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# TURTLE AND TORTOISE NEWSLETTER

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# Turtle and Tortoise Newsletter




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***TURTLE AND TORTOISE NEWSLETTER*** (ISSN 1526-3096) is an international newsletter dedicated to providing an open forum for the timely exchange of information on freshwater / terrestrial turtle and tortoise conservation and biology issues. It incorporates and merges the previous publications of the Newsletter of the IUCN Tortoise and Freshwater Turtle Specialist Group and the Box Turtle Research and Conservation Newsletter.


Submissions are welcome from any source or individual and are in no manner limited to Specialist Group members. Articles may cover any aspects of turtle and tortoise news or research, with a preference for conservation or biology. TTN focuses on freshwater and terrestrial turtles and tortoises; items dealing with sea turtles should be directed to Marine Turtle Newsletter, an independent and separate publication. Of particular interest to TTN are news items and preliminary research or field reports dealing with conservation biology, population status and trends, human exploitation or conservation management issues, community conservation initiatives and projects, legal and trade issues, conservation and development threats, geographic distribution, natural history, ecology, reproduction, morphology, captive propagation, and husbandry. Newsnotes, announcements, commentaries, and reviews of interest to the turtle conservation and research community are also welcome. Submissions will not be peer-reviewed, but minor review and final acceptance for publication is at the discretion of the Editorial Staff. Submit material directly to either H. Kalb or A. Salzberg at the addresses above.


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Cover Photo: From a young age, Aboriginal children of northern Australia are taught to hunt and gather bushtucker (here *Chelodina rugosa*). (Photo by Damien Fordham)

## Clarification to Speckled Padloper Article

The editors and publisher of TTN and Mark Klerk, the author of "Adapting the Namaqualand Speckled Padloper to Captive Conditions", wish to clarify and apologize for any possible misperceptions about the following statement on pg 32 of the 6th issue of TTN: "Barzyk's conclusions (1994) may have been based on turtles that were collected commercially or illegally imported." This statement simply referred to Barzyk's statement (1994, CCB 1(2), p. 138, 4th paragraph) about very high mortality rates experienced for *Homopus signatus* imported into various zoos, and in no manner inferred or meant to imply that his own specimens of *H. areolatus* (all obtained legally through field-collection and imported under CITES permits as noted in his acknowledgments) were either commercially obtained or illegally imported.

## Mock Turtles: An Alternative Perspective

**PETER C. H. PRITCHARD**

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The article "Mock Turtles" in Nature by Rex Dalton (pg 219-220, May 15, 2003) is primarily about new "species" of Asian turtles, described by Dr. Bill McCord and co-workers, that in some cases turned out to be hybrids. This article uses language suggesting that a major miscarriage of the scientific process took place. Words and phrases used include "debacle," "extremely unfortunate waste of precious funds… on hybrid species," "furor," "contemplating the fallout of the affair," and so on. Certainly, some of the turtle suppliers in Asia appear to be somewhat shady characters, but to the extent that they may have deliberately deceived McCord, he was their victim rather than their collaborator. Scientists may be expected to use impeccable sources at all times, but those of us who are conservationists as well find we need to interact with a rather wider range of parties. These range from distinguished scientists and government representatives to outlaws, illiterate poachers and animal dealers who may happen to have access to more real-world, first-hand, field-based information about the species in question than anybody else. The trick is not to boycott or even discount the non-professional sources, but to test what they say, and to use their information as a starting-point for further investigations.

The procedure as a whole – of arriving at the truth by means of a progressive accumulation of information, hypotheses, and interpretations by a series of workers, perhaps with different backgrounds or viewpoints, rather than by the final truth being revealed in an entire and finished form in a single published contribution – is not an alien one. The more familiar turtle species mostly have massive synonymies, indicating that there were many missteps along the way to their correct classification, but in many cases the papers in which the synonyms were perpetrated are well worth reading and contribute much.

It used to be quite commonplace for specimens that were clearly novelties or of obvious systematic interest to arrive in the great museums by routes that were so convoluted that all data regarding origins were either lost or erroneous. Nevertheless, it remains a legitimate procedure to present what IS known about such a specimen (even if only its morphology) to the scientific public, together with whatever shreds of circumstantial information as may be available, in a timely fashion, and gradually the whole truth will emerge. We all know people who have recognized and even "claimed" new taxa, but who take decades to finally commit themselves to print. Perhaps they are perfectionists, terrified of error. Perhaps they seek to write the final word rather than the first word about a new taxon. Or perhaps they are just slow or too busy. But whichever it is, the net result is that scientific knowledge is held back for years. Many species would never have even been recognized, or may have disappeared from the planet through lack of conservation action before they could be described, if preliminary notices of their existence had not been published, by people willing to be proved wrong, like Bill McCord. The chelonian examples are many – *Geochelone nigra phantastica*, *Heosemys depressa*, *Heosemys leytensis*, *Cuora yunnanensis*, and so on. Remember too that the original citation of the distribution of *Chelydra serpentina* was "Habitat in calidis regionibus" – "lives in warm regions" – for a species that is now known to have a considerable north-temperate range extending into Canada. Or *Geochelone chilensis*, that is not found in Chile, and that was confused for a time with the vastly bigger African species *Geochelone sulcata*.

The reason that the McCord team had the bad luck to have perpetrated names for three new taxa that turned out to be synonyms of previously published names in no way reflects sloppy work. Indeed, the record suggests just the opposite. McCord and his coauthors resisted the temptation to publish preliminary notices quickly, but the inherent delays in the peer-review approach that they selected resulted in their descriptions being scooped by competing interests who were able to publish much more quickly by short-cutting some of the formal steps recommended by the International Commission on Zoological Nomenclature.

A final point, left out by Mr. Dalton's article, is that intergeneric hybrids are in fact of considerable scientific interest. Their study, as genetic and phylogenetic enigmas, is not a waste of money.

# The Final Point

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Without notice, springtime had turned into summer down in the valley. Now late June, we found it hard to believe that three of the busiest months of our bog turtle field season had come and gone. Our program for this, the 17th season of our study, was extremely ambitious, but things so far were going quite well for me and for field technician Lynn Eastin. This year we were radio-tracking 21 of the valley turtles which included those 12 that were followed last season. Based on the results from last year, we learned that about half of the turtles in each of our two study sites appeared to be "home bodies", rarely venturing out of their "home-base" sites, while the other half seemed to be the "movers." By following these turtles minimally for two consecutive years, we would have a much better idea of the seasonal patterns of movement, habitat use, and home range of each turtle. And so far, it seemed the movements of about half in each category, "movers" or not, had become rather predictable.

One of the investments made shortly after our season began was a handheld GPS (Global Positioning System) unit. Until now, the locations of our turtles had been plotted on either topographical or scaled property maps. We were convinced of our own accuracy, but a GPS unit would provide other essential distance and directional data we were otherwise unable to determine right away. Our unit would give us mapping coordinates or waypoints (points) which mark our location. In addition, by storing points on the unit, we were able to obtain exact distances between these positions as well as compass direction moved. And, since the unit comes with a PC cable, stored points can be downloaded with complete accuracy into a computerized mapping program. Although at times I feel justified in thinking that technology often gets in the way of "real" herpetology, I had no way of knowing just how essential this piece of equipment would become during the course of this season.

Instinctively, I knew that predictability was all relative when dealing with wild animals. Lynn's message of 27 June drove this home when she wrote... "4.6 has made a big move (Figure 1)! She is 2/3 of the way up the hill toward the log cabin. I was convinced that I was chasing a raccoon with a transmitter inside, so I was a bit alarmed, but not so, there she was under the edge of a log. I am not kidding, and it poured rain. I was soaked, but pleasantly so." "Up the hill?", I thought to myself. Later the next day I called Lynn and she said 4.6 was continuing to move due west and was now down in a wooded drainage very near the cabin. The GPS point showed that she was nearly half a mile from her bog site. She was entering the National Forest!

Female 4.6 (or number 46) had seemed somewhat of an enigma from the beginning. She was a new turtle when first found with others at the hibernaculum in early April 2001. Spunky and precociously large for her young age of 8 years, she was an ideal candidate for radio-tracking. From the start, I couldn't help but think that she had hatched at some other location. After all these years, I knew this "home-base" population well. Some of the turtles here had been recaptured over 50 times, and the last new adult was found in 1994! In 2001, she took off and moved half a mile north along the valley floor, but she returned to a spot near the bog before the winter set in for good. Found and fitted with a new transmitter in May of 2002, we were anxious to learn if her patterns of movement would be repeated again this year. Instead, she headed west.

At the same place on 1 July, we were unable to pick up her transmitter signal. Did the transmitter fail? Probably not. We used top quality transmitters, and we had not had a previous problem. Had she moved out of range? Maybe. If she had moved up and down into the next drainage, that could account for it. Knowing how far these little turtles are capable of moving during a single day, we knew that we really needed to stay on top of this one. With all else that needed to be done, Lynn enlisted the help of her daughter Maryn, and this allowed most everything to remain on schedule. A day or so later, after hiking another half hour further up into the forest, a weak signal could be picked up! Our turtle had indeed crossed over the first ridge and down along a new drainage, now 0.92 miles from the bog. She was really moving along now.

By 6 July, she had traveled to an even further location, now 1.45 miles from her starting point. I had to see this for myself. I met Lynn and Maryn at the bog the morning of 8 July. Rubber boots were traded for hiking boots, and we were off. We tried to follow old hunting trails when possible, and the going was rather easy for the first half hour or so. On this leg of the journey we passed by a beautiful grove of ancient hemlock trees, occasionally interspersed by rock outcroppings. I couldn't help but to think about timber rattlesnakes, but for now, our focus was on our turtle.

From here, we could not pick up the transmitter's signal, but we had grown accustomed to that. On the previous hike, Lynn had marked the trail with flagging, so we knew we

Figure 1. Turtle 4.6 with radiotransmiiter.

would at least be able to find the last capture point. About half way up we rested for a bit on a Forest Service logging road, the only flat piece of ground! From here, the going got considerably rougher. The trail became our own, winding up, then around and behind the large ridge which confronted us. Maryn was well ahead with the telemetry unit, glancing back occasionally to make sure Lynn and I were still following along behind (Figure 2). Lynn whispered that she was probably a bit miffed about us "old people" slowing down the progress! Once on the back side of the ridge, there it was! The signal came through loud and clear.

In order to get to our turtle, it would be necessary to descend down through the small drainage below and climb another couple hundred feet up the next big ridge ahead. Maryn pinpointed the turtle and began circling a large, rotting log. She was right here somewhere, maybe under the leaf litter. All at once, Lynn spotted the transmitter's antenna sticking out from under the log. A closer look revealed a little section of her shell. Since the forest was relatively open here, it was possible to take the point, and the location was marked with flagging.

I just couldn't believe it. Exactly a mile and a half from the bog and at 3600 feet elevation, I looked around and saw nothing that would remotely remind me of bog turtles. No water, no mud, no nothing. If I hadn't seen this for myself, and if someone else had told me they had found a bog turtle up on the mountain, I would have been convinced they were misidentifying a box turtle. Why was this turtle making this incredible journey? Where was she headed? Perhaps she would begin moving north along the ridge and end up at Forest Bog, a small but appropriate piece of habitat and the only such place we knew of in the National Forest. But Forest Bog was a long way off.

Figure 2. Maryn Eastin tracking her through the forest.

Far above, we could see individual trees on the highest ridge, the crest of the mountain chain rising up in places to well over 4000 feet elevation (Figure 3). The crest was the county line as well as the Appalachian Trail. We joked about picking up a newspaper and seeing a photo of a hiker holding our turtle with the caption... "Hiker finds endangered turtle on the Appalachian Trail", or, "Rare turtle hikes the AT"! Would she?

Maryn's e-mail on 13 July told the story. She had gone after 4.6 the previous day and found her. After finally reaching the crest and standing on the Appalachian Trail, a weak signal could be picked up! The turtle had gone over the mountain and was rapidly on her way down the other side! When found, she was 2.08 miles from starting point at an elevation of 3128 feet. Immediately apparent on this map was the tightness of the elevation contours on this side of the mountain. This was an extremely steep and rugged portion of the forest. We were about to find out just how difficult it really was.

We figured it might save a lot of time and effort to park at the service road gate and hike in to where 4.6 had crossed. On 22 July, Lynn, Maryn and I began the hike along the service road. The road appeared to have been literally cut into the side of the very steep, main ridge. The map contours weren't a joke. Through an opening in the trees, we could see a portion of a large, man-made lake far down in the distance. As it turned out, it was a long hike, probably over a mile, and by the time we reached the flagged point where our search would begin, it was getting on toward late afternoon. The signal was weak, and as we slowly proceeded down the steep and slippery grade, at times it would become loud, then very dim. In places it couldn't be picked up at all. We continued until we reached the first grove of thick rhododendron at a point where the gorge began to narrow. The shadows were beginning to lengthen by now, and since the signal indicated that the turtle was still a long way off, we reluctantly decided to return and pick it back up bright and early in the morning.

Maryn had other plans for the next day, but Lynn and I arrived at the service gate at about 9am, ready to go. The day looked promising but there was a chance of thunderstorms during the afternoon. We hiked to our flagging and down we went, eventually reaching the spot where we left off the afternoon before. Continuing on from there became an increasingly difficult and tedious process.

Figure 3. She crawled through the forest on the right side of this clearing and over the ridge in two weeks.

The pruners we always carried became essential for getting through these rhododendron "hells". But the gorge had narrowed considerably, and the only way to keep moving was to climb up far enough to avoid the tangle of rhododendron and boulders. In places this required inching along the various rock outcroppings that protruded from all sides of the gorge. We had to climb higher. After another hour, the signal was beginning to come through well. The only way now was straight down.

Painfully slow was progress at this point. The rhododendron was tightly packed, and the footing couldn't have been more treacherous. Under the wet leaves on this steep ridge was a mini-talus slide made up of rocks of all sizes which had fallen from these ledges through the decades. After what seemed to be forever we finally stepped out onto the wet, moss covered rocks, a common feature in many of these eastern "canyons." The signal indicated that our turtle was somewhere near a group of large boulders under which there was a small pool. I saw water moving in the pool, but it turned out to be a large, black-bellied salamander. We combed the area in, around, and under the boulders with no luck. She was here, but we couldn't actually find her. Lynn moved out to a spot where an opening in the trees might allow us to take this point with our GPS. It worked! Lynn flagged the point, but commented that no other human being would ever see this one. We were now at 2720 feet elevation, nearly identical to that of the valley floor on the other side of the mountain.

By now clouds were rolling in, and we had to begin our climb back out before things became downright dangerous. We agreed that we couldn't go back the same way, it was just too difficult. The shortest distance would be straight up. The rock outcroppings above the gorge proved to be the most difficult part of the entire day. Lynn went first, and in most places she had to crawl, grasping onto saplings here and there for support. There was no footing at all. I tried to follow, but that was impossible. Luckily I found a small gap between the rocks, and eventually I made it to the top. From here we were able to relax a bit, knowing the worst was over. Here, on top of this ridge, the forest became a little more open and slightly more level. I suggested to Lynn that she never go back into this "hellhole" again, especially by herself. It was just too dangerous. We figured that if they were looking for a place to hold a new, advanced "Outward Bound" school, just ask us. We had found it. Six and a half hours after arriving at the service gate, we were back there again, grateful to be sitting in our vehicle. It had been a truly remarkable day.

The turtle appeared to be moving in a straight line slightly East of North. Consulting the map, we estimated that if she continued in this direction, it would take her very close to the drainage paralleling the highway, and on 26 July, sure enough, a clear signal could be picked up. Two days later we took readings from several places in order to triangulate the signal. Our turtle seemed to have continued her movement down "hellhole" drainage and was now moving east. She was drawing closer.

On 30 July we drove over the mountain and parked along the highway. Lynn had gone down the previous afternoon and found the turtle. She looked fine, and her weight was approximately the same as it had been in May. She had obviously fed well during her journey. The road embankment was made of the spoil from when this, the third highway over the mountain, was built many years ago. Going down, I was amazed and disappointed by the decades of trash that had been tossed down and into the forest. The embankment was nearly a straight drop. One slip and we could end up in a pile of broken glass, or into some old, rusted appliance. Once at the bottom, Lynn said... "turn right at the green tricycle." We crossed the second highway, at one time probably a logging and wagon road, now grown up with trees, and the first, now filled with rhododendron, which was likely used by the Indians and other early settlers in the valley.

She had moved slightly from her position the previous day. Cutting through the rhododendron, Lynn spotted her, mostly tucked up under dead leaves about 30 feet up from the bottom of the drainage. I had yet to actually get photos of this turtle since she had been in this county, so now was the time. I gently removed her from under the litter and placed her in a patch of dappled sunlight. She had no doubt been fast asleep when found. As I snapped my photos, she extended her head, looked for a few seconds to the right, then over toward me, and then directly forward and up. She was getting her bearings. I placed her back under the leaves and felt rewarded to have been able to actually see her here, now 2.43 miles from her former home.

Severe thunderstorms seemed to hang over the mountains for the next few days, inundating the region with a lot of much needed rain. Between storms, Lynn had been able to check locations from the road. By Friday, 2 August, 4.6 had moved another tenth of a mile further up the drainage. She was headed in the right direction. She was headed back to the valley.

Late in the afternoon on Saturday, as I gathered materials for the next day, my office phone rang. It was Lynn. In and out of tears, she told me that she had found the entire transmitter package of 4.6 laying in the white stripe on the edge of the highway (Figure 4). The transmitter was still

Figure 4. Cracked transmitter package found on the highway.

working, and everything was there as if it had simply popped right off the turtle. But, it had a large, lateral, midline crack through the epoxy which exposed the transmitter, indicating that our turtle had taken a hard but glancing blow, probably while attempting to cross the highway.

I hardly knew what to say. My stomach was in a knot. The turtle might have survived the incident. They're tough creatures. After all, some of the other turtles have missing legs and seem to be getting along just fine. One of our other telemetry animals, a large male, has a very large and disfiguring, but completely healed crack in his carapace. Perhaps, at a young age, he had an encounter with a vehicle as well. Maybe she's still alive, and maybe someday we'll see her back at the bog. It was a very sad and difficult thing to have it all come to an end like this.

Two days later we were back at the site where the transmitter was found. On Saturday, Lynn and Maryn had gone after 4.6, but the signals were confusing. They seemed to be bouncing off the rock face along the road cut. Just by chance, Lynn had spotted the transmitter on the road. We spent some time searching the ditch, but much debris had accumulated there from the heavy rains. No shell fragments, no turtle.

Our turtle had taken us on a wonderful journey, a marvelous 37 day odyssey which had consumed us and captured our imaginations. During the journey, she taught us much about her species, and she provided us with pages of new, unanswered questions. She took us into a county where bog turtles were not known to occur, and she traveled much further than any bog turtle had ever been known to go. We would probably never know what stimulates such an animal to take off like this, and we would never learn exactly what her destination might have been, but from her, we learned much indeed. Now, although the book continues to be written, it was time to turn the page. This chapter had come to a close.

Without a word, Lynn handed me a blue file card which I will always keep. On it was written "Location for transmitter on the highway", along with the elevation and GPS coordinates. It was the final point.

## Private Lands, Public Access, and the Conservation Status of *Graptemys versa*

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The purpose of this note is to detail my experiences during fieldwork with the Texas map turtle, *Graptemys versa* (Figure 1), in Kimble County, Texas during 1998–2000. I started my investigation by visiting Baylor University's Strecker Museum which holds a collection of 42 *G. versa* collected on 30 April 1949 by retired Baylor biology professor Dr. Bryce C. Brown and two field assistants. They had collected the specimens by hand in shallow water between ca. 8:00 and 11:30 am at four dirt-road access points on a private ranch along the South Llano River in Kimble County. During my study, I found substantially fewer specimens than Brown. I also describe an apparent difference in abundance of the species between riverine habitats with and without public access, and speculate on the role of private lands in conserving this species.

Figure 1. *Graptemys versa* male (plastron length 72 mm) from the South Llano River in Kimble County, Texas.

I collected *G. versa* for 10 days in May 1998, 20 days in May 1999, and 16 days in June 2000 using unbaited fykenets, floating basking traps, and opportunistic hand captures. The area of study was located between and just downstream of two crossings of Texas Highway 377 between the towns of Junction and Telegraph (Figure 2). This stretch of river is immediately downstream (north) of the ranch on which Brown collected specimens in 1949 and appears to be similar habitat. The South Llano River has clear water that originates largely from springs. The river consists of distinct, alternating riffles and pools and occurs in the western part of the area known as Hill Country. I observed numerous canoe groups on the river, particularly on weekends, as the two highway crossings are convenient put-in spots for groups that float downstream to South Llano State Park.


Figure 2. Upstream crossing of Highway 377 on the South Llano River, in Kimble County, demonstrating public access.

In 1998 I worked alone and without the use of a canoe, covering the study area primarily by wading and by swimming across occasional deep pools. In 1999 I had four field assistants and in 2000 I had one. In both years we used a canoe to traverse the stream section between the highway crossings, and waded the section downstream of the lower crossing. We also frequently used snorkeling to search for turtles in various sections of the study site in 1999 and 2000.

A total of 83 captures (fykenets, N = 48; basking traps, N = 22; hand captures, N = 13) of 80 individual *G. versa* were made during the three years of study (average = 1.8 captures/day). Of the thirteen hand captures, there were four hatchlings captured in shallow water after they abandoned aerial basking sites, one adult female encountered on the highway, and eight adults first detected in shallow water (six males, two females; six in 1998, one in 1999, and one in 2000; 9.6% of all captures, average = 0.2/day) (Table 1).

Snorkeling produced neither captures nor even sightings of turtles in 1999-2000. Shallow-water hand captures were relatively more common for Texas river cooters (*Pseudemys texana*; 26 of 229 total captures, 11.4%) and stinkpots (*Sternotherus odoratus*; 17 of 74 total captures, 23.0%).

On 19 May 1999 a Texas Tech University herpetology class (ca. 10 students) taught by Llewellyn Densmore visited a private ranch on East Johnson Fork, a tributary of the Llano River, located 23 km east of the study site on the South Llano River. They waded a section of the stream with shallow, clear water and hand-captured three female and two male *G. versa*. I visited the site with the class and my four field assistants on 25 May 1999. In ca. 20 minutes on a stretch of stream < 300 m in length, we hand-captured two male and 15 female *G. versa* as well as three *P. texana* and one *Apalone spinifera* (spiny softshell turtle); we hand-captured an additional male *G. versa* ca. 0.5 km downstream. On 14 June 2000 one field assistant and I were allowed to search for turtles in the South Llano River on the ranch where Brown and his assistants had collected in 1949. In ca. two hours of searching we hand-captured two male *G. versa*. A return to the site on 23 June 2000 yielded no turtles. Hand captures on sites with private-land access points were relatively more common than hand captures on the main study site near the two highway crossings (Table 1).

We were able to capture every turtle that was detected by a person wading in shallow water, thus all capture numbers represent encounter numbers. These observations suggest three possibilities:

(1) a population decline has occurred over the last five decades in the South Llano River;

(2) the species is presently more abundant in Kimble County habitats that occur on private lands with restricted access than in habitats with frequent public access; and

(3) exploitation of the species for use as pets may be a contributing factor in both the historical decline of the species and its higher abundance on private lands.

Pet trade statistics for *G. versa* fail to accurately delineate the extent of commercial trade in the species. Data from the U.S. Fish and Wildlife Service indicate that over a quarter million *Graptemys* were exported between 1989 and 1997, but only 30% of these specimens were identified to species, with 0.03% being identified as *G. versa* (Telecky, 2001). Data on over 16,000 specimens taken from the wild in Texas for the pet trade in 1999, compiled from permitted collectors by the Texas Parks and Wildlife Department, list no *G. versa* and only two specimens of any species of *Graptemys* (C. Ceballos, pers. comm.). In any event, most exploitation by recreational users of the river is not commercial and so would not be counted in pet trade statistics. Canoeists and fishermen would probably have little difficulty hand-capturing a *G. versa* in shallow water should they encounter one and they likely take occasional specimens home to keep as pets. Garber and Burger (1995) described an example of the correlation of increased public use of a natural area with the decline and local extinction of *Calemys insculpta*, the wood turtle, a turtle species highly valued by people who keep wild turtles as pets.

There is obviously much unexplained variation in encounter rates of *G. versa*, including most prominently the fact that more encounters occurred during 1998 than in 1999 or 2000, despite longer periods of study in the latter two years with more participants and the addition of snorkeling. It is possible that encounter rates are depressed following experience with collecting effort as a result of a change in turtle wariness, which might at least partially explain the differences in encounter rate both among the three years of study and among various sites (but probably not the difference between 1949 and more recent years). Neverthe-

Table 1. Hand captures of *Graptemys versa* encountered in shallow water on the South Llano River and East Johnson Fork, Kimble County, Texas.

| | | | Number of Searcher | | Number | Captures searcher$^{-1}$ |
|---|---|---|---|---|---|---|
| Year | Site | Access | searchers | days | captured | day$^{-1}$ |
| 1949 | South Llano River | Private ranch | 3 | 1 | 42 | 14.00 |
| 1998 | South Llano River | Highway bridges | 1 | 10 | 6 | 0.60 |
| 1999 | South Llano River | Highway bridges | 5 | 20 | 1 | 0.01 |
| 1999 | East Johnson Fork | Private ranch | 10/15 | 2 | 23 | 0.92 |
| 2000 | South Llano River | Highway bridges | 2 | 16 | 1 | 0.03 |
| 2000 | South Llano River | Private ranch | 2 | 1 | 2 | 1.00 |

less, any future investigation of the population status of this species, or of any other turtle species inhabiting the shallow clear streams of southcentral Texas, would benefit from consideration of the hypothesis that private lands with restricted access act to buffer aquatic turtle species from recreational and commercial exploitation.

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## Seychelles Chelonia in 2002

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The Seychelles Islands are home to four genera and seven living species of breeding Chelonia, representing the Cheloniidae, Pelomedusidae and Testudinidae. 200 years of human habitation has had a major impact on the turtles, tortoises and terrapins through direct consumption, export and habitat loss. There have been some advances in chelonian conservation in the islands, most notably with the Aldabra tortoise *Dipsochelys dussumieri* (frequently but incorrectly called *Geochelone gigantea*, and sometimes *D. elephantina*). It has received various forms of protection on Aldabra for nearly 100 years and its numbers have now recovered to some 100,000 wild individuals. Marine turtles have received full protection since 1992 and there are several secure nesting sites for both green (*Chelonia mydas*) and hawksbill (*Eretmochelys imbricata*) turtles. 2002 proved to be a particularly significant year for the conservation of several species.

**Marine Turtles**

Marine turtles are threatened primarily due to the loss of nesting beaches on the larger islands as a result of development (this applies mainly to the hawksbill turtle) and poaching of green turtles in the outer islands. Increases in the number of hawksbill turtles nesting on protected islands such as Aride (66 in 2002/3) and Bird Island (170 in 2000/1) and conservation managed private islands like Cousine (82 in 2001/2) and Fregate (11 green turtles in 2001/2) offer some hope for their long-term survival (Figure 1).

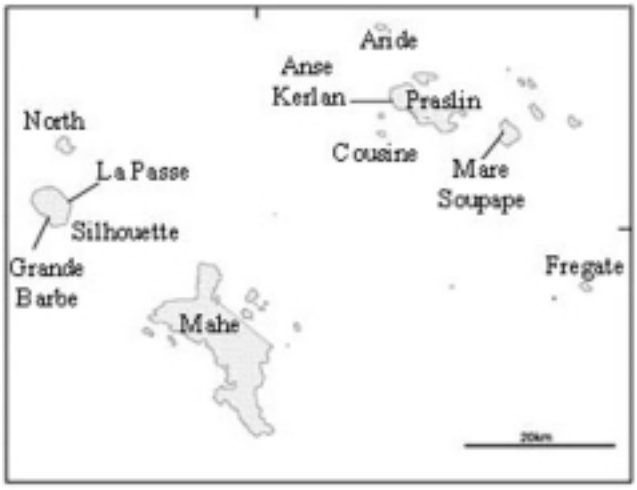


Figure 1. A map of the Seychelles.

Since 1997 the Nature Protection Trust of Seychelles (NPTS) has monitored the number of turtles nesting on the third largest island, Silhouette, largely through information provided by island residents and tourists on the east side of the island. Hawksbills have been recorded in small numbers (approximately 20 nests per year) and green turtles only very rarely. The west of the island is too isolated to allow regular monitoring access; a visit to the largest beach, Grande Barbe, just before the peak of the nesting season in December 2002 recorded 35 recent hawksbill nests and an estimate of 115 nests for the whole season. This suggests that Silhouette may make a more significant contribution to hawksbill conservation than has previously been assumed.

**Terrapins**

Seychelles terrapins, also known as African side-necked mud turtles, were first studied in detail in 1996. That project and more recent work has determined that the black mud turtle *Pelusios subniger parietalis* and the chestnut-bellied mud turtle *P. castanoides intergularis*, the two subspecies endemic to the Seychelles, are Critically Endangered (Gerlach & Canning, 2001). The 1996 study identified habitat loss and predation as the main causes of the current critically low populations and proposed habitat protection, captive breeding and reintroduction as measures needed for conservation. The field study also provided preliminary ecological data, determining that *P. subniger* is a marsh inhabiting species whilst *P. castanoides* is primarily riverine, favoring slow-flowing rivers in coastal woodland.

In 1997 the Seychelles Terrapin Conservation Project was started by the Nature Protection Trust of Seychelles (NPTS) with the approval of the Seychelles Ministry of Environment. In July 1997 four long-term captive *P. subniger* (one male, three females) and four wild *P. castanoides* (one male, three females) were acquired from Mahé island. A further female *P. subniger* and a male *P. castanoides* were donated to the project later in the year from an unknown locality on Mahé.

The first remains of *P. subniger* eggs were found in 1998 and intact eggs were found in 1999; all eggs were laid in the water and varied in weight from 7.0-9.0 grams. Courtship was observed in *P. subniger* in September. Towards the end of the year the breeding pond was occupied by one female and two males; the others remained on land. This declined to a single male in the pond by January 2000. It was

concluded that aggression by a dominant male was keeping the other males out of the water. The additional males were moved to a new pond. A clutch of damaged eggs was found in the pond on 22nd December 1999. A shallow pond was constructed in January 2000. This enabled possibly gravid females to be kept in isolation and to allow regular checks for eggs before they became waterlogged. Ten eggs were laid in January and incubated. The first hatchling was produced on 3rd March after an incubation period of 47 days. Further clutches were obtained in 2001 with nine eggs hatching. In 2001-2002 mating was observed in November-December. Eggs, laid in December-February, hatched in January-March. Hatchlings weighed 5.0-6.5 g.

In contrast to *P. subniger*, *P. castanoides* has proved difficult to breed. Group compositions were continually altered until 2001 when a successful system was developed. The males are now kept together and the females rotated between the ponds. Competition between males appears to be needed for successful mating. In 2002 two females laid eggs in naturally constructed nests (Figure 2), unfortunately the incubation humidity appears to have been too high for this species and although four eggs started developing, all died before hatching. This problem can easily be corrected for future clutches.

The Seychelles Terrapin Action Plan was published in 2002 (Gerlach, 2002a). This proposes the following actions:

1. Secure sites through agreement with land owners – requiring the agreement of government and landowners to secure the future of key existing sites.

2. Secure Anse Kerlan population – investigate the status of the last population on Praslin Island and reintroduce to secure areas as necessary.

3. Restore Mare Soupape – remove water lettuce from the main marsh on La Digue.

4. Reintroduce populations – establish new populations on Silhouette and North Island.

5. Reduce alien threat – eliminate alien water weeds and remove red-eared sliders.

6. Taxonomic investigation of *P. seychellensis* – requiring a DNA study.

7. Review progress – five and ten year reviews of progress on the action plan.

Figure 2. *Pelusios castanoides* nesting.

Implementation of the action plan started straight away with the experimental release of five *P. subniger* (2 males, 3 females) at Grande Barbe, Silhouette (Gerlach, 2002b). All five released terrapins were fitted with radio-tags (Figure 3) sponsored by the British Chelonia Group (BCG) and tracked for six months. All released terrapins survived the first six months; one was observed nine months later. The first release of juveniles occurred in March 2003. It is hoped that *P. castanoides* will be available for reintroduction to Grande Barbe in 2005.

A visit to Praslin Island in October 2002 allowed the status of the Anse Kerlan population to be investigated (item 2 of the Action Plan). This had been a major population of both species until 2000 when the marsh was almost entirely drained for an airport extension and the golf course of the Lemuria Resort. The golf course appeared to offer suitable and secure (although highly modified) terrapin habitat and the management at Lemuria was keen to host such a population. Accordingly, the 2002 visit investigated the survival of terrapins at Lemuria. *P. subniger* was present in the brackish coastal marshes but no evidence of *P. castanoides* survival could be found. An isolated relict area of the original marsh was found which might harbor a few individuals. As this area is likely to be drained by adjacent housing developments this offers an opportunity to transfer any surviving *P. castanoides* to the secure habitat at Lemuria. So far attempts to locate surviving *P. castanoides* on Praslin have failed.

2002 also resulted in a sighting of an unusual terrapin that resembled the apparently extinct endemic Seychelles terrapin *P. seychellensis*. This species is known from only three specimens collected on an unknown island in 1895 and remains an enigma with apparent close relationships to west African terrapins. A single individual resembling this species was found in a highly polluted marsh area known to support a small *P. castanoides* population. The possibility of a surviving individual of this enigmatic species prompted an investigation of the marsh, funded by the BCG and the Turtle Conservation Fund. Intensive trapping of the small area resulted in the capture of three terrapins, corresponding to the three individuals that had been observed

Figure 3. *Pelusios subniger* with radio tag prior to release.

previously. All three were identifiable as *P. castanoides* although one showed some *P. seychellensis* traits and may have been the terrapin observed earlier. A blood sample was collected from this individual for a DNA study of *Pelusios* phylogeny. This was initiated in 2002 and analysis is currently being carried out on *P. subniger parietalis, P. c. castanoides, P. castanoides intergularis, P. niger, P. adansonii* and samples of the type specimens of *P. seychellensis.* This possible *P. seychellensis* site will be trapped at future opportunities in 2003 in case the '*P. seychellensis*' individual was overlooked despite what is believed to have been a very thorough investigation.

A visit to Fregate Island in July 2002 confirmed that a high-density population of *P. subniger* is present. In addition a single male *P. castanoides* was found. Subsequent trapping and searches have located only one more male of this species and it is suspected that these are the last survivors of a population that has declined following habitat change. We have been invited to reintroduce further individuals to re-establish a breeding population in restored habitat.

**Tortoises**

The NPTS Seychelles Giant Tortoise Conservation Project started in 1997 following a morphological and preliminary DNA study indicating that a small number of Seychelles (*Dipsochelys hololissa*) and Arnold's (*D. arnoldi*) giant tortoises were alive in Seychelles (Gerlach & Canning, 1998). In July 1997, six *D. hololissa* (3 adult males, 1 adult female, 1 juvenile female, 1 juvenile male) and a single pair of *D. arnoldi* were moved to breeding facilities on Silhouette island. A further 2 male and 2 female *D. arnoldi* were obtained in 1999.

The first clutch of eggs was produced in 1999 (*D. arnoldi*) but proved to be infertile. Between 1999 and 2002 four females laid 291 infertile eggs. In 2002 two fertile clutches were obtained, with the first *D. hololissa* egg hatching on 6th November. A second egg of this clutch hatched on 11th November. A *D. arnoldi* clutch resulted in three hatchlings on 12-17th December. All these eggs hatched from eggs artificially incubated at 29-30°C. Eggs from the same clutch reburied in the ground (in a secure area) did not hatch and crabs predated all eggs left in the natural nests. These hatchlings of the two species are notably different from each other and from the Aldabran tortoise (*D. dussumieri*). Despite hatchlings normally being morphologically conservative there are clear differences in some scute proportions, and the general shape and coloration differ very clearly. *D. hololissa* hatchlings are dark brown and very broad (Figure 4). *D. arnoldi* hatchlings are higher, narrower and broad at the front, and a very distinctive pale brown (Figure 5). In contrast, hatchling Aldabran tortoises are evenly domed and black. These differences will be described in full in a forthcoming publication (Gerlach & Bour, 2003). These hatchlings are very encouraging for the project as they offer the first real hope of the future of these species. Although we have studied the morphology extensively and since the publication of the morphological review in 1998 have maintained that these are distinct species it has been difficult to get wider support. Unfortunately, the published DNA studies have failed to provide any meaningful results. These indicate only that all the living tortoises have a recent common origin but are unable to say anything conclusive about relationships. This may result from divergence having occurred too recently to be detectable by conventional molecular studies as has been found in an increasing range of animals. A recent investigation has found significant differences in a less frequently studied sequence (with variations of 0.6-4% between all three species), suggesting that the published studies may have excluded the informative, evolving DNA. Despite these frustrations the hatchlings now demonstrate unequivocally that *D. hololissa* and *D. arnoldi* are distinct taxa and, as such, their conservation is worthy of more international support.

The achievements of 2002 suggest that there may be a bright future for Chelonia in Seychelles with continued conservation effort. Reintroduction of terrapins in secure

Figure 4. *Dipsochelys hololissa* hatchling.

Figure 5. *Dipsochelys arnoldi* hatchling.

areas is now in progress and the long-term survival of *Pelusios subniger* and *P. castanoides* should be secured in the foreseeable future. *P. seychellensis* may be extinct already but at least there is some hope that we may soon resolve its taxonomic position. Captive breeding of the giant tortoises now raises the possibility of re-establishing them in the wild. The focus for NPTS planning of Chelonian conservation projects is now focussed on the Grande Barbe marsh area on Silhouette. This isolated part of Silhouette is very rarely visited and in the future the tortoises would add to the reintroduced terrapins and the existing large hawksbill turtle population to make this a wonderful haven for the Seychelles Chelonia.

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## Management of Confiscated Indian Star Tortoises at the Singapore Zoological Gardens

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The Indian Star Tortoise, *Geochelone elegans*, can be found in the semi deserts, dry savannahs and tropical deciduous forests of India and Sri Lanka. Habitat destruction and poaching continue to cause declines in wild populations. They are listed under Appendix II of CITES and protected under the Indian Wildlife Act of 1972. It is still estimated that 10–20,000 are illegally collected from the wild every year to meet pet trade demands around the world. Many of these tortoises are smuggled into South East Asia.

Between April and August 2002, the Agri-Veterinary Authority (AVA) seized three large illegal shipments of Star Tortoises at Singapore's Changi Airport. The first shipment of 334 tortoises, weighing 45 kg, was seized on April 3, 2002. The animals had been packed tightly into a large suitcase. This shipment was handed over to the Singapore Zoological Gardens. The second shipment of 1011 hatchlings was seized on June 28. The Zoo refused the animals until assurance was given by AVA that arrangements were being made to repatriate the tortoises to India. On July 31, a third shipment of 1095 star tortoises weighing approximately 80 kg was intercepted by AVA. These were sent to the Zoo on August 8 to be included in the repatriation operation.

The Singapore Zoological Gardens and the Indian based ZooOutreach organization in collaboration with the legal authorities of both countries arranged for the tortoises to be sent to the Nehru Zoological Park, Hyderabad. The Singapore Zoo took on the responsibility of caring for and conditioning the tortoises prior to shipment.

Each confiscated group of tortoises received different care. Each time the previous husbandry techniques were improved upon.

The first group of tortoises were sent directly from Changi Airport to the Singapore Zoo where they were first housed in the Small Animal Quarantine area for 42 days, then transferred to the reptile section of the Zoo. While in quarantine the tortoises were kept in a sheltered outdoor enclosure with a sand substrate. The tortoises had access to a number of shallow trays of water and were fed daily. After 6 weeks in quarantine these tortoises were transferred to the reptile section of the Zoo. Mortality while under the care of the reptile section was high, but is not discussed here.

The second group of tortoises was initially held at an AVA facility for 2 weeks. The surviving 530 were then sent to

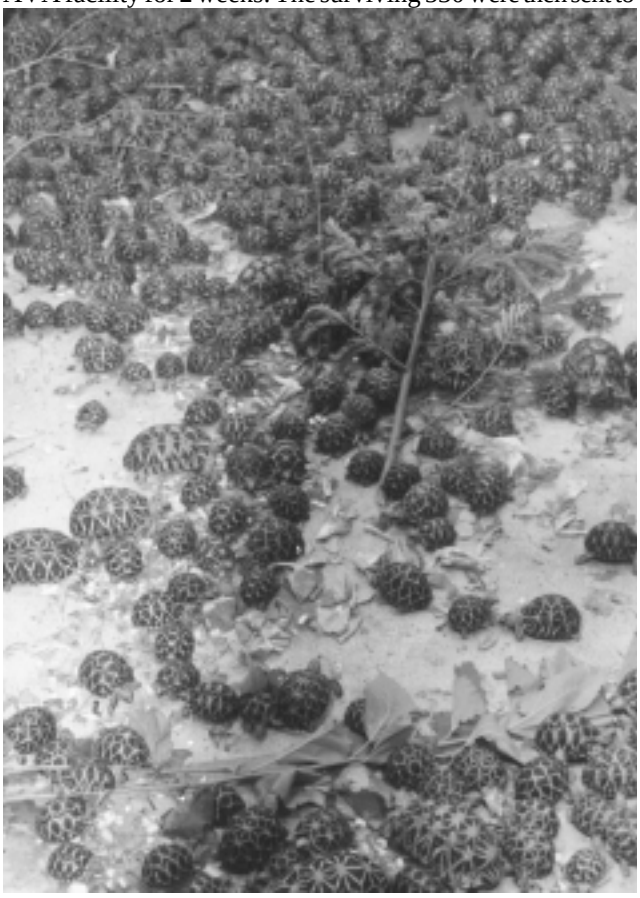

Figure 1. Indian Star Tortoises from group 3 recovering at the Singapore Zoological Gardens.

the Singapore Zoo. These tortoises weighed 30 - 40g and were housed (40 together) in 40 x 50 cm plastic trays with newspaper lining. The trays were kept in an outdoor enclosure that was sheltered from rain but had natural sunlight throughout the day. The newspaper lining was changed daily. These tortoises were soaked in a shallow basin of water for 5-10 minutes every 2-3 days.

The third group of 1,090 tortoises were housed at an AVA facility for eight days while the Zoo made arrangements for a suitable enclosure in the quarantine building. At the Singapore Zoo these tortoises were housed in an outdoor enclosure with a cement floor. This enclosure was sheltered from adverse weather. The enclosure was thoroughly cleaned daily and food and water provided in shallow trays.

Achieving very low mortality rates was one of the most satisfying aspects of the operation (Table 1). Group 2 had the lowest mortality probably the result of three factors. First, since the tortoises were kept in small groups it enabled them easier access to food and reduced contact with feces. Second, cleaning the trays daily provided the opportunity to check each individual so that sick tortoises were identified early and could be isolated and treated before the illness became more serious. Finally soaking the tortoises every two to three days (rather than providing bowls of water in the trays) kept the trays not only drier but also cleaner as the tortoises tended to defecate in the water while being soaked.

When comparing the mortality rates of groups one and three, which were housed in the same enclosure but with different substrate, we found that group three had lower mortality despite a group size over three times that of group one. The concrete surface used for group three could be thoroughly cleaned and would dry more quickly than the sand surface. This greatly reduced tortoise contact with moisture and feces. This is particularly important in consideration of the humid environment of Singapore.

Another factor that is likely to have affected the mortality rates between the three different groups is the condition of the animals on arrival. Initial mortalities (deaths that occur in the first one to two weeks) are generally unavoidable and can usually be attributed to the poor initial condition of the animals. This may account for group one and three having higher mortality rates in the first 1-2 weeks than the following weeks. As group two was held by AVA for the first two weeks the initial mortalities are not represented on this table, however it should be noted that within these two weeks nearly 50% of the tortoises died.

While temperatures in Singapore are similar to that of the Star tortoise habitat in India, the humidity and rainfall is much higher. As a result the main cause of illness appeared to be pneumonia. Due to the large number of tortoises it was often difficult to identify sick individuals prior to death. Tortoises identified with symptoms such as labored breathing, discharge from nostrils, lethargy, lack of appetite, closed puffy eyes etc. were separated from the main groups for treatment. Treatment consisted of Baytril at 10mg/kg and better hydration (daily soaking). Isolating the sick animals from the main group reduced the likelihood of infecting healthy animals. Keeping the sick animals in small groups also allowed for better care.

Prophylactic measures included triage of sick tortoises and deworming. The worming agent (Fenbedazole) was added to the food for 5 consecutive days at a dose of 50 mg/kg (using cumulative weight of the animals in a group). While fecal tests were still not negative at the time of departure we expect that the parasite load was reduced. The second group of 528 star tortoises was dewormed as above and individually with injectable Levamisole 10mg/kg. Fecal samples remained positive even after this treatment.

On the August 22, 2002 over 1800 Star Tortoises were shipped to Nehru Zoo, Hyderabad, India. This provided an excellent opportunity to increase pubic awareness on the issues of the illegal pet trade in Singapore. While the confiscations had been covered in the news previously, having a positive story about 'sending them home' appeared to have a greater public response. The story was shown on the news of all the Singapore TV stations and covered in most papers as prime news.

While the future of the tortoises was still uncertain when they left Singapore, we believe that the efforts of all those involved in coordinating this project made a difficult situation a positive and rewarding experience. With the experience gained and the network of contacts established from this event, future seizures of smuggled animals can be met with greater confidence and repatriating the animals (where possible) can be organized with greater efficiency. Thank you to all those involved.

Table 1: Cumulative mortality rates expressed as a percentage of the original group number. (Preshipment column includes mortalities under care of Reptile Section prior to shipment).

| | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 | Week 6 | Preshipment |
|---|---|---|---|---|---|---|---|
| Group1 | 2.10% | 2.10% | 2.10% | 2.69% | 3.29% | 4.49% | 38.02% |
| | 7/334 | 7/334 | 7/334 | 9/334 | 11/334 | 15/334 | 127/334 |
| Group2 | 0.00% | 0.00% | 0.19% | 0.38% | 0.38% | 0.57% | |
| | 0/528 | 0/528 | 1/528 | 2/528 | 2/528 | 3/528 | |
| Group3 | 0.55% | 0.83% | NA | NA | NA | NA | |
| | 6/1090 | 9/1090 | NA | NA | NA | NA | |

# A New Thread-Trailing Method for Small Tortoises in Densely Structured Habitats

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Many researchers have used thread-trailing in order to gather data on the movement of tortoises (i.e., Hailey and Coulson, 1996; Loehr, 2002; Marlow and Tollestrup, 1982). In contrast to radio-tracking, thread-trailing can reveal details about exactly where and how far animals travel. Basically, the method has remained unchanged in the past decades: A suitable amount of thread is fixed on the carapace of a tortoise, and the unwound thread resulting from tortoise movements is followed at a later time. Marginal changes include the use of thread cocoons rather than spindles, and fixing the thread directly on the shell rather than in a device, to reduce weight (i.e., Díaz-Paniagua *et al.*, 1995; Keller *et al*., 1997; Loehr, 2002).

In its current configuration, the method is not really suitable for very small or depressed tortoises when they travel a lot in densely structured habitats. Once the thread is attached to the carapace of a small or depressed tortoise, the animal's contour changes dramatically; the shell is no longer streamlined. In one thread-trailing study, *Homopus signatus signatus*, the world's smallest tortoise, was obviously slowed down when attempting to move through dense vegetation or under rocks (personal observation). This may have contributed to the short movement distances recorded for this species in spring (Loehr, 2002). The type of refuge used may also be affected.

## New Method

In 2002 a new thread-trailing technigue was tested on *H. s. signatus*. In this method the thread cocoon was trailed some distance behind the tortoise, instead of attached to the carapace. One end of a small plastic stick (diameter 3 mm) was flattened with a soldering iron. The last 2 cm of the other end was curved approximately 45°. A quick-setting (60 s) epoxy was used to glue the flattened end to the plastron with the curved end pointed upwards. The stick should be positioned next to, and not under, the tail (Figure 1), thus allowing the tortoise to mate and nest. A syringe large enough to hold a thread cocoon of sufficient length (180 m, in this case) was connected to the plastic stick by means of 2.5 cm of rubber hose (diameter 5 mm) (Figure 2). This hose had an internal diameter that allowed a tight connection with the syringe and plastic stick. A plastic plug with a small hole in it was used to close the open end of the syringe. As the tortoise moved the thread was pulled through the small hole as the cocoon unwound from the inside. The end of the thread was stuck between the syringe and lid to prevent the tortoise from running out of thread. The thread was renewed by simply replacing the entire syringe.

## Preliminary results

When viewing the tortoise from the front, the animal's contour remained almost completely unchanged by the new thread-trailing device. Furthermore, the rubber hose acted as a flexible hinge, allowing the animal to make sharp turns curves and go through low passages. This allowed easy moving through dense vegetation and around objects (i.e., rock crevices).

The thread-trailing method was tested in two situations. First, a trailer was attached to one female tortoise in captivity (indoors), but no cocoon was placed in the device. The tortoise carried the device for four weeks. No deviant behavior was noticed during this period. Moreover, the female dug a nest and produced an egg in normal fashion (for a description see Loehr, 1999) while the trailer was attached.

Between 13 September and 6 October 2002, nine wild female tortoises were fitted with thread-trailing devices, and followed for an average of 10.8 trailing days. The results of this test were less positive, with tortoises becoming

Figure 1. Adult female *Homopus signatus signatus* showing the location and angle of the plastic stick on the plastron.

Figure 2. The described thread-trailing device, showing the flexible hinge between plastic stick and syringe with cocoon.

entangled in the thread on eight occasions. However, on only one occasion was a tortoise entangled in the thread-trailing device. In all other instances tortoises had walked the same trail for several times, and the thread had become stuck around the extremities of the specimen concerned.

**Conclusions**

The trailing method introduced here might work better for small tortoise species than the previously used methods, but the success will also depend on the movement pattern of the species. It needs testing on a wider variety of species. These preliminary results suggest that the limited success using this method in wild female *H. s. signatus* results from the movement pattern of the species, rather than the thread-trailing method.

**Acknowledgements**

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## Preliminary Results of A Long-Term Conservation Project on *Emys orbicularis* in an Urban Lake in Budapest, Hungary

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The European pond turtle, *Emys orbicularis,* is a widely distributed species, whose range extends from Latvia to Greece and from Spain to Lake Aral in Kazakhstan (Gasc, 1997). In central/eastern Europe, typical habitats of this turtle are slow-flowing rivers or streams, and lowland marshes, swamps and bogs (Fritz, 2001). In Hungary, observations at altitudes ± 300$^+$ m above sea level have been reported (Szabó, 1956; Solti and Varga, 1984; and Kovács, 2002). Human introduction is generally considered the likely source of these populations, even though records from ± 1000 m are not uncommon in the southern part of the species' range (Albania, Bulgaria, Italy, Spain). However, there is a definite paucity of information about the distribution of this species in Hungary (Dely, 1978; Farkas, 2000).

Although IUCN (2002) lists this species as Lower Risk/ Near Threatened globally, survey reports show decreasing populations in several parts of its range. They are classified as endangered in Austria, the Czech Republic, Germany, Lithuania, Poland, Slovakia, Slovenia and Spain (Honegger, 1981; Fritz, 2001; Mascort, 1998). Péchy and Haraszthy (1997) emphasized that populations in Hungary are decreasing even in habitats where all factors seem to be optimal for their survival. On the other hand, verbal accounts from national park staff and NGO members are more optimistic regarding the resistance of the European pond turtle to human impact. For example, introduced specimens may establish viable populations in (sub)urban areas through feeding by residents (mainly in central and western Europe), and by feeding on large fish stocks (chiefly in eastern Europe) that can constitute part of their diets. In this latter region many artificial fish ponds and lakes were constructed in the suburbs of large cities.

**Study Site**

Naplás Lake, Budapest's largest lake, is located on the eastern outskirts of the city in District 16. This reservoir was built in 1971 by retaining water from the Szilas stream. Due to continuous recharging of groundwater, the lake contributes to the maintenance of nearby marshes and willow swamps that originally characterized the stream valley. The lake and surrounding area (150 ha territory) were declared protected in 1997 (Figure 1). This means that it can not become an official recreation area or filled in for other land uses, but otherwise human activity is wholly unregulated. Fishing

Figure 1. Aerial photograph of Naplás Lake.

(especially angling) is currently the main recreational use of the area. Fishing sites occupy the southern and western banks, while extended willow swamp and reedbed comprise the north, with approximately 300 $m^2$ open water in the center. Here, water is very shallow (20-40 cm) but, due to extensive shading by riparian vegetation, water temperatures rise slowly. While this area is partly isolated from humans, dogs penetrate the thick reed and sedge vegetation and may be the main predators of the turtles.

The protected natural zone around the lake is small (only 300 m wide), although it does extend 1200 m up the stream. This provides an extremely limited number of basking and/or egg-laying sites under the shadowy forest and reedbed.

**Materials and Methods**

WWF Hungary initiated a national survey of pond turtle populations in 2002. As part of the project, Naplás Lake was designated as a model site where comprehensive conservation efforts were to be concentrated. The main goals were to: i) determine population size, ii) identify threats, and iii) delineate the foraging area. Here, we present the results of our survey as reported to the official environmental authority during the project's initial year.

Population size of *E. orbicularis* in Naplás Lake was estimated using capture-recapture methods. Turtles were collected by hand or with steel cage-traps (60 x 80 x 100 cm) similar to those used for traditional fishing. Each trap had two entrances (10 x 15 cm), and one circular opening for removing the animals. Pig liver and/ or canned fish were used as bait. Traps were set in both the swamp and the open part of the lake adjacent to the reedbed. Small V-shaped notches were cut into the marginals of captured individuals. The following parameters were recorded for each turtle: sex, straight length and width of carapace and plastron, damage, and apparent signs of illness. The gravid state of females was determined by feeling the abdomen through the inguinal region between the hindleg and bridge.

Between July 1 and September 30, three animals were monitored with radiotelemetry. Transmitters, weighing approximately 8 g, were attached to the highest point of the carapace. A special rubber string was wound four to five times around the shell to safely fix the transmitter onto the animal. Tracking was conducted three times a week. On five separate occasions, location was determined every three hours for a 24 hr period to determine daily movements. Both the transmitters and the receiver were produced by Televilt®.

**Results and Discussion**

Between 25 February and 30 September 2002, a total of 65 turtles were caught (59 *E. orbicularis*; 6 *Trachemys scripta elegans*). The first *E. orbicularis* was encountered February 25. This is the earliest reported emergence in Hungary (Farkas, 2000). Only four *E. orbicularis* < 100 mm carapace length (CL) were collected (Figure 2), although seven gravid *E. orbicularis* and two gravid *T. scripta elegans* females were recorded.

The observed size distribution could indicate that survivorship of young turtles is low, probably due to high predation pressure. Foxes (*Vulpes vulpes*) are common on the edge of Hungarian cities. Large opportunistically predatory birds, including the magpie (*Pica pica*) and jay (*Garrulus glandarius*), are also frequent visitors to the lake. In addition to natural enemies, feral and stray dogs can be another source of danger.

Young turtles are much less likely to be captured in aquatic traps than are adults and once they leave the nest they are usually not seen as often as adults (Frazer *et al.*, 1990). Therefore assessing survivorship of young turtles is difficult and these results are best seen as preliminary.

In our sample of *E. orbicularis*, males clearly predominated in size classes < 170 mm CL (Fig. 2). Overall, the sex ratio was 2.6:1 in favor of males (73.4% of the population). The size at which sexual maturity is attained by Hungarian pond turtles is unknown. Data from other parts of the species' range indicate that males mature at 110-145 mm CL, females at 118-170 mm CL (Fritz, 2001). Contrary to Farkas *et al.* (1998), who reported the largest male ever substantiated by a voucher specimen to measure 164 mm CL, we caught a huge male of 190 mm CL.

This population of *E. orbicularis* appears to have high home site fidelity and a much higher activity level during the mating season. From April to May, 53% of the animals were caught in the open lake. This decreased to 31% in June and July. By August and September all animals were collected in the swamp (95 $m^2$). The turtles tracked with radiotelemetry for 24 hr periods in August also stayed in the swamp. Similar home fidelity was deduced experimentally by Lebboroni and Chelazzi (2000), who pointed out that displaced pond turtles had a very high homing success, and did not easily settle in foreign water bodies.

A number of injuries were detected on both species. These included: bites on the carapace or plastron (n=13),

maimed tail (n=7) and limbs (n=4), abscess from an earlier wound on the head (n=4), fishing hook in the jaw (n=2), and carapace crushed by vehicle (n=1). These wounds also argue for a high predation pressure on the Naplás Lake turtle community.

The origin of *T. scripta elegans* in Naplás Lake is unambiguous. This North American native was imported by the millions to Europe for the pet trade, until banned by the European Union at the end of 1997 (Bringsøe, 2001). According to rough estimates from an anonymous reptile trader, interviewed in 2002, tens of thousands of red-eared sliders were imported to Hungary annually. These were usually sold as hatchlings since their coloration and size made them more attractive for keeping as a household pet. A few years after purchase many were released into (semi)natural waters of usually inferior ecological value (e.g. Farkas, 1997, 2001). Recently passed regulations no longer allow the import of red-eared sliders into Hungary (The Prime Minister's Office, 2002). Large *T. scripta elegans* with old, healed injuries, and gravid females suggest that this alien taxon successfully hibernates and perhaps reproduces in natural waterbodies in Hungary. Specimens were found with a thick, dead layer of algae on their shell in early spring. The algae most likely settled on the carapace the previous year and died over the winter period. All six sliders were caught during April (with two recaptured later). It is unlikely that they would all have been simultaneously released this early in the season.

**Conclusion**

The following conclusions can be deduced from the preliminary results of the one-year survey of the Naplás Lake pond turtle population. Although *Emys orbicularis* spends much of its foraging time in a less disturbed part of the lake, occasional movements to the open water body, mainly during the breeding season, can lead to considerable anthropogenic damage to the animals. Both the restricted number of potential nesting sites and the high level of predator activity are probable causes for low juvenile survivorship. Artificial breeding sites aiding population recruitment must be established and protected by a protective enclosure. Moreover, further research is recommended to determine the status of both *E. orbicularis* and *T. scripta elegans* in other urban locations within Hungary.

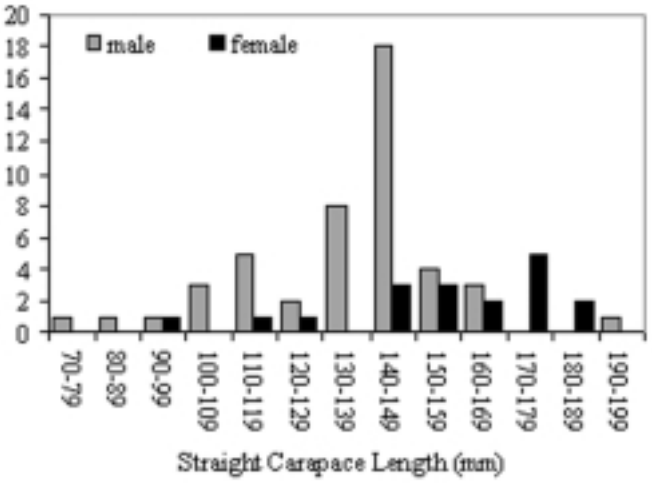


Figure 2. Size categories of captured *Emys orbicularis*.

**Acknowledgments**

The Hungarian Ministry of Environment and Water sponsored our project. We are indebted to all volunteers for assistance in the field, and to Drs. Uwe Fritz (Dresden) and Peter Paul van Dijk (Hoenderloo) for commenting on an earlier version of the manuscript. Mention of commercial products does not constitute endorsement or recommendation for use.

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## The Chinese Softshell Turtle Established in the Philippines?

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The Chinese softshell, *Pelodiscus sinensis* (Wiegmann, 1834) (*sensu lato*), is one of the most widely distributed species of trionychid turtle. Its natural range includes Russia between the Ussuri and Amur River drainages, extreme southeastern Siberia, adjacent Korea, and China from Heilongjiang Province to Taiwan and Hainan Dao. It is apparently absent from Xizang (= Tibet), Qinghai, Xinjiang and Ningxia autonomous regions (Zhou and Zhou, 1992), and northern Vietnam (Iverson 1992; Ernst, Altenburg and Barbour, 2000). It has been introduced to the Hawaiian Islands, Guam, one of the Bonin Islands and Timor (McKeown and Webb, 1987; Ernst, Altenburg and Barbour, 2000). The Japanese population as a whole appears to be of mixed origin (Ota and Sato, 1997).

*Pelodiscus sinensis* is farmed extensively in China (Lau and Shi, 2000), Taiwan (Chen *et al.*, 2000), Thailand (van Dijk and Palasuwan, 2000), and possibly Vietnam (Hendrie, 2000). Rearing-farms that raise hatchlings imported from these countries exist in at least Peninsular Malaysia, Sarawak and Sumatra. This may represent a potential invasive species problem since "some farmed softshell turtles escape and may establish feral populations" (van Dijk *et al.*, 2000).

The earliest record of *P. sinensis* in the Philippines by Siebenrock (1909) and de Rooij (1915) date back to Casto de Elera (1895) (Taylor, 1920). This was based on a single specimen collected at the Batanes Islands, and then deposited in the University of Santo Tomás Museum. This specimen is no longer in existance. Das (1996) observed that Casto de Elera listed many turtle species from the Philippines that were "totally undocumented", and "far out of their known geographical ranges".

We wish to report *P. sinensis* from the Philippines on the account of a live specimen housed at the Museum of Natural History, University of the Philippines at Los Banos, Los Banos, Laguna, Luzon Island (Figure 1). The specimen was collected in Lake Bunot, San Pablo, Laguna, Luzon. The turtle is a young male with an approximate carapace length of 15 cm (no measurements were taken). The leathery carapacial margin of this individual was heavily mutilated, most probably by conspecifics.

According to a market survey conducted by Emerson Sy, some farmers in Mindoro buy and raise hatchlings of this alien species, and sell them to a retailer at Arranque Market in Manila after they have reached a marketable size (Figure 2). Wholesale prices for *P. sinensis* average PhP 450/kg ($8US/kg) and retail PhP 600/kg ($11US/kg)). We believe that our specimen had accidentally escaped from a keeping or rearing facility, and has not been purportedly released to gain merit, a practice common in Buddhist countries (Smith, 1931; Farkas, 1999; and van Dijk and Palasuwan, 2000). As such, it does not substantiate the natural occurrence of *P. sinensis* in the Philippines. Nevertheless, the existence of established feral populations at several locations (e.g. Rizal, Bulacan, Laguna and Nueva Ecija) and Mindoro is very likely.

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Figure 1. *Pelodiscus sinensis* caught in Bunot Lake. Photo by Emerson Sy.

Figure 2. Chinese softshell turtles being transported from rural Mindoro to Manila. Photo by Emerson Sy.

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# Community Awareness Materials for Asian Turtles

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A number of delegates to a public forum on wildlife trade at the Melbourne Zoo, Australia, in July 2001, were so inspired by the presentations on the Asian turtle crises that they decided to take action. They created PACT – Positive Action Conservation Team. In partnership with Melbourne Zoo, PACT members developed a series of color posters and supported translation of a children's book to help raise community awareness of the threats to Asian freshwater turtles in China and Vietnam. The color posters (Figure 1) measure 29 x 42 cm and are bannered by the statement "After 200 million years …… we could lose them forever! Their future is in your hands."

The posters were produced in Melbourne in August 2002. The original artwork, featuring two Golden Coin Turtles (*Cuora trifasciata)*, was donated by a local wildlife artist, Dawn Stubbs. Members and colleagues of PACT were responsible for the design and layout. A total of 12,000 posters were produced – 5,000 in Vietnamese, 5,000 in Mandarin and 2,000 in English. The Vietnamese posters have been distributed throughout Vietnam, with the Turtle Conservation & Ecology Project in Cuc Phuong, and Saigon Zoo in Ho Chi Minh City, being the major distribution points. The Chinese posters were mainly distributed via the generosity of the Biodiversity Working Group in the Chinese CITES Authority in Beijing. The balance of the posters are being used to promote action to address the Asian Turtle Crisis in other areas. Indeed, a major aim of the posters is to support the education programs currently being undertaken by a range of groups in the target regions.


Figure 1. Turtles posters printed in Vietnamese, Mandarin and English.

Comments on drafts of the posters, especially assistance with translation, were received from many colleagues in Australia, Vietnam, Hong Kong, China and USA. An assessment sheet was also developed in order to ascertain the effectiveness of the posters and track where and how they are being used.

"The Adventures of Lucky Turtle" is a Chinese translation of a children's story originally written in 2000 by Doug Hendrie and Vu Thi Quyen at the Turtle Conservation Centre in Cuc Phuong National Park, northern Vietnam. It features a little freshwater turtle that is picked up in the forests of Vietnam by a farmer and eventually ends up in an animal dealer's cage. Here it befriends a range of other animals, including a monkey that is able to open a cage and eventually releases all the animals. The rest of the story follows the turtle's adventures as it makes its way back home. The book was formatted and printed by Lonely Planet in Hong Kong and then distributed in China by "Friends of Nature" (FoN), a Chinese NGO involved in outreach education.

The 5,000 copies have been despatched to FoN, Kadoorie Farms & Botanic Garden (Hong Kong), Ocean Park – Hong Kong and the Chinese Biodiversity Working Group. All these groups provided very welcome assistance in getting the manuscript to its final stage.

Funding for the posters and books was obtained from Melbourne Zoo, the National Zoo & Aquarium in Canberra (Australia), PACT, Wildlife Trust (New York) and Columbus Zoo & Aquarium, USA. It is worth noting that virtually all the funds allocated by the Melbourne Zoo arose from visitor donations to the Asian turtle conservation campaign in the Reptile House. This features *Cuora trifasciata* and information on threats to Asian turtles, with a particular focus on the Turtle Conservation Centre in Cuc Phuong and how visitor donations are being used.

An email from FoN really sums up the response to the effort of PACT and the Melbourne Zoo in producing the book and posters:

"Thank you very much for translating such a useful book for Chinese children, and of course we are very glad to distribute this book among children through our environmental education projects – Environmental Education Van and Green Hope Action. We'd also like to pass some books on to other Chinese NGOs who are doing environmental education too. We have launched a networking project, which promotes other NGOs in different parts of China to do environmental education on wheels. I believe this book will not only benefit FoN, but also other NGOs in China" (Junhui Li, Friends of Nature, Beijing, China).

# Aboriginal Harvest of Long-Necked Turtles in Arnhem Land, Australia

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The Aboriginal people of northwest Arnhem Land, Northern Territory, Australia use freshwater turtles as a significant source of protein. They have accumulated a wealth of knowledge of wildlife and how it can be exploited on a subsistence basis. The Bawinanga Aboriginal Corporation (BAC), a support agency for Aboriginal people who live at outstations on their traditional clan estates, is keen to see this knowledge put to use in developing local industries that contribute to economic self-sufficiency while at the same time maintaining and reinforcing links to traditional Aboriginal culture. The harvest of adults and eggs of the northern long-necked turtle (*Chelodina rugosa*) is seen to provide such an opportunity. This note reports on a project to establish an indigenous industry focused on the harvest of long-necked turtle eggs in the Maningrida region of Arnhem Land.

As the outstation population has grown to about 800 people on 32 outstations, the BAC's role has expanded beyond just housing and services to include land management and employment. The major focus of their employment program is economically, culturally and socially appropriate commercial use of wildlife. The project has been established in conjunction with the Djelk Rangers, an indigenous land management group which cares for lands in the Maningrida region, and the Applied Ecology Research Group at the University of Canberra.

In February 2000, the Djelk ranger program in collaboration with the Applied Ecology Research Group and the Key Centre For Tropical Wildlife Management (Northern Territory University) undertook the first step towards establishing this new indigenous enterprise. With full community involvement, the team has established how to

·efficiently capture, mark and release turtles in floodplain billabongs (Figure 1);

·determine if females are carrying eggs, and how many;

·induce females to lay their eggs;

·transport and care for eggs (Figure 2); and

·care for hatchlings until they are dispatched for sale.

A modest market has been established and all hatchlings produced in 2001 and 2002 were legally sold into the pet trade. A proportion of income is returned to outstation communities in the form of an initial payment per gravid turtle.

This year Bawinanga and the University of Canberra with a grant from the Australian Research Council have started research in support of this aboriginal industry. The research aims to provide fundamental knowledge for the sustainable harvest of *C. rugosa* eggs and adults in Maningrida, Arnhem Land. At the same time, the project aims to capitalize on the opportunity to investigate density-dependent mechanisms that drive a compensatory response to harvest in these long-lived vertebrates by

Figure 1. During the wet season Djelk Rangers, Kim and Clinton, use baited traps to catch gravid turtles.

Figure 2. Djelk Ranger, Dean Cooper, checks to see if any eggs have hatched.

1) examining the impact of current Aboriginal harvest on turtle populations by comparing the population

dynamics of harvested populations with those of populations subjected to little or no harvest pressure;

2) developing a model of the population dynamics to assess the resilience of turtle populations to mortality of eggs and adults, taking into account any density-dependent interactions with growth rate, age/size at maturity, fecundity and population structure;

3) using the model to predict the impact of egg and adult harvests of varying intensity, and to estimate the degree to which this impact can be offset by head-starting and release of captive-reared turtles.

Incubation experiments and captive rearing experiments will determine the optimal conditions for incubation of eggs and rearing of hatchlings, research of fundamental importance to Bawinanga.

Damien Fordham and David Feier have enrolled in postgraduate degrees and will be conducting the research under the supervision of Arthur Georges and Ray Hall. In a related project, Erica Alacs will be working on the conservation genetics of the northern long-necked turtle. With funding from the Australian Federal Police and the Linnaeus Fund of Chelonian Research Foundation, she will be looking at a range of issues from developing techniques for verifying the source of animals entering the legal and illegal trade to more esoteric questions of historical origins of long-neck turtle populations.

Success of this project depends on active involvement of the Maningrida community in all aspects of the work. The Djelk Rangers assigned to this project will be taught how to provide appropriate field and experimental support for the research. Eventually, the Djelk rangers would like to monitor and evaluate their own wildlife production systems. Some have already completed training in crocodile and trepang survey techniques. Their training will play a critical part in meeting the learning objectives of the project, and in communicating the techniques, skills and attitudes to the community so that the benefits can continue when the formal research project terminates.

Involvement of the outstation communities is pivotal to the success of the project, and considerable effort has gone into communicating the objectives of the project and obtaining an appreciation of the views of the outstation communities as to the potential benefits of the project. Training aspects for outstation residents include how to capture turtles, assess whether or not they contain eggs, and house the turtles in satisfactory conditions awaiting collection by Djelk Rangers. The autonomy of outstation communities in this aspect of the project would be a major achievement.

Rock paintings and ceremonial stories indicate that Aboriginal people in the Maningrida region have been harvesting northern long-necked turtles, known locally as *wammarra*, *burnda* and *gomdow*, for many generations (Figure 3). Another aspect of the project is to reinforce the link between the long-standing cultural traditions with the turtles and the current project. This is being accomplished by visiting outstations, by interacting with outstation school programs, and by bringing school children from Maningrida to the Djinkarr Ranger Station and the incubation facilities to see the project in action.

Indigenous social issues have been high on Australian government agendas for many decades. It is widely recognized that adverse social disruption results from disconnecting indigenous people and communities from their language, culture and traditions. The BAC recognizes this and is developing a local economy that will achieve a measure of self-sufficiency for Aboriginal people, a continued connection to traditional values, and conservation of natural resources through sustainable exploitation. As the aboriginal people move from a subsistence approach to natural resource utilization based on servicing a market that extends beyond their local community, they are seeking practical assistance in ensuring that their activities are sustainable. This assistance is also needed to gain the necessary approvals at state and national level for the local industry to proceed.

Figure 3. Rock paintings reveal the cultural importance of turtles for the people of Arnhem Land.

## Turtle Presentations at the 2003 Joint Meeting of Ichthyologists and Herpetologists in Manaus, Brazil

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Akre, Thomas S.B.; Mittermeier, Russell A.; and Buhlmann, Kurt A. The role of biodiversity hotspots in tortoise and freshwater turtle conservation.

Lima, Aldeniza Cardoso; Vogt, Richard; Monjeló, Luis A.; and Andrade, Paulo C. M. Social, economic and environmental characterization of rearing and breeding Amazonian Giant Turtle in captivity.

Allman, Phil; Place, Allen; & Roosenburg, Willem. The dynamics of sex differentiation in three populations of *Malaclemys*: a turtle with temperature-dependent sex determination.

Andrade, Paulo C. M.; De Lima, Aldeniza, C.; Canto, Sonia L.O.; Da Silva, Rosilene G.; Duarte, Joao A. M.; Pinto, Jose R. S.; Oliveira, Paulo H.G.; Da Costa, Pedro M.; Da Silva, Francivane F. S.; and Azevedo, Sandra H.S.; Fe Sustainable management of chelonians (*Podocnemis unifilis*, *P. sextuberculata*, *P. expansa* and *P. erythrocephala*) for communities of low Amazon river pe de pincha project.

Andrade, Paulo C. M.; Duarte, Joao A. M.; Da Costa, Francimara S.; Da Costa, Pedro M.; Oliveira, Paulo H. G.; Fernandes, Francivane S.; Canto, Sonia L.O.; Lima, Aldeniza; and Monjeló, Luis A. Diagnostics of comercial farming of chelonians (*Podocnemis* sp.) in Amazonas State – Brazil.

Bandas, Sarah J. and Higgins, Kenneth F. New distributional ranges for turtle species in South Dakota, USA.

Batistella, Alexandre M. and Vogt, Richard C. Nesting ecology of *Podocnemis erythrocephala* in a Rio Negro tributary, Amazonas, Brazil.

Beheregaray, Luciano B.; Caccone, Adalgisa; Gibbs, James; Havill, Nathan; and Powell, Jeffrey R. Giant tortoises are not so slow: Rapid diversification and biogeographic consensus in the Galapagos.

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# Chelonian Research Foundation Linnaeus Fund: 2001 and 2002 Grant Recipients

**ANDERS G.J. RHODIN**

*Chelonian Research Foundation, 168 Goodrich St., Lunenburg, MA 01462 USA*

Chelonian Research Foundation (CRF), established in 1992 as a 501(c)(3) nonprofit organization, administers a turtle research endowment fund named the *Linnaeus Fund*, for which it invites the submission of chelonian research proposals for its *Annual Turtle Research Awards*. Named after Carolus Linnaeus [1707–1778], the Swedish creator of binomial nomenclature, the fund honors the first turtle taxonomist and father of all modern systematics. Since its inception, the Linnaeus Fund has awarded over 80 grants for a total of over $80,000 disbursed.

For its 10th Annual Linnaeus Fund Awards selection on 31 December 2001, CRF awarded a total of $10,500 divided among 10 research projects. Awards granted were as follows:

Attum, Omar. Conservation of the endangered Egyptian tortoise, *Testudo kleinmanni*. Univ. of Louisville, Louisville, Kentucky.

Chang, Nancy; and Booth, David. Habitat use, ranges sizes, activity and movement patterns in remnant freshwater turtle populations inhabiting coastal lowland creeks of south-east Queensland, Australia: *Chelodina expansa*, *Elseya latisternum*, and *Emydura signata*. Univ. of Queensland, Brisbane, Australia.

Fong, Jonathan J.; and Shi, Haitao. The genetic diversity and phylogenetic relationships of *Mauremys mutica* based on known locality and turtle farm specimens. Loma Linda Univ., Loma Linda, California.

Kuo, Chih-Horng; and Janzen, Fredric. Pedigree analysis in natural populations. Iowa State Univ., Ames, Iowa.

Ligon, Day B. Conservation of the alligator snapping turtle (*Macroclemys temminckii*): evaluating the effects of incubation temperature on a headstart program in southeastern Oklahoma. Oklahoma State Univ., Stillwater, Oklahoma.

Loehr, Victor; and Schmidt, Fabian. Population dynamics, diet, activity and reproduction of the southern speckled padloper (*Homopus signatus cafer*). Homopus Research Foundation, Ijsselstein, Netherlands.

Luiselli, Luca. Freshwater turtle community ecology and oil industry: investigating the effects of oil pollution on the abundance, complexity and functioning of turtle communities in a oil-highly-productive area of tropical Africa (Niger, Delta, Nigeria). Environmental Studies Center "Demetra", Rome, Italy.

Pearse, Devon E.; and Sites, Jack W., Jr. Metapopulation structure and genetic variability in the tortuga arrau (*Podocnemis expansa*) in the Orinoco basin. Brigham Young Univ., Provo, Utah.

Rosenbaum, Peter A.; and Zamudio, Kelly R. Genetic variation in the federally threatened bog turtle (*Clemmys muhlenbergii*). State Univ. of New York, Oswego, New York.

Spinks, Phillip and Shaffer, H. Bradley. Hybridization in geoemydid turtles: are several recently-described species of geoemydids hybrids? Univ. of California, Davis, California.

For its 11th Annual Linnaeus Fund Awards selection on 31 December 2002, CRF awarded a total of $12,000 divided among 12 research projects. Awards granted were as follows:

Amorocho, Diego. Conservation genetics of nesting olive ridley marine turtles (*Lepidochelys olivacea*) in the Colombian Pacific. Australian National Univ., Canberra, Australia.

Castellano, Christina. The ecology and conservation of the Madagascar spider tortoise (*Pyxis arachnoides oblonga*) at Cap Sainte Marie Special Reserve. Fordham Univ., Bronx, New York.

Ford, Dawn. The sublethal physiological effects of multiple stressors on the energy acquisition and allocation patterns of the diamondback terrapin. Ohio Univ., Athens, Ohio.

Howeth, Jennifer G.; and Hendrickson, Dean A. Effects of habitat loss on *Terrapene coahuila* (Emydidae): investigating the interplay of range contraction, genetics, and phenotypic asymmetry. Univ. of Texas, Austin, Texas.

Høybye-Mortensen, Klaus. The tortoise *Manouria emys emys*: behavior and habitat in the wild. Univ. of Southern Denmark, Odense, Denmark.

Kahn, Paula F. Gopher tortoise (*Gopherus polyphemus*) relocation: effects on stress, immunocompetence, and reproduction. Auburn Univ., Auburn, Alabama.

Minh Duc Le. Phylogenetic relationships and biogeography of the genus *Rhinoclemmys* Fitzinger (Testudines: Bataguridae). Columbia Univ., New York, New York.

Luiselli, Luca. Oil industry development and freshwater turtle conservation: Phase II. Assessing the oviposition site selection in turtle species from pristine and oil polluted habitats in the Niger Delta, Nigeria. Institute of Environmental Studies "Demetra", Rome, Italy.

McGaugh, Suzanne E. Introgression effects of Emory's softshell (*Apalone spinifera emoryi*) on genetic structure of *Apalone ater* populations in Cuatro Ciénegas, Coahuila, Mexico. Univ. of Texas, Austin, Texas.

Novak, Richard. Microphylogeography of the river cooter (*Pseudemys concinna*) and the yellow-bellied pond slider (*Trachemys scripta*). Indian Springs School, Pelham, Alabama.

Strong, Joel N. Seed dispersal and the ecological impacts of harvesting *Geochelone carbonaria* and *Geochelone denticulata* in northwestern Brazil. State Univ. of New York, Syracuse, New York.

Wallace, Bryan P.; and Spotila, James R. The thermal properties of leatherback turtle (*Dermochelys coriacea*) peripheral tissue. Drexel Univ., Philadelphia, Pennsylvania.

Linnaeus Fund awards are granted annually to individuals for specific turtle research projects, with either partial or full support as funding allows. Priority is generally given to projects concerning freshwater turtles, but tortoise and marine turtle research proposals are also funded.

Priority is given to the following general research areas: taxonomy and systematic relationships, conservation, distribution and zoogeography, ecology, natural history, and morphology, but other topics are also considered. Priority is given to projects that demonstrate potential relevance to the scientific basis and understanding of chelonian diversity and conservation biology. Award recipients agree to publish at least partial or summarized results of the supported research in a CRF-sponsored publication, such as *Chelonian Conservation and Biology*.

Awards at this time are typically in the $1000–2000 range for each project, with about ten or more projects funded annually. There will hopefully be increased grant support from year to year as the endowment fund grows. The annual application deadline is November 15, with funding selection on December 31. Submit applications in formal grant proposal format in triplicate as follows: title page, project objective, background and research rationale, materials and methods, total project expenses, funding requested from CRF, funding available or requested from other organizations, general timetable, literature cited, and curriculum vitae for all key personnel. Full submission instructions and a listing of former grants awarded are provided on the CRF website at <www.chelonian.org>.

Awards are granted through an internal review process carried out by the Director and Scientific Advisory Board of CRF, which includes Anders G.J. Rhodin, Russell A. Mittermeier, Peter C.H. Pritchard, John L. Behler, Terry E. Graham, Kurt A. Buhlmann, and Jeanette Wyneken. Submit applications to: Anders G.J. Rhodin, Chelonian Research Foundation, 168 Goodrich Street, Lunenburg, Massachusetts 01462 USA; Phone: 978-582-9668, Fax: 978-582-6279, E-mail: RhodinCRF@aol.com, Website: www.chelonian.org

## Reducing Traffic Mortality

**DAVID SEBURN AND CAROLYN SEBURN**

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Traffic mortality is a significant threat to many species of turtles. On behalf of the Canadian Amphibian and Reptile Conservation Network (CARCNET) we undertook a media campaign in the spring of 2002 to educate drivers about turtles on roads. Many people would swerve recklessly to avoid hitting a dog or cat, but think nothing of running over a reptile. Our goal was to raise the profile of turtles. We wanted to emphasize that many of the turtles people see on roads are females looking for a place to nest. This makes running them over a motherhood issue.

A brief news article was written and a simple graphic prepared (Fig. 1). Both were e-mailed to over 100 newspapers in Ontario – the province with the greatest diversity of turtle species and the largest human population. It is unclear how many papers actually ran the material, but we know at least a few did. In addition, reporters from some newspapers called for more information so they could write a feature article.


Figure 1. Simple figure that accompanied the newspaper article.

We encourage others to make use of this material. The text of our press release and the graphic are available on CARCNET's website (www.carcnet.ca). Feel free to edit the text to fit your own area. We are grateful for financial support for this project from the Mountain Equipment Co-op Environment Fund.

## A Note on the Hunting of Radiated Tortoises in the Beheloka Region, Southwest Madagascar

**A.J. WOODS-BALLARD AND E. FANNING**

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This communiqué deals with the collection of Radiated Tortoises, *Geochelone radiata*, in the coastal region of Beheloka, Madagascar, approximately 60 km south of Toliara. This tortoise is listed as vulnerable by the IUCN and is on Appendix I of CITES.

Discussions with the primary coordinator of local collections were held in May 2002. Although the activity is known to be illegal, the interviewee was willing to co-operate in return for anonymity.

In some ethnic groups the tortoises have in the past been protected by *fady* (local taboos), however the interviewee stated that years of poor agricultural production and low fishery production have led to the abandonment of this taboo. The interviewee stated that there were no longer tortoises found within 4 or 5 km of Beheloka village. Although the interviewee was the only tortoise hunter in the region, he stated that two or three *lakana* (Malagasy dugout canoes) come down from Toliara two or three times per month to

collect tortoises. He mainly gathers tortoises for special occasions in the region, however they also collect for the pet trade, for food, for the fabrication of jewelry etc. A large animal being sold for as much as 25,000FMG (~4USD). Profitability is ensured through the collection of large numbers of tortoises along the coast, with 40 or 50 tortoises being transported in each canoe.

These figures lead us to conclude that 1,920 to 5,400 tortoises are collected every year. Although, it was not stated exactly where these animals originated, other observations suggest that collecting occurs whereever there is suitable habitat in the southwest. It also became apparent from further discussions that although the tortoises are caught year round, more are collected during the rainy season (December to March).

The interviewee was asked about trends in population numbers. He was not worried about decreasing numbers as he believes that radiated tortoises have 15 surviving hatchlings from a nest of 20 eggs/year. In reality, radiated tortoises have roughly three to five eggs per clutch and five to six nests/year (Behler, pers. comm.). The interviewee also stated that if young or eggs were found they were left alone.

There is an urgent need for more information about this illegal trade and basic information about *G. radiata* need to be distributed. Recommendations include further interviews north and south of Toliara and completion of transects around southwest Madagascar to ascertain population densities.

The interviews for this note were conducted with the aid of Sarah de Mowbray, Katherine Usher and Victoria Randall as part of the Frontier-Madagascar Coastal Research Programme, based in Beheloka, Southwest Madagascar.

For further information on this topic, review John Behler's article "Madagascar Tortoise Crisis" in the 5th issue of this newsletter and Susan O'Brien and co-authors' article "Decline of the Madagascar radiated tortoise *Geochelone radiata* due to overexploitation" in Oryx 37 (3).

## Radiated Tortoises Found on the Protected Island of Nosy Ve, Southwest Madagascar

**A. J. Woods-Ballard, E. Fanning, C.E. Rix , and R. C. J. Walker**

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The Madagascar radiated tortoise, *Geochelone radiata*, is threatened with extinction due to collection for the food and pet trade (Behler, 2002) and habitat destruction (Seddon *et al.*, 2000). It was therefore encouraging when field operatives from Frontier-Madagascar (a collaboration between the United Kingdom based NGO The Society for Environmental Exploration and the Institute of Marine Sciences, Toliara, Madagascar) discovered specimens on the small island of Nosy Ve.

This approximately 30 ha island is about 5km from the mainland in the Anakao region south of Toliara (S23°38'57'' and E 043°36'15''; WGS 84 Projection). The island is considered sacred due to its historic function as a burial site and is protected by *fady* (local taboo) against any kind of human disturbance. The *fady* is incorporated in a legally respected, local community convention called a *dina* that fully protects a small (approximately 4 ha.) fringing patch reef next to the island and all of Nosy Ve. The island is managed by a local village based organization of fishermen and local delegates called *Fikambanana Miaro sy Mampandroso an'l Nosy Ve* (FI.MI.MA.NO). Due to the cultural significance of the island and the peoples respect for the *dina*, Nosy Ve has been a success as a protected area.

Unpublished data from Frontier-Madagascar suggests the animals have been present since at least 2001, however for this survey, the animals were first recorded during a mapping survey of Nosy Ve in October 2002. They were then specifically searched for during monthly visits and were regularly re-sighted over the next six months. A total of four male tortoises were found, aged approximately 15, 24, 25 and 27 years from the growth rings on their scutes. They appeared to be healthy and the habitat and vegetation were similar to that of the mainland where *G. radiata* is present.

After talking to the locals, the authors believe these tortoises were brought to the island in one of two ways. First, a hotel operator from Ambola (75 km south of Nosy Ve) who saw that the animals were threatened by collection on the mainland may have brought some to the island for protection. Second, the *Nahoda* (village elder charged with ceremonial duties) of Anakao said that around two years ago, a large pirogue (canoe) belonging to poachers overturned near Nosy Ve while returning from a collecting trip to the south. He believes that their canoe contained a large number of *G. radiata* and that some may have floated to the island.

The population that is now resident on the island appears to be small and confined primarily to a small patch of euphorbia forest and scrub on the south side of the island. Only once was an individual spotted on the southeast part of the island. It is quite possible that this very small population of *G. radiata* represents one of the best-protected wild colonies of this species in the world. Mainland population densities of the species are unknown, but evidence suggests hunting pressures by local populations and organized gangs even in Tsimanampetsotsa National Park (Behler, 2002) are having drastic effects on the survival status of the species.

Captive breeding programs have shown great promise for *G. radiata*, with good numbers being successfully captive bred and reared (Behler and Iaderosa 1991). With its protected status Nosy Ve might offer some value as a breeding colony for re-introduction to the wild. First, due to the *dina* and *fady* permission would have to be granted that would allow the captive bred offspring to be removed from the island. The lack of females could be addressed by introduction of wild caught animals or from other breeding colonies. Perhaps the island could be used for location of repatriated animals such as the 165 taken to Berenty from

Reunion in 1994 (Boullay, 1995). Obviously any new tortoises released must go through a rigorous veterinary inspection to insure the health of the resident males. The island is already home to Madagascar's only red-tailed tropicbird colony. If a large population of tortoises were to be established, they would need to be monitored to ensure that they did not compete with these ground-nesting birds for suitable shaded areas.

Nosy Ve has potential for the conservation of radiated tortoises. Further investigative work on the possible impacts of introducing more tortoises needs to be conducted.

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## Moral, Ethical, and Legal Issues Regarding Importation of Rare Turtles under the Guise of Conservation: *Geoemyda japonica*—a Case Study

**Dave Lee**

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The Ryukyu Leaf Turtle, *Geoemyda japonica*, is endemic to Okinawajima, Kumejima and Tokashikijima islands of the Okinawa group of the central Rukyus, Japan. Described in 1931, it was resurrected from synonymy of *G. spengleri* by Yasukawa, *et al.* in 1992 (Japanese J. Herpetol. 14: 143-159). This has always been considered a rare turtle because of its limited geographic range. In fact, the IUCN Red List considers the species as Endangered. Though not much is known regarding its biology, because of its rarity in North American collections this is a very highly desirable and pricey species for the serious turtle hobbyists. Recently small numbers of these turtles became available in the United States. While what follows addresses this specific series of importations, the concern is not limited to this single species. Furthermore, it is not my intent to be pointing fingers. Until I thought this through, I was ready purchase a small group of these turtles myself.

The point of this note is to remind people of the overall intent of conservation efforts. If we do not consider the conservation implications on a species by species basis we could quickly undo the efforts of others to the detriment of the very species we think we are trying to help. I will use this species of leaf turtle as a case study.

In the last five years a growing number of turtle hobbyists have expressed interest in participating in turtle conservation through captive breeding efforts. Several organizations that promote this idea have sprung up in the U.S. and Europe. Because of the issues relating to the food and traditional medicine in China much of this effort has focused on Asian turtles. Lists of species desirable to obtain for assurance colony collections have been made available and a number of serious hobbyists have restructured and refocused their private collections with noble long-range conservation goals in mind.

Japanese authorities do not issue export permits for this *Geoemyda japonica*. The Ryukyu Leaf Turtle is given protected status as a 'National Monument' by the Japanese government. Export is not legal. Nori Oshima, a chelonian biologist from Japan, confirms that *G. japonica* is fully protected, it is illegal to trade them in any way and the fact that it is considered a National Monument makes it illegal to even move one if it is about to be run over by a car. Scientists cannot easily get permits to study this species in the wild. The Ministry of Culture designated this seemingly strange 'National Monument' status. This designation was applied soon after the islands were returned to Japan after the US occupation. In my opinion, North American hobbyists should not reward the illegal commercial traffic in this species by supporting the market. In that Japan has made efforts to protect this endemic turtle from export any and all conservation measures directed at this species need to be focused on wild, naturally occurring populations. If captive breeding is an acceptable strategy, then serious hobbyists, zoos, and government agencies in Japan are the logical and proper groups to do this. Currently there are a few specimens of these turtles in zoos in Japan [<50] but none are being bred. There are serious moral issues regarding the removal of wild caught turtles from protected populations. These issues become ethical when one considers the restricted range of the species and the vulnerability of island populations. We have an almost mirror image situation in the U.S. where Japanese dealers and hobbyists have acquired through back-handed means, protected North American *Clemmys*. We were rightly incensed, but at least it was straightforward and wrong. We never heard excuses that these turtles were being sent across the Pacific for conservation programs.

Since the latest, and hopefully the last, imports of these leaf turtles, I have talked to some of the dealers and hobbyists involved in the transaction. It is amazing how the human mind can attempt to justify misguided intents. Somehow I was expected to accept that the shipment of *G. japonica* was

indeed of conservation priority, and further, I was given an example of a Hong Kong confiscation of 10,000 Malaysian Box Turtles where all but a few of them were found dead. Others stated that even countries with good regulations were not enforcing them. In some minds this justifies "saving" these turtles by placing them in one's private collection. Thus, there is a perceived urgency of acquiring rare species of all types for our captive breeding groups. We are letting down the global conservation community. If the acquisition of rare turtles has personal priority over conservation, then so be it, but these unscrupulous individuals should not mislead themselves and others into thinking that the captive breeding of these turtles is a conservation tool for every situation. The larger effort will become tainted, and people already suspect of the entire assurance colony concept will have additional fuel to strengthen their stand, and we will be undoing the few existing programs managed by home range countries.

I personally think the moral dilemma as outlined above and how it could undercut our overall programs is the major issue, but one must consider the legal issues as well. These turtles are protected by their home country. In that it is an endemic species this is very clear-cut and there is no question as to the origin of the specimens sent here. Not only is export illegal by Japanese law, which we should respect, but it is therefore illegal by U.S. law and probably contrary to any number of international wildlife treaties. So how did they get here, and how did these turtles get past the inspectors at the US port of entry? Simply stated the world is full of rare and protected wildlife spread among numerous countries. For inspectors to recognize each species and to know how the various and shifting laws relate to each is an almost impossible three- dimensional puzzle to assemble. Small, inconspicuous species that do not show up in reference books and the computer-driven radar of the Endangered Species Act or CITES are likely to be initially cleared. This does not make them legal. They are simply cleared for release to the importer. However, as this species is protected in the home country, it is not legal to import without paperwork from that country. These recent shipments of the Ryukyn Leaf Turtle were made through Hong Kong. While I am sure they had paperwork from the country of the origin of the shipment, this is not the same as the country of origin of the species. Hong Kong paperwork is totally irrelevant to this species. Information has come to light that Hong Kong has been very relaxed in enforcement of imported wildlife regulations. The people setting up this import planned shipments way in advance. The importers, shippers, and suppliers knew the regulations. These turtles are hard to obtain and that is why their price is so high. And some individual buyers in this country know the rules too, although it became clear from talking to these individuals that many did not know the turtles they purchased were illegal. However, once in the United States these animals are in violation of the Lacey Act. Every time they cross an international border and every time they cross or recross a state line it is my understanding that they chalk up an additional illegal black mark. Even if keepers are successful in breeding these turtles for conservation, and Japan wanted some of the young back for reintroduction, it would be hard to do so as transporting any produced young would reviolate the act unless it could be proven that the parent stock was legally obtained. This could not be proven, as it is not true.

I am not an attorney and have no training in wildlife enforcement. However, it is clear that having these turtles in this country is in no way promoting conservation. We need our captive breeding and conservation activities to be positive, aboveboard and legal examples. We, as well as our government, need to respect, enforce, help support and expand laws of other countries that were enacted to protect turtles. Foremost this is what we should be about. The captive breeding aspects should remain a secondary consideration as far as overall conservation is concerned. Is this frustrating stuff? You bet. But no one ever said this would be easy or straightforward. We will learn and evaluate as we go. If private keepers are to gain respect in the conservation community we need to know as much about a turtle's legal status as we do its husbandry needs. And importantly, we need to all know this prior to acquisition.

# ORGANIZATIONS

## Canadian Amphibian and Reptile Conservation Network/ Réseau Canadien de Conservation des Amphibiens et des Reptiles (CARCN / RCCAR)

**DAVID GALBRAITH**

*Manager of Biodiversity Projects, Royal Botanical Gardens, P.O. Box 399, Hamilton, Ontario, L8N 3H8 Canada*
*E-mail: dgalbraith@rbg.ca*

The primary goals of CARCN/RCCAR are to facilitate scientific investigations relevant to the conservation of amphibian and reptile populations in Canada, to disseminate the results of this research, and to undertake public education programs and community projects that further public awareness and advance our knowledge of the conservation biology of Canadian amphibians and reptiles.

Twice a year CARCN/RCCAR publishes a newsletter, the Boreal Dip Net. A website (www.carcnet.ca) is maintained which provides information on CARCN/ RCCAR, Canadian amphibians and reptiles, and important herpetology areas in Canada, as well as announcements of upcoming meetings, abstracts from past meetings, information about the student award, and links to herpetology sites.

CARCN/RCCAR holds an annual general meeting and scientific conference in the fall, where business items are discussed and research presentations are made. Students conducting herpetological research are encouraged to present their research findings. An award is presented each year for the best student presentation. The meeting concludes with a herpetological field trip.

As a registered non-profit organization, CARCN/RCCAR acts as an applicant for funding proposals. Funds secured are used for conservation projects including public demonstration projects.

## The Asian Turtle Consortium

**CHUCK SCHAFFER**
*Secretary/Treasurer, 13811 Tortuga Point Drive, Jacksonville, FL 32225 USA*
*www.asianturtle.org*

The Asian Turtle Consortium, a non-profit 501(c)3 organization directed by an elected board, was instituted by the Tortoise Reserve in 1999 as an informal international network of private individuals, corporations, institutions, and conservation organizations dedicated to the captive breeding of Asian turtles as a long-range conservation effort, to raising of public awareness to their plight, and to education. As of 2002, 80 active members held a composite collection in excess of 90 taxa and 4,000 living specimens of Asian chelonians, most of which are established in breeding groups. That same year, members produced over 6,000 captive-hatched turtles.

Turtles are acquired through purchase, donations, adoptions and from government seizures of illegal imports. These Consortium animals are distributed to appropriate members to establish breeding groups. Captive-hatched babies will be used to establish additional genetically diverse breeding groups with other Consortium members. Exchange and sales of stocks between members is an on-going process. Members get first-refusal rights and reduced cost on turtles made available by other Consortium members.

The long-term commitment to eventual reintroduction of turtles to their former habitats will be coordinated over many generations of both turtles and their keepers. Members' endeavors are supported through coordination of planned species recovery efforts in collaboration with public sector institutions, conservation organizations, and governmental agencies. As the numbers of captive-produced animals increase, the pressures begin to lessen on wild populations, and exciting programs such as repatriation of species back into their native homes can begin.

A very exciting Consortium program is focused on sending turtles back to Asia. Our first repatriation project highlights the endemic Vietnamese Pond Turtle, *Annmemys annemensis*. This beautiful turtle is extinct or very nearly so in nature. Consortium members have established this species in captivity and are already producing modest numbers of offspring. The plan is to head start a large group of hatchlings and then return these young turtles to Vietnam. From there, the young will be raised to adulthood and bred in protected sites, and in turn their young will be released into the wild. This is a significant program unlike any being tried today. Not only are we returning first-generation young to Asia, but these captive-hatched young are of a species that is essentially gone from the wild. As it is the only turtle endemic to Vietnam, the work becomes more essential to those involved in the country of origin. Consortium breeders have pledged to make captive-hatched *Annamemys* available to this program at no charge. In less than ten years we should be able to supply Vietnam with over 1,000 turtles which they can raise to adults and use as source populations for a restocking program. These ex-situ populations will also be important in conducting research in behavior, reproduction, and ecology.

The Asian Turtle Consortium website and listserve allows members to keep themselves current as to wildlife regulations, in-range status of various species, and key meetings and Consortium activities, eliminating the need for frequent mailings. Species-specific care sheets and bibliographies are being developed for all Asian species and will be added to the website and updated as our knowledge of these species grows. The Consortium has photos of most Asian species and related conservation materials available for use in educational programs and in making public of the plight of these species, supporting conservation initiatives in Asia.

The Asian Turtle Consortium is one of many groups, which together with the New York Turtle and Tortoise Society supports the Asian Scolarship Program has been successfully running for several years now. In this program, directed by William Espenshade, promising field biology students are sponsored to come to the U.S. for an intensive hands-on study of basic field techniques, data collection and analysis, and conservation programs at the Wetlands Institute under the direction of Dr. Roger Wood. Later, they meet with key U.S. chelonian biologists and conservationists, travel to the Chelonian Research Institute and may visit other locations, including the Tortoise Reserve and other Consortium sites. They then return to their homes, not only bringing this knowledge with them, but becoming critical in-range contacts. One of this year's interns hosted a Consortium member during a month of field work in Malaysia and Thailand which focused on food markets, curated specimens, wild, and captive groups of *Manouria*

*emys*. His trip would not have been a success without her. Experience here, enhances the intern's stature in the region, where they will have the tools to influence, establish, and direct conservation and awareness programs. Important Consortium goals are to help other organizations raise funds through gifts, matching grants, and fund raisers. The establishment of Asian turtles and tortoises in breeding groups in anther vital item needing funding. It requires extensive expenses related to shipping, quarantine, veterinary treatment, and feeding.

Related educational and public awareness programs are equally critical and desperately need funding.

A side benefit of this effort is the opening of select facilities to visiting scientists, particularly those in the Asian Scolarship Program. We encourage anyone interested in helping Asian chelonians to support our effort.

# LEGAL UPDATES

## Emydidae and Trionychidae Receive Protection in North Carolina

General Assembly of North Carolina Session 2003: Session Law 2003-100 Senate Bill 825

An Act to Authorize the Wildlife Resources Commission to Protect Certain Reptiles and Amphibians that Require Conservation Measures.

The General Assembly of North Carolina enacts:

**SECTION 1**. G.S. 113-333(a) is amended by adding a new subdivision to read: "(6) To adopt and implement rules to limit, regulate, or prohibit the taking, possession, collection, transportation, purchase or sale of those species of wild animals in the classes Amphibia and Reptilia that do not meet the criteria for listing pursuant to G.S. 113-334 if the Commission determines that the species requires conservation measures in order to prevent the addition of the species to the protected animal lists pursuant to G.S. 113-334. This subdivision does not authorize the Commission to prohibit the taking of any species of the classes Amphibia and Reptilia solely to protect persons, property, or habitat; to prohibit possession by any person of four or fewer individual reptiles; or to prohibit possession by any person of 24 or fewer individual amphibians."

**SECTION 2.** The commercial taking of any turtle or terrapin within any of the species of turtles and terrapins in the families Emydidae and Trionychidae that are the large basking and sliding turtles and terrapins is prohibited until such time as the Wildlife Resources Commission adopts rules to regulate the taking of turtles or terrapins within these two families of reptiles. For the purposes of this section, "commercial taking" is defined as the taking, possession, collection, transportation, purchase or sale of five or more individual turtles or terrapins from either of the two families of reptiles described in this section. Any person who violates this section is guilty of a misdemeanor and is punishable as provided in G.S. 113-135. This section shall not apply to a licensed veterinarian; to a bona fide zoo operated by the federal government, the State, or a unit of local government; or to bona fide scientific, biological, medical, or veterinary education or research.

**SECTION 3.** Sections 1 and 3 of this act are effective when this act becomes law. Section 2 of this act becomes effective 1 July 2003 and applies to offenses committed on or after that date.

In the General Assembly read three times and ratified this the 21st day of May, 2003.

s/Beverly E. Perdue, President of the Senate
s/Richard T. Morgan, Speaker, House of Representatives
s/Michael F. Easley, Governor
Approved 11:11 a.m. this 31st day of May, 2003

## South Carolina Offers Protection to 7 Species of Freshwater Turtles

**STEPHEN H. BENNETT**
*Biologist/Herpetologist, Wildlife Diversity Programs, South Carolina Department of Natural Resources*
*E-mail: sbennett@scdnr.state.sc.us*

In June, 2003 the South Carolina Department of Natural Resources Board approved emergency regulations good for 180 days protecting seven species of freshwater turtles from commercial harvest in SC. The changes are to Chapter 123, Code Sections 50-15-30, 15-40, 15-50 and 15-70.

**Editors' note**: All non-turtle species have been omitted.

**Synopsis:** These regulations amend Section 123-150.2 and create a new Section, 151.2 in this same Chapter.

Section 123-150.2 addresses additions to the official state list of Non-game Wildlife in Need of Management. The Yellowbelly Turtle, Florida Cooter, River Cooter, Chicken Turtle, Snapping Turtle, Florida Softshell Turtle, and Spiny Softshell Turtle are being added to this list.

Section 123-151.2 addresses establishment of a program to manage the take, possession and commercial trade in these newly listed freshwater turtle species.

**123-150. Non-Game and Endangered Species**

1. The following list of species or subspecies of non-game wildlife are faced with extinction in the foreseeable future and are added to the official State List of Endangered Wildlife Species of South Carolina.

IV. Reptiles: 1. Atlantic Leatherback Turtle (*Dermochelys c. coriacea*), 2. Atlantic Ridley Turtle (*Lepidochelys kempii*), 3. Gopher Tortoise (*Gopherus polyphemus*), 4. Atlantic Hawksbill Sea Turtle (*Eretmochelys imbricata*)

2. It shall be unlawful for any person to take, possess, transport, export, process, sell, or offer for sale or ship, and for any common carrier knowingly to transport or receive for shipment any species or subspecies of wildlife appearing on the list of "Endangered Wildlife Species of South Carolina", except by permit for scientific & conservation purposes issued by the South Carolina Department of Natural Resources.

3. The penalty for the violation of this Rule and Regulation shall be that prescribed by 50-15-80, 1976 S.C. Code of laws.

**123-150.2** Birds, Fish**,** Reptiles, Amphibians & Mammals

The following list of species or subspecies of non-game wildlife are considered to be threatened and are added to the official state list of Non-game Species in Need of Management.

III. Reptiles: 2. Atlantic Loggerhead Sea Turtle (*Caretta caretta*), 3. Atlantic Green Sea Turtle (*Chelonia mydas*), 5. Bog turtle (*Clemmys muhlenbergii*), 6. Spotted Turtle (*Clemmys guttata*), 7. Yellowbelly Turtle (*Trachemys scripta scripta*), 8. Florida Cooter (*Pseudemys floridana floridana*), 9. River Cooter (*Pseudemys concinna concinna*), 10. Chicken Turtle (*Deirochelys reticularia*), 11. Snapping Turtle (*Chelydra serpentina serpentina*), 12. Florida Softshell Turtle (*Apalone{Trionyx} ferox*), and 13. Spiny Softshell Turtle (*Apalone{Trionyx} spinifera aspera*)

**123-151.2 Regulations for Freshwater Turtles.**

A. Freshwater Turtle program

1. It is unlawful for any person to sell, or take, transport or possess for commercial purposes, the following turtle species without a permit from the department: a. Yellowbelly Turtle, b. Florida Cooter, c. River Cooter, d. Chicken Turtle, e. Snapping Turtle, f. Florida Softshell Turtle, g. Spiny Softshell Turtle

# ANNOUNCEMENTS

**Barbara Bonner died July 31, 2003**. One of the founding members of the TSA, Barb was widely recognized as one of the world's leading turtle clinicians. Her contributions to the practice of turtle medicine are both well known and respected. Barb was completely consumed by her work to rehabilitate sick and injured turtles and she gave completely and tirelessly. Her commitment to turtle welfare was unmatched and her dedication unparalleled. Yesterday, the turtle conservation community lost an ardent supporter and one of its most passionate advocates. She was selfless in her efforts for the well-being of turtles and her passing leaves an enormous void in our ranks. She will be dearly missed. Rick Hudson

**Henri Seibert died October 6, 2003.** Henri was one of the kindest, most gracious, teachers of herpetology and one of the most important members and founders of the old Ohio Herp Society that evolved into the Society for the Study of Amphibians and Reptiles. He was a quiet hard working man that took time with many and meant so much to the members and organizations he served for so many years. Hopefully Henri's spirit will hopefully be carried on by those that were touched by him. Thanks Henri, Ray Ashton.

**C. Robert "Bob" Shoop died 7 November 2003** of complications from a stroke suffered earlier that week. A touching celebration of his life was held at Plum Orchard mansion on Cumberland Island, Georgia, 15 November, attended by family, friends, and colleagues. Bob received his PhD from Tulane University in 1963 under the direction of Fred Cagle. Early in his career, Bob focused on salamander biology, publishing some of the earliest work on orientation and migration. Eventually, however, his interests came to include sea turtle biology in northeastern waters and, later, the implications of bycatch and stranding on the conservation biology of loggerheads. After a long career at the University of Rhode Island, Bob retired to Cumberland Island with his long-time companion Carol Ruckdeschel. Most turtle biologists will remember him for his passion for sea turtles, his chili cookoffs with Jack Musick at the annual sea turtle workshop, and his perpetual enthusiasm. He also enjoyed a good glass of wine and a fondness for barbecue. To permanently recognize the contributions of Bob to science in general, and URI in particular, a bronze plaque was commissioned in his memory that will be prominently displayed at the URI Alton Jones Campus. This Campus includes a protected research area where Bob did much of his pioneering work on amphibian movements and population dynamics, an area which now bears his name. He will be missed. Dr. C. Kenneth Dodd, Jr.

**Roger Conant died December 19, 2003**. He was 94. May we all take a moment and remember the incredible accomplishments of one of our world's greatest herpetologists and how his work inspired many of us as youth to pursue careers and hobbies in herpetology. May Roger rest in peace and live on in our memories forever. Gary M. Stolz.

**David Joseph Morafka passed away at home in San Francisco on 13 January 2004** at the age of 58 following a valiant battle with pancreatic cancer. He received his Ph.D. in 1974 from the University of Southern California working with Jay Savage. Dave's thesis research on the herpetology and biogeography of the Chihuahuan Desert is a classic. He retired from his faculty position at California State University Dominguez Hills in 2002. Subsequent to his dissertation, Dave's studies initially centered on the biology and reproduction of the Bolson tortoise, *Gopherus flavomarginatus*. He brought together a team of experts which together produced seminal research on this endangered species. This research sparked his interest in the biology of neonates, one of Dave's most notable areas of expertise. In 1990, Dave initiated work on the Desert tortoise, *Gopherus agassizii* especially at the US Army's Ft. Irwin National Training Cen-

ter. Research at Ft. Irwin bloomed into multi-million dollar efforts to document and conserve critical habitat on the base, and initiate a head-start program for Desert Tortoises. Dave was also intimately involved in research on fringe-toed lizards (*Uma*), rattlesnakes, and the Panamint alligator lizard. Dave was a brilliant scientist and very passionate about his work, food and life. He had a way with words. During a meeting with Senator Diane Feinstein at his Ft. Irwin study site, Dave explained why baby tortoises needed to be kept with their parents; newborn tortoises that ate the droppings of their parents grew more quickly and became stronger than neonates that were raised in isolation. To this he added "So you see, Senator Feinstein, the more crap we take from our parents the better off we are!" Dave could get away with such things. Condolences can be sent to his wife, Sylvia, at mamaherp@aol.com. Bob Murphy, Royal Ontario Museum.

**Walter Auffenberg died January 17, 2003.** He was 75. Walt was widely known as an authority on fossil snakes and turtles, gopher tortoise biology, monitor lizards, and the fauna of south Asia, particularly Pakistan and the Philippines. He was curator emeritus of the Florida Museum of Natural History. His son Kurt, with the help of others, will finish his "Herpetology of Pakistan." Ken Dodd.

The following articles on **Australian turtles available on the web** at http://www.ea.gov.au/biodiversity/abrs/online-resources/abif/fauna/foa/2a-contents.html : 1) General Description and Definition of the Order Chelonia, 2) Morphology and Physiology of the Chelonia, 3) Natural History of the Chelonia, 4) Biogeography & Phylogeny of the Chelonia, 5) Family Cheloniidae, 6) Family Dermochelyidae, 7) Family Chelidae, 8) Family Carettochelyidae.

**2004 Joint Meeting of Ichthyologists and Herpetologists** will be held May 26 - 31 at the at the National Center for Employee Development/ Marriott Conference Center, Norman, Oklahoma. Additional information can be found at http://www.dce.ksu.edu/2004jointmeeting/index.htm.

**28th International Herpetological Symposium** will be held August 10-13, 2004 at the Adam's Mark Daytona Beach Resort, Daytona, Florida, USA. For more info see IHS Website at www.kingsnake.com/ihs. Interested in presenting a paper? E-mail your abstract to: freda@centralfloridazoo.org Deadline for abstract submission is 1 March 2004. Authors will be notified of their status by 1 April 2004.

**2nd Chelonian Assurance Colony and Large Chelonian Collection Management Workshop** to be held May 17-21, 2004 at the Ashton Biological Preserve and Alapattah Flats Turtle Preserve. This is co-sponsored by Ashton Biodiversity Research and Preservation Institute, Alapattah Flats Turtle Preserve, The Asian Turtle Consortium and the Tortoise Reserve. The cost is $400 and registration is limited to 15 participants. For furhter information contact Ray or Pat Ashton at (352) 495-7449 or tortfarm2@aol.com or Al Weinberg at SFREINC@aol.com.

**5th World Congress of Herpetology** will be held at Cape Town, South Africa from 20-27 November 2005. The congress venue is the Cape Town International Convention Centre, which offers excellent conference facilities, close proximity to Cape Town, its international airport and many attractions, such as Table Mountain, the Cape Peninsula, Robben Island, the famous V&A Waterfront, and the wonderful Cape Winelands. Visit their website (www.capetownconvention.com) for a virtual tour.

Please visit the Herpetological Association of Africa's (HAA) website (www.wits.ac.za/haa) for further details. Please contact the congress secretariat at conf@conferencesetal.co.za for additional information and to have your name put on the mailing list for further announcements.

**The Gopher Tortoise Conservation Initiative** is pleased to announce our new web page and training programs for 2004. Our web page (ashtonbiodiversity.org) has been expanded and includes information about gopher tortoise and other upland habitat species. There are quite a number of specific handouts that you can download straight from the web page. If you do not find the information there, please contact us and we will send it to you.

If you go to our page on Courses and Programs, you will find a greatly expanded list of programs. This is our fourth year of offering courses and we have had nearly 1500 people participating. We have added several courses for educators and the general public.

We invite you to join GTCI as a regular member of this program or as a landowner who signs up their land under the Gopher Tortoise Reserve Program. We work with these people in planning land use and management with tortoises and other species in mind. We currently have 168,000 acres in the program. The membership program is described on the web page and you can download or join on line. We currently have approximately 900 members.

## Donors

Chris B. Bogard, Bernard Brown, Jerry H. Czech, James H. Harding, Jean R. Held, Cheryl L. Lechtanski, William E. Redfoot, John Jake Ryan, David L. Schein, and Annie Staten.

# INSTRUCTIONS FOR CONTRIBUTORS

Submissions will NOT be peer-reviewed, but may be edited. Submissions should be sent to the editors and NOT the editorial board.

**Text:** To ensure a swift turnaround of articles, we ask that, where possible, all submissions be in electronic format either as an attached E-mail file or on disc. If compatible computer facilities are not available, hard copies of the article can be sent to the editors by mail or fax. Scientific names should be italicized and given in full in their first appearance. Citations in the text should take the form of (Kuchling, 1989), (Martin and Bateson, 1986), (Ernst *et al*., 1994). All articles need to be accompanied by the name of the author and a complete hard copy mailing address. If you wish your E-mail address, phone or fax number included please include them in your address.

**Table/Figures/Illustrations:** Each figure should be stored as a separate document in Word, Wordperfect, Excel, .bmp, .tif or .jpeg file. The editors will scan figures, slides or photos for authors who do not have access to such facilities. Tables and Figures should be given in Arabic numerals. Photographs will be considered for inclusion.

**References:** Citation format for different styles of references should be as follows:
*a. For an article in a journal:* Gaffney, E.S. 1979. Comparative cranial morphology of recent and fossil turtles. Bull. Amer. Mus. Nat. Hist. 164:65-376.
*b. For a book:* Cogger, H.G. 1975. Reptiles and Amphibians of Australia. Sydney: A.H. and A.W. Reed, 660 pp.
*c. For an article in an edited volume:* Pritchard, P.C.H. 1979. Taxonomy, evolution, and zoogeography. In: Harless, M., and Morlock, H. (Eds.). Turtles: Perspectives and Research. New York: John Wiley and Sons, pp. 1-42.
*d. Citations with two or more authors have all authors listed last name first and separated by commas:* Dodd, C.K., Jr., Franz, R., and Smith, L.L. 1994. Title. Reference.

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# Turtle and Tortoise Publications Available from
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• ***Chelonian Conservation and Biology – International Journal of Turtle and Tortoise Research***. ***CCB*** is the only international professional scientific peer-reviewed journal of broad-based coverage of all aspects of conservation and biology of all chelonians, including freshwater turtles, marine turtles, and tortoises. Inaugurated in 1993, Volumes 1 through 3 have been completed and we are now producing Volume 4, with four issues per volume, averaging about 200 pages per issue. It is edited by Anders G.J. Rhodin and Peter C.H. Pritchard, and backed by an editorial board of 30 of the world's leading turtle authorities. Our worldwide distribution is over 1000 to more than 60 nations. Included in the contents are the formal descriptions of several new genera and new species of turtles, as well as articles on ecology, conservation, systematics, reproduction, sex determination, breeding and husbandry, pathology, physiology, morphology, and wildlife management. We publish one to two issues a year. Our subscription price is a very modest $50 per volume of four issues (over about two years) for individuals, $35 for students, $100 for institutions, and $100 for contributing members (tax-deductible and acknowledged in the journal). Every journal depends on its contributing authors, subscribing readers, and institutional libraries for its support. May we count on yours? Please consider subscribing for yourself, or encourage your institutional library to subscribe. We also invite all turtle workers to consider publishing their turtle research with us.


• ***Turtle and Tortoise Newsletter – The Newsletter of Chelonian Conservationists and Biologists.*** ***TTN*** is an informal high-quality biannual publication inaugurated in 2000 with time-sensitive notes, news, and announcements of interest to the world of turtle conservation and biology. Edited by Heather Kalb and Allen Salzberg it merges two previous publications: *Box Turtle Research and Conservation Newsletter* and *IUCN Tortoise and Freshwater Turtle Specialist Group Newsletter*. It is available free of charge with a paid subscription to ***CCB***.



• ***Chelonian Research Monographs – Contributions in Turtle and Tortoise Research***. Two issues in the ***CRM*** series are available: CRM 1 (1996): *The Galápagos Tortoises: Nomenclatural and Survival Status*, by Peter C.H. Pritchard (85 pp.), and CRM 2 (2000): *Asian Turtle Trade: Proceedings of a Workshop on Conservation and Trade of Freshwater Turtles and Tortoises in Asia*, edited by Peter Paul van Dijk, Bryan L. Stuart, and Anders G.J. Rhodin (164 pp.). Both are filled with numerous photos in full color.

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