Transactions of the Illinois State Academy of Science
(2018) Volume 111, pp. 5-10

received 9/7/17
accepted 3/17/18

# Distribution of the Smooth Softshell (*Apalone mutica*) in Illinois

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## ABSTRACT

We documented occurrences of the Midland Smooth Softshell (*Apalone mutica*) in Illinois by sampling 22 reaches on 14 rivers with potentially suitable habitat (i.e., within the species' presumed range and with stream orders ≥6). During 2007 through 2017, we accrued 796 trap-nights of effort with baited hoop nets. Nine species were represented in 4,974 captures of turtles. Captures of Red-eared Slider (*Trachemys scripta elegans*) were most common ($n$ = 3,911), followed by Spiny Softshell (*A. spinifera*; $n$ = 731) and Smooth Softshell ($n$ = 124). Captures of *A. mutica* documented its presence in 9 of 11 rivers with historical records and 1 of 3 without (the Spoon River). Another study documented presence of *A. mutica* in the Big Muddy River, for a total of 11 rivers with recent records. Occurrences suggest the Smooth Softshell's distribution in Illinois is the same as or substantially similar to historical times. Using stream order to target sampling efforts was a good strategy, but might be improved with refinements. Our findings and those of other recent studies can inform decisions about the legal status of *A. mutica* in Illinois by addressing official thresholds for endangered, threatened, and secure.

## INTRODUCTION

The Midland Smooth Softshell (*Apalone mutica*) is a highly aquatic turtle that occurs in central and south-central parts of the United States. In the Midwest, its range includes the Mississippi, Ohio, and Missouri river basins (Ernst and Lovich 2009). The Smooth Softshell prefers medium-sized to large rivers with moderate to fast flows and sandy substrates (Ernst and Lovich 2009). Backwater lakes that connect to rivers during floods are used occasionally (Dreslik et al. 2005, Wallace et al. 2007), as are impoundments created by damming large rivers (Lindeman 2000).

In Illinois, the Smooth Softshell's presumed range includes all but northeastern and eastcentral parts of the state (Smith 1961). Records of occurrence were compiled by Garman (1892), Cahn (1937), Smith (1961), and Phillips et al. (1999). Early accounts of geographic locations of collections were imprecise by today's standards (Wieczorek et al. 2004). Nevertheless, most records could be assigned to 11 rivers based on proximity to cities referenced by collectors and suitability as habitat for *A. mutica* (Table 1).

During 2009, the Smooth Softshell was listed as endangered because it was considered "formerly widespread in Illinois, but nearly extirpated due to habitat destruction, over collecting, or other development pressures" (Mankowski 2012). Supporting evidence included a paucity of recent records of occurrence, unsuccessful attempts to capture *A. mutica* at three sites with historical records, and concerns about putative threats to its habitat (Mankowski 2010). Information available at the time *A. mutica* was listed could have reflected spatial, environmental, temporal, and taxonomic biases that are common in museum collections and conservation databases (Soberón et al. 2000, Newbold 2010). Therefore, we assessed contemporary distribution of *A. mutica* in Illinois by identifying rivers with potentially suitable habitat and sampling 1-3 reaches in each of them.

**Table 1.** Historical records (before 2000) of the Smooth Softshell (*Apalone mutica*) from mid- and large-sized rivers in and bordering Illinois.

| River | Garman (1892) | Cahn (1937) | Smith (1961)[a] | Phillips et al. (1999)[b] | Other Sources[c] |
|---|---|---|---|---|---|
| Mississippi | Yes | Yes | Yes | Yes | Tucker et al. (2008); Anderson et al. 2002); VanDeWalle (1993) |
| Ohio | Yes | Yes | | Yes | Dreslik et al. (2005)[d] |
| Illinois | Yes | Yes | Yes | | Tucker et al. (2008); Paglia (2004) |
| Wabash | Yes | Yes | Yes | | Pierce (1992) |
| Kaskaskia | | Yes | Yes | Yes | |
| Sangamon | | Yes | | | |
| Embarras | | Yes | Yes | | |
| Big Muddy | | Yes | | | |
| Little Wabash | | Yes | | | |
| Rock | | Yes | | | |
| Vermilion | | | | Yes | |

[a]Does not include specimens reported previously by Garman (1892) or Cahn (1937).
[b]Records from 1980 or after.
[c]All sampling occurred during 1999 or before.
[d]Specimen captured in Round Pound, a backwater lake of the Ohio river.

## METHODS

Beginning in 2009, we targeted reaches of rivers we considered potentially suitable habitat for *A. mutica* because they occurred in the species' presumed range and had stream orders of six or greater (Strahler 1957). Our cut-off (stream order ≥6) was based on observations of *A. mutica* in the Sangamon River, where specimens were first detected in the fifth stream order and encountered regularly thereafter (Bluett et al. 2013). Historical records of occurrence were not considered in classification of potentially suitable habitat.

We attempted to sample targeted reaches of rivers by dividing them into river miles or links (the distance between two successive tributaries, regardless of size) and choosing three potential locations per river with a random numbers table. Distances of these reaches were usually too short (i.e., <4 km) to accommodate our standard sampling effort. Therefore, we considered sampling "random" if a reach we surveyed included all or part of the random link or river mile. Reaches were chosen opportunistically when obstacles (e.g., dams, log-jams) blocked access to random locations or they occurred too far from public boat ramps to complete surveys during assigned work hours (Table 2).

Sampling occurred during the active season for *A. mutica* (Apr through Oct: Ross 2016). Using a motorboat or canoe, we set hoop nets (diameter 61 or 91 cm, depending on depth; mesh 3.8 cm; single throat) at regular intervals [200 m apart in all but one reach (100 m)]. Hoop nets were set parallel to the shoreline using wooden stakes to secure both ends. We chose one shore or the other based on our ability to set a net with the opening of the throat underwater and top of the net extending above water (≥5 cm) to allow turtles to breathe. Distance to the nearest shoreline varied (0–5 m) with depth of water.

Locations of nets were determined with a global positioning system (eTrexLegend; Garmin International, Inc., Olathe, KS) and recorded. Pieces of fresh-frozen fish (400–600 g) were placed in a nylon-mesh bag attached to the hoop farthest from the throat, which faced downstream when set. Baits were replaced daily when we checked nets, recorded the time and number of each species captured, then released turtles unharmed. Gear was deployed for two trap-nights unless inclement weather or rising water levels created risks for staff or turtles.

We did not mark turtles because we anticipated too few recaptures for robust estimates of abundance. Risks of transmitting diseases or invasive species were reduced by drying gear completely in direct sunlight after each deployment and cleaning gear one or more times per season with warm, soapy water applied under pressure. Our methods complied with guidelines for animal welfare developed by the Herpetological Animal Care and Use Committee (2004) of the American Society of Ichthyologists and Herpetologists.

Data from 2007 and 2008 were collected under auspices of a grant to document presence of reptiles and amphibians identified as Species in Greatest Need of Conservation by Illinois' Wildlife Action Plan (Illinois Department of Natural Resources 2005). Reaches and net locations were chosen opportunistically; some surveys employed a small amount of effort (<20 trap-nights). Otherwise, protocols were the same as those of later surveys. Data presented here were not published previously.

## RESULTS

Reaches of 14 rivers were classified as potentially suitable habitat. Candidates included all rivers with historical records of *A. mutica* and three without (Saline, Skillet Fork, Spoon). Overall, we accrued 796 trap-nights of effort ($\overline{X}$ = 57 trap-nights/river; range = 18–125 trap-nights/river). Mean duration of a trap-night was 23.2 hours (SD = 1.8). Nine species were represented in 4,974 captures of turtles (Table 3). Captures of *T. scripta* were most common ($n$ = 3,911) followed by *A. spinifera* ($n$ = 731) and *A. mutica* ($n$ = 124). Presence of *C. serpentina* was confirmed in 95% of reaches, followed by *A. spinifera* and *T. scripta* (86% each) then *A. mutica* (55%). We detected *A. mutica* in 10 rivers. Captures of *A. mutica* varied widely among individual rivers (0.00–0.54/trap-night) and reaches (0.00–0.98/trap-night); pooled success was 0.16 captures per trap-night.

## DISCUSSION

**Sampling.** Dodd (1990) and Ashton et al. (2012) used stream order to target surveys for *Sternotherus depressus* and *Actinemys marmorata*, respectively. To our knowledge, this strategy has not been applied to species of turtles inhabiting medium- to large-sized rivers. Our criteria (presumed range and stream order ≥6) identified all rivers with historical records of *A. mutica* and led us to discover previously undocumented occurrences in the Spoon River. Refinement of our criteria (e.g., including area of the drainage basin) might improve discriminatory ability. For example, Skillet Fork, a tributary of the Little Wabash River, appeared to lack suitable habitat in the reach we sampled because of its narrow width, shallow depth, and lack of meanders. Occurrences documented by our study could provide a rich dataset for modelling distribution of *A. mutica* and identifying variables that affect it (Elith et al. 2006).

**Table 2.** Methods, dates, and locations of surveys for the Smooth Softshell (*Apalone mutica*) in Illinois.

| | | Sampling Scheme | | | |
|---|---|---|---|---|---|
| River | Reach | Reach Location | Net Spacing | Dates | Vicinity[a] |
| Big Muddy | 1 | opportunistic | 200-meter | 9–11 Sep 2014 | 37.56702; -89.48872 |
| Embarras | 1 | opportunistic | opportunistic | 2–5 Jul 2007 | 39.35020; -88.17553 |
| | 2 | opportunistic | opportunistic | 18–21 Aug 2008 | 39.33640; -88.15110 |
| Illinois | 1 | random | 200-meter | 28–30 Jul 2009 | 40.33956; -90.05105 |
| | 2 | opportunistic | 100-meter | 18–20 Jun 2012 | 40.22276; -90.13444 |
| | 3 | opportunistic | 200-meter | 2–4 Sep 2015 | 39.85366; -90.58109 |
| Kaskaskia | 1 | opportunistic | opportunistic | 16–18 Aug 2011 | 39.17861; -88.89633 |
| | 2 | opportunistic | 200-meter | 20–23 Aug 2013 | 38.38300; -89.78912 |
| Little Wabash | 1 | random | 200-meter | 18–20 Jul 2017 | 38.08036; -88.14519 |
| Mississippi | 1 | opportunistic | opportunistic | 10–12 Jul 2007 | 39.51119; -91.09796 |
| Ohio | 1 | opportunistic | 200-meter | 16-17 Aug 2016 | 37.25579; -88.50394 |
| Rock | 1 | random | 200-meter | 14–16 Aug 2012 | 41.82778; -89.52547 |
| | 2 | random | 200-meter | 14–16 Aug 2012 | 42.12056; -89.27125 |
| | 3 | opportunistic | 200-meter | 8–10 Jul 2014 | 41.74422; -89.81657 |
| Saline | 1 | random | 200-meter | 23-24 Aug 2016 | 37.57702; -88.15828 |
| Saline (N Fork) | 1 | random | 200-meter | 3–5 Sep 2013 | 37.74612; -88.33015 |
| Sangamon | 1 | opportunistic | 200-meter | 10–11 May 2016 | 40.07459; -90.37114 |
| Skillet Fork | 1 | opportunistic | 200-meter | 20–22 June 2017 | 38.16595; -88.28650 |
| Spoon | 1 | random | 200-meter | 16–18 Jul 2013 | 40.72175; -90.26237 |
| Vermilion | 1 | random | 200-meter | 11–13 Sep 2012 | 40.08435; -87.59274 |
| Wabash | 1 | opportunistic | opportunistic | 24–26 Jul 2007 | 39.28965; -87.60585 |
| | 2 | opportunistic | 200-meter | 9–11 Aug 2017 | 38.23328; -87.98296 |

[a]Latitude and longitude in decimal degree format (WGS 84).

**Table 3.** Captures of turtles in mid- to large-sized rivers (stream order ≥6) in and bordering Illinois, 2007–2017. Species codes: APMU = Smooth Softshell (*Apalone mutica*), APSP = Spiny Softshell (*Apalone spinifera*), CHSE = Snapping Turtle (*Chelydra serpentina*), CHPI = Painted Turtle (*Chrysemys picta*), GRGE = Northern Map Turtle (*Graptemys geographica*), GROU = Ouachita Map Turtle (*Graptemys ouachitensis*), GRPS = False Map Turtle (*Graptemys pseudogeographica*), STOD = Eastern Musk Turtle (*Sternotherus odoratus*), TRSC = Red-eared Slider (*Trachemys scripta*).

| River | Reach | TN[a] | APMU | APSP | CHSE | CHPI | GRGE | GROU | GRPS | STOD | TRSC | APMU/TN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Big Muddy | 1 | 45 | 0 | 16 | 3 | 0 | 0 | 0 | 28 | 0 | 1459 | 0.00 |
| Embarras | 1 | 12 | 1 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.08 |
| | 2 | 24 | 0 | 6 | 3 | 3 | 0 | 0 | 0 | 0 | 9 | 0.00 |
| Illinois | 1 | 37 | 1 | 26 | 1 | 0 | 0 | 0 | 0 | 0 | 17 | 0.03 |
| | 2 | 42 | 2 | 72 | 15 | 1 | 1 | 3 | 0 | 0 | 468 | 0.05 |
| | 3 | 46 | 0 | 55 | 3 | 2 | 0 | 5 | 11 | 0 | 707 | 0.00 |
| Kaskaskia | 1 | 42 | 22 | 53 | 2 | 0 | 0 | 0 | 0 | 0 | 7 | 0.52 |
| | 2 | 65 | 16 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 21 | 0.25 |
| Little Wabash | 1 | 44 | 0 | 7 | 5 | 2 | 0 | 0 | 0 | 1 | 223 | 0.00 |
| Mississippi | 1 | 18 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0.17 |
| Ohio | 1 | 22 | 3 | 10 | 1 | 0 | 0 | 0 | 5 | 0 | 108 | 0.14 |
| Rock | 1 | 23 | 0 | 9 | 17 | 5 | 3 | 0 | 0 | 0 | 5 | 0.00 |
| | 2 | 21 | 0 | 58 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0.00 |
| | 3 | 47 | 2 | 16 | 8 | 0 | 4 | 0 | 0 | 0 | 0 | 0.04 |
| Saline | 1 | 24 | 0 | 30 | 3 | 0 | 0 | 7 | 1 | 0 | 149 | 0.00 |
| Saline (N Fork)[b] | 1 | 41 | 0 | 38 | 5 | 2 | 3 | 0 | 0 | 0 | 183 | 0.00 |
| Sangamon | 1 | 21 | 3 | 4 | 1 | 0 | 0 | 2 | 0 | 1 | 8 | 0.14 |
| Skillet Fork | 1 | 40 | 0 | 44 | 4 | 1 | 0 | 0 | 0 | 0 | 251 | 0.00 |
| Spoon | 1 | 48 | 15 | 148 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0.31 |
| Vermilion | 1 | 44 | 7 | 105 | 4 | 1 | 0 | 0 | 0 | 0 | 13 | 0.16 |
| Wabash | 1 | 40 | 0 | 30 | 4 | 5 | 0 | 0 | 0 | 0 | 95 | 0.00 |
| | 2 | 50 | 49 | 0 | 2 | 0 | 0 | 1 | 11 | 0 | 185 | 0.98 |
| Total | | 796 | 124 | 731 | 99 | 22 | 11 | 18 | 56 | 2 | 3911 | 0.16 |

[a]No. trap-nights
[b]We also captured 2 hybrids (*T. scripta*, *G. geographica*) described by Gooley et al. (2016)

We might have failed to detect *A. mutica* in rivers or reaches where it was present because probabilities of capturing individuals in baited hoop nets were generally low and variable (Gu and Swihart 2004). Ross et al. (2015) reported 166 captures during 1373 trap-nights on the Kaskaskia River (0.12 captures/trap-night). Intensive sampling (4066 trap-nights) at 2-km reaches of the Missouri, Gasconade, and Osage rivers by Shaffer et al. (2017) yielded a total of 289 captures (0.07 captures/trap-night); success rates varied widely among individual reaches (<0.01–0.29 captures/trap-night). We recommend additional surveys in rivers with potentially suitable habitat but no recent records of the Smooth Softshell. The Little Wabash River is our highest priority because *A. mutica* occurred there in the past.

Capture success varies with factors unrelated to effort or abundance of the target species (Maunder et al. 2006). For example, Plummer (1977) noted a mid-summer lull in captures of *A. mutica* that might have been related to high water temperatures and low water levels. Our surveys were conducted at different times during the active season and under a variety of environmental conditions. Therefore, we caution against using catch per unit effort to make inferences about relative abundance of *A. mutica* in individual rivers or reaches sampled during this study (Slade and Blair 2000, Rodda et al. 2015).

We qualitatively evaluated protocols that could be adopted in an occupancy framework to address imperfect detection and obtain more precise estimates of the Smooth Softshell's range in Illinois. Early surveys (2007–2008) allowed observers to cluster sampling effort in areas they perceived as target-rich environments (e.g., sandbars used for basking and nesting). This source of bias was eliminated by requiring standard spacing of nets within a reach. After a trial (100 m apart), we chose a greater distance (200 m) as a compromise between total length of a reach and distribution of effort within it when setting 20–25 nets. Ecologically, this choice proved appropriate given movements by *A. mutica* ($\bar{x}$ = 140 m/day; Ross 2016). Occupancy methods require random selection of sites when results are applied to a broader area of inference (MacKenzie and Royle 2005). Our difficulties sampling random reaches were indicative of challenges encountered on large rivers (Pegg and McClelland 2004) and should be anticipated when designing studies to estimate occupancy of the Smooth Softshell.

**Implications for Legal Status.** Plants and animals listed under authority of the federal Endangered Species Act are automatically granted the same status by the Illinois Endangered Species Protection Act [Act; 520 Illinois Compiled Statutes (ILCS) 10/]. The Smooth Softshell is not listed federally

**Table 4.** Status Review Triggers for *Apalone mutica* (approved by the Illinois Endangered Species Protection Board at its 164th meeting on 14 Nov 2014). Triggers are non-binding thresholds at which the Illinois Endangered Species Protection Board will consider changes in the species' legal status.

| Status | Triggers |
|---|---|
| Endangered[a] | Element Occurrence Records[b] for the most recent 20-year period document presence of *A. mutica* in ≤6 of 14 rivers with potentially suitable habitat. |
| Threatened[c] | Element Occurrence Records for the most recent 20-year period document presence of *A. mutica* in >6 but ≤9 rivers with potentially suitable habitat. |
| | Sampling efforts yield ≥100 captures per river in one or more rivers. |
| Secure | Element Occurrence Records for the most recent 20-year period document presence of *A. mutica* in ≥10 rivers with potentially suitable habitat. |
| | Sampling efforts yield ≥100 captures per river in one or more rivers and ≥50 captures per river in two or more rivers. |
| | A demographic study on the Kaskaskia River finds a survival rate of ≥85% for adults. |

[a]State law (520 ILCS 10/2) defines an endangered species as "any species of plant or animal classified as endangered under the Federal Endangered Species Act of 1973, P.L. 93–205, and amendments thereto, plus other species which the Board may list as in danger of extinction in the wild in Illinois due to one or more causes including but not limited to, the destruction, diminution or disturbance of habitat, overexploitation, predation, pollution, disease, or other natural or manmade factors affecting its prospects of survival."
[b]Element Occurrence Records from the Illinois Department of Natural Resources' Biological Conservation Database.
[c]State law (520 ILCS 10/2) defines a threatened species as "any species of plant or animal classified as threatened under the Federal Endangered Species Act of 1973, P.L. 93–205, and amendments thereto, plus other species which the Board may list as likely to become endangered in the wild in Illinois within the foreseeable future."

**Table 5.** Records of the Smooth Softshell (*Apalone mutica*) from rivers in and bordering Illinois, 2000–2017.

| River | Present Study? | BCD?[a] | Other Sources |
|---|---|---|---|
| Mississippi | Yes | (2011) (2010) (2009) | Braun and Phelps (2016); Daniel et al. (2014); Braun and West (2014); Barko and Briggler (2006)[b] |
| Ohio | Yes | | Kentucky State Nature Preserves Commission (2015) |
| Illinois | Yes | (2004) | |
| Wabash | Yes | | |
| Kaskaskia | Yes | | Ross (2016) |
| Sangamon | Yes | | Bluett et al. (2013); Bluett et al. (2011b) |
| Embarras | Yes | (2017) (2015) (2012) (2003) | |
| Big Muddy | No | | Bluett et al. (2011a) |
| Rock | Yes | | |
| Vermilion | Yes | | |
| Spoon | Yes | | |

[a]Illinois Department of Natural Resources' Biological Conservation Database; records from the present study and those reported in the literature are not duplicated in BCD column (i.e., all are additional records of captures); years of observations are shown in parentheses.
[b]Sampling occurred from 1996–2001.

(Nanjappa and Conrad 2011). Therefore, its status in Illinois is determined by the Illinois Endangered Species Protection Board (Board) in accordance with provisions of the Act. Information about distribution, relative abundance, and survival of *A. mutica* was sparse when it was listed as endangered. Status Review Triggers adopted by the Board at its 164th meeting (14 Nov 2014) addressed gaps in knowledge by linking them to thresholds at which the Board would consider changes in status (Table 4).

Distribution was a component of Status Review Triggers. We documented occurrences in 10 rivers. Incidental observations submitted to the Biological Conservation Database and recent publications (2000–2017) confirmed our findings in 6 rivers. Another study (Bluett et al. 2011a) documented presence of *A. mutica* in the Big Muddy River, for a total of 11 rivers with recent records of occurrence (Table 5). Findings suggest the Smooth Softshell's contemporary distribution in Illinois is the same as or substantially similar to historical times (i.e., Cahn 1937).

Other studies addressed Status Review Triggers for relative abundance. Barko and Briggler (2006) reported 150 captures of *A. mutica* in the Mississippi River where it borders Illinois. Ross et al. (2015) captured 115 individuals in the Kaskaskia River. Both studies confirmed recruitment by capturing young age classes (Barko and Briggler 2006, Ross et al. 2015). Surveys in the Sangamon River yielded 65 captures (Bluett et al. 2013). Collectively, findings pertain to thresholds for threatened (≥100 captures per river in ≥1 river) and secure (≥100 captures per river in ≥1 river and ≥50 captures in ≥2 rivers).

Putative threats to river turtles such as exploitation, pollution, and loss or degradation of habitat (Bodie 2001, Moll and Moll 2004) were cited as reasons for listing *A. mutica* as endangered in Illinois (Mankowski 2010). Evaluating severity of these threats is a difficult task when historical benchmarks are not available to determine temporal trends in abundance or their causes (Holmes 2001, Lawler et al. 2002). Attempts to do so relied on opinions of experts who expressed concerns about the amount and quality of supporting information. Illinois' Wildlife Action Plan (Illinois Department of Natural Resources 2005) evaluated 20 threats for each organism listed as a Species in Greatest Need of Conservation. All threats to *A. mutica* were considered to have low ($n$ = 11) to moderate ($n$ = 9) effects on population viability or abundance, but all assessments were rated as "very low confidence/no information" (Illinois Department of Natural Resources 2005). A range-wide assessment by the International Union for Conservation of Nature assigned *A. mutica* to a category of Least Concern because it occupied a large range, was locally abundant, had a high reproductive potential, and its habitat was extensive and reasonably secure (van Dijk 2011). However, van Dijk (2011) noted designation as Least Concern reflected lack of empirical evidence of decline more than clear evidence of stable or increasing abundance.

Adoption of state and federal regulations might have moderated threats to the Smooth Softshell. Commercial harvest of turtles was prohibited in Illinois (510 Illinois Compiled Statutes 68/5-10). Exports of live specimens of *A. mutica* from the United States were nominal (0–230 specimens per year from 2009–2014; U.S. Fish and Wildlife Service 2016), so illegal activity seems unlikely. Improvements in water quality since adoption of the Clean Water Act of 1972 contributed to recovery of native fishes and mussels in Illinois (Sietman et al. 2001, Pegg and McClelland 2004, Retzer 2005, Sobat et al. 2006, Tiemann et al. 2007), and may also have contributed to an improvement in status of the Smooth Softshell. For example, recent observations (Paglia 2004, Tucker et al. 2008, present study) documented presence of *A. mutica* in a reach of the Illinois River that Moll (1977) considered too polluted to support the species approximately 30 years earlier.

State and federal laws require “satisfactory” or “best available” rather than unequivocal scientific evidence for listing decisions (Ryder et al. 2010, Mankowski 2012). Laws also mandate periodic (5-yr) reviews of status to consider new information. For example, the Board de-listed 41 species from 1984–2011 because they proved more common than past reviews had indicated (Mankowski 2012). Status of *A. mutica* in Illinois is now being considered, and will be determined officially during 2019. Our findings and those of other studies suggest a change in status could be warranted.

## ACKNOWLEDGMENTS

We thank R. Hilsabeck and W. Herndon for providing bait. Surveys were conducted or assisted by B. Baum, D. Brown, D. Corgiat, K. Delahunt, M. Dreslik, B. Eubanks, R. Geroff, J. Kube, D. Ludwig, D. Major, S. McTaggart, P. Shelton, and D. Woolard. Comments submitted by 2 anonymous reviewers were helpful. Partial funding was provided by State Wildlife Grant T-10-P from the U.S. Fish & Wildlife Service to the Illinois Department of Natural Resources.

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