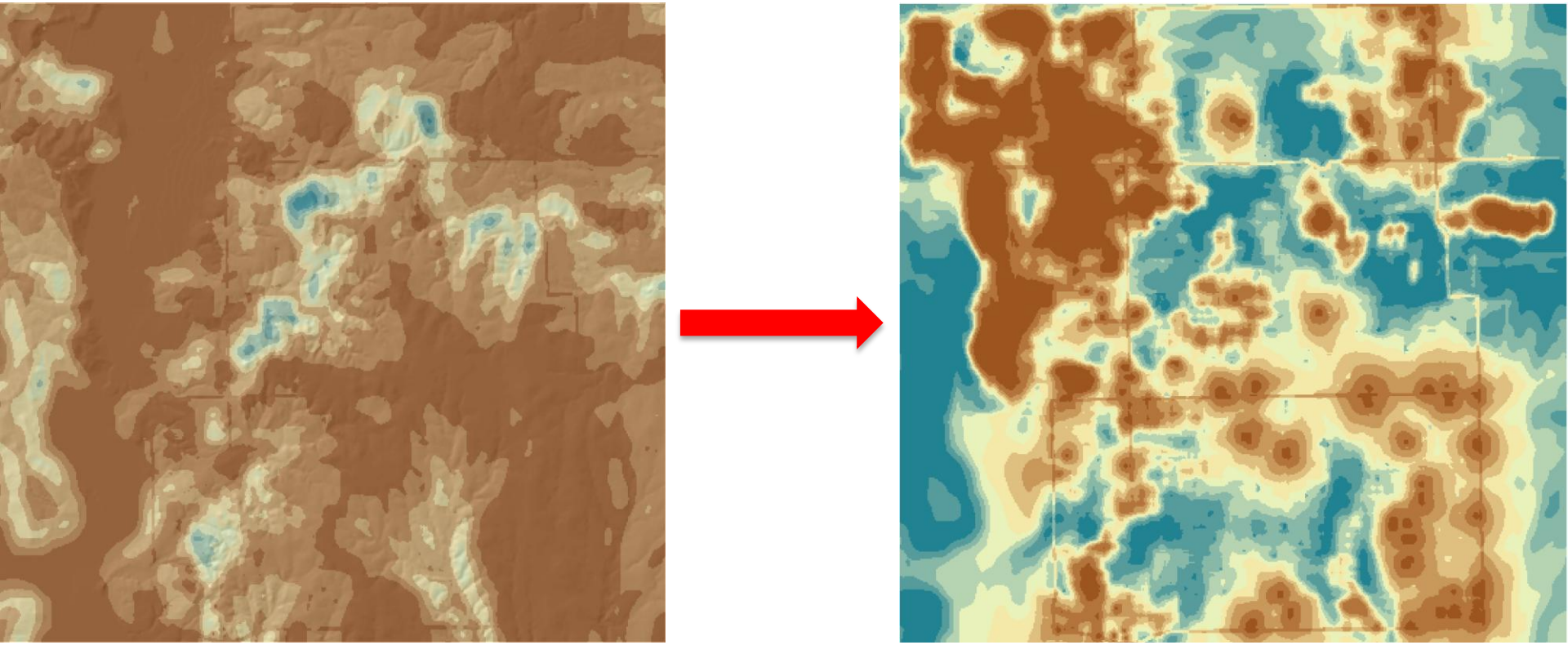
Results:

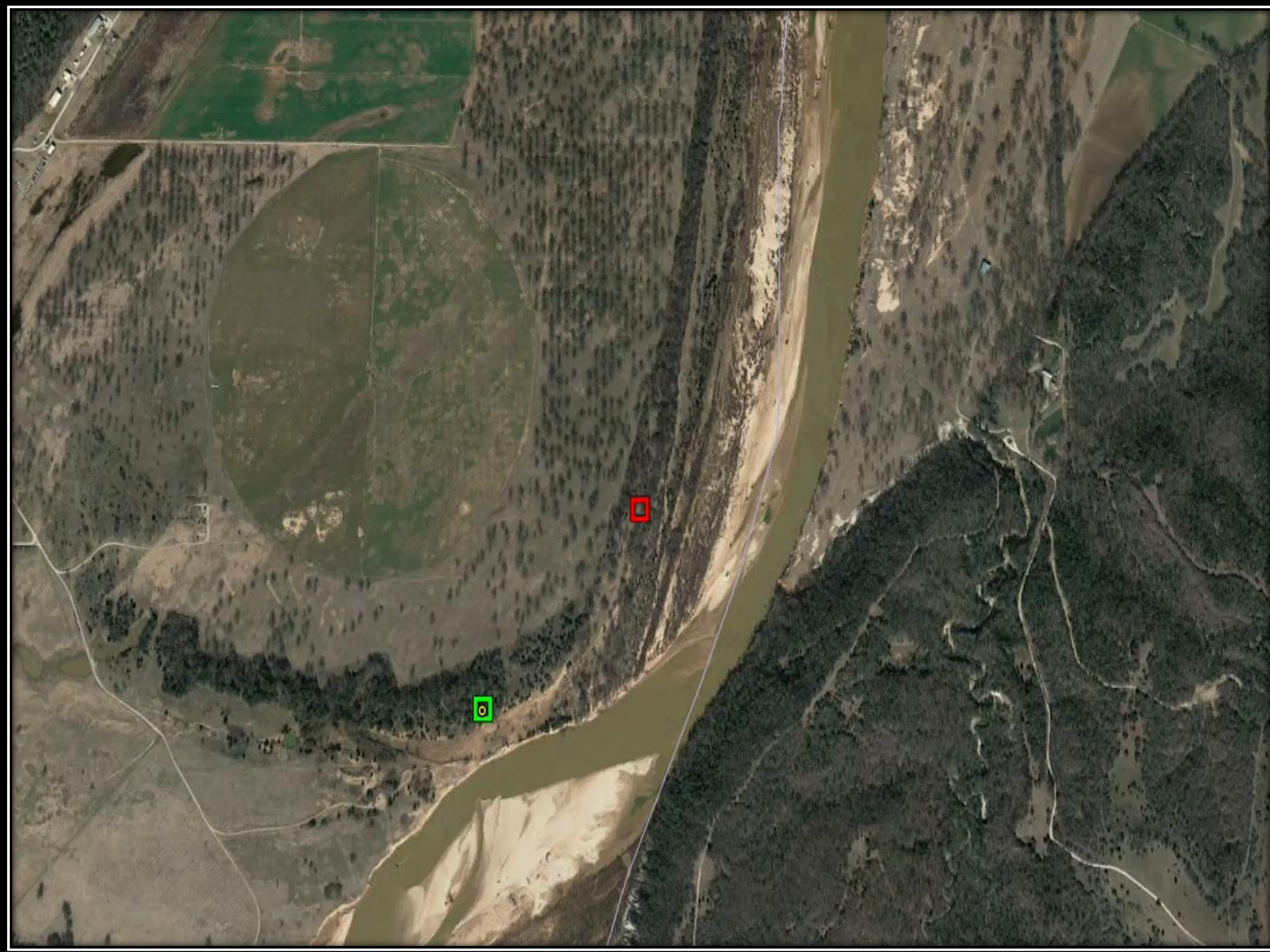
Resource Selection

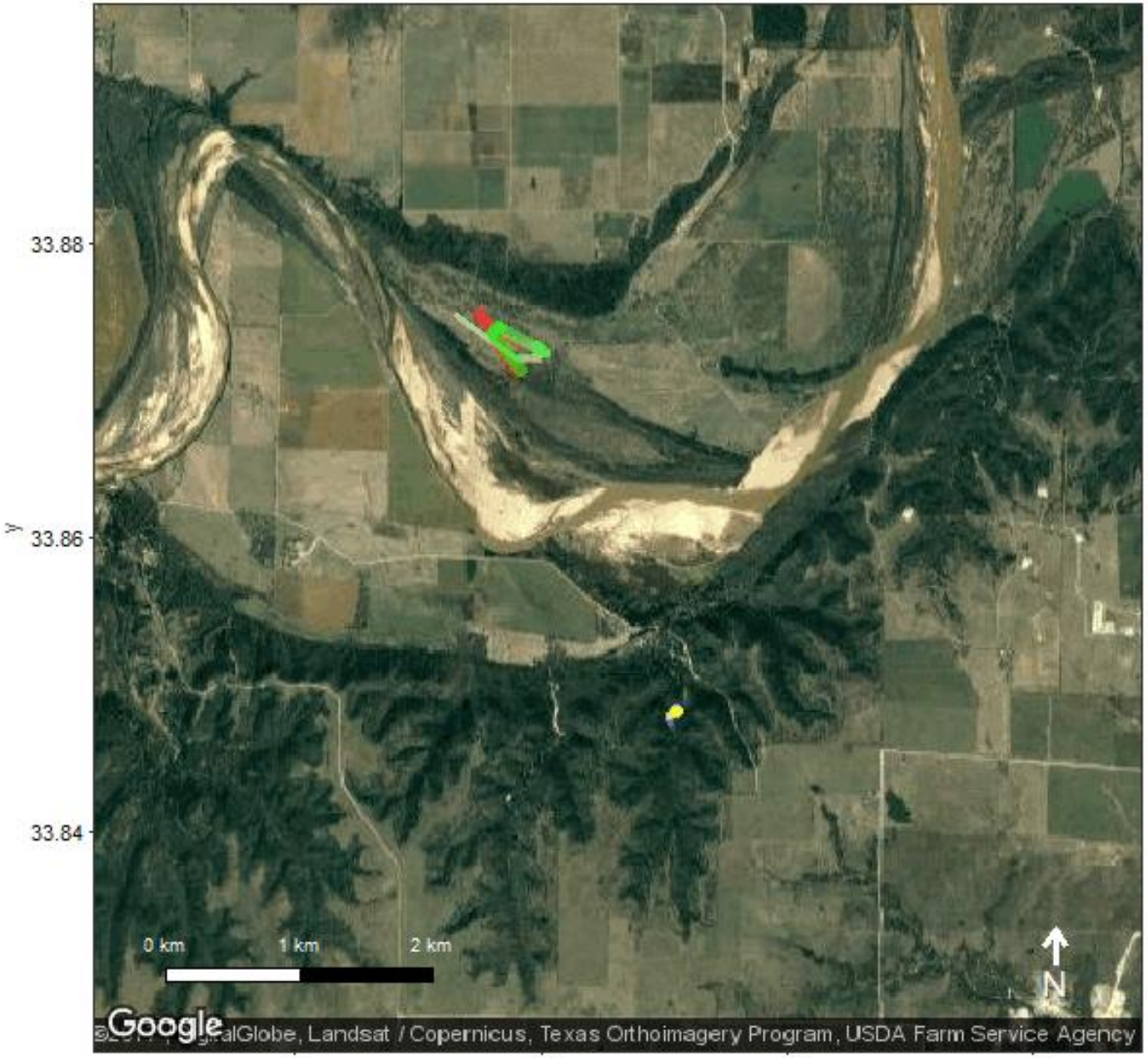
- Study period in 2016 was 76 days (October 10 – December 29) and in 2017, 69 days (October 13 – December 20)
- 98.9% fix rate success over 2 year study
- 28:29 collars were collected from individuals using GPS and VHF telemetry

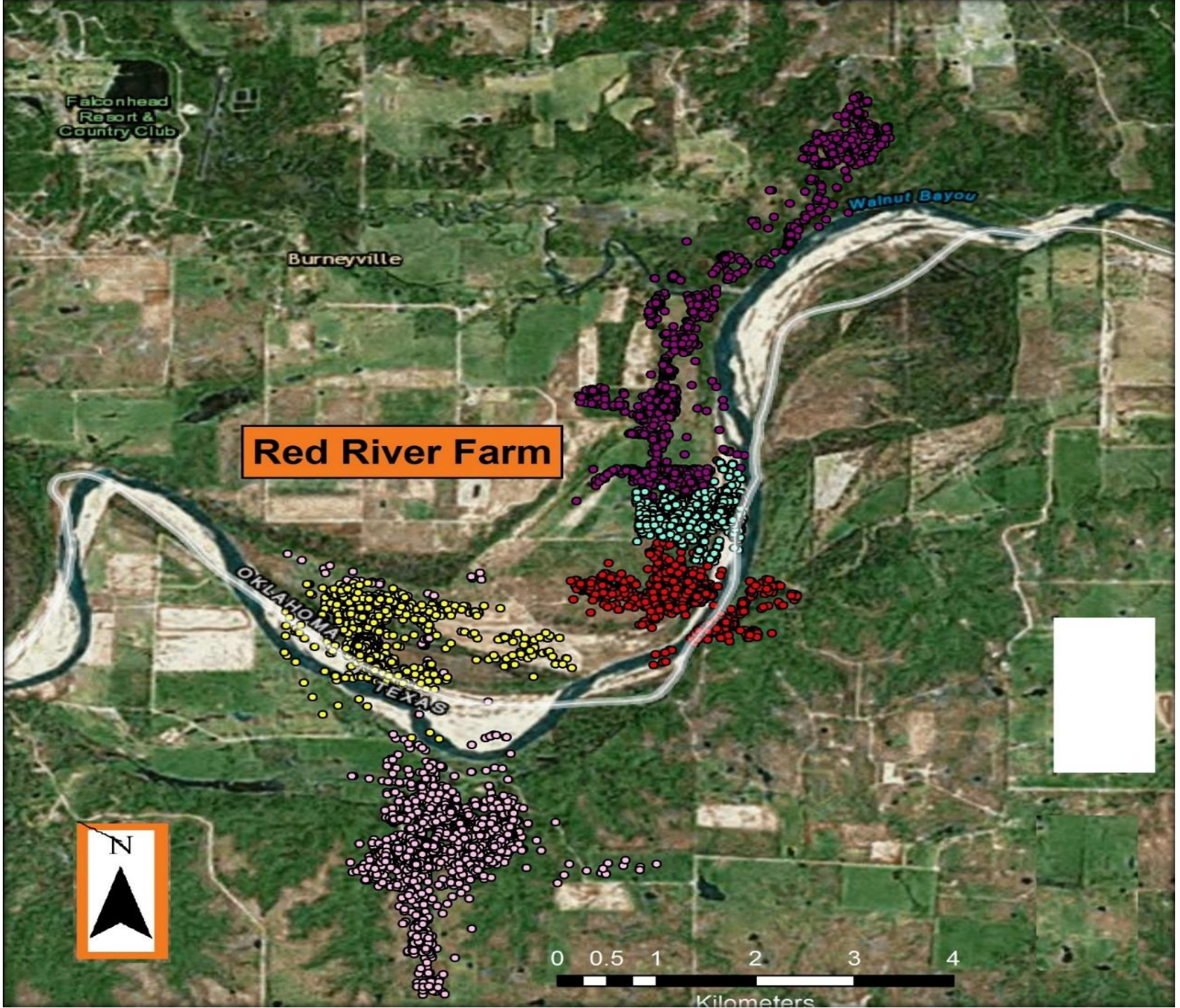


Spatial Prediction – Pig Use






33.88
33.86
33.84
y
0 km
1 km
2 km
N
Google
alGlobe, Landsat / Copernicus, Texas Orthoimagery Program, USDA Farm Service Agency
-97.30
-97.28
-97.26
-97.24
x


Falconhead Resort & Country Club
Burneyville
Walnut Bayou
Red River Farm
OKLAHOMA
TEXAS
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0 0.5 1 2 3 4
Kilometers

Disease

- **Brucella spp.**
- **Pseudorabies virus**
- **Tularemia**
- **Porcine reproductive and respiratory syndrome**
- **Chagas disease**
- **Canine neosporosis**

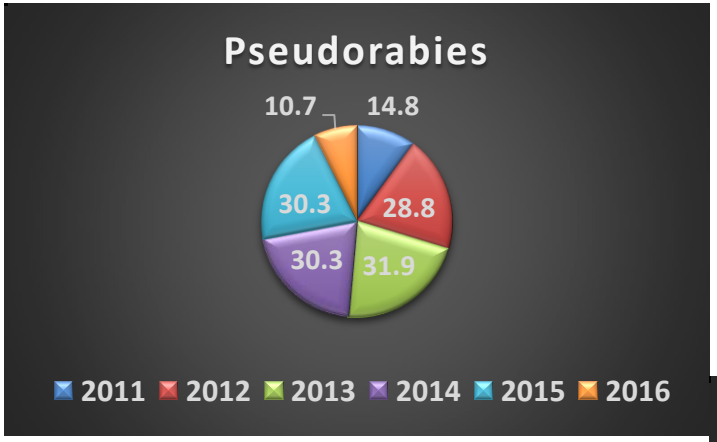
Disease

- **Brucella spp. = 15.5%**
- **Pseudorabies virus = 34.0%**
- **Tularemia = 19.9%**
- **Porcine reproductive and respiratory syndrome = 0.26%**
- **Chagas disease = 0.0%**
- **Canine neosporosis = 67.2%**

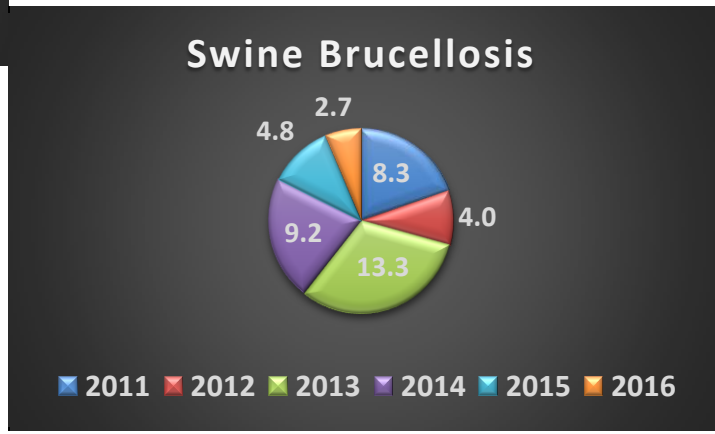
Disease – Wildlife Services

Prevalence (%)

Classical swine fever (0%)
Pseudorabies (24.4%)
Swine brucellosis (7.1%)
Influenza A virus (7.2%)
Leptospirosis (46.2%)
Toxoplasmosis (8.5%)
Trichinosis (1.0%)
Tuberculosis (0%)
Foot and mouth disease (0%)
Hepatitis E (10.9%)
African swine fever (0%)
Salmonella (63.6%)
Porcine reproductive and respiratory syndrome (0.9%)
Bluetongue virus (27.0%)
Senecavirus (0%)



--2011-2016
--28,253 pigs removed
--5,825 tested



Conclusion & Discussion

- Net loss of pecans was found to be 33.7%
- Consumption would be additive to over all loss
- Damage too severe to harvest

Conclusion & Discussion

- Potential for disease contamination
- Resource selection will help to mitigate and prioritize areas for control and reduce loss of pecans from wild pigs.

Miscellaneous

--Home range size (Sept.-Jan.) = 564 acres (112-1,204)

--11 of 16 pigs cross the Red River 80 times (2-11 crossings)

--Litter size = 5.3 (2-9)

--Genetic analyses = 734 DNA samples

--Population monitoring

--Digital phenotyping (age & body mass)

Special Thanks

- Noble Research Institute
- Natural Resource Ecology and Management department of Oklahoma State University
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- All others that have assisted in this research

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