

Herpetofauna Admitted to the South Plains Wildlife Rehabilitation Center (Lubbock, Texas): A Two-decade Perspective

E. Kathleen McGaughey, Mark Wallace, and Gad Perry

Department of Natural Resource Management, Box 42125, Texas Tech University, Lubbock, Texas 79409-2125, USA

All photographs by Gad Perry except where indicated.

More humans than ever live in urban areas, creating complex environmental challenges including interactions with native species and the introduction of species not native to the region or even continent (Vitousek et al. 1997, Olden et al. 2006, Mitchell et al. 2008, Adams and Lindsey 2009). Wildlife rehabilitation centers offer a venue for animals that have suffered from the inevitable encounters that occur between humans and animals, whether wild (e.g., animals injured by cars or pets) or captive (e.g., escaped pets; Karesh 1995). The exact number of certified wildlife rehabilitators in the United States is unknown (National Wildlife Rehabilitators Association 2008), but estimated at 500–1,000 (Southeastern Outdoors 2009, The Wildlife Rehabilitation Information Directory 2008).



These hatchling Ornate Box Turtles hatched at the rehabilitation center in late 2010. They will likely be released next spring in an appropriate habitat in town — this species is common and popular inside the Lubbock city limits.



A Red-eared Slider (*Trachemys scripta elegans*) and baby Ornate Box Turtles (*Terrapene ornata ornata*; at left) are kept inside during the winter at the South Plains Wildlife Rehabilitation Center. During the spring and summer, this area normally houses many more turtles.

The South Plains Wildlife Rehabilitation Center (SPWRC), located in Lubbock, Texas and serving a large area in the southern plains, rehabilitates and releases injured, sick, displaced, or orphaned wildlife (South Plains Wildlife Rehabilitation Center 1988). Each year, SPWRC accepts a variety of animals, many of which are non-native to the region. The admissions records kept by the center provide a unique record of the interactions of residents with reptiles and amphibians, a valuable record of the propagule pressure contributing to the growing invasive herpetofauna (e.g., Kraus 2009, Powell et al. 2011), and how these change over time. Here we report the numbers of native and non-native amphibians and reptiles admitted to the SPWRC over two decades and analyze both taxonomic and temporal patterns. Our aim is to assess the magnitude of human-herpetofaunal interactions in this mid-sized city, which will hopefully offer an example of what many other urban centers across the nation experience. These data can be used to better manage such interactions at a community level and assist in preparing a realistic response plan to non-native species arrivals.

Methods

We examined all SPWRC admission records for the years 1991–2009. For each we recorded species identified by SPWRC staff (until recently, identifications were provided by non-herpetologists and could not be independently verified by us), arrival date, reason the animal was brought in, where it was found, injuries sustained (if any), and ultimate disposition (died, had to be euthanized, or was released). We categorized each record as belonging to a species native or non-native to the region. Records varied in detail, and not all data were available for each individual animal.

Results

Almost 700 individuals belonging to at least 43 identified species were admitted to the SPWRC between 1991 and 2009. The majority of these, 626 individuals (616 reptiles and 10 amphibians belonging to at least 19 species) were native, and another 52 (48 reptiles and 4 amphibians) belonging to at least 24 species were non-native (Fig. 1). By far, most admitted individuals were native chelonians, primarily Ornate Box Turtles (*Terrapene ornata ornata*, N = 342) and Red-eared Sliders (*Trachemys scripta elegans*, N = 138). Although the latter species is native to the broad region, all or some of these might have originated in the pet trade. Other native turtles included Common Snapping Turtles (*Chelydra serpentina*, N = 20) and Yellow Mud Turtles (*Kinosternon flavescens flavescens*, N = 15). The most common lizard was the Texas Horned Lizard (*Phrynosoma cornutum*, N = 36), with 1–2 individuals each of Eastern Collared Lizard (*Crotaphytus collaris*), Lesser Earless Lizard (*Holbrookia maculata maculata*), and an unidentified skink (which may or may not be native; and therefore was not included with the non-natives). The most common snakes were Bullsnares (*Pituophis catenifer sayi*, N = 15) and Checkered Garter Snakes (*Thamnophis marcianus*, N = 13), with 1–2 individuals each of a kingsnake species (*Lampropeltis* sp.) (which, like the skink, may or may not be native), Great Plains Rat Snake (*Elaphe emoryi*), Western Diamondback (*Crotalus atrox*), Western Hognose (*Heterodon nasicus*), and Western Rattlesnake (*Crotalus viridis*). Among native amphibians the most common was the Barred Tiger Salamander (*Ambystoma tigrinum mavortium*, N = 5), with smaller numbers of unidentified spadefoots, toads, and “frogs” (which also may or may not be native) completing the list.

Turtles also dominated among non-natives, with Common Musk Turtles (*Sternotherus odoratus*, N = 9), Desert Box Turtles (*Terrapene ornata luteola*, N = 6), and African Spurred Tortoises (*Centrochelys* [formerly *Geochelone*] *sulcata*, N = 3) being the most common, followed by one or two each of the Desert Tortoise (*Gopherus agassizii*), Texas Tortoise (*Gopherus berlandieri*), Red-footed Tortoise (*Chelonoidis carbonaria*), Alligator Snapping Turtle (*Macrolemys temminckii*), Horsfield’s Tortoise (*Testudo horsfieldii*), Eastern Box Turtle (*Terrapene carolina*), Sabine Map Turtle (*Graptemys ouachitensis sabinensis*), and Western Spiny Softshell (*Apalone spinifer hartwegi*). Identified non-native arrivals also included 1–3 individuals each of unknown geckos (presumed non-native because no species is native to the region), Green Iguana (*Iguana iguana*), Monitor Lizard (*Varanus* sp.), Striped Plateau Lizard (*Sceloporus virgatus*), Boa Constrictor (*Boa constrictor*), Eastern Corn Snake (*Pantherophis guttatus*), Texas Indigo Snake (*Drymarchon corais erebennus*), Plains Garter Snake (*Thamnophis radix*), Bullfrog (*Lithobates catesbeianus*), American Toad (*Anaxyrus americanus*), and Western Spadefoot (*Spea hammondi*). Perhaps most surprising was the number of crocodylians, most of which were American Alligators (*Alligator mississippiensis*, N = 5). Herpetological admissions gradually increased during the 1990s and remained roughly stable during the decade that followed (Fig. 2). The proportion of non-natives ranged from 0–30% of total admissions for a given year, averaging 7.6%. Turtles dominated admissions during the entire study period (Fig. 3). Their proportion of all herpetological admissions ranged from 70–100% (including three years in which all recorded admissions were turtles), averaging about 85%.

Of the known reasons for admittance of natives, 216 individuals were reported “injured” (the most common injury being “hit by a car”; others included cracked shell, impaled with a fishing hook, attacked by a dog or cat, and disease); 57 were found in or near the road, yard, home, or park; 18 were surrendered pets; and one was brought in for injuring a human. Among non-natives, known reasons for admittance were generally similar: 11 were found in the yard, road, or home; seven were injured; and three were confiscated by authorities (Texas Parks and Wildlife or Animal Control).

Of the known dispositions for natives, 361 individuals were released (location usually unspecified), 54 were euthanized, 23 died, three were returned to the finder, and two were transferred to a local pet shop. Unfortunately, dispositions of non-natives followed a similar pattern, with 21 being “released,” seven transferred to a local science museum or a zoo, three dead, and two euthanized.

Discussion

Native reptiles and amphibians made up the majority of all herpetofauna entering SPWRC in 1991–2009. Overall numbers increased during the 1990s, presumably a result of the greater exposure the Center has achieved

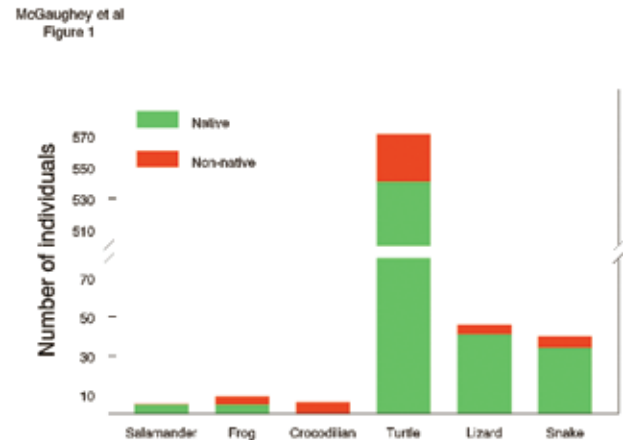


Fig. 1. Numbers of amphibians and reptiles admitted by the South Plains Wildlife Rehabilitation Center over the entire period 1991–2009.

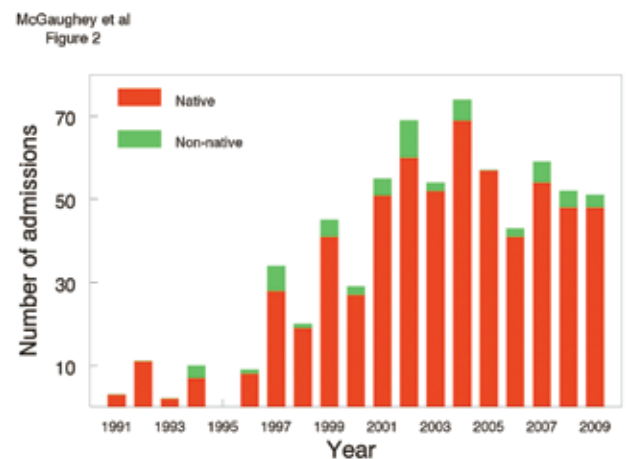


Fig. 2. Numbers of natives and non-natives admitted by the South Plains Wildlife Rehabilitation Center in 1991–2009.

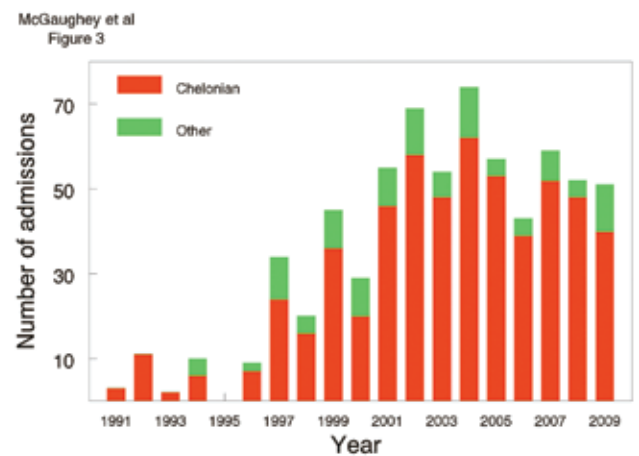
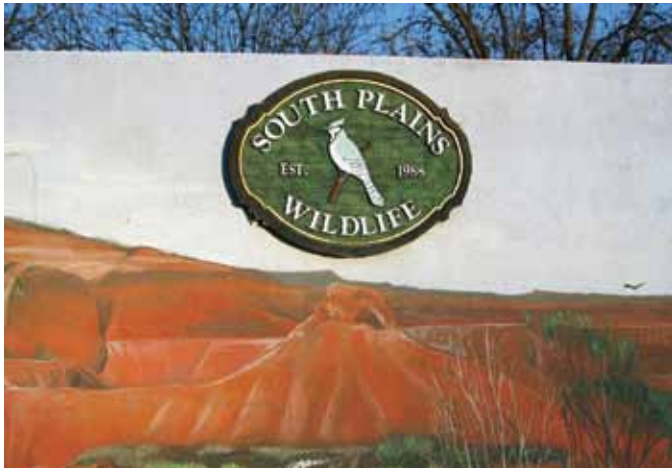


Fig. 3. Relative importance of chelonians in herpetological admissions by the South Plains Wildlife Rehabilitation Center in 1991–2009.

during this period, following its establishment in 1988. Most animals were brought in because of an injury and ~20% either died or had to be euthanized. This left the SPWRC with a substantial number of now-healthy animals in need of disposition; most of these were released in town or nearby.



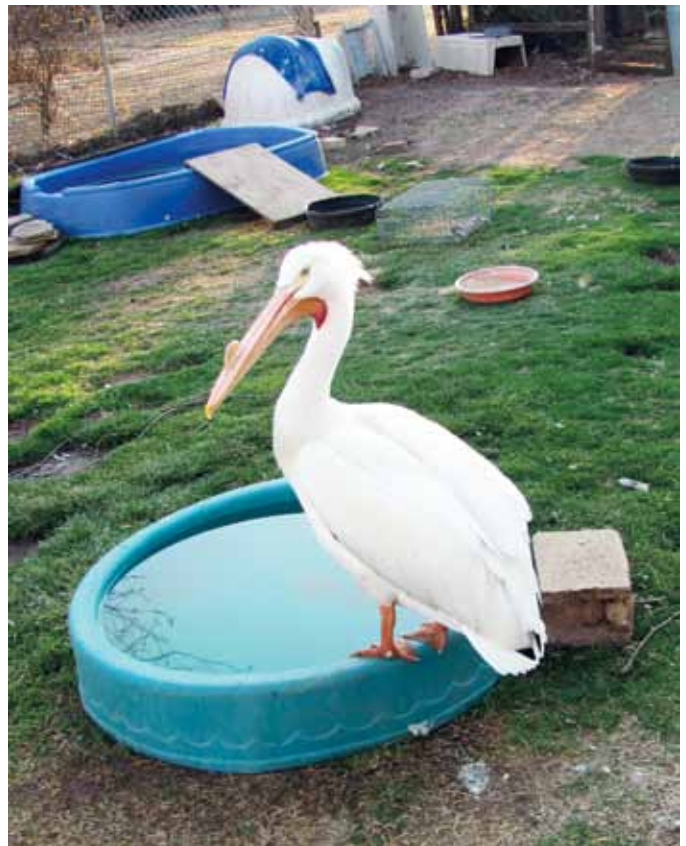
A mural of regional scenery, some native vegetation, and the center's logo welcome visitors at the roadside entrance.



Citizens drop off animals in this building at the entrance to the center. They are asked to provide information about collection circumstances and encouraged to leave a donation to help defray the costs of treating animals.



During the summer, this pond serves as home for several rehabilitated turtles, mostly Red-eared Sliders.



Percy the Pelican is one of many rehabilitated animals at the center.



A child examines a statue of a raptor in the area reserved for presentations for the general public. Education is a big part of the mission of the center.



This tortoise, initially identified as a Sulcata Tortoise (*Centrochelys sulcata*), native to Africa, was found roaming alongside a Texas highway. It is one of several such animals to reach the center in recent years.

Non-native species, most of them likely former pets, average ~8% of annual admissions. This number may be a gross under-estimate, because many of the Red-Eared Sliders received by the center may have originated in the pet trade and likely represent non-local genetics. Even ignoring this, the data include several alarming features. First, the number of non-native species being admitted is slightly larger than that of natives. Second, large and potentially aggressive species such as crocodylians are common. Third, at least some of them, such as the monitor lizard (a Savannah Monitor, *Varanus exanthematicus*, captured in a back yard; G. Perry, unpubl. data), the Red-Eared Sliders, and the Bullfrogs, are capable or may be capable of surviving in the Lubbock region. Fourth, our data represent a far-from-complete listing of such animals found in the city. For example, a large albino Burmese Python (*Python bivittatus*) had been captured by city personnel and not delivered to the SPWRC (G. Perry, unpubl. data). Finally, the disposition of many of these animals is far from satisfactory. The python mentioned above was “released” into a city park (G. Perry, unpubl. data), and nearly all surviving non-natives were similarly “released” by SPWRC staff. Our data thus show both introduction pathways identified by Kraus (2009), unintentional (escapes of pets) and intentional (poorly-considered “releases”). For Lubbock, they also support the contention of Kraus (2009) and others that the pet-trade is currently the primary source of animals establishing invasive populations. For example, many of the non-native turtle and tortoise species admitted to SPWRC are those described by Ceballos and Fitzgerald (2004) as being traded in Texas for pets and/or food.

Ornate Box Turtles comprised about half of the chelonians admitted to the SPWRC. The species is common in Lubbock and often encountered by residents, who tend to view it favorably (Sosa 2009, Sosa et al. 2010). Unfortunately, the outcomes for “released” box turtles are rarely happy (Cook 2004, Sosa 2009), a pattern that is common in translocated amphibians and reptiles (Dodd and Siegel 1991, Siegel and Dodd 2002, Germano and Bishop 2008).

Other chelonians were also very common among admitted herpetofauna, perhaps because to the public, turtles are the most charismatic and non-threatening of all reptiles and amphibians. Considering the fear that they often invoke (Morris and Morris 1965), we were pleasantly surprised that quite a few snakes and lizards were also admitted.

Our study suggests that rehabilitation centers at other locations might also be receiving substantial numbers of amphibians and reptiles, an issue we hope that future research will address. It also identifies two areas of concern. First, over the years, SPWRC staff members have not been properly educated about non-native species issues and the consequences of “releasing” such animals. This is unlikely to be limited to admissions of

amphibians and reptiles. Thus, well-meaning people helping address urban human-wildlife interactions might be contributing to future problems with invasive species. Clearly, opportunities for improved education exist at this, and likely many other rehabilitation centers. Second, more solutions are needed for disposition of rehabilitated native and non-native wildlife alike: The latter certainly should not be “released” and the record for outcomes in the former is poorly documented and generally discouraging. For example, Rodríguez et al. (2010) reported on the reasons raptors were brought in to a rehabilitation center and stated that over 1,000 were “released into the wild,” but not what happened to them post-release. In one of the few studies that looked at post-“release” survival, Bennett (1992) reported that >90% of Gibbons (*Hylobates muelleri*) quickly died. Survival of translocated carnivores can also be poor (Linnell et al. 1997). Success rates for translocated amphibians and reptiles are also discouraging, even where the process is much more carefully conceived than the typical “release” from a rehabilitation center (Dodd and Siegel 1991, Siegel and Dodd 2002, Germano and Bishop 2008). Both the logic and the ethics of investing considerable resources in nursing a sick or injured animal back to health, only to have it die upon leaving the center, are suspect.

Acknowledgements

We thank the South Plains Wildlife Rehabilitation Center for allowing us access to their wildlife admittance records and providing technical assistance. This is MS No. T-9-1206 of the College of Agricultural Sciences and Natural Resources, Texas Tech University.

References

- Adams, C.E. and K.J. Lindsey. 2009. *Urban Wildlife Management*. 2nd ed. CRC Press, Boca Raton, Florida.
- Bennett, J. 1992. A glut of gibbons in Sarawak — Is rehabilitation the answer? *Oryx* 26:157–164.
- Ceballos, C.P. and L.A. Fitzgerald. 2004. The trade in native and exotic turtles in Texas. *Wildlife Society Bulletin* 32:881–892.
- Cook, R.P. 2004. Dispersal, home range establishment, survival, and reproduction of translocated Eastern Box Turtles, *Terrapene c. carolina*. *Applied Herpetology* 1:197–228.
- Dodd, C.K., Jr. and R.A. Siegel. 1991. Relocation, repatriation, and translocation of amphibians and reptiles: Are they conservation strategies that work? *Herpetologica* 47:336–350.
- Germano, J.M. and P.J. Bishop. 2008. Suitability of amphibians and reptiles for translocation. *Conservation Biology* 23:7–15.
- Karesh, W.B. 1995. Wildlife rehabilitation: Additional considerations for developing countries. *Journal of Zoo and Wildlife Medicine* 26:2–9.



This Horsfield's Tortoise (*Testudo horsfieldii*), an Asian species common in the pet trade, reached the center after it was found roaming. It is now kept in an outdoor enclosure by one of the authors and is doing just fine, suggesting that it could have survived in Lubbock.

- Kraus, F. 2009. *Alien Reptiles and Amphibians: A Scientific Compendium and Analysis*. Springer Series in Invasion Biology 4. Springer, New York.
- Linnell, J.D.C., R. Aanes, J.E. Swenson, J. Odden, and M.E. Smith. 1997. Translocation of carnivores as a method for managing problem animals: A review. *Biodiversity and Conservation* 6:1245–1257.
- Mitchell, J.C., R.E. Jung Brown, and B. Bartholomew (eds.). 2008. *Urban Herpetology*. Society for the Study of Amphibians and Reptiles, Salt Lake City, Utah.
- Morris, D. and R. Morris. 1965. *Men and Snakes*. McGraw-Hill, New York.



Some turtles are killed immediately when they meet vehicles, but others are less severely wounded and are brought to the center for rehabilitation.

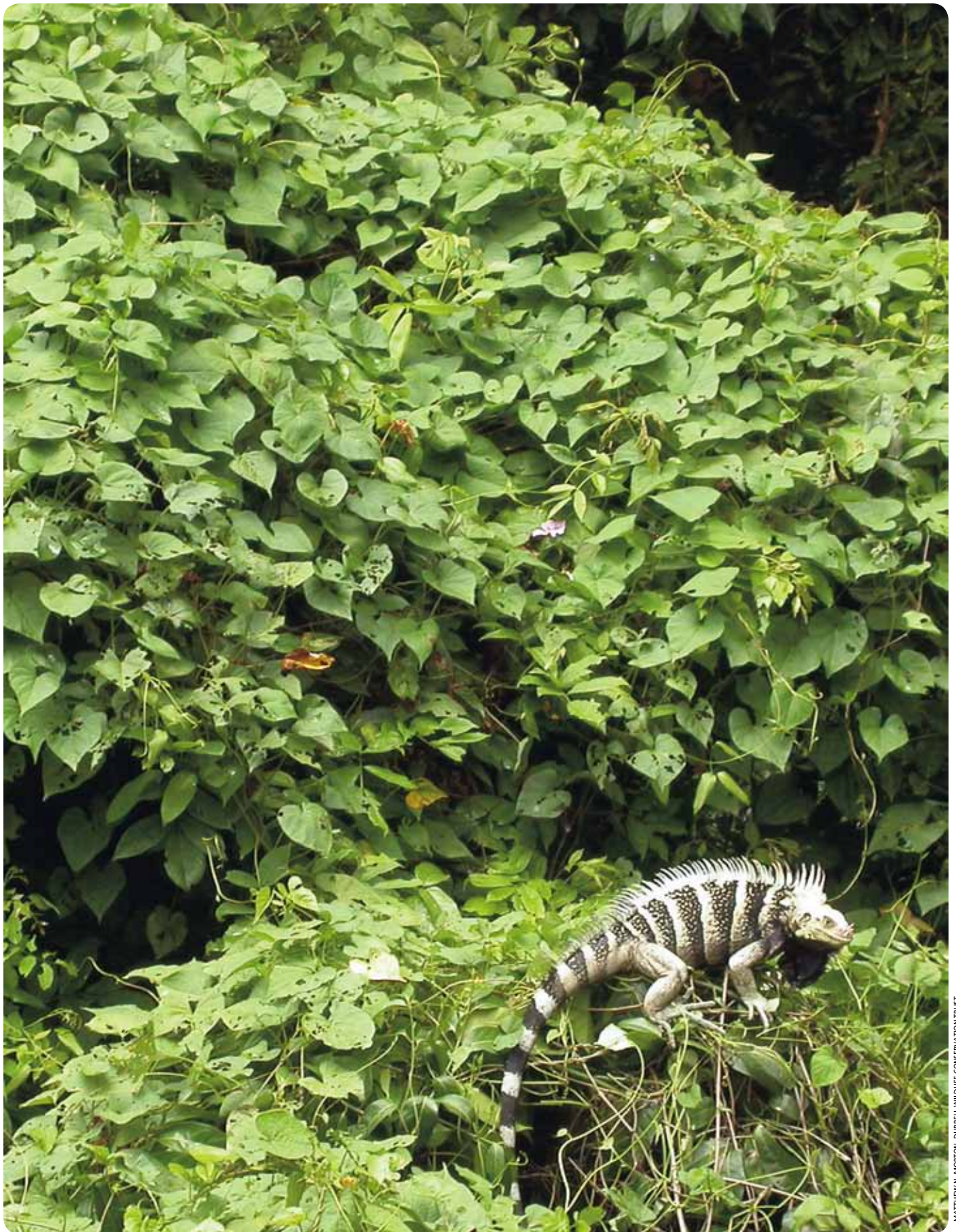


This Eastern Corn Snake (*Pantherophis guttatus*), clearly a well-fed captive-bred individual, was found on the front porch of a Lubbock resident and brought to the center. It is extremely tame and obviously a pet that was released or allowed to escape.



Texas Horned Lizards (*Phrynosoma cornutum*) such as this one tend to disappear from urban centers but can persist on the outskirts of town and may be transported by residents returning from trips. They regularly show up at the center.

- National Wildlife Rehabilitators Association. 2008. Finding a Rehabilitator. <<http://www.nwrawildlife.org/page.asp?ID=214>>.
- Olden, J.D., N.L. Poff, and M.L. McKinney. 2006. Forecasting faunal and floral homogenization associated with human population geography in North America. *Biological Conservation* 127:261–271.
- Powell, R., R.W. Henderson, M.C. Farmer, M. Breuil, A.C. Echternacht, G. van Buurt, C.M. Romagosa, and G. Perry. 2011. Introduced amphibians and reptiles in the Greater Caribbean: Patterns and conservation implications, pp. 63–143. In: A. Hailey, B.S. Wilson, and J.A. Horrocks (eds.), *Conservation of Caribbean Island Herpetofaunas*. Volume 1. Brill, Leiden, The Netherlands.
- Rodríguez, B., A. Rodríguez, F. Siverio, and M. Siverio. 2010. Causes of raptor admissions to a wildlife rehabilitation center in Tenerife (Canary Islands). *Journal of Raptor Research* 44:30–39.
- Seigel, R.A. and C.K. Dodd, Jr. 2002. Translocations of amphibians: Proven management method or experimental technique? *Conservation Biology* 16:552–554.
- Sosa, J.A. 2009. Effects of urbanization on movements, activity, and translocation site fidelity of Ornate Box Turtles (*Terrapene ornata ornata*) in the southern high plains of Texas. M.S. Thesis, Texas Tech University, Lubbock.
- Sosa, A., O. Reyes, and G. Perry. 2010. Turtles in the dust: Effects of hands-on scientific training on a group of behaviorally at-risk students' knowledge and empathy. *Reptiles & Amphibians* 17:108–111.
- South Plains Wildlife Rehabilitation Center. 1988. About SPWRC. <http://spwrc.org/index.php?option=com_content&task=view&id=17&Itemid=29>.
- Southeastern Outdoors. 2009. Wildlife Rehabilitators Directory – USA. <<http://www.southeasternoutdoors.com/wildlife/rehabilitators/directory-us.html>>.
- Vitousek, P.M., H.A. Mooney, J. Lubchenco, and J.M. Melillo. 1997. Human domination of Earth's ecosystems. *Science* 277:494–499.
- The Wildlife Rehabilitation Information Directory. 2008. How to Locate a Wildlife Rehabilitator. <<http://www.tc.umn.edu/~devo0028/contact.htm>>.



MATHEW N. MORTON, DURRELL WILDLIFE CONSERVATION TRUST

Saint Lucia Iguana (*Iguana* cf. *iguana*) on “Lyenn Dous” (Umbrella Vine, *Ipomoea tiliacea*).