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Kinosternon subrubrum subrubrum (Eastern Mud Turtle) Predator Escape

Joseph C. Mitchell

A. C. Markham

B. D. Watts

The Center for Conservation Biology, bdwatt@wm.edu

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monitored (by DMC) since 1988 (see Tuttle and Carroll 1997. *Chelon. Cons. Biol.* 2:447–449, and 2003. *Chelon. Cons. Biol.* 4:656–663, for habitat descriptions), and nearly all of the turtles (≈ 200 during that time) have been uniquely marked. Most have been located in multiple years and multiple times within a year. In late March of 1990, one adult male was found that had recently lost its left front and right hind legs, and a 6–8 yr-old was found dead with two large canine punctures through its carapace. Since 1990, only three instances of attempted predation have been noted, all consisting of limb loss by surviving subadults during the active season. During the spring of 2005, it became evident from observations of emerging turtles that there had been a major predation event during the previous hibernation period. Collections from 25 March 2005 until 11 July 2005 of 45 turtles included 21 (3 dead and 18 injured) that had been attacked. Turtles attacked had straight-line carapace lengths from 7.1 to 18.4 cm. The most common injury was the loss of part or all of one or two limbs, most commonly the front limbs (18 of 23 injuries). Additional undiscovered fatalities are likely, as several turtles that would normally have been located during the first two months after spring emergence had not been found by 11 July.

The portion of the study site where attacks occurred includes stretches of about 100 m and 300 m of two first-order streams ca. 75 m upstream of their confluence, which is in turn about 1.6 km distant from a small river. Undamaged turtles were found both upstream of the 100 m section (1, about 3 km) and downstream (5, about 0.4 km) of the confluence, indicating that this was a localized predation event. Otters (*Lutra canadensis*) are implicated from scats and prints in the area, and the fact that the turtles were submerged in up to 1.5 m of water. The hibernating turtles are often exposed on the bottom, frequently wedged between rocks, among woody debris, or among roots in the banks, which would make them easy prey for an underwater predator. Episodic otter predation upon hibernating Snapping Turtles (*Chelydra serpentina*) has been noted by Brooks et al. (1991. *Can. J. Zool.* 69:1314–1320), Park (1971. *The World of the Otter*. J. P. Lippincott Co., New York), and Surface (1908. *Zool. Bull. Div. Zool.*, Pennsylvania Dept. Agric. 6:105–196), indicating that otters are capable of locating and killing hibernating turtles. In the case of Snapping Turtles, otters typically remove them from the water and eviscerate them ventrally, where the reduced plastron makes these turtles vulnerable. We speculate that the otters also removed the Wood Turtles from their hibernacula and took them to the stream banks (one of the three known fatalities was located on a stream bank), but were in most cases unable to do more than mutilate one or two limbs. The abandoned turtles would then have returned to the water.

Submitted by **DAVID M. CARROLL**, Box 63, Warner, New Hampshire 03278, USA; and **GORDON R. ULTSCH**, Department of Biological Sciences, University of Alabama, Tuscaloosa, Alabama 35487, USA (e-mail: Gultsch@biology.as.ua.edu).

HOMOPUS SIGNATUS (Speckled Padloper). **MAXIMUM MALE SIZE.** *Homopus signatus* is considered the world's smallest tortoise species. In the nominate subspecies *Homopus s. signatus* average straight-line carapace lengths (SLCL) of 87.9 mm for females ($N = 35$) and 77.9 mm ($N = 36$) for males have been reported (Loehr 2002. *J. Herpetol.* 36:378–389). The largest

specimen recorded was a female with a SLCL of 110 mm; the largest male reported had a SLCL of 89.5 mm and a body mass of 113.0 g (Loehr, *op. cit.*). The southern subspecies *Homopus signatus cafer* is reportedly somewhat smaller. The SLCL range is 69.9–79.8 mm in males and 83.8–95.7 mm in females (Boycott 1986. *J. Herpetol. Assoc. Afr.* 32:10–16).

On 14 October 2004 we found a male *Homopus signatus cafer* hiding in a rock crevice in the vicinity of Lambertsbaai, South Africa. The SLCL was 93.0 mm, the straight-line plastron length was 71.9 mm, the maximum shell width was 66.2 mm, and the maximum shell depth was 35.1 mm. The body mass of the male was 128.2 g.

Submitted by **FABIAN A.C. SCHMIDT**, J.W. Goethe-University, Institute of Zoology, Department of Metabolic Physiology, Siesmayerstr. 70 D-60323 Frankfurt am Main, Germany (e-mail: fasmid@stud.uni-frankfurt.de); and **KOBUS ENGELBRECHT**, P.O. Box 110, Lambertsbaai 8130, South Africa.

KINOSTERNON SUBRUBRUM SUBRUBRUM (Eastern Mud Turtle). **PREDATOR ESCAPE.** Known avian predators of *Kinosternon subrubrum* include crows and eagles (Ernst et al. 1994. *Turtles of the United States and Canada*, Smithsonian Inst. Press, Washington, DC; Mitchell 1994. *The Reptiles of Virginia*, Smithsonian Inst. Press, Washington, DC). Bald Eagles (*Haliaeetus leucocephalus*) are opportunistic foragers capable of exploiting a wide range of prey taxa (Buehler 2000. *In* A. Poole and F. Gill [eds.], *The Birds of North America*, No. 506, pp. 1–40. *The Birds of North America*, Inc., Philadelphia, Pennsylvania). Turtles have been documented as regular but uncommon prey primarily within the eastern portion of their breeding range (e.g., Bendell 1959. *Can. Field Nat.* 73:131–132; Broley 1947. *Wilson Bull.* 59:3–20; Ganier 1951. *Migrant* 22:37–39). Quantitative analyses of diets show that turtles account for < 2% of overall prey items taken by Bald Eagles (e.g., McEwan and Hirth 1980. *Condor* 82:229–231; Hunt et al. 2002. *J. Raptor Res.* 36:245–255). However, within the Chesapeake Bay, turtle shells are found with some regularity under eagle nests. An evaluation of prey remains collected from nest sites throughout the Chesapeake Bay over a five-year period documented the use of five turtle species (Clark 1981. *J. Field Ornithol.* 53:49–51). How eagles capture and consume these turtles is poorly understood, and we do not know if predation attempts are always successful. We observed predation of four turtle species during video monitoring of eighteen Bald Eagle nests in eastern Virginia during 2002 to 2003 (Markham and Watts, unpubl. data). Here we report on how one *K. subrubrum* escaped from attempted predation by this raptor.

During one observation on 17 April 2003 at an eagle nest on the York River, Virginia, an adult female eagle brought an adult *K. subrubrum* to her nest at 1114 h EST. She attempted several times to insert her beak enough between the plastron and carapace to grab onto the turtle's flesh. Attempts were made anteriorly and posteriorly over a period of 1 min 40 sec after which she abandoned the turtle and left it lying on its back. Sixty-nine minutes later the turtle turned over and walked to the edge of the nest and fell to the ground.

These observations document that at least some *K. subrubrum* brought to Bald Eagle nests can survive attempted predation. The

hinged plastron, the ability of this species to close up its shell or nearly so, and shell thickness prevented the eagle from being able to extract flesh with her beak. We suspect that Eastern Box Turtles (*Terrapene carolina*), with their ability to close their shells completely, are seldom found in eagle nests. Turtles of other species without this characteristic (e.g., *Chrysemys picta*, *Sternotherus odoratus*) are much less likely to survive predation from this large avian predator.

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Submitted by **JOSEPH C. MITCHELL**, Department of Biology, University of Richmond, Richmond, Virginia 23173, USA (e-mail: jmitchel@richmond.edu); **A. CATHERINE MARKHAM** and **BRYAN D. WATTS**, Center for Conservation Biology, College of William and Mary, Williamsburg, Virginia 23187-8795, USA.

MACROCHELYS TEMMINCKII (Alligator Snapping Turtle). **FEEDING BEHAVIOR.** Observations of lingual luring in Alligator Snapping Turtles are common in captive specimens but apparently rare in the wild (Ernst et al. 1994. Turtles of the United States and Canada, Smithsonian Institution Press, Washington, DC. 578 pp.; Pritchard 1989. The Alligator Snapping Turtle: Biology and Conservation, Milwaukee Public Museum, Milwaukee, Wisconsin. 104 pp.). Herein, we provide an account of luring by an adult male Alligator Snapping Turtle in a clear-water, riverine environment. The turtle was observed by WRH on 21 September 2004 feeding (i.e., luring using its tongue appendage) at the bottom of the Eleven Point River in Randolph County, Arkansas, USA (N36.39383, W91.11433; NAD 27 CONUS) while we were scuba diving. The turtle was located in ca. 4 m of water and was positioned midstream on the gravel/bedrock interface, which is a typical characteristic of a lateral scour pool. Visibility was ca. 3 m, and the water temperature was 20°C. (The discharge rate was approximately 1000 ft³/sec—USGS, Ravenden Springs reporting station.) The turtle's head was facing directly upstream with mouth gaping. The ventral portion of his body was resting partially on bedrock and partially on cobble/gravel; one set of his posterior claws was embedded into the gravel, and the other set was grasping to secure a hold on the bedrock. The anterior claws were positioned in a similar manner. The carapace was completely exposed, yet was well camouflaged within the surrounding substrate.

The turtle was captured by hand by WRH and was taken to the herpetology lab at Arkansas State University for photographing and processing. This turtle had a mass of 14.1 kg, a straight-line carapace length of 37.3 cm, a pre-anal tail length of 10.4 cm, and a post-anal tail length of 29.0 cm. An encrypted (AVID® Identification Systems, Inc., Norco, California) PIT (passive integrated transponder) tag was implanted within the dorsal musculature of the tail. The turtle was released back into the river at the point of capture on 23 September 2004.

Submitted by **WAYLON R. HILER**, Department of Biological Sciences, Arkansas State University, P. O. Box 599, State University, Arkansas 72467, USA (e-mail: waylon.hiler@smail.astate.edu); **BENJAMIN A. WHEELER**, Environmental Sciences Ph.D. Program, Arkansas State University, P.O. Box 847, State University, Arkansas 72467, USA (e-mail: bwheeler@astate.edu); and **STANLEY E. TRAUTH**, Department of Biological Sciences, Arkansas State University, P.O. 599, State University, Arkansas 72467, USA (e-mail: strauth@astate.edu).

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ANNIELLA PULCHRA PULCHRA (Silvery Legless Lizard). **HABITAT.** Except for a questionable account from Redwood Canyon, Marin County (Rivers 1902. Bull. So. California Acad. Sci. 1:27; Jennings and Hayes 1994. Amphibians and Reptile Species of Special Concern in California. California Department of Fish and Game, Rancho Cordova, California. 255 pp.), the range of *Anniella pulchra pulchra* is known to extend north to the south bank of the San Joaquin River, California, along the river's downstream approach to the San Francisco Bay Delta. Although the species is known to occur in the dunes at the Antioch Dunes National Wildlife Refuge, the East Bay Regional Park District Legless Lizard Preserve, and at scattered locations throughout Antioch, Oakley, and Brentwood, Contra Costa County, little has been published on its habitat requirements in this region beyond the treatment of Miller (1944. Ecol. Monogr. 14:271–289) and the species overview in Jennings and Hayes (*op. cit.*). As both a California Species of Special Concern and a Federal Species of Concern, more complete information on habitat conditions at the northern end of its range are needed. Hence, we help fill that gap with a report of the recent occurrence of 19 individuals in the Antioch/Oakley area, and describe a heretofore undescribed vegetation community—Oakley sand stabilized interior dunes—within which we have recorded this species.

On 28 January 2004, during herpetofaunal surveys of a 2.71-ha portion of sand dune ca. 2.4 km E of the City of Oakley, we found a single *A. p. pulchra* beneath a piece of 0.6 × 1.8 m corrugated sheet metal. A follow-up visit on 29 January 2004 revealed a second *A. p. pulchra* ca. 90 m north of the first sighting beneath a pile of ca. 15 pieces of similarly sized corrugated sheet metal. Also observed on this occasion were a *Coluber mormon* and a *Pituophis catenifer catenifer* between sheets situated higher in the pile. In both these cases, *A. p. pulchra* was observed above ground (i.e., not buried within the sandy substrate) between the substrate-cover interfaces, but each was quick to burrow into the sandy substrate when exposed.

At this same dune, focused follow-up surveys were conducted on 28–29 June and again on 26 July 2004. Focused surveys consisted of excavating target areas with habitat components thought to be important to *Anniella* (e.g., sandy soils in proximity to trees and shrubs and associated leaf litter; see Miller, *op. cit.*) and sifting the sands with a hand cultivator tool. Excavations reached depths of up to 60 cm and were generally confined within the drip-line of trees and consisted of trenches that extended up to 6 m from the trunks. We encountered 11 more *A. p. pulchra* at depths between 15 and 30 cm, typically close to the horizon between