

The Box Turtle

Room with a View on Species Decline

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A Once Familiar Friend Is Disappearing

Box turtle (*Terrapene*) populations that have vanished dwell in the memories of many of North America's elderly. Protracted studies of box turtle groups have confirmed such remembrances of the species' fading (e.g. see Stickel 1978; Williams & Parker 1987; Klemens 1989; Dodd & Franz 1993). Dirt, then paved, roads subdivided ancestral habitats, increasingly exposing box turtles to human traffic and collection. Their demise accelerated as autos, all-terrain vehicles, and earth movers increasingly overran them and their traditional food, nest and hibernation sites.

Education Is Key

Any hope for preserving box turtles (or other species) depends on understanding their delicate balance in the natural scheme. Ignorance has been a prime mover in the decline of this generally beloved animal. As educators, you are critically positioned to alleviate widespread ignorance and thereby improve prospects for remnant box turtle populations. This article surveys salient aspects of eastern box turtle natural history. Sharing this information can help your students glimpse the problems confronting the species. It may motivate them to enlighten and mobilize their families and neighbors; to oppose the continued collection of wild turtles; and to support protection for remnant habitats, undisturbed by access roads.

Ways of the Box Turtle—A Stay-at-Home Creature

Few people realize that box turtles can exceed 120 years of age in the wild (a longevity zenith for temperate North America's vertebrates!). They have high "site fidelity," meaning that they will live their

long life in a small parcel of the woods near where they hatched . . . eating slugs, worms, insects, berries, mushrooms, and eventually laying their own eggs there. Unlike sea turtles, a box turtle may lay only three or four eggs a year. Predators and weather destroy almost all their eggs (Madden 1975; Zeiller 1994).

Even when eggs do hatch, the delicate hatchlings have little chance of surviving environmental hazards. But a young female, who survives until reproductive maturity around age 12, can lay a few hundred eggs during her many remaining years. From that lifetime of egg production, two or three hatchlings can actually reach adulthood to replace aged parents, sustaining the local population.

The cost to a local population of losing the slow trickle of eggs from a few missing adults is imperceptible during a human's life span. But now, as box turtle populations vanish, the delicate dynamics of this species' sustainability is becoming apparent. One recent study (Doroff & Keith 1990; cf. Klemens 1989) reported that a population's loss of just one adult each year or two can seal the population's eventual disappearance! Remaining adults can't hatch enough young to replace dying elders.

We who captured box turtles for pets or classroom "exhibits" (Figure 1) were oblivious to our actions' impact. After we took our few pets, we felt reassured by the presence of adults still roaming the woods, even decades later, from which we took our turtles. But the prodigious longevity of those relict individuals obscured a growing senescence in the population, and its insufficient production of young needed to perpetuate the group. It can take decades before such destabilized populations become recognizable as the geriatric and doomed vestige that they have become.

Another aspect of the box turtle's residential nature that impacts its conservation is a strong homing instinct that compels most individuals to search for their natal home after having been moved. The prevalent delusion that an individual, moved from its home, will settle down into a new home after we relocate it to the woods of a pleasant park or friendly farmer is a misguided assumption that causes considerable harm to the species. My field work has seen displaced box turtles engage in *years* of fruitless

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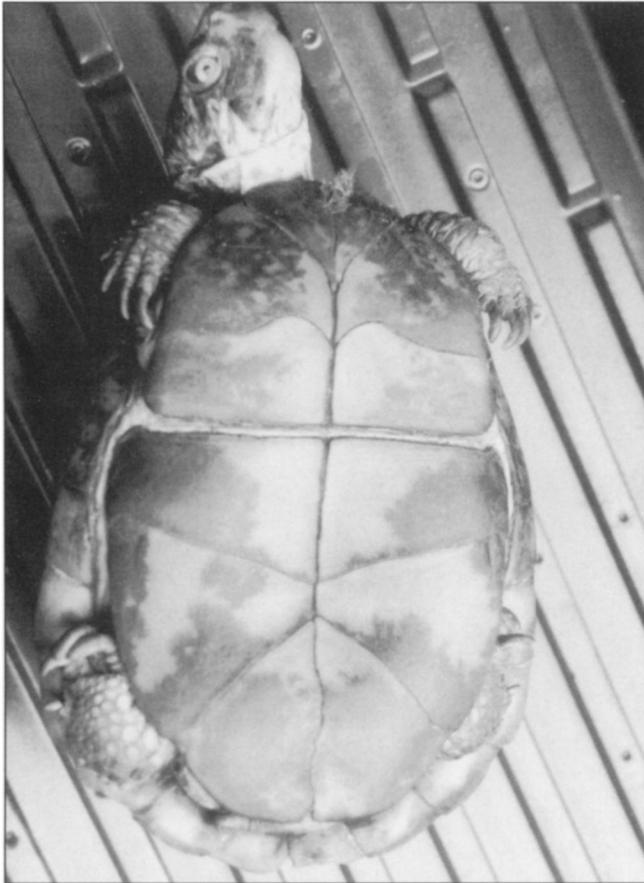


Figure 1. A box turtle's plastron (lower shell) possesses a highly flexible hinge (the line seen here, running straight across the plastron). The high flexibility enables tight closure, after limbs and head are retracted within the shell, for protection against predators. That remarkable specialty (unique among North America's turtles) made box turtles attractive as captive curiosities. Pet collecting has pushed many local populations to (and beyond) the brink of extinction. Photo by Bill Belzer.

searching for lost homes! (Belzer 1999a). This aimless wandering often brings an unmonitored turtle to a fatal end.

Even the conscientious return of a summer pet, in fall, to its capture site (near hibernation areas familiar to the animal), fails to reckon with captivity's privation of key nutrients needed to endure the winter torpor, and of the gradual intestinal (and other) adjustments that must be made to the growing cold for successful hibernation. Moral: *Leave them be!*

Reproductive Impact of Thinning a Population

My years of field observations recently brought me the surprising realization that male box turtles do not use senses which might detect distant females (Belzer 1999b). Mating opportunities appear to rely upon chance visual encounters as turtles meet during daily movements through their home ranges. Such

meetings are routine where high population densities ensure the overlap of home ranges (Stickel 1950; Yahner 1974; Madden 1975). Population density, then, is important for procreation. Removing one turtle can leave reproductively dead adults behind; opportunity for contact with the deleted individual, whose home range overlapped theirs, is now lost.

Diseases

While pet collecting propels turtle declines, releasing captured turtles also undermines turtle conservation. Though cognizant of turtles' potential for disease transmission to humans, many people are unaware of the same threat posed by displaced turtles to native animals they encounter. Some turtles who are released (e.g. by pet owners, or by pet shops wanting to avoid veterinary and other maintenance costs for turtles not selling quickly enough) harbor diseases contracted from humans or other species and transmit them to wild populations they meet. Relocated turtles were largely responsible for the dissemination of the disease organism (*Mycoplasma agassizii*) which has now pushed the American desert tortoise and gopher tortoise to the brink of extinction (Jacobson 1994; Berry 1998; Marlow, Hoff & Brussard 1997). The first data indicating that box turtles could be carriers of similar pathogens were recently reported (Calle, McDougal & Behler 1996; Calle et al. 1998).

Trying To Contravene Extinction

Because of drastic declines over so much of their former range, box turtles received protection in 1995 under provisions of the Convention on International Trade of Endangered Species in an attempt to reduce the pet trade's contribution to this turtle's extinction. Long term studies in Connecticut (Garber & Burger 1998) have (not surprisingly) documented that opening public lands to human recreational use produces dramatic decline in resident turtle populations. Stronger local protections are being enacted or debated in many states. Letters to your state's reptile regulatory authority can assist conservation efforts. Compendia of current local and national conservation laws and regulations pertaining to box turtles and other reptiles and amphibia can be obtained from Ramus Publishing (717-622-6050) and Serpent's Tale Books (612-470-5008). Enforcing conservation law is difficult and inefficient. Unless people understand the box turtle's natural history, and the harm from practices such as collecting wild pets, no conservation measures will succeed.

In 1993, the McKeever Environmental Education Center (Sandy Lake, PA) invited a pioneering effort to see if box turtles could be reestablished in its 80-hectare preserve from which the species had been

eliminated by earlier human activity. The project uses homeless adults to produce hatchlings that might establish stable residency. It takes care to avoid past ecological mistakes. For example:

- Collecting founder adults from the wild to rebuild the lost McKeever population is prohibited so as to avoid destabilizing natural populations. Our founder animals are displaced turtles (donated by veterinarians, animal rehab centers, school classrooms, etc.) that have already lost homes from injury (Figure 2), habitat destruction or captivity.
- Since no turtles remained in the McKeever preserve (Belzer 1999c), potential introduction of disease or nonadaptive genes to a resident population is not a risk.
- To avoid “seeding” the McKeever habitat with pathogens, each founder turtle is first quarantined and its health assured.
- Attached radiotransmitters enable continual monitoring of the movements and welfare of each new arrival (Figure 3). Far-ranging individuals, still searching for their natal homes, are retrieved regularly and returned to the preserve, away from roads or other hazards; wounds and diseases are promptly ministered to; hibernacula are given added insulating mulch as winter’s cold deepens.



Figure 2. Although young box turtles are very vulnerable, their shells become strong enough by age 7 or 8 to frustrate many predator attacks. This female lost part of her front shell (and two front toes that were under that part of her closed, protective shield) to a gnawing predator. The difficulty of chewing through such a barrier discouraged further gnawing and saved her life. The well-intended removal from her habitat for human care, however, cost her her home when captors forgot her collection site. Photo by Bill Belzer.



Figure 3. A homing instinct drives box turtles who are moved from their natal woods to wander, for years, in search of their lost home. The box turtle conservation project at McKeever Environmental Education Center provides each homeless arrival with its own radiotransmitter, so that its daily movements can be monitored. Interventions by project volunteers head off danger from highways, cultivated fields and dog attacks for the far ranging turtle. Photo by Bill Belzer.

- Human intervention during spring provides courtship and mating opportunities for members of our sparse founding population (no egg production occurred during the years before this intervention).
- A Trust Fund (administered by the Venago Area Community Foundation) is accruing to ensure monitoring and care for these founding expatriates, in perpetuity.

Readers interested in more extensive information and updates on the McKeever project can obtain copies of articles from the McKeever Center newsletter by writing to Bill Belzer.

Reflection

Environmental education centers and animal rehab centers in Pennsylvania, learning of the ability of McKeever’s box turtle project to safely get captive turtles back into the environment, have declared it a “Godsend.” It gave them the hitherto absent opportunity to return their box turtles to the environment in an ecologically safe way and enable the turtles’ participation in returning its species to some of its formerly lost range.

Centers also appreciate this way to stop sending their visitors the wrong message: that wildlife is an ornament to be extricated from nature to decorate

our surroundings and entertain visitors. Display of captives tends to nurture a stunted regard for wildlife as a disposable commodity, like wall posters displayed for decoration, and then discarded when the novelty wanes. These creatures, which we have plucked from their homes, sold into captivity and condemned to a shortened, impoverished (often diseased) existence, live longer than we, and were residents of our environs long before we arrived. Increasing numbers of educators are recognizing that visiting wild habitats, where turtles (and other wildlife) can be observed (even if only fleetingly) on their own terms, magnificently integrated into the natural world, is a far more enriching encounter for students than seeing wildlife confined to a container. It is an encounter that fosters respect for life and the conservation ethic.

With a virtual absence of projects like McKeever's (where turtles, once displaced, can be returned to the wild and receive ecologically crucial monitoring and care), education about the devastating consequences of moving turtles from their homes is pivotal for the future of *Terrapene*. Please get this information to others. Trying to return a lost species to even a tiny part of its former range consumes monumental, unending expenditures of money and time—expenditures that carry no guarantee of long term success. We must *preserve* what now remains.

If you are lucky enough to see a shy box turtle wandering the woods where you walk, please don't touch it; simply revel in the peaceful privilege/joy of beholding a life form that graced this Earth before (and long after) the age of dinosaurs! . . . a sight that fewer and fewer humans now experience. Let not us be the disaster of the eons that ends their existence on Earth.

References

- Belzer, B. (1999a). Home range establishment by translocated eastern box turtles. *Box Turtle Research and Conservation Newsletter*, edition #8: 3–7. 20–22.
- Belzer, B. (1999b). Sexual proclivity among translocated male *T. c. carolina*. *Box Turtle Research and Conservation Newsletter*, edition #8: 8–9.
- Belzer, B. (1999c). Repatriation criteria. *Box Turtle Research and Conservation Newsletter*, edition #8: 2–3.
- Berry, K. (1998). Demographic consequences of disease in two desert tortoise populations in California, USA. In J. Van Abbema (Ed.), *Proceedings: Conservation, Restoration and Management of Tortoises and Turtles—An International Conference*, pp. 91–99. Orange, NJ: New York Turtle & Tortoise Society.
- Calle, P.P., McDougal, J. & Behler, J. (1996). Health assessment, with an emphasis on *Mycoplasma*, survey of eastern box turtles in Long Island's Central Pine Barrens Preserve. *Box Turtle Research and Conservation Newsletter*, edition #5, 9.
- Calle, P.P., McDougal, J., Behler, J., Schumacher, I. & Brown, D. (1998). Eastern box turtle (*Terrapene carolina carolina*) *Mycoplasma* serosurvey. *Box Turtle Research and Conservation Newsletter*, edition #7, 1–2.
- Dodd, C.K., Jr. & Franz, R. (1993). The need for status information on common herpetofaunal species. *Herpetological Review*, 24(2), 47–50.
- Doroff, A.M. & Keith, L.B. (1990). Demography and ecology of an ornate box turtle (*Terrapene ornata*) population in south-central Wisconsin. *Copeia*, 1990, (2), 387–399.
- Garber, S.D. & Burger, J. (1998). A twenty-year study documenting the relationship between turtle decline and human recreation. In J. Van Abbema (Ed.), *Proceedings: Conservation, Restoration and Management of Tortoises and Turtles—An International Conference*, p. 477. Orange, NJ: New York Turtle & Tortoise Society.
- Jacobson, E. (1994). The desert tortoise and upper respiratory tract disease. *Bulletin of the Association of Reptile and Amphibian Veterinarians*, 4(1), 6–7.
- Klemens, M.W. (1989). The methodology of conservation. In I.R. Swingland & M.W. Klemens (Eds.), *The Conservation Biology of Tortoises*. Gland, Switzerland: Occasional papers of the IUCN/SSC 5, pp. 1–4.
- Madden, R. (1975). *Home Range, Movements, and Orientation in the Eastern Box Turtle*, *Terrapene carolina carolina*. Ph.D. thesis, City University of New York. 217 pp.
- Marlow, R.W., Hoff, K.S. & Brussard, P. (1998). Management of wild tortoise populations is complicated by escape or release of captives (a presented poster). In J. Van Abbema (Ed.), *Proceedings: Conservation, Restoration and Management of Tortoises and Turtles—An International Conference*, pp. 479–480. Orange, NJ: New York Turtle & Tortoise Society.
- Stickel, L.F. (1950). Populations and home range relationships of the box turtle, *Terrapene c. carolina* (Linnaeus). *Ecological Monographs*, 20, 351–378.
- Stickel, L.F. (1978). Changes in a box turtle population during three decades. *Copeia*, 1978, (2), 221–225.
- Williams, E.C., Jr. & Parker, W.S. (1987). A long-term study of a box turtle (*Terrapene carolina*) population at Alee Memorial Woods, Indiana, with emphasis on survivorship. *Herpetologica*, 43(3), 328–335.
- Yahner, R.H. (1974). Weight change, survival rate and home range change in the box turtle, *Terrapene carolina*. *Copeia*, 1974, (2), 546–648.
- Zeiller, D. (1994). *So You Like Turtles*. Tenafly, NJ: Donald Zeiller, privately published.

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