

Evaluation of Anthropogenic Disturbances of Alligator Snapping Turtles (*Macrochelys temminckii*)



Kelly Garcia¹, Mandi Gordon², George Guillen^{1,2}

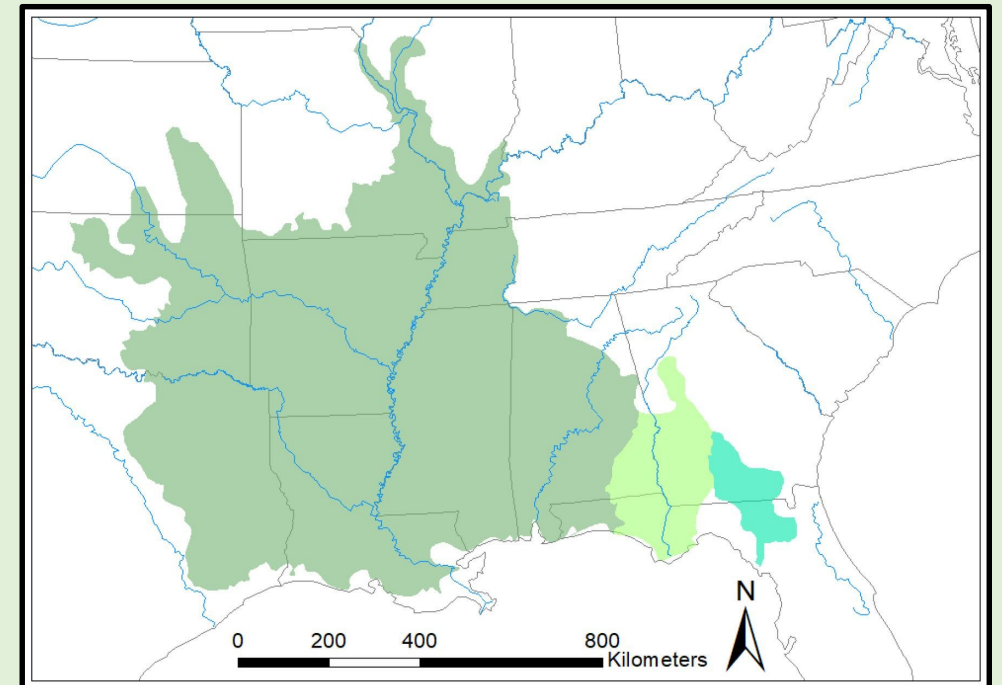
1. University of Houston-Clear Lake, College of Science and Engineering, Houston, Texas

2. Environmental Institute of Houston, Houston, Texas



Background

- Alligator Snapping Turtle (*Macrochelys temminckii*) = AST
- Largest freshwater turtle in North America (Pritchard, 1989).
- Found primarily in rivers and their tributaries, swamps, oxbow lakes, channels (USFWS, 2021).
- Associated with cover from structure and vegetation canopy (Pritchard, 1989).
- Historical range across 14 states (USFWS, 2021).
- Protected in Texas as a threatened species.
- 2021 USFWS Species Status Assessment (SSA) recommended inclusion in Section 4(d) rule of Endangered Species Act.



Geographic range of Alligator Snapping Turtles (USFWS, 2021)

Conservation Implications

Results applicable to range-wide conservation efforts:

- Designating “critical habitat” areas
- Required reporting
- Regulations on trap and hook types

Results may contribute to USFWS five-year review and update of SSA in 2026.

HAVE YOU SEEN THIS TURTLE?



Alligator snapping turtles are a threatened species and protected in Texas. We are asking for help reporting sightings of these turtles. Alligator snapping turtles have a large triangular head and three distinct ridges on their shell.

IT IS ILLEGAL TO INTENTIONALLY KILL, INJURE, OR HARASS THESE TURTLES.

If you accidentally catch one, it should be returned to its habitat, as close as possible to the spot where it was caught.

Report alligator snapping turtle sightings (live or dead) along with a photo, GPS coordinates, and any measurements to the Angelina & Neches River Authority at:

www.anra.org wildlife@anra.org tpwd.texas.gov

Angelina-Neches River Authority

Anthropogenic Factors Influencing Viability

(USFWS, 2021)



Bycatch

The accidental catch of an AST when intending to catch another species. Contributes to hook ingestion.



Poaching & Illegal Harvest

Intentional collection or killing of an AST for meat or pet trade.



Climate Change

Increasing temperatures produce fewer female hatchlings (temperature-dependent sex determination).



Habitat Alteration

Dredging, riparian vegetation removal, channelization, adjacent land use changes.

Photo credits:

1. Reddit: u/Quackalacky
2. Chron.com
3. Tishomingo NFH via USFWS
4. O'Driscoll et al., 2010

Objectives

USFWS 2021 SSA Request for information:

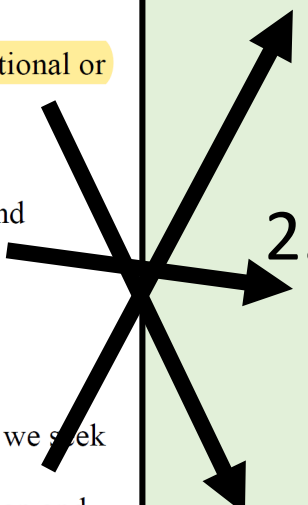
(2) Information on threats to the species, particularly information on:

(a) Frequency of hook ingestion and entanglement associated with recreational or commercial fishing, effects on individual survival, and any population impacts;

(b) Magnitude of poaching and any population impacts from poaching; and

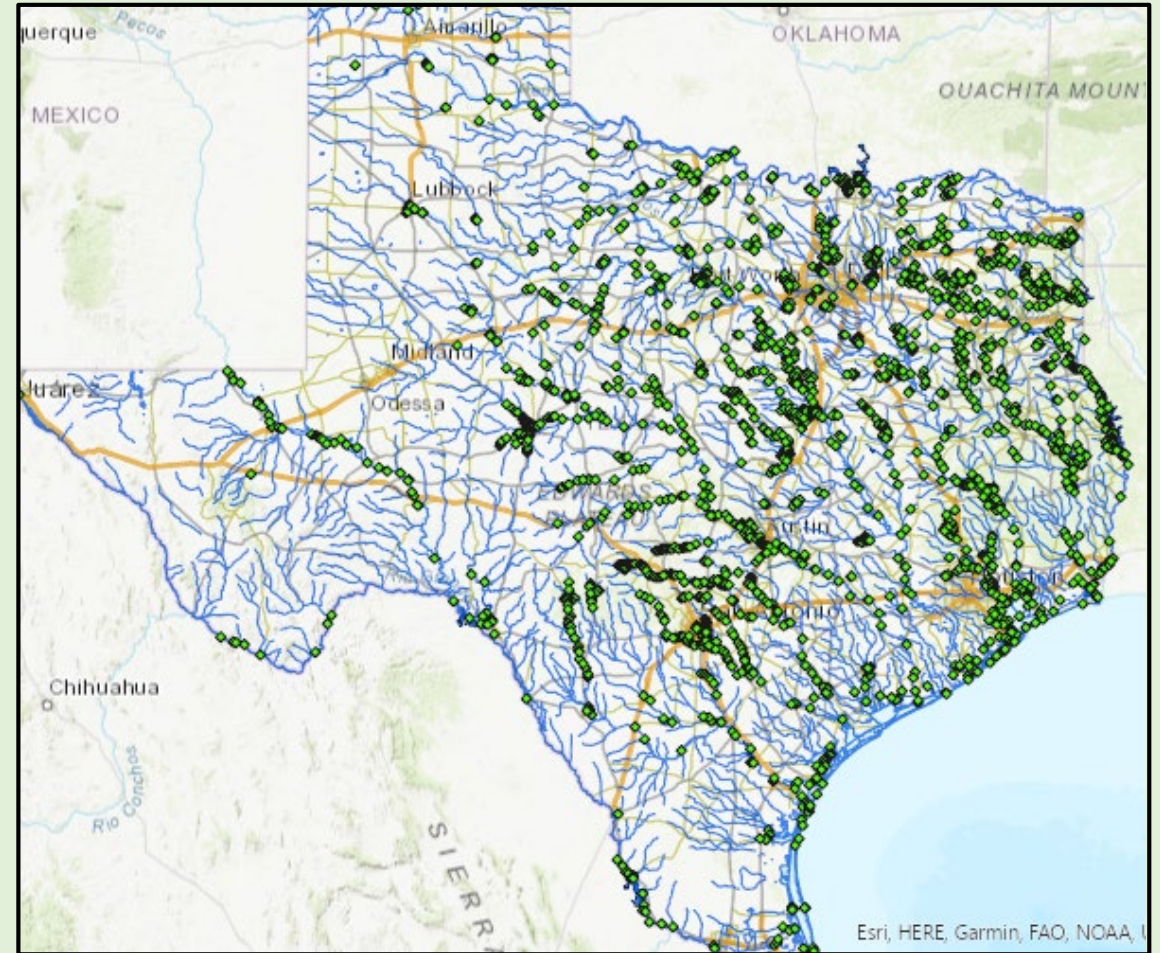
(c) Nest and hatchling predation rates and effects on recruitment and any population impacts.

(3) The spatial distribution and extent of threats to this species. Notably, we seek any information on areas within the species' range where these threats may overlap and potentially act synergistically or antagonistically as well as where there may be a complete absence of threats.

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1. Identify types and locations of potential anthropogenic stressors in Texas.
 2. Evaluate the magnitude and impacts of the most likely stressors on AST populations.
 3. Examine technique for detecting and identifying metallic foreign bodies in AST captures.

Methods – Objective 1

- Field observations of boat ramps, docks, and fishing activity at each site.
- Use online resources and maps to identify anthropogenic disturbances in AST range.



Public Boat Ramps via TPWD's interactive GIS maps

Methods – Objective 2

- Sites across eastern Texas river basins (Brazos River basin to Louisiana border)
- Trapping methods similar to current & previous studies (Rudolph, 2002)
- Site data: anthropogenic observations
- AST Catch per unit effort for each visit

$$CPUE = \frac{(\# \text{ ASTs Captured})}{(\text{Total trap hours})}$$



Methods – Objective 3

- Metal detect all AST catches for presence of metallic foreign bodies.
- Attempted to confirm presence and identity of object via ultrasound



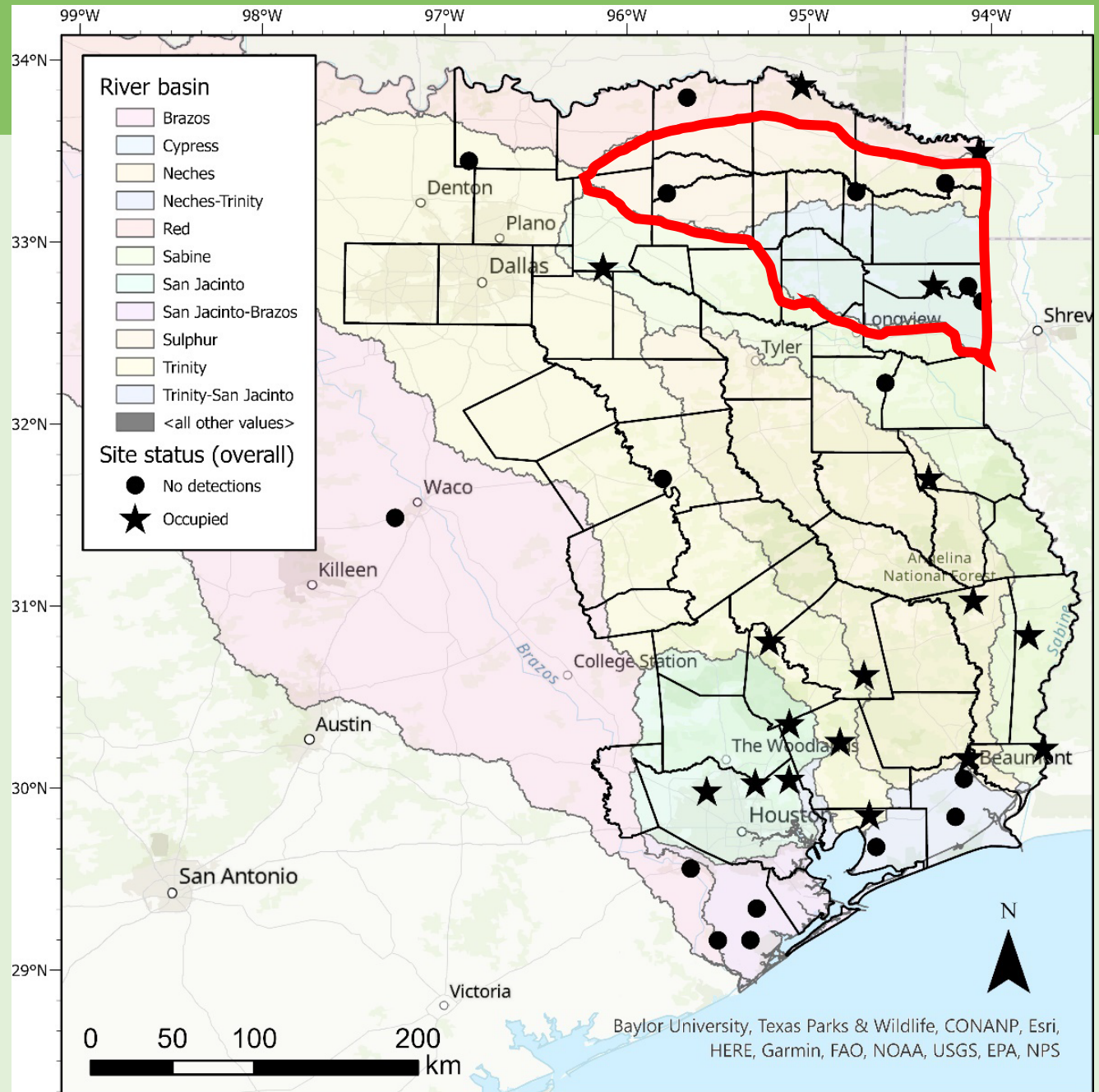
Results - Overall

Total:

- 34 sites across 10 river basins
- 18 occupied (52.9%)
- 69 AST individual captures

Cypress and Sulphur Basins:

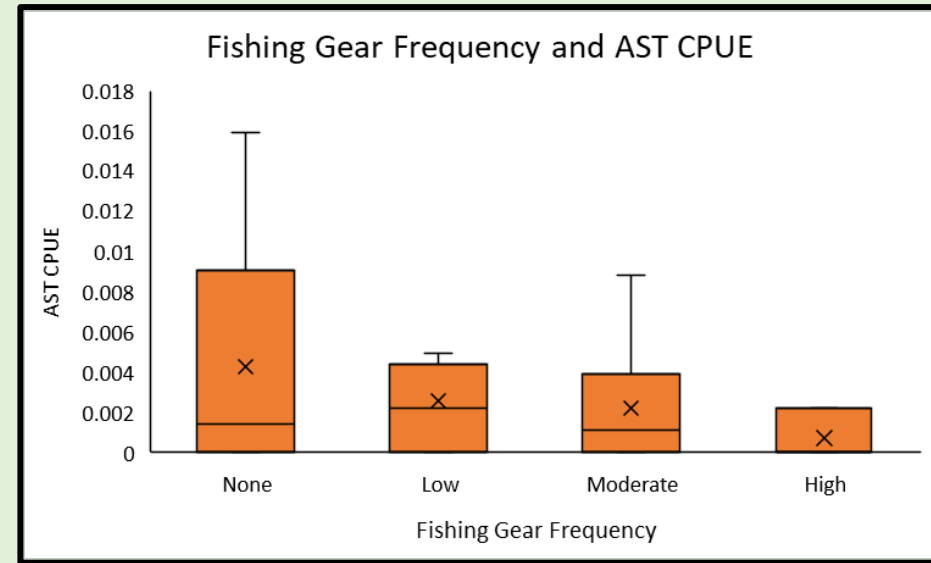
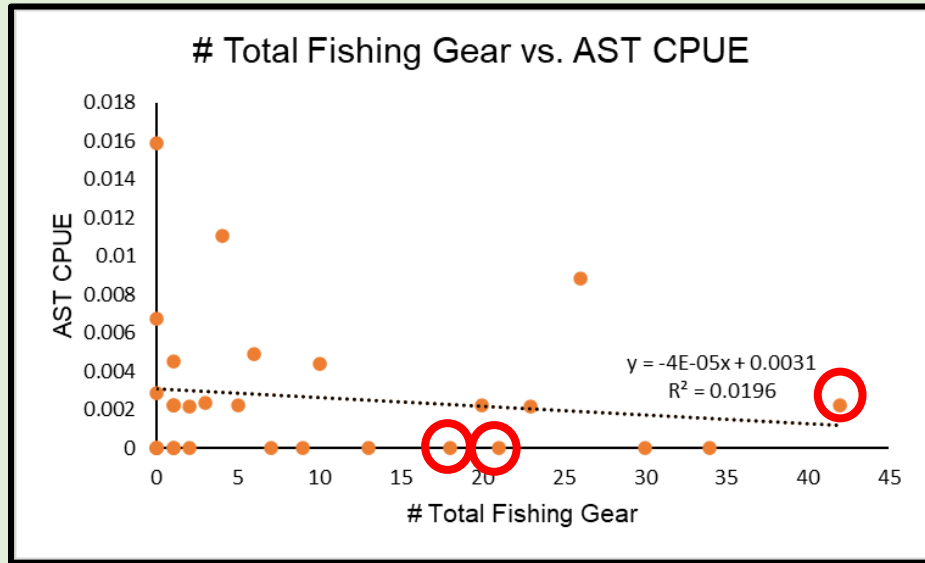
- 6 sites
- 1 occupied (16.7%)
- 4 AST individual captures



(Gordon et al. 2023)

Results- Objective 2

Impacts of Fishing Presence on AST CPUE



Relationships between CPUE and fishing gear at occupied sites did now show statistical significance, but I will be investigating further in my thesis

Cypress and Sulphur River Basins:

- 1 occupied site
- 3 site visits during fishing gear data collection period
- 1 individual capture
- 27 average observed active and derelict fishing lines

Visit #	AST Captures	AST CPUE	# Total Gear	Total Gear Rank	AST CPUE (#/hr)
2	0	0	18	Moderate	0
3	0	0	21	Moderate	0
4	1	0.0022	42	High	0.002218

Results – Objective 3

Detection of Metallic Foreign Bodies

23 Individuals metal detected in the present study

- 2 positive metal detections (8.7% positive)
- 1 individual within Cypress RB → No detection

No metallic foreign bodies could be visualized or identified via sonography.

Use on collaborator^{1,2} AST capture confirmed metal detection worked on metal fishing hook.



1. Turtle Survival Alliance
2. SWCA Environmental Consultants



Expected Analyses

Locating and mapping other potential anthropogenic stressors:

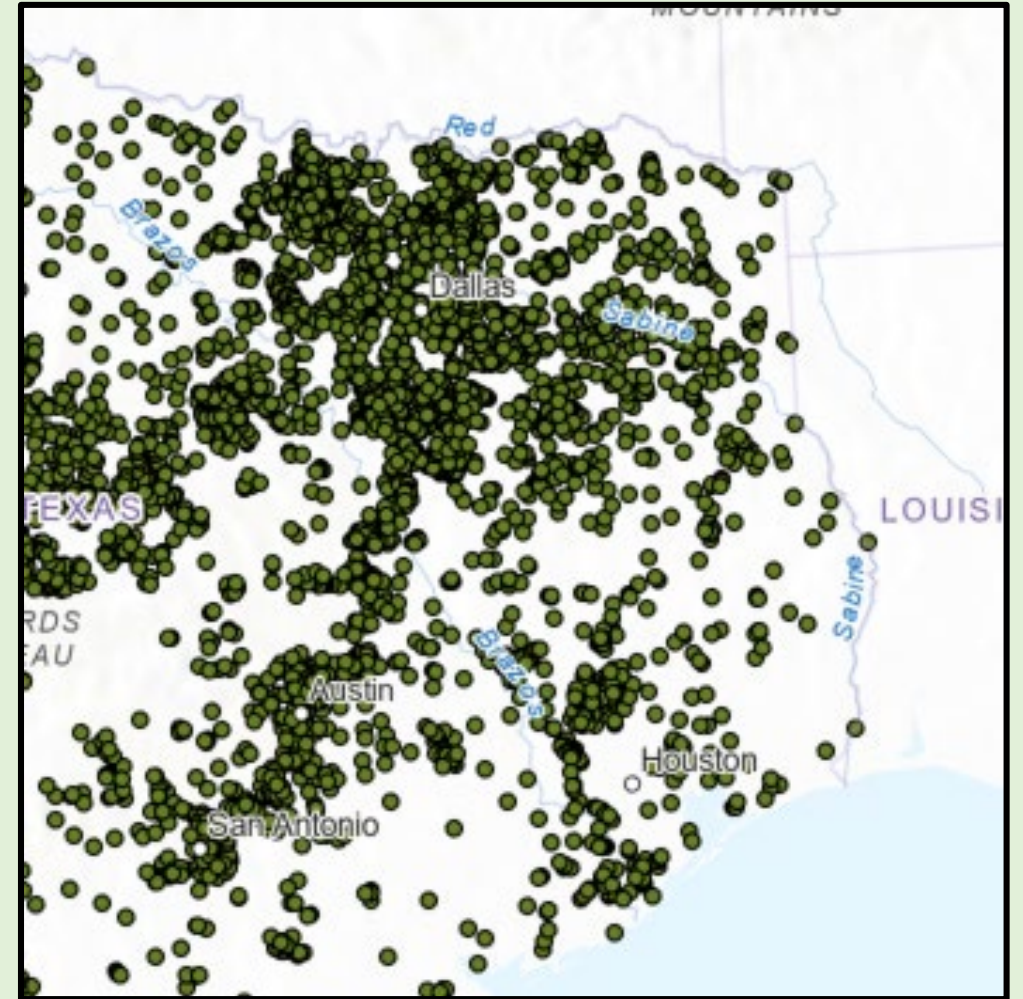
- Dams/Reservoirs – denser in NE Texas
- Pipelines
- Permitted discharges

ArcGIS analyses → effects of potential stressors on site CPUE

- Cluster analyses
- Estimate impact reach

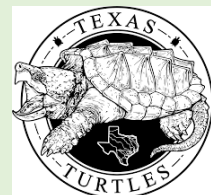
Continued metal detector data collection with collaborators^{1,2,3}

- Evaluate rates of positive detections against CPUE and anthropogenic disturbances



State Regulated Dams in Texas (TCEQ, 2021)

1. Turtle Survival Alliance
2. SWCA Environmental Consultants
3. Texas Turtles



Baseline Population Assessment

Blood and/or tissue samples taken across multiple studies:

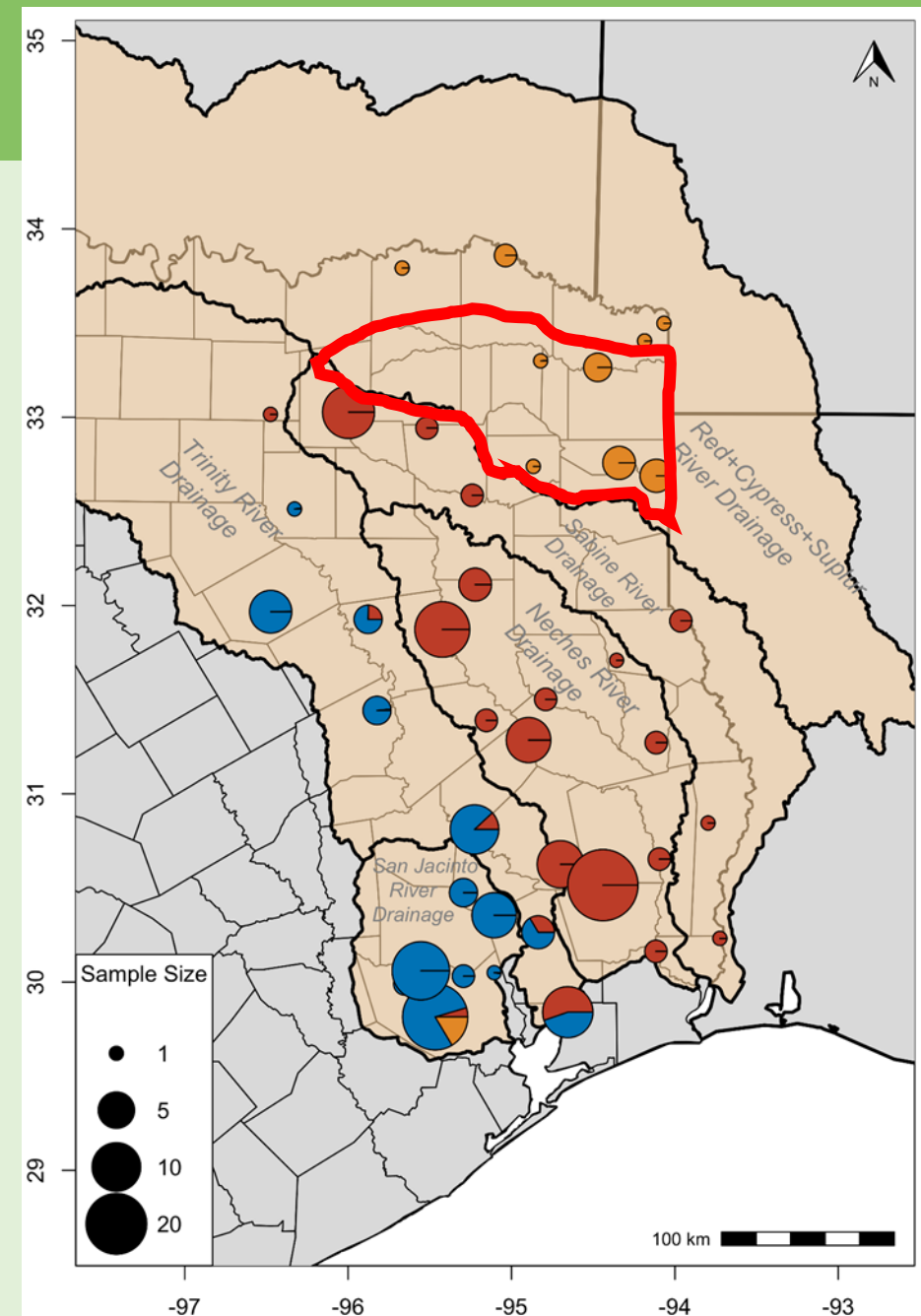
- Principle Component Analysis of 215 individuals
- 3 distinct metapopulations in East Texas
- Cypress + Sulphur + Red River Basins show little mixture

Full report on baseline population assessment available
at:

www.uhcl.edu/environmental-institute

Research → Publications → Articles and Reports

<https://www.uhcl.edu/environmental-institute/research/publications/documents/23-002-alligator-snapping-turtle-population-viability-texas-watersheds-final-report.pdf>



(Gordon et al. 2023)

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Permitting & Site Access:

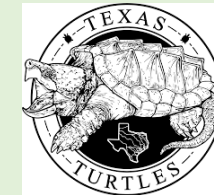
- TPWD scientific research permits SPR-0321-026
- UHCL Institutional Animal Care and Usage Committee
- NWR & WMA Special Use permits
- Private landowners, stakeholders, and other agencies

Research funded by:



Texas Comptroller of Public Accounts

Research Partners



..and many private landowners!



Thank you!

For questions, suggestions
or comments, email:
GarciaK8573@uhcl.edu

Full report on baseline population assessment
available at:

www.uhcl.edu/environmental-institute

Research → Publications → Articles and Reports

<https://www.uhcl.edu/environmental-institute/research/publications/documents/23-002-alligator-snapping-turtle-population-viability-texas-watersheds-final-report.pdf>