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Hidden in Plain Sight:
Alligator Snapping
Turtle (*Macrochelys
temminckii*)
Populations within
Urban Waterways of
Houston, Texas,
Harris County, USA



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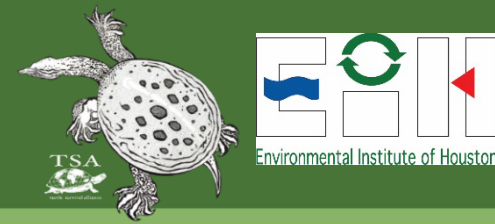
Alligator Snapping Turtle (*M. temminckii*)



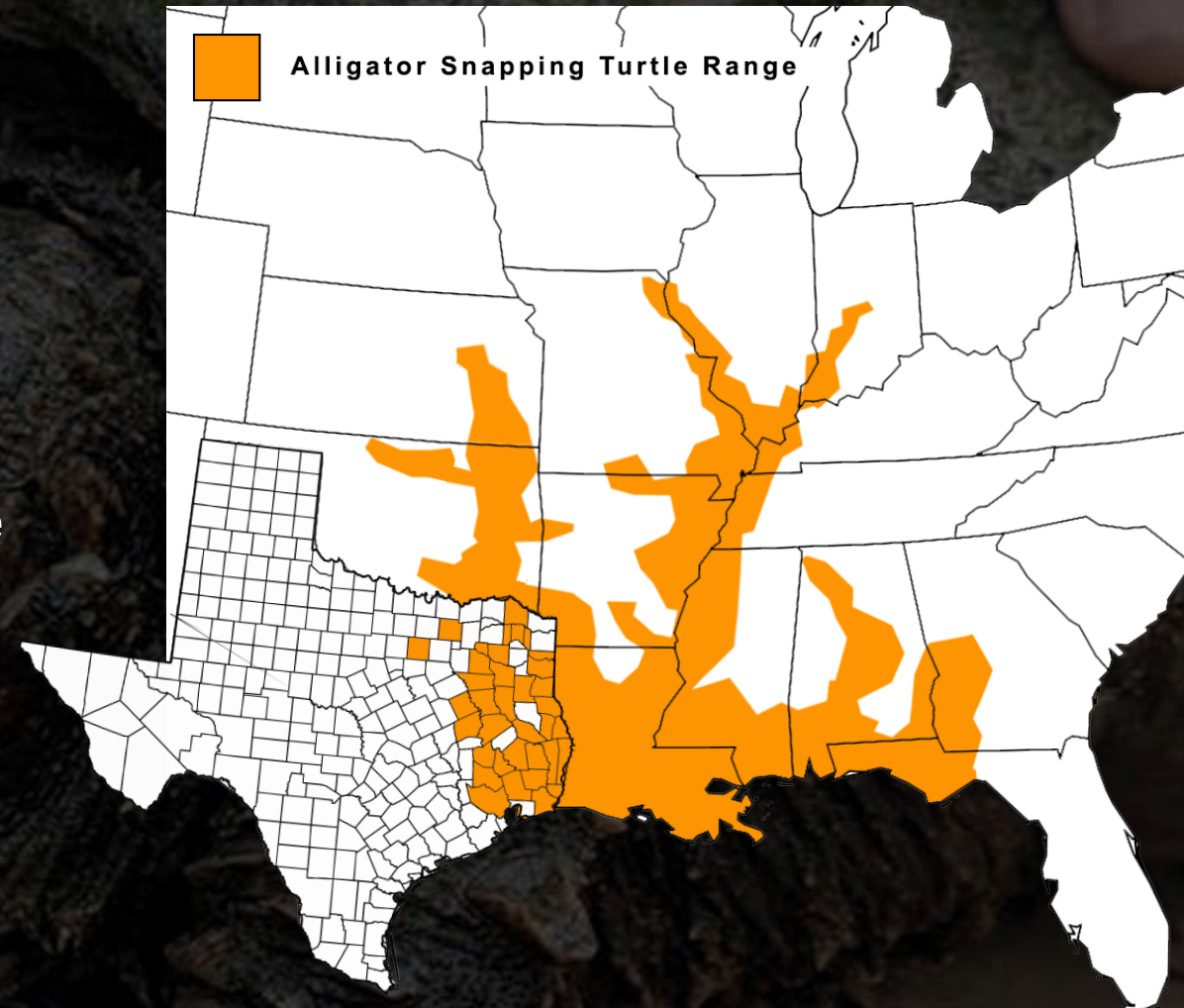
- Largest freshwater turtle in North America.
- Historic records:
 - Over 90 kg (200 lbs.)
 - Carapace length of 80 cm (31 in.)
- Sexually dimorphic
 - Males = larger body size, extended cloacal opening, more bulbous cranium
- Primarily feeds on fish and carrion.
- Bite pressure is approximately 1,000 psi.



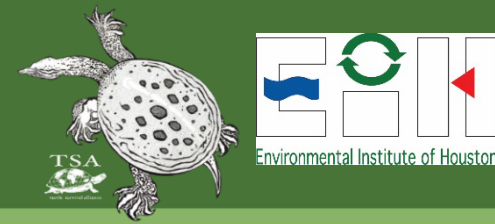
Range and Genetic Isolation



- Range: Gulf of Mexico drainages from Florida Panhandle to eastern Texas and western Illinois
- Habitat: tannin-tainted, turbid, or spring-fed rivers, creeks, bayous, oxbows, river swamps, reservoirs, ponds, and canals
 - Prefers areas with submerged structure
- Life history: overland movement is rare
 - Geographically and genetically isolated (Roman et al. 1999; Echelle et al. 2010; Gordon et al. 2023)
- Limited genetic variability within and among populations



Snappers in the City?



- Houston = 4th largest metropolitan area in the USA.
- Alligator Snapping Turtles purported to be functionally extirpated from Harris County, Texas within past 50 years
- Imperiled and State Threatened in Texas
 - Currently under review for protection under Endangered Species Act



Could bayous of the Greater Houston Metropolitan area harbor functioning populations?

Early Encounters

- October 2016: found inhabiting Buffalo Bayou (Harris County)
 - Far southwestern extent of the known range, at the time
 - Primary waterway bisecting metropolitan Houston.
 - 85 km (53 mi) long, emptying into the Gulf of Mexico.
 - Natural, impacted waterway experiencing runoff, pollution, erosion, and riparian degradation.
- Formal study on abundance, home-range, and habitat utilization launched in Buffalo Bayou



Buffalo Bayou: 2016–2018



Urban Naturalist

No. 32

2020

Discovery of an Alligator Snapping Turtle (*Macrochelys temminckii*) Population in Metropolitan Houston, Harris County, Texas

Eric Munscher, Jordan Gray, Arron Tuggle, Day B. Ligon, Valeria Gladkaya, Carl Franklin, Chris Drake, Viviana Ricardez, Brian P. Butterfield, Kelly Norrid, and Andrew Walde

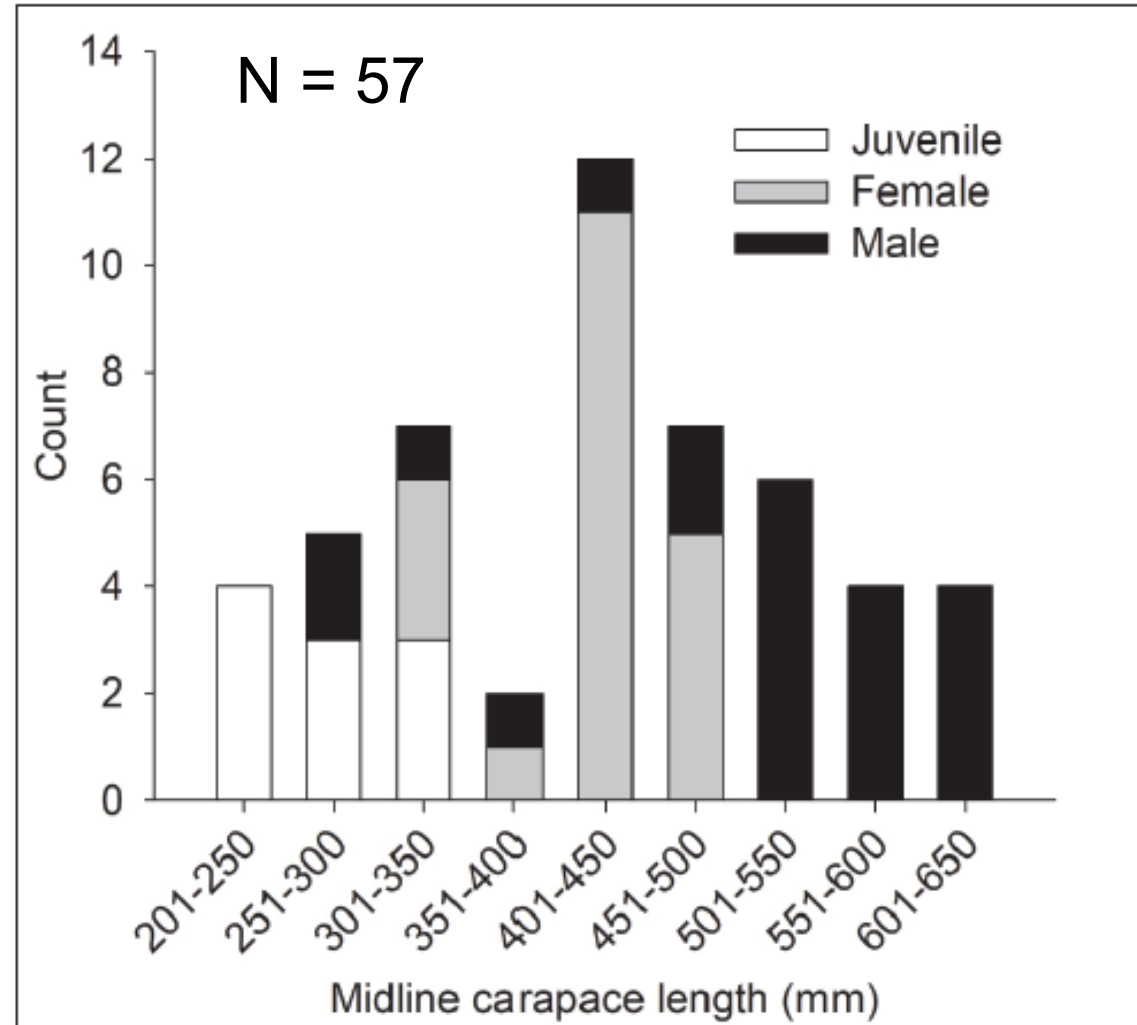
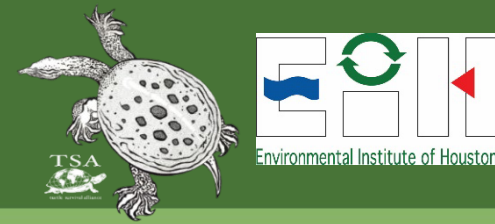


Figure 3. Size classes, based on midline carapace length, of *Macrochelys temminckii* captured at Buffalo Bayou in metropolitan Houston, Texas. The first six turtles captured were marked but were not measured and therefore are not included.

Buffalo Bayou: 2016–2021



Biology and Conservation of Alligator Snapping Turtles (Macrochelys)

Southeastern Naturalist

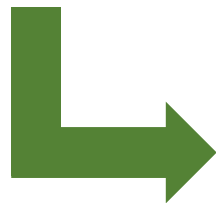
21(Special Issue X):XX–XX

Demography of an Urban Population of Alligator Snapping Turtles (*Macrochelys temminckii*) in Texas

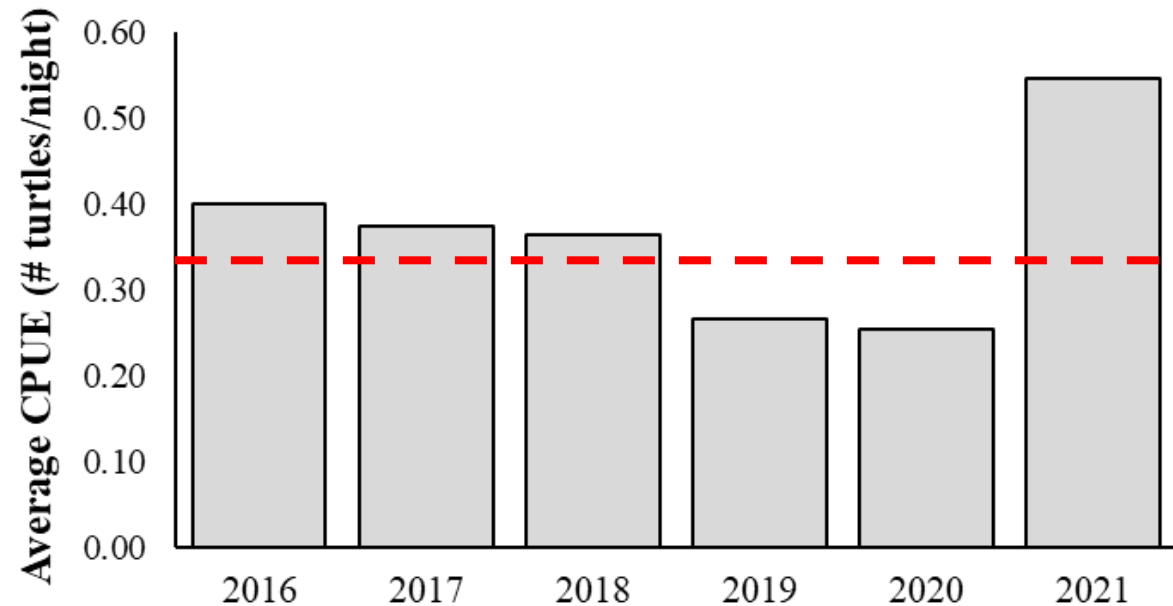
Eric Munscher^{1,2,*}, J. Daren Riedle³, Arron Tuggle^{1,2}, Jordan Gray², Day Ligon⁴,
Valeria Gladkaya², Chris Drake², Ross Couvillon⁵, Jonathon Bolton⁶,
Madeleine Morrison², Brian P. Butterfield⁷, and Andrew D. Walde²

Table 2. Alligator Snapping Turtle (*Macrochelys temminckii*) capture per unit effort (CPUE) by year in Buffalo Bayou, Harris County, TX.

Year	Trap nights	Total captures	CPUE
2016	20	8	0.400
2017	80	30	0.375
2018	93	34	0.365
2019	112	30	0.267
2020	118	30	0.254
2021	42	23	0.547
Total	465	155	0.333



Macrochelys temminckii catch per unit effort (CPUE) by year in Buffalo Bayou, Harris County, TX



Buffalo Bayou: 2016–2021

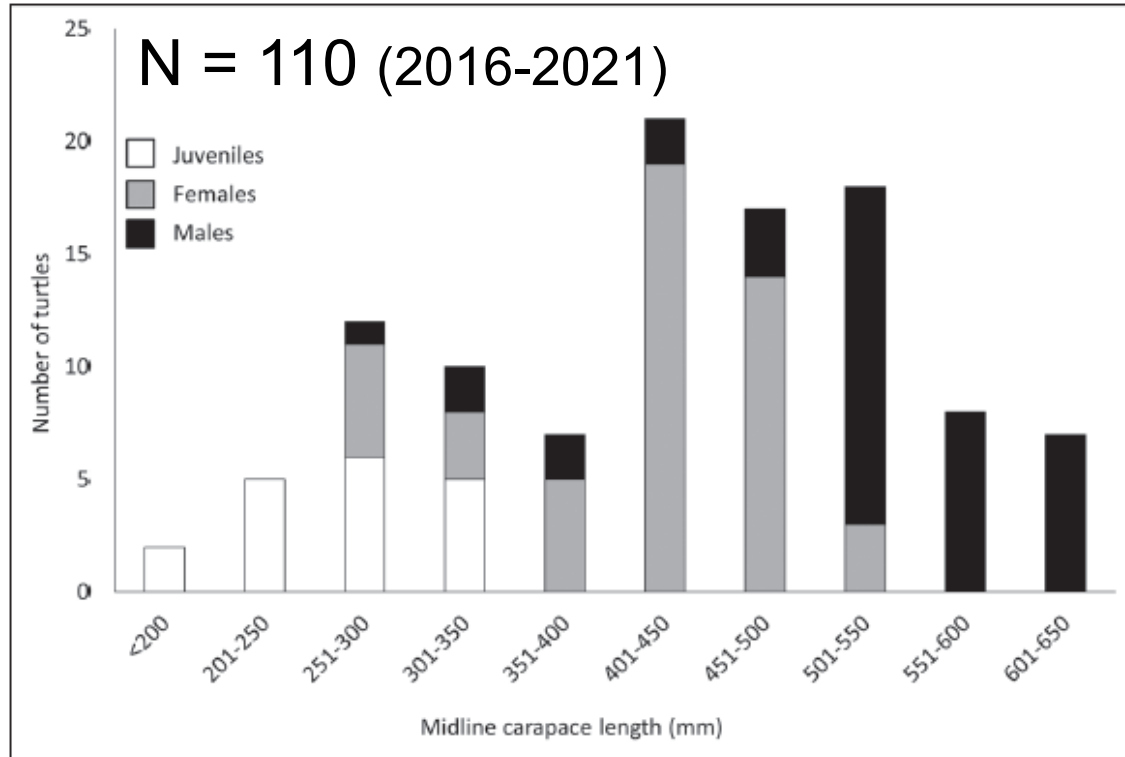
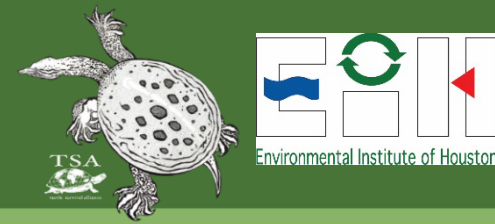


Figure 2. Size distribution of juvenile, female, and male *Macrochelys temminckii* collected in Buffalo Bayou, Harris County, TX (2016–2021, $n = 110$). Initial capture data were used in instances when individual turtles were captured more than one time during the course of the study.

Table 3. Alligator Snapping Turtle (*Macrochelys temminckii*) morphometrics in Buffalo Bayou, Harris County, TX. Data are presented as mean, min–max, and number of individuals (n). P values indicate significant differences between males and females for all variables.

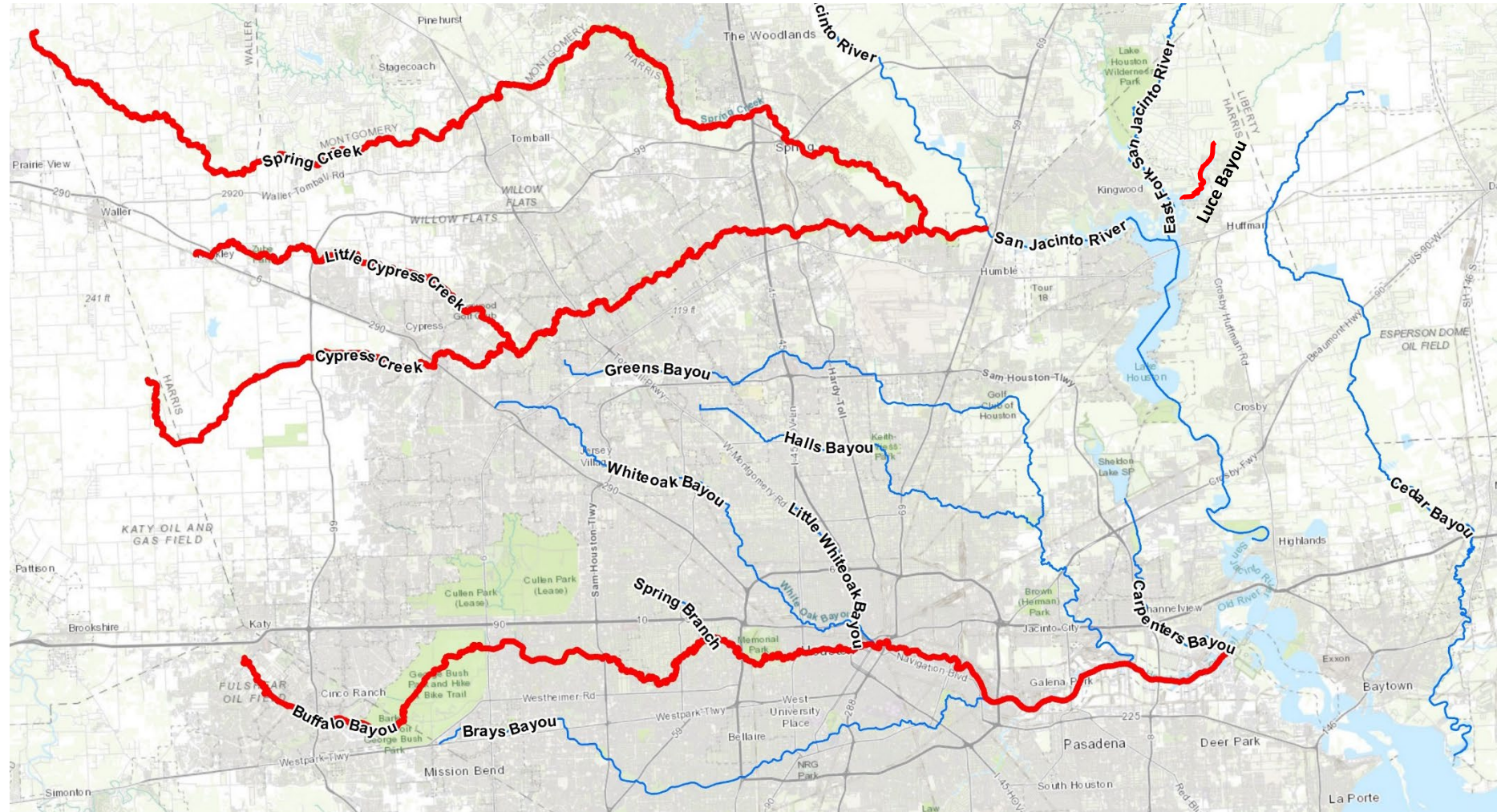
Variable	Male	Female	t	P
Carapace length mid (mm)	521.3, 289–647 ($n = 40$)	421.0, 287–517 ($n = 50$)	6.2	<0.0001
Carapace length max (mm)	559.8, 342–683 ($n = 40$)	444.8, 300–558 ($n = 50$)	7	<0.0001
Carapace width (mm)	433.8, 245–526 ($n = 40$)	353.7, 238–443 ($n = 50$)	6.4	<0.0001
Plastron length max (mm)	381.5, 208–468 ($n = 40$)	324.1, 200–414 ($n = 50$)	4.9	<0.0001
Shell height (mm)	190.7, 112–224 ($n = 40$)	157.4, 106–194 ($n = 50$)	6.4	<0.0001
Head width (mm)	164.4, 100–207 ($n = 38$)	129.0, 88–167 ($n = 41$)	6.7	<0.0001
Pre-Cloaca length (mm)	190.2, 86–263 ($n = 21$)	90.8, 55–127 ($n = 36$)	9.3	<0.0001
Mass (g)	34,952.6, 8600–59,800 ($n = 39$)	19,237.0, 5000–33,700 ($n = 50$)	6.6	<0.0001

Expanded Effort: 2021–2022

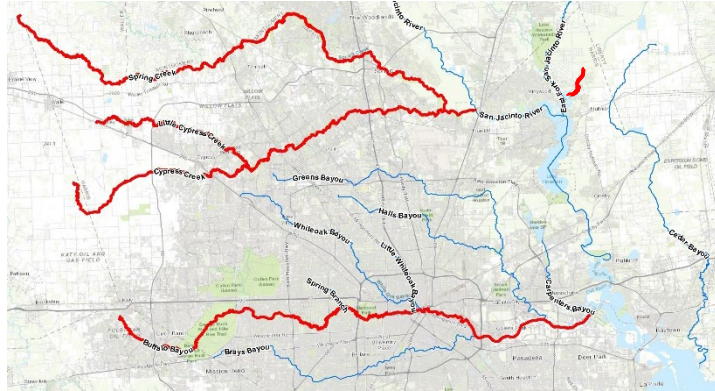
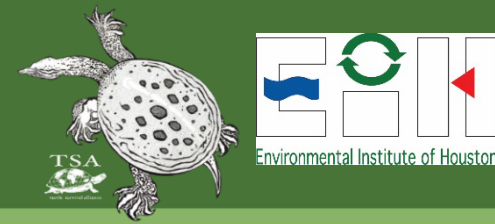


- March 2021: Efforts expanded to surrounding waterbodies in Harris County

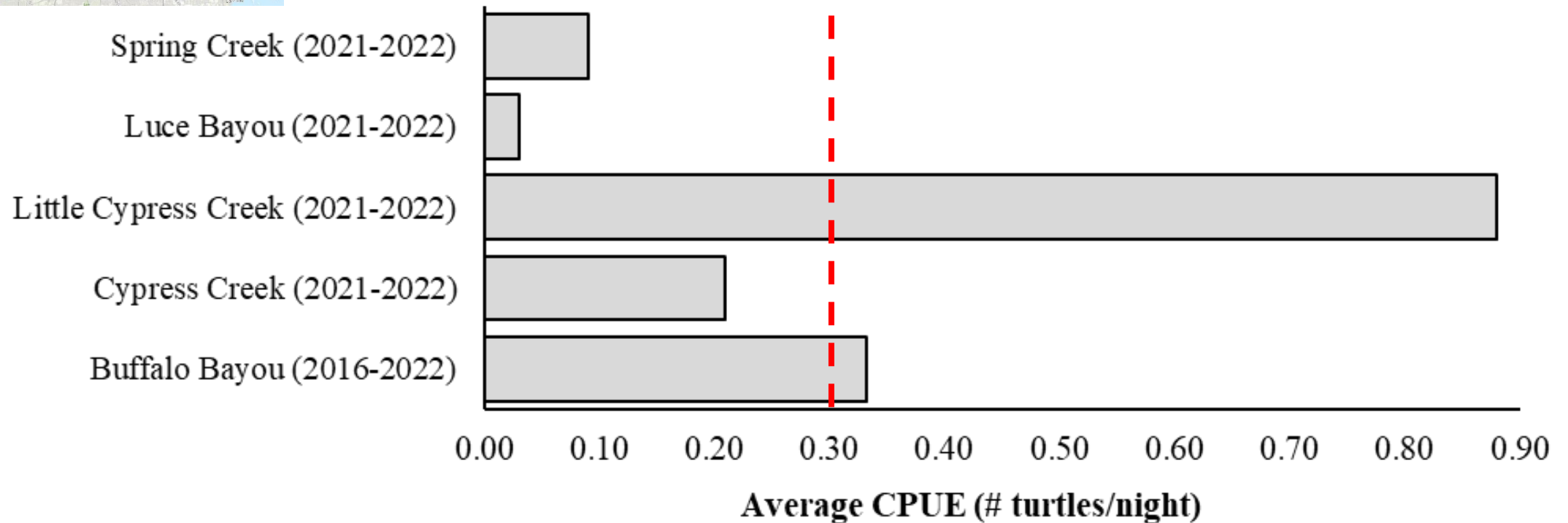
- Little Cypress Creek
- Cypress Creek
- Spring Creek
- Luce Bayou



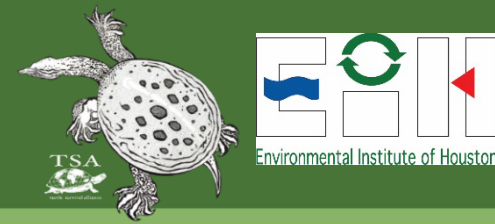
Harris County CPUE: 2016–2022



Average catch per unit effort (CPUE) for *M. temminckii* from waterbodies in Harris County, TX



Size Distribution: 2016–2022



Size distribution of juvenile, females, and male *M. temminckii* from Harris County, Texas, USA (2016-2021)

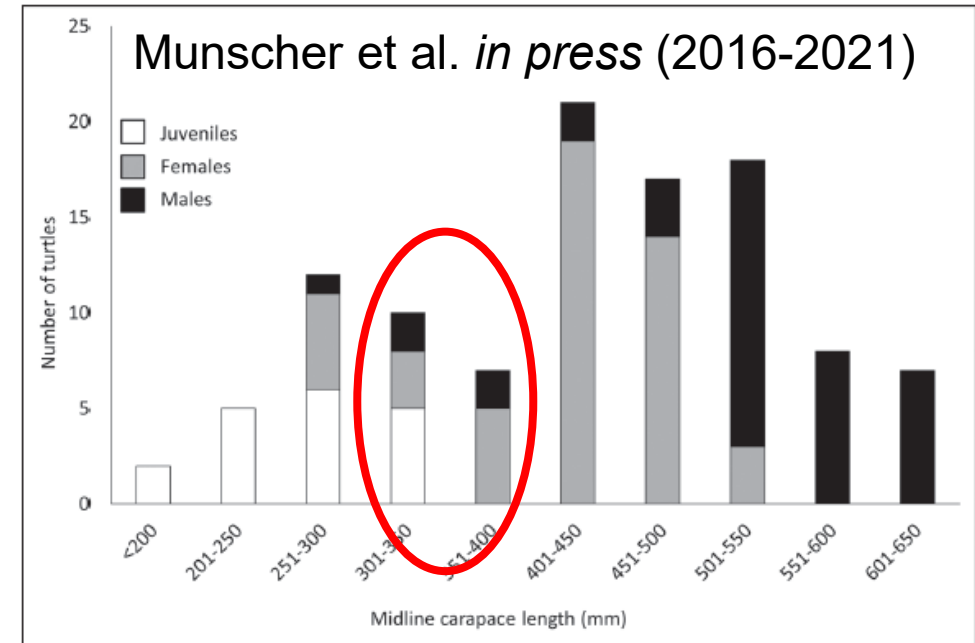
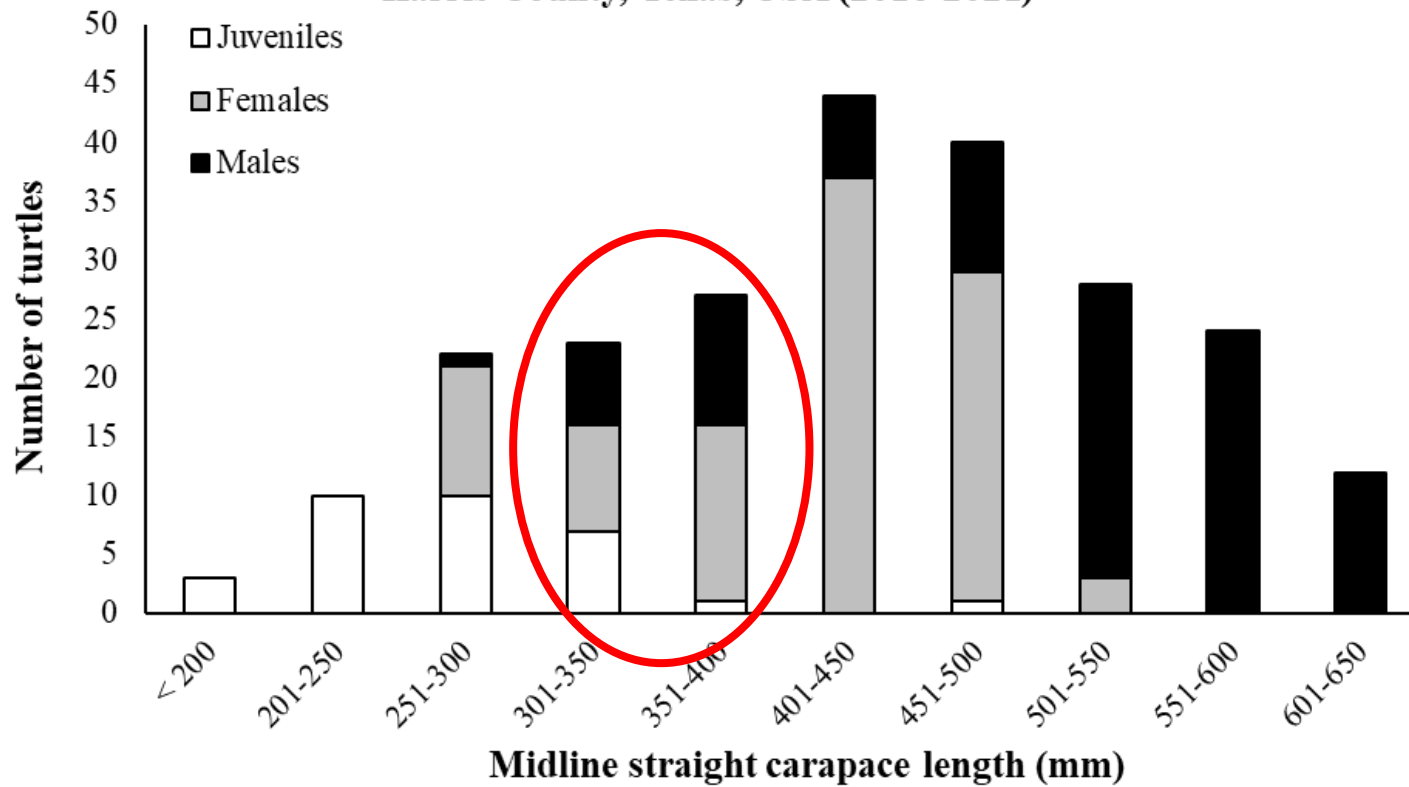


Figure 2. Size distribution of juvenile, female, and male *Macrochelys temminckii* collected in Buffalo Bayou, Harris County, TX (2016–2021, $n = 110$). Initial capture data were used in instances when individual turtles were captured more than one time during the course of the study.

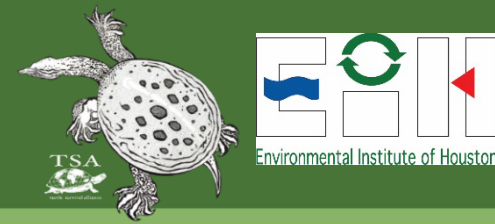
Population Demography

Five years of data from Harris County allow for initial estimates of:

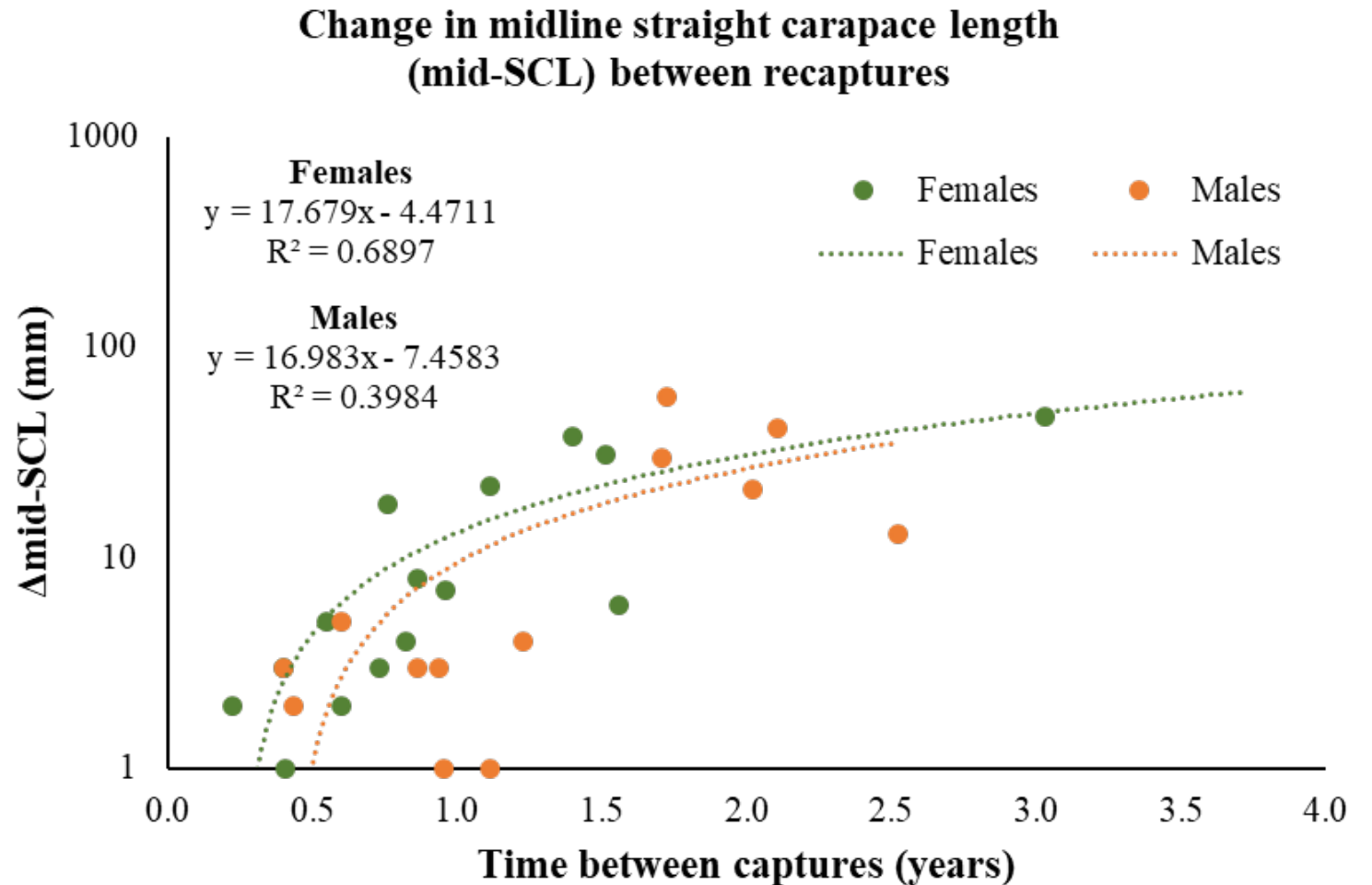
- Preliminary population estimates: 173 individuals from 39 km of river (95% CI: 138–250)
- County-wide sex ratios: 1.08 female: 1.00 male
- Preliminary density estimates: 4.43 turtles/km



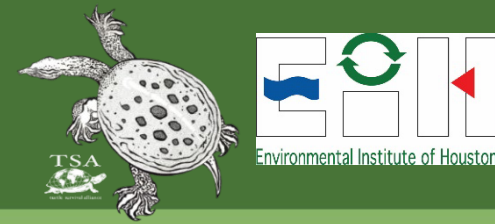
Growth Curves: 2016–2022



- Recaptures allow for first estimates of growth rates for *M. temminckii* in Harris County, Texas, USA
 - Buffalo Bayou (2016-2022)
 - 73 captures
 - 27 unique individuals
 - Cypress Creek (2021-2022)
 - 6 captures
 - 3 individuals



Preliminary Conclusions



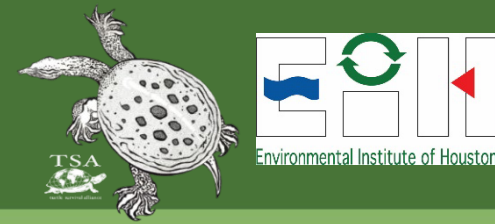
A robust population of this State Threatened species occurs in the 3rd largest city in the country, and yet hidden from sight.

A successful breeding population (evidenced by the number of juveniles) and observations of nesting females

The species seems to be highly adaptive to anthropogenic influences on its habitat.

Removal of individual turtles and bayou manipulation may be the population's greatest threat.

Future Directions



- Research Goals and Questions:
 - Continue long-term population monitoring over the next 5 + years giving us 10 years of consecutive data.
 - Continue monitoring movement within the Buffalo Bayou drainage and establish individual home-range parameters with a focus on establishing “Core Habitats”.
 - Collaboration with other alligator snapping turtle researchers in genetic studies.
 - Determine nesting habitat within the Buffalo Bayou drainage in order to promote conservation. Most of the bayou’s adjacent habitat is commercial, industrial, or private residence.
 - How far does this population extend? Fort Bend County to the west would indicate a range extension. Are there other populations in other bayous?

Questions?

<https://turtlesurvival.org/>

- Special thanks to the Turtle Survival Alliance, Houston Parks and Recreation Department, Texas Parks and Wildlife Department (Kelly Norrid, Christopher Maldonado), SWCA Environmental Consultants, Memorial Park Conservancy, Bayou Bend Collection and Gardens, Texas Master Naturalists, Ken Olive, the Texas Comptroller of Public Accounts, and Harris County Precinct 3 (Rose Belzung and John Carey), and all of our volunteers, field assistants, and students
- Photo Credits: Ross Couvillon, Jess Munscher, Jim Olive, Sam Singletary, Arron Tuggle.

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