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# Collinsorum

THE NEWSLETTER/JOURNAL OF THE KANSAS HERPETOLOGICAL SOCIETY

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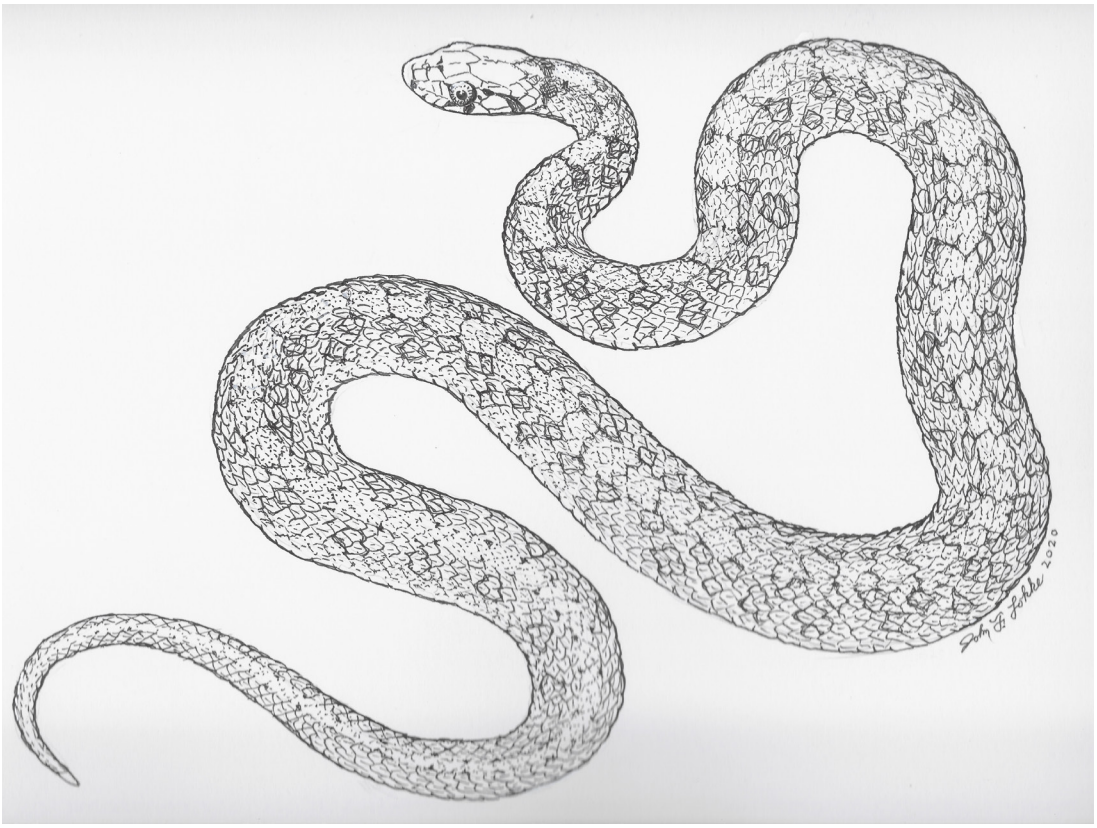

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**Front Cover:** DeKay's Brownsnake, *Storeria dekay*i, pen and ink by John Lokke, 2020. This is one of over 65 illustrations for the forthcoming informative coloring book for all ages on the Amphibians and Reptiles of Nebraska by Dennis Ferraro, Jacki Loomis, and John Lokke.

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# Collinsorum

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# KHS BUSINESS

## Minutes for the Kansas Herpetological Society Executive Meeting on 22 January 2021

Kansas Herpetological Society (KHS) President, Andrew George called to order an executive meeting on January 22nd, 2021. The virtual gathering addressed several ideas, needs and suggestions regarding the current state and future of KHS, as well as tended to a few orders of business. The participants were: Travis Taggart, Daren Riedle, Suzanne Collins, Todd Volkmann, Dexter Mardis, Curtis Schmidt, Andrew George, Lynnette Sievert, David Penning, and Kelly Kluthe. Mr. George regulated the meeting with ease thanks to his agenda and commanding presidential authority. The first item of business was filling two vacant positions.

Andrew George appointed Curtis Schmidt as the Membership Committee Chair. The newly formed position of Media and Public Relations Director was filled by Kelly Kluthe. These positions are appointed by the president and were well-received by members of the board. Being there was no need for group discussion or voting, and each appointee had a dedicated line item in the agenda to discuss later, the next topic regarding membership was briskly introduced.

Membership plans entail a variety of topics and this was by far the most discussed portion of the meeting. Curtis Schmidt began the membership topic by lauding the opportunity to work with a Media and Public Relations Director to effectively communicate with current members and generate interest in the KHS in order to expand the Society. He expressed that the KHS is in a good place and does well blending an academic focus with the annual meeting with events such as the field trips and presence on social media. One focus with regards to expanding or maintaining membership would be to reach out to universities and high schools for more student participation. Student involvement has been a cornerstone of the KHS and in true ouroboro fashion has fed and perpetuated the academic aspect of the society e.g., president-elect David Penning was a student participant but now advises his own students who are members of the KHS.

The KHS membership reached about 300 souls at its highest point and over the past several years has been dwindling by about 10 people per year. The annual meeting has always been a membership boon, but Covid-19 hampered the 2020 meeting experience despite a delightful and quite functional virtual adaptation. Membership dropped as a result and we currently sit at around 80 current members. Several meeting attendees noted that such occurrences are happening to all publications and societies. Ideas flowed and jumped around on how to address membership value in general. An offering of virtual paper sessions each month might maintain interest in the meeting throughout the year and offer additional value to members? Everybody could enjoy something tangible to showcase their appreciation of the KHS? Scholarships and grants could be enhanced or expanded? Do you have ideas? If so, please feel free to share them, perhaps through our social media platforms which lead to the next agenda item.

Kelly Kluthe plans to expand social media platforms to Twitter and Instagram. Special attention will be made to include more information about events, such as field trips, and we will think of ways to engage membership and followers during the winter months. Suzanne Collins expressed the need to promote and publicize award winners. This act is not simply honorary but creates additional circulation via hometown media outlets and social media sharing. Dexter Mardis referenced a recent conversation that included searching for local news outlets in field trip areas and creating posters for nearby schools in order to generate interest among local residents. Dexter then proceeded with the next agenda which was a budget discussion.

Dexter Mardis, KHS Treasurer, would like to plan for any expenditures and propose a budget for 2021. The primary costs are traditionally the *Collinsorum* printing and mailing and annual meeting expenses. In 2020 a $500 sponsorship was made for the Great Plains Nature Center annual event. In addition to being a natural partner, they also print and distribute herp-related pocket guides. Any cost associated with KHS merchandise will be absorbed by merchandise sales. Lastly, a financial oversight committee will be responsible for financial decisions and

advise on investments of KHS assets. Andrew George closed this topic by stating that a vote on the budget will be conducted via email or virtually when possible.

Get ready for a couple more t-shirt options! Travis Taggart detailed the plan for additional merchandise and what to expect soon. In addition to new t-shirts, there will be an expansion into other merchandise items and possible art contests for content. Vinyl stickers, calendars, masks, and license plates were mentioned as possible new swag. Most importantly, if you are a size medium or large then we strongly suggest you purchase a desirable tiger salamander and/or gopher snake t-shirt from the KHS website. Or, better yet, at a field trip.

A motion was made to form an Inclusivity Committee and it will be chaired by Dexter Mardis. Please stay tuned for updates or decisions regarding inclusivity in the KHS which will probably be shared with current membership and social media followers.

Andrew George will put a calendar together that will establish general KHS deadlines and benchmarks throughout the year. The primary focus will be on establishing a timeframe and accountability for the KHS Annual Meeting and maintaining timely submissions for *Collinsorum*. Feedback is still needed, and a draft will be submitted later for approval.

The awards discussion began with how to best deliver a monetary reward to middle and high school-age students and some of the challenges students face nowadays. Dexter Mardis addressed the possible expansion of award possibilities and increase in current payouts. There is a chance that an amphibian-focused award may be available by the 50th Annual KHS Meeting. Did you know the 50th Annual KHS Meeting is only a couple of years away? It was mentioned several times during the meeting and anticipation is building.

Daren Riedle explained the cost of printing a journal has been prohibitive for a while and weighed the benefits versus possible issues with going to a digital delivery format. A few physical copies could always be made for archive purposes and special circumstances. In addition to printing costs the bulk mail rates could not be achieved with the current membership level. Support for digital delivery referenced instances of recent purges of physical journals, space issues, tendency to seek information on digital sources, and environmental impact. Andrew George made a motion to move *Collinsorum* to a digital delivery method, Dexter Mardis seconded, and everybody in attendance voted in agreement. The point was reiterated that a physical copy can, and in some cases would always be made for archive purposes and special circumstances. Daren Riedle concluded this agenda item by making a call for journal information and submissions.

Mark your calendars! The dates for the 2021 field trips were given and destinations have since been determined. Travis Taggert has established the following KHS field trip schedule: May 7th-9th Cowley State Fishing Lake, July 16th-18th Sappa Park, and September 10th-12th Pottawatomie State Fishing Lake. Please check the KHS Facebook page for more information and updates.

The 2021 Annual KHS Meeting is being planned as if it will be conducted in person. Andrew George will make every effort to add to the society legend at Pittsburg State University this November 5th-7th. The 2022 Annual KHS Meeting is also being planned by David Penning as if it will be in person but the location is still up for debate. It may be at Missouri Southern State University in Joplin, MO, or it might be somewhere else. The 50th Annual KHS meeting is in three years and will take place in 2023! Planning for this meeting has also begun…

Andrew George motioned to adjourn at 5:20 p.m. and Suzanne Collins seconded.

Kind regards,

Todd Volkmann, KHS Secretary

## A Call for the 2021 Kansas Herpetological Society Herp Counts

Spring is here and it is time to start conducting and submitting your annual Kansas Herp Counts. The annual counts began in 1989 and were conducted frequently for the next decade or so before slowly fading away (see Riedle, 2020). The data from those early counts were invaluable for understanding trends and distribution of Kansas herpetofauna. In order to maintain biodiversity monitoring efforts in the state of Kansas, the Kansas Herpetological Society encouraged its members to conduct and submit counts throughout 2020. In 2020, thirty-four counts were submitted accounting for the observation of 1,280 individuals of 66 species of amphibians and reptiles in 20 counties. The surprising aspect of this was that only six individuals submitted counts, with each person submitting multiple counts. I hope moving forward in 2021 more folks will submit counts, and the counts will increase in geographic scope.

The basic rules for conducting and submitting herp counts are as follows:

-Counts can take place any time of the year.
-Pick sites that can be repeatedly surveyed at roughly the same time every year.
-The minimum level of data that should be provided includes:
  -The county where the count occurs
  -A GPS point where the count occurred
  -Start and stop times of the count
  -A complete list of names of participants
  -A list of all species and the number of individuals observed
  -Also note anuran choruses, egg masses or other observations of note
-Be sure to have a hunting license on your person whenever you are herping, and always have landowner permission before entering private property.

***Submit all counts to daren.riedle@ks.gov***

**Correction:** In the previous issue of Collinsorum 9(3) there was an editorial mistake in the Meshaka and Morales article on breeding anurans. Through the inexperience of your editor two text boxes overlapped obscuring the first paragraph of results. This problem has since been fixed and an updated issue of Collinsorum 9(3) have been uploaded on the KHS website at:
http://ksherp.com/wp-content/uploads/2021/02/Collinsorum_9_3_Final.pdf

## Articles

# Trapping Efficiency for Aquatic Turtles in East Texas

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Abstract — Sampling diverse assemblages of amphibians and reptiles require the use of multiple methods, and aquatic turtles appear to be no exception. We sampled an aquatic turtle community at two sites in east Texas capturing eight species of turtles in five different aquatic habitat types using seven types of net gear. Emydid turtles had the highest detection probabilities of the representative families and were typically the first species captured in each trap type, with one exception. There was a size bias for sliders with higher capture rates of males in smaller traps, with increasing female capture rates with increasing trap size. Chelydrids had higher detection rates in large hoop traps, while kinosternids had higher detection probabilities in fyke nets. Capture rates may have been influenced by habitat biases, as differing net traps appeared to be more suitable for different habitats based on depth and flow. Based on our results, the ideal combination of traps for this turtle community were fyke nets, large hoop traps, and collapsible box traps.

## Introduction

Species inventories and acquisition of voucher specimens are important when making comparisons of distribution and abundance over a temporal scale (Heyer et al. 1994), thus, baseline inventories are a routine part of any environmental assessment (Gibbons et al. 2000). Within the Chelonia, baseline information on the biology of many species is lacking (Lovich and Ennen 2013). Naturally, the success of baseline inventories is dependent on the application of appropriate field sampling techniques. As such, periodic evaluation of the efficacy of sampling techniques merit attention by researchers. Understanding of the contribution of complementary methods to sampling biodiversity is also important because multiple sampling methods are often needed to adequately sample diverse communities. For example, in a comparison of seven sampling methods for amphibians, Gunzburger (2007) found that detection probability varied across a range of techniques depending on species and life stages. The greatest species richness was documented through the use of frogloggers, while active sampling (dipnets, box traps) provided a more accurate count of individuals.

Early collecting methods for aquatic turtles included antiquated (or just improper) techniques such as shooting, as well as more time-honored methods of using modified hoop nets and fyke nets (Ruthven 1912; Lagler 1943). Each method used for sampling may show biases in captures among species (Cagle and Chaney 1950; Vogt 1980), age classes, and sexes (Ream and Ream 1966; Koper and Brooks 1998; Smith and Iverson 2002), thus a combination of techniques may be needed when sampling diverse species assemblages. Cagle and Chaney (1950) described species specific variation in capture efficacy during their work on Louisiana turtle communities. They noted that larger turtles, such as snap-

ping turtles (*Chelydra* and *Macrochelys*), may preclude other turtles from entering the trap. It has also been postulated by some that the presence of female turtles in a trap could attract other turtles (Ream and Ream 1966). These assumptions were not tested until much later when Frazer et al. (1990) designed a series of manipulations using common snapping turtles (*Chelydra serpentina*) and painted turtles (*Chrysemys picta*). They found no difference in the number of turtles captured in traps with Common Snapping Turtles vs. traps without. They did capture significantly more turtles in traps into which female painted turtles had been placed than those without.

Species-specific differences in capture rates by capture technique have also been published. Cagle and Chaney (1950) noted that River Cooters (*Pseudemys concinna*) were only captured by hand, while False Map Turtles (*Graptemys pseudogeographica*) were only captured in traps. Sterrett et al. (2010) compared effectiveness of active sampling (snorkeling) versus passive sampling (baited hoop traps) among several turtle species in a clear water Georgia stream. They found differences in capture probabilities between methods as Barbour's Map Turtles (*Graptemys barbouri*) were captured 90% of the time by snorkeling, while Pond Sliders (*Trachemys scripta*) were captured 88% of the time in baited hoop nets. Previous research documented variation in capture rates among sites as well as among species. Ream and Ream (1966) noted that Painted Turtles in Wisconsin had female-biased capture rates using basking traps, male-biased captured rates using baited hoop nets, and equal sex ratios when captured by hand or dip net. However, Vogt (1980) reported equal sex ratios utilizing fyke nets in Wisconsin. Female biased captured rates of painted turtles, regardless of technique, were recorded by Koper and Brooks (1998) in Ontario, Canada.

Not all land managers/researchers can afford a wide range of sampling gear, as trap types for aquatic turtles vary widely in cost ($30-1000), which would impose limitations on the number of techniques they could deploy (Plummer 1979; Sterrett et al. 2010). Evaluation of sampling methods should include the effectiveness in terms of number of species and individuals collected in relation to associated labor and cost (Corn et al., 2000).

We sampled two sites in eastern Texas as part of a community ecology study focused on aquatic turtles from 2006-09. Sampling was conducted using six types of traps and we reviewed our trapping results after the fact to compare capture efficacy, effort, and detection probability for each trap type and similarity of captures between trap types. Considering that area managers would most likely have limited funds for future monitoring, We wanted to determine which trap type or combination of trap types would provide adequate capture rates for sampling the entire assemblage of aquatic turtles at these particular sites.

## Study Area

Our study area was located in Anderson County, Texas, on the Texas Parks and Wildlife Department managed Gus Engeling Wildlife Management Area (WMA). Gus Engeling WMA is a 4,434-ha property encompassing a large portion of the Catfish Creek ecosystem. Catfish Creek is a tributary in the Middle Trinity River Basin, encompassing 730 ha and 32 km of Anderson and Henderson counties and considered a Natural National Landmark (Telfair 1988). Twenty-four small creeks feed Catfish Creek, most of which are spring fed. Aquatic habitat at Gus Engeling WMA is represented by Catfish Creek and its tributaries, adjacent scours and backwater habitat, open canopy marshes, several small ponds, and larger lakes. Aquatic habitat is augmented by a series of levees and flood-control gates, built in cooperation with Ducks Unlimited, to provide wetlands for waterfowl. In addition, there are several ponds or "borrow" pits associated with the levees (Eric Wolverton, Texas Parks and Wildlife Department pers.com.).

Our second site was the TPWD managed Keechi Creek WMA in northeastern Leon County, Texas. Keechi Creek WMA, a small 607 ha management area, also lies within the Middle Trinity River Basin and was acquired by TPWD in 1986. Aquatic habitats at Keechi Creek WMA are much less complex, consisting of Keechi and Buffalo creeks, and a large oxbow lake associated with Keechi Creek. The oxbow lake is intermittently connected to both creeks (Gelwick et al. 2001).

## Materials and Methods

We sampled aquatic habitats at Gus Engeling WMA between late May and late July 2006-2008, and between April and late July 2009.

We divided trap types into deep water and shallow water trap gear. Deepwater gear consisted of two sizes of fyke nets and large diameter hoop nets. Shallow water gear consisted of mini catfish hoop nets, two sizes of square collapsible fish traps, and one size of sea/bass/dome traps.

The large fyke net (Christensen Nets, Everson, WA, USA; www.christensennetworks.com) was 4.5 m in length (front frame to cod end) with a single 14.5 m x 88 cm lead. The two anterior rectangular frames were 120 cm x 88 cm followed by five, 88-cm diameter round hoops, with three 3-cm diameter stretchable funnels leading to the cod end. Square mesh size was 1 cm (Fig. 1). The smaller fyke net (Christensen Nets, Everson, WA, USA; www.christensennetworks.com) was 3.3 m in length from the front frame to cod end, and had a single 7.4 m x 67 cm lead. The two rectangular front frames were 95 cm x 67 cm, followed by four 67 cm diameter hoops. Both fyke nets had a single vertical slit funnel within the rectangular frames. There were two 31-cm diameter stretchable funnels leading to the cod end. Square mesh size was 1cm. The larger hoop (turtle net; Memphis Net and Twine, Memphis, TN, USA; www.memphisnet.net) consisted of three 88-cm diameter metal rings and one 31-cm diameter stretchable funnel (Fig. 2). Overall trap length was 245 cm, and the square mesh size was 2.5 cm.

The collapsible box traps and sea bass traps were purchased from Memphis Net and Twine (Memphis Net and Twine, Memphis, TN, USA; www.memphisnet.net www.memphisnet.net; Fig. 3). The mini catfish hoop net had four 47-cm diameter fiberglass hoops, two 27-cm diameter stretchable funnels, and an overall length of 155 cm. Square mesh size was 2.5cm. Small box traps were 59 cm x 43 cm x 22 cm with a square mesh size of 1 cm. There was a 43-cm, horizontal slit funnel opening on opposite ends of the long axis of the trap. Large box traps were 79 cm x 60 cm x 25 cm with a square mesh size of 1 cm, and had a 60-cm horizontal slit funnel on opposite ends of the long axis of the trap. Dome traps were 96 cm x 64 cm x 61 cm. Square mesh size was 2.5 cm and there were two 15-cm rigid funnels (funnel held open with a plastic ring), located on each end of the trap.

All traps were baited with sardines and/or fresh fish. Traps were checked at least once every 24 hrs. Sampling gear was set so that some portion was exposed above the water

Figure 1. Setting a large fyke net.

Figure 2. Large Hoop Net

Figure 3. Collapsible box trap.

surface, providing air space for turtles and other air-breathing organisms.

Aquatic habitats at Gus Engeling WMA were highly variable in size, based on seasonal and annual rainfall. The type and number of traps set was dictated by the amount of water available, depth of available water, and number of nets available at that time. We measured depth at the opening of each trap. To relate habitat characteristics and depth to the trap type used we first classified five types of habitat at Gus Engeling WMA: Creek (flowing waters associated with Catfish Creek and its tributaries); Backwater (scours and flooded timber associated with the Catfish Creek floodplain); Marsh (shallow, open canopy, heavily vegetated water bodies associated with smaller feeder creeks, springs, and bogs); Pond (small manmade water bodies and borrow pits ≤ 100 m diameter and consisting of more open water than marshes); or Lakes (larger, several ha manmade water bodies).

Since trapability of individual species may vary by trap type, we used program PRESENCE (Hines, 2006) to calculate detection probabilities for each trap type. We also calculated catch/per unit effort x species x habitat x trap type. A unit of effort was defined as a net night, or one net set over one night.

To compare species richness between trap types we used Jaccard's measure of similarity: CJ = j/ (a + b - J) where j = the number of species common to both net types, a = the number of species in net type A, and b = the number of species in net type B (Magurran 2004). The closer the value is to 1, then the more similar species composition of captures were between the trap types.

We constructed species accumulation curves to determine the rate at which new species were captured using each trap type. We constructed randomized species accumulation curves and 95% confidence intervals using program EstimateS (Colwell 2013). Program EstimateS assess species richness through construction of rarefaction curves, which are created by resampling the pool of N samples multiple times and plotting the average number of species found in each sample (Gotelli and Colwell 2001; Chiarucci et al. 2008). Samples were randomized 100 times for calculation of sample means and confidence intervals.

Not all traps were available for use in the same numbers, primarily due to cost, and this study was not originally set up to compare capture techniques, but rather attempt to thoroughly sample an aquatic turtle community. So the number of samples for each trap type was unequal. Program EstimateS extrapolates rarefaction curves past your reference samples allowing one to compare unequal sample sets (Longino and Colwell 2011; Colwell et al. 2012). We extrapolated curves for all trap types out to 500 net-nights.

We also determined sex ratio by trap type for each species to determine if there might be a sex bias for each trapping technique. To look for any observed capture bias by body size by trap type we utilized Pond Sliders, our most frequently captured species, to compare body size by trap type.

## Results

Sampling yielded 520 captures of 8 species of turtles in nets at Gus Engeling WMA (Table 1). As a large number of observations are required to obtain reliable detection probabilities, individual turtle species were grouped by family (emydids, kinosternids, and chelydirids). The family Trionychidae was excluded because of very low capture rates. Not all trap types were used frequently throughout the project, so we only calculated detection probabilities for three trap types: large hoop nets, large box traps, and fyke nets (both large and small fyke nets combined). Capture probabilities and detection rates varied among trap types (Table 1; Figure 1a).

Emydids had the highest detection probabilities in all three net types, and fyke nets and large box traps had slightly higher detection probabilities than other trap types. Chelydrids had higher detection probabilities in large hoop nets and kinosternids had higher detectability within the fyke nets. Large fyke nets captured higher proportions of Common Musk Turtles (*Sternotherus odoratus*). Large hoop nets captured higher proportions of Spiny Softshell Turtles (*Apalone spinifera*), Alligator Snapping Turtles (*Macrochelys temminckii*), and Razorback Musk Turtles (*Sternotherus carinatus*). Large box traps captured higher proportions of Common Snapping Turtles (*Chelydra serpentina*), Eastern Mud Turtles (*Kinosternon subrubrum*), River Cooters, and Sliders. The two types of fyke net, large hoop traps, and large box traps were the most similar in species

Table 1. Catch per unit effort x trap type at Gus Engeling Wildlife Management Area, Anderson County, TX, 2006-2009. Species abbreviations: APSP, Spiny Softshell Turtle; CHSE, Common snapping Turtle; MATE, Alligator Snapping Turtle; KISU, Eastern Mud Turtle; STOD, Common Musk Turtle; STCA, Razorback Musk Turtle; PSCO, River Cooter; TRSC, Slider.

| | | | Species | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Trap Type | Net Nights | Captures | APSP | CHSE | MATE | KISU | PSCO | STOD | STCA | TRSC |
| Large Fyke | 82 | 31 | 0.00 | 0.01 | 0.01 | 0.01 | 0 | 0.13 | 0.03 | 0.25 |
| Small Fyke | 54 | 34 | 0.00 | 0.04 | 0.02 | 0.05 | 0 | 0.04 | 0.05 | 0.44 |
| Mini-Hoop | 58 | 44 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.03 | 0.69 |
| Large Hoop | 318 | 111 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.01 | 0.06 | 0.09 |
| Large Box | 547 | 259 | <0.01 | 0.03 | <0.01 | 0.03 | <0.01 | 0.01 | <0.01 | 0.36 |
| Small Box | 193 | 23 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.10 |
| Dome | 47 | 18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.05 | 0.37 |
| All traps pooled | 1299 | 457 | <0.01 | 0.01 | <0.01 | 0.02 | <0.01 | 0.02 | 0.02 | 0.27 |

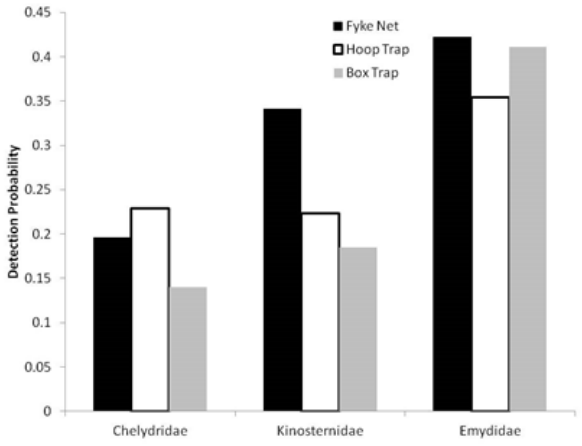
Table 2. Jaccards similarity values for captures by net type at Gus Engeling Wildlife Management Area, Anderson County, Texas, 2006-2009.

| | Trap Type | | | | | |
|---|---|---|---|---|---|---|
| Trap Type | Large Fyke | Small Fyke | Mini-Hoop | Large Hoop | Large Box | Small Box |
| Small Fyke | 1.00 | | | | | |
| Mini-Hoop | 0.50 | 0.50 | | | | |
| Large Hoop | 0.83 | 0.83 | 0.43 | | | |
| Large Box | 0.75 | 0.75 | 0.38 | 0.87 | | |
| Small Box | 0.33 | 0.33 | 0.25 | 0.14 | 0.25 | |
| Dome | 0.50 | 0.50 | 1.00 | 0.43 | 0.38 | 0.25 |

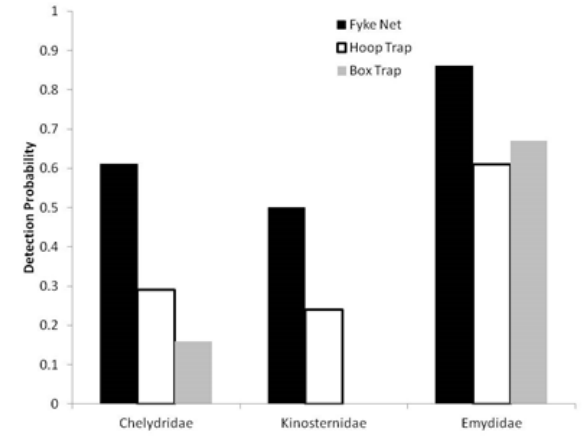
captured (Table 2). Dome and mini catfish hoop traps were also similar (Table 2). The only trap type to capture all 8 species of turtles at Gus Engeling WMA were the large box traps (Table 3), although fyke nets and large hoop traps accumulated more species sooner (Table 3). Sliders were always the first species captured in a trap, except for the large fyke nets (Table 3). Fyke nets appeared to be fairly good at capturing kinosternids, although both box traps did as well.

Table 3. Sequential order of species captured with number of net nights to first occurrence in parentheses by trap type at Gus Engeling Wildlife Management Area, Anderson County, TX, 2006-2009. Species abbreviations: APSP, Spiny Softshell Turtle; CHSE, Common Snapping Turtle; MATE, Alligator Snapping Turtle; KISU, Eastern Mud Turtle; STOD, Common Musk Turtle; STCA, Razorback Musk Turtle; PSCO, River Cooter; TRSC, Slider.

| Trap Type | Species 1 | Species 2 | Species 3 | Species 4 | Species 5 | Species 6 | Species 7 | Species 8 |
|---|---|---|---|---|---|---|---|---|
| Large Fyke | KISU (2) | MATE (9) | STCA (17) | STOD (18) | TRSC (19) | CHSE (19) | | |
| Small Fyke | TRSC (9) | CHSE (9) | KISU (10) | STCA (20) | STOD (25) | MATE (52) | | |
| Mini-Hoop | TRSC (2) | CHSE (2) | STCA (14) | | | | | |
| Large Hoop | TRSC (1) | STOD (18) | STCA (24) | APSP (22) | MATE (33) | STOD (37) | | |
| Large Box | TRSC (7) | CHSE (7) | STCA (17) | STOD (29) | PSCO (60) | KISU (103) | APSP (208) | MATE (308) |
| Small Box | TRSC (1) | KISU (4) | | | | | | |
| Dome | TRSC (1) | STCA (7) | STOD (34) | | | | | |




**A.**




**B.**

Figure 1. A. Detection probabilities for three families of aquatic turtles in three types of net gear at Gus Engeling WMA, Anderson County, Texas, 2006-2009. B. Detection probabilities for three families of aquatic turtles in three types of net gear at Keechi Creek WMA, Leon County, Texas.

Large box traps were the only trap type whose rarefication curve did not reach asymptote (Fig. 2). Large box traps continued to add species, particularly juveniles of larger species, throughout the duration of the project (Table 3). Confidence intervals tend to grow dramatically around the rarefication curves once the curve begins to extrapolate past the last reference sample (Colewell, 2013). When confidence intervals were compared to those of the other small trap types, they tend to remain narrow around small box traps, but widen considerably around the mean accumulation curve for dome traps. When comparing confidence intervals for the larger trap types, they remain large for the mini-hoop and fyke nets (Figure 3). Small fyke nets, mini-hoop traps, and dome traps were the only trap types to reach asymptote at a greater number of species than actually captured. Results for these trap types suggest that more frequent use would result in the capture of additional species, possibly at a higher rate than other large trap types.

Water depth does influence where certain net types can be set, so, in turn, net types showed variation in capture rates in different habitats (Table 4). Creek habitats had deeper water (64.1 ± 27.1 cm), followed by lakes (49.1 ± 44.1 cm), ponds (46.7 ± 27.4 cm), backwater (36.5 ± 26.1) and marsh (36.2 ± 26.4) habitats. In creek habitats, large fyke nets and mini-hoop traps had the highest capture rates (Table 4). Mini-hoop traps and large box traps had high capture rates in shallow backwater habitats, while small fyke nets and dome traps did well in more heavily vegetated marshes (Table 4). Both types of fyke net, large box traps and mini-hoops had high capture rates in ponds and lakes (Table 4).

Mean mid-line carapace lengths for sliders were not significantly different among different trap types at Gus Engeling WMA ($df = 6$, $F = 9.17$, $P = 2.68$). All sizes of sliders were captured in all trap types, although the median sizes for turtles captured in small box, dome, and mini-hoop traps were slightly smaller than those captured in other traps (Fig. 4).

Although sampling effort was considerably less at Keechi Creek WMA, we observed differences in detectability among trap types when compared to Gus Engeling WMA. At this site, emydids had higher detection rates than other families, and detection rates for chelydrids and kinosternids were similar (Fig 1b). The lack of captures of kinosternids in box traps at Keechi Creek WMA may be reflective of the absence of Common Musk Turtles and Eastern Mud Turtles in our captures at this site (Table 5).

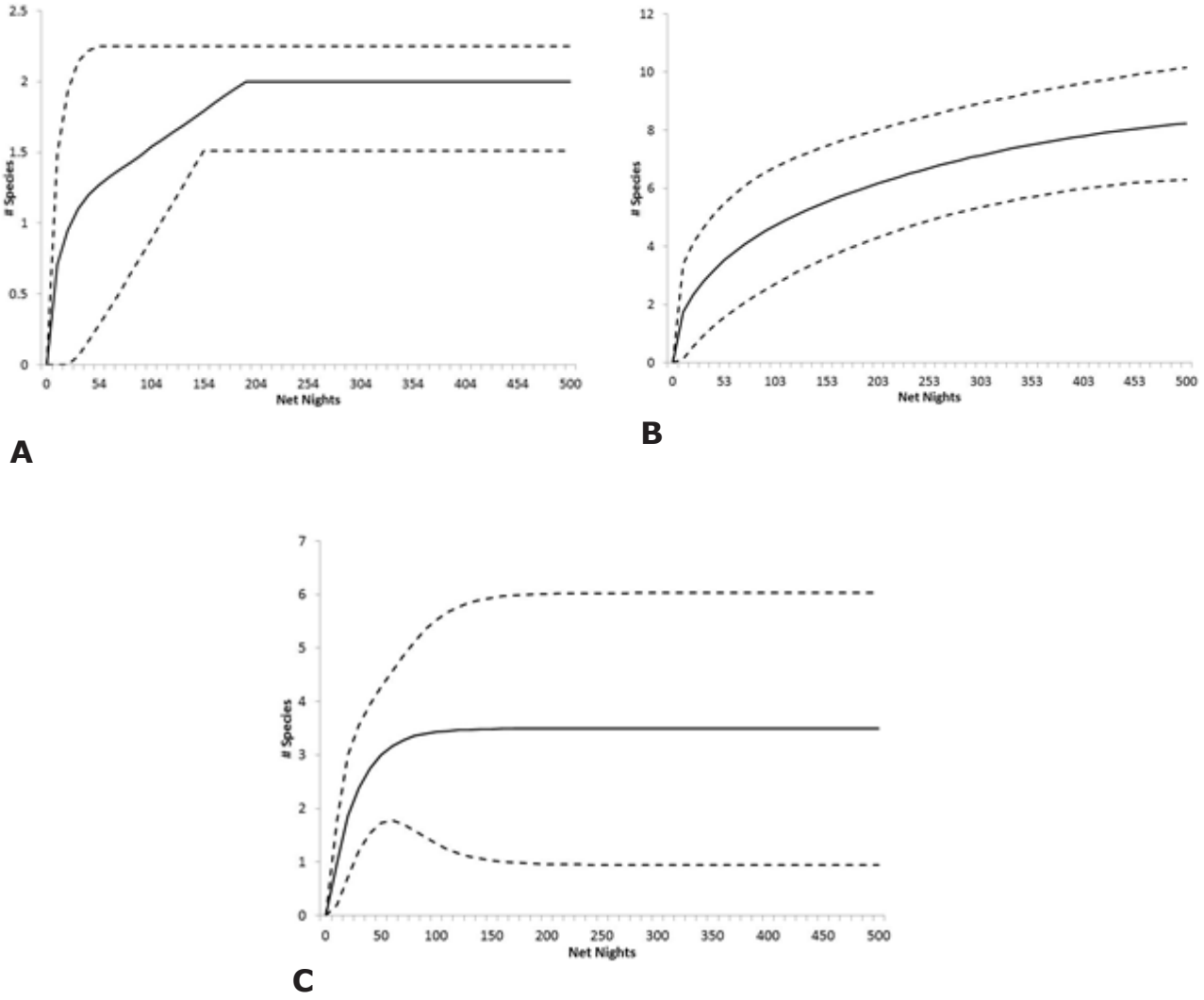



Figure 2. Species accumulation curves and 95% CI for (A) small box traps, (B) large box traps, and (C) dome traps at Gus Engeling WMA, Anderson County, Texas 2006-2009.

Table 4: Catch per unit effort x trap type x habitat at Gus Engeling Wildlife Management Area, Anderson County, Texas 2006-2009. Traps were ranked in order of highest catch per unit effort for each habitat type sampled.

| Trap Type | Creek | Rank | Backwater | Rank | Marsh | Rank | Pond | Rank | Lake | Rank |
|---|---|---|---|---|---|---|---|---|---|---|
| Large Fyke | 0.66 | 1 | 0.18 | 5 | 0.20 | 5 | 1.00 | 3 | 0.60 | 4 |
| Small Fyke | 0.44 | 3 | 0.18 | 5 | 0.80 | 2 | 1.37 | 2 | 1.33 | 2 |
| Mini-hoop | 0.54 | 2 | 0.80 | 1 | 0.00 | 6 | 1.5 | 1 | 1.57 | 1 |
| Large Hoop | 0.15 | 6 | 0.21 | 4 | 0.00 | 6 | 0.23 | 6 | 0.59 | 5 |
| Large Box | 0.23 | 4 | 0.48 | 2 | 0.27 | 4 | 0.42 | 5 | 1.25 | 3 |
| Small Box | 0.00 | 7 | 0.16 | 6 | 0.53 | 3 | 0.00 | 7 | 0.25 | 6 |
| Dome | 0.18 | 5 | 0.33 | 3 | 0.83 | 1 | 0.88 | 4 | - | - |

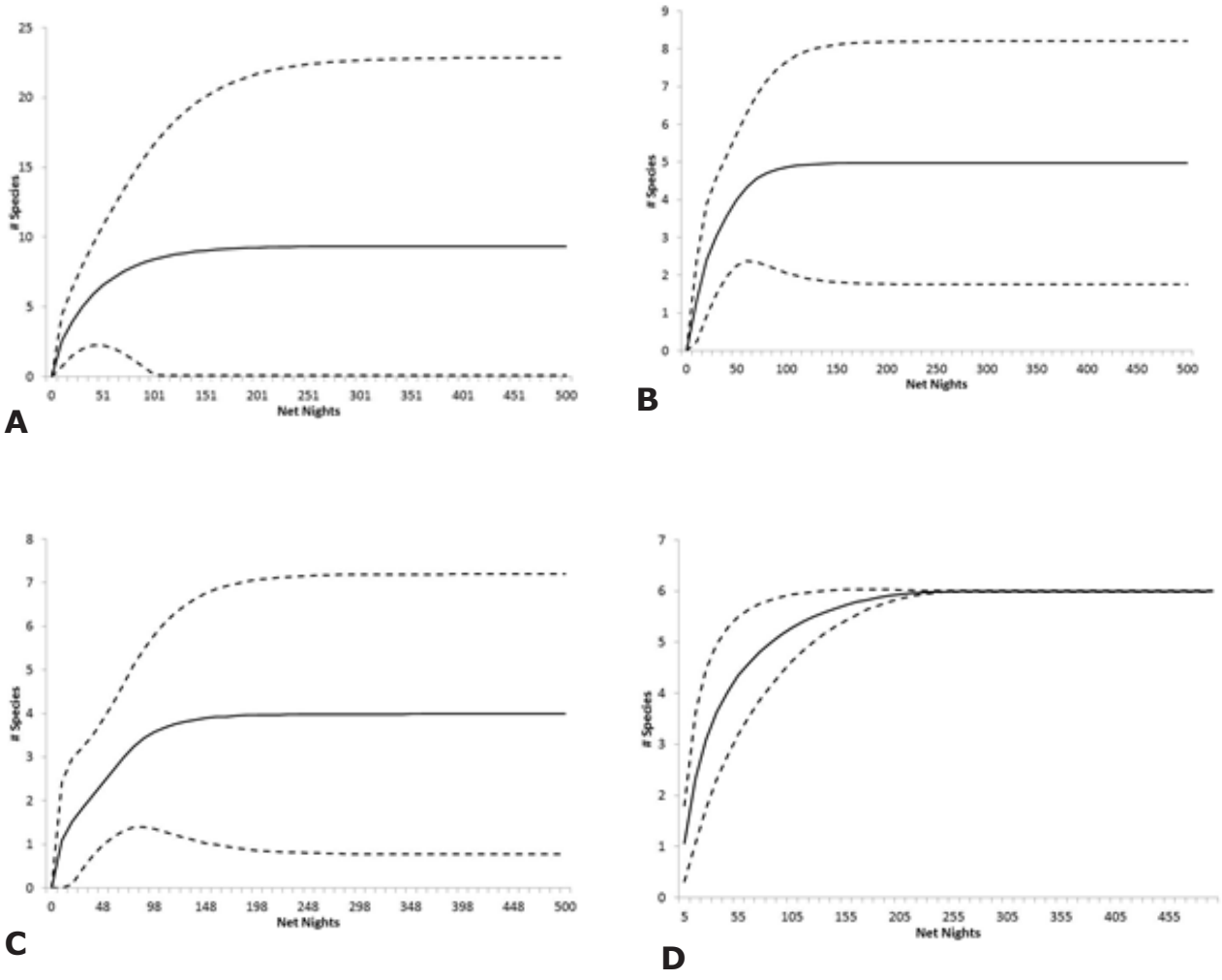



Figure 3. Species accumulation curves for (A) small fyke nets, (B) large fyke nets, (C) mini-hoop traps, and (D) large hoop traps at Gus Engeling WMA, Anderson County, Texas 2006-2009.

Table 5. Catch per unit effort x trap type at Keechi Creek Wildlife Management Area, Leon County, Texas 2009. Species abbreviations: APSP, Spiny Softshell Turtle; CHSE, Common snapping Turtle; MATE, Alligator Snapping Turtle; STCA, Razorback Musk Turtle; TRSC, Slider

| | | | Species | | | | |
|---|---|---|---|---|---|---|---|
| Trap Type | Net Nights | Total Captures | APSP | CHSE | MATE | STCA | TRSC |
| Large Fyke | 4 | 15 | 0.00 | 0.00 | 0.06 | 0.13 | 3.00 |
| Small Fyke | 4 | 11 | 0.00 | 0.75 | 0.00 | 0.00 | 2.00 |
| Large Hoop | 33 | 40 | 0.18 | 0.03 | 0.06 | 0.06 | 0.87 |
| Large Box | 21 | 28 | 0.00 | 0.03 | 0.00 | 0.00 | 1.28 |
| Small Box | 16 | 8 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 |
| All Trap Types | 78 | 92 | 0.06 | 0.05 | 0.03 | 0.04 | 0.91 |

Table 6. Sex ratios (M:F) by species and trap type for Gus Engeling Wildlife Management Area (2006-09) and Keechi Creek Wildlife Management Area (2009). Species abbreviations: CHSE, Common Snapping Turtle; KISU, Eastern Mud Turtle; STCA, Razorback Musk Turtle; STOD, Common Musk Turtle; TRSC, Slider.

| Trap Type | CHSE | KISU | STCA | STOD | TRSC |
|---|---|---|---|---|---|
| Large Fyke | | | | 1:1.5 | 1:2 |
| Small Fyke | 1:2 | 1:1 | 2:1 | | 1:1 |
| Large Hoop | 2:1 | | 1:1.66 | 1:4 | 1:1.43 |
| Mini-Hoop | | | 2:1 | | 1:2 |
| Large Box | 1:1 | 1.42:1 | 1:1 | | 1:1 |
| Small Box | | | | | 3:1 |
| Dome | | | 1:1 | | 5:1 |

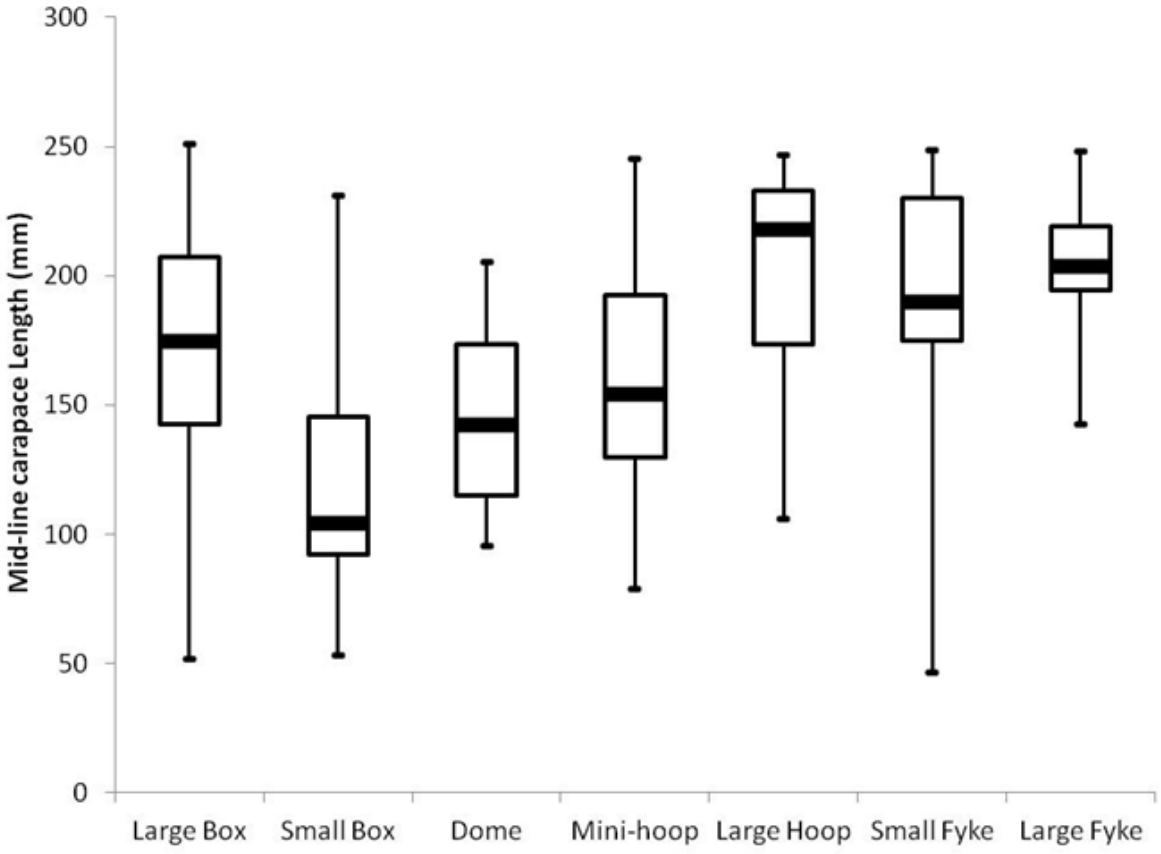



Figure 4. Minimum, 1st quartile, median, 3rd quartile, and maximum mid-line carapace lengths for Pond Sliders captured at Gus Engeling WMA, Anderson County, Texas 2006-2009.

As not all turtles were captured equally in all trap types, sex ratios by trap type include captures from both Gus Engeling WMA and Keechi Creek WMA to provide a more comprehensive picture of captures by sex by net type (Table 6). Common Musk Turtles showed a female bias in all traps in which they were captured. Female Common Snapping Turtles were captured more frequently in small fykes, while males were captured more frequently in large hoop traps. Male Sliders were captured in trap types with smaller entrances with increasing female captures in larger nets. Sliders exhibit sexual size dimorphism, with males being the smaller sex (Ernst and Lovich 2009), and sex-biased captures are also represented by differences in mean body sizes captured in each trap type (Table 6: Fig 4).

## Discussion

The sampling techniques we used were adequate for detecting species occurrence with enough sampling effort, as we captured all but one species previously recorded on Gus Engeling WMA (Wes Littrell, Texas Parks and Wildlife Department pers. comm.). The one species missing was the Chicken Turtle (*Dierochelys reticularia*), which prefer shallow, heavily vegetated bodies of water (Ernst and Lovich 2009). This habitat type is present at Gus Engeling WMA and was sampled during the study. Based on 4 years of sampling for this project, this species may be extremely rare to extirpated at this site.

River Cooters were highly under-represented in my samples, although we observed them basking in open marshy areas quite frequently. River Cooters do not appear to be easily attracted to bait or do not enter traps very readily, and the resulting disparity in number observed vs. number trapped seems to be a trend in other studies as well (Lindeman 2001; Lindeman and Scott 2001). Spiny Softshells were also underrepresented, and with the exception of one hatchling, all captures of spiny softshell turtles were female. Ernst and Lovich (2009) suggested that variation of reported population sizes throughout the Spiny Softshell's range may be related as much to sampling technique as it is environmental conditions. Spiny Softshells typically only make up a low percentage of turtle captures in other studies as well (Bodie et al. 2000; Dreslik et al. 2005; Riedle et al. 2009).

Tinkle (1958) and Trauth et al. (2004) commented on low trap success for Razorback Musk Turtles, although we were fairly successful capturing not only Razorback Musk Turtles, but Common Musk Turtles and Eastern Mud Turtles as well. The kinosternids are typically considered bottom walkers (Moll and Moll 2000; 2004) and the use of fyke nets and box traps may have helped increase our capture success of this family of small turtles. The one advantage box traps had over all other traps was the ability to set them in very shallow water (≥ 20 cm), and in turn they were heavily utilized in backwater and marsh habitats where smaller species and smaller individuals of larger species of turtles may occur.

To properly set large hoop nets, water depth of at least 60 cm was needed, depths generally found in deeper creek habitats. The short length of the trap also allowed us to take advantage of smaller pockets of deeper water that were occasionally present in backwater and marsh habitats. While originally considered deep water gear, fyke nets were more heavily utilized within the shallower backwater habitats. While successful when set in creek habitats, high flow at certain times of the year made setting the lead on fyke nets difficult within those creeks. Dense aquatic vegetation made setting all types of traps difficult within marsh habitats, particularly during periods of low water.

While sampling effort and community composition differed between Gus Engeling WMA and Keechi Creek WMA, patterns of detectability was similar among trap types and turtle families although overall detectability rates were higher at Keechi Creek WMA. Fyke nets have long been touted as the most efficient way to capture turtles (Vogt 1980), and even work quite well passively (unbaited) at catching turtles (Webb 1961: Barko et al. 2004). The long lead off the front frame of fyke nets served to guide turtles towards the opening of the net, and these traps were very successful, particularly for bottom walking species such as the Kinosternidae.

Capture rates among sizes and sexes of single species are thought to be biased based upon differences in behavior between sexes and life stages (Cagle and Chaney 1950). In a Wisconsin population of Painted Turtles, Ream and Ream (1966) noted higher male

captures in baited hoop nets and higher female captures in basking traps. We noted similar discrepancies in sex ratios by trap type for several species. Most notable was the differentiation between sexes of Sliders based on the overall size of the trap, with the smaller males being captured more predominantly in smaller traps. A better understanding of sex-biased sampling methods is needed in light of recent research emphases on climatic (Tucker et al. 2008) and ecotoxicological (Willingham and Crews 1999) impacts on population structure of aquatic turtles.

Ultimately, it was a combination of all net types and high frequency of trapping that allowed us to adequately sample turtles at these sites. While net gear, such as fyke nets captured all eight species in a shorter amount of time, large scale sampling with fyke nets may not be feasible because of their high cost ($500 -1,000/ net). Additionally, fyke nets require moderate water depth to ensure successful deployment. Large box traps and large hoop nets on the other hand cost considerably less, $57 and $106 respectively, and in the case of box traps can be set in much shallower water. But, individual trap types may not adequately sample some species groups, such as the kinosternids. An ideal combination of nets at this site then would include fyke nets, large hoop traps, and the large collapsible box traps. Based on the rarefication curves, other trap types may also give similar results with enough trapping effort. All the techniques used here were passive so active sampling techniques such as seining, snorkeling, or driving turtles may be required to sample turtle species not generally captured in net gear (Marchand 1945; Vogt 1980).

## Acknowledgements

This project was funded by a State Wildlife Grant through the Wildlife Division of Texas Parks and Wildlife. We would also like to thank the Texas Parks and Wildlife Department, Gus Engeling Wildlife Management Area, Keechi Creek Wildlife Management Area, and the Department of Life, Earth, and Environmental Sciences at West Texas A&M University for providing additional funding, housing, and logistical support for this project. We are also grateful for the additional assistance in the field provided by T. Barron, M. Broxson, B. Dickerson, S. Grant, M. Lange, R. Lange, M. Poole, C. Schalk, N. Smolensky, J. Suhr, N. Thomas, C. Tobler, M. Tobler, M. Treglia, and D. Walker.

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# Notes

## Spontaneity a Herpers Helper: Day Tripping To Arkansas and Back

Dexter R. Mardis, Wichita State University Biological Field Station, Box 26, 1845 N. Fairmont, Wichita, KS. Dmardis784@gmail.com

As anyone who has ever wanted to find salamanders or frogs certainly knows, you have to go with the flow. A spontaneous thunderstorm may develop four hours away and you are DYING to see adorably dumpy Strecker's Chorus Frogs. Or you hope to find a rare Eastern Tiger Salamander in the Kansas River floodplain. When the opportunity arises, you may have only minutes to decide whether to jump in the car or stay home.

At 7:04 am on 1 February 2021, I was laying in bed, contemplating everything I needed to accomplish at work that day. Or, scrolling through social media on my phone. Definitely one of those two. At 7:05, I received a group text from Nate Nelson (Sedgwick County Zoo), which also included David Kelley (SCZ as well). Nate, like many of us in late winter, had cabin fever and wanted to make a quick run to look for "leeches, beetles, and salamanders." But he wanted to make a five-hour drive to NW Arkansas to look for them. Being who I am, it was a tempting endeavor! Alas, I had a meeting scheduled and several projects to work on. I said "no." David could not join either. 13 minutes later though, I had quickly flown from bed while sending a second text, "Wait... when leaving?". We arranged to meet shortly after 8 am at a gas station about 15 minutes from my house. In the remaining time span, I shaved and showered, prepared snacks for the day (though I forgot breakfast), and realized that 90% of my field stuff was at my office. Fortunately, I had my muck boots. "Eh, close enough," I said aloud to myself.

By 8:10 am we were barreling east out of Wichita on Highway 400 at the roaring speed of the morning rush hour. Finally, I asked what we were targeting: *Macrobdella* (a genus of leech that specializes in eating amphibians and amphibian eggs), *Cybister* beetles (predacious divers with a brilliant yellow stripe down each side), and *Desmognathus monticola*. Those who recognize that name probably scoffed at the idea of seeing an Appalachian species of salamander in the heart of the Ozarks. However, since at least 2003 (Trauth et al, 2004) there has been a mysteriously introduced population of Seal Salamanders, *Desmognathus monticola,* nestled in the Spavinaw Creek drainage (Benton County, AR). To my knowledge, herpetologists know neither the "why" nor the "when" of this introduction. Regardless, we wanted to see them for ourselves!

Our first destination was the furthest away: McIlroy State Game Management Area (Madison County, AR). Upon getting there, we ironically discovered that while I left everything but my boots at my office, Nate had left only his boots at his office. Despite that, we hiked to several fishless ponds that were discernable from the Google Earth and commenced netting. Despite dozens of net swipes per pond, our beetle and leech targets eluded us. We also did not see any adult Ambystomatid salamanders as we had hoped. What we did find though was still very enjoyable. We netted many larval salamanders (possibly *Ambystoma opacum* or *A. annulatum* [Marbled and Ringed Salamanders, respectively]) and several *Notophthalmus viridescens* (Eastern Newts). *Ambystoma* larvae are practically impossible for all but the best eye to accurately identify with any reliability. However, the newts were absolutely stunning. Some of the females looked mottled with leopard like patterns, and the photographs do no justice to the colors. In life, they had a base color of golden pollen, or perhaps a bright honey as sun gleams from behind the jar.

With heads held high despite our defeat, we withdrew and headed to Spavinaw Creek. With only a single unobscured GPS point on iNaturalist, we had little to go on. Upon reaching the area, our hopes dwindled more. All low-water crossings near the creek were heavily marked with no trespassing signs and barbed-wire fencing went directly to the bridge abutments. We drove every side-road we could find looking for access. We finally found one small ditch that seemed to double as a spring. Our only hope. We turned the few rocks along the ditch's

bank, numbering less than a dozen. Suddenly I moved a rock and saw a dark, thick-bodied salamander sitting there. A Seal Salamander. Before I could exclaim or move to catch it, the zippy little beast bolted. With three strides that reminded me of nothing less than a small alligator's gallop, it retreated into a rocky crevice. I was gobsmacked. Frantic. Incensed. With a frenzy, I tore into the muddy rocks as best as I could without burrowing into the roadbed. Alas. The sole *Desmognathus* of the day had been nothing more than a blurred glimmer of slimy skin in the day's waning light. We tried to find more places to flip rocks without trespassing, but to no avail. The light faded, and we hit the homeward trail. We will return someday hopefully, having worked out prior permission from landowners to ensure that we have access to the creek.

With an investment of 559 miles and almost 13 hours, our spontaneous road trip ended. The following are our tallies of the day:

McIlroy State Game Management Area:
*Notophthalmus viridescens* (Eastern Newt): 9
*Ambystoma* sp: ~50 larvae

Spavinaw Creek:
*Desmognathus monticola* (Seal Salamander): 1
*Acris blandchardi* (Blanchard's Cricket Frog): 1

Author's note: I would like to make clear that neither Nate nor I socialize with other people very frequently, and take strong care with Covid-19 precautions. Please use judgment and care when traveling with others to herp.

Trauth, S. E., H. W. Robison, and M. V. Plummer. 2004. Amphibians and Reptiles of Arkansas. University of Arkansas Press, Fayetteville. 421 pp.

Typical new-growth pine/oak woodland on the Ozark Plateau.

A fishless pond on the Ozark Plateau.

Central Newt, *Notophthalmus viridescens.*

# An Observation of the Remains of an Eastern Box Turtle at Fort Leavenworth, Ks

Neil Bass and Emma Cleland-Leighton
810 McClellan Ave, Fort Leavenworth, KS 66027

The shell of an Eastern Box Turtle (*Terrapene carolina*) was collected by Neil Bass and Emma Cleland-Leighton on the morning of 7 July 2020. Shell fragments and skeletal bones were deposited at the KU Natural History Museum (KU 352336). The collected material was found in a power line right of way west of Sheridan Drive on Fort Leavenworth in Leavenworth County, Kansas. The right of way was vegetated predominantly by tall fescue (*Festuca arundinacea*). The location of this of this record is: 39.366481, -94.938944: Sec ¼ SE ¼ Sec10, T8S, R22E. This specimen represents a range extension to the north by approximately three miles (Collins, Joseph T., Suzanne L. Collins, and Travis W. Taggart. 2010. Amphibians, Reptiles, and Turtles, in Kansas. Eagle Mountain Publishing, LC Eagle Mountain, Utah. xvi + 312 pp.). The straight line distance between these two records is 12.46 miles.

The previous record (KU 221515 Leavenworth Co, Kansas:39.3105, -95.1616, Sec. 34, T8S, R20E: 11 June 1993: Suzanne L. Collins, Joseph T. Collins) was approximately 15 miles north of the next most northerly cataloged specimen (KU 217258 Wyandotte Co, Kansas:39.1289, -94.6782: Kansas City, Wellbourn jct 42nd St and Leavenworth Rd: Oct 1990). Using the Missouri Herp Atlas (www.atlas.moherp.org), there were specimens in Missouri recorded further north from Harrison, Adair, Clark, and Lewis counties. Several of these records are suspect, they could be from anthropogenic releases. The most reliable record from Lewis County is approximately 54 miles further north than this new Kansas specimen. In western Missouri, this Kansas record is approximately 12 miles north of the Platte County record from 2011. The Clay County record for Missouri would be further north but is the only specimens from that county and is from 1933, so also somewhat suspect.

*Terrapene carolina* shell Fort Leavenworth, Sheridan Road 7 July 2020.

*Terrapene carolina* plastron pieces collected 7 July 2020.

# Bahamian Anole Occurrence

John Wahlmeier and Neil Bass
810 McClellan Ave, Fort Leavenworth, KS 66027

A live adult specimen of the Bahaman Anole (*Anolis sagrei*) was found and photographed by Jeremy Freed at 1300 on 21 October 2020, at 1621 SW Arvonia Drive, Topeka, Shawnee County, Ks. More locality information is (39.0371,-95.7688). This is a Lowes Store and the anole was found in the garden center while garden tables were being rearranged. Bahaman Anoles are sold in pet stores and also stow away on tropical vegetation. Thus facilitating dispersal outside of areas with a favorable climate for them. This could be a released pet but is probably a stowaway. The Lowes had no new shipments of plants in over a week and no shipments of tropical plants in over two weeks. I would like to thank Jeremy Freed and John Wahlmeier for bringing this discovery to my attention.

## About the Kansas Herpetological Society

The KHS is a non-profit organization established in 1974 and designed to encourage education and dissemination of scientific information through the facilities of the Society; to encourage conservation of wildlife in general and of the herpetofauna of Kansas in particular; and to achieve closer cooperation and understanding between herpetologists, so that they may work together in common cause. All interested persons are invited to become members of the Society. Membership dues per calendar year are $15.00 (U.S., Regular), $20.00 (outside North America, Regular), and $20.00
(Contributing) payable to the KHS. Send all dues to: KHS Secretary, (address inside the front cover)

*KHS Meetings*
The KHS holds an annual meeting in the fall of each year. The meeting is, minimally, a two day event with lectures and presentations by herpetologists. All interested individuals are invited to make presentations. The annual meeting is also the time of the Saturday night social and fund-raising auction.

*Field Trips*
The KHS hosts three field trips each year, one each in the spring, summer, and fall. Field trips are an enjoyable educational experience for everyone, and also serve to broaden our collective understanding of the distribution and abundance of the amphibians, reptiles, and turtles in Kansas. All interested persons are invited to attend.

## Editorial Policy

*Collinsorum*, currently issued digitally as submissions warrant, publishes all society business.

*Submission of Manuscripts*
As space allows, *Collinsorum* publishes all manner of news, notes, and articles. Priority of publishing is given to submissions of Kansas herpetological subjects and by KHS members; however, all submissions are welcome. The ultimate decision concerning the publication of a manuscript is at the discretion of the Editor. Manuscripts should be submitted to the Editor in an electronic format whenever possible. Those manuscripts submitted in hard copy may be delayed in date of publication. Manuscripts should be submitted to the Editor no later than the 1st of the month prior to the month of issuance. All manuscripts become the sole possession of the Society, and will not be returned unless arrangements are made with the Editor.

*Reprints & Artwork*
*Collinsorum* publishes original peer-reviewed submissions under the Articles and Notes sections. Upon review, acceptance, and publication, Portable Document File (PDF) copies are provided gratis to the author on request.

## Societal Awards, Grants, and Recognitions

*Distinguished Life Members*
Individuals selected as Distinguished Life Members are chosen by the KHS Executive Council based on their distinguished published research papers on Kansas herpetology.

*Bronze Salamander Award*
Established in 1987, this Award is presented to those individuals whose efforts and dedication to the Kansas Herpetological Society go far beyond the normal bounds. The recipients of this Award have given exemplary service to the KHS, and are presented with an elegant bronze sculpture of a Barred Tiger Salamander.

*The Howard K. Gloyd - Edward H. Taylor Scholarship*
Established in 1993, The Gloyd-Taylor Scholarship is presented annually by the Kansas Herpetological Society to an outstanding herpetology student. The scholarship is a minimum of $300.00 and is awarded on the basis of potential for contributing to the science of herpetology. Students from grade school through university are eligible.

*The Alan H. Kamb Grant for Research on Kansas Snakes*
KHS members only are eligible to apply for The Alan H. Kamb Grant for Research on Kansas Snakes, which was established in 2001. The recipient of the grant will be selected by the KHS Awards Committee. A minimum award of $300 is given annually. Research results (in whole or in part) must be submitted for publication in Collinsorum.

*The Henry S. Fitch - Dwight R. Platt Award for Excellence in Field Herpetology*
KHS members only are eligible to apply for The Henry S. Fitch - Dwight R. Platt Award for Excellence in Field Herpetology, which was established in 2010. The recipient of the grant will be selected by the KHS Awards Committee. The award will be given annually when sufficient funds have been raised to establish a trust.

*The George Toland Award for Ecological Research on North American Herpetofauna*
This CNAH Award was established in 2008 in recognition of the scientific career of George Fredrick Toland, whose life-long interest in herpetology was passed on to so many of his students. The recipient of this award will be selected by the KHS Awards Committee. A minimum award of $200 is given annually at the end of the KHS meeting. Research results (in whole or part) must be submitted for publication in Collinsorum.

*The Suzanne L. & Joseph T. Collins Award for Excellence in Kansas Herpetology*
This CNAH Award was established by Westar Energy in 1998 in recognition of the achievements of Suzanne L. Collins and Joseph T. Collins. In even years, the Award is bestowed upon an individual who, in the preceding two calendar years, had published a paper of academic excellence on native species of Kansas amphibians, reptiles, and/or turtles, and in odd years, the Award is given to an individual who, in a juried competition, took the best photograph of an amphibian, reptile, or turtle representing a species native to Kansas. The Collins Award is minimally $1,000.00 and is neither a grant nor a scholarship. No nominations or applications can be made for it.

Kansas Herpetological Society
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