Spring 2009

Translocation of nine-banded armadillos

Daniel J. Gammons
University of Georgia

Michael Mengak
University of Georgia, mmengak@warnell.uga.edu

L. Michael Conner
Joseph W. Jones Ecological Research Center at Ichauway, mconner@jonesctr.org

Human–Wildlife Conflicts 3(1): , Spring 2009

Translocation of nine-banded armadillos

Daniel J. Gammons[1], Warnell School of Forestry and Natural Resources, University of Georgia, Athens, GA 30602, USA
Michael T. Mengak, Warnell School of Forestry and Natural Resources, University of Georgia, Athens, GA 30602, USA *mmengak@warnell.uga.edu*
L. Michael Conner, Joseph W. Jones Ecological Research Center at Ichauway, Route 2, Box 2324, Newton, GA 39870, USA

Abstract: During the last 150 years, nine-banded armadillos (*Dasypus novemcinctus*) have increased their range and abundance in the southeastern United States. When foraging, armadillos cause damage to agricultural crops as, as well as cause structural damage to driveways and foundations. Homeowners frequently use translocation to reduce local armadillo abundance. Despite its popularity with the general public, however, the appropriateness of nuisance wildlife translocation presents concerns for biologists. Our objective was to address some of these concerns by examining survival and movements of translocated armadillos. We translocated 12 armadillos (9 male, 3 female) equipped with radio-transmitters and compared their survival and movements to that of 29 (11 male, 18 female) resident armadillos. Most (92%) of the translocated animals dispersed from their release site within the first few days after release. Resident armadillos generally maintained stable home ranges. We found evidence that translocated animals were abl to return to their original capture sites. We, therefore, recommend against translocating nuisance armadillos.

Key words: armadillo, armadillo home range, armadillo mortality, armadillo mortality, *Dasypus novemcinctus*, human–wildlife conflicts, nine-banded armadillo, nuisance animal relocation, translocation

During the last 150 years, nine-banded armadillos (*Dasypus novemcinctus*) have become an abundant and conspicuous member of the fauna in the southeastern United States. Considered by some to be an innocuous novelty and by others to be a nuisance, armadillos have long held a controversial position in public opinion (Clark 1951, Chamberlain 1980). While their range expansion has been well-documented (Humphrey 1974, Taulman and Robbins 1996), there is disagreement about how natural their expansion has been (Taulman and Robbins 1996), and, therefore, whether armadillos should be regarded as a native or exotic species in certain locales. Regardless of their status, armadillos are a species of intense concern among landowners, both in suburban and urban situations. For example, Mengak (2003) found that armadillo-related inquiries to Georgia cooperative extension agents made up 10% of the total number of inquiries for all agents across the state, even more than white-tailed deer (*Odocoileus virginianus*). As evidenced by recent sightings in Nebraska (Freeman and Genoways 1998), Kansas (Kamler and Gibson 2000), and South Carolina (Platt and Snyder 1995), the distribution of armadillos is continuing to expand, and conflicts between landowners and armadillos are likely to increase.

Most damage to property by armadillos is a result of their foraging and feeding habits. No repellents or toxicants are registered for use on armadillos, and exclusion typically does not work well because they are adept burrowers and can climb fences (Chamberlain 1980, Hawthorne 1994). Habitat modification (i.e., large-scale vegetation alteration) in urban and suburban environments also is impractical (Chamberlain 1980, Mastro et al. 2008, Ng et al. 2008, McShea et al. 2008). Consequently, often the only recourses for landowners are lethal removal (i.e., shooting) or live-capture and translocation. Many landowners believe it is not practical or desirable to shoot or sterilize armadillos, so translocation often is preferred (Braband and Clark 1992, Craven et al. 1998, Conover 2002). As Craven et al. (1998) noted, there is a common perception that translocated animals will "live happily ever after," but no data are available on the frequency of nuisance armadillo translocations or their fate once

[1]Present address: 9980 S. Naches Rd., Naches, WA 98937, USA

they are relocated. Nuisance armadillos have become such a problem that the USDA's Wildlife Services program has identified developing effective baits to live-trap armadillos in urban areas as an important research need.

Despite armadillos' popularity with the public, biologists are concerned about the appropriateness of nuisance wildlife translocation (Craven et al. 1998, Conover 2002). Primary concerns include the spread of disease, humane aspects (e.g., stress and mortality of translocated animals), impacts on resident wildlife at release sites, post-release movement of animals to areas where they continue to be a problem, and new animals simply replacing translocated ones, so that the problem is not solved (Barnes 1994, Conover 2002, Hartin et al. 2008). Because no studies have evaluated armadillo translocations, our objective was to address some of these concerns by estimating the survival and movements (release site fidelity and home ranges) of translocated armadillos. We also collected data on resident armadillos so that we could make limited comparisons of survival and movement between resident and translocated armadillos.

Study area

We studied armadillos at Ichauway, a plantation operated by the Joseph W. Jones Ecological Research Center. This 11,735-ha research facility is located near Newton, Georgia, in the southeastern Gulf Coastal Plain. Historically, Ichauway was managed as a northern bobwhite (*Colinus virginianus*) transmitters hunting plantation, and while hunting still plays a significant role in its management, the main objectives of land management today are (1) conservation and restoration of the longleaf pine (*Pinus palustris)* ecosystem and (2) integrating sustainable land-use practices for wildlife and forest management while conserving biological diversity.

Methods

We captured 41 armadillos using long-handled dip nets and unbaited wire cage traps (Hawthorne 1994). All armadillos were captured and handled in compliance with the University of Georgia's Animal Care and Use Committee (IACUC) project A2004-10138-0. We assigned captured armadillos randomly to 1 of 2 treatments: resident or translocated. Resident animals (N = 29) were those released at their capture sites. Translocated animals (N = 12) were those released within the boundaries of the study site at randomly chosen road intersections >1.4 km away from the original capture site ($\bar{x}$ = 3,637 m, range = 1,429 to 8,052 m). We chose this minimum distance because it exceeded the longest distance known for armadillos to return to a capture site (Layne and Glover 1977).

Nine-banded armadillo foraging. A primary concern of landowners with armadillos is the damage caused by their foraging behavior.

All resident animals received surgically-implanted transmitters (Model M1240, Advanced Telemetry Systems, Isanti, Minn.), following procedures adapted from Herbst and Redford (1991) and described in further detail in Gammons (2006). We also used surgically-implanted transmitters for the first 8 translocated armadillos, but upon finding that four of these animals were never located after their release, we switched to using externally-attached modified fox squirrel (*Scuirus niger*) or northern bobwhite transmitters on the remaining translocated animals. The transmitters were bolted onto the anterior dorsal shield after animals were sedated.

Using triangulation and homing (White and Garrott 1990), we monitored armadillos. We located armadillos 3 to 4 times per week. Independence of locations was maintained by having a minimum interval of 8 hours between consecutive locations on an individual (White and Garrott 1990). Locations were recorded equally throughout the diel period (i.e., every hour of the day) for each animal.

We used triangulation (Locate III, Pacer Computer Software, Tatamagouche, Nova Scotia, Can.) to estimate the animals' location using the maximum-likelihood method (Lenth 1981). We used homing primarily when animals were located in their underground burrows; in these instances, we used a hand-held GPS unit (Garmin GPS 60, Garmin International, Inc., Olathe, Kan.) to mark the location of the burrow or the animal. Home ranges were estimated in ArcGIS (ESRI 2005) with the program Home Range Tools (Rodgers et al. 2005), using the area-added method (White and Garrott 1990) for 95% minimum convex polygons (MCP).

Results

Between May 26, 2005, and March 22, 2006, we released 29 (11 male, 18 female) armadillos at their original capture sites (residents), and we translocated 12 armadillos (9 male, 3 female). We monitored animals until June 19, 2006. Effects of the surgical procedure on armadillo survival and behavior appeared to be minimal. Only 1 animal, which had apparently sustained severe wounds on her carapace from a predator within days of her capture, failed to survive >1 month post-implantation.

Resident armadillos

All 29 resident armadillos initially remained near their release sites and maintained stable home ranges. We calculated 95% minimum convex polygon (MCP) home ranges for 27 animals with >30 observations (2 animals died before 30 observations were recorded). The average home range size for these animals was 11.0 ha (range = 3.0 to 29.7 ha). While the animals initially maintained stable home ranges, radio signals eventually were lost for 11 animals. Radio-signal loss occurred on an average 245 days post-release (range = 117 to 322 days). Of the remaining animals, six died and twelve remained within their home ranges until the end of the study.

Translocated armadillos

A higher proportion (11 of 12) of translocated animals dispersed from their release sites within the first few days after release compared to residents (0 of 29; Fisher's Exact Test, $P< 0.001$). Because of the relatively poor range (<500 m) of both our implantable and externally attached transmitters, locating dispersing animals was difficult, and we did not obtain post-release observations for 6 animals (four with implants and two with external transmitters). The fate and direction of travel for these animals are unknown. Consequently, we obtained post-release spatial data for 6 of the 12 translocated animals. Because of this small sample size, general population level patterns could not be described; therefore, the movements of each translocated individual for which we obtained sufficient data are reported separately.

Male #4. This animal received an implanted

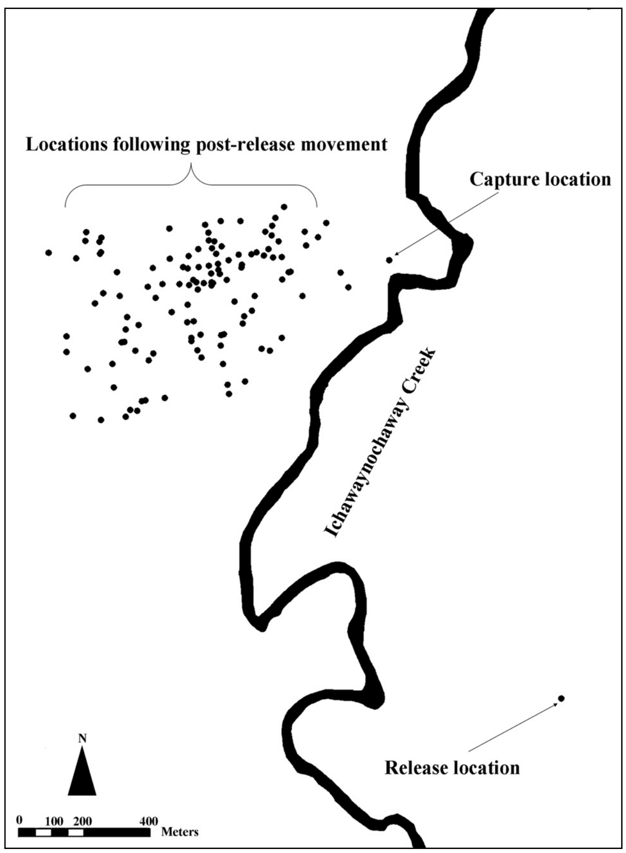

Figure 1a. Locations for male armadillo # 4 at Ichauway, Georgia.

transmitter and was released 1,429 m away from its capture site. For 5 days, it remained near the release site (within 250 m). After this time, its location was unknown until it was located 8 days later 404 m from the initial capture site, having moved a distance of >1,200 m towards its capture site since the previous observation. In moving that distance, it crossed the Ichawaynochaway Creek, which is between 20 and 40 m wide and over 2 m deep in that area. Subsequently, it maintained a 35.6-ha home range (based on 113 observations) in that area for at least 310 days, after which time the signal was lost. It was never located near its release site again. Apparently, it returned to its prior home range (Figure 1a).

Male #5. This male armadillo received a transmitter implant and was scheduled to be released at its original capture site, but while recovering from surgery it escaped from its holding cage, which was located 698 m from its capture site. The first location obtained after this escape was recorded 5 days later, at which point it had returned to within 128 m of its original capture site. Subsequently, it maintained a 15.6-ha home range (based on 144 observations) in that area for at least 358 days, after which time the signal was lost. After apparently returning to its prior home range, it was never located near its release site again.

Male #10. This animal received an implanted transmitter and was released 5,167 m away from its capture site. For 2 days, it remained near the release site (within 200 m). It was next located 5 days later 1,643 m from its release site; however, this movement was not toward its capture site. Nonetheless, it established a new home range of 7.8 ha (based on 17 observations; Figure 1b). We found this animal dead in a burrow 37 days after its release. The cause of death could not be determined, but we do not suspect surgical complications, predation, or shooting to be a factor in the death.

Male #22. This armadillo received a modified fox-squirrel transmitter and was released 4,475 m from its capture site. Rather than initially remaining near its release site, it immediately began a long-distance movement, but not towards its capture site. Within 3 hours of its release, it traveled >1,680 m (0.56 km/hr). We monitored it for 4 more days until the transmitter fell off, during which time it moved little.

Male #27. This individual received a modified fox squirrel transmitter and was released 2,377 m from its capture site. Upon release, it apparently made an immediate long-distance movement, and we could not record any observations. We found the transmitter, having fallen off the animal, 10 days after release. The transmitter was located 370 m from the release site. The direction of movement was not toward its capture site.

Male #15. This individual received a transmitter implant and was released 8,052 m away from its capture site. In contrast to the previous animals, it made no long distance movement in any particular direction; rather, it appeared to establish a home range within the area of its release. However, this animal's home range of 62.3 ha (based on 18 locations) was 6 times larger than the average home range of resident armadillos at this site and

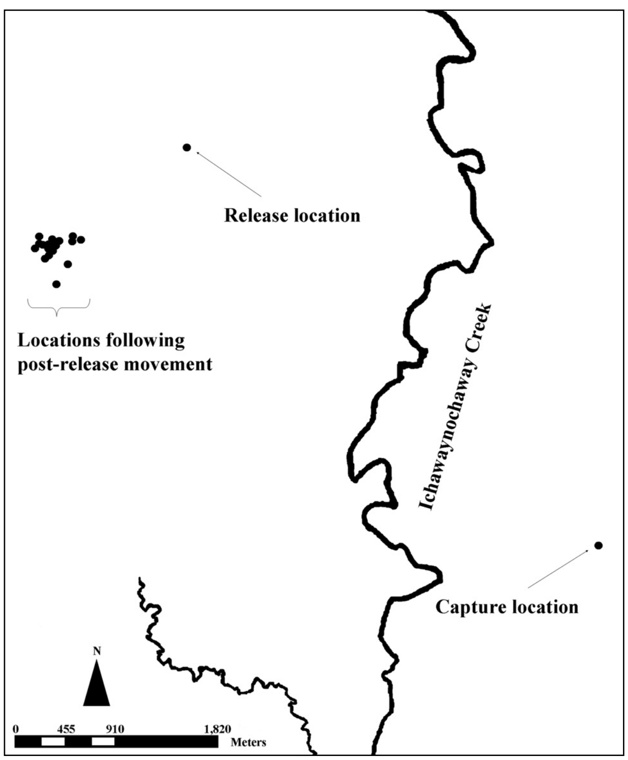

Figure 1b. Locations for male armadillo # 10 at Ichauway, Georgia.

twice as large as the largest resident home range. It made several long distance (>500 m) movements between consecutive observations, which we suspect were because it was avoiding conflict with conspecifics. This hypothesis is supported by the observation of this animal fighting with another individual. This animal was found dead 50 days after its release, having been killed by an unknown predator.

Discussion

The clear difference in fidelity to the initial release site between resident and translocated armadillos suggests that translocated nuisance armadillos are unlikely to remain at their release sites. Our limited data suggest that translocated armadillos will likely either return to the area of capture where they may resume nuisance activities or disperse from the release site to other areas where they might not be desired. Homing in armadillos has not been well-studied, but if they are moved only a short distance (<1,500 m), it appears that armadillos are capable of returning to their capture sites. Layne and Glover (1977) reported the return of 1 individual that escaped 930 m from its capture site, although 2 other animals that escaped 300 and 1,896 m from their capture sites, respectively, settled in new areas. Longer distance homing has been reported among armadillos—up to 37 km in 1 case (Chamberlain 1980). Given the average home range size of 11.0 ha for resident armadillos at our site, which is similar to the estimates of others (McDonough 2000), short distance translocations may be within an animal's original home range. In these situations, armadillos may be able to navigate back to their capture site via olfactory cues deposited by their anal glands (Clark 1951, Jacobs 1979). However, the 2 individuals in which we observed homing behavior appeared to have been released outside their home ranges, as they were never observed near their release sites following their post-release dispersal. Perhaps armadillos can use other environmental cues when homing; this may have been demonstrated by 1 male that crossed of the Ichawaynochaway Creek to return near its capture site. Bodies of water should not be considered barriers to translocated armadillos. Frutos and van den Bussche (2002), for example, found that the Paraguay River, in Paraguay, South America, was not a significant barrier to gene flow in that population.

In practice, it is likely that nuisance armadillos will be translocated a sufficient distance to prevent homing, so the more important concern may be their movement away from release sites to other areas where they may cause further nuisance problems. In addition, post-release dispersal may increase the spread of diseases, such as leprosy and Chagas' disease—armadillos are known reservoirs of the causative organisms for these diseases (Paige et al. 2002). Extensive post-release movements have been reported in a number of other translocated nuisance animals ranging from raccoons (*Procyon lotor*; Rosatte and MacInnes 1989, Mosillo et al. 1999) and black bears (*Ursus americanus*; Rogers 1986) to even relatively sedentary Gila monsters (*Heloderma suspectum*) (Sullivan et al. 2004). Thus it is not surprising that armadillos in this study behaved similarly. Possible reasons for the immediate dispersal of translocated animals from their release sites include competition with resident animals or attempted homing (Mosillo et al. 1999). We found evidence for both of these factors.

Six (20%) of the resident animals died during the study, and the fate of 11 residents was unknown because of radio signal loss. Among armadillos, aggression and territoriality is generally directed at younger individuals

Daniel Gammons attempts to capture an armadillo by using a long-handled dip net at the Jones Ecological Research Center at Ichauway, Georgia.

(McDonough 1994), and because the animals we lost signals for weighed less (3.69 ± 0.29 kg) than animals that remained in their home ranges (4.33 ± 0.15; t_{20} = 2.03, P = 0.03), we suspect most animals for which we lost signals dispersed under pressure from conspecifics. Two (17%) of the translocated animals died, while the fate of the 10 others was unknown. Because of the high rate of unknown fates for both treatment groups, we cannot determine if translocated armadillos had similar survival rates to those of residents. One might assume that translocated armadillos may be able to adapt quickly to local conditions and experience high survival rates, based on the fate of armadillos that were both purposefully and accidentally moved (Humphrey 1974, Taulman and Robbins 1996). It is important to remember, however, that most of these translocations probably occurred in areas where few or no other armadillos were present. Therefore, translocated individuals historically encountered low levels of intraspecific competition and high levels of resources. Survival rates may be lower when translocating individuals into areas where populations are already established, as will generally be the case when translocating nuisance animals today. Additionally, the immediate post-release movements of translocated animals may predispose them to higher risks of mortality. For example, when dispersing from a release site, translocated armadillos are more likely to cross roads, which are a significant source of mortality (Loughry and McDonough 1996, Inbar and Mayer 1999).

The high rate of emigration among resident armadillos that we observed is consistent with observations of other researchers. The emerging picture of armadillo population dynamics is that they have quite fluid populations, with some animals remaining within their home range for a number of years, but up to half of the population emigrates each year (Loughry and McDonough 2001). This pattern may be expected for a population that is below carrying capacity. We may also expect that emigrating resident armadillos will likely enter into vacant territories previously occupied by translocated animals and that nuisance activities will resume. Conover (2002), Cotton (2008), and Madison (2008) noted that when nuisance behavior is exhibited by most members of a population (as is the case with armadillos), problems are likely to reoccur as soon as the translocated animals are replaced.

Management implications

In conclusion, we recommend against translocating nuisance armadillos in most cases. First, translocated animals are unlikely to remain at their release site and will likely transfer the problem elsewhere, increase the risk of the spreading disease, and increase mortality rates because of translocated animals. Second, resident armadillos are highly dispersive and will likely quickly fill vacated territories formerly occupied by translocated animals. In addition, negative ecological impacts of additional armadillos in an area should be considered. Armadillos pose a threat to a number of native fauna, including several rare or endangered reptiles (Layne 1997), soil invertebrates (Carr 1982), marine turtles, gopher tortoises (*Gopherus polyphemus*; Drennen et al. 1989), and ground-nesting birds, such as northern bobwhite (Staller et al. 2005).

If shooting is not a desired or practical management option for removing nuisance armadillos within certain localities, they should be trapped and humanely euthanized. It is important to remember, however, that until there is a more permanent solution to keeping armadillos away from areas where they are unwanted, whatever removal techniques landowners choose to use will likely need to be continuously applied.

Acknowledgments

We thank the wildlife lab at the J. W. Jones Ecological Research Center and numerous volunteers, particularly J. Keenan and D. Temple, for assistance with data collection. J. Brock assisted with analysis of spatial data. This work was supported with funding from the Jack H. Berryman Institute, the J. W. Jones Ecological Research Center, and the University of Georgia.

Literature cited

Barnes T. G. 1994. A survey comparison of pest control and nuisance wildlife control operators in Kentucky. Proceedings of the Eastern Wildlife Damage Control Conference 6:39–48.

Braband, L. A., and K. D. Clark. 1992. Perspective on wildlife nuisance control: results of a wildlife damage control firm's customer survey. Proceedings of the Eastern Wildlife Damage Control Conference 5:34–37.

Carr, A. 1982. Armadillo dilemma. Animal Kingdom 85:40–43.

Chamberlain, P. A. 1980. Armadillos: problems and control. Proceedings of the Vertebrate Pest Conference 9:163–169.

Clark, W. K. 1951. Ecological life history of the armadillo in the Eastern Edwards Plateau region. American Midland Naturalist 2:337–358.

Conover, M. 2002. Resolving human–wildlife conflicts: the science of wildlife damage management. Lewis, Boca Raton, Florida, USA.

Cotton, W. 2008. Resolving conflicts between humans and the threatened Louisiana black bear. Human–Widlife Conflicts 2:151–152.

Craven, S., T. Barnes, and G. Kania. 1998. Toward a professional position on the translocation of problem wildlife. Wildlife Society Bulletin 26:171–177.

Drennen, D., D. Cooley, and J. E. Devore. 1989. Armadillo predation on loggerhead turtle eggs at two national wildlife refuges in Florida, USA. Marine Turtle Newsletter 45:7–8.

Freeman, P. W., and H. H. Genoways. 1998. Recent northern records of the nine-banded armadillo (*Dasypodidae*) in Nebraska. Southwestern Naturalist 43:491–495.

Frutos, S. D., and R. A. van den Bussche. 2002. Genetic diversity and gene flow in nine-banded armadillos in Paraguay. Journal of Mammalogy 83: 815–823.

Gammons, D. J. 2006. Radiotelemetry studies of armadillos in southwestern Georgia. Thesis, University of Georgia, Athens, Georgia, USA.

Hartin, R. E., M. R. Ryan, and T. A. Campbell. Distribution and disease prevalence of feral hogs in Missouri. 2007. Human–Wildlife Conflicts 1: 186–191.

Hawthorne, D. W. 1994. Armadillos. Pages D1-D3 *in* S. E. Hygnstrom, R. M. Timm, and G. E. Larson, editors. Prevention and control of wildlife damage.Cooperative Extension Office, University of Nebraska, Lincoln, Nebraska, USA.

Herbst, L., and K. Redford. 1991. Home-range size and social spacing among female common long-nosed armadillos (*Dasypusnovemcinctus*). Research and Exploration 7:236–237.

Humphrey, S. R. 1974. Zoogeography of the nine-banded armadillo (*Dasypusnovemcinctus)* in the United States. Bioscience 24:457–462.

Inbar, M., and R. T. Mayer. 1999. Spatio-temporal trends in armadillo diurnal activity and road-kills in central Florida. Wildlife Society Bulletin 27:865–872.

Jacobs, J. F. 1979. Behavior and space use patterns of the nine-banded armadillo (*Dasypusnovemcinctus*) in southwestern Mississippi. Thesis, Cornell University, Ithaca, New York, USA.

Kamler, J. F., and P. S. Gibson. 2000. New records of a porcupine and armadillo in Riley County, Kansas. Transaction of the Kansas Academy of Science 103:55–57.

Layne, J. N. 1997.Nonindigenous mammals. Pages 157–186 *in* D. Simberloff, D. C. Schmitz, and T. C. Brown, editors. Strangers in paradise: impact and management of nonindigenous species in Florida. Island Press, Washington, D.C., USA.

Layne, J. N., and D. Glover. 1977. Home ranges of the armadillo in Florida. Journal of Mammalogy 58:411–413.

Lenth R. V. 1981. On finding the source of a signal. Technometrics 23:149–154.

Loughry, W. J., and C. M. McDonough. 1996. Are road-kills valid indicators of armadillo population structure? American Midland Naturalist 135:53–59.

Loughry, W. J., and C. M. McDonough. 2001. Natal recruitment and adult retention in a population of nine-banded armadillos. ActaTheriologica 46:393–406.

Madison, J. S. 2008. Yosemite National Park: the continuous evolution of human–black bear conflict management. Human–Wildlife Conflicts 2:160–167.

Mastro, L. L., M. R. Conover, and S. N. Frey. 2008. Deer–vehicle collision prevention techniques. Human–Wildlife Conflicts 2:80–92.

McDonough, C. M. 1994. Determinants of aggression in nine-banded armadillos. Journal of Mammalogy 75:189–198.

McDonough, C. M. 2000. Social organization of nine-banded armadillos (*Dasypusnovemcinctus*) in a riparian habitat. American Midland Naturalist 144:139–151.

Mengak, M. T. 2003. Wildlife damage management education needs: survey of Georgia county FASAT agents. Proceedings of the Wildlife Damage Management Conference 10:7–15.

Mosillo, M., E. J. Heske, and J. D. Thompson.

1999. Survival and movements of translocated raccoons in northcentral Illinois. Journal of Wildlife Management 63:278–285.

Ng, J. W., C. Nielsen, and C. C. St. Clair. 2008. Landscape and traffic factors influencing deer–vehicle collisions in an urban environment. Human–Wildlife Conflicts 2:34–47.

Paige, C. F., D. T. Scholl, and R. W. Truman. 2002. Prevalence and incidence density of *Mycobacterium leprae* and *Trypanasomacruzi* within a population of wild nine-banded armadillos. American Journal of Tropical Medicine and Hygiene 67:528–532.

Platt, S. G., and W. E. Snyder. 1995. Nine banded armadillo, *Dasypusnovemcinctus* (*Mammalia: Edentata*), in South Carolina: additional records and reevaluation of status. Brimleyana 23:89–93.

Rodgers, A. R., A. P. Carr, L. Smith, and J. G. Kie. 2005. HRT: home range tools for ArcGIS. Ontario Ministry of Natural Resources, Centre for Northern Forest Ecosystem Research, Thunder Bay, Ontario, Canada.

Rogers, L. L. 1986. Effects of translocation distance on frequency of return by adult black bears. Wildlife Society Bulletin 14:76–80.

Rosatte, R. C., and C. D. MacInnes. 1989. Relocation of city raccoons. Proceedings of the Great Plains Wildlife Damage Conference 9:87–92.

Sullivan, B. K., M. A. Kwiatkowski, and G.W. Schuett. 2004. Translocation of urban gila monsters: a problematic conservation tool. Biological Conservation 117:235–242.

Staller, E. L., W. E. Palmer, J. P. Carroll, R. P. Thornton, and D. C. Sisson. 2005. Identifying predators at northern bobwhite nests. Journal of Wildlife Management 69:124–132.

Taulman, J. F., and L. W. Robbins. 1996. Recent range expansion and distributional limits of the nine-banded armadillo (*Dasypusnovemcinctus*) in the United States. Journal of Biogeography 23:635–648.

White, G. C., and R. A. Garrott. 1990. Analysis of wildlife radio-tracking data. Academic Press, San Diego, California, USA.

Daniel J. Gammons is certified as an associate wildlife biologist by The Wildlife Society.

He earned a B.S. degree in environmental science from Ferrum College in 2003 and an M. S. degree in forest resources from the University of Georgia in 2006. Since completing his research on nine-banded armadillos in Georgia, he has been involved with black bear management in both Louisiana and California. He currently lives in Washington, where he spends much of his free time fly-fishing and backpacking with his dog, Miss Dagny Taggart.

Michael T. Mengak received a B.S. degree in forestry and wildlife from Virginia Tech

and M.S. and Ph.D. degrees from Clemson University. He currently is an associate professor and wildlife specialist at the Warnell School at the University of Georgia. His duties focus on teaching classes in endangered species management and wildlife damage management, conducting outreach programs with county agents and landowners, and researching endangered or nuisance wildlife and Allegheny woodrats.

L. Michael Conner (photo unavailable) received his B.S. degree from the University of Tennessee at Martin and his M. S. and Ph.D. degrees from Mississippi State University. He is currently an associate scientist at the Joseph W. Jones Ecological Research Center in Newton, Georgia. His research interests include predator ecology and the predation process.