ARTICLES

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Status of the Alligator Snapping Turtle (*Macrochelys temminckii*) in South Alabama with Comments on Its Distribution

Brian Folt[1,*] **and James C. Godwin**[2]

[1]*Department of Biological Sciences and Auburn University Museum of Natural History, 331 Funchess Hall, Auburn University, Auburn, Alabama 36849 USA [brian.folt@gmail.com];*
[2]*Alabama Natural Heritage Program, Environmental Institute, Auburn University, Auburn, Alabama 36849 USA [jcg0001@auburn.edu];*
**Corresponding author*

Abstract. – Historic commercial collecting of the alligator snapping turtle (*Macrochelys temminckii*) appears to have severely reduced populations throughout much of its range. In this study, we analyze 8 seasons of turtle-trapping data from 11 major rivers in southern Alabama and provide the first report on the status of the species in the state. During 1332 trap nights, we captured 93 *M. temminckii* in 7 rivers in south Alabama. We recorded relatively low overall catch per unit effort (CPUE; 0.062 using paired hoop nets connected by a lead net, 0.081 using single-baited hoop nets) compared with recent studies from other states. By evaluating relative abundances, size distributions, and sex ratios, we document variation in abundance among independent river populations as well as unexpected sex ratios. In particular, the Fowl River population is characterized by unexpectedly high abundance (0.478 CPUE) and may represent historic population conditions prior to commercial trapping. We discuss distribution and abundances, conservation concerns, and the significance of the Fowl River with respect to the recovery of populations throughout the species' range. This study contributes baseline population data to better understand the ecology and conservation of *M. temminckii* both in Alabama and across its entire range.

Key Words. – Reptilia; Testudines; catch per unit effort; Fowl River; population recovery; conservation

The southeastern United States possesses one of the most species-rich turtle faunas in the world (Buhlmann et al. 2009). Turtle species of this region vary dramatically in ecology, natural history, and morphology, occupying a diverse spectrum of habitats, from xeric upland pine forests to brackish or marine waters (Buhlmann et al. 2008). Of this diverse fauna, perhaps the most remarkable species is the alligator snapping turtle (*Macrochelys temminckii*). The largest freshwater turtle in North America, male *M. temminckii* can reach 80 cm in caparace length and exceed 120 kg in mass (Pritchard 1989; Lovich 1993). *Macrochelys temminckii* are highly aquatic; overland movements rarely occur, except when females lay eggs and juveniles move from nests to water (Mount 1975; Dobie 1986).

Throughout the 1960s and 1970s, commercial harvest of *M. temminckii* for turtle soup appears to have severely reduced populations throughout Alabama, Florida, Georgia, and Louisiana (Pritchard 1989). For example, a large collecting operation in Georgia took an average of 3 to 4 tons of *M. temminckii* per day from the Flint River during the early 1970s, until overcollection reduced the population below commercial viability. In Alabama, historic commercial trapping of *M. temminckii* appears to have occurred extensively in the lower Alabama River, but efforts in the Florida panhandle may have extended north in the Perdido, Conecuh, Yellow, and Choctawhatchee rivers (Pritchard 1989). The species became legally protected as an Alabama nongame animal in 1990 and collection, possession, and sale are currently prohibited without permitting (Alabama Nongame Species Regulation #220-2-92).

Most turtle species are characterized by demography with low juvenile survival followed by high adult survival (Type III survivorship; Pearl 1928; Congdon and Gibbons 1990). Reed et al. (2002) conservatively modeled population demography of *M. temminckii* and found that annual adult survivorship of females must be 98% to maintain a stable population. Reduction of adult female survival by only 0.25% resulted in halving of population size in 410 yrs. Thus, it appears that slight decreases in adult survivorship by factors such as commercial collecting, bycatch, or habitat loss can initiate long-term population declines (Reed et al. 2002).

Despite considerable concern and speculation regarding the effects of commercial trapping on *M. temminckii* to date (e.g., Jensen and Birkhead 2003; Boundy and Kennedy 2006), no study has addressed the turtle's status in Alabama, a state central in the species' range. Here, we synthesize turtle-trapping data from 11 major rivers and report on the status of the species from the southern half of the state. We examine how relative abundance, size distribution, and sex ratio vary among independent river

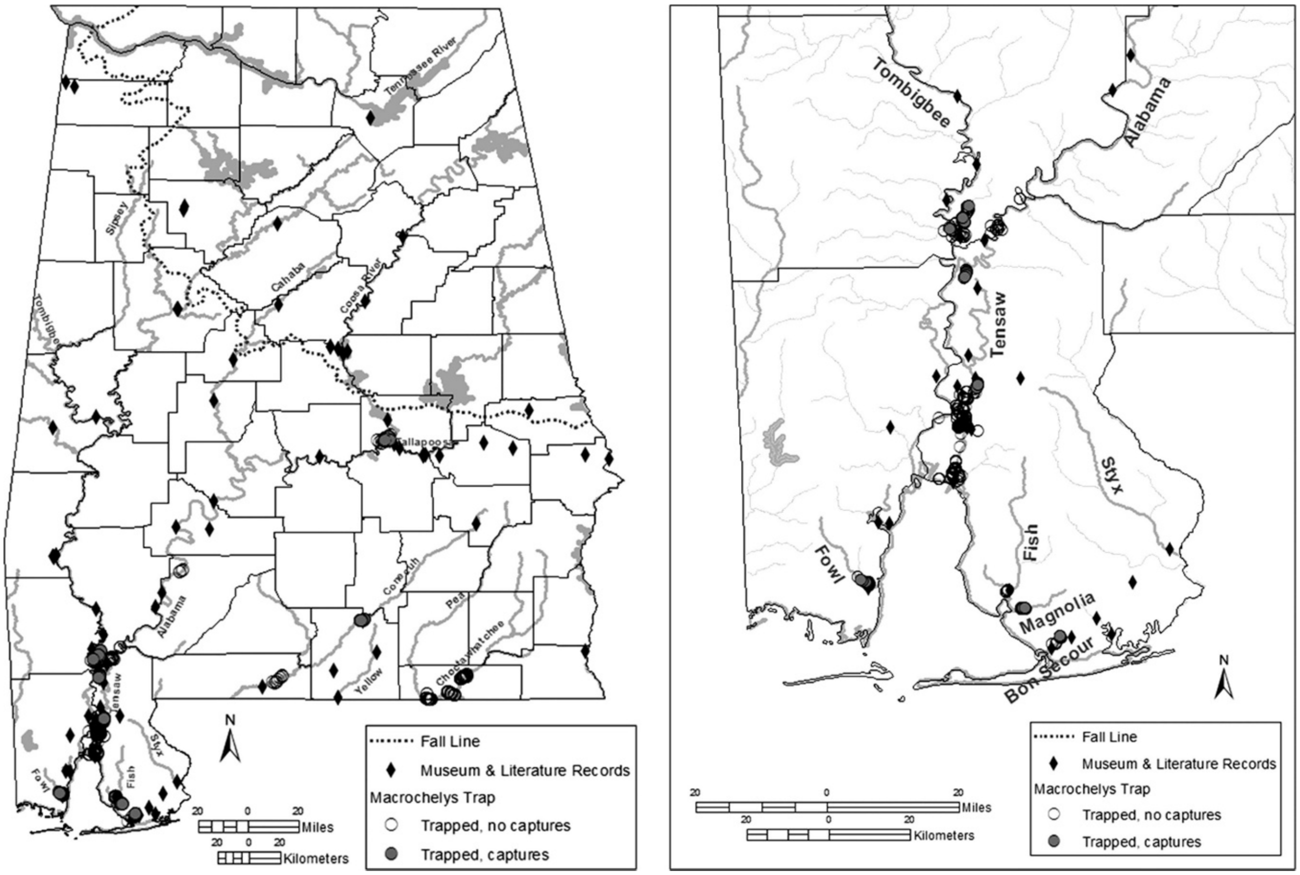

Figure 1. (Left) The known distribution of *Macrochelys temminckii* in Alabama. Diamonds represents museum or literature records believed to be valid; open circles indicate trap sites without captures; closed circles indicate trap sites where *M. temminckii* were captured. (Right) Collecting localities in the immediate vicinity of Mobile Bay, Alabama.

populations and evaluate these indices with respect to historic commercial trapping in the state. Specifically, because reports of historic commercial trapping are mostly localized in the lower Alabama River near its confluence with the Tombigbee to become the Mobile and Tensaw rivers (Pritchard 1989), we predict this region to support lower abundances than other sites. Lastly, we discuss the species' distribution and abundance in south Alabama, conservation concerns, and the significance of the Fowl River to the recovery of *M. temminckii* populations throughout the species' range.

METHODS

Turtle-trapping efforts were undertaken from April to September in 8 nonconsecutive years from 1996 to 2012 at 17 freshwater sites in 11 major rivers throughout south Alabama (Fig. 1). Two turtle-trapping methods were used in this study. The first, a general technique for sampling aquatic turtles, consisted of 2 double-throated hoop nets connected by a lead net (hereafter, paired-net method). Hoop nets were 1.2 m in diameter and 4 m in length; the intervening lead nets were 1.2 m in height and 12 m in length. Nets were anchored with polyvinyl chloride tubing driven into the substrate. This is an encounter-type trapping method that acts like a drift fence by intercepting and directing turtle movement into the linearly arranged terminal hoop nets (Vogt 1980, 2012). The second method consisted of baited single-throated hoop nets (hereafter, single-baited nets; sensu Vogt 2012); single-baited nets comprised 4 1.2-m-diameter hoops enclosed by a 2.5-m net. Because the single-baited nets specifically targeted trapping carnivorous *M. temminckii*, traps were baited with fresh fish, the most effective bait (Jensen 1998), and placed upstream of submerged-structure habitats, the preferred microhabitat (Sloan and Taylor 1987; Harrel et al. 1996; Riedle et al. 2006; Shipman and Riedle 2008; Howey and Dinkelacker 2009). Bait was replenished daily. With both trap methods, hoops were submerged to within 10–20 cm of their tops, set during the morning or afternoon, and checked each consecutive day until removal. Four-gallon floats were usually placed within hoop nets to maintain flotation and provide turtles access to air. For each sampling period, approximately 10 traps were deployed for 2–3 trap nights.

In general, trap deployment was dictated by river conditions. Single-baited nets were employed in Upper Coastal Plain rivers, which have defined channels and strong downstream flows. The paired-net method was utilized in tidally influenced Lower Coastal Plain rivers,

Table 1. Capture rates of *Macrochelys temminckii* during turtle-trapping efforts throughout south Alabama.

Site	County	Year	No. of trap nights	No. of turtles	Catch/unit effort
Paired hoop nets with a lead net					
Bon Secour River	Baldwin	2012	57	11[a]	0.193
Fish River	Baldwin	2011–2012	18	0	0.000
Fowl River	Mobile	2012	46	22	0.478
Magnolia River	Baldwin	2011–2012	56	5	0.089
Tensaw River	Baldwin	2008–2012	585	9	0.020
Total			762	47	0.062
Single-baited hoop nets					
Choctawhatchee River	Geneva	1996	40	0	0.000
Pea River	Geneva	1996	40	0	0.000
Conecuh River	Covington	1996	20	6	0.300
	Escambia	1996	18	0	0.000
Lower Tallapoosa River	Elmore	2004	347	32[b]	0.092
Lower Tombigbee River	Washington	1996, 2004	60	3	0.050
Tensaw River	Baldwin	2004	25	5	0.200
Yellow River	Covington	1996	20	0	0.000
Total			570	46	0.081

[a] Includes 1 recapture.
[b] Includes 3 recaptures.

which are characterized by diel variation in upstream and downstream water flow. Single-baited nets were not used at these sites because of inconsistent scent transmission and to reduce by-catch of American alligators (*Alligator mississippiensis*)—a costly contributor to trap damage and a hazard to researchers.

Captured turtles were classified as to sex, measured for various morphological features (e.g., standard carapace length, plastron-to-vent length, tail length, body mass), and released. Sexual maturity was determined by the relative position of the cloacal aperture to the posterior carapace margin and base of the tail (beyond margin of carapace in males), or by the presence of a penis (Dobie 1971). Mass was measured using a 50-kg Pesola scale. Because some large males outweighed the maximum limit of our equipment, we were unable to obtain mass measurements for a few extremely large individuals. Turtles were uniquely marked with stainless steel screws in combinations of marginal scutes.

We compared relative abundances among populations by calculating catch per unit effort (CPUE; Rodda 2012), an index defined as the number of individuals captured at a given site divided by the number of trap nights. Different trapping periods were used as replicates within sites. Median CPUE among independent river populations (Bon Secour, Choctawhatchee-Pea, Conecuh, Fish, Fowl, Magnolia, Tallapoosa, Tensaw, Tombigbee, and Yellow) were compared for each trapping method using the Kruskal-Wallis test; further pairwise post hoc comparisons were performed using Wilcoxon rank sum tests with Bonferroni sequentially adjusted p values. Abundance data were analyzed separately by trapping methodology.

We compared size differences among males, females, and sexually immature individuals by performing a regression of mass on standard carapace length. Regressed variables were natural-log transformed to account for large variation in scale between measurement units and for curvilinear relationships (King 2000). Because variables did not meet all the assumptions of parametric statistics (e.g., homogeneity of variance), sexual size dimorphism was evaluated statistically using a nonparametric Wilcoxon rank sum test. We examined potential differences in size among populations from independent rivers using a Kruskal-Wallis test. We evaluated whether sex ratios deviated from 1:1 in each population and the entire sample using Pearson's chi-square tests. All statistical analyses were performed in the program R version 2.12.1 (R Development Core Team 2011) with alpha set at 0.05.

RESULTS

We captured 93 *M. temminckii* during 1332 trap nights throughout south Alabama. *Macrochelys temminckii* was collected in every major river where traps were deployed except for the Choctawhatchee, Fish, and Yellow. Trapping effort per site ranged from 7 to 458 nights. Twelve other turtle species were captured (Appendix 1). In terms of rank-abundance, *M. temminckii* was fourth (7.4%) using paired nets and third (13.4%) using single-baited nets.

Using the paired-net method, we recorded an overall CPUE of 0.062 over 762 trap nights (Table 1). At localities where *M. temminckii* was detected, CPUE ranged from 0.020 (Tensaw) to 0.478 (Fowl). We collected significantly different CPUEs among the major rivers ($K = 31.9$, df = 4, $p < 0.0001$); specifically, the Bon Secour, Fowl, and Magnolia populations had significantly higher CPUEs than the Tensaw population (respectively: $W = 188.5$, $p = 0.002$; $W = 154$, $p < 0.0001$; $W = 222.5$, $p = 0.03$). Using single-baited nets, we recorded an overall CPUE of 0.081 over 570 trap nights; at localities where we detected *M. temminckii*, CPUE ranged from 0.050 (Tombigbee) to 0.200 (Tensaw). We did

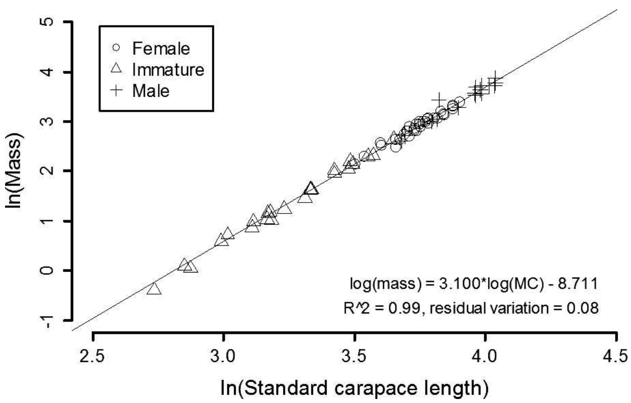

Figure 2. Mass-standard carapace length relationships for male, female, and immature *Macrochelys temminckii* in Alabama; a linear model of the natural log-transformed variables was highly correlated.

not find evidence of significantly different CPUE among the major river populations using the single-baited nets ($K = 10.154$, df $= 5$, $p = 0.071$).

A linear model of mass to standard carapace length (SCL) was highly correlated ($r^2 = 0.99$, $p < 0.0001$; ln [SCL] $= 3.100$ ln [mass] $- 8.711$; Fig. 2), a similar trend to that noted in Louisiana (Boundy and Kennedy 2006). The sample was sexually dimorphic, as male SCL (mean ± SD, 52.8 ± 11.9 cm; range, 39.7–64.8 cm; $n = 20$) was significantly greater than that of females (42.5 ± 11.7 cm; 33.2–49.5 cm; $n = 36$; $W = 635.5$, $p < 0.0001$). We were unable to record the mass of 4 large males that exceeded the limits of our scale (Bon Secour River, 60.4 and 61.0 cm SCL; Fowl River, 60.4 cm SCL; Magnolia River, 64.8 cm SCL). Our trapping methods sampled all size classes > 15 cm SCL (Fig. 3), but the first and third quartiles of SCL ranged from 32.2 to 46.3 cm. We did not detect a difference in median size among independent river populations ($K = 6.2$, df $= 5$, $p = 0.29$). The smallest individual in this study, a hatchling (Magnolia River; Fig. 3), was not collected in traps but rather while snorkeling. Time of year (i.e., month) did not significantly influence turtle size ($K = 9.7$, df $= 5$, $p = 0.085$) or CPUE ($K = 4.5$, df $= 5$, $p = 0.48$).

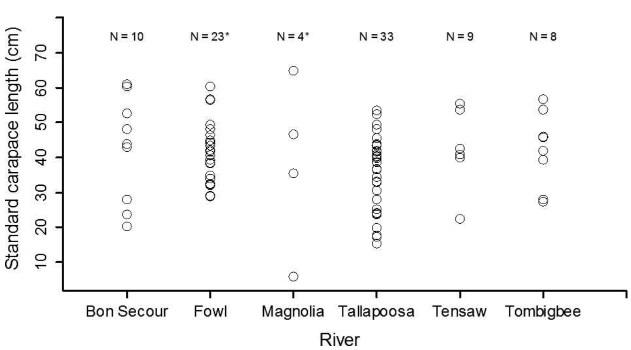

Figure 3. Size distribution of *Macrochelys temminckii* from independent river populations. Sample sizes are labeled above each river's plot. Asterisks indicate where morphometric data from opportunistic captures were included.

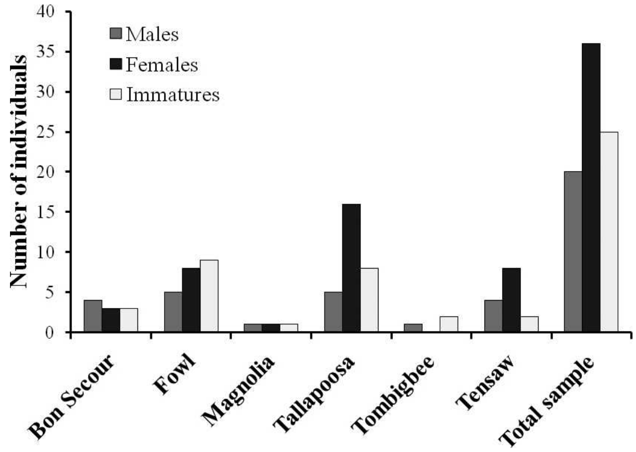

Figure 4. Ratios of males, females, and immatures collected in each river and the summed sample. Male:female ratios deviated significantly from 1:1 in the Tallapoosa River and the total sample.

The sex ratio of our sample (21:38) in favor of females was significantly different from 1:1 ($\chi^2 = 4.571$, df $= 1$, $p = 0.033$; Fig. 4). Similarly, the Tallapoosa River population ratio (5:16) deviated significantly ($\chi^2 = 5.76$, df $= 1$, $p = 0.016$), but other populations did not.

DISCUSSION

Our results suggest that *M. temminckii* is less abundant in south Alabama than in other parts of the species' range. Boundy and Kennedy (2006) reviewed studies of abundance using single-baited nets: CPUEs from Arkansas (0.234, 0.273; Wagner et al. 1996, Trauth et al. 1998, respectively), western Florida (0.251; Moler, unpubl. data, 1996), and southern Georgia (0.196; Jensen and Birkhead 2003) are all higher than our sample using the same method (0.081). Lower CPUEs have been reported from Oklahoma (0.071; Riedle et al. 2005) and southeastern Louisiana (0.057); in the latter state commercial trapping of *M. temminckii* was only recently banned in 2004 (Boundy and Kennedy 2006).

The skewed sex ratio was unexpected, as numerous recent studies throughout the species' range have reported sex ratios closer to 1:1 (Jensen and Birkhead 2003; Boundy and Kennedy 2006; Riedle et al. 2006; Shipman and Riedle 2008). However, given the small sample sizes and the possibility of sampling biases of our study, we refrain from attributing explanation to these results (Gibbons 1990), but see Howey and Dinkelacker (2013) for discussion on a biased sex ratio of *M. temminckii*.

Reports of historic commercial trapping in Alabama are localized in the lower Alabama River near its confluence with the Tombigbee to become the Tensaw and Mobile rivers (Pritchard 1989). Because we collected lower CPUEs in the Tensaw River, our results support the prediction that the confluence of these rivers currently has lower abundance of *M. temminckii* relative to other localities in the state. Because adult *M. temminckii* have high dispersal capabilities (Sloan and Taylor 1987; Harrel et al. 1996; Trauth et al. 1998), individuals from nonharvested populations (e.g., Tensaw River) may have diffused to harvested areas of lower density and competition (e.g., lower Alabama River) during the circa 40 yrs post–commercial trapping. Thus, despite the lack of direct historic reports of trapping from the Tensaw (Pritchard 1989), we hypothesize that trapping operations in the lower Alabama followed by dispersal may have indirectly caused the relatively low abundances we measured in those rivers.

Macrochelys temminckii is historically unknown from the Choctawhatchee River drainage in Alabama (Mount 1975; Pritchard 1989; Fig. 1), despite being represented from the same drainage in Florida (Krysko et al. 2011). To address this enigmatic absence, we undertook trapping endeavors in the Choctawhatchee and Pea rivers but did not collect any *M. temminckii* there (Table 1). Historic commercial trapping efforts in the Florida portion of the Choctawhatchee (Pritchard 1989) may have impacted potential Alabama *M. temminckii* directly by extending into Alabama, or indirectly by the population-homogenization hypothesis previously proposed for the Alabama River drainage. Alternatively, although the continued absence of *M. temminckii* records in this drainage in Alabama is troubling, the species may not occur there.

On the other hand, our study illustrates the significance of the Fowl River population among those both in the state and throughout the species' range. Relative to other populations in Alabama, the Fowl River *M. temminckii* are characterized by significantly high abundance (0.478 CPUE; Table 1). We collected greater abundances here using the paired-net method than studies in other states using single-baited nets (Boundy and Kennedy 2006). Based on the fact that the Fowl River current supports such high relative abundance of *M. temminckii*, this population may represent one of the few localities that evaded historic commercial trapping. For this reason, the Fowl River seems to provide an example of historic reference population conditions in the Coastal Plain and a template for future comparative studies investigating the recovery of populations negatively impacted by commercial harvest.

While the single-baited nets likely do not discriminate by sex or age class, commercial trappers using this method preferentially collected adults over juveniles and males over females to increase profit margins (Pritchard 1989). In this fashion, areas in Louisiana characterized by greater commercial trapping of *M. temminckii* in recent years yielded both lower abundances and smaller sizes than sites with less recent trapping pressure (Boundy and Kennedy 2006). We did not find evidence of differing size distributions among independent populations. Because circa 40 yrs have passed since commercial trapping ceased in Alabama, posttrapping extant individuals may have matured and obscured the effects of harvest. However, this is likely too short of a time for populations to recover in abundance which, all else being equal, will likely require hundreds of years (Reed et al. 2002).

We did not find direct evidence of illegal turtle trapping throughout our sampling in southern Alabama. However, casual conversations with locals indicated that they consume *M. temminckii* on occasion. We also collected 2 *M. temminckii* hooked on abandoned limb-lines (1 alive, 1 drowned) in the Fowl River. Limb-lines and trotlines, popular methods used by sport fisherman, have been a cause of *M. temminckii* mortality in Georgia (Pritchard 1989) and Arkansas (Howey and Dinkelacker 2013), and may inhibit population recovery in Alabama. Officials should more closely monitor and regulate such fishing lines to reduce *M. temminckii* by-catch and mortality.

Currently, the Fowl River is of turtle conservation concern due to the presence of the federally endangered Alabama red-bellied turtle (*Pseudemys alabamensis*); however, public officials involved in future conservation efforts in the area should be aware of the important population of *M. temminckii* there as well. Although the river seems well protected from illegal trapping, the area is heavily developed with human homes and resident turtle species may be limited by lack of quality nesting habitat. Future studies at the Fowl River could explore attributes of nesting behavior to better understand turtle ecology in human-modified landscapes (sensu Chazdon et al. 2009).

Our study provides baseline data for future population monitoring of *M. temminckii* throughout south Alabama. In general, however, *M. temminckii* remains an uncommon and elusive species in the state. If current protection measures are maintained long-term and the above-mentioned recommendations are implemented (e.g., limb-line regulation), populations may eventually recover from the effects of historically unsustainable commercial harvest (Reed et al. 2002).

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201200006478680, and US Fish and Wildlife Service permit TE32397A-0. We thank the Auburn University librarians for procuring literature resources for this study. This paper is contribution no. 690 of the Auburn University Museum of Natural History.

LITERATURE CITED

Boundy, J. and Kennedy, C. 2006. Trapping survey results for the alligator snapping turtle (*Macrochelys temminckii*) in southeastern Louisiana, with comments on exploitation. Chelonian Conservation and Biology 5:3–9.

Buhlmann, K.A., Akre, T.S.B., Iverson, J.B., Karapatakis, D., Mittermeier, R.S., Georges, A., Rhodin, A.G.J., van Dijk, P.P., and Gibbons, J.W. 2009. A global analysis of tortoise and freshwater turtle distributions with identification of priority conservation areas. Chelonian Conservation and Biology 8:116–149.

Buhlmann, K.A., Tuberville, T., and Gibbons, J.W. 2008. Turtles of the Southeast. Athens: University of Georgia Press, 264 pp.

Chazdon, R.L., Harvey, C.A., Komar, O., Griffith, D.M., Ferguson, B.G., Martínez-Ramos, M., Morales, H., Nigh, R., Soto-Pinto, L., van Breugel, M., and Philpott, S.M. 2009. Beyond reserves: a research agenda for conserving biodiversity in human-modified tropical landscapes. Biotropica 41: 142–153.

Congdon, J.D. and Gibbons, J.W. 1990. The evolution of turtle life histories. In: Gibbons, J.W. (Ed.). Life History and Ecology of the Slider Turtle. Washington, DC: Smithsonian Institution Press, pp. 45–54.

Dobie, J.L. 1971. Reproduction and growth in the alligator snapping turtle, *Macroclemys temminckii* (Troost). Copeia 1971:645–658.

Dobie, J.L. 1986. Alligator snapping turtle, *Macroclemys temmincki* (Troost). In: Mount, R.H. (Ed.). Vertebrate Animals of Alabama in Need of Special Attention. Auburn: Alabama Agricultural Experiment Station, pp. 49–50.

Gibbons, J.W. 1990. Sex ratios and their significance among turtle populations. In: Gibbons, J.W. (Ed.). Life History and Ecology of the Slider Turtle. Washington, DC: Smithsonian Institution Press, pp. 171–182.

Harrel, J.B., Allen, C.M., and Hebert, S.J. 1996. Movements and habitat use of subadult alligator snapping turtles (*Macroclemys temminckii*) in Louisiana. American Midland Naturalist 35:60–67.

Howey, C.A.F. and Dinkelacker, S.A. 2009. Habitat selection of the alligator snapping turtle (*Macrochelys temminckii*) in Arkansas. Journal of Herpetology 43:589–596.

Howey, C.A.F. and Dinkelacker, S.A. 2013. Characteristics of a historically harvested alligator snapping turtle (*Macrochelys temminckii*) population. Copeia 2013:58–63.

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

Jensen, J.B. and Birkhead, W.S. 2003. Distribution and status of the alligator snapping turtle (*Macrochelys temminckii*) in Georgia. Southeastern Naturalist 2:25–34.

King, R.B. 2000. Analyzing the relationship between clutch size and female body size in reptiles. Journal of Herpetology 34: 148–150.

Krysko, K.L., Enge, K.M., and Moler, P.E. 2011. Atlas of amphibians and reptiles in Florida. Final Report, Project Agreement 08013, Florida Fish and Wildlife Conservation Commission, 524 pp.

Lovich, J.E. 1993. *Macroclemys*, *M. temminckii*. Catalogue of American Amphibians and Reptiles 562:1–4.

Mount, R.H. 1975. The Reptiles and Amphibians of Alabama. Auburn, AL: Auburn University Agricultural Experiment Station, 347 pp.

Pearl, R. 1928. The Rate of Living. New York: Alfred A. Knopf, 185 pp.

Pritchard, P.C.H. 1989. The Alligator Snapping Turtle: Biology and Conservation. Milwaukee, WI: Milwaukee Public Museum, 104 pp.

R Development Core Team. 2011. R: a language and environment for statistical computing. www.R-project.org.

Reed, R.N., Congdon, J., and Gibbons, J.W. 2002. The alligator snapping turtle [*Macrochelys* (*Macroclemys*) *temminckii*]: a review of ecology, life history, and conservation, with demographic analyses of the sustainability of take from wild populations. Report to the Division of Scientific Authority, US Fish and Wildlife Service, 17 pp.

Riedle, J.D., Shipman, P.A., Fox, S.F., and Leslie, D.M., Jr. 2005. Status and distribution of the alligator snapping turtle, *Macrochelys temminckii*, in Oklahoma. Southwestern Naturalist 50:79–84.

Riedle, J.D., Shipman, P.A., Fox, S.F., and Leslie, D.M., Jr. 2006. Microhabitat use, home range, and movements of the alligator snapping turtle, *Macrochelys temminckii*, in Oklahoma. Southwestern Naturalist 51:35–40.

Rodda, G.H. 2012. Population size and demographics. In: McDiarmid, R.W., Foster, M.S., Guyer, C., Gibbons, J.W., and Chernoff, N. (Eds.). Reptile Biodiversity: Standard Methods for Inventory and Monitoring. Berkeley: University of California Press, pp. 283–322.

Shipman, P.A. and Riedle, J.D. 2008. Status and distribution of the alligator snapping turtle (*Macrochelys temminckii*) in southeastern Missouri. Southeastern Naturalist 7:331–338.

Sloan, K.N. and Taylor, D. 1987. Habitats and movements of adult alligator snapping turtles in northeast Louisiana. Proceedings of the Annual Conference, Southeastern Association of Fish and Wildlife Agencies 41:343–348.

Trauth, S.E., Wilhide, J.D., and Holt, A. 1998. Population structure and movement patterns of alligator snapping turtles (*Macroclemys temminckii*) in northeastern Arkansas. Chelonian Conservation and Biology 3:64–70.

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

Vogt, R.C. 2012. Detecting and capturing turtles in freshwater habitats. In: McDiarmid, R.W., Foster, M.S., Guyer, C., Gibbons, J.W., and Chernoff, N. (Eds). Reptile Biodiversity: Standard Methods for Inventory and Monitoring. Berkeley: University of California Press, pp. 181–187.

Wagner, B., Urbston, D., and Leek, D. 1996. Status and distribution of alligator snapping turtles in Arkansas. In: Eversole, A.G. (Ed.). Proceedings of the Fiftieth Annual Conference Southeastern Association of Fish and Wildlife Agencies, pp. 264–270.

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Appendix 1. Turtle-trapping results from 11 rivers in south Alabama.[a]

Site	Year	No. of trap nights	*Mt*	*Cs*	*Pa*	*Pc*	*Pf*	*Ge*	*Gn*	*Gp*	*Ts*	*Sm*	*Af*	*Am*	*As*
Paired hoop nets															
Tensaw River	2008–2012	585	9	0	38	39	45	0	11	0	20	0	11	0	0
Bon Secour River	2012	57	11	0	8	0	197	0	0	0	4	0	0	0	0
Fish River	2011–2012	18	0	0	15	3	23	0	0	0	0	0	0	0	0
Magnolia River	2011–2012	56	5	0	21	4	68	0	0	0	0	0	1	0	0
Fowl River	2012	46	22	1	3	15	29	0	0	0	2	0	0	0	0
Percent of total			7.4	0.2	14.3	10.2	57.6	0.0	1.7	0.0	6.5	0.0	2.0	0.0	0.0
Single-baited hoop nets															
Choctawhatchee River	1996	40	0	2	0	3	0	0	0	0	0	0	0	0	23
Pea River	1996	20	0	0	0	0	0	0	0	0	1	0	0	0	13
Conecuh River	1996	38	6	2	0	0	0	1	0	0	2	0	0	0	2
Lower Tallapoosa River	2004	347	32	1	0	15	0	0	13	2	176	1	0	1	29
Lower Tombigbee River	1996, 2004	60	3	0	0	0	1	0	0	0	5	0	0	0	2
Tensaw River	2004	25	5	0	0	0	1	0	0	0	0	0	0	0	0
Yellow River	1996	20	0	1	0	0	0	0	0	0	0	0	0	0	1
Percent of total			13.4	1.7	0.0	5.2	0.6	0.3	3.8	0.6	53.4	0.3	0.0	0.3	20.3

[a] *Mt* = *Macrochelys temminckii*; *Cs* = *Chelydra serpentina*; *Pa* = *Pseudemys alabamensis*; *Pc* = *Pseudemys concinna*; *Pf* = *Pseudemys floridana*; *Ge* = *Graptemys ernsti*; *Gn* = *Graptemys nigronoda*; *Gp* = *Graptemys pulchra*; *Ts* = *Trachemys scripta*; *Sm* = *Sternotherus minor*; *Af* = *Apalone ferox*; *Am* = *Apalone mutica*; *As* = *Apalone spinifera*.