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DOES METHOD OF BAIT PRESENTATION WITHIN FUNNEL TRAPS INFLUENCE CAPTURE RATES OF SEMI-AQUATIC TURTLES?

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***Abstract.*—Semi-aquatic turtle population sampling commonly uses baited aquatic funnel traps. However, researchers may use different methods of bait presentation within these traps. Two common methods of bait presentation are suspension of the bait from the top of the trap (near the funnel entrance) or placement of the bait into the trap without attachment. We used both methods to sample populations of Western Painted Turtles (*Chrysemys picta bellii*) and Red-eared Sliders (*Trachemys scripta elegans*) at nine different trap stations near Americus, Lyon County, Kansas, and compared mean daily capture rates. We found no significant differences between the two methods of bait presentation.**

Key Words.—bait presentation; *Chrysemys picta bellii*; collection methods; Kansas; Red-eared Slider; *Trachemys scripta elegans*; Western Painted Turtle

INTRODUCTION

Maximizing catch per unit effort is usually a desirable goal when sampling turtle populations and/or communities. There are numerous methods for sampling freshwater turtles (Plummer 1979; Vogt 1980) but not all methods yield equivalent capture rates (e.g., Ream and Ream 1966; Koper and Brooks 1998; Reehl et al. 2006; Thomas et al. 2008). Investigators commonly sample semi-aquatic freshwater turtles with baited aquatic funnel traps (Cagle 1950; Gibbons 1990). There are several modifications to the basic design, but most of these traps function in a similar manner (Plummer 1979; Gibbons 1990).

Researchers usually use some type of bait to entice turtles to enter the trap (Plummer 1979; Gibbons 1990). Many different bait types exist and investigators have examined the relative efficacy of some of these baits (Ernst 1965; Voorhees et al. 1991; Jensen 1998; Thomas et al. 2008). However, there is variation in the method of bait placement in the funnel trap among studies. For example, some researchers place the bait into perforated containers that allow for scent dispersal but prevent consumption (Cagle and Chaney 1950; Ream and Ream 1966; Frazer et al. 1990), and others do not use perforated containers (e.g., Kennett 1992; Smith et al. 2006; R. Brent Thomas, *pers. obs.*). In addition, some researchers suspend the bait (which may or may not be in a container) from the top of the trap near the entrance (Cagle and Chaney 1950; Plummer 1979), while others simply toss the bait into the trap (Kennett 1992; Thomas et al. 2008). Different methods of bait presentation may influence capture rates in studies of freshwater turtles, but no previously published studies have focused on the potential for such variation. We compared the relative efficacy of two different methods of bait presentation within funnel traps for trapping semi-aquatic turtles. Specifically, we compared mean daily capture rates of Western Painted Turtles (*Chrysemys picta bellii*) and Red-eared Sliders (*Trachemys scripta elegans*) captured in funnel traps in which bait-filled containers were suspended near the funnel entrance with that of funnel traps in which the bait-filled containers were merely tossed into the trap.

MATERIALS AND METHODS

We sampled nine different trap stations located in eight different ponds over a period of 13 d (8–21 August 2007). Ponds were located on or near the Emporia State University (ESU) Ross Natural History Reservation (RNHR) near Americus, Lyon County, Kansas (N 38.49491° W 96.33540°; NADS 1983). We used rectangular frame nets (65 x 90 cm frame covered in 3.8 cm treated nylon mesh; Nichols Net and Twine Inc.; Fig. 1) baited with frozen fish placed into perforated 5.1 cm diameter PVC tubes. We placed the 18 traps in pairs at each of the nine trap stations. There was a single trap station in all ponds except for one large pond (ca. 9.6 ha) in which we placed two separate trap stations ~150 m apart. We used two methods of bait presentation at each of the nine trap stations. In one of these traps, we suspended a bait tube from the top of the trap with twine. We positioned bait containers near the (8-10 cm) trap entrance below the surface of the water but above the

FIGURE 1. A photograph of a frame net set in one of the study ponds. (Photographed by R. Brent Thomas)

substrate (hereafter referred to as "hanging"). In the second method, we tossed the bait tube into the trap and allowed it to sink to the bottom (hereafter referred to as "non-hanging"). We randomly assigned the method of bait presentation to the traps within each of the nine trap stations on the first day of trapping. We checked traps every other day, and replenished each bait tube with fresh bait each time traps were checked. The method of bait presentation was alternated between the two traps at each of the nine trap stations during each trap check. Because of likely site-specific variation in capture rates, we used Friedman's Tests within a blocked design (i.e., with trap stations serving as blocks) to compare mean daily capture rates of the two methods of bait presentation (SAS Institute Inc., Cary, North Carolina, USA). We assessed significance with $\alpha = 0.05$.

RESULTS

We captured 57 *C. p. bellii* and 33 *T. s. elegans* during the study (Table 1). The non-hanging method matched or exceeded the mean daily capture rate of the hanging method for *T. s. elegans* at 44.4% (4/9) of the trap stations, and 55.5% (5/9) of the trap stations for *C. p. bellii*. We found no significant difference between the two methods of bait presentation (i.e., "hanging" versus "non-hanging") with respect to mean captures/d (Table 1) for *C. p. bellii* ($X^2_r = 0.500$, df = 1, $P = 1.00$) or *T. s. elegans* ($X^2_r = 0.655$, df = 1, $P = 0.41$).

DISCUSSION

These two methods of bait presentation were not significantly different with respect to mean daily capture rate for *T. s. elegans* or *C. p. bellii* in these ponds. It is possible that trapping in different habitats, during a different season, or for different species might have yielded different results. Some studies have suggested that captured females may serve as further enticement for males to enter traps (e.g., Cagle and Chaney 1950; Frazer et al. 1990; Rose and Manning 1996; Gamble 2006). However, the influence of such differences should have been distributed equally between the two methods of bait presentation. In other words, males should have been equally attracted to females no matter which method of bait presentation was used within a particular trap. Individual turtles sometimes exhibit "trap-happy" or "trap-shy" behaviors (Koper and Brooks 1998; Deforce et al. 2004). However, turtles were never rewarded for entering a trap (i.e., bait consumption was not possible) and the bait tubes were systematically rotated between the two traps at each trap station. Therefore, the influence of such behaviors (if any) should have been equal between the two methods of bait presentation.

Hanging bait tubes requires only a minimal increase in time and expense compared to merely tossing bait tubes into funnel traps. However, we did not observe a significant difference between the mean daily capture rates of these two methods. Therefore, it appears that the costs (while minimal) may not result in substantial gains in trap success.

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TABLE 1. Mean daily capture rate (± SD), range, and total number of Red-eared Sliders (*Trachemys scripta elegans*) and Western Painted Turtles (*Chrysemys picta bellii*) captured in funnel traps using two different methods of bait presentation at nine trap stations in Lyon County, Kansas, USA.

	T. s. elegans		*C. p. bellii*	
	Hanging	**Non-hanging**	**Hanging**	**Non-hanging**
$\bar{x}$ (± SD)	0.171 (0.153)	0.111 (0.155)	0.265 (0.221)	0.223 (0.113)
Range	0.000-0.462	0.000-0.462	0.000-0.615	0.077-0.389
Total captured	20	13	31	26

during the study (ESU-ACUC-07-010). Turtles were collected under permit number SC-127-2006 issued to R. Brent Thomas by the Kansas Department of Wildlife and Parks.

LITERATURE CITED

Cagle, F.R. 1950. The life history of the Slider Turtle, *Pseudemys scripta troostii* (Holbrook). Ecological Monographs 20:31–54.

Cagle, F.R., and A.H. Chaney. 1950. Turtle populations in Louisiana. American Midland Naturalist 43:383–388.

Deforce, E.A., C.D. Deforce, and P.V. Lindeman. 2004. *Phrynops gibbus* (Gibba Turtle). Trap–happy behavior. Herpetological Review 35:55–56.

Ernst, C.H. 1965. Bait preferences of some freshwater turtles. Journal of the Ohio Herpetological Society 5:53.

Frazer, N.B., J.W. Gibbons, and T.J. Owens. 1990. Turtle trapping: preliminary test of conventional wisdom. Copeia 1990:1150–1152.

Gamble, T. 2006. The relative efficiency of basking and hoop traps for Painted Turtles (*Chysemys picta*). Herpetological Review 37:308–312.

Gibbons, J.W. (Ed.). 1990. Life History and Ecology of the Slider Turtle. Smithsonian Institution Press, Washington, D.C., USA.

Jensen, J.B. 1998. Bait preferences of southeastern United States coastal plain riverine turtles: fish or fowl? Chelonian Conservation and Biology 3:109–111.

Kennett, R. 1992. A new trap design for catching freshwater turtles. Wildlife Research 19:443–445.

Koper, N., and R.J. Brooks. 1998. Population-size estimators and unequal catchability in Painted Turtles. Canadian Journal of Zoology 76:458–465.

Plummer, M.V. 1979. Collecting and marking. Pp.45–60 *In* Turtles: Perspectives and Research. Harless, M., and H. Morlock (Eds.). John Wiley & Sons, Inc., New York, New York, USA.

Ream, C., and R. Ream. 1966. The influence of sampling methods on the estimation of population structure in Painted Turtles. American Midland Naturalist 75:325–338.

Reehl, M., J. Thompson, and J. K. Tucker. 2006. A three year survey of aquatic turtles in a riverside pond. Transactions of Illinois State Academy of Science 99:145–152.

Rose, F.L., and R.W. Manning. 1996. Notes on the biology of the slider, *Trachemys scripta elegans* (Reptilia: Emydidae), inhabiting man-made cattle ponds in west Texas. Texas Journal of Science 48:191–206.

Smith, G.R., J.B. Iverson, and J.E. Retrig. 2006. Changes in a turtle community from a northern Indiana lake: a long–term study. Journal of Herpetology 40:180–185.

Thomas, R.B., I.M. Nall, and W.J. House. 2008. Relative efficacy of three different baits for trapping pond-dwelling turtles in East-central Kansas. Herpetological Review 39:186–188.

Vogt, R.C. 1980. New methods for trapping aquatic turtles. Copeia 1980:368–371.

Voorhees, W., J. Schnell, and D. Edds. 1991. Bait preferences of semi-aquatic turtles in southeast Kansas. Kansas Herpetological Newsletter 85:13–15.

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