Preliminary analyses of landscape-scale impacts on Western Chicken Turtles in Texas

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Western Chicken Turtle Ecology

➢ Biology

- Occurs in Louisiana, Texas, Oklahoma, Arkansas, and Missouri with the Mississippi River as the eastern geographic barrier
- Prefer to inhabit shallow, ephemeral wetlands[1]
- Suggested they depend on the landscape-matrix quality[2,3,4]

➢ Potential Anthropogenic Influences:

- Urbanization and highway development[2,3,5,6]
- Agricultural expansion and land subsidence[2,5,7]
- Climate change[5,8,9,10]

References:
1: Buhlmann et al. 2009
2: Ryberg et al. 2017
3: Quesnelle et al. 2015
4: Semlitsch & Bodie, 2003
5: Stanford et al. 2020
6: Santoro et al. 2020
7: Morton et al. 2006
8: Li et al. 2019
9: Heo et al. 2015
10: Agha et al. 2018

Overall Study Objectives

1. Estimating the current range, distribution, and habitat associations of WCTs* in Texas

2. Evaluating the efficacy of various survey methods in observing WCTs

3. Identifying recommended landscape-level research needs for WCT in Texas, emphasizing assessment of anthropogenic threats to the species and their associated habitat

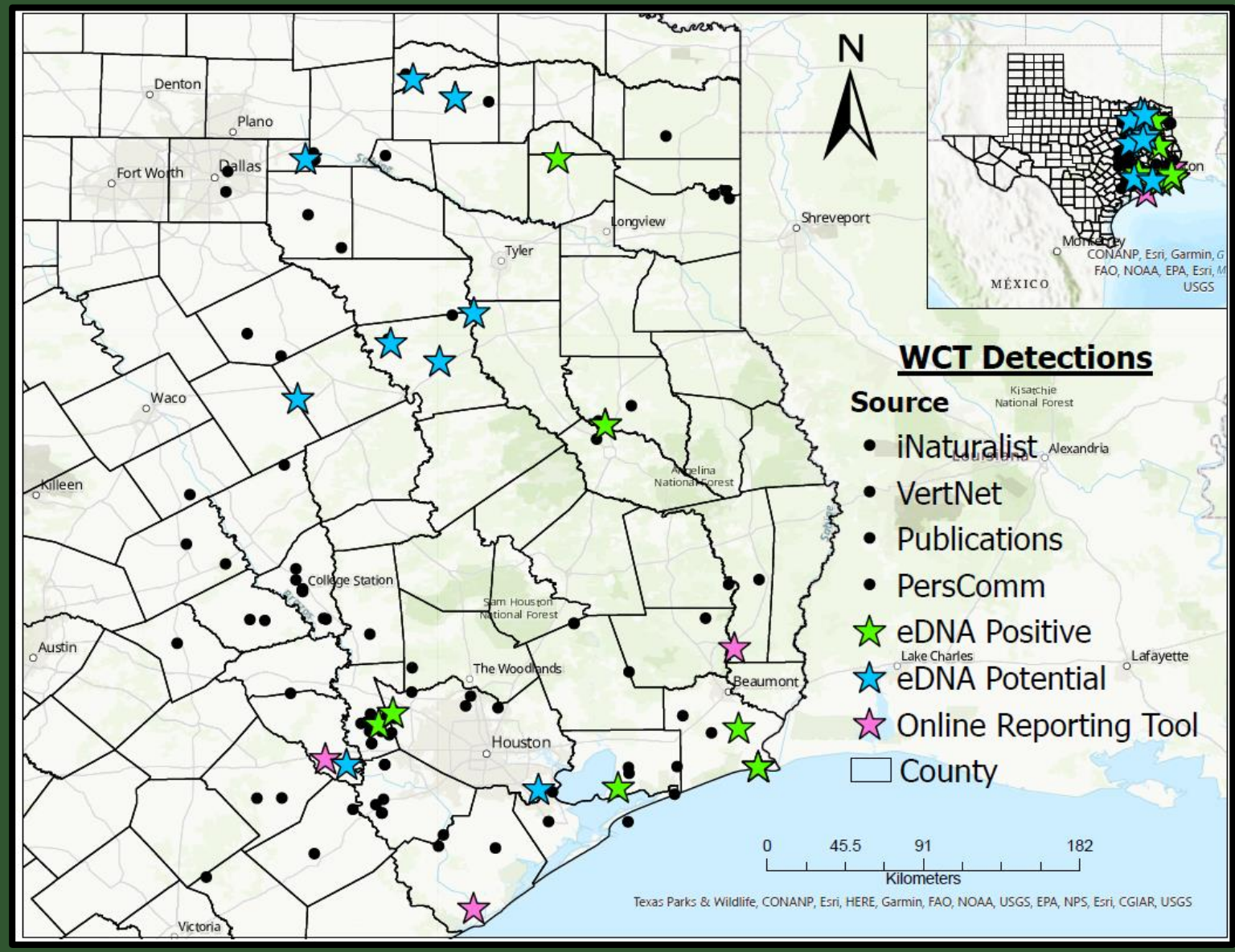
*WCT=Western Chicken Turtle

Study Methods and Results to Date

- **Methods**
  - Suite of traditional and novel detection methods
  - Micro-Habitat assessment
    - Water quality
    - Vegetation cover and structure
    - Substrate type
    - Hydrology indicators

- **Results so far (Gordon et al. 2021)**
  - March-July of 2020 and 2021: 54 sites in 29 counties have been sampled (239 sampling events)
  - WCT presence confirmed at 11 locations and potential presence at an additional 7 locations

WCT Detections in Texas (Historical + New)



Next Steps: Statistical Analyses

- Software: R, SigmaPlot, Primer, ArcGIS Pro
- Correlational studies: what relationships exist at each site and across sites?
  - Have found some significant differences in water quality and canopy cover between occupied vs. unoccupied WCT sites, but further analyses needed
- Multivariate statistical analyses: used to evaluate significance of correlations
- Long-term temporal trends in weather, river flow, and water quality using data from state-wide stations and gauges

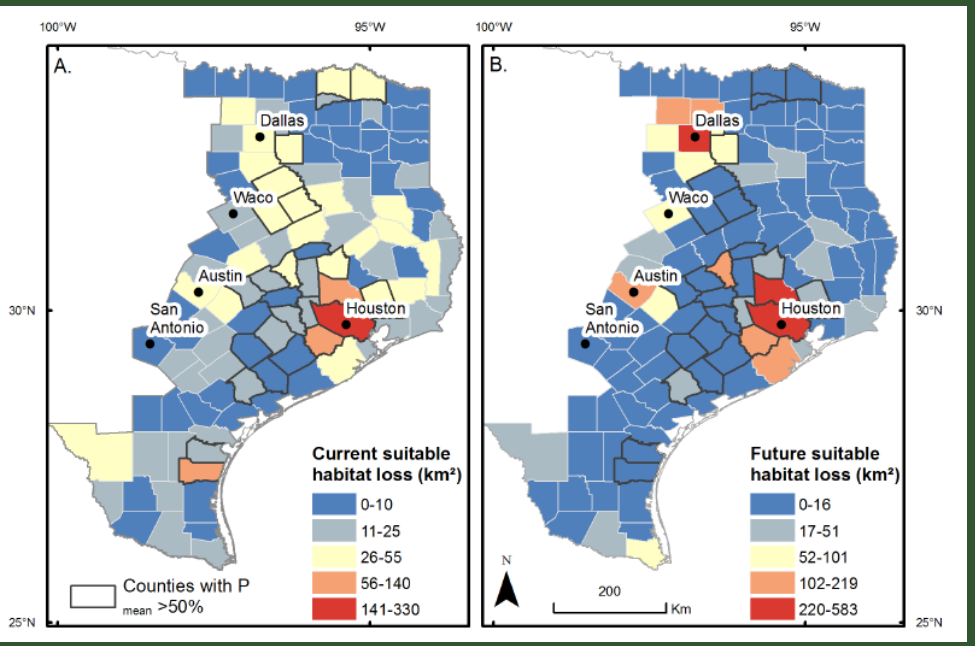

Cooper Lake WMA Site


Gus Engeling WMA Site


Sabine Woods Site

Planned Landscape-scale Models

- Goal: Update existing models with new WCT locations and develop modeling process by identifying significant environmental variables



Ryberg et al. 2017

Model 1: Species Distribution Modeling (SDM)

WCT occurrence data (historical accounts + new detections)

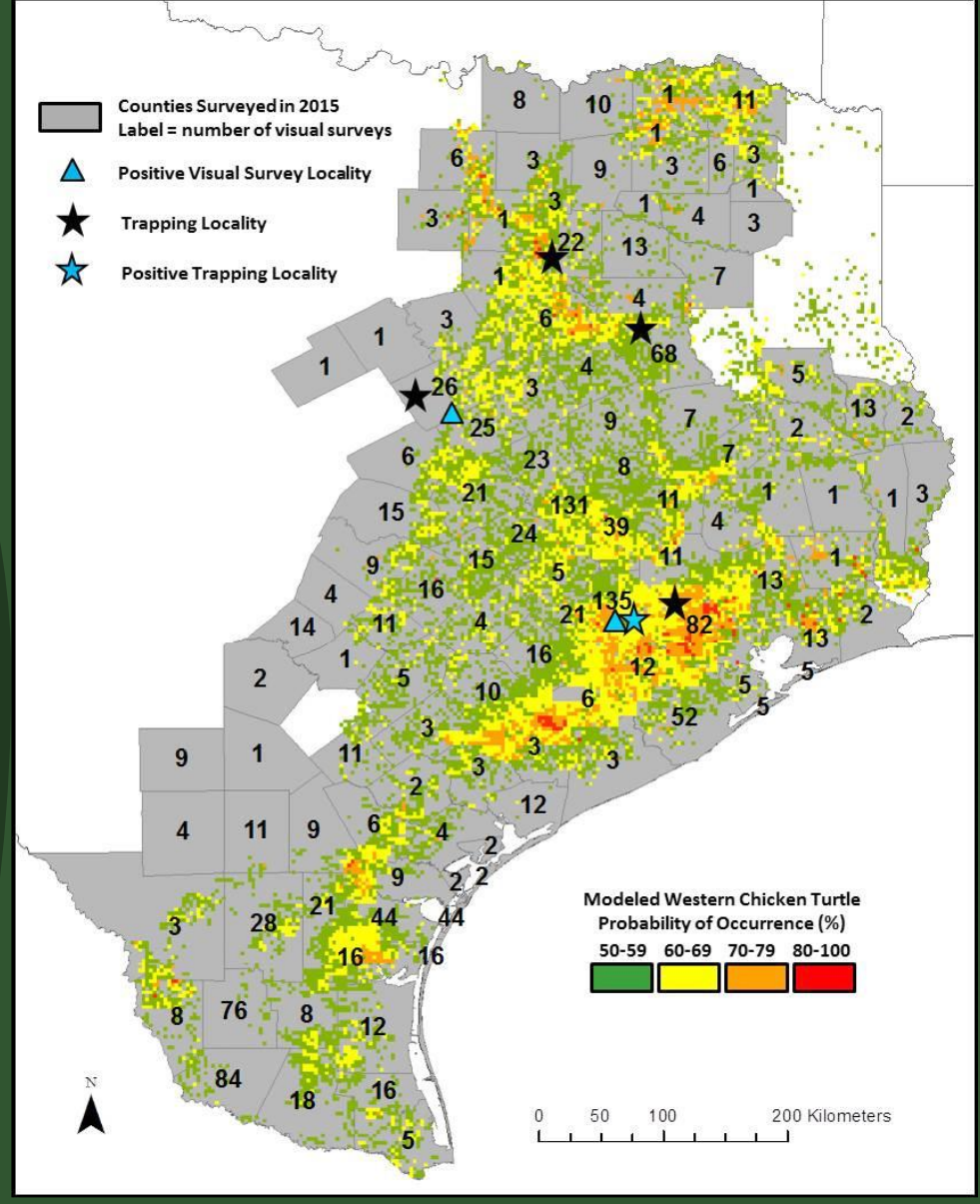
Suite of environmental variables

Model 2: Current and future habitat alteration and fragmentation caused by anthropogenic threats

Model 3: Spatial analysis of habitat heterogeneity and homogeneity within WCT home range

Considerations from Previous Research

- **WCT Distribution and Threats[1]:**
  - Suggested WCT is extremely rare in Texas and wetland loss and fragmentation from rapid urbanization is likely the largest current and future threat
- **SDMs for turtles[1,2,3]:**
  - MaxEnt method has been effective for modeling distributions of species based on presence-only data
- **WCT Home Range[4]:**
  - One recommended model estimated an average annual home range of 703,114 m²
  - Suggested that WCT may exhibit irruptive or partial nomadism



References: 1) Ryberg et al. 2016/2017; 2) Stryszowska et al. 2016; 3) Stratmann et al. 2016; 4) Bowers et al. 2021

Summary

- Current study: WCT have been detected at 18 locations (11 confirmed, 7 potential)
- One more sampling season to complete this year
- Data exploration and further analyses to evaluate relationships
- Multiple models planned for thesis

Katy Prairie Conservancy Site

Thank You! Questions?

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- Research Partners: Texas Parks & Wildlife, TAMU NRI, Working Dogs for Conservation
- Site Access: TPWD, state river authorities, private landowners & organizations

EIH WCT Project Website and Reporting Tool:

https://www.uhcl.edu/environmental-institute/research/current-projects/western-chicken-turtle

For additional questions:

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