Investigations of the Ecology of
Graptemys versa and Pseudemys texana
in Southcentral Texas.
Linnaeus Fund Research Report

PETER V. LINDEMAN

1Department of Biology and Health Services,
150 Cooper Hall, Edinboro University of Pennsylvania,
Edinboro, Pennsylvania, 16444 USA
[Fax: 814-732-2593; E-mail: plindeman@edinboro.edu]

Ernst et al. (1994) published an exhaustive compendium of literature citations for the chelonian fauna of North America. Perusal of species accounts with regard to text length and the number of cited ecological works reveals that two of the most neglected species with regard to ecological study are partially sympatric: the Texas map turtle, Graptemys versa, and the Texas river cooter, Pseudemys texana. Graptemys versa is endemic to the Colorado River system of Texas, while P. texana is found in the Brazos, Colorado, Guadalupe, San Antonio, and Frio drainages of Texas (Iverson, 1992; Lindeman et al., 1999). The two species are syntopic in the South Llano River, the southernmost tributary of the Colorado drainage.

A study of diet, life history, and habitat use was initiated on the South Llano River in 1998. In addition, dissection of 21 G. versa collected from the river in 1999 and housed in the Strecke Museum (Baylor University) supplements the dietary and life-history data, and will eventually allow a comparison of these attributes from before and after invasion of the habitat by the Asian clam (Corbicula fluminea), which was first recorded in Texas rivers in 1972 (McMahon, 1982).

Methods. — During May 1998 and May 1999, turtles were captured in the South Llano River south of Junction, Texas, using fykenets (Vogt, 1980), basking traps (MacCulloch and Gordon, 1978), wading, and snorkeling. The South Llano River is a clear, spring-fed river with alternating riffles and pools. Stomach flushing and collection of feces were used to obtain dietary samples. Clutch sizes and egg sizes of gravid females were determined using a combination of radiography (Gibbons and Greene, 1979) and injection with oxytocin (Ewert and Legler, 1978). Midline plastron length (PL) was measured and turtles were marked (Cagle, 1939) and released at the site of capture.

Life History. — Mature male G. versa ranged from 57–79 mm PL (mean 65.7 mm, n = 31). Female G. versa ranged from 59–163 mm PL (mean 110.0 mm, n = 31). The minimum size of females determined to be gravid by palpation or dissection was 115 mm PL and the mean size of females this size or larger was 136.5 mm PL (n = 21). Clutch size of 13 females (nine X-rays from 1999 and four sets of oviductal eggs from dissected museum specimens) averaged 5.6 eggs (range 4–9 eggs). Average egg dimensions for 32 eggs obtained by oxytocin injection were 35.26 mm for length (range 33.0–38.4 mm) and 20.87 mm for width (range 18.4–22.2 mm).

Mature male P. texana ranged from 78–162 mm PL (mean 122.2 mm, n = 62). Female P. texana ranged from 95–234 mm PL (mean 178.8 mm, n = 54). The minimum size of gravid females was 213 mm PL and the mean size of females this size or larger was 222.6 mm PL (n = 13). Clutch size of four females radiographed in 1999 averaged 8.3 eggs (range 7–9 eggs). Average egg dimensions for 23 eggs obtained by oxytocin injection were 42.19 mm for length (range 39.9–44.7 mm) and 26.96 mm for width (range 26.0–27.6 mm).

Diet. — Mollusks were abundant in the diet of 12 female G. versa from 1949 and 16 females captured in 1998–99. Insects were abundant in the diet of male G. versa (which are much smaller than females, as in other Graptemys; Ernst et al., 1994); in 1998–99, 25 males fed predominantly on soft-bodied aquatic invertebrates, especially trichopteran larvae, and 7 dissected males from 1949 also yielded aquatic insect remains.

Graptemys versa has previously been regarded as a "narrow-headed" map turtle (Bertl and Killebrew, 1983; Ernst et al., 1994), which would imply a presumed diet of algae and soft-bodied invertebrates, with few mollusks, based on the diets of other Graptemys with narrow heads and narrow alveolar surfaces of the jaws (Ernst et al., 1994; Lindeman, 2000). Scant dietary data suggest a predominance of invertebrates in juveniles (Bertl and Killebrew, 1983), although gastropod mollusks were reported in the feces of a female of record body size (Kittirian et al., 1990). Measurements of head width in all 12 species of the genus have revealed moderately broad head widths in adult female G. versa, making them comparable to G. geographica, G. pseudogeographica kohnnii, and G. caglei, all of which are species in which females are moderately to nearly exclusively mollusivoruous (Lindeman, 2000).

Stomach contents of 60 P. texana captured in 1998–99 were composed primarily of leaves and algae, and also contained ephemeropteran larvae, aggregate fruits, and sponges. The only published account of diet in P. texana is an assertion that dissected specimens fed almost exclusively on mollusks (Strecke, 1927), although herbivory is the rule in other species of Pseudemys (Ernst et al., 1994). Strecke (1927) may have confused a mollusivoruous Graptemys such as G. versa, G. caglei, or G. pseudogeographica kohnnii with P. texana.

Ongoing Research. — Habitat use of G. versa appears to differ sexually, as has been reported for other species of Graptemys (e.g., Pluto and Bellis, 1986; Craig, 1992; Jones, 1996). One objective of continuing field work is to use data from small females to determine whether sexual differences in habitat can be attributed to dietary differences or body size differences. In addition, growth of G. versa is being studied with the objective of comparing its growth parameters in nonlinear models with those of congeners (Lindeman, 1999). Finally, acanthocephalan parasites were recovered from dissected G. versa specimens taken in 1949, and were
abundant in some specimens. An investigation of how sexual differences in diet influence parasite load is nearing completion.

Acknowledgments. — I thank Tara Allen, Damien Edwards, Julia Lovell, and Lake Lovell for their assistance in the field during 1999. David Lintz of the Strecker Museum graciously allowed me to dissect specimens from 1949, and Bryce Brown shared his field notes with me regarding those collections. Cindy Skaggs volunteered her time to radiograph turtles, and Martha Richardson and Bill Darbon were gracious hosts during our stay at the Texas Tech Center in Junction, Texas. Field work in 1998 and a visit to the Strecker Museum were supported by a Linnaeus Fund Turtle Research Award.

LITERATURE CITED


Received: 5 May 2000
Reviewed: 13 March 2001
Revised and Accepted: 30 March 2001