

The First Record of an Alligator Snapping Turtle (*Macrochelys temminckii*) in Illinois in 30 Years

Ethan J. Kessler^{1,*}, Christopher A. Phillips¹, Scott R. Ballard², and Michael J. Dreslik¹

Abstract - *Macrochelys temminckii* (Alligator Snapping Turtle) populations have experienced range-wide declines over the past century, and records of this species have become increasingly rare in the northern portion of its range. We report the first record of an Alligator Snapping Turtle in Illinois since 1984, only the second in the past 50 years. This individual was captured in a tributary of the undammed portion of the Mississippi River in close proximity to the last 3 published records in Illinois. It is possible that this region provides the last accessible, suitable habitat for this species in Illinois.

Introduction. *Macrochelys temminckii* (Troost in Harlan) (Alligator Snapping Turtle) has declined across its range over the past century (Pritchard 2006) due to extensive damming and channelization of the rivers and backwater areas this species prefers and intense commercial harvest throughout the 20th century (Buhlmann and Gibbons 1997, Pritchard 2006). As a result, the Alligator Snapping Turtle now receives range-wide, state-level protection (Reed et al. 2002) and is currently being considered as a candidate for protection under the Endangered Species Act (US Fish and Wildlife Service 2015). Observations are historically rare along the Alligator Snapping Turtle's northern range limit (Illinois, Indiana, Iowa, Kansas, Kentucky, and northern Missouri; Ernst and Lovich 2009), and the frequency of encounters in these states has decreased over the second half of the 20th century (Baxley et al. 2014, Morris and Sweet 1985, Riedle et al. 2008). The northernmost confirmed populations occur in the Tennessee River drainage in northern Tennessee (Scott and Koons 1994) and in the Mississippi River drainage in extreme southeastern Missouri (Lescher et al. 2013a, Shipman and Riedle 2008). Recent efforts to evaluate the status of Alligator Snapping Turtles north of these populations in Illinois, Kentucky, and Kansas have failed to capture any individuals (Baxley et al. 2014, Bluett et al. 2011, Shipman et al. 1995). In Illinois, there have been 15 published records since 1886, only 1 of which is from the past 50 years (Galbreath 1961, Morris and Sweet 1985, Smith 1961).

Within Illinois, Alligator Snapping Turtles have been reported from the Mississippi, lower Illinois, Ohio, and Wabash rivers and their tributaries (Smith 1961). The most-recent observations (1959, 1960, and 1984) came from the Big Muddy River and Clear Creek drainages in Jackson and Union counties, (Galbreath 1961, Morris and Sweet 1985) and were within 30 km of each other (Fig. 1). The declining frequency and increasingly limited geographic range of records led to the listing of Alligator Snapping turtles as an endangered species in Illinois in 1999 (Illinois Endangered Species Protection Board 2011). Despite extensive trapping efforts and calls for citizen observations across their historic range, there have been no confirmed sightings in Illinois since 1984 (Bluett et al. 2011, Morris and Sweet 1985). As it was unlikely the species would persist in Illinois without active management, a reintroduction feasibility study was initiated by the Illinois Department of Natural Resources in 2008, and reintroductions began in July 2014.

¹Illinois Natural History Survey, University of Illinois at Urbana-Champaign, 1816 S. Oak Street, Champaign, IL 61820. ²Illinois Department of Natural Resources, 9053 Route 148, Suite B, Marion, IL 62959. *Corresponding author - ekessler2@illinois.edu.

E.J. Kessler, C.A. Phillips, S.R. Ballard, and M.J. Dreslik

Herein we report the capture of an individual Alligator Snapping Turtle from Clear Creek, Union County, IL—the first observation of the species in the state in 30 years. The observation described in this note occurred during fieldwork associated with the aforementioned reintroduction effort.

Field Site Description. Clear Creek is a partially channelized, mud-bottomed direct tributary of the Mississippi River in Union and Alexander counties, IL. Clear Creek originates in the Shawnee National Forest and for 90% of its length is a channelized ditch draining adjacent cropland and waterfowl wetlands. Fieldwork was conducted in the channelized section of Clear Creek. Unlike most other river systems in Illinois, Clear Creek and its tributaries are spring-fed along their length. This system is noted for supporting unusually high vertebrate biodiversity (Cagle 1942, Smith 1971). Despite past dredging and channelization of Clear Creek, it now contains abundant log-jams and other debris preferred by Alligator Snapping Turtles (Harrel et al. 1996, Howey and Dinkelacker 2009, Riedle et al. 2006). Two of the last 3 Alligator Snapping Turtles reported in Illinois were captured in the Clear Creek drainage (Galbreath 1961, Morris and Sweet 1985).

Observation. In order to assess the survival of turtles released as part of the reintroduction effort, all reintroduced turtles were manually recaptured prior to hibernation. On 15 October 2014, during recapture work for the reintroduction project, we captured by hand

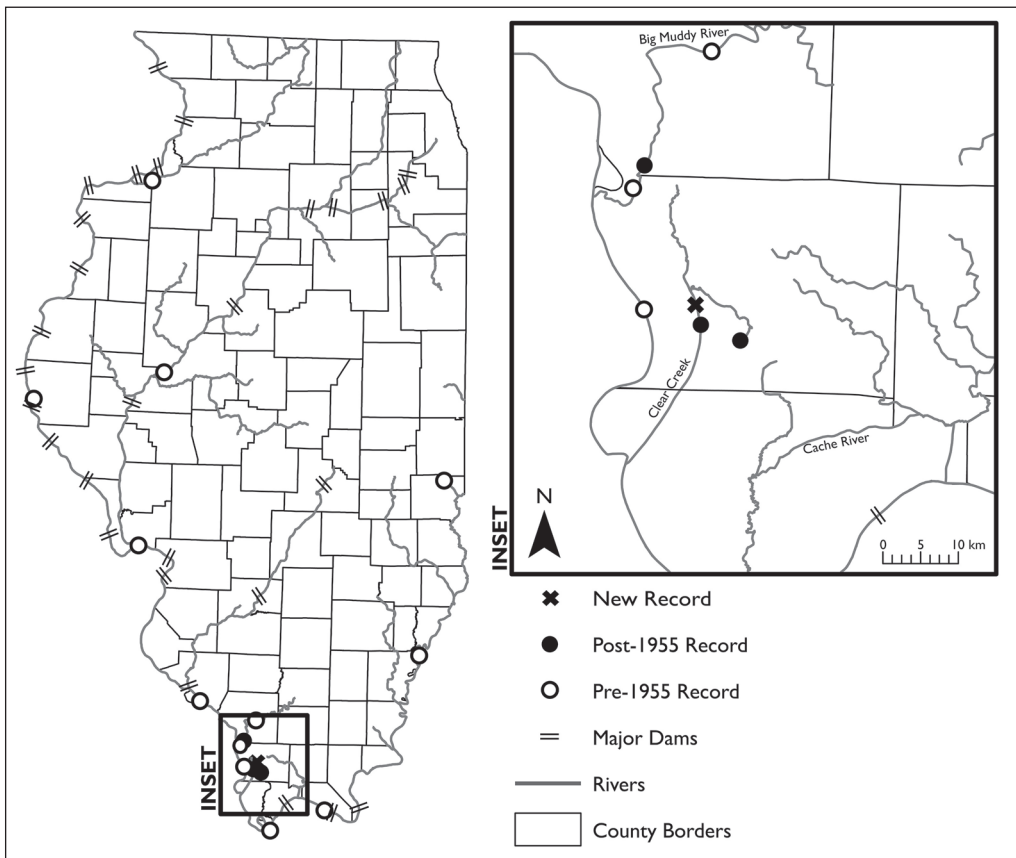


Figure 1. All reported Alligator Snapping Turtle locations in Illinois. The new record is marked with an “X”, closed circles represent post-1955 records, and open circles represent pre-1955 records. The inset shows the clustering of recent records along the undammed portion of the Middle Mississippi River.

a wild, unmarked Alligator Snapping Turtle (Fig. 2) in an emergent log-jam. After taking measurements, tissue, and voucher photos, we implanted a PIT tag into the wild individual, gave it a unique set of notches on the marginal scutes, fitted it with a radio transmitter, and released it at the same location on 16 October 2014. Photo vouchers were deposited in the Illinois Natural History Survey Unvouchered Collection (INHS-unvouch 44175).

Results and Discussion. The wild Alligator Snapping Turtle had a mass of 9.95 kg and carapace length of 380 mm. At this size, this individual is the second smallest of the 10 Illinois specimens with recorded measurements (Table 1). We estimate this individual to be



Figure 2. Wild Alligator Snapping Turtle captured in Union County, IL, 15 October 2014 (INHS-unvouch 44175) (Photograph © Eva Kwiatek).

Table 1. All Illinois Alligator Snapping Turtle records with published measurements along with the county of capture and associated citation. CL = carapace length, CW = carapace width, PL = plastron length, SH = shell height. * denotes measurement was estimated within cited publication. ** denotes measurements taken on ethanol-preserved museum specimen by E.J. Kessler in 2016

Citation	Year of capture	County	Mass (kg)	CL (mm)	CW (mm)	PL (mm)	SH (mm)
This study	2014	Union	9.95	380	306	273	162
Morris and Sweet 1985	1984	Union	32.00	495	381	368	-
Galbreath 1961	1960	Jackson	68.04*	680	495	-	-
Galbreath 1961	1959	Union	17.69	425	340	315	140
Smith 1961	pre-1961	Mason	18.00*	-	-	-	-
Parmalee 1954	1953	Calhoun	49.00	-	-	-	-
Schroder 1957	1950	Rock Island	24.49	-	-	-	-
Smith 1961	1949	Jackson	-	311**	240**	210**	115**
Cahn 1937	pre-1937	Randolph	14.96	453	342	303	175
Cahn 1937	1928–1929	Jackson	43.54	585	448	388	186
Cahn 1937	1920–1930	Massac	46.72	610	462	400	186

at least 18 years old based on annuli counts of the second right pleural scute (Dobie 1971). Pre-anal tail length was determined to be 86.3 mm based on measurements from a scaled ventral photograph. At the carapace length of this individual, male pre-anal tail length should be roughly 130 mm and female pre-anal tail length around 84 mm (Dobie 1971), suggesting this individual is a female. Given its size and estimated age, it is likely sexually mature (Dobie 1971, Reed et al. 2002).

Unfortunately, long-term radio-telemetry of the individual was unsuccessful. On 25 November 2014, it was radio-located 470 m downstream of the 16 October location. Then, on 15 January 2015 it was radio-located 21 m downstream of the November location. In March 2015, we were unable to relocate the signal despite extensive search attempts throughout Clear Creek and its tributaries. The majority of the same model radio-transmitters affixed to reintroduced turtles failed around the same time, therefore we attribute the apparent disappearance of this animal to radio-transmitter failure, rather than emigration.

Large, charismatic species such as the Alligator Snapping Turtle are commonly kept as pets and, as such, unusual records of free-ranging individuals are often discredited as captive releases. To address concerns regarding the origin of this individual, whole blood was taken and used for mtDNA analysis at Oklahoma State University. Range-wide genetic analyses suggest that the haplotype of individuals from the Mississippi River drainage is distinct from the haplotypes of all populations in eastern river drainages (Echelle et al. 2010, Roman et al. 1999), and the wild Alligator Snapping Turtle was matched to this Mississippi River haplotype (D. Ligon, Missouri State University, Springfield, MO, and D. Thompson, Oklahoma State University, Stillwater, OK, pers. comm.). Due to this turtle's Mississippi River haplotype and the proximity of this individual to previous records, we consider it to be a wild Illinois Alligator Snapping Turtle.

All Alligator Snapping Turtles captured in Illinois since 1959 have been found in tributaries of the undammed stretch of the Mississippi River in Illinois (Fig. 1). In the first half of the 1900s, the Mississippi River north of Alton, IL, and the entire stretch of the Ohio River were dammed (Rasmussen and Pitlo 2004, Robinson 1983). The lock-and-dam system of these rivers essentially turned these previously free-flowing rivers into a series of pools allowing barge traffic, but inhibiting wildlife migration (Rasmussen and Pitlo 2004). The wild Alligator Snapping Turtle reported in this note, like the 3 previous Illinois individuals, was found in a tributary within the undammed stretch of the Mississippi River. Trapping of several of the nearest populations in southeastern Missouri (~250 km downriver) showed that Alligator Snapping Turtles used relatively deep, warm waters with physical structure and muddy substrates (Lescher et al. 2013b), all characteristics of downstream reaches. We suggest that primary tributaries of the Mississippi River south of Alton, IL, provide the best chance of harboring wild Alligator Snapping Turtles, and an emphasis should be placed on sampling reaches near their confluence with the Mississippi River with abundant woody debris.

This wild individual is only the fourth record of an Alligator Snapping Turtle in Illinois since 1959 (Table 1), all of which came from Union and southern Jackson counties (Galbreath 1961, Morris and Sweet 1985). In a comparable time span from 1887 to 1958, there were 13 records of Alligator Snapping Turtles from 12 counties in Illinois (Smith 1961). This drop in occurrences cannot be attributed to a lack of sampling in the state as there have been numerous turtle trapping efforts throughout Illinois by various agencies in this timeframe, with at least 166 net nights of recent trapping effort in Clear Creek and the Big Muddy River (the 2 drainages with post-1960 Alligator Snapping Turtle records), yet no Alligator Snapping Turtles were captured (Bluett et al. 2011; E. Kessler, unpubl. data). Additionally, digital photography and email are now ubiquitous and have made it virtually

effortless for the public to share verifiable observations with researchers; however, no credible Alligator Snapping Turtle sightings have been reported to Illinois herpetologists since 1984 (Morris and Sweet 1985). It is difficult to defend the assertion that the Alligator Snapping Turtle has been declining in Illinois based on less than 20 total records, yet even with recent sampling and increased potential for citizen support over the past half-century, observations have drastically decreased. Thus, the recent range restriction of the Alligator Snapping Turtle in Illinois is unlikely to be due solely to a lack of information; instead it is most likely due to statewide habitat alteration and fragmentation making Union and Jackson counties the only area in Illinois with accessible, suitable habitat.

Additionally, the unique mode of capture of this individual in an area where the species had previously evaded detection, despite intensive trapping, suggests a need to develop new sampling protocols for the Alligator Snapping Turtle in the periphery of its range. The wild individual was captured at a site that had been heavily sampled with hoop traps with no evidence of the species (Bluett et al. 2011; E. Kessler, unpubl. data), which suggests that hoop trapping may not be a cost-effective method to assess Alligator Snapping Turtle presence at the low densities often encountered at the edge of its range. Environmental DNA (eDNA) may provide a more reliable tool for future surveys, and this technique has shown promise in chelonian species (Davy et al. 2015). In conjunction with traditional hoop-trap sampling, eDNA will likely prove useful for accurately evaluating the presence of Alligator Snapping Turtles at the northern edge of their range and should be considered for such studies.

The discovery of this individual is surprising, though the rediscovery of small populations or individuals of species thought possibly extirpated is not entirely uncommon and rarely indicates the presence of a stable population (Scheffers et al. 2011). With this in mind, it is unlikely that the discovery of this individual provides evidence of a population of Alligator Snapping Turtles in Clear Creek. Rather, it is more likely that this sighting was simply a chance encounter with either a transient individual or a solitary turtle from a vanishing population and this species is still in imminent danger of extirpation in Illinois. This discovery suggests that regions in Illinois may still provide suitable habitat for Alligator Snapping Turtles and conservation efforts, such as reintroduction, may prove fruitful for this species.

Acknowledgements. We would like to thank Eva Kwiatek for providing photographs of the wild individual. We also thank Day Ligon and Denise Thompson for their assistance in haplotyping. We are grateful for comments on this manuscript from Sarah Baker and Erika Bilger as well as 2 anonymous reviewers. This work was funded by a State Wildlife Grant through the Illinois Department of Natural Resources and United States Fish and Wildlife (U-1-R-1).

Literature Cited

- Baxley, D.L., J.O. Barnard, and H. Venter. 2014. A survey for the Alligator Snapping Turtle (*Macrochelys temminckii*) in western Kentucky. *Southeastern Naturalist* 13:337–346.
- Bluett, R.D., D.A. Woolard, J.G. Palis, and J.A. Kath. 2011. Survey for *Macrochelys temminckii* in southern Illinois: Implications for recovery actions. *Transactions of the Illinois State Academy of Science* 104:63–70.
- Buhlmann, K.A., and J.W. Gibbons. 1997. Imperiled aquatic reptiles of the southeastern United States: Historical review and current conservation status. Pp. 201–232, *In* G.W. Benz and D.E. Collins (Eds.). *Aquatic Fauna In Peril: The Southeastern Perspective*. Lenz Design and Communications, Decatur, GA. 554 pp.
- Cagle, F.R. 1942. Herpetological fauna of Jackson and Union counties, Illinois. *American Midland Naturalist* 28:164–200.
- Cahn, A.R. 1937. The turtles of Illinois. *Illinois Biological Monographs* 16. University of Illinois Press, Urbana, IL. 218 pp.

E.J. Kessler, C.A. Phillips, S.R. Ballard, and M.J. Dreslik

- Davy, C.M., A.G. Kidd, and C.C. Wilson. 2015. Development and validation of environmental DNA (eDNA) markers for detection of freshwater turtles. *PLoS ONE* 10:1–13.
- Dobie, J.L. 1971. Reproduction and growth in the Alligator Snapping Turtle, *Macrolemys temmincki* (Troost). *Copeia* 1971:645–658.
- Echelle, A.A., J.C. Hackler, J.B. Lack, S.R. Ballard, J. Roman, S.F. Fox, D.M. Leslie, and R.A. Van Den Bussche. 2010. Conservation genetics of the Alligator Snapping Turtle: Cytonuclear evidence of range-wide bottleneck effects and unusually pronounced geographic structure. *Conservation Genetics* 11:1375–1387.
- Ernst, C.H., and J.E. Lovich. 2009. *Turtles of the United States and Canada*. 2nd Edition. Johns Hopkins University Press, Baltimore, MD. 840 pp.
- Galbreath, E.C. 1961. Two Alligator Snappers, *Macrolemys temmincki*, from southern Illinois. *Transactions of the Illinois State Academy of Science* 54:134–135.
- Harrel, J.B., C.M. Allen, and S.J. Hebert. 1996. Movements and habitat use of subadult Alligator Snapping Turtles (*Macrolemys temminckii*) in Louisiana. *American Midland Naturalist* 135:60–67.
- Howey, C.A.F., and S.A. Dinkelacker. 2009. Habitat selection of the Alligator Snapping Turtle (*Macrochelys temminckii*) in Arkansas. *Journal of Herpetology* 43:589–596.
- Illinois Endangered Species Protection Board. 2011. Checklist of endangered and threatened animals and plants of Illinois. Illinois Endangered Species Protection Board, Springfield, IL. 18 pp.
- Lescher, T.C., J.T. Briggler, and Z. Tang-Martinez. 2013a. Relative abundance, population structure, and conservation of Alligator Snapping Turtles (*Macrochelys temminckii*) in Missouri between 1993–1994 and 2009. *Chelonian Conservation and Biology* 12:163–168.
- Lescher, T.C., Z. Tang-Martinez, and J.T. Briggler. 2013b. Habitat Use by the Alligator Snapping Turtle (*Macrochelys temminckii*) and Eastern Snapping Turtle (*Chelydra serpentina*) in Southeastern Missouri. *The American Midland Naturalist* 169:86–96.
- Morris, M.A., and M.J. Sweet. 1985. Size, age, and growth of an Alligator Snapping Turtle, *Macrolemys temminckii*, from Illinois. *Transactions of the Illinois State Academy of Science* 78:241–245.
- Parmalee, P.W. 1954. The turtle that fishes with a lure. *The Living Museum* 15:453–454.
- Pritchard, P.C.H. 2006. *The Alligator Snapping Turtle: Biology and Conservation*. 2nd Edition. Krieger Publishing Company, Malabar, FL. 140 pp.
- Rasmussen, J.L., and J.M. Pitlo (Eds.). 2004. *UMRCC Fisheries Compendium*. 3rd Edition. Upper Mississippi River Conservation Committee - Fish Technical Committee, Rock Island, IL. 274 pp.
- Reed, R.N., J.D. Congdon, and J.W. Gibbons. 2002. The Alligator Snapping Turtle [*Macrochelys (Macrolemys) temminckii*]: A review of ecology, life history, and conservation, with demographic analyses of the sustainability of take from wild populations. Report to USFWS. Savannah River Ecology Laboratory, Aiken, SC. 20 pp. pp.
- Riedle, J.D., P.A. Shipman, and S.F. Fox. 2006. Microhabitat use, home range, and movements of the Alligator Snapping Turtle, *Macrochelys temminckii*, in Oklahoma. *The Southwestern Naturalist* 51:35–40.
- Riedle, J.D., D.B. Ligon, and K. Graves. 2008. Distribution and management of Alligator Snapping Turtles, *Macrochelys temminckii*, in Kansas and Oklahoma. *Transactions of the Kansas Academy of Science* 111:21–28.
- Robinson, M.C. 1983. History of navigation in the Ohio River Basin. National Waterways Study, US Army Engineer Water Resources Support Center, Institute for Water Resources, Ft. Belvoir, VA. 71 pp.
- Roman, J., S.D. Santhuff, P.E. Moler, and B.W. Bowen. 1999. Population structure and cryptic evolutionary units in the Alligator Snapping Turtle. *Conservation Biology* 13:135–142.
- Scheffers, B.R., D.L. Yong, J.B.C. Harris, X. Giam, and N.S. Sodhi. 2011. The world's rediscovered species: Back from the brink? *PLoS ONE* 6:e22531.
- Schroder, R.C. 1957. Range extension of *Macrochelys temmincki*. *Copeia* 1957:234.
- Scott, A.F., and J. Koons. 1994. *Macrolemys temminckii* (Alligator Snapping Turtle): Reproduction. *Herpetological Review* 25:64.
- Shipman, P.A., and J.D. Riedle. 2008. Status and distribution of the Alligator Snapping Turtle (*Macrochelys temminckii*) in southeastern Missouri. *Southeastern Naturalist* 7:331–338.

E.J. Kessler, C.A. Phillips, S.R. Ballard, and M.J. Dreslik

- Shipman, P.A., D.R. Edds, and L.E. Shipman. 1995. Distribution of the Alligator Snapping Turtle (*Macrolemys temminckii*) in Kansas. *Transactions of the Kansas State Academy of Science* 98:83–91.
- Smith, P.W. 1961. The amphibians and reptiles of Illinois. *Illinois Natural History Survey Bulletin* 28:1–298. Urbana, IL.
- Smith, P.W. 1971. Illinois streams: A classification based on their fishes and an analysis of factors responsible for disappearance of native species. *Illinois Natural History Survey Biological Notes* 76:1–14.
- US Fish and Wildlife Service. 2015. Endangered and threatened wildlife and plants; 90-day findings on 31 petitions. *Federal Register* 80:37568–37579.